ADTRAN

Bid Contact **Karen Strickhouser**
rick.schansman@adtran.com
Ph 256-963-6079

Address **901 Explorer Boulevard**
Huntsville, AL 35806

Bid Notes **Please note that the response file attached has been updated from the version that was sent hardcopy to the evaluation team. The changes are as follows:**
Section 5.2.4 Product Listing - 7 items were removed.
Section 5.2.4 Product Listing - the text for the AOE management system was changed.
If you have any questions, or issues with the response attachments, please contact Karen Strickhouser at 256.963.6079, or karen.strickhouser@adtran.com.
Thank You

Item #	Line Item	Notes	Unit Price	Qty/Unit	Total Price	Attch.	Docs
JP14001--01-01	JP14001 - Data Communications Products & Services	**Supplier Product Code:** **Supplier Notes:** ADTRAN Response Number 121342181. ADTRAN is proud to present the attached response documents for the WSCA-NASPO Data Communications Products & Services RFP # JP14001. If you have any questions, or issues with the response attachments, please contact Karen Strickhouser at 256.963.6079, or karen.strickhouser@adtran.com. Thank You	**First Offer -**	1 / contract		**Y**	**Y**

Supplier Total **$0.00**

ADTRAN

Item: **JP14001 - Data Communications Products & Services**

Attachments
State of Utah-WSCA-NASPO Supplier Response Form.pdf
ADTRAN Response No. 121342181 DG1400_-_Data_Com_RFP_FINAL_Document_-_Posting_7.1.2013.doc
ADTRAN Table of Contents.doc
Appendix A - Exceptions to WSCA Contract Terms.docx
Appendix B - ADTRAN_2012_Annual_Report.pdf
Appendix C Section 5.2.4 Supporting Docs.pdf
Appendix C Section 5.2.5 Supporting Docs.pdf
Appendix C Section 5.2.8 Supporting Docs.pdf
Appendix C Section 5.2.9 Supporting Docs.pdf
Appendix C Section 5.3.0 Supporting Docs.pdf
Appendix C Section 5.3.1 Supporting Docs.pdf
ADTRAN WSCA JP14001 Price List - No. 121342181.xls
SOLICITATION JP14001 Cost Schedule.doc

State of Utah
Request for Proposal

Legal Company Name (include d/b/a if applicable)	Federal Tax Identification Number	State of Utah Sales Tax ID Number	
ADTRAN, Inc.	63-0918200	12055930-004-STC	
Ordering Address: Authorized Reseller/Distributor	City	State	Zip Code
Remittance Address (if different from ordering address): Authorized Reseller/Distributor	City	State	Zip Code
Type Corporation ☐ Partnership ☐ Proprietorship ☐ Government ☐	Company Contact Person: Darrell Rogers		
Telephone Number (include area code): 970.482.2216	Fax Number (include area code): 970.482.2216		
Company=s Internet Web Address: www.adtran.com	Email Address: Darrell.Rogers@adtran.com		
Discount Terms (for bid purposes, bid discounts less than 30 days will not be considered): Net 30 Days	Days Required for Delivery After Receipt of Order (see attached for any required minimums): Dependent on product and volume.		

The undersigned certifies that the goods or services offered are produced, mined, grown, manufactured, or performed in Utah. Yes ☐ No ☒. If no, enter where produced, etc.
Huntsville, AL/China/Taiwan/Vietnam

Offeror=s Authorized Representative=s Signature	Date
Rick Schansman	August 27, 2013
Type or Print Name: Rick Schansman	Position or Title: Senior VP & General Manager EN Division

ADTRAN Response No. 121342181
WSCA-NASPO Data Communications Services Solicitation # JP14001

REQUEST FOR PROPOSAL
DATA COMMUNICATIONS PRODUCTS AND SERVICES CONTRACT
Solicitation # JP14001 Revised 5/30/2013

Section 1: WSCA-NASPO Solicitation General Information

1.1 Purpose of Request for Proposal (RFP)

The State of Utah, Division of Purchasing is requesting proposals in conjunction with WSCA-NASPO Cooperative Purchasing Organization, LLC (WSCA-NASPO). The purpose of this request for proposal is to establish master agreements with qualified manufacturers to provide Data Communications products and services outlined in the specifications for all participating States. The services resulting from the award of this solicitation are to be available to all state entities, cities, counties, higher education, school districts and other political subdivisions on an as needed basis under the same pricing and terms and conditions agreed to in the Master Agreement.

It is anticipated that this RFP may result in Master Agreement awards to multiple contractors.

While the primary purpose of this solicitation is to select a proposer(s) who can offer the Products or Services for all Participating States, proposers are permitted to submit a proposal on more limited geographical areas, but not less than one entire Participating State. Proposers must clearly describe the geographical limits (e.g. by State name) if proposing a geographical area less than that of all Participating States. However, if a proposer elects to submit a Proposal for a single State then the proposer must be willing to supply the entire State and will not be allowed to add additional States following award or at any time during the term of the contract or any renewals.

A Participating State may evaluate and select a proposer for award in more limited geographical areas (e.g. A single state) where judged to be in the best interests of the State or States involved.

Each participating entity shall select the authorized contractor(s) they choose to do business with during the participating addendum process. A participating entity may require the authorized contractor(s) to submit additional information regarding their firm as part of the selection process during the execution of a participating addendum. This information could include, but is not limited to; partners or resellers approved under their PA, business references, number of years in business, technical capabilities, and the experience of both their sales and installation personnel.

Each participating entity has the option to select one or more product categories or services from the resulting Master Agreement(s) during the execution of the participating addendum process.

Each participating entity has the option to negotiate an expanded product line within the product category offering and within the scope of this RFP during the Participating Addendum process. Any additional incremental discounts available to a Participating Entity, if offered, may be provided at the discretion and as the sole legal obligation of the Contract provider or their Authorized Sub-Contractor to the Participating Entity and negotiated during the Participating Addendum process. All Participating entities have the right to put dollar limits and certain line item, parts or on the total amount purchased per occasion on their individual PA's as they deem appropriate.

The resulting Master Agreement will be awarded with the understanding and agreement that it is

for the sole convenience of the participating entities. The participating entities reserve the right to obtain like goods or services from other sources when necessary.

This RFP is designed to provide interested proposers with sufficient basic information to submit proposals meeting minimum requirements, but is not intended to limit a proposal's content or exclude any relevant or essential data. Suppliers are encouraged to expand upon the specifications to evidence service and capability.
ADTRAN has read and understands Section 1.1. ADTRAN confirms that it is proposing product and services for all participating states.

1.2 WSCA-NASPO Background Information

WSCA-NASPO is a cooperative purchasing organization of all 50 states, the District of Columbia and the organized US territories. WSCA-NASPO is a subsidiary of the National Association of State Procurement Officials (NASPO). NASPO is a non-profit association dedicated to strengthening the procurement community through education, research, and communication. It is made up of the directors of the central purchasing offices in each of the 50 states, the District of Columbia and the territories of the United States. For more information consult the following websites www.wsca-naspo.org and www.naspo.org

Obligations under master agreements that result from this cooperative procurement are limited to those states and other eligible entities that execute a Participating Addendum:

63G-6a-2105. Participation of a public entity or a procurement unit in agreements or contracts of procurement units -- Cooperative purchasing -- State cooperative contracts.

> (2) A public entity may obtain a procurement item from a state cooperative contract or a contract awarded by the chief procurement officer under Subsection (1), without signing a participating addendum if the quote, invitation for bids, or request for proposals used to obtain the contract includes a statement indicating that the resulting contract will be issued on behalf of a public entity in Utah.

Financial obligations of Participating States (Entities) are limited to the orders placed by the departments, agencies and institutions of that Participating State (Entity) having legally available funds. Participating States incur no financial obligations on behalf of its political subdivisions, other governmental entities or other eligible entities.

Unless otherwise specified in the solicitation or a Participating Addendum, the resulting master price agreement(s) will be permissive.

This RFP is designed to provide interested Offerors with sufficient basic information to submit proposals meeting minimum requirements, but is not intended to limit a proposal's content or exclude any relevant or essential data. Proposals must be succinct, concise, and as short as possible to allow for efficient evaluation. Blanket marketing material and unnecessary elaborate brochures or representations beyond what is sufficient to present a complete and effective proposal are not acceptable.

Offerors must respond to any or all of the 12 categories that follow. The following product and service categories are included in this RFP:

1. Data Center Application Services
2. Networking Software
3. Network Management and Automation

4. Network Optimization and Acceleration
5. Optical Networking
6. Routers
7. Security
8. Storage Networking
9. Switches
10. Wireless
11. Unified Communications
12. Services

ADTRAN has read and understands Section 1.2. ADTRAN confirms that Item 3 (Network Management and Automation) was removed from the list of categories available for bid on this contract (Referencing Addendum 1).

1.3 Objective

The objective of this RFP is to obtain deeper volume price discounts than are obtainable by an individual state or local government entity. This discount is based on the collective volume of potential purchases by the numerous state and local government entities. The savings realized by the contractor in managing one comprehensive WSCA-NASPO Master Agreement rather than numerous state and local contracts should result in the most attractive service level and discounts available in the marketplace.

The Master Agreement(s) resulting from this procurement may be used by state governments (including departments, agencies, institutions), institutions of higher education, political subdivisions (i.e., colleges, school districts, counties, cities, etc.), and other eligible entities subject to approval of the individual state procurement director and local statutory provisions.

Participation by political subdivisions, other government entities and other eligible participants is with the authorization or acknowledgement of the specific state chief procurement official, and the execution of a Participating Addendum.
ADTRAN has read and understands Section 1.3.

1.4 Solicitation Background

This is a rebid for the current for the WSCA-NASPO Data Communications Equipment, Supplies and Services contracts. Eight (8) Manufacturers currently have Master Contracts to provide Data Communications Equipments, Supplies and Services. They are as follows:

Alcatel-Lucent – AR1466
Brocade Communications – AR214
Cisco Systems – AR233
Enterasys Networks, Inc. – AR1471
Extreme Networks – AR1471
Hewlett-Packard - AR1464
Juniper Networks – AR229
Meru Networks – AR218

Although the State of Utah and WSCA-NASPO does not guarantee any usage or spend under these contracts, for bid purposes only, the total combined spend on these contracts for 2012 was $204 million dollars.
ADTRAN has read and understands Section 1.4.

ADTRAN Response No. 121342181
WSCA-NASPO Data Communications Services Solicitation # JP14001

1.5 Issuing Office and Solicitation Number

The State of Utah, Division of Purchasing is the issuing office for this document and all subsequent addenda relating to it. The reference number for the transaction is Solicitation # JP14001. This number must be referred to on all proposals, correspondence, and documentation relating to the RFP.
ADTRAN has read and understands Section 1.5.

1.6 WSCA-NASPO Contract Administrator

The WSCA-NASPO Contract Administrator designated by WSCA-NASPO and the State of Utah, Division of Purchasing and General Services is:

Name: Jennifer Porter
State of Utah Division of Purchasing and General Services
State Office Building, Capitol Hill
Room 3150
Salt Lake City, UT 84114-1061
Email: jenniferporter@utah.gov
Phone: 801-538-3064
Fax: 801-538-3882

ADTRAN has read and understands Section 1.6.

1.7 Proposal Submittal

Offers must be received, according to instructions, by the posted due date and time. Offers received after the deadline will be non-responsive.

Proposals are due August 30, 2013 at 11:00 am MST

Questions will be accepted until July 26, 2013 at 11:00 am MST

Data Communication RFP Release Webinar is scheduled for July 11, 2013. Webinar details will be posted on the WSCA-NASPO website (www.wsca-naspo.org).

The preferred method of submitting your original 'master' proposal packet is electronically in Microsoft Word and Excel through BidSync, (www.bidsync.com), or you may mail or drop off your hard copies to the address noted in Section 1.6 of this RFP on or before the due date and time. The original 'master' proposal packet shall include a separate document or sealed envelope labeled "SOLICITATION # JP14001 Cost Schedule" that contains the pricing document. Please note that the State of Utah Division of Purchasing office is closed on Saturday and Sunday and therefore does not accept deliveries on those days.

When submitting an offer electronically through BidSync, please allow sufficient time to complete the online forms and upload documents. The solicitation will end at the closing time listed in the offer. If you are in the middle of uploading your documents at the closing time, the system will stop the process and your offer will not be received by the system. It is recommended that the submission process be completed the day prior to the due date, with the knowledge that any changes/updates will be accepted through the due date and time.

Electronic offers may require the uploading of electronic attachments. BidSync's site will accept a wide variety of document types as attachments. However, the submission of documents

containing embedded documents (zip files), mov, wmp, and mp3 files are prohibited. All documents should be attached as separate files.

BidSync customer support may be contacted at (800) 990-9339 for guidance on the BidSync site.

Respondents are responsible for ensuring that their BidSync registration information is current and correct. The State of Utah accepts no responsibility for missing or incorrect information contained in the vendor registration in BidSync. Incorrect or missing vendor registration information may result in failure to receive notification from BidSync regarding this procurement.

In addition to the original 'master' proposal packet submission, Respondents are required to send one (1) hard copy and one (1) electronic version (Microsoft Word and Excel) of the complete proposal, **excluding pricing information**, to each of the evaluation team members listed below. Each proposal packet shall be marked with the solicitation number and be in accordance with the submittal requirements. The original 'master' sent to the WSCA-NASPO Master Agreement Administrator identified in Section 1.6 of this RFP will prevail in resolving any discrepancies.

Alaska – Ted Fawcett
Contracting Officer
ted.fosket@alsaka.gov

California - Bonnie Bahnsen
bonnie.bahnsen@dgs.ca.gov

Nevada – Marti Marsh
Purchasing Officer
mmarsh@admin.nv.gov

New Jersey – Vicente Azarcon
Procurement Specialist
vicente.azarcon@treas.state.nj.us

Utah – Jennifer Porter
Purchasing Agent
State of Utah
jenniferporter@utah.gov

ADTRAN has read and understands Section 1.7. ADTRAN notes that physical addresses for delivery of the evaluation packet (minus pricing) have been provided in the Q&A results posted on the BidSync site.

1.8 Current State Participants

The States currently participating in the existing contracts are: Alaska, Arkansas, California, Colorado, Delaware, District of Columbia, Hawaii, Idaho, Iowa, Kentucky, Louisiana, Minnesota, Missouri, Montana, Nevada, New Jersey, Oklahoma (Grand River Dam Authority), Oregon, South Dakota, Utah, Washington, Wisconsin and Wyoming.

States with "Intent to Participate" – The following states have executed an Intent to Participate thru WSCA-NASPO, which simply indicates that they want to be formally listed in the published Request for Proposal as participating in the solicitation process: California, Hawaii, Minnesota, Missouri, Montana, Nevada, New Jersey, South Carolina, South Dakota, Utah, Vermont and Washington. All 56 NASPO members are eligible to participate in all WSCA-NASPO contracts

when and if they decide they want to, in accordance with their individual statutory requirements.
ADTRAN has read and understands Section 1.8.

1.9 Governing Laws and Regulations

This procurement is conducted by the State of Utah, Division of Purchasing & General Services, in accordance with the Utah Procurement Code. These are available at the Internet website www.purchasing.utah.gov for the State of Utah's Division of Purchasing & General Services.

The laws of the State of Utah will govern all Master Agreements that result from this procurement unless the Data Communications Products and Services Provider and participating entity agree in a Participating Addendum that the laws of another jurisdiction will govern purchases made by purchasing entities within the jurisdiction of the participating entity.
ADTRAN has read and understands Section 1.9.

1.10 Length of Contract

The Master Agreement(s) resulting from this RFP will be for a period of five years (initial term). The Master Agreement(s) may be extended beyond the original Master Agreement period for a two (2) year period, by mutual agreement.
ADTRAN has read and understands Section 1.10.

1.11 Pricing Structure

Pricing Structure: Pricing for the WSCA-NASPO Master Agreements shall be based on the Percent Discount off the current global MSRP Schedule applicable to United States customers.
ADTRAN has read and understands Section 1.11.

1.12 Price Guarantee Period

Price Guarantee Period: The Data Communication Provider's Discount rate shall remain in effect for the term of the WSCA-NASPO Master Price Agreement.
ADTRAN has read and understands Section 1.12.

1.13 Price Escalation

Equipment, Supplies and Services: Data Communications provider may update the pricing on their MSRP price list one time every year after the first year of the original contract term. The WSCA-NASPO Contract Administrator will review a documented request for a Price Schedule price list adjustment only after the Price Guarantee Period.
ADTRAN has read and understands Section 1.13.

1.14 Price Reductions

In the event of a price decrease in any category of product at any time during the contract in a Provider's Price Schedule, including renewal options, the WSCA-NASPO Contract Administrator shall be notified immediately. All Price Schedule price reductions shall be effective upon the notification provided to the WSCA-NASPO Master Agreement Administrator.
ADTRAN has read and understands Section 1.14.

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WSCA-NASPO Data Communications Services Solicitation # JP14001

1.15 Usage Reporting Requirement

All Data Communication Provider's will be required to provide quarterly usage reports to the WSCA-NASPO Contract Administrator or designee. The initiation and submission of the quarterly reports are the responsibility of the Data Communication Contract Provider. You are responsible to collect and report all sales data including your resellers and partners sales associated with your Master Agreement. There will be no prompting or notification provided by the WSCA-NASPO Contract Administrator.
Quarterly reports must coincide with the quarters in the fiscal year as outlined below:

Quarter #1: July 1 through September 30, due annually by October 30.
Quarter #2: October 1 through December 31, due annually by January 30.
Quarter #3: January 1 through March 31, due annually by April 30.
Quarter #4: April 1 through June 30, due annually by July 30.

Respondents must identify the person responsible for providing the mandatory usage reports. This contact information must be kept current during the Master Agreement period. The WSCA-NASPO Contract Administrator must be notified if the contact information changes. The contact information for the person responsible for the mandatory quarterly usage reporting must be specified per Section 3.1.5.

The purpose of the Master Agreement usage-reporting requirement is to aid in Master Agreement management. The specific report content, scope, and format requirements will be provided to the awarded Data Communications Products and Services Provider's during Master Agreement execution. Some WSCA-NASPO States may require additional reporting requirements. Those requirements will be addressed through the individual participating entity's Participating Addendum process. Failure to comply with this requirement may result in Master Agreement cancellation.
ADTRAN has read and understands Section 1.15. The ADTRAN contact that will be responsible for usage reporting is:

Darrell Rogers
Phone: 970 482-2216
Email: Darrell.Rogers@ADTRAN.com

1.16 Standard Contract Terms and Conditions

Any Master Agreement resulting from this RFP will include, but will not be limited to, the WSCA-NASPO Standard Master Agreement Terms and Conditions, the State of Utah Additional Terms and Conditions (Appendix A) and any additional terms and conditions specific to WSCA-NASPO participating addendums for participating entities. The WSCA-NASPO Master Agreement Terms and Conditions and State of Utah Additional Terms and Conditions will take highest precedence in any contract resulting from this solicitation. Vendors must clearly identify exceptions to the WSCA-NASPO Standard Master Agreement Terms and Conditions and the State of Utah Additional Terms and Conditions in the bid submission. Vendor exceptions must include proposed solution language. Failure to submit exceptions and/or solution language will constitute vendor acceptance of WSCA-NASPO and State of Utah Additional Terms and Conditions. No third party terms and conditions will be allowed in resulting contracts awarded under this solicitation. Additional vendor terms and conditions must be submitted with the solicitation bid response for legal review and contract applicability. Submission of vendor terms and conditions with a bid response does not guarantee acceptance. Vendor terms and condition will not include any reference to website URLs that house additional terms and conditions. All terms and

conditions associated with resulting contracts will be identified and attached to the WSCA-NASPO Master Agreement. The State of Utah reserves the right to accept, reject, and/or negotiate vendor terms and conditions after the award(s) have been made if it is in the best interest of the State of Utah. Participating States reserve the right to negotiate vendor terms and conditions during the Participating Addendum process. Vendor terms and conditions included with a bid response are limited to a maximum of 10 pages ($8^{1/2}$ x 11 inch paper, 10 pt Arial font, and single sided). Failure to adhere to these terms and conditions requirements may result in vendor disqualification.
ADTRAN has read and understands Section 1.16. Exceptions to the stated Terms and Conditions are detailed in Appendix A of this response.

1.17 Questions

All questions must be submitted through BidSync. Answers will be given via the BidSync website. Questions received after the Question/Answer period will not be answered. No agency employee, board member, or evaluation committee member should be contacted concerning this solicitation during the solicitation posting and selection process. Failure to comply with this requirement may result in vendor disqualification.
ADTRAN has read and understands Section 1.17.

1.18 Discussions with Respondents (Oral Presentation)

An oral presentation by a Respondent to clarify a proposal may be required at the sole discretion of the WSCA-NASPO Master Agreement Administrator. However, the WSCA-NASPO Contract Administrator may award a Master Agreement based on the initial proposals received without discussion with the Respondent. If oral presentations are required, they will be scheduled after the submission of proposals. Oral presentations will be made at the Respondents expense.
ADTRAN has read and understands Section 1.18.

1.19 Protected Information

The Government Records Access and Management Act (GRAMA), Utah Code Ann., Subsection 63-2-304, provides in part that:

> the following records are protected if properly classified by a government entity:
> (1) trade secrets as defined in Section 13-24-2 if the person submitting the trade secret has provided the governmental entity with the information specified in Section 63-2-308 (Business Confidentiality Claims);
> (2) commercial information or non-individual financial information obtained from a person if:
> (a) disclosure of the information could reasonably be expected to result in unfair competitive injury to the person submitting the information or would impair the ability of the governmental entity to obtain necessary information in the future;
> (b) the person submitting the information has a greater interest in prohibiting access than the public in obtaining access; and
> (c) the person submitting the information has provided the governmental entity with the information specified in Section 63-2-308;
> * * * * *
> (6) records the disclosure of which would impair governmental procurement proceedings or give an unfair advantage to any person proposing to enter into a contract or agreement with a governmental entity,

> except that this Subsection (6) does not restrict the right of a person to see bids submitted to or by a governmental entity after bidding has closed; ....

GRAMA provides that trade secrets, commercial information or non-individual financial information may be protected by submitting a Claim of Business Confidentiality.

To protect information under a Claim of Business Confidentiality, the Respondent must:

1. provide a written Claim of Business Confidentiality at the time the information (proposal) is provided to the State, and
2. include a concise statement of reasons supporting the claim of business confidentiality (Subsection 63-2-308(1)).
3. submit an electronic "redacted" (excluding protected information) copy of your proposal response. Copy must clearly be marked "Redacted Version." Failure to submit a redacted version may result in release of your entire proposal.

A Claim of Business Confidentiality may be appropriate for information such as client lists and non-public financial statements. **Pricing and service elements cannot be protected**. **An entire proposal cannot be protected under a Claim of Business Confidentiality or Propritary. Failure to comply with this requirement many result in your proposal being ruled Non-Responsive** and no longer considered**.** The claim of business confidentiality must be submitted with your proposal on the form which may be accessed at:
www.purchasing.utah.gov/contract/documents/confidentialityclaimform.doc

To ensure the information is protected, the Division of Purchasing asks the Respondent to clearly identify in the Executive Summary and in the body of the proposal any specific information for which a Respondent claims business confidentiality protection as "PROTECTED".

All materials submitted become the property of the State of Utah. Materials may be evaluated by anyone designated by the State as part of the sourcing team. Materials submitted may be returned only at the State's option.
ADTRAN has read and understands Section 1.19.

1.20 WSCA Administrative Fee

The Contracted Supplier must pay a WSCA-NASPO administrative fee of one quarter of one percent (.025%) in accordance with the terms and conditions of the contract. The WSCA-NASPO administrative fee shall be submitted quarterly and is based on the actual sales of all products and services in conjunction with your quarterly reports. The WSCA-NASPO administrative fee must be included when determining the pricing offered. The WSCA-NASPO administrative fee is not negotiable and shall not be added as a separate line item on an invoice.

Additionally, some WSCA-NASPO participating entities may require that an administrative fee be paid directly to the WSCA-NASPO participating entity on purchases made by purchasing entities within that State. For all such requests, the fee percentage, payment method and payment schedule for the participating entity's administrative fee will be incorporated in the Participating Addendum. Data Communications Provider will be held harmless, and may adjust (increase) the WSCA-NASPO Master Agreement pricing by the fee percentage for that participating entity accordingly for purchases made by purchasing entities within the jurisdiction of the State. All such agreements may not affect the WSCA-NASPO fee or the prices paid by the purchasing entities outside the jurisdiction of the participating entities requesting the additional fee.
ADTRAN has read and understands Section 1.20. ADTRAN confirms that the Q&A has clarified the fee amount to be .25%.

1.21 Interest

Any payments that a Contracted Supplier makes or causes to be made to WSCA-NASPO after the due date as indicated on the Quarterly Report schedule shall accrue interest at a rate of 18% per annum or the maximum rate permitted by law, whichever is less, until such overdue amount shall have been paid in full. The right to interest on late payments shall not preclude WSCA-NASPO from exercising any of its other rights or remedies pursuant to this agreement or otherwise with regards to Data Communication Provider's failure to make timely remittances.
ADTRAN has read and understands Section 1.21.

1.22 Proposal Offer Firm

Responses to this RFP, including proposed discounts offered will be considered firm for one hundred and sixty (160) days after the proposal due date. By signature (electronic or otherwise) and submission of a proposal, the person signing verifies that they are authorized to submit the proposal and bind the firm to provide the products/services in the proposal and potential Master Agreement.
ADTRAN has read and understands Section 1.22.

1.23 Cancellation of Procurement

This RFP may be canceled at any time and any and all proposals may be rejected in whole or in part when the State of Utah, Division of Purchasing and General Services determines such action to be in the best interest of the State of Utah.
ADTRAN has read and understands Section 1.23.

1.24 Right to Waive

The sourcing team reserves the right to waive minor irregularities at its sole discretion.
ADTRAN has read and understands Section 1.24.

1.25 Right to Accept All or Portion

It is our intent to accept the entire line of Data Communications Equipment and Services (included in the scope) from the awarded Data Communications Providers, however we reserve the right to accept all or a portion of a Respondents proposal.
ADTRAN has read and understands Section 1.25.

1.26 Service Line Additions and Updates

During the term of the contract, Data Communications Providers may submit a request to update the awarded items (within the scope listed in IDENTIFY SECTION) as new technology is introduced, updated or removed from the market. The Master Agreement Administrator will evaluate requests and update the contract offering via written amendment as appropriate. The Data Communications Service Provider shall update the dedicated website, price lists, and catalogs to reflect approved changes. Pricing must utilize the same pricing structure as was used for services falling into the same service category.
ADTRAN has read and understands Section 1.26.

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WSCA-NASPO Data Communications Services Solicitation # JP14001

1.27 Right to Publish

Throughout the duration of this procurement process and Master Agreement term, Respondents, Data Communications Providers and their authorized contractors must secure from the WSCA-NASPO Contract Administrator prior approval for the release of any information that pertains to the potential work or activities covered by this procurement or the Master Agreement. The Data Communications Provider shall not make any representations of WSCA-NASPO's opinion or position as to the quality or effectiveness of the services that are the subject of this Master Agreement without prior written consent of the WSCA-NASPO Contract Administrator. Failure to adhere to this requirement may result in disqualification of the Respondents proposal or termination of the Master Agreement for cause
ADTRAN has read and understands Section 1.27.

1.28 Changes in Representation

The Contracted Supplier must notify the WSCA-NASPO Contract Administrator of changes in the Contracted Supplier's key administrative personnel, to the extent that there may be adverse impacts to the contract. The WSCA-NASPO Contact Administrator reserves the right to require a change in Contracted Supplier(s) representatives if the assigned representative(s) is not, in the opinion of the WSCA-NASPO Contract Administrator, meeting the terms and conditions of the contract.
ADTRAN has read and understands Section 1.28.

1.29 E-Rate Requirement

All award contractors must commit to participation in the Federal Communication Commission's E-rate discount program established under authority of the Federal Telecommunications Commission Act of 1996. Participation in, and implementation of, this program must be provided without the addition of any service or administration fee by the contractor.
ADTRAN has read and understands Section 1.29.

1.30 Section 508 Compliant

Respondents must meet all Federal and State regulations required to these type of products including but limited to accessible products by describing their support of the applicable provisions of the Workforce Investment Act of 1998, Section 508.
Most of the ADTRAN products proposed within this response are products which are installed, configured, and implemented by professional service technicians or other trained individuals. These products are not directly utilized by end users. ADTRAN is proposing phones in the UC section of this response. Some of the phones that have been proposed are TA508 compliant and are noted in that section of the response.

1.31 Glossary

Authorized Contractor: The Prime Contractor as listed as Contractor under the resulting Master Agreement(s) as a result of this RFP.

Authorized Sub Contractor: sub Contractor, Reseller, Partner, etc. Authorized by the Contractor (Prime) to sell only the products and services listed under the Master Agreement (s)

established as a result of this RFP. This authorized sub contractor must have the authority and ability to accurately reflect the ability of the Respondent to meet the requirements detailed in this RFP.

WSCA-NASPO Contract Administrator: A dedicated person with the authority and ability to manage compliance with the scope and terms and conditions for this contract.

Mandatory Minimum Requirements: Requirements that must be met in order to be considered for further evaluation. Mandatory minimum requirements are non-negotiable. An offer that does not meet the mandatory minimum requirements will be disqualified from further consideration.

Participating Addendum: A Participating Addendum must be executed by any State that decides to adopt a WSCA-NASPO Master Agreement.

A Participating Addendum shall be executed for each contractor by the individual State desiring to use their contract.

Additional States may be added with the consent of the contractor and the Lead State (on behalf of WSCA-NASPO) through execution of Participating Addendums.

A Participating Addendum allows for each Participating State to add terms and conditions that may be unique to their State.

The Participating State and the Contractor shall negotiate and agree upon any additional terms and conditions prior to the signing and execution of the Participating Addendum.

States are not mandated to sign a Participating Addendum with all awarded vendors.

Participating Entity: A State that has indicated intent to participate in the solicitation process, or after award, a State that has executed a participating addendum.

Purchasing Entity: Any end-user in a participating State that is eligible to use the Master Agreement(s) through the participating addendum, including but not limited to State Agencies, Counties, Cities, Education, and other entities.

Qualified Entity: An entity that is eligible to use the Master Agreement(s).

Usage Report Administrator: A contractors person responsible for the quarterly sales reporting and payments described in Section 1.15 Usage Reporting Requirement.

Volume Discount: A percentage discount offered by the seller to the buyer for purchasing a stated dollar amount of Data Communications services and products to be delivered at one time or for a specified period.

Sourcing Team: The technical and business team charged with setting requirements for the Data Communications procurement, and its subsequent evaluation.

ADTRAN has read and understands Section 1.31.

Section 2: General Proposal Requirements and Information

2.1 Proposal Content and Format Requirements

Proposals must be detailed and concise. Unless otherwise stated in your proposal as an "exception", Respondents agree to comply with every section, subsection, attachment and addendum of this RFP. Each proposal must be submitted in Microsoft Word or Excel, labeled and organized in a manner that is congruent with the section number, headings, requirements, and terminology used in this RFP. Proposal documents must be Arial font size 10. Respondent responses that are limited to a specified number of pages are referring to single sided pages. As an example, a response that is limited to a document that is no more than two pages long may be submitted on one double sided page, but not two double sided pages.

2.2 RFP Revisions

Revisions, if any, and all written questions and the State's answers, will be posted on the BidSync website. Solicitation documents will not be mailed to prospective Proposers. Respondents must register (free of charge) as a vendor with BidSync in order to have access to the RFP and related documents. Respondents are responsible for ensuring that their registration information is current and correct. The State of Utah accepts no responsibility for missing or incorrect information contained in the supplier's registration information on BidSync. The State of Utah accepts no responsibility for a prospective Respondent not receiving solicitation documents and/or revisions to the solicitation. It is the responsibility of the prospective Respondent to obtain the information provided through BidSync.

2.3 Right to Waive

The State of Utah reserves the right to waive any informality or technicality in any proposal.

2.4 Proposals Become Property of the State of Utah

All proposal contents become the property of the State of Utah. All proposal content is proprietary during the proposal evaluation process. Upon Master Agreement award, the successful Respondents' proposals will be open to public inspection, by request, with the exception of any proposal content that is marked as "proprietary or confidential" by the Respondent. All content designated as "proprietary or confidential" must be supported by documentation as to the rationale for the proprietary nature of the information.

2.5 News Releases

News releases or other public disclosure of information pertaining to this RFP or the statewide contracts may not be published without the prior written permission of the State of Utah.

2.6 State Seal Use

The Utah Great Seal Rule states, in section R622-2-3.Custody and Use, that "no facsimile or reproduction of the Great Seal may be manufactured, used, displayed, or otherwise employed by anyone without the written approval of the Lieutenant Governor."

Other participating States have similar rules that must be adhered to by Respondents or interested parties.

ADTRAN has read and understands Section 2.

Section 3: Data Communications Provider Mandatory Minimum Requirements

3.1 General Information

ADTRAN Response No. 121342181
WSCA-NASPO Data Communications Services Solicitation # JP14001

This section contains requirements that must be addressed in order for your proposal to be considered for the evaluation phase of this RFP. All of the items described in this section are non-negotiable. Respondents are required to complete:

Mandatory Requirements (M)
All Respondents must meet the **(M)** requirements listed in this section, and explain how the requirement is met. A 'no' response on the acceptance document or omission of the required explanation will disqualify the service from further evaluation.
ADTRAN has read and understands Section 3.1. Please see additional comment for each item in the sections below.

3.1.1 Equipment Offering

(M) Identify Equipment Offering in sections 5.2.1-5.3.0.
ADTRAN has read and understands Section 3.1.1. Please see detailed offering information in Sections 5.2.1 through 5.3.0.

3.1.2 Service Offering

(M) Identify Service Offerings for all products offered in Sections 5.2.1-5.3.0.
ADTRAN has read and understands Section 3.1.2. Please see detailed offering information in Sections 5.2.1 through 5.3.0.

3.1.3 Insurance Requirement

(M) This pertains to the State of Utah insurance requirements. Other Participating States may identify different insurance requirements during the participating addendum process.

Data Communications Provider's and their authorized contractors shall procure and maintain insurance which shall protect the authorized contractor and The State and/or purchasing entity (as an additional insured) from any claims from bodily injury, property damage, or personal injury covered by the indemnification obligations set forth herein. The Data Communications Provider's authorized contractor shall procure and maintain the insurance policies described below at their own expense and shall furnish to the procurement manager, upon award, an insurance certificate listing the participating State(s) as certificate holder and as an additional insured. The insurance certificate must document that the Commercial General Liability insurance coverage purchased by the authorized contractor to include contractual liability coverage applicable to this Master Agreement. In addition, the insurance certificate must provide the following information: the name and address of the insured; name, address, telephone number and signature of the authorized agent; name of the insurance company (authorized to operate in all States); a description of coverage in detailed standard terminology (including policy period, policy number, limits of liability, exclusions and endorsements) and an acknowledgment of notice of cancellation to the participating States.

> Authorized contractor is required to maintain the following insurance coverage's during the term of the WSCA-NASPO Master Agreement:
>
> 1) Workers' Compensation Insurance – The Data Communications Provider's authorized contractor must comply with Participating State's requirements and provide a certificate of insurance.
> 2) Commercial General Liability Policy per occurrence - $1,000,000. Coverage to include bodily injury and property damage combined single limit.

3) Business Automobile Policy to include but not limited to liability coverage on any owned, non-owned, or hired vehicle used by Data Communications Provider's authorized contractor personnel in the performance of this Master Agreement. The business automobile policy shall have the following limits of liability: Per Occurrence - $1,000,000, Annual Aggregate - $3,000,000, Annual Aggregate applying to products and services - $3,000,000. Coverage must include premises and operations, bodily injury and property damage, personal and advertising injury; blanket contractual, products and services, owner named as an additional insured. The State of Utah must be listed as an additional insured.

Within 10 days of contract award, the Contracted Supplier and/or Authorized Contractor must submit proof of certificate of insurance that meets the above requirements or the Participating States requirements.
ADTRAN has read and understands Section 3.1.3. The required limits for this section can be met through umbrella or excess coverage policies.

3.1.4 Delivery

(M) The prices offered shall be the delivered price to any WSCA-NASPO purchasing entity. All deliveries shall be F.O.B. destination with all transportation and handling charges paid by the contractor. Responsibility and liability for loss or damage shall remain the Contractor until final inspection and acceptance *(within 30 days after delivery for external damage and 30 days for any concealed damage)* when responsibility shall pass to the Buyer except as to latent defects, fraud and Contractor's warranty obligations. The minimum shipment amount will be found in the special terms and conditions. Any order for less than the specified amount is to be shipped with the freight prepaid and added as a separate item on the invoice. Any portion of an order to be shipped without transportation charges that is back ordered shall be shipped without charge.
ADTRAN takes exception to the second sentence in 3.1.4 and proposes to change the sentence such that it will read; "Responsibility and liability for loss or damage shall remain the Contractor until delivery to Buyer's dock at which time responsibility shall pass to Buyer."

3.1.5 Service Offering Documentation

(M) Upon request, user and/or technical documentation should be supplied for all procured products and services. Manuals may be available via the Contracted Supplier's website. The manual shall contain user and technical instructions appropriate to the service.
ADTRAN has read and understands Section 3.1.5.

3.1.6 Data Communications Provider Contract Administrator and Usage Report Administrator

(M) The Contracted Supplier shall provide a Contract Administrator to manage compliance with the scope and terms and conditions for this contract. The following Information, at a minimum, regarding the Contract Administrator shall be provided:

a. Administrator's number of years experience in the Data Communications Services business.
b. Confirmation that the Data Communications Provider Contract Administrator has authority to enforce the scope of work and terms and conditions of the resulting contract.

The Contracted Supplier shall also provide a Usage Report Administrator responsible for the

quarterly sales reporting described in Section 1.15 Usage Reporting Requirement.
ADTRAN has read and understands Section 3.1.6. The ADTRAN contact who will be Contract Administrator, as well as the Usage Report Administrator is:

Darrell Rogers
Phone: 970 482-2216
Email: Darrell.Rogers@ADTRAN.com

Qualifications:
25 years Data Communications/Computer Equipment, Peripherals & Related Services

1993	**Sr. SLED Account Executive for Zenith Data System Proposed and Managed State of CO Desktop Contract**
2000	**SLED Account Executive RFP team for Compaq Computer for WSCA Desktop contract and PA agreements after award**
2005	**SLED Account Executive RFP team for Compaq/HP Desktop renewal RFP for WSCA contract and PA agreements after award**

3.1.7 eMarket Center Cooperation

(M) To be eligible for contract award, the Contractor must agree to cooperate with WSCA-NASPO and SciQuest (and any authorized agent or successor entity to SciQuest) with uploading a hosted catalog or integrating a punchout site. The contract requirements are in section 7.
ADTRAN has read and understands Section 3.1.4.

Section 4: Data Communications Provider Qualifications

4.1 General Information:

Provide any pertinent general information about the depth and breadth of the Offeror's product and service offerings and their overall use and acceptance in the Data Communications marketplace.
ADTRAN, Inc. is a leading global provider of networking and communications equipment. ADTRAN's products enable voice, data, video and Internet communications across a variety of network infrastructures. ADTRAN solutions are currently in use by service providers, private enterprises, government organizations and millions of individual users worldwide. Please refer to Section 4.5.1 for further information regarding ADTRAN.

4.2 Warranty

Specify the Offeror's standard warranty offerings for the products and services proposed in the response to this RFP.
The warranty periods for product proposed for Section 5.2.4 Optical Networking are as follows:

TA5000 Equipment	**5 Years**
ONE Equipment	**5 Years**
SFPs/XFPs	**1 Year**

The warranty period for product proposed for Section 5.2.5 Routers are as follows:

NetVanta Routers and IPBGs	**5 Years**
TA900e	**5 Years**

SFPs/XFPs	**1 Year**

The warranty period for product proposed in Section 5.2.8 Switches are as follows:

NetVanta Switches	**Limited Lifetime**
SFPs/XFPs	**1 Year**

The warranty period for product proposed in Section 5.2.9 Wireless are as follows:

vWLAN Appliance	**1 Year**
1920/25/30/35 APs	**Limited Lifetime**
1940 Outdoor AP	**1 Year**

The warranty period for product proposed in Section 5.3.0 Unified Communications are as follows:

NetVanta 7000 Series	**5 Years**
Phones	**1 Year**

All ADTRAN warranties start on the day of shipment.

4.3 Website

Award contractors are required to establish and maintain a website applicable to the WSCA/NASPO contract which will allow Participating States to see applicable contract price list, discounts on said price list, approved resellers or partners for their state and any additional information that may be required to assist the participating states in obtaining information concerning the contract award. The State of Utah representing WSCA/NASPO reserves the right to require the award contractor to add additional items to assist in this process. Specify Websites used by the Offeror to facilitate customer ordering under awarded contracts.
This is a mandatory requirement.
ADTRAN has read and understands Section 4.3. Reference websites that ADTRAN currently hosts for state and local government and education opportunities can be accessed at the following links:

www.ADTRAN.com/al

www.ADTRAN.com/ms

4.4 Customer Service

Specify the Offeror's standard customer service policies and detail the escalation process used to handle customer-generated issues.
ADTRAN's standard customer service policy is to provide access to a team of Technical Support Engineers expert in the product experiencing an issue so that issues can be quickly resolved. Customer support cases can be opened by the customer via telephone, email, or through the web. Depending on the product, live access to our technical support team is included as part of standard warranty coverage or may require that the product is covered by a service plan.

In the event that the product is determined to be defective while in warranty, it will be replaced according to that product's warranty policy – either it will be repaired and returned to the customer or it will be replaced in advance. Service plans are also available that deliver advance replacement within 4 hours or the next business day, according to the plan.

ADTRAN provides support for service affecting emergencies 24 hours/day, 7 days/week, 365 days a year. ADTRAN also offers an online Support Community and an extensive knowledge-base of technical documents, configuration guides, and "How-To" instructions.

In the event an issue needs to be escalated, the path is first to the Technical Support Manager, then the VP of Customer Support, and ultimately the General Manager of the Division.

4.5 Firm

a. Provide a brief history of your firm including the following:

1. Number of years providing Data Communications Services being offered in response to this RFP.

2. Number of separate services provided in each of the area categories described in this RFP.

ADTRAN, Inc. is a leading global provider of networking and communications equipment. ADTRAN's products enable voice, data, video and Internet communications across a variety of network infrastructures. ADTRAN solutions are currently in use by service providers, private enterprises, government organizations and millions of individual users worldwide.

Headquartered in Huntsville, Alabama, with sales offices strategically located throughout the United States and around the world, ADTRAN's mission is to be a trusted provider of global communications solutions, to develop innovative technologies used to create products and services that make communications simpler and more affordable for people everywhere, and to foster an entrepreneurial environment supported by enthusiastic employees who exhibit an unwavering commitment to personal integrity and support our customers beyond their expectations.

The company's success stems from its history in telecommunications. Incorporated in 1985, ADTRAN began operations in 1986 following AT&T's divestiture of the Regional Bell Operating Companies (RBOCs). This created an opportunity for companies such as ADTRAN to supply network equipment to the seven RBOCs as well as the more than 1,300 independent telephone companies in the United States.

The Carrier Networks division is positioned with product and service offerings that compete in many segments of the global telecommunications industry, and, specifically, in the areas of Ethernet and Internet Protocol (IP) based networks. As networks migrate to IP-based architectures, ADTRAN has strengthened its

technologies in its primary growth areas: Broadband Access, Optical Access and Internetworking. Service providers use ADTRAN equipment to connect central offices or remote terminals directly to the subscriber's terminating equipment. ADTRAN's Carrier Networks Division offers a broad portfolio of products including broadband access platforms, FTTN sealed OSP DSLAMs, ATM/TDM aggregation equipment, fiber access platforms, fiber add/drop multiplexers, M13/STS-1 multiplexers, HDSL2/4 technologies, SHDSL and ADSL technologies, and narrowband access platforms.

With the rise of the Internet and ever increasing importance of the Local Area Network (LAN), the company decided to capitalize on its success in the carrier market by addressing the end-user's need for termination equipment. Having firmly established a leading position in the telco arena, ADTRAN adapted those technologies for use in enterprise Wide Area Networks (WANs), and quickly gained a significant share of this market.

Today, the Enterprise Networks Division supplies small and mid-sized businesses, distributed enterprise customers, as well as government and public sector entities with the internetworking equipment needed to create sophisticated LANs and WANs. With a host of products including routers, Fast Ethernet, Gigabit and PoE switches; IP Communications platforms; IP phones; IP PBX platforms; wireless access points; security appliances and management platforms, ADTRAN has a solution to meet almost any LAN need.

With products for both carrier and enterprise markets, ADTRAN is uniquely positioned to provide complete end-to-end solutions that produce the greatest network efficiency and lowest possible costs. ADTRAN products are made available through a network of domestic and international value added resellers and distributors.

ADTRAN works to have a sustainable impact throughout our company and the communities in which we live. The telecommunications industry is embracing the move to "green" technology with the establishment of new standards that will revolutionize the industry. These standards will lead to the development and implementation of sustainable products that have enhanced performance, but with reduced consumption of natural resources. As networks from the carrier to the enterprise continue the transition to all-IP architectures, and the demand for bandwidth continues to increase, the need for energy efficient power consumption and "green" technologies will hold an even greater role.

b. Describe specifically what makes your firm a stable long term partner for WSCA-NASPO.
ADTRAN has a track record of technical leadership, excellence and innovation. ADTRAN has consistently demonstrated global industry leadership. We have several firsts to our credit:

- **First to make T-1 access affordable and first 2G fiber backhaul solutions (1995)**
- **First all Ethernet MSAP, First VDSL deployment based on IP DSLAM (2006)**
- **First cloud based wireless LAN (2010)**
- **First edge optimized packet optical networking platform (2011)**

- **First cloud based mobile offload architecture (2012)**

Excellence and innovation

- **Approximately 750 patents and patent applications.**
- **ADTRAN's average patents per $1M R&D is very high compared to the industry standard (0.4 vs 0.25)**

Solid financials, excellent growth prospects

- **25 Years of continuous profitability**
- **Approx. 2x more Net Cash and Marketable securities compared to the competitors' average.**
- **Approx. 4.8x free cash flow advantage compared to the competitors' average.**
- **Annual revenue of over $600 million.**

c. Describe specifically what information the Data Communications Provider contract administrator would provide at annual meetings with an entity that has executed a participating addendum.

The ADTRAN Contract Administrator would provide the following information to participating WSCA-NASPO entities:

- **Review of each States purchases by end user and dollar volume**
- **Review of total purchases made under this agreement**
- **Review of each reseller in that State and volume of business**
- **Also review any resellers out of state that sold to entities in that state**
- **Discuss any compliance issues and resolutions during past year**
- **Review any escalation issues that may have occurred and resolution**
- **Presentation on Marketing events held in each state and attendees**
- **45 days prior to meetings ADTRAN would engage with State Administrator to determine what if any other areas they would like to review/discuss**

d. Describe how you plan to implement the contract including having a single point of contact to perform and manage all aspects of this contract.

ADTRAN will designate Darrell Rogers as the Contract Administrator/Reporting person for this contract once awarded to ADTRAN. IN this role Darrell will have the authority to negotiate with the Procurement offices for each State. He will be responsible for the Participating Addendums and will work with our Contracts team. IN addition he will also work with our named sub-contractors for reporting and sales as needed to meet the reporting requirements. In this role he will work with each of our Regional Sales Managers to ensure that all partners are in compliance with this contract. In this role he will be assisted with any issues or escalations by our various support teams in each product division. Day one he will begin the process of meeting with each of the state procurement offices and determining what if any specific areas that the state is asking for modifications from the WSCA contract language. During this process he will also be meeting with our resellers in each state to align them with the contract requirement so that once the PA has been signed they can begin immediate ordering. In addition to this he will be working with our Marketing and Sales Operations to bring the website online and begin the marketing of this award in each state as the participating agreements are signed.

e. Describe in detail your firm's escalation management plan including contact information.

Participants in this agreement with ADTRAN will have a single point of contact in Darrell Rogers, the aforementioned Contract Administrator, who will be the primary point and will engage the proper groups or management staff needed to resolve issues if they arise. Should the need arise to escalate a particular situation beyond the contract administrator, please contact Andrea Thomas, Director of Channel Development. If further escalation is required, please contact Rick Schansman, Senior Vice President and General Manager – Enterprise Networks Division. Contact information for both is below:

Andrea Thomas
Director of Channel Development
940-365-2700
andrea.thomas@ADTRAN.com

Rick Schansman
Senior Vice President and General Manager – Enterprise Networks Division
256-963-7917
rick.schansman@ADTRAN.com

4.6 Authorized Sub Contractor Relationships

Respondents may propose the use of Servicing Subcontractors or partners however, the Contractor shall remain solely responsible for the performance under the terms and conditions of the Contract if Servicing Subcontractors are utilized. This includes sales report information. The Contractor will be responsible to collect, and report this information from all partners or resellers representing your contract.

a. Briefly describe what your firm requires from potential contractors to become an "Authorized Data Communications Reseller". Provide an Authorized Contractor List.
ADTRAN offers a multi-channel fulfillment model to provide solutions to the marketplace. Authorized resellers include National Service Providers, regional and local service providers, and Value Added Resellers (VARs). In order to participate in the ADTRAN tiered VAR partner program, partners must agree to comprehensive sale engagement, training and certification programs, and revenue attainment commitments.

ADTRAN has over 3,700 partners that serve across all states. We will be evaluating the partners who are best positioned to serve the needs of the WSCA contract based on experience, ability to service the customer and geographic coverage. ADTRAN intends to identify and name Authorized Contractors during the contract negotiation process.

b. Describe in detail how your firm currently measures an authorized contractors' performance.
Partners are routinely evaluated against contractual requirements for certification compliance, engagement level and revenue attainment.

c. Describe in detail the process for revoking a designation as a sub contractor from an authorized contractor for issues related to customer service, or other authorized contractor performance related issues.
As part of routine partner reviews a partner can be reclassified to a lower level of partnership, if they are not in compliance with partner level requirements. A Letter of Change is sent to advise partners of revised status prior to actual contract changes.

d. Describe in detail how your firm will support and assist an authorized contractor in improving their performance and the corrective action process.
ADTRAN Territory Managers support the day-to-day activities of authorized resellers and conducts regular reviews for partner contract compliance including engagement, revenue and certification compliance. In conjunction with regular reviews the contract administrator at ADTRAN for the WSCA agreement will review all contracted partner's sales and performance. If a reseller is out of compliance a 90 day plan for corrective action will be implemented. The Territory Managers will engage with the appropriate resources required to implement enablement plans.

e. Describe in detail the process that your firm uses to track and respond to issues and concerns from both your authorized contractors and from participating entities.
ADTRAN uses a commercial trouble ticketing system to capture the details associated with all customer support cases. Customers can view the status of their support cases online via a portal on the ADTRAN website. We communicate with them via phone or email, whichever method that the customer prefers.

When a support case is resolved, a survey is sent to the customer asking for their feedback on the support experience. ADTRAN Technical Support will contact the respondent for any survey returned with a negative response or where the customer requested to be contacted. Information learned from these exchanges is used as necessary to correct identified issues with delivering exceptional support.

f. Describe in detail how your firm will track, report and verify sales from your designated Data Communication partners and authorized contractors.
ADTRAN will require each Authorized Partner who participates in the WSCA Contract to sign a contract addendum specifying participation requirements and T&C's of this award. Each partner will provide ADTRAN with the sales information required by this award on a quarterly basis, and would also agree to monthly reporting to meet specific state requirements. Additional requirements may be also placed on each partner for this agreement. In addition, ADTRAN receives point of sales information from distribution partners and will validate sales out from the partners. The reseller agreement addenda will also outline penalties that may be levied against a partner for failure to meet the requirements of this award. The Contract Administrator for ADTRAN will manage the reporting aspects of the agreement, and will work with each partner's designee to acquire sales out information on a timely basis.

Section 5: Service Offering Qualifications

5.1 General Information

This section contains mandatory minimum requirements that must be met in order for your proposal to be considered for the evaluation phase of this RFP. All of the items described in this section are non-negotiable. Respondents are required to complete:

ADTRAN Response No. 121342181
WSCA-NASPO Data Communications Services Solicitation # JP14001

Mandatory Requirements (M)
All Respondents must meet the **(M)** requirements listed in this section, and explain how the requirement is met. A 'no' response on the acceptance document or omission of the required explanation will disqualify the service from further evaluation.

5.1.1 General Business Requirements

Each provider must meet the following mandatory general business requirements:
ADTRAN has read and understands Section 5.1.1. Please see specific detail below.

5.1.2 Terms and Conditions

(M) Respondents *must* indicate their acceptance of the State of Utah Standard Terms and Conditions in addition to the WSCA-NASPO Terms and Conditions attached to this RFP as Attachment A and Attachment B. Any exceptions to these terms and conditions must be clearly identified in bid response and during the question and answer period on BidSync. Significant exceptions may constitute grounds for rejecting Respondent proposals.
ADTRAN has read and understands Section 5.1.2. Exceptions to the stated Terms and Conditions are detailed in Appendix A of this response.

5.1.3 Experience

(M) Respondents *must* be able to provide reference service contracts from a minimum of five government or commercial customers for their Data Communications Product and Services offerings. Government references are preferred. References must include environments and complexity that is similar in scope to those described within this RFP. Any proposals from Respondents that cannot meet these requirements will not be considered. The Respondent must provide specific contact information describing their reference service contracts, which may be verified.
ADTRAN has read and understands Section 5.1.1. As clarified in the RFP Q&A, and Addendum #3; ADTRAN has supplied the Revised Attachment B Reference Form to the following 5 contacts:

Chris Lott
Manager of User Services
Mount St. Mary's College

Dave Slabe
IT Operations Manager
Hamilton Heights School Corporation

Thomas Flanders
IT Services
City of Lake Havasu

Steve Robinson
Director of Academic Technology
Archbishop Riordan High School

Harold Tame
State of TX Department of Family & Protective Services

5.1.4 Financial Stability

(M) The Data Communications Product and Services vendor ***must*** provide audited financial statements to the State and should meet a minimum Dun and Bradstreet (D&B) credit rating of 4A2 or better, or a recognized equivalent rating. Please provide the Respondent's D&B Number and the composite credit rating. The State reserves the right to verify this information. If a branch or wholly owned subsidiary is bidding on this RFP, please provide the D&B Number and score for the parent company that will be financially responsible for performance of the agreement. Prime contractors working on behalf of Respondents must submit financial statements that demonstrate financial stability, and adequate working capital, but do not need to meet 4A2 credit rating requirements.

ADTRAN has read and understands Section 5.1.4. Please see the attached ADTRAN Annual Report for 2012 in Appendix B. The ADTRAN D&B number is 14-787-1412. The composite credit rating is 5A1.

5.1.5 Other General Responsibilities

(M) The Respondent *must* provide the personnel, equipment, tools, and expertise to meet the requirements in this RFP.

(M) Computer applications and Web sites *must* be accessible to people with disabilities, and *must* comply with Participating entity accessibility policies and the Americans with Disability Act.

(M) Applications and content delivered through Web browsers must be accessible using current released versions of multiple browser platforms (such as Internet Explorer, Firefox, Chrome, and Safari) at minimum.

ADTRAN has read and understands Section 5.1.5.

5.2 Data Communications Services – Requirements

Offerors may respond to any of the sections where they have substantive product offerings that address the scope detailed in each Section from 5.2.1-5.3.0. All Offerors must include a response to section 5.31 services, that addresses products proposed in 5.2.1-5.3.0.

Products may be used by the states in branch offices, main government offices and data centers, and by overall government data communications providers offering carrier class services. Responses should consider this breadth of use and users.

The scope and context of this solicitation **does not include endpoints such as cell/smart phones, other mobile devices or devices designed exclusively for use by individual users**. It is focused on the equipment and software infrastructure required to support provisioning of a variety of network services within a modern digital network. The user context will vary from branch offices through enterprise and statewide data communication network installations. Respondents should offer a range of solutions that are appropriate for installations of varying size and complexity.

ADTRAN has read and understands the general information stated in Section 5.2. Please see the subsections below for detailed information on the ADTRAN product offerings.

5.2.1 DATA CENTER APPLICATION SERVICES — Application networking solutions and technologies that enable the successful and secure delivery of applications within data centers to local, remote, and branch-office users using technology to accelerate, secure, and increase availability of both application traffic and computing resources.

ADTRAN will not be proposing solutions for Section 5.2.1.

5.2.1.1 **Virtualized Load Balancers** — Virtual devices that act like a reverse proxy to distribute network and/or application traffic across multiple servers to improve the concurrent user capacity and overall reliability of applications. Capabilities should include:

- SSL (Secure Sockets Layer) Off-loading
- Caching capabilities
- Layer 4 Load Balancing
- Layer 7 Load Balancing
- Detailed Reporting
- Supports multiple load balancers in the same system for multiple groups
- Supports TLS1.2

5.2.1.2 **WAN Optimization** — An appliance utilizing a collection of techniques for increasing data-transfer efficiencies across wide-area networks (WAN). Capabilities should include:

- CIFS (Common Internet File System) acceleration
- Data Compression
- SSL encryption/decryption for acceleration (Optional)
- Layer 4-7 visibility
- Application Specific optimization

5.2.2 NETWORKING SOFTWARE — Software that runs on a server and enables the server to manage data, users, groups, security, applications, and other networking functions. The network operating system is designed to allow shared file and printer access among multiple computers in a network, typically a local area network (LAN), a private network or to other networks. Networking software capabilities should include:

- Restartable Process
- High availability options
- Targeted operating systems, i.e. DC, campus, core, wan, etc.
- Operating System Efficiencies

ADTRAN will not be proposing solutions for Section 5.2.2.

5.2.2.1 **Network Management and Automation** — Software products and solutions for data center automation, cloud computing, and IT systems management.

5.2.2.2 **Data Center Management and Automation** — Software products and solutions that capture and automate manual tasks across servers, network, applications, and virtualized infrastructure.

5.2.2.3 **Cloud Portal and Automation** — Software products and solutions for cloud management with policy-based controls for provisioning virtual and physical resources.

5.2.2.4 **Branch Office Management and Automation** — Software products and solutions for management of branch offices. Capabilities include remote troubleshooting, device management, WAN performance monitoring.

5.2.3 NETWORK OPTIMIZATION AND ACCELERATION — Devices and tools for increasing data-transfer efficiencies across wide-area networks.

ADTRAN will not be proposing solutions for Section 5.2.3.

5.2.3.1 **Dynamic Load Balancing** — An appliance that performs a series of checks and calculations to determine which server can best service each client request in order to select the server that can successfully fulfill the client request and do so in the shortest amount of time without overloading either the server or the server farm as a whole.

5.2.3.2 **WAN Acceleration** — Appliance that optimizes bandwidth to improve the end user's experience on a wide area network (WAN). Capabilities should include:

- CIFS acceleration
- Data Compression
- SSL encryption/decryption for acceleration (Optional)
- Layer 4-7 visibility
- Application Specific optimization

5.2.3.3 **High Availability and Redundancy** — Limits any disruption to network uptime should an appliance face unforeseen performance issues. Transparently redistributes workloads to surviving cluster appliances without impacting communication throughout the cluster.

5.2.4 OPTICAL NETWORKING — High capacity networks based on optical technology and components that provide routing, grooming, and restoration at the wavelength level as well as wavelength based services.

ADTRAN is proud to propose the ADTRAN Optical Networking Edge (ONE) Hardware Solution and the ADTRAN Advanced Operation Environment (AOE) Management Software for the future Optical Networking needs of your participating members. Part number listing have been included in the pricing section of this response for the ONE products, as well as the AOE management system. Due to the complexities of optical networking, each opportunity presented by participating members will have to be analyzed, and custom quoted. ADTRAN has included part numbers for product, management, maintenance, installation services, and support as a guideline for this section. However, custom quotes will be generated to include all phases for each project.

Please refer to Appendix C for supporting documentation for this section.

5.2.4.1 **Core DWDM (Dense Wavelength Division Multiplexing) Switches** — Switches used in systems designed for long haul and ultra long-haul optical networking applications.

ADTRAN's Optical Networking Edge (ONE) is an innovative, cost-effective, and optimized Packet Optical Transport System (P-OTS) delivering Agile Photonics that can be integrated with access and aggregation solutions. The ONE solution includes advanced technologies Right-Sized for the required applications including wholesale, mobile backhaul, data centers,

business, and residential services. These optimized building blocks include:

- **"Pay as you Grow" Reconfigurable or Fixed Wavelength Division Multiplexing (WDM) at Layer 0/1 providing multi-wavelength capabilities to serve up to 44/88 channels of 10 Gbps optical transport (440 Gbps/880Gbps) over a single fiber pair via:**
  - **Mini Amplified ROADM System on a blade. 2/4 degree, 44/88 channel solutions for multi-ring and mesh topologies**
  - **44/88 - Channel DWDM Standalone (1RU/2RU) MUX/DEMUX Unit (Fixed Filter)**

- **Fiber distance and characteristic compensation including:**
  - **Embedded variable gain amplifiers capable of adapting to a variety of fiber span lengths**
  - **A line of DCMs compatible with the ROADMs' mid-stage amplification for dispersion compensation with little-to-no added loss**

- **Next-Generation Transport Services delivery and aggregation to the network edge and middle mile in a multi-layer, multi-service aggregation and switching solution including Carrier Ethernet, OTN, SONET, and wavelength over Fiber using DWDM multi-wavelength optical transport.**
  - **Multi-service Optical Transport Network (OTN) switching and transport, Scalable and reliable MEF-Compliant Mobile Backhaul, and Carrier Ethernet E-type services.**
  - **Transparent SONET/SDH services over OTN**

5.2.4.2 **Edge Optical Switches** — Provide entry points into the enterprise or service provider core networks.
ADTRAN will not be proposing solutions for Section 5.2.4.2.

5.2.4.3 **Optical Network Management** — Provides capabilities to manage the optical network and allows operators to execute end-to-end circuit creation.

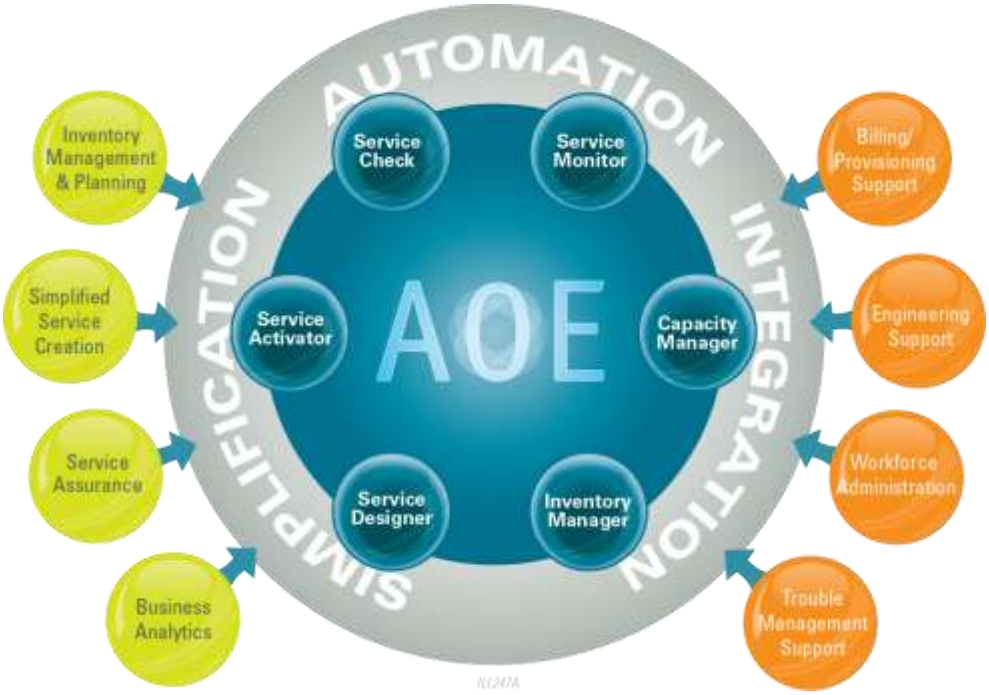
ADTRAN Advanced Operational Environment

ADTRAN is focused on meeting the increasing demand for service level management and is evolving the ADTRAN suite of management offerings to an intelligent service delivery platform. Leveraging our decade of global experience working with service providers and building up from the Service Management Delivery Core, we are evolving to the ADTRAN Advanced Operational Environment (AOE). AOE is a framework which enables integrated end to end service aware network management tools such as: enhanced network planning, service activation, decision support tools, service assurance and business planning for operations. This environment facilitates reduced time to market by streamlining OSS integration of ADTRAN service activation and troubleshooting features and incorporates best in class tools to provide a complete service management solution in a multivendor environment.

AOE translates network data and management information into

knowledge which is presented as actionable steps for provisioning, testing, and troubleshooting.

ADTRAN ADVANCED OPERATIONAL ENVIRONMENT (AOE)



This simplified, user-focused interface significantly reduces the training and execution time for all supported functions (service aware alarm reporting, provisioning, performance monitoring, prequalification, test and troubleshooting capabilities from a thin client, web accessible interface). The initial offering of AOE supports the ADTRAN Carrier Network equipment and as AOE evolves, the complete set of ADTRAN networking equipment (Carrier and Enterprise) will be managed from the same interface.

AOE abstracts away hardware management to provide a simplified, service centric, and operations oriented interface to the user, whether the user is a human using a web interface or a northbound OSS using a TL1 or XML gateway. AOE manages, for example, IPTV, Voice, Internet services (Data and Video), Carrier Ethernet, CES services and Optical Transport Infrastructure, and facilitates the operation and automation of activation, assurance, and capacity management functions. AOE also incorporates a logic system that takes the information from the management core - provisioning, PM, status, diagnostics, and more – and reduces all this data to concise operational insights and recommendations via the ServiceCheck product.

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AOE is a transformation in management philosophy. ADTRAN will continue to deliver AOE products such as ServiceCheck as they become available.

AOE product offerings will include:

Services

- **ServiceActivator – end to end service activation**
- **ServiceDesigner– service profile/template manager (basic)**
- **ONE Services – Optical Network Edge service activation**
- **Ethernet Access Services – service activation for EoX**
- **OPTI6100 Services – TDM service activation on OPTI-6100 subtended rings**

Network Design

- **LinkManager (future)– fiber wavelength assignment/management**
- **Optical Planning Tool (future)**
- **Traffic Engineering (future)**

Troubleshooting: includes the following functions:

- **ServiceCheck – knowledge based troubleshooting**

Service Assurance

- **ServiceMonitor – proactive monitoring of service BW and parameters, Y.1731, Ethernet OAM, SLA and QoS**
- **CapacityManager – trunk utilization over time**
- **Alarm Window – human readable alarm listing with color coded severity**

Asset Management

- **InventoryManager – network wide provisioning and inventory information**
- **Discovery – manual initiation for discovery for new managed objects**
- **SW upgrade – single GUI for all managed ADTRAN CN devices**

- **Scheduler – network device resync, network device heartbeat, network device software upgrade**

Help

- **About AOE – AOE version and license key status**
- **AOE Client – administrative control of client access**
- **Port Status Legend – key for port status in Network Device Manager**

OSS GW

ADTRAN supports a TeleManagement Forum (TMF) 854 compliant XML Northbound interface integrated with AOE. ADTRAN inherits the core for this solution from ADTRAN existing Northbound OSS product. Similar to the existing TL1 NB interface this interface is standards-compliant and initially offers activation/deactivation for the Ethernet over Copper Application for ADTRAN TA5000 system. The new XML interface will support provisioning, inventory and PM information via a 'golden' (backward compatible) interface. Integration work done for the initial deployment will continue to be supported as new features are added.

Service Delivery Management Core

Service Delivery Management Core encompasses the spectrum of ADTRAN access solutions with the tools and interfaces required of a network management system. This industry-proven core utilizes an all-Java architecture to provide configuration, performance, network assurance, accounting, and security functions at the core of AOE.

Two protocol agents are available for communication with the ADTRAN devices. These agents provide traffic regulation between the Application Server and the devices for efficient data processing. The SNMP agent converts JAVA to SNMP and vice versa for SNMP applications. For optical applications where SNMP over IP is not achievable, the TL1 agent can be used to convert JAVA to TL1 and vice versa. The TL1 messaging scheme used in this application is ADTRAN proprietary.

Service Delivery Management Core Key Features

- **Scalable, extensible architecture**
- **All Java application based on the TMN model**
- **Single platform for ADTRAN systems**
- **Fault, configuration, accounting, performance and security management functions**
- **Automated software downloads**
- **Provisioning recovery after catastrophic failure**
- **Automatic server failover**

- **Network-wide reporting tool**

Service Delivery Core Components:

- **Application Server**
- **Databases**

The Application Server functions as the engine for all activities within the management core environment. It is the rule engine of the management core and coordinates the interaction between all of the various components.

The management core utilizes an SQL based and additional internal databases: MySQL is the SQL based database. Additional internal databases are used for internal data. The internal databases store basic inventory and other pertinent management information for the Application Server and some network element specific data. The Reports Plus database provides real-time inventory and provisioning information collected via a highly optimized, bandwidth friendly mechanism. Additionally, when provisioning changes are made either through the multi-access GUI or northbound interface, the database is immediately updated. This database is a common SQL database that supports user queries via the multi-access GUI and standard SQL queries from a third-party application. Queries for network wide information can be run without impacting system performance or day-to-day operations. If desired, the Reports database component can be offloaded to a separate server for further optimization of the management architecture.

Using a standard NetCool log probe, integration with Micromuse NetCool systems are easily facilitated. As the AOE records alarms received from the ADTRAN systems as well as events generated by the AOE, this information is immediately available for transmission to the NetCool system. Other fault management systems can be supported as well through trap forwarding or other common mechanisms.

Client access is multi-access via the internet and supports stationary and a variety of mobile devices.

5.2.4.4 **IP over DWDM (IPoDWDM)** — A device utilized to integrate IP Routers and Switches in the OTN (Optical Transport Network).
ADTRAN's Optical Networking Edge (ONE) solution provides a unique, right-sized integration of advanced packet optical transport with access and aggregation capabilities. ONE solves the problem of migration to efficient next-generation core packet optical transport network capabilities without the costs and Central Office real estate associated with most multi-wavelength standalone solutions. ONE's portfolio of solutions include the following modular options and more:

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- **Multiple chassis options, including both a full-sized Total Access 5000 for central aggregation and a space-optimized 5RU 5006 platform for customer premises**
- **Multiple ROADM options to achieve an optimal, Any-to-Any design for native ADTRAN Lambdas or third-party "Alien Lambdas", including full Lambda equalization support**
- **Ethernet aggregation options in both the ETOS-1 (featuring 16x 1GigE and 2x 10GigE) and ETOS-10 (featuring 8x 10GigE and 2x 1GigE) including ERPS for path-redundancy and a backplane option for hardware-redundancy and/or port-count doubling**
- **OTN transport options in both the OTOS-1-8 (featuring 8x mid-speed and 1x high-speed ports) and OTOS-2-16 (featuring 16x mid-speed and 2x high-speed ports) including SNCN for path-redundancy and a backplane option for hardware-redundancy and/or port-count doubling**

ADTRAN Parts List (Product/Management/Services/Training) for applicable sections of 5.2.4:

Item	Part Number	Description
HARDWARE		
TA 5000 Bundles, Commons and Shelves		
TA5000 CHASSIS STARTER KIT	4187001L1	TA5000 shelf (ANSI)
TA5000 SCM G2	1187010G2	TA5000 Switch control module
TA5000 SM 2GE RG	1187020G2	Switch Module 2 GE (does not support rings)
TA5000 SM 2-10GE RG	1187025G2	Switch Module 2 x 10 GE
TA5K SM5 2-10G/2-1G SM RG	1187030G2	Switch Module 2 x 10 GE / 2 x GE
TA5000 OSCP, OSC PROCESSOR	1174471G1	Optical Supervisory Channel Processor
TA5000 OSCF, OSC FILTER	1174461G1	Optical Supervisory Channel Filter
SFP, OC-3 1511 nm 80 km	1442701PG3	SFP, OC-3 1511 nm 80 km
TA5000 Blank Panels		
TA5000 AM BLANK DUAL SLOT	1187922E1	Total Access 5000 Dual Access Module Blank Panel
TA5000 AM BLANK	1187921E1	Total Access 5000 Access Module Blank Panel
TA5000 AMIO2 BLANK	1187923G1	Total Access 5000 Dual Access Module Rear Blank Panel
TA5000 AMIO1 BLANK	1187925G1	Total Access 5000 Access Module Rear Blank Panel
TA5000 Carrier Module Blank Panel	1174510G5	Total Access 5000 Carrier Module Blank Panel
TA5000 Reconfigurable Optical Add/Drop Multiplexers (ROADMs)		

TA5000 MARS-2, ROADM System	1174501G1	Mini Amplified ROADM System 1x2 with mid-stage pre-amp
TA5000 MARS-2P, ROADM System	1174502G1	Mini Amplified ROADM System 1x2 with VG pre-amp
TA5000 MARS-2B, ROADM System	1174503G1	Mini Amplified ROADM System 1x2 with a booster
TA5000 MARS-4PB, ROADM System	1174512G1	Mini Amplified ROADM System 1x4 with VG pre-amp and a booster
TA5000 MARS-4B, ROADM System	1174513G1	Mini Amplified ROADM System 1x4 with 21 dB booster
TA5000 Optical Multiplexers		
44 CH MUX/DeMUX	1174980F1	1RU 44 channel DWDM Mux/DeMux 100GHz Spacing, channel 17-60
88 CH MUX/DeMUX	1174982F1	2RU 88 channel DWDM Mux/DeMux 50GHz Spacing, channel 17-60.5
Carrier Module	1174510G3	Carrier Module for WDM cards. Up to 2 half height WDM modules can be plugged into the Carrier
TA5000 D4A1720, 4-CH DWDM OADM	1174920G2	TA5000 ONE 4 Channel DWDM OADM, channel 17-20 (1563.86nm - 1561.42nm)
TA5000 D4A2124, 4-CH DWDM OADM	1174920G1	TA5000 ONE 4 Channel DWDM OADM, channel 21-24 (1560.61nm - 1558.17nm)
TA5000 D4A2528, 4-CH DWDM OADM	1174921G1	TA5000 ONE 4 Channel DWDM OADM, 100 GHz spacing, channel 25-28 (1557.36nm - 1554.94nm)
TA5000 D4A2932, 4-CH DWDM OADM	1174922G1	TA5000 ONE 4 Channel DWDM OADM, channel 29-32 (1554.13nm - 1551.72nm)
TA5000 D4A3336, 4-CH DWDM OADM	1174923G1	TA5000 ONE 4 Channel DWDM OADM, 100 GHz spacing, channel 33-36 (1550.92nm - 1548.52nm)
TA5000 D4A3740, 4-CH DWDM OADM	1174924G1	TA5000 ONE 4 Channel DWDM OADM, 100 GHz spacing, channel 37-40 (1547.72nm - 1545.32nm)
TA5000 D4A4144, 4-CH DWDM OADM	1174925G1	TA5000 ONE 4 Channel DWDM OADM, 100 GHz spacing, channel 41-44 (1544.53nm - 1542.14nm)
TA5000 D4A4548, 4-CH DWDM OADM	1174926G1	TA5000 ONE 4 Channel DWDM OADM, 100 GHz spacing, channel 45-48 (1541.35nm - 1538.98nm)
TA5000 D4A4952, 4-CH DWDM OADM	1174927G1	TA5000 ONE 4 Channel DWDM OADM, 100 GHz spacing, channel 49-52 (1538.19nm - 1535.82nm)
TA5000 D4A5356, 4-CH DWDM OADM	1174928G1	TA5000 ONE 4 Channel DWDM OADM, 100 GHz spacing, channel 53-56 (1535.04nm - 1532.68nm)
TA5000 D4A5960, 4-CH DWDM OADM	1174929G1	TA5000 ONE 4 Channel DWDM OADM, 100 GHz spacing, channel 57-60 (1531.90nm - 1529.55nm)

TA5000 D8M2128, 8-CH DWDM MUX	1174910G1	TA5000 ONE 8 Channel DWDM MUX, 100 GHz spacing, channel 21-28 (1560.61nm - 1554.94nm)
TA5000 D8M2936, 8-CH DWDM MUX	1174911G1	TA5000 ONE 8 Channel DWDM MUX, 100 GHz spacing, channel 29-36 (1554.13nm - 1548.51nm)
TA5000 D8D2128, 8-CH DWDM DMUX	1174915G1	TA5000 ONE 8 Channel DWDM DeMUX, 100 GHz spacing, channel 21-28 (1560.61nm - 1554.94nm)
TA5000 D8D2936, 8-CH DWDM DMUX	1174916G1	TA5000 ONE 8 Channel DWDM DeMUX, 100 GHz spacing, channel 29-36 (1554.13nm - 1548.51nm)
Dispersion Compensation		
TA5000 DCM-B20	1174451G1	TA5000 ONE Fiber Bragg Grating Dispersion Compensation Module - 20KM.
TA5000 DCM-B40	1174452G1	TA5000 ONE Fiber Bragg Grating Dispersion Compensation Module - 40KM.
TA5000 DCM-B60	1174453G1	TA5000 ONE Fiber Bragg Grating Dispersion Compensation Module - 60KM.
TA5000 DCM-B80	1174454G1	TA5000 ONE Fiber Bragg Grating Dispersion Compensation Module - 80KM.
TA5000 DCM-B100	1174455G1	TA5000 ONE Fiber Bragg Grating Dispersion Compensation Module - 100KM.
TA5000 DCM-B120	1174456G1	TA5000 ONE Fiber Bragg Grating Dispersion Compensation Module - 120KM.
Amplifiers		
TA5000, OPBA-18 Booster Amp	1174402G1	Optical Pre Amp / Booster Amp. 15dB gain and output power of 18 dBm
TA5000 OPAM, Pre-Amp	1174411G1	Optical Pre-Amplifier Module. 27dB Gain and -35dBm minimum sensitivity.
TA 5000/5006 ONE Transport Modules		
TA5000 ETOS-1	1174101F1	TA5000 ONE Ethernet Transport Optical Switch. Integrated Ethernet switch and Muxponder functions with 2x10GE (XFP) and 16x1GE (SFP) interfaces.
TA5000 ETOS-1N	1174101F2	TA5000 ONE Ethernet Transport Optical Switch with OTN capable 10G interfaces. Integrated Ethernet switch and Muxponder functions with 2x10GE or OTU-2 OTN (XFP) and 16x1GE (SFP) interfaces.
TA5000 ETOS-1 PMOD LMIO4,ANSI	1174102F1	TA5000 ETOS-1 PMOD LMIO4,ANSI

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TA5000 ETOS-10	1174130F2	TA5000 ONE Ethernet Transport Optical Switch 10. Integrated Ethernet switch and Muxponder functions with 8x10GE (SFP+) and 2x1GE/2.5GE (SFP) interfaces.
TA5000 ETOS-10 PMOD LMI02,ANSI	1174131F1	TA5000 ETOS-10 PMOD LMI02,ANSI
TA5000 OTOS-2-16	1174123F1	TA5000 ONE OTN Transport Optical Switch with ODU-0 granularity and 2xOTU-2 (XFP) and 16 programmable mid speed SFP based interfaces (any service any port)
TA5K OTOS-2-16 PMOD LMI04,ANSI	1174111F1	TA5K OTOS-2-16 PMOD LMI04,ANSI
TA5000 OTOS-1-8	1174121F1	TA5000 ONE OTN Transport Optical Switch with 1xOTU-2 (XFP) and 8 programmable mid speed SFP based interfaces (any service any port)
TA5K OTOS-1-8 PMOD LMI02,ANSI	1174122F1	TA5K OTOS-1-8 PMOD LMI02,ANSI
TA5000 TPR-10-4	1174211G1	TA5000 ONE Multi-Protocol 10G Transponder with 4x10G XFP Interfaces. Can be used as dual 10G transponder or regenerator.
WDM XFP C-Temp		
XFP 10G 1563.86NM 80KM ET, 17	1442982G8C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1563.05NM 80KM ET, 18	1442982G9C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1562.23NM 80KM ET, 19	1442983G1C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1561.42NM 80KM ET, 20	1442983G2C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1560.61NM 80KM ET, 21	1442981G1C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1559.79NM 80KM ET, 22	1442981G2C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1558.98NM 80KM ET, 23	1442981G3C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1558.17NM 80KM ET, 24	1442981G4C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1557.36NM 80KM ET, 25	1442981G5C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1556.56NM 80KM ET, 26	1442981G6C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1555.75NM 80KM ET, 27	1442981G7C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1554.94NM 80KM ET, 28	1442981G8C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1554.13NM 80KM ET, 29	1442981G9C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.

XFP 10G 1553.33NM 80KM ET, 30	1442982G1C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1552.52NM 80KM ET, 31	1442982G2C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1551.72NM 80KM ET, 32	1442982G3C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1550.92NM 80KM ET, 33	1442982G4C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1550.12NM 80KM ET, 34	1442982G5C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1549.32NM 80KM ET, 35	1442982G6C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1548.52NM 80KM ET, 36	1442982G7C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1547.72NM 80KM ET, 37	1442983G3C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1546.92NM 80KM ET, 38	1442983G4C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1546.12NM 80KM ET, 39	1442983G5C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1545.32NM 80KM ET. 40	1442983G6C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1544.53NM 80KM ET, 41	1442983G7C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1543.73NM 80KM ET, 42	1442983G8C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1542.94NM 80KM ET, 43	1442983G9C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1542.14NM 80KM ET, 44	1442986G1C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1541.35NM 80KM ET. 45	1442986G2C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1540.56NM 80KM ET. 46	1442986G3C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1539.77NM 80KM ET, 47	1442986G4C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1538.98NM 80KM ET, 48	1442986G5C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1538.19NM 80KM ET, 49	1442986G6C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFO 10G 1537.40NM 80KM ET, 50	1442986G7C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1536.61NM 80KM ET, 51	1442986G8C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1535.82NM 80KM ET, 52	1442986G9C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1535.04NM 80KM ET, 53	1442987G1C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1534.25NM 80KM ET, 54	1442987G2C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.

XFP 10G 1533.47NM 80KM ET, 55	1442987G3C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1532.68NM 80KM ET, 56	1442987G4C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1531.90NM 80KM ET, 57	1442987G5C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1531.12NM 80KM ET, 58	1442987G6C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1530.33NM 80KM ET, 59	1442987G7C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
XFP 10G 1529.55NM 80KM ET, 60	1442987G8C	10 GbpS DWDM XFP. 80 km range, NOT temperature hardened.
WDM Tunable XFP C-Temp		
XFP 10G Tunable 80KM ET	1442985G1C	10 GbpS DWDM Tunable XFP. 80 km range, NOT temperature hardened.
WDM SFP+ (10.7G)		
SFP+ 10G 1563.86NM DWDM CH17 CT, 80 KM	1442485G5C	SFP+ 10G 1563.86 DWDM CH17 CT
SFP+ 10G 1563.05NM DWDM CH18 CT, 80 KM	1442485G6C	SFP+ 10G 1563.05 DWDM CH18 CT
SFP+ 10G 1562.23NM DWDM CH19 CT, 80 KM	1442485G7C	SFP+ 10G 1562.23 DWDM CH19 CT
SFP+ 10G 1561.42NM DWDM CH20 CT, 80 KM	1442485G8C	SFP+ 10G 1561.42 DWDM CH20 CT
SFP+ 10G 1560.61 DWDM CH21 CT, 80 km	1442481G1C	SFP+ 10G 1560.61 DWDM CH21 CT
SFP+ 10G 1559.79 DWDM CH22 CT, 80 km	1442481G2C	SFP+ 10G 1559.79 DWDM CH22 CT
SFP+ 10G 1558.98 DWDM CH23 CT, 80 km	1442481G3C	SFP+ 10G 1558.98 DWDM CH23 CT
SFP+ 10G 1558.17 DWDM CH24 CT, 80 km	1442481G4C	SFP+ 10G 1558.17 DWDM CH24 CT
SFP+ 10G 1557.36 DWDM CH25 CT, 80 km	1442481G5C	SFP+ 10G 1557.36 DWDM CH25 CT
SFP+ 10G 1556.56 DWDM CH26 CT, 80 km	1442481G6C	SFP+ 10G 1556.56 DWDM CH26 CT
SFP+ 10G 1555.75 DWDM CH27 CT, 80 km	1442481G7C	SFP+ 10G 1555.75 DWDM CH27 CT
SFP+ 10G 1554.94 DWDM CH28 CT, 80 km	1442481G8C	SFP+ 10G 1554.94 DWDM CH28 CT
SFP+ 10G 1554.13NM DWDM CH29 CT, 80KM	1442481G9C	SFP+ 10G 1554.10 DWDM CH29 CT
SFP+ 10G 1553.33NM DWDM CH30 CT, 80KM	1442482G1C	SFP+ 10G 1553.33 DWDM CH30 CT
SFP+ 10G 1552.52NM DWDM CH31 CT, 80KM	1442482G2C	SFP+ 10G 1552.52 DWDM CH31 CT
SFP+ 10G 1551.72NM DWDM CH32 CT, 80KM	1442482G3C	SFP+ 10G 1551.72 DWDM CH32 CT
SFP+ 10G 1550.92NM DWDM CH33 CT, 80KM	1442482G4C	SFP+ 10G 1550.92 DWDM CH33 CT

SFP+ 10G 1550.12NM DWDM CH34 CT, 80KM	1442482G5C	SFP+ 10G 1550.12 DWDM CH34 CT
SFP+ 10G 1549.32NM DWDM CH35 CT, 80KM	1442482G6C	SFP+ 10G 1549.32 DWDM CH35 CT
SFP+ 10G 1548.52NM DWDM CH36 CT, 80KM	1442482G7C	SFP+ 10G 1548.52 DWDM CH36 CT
SFP+ 10G 1547.72NM DWDM CH37 CT, 80KM	1442482G8C	SFP+ 10G 1547.72 DWDM CH37 CT
SFP+ 10G 1546.92NM DWDM CH38 CT, 80KM	1442482G9C	SFP+ 10G 1546.92 DWDM CH38 CT
SFP+ 10G 1546.12NM DWDM CH39 CT, 80KM	1442483G1C	SFP+ 10G 1546.12 DWDM CH39 CT
SFP+ 10G 1545.32NM DWDM CH40 CT, 80KM	1442483G2C	SFP+ 10G 1545.32 DWDM CH40 CT
SFP+ 10G 1544.53NM DWDM CH41 CT, 80KM	1442483G3C	SFP+ 10G 1544.53 DWDM CH41 CT
SFP+ 10G 1543.73NM DWDM CH42 CT, 80KM	1442483G4C	SFP+ 10G 1543.73 DWDM CH42 CT
SFP+ 10G 1542.94NM DWDM CH43 CT, 80KM	1442483G5C	SFP+ 10G 1542.94 DWDM CH43 CT
SFP+ 10G 1542.14NM DWDM CH44 CT, 80KM	1442483G6C	SFP+ 10G 1542.14 DWDM CH44 CT
SFP+ 10G 1541.35NM DWDM CH45 CT, 80KM	1442483G7C	SFP+ 10G 1541.35 DWDM CH45 CT
SFP+ 10G 1540.56NM DWDM CH46 CT, 80KM	1442483G8C	SFP+ 10G 1540.56 DWDM CH46 CT
SFP+ 10G 1539.77NM DWDM CH47 CT, 80KM	1442483G9C	SFP+ 10G 1539.77 DWDM CH47 CT
SFP+ 10G 1538.98NM DWDM CH48 CT, 80KM	1442484G1C	SFP+ 10G 1538.98 DWDM CH48 CT
SFP+ 10G 1538.19NM DWDM CH49 CT, 80KM	1442484G2C	SFP+ 10G 1538.19 DWDM CH49 CT
SFP+ 10G 1537.40NM DWDM CH50 CT, 80KM	1442484G3C	SFP+ 10G 1537.40 DWDM CH50 CT
SFP+ 10G 1536.61NM DWDM CH51 CT, 80KM	1442484G4C	SFP+ 10G 1536.61 DWDM CH51 CT
SFP+ 10G 1535.82NM DWDM CH52 CT, 80KM	1442484G5C	SFP+ 10G 1535.82 DWDM CH52 CT
SFP+ 10G 1535.04NM DWDM CH53 CT, 80KM	1442484G6C	SFP+ 10G 1535.04 DWDM CH53 CT
SFP+ 10G 1534.25NM DWDM CH54 CT, 80KM	1442484G7C	SFP+ 10G 1534.25 DWDM CH54 CT
SFP+ 10G 1533.47NM DWDM CH55 CT, 80KM	1442484G8C	SFP+ 10G 1533.47 DWDM CH55 CT
SFP+ 10G 1532.68NM DWDM CH56 CT, 80KM	1442484G9C	SFP+ 10G 1532.68 DWDM CH56 CT
SFP+ 10G 1531.90NM DWDM CH57 CT, 80KM	1442485G1C	SFP+ 10G 1531.90 DWDM CH57 CT
SFP+ 10G 1531.12NM DWDM CH58 CT, 80KM	1442485G2C	SFP+ 10G 1531.12 DWDM CH58 CT

SFP+ 10G 1530.33NM DWDM CH59 CT, 80KM	1442485G3C	SFP+ 10G 1530.33 DWDM CH59 CT
SFP+ 10G 1529.55NM DWDM CH60 CT, 80KM	1442485G4C	SFP+ 10G 1529.55 DWDM CH60 CT
Non-WDM SFP / XFP		
XFP 10G MULTI-MODE FIBER	1442901G1	XFP 10G MULTI-MODE FIBER
XFP, 10G, 1310NM, 10KM	1442910G1	XFP, 10G, 1310NM, 10KM
XFP 10G 1550NM 80KM CTEMP	1442980G1C	XFP 10G 1550NM 80KM CTEMP
SFP+ 10G MMF	1442401G1	SFP+ 10G MMF, 850 nm
SFP+ 10G 1310NM SMF 10KM	1442410G1	SFP+ 10G 1310NM SMF 10KM
SFP+ 10G 1310NM SMF 20KM	1442420G1	SFP+ 10G 1310NM SMF 20KM
SFP+ 10G 1550NM SMF 40KM	1442440G1	SFP+ 10G 1550NM SMF 40KM
SFP+ 10G 1550NM SMF 80KM CTMP	1442480G1C	SFP+ 10G 1550NM SMF 80KM CTMP
SFP, OC-48, 5KM, 1310NM SR	1184560P6	SR OPTICS SFP OC-48
SFP, 3.123 G, 1510 nm, 60 km	1442861G1	Small Form-Factor Pluggable 3.125 Gigabit Ethernet 1510 nm CWDM
SFP, OC-48 1310 nm, IR-1, 15 km	1184560P2	SFP, OC-48 1310 nm, IR-1, 15 km
SFP, OC-48 1550 nm, LR-2, 80 km	1184560P5	SFP, OC-48 1550 nm, LR-2, 80 km
SFP, OC-48 1310 nm, SR-1, 2 km	1184560P6	SFP, OC-48 1310 nm, SR-1, 2 km
SFP GIGE 1310NM SMF 10KM	1184561PG1	SFP GIGE 1310NM SMF 10KM
SFP GIGE 850NM MMF SHORT	1184561PG3	SFP GIGE 850NM MMF SHORT
SFP GigE 1550 nm, 1000Base-ZX, 80 km	1184562PG5	SFP GigE 1550 nm, 1000Base-ZX, 80 km
SFP, OC-12 1310 nm, IR-1, 15 km	1184544PG2	SFP, OC-12 1310 nm, IR-1, 15 km
SFP, OC3 IR SFP 1310 nm 10 km	1184543PG2	SFP, OC3 IR SFP 1310 nm 10 km

SERVICES

In all cases, implementation services vary greatly depending on the product mix, customer specific requirements and site specific architecture. Therefore, in all cases a Statement of Work must be prepared and provided as the part of any quote.

ADTRAN will generate an ADTRAN specific project quote #. Any Purchase Order received by ADTRAN must have this Quote # attached or referenced before ADTRAN will acknowledge or process the order. In addition, it is advisable to return the SOW signed by the customer with the purchase order. This ensures all parties know what is being delivered by ADTRAN and minimizes the need for changes and PO revisions and potential delay projects.

Installations are performed in 3 stages:

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1) **Physical Installation (optional)**
2) **Test & Turn-up (requires either on-site or remote ADTRAN Professional Services depending on the complexity of the project)**
3) **Cutover (optional)**

Physical installation of the TA5000/TA5006 is optional.
However, if ADTRAN is requested to provide the physical installation pricing is subject to the specific Statement of Work to be performed.

The SOW can vary significantly based on results of a Site Survey or Customer provided Engineering Design Package.

Examples of areas that can significantly affect SOW and pricing:

1) **Rack (existing or does a new rack need to be installed)**
2) **Power (is sufficient power available, if not, will ADTRAN be installing or upgrading power systems. If so, what are the customer's power system specifications, distances, etc.**
3) **Ladder racking (is ladder racking in place or will ADTRAN be providing ladder racking. If so, items such as: distances turns, evaluations (i.e. layout) all affect the SOW pricing.**
4) **Interconnect cabling – distances, turns**
5) **Is splicing required**
6) **Etc.**

If ADTRAN is requested to provide Physical Installation, a specific SOW will be drafted and reviewed with the customer based on the Site Survey or Engineering Design Package.

ADTRAN will use the following part numbers to appropriately price the project.

P/N: 1901ADPLYT5K0GA1
Description: INSTALLATION TA5K
Quantities are used to adjust total price according to the SOW.
In addition, to the above, ADTRAN may also add a travel or mobilization fee depending on the site locations and duration.

Pricing for Test & Turn-up is based on the number of cards, types of cards, number of nodes and site locations using the following part numbers:

Service	Part	Description
Remote Test & Turn-up Support	1901BRTUC4HDAY01	REMOTE TURN/CUT SUPPORT-4HR
	1901BRTUC4HNGT01	REMOTE TURN/CUT SUP(NIGHT-4HR)
	1901BRTUC4HWEH01	REMOTE TURN/CUT SUP(WEHOL-4HR)
Onsite Test and Turn-up	1901BTTUPPXNEGA1	ONSITE T&TU (TOS CARDS)
	1901BTTUPPXNEGA2	ONSITE T&TU (MUXES, CARRIER)

	1901BTTUPPXNEGA3	ONSITE T&TU (ROADM, DCM)
	1901BTTUPPXNEGA4	ONSITE T&TU TOS PORT DWDM
	1901BTTUPPXNEGA5	ONSITE T&TU TOS PORT 1G-10G
Optional Services	1901BFBCBPONEGA1	FIBER CHARACTERIZATION BASE
	1901BFCADPONEGA1	FIBER CHARACTERIZATION ADD-ON

Cutover is optional.
However, is ADTRAN is requested to perform or support this service, ADTRAN will price using the part numbers and unit prices below according to the duration imposed by the customer's methods and procedures.
Typically ADTRAN will estimate the number of cutovers that can be performed based on the above.
For example, if customer has 100 cutovers to be performed and ADTRAN has estimated that 30 can be completed per customer's maintenance window and required methods and procedures ADTRAN will charge quantity 4 of the specific part below.

Part	Service	Description
1901BRTUC4HDAY01	REMOTE TURN/CUT SUPPORT-4HR	REMOTE TURN/CUT SUPPORT-4HR
1901BRTUC4HNGT01	REMOTE TURN/CUT SUP(NIGHT-4HR)	REMOTE TURN/CUT SUP(NIGHT-4HR)
1901BRTUC4HWEH01	REMOTE TURN/CUT SUP(WEHOL-4HR)	REMOTE TURN/CUT SUP(WEHOL-4HR)
1901AOISUDAYTM01	ON-SITE SUPPORT (DAILY-NBH)	ON-SITE SUPPORT (DAILY-NBH)
1901AOISUNIGHT01	ON-SITE SUPPORT (DAILY-NIGHT)	ON-SITE SUPPORT (DAILY-NIGHT)
1901BOTUCWEKLY01	ON-SITE SUPPORT (WEEKLY)	ON-SITE SUPPORT (WEEKLY)
1901BOTUCWEHOL01	ON-SITE SUPPORT (WEEKENDHOL)	ON-SITE SUPPORT (WEEKENDHOL)

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P/N	Network Care Program	Description
1902PTACR7AT3C01	PREMIUM NETWORK CARE(T3-5K)	PREMIUM NETWORK CARE(T3-5K)
1902PTACR7AT3B01	PREMIUM NETWORK CARE(T3-5K10K)	PREMIUM NETWORK CARE(T3-5K10K)
1902PTACR7AT3A01	PREMIUM NETWORK CARE(T3-10K)	PREMIUM NETWORK CARE(T3-10K)
TBD	PREMIUM NETWORK CARE for access lines > 100,000 as determined by ADTRAN CN Services	PREMIUM NETWORK CARE for access lines > 100,000 as determined by ADTRAN CN Services
1902ADVRS7AT3C01	TOTAL NETWORK CARE(T3-5K)	TOTAL NETWORK CARE(T3-5K)
1902ADVRS7AT3B01	TOTAL NETWORK CARE(T3-5K10K)	TOTAL NETWORK CARE(T3-5K10K)
1902ADVRS7AT3A01	TOTAL NETWORK CARE(T3-10K)	TOTAL NETWORK CARE(T3-10K)
TBD	TOTAL NETWORK CARE for access lines > 100,000 as determined by ADTRAN CN Services	TOTAL NETWORK CARE for access lines > 100,000 as determined by ADTRAN CN Services
Part	**Service**	**Description**
1901ADPLYT5K0GA1	#N/A	#N/A
1901BRTUC4HDAY01	REMOTE TURN/CUT SUPPORT-4HR	REMOTE TURN/CUT SUPPORT-4HR

1901BRTUC4HNGT01	REMOTE TURN/CUT SUP(NIGHT-4HR)	REMOTE TURN/CUT SUP(NIGHT-4HR)
1901BRTUC4HWEH01	REMOTE TURN/CUT SUP(WEHOL-4HR)	REMOTE TURN/CUT SUP(WEHOL-4HR)
1901BTTUPPXNEGA1	ONSITE T&TU (TOS CARDS)	ONSITE T&TU (TOS CARDS)
1901BTTUPPXNEGA2	ONSITE T&TU (MUXES, CARRIER	ONSITE T&TU (MUXES, CARRIER
1901BTTUPPXNEGA3	ONSITE T&TU (ROADM, DCM)	ONSITE T&TU (ROADM, DCM)
1901BTTUPPXNEGA4	ONSITE T&TU TOS PORT DWDM	ONSITE T&TU TOS PORT DWDM
1901BTTUPPXNEGA5	ONSITE T&TU TOS PORT 1G-10G	ONSITE T&TU TOS PORT 1G-10G
1901BFBCBPONEGA1	FIBER CHARACTERIZATION BASE	FIBER CHARACTERIZATION BASE
1901BFCADPONEGA1	FIBER CHARACTERIZATION ADD-ON	FIBER CHARACTERIZATION ADD-ON

AOE

ADTRAN Services Management
Advanced Operation Environment (AOE) Software – P/N 4150800G1
The 4150800G1 part number includes the following:

AOE/EMS Application Software (for all supported platforms: Solaris, Windows and Linux)
All AOE Product keys – refer to Appendix
A below
100 Category I licenses (support for ALL CN managed devices)
Unlimited Category IV Licenses (support for ADTRAN and ACP ONTs)
OSS GW Key – supports automated provisioning
AOE/EMS documentation
One year of AOE annual maintenance (additive to 90 day warranty)

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Additional details on the above components are provided below.
AOE basic features include:

- AOE Basic Package contents
  - Dashboards – alarm summary, scheduler status, CapacityMonitor Alerts, ServiceMonitor Alerts
  - Alarm reporting – network wide alarm details
  - Discovery – manual initiation for discovery
  - Network View – complete tree/topology view
  - Software Upgrades – single GUI for all managed ADTRAN CN devices
  - Scheduler – network device resync, network device heartbeat, network device software upgrade
  - Disaster recovery – SCA collection and push
  - Detailed Provisioning – per device/port provisioning, status, configuration, testing

AOE Product keys enable the following applications (refer to Appendix A for details):

ServiceActivator
ServiceDesigner
ServiceCheck
ServiceMonitor
CapacityManager
InventoryManager
LinkDesigner
Ethernet and Optical Services

The AOE Annual Maintenance Support includes:

- Updates to the Total Access AOE software
- Planned feature enhancements to the Total Access AOE software
- New product support within the Total Access AOE software
- Total Access AOE software patches and bug fixes
- Best effort Telephone Technical Support during ADTRAN's normal business hours (7 a.m. to 7 p.m. CST, Monday through Friday, excluding holidays)

APPENDIX A – AOE Features

AOE features include:

Service Definition and Activation (MACD/SR)

- **ServiceActivator®** – end to end service activation
- **ServiceDesigner®**– service profile/template manager (basic)
- **Ethernet Access Services** – service activation for EoX
- **OPTI6100 Services –** TDM service activation on OPTI-6100 subtended rings

Network Design

- **LinkManager®**

Optical infrastructure definition
Optical infrastructure provisioning

Protection Domain configuration

Troubleshooting: includes the following functions:

- **ServiceCheck®** – knowledge based troubleshooting

Service Assurance

- **ServiceMonitor®** – proactive monitoring of service BW and parameters, Y.1731, Ethernet OAM, SLA and QoS
- **CapacityManager®** – trunk utilization over time
- **Alarm Window** – human readable alarm listing with color coded severity

Asset Management

- **InventoryManager®** – network wide provisioning and inventory information
- **Discovery** – manual initiation for discovery for new managed objects
- **SW upgrade** – single GUI for all managed ADTRAN CN devices
- **SW Auto-Upgrade** – single GUI for centralized ONT firmware management and upgrade control
- **Scheduler** – network device resync, network device heartbeat, network device software upgrade

Administrative

- **Licenses/Keys** – application and viewing of keys
- **AOE Client** – administrative control of client access
- **Administrator Settings** – controls for email alerts, users, user groups, user accounts, alarm processing

Help

- **About AOE** – AOE version and license key status
- **Port Status Legend** – key for port status in Network Device Manager

Part	Short Description	Description
4150800G1/10	AOE SERVICE MGMNT PACKAGE	The 4150800G1 part number includes the following: AOE/EMS Application Software (for all supported platforms: Solaris, Windows and Linux); All AOE Product keys;100 Category I licenses (supports ALL CN managed devices); Unlimited Category IV Licenses (support for ADTRAN ONTs); OSS GW Key; AOE/EMS documentation; One year of Annual Maintenance (additive to 90 day warranty)

1150TAEMSL1	AOE Annual Maintenance	The AOE Annual Maintenance Support includes: · Updates to the Total Access AOE software · Planned feature enhancements to the Total Access AOE software · New product support within the Total Access AOE software · Total Access AOE software patches and bug fixes · Best effort Telephone Technical Support during ADTRAN's normal business hours &7 a.m. to 7 p.m. CST, Monday through Friday, excluding holidays)

ADTRAN will use the following part numbers to appropriately price the AOE annual maintenance for opportunities that exceed the maximum number of 100 managed devices, supported by the 4150800G1 part number.

P/N: 1150TAEMSL1
Description: AOE Annual Maintenance
In cases where the number of managed devices/network elements exceeds quantity 100, an additional maintenance charge is required up front, in addition to the maintenance for the 4150800G1. This part number is used to quote and invoice this additional annual maintenance.

TRAINING		
1600CSYS5020E	TA5000 ONE TRAINING	Total Access 5000 ONE Enrollment
1600CSYS5020C	TA5000 ONE COURSE	Total Access 5000 ONE Course

5.2.5 ROUTERS — A device that forwards data packets along networks. A router is connected to at least two networks, commonly two LANs or WANs or a LAN and its ISP's network. Routers are located at gateways, the places where two or more networks connect, and are the critical device that keeps data flowing between networks and keep the networks connected to the Internet.
ADTRAN has read and understands Section 5.1.5. Please see the subsections below for the ADTRAN product offering.

5.2.5.1 **Branch Routers** — A multiservice router typically used in branch offices or locations with limited numbers of users and supports flexible configurations/feature. For example: security, VoIP, wan acceleration, etc.

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ADTRAN is proud to propose the ADTRAN NetVanta 3400 Series and 4000 Series routers.

The NetVanta 3400 Series are Multiservice Access Routers that accomplish multiple networking functions in a single compact platform; an IP router, a modular WAN interface, stateful inspection firewall, and can support IPSec Virtual Private Networking (VPN) as well. This Series delivers the high-packet throughput required for IP Telephony, corporate connectivity, Internet access, and Carrier Ethernet. These performance-enhanced platforms deliver wire-speed throughput, even with advanced services like VQM, QoS, NAT, Firewall, and VPN-enabled.

- **Standards-based routing/switching protocols**
- **RapidRoute technology for greater performance**
- **Inherent URL filtering to manage Internet access**
- **IPSec Virtual Private Network (VPN) for secure corporate connectivity across the Internet**
- **Voice Quality Monitoring (VQM) for Mean Opinion Score (MOS) prediction**
- **CompactFlash slot for backup and restore, and for auto-provisioning**
- **Wi-Fi Access Controller for centralized management of NetVanta Wireless Access Points (WAPs)**

The NetVanta 4000 Series is designed for cost-effective Internet access, MPLS, corporate Frame Relay, point-to-point connectivity, ADSL, VPN and Carrier Ethernet for high-bandwidth applications. The NetVanta 4000 Series are modular platforms that offer Ethernet LAN ports (Fast or Gig), one wide-slot for the Octal T1 Wide NIM Module, and two NIM slots that will house a variety of the NetVanta Network Interface Modules (NIMs) and Dial Backup Modules (DIMs).

- **Three-slot, Dual-Ethernet Modular Access Router for eight-T1s of bandwidth or up to 750Mbps of Carrier Ethernet (NetVanta 4430)**
- **Stateful inspection firewall for network security**
- **Quality of Service (QoS) for delay-sensitive traffic like Voice over IP (VoIP)**
- **Voice Quality Monitoring (VQM) for MOS prediction**
- **Recognizable CLI and intuitive Web-based GUI**
- **Wi-Fi Access Controller for centralized management of NetVanta Wireless Access Points (WAPs)**

Throughput numbers below are for IMIX traffic and are in Mbps.

	Routing, FW & NAT	**Routing, FW/NAT with QoS and Shaping**
NV3430	100	50
NV3450	150	100
NV3448	100	50
NV3458	150	100

NV4430	750	150

ADTRAN is also proud to offer the Total Access 900e Series and NetVanta 6250 Series

ADTRAN offers a full line of IP Business Gateways for converged IP networks. The Total Access 900e Series is ideal for networks transitioning to VoIP and offers a number of fixed-port configurations for PRI and analog termination. The NetVanta 6250 is an innovative, highly performing IPBG also used for transitioning VoIP customers with its ability to support 100M Ethernet services. It can terminate fiber or copper GigE and supports 3 PRI and 24 analog FXS and up to 9 FXO interfaces.

All of these platforms provide SIP/MGCP-gateway functionality, support for a number of analog and digital interfaces for existing phone equipment, or for the combination of an IP PBX and an analog fax/phone or modem. Transparent proxy functionality and remote survivability provide backup capability for phone support in the event of a Wide Area Network (WAN) outage.

- **Carrier-class, cost-effective IP Business Gateways for integrated services such as Business Trunking, Hosted VoIP and SIP trunking**
- **Robust routing for business class services.**
- **Stateful inspection firewall for network security**
- **Quality of Service (QoS) for delay-sensitive traffic like VoIP**
- **Voice Quality Monitoring (VQM) for MOS prediction**
- **Recognizable CLI and intuitive Web-based GUI**
- **Wi-Fi Access Controller for centralized management of NetVanta Wireless Access Points (WAPs)**
- **Industry-leading product, support, and warranty**

Please refer to Appendix C for supporting documentation for this section.

5.2.5.2 **Network Edge Routers** — A specialized router residing at the edge or boundary of a network. This router ensures the connectivity of its network with external networks, a wide area network or the Internet. An edge router uses an External Border Gateway Protocol, which is used extensively over the Internet to provide connectivity with remote networks.
The NetVanta 4000 Series is designed for cost-effective Internet access, MPLS, corporate Frame Relay, point-to-point connectivity, ADSL, VPN and Carrier Ethernet for high-bandwidth applications. The NetVanta 4000 Series are modular platforms that offer Ethernet LAN ports (Fast or Gig), one wide-slot for the Octal T1 Wide NIM Module, and two NIM slots that will house a variety of the NetVanta Network Interface Modules (NIMs) and Dial Backup Modules (DIMs).

- **Three-slot, Dual-Ethernet Modular Access Router for eight-T1s of bandwidth or up to 750Mbps of Carrier Ethernet (NetVanta 4430)**
- **Stateful inspection firewall for network security**
- **Quality of Service (QoS) for delay-sensitive traffic like Voice over IP (VoIP)**

- **Voice Quality Monitoring (VQM) for MOS prediction**
- **Recognizable CLI and intuitive Web-based GUI**
- **Wi-Fi Access Controller for centralized management of NetVanta Wireless Access Points (WAPs)**

NetVanta 6250 Series
The NetVanta 6250 is an innovative, highly performing IPBG also used for transitioning VoIP customers with its ability to support 100M Ethernet services. It can terminate fiber or copper GigE and supports 3 PRI and 24 analog FXS and up to 9 FXO interfaces.

These platforms provide SIP/MGCP-gateway functionality, support for a number of analog and digital interfaces for existing phone equipment, or for the combination of an IP PBX and an analog fax/phone or modem. Transparent proxy functionality and remote survivability provide backup capability for phone support in the event of a Wide Area Network (WAN) outage.

- **Carrier-class, cost-effective IP Business Gateways for integrated services such as Business Trunking, Hosted VoIP and SIP trunking**
- **Flexible WAN interfaces support up to 4 T1s of bandwidth up to 300 Mbps of Carrier Ethernet**
- **Robust routing for business class services.**
- **Stateful inspection firewall for network security**
- **Quality of Service (QoS) for delay-sensitive traffic like VoIP**
- **Voice Quality Monitoring (VQM) for MOS prediction**
- **Recognizable CLI and intuitive Web-based GUI**
- **Wi-Fi Access Controller for centralized management of NetVanta Wireless Access Points (WAPs)**
- **Industry-leading product, support, and warranty**

Please refer to Appendix C for supporting documentation for this section.

5.2.5.3 **Core Routers** - High performance, high speed, low latency routers that enable Enterprises to deliver a suite of data, voice, and video services to enable next-generation applications such as IPTV and Video on Demand (VoD), and Software as a Service (SaaS).
ADTRAN will not be proposing solutions for Section 5.2.5.3.

5.2.5.4 **Service Aggregation Routers** — Provides multiservice adaptation, aggregation and routing for Ethernet and IP/MPLS networks to enable service providers and enterprise edge networks simultaneously host resource-intensive integrated data, voice and video business and consumer services.
ADTRAN will not be proposing solutions for Section 5.2.5.4.

5.2.5.5 **Carrier Ethernet Routers** — High performance routers that enable service providers to deliver a suite of data, voice, and video services to enable next-generation applications such as IPTV, Video on Demand (VoD), and Software as a Service (SaaS).

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ADTRAN will not be proposing solutions for Section 5.2.5.5.

ADTRAN Parts List (Product/Management/Services/Training) for applicable sections of 5.2.5:

PART NUMBER	MODEL	DESCRIPTION
4200820E2	NTVANTA 3430,W/ENHNCE FEAT PCK	Access router for frame relay and point-to-point connectivity. Includes modular network interface and 2 integral10/100BaseT Ethernet ports. Supports all current NetVanta Interface Modules. Features include IP routing, OSPF, BGP, RIP V1 and V2, Static routes, 802.1d Bridging (all protocols), Command Line Interface, Frame Relay and PPP WAN Protocols, optional Modular Dial Backup, SNMP, Telnet, Craft/Console port, TFTP support, stateful inspection firewall. Desktop or wallmount chassis. CHASSIS ONLY. Rackmount brackets included. Includes Enhanced Feature Pack software for IPSec-based VPN supporting DES/3DES/AES encryption
4200821E2	NTVNTA 3448,W/ ENHNCE FEAT PCK	Access router for frame relay and point-to-point connectivity. Includes modular network interface and 2 integral10/100BaseT Ethernet ports. Also includes integrated 8 Port Fully-Managed Layer 2 Ethernet Switch. Supports all current NetVanta Interface Modules. Features include IP routing, OSPF, BGP, RIP V1 and V2, Static routes, 802.1d Bridging (all protocols), Command Line Interface, Frame Relay and PPP WAN Protocols, optional Modular Dial Backup, SNMP, Telnet, Craft/Console port, TFTP support, stateful inspection firewall. Desktop or wallmount chassis. CHASSIS ONLY. Rackmount brackets included. Includes Enhanced Feature Pack software for IPSec-based VPN supporting DES/3DES/AES encryption and Voice Quality Monitoring for MOS detection, packet loss, jitter and delay.
4200823G2	NETVANTA 3450 W/EFP	Modular access router that includes two (2) network interface slots and two (2) integral10/100BaseT Ethernet ports. Includes Enhanced Feature Pack firmware that provides additional functionality including IPSec VPN capability. 1U metal chassis with 19inches rackmount brackets included.
4200824G2	NETVANTA 3458 W/EFP	Modular access router that includes two (2) network interface slots, two (2) integral10/100BaseT Ethernet ports, and an integrated eight (8) port fully-managed Layer 2 ethernet switch with optional Power over Ethernet (PoE) capability. Includes Enhanced Feature Pack firmware that provides additional functionality including IPSec VPN capability. 1U metal chassis with 19inches rackmount brackets included.

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4700630G2	NTVNTA 4430 W/ENHANCE FEAT PCK	NetVanta 4430 (1700630E1) chassis with Enhanced Feature Pack (EFP) software, adding support for up to1000 IPSec VPN tunnels and support for Voice Quality Monitoring (VQM).
1202862L1	NETVANTA T1 NIM, GEN 2	T1/FT1 Network Interface Module (NIM) for NetVanta modular routers and multiservice access routers equipped with a NIM slot. Provides T1/FT1 network interface.
1202863L1	T1+DSX-1 NIM, GEN 2	T1/FT1 + DSX-1 Network Interface Module (NIM) for NetVanta modular routers and multiservice access routers equipped with a NIM slot. Provides T1/FT1 network interface and DSX-1 interface to userfts voice equipment (e.g., PBX).
1202872L1	NETVANTA DUAL T1 NIM, 2ND GEN	Dual T1/FT1 Network Interface Module (NIM) for NetVanta Modular routers. 2nd GEN model supports independent timing on each T1 interface and supports v.90 Analog modem DIM only (no ISDN DIM support).
1202843E1	OCTAL T1/E1, 2ND GEN	Octal T1 or E1 Wide Module for use in the NetVanta 4305 or 5305. Supports NxT1/E1 connections with MLPPP. Supports 8 separate T1 or E1 connections of Frame Relay or PPP.
1202869E1	NETVANTA ADSL NIM ANNEX A	The ADSL (NIM) Network Interface Module adds ADSL capability to the NetVanta. The module provides a single ADSL, ADSL2, or ADSL2+ network interface.
1200936E1	NETVANTA SDHSL NIM ANNEX A	2 Wire and 4 Wire ATM-Based Annex A SHDSL Network Interface Module (NIM). Used with NetVanta modular routers and multiservice access routers equipped with a NIM slot.
1200866E1	NETVANTA ROUTER SERIAL	Serial Interface for V.35 or X.21/V.11 connections to external DSU/CSU. V.35 (1200873L1) and X.21/V.11 (1200874L1) cables sold separately. Used with NetVanta modular routers and multiservice access routers equipped with a NIM slot.
4243908F1	TA 908E, 3RD GEN	Total Access 908e IP Business Gateway- Designed for WAN flexibility using Ethernet or T1 WAN. Includes 1 Gigabit 10/100/1000 BaseT port, two 10/100 BaseT interfaces, four T1 interfaces ,8 FXS ports, and IP Router. VoIP gateway supports simultaneous Back-to-Back User Agent (B2BUA) and SIP proxy functionality. Includes G.168 Echo Cancellation, support for G.711 and G.729a CODECs and supports up to 60 simultaneous TDM to VoIP call conversions. Supports VoIP applications using SIP (for analog, PRI, and IP endpoints/PBX) and MGCP (for analog only). Router features include OSPF, BGP, RIP V1/V2, Static routes, VRRP, multi-VRF, and stateful inspection firewall. OPTIONAL Session Border Controller Feature Pack also available.

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4243908F2	TA 908E W/ 1FXO, 3RDGEN	Total Access 908e IP Business Gateway- Designed for WAN flexibility using Ethernet or T1 WAN. Includes 1 Gigabit 10/100/1000 BaseT port, two 10/100 BaseT interfaces, four T1 interfaces ,8 FXS ports, and IP Router. Includes lifeline FXO interface. VoIP gateway supports simultaneous Back-to-Back User Agent (B2BUA) and SIP proxy functionality. Includes G.168 Echo Cancellation, support for G.711 and G.729a CODECs and supports up to 60 simultaneous TDM to VoIP call conversions. Supports VoIP applications using SIP (for analog, PRI, and IP endpoints/PBX) and MGCP (for analog only). Router features include OSPF, BGP, RIP V1/V2, Static routes, VRRP, multi-VRF, and stateful inspection firewall. OPTIONAL Session Border Controller Feature Pack also available.
4243916F1	TA 916E, 3RD GEN	Total Access 916e IP Business Gateway- Designed for WAN flexibility using Ethernet or T1 WAN. Includes 1 Gigabit 10/100/1000 BaseT port, two 10/100 BaseT interfaces, four T1 interfaces ,16 FXS ports, and IP Router. VoIP gateway supports simultaneous Back-to-Back User Agent (B2BUA) and SIP proxy funcationality. Includes G.168 Echo Cancellation, support for G.711 and G.729a CODECs and supports up to 60 simultaneous TDM to VoIP call conversions. Supports VoIP applications using SIP (for analog, PRI, and IP endpoints/PBX) and MGCP (for analog only). Router features include OSPF, BGP, RIP V1/V2, Static routes, VRRP, multi-VRF, and stateful inspection firewall. OPTIONAL Session Border Controller Feature Pack also available.
4243916F2	TA 916E W/FXO, 3RDGEN	Total Access 916e IP Business Gateway- Designed for WAN flexibility using Ethernet or T1 WAN. Includes 1 Gigabit 10/100/1000 BaseT port, two 10/100 BaseT interfaces, four T1 interfaces ,16 FXS ports, and IP Router. Includes lifeline FXO interface. VoIP gateway supports simultaneous Back-to-Back User Agent (B2BUA) and SIP proxy functionality. Includes G.168 Echo Cancellation, support for G.711 and G.729a CODECs and supports up to 60 simultaneous TDM to VoIP call conversions. Supports VoIP applications using SIP (for analog, PRI, and IP endpoints/PBX) and MGCP (for analog only). Router features include OSPF, BGP, RIP V1/V2, Static routes, VRRP, multi-VRF, and stateful inspection firewall. OPTIONAL Session Border Controller Feature Pack also available.

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4243924F1	TA 924E, 3RD GEN	Total Access 924e IP Business Gateway- Designed for WAN flexibility using Ethernet or T1 WAN. Includes 1 Gigabit 10/100/1000 BaseT port, two 10/100 BaseT interfaces, four T1 interfaces ,24 FXS ports, and IP Router. VoIP gateway supports simultaneous Back-to-Back User Agent (B2BUA) and SIP proxy funcationality. Includes G.168 Echo Cancellation, support for G.711 and G.729a CODECs and supports up to 60 simultaneous TDM to VoIP call conversions. Supports VoIP applications using SIP (for analog, PRI, and IP endpoints/PBX) and MGCP (for analog only). Router features include OSPF, BGP, RIP V1/V2, Static routes, VRRP, multi-VRF, and stateful inspection firewall. OPTIONAL Session Border Controller Feature Pack also available.
4243924F2	TA 924E W/1 FXO, 3RD GEN	Total Access 924e IP Business Gateway- Designed for WAN flexibility using Ethernet or T1 WAN. Includes 1 Gigabit 10/100/1000 BaseT port, two 10/100 BaseT interfaces, four T1 interfaces ,24 FXS ports, and IP Router. Includes lifeline FXO interface. VoIP gateway supports simultaneous Back-to-Back User Agent (B2BUA) and SIP proxy funcationality. Includes G.168 Echo Cancellation, support for G.711 and G.729a CODECs and supports up to 60 simultaneous TDM to VoIP call conversions. Supports VoIP applications using SIP (for analog, PRI, and IP endpoints/PBX) and MGCP (for analog only). Router features include OSPF, BGP, RIP V1/V2, Static routes, VRRP, multi-VRF, and stateful inspection firewall. OPTIONAL Session Border Controller Feature Pack also available.
4243924F3	TA 924E W/16 FXS + 9 FXO, 3RD	Total Access 924e IP Business Gateway- Designed for WAN flexibility using Ethernet or T1 WAN. Includes 1 Gigabit 10/100/1000 BaseT port, two 10/100 BaseT interfaces, four T1 interfaces ,24 FXS ports, and IP Router. Includes 9 FXO interfaces (single lifeline FXO and 8 always-on). VoIP gateway supports simultaneous Back-to-Back User Agent (B2BUA) and SIP proxy functionality. Includes G.168 Echo Cancellation, support for G.711 and G.729a CODECs and supports up to 60 simultaneous TDM to VoIP call conversions. Supports VoIP applications using SIP (for analog, PRI, and IP endpoints/PBX) and MGCP (for analog only). Router features include OSPF, BGP, RIP V1/V2, Static routes, VRRP, multi-VRF, and stateful inspection firewall. OPTIONAL Session Border Controller Feature Pack also available.

4700252F1	NETVANTA 6250, 8 FXS	NetVanta 6250 8 FXS IP Business Gateway- ADTRAN's highest performing IPBG for delivering business services. Includes one combo 1000Base-T/SFP Gigabit interface, five 10/100 BaseT interfaces, four T1 interfaces ,8 FXS ports, and IP Router. VoIP gateway supports simultaneous Back-to-Back User Agent (B2BUA) and SIP proxy functionality. Includes G.168 Echo Cancellation, support for G.711 and G.729a CODECs and supports up to 72 simultaneous TDM to VoIP call conversions. Supports VoIP applications using SIP (for analog, PRI, and IP endpoints/PBX) and MGCP (for analog only). Router features include OSPF, BGP, RIP V1/V2, Static routes, VRRP, multi-VRF, and stateful inspection firewall. OPTIONAL Session Border Controller Feature Pack also available.
4700252F2	NETVANTA 6250, 8FXS + 1FXO	NetVanta 6250 8 FXS IP Business Gateway- ADTRAN's highest performing IPBG for delivering business services. Includes one combo 1000Base-T/SFP Gigabit interface, five 10/100 BaseT interfaces, four T1 interfaces ,8 FXS ports, and IP Router. Includes lifeline FXO interface. VoIP gateway supports simultaneous Back-to-Back User Agent (B2BUA) and SIP proxy functionality. Includes G.168 Echo Cancellation, support for G.711 and G.729a CODECs and supports up to 72 simultaneous TDM to VoIP call conversions. Supports VoIP applications using SIP (for analog, PRI, and IP endpoints/PBX) and MGCP (for analog only). Router features include OSPF, BGP, RIP V1/V2, Static routes, VRRP, multi-VRF, and stateful inspection firewall. OPTIONAL Session Border Controller Feature Pack also available.
4700254F1	NETVANTA 6250, 16 FXS	NetVanta 6250 16 FXS IP Business Gateway- ADTRAN's highest performing IPBG for delivering business services. Includes one combo 1000Base-T/SFP Gigabit interface, five 10/100 BaseT interfaces, four T1 interfaces ,16 FXS ports, and IP Router. VoIP gateway supports simultaneous Back-to-Back User Agent (B2BUA) and SIP proxy functionality. Includes G.168 Echo Cancellation, support for G.711 and G.729a CODECs and supports up to 72 simultaneous TDM to VoIP call conversions. Supports VoIP applications using SIP (for analog, PRI, and IP endpoints/PBX) and MGCP (for analog only). Router features include OSPF, BGP, RIP V1/V2, Static routes, VRRP, multi-VRF, and stateful inspection firewall. OPTIONAL Session Border Controller Feature Pack also available.

4700254F2	NETVANTA 6250, 16FXS + 1FXO	NetVanta 6250 IP Business Gateway- ADTRAN's highest performing IPBG for delivering business services. Includes one combo 1000Base-T/SFP Gigabit interface, five 10/100 BaseT interfaces, four T1 interfaces ,16 FXS ports, and IP Router. Includes lifeline FXO interface. VoIP gateway supports simultaneous Back-to-Back User Agent (B2BUA) and SIP proxy functionality. Includes G.168 Echo Cancellation, support for G.711 and G.729a CODECs and supports up to 72 simultaneous TDM to VoIP call conversions. Supports VoIP applications using SIP (for analog, PRI, and IP endpoints/PBX) and MGCP (for analog only). Router features include OSPF, BGP, RIP V1/V2, Static routes, VRRP, multi-VRF, and stateful inspection firewall. OPTIONAL Session Border Controller Feature Pack also available.
4700256F1	NETVANTA 6250, 24 FXS	NetVanta 6250 IP Business Gateway- ADTRAN's highest performing IPBG for delivering business services. Includes one combo 1000Base-T/SFP Gigabit interface, five 10/100 BaseT interfaces, four T1 interfaces ,8 FXS ports, and IP Router. VoIP gateway supports simultaneous Back-to-Back User Agent (B2BUA) and SIP proxy functionality. Includes G.168 Echo Cancellation, support for G.711 and G.729a CODECs and supports up to 72 simultaneous TDM to VoIP call conversions. Supports VoIP applications using SIP (for analog, PRI, and IP endpoints/PBX) and MGCP (for analog only). Router features include OSPF, BGP, RIP V1/V2, Static routes, VRRP, multi-VRF, and stateful inspection firewall. OPTIONAL Session Border Controller Feature Pack also available.
4700256F2	NETVANTA 6250, 24FXS + 1FXO	NetVanta 6250 IP Business Gateway- ADTRAN's highest performing IPBG for delivering business services. Includes one combo 1000Base-T/SFP Gigabit interface, five 10/100 BaseT interfaces, four T1 interfaces ,8 FXS ports, and IP Router. Includes lifeline FXO interface. VoIP gateway supports simultaneous Back-to-Back User Agent (B2BUA) and SIP proxy functionality. Includes G.168 Echo Cancellation, support for G.711 and G.729a CODECs and supports up to 72 simultaneous TDM to VoIP call conversions. Supports VoIP applications using SIP (for analog, PRI, and IP endpoints/PBX) and MGCP (for analog only). Router features include OSPF, BGP, RIP V1/V2, Static routes, VRRP, multi-VRF, and stateful inspection firewall. OPTIONAL Session Border Controller Feature Pack also available.

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4700256F3	NETVANTA 6250, 16FXS + 9FXO	NetVanta 6250 IP Business Gateway- ADTRAN's highest performing IPBG for delivering business services. Includes one combo 1000Base-T/SFP Gigabit interface, five 10/100 BaseT interfaces, four T1 interfaces ,8 FXS ports, and IP Router. Includes 9 FXO interfaces (single lifeline FXO and 8 always-on). VoIP gateway supports simultaneous Back-to-Back User Agent (B2BUA) and SIP proxy functionality. Includes G.168 Echo Cancellation, support for G.711 and G.729a CODECs and supports up to 72 simultaneous TDM to VoIP call conversions. Supports VoIP applications using SIP (for analog, PRI, and IP endpoints/PBX) and MGCP (for analog only). Router features include OSPF, BGP, RIP V1/V2, Static routes, VRRP, multi-VRF, and stateful inspection firewall. OPTIONAL Session Border Controller Feature Pack also available.
		ProStart Remote Installation
1100ALR10027L	ProStart REM	ProStart Remote telephone support of customer installation of TA 904, 908, 912, NetVanta 6310, NetVanta 6330 8FXS, NetVanta 6240 8FXS.
1100ALR10028L	ProStart REM	ProStart Remote telephone support of customer installation of TA 916, 924, NetVanta 6630 16FXS, NetVanta 6330 16FXS+8FXO, NetVanta 6330 24FXS, NetVanta 644, NetVanta 6240 16FXS, NetVanta 6240 24FXS
1101101N5	ProStart REM	ProStart Remote telephone support of customer installation of 320x, 3120, 3130, 3430, 3448, 3450 or 3458 Enhanced Install (includes BGP, IGMP, QOS, VPN, and HMR for approved PBXs)
1101101N9	ProStart REM	ProStart Remote telephone support of customer installation of 4305, 4430 Enhanced Install (includes BGP, IGMP, QOS, VPN)
		ProStart Onsite Installation
1101102N5	ProStart OST	ProStart On Site Installation of 320x, 3120, 3130, 3430, 3448, 3450 or 3458 Enhanced Install (includes BGP, IGMP, QOS, VPN, and HMR for approved PBXs)
1101102N9	ProStart OST	ProStart On Site Installation of 4305, 4430 Enhanced Install (includes BGP, IGMP, QOS, VPN)
1100ALS10027L	ProStart OST	ProStart On-Site Installation of TA 904, 908, 912, NetVanta 6310, NetVanta 6330 8FXS, NetVanta 6240 8FXS.
1100ALS10028L	ProStart OST	ProStart On-Site Installation of TA 916, 924, NetVanta 6630 16FXS, NetVanta 6330 16FXS+8FXO, NetVanta 6330 24FXS, NetVanta 644, NetVanta 6240 16FXS, NetVanta 6240 24FXS
		Optional Services -- Basic Maintenance

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1100AMNVRGM1T1	ProCare Basic 1 YR	ProCare 1 Year Basic Maintenance for the NetVanta 3458, 4305, and 4430 with enhanced feature pack software, the NetVanta 6355 and 644, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
1100AMNVSRM1T1	ProCare Basic 1 YR	ProCare 1 Year Basic Maintenance for the NetVanta 1224STR, 3450, 3458, 4305, and 4430 with standard feature pack software, and the NetVanta 1224R, 1224STR, and 3450 with enhanced feature pack software, and the 1335 non-wifi, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
1100AMNVSR2M1T1	ProCare Basic 1 YR	ProCare 1 Year Basic Maintenance for the NetVanta 3305 and 1234 (POE), the NetVanta 3448 with standard feature pack software, and NetVanta 320X and 3430 with enhanced feature pack software, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
1100AMNVSR3M1T1	ProCare Basic 1 YR	ProCare 1 Year Basic Maintenance for the NetVanta 1224R with standard feature pack software, and the NetVanta 3305 and 3448 with the enhanced feature pack software, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
1100AMTAGM1T1	ProCare Basic 1 YR	ProCare 1 Year Basic Maintenance for the TA 624, 924, and NetVanta 6330 24 FXS, 6330 16 FXS + 8 FXO, 6240 24 FXS, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
1100AMTAGSM1T1	ProCare Basic 1 YR	ProCare 1 Year Basic Maintenance for the TA 604, 608, 612, 616, 904, 908, 912, 916, the NetVanta 6310, 6330 8 FXS, 6330 16 FXS, 6240 8 FXS, 6240 16 FXS, 3430 with SBC, 6310 with SBC, 3448 with SBC, and the TA 908e with SBC, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
1100AMNVRGM1T3	ProCare Basic 3 YR	ProCare 3 Year Basic Maintenance for the NetVanta 3458, 4305, and 4430 with enhanced feature pack software, the NetVanta 6355 and 644, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT

1100AMNVSRM1T3	ProCare Basic 3 YR	ProCare 3 Year Basic Maintenance for the NetVanta 1224STR, 3450, 3458, 4305, and 4430 with standard feature pack software, and the NetVanta 1224R, 1224STR, and 3450 with enhanced feature pack software, and the 1335 non-wifi, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
1100AMNVSR2M1T3	ProCare Basic 3 YR	ProCare 3 Year Basic Maintenance for the NetVanta 3305 and 1234 (POE), the NetVanta 3448 with standard feature pack software, and NetVanta 320X and 3430 with enhanced feature pack software, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
1100AMNVSR3M1T3	ProCare Basic 3 YR	ProCare 3 Year Basic Maintenance for the NetVanta 1224R with standard feature pack software, and the NetVanta 3305 and 3448 with the enhanced feature pack software, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
1100AMTAGM1T3	ProCare Basic 3 YR	ProCare 3 Year Basic Maintenance for the TA 624, 924, and NetVanta 6330 24 FXS, 6330 16 FXS + 8 FXO, 6240 24 FXS, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
1100AMTAGSM1T3	ProCare Basic 3 YR	ProCare 3 Year Basic Maintenance for the TA 604, 608, 612, 616, 904, 908, 912, 916, the NetVanta 6310, 6330 8 FXS, 6330 16 FXS, 6240 8 FXS, 6240 16 FXS, 3430 with SBC, 6310 with SBC, 3448 with SBC, and the TA 908e with SBC, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
		Optional Services -- NBD Remote Maintenance
1100AMNVRGM2T1	ProCare 5x8xNBD 1 YR	ProCare 1 Year NBD Remote Maintenance for the NetVanta 3458, 4305, and 4430 with enhanced feature pack software, the NetVanta 6355 and 644, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT

1100AMNVSRM2T1	ProCare 5x8xNBD 1 YR	ProCare 1 Year NBD Remote Maintenance for the NetVanta 1224STR, 3450, 3458, 4305, and 4430 with standard feature pack software, and the NetVanta 1224R, 1224STR, and 3450 with enhanced feature pack software, and the 1335 non-wifi, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
1100AMNVSR2M2T1	ProCare 5x8xNBD 1 YR	ProCare 1 Year NBD Remote Maintenance for the NetVanta 3305 and 1234 (POE), the NetVanta 3448 with standard feature pack software, and NetVanta 320X and 3430 with enhanced feature pack software, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
1100AMNVSR3M2T1	ProCare 5x8xNBD 1 YR	ProCare 1 Year NBD Remote Maintenance for the NetVanta 1224R with standard feature pack software, and the NetVanta 3305 and 3448 with the enhanced feature pack software, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
1100AMTAGM2T1	ProCare 5x8xNBD 1 YR	ProCare 1 Year NBD Remote Maintenance for the TA 624, 924, and NetVanta 6330 24 FXS, 6330 16 FXS + 8 FXO, 6240 24 FXS, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
1100AMTAGSM2T1	ProCare 5x8xNBD 1 YR	ProCare 1 Year NBD Remote Maintenance for the TA 604, 608, 612, 616, 904, 908, 912, 916, the NetVanta 6310, 6330 8 FXS, 6330 16 FXS, 6240 8 FXS, 6240 16 FXS, 3430 with SBC, 6310 with SBC, 3448 with SBC, and the TA 908e with SBC, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
1100AMNVRGM2T3	ProCare 5x8xNBD 3 YR	ProCare 3 Year NBD Remote Maintenance for the NetVanta 3458, 4305, and 4430 with enhanced feature pack software, the NetVanta 6355 and 644, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT

1100AMNVSRM2T3	ProCare 5x8xNBD 3 YR	ProCare 3 Year NBD Remote Maintenance for the NetVanta 1224STR, 3450, 3458, 4305, and 4430 with standard feature pack software, and the NetVanta 1224R, 1224STR, and 3450 with enhanced feature pack software, and the 1335 non-wifi, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
1100AMNVSR2M2T3	ProCare 5x8xNBD 3 YR	ProCare 3 Year NBD Remote Maintenance for the NetVanta 3305 and 1234 (POE), the NetVanta 3448 with standard feature pack software, and NetVanta 320X and 3430 with enhanced feature pack software, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
1100AMNVSR3M2T3	ProCare 5x8xNBD 3 YR	ProCare 3 Year NBD Remote Maintenance for the NetVanta 1224R with standard feature pack software, and the NetVanta 3305 and 3448 with the enhanced feature pack software, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
1100AMTAGM2T3	ProCare 5x8xNBD 3 YR	ProCare 3 Year NBD Remote Maintenance for the TA 624, 924, and NetVanta 6330 24 FXS, 6330 16 FXS + 8 FXO, 6240 24 FXS, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
1100AMTAGSM2T3	ProCare 5x8xNBD 3 YR	ProCare 3 Year NBD Remote Maintenance for the TA 604, 608, 612, 616, 904, 908, 912, 916, the NetVanta 6310, 6330 8 FXS, 6330 16 FXS, 6240 8 FXS, 6240 16 FXS, 3430 with SBC, 6310 with SBC, 3448 with SBC, and the TA 908e with SBC, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
		Optional Services -- 7x24x4 Remote Maintenance
1100AMNVRGM3T1	ProCare 7x24x4 1 YR	ProCare 1 Year 7x24x4 Remote Maintenance for the NetVanta 3458, 4305, and 4430 with enhanced feature pack software, the NetVanta 6355 and 644, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week

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1100AMNVSRM3T1	ProCare 7x24x4 1 YR	ProCare 1 Year 7x24x4 Remote Maintenance for the NetVanta 1224STR, 3450, 3458, 4305, and 4430 with standard feature pack software, and the NetVanta 1224R, 1224STR, and 3450 with enhanced feature pack software, and the 1335 non-wifi, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
1100AMNVSR2M3T1	ProCare 7x24x4 1 YR	ProCare 1 Year 7x24x4 Remote Maintenance for the NetVanta 3305 and 1234 (POE), the NetVanta 3448 with standard feature pack software, and NetVanta 320X and 3430 with enhanced feature pack software, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
1100AMNVSR3M3T1	ProCare 7x24x4 1 YR	ProCare 1 Year 7x24x4 Remote Maintenance for the NetVanta 1224R with standard feature pack software, and the NetVanta 3305 and 3448 with the enhanced feature pack software, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
1100AMTAGM3T1	ProCare 7x24x4 1 YR	ProCare 1 Year 7x24x4 Remote Maintenance for the TA 624, 924, and NetVanta 6330 24 FXS, 6330 16 FXS + 8 FXO, 6240 24 FXS, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
1100AMTAGSM3T1	ProCare 7x24x4 1 YR	ProCare 1 Year 7x24x4 Remote Maintenance for the TA 604, 608, 612, 616, 904, 908, 912, 916, the NetVanta 6310, 6330 8 FXS, 6330 16 FXS, 6240 8 FXS, 6240 16 FXS, 3430 with SBC, 6310 with SBC, 3448 with SBC, and the TA 908e with SBC, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
1100AMNVRGM3T3	ProCare 7x24x4 3 YR	ProCare 3 Year 7x24x4 Remote Maintenance for the NetVanta 3458, 4305, and 4430 with enhanced feature pack software, the NetVanta 6355 and 644, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week

1100AMNVSRM3T3	ProCare 7x24x4 3 YR	ProCare 3 Year 7x24x4 Remote Maintenance for the NetVanta 1224STR, 3450, 3458, 4305, and 4430 with standard feature pack software, and the NetVanta 1224R, 1224STR, and 3450 with enhanced feature pack software, and the 1335 non-wifi, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
1100AMNVSR2M3T3	ProCare 7x24x4 3 YR	ProCare 3 Year 7x24x4 Remote Maintenance for the NetVanta 3305 and 1234 (POE), the NetVanta 3448 with standard feature pack software, and NetVanta 320X and 3430 with enhanced feature pack software, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
1100AMNVSR3M3T3	ProCare 7x24x4 3 YR	ProCare 3 Year 7x24x4 Remote Maintenance for the NetVanta 1224R with standard feature pack software, and the NetVanta 3305 and 3448 with the enhanced feature pack software, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
1100AMTAGM3T3	ProCare 7x24x4 3 YR	ProCare 3 Year 7x24x4 Remote Maintenance for the TA 624, 924, and NetVanta 6330 24 FXS, 6330 16 FXS + 8 FXO, 6240 24 FXS, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
1100AMTAGSM3T3	ProCare 7x24x4 3 YR	ProCare 3 Year 7x24x4 Remote Maintenance for the TA 604, 608, 612, 616, 904, 908, 912, 916, the NetVanta 6310, 6330 8 FXS, 6330 16 FXS, 6240 8 FXS, 6240 16 FXS, 3430 with SBC, 6310 with SBC, 3448 with SBC, and the TA 908e with SBC, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
		Optional Services -- NBD Onsite Maintenance
1100AMNVRGM4T1	ProCare 5x8xNBD OST 1 YR	ProCare 1 Year NBD On-site Maintenance for the NetVanta 3458, 4305, and 4430 with enhanced feature pack software, the NetVanta 6355 and 644, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT

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1100AMNVSRM4T1	ProCare 5x8xNBD OST 1 YR	ProCare 1 Year NBD On-site Maintenance for the NetVanta 1224STR, 3450, 3458, 4305, and 4430 with standard feature pack software, and the NetVanta 1224R, 1224STR, and 3450 with enhanced feature pack software, and the 1335 non-wifi, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
1100AMNVSR2M4T1	ProCare 5x8xNBD OST 1 YR	ProCare 1 Year NBD On-site Maintenance for the NetVanta 3305 and 1234 (POE), the NetVanta 3448 with standard feature pack software, and NetVanta 320X and 3430 with enhanced feature pack software, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
1100AMNVSR3M4T1	ProCare 5x8xNBD OST 1 YR	ProCare 1 Year NBD On-site Maintenance for the NetVanta 1224R with standard feature pack software, and the NetVanta 3305 and 3448 with the enhanced feature pack software, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
1100AMTAGM4T1	ProCare 5x8xNBD OST 1 YR	ProCare 1 Year NBD On-site Maintenance for the TA 624, 924, and NetVanta 6330 24 FXS, 6330 16 FXS + 8 FXO, 6240 24 FXS, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
1100AMTAGSM4T1	ProCare 5x8xNBD OST 1 YR	ProCare 1 Year NBD On-site Maintenance for the TA 604, 608, 612, 616, 904, 908, 912, 916, the NetVanta 6310, 6330 8 FXS, 6330 16 FXS, 6240 8 FXS, 6240 16 FXS, 3430 with SBC, 6310 with SBC, 3448 with SBC, and the TA 908e with SBC, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
1100AMNVRGM4T3	ProCare 5x8xNBD OST 3 YR	ProCare 3 Year NBD On-site Maintenance for the NetVanta 3458, 4305, and 4430 with enhanced feature pack software, the NetVanta 6355 and 644, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT

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1100AMNVSRM4T3	ProCare 5x8xNBD OST 3 YR	ProCare 3 Year NBD On-site Maintenance for the NetVanta 1224STR, 3450, 3458, 4305, and 4430 with standard feature pack software, and the NetVanta 1224R, 1224STR, and 3450 with enhanced feature pack software, and the 1335 non-wifi, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
1100AMNVSR2M4T3	ProCare 5x8xNBD OST 3 YR	ProCare 3 Year NBD On-site Maintenance for the NetVanta 3305 and 1234 (POE), the NetVanta 3448 with standard feature pack software, and NetVanta 320X and 3430 with enhanced feature pack software, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
1100AMNVSR3M4T3	ProCare 5x8xNBD OST 3 YR	ProCare 3 Year NBD On-site Maintenance for the NetVanta 1224R with standard feature pack software, and the NetVanta 3305 and 3448 with the enhanced feature pack software, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
1100AMTAGM4T3	ProCare 5x8xNBD OST 3 YR	ProCare 3 Year NBD On-site Maintenance for the TA 624, 924, and NetVanta 6330 24 FXS, 6330 16 FXS + 8 FXO, 6240 24 FXS, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
1100AMTAGSM4T3	ProCare 5x8xNBD OST 3 YR	ProCare 3 Year NBD On-site Maintenance for the TA 604, 608, 612, 616, 904, 908, 912, 916, the NetVanta 6310, 6330 8 FXS, 6330 16 FXS, 6240 8 FXS, 6240 16 FXS, 3430 with SBC, 6310 with SBC, 3448 with SBC, and the TA 908e with SBC, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
		Optional Services -- 7x24x4 Onsite Maintenance
1100AMNVRGM5T1	ProCare 7x24x4 OST 1 YR	ProCare 1 Year 7x24x4 On-site Maintenance for the NetVanta 3458, 4305, and 4430 with enhanced feature pack software, the NetVanta 6355 and 644, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week

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1100AMNVSRM5T1	ProCare 7x24x4 OST 1 YR	ProCare 1 Year 7x24x4 On-site Maintenance for the NetVanta 1224STR, 3450, 3458, 4305, and 4430 with standard feature pack software, and the NetVanta 1224R, 1224STR, and 3450 with enhanced feature pack software, and the 1335 non-wifi, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
1100AMNVSR2M5T1	ProCare 7x24x4 OST 1 YR	ProCare 1 Year 7x24x4 On-site Maintenance for the NetVanta 3305 and 1234 (POE), the NetVanta 3448 with standard feature pack software, and NetVanta 320X and 3430 with enhanced feature pack software, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
1100AMNVSR3M5T1	ProCare 7x24x4 OST 1 YR	ProCare 1 Year 7x24x4 On-site Maintenance for the NetVanta 1224R with standard feature pack software, and the NetVanta 3305 and 3448 with the enhanced feature pack software, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
1100AMTAGM5T1	ProCare 7x24x4 OST 1 YR	ProCare 1 Year 7x24x4 On-site Maintenance for the TA 624, 924, and NetVanta 6330 24 FXS, 6330 16 FXS + 8 FXO, 6240 24 FXS, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
1100AMTAGSM5T1	ProCare 7x24x4 OST 1 YR	ProCare 1 Year 7x24x4 On-site Maintenance for the TA 604, 608, 612, 616, 904, 908, 912, 916, the NetVanta 6310, 6330 8 FXS, 6330 16 FXS, 6240 8 FXS, 6240 16 FXS, 3430 with SBC, 6310 with SBC, 3448 with SBC, and the TA 908e with SBC, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
1100AMNVRGM5T3	ProCare 7x24x4 OST 3 YR	ProCare 3 Year 7x24x4 On-site Maintenance for the NetVanta 3458, 4305, and 4430 with enhanced feature pack software, the NetVanta 6355 and 644, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week

1100AMNVSRM5T3	ProCare 7x24x4 OST 3 YR	ProCare 3 Year 7x24x4 On-site Maintenance for the NetVanta 1224STR, 3450, 3458, 4305, and 4430 with standard feature pack software, and the NetVanta 1224R, 1224STR, and 3450 with enhanced feature pack software, and the 1335 non-wifi, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
1100AMNVSR2M5T3	ProCare 7x24x4 OST 3 YR	ProCare 3 Year 7x24x4 On-site Maintenance for the NetVanta 3305 and 1234 (POE), the NetVanta 3448 with standard feature pack software, and NetVanta 320X and 3430 with enhanced feature pack software, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
1100AMNVSR3M5T3	ProCare 7x24x4 OST 3 YR	ProCare 3 Year 7x24x4 On-site Maintenance for the NetVanta 1224R with standard feature pack software, and the NetVanta 3305 and 3448 with the enhanced feature pack software, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
1100AMTAGM5T3	ProCare 7x24x4 OST 3 YR	ProCare 3 Year 7x24x4 On-site Maintenance for the TA 624, 924, and NetVanta 6330 24 FXS, 6330 16 FXS + 8 FXO, 6240 24 FXS, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
1100AMTAGSM5T3	ProCare 7x24x4 OST 3 YR	ProCare 3 Year 7x24x4 On-site Maintenance for the TA 604, 608, 612, 616, 904, 908, 912, 916, the NetVanta 6310, 6330 8 FXS, 6330 16 FXS, 6240 8 FXS, 6240 16 FXS, 3430 with SBC, 6310 with SBC, 3448 with SBC, and the TA 908e with SBC, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
		ProStart After Hours Remote Installation
1100ALR11527L	ProStart REM AFTR HRS	ProStart After Hours Remote (excludes Sunday & Holidays) telephone support of customer installation of TA 904, 908, 912, NetVanta 6310, NetVanta 6330 8FXS, NetVanta 6240 8FXS.

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1100ALR11528L	ProStart REM AFTR HRS	ProStart After Hours Remote (excludes Sunday & Holidays) telephone support of customer installation of TA 916, 924, NetVanta 6630 16FXS, NetVanta 6330 16FXS+8FXO, NetVanta 6330 24FXS, NetVanta 644, NetVanta 6240 16FXS, NetVanta 6240 24FXS
1100103N5	ProStart REM AFTR HRS	ProStart After Hours Remote (excludes Sunday & Holidays) telephone support of customer installation of 320x, 3120, 3130, 3430, 3448, 3450 or 3458 Enhanced Install (includes BGP, IGMP, QOS, VPN, and HMR for approved PBXs)
1100103N9	ProStart REM AFTR HRS	ProStart After Hours Remote (excludes Sunday & Holidays) telephone support of customer installation of 4305, 4430 Enhanced Install (includes BGP, IGMP, QOS, VPN)
1100ALR12027L	ProStart REM SUNDAY/HOLIDAY	ProStart Sunday/Holiday Remote telephone support of customer installation of TA 904, 908, 912, NetVanta 6310, NetVanta 6330 8FXS, NetVanta 6240 8FXS.
1100ALR12028L	ProStart REM SUNDAY/HOLIDAY	ProStart Sunday/Holiday Remote telephone support of customer installation of TA 916, 924, NetVanta 6630 16FXS, NetVanta 6330 16FXS+8FXO, NetVanta 6330 24FXS, NetVanta 644, NetVanta 6240 16FXS, NetVanta 6240 24FXS
1100104N5	ProStart REM SUNDAY/HOLIDAY	ProStart Sunday/Holiday Remote telephone support of customer installation of 320x, 3120, 3130, 3430, 3448, 3450 or 3458 Enhanced Install (includes BGP, IGMP, QOS, VPN, and HMR for approved PBXs)
1100104N9	ProStart REM SUNDAY/HOLIDAY	ProStart Sunday/Holiday Remote telephone support of customer installation of 4305, 4430 Enhanced Install (includes BGP, IGMP, QOS, VPN)
		ProStart After Hours Onsite Installation
1100ALS11527L	ProStart OST AFTR HRS	ProStart After Hours On-Site Installation (excludes Sunday & Holidays) TA 904, 908, 912, NetVanta 6310, NetVanta 6330 8FXS, NetVanta 6240 8FXS.
1100ALS11528L	ProStart OST AFTR HRS	ProStart After Hours On-Site Installation (excludes Sunday & Holidays) TA 916, 924, NetVanta 6630 16FXS, NetVanta 6330 16FXS+8FXO, NetVanta 6330 24FXS, NetVanta 644, NetVanta 6240 16FXS, NetVanta 6240 24FSX, NetVanta 6240 16FXS, NetVanta 6240 24FXS
1100105N5	ProStart OST AFTR HRS	ProStart After Hours On-Site Installation (excludes Sunday & Holidays) of 320x, 3120, 3130, 3430, 3448, 3450 or 3458 Enhanced Install (includes BGP, IGMP, QOS, VPN, and HMR for approved PBXs)
1100105N9	ProStart OST AFTR HRS	ProStart After Hours On-Site Installation (excludes Sunday & Holidays) of 4305, 4430 Enhanced Install (includes BGP, IGMP, QOS, VPN)
1100ALS11519LT	ProStart OST AFTR HRS	ProStart On Site Installation of Advanced Routing or Firewall (beyond default) or VPN in installation of NetVanta 7xxx - Base Installation REQUIRED

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1100ALS12019LT	ProStart OST SUNDAY/HOLIDAY	ProStart On Site Installation of Advanced Routing or Firewall (beyond default) or VPN in installation of NetVanta 7xxx - Base Installation REQUIRED
1100ALS12027L	ProStart OST SUNDAY/HOLIDAY	ProStart Sunday/Holiday On-Site Installation of TA 904, 908, 912, NetVanta 6310, NetVanta 6330 8FXS, NetVanta 6240 8FXS.
1100ALS12028L	ProStart OST SUNDAY/HOLIDAY	ProStart Sunday/Holiday On-Site Installation of TA 916, 924, NetVanta 6630 16FXS, NetVanta 6330 16FXS+8FXO, NetVanta 6330 24FXS, NetVanta 644, NetVanta 6240 16FXS, NetVanta 6240 24FXS
1100106N5	ProStart OST SUNDAY/HOLIDAY	ProStart Sunday/Holiday On-Site Installation of 320x, 3120, 3130, 3430, 3448, 3450 or 3458 Enhanced Install (includes BGP, IGMP, QOS, VPN, and HMR for approved PBXs)
1100106N9	ProStart OST SUNDAY/HOLIDAY	ProStart Sunday/Holiday On-Site Installation of 4305, 4430 Enhanced Install (includes BGP, IGMP, QOS, VPN)
1100401L1	ProStart T&M OST	Hourly rate for On-Site support during normal business hours; can also be used to bill travel time. Does not include any applicable freight charges for equipment dispatched under emergency circumstances. Scope of work may be required, and work must be scheduled in advance.
1100401L2	ProStart T&M OST AFTR HRS	Hourly rate for On-Site support after normal business hours; can also be used to bill travel time. Applicable for Weekday evenings and Saturdays. Does not include any applicable freight charges for equipment dispatched under emergency circumstances. Scope of work may be required, and work must be scheduled in advance.
1100401L3	ProStart T&M OST Sunday/Holida	Hourly rate for On-Site support on Sundays or Holidays; can also be used to bill travel time. Does not include any applicable freight charges for equipment dispatched under emergency circumstances. Scope of work may be required, and work must be scheduled in advance.
1100401L4	ProStart T&M REM	Hourly rate for remote engineering support during normal business hours. Does not include any applicable freight charges for equipment dispatched under emergency circumstances. Scope of work may be required, and work must be scheduled in advance.
1100401L5	ProStart T&M REM AFTR HRS	Hourly rate for remote engineering support after normal business hours. Applicable for Weekday evenings and Saturdays. Does not include any applicable freight charges for equipment dispatched under emergency circumstances. Scope of work may be required, and work must be scheduled in advance.

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1100401L6	ProStart T&M REM Sunday/Holida	Hourly rate for remote engineering support on Sundays or Holidays. Does not include any applicable freight charges for equipment dispatched under emergency circumstances. Scope of work may be required, and work must be scheduled in advance.
1100402L1	PROSTART EXPEDITE FEE	Expedite fee for scheduling on-site installations with less than 15 business days notice from approved receipt of data gathering for UC installations; 10 business days notice from approved receipt of data gathering for NetVanta 7xxx installations; and 5 business days notice from approved receipt of data gathering for all other installation types
1100402L2	PROSTART EXPEDITE FEE	Expedite fee for scheduling remote installation support with less than 15 business days notice from approved receipt of data gathering for UC installations; approved 10 business days notice from receipt of data gathering for NetVanta 7xxx installations; and approved 5 business days notice from receipt of data gathering for all other installation types
1100403L1	PROSTART SITE NOT READY FEE	Site not ready fee charged for site visit for installation when site is not ready and a return trip is necessary to perform the installation
1100403L2	PROSTART NOT READY FEE REMOTE	Site not ready fee charged for rescheduling remote installation when site is not ready and the installation must be rescheduled
1100409L1	PROSTART FEE	Rescheduling fee charged when on site installation is rescheduled less than 24 Business Hours prior to the scheduled installation.
1100409L2	PROSTART RESCHEDULE FEE REMOTE	Rescheduling fee charged when remote installation is rescheduled less than 24 Business Hours prior to the scheduled installation.
1100LS00CXL	CANCELLATION FEE ON-SITE	Fee for cancellation of an on-site installation.
1100ALR30001W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 1 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services
1100ALR30005W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 5 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services.
1100ALR30010W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 10 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services.

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1100ALR30025W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 25 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services.
1100ALR30050W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 50 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services.
1100ALR30075W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 75 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services.
1100ALR30100W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 100 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services.
		Optional - N-Command
1700841G1	N-COMMAND MSP, BASIC	N-Command MSP is a network management platform that offers configuration, firmware, and inventory management for AOS-based NetVanta and TA 900 devices. Allows network administrators to push firmware updates and configuration changes out to remote devices, back up and restore configurations, review VQM data, and manage assets and inventory. First year of license and annual maintenance included and gives access to Technical Support and Software Upgrades. Supports up to 10,000 devices.
1700842G1	N-COMMAND MSP, ADVANCED	N-Command MSP Server, Advanced, Supports up to 25,000 devices. N-Command MSP is a network management platform that offers configuration, firmware, and inventory management for AOS-based NetVanta and TA 900 devices. Allows network administrators to push firmware updates and configuration changes out to remote devices, back up and restore configurations, review VQM data, and manage assets and inventory. First year of license and annual maintenance included and gives access to Technical Support and Software Upgrades.

1700845G1	N-COMMAND MSP, VMWARE	N-Command MSP for VM Ware installation. OVA file is designed to supports up to 10,000 devices. N-Command MSP is a network management platform that offers configuration, firmware, and inventory management for AOS-based NetVanta and TA 900 devices. Allows network administrators to push firmware updates and configuration changes out to remote devices, back up and restore configurations, review VQM data, and manage assets and inventory. First year of license and annual maintenance included and gives access to Technical Support and Software Upgrades. Requires yearly maintenance renewal after the first year.
1950840F1	MSP HA LICENSE	Upgrade license for supporting clustering of multiple n-Command MSP instances. Allows for a highly-available solution and the ability to support a common database across multiple MSP installations. Each server in the cluster requires 1 license.
1700NCMDG1	N-CMND MSP ANNUAL MAINT RENWL	Annual license renewal for n-Command MSP. After the initial year of support expires, this renewal allows for ongoing access to ADTRAN Technical Support, access to upgrades to n-Command MSP to enable new features, and allows new devices to be added to the system.
		Training Options
1600NETPPE	ATSP/IN TRAINING	ATSP/IN Enrollment
1600NETPPE	ATSP/IN TRAINING	ATSP/IN Course
1600NETPPV	ATSP/IN VIRTUAL TRAINING	ATSP/IN Virtual Enrollment
1600NETSS	ATSP/IN SELF-STUDY	ATSP/IN Self-Study Kit
1600IPBGE	NETVANTA IP BUSINESS GATEWAYS	ATSP/IPBG Enrollment
1600IPBGC	NETVANTA IP BUSINESS GATEWAYS	ATSP/IPBG Course
1600IPBGV	ATSP/IPBG VIRTUAL TRAINING	ATSP/IPBG Virtual Enrollment

5.2.6 SECURITY

ADTRAN will not be proposing solutions for Section 5.2.6.

5.2.6.1 Data Center and Virtualization Security Products and Appliances — Products designed to protect high-value data and data center resources with threat defense and policy control.

5.2.6.2 **Intrusion Detection/Protection and Firewall Appliances** — Provide comprehensive inline network firewall security from worms, Trojans, spyware, key loggers, and other malware. This includes Next-Generation Firewalls (NGFW), which offer a wire-speed integrated network platform that performs deep inspection of traffic and blocking of attacks. Intrusion Detection/Protection and Firewall Appliances should provide:

- Non-disruptive in-line bump-in-the-wire configuration
- Standard first-generation firewall capabilities, e.g., network-address translation (NAT), stateful protocol inspection (SPI) and virtual private networking (VPN), etc.
- Application awareness, full stack visibility and granular control
- Capability to incorporate information from outside the firewall, e.g., directory-based policy, blacklists, white lists, etc.
- Upgrade path to include future information feeds and security threats
- SSL decryption to enable identifying undesirable encrypted applications (Optional)

5.2.6.3 **Logging Appliances and Analysis Tools** — Solutions utilized to collect, classify, analyze, and securely store log messages.

5.2.6.4 **Secure Edge and Branch Integrated Security Products** — Network security, VPN, and intrusion prevention for branches and the network edge. Products typically consist of appliances or routers.

5.2.6.5 **Secure Mobility Products** — Delivers secure, scalable access to corporate applications across multiple mobile devices.

5.2.6.6 **Encryption Appliances** — A network security device that applies crypto services at the network transfer layer - above the data link level, but below the application level.

5.2.6.7 **On-premise and Cloud-based services for Web and/or Email Security** — Solutions that provide threat protection, data loss prevention, message level encryption, acceptable use and application control capabilities to secure web and email communications.

5.2.6.8 **Secure Access** — Products that provide secure access to the network for any device, including personally owned mobile devices (laptops, tablets, and smart phones). Capabilities should include:

- Management visibility for device access
- Self-service on-boarding
- Centralized policy enforcement
- Differentiated access and services
- Device Management

5.2.7 STORAGE NETWORKING — High-speed network of shared storage devices connecting different types of storage devices with data servers.
ADTRAN will not be proposing solutions for Section 5.2.7.

5.2.7.1 **Director Class SAN (Storage Area Network) Switches and Modules** — A scalable, high-performance, and protocol-independent designed primarily to fulfill the role of core switch in a core-edge Fibre Channel (FC), FCOE or similar SAN topology. A Fibre Channel director is, by current convention, a switch with at least 128 ports. It does not differ from a switch in core FC protocol functionality.

Fibre Channel directors provide the most reliable, scalable, high-performance foundation for private cloud storage and highly virtualized environments.

5.2.7.2 **Fabric and Blade Server Switches** — A Fibre Channel switch is a network switch compatible with the Fibre Channel (FC) protocol. It allows the creation of a Fibre Channel fabric, which is currently the core component of most SANs. The fabric is a network of Fibre Channel devices, which allows many-to-many communication, device name lookup, security, and redundancy. FC switches implement zoning; a mechanism that disables unwanted traffic between certain fabric nodes.

5.2.7.3 **Enterprise and Data Center SAN and VSAN (Virtual Storage Area Network) Management** — Management tools to provisions, monitors, troubleshoot, and administers SANs and VSANs.

5.2.7.4 **SAN Optimization** — Tools to help optimize and secure SAN performance (ie. Encryption of data-at-rest, data migration, capacity optimization, data reduction, etc.

5.2.8 SWITCHES — Layer 2/3 devices that are used to connect segments of a LAN (local area network) or multiple LANs and to filter and forward packets among them.

5.2.8.1 **Campus LAN – Access Switches** — Provides initial connectivity for devices to the network and controls user and workgroup access to internetwork resources. The following are some of the features a campus LAN access switch should support:

- Security
  i. SSHv2 (Secure Shell Version 2)
  ii. 802.1X (Port Based Network Access Control)
  iii. Port Security
  iv. DHCP (Dynamic Host Configuration Protocol) Snooping
- VLANs
- Fast Ethernet/Gigabit Ethernet
- PoE (Power over Ethernet)
- link aggregation
- 10 Gb support
- Port mirroring
- Span Taps
- Support of IPv6 and IPv4
- Standards-based rapid spanning tree
- Netflow Support (Optional).

ADTRAN recommends the NetVanta 1638P. The NetVanta 1638P is a managed, 48-port PoE, Layer 3, Gigabit Ethernet switch providing advanced access and distribution capabilities for Small to Medium-sized Enterprises (SMEs). With the combination of the advanced multi-layer switching fabric, ActivChassis stacking, high-bandwidth capabilities, and enhanced Quality of Service (QoS) features, the NetVanta 1638P is ideal in Gigabit-to-the-desktop deployments, distributed campus networking, and converged voice and data networks.

The NV1638P come with two high-speed option slots that can accommodate up to four 16-

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Gigabit Ethernet high speed links and can provide up to 128 Gbps of bandwidth between interconnected NetVanta 1600 switches. The NV1638P also supports SFP (1 or 2.5G) and SFP+ (10G) option slots for interconnecting switches up to 10Km apart.

ADTRAN Equipment Name/Part Number:	NV1638P/4700569F1	
Requirement	**Compliance**	**Comment**
Security – SSHv2 (Secure Shell Version 2)	Yes	
Security – 802.1X (Port Based Network Access Control)	Yes	
Security – Port Security	Yes	
Security DHCP (Dynamic Host Configuration Protocol) Snooping	Yes	DHCP Network Forensics
VLANs	Yes	
Fast Ethernet/Gigabit Ethernet	Yes	
PoE (Power over Ethernet)	Yes	Both PoE and PoE+
Link Aggregation	Yes	When in ActivChassis mode and R10.9 or higher, the NV1638P can support up to 10 channel groups and up to 8 ports per group. When ActivChassis is disable, each NV1638P can support up to 6 channel groups and up to 8 ports per group
10Gb Support	Yes	
Port Mirroring	Yes	
Span Taps	No	
Support of IPv6 and IPv4	Yes	
Standards-based Rapid Spanning Tree	Yes	
Netflow Support (Optional)	No	

For Non-PoE applications, ADTRAN recommends the NetVanta 1638. The NetVanta 1638 is a managed, 48-port, Layer 3, Gigabit Ethernet switch providing advanced access and distribution capabilities for Small to Medium-sized Enterprises (SMEs). With the combination of the advanced multi-layer switching fabric, ActivChassis stacking, high-bandwidth capabilities, and enhanced Quality of Service (QoS) features, the NetVanta 1638 is ideal in Gigabit-to-the-desktop deployments, distributed campus networking, and converged voice and data networks.

The NV1638 come with two high-speed option slots that can accommodate up to four 16-Gigabit Ethernet high speed links and can provide up to 128 Gbps of bandwidth between interconnected NetVanta 1600 switches. The NV1638 also support SFP (1 or 2.5G) and SFP+ (10G) option slots for interconnecting switches up to 10Km apart.

ADTRAN Equipment Name/Part Number:	NV1638/4700568F1	
Requirement	**Compliance**	**Comment**

ADTRAN Response No. 121342181
WSCA-NASPO Data Communications Services Solicitation # JP14001

Security – SSHv2 (Secure Shell Version 2)	**Yes**	
Security – 802.1X (Port Based Network Access Control)	**Yes**	
Security – Port Security	**Yes**	
Security DHCP (Dynamic Host Configuration Protocol) Snooping	**Yes**	**DHCP Network Forensics**
VLANs	**Yes**	
Fast Ethernet/Gigabit Ethernet	**Yes**	
PoE (Power over Ethernet)	**No**	
Link Aggregation	**Yes**	**When in ActivChassis mode and R10.9 or higher, the NV1638 can support up to 10 channel groups and up to 8 ports per group. When ActivChassis is disable, each NV1638 can support up to 6 channel groups and up to 8 ports per group**
10Gb Support	**Yes**	
Port Mirroring	**Yes**	
Span Taps	**No**	
Support of IPv6 and IPv4	**Yes**	
Standards-based Rapid Spanning Tree	**Yes**	
Netflow Support (Optional)	**No**	

For Non-10Gb, PoE applications requiring Fast Ethernet basic L3 functionality, ADTRAN recommends the NetVanta 1234P/1238P. The NetVanta 1234P/1238P is a managed, 28-port PoE/52-port PoE, Layer 3 lite, Fast Ethernet switch designed for fast, secure, cost-effective LAN switching. This scalable, full-featured business-class switch is perfect for Voice over IP (VoIP) applications needing PoE to power IP Phones. Experience the ease of management with an easy-to-use Web-based Graphical User Interface (GUI) and familiar Command Line Interface (CLI).

ADTRAN Equipment Name/Part Number:	**NV1234P/1702595G1 NV1238P/1702599G1**	
Requirement	**Compliance**	**Comment**
Security – SSHv2 (Secure Shell Version 2)	**Yes**	
Security – 802.1X (Port Based Network Access Control)	**Yes**	
Security – Port Security	**Yes**	
Security DHCP (Dynamic Host Configuration Protocol) Snooping	**Yes**	**DHCP Network Forensics**
VLANs	**Yes**	
Fast Ethernet/Gigabit Ethernet	**Yes**	
PoE (Power over Ethernet)	**No**	

Link Aggregation	Yes	Up to 6 channel groups and up to 8 ports per group
10Gb Support	No	
Port Mirroring	Yes	
Span Taps	No	
Support of IPv6 and IPv4	Yes	
Standards-based Rapid Spanning Tree	Yes	
Netflow Support (Optional)	No	

For Non-10Gb, PoE applications requiring basic L3 functionality, ADTRAN recommends the NetVanta 1534P. The NetVanta 1534P is a managed, 28-port PoE, Layer 3 Lite, Gigabit Ethernet switch designed for fast, secure, cost-effective Local Area Network (LAN) switching. This scalable, full-featured business-class switch is perfect for higher-bandwidth Voice over IP (VoIP) applications needing PoE to power IP Phones, as well as Gigabit-to-the-desktop deployments. Experience the ease of management with an easy-to-use Web-based Graphical User Interface (GUI) and familiar Command Line Interface (CLI).

ADTRAN Equipment Name/Part Number:	NV1534P/1702591G1	
Requirement	Compliance	Comment
Security – SSHv2 (Secure Shell Version 2)	Yes	
Security – 802.1X (Port Based Network Access Control)	Yes	
Security – Port Security	Yes	
Security DHCP (Dynamic Host Configuration Protocol) Snooping	Yes	DHCP Network Forensics
VLANs	Yes	
Fast Ethernet/Gigabit Ethernet	Yes	
PoE (Power over Ethernet)	No	
Link Aggregation	Yes	Up to 6 channel groups and up to 8 ports per group
10Gb Support	No	
Port Mirroring	Yes	
Span Taps	No	
Support of IPv6 and IPv4	Yes	
Standards-based Rapid Spanning Tree	Yes	
Netflow Support (Optional)	No	

For Non-10Gb, PoE applications requiring full L3 functionality, ADTRAN also recommends the NetVanta 1544P. The NetVanta 1544P is a managed, 28-port PoE, Layer 3, Gigabit Ethernet switch designed for fast, secure, cost-effective Local Area Network (LAN)

switching. This scalable, full-featured business-class switch is perfect for higher-bandwidth Voice over IP (VoIP) applications needing PoE to power IP Phones, as well as Gigabit-to-the-desktop deployments. Experience the ease of management with an easy-to-use Web-based Graphical User Interface (GUI) and familiar Command Line Interface (CLI).

ADTRAN Equipment Name/Part Number:	NV1544P/1702545G1	
Requirement	**Compliance**	**Comment**
Security – SSHv2 (Secure Shell Version 2)	Yes	
Security – 802.1X (Port Based Network Access Control)	Yes	
Security – Port Security	Yes	
Security DHCP (Dynamic Host Configuration Protocol) Snooping	Yes	DHCP Network Forensics
VLANs	Yes	
Fast Ethernet/Gigabit Ethernet	Yes	
PoE (Power over Ethernet)	No	
Link Aggregation	Yes	Up to 6 channel groups and up to 8 ports per group
10Gb Support	No	
Port Mirroring	Yes	
Span Taps	No	
Support of IPv6 and IPv4	Yes	
Standards-based Rapid Spanning Tree	Yes	
Netflow Support (Optional)	No	

For Non-10Gb, Non-PoE applications requiring Fast Ethernet basic L3 functionality, ADTRAN recommends the NetVanta 1234/1238. The NetVanta 1234/1238 is a managed, 28-port/52-port, Layer 3 lite, Fast Ethernet switch designed for fast, secure, cost-effective LAN switching. This scalable, full-featured business-class switch is perfect for higher-bandwidth VoIP applications. Experience the ease of management with an easy-to-use Web-based Graphical User Interface (GUI) and familiar Command Line Interface (CLI).

ADTRAN Equipment Name/Part Number:	NV1234/1702594G1 NV1238/1702598G1	
Requirement	**Compliance**	**Comment**
Security – SSHv2 (Secure Shell Version 2)	Yes	
Security – 802.1X (Port Based Network Access Control)	Yes	
Security – Port Security	Yes	
Security DHCP (Dynamic Host Configuration Protocol) Snooping	Yes	DHCP Network Forensics
VLANs	Yes	
Fast Ethernet/Gigabit Ethernet	Yes	
PoE (Power over Ethernet)	No	

Link Aggregation	Yes	Up to 6 channel groups and up to 8 ports per group
10Gb Support	No	
Port Mirroring	Yes	
Span Taps	No	
Support of IPv6 and IPv4	Yes	
Standards-based Rapid Spanning Tree	Yes	
Netflow Support (Optional)	No	

For Non-10Gb, Non-PoE applications requiring basic L3 functionality, ADTRAN recommends the NetVanta 1534. The NetVanta 1534 is a managed, 28-port, Layer 3 lite, Gigabit Ethernet switch designed for fast, secure, cost-effective LAN switching. This scalable, full-featured business-class switch is perfect for higher-bandwidth VoIP applications, as well as Gigabit-to-the-desktop deployments. Experience the ease of management with an easy-to-use Web-based Graphical User Interface (GUI) and familiar Command Line Interface (CLI).

ADTRAN Equipment Name/Part Number:	NV1534/1702590G1	
Requirement	Compliance	Comment
Security – SSHv2 (Secure Shell Version 2)	Yes	
Security – 802.1X (Port Based Network Access Control)	Yes	
Security – Port Security	Yes	
Security DHCP (Dynamic Host Configuration Protocol) Snooping	Yes	DHCP Network Forensics
VLANs	Yes	
Fast Ethernet/Gigabit Ethernet	Yes	
PoE (Power over Ethernet)	No	
Link Aggregation	Yes	Up to 6 channel groups and up to 8 ports per group
10Gb Support	No	
Port Mirroring	Yes	
Span Taps	No	
Support of IPv6 and IPv4	Yes	
Standards-based Rapid Spanning Tree	Yes	
Netflow Support (Optional)	No	

For Non-10Gb, Non-PoE applications requiring full L3 functionality, ADTRAN recommends the NetVanta 1544. The NetVanta 1544 is a managed, 28-port, Layer 3, Gigabit Ethernet

switch designed for fast, secure, cost-effective LAN switching. This scalable, full-featured business-class switch is perfect for higher-bandwidth VoIP applications, Gigabit-to-the-desktop deployments, network security, and ease of management with an easy to use Web-GUI.

ADTRAN Equipment Name/Part Number:	NV1544/1702544G1	
Requirement	Compliance	Comment
Security – SSHv2 (Secure Shell Version 2)	Yes	
Security – 802.1X (Port Based Network Access Control)	Yes	
Security – Port Security	Yes	
Security DHCP (Dynamic Host Configuration Protocol) Snooping	Yes	DHCP Network Forensics
VLANs	Yes	
Fast Ethernet/Gigabit Ethernet	Yes	
PoE (Power over Ethernet)	No	
Link Aggregation	Yes	Up to 6 channel groups and up to 8 ports per group
10Gb Support	No	
Port Mirroring	Yes	
Span Taps	No	
Support of IPv6 and IPv4	Yes	
Standards-based Rapid Spanning Tree	Yes	
Netflow Support (Optional)	No	

For Non-10Gb, Non-PoE applications requiring full L3 functionality and fiber aggregation, ADTRAN recommends the NetVanta 1544F. The NetVanta 1544F is a managed, 28-port, Layer 3, Gigabit Ethernet switch designed as an access layer or network backbone switch. This scalable, full-featured business-class switch is an aggregation switch for high-bandwidth Voice over IP and converge voice and data deployments.

ADTRAN Equipment Name/Part Number:	NV1544F/1700546G1	
Requirement	Compliance	Comment
Security – SSHv2 (Secure Shell Version 2)	Yes	
Security – 802.1X (Port Based Network Access Control)	Yes	
Security – Port Security	Yes	
Security DHCP (Dynamic Host Configuration Protocol) Snooping	Yes	DHCP Network Forensics
VLANs	Yes	
Fast Ethernet/Gigabit Ethernet	Yes	

PoE (Power over Ethernet)	**No**	
Link Aggregation	**Yes**	**Up to 6 channel groups and up to 8 ports per group**
10Gb Support	**No**	
Port Mirroring	**Yes**	
Span Taps	**No**	
Support of IPv6 and IPv4	**Yes**	
Standards-based Rapid Spanning Tree	**Yes**	
Netflow Support (Optional)	**No**	

Please refer to Appendix C for supporting documentation for this section.

5.2.8.2 **Campus LAN – Core Switches** — Campus core switches are generally used for the campus backbone and are responsible for transporting large amounts of traffic both reliably and quickly. Core switches should provide:
ADTRAN will not be proposing solutions for Section 5.2.8.2.

- High bandwidth
- Low latency
- Hot swappable power supplies and fans
- Security

SSHv2

MacSec encryption

Role-Based Access Control Lists (ACL)

- Support of IPv6 and IPv4
- 1/10/40/100 Gbps support
- IGP (Interior Gateway Protocol) routing
- EGP (Exterior Gateway Protocol) routing
- VPLS (Virtual Private LAN Service) Support
- VRRP (Virtual Router Redundancy Protocol) Support
- Netflow Support.

5.2.8.3 **Campus Distribution Switches** — Collect the data from all the access layer switches and forward it to the core layer switches. Traffic that is generated at Layer 2 on a switched network needs to be managed, or segmented into Virtual Local Area Networks (VLANs), Distribution layer switches provides the inter-VLAN routing functions so that one VLAN can communicate with another on the network. Distribution layer switches provides advanced security policies that can be applied to network traffic using Access Control Lists (ACLs).

- High bandwidth
- Low latency

- Hot swappable power supplies and fans
- Security (SSHv2 and/or 802.1X)
- Support of IPv6 and IPv4
- Jumbo Frames Support
- Dynamic Trunking Protocol (DTP)
- Per-VLAN Rapid Spanning Tree (PVRST+)
- Switch-port auto recovery
- NetFlow Support or equivalent

ADTRAN recommends the NetVanta 1638P. The NetVanta 1638P is a managed, 48-port PoE, Layer 3, Gigabit Ethernet switch providing advanced access and distribution capabilities for Small to Medium-sized Enterprises (SMEs). With the combination of the advanced multi-layer switching fabric, ActivChassis stacking, high-bandwidth capabilities, and enhanced Quality of Service (QoS) features, the NetVanta 1638P is ideal in Gigabit-to-the-desktop deployments, distributed campus networking, and converged voice and data networks.

The NV1638P come with two high-speed option slots that can accommodate up to four 16-Gigabit Ethernet high speed links and can provide up to 128 Gbps of bandwidth between interconnected NetVanta 1600 switches. The NV1638P also support SFP (1 or 2.5G) and SFP+ (10G) option slots for interconnecting switches up to 10Km apart.

ADTRAN Equipment Name/Part Number:	NV1638P/4700569F1	
Requirement	**Compliance**	**Comment**
High Bandwidth	**Yes**	**Up to 128G Backplane when in ActivChassis Mode**
Low Latency	**Yes**	
Hot Swappable Power Supplies and Fans	**No**	**Field Removable Power Supply and Fan but the switch needs to be turn off to replace it**
Security (SSHv2 and/or 802.1X)	**Yes**	**Authenticator Mode**
Support of IPv6 and IPv4	**Yes**	
Jumbo Frames Support	**Yes**	**12000 Bytes**
Dynamic Trunking Protocol (DTP)	**No**	
Per-VLAN Rapid Spanning Tree (PVRST+)	**No**	
Switch-port Auto Recovery	**No**	
NetFlow Support or Equivalent	**No**	

For Non-PoE applications, ADTRAN recommends the NetVanta 1638. The NetVanta 1638 is a managed, 48-port, Layer 3, Gigabit Ethernet switch providing advanced access and distribution capabilities for Small to Medium-sized Enterprises (SMEs). With the combination of the advanced multi-layer switching fabric, ActivChassis stacking, high-bandwidth capabilities, and enhanced Quality of Service (QoS) features, the NetVanta 1638

is ideal in Gigabit-to-the-desktop deployments, distributed campus networking, and converged voice and data networks.

The NV1638 come with two high-speed option slots that can accommodate up to four 16-Gigabit Ethernet high speed links and can provide up to 128 Gbps of bandwidth between interconnected NetVanta 1600 switches. The NV1638 also support SFP (1 or 2.5G) and SFP+ (10G) option slots for interconnecting switches up to 10Km apart.

ADTRAN Equipment Name/Part Number:	NV1638/4700568F1	
Requirement	**Compliance**	**Comment**
High Bandwidth	**Yes**	**Up to 128G Backplane when in ActivChassis Mode**
Low Latency	**Yes**	
Hot Swappable Power Supplies and Fans	**No**	**Field Removable Power Supply and Fan but the switch needs to be turn off to replace it**
Security (SSHv2 and/or 802.1X)	**Yes**	**Authenticator Mode**
Support of IPv6 and IPv4	**Yes**	
Jumbo Frames Support	**Yes**	**12000 Bytes**
Dynamic Trunking Protocol (DTP)	**No**	
Per-VLAN Rapid Spanning Tree (PVRST+)	**No**	
Switch-port Auto Recovery	**No**	
NetFlow Support or Equivalent	**No**	

Please refer to Appendix C for supporting documentation for this section.

5.2.8.4 **Data Center Switches** — Data center switches, or Layer 2/3 switches, switch all packets in the data center by switching or routing good ones to their final destinations, and discard unwanted traffic using Access Control Lists (ACLs), all at Gigabit and 10 Gigabit speeds. High availability and modularity differentiates a typical Layer 2/3 switch from a data center switch. Capabilities should include:

ADTRAN will not be proposing solutions for Section 5.2.8.4.

- High bandwidth
- Low latency
- Hot swappable power supplies and fans
- Ultra-low latency through wire-speed ports with nanosecond port-to-port latency and hardware-based Inter-Switch Link (ISL) trunking
- Load Balancing across Trunk group able to use packet based load balancing scheme
- Bridging of Fibre Channel SANs and Ethernet fabrics
- Jumbo Frame Support

- Plug and Play Fabric formation that allows a new switch that joins the fabric to automatically become a member
- Ability to remotely disable and enable individual ports
- Support NetFlow or equivalent

5.2.8.5 **Software Defined Networks (SDN) - Virtualized Switches and Routers** — Technology utilized to support software manipulation of hardware for specific use cases.

ADTRAN will not be proposing solutions for Section 5.2.8.5.

5.2.8.6 **Software Defined Networks (SDN)** — Controllers - is an application in software-defined networking (SDN) that manages flow control to enable intelligent networking. SDN controllers are based on protocols, such as OpenFlow, that allow servers to tell switches where to send packets. The SDN controller lies between network devices at one end and applications at the other end. Any communications between applications and devices have to go through the controller. The controller uses multiple routing protocols including OpenFlow to configure network devices and choose the optimal network path for application traffic.

ADTRAN will not be proposing solutions for Section 5.2.8.6.

5.2.8.7 **Carrier Aggregation Switches** — Carrier aggregation switches route traffic in addition to bridging (transmitted) Layer 2/Ethernet traffic. Carrier aggregation switches' major characteristics are:

ADTRAN will not be proposing solutions for Section 5.2.8.7.

- Designed for Metro Ethernet networks
- Designed for video and other high bandwidth applications
- Supports a variety of interface types, especially those commonly used by Service Providers

Capabilities should include:

- Redundant Processors
- Redundant Power
- IPv4 and IPv6 unicast and multicast
- High bandwidth
- Low latency
- Hot swappable power supplies and fans
- MPLS (Multiprotocol Label Switching)
- BGP (Border Gateway Protocol)
- Software router virtualization and/or multiple routing tables
- Policy based routing
- Layer 2 functionality

Per VLAN Spanning Tree

Rapid Spanning Tree

VLAN IDs up to 4096

Layer 2 Class of Service (IEEE 802.1p)

Link Aggregation Control Protocol (LACP)

QinQ (IEEE 802.1ad)

5.2.8.8 **Carrier Ethernet Access Switches** — A carrier Ethernet access switch can connect directly to the customer or be utilized as a network interface on the service side to provide layer 2 services.

ADTRAN will not be proposing solutions for Section 5.2.8.8.

- Hot-swappable and field-replaceable integrated power supply and fan tray
- AC or DC power supply with DC input ranging from 18V to 32 VDC and 36V to 72 VDC
- Ethernet and console port for manageability
- SD flash card slot for additional external storage
- Stratum 3 network clock
- Line-rate performance with a minimum of 62-million packets per second (MPPS) forwarding rate
- Support for dying gasp on loss of power
- Support for a variety of small form factor pluggable transceiver (SFP and SFP+) with support for Device Object Model (DOM)
- Timing services for a converged access network to support mobile solutions, including Radio Access Network (RAN) applications
- Support for Synchronous Ethernet (SyncE) services
- Supports Hierarchical Quality of Service (H-QoS) to provide granular traffic-shaping policies
- Supports Resilient Ethernet Protocol REP/G.8032 for rapid layer-two convergence

ADTRAN Parts List (Product/Management/Services/Training) for applicable sections of 5.2.8:

MODEL	**PART NUMBER**	**DESCRIPTION**
NetVanta 1234, 2nd Gen	1702594G1	24 Port Managed Layer 2 Fast Ethernet Switch with quad Gigabit uplinks. Includes 24 - 10/100Base-T access ports, 2 - combo 1000Base-T/SFP Gigabit Ethernet Ports and 2 - Enhanced (1Gbps/2.5Gbps) SFP ports. Features include Stacking, 802.1Q VLANs, GVRP, 802.1p/DiffServ QoS, 802.1w Rapid Spanning Tree, 802.3ad Link Aggregation, Auto MDI/MDI-X, CLI, HTTP GUI, SSH, SSL, RADIUS, SNMP. 19" Rack mount 1U housing. Supported SFP modules include 1000Base-SX (1200480E1), 1000Base-LX (1200481E1) and SFP interconnect cable (1200484Gx).

NetVanta 1234P, 2nd Gen	1702595G1	24 Port Managed Layer 2 Fast Ethernet Switch with quad Gigabit uplinks, supporting 802.3af & Legacy Power over Ethernet. Includes 24 - 10/100Base-T access ports and 2 - combo 1000Base-T/SFP Gigabit Ethernet Ports and 2 - Enhanced (1Gbps/2.5Gbps) SFP ports. Features include Stacking, 802.1Q VLANs, GVRP, 802.1p/DiffServ QoS, 802.1w Rapid Spanning Tree, 802.3ad Link Aggregation, Auto MDI/MDI-X, CLI, HTTP GUI, SSH, SSL, RADIUS, SNMP. Provides up to 15.4 watts/port (370 watts) of 802.3af compliant power. 19" Rack mount 1U housing. Supported SFP modules include 1000Base-SX (1200480E1), 1000Base-LX (1200481E1) and SFP interconnect cable (1200484Gx).
NetVanta 1238, 2nd Gen	1702598G1	48 Port Managed Layer 2 Fast Ethernet Switch with quad Gigabit uplinks. Includes 48 - 10/100Base-T access ports, 2 - combo 1000Base-T/SFP Gigabit Ethernet Ports and 2 - Enhanced (1Gbps/2.5Gbps) SFP ports. Features include Stacking, 802.1Q VLANs, GVRP, 802.1p/DiffServ QoS, 802.1w Rapid Spanning Tree, 802.3ad Link Aggregation, Auto MDI/MDI-X, CLI, HTTP GUI, SSH, SSL, RADIUS, SNMP. 19" Rack mount 1U housing. Supported SFP modules include 1000Base-SX (1200480E1), 1000Base-LX (1200481E1) and SFP interconnect cable (1200484Gx).
NetVanta 1238P, 2nd Gen	1702599G1	48 Port Managed Layer 2 Fast Ethernet Switch with quad Gigabit uplinks, supporting 802.3af & Legacy Power over Ethernet. Includes 48 - 10/100Base-T access ports and 2 - combo 1000Base-T/SFP Gigabit Ethernet Ports and 2 - Enhanced (1Gbps/2.5Gbps) SFP ports. Features include Stacking, 802.1Q VLANs, GVRP, 802.1p/DiffServ QoS, 802.1w Rapid Spanning Tree, 802.3ad Link Aggregation, Auto MDI/MDI-X, CLI, HTTP GUI, SSH, SSL, RADIUS, SNMP. Provides up to 15.4 watts/port (370 watts) of 802.3af compliant power. 19" Rack mount 1U housing. Supported SFP modules include 1000Base-SX (1200480E1), 1000Base-LX (1200481E1) and SFP interconnect cable (1200484Gx).

NetVanta 1534 2nd Gen	1702590G1	28 Port Managed Layer 3 Lite Gigabit Ethernet Switch. Includes 24 -10/100/1000Base-T access ports, 2 - Standard SFP Gigabit Ethernet Ports and 2 - Enhanced (1Gbps/2.5Gbps) SFP ports. Features include 16 Static Routes, 802.1Q VLANs, GVRP, 802.1p QoS, 802.1w Rapid Spanning Tree, 802.3ad Link Aggregation, Auto MDI/MDI-X, CLI, HTTP GUI, SSH, SSL, RADIUS, SNMP. 8" Width allows 2 units to be mounted side-by-side in a stand 19" Rack. Supported SFP modules include1000Base-SX (1200480E1),1000Base-LX (1200481E1), 2.5 Gbps MM (1200482G1), 2.5 Gbps SM (1200483G1) and SFP interconnect cable (1200484Gx). Dual 1U 19" mounting shelf (1700508F1).
NetVanta 1534 POE 2nd Gen	1702591G1	28 Port Managed Layer 3 Lite Gigabit PoE Ethernet Switch. Includes 24 -10/100/1000Base-T access PoE ports, 2 - Standard SFP Gigabit Ethernet Ports and 2 - Enhanced (1Gbps/2.5Gbps) SFP ports. Features include 16 Static Routes, 802.1Q VLANs, GVRP, 802.1p QoS, 802.1w Rapid Spanning Tree, 802.3ad Link Aggregation, Auto MDI/MDI-X, CLI, HTTP GUI, SSH, SSL, RADIUS, SNMP. Provides up to 15.4 watts/port (370 watts) of 802.3af(PoE) and 802.3at(PoE+) compliant power. 19" Rack mount 1U housing. Supported SFP modules include1000Base-SX (1200480E1),1000Base-LX (1200481E1), 2.5 Gbps MM (1200482G1), 2.5 Gbps SM (1200483G1) and SFP interconnect cable (1200484Gx).
NetVanta 1544 2nd Gen	1702544G1	28 Port Managed Layer 3 Gigabit Ethernet Switch. Includes 24 - 10/100/1000Base-T access ports and 4 - Enhanced SFP (1Gbps/2.5Gbps) Gigabit Ethernet Ports. Features include 802.1Q VLANs, GVRP, 802.1p QoS, 802.1w Rapid Spanning Tree, 802.3ad Link Aggregation, Auto MDI/MDI-X, CLI, HTTP GUI, SSH, SSL, RADIUS, SNMP. 8" Width allows 2 units to be mounted side-by-side in a stand 19" Rack. Supported SFP modules include 1000Base-SX (1200480E1), 1000Base-LX (1200481E1), 2.5 Gbps MM (1200482G1), 2.5 Gbps SM (1200483G1) and SFP interconnect cable (1200484Gx). Dual 1U 19" mounting shelf (1700508F1).

NetVanta 1544 POE 2nd Gen	1702545G1	28 Port Managed Layer 3 Gigabit Ethernet Switch supporting 802.3af & Legacy Power over Ethernet. Includes 24 - 10/100/1000Base-T access ports and 4 - Enhanced SFP Gigabit (1Gbps/2.5Gbps) Ethernet Ports. Features include 802.1Q VLANs, GVRP, 802.1p QoS, 802.1w Rapid Spanning Tree, 802.3ad Link Aggregation, Auto MDI/MDI-X, CLI, HTTP GUI, SSH, SSL, RADIUS, SNMP. Provides up to 15.4 watts/port (370 watts) of 802.3af(PoE) and 802.3at(PoE+) compliant power. 19" Rack mount 1U housing. Supported SFP modules include 1000Base-SX (1200480E1), 1000Base-LX (1200481E1), 2.5 Gbps MM (1200482G1), 2.5 Gbps SM (1200483G1) and SFP interconnect cable (1200484Gx).
NetVanta 1544F, 120V AC	1700546G1#120	28 Port Managed Layer 3 Gigabit Ethernet Switch. Includes 24 - SFP Gigabit (1Gbps) access ports and 4 - Enhanced SFP Gigabit (1Gbps/2.5Gbps) Ethernet Ports. Features include 802.1Q VLANs, GVRP, 802.1p QoS, 802.1w Rapid Spanning Tree, 802.3ad Link Aggregation, Auto MDI/MDI-X, CLI, HTTP GUI, SSH, SSL, RADIUS, SNMP. 19" Rack mount 1U housing. Supported SFP modules include 1000Base-SX (1200480E1), 1000Base-LX (1200481E1), 2.5 Gbps MM (1200482G1), 2.5 Gbps SM (1200483G1) and SFP interconnect cable (1200484Gx). 120Vac 50/60Hz.
NetVanta 1638	4700568F1	48 Port Managed Layer 3 Gigabit Ethernet Switch with optional 10GigE uplinks. Includes 48 - Copper Gigabit (1000Base-T) access ports and 2 - High Speed Expansion Slots. Features include 802.1Q VLANs, GVRP, 802.1p QoS, 802.1w Rapid Spanning Tree, 802.3ad Link Aggregation, Auto MDI/MDI-X, CLI, HTTP GUI, SSH, SSL, RADIUS, SNMP. 19" Rack mount 1U housing. Includes AC power supply. Supported expansion modules: Dual Stacking XIM (4700470F1, 4700470F2, 4700470F5), Dual SFP XIM (1700473F1), Dual SFP+ XIM (1700471F1).
NetVanta 1638P	4700569F1	48 Port Managed Layer 3 Gigabit Ethernet Switch with optional 10GigE uplink and 802.3af and Legacy Power over Ethernet. Includes 48 - Copper Gigabit (1000Base-T) access ports and 2 - High Speed Expansion Slots. Provides up to 370 watts of 802.3af compliant power. Features include 802.1Q VLANs, GVRP, 802.1p QoS, 802.1w Rapid Spanning Tree, 802.3ad Link Aggregation, Auto MDI/MDI-X, CLI, HTTP GUI, SSH, SSL, RADIUS, SNMP. 19" Rack mount 1U housing. Includes AC PoE power supply. Supported expansion modules: Dual Stacking XIM (4700470F1, 4700470F2, 4700470F5), Dual SFP XIM (1700473F1), Dual SFP+ XIM (1700471F1).
NetVanta 1131	1700530F1	Redundant and External Power Supply for NetVanta 1500 and 1600 series Ethernet Switches. Includes 3 - Redundant Power Supply ports capable of delivering 12V backup power to one of up to 3 connected

		switches and 1 - External Power Supply port capable of delivering 370W of 802.3af(PoE) or 802.3at(PoE+) compliant power to capable switches. 8" Width allows 2 units to be mounted side-by-side in a standard 19" Rack.
NetVanta 1131 RPS Cable	1700532F1	2 Meter Redundant Power Supply cable. Connects NV1500 or NV1600 series switches to the NV1131 RPS/EPS to provide a redundant 12V power source.
NetVanta 1131 EPS Cable	1700533F1	2 Meter External Power Supply cable. Connects NV1500 or NV1600 series switches to the NV1131 RPS/EPS to deliver 370W of 802.3af(PoE) or 802.3at(PoE+) compliant power.
NetVanta 1600 Dual Stacking XIM Module w/0.5 m Cable	4700470F1	Stacking module for use with NetVanta 1600 series switches. Provides two 10Gbps (16Gbps in ActivChassis mode) stacking interfaces. Includes one 1/2 meter XIM stacking cable (1700500F1).
NetVanta 1600 Dual Stacking XIM Module w/2 m Cable	4700470F2	Stacking module for use with NetVanta 1600 series switches. Provides two 10Gbps (16Gbps in ActivChassis mode) stacking interfaces. Includes one 2 meter XIM stacking cable (1700500F2).
NetVanta 1600 Dual Stacking XIM Module w/5 m Cable	4700470F5	Stacking module for use with NetVanta 1600 series switches. Provides two 10Gbps (16Gbps in ActivChassis mode) stacking interfaces. Includes one 5 meter XIM stacking cable (1700500F5).
NetVanta 1600 Dual Stacking XIM Module	1700470F1	Stacking module for use with NetVanta 1600 series switches. Provides two 10Gbps stacking interfaces.
NetVanta .5 meter XIM Stacking Cable	1700500F1	1/2 Meter XIM 10Gbps stacking cable. For use with NetVanta 1600 Series Switches and the Dual Stacking XIM (1700470F1)
NetVanta 2 meter XIM Stacking Cable	1700500F2	2 Meter XIM 10Gbps stacking cable. For use with NetVanta 1600 Series Switches and the Dual Stacking XIM (1700470F1)
NetVanta 5 meter XIM Stacking Cable	1700500F5	5 Meter XIM 10Gbps stacking cable. For use with NetVanta 1600 Series Switches and the Dual Stacking XIM (1700470F1)
NetVanta 1600 Dual SFP XIM Module	1700473F1	Dual SFP XIM module for use with the NetVanta 1600 series Ethernet switches. Used for 1G or 2.5 G SFP (fiber) connections.
NetVanta 1600 Dual SFP+ XIM Module	1700471F1	Dual SFP+ XIM module for use with the NetVanta 1600 series Ethernet switches. Used for 10G SPF+ (fiber) connections.
10GBase-SR SFP+ Transceiver	1700485F1	10GBASE-SR SFP+ TRANSCEIVER
10GBase-LR SFP+ Transceiver	1700486F1	10GBASE-LR SFP+ TRANSCEIVER

NetVanta 1600 series Power Supply	1700460F1	Spare AC power supply for NetVanta 1638 (4700568F1).
NetVanta 1600P series Power Supply	1700462F1	Spare AC power supply for NetVanta 1638P (4700569F1).
1000Base-SX 850nm Optical SFP Transceiver	1200480E1	850nm 1-Gbps Optical SFP Transceiver. Supports 1Gbps. Provides Gigabit Ethernet up to 500 meters over Multimode fiber, using a 850nm laser. Provides LC fiber connectors. For use with all NetVanta Switches.
1000Base-LX 1310nm Optical SFP Transceiver	1200481E1	1310nm 1-Gbps Optical SFP Transceiver. Support 1Gbps. Provides Gigabit Ethernet up to 10km over Singlemode fiber, using a 1310nm laser. Provides LC fiber connectors. For use with all NetVanta Switches.
2.5 Gbps Multimode SFP Transceiver	1200482G1	850nm 1/2.5-Gbps Optical SFP Transceiver. Support 1 or 2.5Gbps. Provides Gigabit Ethernet up to 550 meters over Multimode fiber, using a 850nm laser. Provides LC fiber connectors. For use with NetVanta 2nd Gen 1534, 1st Gen 1544, 2nd Gen 1544 and 1544F.
2.5 Gbps SingleMode SFP Transceiver	1200483G1	1310nm 1/2.5-Gbps Optical SFP Transceiver. Support 1 or 2.5Gbps. Provides Gigabit Ethernet up 30km over Singlemode fiber, using a 1310nm laser. Provides LC fiber connectors. For use with NetVanta 2nd Gen 1534, 1st Gen 1544, 2nd Gen 1544 and 1544F.
1M SFP Interconnect Cable	1200484G1	1 Meter cable with integrated SFPs on each end. Allows adjacent NetVanta switches to be interconnected. Support 1 or 2.5Gbps. For use with NetVanta 1200 and 1500 Series Switches.
3M SFP Interconnect Cable	1200484G3	3 Meter cable with integrated SFPs on each end. Allows adjacent NetVanta switches to be interconnected. Support 1 or 2.5Gbps. For use with NetVanta 1200 and 1500 Series Switches.
1000BASE-T SFP Module 100M	1200485G1	10/100/1000Base-T Copper Gigabit SFP Transceiver. Provides Gigabit Ethernet up to 100 meters over Cat5e cabling. Provides RJ-45. For use with NetVanta 1534 and NetVanta 1544 Series switches.
		ProStart Remote Installation
ProStart REM	1100ALR10029N	ProStart Remote telephone support of customer installation of NetVanta 1638 (PoE)
ProStart REM	1101101N2	ProStart Remote telephone support of customer installation of NetVanta 1534(PoE) Standard Install (excludes VLAN, Mgmt., SNMP, QoS)
ProStart REM	1101101N3	ProStart Remote telephone support of customer installation of 1234(PoE), 1534(PoE) Enhanced Install (includes VLAN, Mgmt., SNMP, QoS), NetVanta 1544(PoE), 1544F

ProStart REM	1100ALR10027N	ProStart Remote telephone support of customer installation of NetVanta 1238 (PoE) without VLAN, Mgmt., SNMP, CoS
ProStart REM	1100ALR10028N	ProStart Remote telephone support of customer installation of NetVanta 1238 (PoE) includes programming for VLAN, Mgmt., SNMP, CoS
		ProStart Onsite Installation
ProStart OST	1101102N2	ProStart On Site Installation of NetVanta 1534(PoE) Standard Install (excludes VLAN, Mgmt., SNMP, QoS)
ProStart OST	1101102N3	ProStart On Site Installation of 1234(PoE), 1534(PoE) Enhanced Install (includes VLAN, Mgmt., SNMP, QoS), NetVanta 1544(PoE), 1544F
ProStart OST	1100ALS10029N	ProStart On Site Installation of NetVanta 1638 (PoE)
ProStart OST	1100ALS10027N	ProStart On-Site Installation of NetVanta 1238 (PoE) without VLAN, Mgmt., SNMP, CoS
ProStart OST	1100ALS10028N	ProStart On-Site Installation of NetVanta 1238 (PoE) includes programming for VLAN, Mgmt., SNMP, CoS
		Optional Services -- Basic Maintenance
ProCare Basic 1 YR	1100AMNVS2M1T1	ProCare 1 Year Basic Maintenance for the NetVanta 1534 and 1238 (POE), providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
ProCare Basic 1 YR	1100AMNVS3M1T1	ProCare 1 Year Basic Maintenance for the NetVanta 1544, 1544F, and 1335 WIFI, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
ProCare Basic 1 YR	1100AMNVSR2M1T1	ProCare 1 Year Basic Maintenance for the NetVanta 3305 and 1234 (POE), the NetVanta 3448 with standard feature pack software, and NetVanta 320X and 3430 with enhanced feature pack software, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
ProCare Basic 1 YR	1100AMSWENM1T1	ProCare 1 Year Basic Maintenance for the NetVanta 1638 and 1535P, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
ProCare Basic 3 YR	100AMNVS2M1T3	ProCare 3 Year Basic Maintenance for the NetVanta 1534 and 1238 (POE) providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
ProCare Basic 3 YR	1100AMNVS3M1T3	ProCare 3 Year Basic Maintenance for the NetVanta 1534 and 1238 (POE), providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT

ProCare Basic 3 YR	1100AMNVSR2M1T3	ProCare 3 Year Basic Maintenance for the NetVanta 3305 and 1234 (POE), the NetVanta 3448 with standard feature pack software, and NetVanta 320X and 3430 with enhanced feature pack software, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
ProCare Basic 3 YR	1100AMSWENM1T3	ProCare 3 Year Basic Maintenance for the NetVanta 1638 and 1535P, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
		Optional Services -- NBD Remote Maintenance
ProCare 5x8xNBD 1 YR	1100AMNVS2M2T1	ProCare 1 Year NBD Remote Maintenance for the NetVanta 1534 and 1238 (POE), providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD 1 YR	1100AMNVS3M2T1	ProCare 1 Year NBD Remote Maintenance for the NetVanta 1544, 1544F, and 1335 WIFI, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD 1 YR	1100AMNVSR2M2T1	ProCare 1 Year NBD Remote Maintenance for the NetVanta 3305 and 1234 (POE), the NetVanta 3448 with standard feature pack software, and NetVanta 320X and 3430 with enhanced feature pack software, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD 1 YR	1100AMSWENM2T1	ProCare 1 Year NBD Remote Maintenance for the NetVanta 1638 and 1535P, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD 3 YR	1100AMNVS2M2T3	ProCare 3 Year NBD Remote Maintenance for the NetVanta 1534 and 1238 (POE), providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT

ProCare 5x8xNBD 3 YR	1100AMNVS3M2T3	ProCare 3 Year NBD Remote Maintenance for the NetVanta 1544, 1544F, and 1335 WIFI, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD 3 YR	1100AMNVSR2M2T3	ProCare 3 Year NBD Remote Maintenance for the NetVanta 3305 and 1234 (POE), the NetVanta 3448 with standard feature pack software, and NetVanta 320X and 3430 with enhanced feature pack software, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD 3 YR	1100AMSWENM2T3	ProCare 3 Year NBD Remote Maintenance for the NetVanta 1638 and 1535P, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
		Optional Services -- 7x24x4 Remote Maintenance
ProCare 7x24x4 1 YR	1100AMNVS2M3T1	ProCare 1 Year 7x24x4 Remote Maintenance for the NetVanta 1534 and 1238 (POE), providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
ProCare 7x24x4 1 YR	1100AMNVS3M3T1	ProCare 1 Year 7x24x4 Remote Maintenance for the NetVanta 1544, 1544F, and 1335 WIFI, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
ProCare 7x24x4 1 YR	1100AMNVSR2M3T1	ProCare 1 Year 7x24x4 Remote Maintenance for the NetVanta 3305 and 1234 (POE), the NetVanta 3448 with standard feature pack software, and NetVanta 320X and 3430 with enhanced feature pack software, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
ProCare 7x24x4 1 YR	1100AMSWENM3T1	ProCare 1 Year 7x24x4 Remote Maintenance for the NetVanta 1638 and 1535P, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
ProCare 7x24x4 3 YR	1100AMNVS2M3T3	ProCare 3 Year 7x24x4 Remote Maintenance for the NetVanta 1534 and 1238 (POE), providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week

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ProCare 7x24x4 3 YR	1100AMNVS3M3T3	ProCare 3 Year 7x24x4 Remote Maintenance for the NetVanta 1544, 1544F, and 1335 WIFI, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
ProCare 7x24x4 3 YR	1100AMNVSR2M3T3	ProCare 3 Year 7x24x4 Remote Maintenance for the NetVanta 3305 and 1234 (POE), the NetVanta 3448 with standard feature pack software, and NetVanta 320X and 3430 with enhanced feature pack software, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
ProCare 7x24x4 3 YR	1100AMSWENM3T3	ProCare 3 Year 7x24x4 Remote Maintenance for the NetVanta 1638 and 1535P, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
		Optional Services -- NBD Onsite Maintenance
ProCare 5x8xNBD OST 1 YR	1100AMNVS2M4T1	ProCare 1 Year NBD On-site Maintenance for the NetVanta 1534 and 1238 (POE), providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD OST 1 YR	1100AMNVS3M4T1	ProCare 1 Year NBD On-site Maintenance for the NetVanta 1544, 1544F, and 1335 WIFI, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD OST 1 YR	1100AMNVSR2M4T1	ProCare 1 Year NBD On-site Maintenance for the NetVanta 3305 and 1234 (POE), the NetVanta 3448 with standard feature pack software, and NetVanta 320X and 3430 with enhanced feature pack software, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD OST 1 YR	1100AMSWENM4T1	ProCare 1 Year NBD On-site Maintenance for the NetVanta 1638 and 1535P, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT

ProCare 5x8xNBD OST 3 YR	1100AMNVS2M4T3	ProCare 3 Year NBD On-site Maintenance for the NetVanta 1534 and 1238 (POE), providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD OST 3 YR	1100AMNVS3M4T3	ProCare 3 Year NBD On-site Maintenance for the NetVanta 1544, 1544F, and 1335 WIFI, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD OST 3 YR	1100AMNVSR2M4T3	ProCare 3 Year NBD On-site Maintenance for the NetVanta 3305 and 1234 (POE), the NetVanta 3448 with standard feature pack software, and NetVanta 320X and 3430 with enhanced feature pack software, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD OST 3 YR	1100AMSWENM4T3	ProCare 3 Year NBD On-site Maintenance for the NetVanta 1638 and 1535P, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
		Optional Services -- 7x24x4 Onsite Maintenance
ProCare 7x24x4 OST 1 YR	1100AMNVS2M5T1	ProCare 1 Year 7x24x4 On-site Maintenance for the NetVanta 1534 and 1238 (POE), providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
ProCare 7x24x4 OST 1 YR	1100AMNVS3M5T1	ProCare 1 Year 7x24x4 On-site Maintenance for the NetVanta 1544, 1544F, and 1335 WIFI, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
ProCare 7x24x4 OST 1 YR	1100AMNVSR2M5T1	ProCare 1 Year 7x24x4 On-site Maintenance for the NetVanta 3305 and 1234 (POE), the NetVanta 3448 with standard feature pack software, and NetVanta 320X and 3430 with enhanced feature pack software, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week

ProCare 7x24x4 OST 1 YR	1100AMSWENM5T1	ProCare 1 Year 7x24x4 On-site Maintenance for the NetVanta 1638 and 1535P, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
ProCare 7x24x4 OST 3 YR	1100AMNVS2M5T3	ProCare 3 Year 7x24x4 On-site Maintenance for the NetVanta 1534 and 1238 (POE), providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
ProCare 7x24x4 OST 3 YR	1100AMNVS3M5T3	ProCare 3 Year 7x24x4 On-site Maintenance for the NetVanta 1544, 1544F, and 1335 WIFI, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
ProCare 7x24x4 OST 3 YR	1100AMNVSR2M5T3	ProCare 3 Year 7x24x4 On-site Maintenance for the NetVanta 3305 and 1234 (POE), the NetVanta 3448 with standard feature pack software, and NetVanta 320X and 3430 with enhanced feature pack software, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
ProCare 7x24x4 OST 3 YR	1100AMSWENM5T3	ProCare 3 Year 7x24x4 On-site Maintenance for the NetVanta 1638 and 1535P, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
		ProStart After Hours Remote Installation
1100103N3	ProStart REM AFTR HRS	ProStart After Hours Remote (excludes Sunday & Holidays) telephone support of customer installation of 1234(PoE), 1534(PoE) Enhanced Install (includes VLAN, Mgmt., SNMP, QoS), NetVanta 1544(PoE), 1544F
1100ALR11529N	ProStart REM AFTR HRS	ProStart After Hours Remote (excludes Sunday & Holidays) telephone support of customer installation of NetVanta 1638 (PoE)
1100ALR11527N	ProStart REM AFTR HRS	ProStart After Hours Remote (excludes Sunday & Holidays) telephone support of customer installation of NetVanta 1238 (PoE) without VLAN, Mgmt., SNMP, CoS
1100ALR11528N	ProStart REM AFTR HRS	ProStart After Hours Remote (excludes Sunday & Holidays) telephone support of customer installation of NetVanta 1238 (PoE) includes programming for VLAN, Mgmt., SNMP, CoS

1100ALR12029N	ProStart REM SUNDAY/HOLIDAY	ProStart Sunday/Holiday Remote telephone support of customer installation of NetVanta 1638 (PoE)
1100104N3	ProStart REM SUNDAY/HOLIDAY	ProStart Sunday/Holiday Remote telephone support of customer installation of 1234(PoE), 1534(PoE) Enhanced Install (includes VLAN, Mgmt., SNMP, QoS), NetVanta 1544(PoE)
1100ALR12027N	ProStart REM SUNDAY/HOLIDAY	ProStart Sunday/Holiday Remote telephone support of customer installation of NetVanta 1238 (PoE) without VLAN, Mgmt., SNMP, CoS
1100ALR12028N	ProStart REM SUNDAY/HOLIDAY	ProStart Sunday/Holiday Remote telephone support of customer installation of NetVanta 1238 (PoE) includes programming for VLAN, Mgmt., SNMP, CoS
		ProStart After Hours Onsite Installation
1100105N3	ProStart OST AFTR HRS	ProStart After Hours On-Site Installation (excludes Sunday & Holidays) of 1234(PoE) or 1534(PoE) Enhanced Install (includes VLAN, Mgmt., SNMP, QoS), NetVanta 1544(PoE), 1544F
1100ALS11529N	ProStart OST AFTR HRS	ProStart After Hours On-Site Installation (excludes Sunday & Holidays) of NetVanta 1638 (PoE)
1100ALS11527N	ProStart OST AFTR HRS	ProStart After Hours On-Site Installation (excludes Sunday & Holidays) NetVanta 1238 (PoE) without VLAN, Mgmt., SNMP, CoS
1100ALS11528N	ProStart OST AFTR HRS	ProStart After Hours On-Site Installation (excludes Sunday & Holidays) NetVanta 1238 (PoE) includes programming for VLAN, Mgmt., SNMP, CoS
1100ALS11519LT	ProStart OST AFTR HRS	ProStart On Site Installation of Advanced Routing or Firewall (beyond default) or VPN in installation of NetVanta 7xxx - Base Installation REQUIRED
1100ALS12019LT	ProStart OST SUNDAY/HOLIDAY	ProStart On Site Installation of Advanced Routing or Firewall (beyond default) or VPN in installation of NetVanta 7xxx - Base Installation REQUIRED
1100106N3	ProStart OST SUNDAY/HOLIDAY	ProStart Sunday/Holiday On-Site Installation of 1234(PoE), 1534(PoE) Enhanced Install (includes VLAN, Mgmt., SNMP, QoS), NetVanta 1544(PoE), 1544F
1100ALS12029N	ProStart OST SUNDAY/HOLIDAY	ProStart Sunday/Holiday On-Site Installation of NetVanta 1638 (PoE)
1100ALS12027N	ProStart OST SUNDAY/HOLIDAY	ProStart Sunday/Holiday On-Site Installation of NetVanta 1238 (PoE) without VLAN, Mgmt., SNMP, CoS
1100ALS12028N	ProStart OST SUNDAY/HOLIDAY	ProStart Sunday/Holiday On-Site Installation of NetVanta 1238 (PoE) includes programming for VLAN, Mgmt., SNMP, CoS
1100401L1	ProStart T&M OST	Hourly rate for On-Site support during normal business hours; can also be used to bill travel time. Does not include any applicable freight charges for equipment dispatched under emergency circumstances. Scope of work may be required, and work must be scheduled in advance.

1100401L2	ProStart T&M OST AFTR HRS	Hourly rate for On-Site support after normal business hours; can also be used to bill travel time. Applicable for Weekday evenings and Saturdays. Does not include any applicable freight charges for equipment dispatched under emergency circumstances. Scope of work may be required, and work must be scheduled in advance.
1100401L3	ProStart T&M OST Sunday/Holida	Hourly rate for On-Site support on Sundays or Holidays; can also be used to bill travel time. Does not include any applicable freight charges for equipment dispatched under emergency circumstances. Scope of work may be required, and work must be scheduled in advance.
1100401L4	ProStart T&M REM	Hourly rate for remote engineering support during normal business hours. Does not include any applicable freight charges for equipment dispatched under emergency circumstances. Scope of work may be required, and work must be scheduled in advance.
1100401L5	ProStart T&M REM AFTR HRS	Hourly rate for remote engineering support after normal business hours. Applicable for Weekday evenings and Saturdays. Does not include any applicable freight charges for equipment dispatched under emergency circumstances. Scope of work may be required, and work must be scheduled in advance.
1100401L6	ProStart T&M REM Sunday/Holida	Hourly rate for remote engineering support on Sundays or Holidays. Does not include any applicable freight charges for equipment dispatched under emergency circumstances. Scope of work may be required, and work must be scheduled in advance.
1100402L1	PROSTART EXPEDITE FEE	Expedite fee for scheduling on-site installations with less than 15 business days notice from approved receipt of data gathering for UC installations; 10 business days notice from approved receipt of data gathering for NetVanta 7xxx installations; and 5 business days notice from approved receipt of data gathering for all other installation types
1100402L2	PROSTART EXPEDITE FEE	Expedite fee for scheduling remote installation support with less than 15 business days notice from approved receipt of data gathering for UC installations; approved 10 business days notice from receipt of data gathering for NetVanta 7xxx installations; and approved 5 business days notice from receipt of data gathering for all other installation types
1100403L1	PROSTART SITE NOT READY FEE	Site not ready fee charged for site visit for installation when site is not ready and a return trip is necessary to perform the installation
1100403L2	PROSTART NOT READY FEE REMOTE	Site not ready fee charged for rescheduling remote installation when site is not ready and the installation must be rescheduled

1100409L1	PROSTART FEE	Rescheduling fee charged when on site installation is rescheduled less than 24 Business Hours prior to the scheduled installation.
1100409L2	PROSTART RESCHEDULE FEE REMOTE	Rescheduling fee charged when remote installation is rescheduled less than 24 Business Hours prior to the scheduled installation.
1100LS00CXL	CANCELLATION FEE ON-SITE	Fee for cancellation of an on-site installation.
1100ALR10001SMB	ProStart REM	Remote system upgrade for NetVanta 7100, VSMB (Very Small Business) units to activate support up to 100 users Mon-Fri 8am-5pm site time. Does not include configuration for new users. The NetVanta 7100 being upgraded must have been bought as a standalone 4200796G1#VSMB
1100ALS10001SMB	ProStart OST UPGRADE	On-site system upgrade for NetVanta 7100, VSMB (Very Small Business) units to activate support up to 100 users Mon-Fri 8am-5pm site time. Does not include configuration for new users. The NetVanta 7100 being upgraded must have been bought as a standalone 4200796G1#VSMB
1100ALR30001W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 1 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services
1100ALR30005W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 5 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services.
1100ALR30010W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 10 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services.
1100ALR30025W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 25 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services.
1100ALR30050W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 50 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services.
1100ALR30075W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 75 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services.

1100ALR30100W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 100 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services.
		Optional - N-Command
N-COMMAND MSP, BASIC	1700841G1	N-Command MSP is a network management platform that offers configuration, firmware, and inventory management for AOS-based NetVanta and TA 900 devices. Allows network administrators to push firmware updates and configuration changes out to remote devices, back up and restore configurations, review VQM data, and manage assets and inventory. First year of license and annual maintenance included and gives access to Technical Support and Software Upgrades. Supports up to 10,000 devices.
N-COMMAND MSP, ADVANCED	1700842G1	N-Command MSP Server, Advanced, Supports up to 25,000 devices. N-Command MSP is a network management platform that offers configuration, firmware, and inventory management for AOS-based NetVanta and TA 900 devices. Allows network administrators to push firmware updates and configuration changes out to remote devices, back up and restore configurations, review VQM data, and manage assets and inventory. First year of license and annual maintenance included and gives access to Technical Support and Software Upgrades.
N-COMMAND MSP, VMWARE	1700845G1	N-Command MSP for VM Ware installation. OVA file is designed to supports up to 10,000 devices. N-Command MSP is a network management platform that offers configuration, firmware, and inventory management for AOS-based NetVanta and TA 900 devices. Allows network administrators to push firmware updates and configuration changes out to remote devices, back up and restore configurations, review VQM data, and manage assets and inventory. First year of license and annual maintenance included and gives access to Technical Support and Software Upgrades. Requires yearly maintenance renewal after the first year.
MSP HA LICENSE	1950840F1	Upgrade license for supporting clustering of multiple n-Command MSP instances. Allows for a highly-available solution and the ability to support a common database across multiple MSP installations. Each server in the cluster requires 1 license.

N-CMND MSP ANNUAL MAINT RENWL	1700NCMDG1	Annual license renewal for n-Command MSP. After the initial year of support expires, this renewal allows for ongoing access to ADTRAN Technical Support, access to upgrades to n-Command MSP to enable new features, and allows new devices to be added to the system.
		Training Options
1600NETPPE	ATSP/IN TRAINING	ATSP/IN Enrollment
1600NETPPE	ATSP/IN TRAINING	ATSP/IN Course
1600NETPPV	ATSP/IN VIRTUAL TRAINING	ATSP/IN Virtual Enrollment
1600NETSS	ATSP/IN SELF-STUDY	ATSP/IN Self-Study Kit

5.2.9 WIRELESS — Provides connectivity to wireless devices within a limited geographic area. System capabilities should include:

- Redundancy and automatic failover

  ADTRAN Bluesocket vWLAN splits management and control from data. Management and control is virtualized in the data center which is inherently more reliable. Data stays out at the access points which are intelligent enforcing policies at the edge such as stateful firewall rules and bandwidth allocation. vWLAN and APs can be deployed anywhere in the world. If the connection between the access points and vWLAN goes down, clients continue to pass traffic since vWLAN is not in the data path. In addition vWLAN includes a high availability option. A secondary management and control instance can be deployed and should the connection between the access points and vWLAN go down, the APs will automatically establish a management and control channel to the secondary vWLAN instance.

- IPv6 compatibility

  ADTRAN Bluesocket vWLAN includes IPv6 support today with the following caveats:

  - **Web based authentication cannot be used for IPv6 clients. All other authentication methods (MAC Auth, 802.1X, Preshared Key, Default role) can be used for IPv6 clients.**
  - **Stateful firewall enforced at access point must be disabled.**
  - **vWLAN and Bluesocket Access Points cannot have IPv6 addresses.**

  Full IPv6 support is currently on the roadmap for 2H2014.

- NTP Support

  ADTRAN Bluesocket vWLAN supports NTP.

5.2.9.1 Access Points — A wireless Access Point (AP) is a device that allows wireless devices to connect to a wired network using Wi-Fi, or related standards.

Capabilities should include:

- 802.11a/b/g/n

  ADTRAN Bluesocket Access Point 1900 series are dual radio 802.11a/b/g/n access points.

- 802.11n

  ADTRAN Bluesocket Access Point 1900 series are 802.11n access points.

- 802.11ac

  ADTRAN Bluesocket vWLAN is a software based virtualized solution, future proof for 802.11ac and other emerging technologies. vWLAN will simply require a software upgrade to support 802.11ac. 802.11ac access points are roadmap for 2H2014.

- Capable of controller discovery method via DHCP (onsite controller or offsite through Cloud Architecture)

  ADTRAN Bluesocket vWLAN supports 3 discovery methods (DHCP, DNS, Statically Configured) for zero touch AP provisioning.

- UL2043 plenum rated for safe mounting in a variety of indoor environments

  ADTRAN Bluesocket Access Point 1900 Series are plenum rated.

- Support AES-CCMP (128-bit)

  ADTRAN Bluesocket Access Point 1900 Series support AES-CCMP.

- Provides real-time wireless intrusion monitoring and detection

  ADTRAN Bluesocket vWLAN and access points includes wireless intrusion monitoring and detection such as the following:
  - **Rogue AP Detection**
  - **Rogue AP Location Tracking**

  More than 40 Wireless IDS Signatures Detecting Spoofed APs, Attacks and Exploits

5.2.9.2 **Outdoor Wireless Access Points** — Outdoor APs are rugged, with a metal cover and a DIN rail or other type of mount. During operations they can tolerate a wide temperature range, high humidity and exposure to water, dust, and oil. Capabilities should include:

ADTRAN Bluesocket 1940 Outdoor Access Points are IP67 rated, waterproof, and salt spray resistant.

- Flexible Deployment Options

  ADTRAN Bluesocket 1940 Outdoor Access Points include wall/ceiling and pole mounting hardware for flexible deployment options. In addition ADTRAN Bluesocket 1940 Outdoor Access Points include external antenna connectors to support various antenna types such as wide angle directional for coverage outside a back of a building, omni-directional for general coverage, narrow angle directional for long range mesh/point-to-point links, etc.

- Provides real-time wireless intrusion monitoring and detection

  ADTRAN Bluesocket vWLAN and access points includes wireless intrusion monitoring and detection such as the following:

- **Rogue AP Detection**
- **Rogue AP Location Tracking**

More than 40 Wireless IDS Signatures Detecting Spoofed APs, Attacks and Exploits

- Capable of controller discovery method via DHCP (onsite controller or offsite through Cloud Architecture)

  ADTRAN Bluesocket vWLAN supports 3 discovery methods (DHCP, DNS, Statically Configured) for zero touch AP provisioning.

5.2.9.3 **Wireless LAN Controllers** — An onsite or offsite solution utilized to manage light-weight access points in large quantities by the network administrator or network operations center. The WLAN controller automatically handles the configuration of wireless access-points. Capabilities should include:

- Ability to monitor and mitigate RF interference/self-heal

  ADTRAN Bluesocket vWLAN's DynamicRF (Radio Resource Management) technology provides Automatic Channel, TX Power, and Neighbor Discovery.

- Support seamless roaming from AP to AP without requiring re-authentication

  ADTRAN Bluesocket vWLAN supports seamless layer 2 and layer 3 Roaming with layer 3 tunnel load balancing. vWLAN also supports fast roaming (OKC).

- Support configurable access control lists to filter traffic and denying wireless peer to peer traffic

  Role based access control includes layer 3 and 4 firewall rules that are enforced by the ADTRAN Bluesocket Access Points at the edge along with the ability to block client to client traffic at layer 2.

- System encrypts all management layer traffic and passes it through a secure tunnel

  ADTRAN Bluesocket vWLAN utilizes a Secure TLS Management/Control Channel between the Access Points and vWLAN. Client data however stays at the access point, and doesn't traverse this tunnel. Only management/control traverses the tunnel.

- Policy management of users and devices provides ability to de-authorize or deny devices without denying the credentials of the user, nor disrupting other AP traffic

  With the ADTRAN Bluesocket vWLAN, devices can be placed into a "Quarantined" role by the administrator denying all access.

- Support configurable access control lists to filter traffic and denying wireless peer to peer traffic

  ADTRAN Bluesocket vWLAN included Role Based Access Control— User, Location (VLAN/Subnet), Block Client to Client Traffic, Over the Air Fairness, QOS, Bandwidth Allocation, Stateful Firewall Rules.

5.2.9.4 **Wireless LAN Network Services and Management** — Enables network administrators to quickly plan, configure and deploy a wireless network, as well as provide additional WLAN services. Some examples include wireless security, asset tracking, and location services. Capabilities should include:

- Provide for redundancy and automatic failover

  ADTRAN Bluesocket vWLAN splits management and control from data. Management and control is virtualized in the data center which is inherently more reliable. Data stays out at the access points which are intelligent enforcing policies at the edge such as stateful firewall rules and bandwidth allocation. vWLAN and APs can be deployed anywhere in the world. If the connection between the access points and vWLAN goes down, clients continue to pass traffic since vWLAN is not in the data path. In addition vWLAN includes a high availability option. A secondary management and control instance can be deployed and should the connection between the access points and vWLAN go down, the APs will automatically establish a management and control channel to the secondary vWLAN instance.
- Historical trend and real time performance reporting is supported

  ADTRAN Bluesocket vWLAN includes customizable dashboard with real time widgets as well as customizable historical reports.
- Management access to wireless network components is secured

  ADTRAN Bluesocket vWLAN includes secure HTML5-based administrative graphical user interface (GUI).
- SNMPv3 enabled

  ADTRAN Bluesocket vWLAN supports SNMPv2c. SNMP v3 support is roadmap for 1H2014.
- RFC 1213 compliant

  ADTRAN Bluesocket vWLAN is RFC 1213 (MIBII) Compliant.
- Automatically discover wireless network components

  ADTRAN Bluesocket vWLAN supports 3 discovery methods (DHCP, DNS, Statically Configured) for zero touch AP provisioning.
- Capability to alert for outages and utilization threshold exceptions

  ADTRAN Bluesocket vWLAN includes Customizable Notification Templates for Logs, Alarms, and Wireless IDS Alerts (Email, Syslog, SNMP Traps).
- Capability to support Apple's Bonjour Protocol / mDNS

  ADTRAN Bluesocket vWLAN includes support for Apple Bonjour based services (Airprint, Airplay, etc).
- QoS / Application identification capability

  ADTRAN Bluesocket vWLAN includes the following QoS functionality:

  - **Bandwidth Management (Incoming, Outgoing)**
  - **WMM (802.11e)**
  - **802.1p or Differentiated Service Code Point (DSCP)**
  - **WMM Power Save (U-APSD)**
  - **Over the Air Fairness**

5.2.9.5 **Cloud-based services for Access Points** — Cloud-based management of campus-wide WiFi deployments and distributed multi-site networks. Capabilities include:

ADTRAN Bluesocket vWLAN includes flexible deployment options - on-premises, cloud-hosted, and fully managed (via ProCloudSM Wi-Fi).

- Zero-touch access point provisioning, Network-wide visibility and control

  ADTRAN Bluesocket vWLAN supports 3 discovery methods (DHCP, DNS, Statically Configured) for zero touch AP provisioning.

- RF optimization,

  ADTRAN Bluesocket vWLAN's DynamicRF (Radio Resource Management) technology provides Automatic Channel, TX Power, and Neighbor Discovery.

- Firmware updates

  ADTRAN Bluesocket vWLAN includes smart and secure AP firmware updates:

  - **AP Pre-Imaging Allows APs to Download Firmware While Operating, Reducing Downtime During Software Maintenance**
  - **Secure AP Upgrades Allow APs to Download Firmware from the vWLAN or Server Local to the APs Using Secure Copy (SCP)**
  - **Optional Local AP Upgrades Allow the AP to Download Firmware from Server Local to the AP Rather than Using Precious WAN bandwidth**

5.2.9.6 **Bring Your Own Device (BYOD)** — Mobile Data Management (MDM) technology utilized to allow employees to bring personally owned mobile devices (laptops, tablets, and smart phones) to their workplace, and use those devices to access privileged government information and applications in a secure manner. Capabilities should include:

ADTRAN's Bluesocket vWLAN includes Machine Authentication Enforcement, the ability to distinguish between users on corporate owned windows domain computers and Bring Your Own Devices such as iPads, iPhones, and Androids. This feature coupled with vWLAN's Secure RESTful Web Services API with Multi-tenant and Granular Administrative Access Support allows vWLAN to integrate with any third-party Bring Your Own Devices (BYOD) onboarding/enrollment system and or Mobile Device Management (MDM) system. The process of how trusted clients are on-boarded would be specific to third-party application however general flow would be as follows:

- **Mobile device connects to the wireless network.**
- **vWLAN would determine if the device is known by checking for device registration with third-party BYOD onboarding/enrollment system and or Mobile Device Management (MDM) system. If device is unknown vWLAN would redirect to third-party BYOD onboarding/enrollment and or MDM system for enrollment including certificate creation with customer's certificate authority and installation of certificate and profile on client.**
- Ability to apply corporate policy to new devices accessing the network resources, whether wired or wireless

  ADTRAN Bluesocket vWLAN can apply role based access control polices to devices access the wireless network. In addition vWLAN can apply role based access control policies to wired devices using vWLAN's unique Unified Access (wired) software option.

- Provide user and devices authentication to the network

  ADTRAN Bluesocket vWLAN includes the following Authentication methods:

  - **Local Database (Internal Users)**
  - **Full or Wild Card MAC Address (MAC Devices)**
  - **802.1X Machine and User for WPA and WPA2**
  - **EAP Methods - EAP-PEAP, EAP-TLS, EAP-TTLS, EAP-FAST, EAP-SIM, EAP-AKA**
  - **Enforce Machine Auth. (Distinguish Between Corp Owned**
  - **Windows Domain Computers and BYODs such as iPads,**
  - **iPhones, and Androids**
  - **Web Based (Captive Portal) RADIUS**
  - **Web Based (Captive Portal) LDAP, Secure LDAP, and Microsoft**
  - **Active Directory (AD)**
  - **Web-based (Captive Portal) SIP2 Library**
  - **Dynamic Role Assignment Using RADIUS and LDAP/AD Attributes**
  - **RADIUS Accounting**
  - **RADIUS Session-Timeout**
  - **RADIUS Administrative Authentication**
- Provide secure remote access capability

  3rd Party MDM to provide secure remote access to devices.
- Support 802.1x

  ADTRAN Bluesocket vWLAN includes support for 802.1X authentication.

- Network optimization for performance, scalability, and user experience

  ADTRAN Bluesocket vWLAN includes the ability to optimize the network using QoS, airtime fairness, bandwidth allocation, multicast/broadcast to unicast conversion, etc.

ADTRAN Parts List (Product/Management/Services/Training) for applicable sections of 5.2.9:

PART NUMBER	MODEL	DESCRIPTION
1951900G1	VWLAN FOR VMWARE, 0 APS	Bluesocket vWLAN Virtual Appliance (VMware). Supports 0 APs by default; Requires licenses per AP.
1700900F1	VWLAN APPLIANCE, 0 APS	Bluesocket vWLAN Appliance (Hardware). Supports 0 APs by default; Requires licenses per AP.

1951901G1	AP LICENSE	vWLAN license required to be purchased for each AP that will be used with the vWLAN. Does not include High Availability. High Availability licenses sold separately.
1951904G1	HA SOFTWARE UPGRADE	vWLAN High Availability license purchased per AP to enable zero packet loss failover. Backup appliance sold separately.
1951910G1	WIRED SUPPORT LICENSE UPGRADE	vWLAN Wired user license purchased per AP to enable support of up 32 users per AP from a source other than a Bluesocket AP. Provide a unified experience to wired and third-party AP users.
1700954F1	BSAP-1920 2X2:2	Bluesocket Access Point 1920 (BSAP 1920) for vWLAN; concurrent dual band (2.4 GHz/5 GHz) 802.11a/b/g/n, 2x2:2 MIMO (300 Mbps per radio) with internal Omni-directional antennas. No external antenna connectors. Includes wall/ceiling mount kit and t-bar mount kit for ceiling panels. Requires IEEE 802.3af PoE or 12 volt AC/DC power adapter, both sold separately.
1700955F1	BSAP-1925 2X2:2 EXT ANTENNA	Bluesocket Access Point 1925 (BSAP 1925) for vWLAN; concurrent dual band (2.4 GHz/5 GHz) 802.11a/b/g/n, 2x2:2 MIMO (300 Mbps per radio) with 4 RP-SMA jack antenna connectors. No internal antenna. Requires external antennas sold separately. Includes wall/ceiling mount kit and t-bar mount kit for ceiling panels. Requires IEEE 802.3af PoE or 12 volt AC/DC power adapter, both sold separately.
1700950F1	BSAP-1930 3X3:3	Bluesocket Access Point 1930 (BSAP 1930) for vWLAN; concurrent dual band (2.4 GHz/5 GHz) 802.11a/b/g/n, 3x3:3 MIMO (450 Mbps per radio) with internal Omni-directional antennas. No external antenna connectors. Includes wall/ceiling mount kit and t-bar mount kit for ceiling panels. Requires IEEE 802.3af PoE or 12 volt AC/DC power adapter, both sold separately.
1700951F1	BSAP-1935 3X3:3 EXT ANTENNA	Bluesocket Access Point 1935 (BSAP 1935) for vWLAN; concurrent dual band (2.4 GHz/5 GHz) 802.11a/b/g/n, 3x3:3 MIMO (450 Mbps per radio) with 6 RP-SMA jack antenna connectors. No internal antenna. Requires external antennas sold separately. Includes wall/ceiling mount kit and t-bar mount kit for ceiling panels. Requires IEEE 802.3af PoE or 12 volt AC/DC power adapter, both sold separately.
1700952F1	BSAP-1940 3X3:3 OUTDOOR AP	Bluesocket Access Point 1940 (BSAP 1940) for vWLAN; rated for outdoors and harsh environments, concurrent dual band (2.4 GHz/5 GHz) 802.11a/b/g/n, 3x3:3 MIMO (450 Mbps per radio) with 6 Type N jack antenna connectors. No internal antenna. Requires external antennas sold separately. Includes wall/pole mount kit. Includes built-in surge protection on Ethernet interface and antenna connectors. Requires IEEE 802.3at PoE sold separately.

1700932F1	ANTENNA BUNDLE, BSAP 1925	A set of two 2.4 GHz and two 5 GHz RP-SMA Omni-directional antennas with 3 dBi gain for the BSAP 1925.
1700931F1	ANTENNA BUNDLE, BSAP 1935	A set of three 2.4 GHz and three 5 GHz RP-SMA Omni-directional antennas with 3 dBi gain for the BSAP 1935.
1700930F1	ANTENNA BUNDLE, BSAP 1940	A set of three 2.4 GHz and three 5 GHz Type N Omni-directional antennas with 5/7 dBi gain respectively for the BSAP 1940.
1700926F1	POE INJ AF, BSAP 1920/25/30/35	Single port (10/100/1000) IEEE 802.3af PoE injector for the BSAP 1920/1925/1930/1925.
1700923F1	POE INJECTOR AT, BSAP 1940	Single port (10/100/1000) IEEE 802.3at PoE injector for the BSAP 1940. For indoor use only.
1700928F1	AC PWR ADAPTER BSAP 1920	AC/DC power adapter for the BSAP 1920/1925
1700929F1	AC PWR ADAPTER BSAP 1930	AC/DC power adapter for the BSAP 1930/1935
1700924F1	BSAP SERIAL CABLE	DB9 to RJ-45 rollover serial console cable for the BSAP 1800/1840/1930/1935 and NetVanta 160/161.
1600NVBSWLC	ATSP/WLAN COURSE	Provides an ATSP/vWLAN course at customer site. Price includes course fees, travel (continental US), equipment, and training materials for up to 12 students. To register or for more information please call 888-4ADTRAN or visit www.adtranuniversity.com
1600NVBSWLE	ATSP/WLAN TRAINING	Provides an enrollment in the ATSP/vWLAN training course at an ADTRAN training facility. To register or for more information please call 888-4ADTRAN or visit www.adtranuniversity.com.
1600NVBSWLV	ATSP/VWLAN VIRTUAL	Provides an enrollment in the ATSP/vWLAN virtual class. To register or for more information, call 888-4ADTRAN or visit www.adtranuniversity.com.
1600VWLANSSK	ATSP/VWLAN SELF-STUDY KIT	The ATSP/vWLAN Self-Study Kit provides a comprehensive, independent study method to prepare for the ATSP/vWLAN certification exam.
1100AMWIF1M1T1	ProCare Basic 1 YR	ProCare 1 Year Basic Maintenance for the Bluesocket Access Point (BSAP) 1800, 1840, 1920, 1930, 1935, and 1940, when used with vWLAN, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
1100AMAPPLM2T1	ProCare 5x8xNBD 1YR	ProCare 1 Year NBD Remote Maintenance for the UC 420, UC 420e, and Bluesocket vWLAN appliance, providing: 1 hour response time into technical support and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
1100AMWIF1M2T1	ProCare NBD REM 1 YR	ProCare 1 Year NBD Remote Maintenance for the Bluesocket Access Point (BSAP) 1800, 1840, 1920, 1925, 1930, 1935, and 1940 when used with vWLAN, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware

		replacement, available Monday through Friday, 7 am until 7 pm CT
100AMAPPLM3T1	ProCare 7x24 1 YR APPL	ProCare 1 Year 7x24x4 Remote Maintenance for the UC 420, UC 420e, and approved vWLAN appliance, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
1100AMWIF1M3T1	ProCare 7x24x4 REM 1 YR	ProCare 1 Year 7x24x4 Remote Maintenance for the Bluesocket Access Point (BSAP) 1800, 1840, 1920, 1925, 1930, 1935, and 1940 when used with vWLAN, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
1100AMAPPLM4T1	ProCare NBD OST 1 YR	ProCare 1 Year NBD On-site Maintenance for the UC 420, UC 420e, and Bluesocket vWLAN appliance, providing: 1 hour response time into technical support and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
1100AMWIF1M4T1	ProCare NBD OST 1 YR	ProCare 1 Year NBD On-site Maintenance for the Bluesocket Access Point (BSAP) 1800, 1840, 1920, 1925, 1930, 1935, and 1940 when used with vWLAN, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
1100AMAPPLM5T1	ProCare 7x24X4 OST 1 YR	ProCare 1 Year 7x24x4 On-site Maintenance for the UC 420, UC 420e, and Bluesocket vWLAN appliance, providing: 30 minute response time into technical support and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
1100AMWIF1M5T1	ProCare 7x24x4 OST 1 YR	ProCare 1 Year 7x24x4 On-site Maintenance for the Bluesocket Access Point (BSAP) 1800, 1840, 1920, 1925, 1930, 1935, and 1940 when used with vWLAN, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
1100AMWIF1M1T3	ProCare Basic 3 YR	ProCare 3 Year Basic Maintenance for the Bluesocket Access Point (BSAP) 1800, 1840, 1920, 1930, 1935, and 1940 when used with vWLAN, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT

1100AMAPPLM2T3	ProCare 5x8xNBD REM 3YR	ProCare 3 Year NBD Remote Maintenance for the UC 420, UC 420e, and Bluesocket vWLAN appliance, providing: 1 hour response time into technical support and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
1100AMWIF1M2T3	ProCare NBD REM 3 YR	ProCare 3 Year NBD Remote Maintenance for the Bluesocket Access Point (BSAP) 1800, 1840, 1920, 1925, 1930, 1935, and 1940 when used with vWLAN, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
1100AMAPPLM3T3	ProCare 7x24x4 REM 3 YR	ProCare 3 Year 7x24x4 Remote Maintenance for the UC 420, UC 420e, and Bluesocket vWLAN appliance, providing: 30 minute response time into technical support and four hour hardware replacement, available 24 hours a day, 7 days a week
1100AMWIF1M3T3	ProCare 7x24x4 REM 3 YR	ProCare 3 Year 7x24x4 Remote Maintenance for the Bluesocket Access Point (BSAP) 1800, 1840, 1920, 1925, 1930, 1935, and 1940 when used with vWLAN, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
1100AMAPPLM4T3	ProCare NBD OST 3 YR	ProCare 3 Year NBD On-site Maintenance for the UC 420, UC 420e, and Bluesocket vWLAN appliance, providing: 1 hour response time into technical support and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
1100AMWIF1M4T3	ProCare NBD OST 3 YR	ProCare 3 Year NBD On-site Maintenance for the Bluesocket Access Point (BSAP) 1800, 1840, 1920, 1925, 1930, 1935, and 1940 when used with vWLAN, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
1100AMAPPLM5T3	ProCare 7x24X4 OST 3 YR	ProCare 3 Year 7x24x4 On-site Maintenance for the UC 420, UC 420e, and Bluesocket vWLAN appliance, providing: 30 minute response time into technical support and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
1100AMWIF1M5T3	ProCare 7x24x4 OST 3 YR	ProCare 3 Year 7x24x4 On-site Maintenance for the Bluesocket Access Point (BSAP) 1800, 1840, 1920, 1925, 1930, 1935, and 1940 when used with vWLAN, providing: 30 minute response time into technical support, access to software upgrades and

		patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
1100MSPM200112	ProCloud NBD AP 1 YR	ProCloud Service for a vWLAN access point, which provides: hosting and management services, next business day remote hardware replacement, access to technical support at 1 hour priority response, 1 year *No AP or HA licenses are required when under an active ProCloud or ProCloud private label service plan.*
1100MSPM200136	ProCloud NBD AP 3 YR	ProCloud Service for a vWLAN access point, which provides: hosting and management services, next business day remote hardware replacement, access to technical support at 1 hour priority response, 3 years *No AP or HA licenses are required when under an active ProCloud or ProCloud private label service plan.*
1100MSPM200160	ProCloud NBD AP 5 YR	ProCloud Service for a vWLAN access point, which provides: hosting and management services, next business day remote hardware replacement, access to technical support at 1 hour priority response, 5 years *No AP or HA licenses are required when under an active ProCloud or ProCloud private label service plan.*
1100MSPM300112	ProCloud 7x24x4 AP 1 YR	ProCloud Service for a vWLAN access point, which provides: hosting and management services, 7x24x4 remote hardware replacement, access to technical support at 30 Minute priority response, 1 year *No AP or HA licenses are required when under an active ProCloud or ProCloud private label service plan.*
1100MSPM300136	ProCloud 7x24x4 AP 3 YR	ProCloud Service for a vWLAN access point, which provides: hosting and management services, 7x24x4 remote hardware replacement, access to technical support at 30 Minute priority response, 3 years *No AP or HA licenses are required when under an active ProCloud or ProCloud private label service plan.*
1100MSPM300160	ProCloud 7x24x4 AP 5 YR	ProCloud Service for a vWLAN access point, which provides: hosting and management services, 7x24x4 remote hardware replacement, access to technical support at 30 Minute priority response, 5 years *No AP or HA licenses are required when under an active ProCloud or ProCloud private label service plan.*
1100MSPONBFAP	ProCloud ONBOARD FEE	ProCloud Service Per AP Onboarding Fee; to be used in conjunction with the ProCloud Service Base Onboarding Fee; each AP migrated to the ProCloud service must be onboarded.
1100MSPONBFB1	ProCloud ONBOARD FEE	ProCloud Service Base Onboarding Fee; required when migrating from on-premise solution to ProCloud Services; waived if ProStart installation is

		included.
1100MSPH200112	ProCloud PL NBD AP 1 YR	ProCloud Private Label Service for a vWLAN access point, which provides: hosting services, next business day remote hardware replacement, access to technical support at 1 hour priority response for Level 3 issues, 1 year *No AP or HA licenses are required when under an active ProCloud or ProCloud private label service plan.*
1100MSPH200136	ProCloud PL NBD AP 3 YR	ProCloud Private Label Service for a vWLAN access point, which provides: hosting services, next business day remote hardware replacement, access to technical support at 1 hour priority response for Level 3 issues, 3 years *No AP or HA licenses are required when under an active ProCloud or ProCloud private label service plan.*
1100MSPH200160	ProCloud PL NBD AP 5 YR	ProCloud Private Label Service for a vWLAN access point, which provides: hosting services, next business day remote hardware replacement, access to technical support at 1 hour priority response for Level 3 issues, 5 years *No AP or HA licenses are required when under an active ProCloud or ProCloud private label service plan.*
1100MSPH300112	ProCloud PL 7x24x4 AP 1 YR	ProCloud Private Label Service for a vWLAN access point, which provides: hosting services, 7x24x4 remote hardware replacement, access to technical support at 30 Minute priority priority response for Level 3 issues, 1 year. *No AP or HA licenses are required when under an active ProCloud or ProCloud private label service plan.*
1100MSPH300136	ProCloud PL 7x24x4 AP 3 YR	ProCloud Private Label Service for a vWLAN access point, which provides: hosting services, 7x24x4 remote hardware replacement, access to technical support at 30 Minute priority response for Level 3 issues, 3 years *No AP or HA licenses are required when under an active ProCloud or ProCloud private label service plan.*
1100MSPH300160	ProCloud PL 7x24x4 AP 5 YR	ProCloud Private Label Service for a vWLAN access point, which provides: hosting services, 7x24x4 remote hardware replacement, access to technical support at 30 Minute priority response for Level 3 issues, 5 years *No AP or HA licenses are required when under an active ProCloud or ProCloud private label service plan.*
1100ALS3GSV	ProStart OST SURVEY	On-Site 3G Site Survey performed during normal business hours M-F, 8am - 5pm site time

5.3.0 UNIFIED COMMUNICATIONS (UC) — A set of products that provides a consistent unified user interface and user experience across multiple devices and media types. Unified Communications that is able to provide services such as session management, voice, video,

messaging, mobility, and web conferencing. It can provide the foundation for advanced unified communications capabilities of IM and presence-based services and extends telephony features and capabilities to packet telephony network devices such as IP phones, media processing devices, Voice over IP (VoIP) gateways, and multimedia applications. Additional services, such as unified messaging, multimedia conferencing, collaborative contact centers, and interactive multimedia response systems, are made possible through open telephony APIs. General UC solution capabilities should include:

- High Availability for Call Processing
- Hardware Platform High Availability
- Network Connectivity High Availability
- Call Processing Redundancy

ADTRAN's Enterprise Communications Server (ECS) software provides unified communications software solutions that enable enterprises to drive workforce productivity and improve organizational responsiveness. Its award winning, hardware agnostic ECS solution, integrates business communications, business processes and corporate data to deliver a true communications enabled business process solution.

This comprehensive, low-cost approach to business communications provides a complete, turnkey, all-in-one business communications system suitable for 15-5,000 users.

With ADTRAN's ECS Server, you can create value added-services more quickly and professionally by integrating business communications, business processes, line-of-business applications and corporate data in a single, Windows-based application. A sophisticated, visual service-creation environment allows customers to provide any data from any ODBC database and account management service around the clock, over the phone. Simple, self-service call-flow management unified messaging and line-of-business integration tools drive workforce productivity.

ADTRAN's solutions provide unprecedented simplicity and value to businesses that want to make a smooth transition from simple telephony to a feature-rich unified communications solution, while leveraging their investment in their IT business systems.

NetVanta Enterprise Communications Server

SIP Telephony

- **NetVanta Enterprise Communications Server incorporates a full featured, standards-based SIP server to provide common telephony features that you expect from legacy PBXs. Combined with SIP-compliant telephones and softphones, gateways for connection to your existing service provider, NetVanta Enterprise Communications Server provides the telephony services you need at your business location, branch offices, home offices and for users on the move.**

Unified Messaging

- **Unified messaging is the ability to quickly and effectively retrieve and manage voice mail, faxes,and email messages, all from the familiar**

interface of your email client or from any telephone. The NetVanta UC Server integrates with Microsoft Outlook®/Exchange Server™, Google® Gmail, and a host of other email clients with Internet Message Access Protocol (IMAP4).

Presence and Instant Messaging

- **NetVanta UC Server provides business class presence and instant messaging. Users can use desktop presence, telephony presence and status messages to determine whether someone is at their desk or on the phone and chose how to most effectively communicate - instant message or click-to-dial. Enterprise wide search capabilities reduces the time it takes find a co-worker and establish rich and effortless conversations.**

Fax Server

- **The NetVanta UC Server includes a full fax server. Desktop faxing is available from any Windows application supporting a print function. The built-in fax server provides advanced features such as DID fax, single number voice and fax number, and individual "fax on demand" using the multimedia personal call control capabilities. In addition, the NetVanta UC Server uses standard TIFF or PDF formats so that you can view faxes on any PC.**

Text-to-speech Engine

- **The NetVanta UC Server includes a speech engine to provide text-to-speech conversion. This enables you to listen to email messages from any telephone and speak text from your auto-attendants, IVR applications, or Personal Assistants.**

Auto-attendant and Personal Call Control

- **The NetVanta UC Server provides the ability to create multiple auto-attendants using its award-winning drag-and-drop, database enabled, non-programmatic, graphical service creation environment. These assistants integrate with Microsoft Outlook contacts and internal/external databases, allowing employees to easily configure their own assistant to establish multifaceted business rules for call screening, call routing, find-me/follow-me, and call notifications, all depending on the defined rules like the caller ID, time-of-day/day-of-week, and many others.**

Conference Server

- **The optional meet-me conference bridge capability that allows for multiple simultaneous audio conferences, each having a unique four digit conference ID. Each conference can be controlled separately with features like mute all for large one-way calls, close conference to any new entrants once the call has started, and report on the number of participants while still on the call.**

Paging Server

- **The paging server allows live paging, record and review paging, and paging using prerecorded announcements. Paging groups can be established to allow pages to be played over phone sets or overhead speakers in precise locations. Employees simply dial a code or use a speed dial from any handset and issue a page.**

Administration

- **The NetVanta UC Server can be installed in one of two modes—standalone or within a customer's Active Directory. When integrated with Active Directory, the Microsoft Active Directory Users and Microsoft Management Console (MMC) Snap-ins can be used to administer and manage users. The NetVanta UC Server allows your IT staff to manage your business communications services using the same user accounts and security policies used in your Windows environment, without any programming or special integration. Adds, moves, and changes become easy, and security policies become universal throughout the company. In addition, with single user login, your users will never have to log into your business communications system separately.**

Business Continuity

- **The UC Server failover system will provide resiliency in case of a permanent network, hardware, or software failure with the Primary UC Server. The failover NetVanta UC Server will provide normal call handling for internal and external calls, voicemail, and attendant services.**
- **The failover NetVanta UC Server maintains synchronization with the main server. When the Primary NetVanta UC Server fails then all application service requests are automatically handled by the Failover UC Server.**

Remote Site Redundancy

- **Further redundancy can be provided by taking advantage of local survivability modes of PSTN gateways. For example the NetVanta 6355 includes a SIP Back-to-Back User Agent (B2BUA) as a SIP-transparent proxy to facilitate remote survivability in the event of a service interruption on the WAN. If connection to the feature server is lost, calls may continue between IP and analog phones to local facilities FXO POTS line to the PSTN.**

5.3.0.1 **IP Telephony** — Solutions utilized to provide the delivery of the telephony application (for example, call setup and teardown, and telephony features) over IP, instead of using circuit-switched or other modalities. Capabilities should include:

- Support for analog, digital, and IP endpoints
- Centralized Management
- Provide basic hunt group and call queuing capabilities

- Flexibility to configure queue depth and hold time, play unique announcements and Music on Hold (MoH), log in and log out users from a queue and basic queue statistics (from the phone
- E911 Support

NetVanta Enterprise Communications Server incorporates a full featured, standards-based SIP server to provide common telephony features that you expect from legacy PBXs. Combined with SIP-compliant telephones and softphones, gateways for connection to your existing service provider, NetVanta Enterprise Communications Server provides the telephony services you need at your business location, branch offices, home offices and for users on the move.

Support for Analog extensions is accomplished through an IP Business gateway and the vendor provides a complete portfolio of SIP Endpoints to allow for simple lobby phones through to a fully color display executive telephones.

Centralized management is accomplished through the Administration UC Client configuration which manages users, voicemail and unified configurations as well as call behaviors.

NetVanta UC Server provides hunt group and ring groups with flexible call handling in the event that calls are not answered within the configured amount of time. Call Queuing is also provided which allow users to login to a call queue to make themselves available for incoming calls. Advanced call queuing and contact center solution offers are available through a partner product called Vocalcom, which provides an extensive and flexible contact center. These 3rd party solutions would be available through the authorized resellers for this contract. More information can be provided upon request.

Emergency 911 support is handled on NetVanta UC Server to provide routing to the correct gateway. Extended E911 support is handled through a partner product called 911-Enable. These 3rd party solutions would be available through the authorized resellers for this contract. More information can be provided upon request.

5.3.0.2 **Instant messaging/ Presence** — Solutions that allow communication over the Internet that offers quick transmission of text-based messages from sender to receiver. In push mode between two or more people using personal computers or other devices, along with shared clients, instant messaging basically offers real-time direct written language-based online chat. Instant messaging may also provide video calling, file sharing, PC-to-PC voice calling and PC-to-regular-phone calling.

NetVanta UC Server provides business class presence and instant messaging. Users can use desktop presence, telephony presence and status messages to determine whether someone is at their desk or on the phone and chose how to most effectively communicate - instant message

or click-to-dial. Enterprise wide search capabilities reduce the time it takes find a co-worker and establish rich and effortless conversations.

Features include:

- **Automatic login based Windows Active Directory login**
- **Enterprise wide search capability**
- **Global directory**
- **Desktop and telephony presence**
- **Click-to-dial**
- **Instant Messaging for text**
- **Federation between multiple NetVanta UC Server system**

Desktop sharing, video calling and file sharing are currently not supported but available through partner solutions. These 3rd party solutions would be available through the authorized resellers for this contract. More information available upon request.

5.3.0.3 **Unified messaging** — Integration of different electronic messaging and communications media (e-mail, SMS, Fax, voicemail, video messaging, etc.) technologies into a single interface, accessible from a variety of different devices.

- Ability to access and manage voice messages in a variety of ways, using email inbox, Web browser, desktop client, VoIP phone, or mobile phone
- Visual Voicemail Support (Optional)

NetVanta UC Server provides a variety of voice messaging options including:

- **Unified Messaging with Microsoft Exchange Server – uses Exchange as the single message store which you can manage voice and fax messages through Outlook clients, Outlook web editions, email clients on smart phones and over the telephone. With the inclusion of Text to Speech, optional, users will be able to have their email messages read to them over the phone.**
- **Unified Messaging with IMAP4 servers such as Google gmail and others. Uses the email server as the single message store. Users can use their web clients on both desktop, smart phones and tablets.**
- **Integrated messaging which provides the ability to send a copy of the voice or fax message to any email server.**
- **Visual voicemail which provides management of voice and fax messages through a UC Client.**
- **Standard voicemail which allows users to manage their voice messages over the telephone.**

5.3.0.4 **Contact Center** — A computer-based system that provides call and contact routing for high-volume telephony transactions, with specialist answering “agent” stations and a sophisticated real-time contact management system. The definition includes all contact center systems that provide inbound contact handling capabilities and automatic contact distribution, combined with a high degree of sophistication in terms of dynamic contact traffic management.

The vendor recommends a commercial partner, Vocalcom, that provides a fully featured multi-modal contact center solution. These 3rd party solutions would be available through the authorized resellers for this contract. More information can be provided upon request.

5.3.0.5 Communications End Points and Applications

- Attendant Consoles
- IP Phones

NetVanta UC Server provides a large variety of IP Telephones.

ADTRAN IP 321
Two line, Enterprise grade SIP Phone providing remarkable value

ADTRAN IP 335
Dual-line SIP Phone Featuring HD Voice for Unmatched Clarity

IP 430
ADTRAN/Polycom Two Line IP Telephone

IP 450
Three Line, HD voice phone

ADTRAN IP 550
Four-line SIP Phone with Exceptional Sound Quality and Advanced Features

IP 560
Four-line HD Voice, Gigabit, Backlit phone.

ADTRAN IP 650
High Performance Six-line Phone Feature HD Voice

IP 670
Six-line HD Voice, Gigabit, Color, Expandable Attendant Console phone

ADTRAN VVX 300
Six-line entry-level business media phone

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ADTRAN VVX 310
Six-line entry-level Gigabit Ethernet business media phone

ADTRAN VVX 400
Twelve-Line mid-range color business media phone

ADTRAN VVX 410
Twelve-line mid-range Gigabit Ethernet color business media phone

IP 430
ADTRAN/Polycom Two Line IP Telephone

ADTRAN VVX 500
Twelve-line Performance Business Media Phone with Touch Screen Display Technology

ADTRAN VVX 600
Sixteen-line Executive business media phone with touch screen display and optional camera for desktop video

IP 6000
Conference phone, HD Voice, High Quality

IP 7000
SIP-based VoIP platform phone

IP 5000
Conference phone for smaller rooms, HD Voice

Live Attendant **PC based console that provides enterprise wide presence, drag and drop telephony.**

The following phones are TA508 compliant:

ADTRAN IP 321	1202742G1
ADTRAN IP 335	1202752G1
ADTRAN IP 550	1202755G1
ADTRAN VVX 300	1200853G1
ADTRAN VVX 310	1200853G1#GB
ADTRAN VVX 400	1200854G1
ADTRAN VVX 410	1200854G1#GB
ADTRAN VVX 500	1202855G1
ADTRAN VVX 600	1200856G1
ADTRAN IP 650	1202758G1

Further information on accessibility can be found in the supporting documentation for this response.

5.3.0.6 **UC Network Management** — Provides end-to-end service management for Unified Communications. Capabilities include testing, performance monitoring, configuration management, and business intelligence reporting.

NetVanta UC Server provides a UC Client to provide management of UC Server. Optionally, nCommand MSP can be used to provide management.

5.3.0.7 **Collaboration** — Voice, video, and web conferencing; messaging; mobile applications; and enterprise social software.

The NetVanta UC Server provides an open environment for 3rd party solutions to provide web conferencing and mobile applications.

5.3.0.8 **Collaborative Video** — A set of immersive video technologies that enable people to feel or appear as if they were present in a location that they are not physically in. Immersive video consists of a multiple codec video system, where each meeting attendee uses an immersive video room to “dial in” and can see/talk to every other member on a screen (or screens) as if they were in the same room and provides call control that enables intelligent video bandwidth management.

Partner solutions available from Polycom and Lifesize can provide the conference room video room solutions. These 3rd party solutions would be available through the authorized resellers for this contract. More information can be provided upon request.

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5.3.0.8.1 **Content Delivery Systems (CDS)** — A large distributed system of servers deployed in multiple data centers connected by the Internet. The purpose of the content delivery system is to serve content to end-users with high availability and high performance. CDSs serve content over the Internet, including web objects (text, graphics, URLs, and scripts), downloadable objects (media files, software, documents), applications (e-commerce, portals), live streaming media, on-demand streaming media, and social networks.

Content delivery systems are currently not provided by vendor.

5.3.0.8.2 **Physical Security** — Technology utilized to restricting physical access by unauthorized people to controlled facilities. Technologies include:

a. Access control systems

b. Detection/Identification systems, such as surveillance systems, closed circuit television cameras, or IP camera networks and the associated monitoring systems.

c. Response systems such as alert systems, desktop monitoring systems, radios, mobile phones, IP phones, and digital signage

d. Building and energy controls

The vendor does not provide these solutions. However, the solution is based on an open standards architecture that can leverage other solutions available in the marketplace.

ADTRAN Parts List (Product/Management/Services/Training) for applicable sections of 5.3.0:

MODEL	PART NUMBER	DESCRIPTION
NetVanta T1/PRI VIM	1200695L1	T1/PRI Voice Interface Module (VIM) for the NetVanta 6355 and NetVanta 7100. Provides one RBS T1 or one PRI (5E, DMS100, or National) interface for termination of TDM voice trunks. Includes DBU port. 5-year warranty.
NetVanta Analog 4-Port Trunk VIM	1202691G1	Analog Trunk Voice Interface Module (VIM) for the NetVanta 6355 and NetVanta 7000 series Provides four analog RJ-11 trunk (FXO) ports for termination of PSTN circuits. Supports loop-start and ground-start and captures Caller ID name/number using FSK. Part 68 compliant. 5-year warranty.
NetVanta Analog 4-Port Station VIM	1200690E1	Analog Station Voice Interface Module (VIM) for the NetVanta 6355 and NetVanta 7100. Provides four analog RJ-11 station (FXS) ports for connection to analog devices such as POTS phones, FAX machines, and/or modems. Delivers Caller ID name/number using FSK. Loop-start/DTMF. Includes ring generator. 5-year warranty.

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NetVanta Analog 2-Trunk/2-Station VIM	1202692G1	Analog Trunk/Station Voice Interface Module (VIM) for the NetVanta 6355 and NetVanta 7000 series. Provides two analog RJ-11 trunk (FXO) ports for termination of PSTN circuits; supports loop-start and ground-start and captures Caller ID name/number using FSK; Part 68 compliant. Also provides two analog RJ-11 station (FXS) ports for connection to analog devices such as POTS phones, FAX machines, and/or modems; delivers Caller ID name/number using FSK; loop-start/DTMF; includes ring generator. 5-year warranty.
ADTRAN IP 321	1202742G1	Two-line entry level SIP phone, with a full duplex speaker phone and enterprise grade feature set. Comes with dedicated feature keys (of which there are 2 line keys, 3 soft keys) and a full-duplex speakerphone. Support for G.711 and G.729 codecs, and a RJ-22 headset jack. Includes auto-sensing 802.3af PoE support. No separate wall mount needed, as the base stand doubles as a wall mount bracket. 1-year warranty. Does not include AC power supply. Co-branded ADTRAN-Polycom model.
ADTRAN IP 335	1202752G1	Two-line entry level HD Voice SIP phone, with a full duplex speaker phone and enterprise grade feature set. Comes with dedicated feature keys (of which there are 2 line keys, 3 soft keys) and a full-duplex speakerphone. Provides two 10/100 Mbps switched Ethernet ports, support for G.711 and G.729 codecs, and a RJ-22 headset jack. Includes auto-sensing 802.3af PoE support. No separate wall mount needed, as the base stand doubles as a wall mount bracket. 1-year warranty. Does not include AC power supply. Co-branded ADTRAN-Polycom model.
ADTRAN IP 550	1202755G1	Four-line HD Voice, Backlit, SIP phone that includes more than 16 dedicated feature keys (4 illuminated), 4 soft keys, and a full-duplex speakerphone. The ADTRAN IP 550 provides two 10/100 Mbps switched Ethernet ports, support for G.711 and G.729 codecs, and a RJ-9 headset jack. Includes auto-sensing 802.3af PoE support. 1-year warranty. Does not include AC power supply. Co-branded ADTRAN-Polycom model.
ADTRAN VVX 300	1200853G1	6-line Business. Two-port 10/100 Ethernet switch. Includes auto-sensing 802.3af PoE support. Supports optional expansion modules. Ships without power supply. 1-year warranty.
ADTRAN VVX 310	1200853G1#GB	6-line Business. Two-port 10/100/1000 Ethernet switch. Includes auto-sensing 802.3af PoE support. Supports optional expansion modules. Ships without power supply. 1-year warranty.

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ADTRAN VVX 400	1200854G1	12-line Business. Two-port 10/100 Ethernet switch. Equipped with a Color LCD. Includes auto-sensing 802.3af PoE support. Supports optional expansion modules. Ships without power supply. 1-year warranty.
ADTRAN VVX 410	1200854G1#GB	12-line Business. Two-port 10/100/1000 Ethernet switch. Equipped with a Color LCD. Includes auto-sensing 802.3af PoE support. Supports optional expansion modules. Ships without power supply. 1-year warranty.
ADTRAN VVX 500	1202855G1	12-line SIP Business Media Phone with HD Voice. Gesture-based, multi-touch-capable, capacitive 3.5-inch Color, QVGA touchscreen. Adjustable base height. Screensaver and digital picture frame mode. Two-port Gigabit Ethernet switch. Includes auto-sensing 802.3at PoE support. 1-year warranty. Does not include AC power supply. Co-branded ADTRAN-Polycom model.
ADTRAN VVX 600	1200856G1	ADTRAN VVX 600 16-line Business Media Phone with HD Voice. Gesture-based, multitouch-capable, capacitive 4.3-inch color touchscreen. Adjustable base height. Integrated Bluetooth 2.1. Screensaver and digital picture frame mode. Support video calls with the use of an optional USB camera accessory. Two-port Gigabit Ethernet switch. Includes auto-sensing 802.3at PoE support. Ships without power supply. 1-year warranty.
ADTRAN IP 650	1202758G1	Six-line HD Voice, Backlit, SIP phone that includes 18 dedicated feature keys (6 illuminated), 4 soft keys, and a full-duplex speakerphone. The ADTRAN IP 650 provides two 10/100 Mbps switched Ethernet ports, support for G.711 and G.729 codecs, and a RJ-22 headset jack. Includes auto-sensing 802.3af PoE support. Supports up to three optional IP Expansion Modules (#1200779L1) or (#1200748G1) and an optional Wallmount kit (1200762L1). Expansion Module and wallmount kit are available separately. 1-year warranty. Does not include AC power supply. Co-branded ADTRAN-Polycom model.
IP 650 EM	1200748G1	Backlit Expansion Module for the IP 650 telephone (#1200758E1) that adds 14 (illuminated) multifunctional keys for call appearances and/or speed dial. Simple plug-and-play setup as both power and signaling are provided by the host telephone. Up to 3 Expansion Modules can be connected to a single IP 601 or IP 650 telephone. 1-year warranty.
IP 5000	1200753G1	High quality, HD Voice, SIP conference phone designed for smaller conference rooms and executive offices, with up to 6 participants in the room. The microphone pickup range is up to 7ft. The IP 5000 provides menu driven user interface, a high-resolution backlit LCD , and convenient access to common telephony functions including hold, redial, and conference. 1-year warranty. 25 ft./6m Cat5 shielded Ethernet cable included. Does not include a power adapter.

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IP 6000	1200749G1	High quality, HD Voice, SIP conference phone designed for offices or small to medium sized conference rooms. IP 6000 provides menu driven user interface, a high-resolution backlit LCD , and convenient access to common telephony functions including transfer, hold, redial, and conference. 1-year warranty. SoundStation IP6000 (SIP) conference phone. AC power or 802.3af Power over Ethernet. Includes 100-240V power supply, 0.4A, 48V/19W; NA power plug; 25 ft./6m Cat5 shielded Ethernet cable; Power Insert Cable. Expandable.
IP 7000	1200759G1	High quality, HD Voice, SIP conference phone designed for Large conference rooms. The microphone pickup range is up to 20ft (7 meter), and even greater distances with optional expansion microphones or multi-unit connectivity to reach all corners of the conference room Integrates with Polycom HDX™ Video Conferencing Systems. The IP 7000 provides menu driven user interface, a high-resolution backlit LCD , and convenient access to common telephony functions including hold, redial, and conference. 1-year warranty. 25 ft./6m Cat5 shielded Ethernet cable included. Includes 100-240V power supply, 1.5A, 48V/50W with North American power plug.
IP SoftPhone 5 Pack	1950859L1	Pack of 5 Licenses for the IP SoftPhone Client and access to download the software from ADTRAN's website. The IP SoftPhone enables VoIP communication via a PC or laptop and offers familiar call features such as conference, hold, transfer and 4-digit dialing from any location that offers High-Speed Internet Access. The IP SoftPhone can be installed on a Windows platform running 2000, XP, Vista or 2003. 90-day warranty
ADP-40 Analog Door Phone	1200761L1	The ADP-40 is a Stainless Steel, compact, weather and vandal resistant, telephone line powered speaker phone designed to provide two-way hands free communication. The ADP-40 can be mounted in a standard single gang electrical box and is ideal for entry applications. 1-year warranty.
Single Port POE Power Supply	1200809E1	Single Port POE Power Supply for local powering an 802.3af compliant IP Phone or other IP device. Includes POE Injector, Ethernet cable, & US cord. RoHS compliant.
VVX 300/400 AC ADAPTER	1700775G1	Universal Power Supply for VVX 300, 310, 400, 410. 1-pack, 48V, 0.4A, NA power plug.
IP560/670/VVX 500/VVX 600 AC ADAPTER 5-PACK	1700773G1	Universal Power Supply for SPIP 560, SPIP 670, VVX 500/600 and VVX 1500. 5-pack, 48V, 0.4A, NA power plug.

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VVX 300/400 AC ADAPTER 5-PACK	1700756G1	Universal Power Supply for VVX 300, 310, 400, 410. 5-pack, 48V, 0.4A, NA power plug.
IP550/650 AC ADAPTER 5-PACK	1700772G1	Universal Power Supply for SPIP 550, 650, 320, SPIP 330, SPIP 430, SPIP 550, SPIP 601 and SPIP 650. 5-pack, 24V, 0.5A, NA power plug.
IP321/335/450 AC ADAPTER 5-PACK	1700774G1	Universal Power Supply for SPIP 321, SPIP 331, SPIP 335 SPIP 450. 5-pack, 24V, 0.5A, NA power plug.
USB CAMERA	1200954G1	VVX Camera. Plug-n-Play USB camera for use with the Business Media phones, VVX 500 (1202855G1) and VXX 600 (1200856G1)
EXTERNAL MIC FOR IP6000 CONFERENCE PHONE	1200956G1	Expansion (EX) microphone kit for n IP6000. Includes two EX mics and two 7ft/2.3m cables.
VVX 500/600 WALL MOUNT 5-PACK	1200955G1	Wall mount accessory for the with VVX 300, 310, 400, 410, VVX 500 (1202855G1) and VXX 600 (1200856G1) phone
NetVanta BCS w/ 7100	4200796G1#UC	The NetVanta Business Communications with NetVanta 7100 is a bundled system of NetVanta hardware (1200796E1) and UC software(1950101BSG1). The Windows®-based Unified Communications along with the AOS based NetVanta 7100 provides low TCO and ROI in as little as 30 days. The UC software provides many of the productivity enhancing functionalities such as unified messaging, voicemail, Fax, Conferencing, Auto Attendants, ODBC visual IVR, Click to Dial, desktop clients and more, which complement the all-in-one nature of the NetVanta 7100, that comes with a inbuilt IP-PBX, Router, PoE Switch, VPN, Firewall, and Multi-level AA. Some high level features of this bundle are given below; 100 UC users with UM and PBA licenses; 2 T.38 Fax Server channels; 6 Conference Channels and the unique Click to dial from outlook.

NetVanta BCS w/ 7060	4700706G1#UC	The NetVanta Business Communications with NetVanta 7060 is a bundled system of NetVanta hardware (1700706G1) and UC software(1950101BSG1). The Windows®-based Unified Communications along with the AOS based NV7060 provides low TCO and ROI in as little as 30 days. The UC software provides many of the productivity enhancing functionalities such as unified messaging, voicemail, Fax, Conferencing, Auto Attendants, ODBC visual IVR, Click to Dial, desktop clients and more, which complement the all-in-one nature of the NetVanta 7060, that comes inbuilt IP-PBX, PoE Switch, and Multi-level AA, add to the capabilities of this solution. Some high level features of this bundle are given below; 100 SIP Phone Users; 100 UC users with UM and PBA licenses; 2 T.38 Fax Server channels; 6 Conference Channels and the unique Click to dial from outlook. IP PBX with integrated 24 port PoE Switch. Chassis includes two NetVanta NIM/VIM module slots, 24 Power over Ethernet 802.3af 10/100 access ports, two Combo 10/100/1000/SFP Gigabit ports, one 10/100 WAN Ethernet port, two analog trunk (FXO) ports, two analog station (FXS) ports, music-on-hold input, paging output, and door relay. Supports 100 SIP phones. Switch features include 15.4 watts/port PoE (370 watts total), 802.1Q VLANs, 802.1p/DiffServ QoS, 802.1w Rapid STP, 802.3ad Link Aggregation, Auto MDI/MDI-X. System management features include Web GUI, CLI, HTTP/HTTPS GUI, SSH, RADIUS and TACACS+. Supports NetVanta Voice Interface Modules. The NetVanta 7060 chassis in the bundle comes with a five year hardware warranty. Additional licenses can be bought to further enhance the UC software capabilities of this bundle. To have access to this product - IPT only specialized partners must sell UC ProStart Install and Software assurance SKUs. UC Only Specialized partners must sell IPT ProStart Install and Maintenance SKUs. Partners having neither IPT nor UC specialization must sell this along with ProStart Install, Software Assurance and Maintenance SKUs.
NVU BCS BNDL 100 LIC	1950101BSG1	The NetVanta UC Server Business Communications System - 100 Advanced User License adds low cost Windows-based, Active Directory enabled unified communications software to a NetVanta Series 7000 IP Telephony product. Licenses included in this bundle include: 100 Advanced SIP Users, 8 PBX Channels, 2 Fax Channels, 6 Meet-Me Conference Channels, and a Data Source Connect License. Note that this bundle is licensed only for use with ADTRAN NetVanta Series 7000 IP Telephony products and is not licensed for use with 3rd party PBXs. Partner must hold UC specialization or sell ProStart UC installation services and software assurance in conjunction with this product.

ADTRAN Response No. 121342181
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NetVanta 7100	1200796E1	IP PBX with integrated Switch/Router. Chassis includes two NetVanta NIM/VIM module slots, 24 Power over Ethernet 802.3af10/100 access ports, two Combo10/100/1000/SFP Gigabit ports, one10/100 WAN Ethernet port, two analog trunk (FXO) ports, two analog station (FXS) ports, music-on-hold input, paging output, and door relay. IP PBX supports 50 SIP phones and includes voicemail (12 hours, 8 ports), auto attendant (8 ports), call detail records, and e-mail notification of voicemail. Switch features include 15.4 watts/port PoE (370 watts total), 802.1Q VLANs, 802.1p/DiffServ QoS, 802.1w Rapid STP, 802.3ad Link Aggregation, Auto MDI/MDI-X. Router features include Static, RIP, OSPF, BGP, Frame Relay/PPP WAN Protocols, Stateful Inspection Firewall, and VPN (50 IPSec tunnels). System management features include Web GUI, CLI, HTTP/HTTPS GUI, SSH, RADIUS and TACACS+. Supports NetVanta Voice Interface Modules and NetVanta Network Interface Modules. 19inches 1U housing. Rackmount and wall-mount brackets included. 5-year warranty. Can only be purchased by ADTRAN certified IP Telephony Dealers.
NetVanta 7100 VSMB	4200796G1#VSMB	NetVanta 7100, VSMB edition. Supports up to 30 users. A IP PBX with integrated 24 port PoE Switch. Base Chassis includes two NetVanta NIM/VIM module slots, 24 Power over Ethernet 802.3af 10/100 access ports, two Combo 10/100/1000/SFP Gigabit ports, one 10/100 WAN Ethernet port, two analog trunk (FXO) ports, two analog station (FXS) ports, music-on-hold input, paging output, and door relay. Supports 30 SIP phones and includes voicemail (up to 50 hours), auto attendant, call detail records, and e-mail notification/attachment of voicemail. Switch features include 15.4 watts/port PoE (370 watts total), 802.1Q VLANs, 802.1p/DiffServ QoS, 802.1w Rapid STP, 802.3ad Link Aggregation, Auto MDI/MDI-X. System management features include Web GUI, CLI, HTTP/HTTPS GUI, SSH, RADIUS and TACACS+. Supports NetVanta Voice Interface Modules and NetVanta Network Interface Modules. 19" 1U housing. Rack mount and wall-mount brackets included. 5-year warranty. To have access to this product, partner must hold IPT specialization, or sell along with ADTRAN's ProStart installation and maintenance services.

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NETVANTA 7060	1700706G1	IP PBX with integrated 24 port PoE Switch. Chassis includes two NetVanta NIM/VIM module slots, 24 Power over Ethernet 802.3af10/100 access ports, two Combo10/100/1000/SFP Gigabit ports, one10/100 WAN Ethernet port, two analog trunk (FXO) ports, two analog station (FXS) ports, music-on-hold input, paging output, and door relay. Supports100 SIP phones and includes voicemail (unto 50 hours, 8 ports), auto attendant (8 ports), call detail records, and e-mail notification/attachment of voicemail. Switch features include 15.4 watts/port PoE (370 watts total), 802.1Q VLANs, 802.1p/DiffServ QoS, 802.1w Rapid STP, 802.3ad Link Aggregation, Auto MDI/MDI-X. System management features include Web GUI, CLI, HTTP/HTTPS GUI, SSH, RADIUS and TACACS+. Supports NetVanta Voice Interface Modules and NetVanta Network Interface Modules. 19inches 1U housing. Rackmount and wall-mount brackets included. 5-year warranty. To have access to this product, partner must hold IPT specialization, or sell along with ADTRAN's ProServices installation and maintenance services.
NVUC 420E PLATFORM	1700851G1	Turnkey NetVanta UC Server (2nd Gen) hardware platform for under 400 users. Contains a mini tower computer bundled with Windows Server 2008R2 Embedded OS and NetVanta UC Server software. Intel Pentium G850 2.9GHz Processor, non-redundant 1x250GB HD, 4G RAM, 16x DVD+/-RW, single non-redundant 65W power supply. This server must be sold with one of the BCS, ECS, UCS or BAS NetVanta UC Server Software Bundles. Hardware warranty includes 1 year next business day parts replacement and tech support. Support for UC Server Software requires partner to hold UC specialization or sell ProServices UC installation services and software assurance in conjunction with this product.
		ProStart Remote Installation
ProStart REM	1100ALR10008LT	ADTRAN Partner Support Remote Silver NetVanta 7xxx Install Package - Channel partner must have an ATSA/UCAS certified technician performing the onsite work under the direction of the remote ADTRAN Installation Engineer via phone during the installation - ProStart installation of NetVanta 7xxx in accordance to the Silver NetVanta 7xxx package features M-F, 8am-5pm site time (must be sold in conjunction with ProStart Remote Per User NetVanta 7xxx Phone Install)

ProStart REM	1100ALR10009LT	ADTRAN Partner Support Remote Gold NetVanta 7xxx Install Package - Channel partner must have an ATSA/UCAS certified technician performing the onsite work under the direction of the remote ADTRAN Installation Engineer via phone during the installation - ProStart installation of NetVanta 7xxx in accordance to the Gold NetVanta 7xxx package features M-F, 8am-5pm site time (must be sold in conjunction with ProStart Remote Per User NetVanta 7xxx Phone Install).
ProStart REM	1100ALR10010LT	ADTRAN Partner Support Remote Platinum NetVanta 7xxx Install Package - Channel partner must have an ATSA/UCAS certified technician performing the onsite work under the direction of the remote ADTRAN Installation Engineer via phone during the installation - ProStart installation of NetVanta 7xxx in accordance to the Platinum NetVanta 7xxx package features M-F, 8am-5pm site time (must be sold in conjunction with the ProStart Remote Per User NetVanta 7xxx Phone Install).
ProStart REM	1100ALR10011LT	ADTRAN Partner Support Remote Per User Configuration to be sold in conjunction with an ProStart Remote NetVanta 7xxx Installation (Silver, Gold, Platinum Package on NetVanta 7xxx) - Channel partner must have an ATSA/UCAS certified technician performing the onsite work under the direction of the remote ADTRAN Installation Engineer via phone during the installation.
ProStart REM	1100ALR100016LT	ProStart Remote Installation of Advance Voice Features supports either SIP trunking(up to 10), SIP networking(per project), SABR or System Mode/Scheduler with remote installation of NetVanta 7xxx or UC products - Price applies per feature, REQUIRES Base Remote Installation. Channel partner must have an ATSA/UCAS certified technician performing the onsite work under the direction of the remote ADTRAN Installation Engineer via phone during the installation.
ProStart REM	1100ALR100019LT	ProStart Remote Installation of Advanced Routing or Firewall (beyond default) or VPN with remote installation of NetVanta 7xxx - Base Remote Installation REQUIRED. Channel partner must have an ATSA/UCAS certified technician performing the onsite work under the direction of the remote ADTRAN Installation Engineer via phone during the installation.
ProStart Assisted	1100ALR10012LT	ADTRAN Assisted NetVanta 7xxx Install Package - Partner must assign an ATSP/UCAS certified technician to take full responsibility for the installation. ProStart will provide that technician with up to 4Hours of project/configuration review and up to 8Hours of remote support for test/turn-up normal business Hours. (8am-5pm site time M-F). All ProStart review and support activities must be scheduled in advance. Does not include end user training (phone or admin).

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		ProStart Onsite Installation
ProStart OST	1100ALS10008LT	ProStart Silver NetVanta 7xxx Install Package- ProStart installation of NetVanta 7xxx in accordance to the Silver package features M-F, 8am-5pm site time (must be sold in conjunction with ProStart Per User NetVanta 7xxx Phone Install) Project scope will be validated at the start of the install project and must be finalized before moving forward. See www.adtran.com/ProStartipt for package details
ProStart OST	1100ALS10009LT	ProStart Gold NetVanta 7xxx Install Package- ProStart installation of NetVanta 7xxx in accordance to the Gold IPT package features M-F, 8am-5pm site time (must be sold in conjunction with ProStart Per User NetVanta 7xxx Phone Install). Project scope will be validated at the start of the install project and must be finalized before moving forward. See www.adtran.com/ProStartipt for package details
ProStart OST	1100ALS10010LT	ProStart Platinum NetVanta 7xxx Install Package - ProStart installation of NetVanta 7xxx in accordance to the Platinum package features M-F, 8am-5pm site time (must be sold in conjunction with the ProStart Per User NetVanta 7xxx Phone Install). Project scope will be validated at the start of the install project and must be finalized before moving forward. See www.adtran.com/ProStartipt for package details
ProStart OST	1100ALS10030LT	ProStart SMB UC appliance based install package - ProStart installation of NetVanta 7xxx in accordance to the features delivered in SMB UC appliance package M-F, 8am-5pm (must be sold in conjunction with ProStart Per User Phone Install). Project scope will be validated at the start of the install project and must be finalized before moving forward. See www.adtran.com/ProStartipt for package details
ProStart OST	1100ALS10011LT	ProStart Per User Installation Fee to be sold in conjunction with NetVanta 7xxx Installation (Silver, Gold, Platinum) packages. See www.adtran.com/ProStartipt for package details
ProStart OST	1100ALS100016LT	ProStart On Site Installation of Advance Voice Features supports either SIP trunking(up to 10), SIP networking(per project), SABR or System Mode/Scheduler with installation of NetVanta 7xxx or UC products - Base Installation REQUIRED *per feature*
ProStart OST	1100ALS100019LT	ProStart On Site Installation of Advanced Routing or Firewall (beyond default) or VPN in installation of NetVanta 7xxx - Base Installation REQUIRED

ProStart OST	1100ALS30001BCS	ProStart BCS Silver Install Package - ProStart installation of NetVanta Business Communication System in accordance to package features M-F, 8am-5pm site time (must be sold in conjunction with ProStart Per User Phone Install) Project scope will be validated at the start of the install project and must be finalized before moving forward. See www.adtran.com/ProStart_ipt for package details
ProStart OST	1100ALS30002BCS	ProStart BCS Gold Install Package - ProStart installation of NetVanta Business Communication System in accordance to package features M-F, 8am-5pm site time(must be sold in conjunction with ProStart Per User Phone Install). Project scope will be validated at the start of the install project and must be finalized before moving forward. See www.adtran.com/ProStart_ipt for package details
ProStart OST	1100ALS30003BCS	ProStart BCS Platinum Install Package - ProStart installation of NetVanta Business Communication System in accordance to package features M-F, 8am-5pm site time (must be sold in conjunction with the ProStart Per User Phone Install). Project scope will be validated at the start of the install project and must be finalized before moving forward. See www.adtran.com/ProStart_ipt for package details
ProStart OST	1100ALS10012UC	NetVanta 7xxx and BCS Per User Installation fee. To be sold in conjunction with an ProStart or BCS Silver, Gold, or Platinum installation packages
ProStart OST	1100ALS10016UC	Advanced Routing or Firewall (beyond default) or VPN in installation. Used with NV Unified Communications Products, NV BCS, ECS
ProStart OST	1100ALS10014UC	Integration support for SIP Paging or Conference Server Configuration (per feature)
ProStart OST	1100ALS10018UC	Multi-site integration support for NetVanta UC, BCS, ECS
ProStart OST	1100ALS10019UC	T1/PRI test and turn-up support
ProStart OST	1100ALS10010UC	Customize Basic Personal Call Control for Personal Assistant/Personal Business Assistant Users (per user) on NV USB, BCS, ECS
ProStart OST	1100ALS10013UC	UC Client & UC Companion Installation (per desktop)
		Optional Services -- Basic Maintenance
ProCare Basic 1 YR	1100AMNV70M1T1	ProCare 1 Year Basic Maintenance for the NetVanta 7000 series, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
ProCare Basic 1 YR	1100AMBCSM1T1	ProCare 1 Year Basic Maintenance for the BCS Bundle, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT

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ProCare Basic 3 YR	1100AMNV70M1T3	ProCare 3 Year Basic Maintenance for the NetVanta 7000 series, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
ProCare Basic 3 YR	1100AMBCSM1T3	ProCare 3 Year Basic Maintenance for the BCS Bundle, providing: 4 hour response time into technical support, access to software upgrades and patches, available Monday through Friday, 7 am until 7 pm CT
		Optional Services -- NBD Remote Maintenance
ProCare 5x8xNBD 1 YR	1100AMAPPLM2T1	ProCare 1 Year NBD Remote Maintenance for the UC 420, UC 420e, and Bluesocket vWLAN appliance, providing: 1 hour response time into technical support and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD 1 YR	1100AMPHOM2T1	ProCare 1 Year NBD Remote Maintenance for ADTRAN approved IP phones, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD 1 YR	1100AMNV70M2T1	ProCare 1 Year NBD Remote Maintenance for the NetVanta 7000 series, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD 1 YR	1100AMBCSM2T1	ProCare 1 Year NBD Remote Maintenance for the BCS Bundle, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD 3 YR	1100AMAPPLM2T3	ProCare 3 Year NBD Remote Maintenance for the UC 420, UC 420e, and Bluesocket vWLAN appliance, providing: 1 hour response time into technical support and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD 3 YR	1100AMPHOM2T3	ProCare 3 Year NBD Remote Maintenance for ADTRAN approved IP phones, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD 3 YR	1100AMNV70M2T3	ProCare 3 Year NBD Remote Maintenance for the NetVanta 7000 series, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD 3 YR	1100AMBCSM2T3	ProCare 3 Year NBD Remote Maintenance for the BCS Bundle, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement, available Monday through Friday, 7 am until 7 pm CT

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		Optional Services -- 7x24x4 Remote Maintenance
ProCare 7x24x4 1 YR	100AMAPPLM3T1	ProCare 1 Year 7x24x4 Remote Maintenance for the UC 420, UC 420e, and approved vWLAN appliance, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
ProCare 7x24x4 1 YR	1100AMPHOM3T1	ProCare 1 Year 7x24x4 Remote Maintenance for ADTRAN approved IP phones, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
ProCare 7x24x4 1 YR	1100AMNV70M3T1	ProCare 1 Year 7x24x4 Remote Maintenance for the NetVanta 7000 series, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
ProCare 7x24x4 1 YR	1100AMBCSM3T1	ProCare 1 Year 7x24x4 Remote Maintenance for the BCS Bundle, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
ProCare 7x24x4 3 YR	1100AMAPPLM3T3	ProCare 3 Year 7x24x4 Remote Maintenance for the UC 420, UC 420e, and Bluesocket vWLAN appliance, providing: 30 minute response time into technical support and four hour hardware replacement, available 24 hours a day, 7 days a week
ProCare 7x24x4 3 YR	1100AMPHOM3T3	ProCare 3 Year 7x24x4 Remote Maintenance for ADTRAN approved IP phones, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
ProCare 7x24x4 3 YR	1100AMNV70M3T3	ProCare 3 Year 7x24x4 Remote Maintenance for the NetVanta 7000 series, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
ProCare 7x24x4 3 YR	1100AMBCSM3T3	ProCare 3 Year 7x24x4 Remote Maintenance for the BCS Bundle, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement, available 24 hours a day, 7 days a week
		Optional Services -- NBD Onsite Maintenance
ProCare 5x8xNBD OST 1 YR	1100AMAPPLM4T1	ProCare 1 Year NBD On-site Maintenance for the UC 420, UC 420e, and Bluesocket vWLAN appliance, providing: 1 hour response time into technical support and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT

ProCare 5x8xNBD OST 1 YR	1100AMNV70M4T1	ProCare 1 Year NBD On-site Maintenance for the NetVanta 7000 series, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD OST 1 YR	1100AMBCSM4T1	ProCare 1 Year NBD On-site Maintenance for the BCS Bundle, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD OST 3 YR	1100AMAPPLM4T3	ProCare 3 Year NBD On-site Maintenance for the UC 420, UC 420e, and Bluesocket vWLAN appliance, providing: 1 hour response time into technical support and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD OST 3 YR	1100AMNV70M4T3	ProCare 3 Year NBD On-site Maintenance for the NetVanta 7000 series, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
ProCare 5x8xNBD OST 3 YR	1100AMBCSM4T3	ProCare 3 Year NBD On-site Maintenance for the BCS Bundle, providing: 1 hour response time into technical support, access to software upgrades and patches, and next business day hardware replacement with ProCare on-site representative, available Monday through Friday, 7 am until 7 pm CT
		Optional Services -- 7x24x4 Onsite Maintenance
ProCare 7x24x4 OST 1 YR	1100AMAPPLM5T1	ProCare 1 Year 7x24x4 On-site Maintenance for the UC 420, UC 420e, and Bluesocket vWLAN appliance, providing: 30 minute response time into technical support and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
ProCare 7x24x4 OST 1 YR	1100AMNV70M5T1	ProCare 1 Year 7x24x4 On-site Maintenance for the NetVanta 7000 series, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
ProCare 7x24x4 OST 1 YR	1100AMBCSM5T1	ProCare 1 Year 7x24x4 On-site Maintenance for the BCS Bundle, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week

ProCare 7x24x4 OST 3 YR	1100AMAPPLM5T3	ProCare 3 Year 7x24x4 On-site Maintenance for the UC 420, UC 420e, and Bluesocket vWLAN appliance, providing: 30 minute response time into technical support and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
ProCare 7x24x4 OST 3 YR	1100AMNV70M5T3	ProCare 3 Year 7x24x4 On-site Maintenance for the NetVanta 7000 series, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
ProCare 7x24x4 OST 3 YR	1100AMBCSM5T3	ProCare 3 Year 7x24x4 On-site Maintenance for the BCS Bundle, providing: 30 minute response time into technical support, access to software upgrades and patches, and four hour hardware replacement with ProCare on-site representative, available 24 hours a day, 7 days a week
		Moves, Adds, Changes Support; Professional Services and Misc.
ProCare MAC 1 YR	1100AM5801MAC	Remote move, add, change support one year for NetVanta UC customers. Covers up to 100 users Monday-Friday 8am-5pm. Includes modifying, adding, or deleting phone user configurations remotely and making adjustments to the existing configuration. Work must be scheduled in advance.
ProCare MAC 3 YR	1100AM5803MAC	Remote move, add, change support three year for NetVanta UC customers. Covers up to 100 users Monday-Friday 8am-5pm. Includes modifying, adding, and deleting user phone configurations remotely and adjustments to the existing configuration. Must be scheduled in advance.
		ProStart After Hours Onsite Installation
1100ALS11508LT	ProStart OST AFTR HRS	ProStart After Hours Silver NetVanta 7xxx Install Package (excludes Sunday & Holiday) - ProStart installation of NetVanta 7xxx in accordance to the Silver IPT package features M-F, 8am-5pm site time (must be sold in conjunction with ProStart Per User NetVanta 7xxx Phone Install) Project scope will be validated at the start of the install project and must be finalized before moving forward. See www.adtran.com/ProStartipt for package details
1100ALS11509LT	ProStart OST AFTR HRS	ProStart After Hours Gold NetVanta 7xxx Install Package (excludes Sunday & Holiday) - ProStart installation of NetVanta 7xxx in accordance to the Gold IPT package features M-F, 8am-5pm site time (must be sold in conjunction with ProStart Per User NetVanta 7xxx Phone Install). Project scope will be validated at the start of the install project and must be finalized before moving forward. See www.adtran.com/ProStartipt for package details

1100ALS11510LT	ProStart OST AFTR HRS	ProStart After Hours Platinum NetVanta 7xxx Install Package (excludes Sunday & Holiday) - ProStart installation of NetVanta 7xxx in accordance to the Platinum IPT package features M-F, 8am-5pm site time (must be sold in conjunction with the ProStart Per User NetVanta 7xxx Phone Install). Project scope will be validated at the start of the install project and must be finalized before moving forward. See www.adtran.com/ProStartipt for package details
1100ALS11530LT	ProStart OST AFTR HRS	ProStart SMB UC appliance based install package - ProStart installation of NetVanta 7xxx in accordance to the features delivered in SMB UC appliance package M-F, 8am-5pm site time (must be sold in conjunction with ProStart Per User Phone Install). Project scope will be validated at the start of the install project and must be finalized before moving forward. See www.adtran.com/ProStartipt for package details
1100ALS11511LT	ProStart OST AFTR HRS	ProStart After Hours Per User Installation Fee (excludes Sunday & Holiday) to be sold in conjunction with NetVanta 7xxx Installation (Silver, Gold, Platinum) package. See www.adtran.com/ProStartipt for package details
1100ALS11516LT	ProStart OST AFTR HRS	ProStart On Site Installation of Advance Voice Features supports either SIP trunking(up to 10), SIP networking(per project), SABR or System Mode/Scheduler with installation of NetVanta 7xxx - Base Installation REQUIRED *per feature*
1100ALS11519LT	ProStart OST AFTR HRS	ProStart On Site Installation of Advanced Routing or Firewall (beyond default) or VPN in installation of NetVanta 7xxx - Base Installation REQUIRED
1100ALS12008LT	ProStart OST SUNDAY/HOLIDAY	ProStart Silver NetVanta 7xxx Install Package Sunday/Holiday - ProStart installation of NetVanta 7xxx in accordance to the Silver package features M-F, 8am-5pm site time (must be sold in conjunction with ProStart Per User NetVanta 7xxx Phone Install) Project scope will be validated at the start of the install project and must be finalized before moving forward. See www.adtran.com/ProStartipt for package details
1100ALS12009LT	ProStart OST SUNDAY/HOLIDAY	ProStart Gold IPT Install Package Sunday/Holiday- ProStart installation of NetVanta 7xxx in accordance to the Gold IPT package features M-F, 8am-5pm (must be sold in conjunction with ProStart Per User IPT Phone Install). Project scope will be validated at the start of the install project and must be finalized before moving forward. See www.adtran.com/ProStartipt for package details

1100ALS12010LT	ProStart OST SUNDAY/HOLIDAY	ProStart Platinum NetVanta 7xxx Install Package Sunday/Holiday - ProStart installation of NetVanta 7xxx in accordance to the Platinum package features M-F, 8am-5pm site time (must be sold in conjunction with the ProStart Per User NetVanta 7xxx Phone Install). Project scope will be validated at the start of the install project and must be finalized before moving forward. See www.adtran.com/ProStartipt for package details
1100ALS12030LT	ProStart OST SUNDAY/HOLIDAY	ProStart SMB UC appliance based install package - ProStart installation of NetVanta 7xxx in accordance to the features delivered in SMB UC appliance package M-F, 8am-5pm site time (must be sold in conjunction with ProStart Per User Phone Install). Project scope will be validated at the start of the install project and must be finalized before moving forward. See www.adtran.com/ProStartipt for package details
1100ALS12011LT	ProStart OST SUNDAY/HOLIDAY	ProStart Sunday/Holiday Per User Installation Fee to be sold in conjunction with NetVanta 7xxx Installation (Silver, Gold, Platinum) packages. See www.adtran.com/ProStartipt for package details
1100ALS12016LT	ProStart OST SUNDAY/HOLIDAY	ProStart On Site Installation of Advance Voice Features supports either SIP trunking(up to 10), SIP networking(per project), SABR or System Mode/Scheduler with installation of NetVanta 7xxx - Base Installation REQUIRED *per feature*
1100ALS12019LT	ProStart OST SUNDAY/HOLIDAY	ProStart On Site Installation of Advanced Routing or Firewall (beyond default) or VPN in installation of NetVanta 7xxx - Base Installation REQUIRED
1100401L1	ProStart T&M OST	Hourly rate for On-Site support during normal business hours; can also be used to bill travel time. Does not include any applicable freight charges for equipment dispatched under emergency circumstances. Scope of work may be required, and work must be scheduled in advance.
1100401L2	ProStart T&M OST AFTR HRS	Hourly rate for On-Site support after normal business hours; can also be used to bill travel time. Applicable for Weekday evenings and Saturdays. Does not include any applicable freight charges for equipment dispatched under emergency circumstances. Scope of work may be required, and work must be scheduled in advance.
1100401L3	ProStart T&M OST Sunday/Holida	Hourly rate for On-Site support on Sundays or Holidays; can also be used to bill travel time. Does not include any applicable freight charges for equipment dispatched under emergency circumstances. Scope of work may be required, and work must be scheduled in advance.

1100401L4	ProStart T&M REM	Hourly rate for remote engineering support during normal business hours. Does not include any applicable freight charges for equipment dispatched under emergency circumstances. Scope of work may be required, and work must be scheduled in advance.
1100401L5	ProStart T&M REM AFTR HRS	Hourly rate for remote engineering support after normal business hours. Applicable for Weekday evenings and Saturdays. Does not include any applicable freight charges for equipment dispatched under emergency circumstances. Scope of work may be required, and work must be scheduled in advance.
1100401L6	ProStart T&M REM Sunday/Holida	Hourly rate for remote engineering support on Sundays or Holidays. Does not include any applicable freight charges for equipment dispatched under emergency circumstances. Scope of work may be required, and work must be scheduled in advance.
1100402L1	PROSTART EXPEDITE FEE	Expedite fee for scheduling on-site installations with less than 15 business days notice from approved receipt of data gathering for UC installations; 10 business days notice from approved receipt of data gathering for NetVanta 7xxx installations; and 5 business days notice from approved receipt of data gathering for all other installation types
1100402L2	PROSTART EXPEDITE FEE	Expedite fee for scheduling remote installation support with less than 15 business days notice from approved receipt of data gathering for UC installations; approved 10 business days notice from receipt of data gathering for NetVanta 7xxx installations; and approved 5 business days notice from receipt of data gathering for all other installation types
1100403L1	PROSTART SITE NOT READY FEE	Site not ready fee charged for site visit for installation when site is not ready and a return trip is necessary to perform the installation
1100403L2	PROSTART NOT READY FEE REMOTE	Site not ready fee charged for rescheduling remote installation when site is not ready and the installation must be rescheduled
1100409L1	PROSTART FEE	Rescheduling fee charged when on site installation is rescheduled less than 24 Business Hours prior to the scheduled installation.
1100409L2	PROSTART RESCHEDULE FEE REMOTE	Rescheduling fee charged when remote installation is rescheduled less than 24 Business Hours prior to the scheduled installation.
1100LS00CXL	CANCELLATION FEE ON-SITE	Fee for cancellation of an on-site installation.

1100ALR10001SMB	ProStart REM	Remote system upgrade for NetVanta 7100, VSMB (Very Small Business) units to activate support up to 100 users Mon-Fri 8am-5pm site time. Does not include configuration for new users. The NetVanta 7100 being upgraded must have been bought as a standalone 4200796G1#VSMB
1100ALS10001SMB	ProStart OST UPGRADE	On-site system upgrade for NetVanta 7100, VSMB (Very Small Business) units to activate support up to 100 users Mon-Fri 8am-5pm site time. Does not include configuration for new users. The NetVanta 7100 being upgraded must have been bought as a standalone 4200796G1#VSMB
1100ALR30001W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 1 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services
1100ALR30005W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 5 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services.
1100ALR30010W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 10 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services.
1100ALR30025W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 25 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services.
1100ALR30050W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 50 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services.
1100ALR30075W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 75 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services.
1100ALR30100W	PROFESSIONAL SERVICE VOUCHER	This part number provides an Professional Service Voucher - 100 Pack. Professional Service Vouchers (PSV) are redeemable with ADTRAN in exchange for both Problem Resolution Assistance Services and First Line Support Services.

1100ALS10026UC	BIS REM PROFESSIONAL SERVICES	UC Custom "Remote" System Design & Deployment Support. Requires SOW
1100ALS10027UC	BIS OST PROFESSIONAL SERVICES	UC Custom "On-Site" System Design & Deployment Support. Requires SOW
1100ALSIPTSV	ProStart REM SURVEY	ProServices NetVanta 7xxx Application Qualification is designed to qualify ADTRAN 7xxx solutions remotely. The ProServices Professional Services team will remotely verify desired feature set functionality and review remotely the sitefts network and physical environment through phone interview and data gathering. At completion, the ProServices Professional Services team will deliver a network diagram, site qualification document, and quote to include the ADTRAN BOM as well as the ProStart and ProCare options.
1100ALS3GSV	ProStart OST SURVEY	On-Site 3G Site Survey performed during normal business hours M-F, 8am - 5pm site time
		Training Options
1600NETUCE	ATSP/UCSS TRAINING	ATSP/UCSS Enrollment
1600NETUCE	ATSP/UCSS TRAINING	ATSP/UCSS Course
1600NETUCV	ATSP/UCSS VILT	ATSP/UCSS Virtual Enrollment
1600NEUCSSK	ATSP/UCSS SELF-STUDY	ATSP/UCSS Self-Study Kit
1600NET7DE	ATSP/UCAS TRAINING	ATSP/UCAS Enrollment
1600NET7DE	ATSP/UCAS TRAINING	ATSP/UCAS Course
1600NET7DV	ATSP/UCAS VIRTUAL TRAINING	ATSP/UCAS Virtual Enrollment
1600NET7SS	ATSP/UCAS SELF-STUDY	ATSP/UCAS Self-Study Kit

5.3.1 **SERVICES** — For each Category above (5.21-5.30), the following services should be available for procurement as well at the time of product purchase or anytime afterwards.

5.3.1.1 **Maintenance Services** — Capability to provide technical support, flexible hardware coverage, and smart, proactive device diagnostics for hardware.

For ADTRAN proposed Solutions excluding Section 5.2.4:

ADTRAN is proud to offer our ProCare program. ProCare ensures you get the most

out of your ADTRAN solutions with ongoing access to technical support, after hour's assistance, the latest software releases and patches, as well as hardware replacement. All of these benefits are delivered by ADTRAN's award winning support team with options that provide the flexibility to choose what fits your business the best. http://www.ADTRAN.com/web/page/portal/ADTRAN/wp_aces_maintenance (Related documents on upper right hand side for plan descriptions and solutions overview). These documents have also been included in Appendix C.

For Section 5.2.4 – Optical Networking:

ADTRAN is proud to offer our Total Network Care, and Premium Network Care Programs:

Network Care Program	P/N	Description
PNC - small	1902PTACR7AT3C01	PREMIUM NETWORK CARE for access lines < 5000 as determined by ADTRAN CN Services
PNC - medium	1902PTACR7AT3B01	PREMIUM NETWORK CARE for access lines between 5,000 and 10,000 as determined by ADTRAN CN Services
PNC - large	1902PTACR7AT3A01	PREMIUM NETWORK CARE for access lines 10,000 to 100,000 as determined by ADTRAN CN Services
PNC - custom	TBD	PREMIUM NETWORK CARE for access lines > 100,000 as determined by ADTRAN CN Services
TNC - small	1902ADVRS7AT3C01	TOTAL NETWORK CARE for access lines < 5000 as determined by ADTRAN CN Services
TNC - medium	1902ADVRS7AT3B01	TOTAL NETWORK CARE for access lines between 5,000 and 10,000 as determined by ADTRAN CN Services
TNC - large	1902ADVRS7AT3A01	TOTAL NETWORK CARE for access lines 10,000 to 100,000 as determined by ADTRAN CN Services
TNC - custom	TBD	TOTAL NETWORK CARE for access lines > 100,000 as determined by ADTRAN CN Services

Please refer to Appendix C for supporting documentation for this section.

5.3.1.2 Professional Services

- Deployment Services
  - Survey/ Design Services — Includes, but not limited to, discovery, design, architecture review/validation, and readiness assessment.
  - Implementation Services — Includes, but not limited to, basic installation and configuration or end-to-end integration and deployment.
  - Optimization — Includes, but not limited to, assessing operational environment readiness, identify ways to increase efficiencies throughout

the network, and optimize Customer's infrastructure, applications and service management.

For ADTRAN proposed Solutions excluding Section 5.2.4:

ProStart provide a variety of flexible installation offerings, designed to assist you in planning and implementing ADTRAN solutions.

With ProStart, you have the expertise to deploy your ADTRAN network solutions, either for a greenfield application, redesigning networks, or deploying existing hardware in new applications or new locations. ProStart can provide the level of support you need – whether it is the full turnkey solution, remote support, or partner support.
ProStart Includes:

- **Surveys and Assessments**
  - **Comprehensive Pre-installation Predictive Site Survey for Bluesocket**
  - **Post-installation Site Surveys for Bluesocket**
  - **Unified Communications Site Surveys**

- **Staging**
  - **Let ProStart load standard configurations on your ADTRAN hardware before the hardware ships onsite**
  - **Ideal for large, standardized deployments**

- **Assisted Installations**
  - **Supporting certified specialized partners with installations**
  - **Remote Installations**
  - **ADTRAN provides a dedicated project manager to deliver project timelines, manage the deployment, and coordinate with third parties as necessary**
  - **Assigned ADTRAN project engineer to build custom configuration and oversee the installation remotely**
  - **Remote test and turn up support**
  - **30 day installation warranty**
  - **Includes phone and administration training for IPT and Unified Communications installations**

- **Onsite Installations**
  - **ADTRAN provides a dedicated project manager to deliver project timelines, manage the deployment, and coordinate with third parties as necessary**
  - **Assigned ADTRAN project engineer to build custom configuration and drive the installation**
  - **Onsite ProStart technician for unboxing, mounting, and physical connections**
  - **Onsite test and turn up support**
  - **30 day installation warranty**
  - **Includes phone and administration training for IPT and Unified Communications installations**

- Remote Management Services — Includes, but not limited to, continuous monitoring, incident management, problem management, change

management, and utilization and performance reporting that may be on a subscription basis.

For ADTRAN proposed Solutions excluding Section 5.2.4:

ProCare services can offer overlay move / add / change support and also leverages the ADTRAN N-Command server for configuration back-ups for change management. These tools can also be utilized for performance and utilization reporting.

ProCloud Wi-Fi offers a "No Worry" fully managed, business-class Wi-Fi service built on Bluesocket vWLAN. ProCloud Wi-Fi services are flexible and scalable, ensure a secure, always-on wireless network, provide proactive network monitoring, moves/adds/changes, and monthly management reports. ProCloud Wi-Fi can be included with ProStart deployment services to provide a full turn-key service to reduce IT support burdens.

ProCloud Wi-Fi Key Features

- **Fully managed, business-class Wi-Fi service**
- **Guaranteed 99.99% uptime**
- **Proactive 7x24 monitoring, technical issue resolution, hardware replacement, and moves/adds/changes**
- **Monthly management reports on network health and usage**
- **Freedom to migrate to in-house management anytime, to ensure business continuity**

What can ProCloud Wi-Fi do for you?

Management

- **Proactive alerts of Wi-Fi network issues, delivered 7x24**
- **Proactive technical issue resolution for service affecting emergencies 7x24**
- **Priority access into ADTRAN Technical Support at either 1 hour or 30 minute response time**
- **Monthly management reports**
- **Move/add/changes**

Infrastructure

- **"High-availability" redundant infrastructure to provide 99.99% guaranteed uptime**

Hardware and Software

- **Ongoing maintenance and hardware replacement (NBD or 4 hour)**
- **Software upgrades scheduled and performed by ADTRAN**

- Consulting/Advisory Services — Includes, but not limited to, assessing the availability, reliability, security and performance of Customer's existing solutions.

  For ADTRAN proposed Solutions excluding Section 5.2.4:

  ADTRAN offers a variety of support offerings to address optimization and analysis of an ADTRAN network. Applications engineering can review design requirements and scope and assist customers and partners in determining the most appropriate hardware, software, and

services given the functionality requirements. ProStart can be leveraged for site surveys and assessments. ADTRAN Technical Support can also support customers on a time and materials basis (utilizing professional service vouchers, pre-paid blocks of time) for vendor meets, in depth network review, etc.

- Data Communications Architectural Design Services — Developing architectural strategies and roadmaps for transforming Customer's existing network architecture and operations management.
  Not Compliant.
- Statement of Work (SOW) Services — Customer-specific tasks to be accomplished and/or services to be delivered based on Customer's business and technical requirements.

  For ADTRAN proposed Solutions excluding Section 5.2.4:

  Please see https://www.ADTRAN.com/web/page/portal/ADTRAN/wp_aces_installation

  These documents have also been included in Appendix C.

For Section 5.2.4 – Optical Networking:

In all cases, implementation services vary greatly depending on the product mix, customer specific requirements and site specific architecture. Therefore, in all cases a Statement of Work must be prepared and provided as the part of any quote.

ADTRAN will generate an ADTRAN specific project quote #. Any Purchase Order received by ADTRAN must have this Quote # attached or referenced before ADTRAN will acknowledge or process the order. In addition, it is advisable to return the SOW signed by the customer with the purchase order. This ensures all parties know what is being delivered by ADTRAN and minimizes the need for changes and PO revisions and potential delay projects.

Installations are performed in 3 stages:

1) **Physical Installation (optional)**
2) **Test & Turn-up (requires either on-site or remote ADTRAN Professional Services depending on the complexity of the project)**
3) **Cutover (optional)**

Physical installation of the TA5000/TA5006 is optional.
However, if ADTRAN is requested to provide the physical installation pricing is subject to the specific Statement of Work to be performed.

The SOW can vary significantly based on results of a Site Survey or Customer provided Engineering Design Package.

Examples of areas that can significantly affect SOW and pricing:

1) Rack (existing or does a new rack need to be installed)
2) Power (is sufficient power available, if not, will ADTRAN be installing or upgrading power systems. If so, what are the customer's power system specifications, distances, etc.
3) Ladder racking (is ladder racking in place or will ADTRAN be providing ladder racking. If so, items such as: distances turns, evaluations (i.e. layout) all affect the SOW pricing.
4) Interconnect cabling – distances, turns
5) Is splicing required
6) Etc.

If ADTRAN is requested to provide Physical Installation, a specific SOW will be drafted and reviewed with the customer based on the Site Survey or Engineering Design Package.

ADTRAN will use the following part numbers to appropriately price the project.

P/N: 1901ADPLYT5K0GA1
Description: INSTALLATION TA5K
Quantities are used to adjust total price according to the SOW.
In addition, to the above, ADTRAN may also add a travel or mobilization fee depending on the site locations and duration.

Test & Turn-up requirements are based on the following:

- **ONE Solutions requirements / recommendations for ADTRAN Professional Services involvement depend on ADTRAN approved design**
  - **Point-to-point or simple 3 node rings**
    - **No Amps, no Dispersion Compensation, no ROADM, etc.**
    - **Distributor can quote physical install**
    - **Recommend ADTRAN Pre-scheduled Remote Test & Turn-up Support, if waived Sales must communicate support policy (1) - Ensures Priority Support is available when needed**
  - **Multi-node (single rings comprising of more than 3 nodes)**
    - **No Amps, no Dispersion Compensation, no ROADM, etc.**
    - **Mandatory* Pre-scheduled Remote ADTRAN Professional Services perform "Test & Turn-up" portion of deployment via remote assistance - Ensures Priority Support is available when needed**
    - **Recommend Pre-scheduled ONSITE ADTRAN Professional Services perform "Test & Turn-up" portion of deployment via onsite delivery - Minimizes issues during turn-up**
  - **Active Optical Designs or multi-ring designs**
    - **Requires Amps, Dispersion Compensation, ROADM, etc.**
    - **Mandatory* Pre-scheduled ONSITE ADTRAN Professional Services perform "Test & Turn-up" portion of deployment via remote assistance - Ensures quick and trouble-free turn-up**
    - **Strongly Recommend ADTRAN Professional Services perform complete deployment - Ensures quickest deployment possible**

Please note that the ADTRAN policy of direct involvement with ONE implementations is in place for several reasons:

- **To help ensure customer experiences are positive by having trained resources available to perform implementations correctly, timely and to address any issues that may arise in real-time.**
- **By pre-scheduling trained resources, ADTRAN can certify installation and, ensure other ADTRAN customers receive industry-leading support.**

Without pre-scheduled involvement if any issues are encountered by the customer:

- **ADTRAN cannot provide real-time support**
- **ADTRAN cannot certify installation**
- **Trained resources will not be available in a timely manner. As those resources will not have prior knowledge of the project, they must devote time in discovery before support can be provided which lengthens the overall trouble-shooting cycle time**
- **The customer will have no method to receive expedited support**

All of these factors impacts our ability to deliver timely service to this customer and other customers and impacts the overall customer experience negatively if problems are encountered.

*** Waivers may be granted provided:**

- **Installers have proven in-depth experience with DWDM**
- **Installers have the tools to support/perform (e.g. Fiber Characterization, Optical Return Loss, Fiber connector replacement, Connector-to-connector and OTDR readings, CD/PMD testing, etc. as needed)**
- **ADTRAN PSE has verified the installer capabilities**

Pricing for Test & Turn-up is based on the number of cards, types of cards, number of nodes and site locations using the following part numbers:

Service	Part	Description	Minimum Requirements
Remote Test & Turn-up Support	1901BRTUC4HDAY01	REMOTE TURN/CUT SUPPORT-4HR	Per Node during normal ADTRAN business hours. Additional quantities may be required depending on SOW
	1901BRTUC4HNGT01	REMOTE TURN/CUT SUP(NIGHT-4HR)	Per Node after-hours M-F. Additional quantities may be required depending on SOW
	1901BRTUC4HWEH01	REMOTE TURN/CUT SUP(WEHOL-4HR)	Per Node weekends and holidays. Additional quantities may be required depending on SOW
Onsite Test and Turn-up	1901BTTUPPXNEGA1	ONSITE T&TU (TOS CARDS)	1 for each xTOS card
	1901BTTUPPXNEGA2	ONSITE T&TU (MUXES, CARRIER)	1 for each Mux and Carrier Card
	1901BTTUPPXNEGA3	ONSITE T&TU (ROADM, DCM)	1 for each ROADM and DCM
	1901BTTUPPXNEGA4	ONSITE T&TU TOS PORT DWDM	1 for each port where DWDM xFPs are to be installed
	1901BTTUPPXNEGA5	ONSITE T&TU TOS PORT 1G-10G	1 for each port where non-DWDM xFPs are to be installed

Optional Services	**1901BFBCBPONEGA1**	**FIBER CHARACTERIZATION BASE**	**1 for each node (includes up to 4 fibers per node)**
	1901BFCADPONEGA1	**FIBER CHARACTERIZATION ADD-ON**	**1 for each add'l fiber/node**

Cutover is optional.

However, is ADTRAN is requested to perform or support this service, ADTRAN will price using the part numbers and unit prices below according to the duration imposed by the customer's methods and procedures.

Typically ADTRAN will estimate the number of cutovers that can be performed based on the above.

For example, if customer has 100 cutovers to be performed and ADTRAN has estimated that 30 can be completed per customer's maintenance window and required methods and procedures ADTRAN will charge quantity 4 of the specific part below.

Service	Part	Description
Remote Cutover Support	**1901BRTUC4HDAY01**	**REMOTE TURN/CUT SUPPORT-4HR**
	1901BRTUC4HNGT01	**REMOTE TURN/CUT SUP(NIGHT-4HR)**
	1901BRTUC4HWEH01	**REMOTE TURN/CUT SUP(WEHOL-4HR)**
On-site Cutover	**1901AOISUDAYTM01**	**ON-SITE SUPPORT (DAILY-NBH)**
	1901AOISUNIGHT01	**ON-SITE SUPPORT (DAILY-NIGHT)**
	1901BOTUCWEKLY01	**ON-SITE SUPPORT (WEEKLY)**
	1901BOTUCWEHOL01	**ON-SITE SUPPORT (WEEKENDHOL)**

5.3.1.3 **Partner Services** — Provided by Contractor's Authorized Partners/Resellers.

- Subject to Contractor's approval and the certifications held by its Partners/Resellers, many Partners/Resellers can also offer and provide some or all of the Services as listed above at competitive pricing, along with local presence and support. As the prime, Contractor is still ultimately responsible for the performance of its Partners/ Resellers. Customers can have the option to purchase the Services to be directly delivered by Contractor (OEM) or its certified Partners/Resellers.

  For ADTRAN proposed ADTRAN Solutions excluding Section 5.2.4:

  ADTRAN services can be purchased through the customer's Partner / Reseller. For those ADTRAN services, purchased from ADTRAN,

ProServices is responsible for the delivery and management of those services.

5.3.1.4 **Training** — Learning offerings for IT professionals on networking technologies, including but not limited to designing, implementing, operating, configuring, and troubleshooting network systems pertaining to items provided under the master agreement.

ADTRAN University delivers training and certification that provide you with the sales and technical detail and capabilities that will equip you sell, install, configure and maintain ADTRAN solutions. Visit ADTRAN University at www.ADTRANunivesity.com.

ADTRAN brings its telecommunications expertise to you through a variety of training options. From traveling regional seminars, to classroom instruction at ADTRAN training facilities, online self-paced, live instruction via ADTRAN virtual classroom. ADTRAN University provides training solutions for today's dynamic businesses.

Router and Switches Training Offerings

The ADTRAN Internetworking Certification includes training on NetVanta routers, Ethernet switches, and Wi-Fi solutions for innovative high performance network infrastructure applications.

Course Title: ADTRAN Technical Support Associate for Internetworking (ATSA/IN)
Description: ATSA/IN is the foundation level certification for technical staff responsible for designing and implementing ADTRAN solutions using ADTRAN's NetVanta Internetworking products. This training provides a solid understanding of basic data and internetworking concepts, plus basic operations of the ADTRAN Operating System (AOS) and NetVanta hardware as they relate to IP routing, Ethernet switching, and Wi-Fi. The self-paced online training curriculum and exam are free.
Part Numbers: NA
Price(s): Free

Course Title: ADTRAN Technical Support Professional for Internetworking (ATSP/IN)

Description: ATSP/IN is a professional level certification for technical staff responsible for designing, implementing and supporting ADTRAN solutions using ADTRAN's NetVanta internetworking products. To achieve this certification, the student must successfully complete and master the concepts covered in ATSA/IN, complete the ATSP/IN certification training, and pass the ATSP/IN exam.
Part Numbers:1600NETPPE (ATSP/IN Classroom Training)
1600NETPPV (ATSP/IN Virtual Training)
1600NETSS (ATSP/IN Self-study)

Unified Communications training offerings

ADTRAN Response No. 121342181
WSCA-NASPO Data Communications Services Solicitation # JP14001

The ADTRAN Unified Communications Server Solutions Certification includes training on the NetVanta Unified Communication Server suite of solutions for unified messaging, interactive voice response (IVR) applications, outbound dialing, communications enabled business process (CEBP) automation and Windows-based IP PBX applications.

Course Title: ADTRAN Technical support Associate for Unified Communications Server Solutions (ATSA/UCSS)
Description: ATSA/UCSS is the foundation level certification or technical staff responsible for designing and implementing, and supporting ADTRAN solutions using ADTRAN's NetVanta Unified Communications Server products. This training covers the basic concepts required to prepare each student for the hands-on ATSP course. The self-paced online training curriculum and exam are free.
Part Numbers: NA
Price(s): Free

Course Title: ADTRAN Technical Support Professional for Unified Communications Server Solutions (ATSP/UCSS)
Description: ATSP/UCSS is the professional level certification for technical staff that will be responsible for designing, installing, and supporting solutions using the NetVanta Unified Communications product and solutions. To achieve this certification, the student must successfully complete and master the concepts covered in ATSA/UCSS, complete the ATSP/UCSS certification training, and pass the ATSP/UCSS exam.
Part Numbers:1600NETUCE (ATSP/UCSS Classroom Training)
1600NETUCV (ATSP/UCSS Virtual Training)
1600NEUCSSK (ATSP/UCSS Self-study)

The Unified Communications Appliance Solutions Certification includes training on the revolutionary NetVanta 7000 Series all-in-one IP PBX and communications platform for simplified, affordable Voice over IP (VoIP) applications.

Course Title: ADTRAN Technical support Associate for Unified Communications Appliance Solutions (ATSA/UCAS)
Description: ATSA/UCSS is the foundation level certification for technical staff responsible for designing and implementing ADTRAN solutions using ADTRAN's Unified Communications Appliance solutions. The student will learn basic operations of the NetVanta 7000 Series platform, the ADTRAN Operating System (AOS) and NetVanta 7000 hardware as they relate to IP routing, Ethernet Switching and IP Telephony. The self-paced online training curriculum and exam are free
Part Numbers: NA
Price(s): Free

Course Title: ADTRAN Technical Support Professional for Unified Communications Appliance Solutions (ATSP/UCAS)
Description: ATSP/UCSS is a professional level certification for technical staff responsible for designing, implementing, and supporting ADTRAN Unified Communications Appliance solutions. To achieve this certification, the student must successfully complete and master the concepts covered in ATSA/UCAS complete the ATSP/UCAS certification training and pass the ATSP/UCAS exam.

Part Numbers:1600NET7DE (ATSP/UCAS Classroom Training)
1600NET7DV (ATSP/UCAS Virtual Training)
1600NET7SS (ATSP/UCAS Self-study)

Virtual Wireless LAN (vWLAN)

The ADTRAN Virtual Wireless LAN Certification includes training on ADTRAN's family of high performance Bluesocket Access Points (APs) which are a perfect fit for enterprises who are deploying secure wireless networks.

Course Title: ADTRAN Technical support Associate for Virtual Wireless LAN (ATSA/vWLAN)
Description: ATSA/vWLAN is the foundation level certification for technical staff responsible for designing and implementing ADTRAN's Virtual Wireless LAN products. This training provides a solid understanding of basic data, internetworking and wireless concepts The self-paced online training curriculum and exam are free.
Part Numbers: NA
Price(s): Free

Course Title: ADTRAN Technical Support Professional for Virtual Wireless LAN (ATSP/vWLAN)
Description: ATSP/vWLAN is a professional level certification for technical staff responsible for designing, implementing and supporting solutions using ADTRAN's Virtual Wireless LAN products. To achieve this certification, the student must successfully complete and master the concepts covered in ATSA/vWLAN, complete the ATSP/vWLAN certification training, and pass the ATSP/vWLAN exam.
Part Numbers:1600NETBSWLE (ATSP/vWLAN Classroom Training)
1600NETBSWLV (ATSP/vWLAN Virtual Training)
1600NETBSWSS (ATSP/vWLAN Self-study)

IP Business Gateways

The ADTRAN IP Business Gateway (IPBG) Certification includes training on the NetVanta 6000 series and Total Access 900/900e series IPBGs for hosted VoIP, IP Centrex, and branch office extension applications.

Course Title: ADTRAN Technical support Associate for IP Business Gateways (ATSA/IPBG)
Description: ATSA/IPBG is the foundation level certification or technical staff responsible for designing and implementing, and supporting ADTRAN solutions using ADTRAN's IP Business Gateways solutions. This training covers the basic concepts and technologies required to prepare each student for the hands-on ATSP course. The self-paced online training curriculum and exam are free
Part Numbers: NA
Price(s): Free

Course Title: ADTRAN Technical Support Professional for IP Business Gateways (ATSP/IPBG)

Description: ATSP/IPBG is the professional level certification for technical staff that will be responsible for designing, implementing, and supporting solutions using ADTRAN's IP Business Gateway solutions. To achieve this certification, the student must successfully complete and master the concepts covered in ATSA/IPBG, complete the ATSP/IPBG certification training, and pass the ATSP/IPBG exam.
Part Numbers:1600IPBGE (ATSP/IPBG Classroom Training)
1600IPBGV (ATSP/IPBG Virtual Training)

Optical Network Environment (ONE)

This course is designed for those students that will be responsible for either designing, installing, provisioning or maintaining the Total Access 5000 for ONE deployment. This course will include interactive lectures as well as lab exercises. Integrated hands-on lab exercises are designed to reinforce the classroom instruction. After completion of the course, the student should be able to turn-up, provision, and maintain the ADTRAN Total Access 5000 ONE system.

Part Numbers:1600CSYS5020E (Classroom Training)

5.3.2 ADDING PRODUCTS

The ability to add new equipment and services is for the convenience and benefit of WSCA-NASPO, the Participating States, and all the Authorized Purchasers. The intent of this process is to promote “one-stop shopping” and convenience for the customers and equally important, to make the contract flexible in keeping up with rapid technological advances. The option to add new product or service categories and/items will expedite the delivery and implementation of new technology solutions for the benefit of the Authorized Purchasers.

After the contracts are awarded, additional IT product categories and/or items may be added per the request of the Contractor, a Participating State, an Authorized Purchaser or WSCA-NASPO. Additions may be ad hoc and temporary in nature or permanent. All additions to an awarded Contractor or Manufacturer’s offerings must be products, services, software, or solutions that are commercially available at the time they are added to the contract award and fall within the original scope and intent of the RFP (i.e., converged technologies, value adds to manufacturer’s solution offerings, etc.).

5.3.2.1 New Product from Contractors — If Contractor, a Participating State, an Authorized Purchaser or WSCA-NASPO itself requests to add new product categories permanently, then all awarded Contractors (Manufacturers) will be notified of the proposed change and will have the opportunity to work with WSCA to determine applicability, introduction, etc. Any new products or services must be reviewed and approved by the WSCA-NASPO Contract Administrator.

5.3.2.2 Ad Hoc Product Additions — A request for an ad hoc, temporary addition of a product category/item must be submitted to WSCA-NAPOS via the governmental entity’s contracting/purchasing officer. Ad hoc, temporary requests will be handled on a case-by-case basis.

5.3.2.3 Pricelist Updates — As part of each Contractor’s ongoing updates to its pricelists throughout the contract term, Contractor can add new SKUs to its awarded product categories that may have been developed in-house or obtained through mergers, acquisitions or joint

ventures; provided, however, that such new SKUs fall within the Contractor's awarded product categories.

ADTRAN has read and understands Section 5.3.2.

Section 6: Evaluation

6.1 General Information

Proposals will be evaluated for completeness and compliance with the requirements of this RFP by a sourcing team. The sourcing team may engage additional qualified individuals during the process to assist with technical, financial, legal, or other matters.

Except at the invitation of the sourcing team, no activity or comments from Offerors regarding this RFP shall be discussed with any member of the sourcing team during the evaluation process. An Offeror who contacts a member of the sourcing team in reference to this RFP may have its proposal rejected.

Each proposal must be submitted in Microsoft Word or Excel, or PDF labeled and organized in a manner that is congruent with the section number, headings, requirements, and terminology used in this RFP. Proposal documents must be use Arial font size 10. All proposals must be submitted in electronic form.
ADTRAN has read and understands Section 6.1.

6.2 Administrative Requirements Compliance

The sourcing team will evaluate each proposal for compliance with administrative requirements. Non compliance with any of these requirements will render a proposal non-responsive. Only those proposals that pass the administrative requirements will be evaluated further.

In order to pass the Administrative Requirements, the following must be received by due date and time associated with this RFP as listed in Bid Sync.
ADTRAN has read and understands Section 6.2.

6.2.1 References

Vendor must provide a least three current account references for which your company provides similar Data Communications services for private, state and/or large local government clients (preferably government/public entities). **Offerors are required to submit Attachment B - Reference Form, for business references. The business providing the reference must submit the Reference Form directly to the State of Utah, Division of Purchasing.** It is the offeror's responsibility to ensure that completed forms are received by the State of Utah Division of Purchasing on or before the proposal submission deadline for inclusion in the evaluation process. Business references not received, or not complete, may adversely affect the offeror's score in the evaluation process. The Purchasing Division reserves the right to contact any or all business references for validation of information submitted.
ADTRAN has read and understands Section 5.1.1. As clarified in the RFP Q&A, and Addendum #3; ADTRAN has supplied the Revised Attachment B Reference Form to the following 5 contacts:

Chris Lott
Manager of User Services
Mount St. Mary's College

Dave Slabe
IT Operations Manager
Hamilton Heights School Corporation

Thomas Flanders
IT Services
City of Lake Havasu

Steve Robinson
Director of Academic Technology
Archbishop Riordan High School

Harold Tame
State of TX Department of Family & Protective Services

6.3 Minimum Scope Requirements Compliance

The sourcing team will evaluate each proposal that passed the administrative requirements for compliance with Section 5.2 Data Communications Services – Requirements. Scope requirements are evaluated in terms of the breadth and depth of the offeror proposal for each of the section 5.2.1-5.3.0 Scope categories. Only those proposals in each section that score 70% or better will move on to cost evaluation.
ADTRAN has read and understands Section 6.3

6.4 Evaluation Criteria

The following table details how each proposal shall be evaluated on a basis of 100 points.

An evaluation committee comprised of representatives from some WSCA-NASPO member States will be appointed by the WSCA-NASPO Contract Administrator to perform the proposal evaluation.

All Offeror's proposals will be initially reviewed for compliance with the mandatory general requirements in Section 3 and Sections 5.1.1-5.1.5 stated within the RFP. Any proposal failing to meet one or more mandatory requirement(s) will be considered non-responsive and deemed "unacceptable", and will be eliminated from further consideration.

Those proposals deemed "acceptable" or "potentially acceptable" will be evaluated against the following proposal evaluation criteria using a point-based scoring methodology. Proposal evaluation criteria are listed in relative order of importance:

6.4.1 Cost – (bid sheets including discounts off list price attached) – 30%

Given that technology products generally depreciate over time and go through typical product lifecycles, it is more favorable for customers to have prime contracts be based on minimum discounts off the Offeror's' commercially published pricelists versus fixed pricing. In addition, Offerors must have the ability to update and refresh their respective price books, as long as the agreed-upon discounts are fixed. Minimum guaranteed

contract discounts do not preclude an Offeror and/or its authorized resellers from providing deeper or additional, incremental discounts at there sole discretion.

6.4.1.1 Refurbished Equipment – Many IT manufacturers offer refurbished equipment at a substantially lower cost with attractive warranties that also address risk concerns some customers may have with refurbished gear. Offerors may add an optional provision for manufacturer-certified refurbished equipment to be available for procurement under this contract. This offering will not be evaluated as part of the cost scoring process.

6.4.2 Demonstrate ability to provide products and services within scope of the RFP (Section 5.2-5.31) – 25%

6.4.3 Qualifications, technical ability, maintenance, training and value added services – 10%

6.4.4 Ability to supply to WSCA / NASPO member states/geographical coverage -10%

6.4.5 Offer profile and references (i.e., financial stability, presence in marketplace, adequate staff, marketing efforts etc.) – **20%**

6.4.6 Administrative (i.e., report generating ability, e-commerce, account reps, problem resolution, customer satisfaction, website hosting and other administrative related issues) – **5%**

At the option of the evaluation committee the WSCA-NASPO Contract Administrator may initiate discussion(s) with Offerors who submit responsive or potentially responsive proposals for the purpose of clarifying aspects of the proposal(s), however, proposals may be evaluated without such discussion(s). Such discussion(s) is not to be initiated by Offerors.

Based on the competitive range of the evaluation scores, the evaluation committee may choose to make a “finalist list” of offeror’s; if opted for, all offeror’s will be notified of their status at this juncture by the Procurement Manager.

Finalist Offeror’s may be required, at the option of the evaluation committee, to present their proposals and possibly demonstrate their Internet website to the evaluation committee. The Procurement Manager will schedule the time and location for each Offeror presentation. Each Offeror presentation will be of equal duration for all offeror’s and may also include an additional amount of time reserved for questions/answers.

The sourcing team will evaluate each proposal that has passed the administrative requirements and met or exceeded the Section 3 and Section 5.1.1-5.1.5 Mandatory Requirements.

ADTRAN has read and understands Section 6.4.

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Section 7: Master Agreement Terms and Conditions/Exceptions

7.1 WSCA-NASPO Master Agreement Terms and Conditions

7.1.1 The WSCA-NASPO Contract Administrator referred to in section 2 of the WSCA-NASPO Master Agreement Terms and Conditions is Debra Gunderson, State of Utah Division of Purchasing and General Services. This RFP represents the WSCA-NASPO Contract Administrator's written approval of the modifications, waivers, alterations, amendments, and supplements to the Master Agreement Terms and Conditions made in this RFP and this Section 7.

7.1.2 Except as limited in this section or elsewhere in this RFP, Participating Entities who execute a Participating Addendum may alter, modify, supplement, or amend the WSCA-NASPO Master Agreement Terms and Conditions as necessary to comply with Participating Entity law or policy with respect to their orders under the Master Agreement. A Contractor may not deliver Products or perform services under this Master Agreement until a Participating Addendum acceptable to the Participating Entity and Contractor is executed. The WSCA-NASPO Terms and Conditions are applicable to any order by a Participating Entity, except to the extent altered, modified, supplemented or amended by a Participating Addendum. By way of illustration and not limitation, this authority may apply to unique delivery and invoicing requirements, confidentiality requirements, defaults on orders, governing law and venue relating to orders by a Participating Entity, Indemnification, and insurance requirements. Statutory or constitutional requirements relating to availability of funds may require specific language in some Participating Addenda in order to comply with applicable law. The expectation is that these alterations, modifications, supplements, or amendments will be addressed in the Participating Addendum or, with the consent of the Participating Entity and Contractor, may be included in the commitment voucher (e.g. purchase order or contract) used by the Participating Entity to place the order.

7.1.3 The term Purchasing Entity and Participating Entity shall both mean "Participating Entity" as that term is defined in WSCA-NASPO Master Agreement Terms and Conditions.

7.1.4 With respect to section 11, Indemnification, the terms of any Participating Addendum may alter, modify, supplement, or amend the language in section 11 and may include a limitation of liability mutually agreeable to the Participating Entity and the Contractor.

7.1.5 With regard to section 20, Participants, Participating Entities who are not states may under some circumstances sign their own Participating Addendum, subject to the approval of the Chief Procurement Official of the state where the Participating Entity is located. Contractors may upon request obtain a copy of the written authorization from the WSCA-NASPO Contract Administrator.

ADTRAN has read and understands Section 7.1.

7.2 Offeror Exceptions to Terms and Conditions

7.2.1 The Lead State discourages exceptions to contract terms and conditions in the RFP, attached Participating Entity terms and conditions (if any), and the WSCA-NASPO Master Agreement Terms and Conditions. As specified in this RFP, exceptions may

cause a proposal to be rejected as nonresponsive when, in the sole judgment of the Lead State (and its evaluation team), the proposal appears to be conditioned on the exception or correction of what is deemed to be a deficiency or unacceptable exception would require a substantial proposal rewrite to correct. Moreover, Offerors are cautioned that award may be made on receipt of initial proposals without clarification or an opportunity for discussion, and the nature of exceptions would be evaluated. Further, the nature of exceptions will be considered in the competitive range determination if one is conducted. Exceptions will be evaluated to determine the extent to which the alternative language or approach poses unreasonable, additional risk to the state, is judged to inhibit achieving the objectives of the RFP, or whose ambiguity makes evaluation difficult and a fair resolution (available to all vendors) impractical given the timeframe for the RFP.

7.2.2 The Lead State will entertain exceptions to contract terms and conditions in this RFP, including the WSCA-NASPO Master Agreement Terms and Conditions. Offerors are strongly encouraged to be judicious in identifying exceptions.

7.2.3 Based on the market research conducted by the Lead State, the following provisions are intended to frame the contours of exceptions that may be acceptable, additional risk so long as the Offeror's exceptions are specified with sufficient particularity.

7.2.4 The Lead State will consider Offeror standard terms for inspection and acceptance, so long as a reasonable time for acceptance is stated. However, the Participating Entities right to exercise revocation of acceptance under its Uniform Commercial Code must be preserved. Submit the standard terms with the offer and describe generally how commerciality in their use is established, e.g., identify publicly-available catalogs where the warranty terms are used and how long they have been in use.

7.2.5 The Lead State will consider standard warranty and/or maintenance terms, but the alternative warranty and/or maintenance will be evaluated to determine whether they provide comparable protection to the warranty specified in section 30 of the WSCA-NASPO Master Agreement Terms and Conditions. Provide the terms of the warranty and maintenance in the offer. Also describe generally how commerciality is established for those terms, e.g., publicly-available catalogs the warranty terms are used and how long they have been in use. Provide one reference from a customer having comparable sales volume who is using the warranty and maintenance provisions, where the warranty term has expired, and who has exercised rights under the warranty.

7.2.6 Intellectual property. The Lead State will consider license terms and conditions that as a minimum convey to Participating Entities a nonexclusive, irrevocable, perpetual, paid-up, royalty free license to use software or other intellectual property delivered with or inherent in the commodity or service, and to transfer the license rights to third parties for government purposes. Provide the terms of the license, including any terms that cover third party intellectual property used in the Offeror's solution. Offerors should be aware that Participating Entities using federal funds may be required to negotiate additional or different terms to satisfy minimum rights requirements of their federal grants.

7.2.7 Any limitation of liability provision – including any exclusion of damages clause – proposed by an Offeror to be the default limitation of liability provision under the Master Agreement must preserve a reasonable amount of direct damages for breach of contract, additionally permit the Participating Entity to recoup amounts paid for supplies or services not finally accepted (as in the case of advance or progress payments, if used), and preserve the right of the Participating Entity to be held harmless from costs of litigation as well as ultimate liability within limits agreed by the parties.

Moreover, any limitation of liability clause proposed by an Offeror should be reciprocal,

cover lost profits, and exclude claims or liability arising out of intellectual property infringement, bodily injury (including death), damage to tangible property, and data breach. Include the text of any such language if proposed. Further, provide contact information for a public entity, or private entity if no public entity exists, where the limitation of liability clause (or another clause substantially similar) operated to limit liability. If no such example exists, provide contact information for a state, or if no state exists, a higher education institution, or if none exists, a city or county represented by counsel in the negotiations who has agreed to the proposed terms and conditions.

7.2.8 The enumerated examples in subsection 7.2 are not intended to limit the ability of Offerors to propose additional, reasonable exceptions. For any other exception, where the exception is based on claims of standard or normal commercial practice, provide contact information for a state, or if no state exists, a higher education institution, or if none exists, a city or county represented by counsel in the negotiations who has agreed to the proposed terms and conditions.

ADTRAN has read and understands Section 7.2.

7.3 WSCA-NASPO eMarket Center

7.3.1 In July 2011, WSCA-NASPO entered into a multi-year agreement with SciQuest, Inc. whereby SciQuest will provide certain electronic catalog hosting and management services to enable eligible WSCA-NASPO entity's customers to access a central online website to view and/or shop the goods and services available from existing WSCA-NASPO Cooperative Contracts. The central online website is referred to as the WSCA-NASPO eMarket Center Contractor shall either upload a hosted catalog into the eMarket Center or integrate a punchout site with the eMarket Center.

Supplier's Interface with the eMarket Center
There is no cost charged by SciQuest to the Contractor for loading a hosted catalog or integrating a punchout site.

At a minimum, the Contractor agrees to the following:

1. Implementation Timeline: WSCA-NASPO eMarket Center Site Admin shall provide a written request to the Contractor to begin enablement process. The Contractor shall have fifteen (15) days from receipt of written request to work with WSCA-NASPO and SciQuest to set up an enablement schedule, at which time SciQuest's technical documentation shall be provided to the Contractor. The schedule will include future calls and milestone dates related to test and go live dates. The contractor shall have a total of Ninety (90) days to deliver either a (1) hosted catalog or (2) punch-out catalog, from date of receipt of written request.

2. Definition of Hosted and Punchout: WSCA-NASPO and SciQuest will work with the Contractor, to decide which of the catalog structures (either hosted or punch-out as further described below) shall be provided by the Contractor. **Whether hosted or punch-out, the catalog must be strictly limited to the Contractor's awarded contract offering (e.g. products and/or services not authorized through the resulting cooperative contract should not be viewable by WSCA-NASPO Participating Entity users).**

a. Hosted Catalog. By providing a hosted catalog, the Contractor is providing a list of its awarded products/services and pricing in an electronic data file in a format acceptable to SciQuest, such as Tab Delimited Text files. In this scenario, the Contractor must submit updated electronic data annually to the the eMarket Center for WSCA-NASPO Contract Administrator's approval to maintain the most up-to-date version of its product/service offering under the cooperative contract in the eMarket Center.

b. Punch-Out Catalog. By providing a punch-out catalog, the Contractor is providing its own online catalog, which must be capable of being integrated with the eMarket Center as a. Standard punch-in via Commerce eXtensible Markup Language (cXML). In this scenario, the Contractor shall validate that its online catalog is up-to-date by providing a written update quarterly to the Contract Administrator stating they have audited the offered products/services and pricing listed on its online catalog. The site must also return detailed UNSPSC codes (as outlined in line 3) for each line item. Contractor also agrees to provide e-Quote functionality to facilitate volume discounts.

3. Revising Pricing and Product Offerings: Any revisions (whether an increase or decrease) to pricing or product/service offerings (new products, altered SKUs, etc.) must be pre-approved by the WSCA-NASPO Contract Administrator and shall be subject to any other applicable restrictions with respect to the frequency or amount of such revisions. However, no cooperative contract enabled in the eMarket Center may include price changes on a more frequent basis than once per quarter. The following conditions apply with respect to hosted catalogs:

    a. Updated pricing files are required by the 1st of the month and shall go into effect in the eMarket Center on the 1st day of the following month (i.e. file received on 1/01/14 would be effective in the eMarket Center on 2/01/14). Files received after the 1st of the month may be delayed up to a month (i.e. file received on 11/06/14 would be effect in the eMarket Center on 1/01/15).

    b. Contract Administrator-approved price changes are not effective until implemented within the eMarket Center. Errors in the Contractor's submitted pricing files will delay the implementation of the price changes in eMarket Center.

4. Supplier Network Requirements: Contractor shall join the SciQuest Supplier Network (SQSN) and shall use the SciQuest's Supplier Portal to import the Contractor's catalog and pricing, into the SciQuest system, and view reports on catalog spend and product/pricing freshness. The Contractor can receive orders through electronic delivery (cXML) or through low-tech options such as fax. More information about the SQSN can be found at: www.sciquest.com or call the SciQuest Supplier Network Services team at 800-233-1121.

5. Minimum Requirements: Whether the Contractor is providing a hosted catalog or a punch-out catalog, the Contractor agrees to meet the following requirements:

a. Catalog must contain the most current pricing, including all applicable administrative fees and/or discounts, as well as the most up-to-date product/service offering the Contractor is authorized to provide in accordance with the cooperative contract; and

b. The accuracy of the catalog must be maintained by Contractor throughout the duration of the cooperative contract between the Contractor and the Contract Administrator; and

c. The Catalog must include a Lead State contract identification number; and

d. The Catalog must include detailed product line item descriptions; and

e. The Catalog must include pictures when possible; and

f. The Catalog must include any additional WSCA-NASPO and Participating Addendum requirements.*

6. Order Acceptance Requirements: Contractor must be able to accept Purchase Orders via fax or cXML.

    a. The Contractor shall provide positive confirmation via phone or email within 24 hours of the Contractor's receipt of the Purchase Order. If the Purchasing Order is received after 3pm EST on the day before a weekend or holiday, the Contractor must provide positive confirmation via phone or email on the next business day.

7. UNSPSC Requirements: Contractor shall support use of the United Nations Standard Product and Services Code (UNSPSC). UNSPSC versions that must be adhered to are driven by SciQuest for the suppliers and are upgraded every year. WSCA-NASPO reserves the right to migrate to future versions of the UNSPSC and the Contractor shall be required to support the migration effort. All line items, goods or services provided under the resulting statewide contract must be associated to a UNSPSC code. All line items must be identified at the most detailed UNSPSC level indicated by segment, family, class and commodity. More information about the UNSPSC is available at: http://www.unspsc.com and http://www.unspsc.com/FAQs.asp#howdoesunspscwork.

8. Applicability: Contractor agrees that WSCA-NASPO controls which contracts appear in the eMarket Center and that WSCA-NASPO may elect at any time to remove any supplier's offering from the eMarket Center.

9. The WSCA-NASPO Contract Administrator reserves the right to approve the pricing on the eMarket Center. This catalog review right is solely for the benefit of the WSCA-NASPO Contract Administrator and Participating Entities, and the review and approval shall not waive the requirement that products and services be offered at prices (and approved fees) required by the Master Agreement.

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* Although suppliers in the SQSN normally submit one (1) catalog, it is possible to have multiple contracts applicable to different WSCA-NASPO Participating Entities. For example, a supplier may have different pricing for state government agencies and Board of Regents institutions. Suppliers have the ability and responsibility to submit separate contract pricing for the same catalog if applicable. The system will deliver the appropriate contract pricing to the user viewing the catalog.

Several WSCA-NASPO Participating Entities currently maintain separate SciQuest eMarketplaces, these Participating Entities do enable certain WSCA-NASPO Cooperative Contracts. In the event one of these entities elects to use this WSCA-NASPO Cooperative Contract (available through the eMarket Center) but publish to their own eMarketplace, the Contractor agrees to work in good faith with the entity and WSCA-NASPO to implement the catalog. WSCA-NASPO does not anticipate that this will require substantial additional efforts by the Contractor; however, the supplier agrees to take commercially reasonable efforts to enable such separate SciQuest catalogs.

ADTRAN has read and understands Section 7.3.

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Appendix A

Changes to WSCA Terms and Conditions

The WSCA Standard Terms and Conditions will be revised as follows:

1. Add the following language to the end of paragraph ‘b’ of section 7, "Defaults & Remedies":
"The opportunity to cure mentioned in this paragraph shall be 15 days from receipt of notice of default."

2. Add the following language to paragraph ‘c’ of section 7, "Defaults & Remedies": "The amount of the liquidated damages, if any, must be agreed upon in writing by the parties to the contract."

3. Section 8, “Delivery”, shall be replaced in its entirety with the following:

“8. **DELIVERY** As used herein, “Buyer” shall mean WSCA-NASPO Participating State agency or political subdivision authorized to purchase under the terms of this Master Agreement. Unless otherwise indicated in the Master Agreement, the prices are the delivered price to any Participating State agency or political subdivision. All deliveries shall be F.O.B. destination with all transportation and handling charges paid by the contractor. Responsibility and liability for loss or damage shall remain the Contractor until delivery to the Buyer’s dock at which time and place responsibility for loss and/or damage shall pass to the Buyer. The minimum shipment amount will be found in the special terms and conditions. Any order for less than the specified amount is to be shipped with the freight prepaid and added as a separate item on the invoice. Any portion of an order to be shipped without transportation charges that is back ordered shall be shipped without charge.”

4. Section 11, “Indemnification”, shall be deleted in its entirety and replaced with the following:
“11. **HOLD HARMLESS AND LIMITATION OF LIABILITY**

“11.1 **Hold Harmless.** Each party shall release, defend, indemnify and hold the other party, as well as the officers, agents and employees of the parties, harmless, from and against any damage, cost or liability, including reasonable attorney's fees for any or all death, injury, or damage to property arising from negligence or intentionally wrongful acts or omissions of the indemnifying party, its employees or subcontractors when the indemnifying party is fulfilling its obligations hereunder.

“11.2 **Limitation of Liability.** NOTWITHSTANDING ANY OTHER PROVISIONS OF THIS AGREEMENT, EACH PARTY'S TOTAL LIABILITY ARISING FROM OR IN RELATION TO THIS AGREEMENT OR THE PRODUCTS AND SERVICES SHALL BE LIMITED TO THE TOTAL AMOUNT PAID OR PAYABLE TO CONTRACTOR UNDER THIS AGREEMENT IN THE MOST RECENT FULL CALENDAR YEAR PRECEDING EITHER PARTY'S INITIAL NOTICE OF ANY CLAIM OR POTENTIAL CLAIM HEREUNDER, EXCEPT THAT EACH PARTY'S TOTAL LIABILITY WITH RESPECT TO DIRECT DAMAGE TO PROPERTY SHALL BE LIMITED TO TWO MILLION DOLLARS. THE FOREGOING LIMITATIONS SHALL NOT APPLY TO DAMAGES ARISING FROM DEATH OR PERSONAL INJURY. IN NO EVENT SHALL CONTRACTOR HAVE ANY LIABILITY FOR ANY LOST PROFITS, LOSS OF DATA OR COSTS OF PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES, OR FOR ANY SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES ARISING OUT OF THIS AGREEMENT.”

5. Section 12, “Indemnification – Intellectual Property”, shall be deleted in its entirety and replaced with the following:
“12. **INDEMNIFICATION – INTELLECTUAL PROPERTY** The Contractor shall defend, indemnify and hold harmless WSCA-NASPO, the Lead State and Participating Entities along with their officers, agencies, and employees ("Indemnified Party") from and against claims, damages or causes of action including reasonable attorneys’ fees and settlement costs arising out of the claim that the Products furnished and used within the scope of this Agreement infringe any U.S. patent or U.S. copyright. The foregoing indemnity obligation shall not extend to any claims of infringement arising out of: (i) a

modification of the Products by anyone other than Contractor; (ii) a combination of the Products with any third party software or hardware where such combination is the cause of such infringement; or (iii) the use of a version of Products other than the then current version if infringement would have been avoided by the use of the then-current version made available to the WSCA-NASPO, the Lead State and/or the Participating Entities. Contractor's obligation to indemnify hereunder is subject to the WSCA-NASPO, the Lead State, and/or the Participating Entities (a) giving Contractor prompt written notice of any such claim; (b) giving Contractor sole control over the defense and settlement of any such claim; (c) providing full cooperation for the defense of any such claim, at Contractor's expense; and (d) not entering into any settlement or compromise of any such claim without Contractor's prior written approval. Upon notice of an alleged infringement or if in Contractor's opinion such a claim is likely, Contractor shall have the right, at its sole option and expense, to procure a license to the relevant Products or modify the Products or substitute other non-infringing hardware or software with similar operating capabilities; or if Contractor determines that the foregoing is not reasonable, Contractor may refund the fees paid by the WSCA-NASPO, the Lead State and/or the Participating Entities for the infringing copies of the Products upon the WSCA-NASPO's, the Lead State's and/or the Participating Entities' return of such Products to Contractor. THIS SECTION, "INDEMNIFICATION – INTELLECTUAL PROPERTY", SETS FORTH CONTRACTOR'S SOLE AND EXCLUSIVE LIABILITY AND WSCA-NASPO'S, THE LEAD STATE'S AND/OR THE PARTICIPATING ENTITIES' SOLE AND EXCLUSIVE REMEDIES FOR INFRINGEMENT BY THE PRODUCTS OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS OF ANY KIND."

6. Section 17, "License of Pre-Existing Intellectual Property", shall be deleted in its entirety and replaced with the following:

"17. **SOFTWARE LICENSE**

"17.1. License. Conditioned upon compliance with the terms and conditions of the license granted herein, Contractor grants to the Buyer a nonexclusive and nontransferable license to use for Buyer's internal business purposes the Software and the Documentation for which Buyer has paid the required license fees. Buyer's license to use the Software shall be limited to, and Buyer shall not use the Software in excess of, a single hardware chassis or card or that number of agent(s), concurrent users, sessions, IP addresses, port(s), seat(s), server(s) or site(s), as set forth in the applicable Purchase Order which has been accepted by Contractor and for which Buyer has paid to Contractor the required license fee. Unless otherwise expressly provided in the Documentation, Buyer shall use the Software solely as embedded in, for execution on, or (where the applicable documentation permits installation on non-Contractor equipment) for communication with Contractor equipment owned or leased by Buyer and used for Buyer's internal business purposes.

"17.2. General Limitations. This is a license, not a transfer of title, to the Software and Documentation, and Contractor retains ownership of all copies of the Software and Documentation. Buyer acknowledges that the Software and Documentation contain trade secrets of Contractor, its suppliers or licensors, including but not limited to the specific internal design and structure of individual programs and associated interface information. Accordingly, except as otherwise expressly provided under this Agreement, Buyer shall have no right, and Buyer specifically agrees not to:
(a) transfer, assign or sublicense its license rights to any other person or entity, or use the Software on unauthorized or secondhand Contractor equipment, and Buyer acknowledges that any attempted transfer, assignment, sublicense or use shall be void;
(b) except as approved in writing by Contractor, make error corrections to or otherwise modify or adapt the Software or create derivative works based upon the Software, or permit third parties to do the same;
(c) reverse engineer or decompile, decrypt, disassemble or otherwise reduce the Software to human-readable form, except to the extent otherwise expressly permitted under applicable law notwithstanding this restriction;
(d) use or permit the Software (other than embedded in the Product) to be used to perform services for third parties, whether on a service bureau or time sharing basis or otherwise, without the express written authorization of Contractor; or

(e) except and to the extent expressly required by a Buyer's applicable records laws or final court order (provided that the Buyer provides: (1) prior written notice to Contractor of such obligation and (2) the opportunity to oppose such disclosure, provision or otherwise making available), disclose, provide, or otherwise make available trade secrets contained within the Software and Documentation in any form to any third party without the prior written consent of Contractor. Buyer shall implement reasonable security measures to protect such trade secrets.

“17.3. Software, upgrades/updates and Additional Copies. NOTWITHSTANDING ANY OTHER PROVISION OF THIS AGREEMENT: (1) BUYER HAS NO LICENSE OR RIGHT TO USE ANY ADDITIONAL COPIES OR UPGRADES UNLESS BUYER, AT THE TIME OF ACQUIRING SUCH COPY OR UPGRADE, ALREADY HOLDS A V ALID LICENSE TO THE ORIGINAL SOFTWARE AND HAS PAID THE APPLICABLE FEE FOR THE UPGRADE OR ADDITIONAL COPIES; (2) USE OF UPGRADES IS LIMITED TO CONTRACTOR EQUIPMENT FOR WHICH BUYER IS THE ORIGINAL END USER PURCHASER OR LESSEE OR WHO OTHERWISE HOLDS A VALID LICENSE TO USE THE SOFTWARE WHICH IS BEING UPGRADED; AND (3) THE MAKING AND USE OF ADDITIONAL COPIES IS LIMITED TO NECESSARY BACKUP PURPOSES ONLY.

“17.4. Proprietary Notices. Buyer agrees to maintain and reproduce all copyright and other proprietary notices on all copies, in any form, of the Software in the same form and manner that such copyright and other proprietary notices are included on the Software. Except as expressly authorized in this Agreement, Buyer shall not make any copies or duplicates of any Software without the prior written permission of Contractor.

“17.5. Term and Termination of License. This license granted herein shall remain effective until terminated. Buyer may terminate the license at any time by destroying all copies of Software and any Documentation except as to the minimum number of copies required by law to keep for archival records purposes only. Buyer's rights under this license will terminate immediately if Buyer fails to comply with any material provision of this license and Contractor will give Buyer notice of such non-compliance. Upon termination, Buyer shall destroy all copies of Software and Documentation in its possession or control.

“17.6. Buyer Records. Buyer grants to Contractor and its independent accountants the right to examine Buyer's books, records and accounts during Buyer's normal Business Hours to verify compliance with this license. In the event such audit discloses non-compliance with this license, Buyer shall promptly pay to Contractor the appropriate license fees, plus the reasonable cost of conducting the audit. In all other circumstances, the audit fees shall be paid by Contractor.”

7. Section 26, “Standard of Performance and Acceptance”, shall be deleted in its entirety and replaced with the following:

“26. **INSPECTION PROVISIONS** Goods furnished under this Master Agreement shall be subject to inspection and test by the Buyer at times and places as determined by the Buyer and agreed to by Contractor, such agreement not to be unreasonably withheld. If the goods furnished are incomplete or not in compliance with proposal specifications, the Buyer may reject the goods in accordance with the Warranty provisions and return policies contained in this Master Agreement. If Contractor is unable or refuses to correct such goods within the Warranty provisions and return policies contained in this Master Agreement, the Buyer may cancel the order in whole or in part."

8. Section 30, “Warranty”, shall be deleted in its entirety and replaced with the following:

“30. **WARRANTY** During the warranty period and subject to the limitations herein, Contractor warrants that items sold by Contractor and supplied under Buyer's order for use within the United States shall be free from defects in materials and workmanship and will conform to applicable specifications and

drawings. This warranty extends only to the original end user customer and is not transferable. Any such transfer shall void the above warranty. Contractor's liability herein, whether based upon breach of warranty or contract or negligence in manufacture, shall be limited to replacement or repair at Contractor's election of all such defective or nonconforming items, provided that this warranty shall apply only where Buyer has given Contractor written notice of such defects or nonconformity within the applicable warranty period after delivery by Contractor of such items to Buyer. Contractor shall have the right prior to return to inspect at Buyer's plant any items claimed to be defective or nonconforming.

“Warranty Period for Product shall be the applicable warranty period(s) specified in Contractor’s proposal. Warranty Period for Software is a limited ninety (90) day warranty subject to applicable license agreement.

“The foregoing constitutes the sole and exclusive remedy of the Buyer and exclusive liability of CONTRACTOR AND IS IN LIEU OF ANY AND ALL OTHER WARRANTIES EXPRESSED OR IMPLIED OR STATUTORY AS TO MERCHANTABILITY, FITNESS FOR PURPOSE SOLD, DESCRIPTION, QUALITY, PRODUCTIVENESS, OR ANY OTHER MATTER. Without limiting the foregoing, in no event shall ADTRAN or its suppliers be liable to Buyer for any incidental, special, punitive, exemplary or consequential damages experienced by either Buyer or a third party (including, but not limited to, loss of data or information, loss of profits, or loss of use). ADTRAN is not liable for damages for any cause whatsoever (whether based in contract, tort, or otherwise) in excess of the amount paid for the item.

“RETURNS: Return authorization and an RMA number must be obtained from ADTRAN prior to return of any item for repair. Buyer's rights to repair or replacement are governed by this Warranty.

“SHIPPING: The cost of shipping an in-warranty or out-of-warranty item from Buyer's facility back to ADTRAN shall be paid by the Buyer. The cost of shipping an in-warranty repaired or replaced item from ADTRAN back to the Buyer by surface carrier shall be paid by ADTRAN. At the request of the Buyer, ADTRAN will utilize other means of express shipment in which case the cost of the return using express shipping shall be paid by the Buyer. The cost of shipping an out-of-warranty repaired item from ADTRAN back to the Buyer shall be paid by Buyer. In the case of a DOA (see “Dead on Arrival” section below), the cost of shipping the defective item back to ADTRAN and the cost of shipping the replacement item to Buyer is paid by ADTRAN.

“REPAIR CHARGES: In-warranty repair will be made at no charge to Buyer provided that the reason for failure is not one of the exclusions under Warranty Restrictions herein. The cost of out-of-warranty repair is subject to a charge as quoted by Contractor. The cost of the repair will be invoiced to Buyer.

“REPAIR WARRANTY: Repair work performed on an in-warranty item is warranted for the remainder of the original warranty period or six (6) months, whichever is greater. Repair work performed on an out-of-warranty item is warranted for six (6) months from the date of shipment of the repaired unit from Contractor. This six (6) month period for in-warranty or out-of warranty repair covers only the actual repair(s) made to the item and is exclusive of potential non-related faults that may occur during the six (6) month period.

“WARRANTY RESTRICTIONS: Modification or alteration to purchased items by Buyer, other than that specifically authorized in writing by Contractor, shall VOID AND NULLIFY, in its entirety, all warranty rights as set forth in Warranty paragraph above. Any damage or malfunction resulting from exposure of the item to abnormal physical or electrical stress, abnormal environmental conditions, misuse, negligence, abuse or other such cause shall VOID AND NULLIFY, in its entirety, all warranty rights for such item.

“ENGINEERING UPDATES: Contractor reserves the right to upgrade and modify items during in-warranty or out-of-warranty repair without prior approval or notification to Buyer and without incurring any obligation or liability to make the same or similar changes in items previously manufactured.

"DATA RIGHTS: Rights to any intellectual property residing in the items or any data furnished hereunder are not granted except by specific written permission by an authorized representative of Contractor. Buyer shall have no right to copy, reverse engineer or reproduce, in whole or part, the item or any data thereof without the prior written consent of Contractor.

"TECHNICAL SUPPORT: ADTRAN Technical Support is limited to troubleshooting and general use support. ADTRAN will provide Technical Support for the then current release of firmware and/or software and the previous release; however, ADTRAN's sole remedy may require Buyer to upgrade to the current product firmware and/or software release or appropriate release as determined by Technical Support to provide resolution.

"RETURN MATERIAL AUTHORIZATION ("RMA") INFORMATION:

"Dead-on Arrival ("DOA"). Dead on Arrival refers to an item that does not operate upon delivery. A DOA determination could apply to any item that, upon installation, does not technically work, fails at initial power-up or fails after a few hours of operation. An item will not be considered DOA if more than sixty (60) days have passed since it shipped from ADTRAN. ADTRAN's policy for handling DOA items associated with an installation ADTRAN is performing is specified in the applicable ADTRAN Installation Description of Service Offering. For items purchased from ADTRAN authorized resellers, the original end-user owner of the item may show proof that no more than forty-five (45) days have passed since the item was purchased from the reseller. For items determined by ADTRAN Technical Support to be DOA, ADTRAN will provide advance replacements (subject to product availability) in accordance with this DOA section and ADTRAN's RMA process. ADTRAN will use commercially reasonable efforts to ship advance replacements on the same business day when determination of hardware failure has been made before 5:00 PM in the time zone from where the replacement will ship, otherwise it will be scheduled to ship on the next business day. Advance replacements will be scheduled for next business day (NBD) delivery for locations within the United States. Defective item must be returned within thirty (30) days of the date of shipment of advance replacement item. If the defective item is not returned within the thirty (30) days, Buyer will be invoiced at list price for the advance replacement item using the provided purchase order number or if a credit card number was given in lieu of a purchase order then such credit card will be charged at that time. Replacement unit will be warranted for the remaining warranty period of the original item, and may be new or refurbished

"In-Warranty Advance Replacement. Certain ADTRAN items, as listed on ADTRAN's website, may include advance replacement as a standard warranty entitlement. In these cases, if ADTRAN Technical Support determines that the in-warranty unit has failed, ADTRAN will provide an advance replacement (subject to product availability). ADTRAN will use commercially reasonable efforts to ship advance replacements on the same business day when determination of hardware failure has been made before 5:00 PM in the time zone from where the replacement will ship, otherwise it will be scheduled to ship on the next business day. Advance replacements will be scheduled for next business day (NBD) delivery for locations within the United States. Defective items must be returned within thirty (30) days of the ship date of the advance replacement item. If the defective item is not returned within thirty (30) days, Buyer will be invoiced or charged list price for the advance replacement item. Replacement item will be warranted for the remaining warranty period of the original item, and may be new or refurbished.

"Repair. Buyer may request an RMA number for any item sold by ADTRAN and found by the Buyer to be defective. Such returns may be subject to fees including the following: (1) No Trouble Found (NTF) – fee applies to any item, in-warranty or out-of warranty, tested and found to have no defect or failure, (2) Out-of-Warranty service – fee applies to any item returned outside the warranty term, 3) Service fee – applies to any item returned in a condition which voids the warranty, and 4) Out-of-Warranty Repair – fee applies to any item returned outside the warranty term and repaired by ADTRAN. Buyer may return in-warranty ADTRAN items for repair with or without involving ADTRAN's Technical Support department. In cases

where Buyer elects to return the item to ADTRAN for repair without involving Technical Support, a No Trouble Found (NTF) as specified on ADTRAN's website will be assessed if the item is found not to be defective, covering handling and testing costs. If ADTRAN Technical Support is involved in troubleshooting the issue and approves the item's replacement, the NTF fee may be waived. In either case, ADTRAN's Customer Care Center will issue a Return Material Authorization (RMA) Number after customer provides ADTRAN with a valid serial number of the defective item. In-warranty items found to be NTF, with voided warranty, or out-of-warranty will be returned to Buyer at Buyer's expense and applicable fees will be invoiced.

"For all RMA returns, the RMA number must be written clearly on the package label and returned to the address supplied by ADTRAN. ADTRAN's RMA process and additional instructions concerning submitting a request for a RMA can be found at http://adtran.com/web/page/portal/Adtran/wp_support_rma.

"Additional information on ADTRAN's warranty may be found at http://www.adtran.com/warranty."

ADTRAN®

2012 ANNUAL REPORT

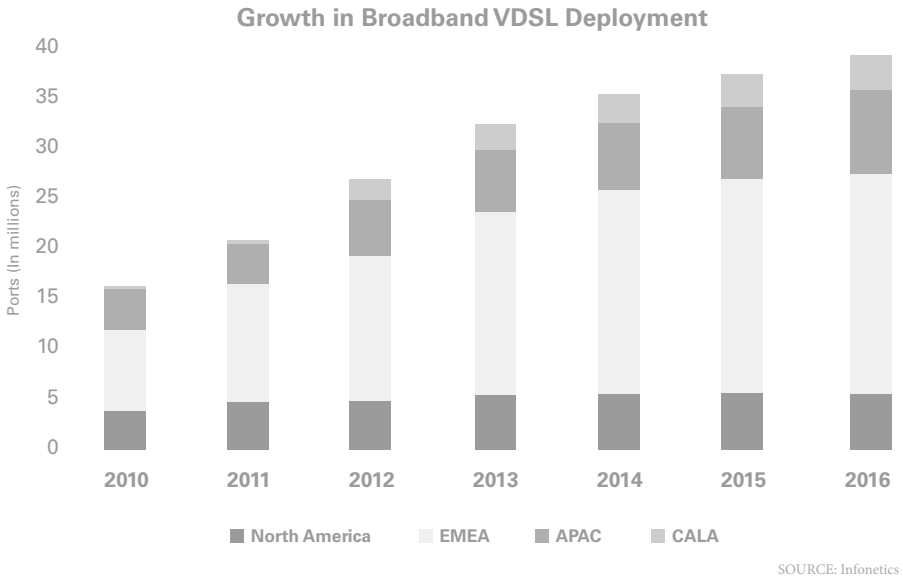
Visualization of the relative densities of Internet connectivity across the globe. The stronger the contrast, the more connectivity.

BOUNDLESS POSSIBILITIES

The ability to overcome challenges is a key to success for any business. In an environment marked by tough economic conditions and reduced carrier and enterprise infrastructure spending, we continued to execute our strategic plan, focusing on global expansion and customer diversification. We made exciting progress in both of these areas in 2012 despite the macroeconomic environment, and as a result, we believe ADTRAN is well positioned for 2013 and beyond.

Global Growth and Customer Diversification

The first, and perhaps the most important, of our initiatives was global growth. With the completion of the acquisition of Nokia Siemens Networks' Broadband Access Business (BBA) in 2012, the company is positioned for significant growth outside of its traditional geographic customer base. To this end, we have extended ADTRAN operations to more than 20 new countries and entered into approximately 100 new carrier customer contracts. In addition, the acquisition has provided a complementary portfolio of broadband access solutions designed for, and well established in, the global market. This was further complemented with the addition of over 300 new team members in engineering, sales, services and support. Following the acquisition, ADTRAN has been firmly established as a top-tier global provider of fixed-broadband solutions and the company is now positioned to compete with leading European and Chinese vendors in the global market. We ended the year with 24 percent of our revenue coming from the international market, doubling our percentage from the previous year.



SOURCE: Infonetics

"VDSL port shipments will grow steadily through CY16, as operators deliver higher-margin premium broadband services to subscribers to support IPTV, VoIP, and online video services." ~ Infonetics

Perfect Timing

Long-term business success is driven by many factors, with proper timing being one of the most important. The timing of our acquisition and the corresponding increase in Research and Development (R&D) efforts coincides with the emergence of a significant wave of investment by carriers around the world. Bolstered by our combined R&D resources, we have been able to rapidly respond to global broadband expansion initiatives in areas like VDSL2 and GPON/Gigabit Ethernet Fiber-to-the-Premises (FTTP) technologies. Cross-product integration is enabling us to fully utilize our key product innovations throughout our entire solution portfolio. By accelerating time to market for new solutions like vectoring, we are enabling service providers around the world to offer new, higher-speed services to better meet the requirements of their customers. These investments in product development have been well timed as major service providers around the globe have recently announced broadband build out plans that will position their networks for future growth.

Indicative of this wave of investment, in Europe, Deutsche Telekom (DT) has announced plans to considerably increase capital expenditures over the next three years. Approximately €6 billion has been earmarked for broadband infrastructure rollout in the German fixed network with optical fiber and vectoring between 2013 and 2020. Similarly, in the United States, AT&T announced in November that it will invest $14 billion over three years to expand and upgrade its existing wireline and wireless networks. Of this, $6 billion will be dedicated to wireline investment. Carriers from BT to Telecom Italia have joined the list of service providers around the world who have announced significant investments. Combined, these projects will substantially increase global investment in broadband infrastructure for years to come. Each of these opportunities brings boundless possibilities for growth, innovation and success.

Growth in the Tier 2 and Tier 3 Customer Base

The Tier 2 and Tier 3 carrier markets are target areas for customer diversification and areas where we achieved significant market share gains. During the year, we successfully secured major market share awards in several strategic Tier 2 accounts for multi-year broadband rollouts. This was complemented by continued market share and revenue increases in the Tier 3 market.

Expanding the VAR Channel

Expanding sales of our enterprise products within the Value-Added Reseller (VAR) channel was yet another area of diversification in 2012. In our enterprise business, we solidly executed on our goals to diversify and grow the VAR channel as well as strengthen the VAR partner program. Internetworking sales for our U.S. VAR channel increased, bolstered by sales of our Bluesocket® wireless local area network products. Our product innovation and success were further reinforced by growth in our VAR partner base, which is now more than 3,500 partners strong. We realize the importance of the VAR channel to our continued success and as a result, we are investing in the future growth and development of this channel and the programs that support it.

The Year in Review

Another key component of long-term business success is execution. During the year, we were able to increase customer presence in key markets and deliver on all significant customer commitments - all while maintaining the excellence in service and support we are known for throughout the industry.

Financially, we continued our strong commitment to R&D investing $126 million. We reported total revenues of $621 million, operating income of $56 million and cash flow from operations of $86 million. While these results are a decline from the record numbers posted in 2011, we continued to build on our strong history of profitability and continued to provide dividends to our shareholders.

Inner Strength

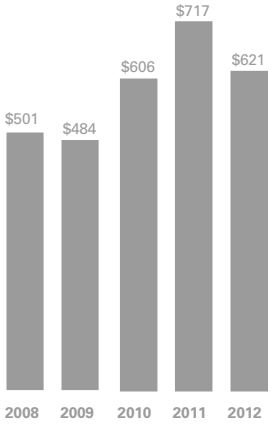
The many accomplishments of 2012 would not have been possible without our team of dedicated, loyal employees. Now more than 2,000 strong, the ADTRAN family consistently goes above and beyond to meet our customers' needs, whatever they may be. I am fortunate to work alongside these individuals each day. Our employees have always been, and continue to be, the secret to our success. Thank you for a job well done!

The Future is Bright

We enter 2013 with a solid plan in place and boundless possibilities before us. We will continue to focus on global growth and customer diversification. Our efforts to develop and deliver innovative solutions in the areas of high-speed broadband, cloud connectivity and mobility are well timed. Carriers both large and small are investing to meet their customers' needs and we believe ADTRAN is uniquely positioned to continue to gain meaningful market share as a top-tier global supplier of these solutions.

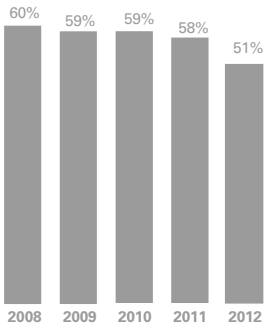
As the macroeconomic environment improves, regulatory issues are resolved and fiscal policies are solidified, carrier and enterprise spending will return to normal levels. In addition, ADTRAN stands to benefit from large carrier infrastructure investments, continued market share growth within the U.S. Tier 2 and Tier 3 markets and continued growth from enterprise VAR channel expansion. With a firm focus on our strategic plan and continued investment in R&D, we are confident that ADTRAN is well positioned to take its place as a global leader in telecommunications.

Tom Stanton
Chairman & Chief Executive Officer

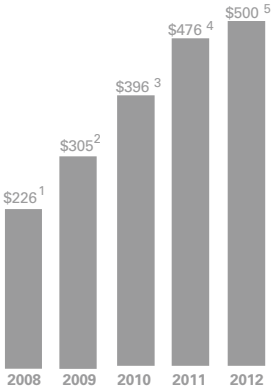


Annual Revenue
(In millions)

Annual Earnings Per Share
(Diluted)



Gross Margin



Unrestricted Cash and Marketable Securities
(In millions)

Consolidated Statements of Income Data

(In thousands, except per share amounts)

Years Ended December 31	2012	2011
Total sales	$620,614	$717,229
Income before provision for income taxes	$72,965	$206,142
Net income	$47,263	$138,577
Earnings per common share (Diluted)	$0.74	$2.12

Consolidated Balance Sheets Data

(In thousands)

Years Ended December 31	2012	2011
Working capital [6]	$339,405	$329,311
Total assets	$886,381	$817,514
Stockholders' equity	$692,406	$692,131

[1] Net of $64 million in stock repurchases and $23 million in dividend payments during 2008

[2] Net of $16 million in stock repurchases and $22 million in dividend payments during 2009

[3] Net of $18 million in stock repurchases and $23 million in dividend payments during 2010

[4] Net of $36 million in stock repurchases and $23 million in dividend payments during 2011

[5] Net of $39 million in stock repurchases and $23 million in dividend payments during 2012

[6] Working capital consists of current assets less current liabilities

Financial Results

This annual report contains forward-looking statements which reflect management's best judgment based on factors currently known. However, these statements involve risks and uncertainties, including the successful development and market acceptance of new products, the degree of competition in the market for such products, the product and channel mix, component costs, manufacturing efficiencies, and other risks detailed in our annual report on Form 10-K for the year ended December 31, 2012. These risks and uncertainties could cause actual results to differ materially from those in the forward-looking statements included in this annual report.

Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities

ADTRAN's common stock is traded on the NASDAQ Global Select Market under the symbol ADTN. As of February 7, 2013, ADTRAN had 224 stockholders of record and approximately 30,600 beneficial owners of shares held in street name. The following table shows the high and low closing prices per share for our common stock as reported by NASDAQ for the periods indicated.

Common Stock Prices

2012	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
High	$38.42	$31.07	$29.55	$20.14
Low	$29.01	$28.02	$17.28	$15.65
2011	**First Quarter**	**Second Quarter**	**Third Quarter**	**Fourth Quarter**
High	$47.24	$43.20	$42.55	$34.30
Low	$36.28	$37.31	$26.46	$25.99

The following table shows the shareholder dividends paid in each quarter of 2012 and 2011. The Board of Directors presently anticipates that it will declare a regular quarterly dividend so long as the present tax treatment of dividends exists and adequate levels of liquidity are maintained.

Dividends per Common Share

2012	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	$0.09	$0.09	$0.09	$0.09
2011	**First Quarter**	**Second Quarter**	**Third Quarter**	**Fourth Quarter**
	$0.09	$0.09	$0.09	$0.09

Stock Repurchases

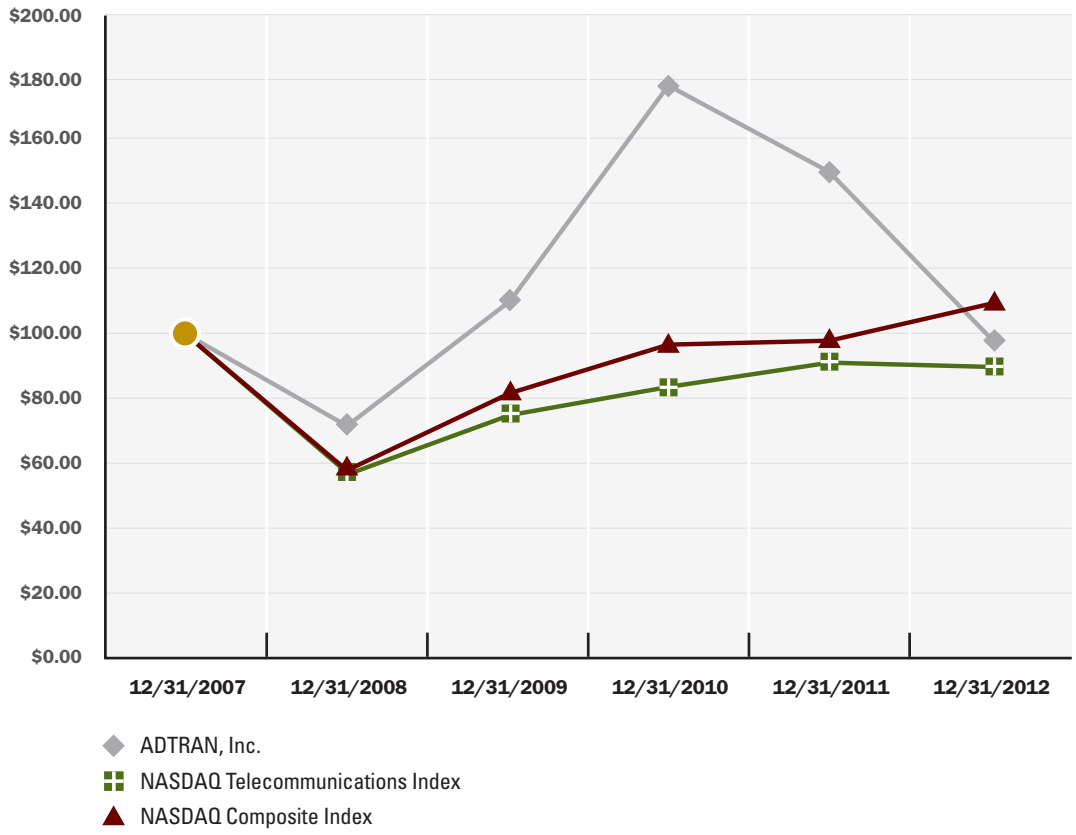
The following table sets forth repurchases of our common stock for the months indicated.

Period	Total Number of Shares Purchased	Average Price Paid Per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs (1)	Maximum Number of Shares That May Yet Be Purchased Under the Plans or Programs
October 1, 2012 – October 31, 2012	200,000	$15.74	200,000	4,478,188
November 1, 2012 – November 30, 2012	407,644	$18.73	407,644	4,070,544
December 1, 2012 – December 31, 2012	—	—	—	4,070,544
Total	**607,644**		**607,644**	

(1) On October 11, 2011, our Board of Directors approved repurchases of up to 5,000,000 shares of our common stock. This plan is being implemented through open market purchases from time to time as conditions warrant.

Stock Performance Graph

Our common stock began trading on the NASDAQ National Market on August 9, 1994. The price information reflected for our common stock in the following performance graph and accompanying table represents the closing sales prices of the common stock for the period from December 31, 2007 through December 31, 2012, on an annual basis. The graph and the accompanying table compare the cumulative total stockholders' return on our common stock with the NASDAQ Telecommunications Index and the NASDAQ Composite Index. The calculations in the following graph and table assume that $100 was invested on December 31, 2007 in each of our common stock, the NASDAQ Telecommunications Index and the NASDAQ Composite Index and also assume dividend reinvestment.



	12/31/07	12/31/08	12/31/09	12/31/10	12/31/11	12/31/12
ADTRAN, Inc.	$100.00	$70.89	$109.36	$177.92	$149.67	$98.47
NASDAQ Telecommunications Index	$100.00	$57.58	$72.97	$86.05	$90.30	$89.62
NASDAQ Composite Index	$100.00	$59.03	$82.25	$97.32	$98.63	$110.78

Selected Financial Data

Income Statement Data (1)

(In thousands, except per share amounts)

Year Ended December 31,	2012	2011	2010	2009	2008
Sales					
Carrier Networks Division	$492,096	$569,579	$476,030	$371,349	$392,219
Enterprise Networks Division	128,518	147,650	129,644	112,836	108,457
Total sales	620,614	717,229	605,674	484,185	500,676
Cost of sales	303,971	302,911	246,811	197,223	201,771
Gross profit	316,643	414,318	358,863	286,962	298,905
Selling, general and administrative expenses	134,523	124,879	114,699	99,446	103,286
Research and development expenses	125,951	100,301	90,300	83,285	81,819
Operating income	56,169	189,138	153,864	104,231	113,800
Interest and dividend income	7,657	7,642	6,557	6,933	8,708
Interest expense	(2,347)	(2,398)	(2,436)	(2,430)	(2,514)
Net realized investment gain (loss)	9,550	12,454	11,008	(1,297)	(2,409)
Other income (expense), net	183	(694)	(804)	131	688
Gain on bargain purchase of a business	1,753	—	—	—	—
Income before provision for income taxes	72,965	206,142	168,189	107,568	118,273
Provision for income taxes	(25,702)	(67,565)	(54,200)	(33,347)	(39,692)
Net income	$47,263	$138,577	$113,989	$74,221	$78,581

Year Ended December 31,	2012	2011	2010	2009	2008
Weighted average shares outstanding—basic	63,259	64,145	62,490	62,459	63,549
Weighted average shares outstanding—assuming dilution (2)	63,774	65,416	63,879	63,356	64,408
Earnings per common share—basic	$0.75	$2.16	$1.82	$1.19	$1.24
Earnings per common share—assuming dilution (2)	$0.74	$2.12	$1.78	$1.17	$1.22
Dividends declared and paid per common share	$0.36	$0.36	$0.36	$0.36	$0.36

Balance Sheet Data

(In thousands)

At December 31,	2012	2011	2010	2009	2008
Working capital (3)	$339,405	$329,311	$304,952	$278,044	$212,740
Total assets	$886,381	$817,514	$691,974	$564,463	$473,615
Total debt	$46,500	$47,000	$48,000	$48,250	$48,750
Stockholders' equity	$692,406	$692,131	$572,322	$452,515	$375,819

(1) Net income for 2012, 2011, 2010, 2009 and 2008 includes stock-based compensation expense under the Stock Compensation Topic of the Financial Accounting Standards Board Accounting Standards Codification of $8.0 million, $7.8 million, $7.1 million, $6.4 million and $6.7 million, respectively, net of tax, related to stock option awards. See Note 3 of Notes to the Consolidated Financial Statements.

(2) Assumes exercise of dilutive stock options calculated under the treasury method. See Notes 1 and 13 of Notes to Consolidated Financial Statements.

(3) Working capital consists of current assets less current liabilities.

Management's Discussion and Analysis of Financial Condition and Results of Operations

Overview

ADTRAN, Inc. designs, manufactures and markets solutions and provides services and support for communications networks. Our solutions are widely deployed by providers of communications services (serviced by our Carrier Networks Division), and small, mid-sized and distributed enterprises (serviced by our Enterprise Networks Division), and enable voice, data, video and Internet communications across a variety of network infrastructures. Many of these solutions are currently in use by every major United States service provider, many global service providers, as well as many public, private and governmental organizations worldwide.

Our success depends upon our ability to increase unit volume and market share through the introduction of new products and succeeding generations of products having lower selling prices and increased functionality as compared to both the prior generation of a product and to the products of competitors. An important part of our strategy is to reduce the cost of each succeeding product generation and then lower the product's selling price based on the cost savings achieved in order to gain market share and/or improve gross margins. As a part of this strategy, we seek in most instances to be a high-quality, low-cost provider of products in our markets. Our success to date is attributable in large measure to our ability to design our products initially with a view to their subsequent redesign, allowing both increased functionality and reduced manufacturing costs in each succeeding product generation. This strategy enables us to sell succeeding generations of products to existing customers, while increasing our market share by selling these enhanced products to new customers.

Our three major product categories are:

■ Carrier Systems ■ Business Networking ■ Loop Access.

Carrier Systems products are used by communications service providers to provide data, voice and video services to consumers and enterprises. This category includes the following product areas and related services:

Broadband Access

- Total Access® 5000 Multi-Service Access and Aggregation Platform (MSAP)
- hiX family of MSAPs
- Total Access 1100/1200 Series of Fiber to the Node (FTTN) products
- Ultra Broadband Ethernet (UBE)
- Digital Subscriber Line Access Multiplexer (DSLAM) products

Optical

- Optical Networking Edge (ONE)
- NetVanta® 8000 Series
- OPTI and Total Access 3000 Optical products
- Small Form-Factor Pluggable (SFP) products

TDM Systems

Network Management Solutions

Business Networking products provide access to telecommunication services and facilitate the delivery of cloud connectivity, enterprise communications and virtual mobility to the Small and Mid-sized Enterprise (SME) market. This category includes the following product areas and related services:

Internetworking Products

- Total Access IP Business Gateways
- Optical Network Terminals (ONTs)
- Bluesocket® virtual Wireless LAN (vWLAN®)
- NetVanta
  - – Multiservice Routers
  - – Managed Ethernet Switches
  - – Unified Communications (UC) solutions
  - – Carrier Ethernet Network Terminating Equipment (NTE)
- Network Management Solutions

Integrated Access Devices (IADs)

Loop Access products are used by carrier and enterprise customers for access to copper-based telecommunications networks. The Loop Access category includes the following product areas:

- High bit-rate Digital Subscriber Line (HDSL) products
- Digital Data Service (DDS)
- Integrated Services Digital Network (ISDN) products
- T1/E1/T3 Channel Service Units/Data Service Units (CSUs/DSUs)
- TRACER fixed-wireless products

In addition, we identify subcategories of product revenues, which we divide into core products and legacy products. Our core products consist of Broadband Access and Optical products (included in Carrier Systems) and Internetworking products (included in Business Networking). Our legacy products include HDSL products (included in Loop Access) and other products not included in the aforementioned core products. Many of our customers are migrating their networks to deliver higher bandwidth services by utilizing newer technologies. We believe that products and services offered in our core product areas position us well for this migration. Despite occasional increases, we anticipate that revenues of many of our legacy products, including HDSL, will decline over time; however, revenues from these products may continue for years because of the time required for our customers to transition to newer technologies.

Sales were $620.6 million in 2012 compared to $717.2 million in 2011 and $605.7 million in 2010. Total sales of products in our three core areas, Broadband Access, Optical and Internetworking, decreased 1.7% in 2012 compared to 2011 and increased 48.2% in 2011 compared to 2010. Our gross profit margin decreased in 2012 to 51.0% from 57.8% in 2011 and 59.3% in 2010. Net income was $47.3 million in 2012 compared to $138.6 million in 2011 and $114.0 million in 2010. Earnings per share, assuming dilution, were $0.74 in 2012 compared to $2.12 in 2011 and $1.78 in 2010. Earnings per share in 2012, 2011 and 2010 include the effect of the repurchase of 1.8 million, 1.1 million and 0.7 million shares of our stock in those years, respectively.

Our operating results have fluctuated on a quarterly basis in the past, and may vary significantly in future periods due to a number of factors, including customer order activity and backlog. Backlog levels vary because of seasonal trends, the timing of customer projects and other factors that affect customer order lead times. Many of our customers require prompt delivery of products. This requires us to maintain sufficient inventory levels to satisfy anticipated customer demand. If near-term demand for our products declines, or if potential sales in any quarter do not occur as anticipated, our financial results could be adversely affected. Operating expenses are relatively fixed in the short term; therefore, a shortfall in quarterly revenues could significantly impact our financial results in a given quarter.

Our operating results may also fluctuate as a result of a number of other factors, including a decline in general economic and market conditions, increased competition, customer order patterns, changes in product and services mix, timing differences between price decreases and product cost reductions, product warranty returns, expediting costs and announcements of new products by us or our competitors. Additionally, maintaining sufficient inventory levels to assure prompt delivery of our products increases the amount of inventory that may become obsolete and increases the risk that the obsolescence of this inventory may have an adverse effect on our business and operating results. Also, not maintaining sufficient inventory levels to assure prompt delivery of our products may cause us to incur expediting costs to meet customer delivery requirements, which may negatively impact our operating results in a given quarter.

Accordingly, our historical financial performance is not necessarily a meaningful indicator of future results, and, in general, management expects that our financial results may vary from period to period. See Note 14 of Notes to Consolidated Financial Statements for additional information. For a discussion of risks associated with our operating results, see Item 1A of our Form 10-K for the year ended December 31, 2012.

Critical Accounting Policies and Estimates

An accounting policy is deemed to be critical if it requires an accounting estimate to be made based on assumptions about matters that are highly uncertain at the time the estimate is made, if different estimates reasonably could have been used, or if changes in the accounting estimate that are reasonably likely to occur could materially impact the results of financial operations. We believe the following critical accounting policies affect our more significant judgments and estimates used in the preparation of our consolidated financial statements. These policies have been consistently applied across our two reportable segments: (1) Carrier Networks Division and (2) Enterprise Networks Division.

- We review customer contracts to determine if all of the requirements for revenue recognition have been met prior to recording revenues from sales transactions. We generally record sales revenue upon shipment of our products, net of any

rebates or discounts, since: (i) we generally do not have significant post-delivery obligations, (ii) the product price is fixed or determinable, (iii) collection of the resulting receivable is probable, and (iv) product returns are reasonably estimable. We generally ship products upon receipt of a purchase order from a customer. We evaluate shipping terms and we record revenue on products shipped in accordance with the terms of each respective contract where applicable, or under our standard shipping terms for purchase orders accepted without a contract, generally FOB shipping point. In the case of consigned inventory, revenue is recognized when the customer assumes ownership of the product. Contracts that contain multiple deliverables are evaluated to determine the units of accounting, and the revenue from the arrangement is allocated to each item requiring separate revenue recognition based on the relative selling price and corresponding terms of the contract. We strive to use vendor-specific objective evidence of selling price. When this evidence is not available, we are generally not able to determine third-party evidence of selling price because of the extent of customization among competing products or services from other companies. We record revenue associated with installation services when all contractual obligations are complete. Contracts that include both installation services and product sales are evaluated for revenue recognition in accordance with the respective contract terms. As a result, depending on contract terms, installation services may be considered as a separate deliverable item or may be considered an element of the delivered product. Either the purchaser, ADTRAN, or a third party can perform installation of our products. Revenues related to maintenance services are recognized on a straight line basis over the contract term.

- Sales returns are accrued based on historical sales return experience, which we believe provides a reasonable estimate of future returns. A significant portion of Enterprise Networks products are sold in the United States through a non-exclusive distribution network of major technology distributors. These organizations then distribute to an extensive network of value-added resellers and system integrators. Value-added resellers and system integrators may be affiliated with us as a channel partner, or they may purchase from the distributor on an unaffiliated basis. Additionally, with certain limitations, our distributors may return unused and unopened product for stock-balancing purposes when these returns are accompanied by offsetting orders for products of equal or greater value.

  We participate in cooperative advertising and market development programs with certain customers. We use these programs to reimburse customers for certain forms of advertising, and in general, to allow our customers credits up to a specified percentage of their net purchases. Our costs associated with these programs are estimated and accrued at the time of sale and are included in selling, general and administrative expenses in our consolidated statements of income. We also participate in rebate programs to provide sales incentives for certain products. Our costs associated with these programs are estimated and accrued at the time of sale and are recorded as a reduction of sales in our consolidated statements of income.

  Prior to issuing payment terms to a new customer, we perform a detailed credit review of the customer. Credit limits and payment terms are established for each new customer based on the results of this credit review. Collection experience is reviewed periodically in order to determine if the customer's payment terms and credit limits need to be revised. We maintain allowances for doubtful accounts for losses resulting from the inability of our customers to make required payments. If the financial condition of our customers deteriorates, resulting in an impairment of their ability to make payments, we may be required to make additional allowances. If circumstances change with regard to individual receivable balances that have previously been determined to be uncollectible (and for which a specific reserve has been established), a reduction in our allowance for doubtful accounts may be required. Our allowance for doubtful accounts was $6 thousand at December 31, 2012 and $8 thousand at December 31, 2011.

- We carry our inventory at the lower of cost or market, with cost being determined using the first-in, first-out method. We use standard costs for material, labor, and manufacturing overhead to value our inventory. Our standard costs are updated on at least a quarterly basis and any variances are expensed in the current period; therefore, our inventory costs approximate actual costs at the end of each reporting period. We write down our inventory for estimated obsolescence or unmarketable inventory by an amount equal to the difference between the cost of inventory and the estimated fair value based upon assumptions about future demand and market conditions. If actual future demand or market conditions are less favorable than those projected by management, we may be required to make additional inventory write-downs. Our reserve for excess and obsolete inventory was $12.0 million and $9.4 million at December 31, 2012 and 2011, respectively. Inventory write-downs charged to the reserve were $0.5 million, $0.7 million and $0.8 million for the years ended December 31, 2012, 2011 and 2010, respectively.

- The objective of our short-term investment policy is to preserve principal and maintain adequate liquidity with appropriate diversification, while achieving market returns. The objective of our long-term investment policy is principal preservation and total return; that is, the aggregate return from capital appreciation, dividend income,

and interest income. These objectives are achieved through investments with appropriate diversification in fixed and variable rate income securities, public equity, and private equity portfolios. Our investment policy provides limitations for issuer concentration, which limits, at the time of purchase, the concentration in any one issuer to 5% of the market value of our total investment portfolio. We have experienced significant volatility in the market prices of our publicly traded equity investments. These investments are recorded on the consolidated balance sheets at fair value with unrealized gains and losses reported as a component of accumulated other comprehensive income, net of tax. The ultimate realized value on these equity investments is subject to market price volatility.

We have categorized our cash equivalents held in money market funds and our investments held at fair value into a three-level fair value hierarchy based on the priority of the inputs to the valuation technique for the cash equivalents and investments as follows: Level 1 – Values based on unadjusted quoted prices for identical assets or liabilities in an active market; Level 2 – Values based on quoted prices in markets that are not active or model inputs that are observable either directly or indirectly for substantially the full term of the asset or liability; Level 3 – Values based on prices or valuation techniques that require inputs that are both unobservable and significant to the overall fair value measurement. These inputs include information supplied by investees. At December 31, 2012, we categorized $47.2 million and $395.9 million of our available-for-sale investments as Level 1 and Level 2, respectively, and $28.1 million of our cash equivalents as Level 1. At December 31, 2011, we categorized $39.7 million and $401.2 million of our available-for-sale investments as Level 1 and Level 2, respectively, and $13.7 million of our cash equivalents as Level 1.

We review our investment portfolio for potential "other-than-temporary" declines in value on an individual investment basis. We assess, on a quarterly basis, significant declines in value which may be considered other-than-temporary and, if necessary, recognize and record the appropriate charge to write-down the carrying value of such investments. In making this assessment, we take into consideration qualitative and quantitative information, including but not limited to the following: the magnitude and duration of historical declines in market prices, credit rating activity, assessments of liquidity, public filings, and statements made by the issuer. We generally begin our identification of potential other-than-temporary impairments by reviewing any security with a fair value that has declined from its original or adjusted cost basis by 25% or more for six or more consecutive months. We then evaluate the individual security based on the previously identified factors to determine the amount of the write-down, if any. As a result of our review, we recorded an other-than-temporary impairment charge of $17 thousand during the fourth quarter of 2012. For the years ended December 31, 2012, 2011 and 2010, we recorded charges of $0.7 million, $68 thousand and $43 thousand, respectively, related to the other-than-temporary impairment of certain publicly traded equity securities, a fixed income bond fund, and our deferred compensation plan assets. Actual losses, if any, could ultimately differ from these estimates. Future adverse changes in market conditions or poor operating results of underlying investments could result in additional losses that may not be reflected in an investment's current carrying value, thereby possibly requiring an impairment charge in the future. See Note 4 of Notes to the Consolidated Financial Statements in this report for more information about our investments.

We also invest in privately held entities and private equity funds and record these investments at cost. We review these investments periodically in order to determine if circumstances (both financial and non-financial) exist that indicate that we will not recover our initial investment. Impairment charges are recorded on investments having a cost basis that is greater than the value that we would reasonably expect to receive in an arm's length sale of the investment. We have not been required to record any impairment losses relating to these investments in 2012, 2011 or 2010.

- For purposes of determining the estimated fair value of our stock option awards on the date of grant, we use the Black-Scholes Model. This model requires the input of certain assumptions that require subjective judgment. These assumptions include, but are not limited to, expected stock price volatility over the term of the awards and actual and projected employee stock option exercise behaviors. Because our stock option awards have characteristics significantly different from those of traded options, and because changes in the input assumptions can materially affect the fair value estimate, the existing model may not provide a reliable single measure of the fair value of our stock option awards. For purposes of determining the estimated fair value of our performance-based restricted stock unit awards on the date of grant, we use a Monte Carlo Simulation valuation method. The restricted stock units are subject to a market condition based on the relative total shareholder return of ADTRAN against all of the companies in the NASDAQ Telecommunications Index and vest at the end of a three-year performance period. The fair value of restricted stock issued to our Directors in 2012 is equal to the closing price of our stock on the date of grant. Management will continue to assess the assumptions and methodologies used to calculate the estimated fair value of stock-based compensation. Circumstances

may change and additional data may become available over time, which could result in changes to these assumptions and methodologies and thereby materially impact our fair value determination. If factors change in future periods, the compensation expense that we record may differ significantly from what we have recorded in the current period.

- We estimate our income tax provision or benefit in each of the jurisdictions in which we operate, including estimating exposures related to examinations by taxing authorities. We also make judgments regarding the realization of deferred tax assets, and establish reserves where we believe it is more likely than not that future taxable income in certain jurisdictions will be insufficient to realize these deferred tax assets. Our estimates regarding future taxable income and income tax provision or benefit may vary due to changes in market conditions, changes in tax laws, or other factors. If our assumptions, and consequently our estimates, change in the future, the valuation allowances we have established may be increased or decreased, impacting future income tax expense. At December 31, 2012 and 2011 respectively, the valuation allowance was $10.9 million and $7.6 million. As of December 31, 2012, we have state research tax credit carry-forwards of $3.1 million, which will expire between 2015 and 2027. These carry-forwards were caused by tax credits in excess of our annual tax liabilities to an individual state where we no longer generate sufficient state income. In addition, as of December 31, 2012, we have a deferred tax asset of $8.2 million relating to current losses and net operating loss carry-forwards generated by our domestic and foreign subsidiaries which will expire between 2013 and 2030. These carry-forwards are the result of acquisitions in 2009 and in 2011, plus losses generated in 2012 by a foreign entity. The acquired net operating losses are in excess of the amount of estimated earnings. We believe it is more likely than not that we will not realize the full benefits of our deferred tax asset arising from these credits and net operating losses, and accordingly, have provided a valuation allowance against them. This valuation allowance is included in non-current deferred tax liabilities in the accompanying balance sheets.
- Our products generally include warranties of 90 days to ten years for product defects. We accrue for warranty returns at the time revenue is recognized based on our estimate of the cost to repair or replace the defective products. We engage in extensive product quality programs and processes, including actively monitoring and evaluating the quality of our component suppliers. Our products continue to become more complex in both size and functionality as many of our product offerings migrate from line card applications to systems products. The increasing complexity of our products will cause warranty incidences, when they arise, to be more costly. Our estimates regarding future warranty obligations may change due to product failure rates, material usage, and other rework costs incurred in correcting a product failure. In addition, from time to time, specific warranty accruals may be recorded if unforeseen problems arise. Should our actual experience relative to these factors be worse than our estimates, we will be required to record additional warranty expense. Alternatively, if we provide for more reserves than we require, we will reverse a portion of such provisions in future periods. The liability for warranty returns totaled $9.7 million and $4.1 million at December 31, 2012 and 2011, respectively. These liabilities are included in accrued expenses in the accompanying consolidated balance sheets.
- We use the acquisition method to account for business combinations. Under the acquisition method of accounting, we recognize the assets acquired and liabilities assumed at their fair value on the acquisition date. Goodwill is measured as the excess of the consideration transferred over the net assets acquired. The acquisition method of accounting requires us to exercise judgment and make significant estimates and assumptions regarding the fair value of the assets acquired and liabilities assumed, including the fair values of inventory, unearned revenue, warranty liabilities, identifiable intangible assets and deferred tax asset valuation allowances. This method also requires us to refine these estimates over a one-year measurement period to reflect information obtained about facts and circumstances that existed as of the acquisition date that, if known, would have affected the measurement of the asset and liabilities recorded on that date, which could affect our net income.
- We evaluate the carrying value of goodwill during the fourth quarter of each year and between annual evaluations if events occur or circumstances change that would more likely than not reduce the fair value of the reporting unit below its carrying amount. When evaluating whether goodwill is impaired, we first assess qualitative factors to determine whether it is necessary to perform the two-step quantitative goodwill impairment test. If we determine that the two-step quantitative test is necessary, then we compare the fair value of the reporting unit to which the goodwill is assigned to the reporting unit's carrying amount, including goodwill. If the carrying amount of the reporting unit exceeds its fair value, then the amount of the impairment loss is measured. We passed the qualitative assessment in 2012 and 2011; therefore, we did not complete a quantitative assessment. As a result, there were no impairment losses recognized during 2012 or 2011.

Results of Operations

The following table presents selected financial information derived from our consolidated statements of income expressed as a percentage of sales for the years indicated.

Year Ended December 31,	2012	2011	2010
Sales			
Carrier Networks Division	79.3%	79.4%	78.6%
Enterprise Networks Division	20.7	20.6	21.4
Total sales	**100.0%**	**100.0%**	**100.0%**
Cost of sales	49.0	42.2	40.7
Gross profit	**51.0**	**57.8**	**59.3**
Selling, general and administrative expenses	21.7	17.4	19.0
Research and development expenses	20.3	14.0	14.9
Operating income	**9.1**	**26.4**	**25.4**
Interest and dividend income	1.2	1.1	1.1
Interest expense	(0.4)	(0.3)	(0.4)
Net realized investment gain	1.5	1.7	1.8
Other income (expense), net	—	(0.1)	(0.1)
Gain on bargain purchase of a business	(0.3)	—	—
Income before provision for income taxes	**11.8**	**28.7**	**27.8**
Provision for income taxes	(4.1)	(9.4)	(9.0)
Net income	**7.6%**	**19.3%**	**18.8%**

Acquisition Expenses

On August 4, 2011, we closed on the acquisition of Bluesocket, Inc. and on May 4, 2012, we closed on the acquisition of the NSN BBA business. Acquisition related expenses, amortizations and adjustments for the twelve months ended December 31, 2012 and 2011 for both transactions are as follows:

(In Thousands)	2012	2011
Bluesocket, Inc. Acquisition		
Amortization of acquired intangible assets	$1,020	$495
Amortization of other purchase accounting adjustments	443	521
Acquisition related professional fees, travel and other expenses	—	730
Subtotal	**$1,463**	**$1,746**
NSN BBA Acquisition		
Amortization of acquired intangible assets	$762	—
Amortization of other purchase accounting adjustments	2,305	—
Acquisition related professional fees, travel and other expenses	4,860	2,027
Subtotal	**$7,927**	**$2,027**
Total acquisition related expenses, amortizations and adjustments	**$9,390**	**$3,773**
Tax effect	**(3,148)**	**(1,434)**
Total acquisition related expenses, amortizations and adjustments, net of tax	**$6,242**	**$2,339**

The acquisition related expenses, amortizations and adjustments above were recorded in the following Consolidated Statements of Income categories for the twelve months ended December 31, 2012 and 2011:

(In Thousands)	2012	2011
Revenue (adjustments to unearned revenue recognized in the period)	$1,528	$362
Cost of goods sold	1,086	165
Subtotal	**$2,614**	**$527**
Selling, general and administrative expenses	4,510	2,557
Research and development expenses	2,266	689
Subtotal	**$6,776**	**$3,246**
Total acquisition related expenses, amortizations and adjustments	**$9,390**	**$3,773**
Tax effect	**(3,148)**	**(1,434)**
Total acquisition related expenses, amortizations and adjustments, net of tax	**$6,242**	**$2,339**

2012 Compared to 2011

Sales

ADTRAN's sales decreased 13.5% from $717.2 million in 2011 to $620.6 million in 2012. The decrease in sales is primarily attributable to an $87.6 million decrease in sales of our HDSL and other legacy products, a $30.8 million decrease in sales of our Optical products, an $8.6 million decrease in sales of our Internetworking products, partially offset by a $30.3 million increase in sales of our Broadband Access products.

Carrier Networks sales decreased 13.6% from $569.6 million in 2011 to $492.1 million in 2012. The decrease is primarily attributable to decreases in sales of Optical products, HDSL products and other legacy products. These declines were partially offset by the added sales of the NSN BBA business and an increase in sales of our Internetworking NTE products. Our organic Broadband Access sales in 2012 were negatively impacted by decreased capital expenditures at two substantial Broadband Access customers. The decrease in sales of Optical products in 2012 is primarily attributable to the market transitioning to Ethernet and our transition to new products to address this market. The declining trend in HDSL and other legacy products has been expected as we evolve our products towards packet-based technologies, but was larger than anticipated due to a large carrier customer that initiated a significant acceleration of their installed inventory reuse program.

Enterprise Networks sales decreased 13.0% from $147.7 million in 2011 to $128.5 million in 2012. The decrease is attributable to decreases in sales of Internetworking products and legacy products. The decrease in Internetworking product sales in 2012 is primarily due to a decline in Carrier spending caused by the macroeconomic environment, partially offset by growth in the value-added reseller channel and by the addition of our vWLAN solutions. Internetworking product sales attributable to Enterprise Networks were 91.5% of the division's sales in 2012 compared with 87.4% in 2011. Legacy products primarily comprise the remainder of Enterprise Networks sales. Enterprise Networks sales as a percentage of total sales increased from 20.6% in 2011 to 20.7% in 2012.

International sales, which are included in the Carrier Networks and Enterprise Networks amounts discussed above, increased 77.9% from $84.4 million in 2011 to $150.2 million in 2012. International sales, as a percentage of total sales, increased from 11.8% in 2011 to 24.2% in 2012. The increase in international sales in 2012 was primarily due to sales attributable to the acquired NSN BBA business and an increase in organic sales in Latin America.

Carrier Systems product sales decreased $20.6 million in 2012 compared to 2011 primarily due to a $30.8 million decrease in Optical product sales and a $20.2 million decrease in legacy product sales, partially offset by an increase of $30.3 million in Broadband Access product sales. The decrease in sales of Optical products in 2012 is primarily attributable to the market transitioning to Ethernet and our transition to new products to address this market. The increase in Broadband Access product sales was due to the added sales of the NSN BBA business, partially offset by a decline in organic Broadband Access product sales. Our organic Broadband Access sales in 2012 were negatively impacted by decreased capital expenditures at two substantial Broadband Access customers.

Business Networking product sales decreased $12.9 million in 2012 compared to 2011 primarily due to an $8.6 million decrease in Internetworking product sales across both divisions and a $4.3 million decrease in legacy product sales. The decrease in Internetworking product sales in 2012 is primarily due to a decline in Carrier spending caused by the macroeconomic environment, partially offset by growth in the value-added reseller channel and by the addition of our vWLAN solutions. The decrease in sales of legacy products is a result of customers shifting to newer technologies. Many of these newer technologies are integral to our Internetworking product area.

Loop Access product sales decreased $63.1 million in 2012 compared to 2011 primarily due to a $60.0 million decrease in HDSL product sales. The declining trend in HDSL and other legacy products has been expected as we evolve our products towards packet-based technologies, but was larger than anticipated due to a large carrier customer that initiated a significant acceleration of their installed inventory reuse program.

Cost of Sales

As a percentage of sales, cost of sales increased from 42.2% in 2011 to 49.0% in 2012. The increase was primarily attributable to lower gross margins related to the acquired NSN BBA business, lower cost absorption due to the lower production volumes, customer price movements to achieve market share position and higher warranty costs.

Carrier Networks cost of sales increased from 42.4% of sales in 2011 to 49.7% of sales in 2012. The increase in Carrier Networks cost of sales as a percentage of sales was primarily attributable to lower gross margins related to the acquired NSN BBA business, lower cost absorption due to the lower production volumes, customer price movements to achieve market share position and higher warranty costs.

Enterprise Networks cost of sales increased from 41.4% of sales in 2011 to 46.1% of sales in 2012. The increase in Enterprise Networks cost of sales as a percentage of sales was primarily attributable to lower cost absorption due to the lower production volumes and customer price movements to achieve market share position.

An important part of our strategy is to reduce the product cost of each succeeding product generation and then to lower the product's price based on the cost savings achieved. This may cause variations in our gross profit percentage due to timing differences between the recognition of cost reductions and the lowering of product selling prices.

Selling, General and Administrative Expenses

Selling, general and administrative expenses increased 7.7% from $124.9 million in 2011 to $134.5 million in 2012. Selling, general and administrative expenses include personnel costs for administration, finance, information systems, human resources, sales and marketing, and general management, as well as rent, utilities, legal and accounting expenses, bad debt expense, advertising, promotional material, trade show expenses, and related travel costs. The increase in selling, general and administrative expenses is primarily related to increases in staffing and fringe benefit costs due to increased headcount, professional services, legal services and amortization of acquired intangible assets. These increases were primarily related to the NSN BBA business, which was acquired on May 4, 2012, and Bluesocket Inc., which was acquired on August 4, 2011.

Selling, general and administrative expenses as a percentage of sales increased from 17.4% for the year ended December 31, 2011 to 21.7% for the year ended December 31, 2012. Selling, general and administrative expenses as a percent of sales will generally fluctuate whenever there is a significant fluctuation in revenues for the periods being compared.

Research and Development Expenses

Research and development expenses increased 25.6% from $100.3 million in 2011 to $126.0 million in 2012. The increase in research and development expense is primarily related to increases in staffing and fringe benefit costs due to increased headcount, including expenses and increased headcount related to the NSN BBA business acquired on May 4, 2012 and Bluesocket, Inc., which was acquired on August 4, 2011, amortization of acquired intangible assets related to both acquisitions, and increases in independent contractor expense and office lease expense related to the NSN BBA business.

Research and development expenses as a percentage of sales increased from 14.0% for the year ended December 31, 2011 to 20.3% for the year ended December 31, 2012. Research and development expenses as a percentage of sales will fluctuate whenever there are incremental product development activities or a significant fluctuation in revenues for the periods being compared.

We expect to continue to incur research and development expenses in connection with our new and existing products and our expansion into international markets. We continually evaluate new product opportunities and engage in intensive research and product development efforts which provide for new product development, enhancement of existing products and product cost reductions. We may incur significant research and development expenses prior to the receipt of revenues from a major new product group.

Interest and Dividend Income

Interest and dividend income remained consistent at $7.6 million in 2011 and $7.7 million in 2012, as we had no substantial change in interest-bearing investment balances or interest rates.

Interest Expense

Interest expense remained consistent at $2.4 million in 2011 and $2.3 million in 2012, as we had no substantial change in our fixed rate borrowing. See "Liquidity and Capital Resources" below for additional information.

Net Realized Investment Gain (Loss)

Net realized investment gain (loss) decreased from a $12.5 million gain in 2011 to a $9.6 million gain in 2012. This change is primarily related to a $1.3 million decrease related to sales of marketable equity securities and impaired marketable equity securities, a $0.6 million decrease in distributions from two private equity funds, and a $0.6 million increase in impairment of deferred compensation plan assets. See "Investing Activities" in "Liquidity and Capital Resources" below for additional information.

Other Income (Expense), net

Other income (expense), net, comprised primarily of miscellaneous income, gains and losses on foreign currency transactions, investment account management fees, and gains or losses on the disposal of property, plant and equipment occurring in the normal course of business, changed from $0.7 million of expense in 2011 to $0.2 million of income in 2012.

Income Taxes

Our effective tax rate increased from 32.8% in 2011 to 35.2% in 2012. This increase is primarily attributable to the exclusion of the research tax credit in 2012 and our inability to utilize losses generated by our foreign subsidiaries where a full valuation allowance was provided. These tax rate increases were partially offset by increased state tax incentives in 2012. In 2013, we will recognize a benefit from the research tax credit related to 2012 and 2013, of which we estimate $3.1 million will be attributable to 2012.

Net Income

As a result of the above factors, net income decreased from $138.6 million in 2011 to $47.3 million in 2012. As a percentage of sales, net income decreased from 19.3% in 2011 to 7.6% in 2012.

2011 Compared to 2010

Sales

ADTRAN's sales increased 18.4% from $605.7 million in 2010 to $717.2 million in 2011. This increase in sales is primarily attributable to a $113.7 million increase in sales of our Broadband Access products, a $40.4 million increase in sales of our Internetworking products, a $16.3 million increase in sales of our Optical products, partially offset by a $58.8 million decrease in sales of our HDSL and other legacy products.

Carrier Networks sales increased 19.7% from $476.0 million in 2010 to $569.6 million in 2011. The increase is primarily attributable to increases in Broadband Access, Optical and Internetworking NTE product sales, partially offset by a decrease in HDSL and other legacy product sales.

Enterprise Networks sales increased 13.9% from $129.6 million in 2010 to $147.7 million in 2011. The increase is primarily attributable to an increase in sales of Internetworking products, partially offset by decreases in sales of legacy products. Internetworking product sales attributable to Enterprise Networks were 87.4% of the division's sales in 2011 compared with 77.3% in 2010. Legacy products primarily comprise the remainder of Enterprise Networks sales. Enterprise Networks sales as a percentage of total sales decreased from 21.4% in 2010 to 20.6% in 2011.

International sales, which are included in the Carrier Networks and Enterprise Networks amounts discussed above, increased 165.3% from $31.8 million in 2010 to $84.4 million in 2011. International sales, as a percentage of total sales, increased from 5.3% in 2010 to 11.8% in 2011. The increase in international sales in 2011 was primarily due to an increase in sales to Latin America, Asia-Pacific and Europe regions.

Carrier Systems product sales increased $131.0 million in 2011 compared to 2010 primarily due to a $113.7 million increase in Broadband Access product sales and a $16.3 million increase in Optical product sales. The increase in Broadband Access product sales was primarily attributable to continued growth in deployments of our Total Access 5000 and Fiber-to-the-Node platforms.

Business Networking product sales increased $35.0 million in 2011 compared to 2010 primarily due to a $40.4 million increase in Internetworking product sales across both divisions, partially offset by a $5.8 million decrease in legacy product sales. The decrease in sales of legacy products is a result of customers shifting to newer technologies. Many of these newer technologies are integral to our Internetworking product area.

Loop Access product sales decreased $54.4 million in 2011 compared to 2010 primarily due to a $50.3 million decrease in HDSL product sales.

Cost of Sales

As a percentage of sales, cost of sales increased from 40.7% in 2010 to 42.2% in 2011. The increase was primarily the result of higher services related revenue including cabinet shipments, and specific customer price movements related to market share expansion. These effects were partially offset by cost absorption and manufacturing efficiencies achieved at the higher production volumes.

Carrier Networks cost of sales increased from 40.5% of sales in 2010 to 42.4% of sales in 2011. The increase in Carrier Networks cost of sales as a percentage of sales was primarily attributable to higher services related revenue including cabinet shipments, and specific customer price movements related to market share expansion.

Enterprise Networks cost of sales decreased from 41.7% of sales in 2010 to 41.4% of sales in 2011. The decrease in Enterprise Networks cost of sales as a percentage of sales was primarily attributable to cost absorption and manufacturing efficiencies achieved at higher production volumes.

An important part of our strategy is to reduce the product cost of each succeeding product generation and then to lower the product's price based on the cost savings achieved. This may cause variations in our gross profit percentage due to timing differences between the recognition of cost reductions and the lowering of product selling prices.

Selling, General and Administrative Expenses

Selling, general and administrative expenses increased 8.9% from $114.7 million in 2010 to $124.9 million in 2011. Selling, general and administrative expenses include personnel costs for administration, finance, information systems, human resources, sales and marketing, and general management, as well as rent, utilities, legal and accounting expenses, bad debt expense, advertising, promotional material, trade show expenses, and related travel costs. The increase in selling, general and administrative expenses is primarily related to increases in staffing and fringe benefit costs due to increased headcount, contract services, professional services, recruiting expenses and travel expenses. These increases included expenses related to Bluesocket, Inc., which was acquired on August 4, 2011, and the announced planned acquisition of Nokia Siemens Networks Broadband Access business.

Selling, general and administrative expenses as a percentage of sales decreased from 18.9% for the year ended December 31, 2010 to 17.4% for the year ended December 31, 2011. Selling, general and administrative expenses as a percent of sales will generally fluctuate whenever there is a significant fluctuation in revenues for the periods being compared.

Research and Development Expenses

Research and development expenses increased 11.1% from $90.3 million in 2010 to $100.3 million in 2011. The increase in research and development expense is primarily related to increases in staffing and fringe benefit costs due to increased headcount. These increases included research and development expenses related to Bluesocket, Inc., and amortization of intangible assets related to the acquisition of Bluesocket, Inc.

Research and development expenses as a percentage of sales decreased from 14.9% for the year ended December 31, 2010 to 14.0% for the year ended December 31, 2011. Research and development expenses as a percentage of sales will fluctuate whenever there are incremental product development activities or a significant fluctuation in revenues for the periods being compared.

We expect to continue to incur research and development expenses in connection with our new and existing products and our expansion into international markets. We continually evaluate new product opportunities and engage in intensive research and product development efforts which provide for new product development, enhancement of existing products and product cost reductions. We may incur significant research and development expenses prior to the receipt of revenues from a major new product group.

Interest and Dividend Income

Interest and dividend income increased 16.5% from $6.6 million in 2010 to $7.6 million in 2011. This increase was primarily attributable to a 19.9% increase in our average investment balances, partially offset by a 22.6% reduction in the average rate of return on our investments as a result of lower interest rates.

Interest Expense

Interest expense remained consistent at $2.4 million in 2011 and 2010, as we had no substantial change in our fixed rate borrowing. See "Liquidity and Capital Resources" below for additional information.

Net Realized Investment Gain (Loss)

Net realized investment gain (loss) increased from an $11.0 million gain in 2010 to a $12.5 million gain in 2011. This change is related to a $0.7 million increase related to sales of marketable equity securities and an increase of $0.8 million related to distributions from two private equity funds. See "Investing Activities" in "Liquidity and Capital Resources" below for additional information.

Other Income (Expense), net

Other income (expense), net, comprised primarily of miscellaneous income, gains and losses on foreign currency transactions, investment account management fees, and gains or losses on the disposal of property, plant and equipment occurring in the normal course of business, decreased from $0.8 million of expense in 2010 to $0.7 million of expense in 2011.

Income Taxes

Our effective tax rate increased from 32.2% in 2010 to 32.8% in 2011. This increase is primarily due to the reduced impact of available statutory tax benefits applied to the increased level of pretax income in 2011. The statutory benefits include the research tax credit, deduction for domestic manufacturing under Internal Revenue Code Section 199 and stock option related tax benefits.

Net Income

As a result of the above factors, net income increased from $114.0 million in 2010 to $138.6 million in 2011. As a percentage of sales, net income increased from 18.8% in 2010 to 19.3% in 2011.

Liquidity and Capital Resources

Liquidity

We intend to finance our operations with cash flow from operations. We have used, and expect to continue to use, the cash generated from operations for working capital, purchases of treasury stock, shareholder dividends, and other general corporate purposes, including (i) product development activities to enhance our existing products and develop new products and (ii) expansion of sales and marketing activities. We believe our cash and cash equivalents, investments and cash generated from operations to be adequate to meet our operating and capital needs for the foreseeable future.

At December 31, 2012, cash on hand was $68.5 million and short-term investments were $160.5 million, which placed our short-term liquidity at $228.9 million. At December 31, 2011, our cash on hand of $43.0 million and short-term investments of $159.3 million placed our short-term liquidity at $202.3 million. The increase in short-term liquidity from 2011 to 2012 primarily reflects funds provided by our operating activities, proceeds from stock option exercises, cash received from NSN as a result of our acquisition of the NSN BBA business and long-term corporate bonds moving to short-term status, partially offset by equipment acquisitions, share repurchases and shareholder dividends.

Operating Activities

Our working capital, which consists of current assets less current liabilities, increased 3.1% from $329.3 million as of December 31, 2011 to $339.4 million as of December 31, 2012. The quick ratio, defined as cash and cash equivalents, short-term investments, and net accounts receivable, divided by current liabilities, decreased from 4.50 as of December 31, 2011 to 2.90 as of December 31, 2012. The current ratio, defined as current assets divided by current liabilities, decreased from 6.32 as of December 31, 2011 to 4.18 as of December 31, 2012. The changes in our working capital, quick ratio and current ratio are primarily attributable to changes in the underlying assets and liabilities, including unearned revenue balances, relating to the acquired NSN BBA business.

Net accounts receivable increased 6.7% from $76.1 million at December 31, 2011 to $81.2 million at December 31, 2012. Our allowance for doubtful accounts decreased from $8 thousand at December 31, 2011 to $6 thousand at December 31, 2012. Quarterly accounts receivable days sales outstanding (DSO) increased from 40 days as of December 31, 2011 to 53 days as of December 31, 2012. The change in net accounts receivable and DSO is due to an increase in international sales as a percentage of our total sales, which typically have longer payment terms than our U.S. customers. Other receivables increased from $9.7 million at December 31, 2011 to $16.3 million at December 31, 2012. At December 31, 2012, other receivables included an estimated receivable due from NSN related to working capital adjustments under negotiation. Other receivables will also fluctuate due to the timing of shipments and collections for materials supplied to our contract manufacturers during the quarter.

Quarterly inventory turnover decreased from 3.5 turns as of December 31, 2011 to 2.8 turns as of December 31, 2012. Inventory increased 16.8% from December 31, 2011 to December 31, 2012. The increase in inventory is primarily attributable to inventories acquired during the acquisition of the NSN BBA business, increased installation services business and the timing of acceptances of broadband stimulus projects. We expect inventory levels to fluctuate as we attempt to maintain sufficient inventory in response to seasonal cycles of our business ensuring competitive lead times while managing the risk of inventory obsolescence that may occur due to rapidly changing technology and customer demand.

Accounts payable increased 43.4% from $29.4 million at December 31, 2011 to $42.2 million at December 31, 2012. The increase in accounts payable is primarily attributable to accounts payable related to the acquired NSN BBA business. Additionally, accounts payable will fluctuate due to variations in the timing of the receipt of supplies, inventory and services and our subsequent payments for these purchases.

Investing Activities

Capital expenditures totaled approximately $12.1 million, $11.9 million and $9.9 million for the years ended December 31, 2012, 2011 and 2010, respectively. These expenditures were primarily used to purchase computer hardware, software and manufacturing and test equipment.

On May 4, 2012, we acquired the NSN BBA business. This acquisition provides us with an established customer base in key markets and complementary, market-focused products and was accounted for as a business combination. We received a cash payment of $7.5 million from NSN and recorded a bargain purchase gain of $1.8 million, net of income taxes, subject to customary working capital adjustments between the parties. We are currently negotiating the final working capital adjustments in accordance with the provisions of the underlying purchase agreement.

Our combined short-term and long-term investments increased $1.9 million from $491.4 million at December 31, 2011 to $493.2 million at December 31, 2012. This increase reflects the impact of additional funds available for investment provided by our operating activities and proceeds from stock option exercises by our employees, reduced by our cash needs for equipment acquisitions, share repurchases and shareholder dividends, as well as net realized and unrealized losses and amortization of net premiums on our combined investments.

We invest all available cash not required for immediate use in operations primarily in securities that we believe bear minimal risk of loss. At December 31, 2012 these investments included corporate bonds of $186.4 million, municipal fixed-rate bonds of $175.1 million and municipal variable rate demand notes of $34.4 million. At December 31, 2011, these investments included corporate bonds of $156.8 million, municipal fixed-rate bonds of $174.8 million and municipal variable rate demand notes of $69.7 million. As of December 31, 2012, our corporate bonds, municipal fixed-rate bonds, and municipal variable rate demand notes were classified as available-for-sale and had a combined duration of 1.03 years with an average credit rating of AA-. Because our bond portfolio has a high quality rating and contractual maturities of a short duration, we are able to obtain prices for these bonds derived from observable market inputs, or for similar securities traded in an active market, on a daily basis.

Our long-term investments increased 0.2% from $332.0 million at December 31, 2011 to $332.7 million at December 31, 2012. Long-term investments at December 31, 2012 and December 31, 2011 included an investment in a certificate of deposit of $48.3 million, which serves as collateral for our revenue bonds, as discussed below. We have various equity investments included in long-term investments at a cost of $21.0 million and $12.8 million, and with a fair value of $35.2 million and $31.3 million, at December 31, 2012 and December 31, 2011, respectively.

Long-term investments at December 31, 2012 and 2011 also included $11.5 million and $7.7 million, respectively, related to our deferred compensation plan; $1.9 million and $2.1 million, respectively, of other investments carried at cost, consisting of interests in two private equity funds and an investment in a privately held telecommunications equipment manufacturer; and $0.5 million and $0.7 million, respectively, of a fixed income bond fund.

We review our investment portfolio for potential "other-than-temporary" declines in value on an individual investment basis. We assess, on a quarterly basis, significant declines in value which may be considered other-than-temporary and, if necessary, recognize and record the appropriate charge to write-down the carrying value of such investments. In making this assessment, we take into consideration qualitative and quantitative information, including but not limited to the following: the magnitude and duration of historical declines in market prices, credit rating activity, assessments of liquidity, public filings, and statements made by the issuer. We generally begin our identification of potential other-than-temporary impairments by reviewing any security with a fair value that has declined from its original or adjusted cost basis by 25%

or more for six or more consecutive months. We then evaluate the individual security based on the previously identified factors to determine the amount of the write-down, if any. As a result of our review, we recorded an other-than-temporary impairment charge of $17 thousand during the fourth quarter of 2012 related to three marketable equity securities. For the years ended December 31, 2012, 2011 and 2010 we recorded charges of $0.7 million, $68 thousand and $43 thousand, respectively, related to the other-than-temporary impairment of certain publicly traded equity securities, a fixed income bond fund, and our deferred compensation plan assets.

Financing Activities

In conjunction with an expansion of our Huntsville, Alabama, facility, we were approved for participation in an incentive program offered by the State of Alabama Industrial Development Authority (the "Authority"). Pursuant to the program, on January 13, 1995, the Authority issued $20.0 million of its taxable revenue bonds and loaned the proceeds from the sale of the bonds to ADTRAN. The bonds were originally purchased by AmSouth Bank of Alabama, Birmingham, Alabama (the "Bank"). Wachovia Bank, N.A., Nashville, Tennessee (formerly First Union National Bank of Tennessee) (the "Bondholder"), which was acquired by Wells Fargo & Company on December 31, 2008, purchased the original bonds from the Bank and made further advances to the Authority, bringing the total amount outstanding to $50.0 million. An Amended and Restated Taxable Revenue Bond ("Amended and Restated Bond") was issued and the original financing agreement was amended. The Amended and Restated Bond bears interest, payable monthly. The interest rate is 5% per annum. The Amended and Restated Bond matures on January 1, 2020. The estimated fair value of the bond at December 31, 2012 was approximately $48.8 million, based on a debt security with a comparable interest rate and maturity and a Standard & Poor's credit rating of A. We are required to make payments to the Authority in amounts necessary to pay the principal of and interest on the Amended and Restated Bond. Included in long-term investments at December 31, 2012 is $48.3 million which is invested in a restricted certificate of deposit. These funds serve as a collateral deposit against the principal of this bond, and we have the right to set-off the balance of the Bond with the collateral deposit in order to reduce the balance of the indebtedness.

In conjunction with this program, we are eligible to receive certain economic incentives from the state of Alabama that reduce the amount of payroll withholdings that we are required to remit to the state for those employment positions that qualify under the program. For the years ended December 31, 2012, 2011 and 2010, we realized economic incentives related to payroll withholdings totaling $1.4 million, $1.9 million and $1.5 million, respectively.

We are required to make payments in the amounts necessary to pay the principal and interest on the amounts currently outstanding. Based on positive cash flow from operating activities, we have decided to continue early partial redemptions of the Bond. We made principal payments of $0.5 million and $1.0 million for the years ended December 31, 2012 and 2011, respectively. It is our intent to make annual principal payments in addition to the interest amounts that are due. In connection with this decision, $0.5 million of the bond debt has been reclassified to a current liability in accounts payable in the Consolidated Balance Sheets at December 31, 2012 and 2011.

The following table shows dividends paid to our shareholders in each quarter of 2012, 2011 and 2010. During 2012, 2011 and 2010, we paid shareholder dividends totaling $22.8 million, $23.1 million and $22.5 million, respectively. The Board of Directors presently anticipates that it will declare a regular quarterly dividend so long as the present tax treatment of dividends exists and adequate levels of liquidity are maintained.

Dividends per Common Share

2012	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	$0.09	$0.09	$0.09	$0.09
2011	**First Quarter**	**Second Quarter**	**Third Quarter**	**Fourth Quarter**
	$0.09	$0.09	$0.09	$0.09
2010	**First Quarter**	**Second Quarter**	**Third Quarter**	**Fourth Quarter**
	$0.09	$0.09	$0.09	$0.09

Stock Repurchase Program

Since 1997, our Board of Directors has approved multiple share repurchase programs that have authorized open market repurchase transactions of up to 35 million shares of our common stock. For the years 2012, 2011 and 2010, we repurchased 1.8 million shares, 1.1 million shares and 0.7 million shares, respectively, for a cost of $39.4 million, $35.6 million and $18.3 million, respectively, at an average price of $22.03, $31.97 and $25.12 per share, respectively. We currently have the authority to purchase an additional 4.1 million shares of our common stock under the current plan approved by the Board of Directors.

Stock Option Exercises

To accommodate employee stock option exercises, we issued 0.4 million shares of treasury stock for $6.0 million during the year ended December 31, 2012, 1.8 million shares of treasury stock for $34.1 million during the year ended December 31, 2011, and 1.5 million shares of treasury stock for $24.9 million during the year ended December 31, 2010.

Off-Balance Sheet Arrangements and Contractual Obligations

We do not have off-balance sheet financing arrangements and have not engaged in any related party transactions or arrangements with unconsolidated entities or other persons that are reasonably likely to materially affect liquidity or the availability of or requirements for capital resources.

We have various contractual obligations and commercial commitments. The following table sets forth, in millions, the annual payments we are required to make under contractual cash obligations and other commercial commitments at December 31, 2012.

Contractual Obligations

(In millions)	Total	2013	2014	2015	2016	After 2016
Long-term debt	$46.5	$0.5	$—	$—	$—	$46.0
Interest on long-term debt	16.3	2.3	2.3	2.3	2.3	7.1
Purchase obligations	53.3	52.4	0.9	—	—	—
Operating lease obligations	16.3	4.4	3.7	3.2	2.3	2.7
Totals	**$132.4**	**$59.6**	**$6.9**	**$5.5**	**$4.6**	**$55.8**

We are required to make payments necessary to pay the interest on the Taxable Revenue Bond, Series 1995, as amended, currently outstanding in the aggregate principal amount of $46.5 million. The bond matures on January 1, 2020, and bears interest at the rate of 5% per annum. Included in long-term investments are $48.3 million of restricted funds, which is a collateral deposit against the principal amount of this bond. Due to continued positive cash flow from operating activities, we made a business decision in 2006 to begin an early partial redemption of the Bond. We made principal payments of $0.5 million and $1.0 million for the years ended December 31, 2012 and 2011, respectively. It is our intent to make annual principal payments in addition to the interest amounts that are due. In connection with this decision, $0.5 million of the bond debt has been reclassified to a current liability in accounts payable in the Consolidated Balance Sheets at December 31, 2012. See Note 8 of Notes to Consolidated Financial Statements for additional information.

We have committed to invest up to an aggregate of $7.9 million in two private equity funds, and we have contributed $8.4 million as of December 31, 2012, of which $7.7 million has been applied to these commitments. The additional $0.2 million commitment has been excluded from the table above due to uncertainty of when it will be applied.

We also have obligations related to uncertain income tax positions that have been excluded from the table above due to the uncertainty of when the related expense will be recognized. See Note 9 of Notes to Consolidated Financial Statements for additional information.

Effect of Recent Accounting Pronouncements

During 2012, we adopted the following accounting standards, which had no material effect on our consolidated results of operations or financial condition:

In June 2011, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update No. 2011-05, Presentation of Comprehensive Income (ASU 2011-05). ASU 2011-05 requires companies to present the components of net income and other comprehensive income either as one continuous statement or as two consecutive statements. ASU 2011-05 eliminates the option to present the components of other comprehensive income as part of the statement of changes in stockholders' equity. While ASU 2011-05 changes the presentation of comprehensive income, it does not change the components that are recognized in net income or comprehensive income under current accounting guidance. This update is effective for fiscal years, and interim periods within those years, ending after December 15, 2011, with early adoption permitted. We adopted this amendment during the first quarter of 2012, and we have provided the revised financial statement presentation required for the period ended December 31, 2012.

In December 2011, the FASB issued Accounting Standards Update No. 2011-12, Deferral of the Effective Date for Amendments to the Presentation of Reclassifications of Items Out of Accumulated Other Comprehensive Income in Accounting Standards Update No. 2011-05 (ASU 2011-12). ASU 2011-12 defers the effective date for certain presentation requirements that relate to reclassification adjustments and the effect of those reclassification adjustments on the financial statements. This update is effective for fiscal years, and interim periods within those years, ending after December 15, 2011, with early adoption permitted. We adopted this amendment during the first quarter of 2012. The adoption of this amendment had no effect on our consolidated results of operations and financial condition for the period ended December 31, 2012.

In May 2011, the FASB issued Accounting Standards Update No. 2011-04, Amendments to Achieve Common Fair Value Measurement and Disclosure Requirements in U.S. GAAP and IFRSs (ASU 2011-04). ASU 2011-04 is intended to improve the comparability of fair value measurements presented and disclosed in financial statements prepared in accordance with U.S. GAAP and IFRS. The amendments are of two types: (i) those that clarify the Board's intent about the application of existing fair value measurement and disclosure requirements and (ii) those that change a particular principle or requirement for measuring fair value or for disclosing information about fair value measurements. This update is effective for annual periods beginning after December 15, 2011. We adopted this amendment during the first quarter of 2012, and we have provided the disclosures required for the period ended December 31, 2012.

In February 2013, the FASB issued Accounting Standards Update No. 2013-02, Reporting of Amounts Reclassified Out of Accumulated Other Comprehensive Income (ASU 2013-02). ASU 2013-02 requires entities to provide information about the amounts reclassified out of accumulated other comprehensive income by component either on the face of the financial statements or in the footnotes. ASU 2013-02 does not change the current requirements for reporting net income or other comprehensive income in the financial statements. This update is effective prospectively for reporting periods beginning after December 15, 2012. We do not expect the adoption of this amendment will have an effect on our consolidated results of operations, financial condition or cash flows.

Subsequent Events

On January 15, 2013, the Board declared a quarterly cash dividend of $0.09 per common share to be paid to shareholders of record at the close of business on February 7, 2013. The quarterly dividend payment was $5.6 million and was paid on February 21, 2013.

As of February 28, 2013, we have repurchased 0.9 million shares of our common stock through open market purchases at an average cost of $22.45 per share. We currently have the authority to purchase an additional 3.2 million shares of our common stock under the current plan approved by the Board of Directors.

Quantitative and Qualitative Disclosures About Market Risk

We are exposed to financial market risks, including changes in interest rates and prices of marketable equity and fixed-income securities. The primary objective of the large majority of our investment activities is to preserve principal while at the same time achieving appropriate yields without significantly increasing risk. To achieve this objective, a majority of our marketable securities are investment grade, municipal, fixed-rate bonds, municipal variable rate demand notes and municipal money market instruments denominated in United States dollars. Our investment policy provides limitations for issuer concentration, which limits, at the time of purchase, the concentration in any one issuer to 5% of the market value of our total investment portfolio.

We maintain depository investments with certain financial institutions. Although these depository investments may exceed government insured depository limits, we have evaluated the credit worthiness of these financial institutions, and determined the risk of material financial loss due to exposure of such credit risk to be minimal. As of December 31, 2012, $46.7 million of our cash and cash equivalents, primarily certain domestic money market funds and foreign depository accounts, were in excess of government provided insured depository limits.

As of December 31, 2012, approximately $412.5 million of our cash and investments may be directly affected by changes in interest rates. We have performed a hypothetical sensitivity analysis assuming market interest rates increase or decrease by 50 basis points (bps) for an entire year, while all other variables remain constant. At December 31, 2012, we held $169.4 million of cash, money market instruments, floating rate corporate bonds and municipal variable rate demand notes where a change in interest rates would impact our interest income. A hypothetical 50 bps decline in interest rates as of December 31, 2012 would reduce annualized interest income on our cash, money market instruments, floating rate corporate bonds and municipal variable rate demand notes by approximately $0.6 million. In addition, we held $352.9 million of municipal and corporate bonds whose fair values may be directly affected by a change in interest rates. A hypothetical 50 bps increase in interest rates as of December 31, 2012 would reduce the fair value of our municipal and corporate bonds by approximately $1.7 million.

As of December 31, 2011, interest income on approximately $417.4 million of our cash and investments was subject to being directly affected by changes in interest rates. We performed a hypothetical sensitivity analysis assuming market interest rates increase or decrease by 50 bps for an entire year, while all other variables remain constant. A hypothetical 50 bps decline in interest rates as of December 31, 2011 would have reduced annualized interest income on our money market instruments and municipal variable rate demand notes by approximately $0.7 million. In addition, a hypothetical 50 bps increase in interest rates as of December 31, 2011 would have reduced the fair value of our municipal fixed-rate bonds and corporate bonds by approximately $1.7 million.

We are directly exposed to changes in foreign currency exchange rates to the extent that such changes affect our revenue derived from international customers, expenses related to our foreign sales offices, and our foreign assets and liabilities. We attempt to manage these risks by primarily denominating contractual and other foreign arrangements in U.S. dollars. Our primary exposure in regard to our foreign assets and liabilities is with our German subsidiary whose functional currency is the Euro and our Australian subsidiary whose functional currency is the Australian dollar. We are indirectly exposed to changes in foreign currency exchange rates to the extent of our use of foreign contract manufacturers and foreign raw material suppliers whom we pay in U.S. dollars. As a result, changes in the local currency rates of these vendors in relation to the U.S. dollar could cause an increase in the price of products that we purchase.

Management's Report on Internal Control over Financial Reporting

Management of ADTRAN, Inc. is responsible for establishing and maintaining adequate internal control over financial reporting as defined in Rules 13a-15(f) and 15d-15(f) under the Securities Exchange Act of 1934, as amended. ADTRAN's internal control over financial reporting is designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. ADTRAN's internal control over financial reporting includes those policies and procedures that:

- pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of ADTRAN;
- provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of ADTRAN are being made only in accordance with authorizations of management and directors of ADTRAN; and
- provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of ADTRAN's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Management assessed the effectiveness of ADTRAN's internal control over financial reporting as of December 31, 2012. In making this assessment, management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in *Internal Control-Integrated Framework*.

Based on our assessment and those criteria, management has concluded that ADTRAN maintained effective internal control over financial reporting as of December 31, 2012.

The effectiveness of our internal control over financial reporting has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report which appears herein.

Report of Independent Registered Public Accounting Firm

To Board of Directors and Stockholders of ADTRAN, Inc.:

In our opinion, the consolidated financial statements listed in the accompanying index present fairly, in all material respects, the financial position of ADTRAN, Inc. and its subsidiaries at December 31, 2012 and December 31, 2011, and the results of their operations and their cash flows for each of the three years in the period ended December 31, 2012 in conformity with accounting principles generally accepted in the United States of America. In addition, in our opinion, the financial statement schedule listed in the accompanying index presents fairly, in all material respects, the information set forth therein when read in conjunction with the related consolidated financial statements. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2012, based on criteria established in *Internal Control - Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). The Company's management is responsible for these financial statements and financial statement schedule, for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying *Management's Report On Internal Control Over Financial Reporting*. Our responsibility is to express opinions on these financial statements, on the financial statement schedule, and on the Company's internal control over financial reporting based on our integrated audits. We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the financial statements are free of material misstatement and whether effective internal control over financial reporting was maintained in all material respects. Our audits of the financial statements included examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

PricewaterhouseCoopers LLP
Birmingham, Alabama
February 28, 2013

Financial Statements

ADTRAN, INC.

Consolidated Balance Sheets

December 31, 2012 and 2011

(In thousands, except per share amounts)

Assets	2012	2011
Current Assets		
Cash and cash equivalents	$68,457	$42,979
Short-term investments	160,481	159,347
Accounts receivable, less allowance for doubtful accounts of $6 and $8 at December 31, 2012 and 2011, respectively	81,194	76,130
Other receivables	16,253	9,743
Inventory	102,583	87,800
Prepaid expenses	4,148	3,119
Deferred tax assets, net	13,055	12,125
Total Current Assets	**446,171**	**391,243**
Property, plant and equipment, net	80,246	75,295
Deferred tax assets, net	10,261	8,345
Goodwill	3,492	3,492
Other assets	13,482	7,131
Long-term investments	332,729	332,008
Total Assets	**$886,381**	**$817,514**
Liabilities and Stockholders' Equity		
Current Liabilities		
Accounts payable	$42,173	$29,404
Unearned revenue	38,051	9,965
Accrued expenses	10,309	5,876
Accrued wages and benefits	15,022	13,518
Income tax payable, net	1,211	3,169
Total Current Liabilities	**106,766**	**61,932**
Non-current unearned revenue	23,803	4,874
Other non-current liabilities	17,406	12,077
Bonds payable	46,000	46,500
Total Liabilities	**193,975**	**125,383**
Commitments and contingencies (see Note 12)		
Stockholders' Equity		
Common stock, par value $0.01 per share; 200,000 shares authorized; 79,652 shares issued and 62,310 shares outstanding at December 31, 2012 and 79,652 shares issued and 63,703 shares outstanding at December 31, 2011	797	797
Additional paid-in capital	224,517	213,560
Accumulated other comprehensive income	11,268	13,102
Retained earnings	861,465	840,206
Less treasury stock at cost: 17,342 and 15,949 shares at December 31, 2012 and 2011, respectively	(405,641)	(375,534)
Total Stockholders' Equity	**692,406**	**692,131**
Total Liabilities and Stockholders' Equity	**$886,381**	**$817,514**

See notes to consolidated financial statements.

ADTRAN, INC.

Consolidated Statements of Income

Years ended December 31, 2012, 2011 and 2010

(In thousands, except per share amounts)	2012	2011	2010
Sales	$620,614	$717,229	$605,674
Cost of sales	303,971	302,911	246,811
Gross Profit	**316,643**	**414,318**	**358,863**
Selling, general and administrative expenses	134,523	124,879	114,699
Research and development expenses	125,951	100,301	90,300
Operating Income	**56,169**	**189,138**	**153,864**
Interest and dividend income	7,657	7,642	6,557
Interest expense	(2,347)	(2,398)	(2,436)
Net realized investment gain	9,550	12,454	11,008
Other income (expense), net	183	(694)	(804)
Gain on bargain purchase of a business	1,753	—	—
Income before provision for income taxes	**72,965**	**206,142**	**168,189**
Provision for income taxes	(25,702)	(67,565)	(54,200)
Net Income	**$47,263**	**$138,577**	**$113,989**
Weighted average shares outstanding—basic	63,259	64,145	62,490
Weighted average shares outstanding—diluted	63,774	65,416	63,879
Earnings per common share—basic	$0.75	$2.16	$1.82
Earnings per common share—diluted	$0.74	$2.12	$1.78

See notes to consolidated financial statements.

ADTRAN, INC.

Consolidated Statements of Comprehensive Income

Years ended December 31, 2012, 2011 and 2010

(In thousands)	2012	2011	2010
Net Income	**$47,263**	**$138,577**	**$113,989**
Other Comprehensive Income (Loss), net of tax:			
Net change in unrealized gains (losses) on marketable securities, net of deferred tax (expense) benefit of $120, $7,427 and $(5,223) for the years ended December 31, 2012, 2011 and 2010, respectively	(187)	(13,004)	8,700
Reclassification adjustments for amounts included in net income, net of deferred tax (expense) benefit of $(86), $389 and $598 for the years ended December 31, 2012, 2011 and 2010, respectively	135	(688)	(999)
Defined benefit plan adjustments	(1,952)	—	—
Foreign currency translation	170	(154)	1,394
Other Comprehensive Income (Loss), net of tax	**(1,834)**	**(13,846)**	**9,095**
Comprehensive Income, net of tax	**$45,429**	**$124,731**	**$123,084**

See notes to consolidated financial statements.

ADTRAN, INC.

Consolidated Statements of Changes in Stockholders' Equity

Years ended December 31, 2012, 2011 and 2010

(In thousands)	Common Shares	Common Stock	Additional Paid-In Capital	Retained Earnings	Treasury Stock	Accumulated Other Comprehensive Income (Loss)	Total Stockholders' Equity
Balance, December 31, 2009	**79,652**	**$797**	**$181,240**	**$649,256**	**$(396,631)**	**$17,853**	**$452,515**
Net income				113,989			113,989
Other comprehensive income, net of tax						9,095	9,095
Dividend payments				(22,502)			(22,502)
Dividends accrued for unvested restricted stock units				(27)			(27)
Stock options exercised: Various prices per share				(8,754)	33,696		24,942
Purchase of treasury stock: 729 shares					(18,316)		(18,316)
Income tax benefit from exercise of stock options			4,909				4,909
Stock-based compensation expense			7,717				7,717
Balance, December 31, 2010	**79,652**	**$797**	**$193,866**	**$731,962**	**$(381,251)**	**$26,948**	**$572,322**
Net income				138,577			138,577
Other comprehensive income, net of tax						(13,846)	(13,846)
Dividend payments				(23,124)			(23,124)
Dividends accrued for unvested restricted stock units				(52)			(52)
Stock options exercised: Various prices per share				(6,345)	40,470		34,125
Restricted stock units vested				(812)	812		—
Purchase of treasury stock: 1,112 shares					(35,565)		(35,565)
Income tax benefit from exercise of stock options			10,525				10,525
Stock-based compensation expense			9,169				9,169
Balance, December 31, 2011	**79,652**	**$797**	**$213,560**	**$840,206**	**$(375,534)**	**$13,102**	**$692,131**
Net income				47,263			47,263
Other comprehensive income, net of tax						(1,834)	(1,834)
Dividend payments				(22,813)			(22,813)
Dividends accrued for unvested restricted stock units				15			15
Stock options exercised: Various prices per share				(2,659)	8,708		6,049
Restricted stock units vested			(212)	(547)	547		(212)
Purchase of treasury stock: 1,786 shares					(39,362)		(39,362)
Income tax benefit from exercise of stock options			1,905				1,905
Stock-based compensation expense			9,264				9,264
Balance, December 31, 2012	**79,652**	**$797**	**$224,517**	**$861,465**	**$(405,641)**	**$11,268**	**$692,406**

ADTRAN issued 393 shares, 1,813 shares and 1,483 shares of treasury stock to accommodate employee stock option exercises and vesting of restricted stock units during 2012, 2011 and 2010, respectively. During 2011 and 2010, ADTRAN received 7 shares and 4 shares, respectively, previously held by employees for at least six months as payment of the exercise price for employee stock options. None of the transactions with respect to these shares were made in the open market. The average price paid per share with respect to these transactions was based on the closing price of the common stock on the NASDAQ Global Select Market on the date of the transaction. There were no such transactions during 2012.

See notes to consolidated financial statements.

ADTRAN, INC.

Consolidated Statements of Cash Flows

Years ended December 31, 2012, 2011 and 2010

(In thousands)	2012	2011	2010
Cash flows from operating activities			
Net income	$47,263	$138,577	$113,989
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	14,079	11,499	10,545
Amortization of net premium on available-for-sale investments	8,257	6,617	4,380
Net realized gain on long-term investments	(9,550)	(12,454)	(11,008)
Net (gain) loss on disposal of property, plant, and equipment	(214)	6	2
Gain on bargain purchase of a business	(1,753)	—	—
Stock-based compensation expense	9,264	9,169	7,717
Deferred income taxes	(3,785)	575	(1,324)
Tax benefit from stock option exercises	1,905	10,525	4,909
Excess tax benefits from stock-based compensation arrangements	(1,456)	(9,373)	(4,404)
Change in operating assets and liabilities:			
Accounts receivable, net	(4,365)	(4,939)	(2,849)
Other receivables	2,977	(5,781)	135
Income tax receivable, net	—	2,741	(2,741)
Inventory	7,163	(12,734)	(28,600)
Prepaid expenses and other assets	(1,045)	522	(574)
Accounts payable	7,265	6,178	(2,997)
Accrued expenses and other liabilities	11,583	6,309	8,626
Income taxes payable, net	(1,960)	3,169	(3,017)
Net cash provided by operating activities	**85,628**	**150,606**	**92,789**
Cash flows from investing activities			
Purchases of property, plant, and equipment	(12,075)	(11,912)	(9,872)
Proceeds from disposals of property, plant and equipment	266	—	—
Proceeds from sales and maturities of available-for-sale investments	282,039	466,243	275,442
Purchases of available-for-sale investments	(282,740)	(554,629)	(340,489)
Acquisition of business, net of cash acquired	7,496	(22,661)	—
Net cash used in investing activities	**(5,014)**	**(122,959)**	**(74,919)**
Cash flows from financing activities			
Proceeds from stock option exercises	6,049	34,125	24,942
Purchases of treasury stock	(39,362)	(35,565)	(18,316)
Dividend payments	(22,813)	(23,124)	(22,502)
Payments on long-term debt	(500)	(1,000)	(250)
Excess tax benefits from stock-based compensation arrangements	1,456	9,373	4,404
Net cash used in financing activities	**(55,170)**	**(16,191)**	**(11,722)**
Net increase in cash and cash equivalents	25,444	11,456	6,148
Effect of exchange rate changes	34	(154)	1,394
Cash and cash equivalents, beginning of year	**42,979**	**31,677**	**24,135**
Cash and cash equivalents, end of year	**$68,457**	**$42,979**	**$31,677**
Supplemental disclosure of cash flow information			
Cash paid during the year for interest	$2,348	$2,396	$2,411
Cash paid during the year for income taxes	$31,021	$51,402	$57,662

See notes to consolidated financial statements.

Notes to Consolidated Financial Statements

1 Nature of Business and Summary of Significant Accounting Policies

ADTRAN, Inc. designs, manufactures and markets solutions and provides services and support for communications networks. Our solutions are widely deployed by providers of communications services (serviced by our Carrier Networks Division), and small, mid-sized and distributed enterprises (serviced by our Enterprise Networks Division), and enable voice, data, video and Internet communications across a variety of network infrastructures. Many of these solutions are currently in use by every major United States service provider, many global service providers, as well as many public, private and governmental organizations worldwide.

Principles of Consolidation

Our consolidated financial statements include ADTRAN and its wholly owned subsidiaries. All significant inter-company accounts and transactions have been eliminated in consolidation.

Cash and Cash Equivalents

Cash and cash equivalents represent demand deposits, money market funds, and short-term investments classified as available-for-sale with original maturities of three months or less. We maintain depository investments with certain financial institutions. Although these depository investments may exceed government insured depository limits, we have evaluated the credit worthiness of these applicable financial institutions, and determined the risk of material financial loss due to the exposure of such credit risk to be minimal. As of December 31, 2012, $46.7 million of our cash and cash equivalents, primarily certain domestic money market funds and foreign depository accounts, were in excess of government provided insured depository limits.

Financial Instruments

The carrying amounts reported in the consolidated balance sheets for cash and cash equivalents, accounts receivable, and accounts payable approximate fair value due to the immediate or short-term maturity of these financial instruments. The carrying amount reported for bonds payable was $46.5 million compared to an estimated fair value of $48.8 million, based on a debt security with a comparable interest rate and maturity and a Standard & Poor's credit rating of A.

Investments with contractual maturities beyond one year, such as our municipal variable rate demand notes, may be classified as short-term based on their highly liquid nature and because such marketable securities represent the investment of cash that is available for current operations. Despite the long-term nature of their stated contractual maturities, we routinely buy and sell these securities and we believe we have the ability to quickly sell them to the remarketing agent, tender agent, or issuer at par value plus accrued interest in the event we decide to liquidate our investment in a particular variable rate demand note. All income generated from these investments was recorded as interest income. We have not been required to record any losses relating to municipal variable rate demand notes.

Long-term investments represent a restricted certificate of deposit held at cost, municipal fixed-rate bonds, corporate bonds, a fixed income bond fund, marketable equity securities, and other equity investments. Marketable equity securities are reported at fair value as determined by the most recently traded price of the securities at the balance sheet date, although the securities may not be readily marketable due to the size of the available market. Unrealized gains and losses, net of tax, are reported as a separate component of stockholders' equity. Realized gains and losses on sales of securities are computed under the specific identification method and are included in current income. We periodically review our investment portfolio for investments considered to have sustained an other-than-temporary decline in value. Impairment charges for other-than-temporary declines in value are recorded as realized losses in the accompanying consolidated statements of income. All of our investments at December 31, 2012 and 2011 are classified as available-for-sale securities. See Note 4 of Notes to Consolidated Financial Statements for additional information.

Accounts Receivable

We record accounts receivable at net realizable value. Prior to issuing payment terms to a new customer, we perform a detailed credit review of the customer. Credit limits are established for each new customer based on the results of this credit review. Payment terms are established for each new customer, and collection experience is reviewed periodically in order to determine if the customer's payment terms and credit limits need to be revised. At December 31, 2012, one customer accounted for 10.4% of our total accounts receivable. At December 31, 2011, three customers, each of which accounted for more than 10% of our accounts receivable, accounted for 57.3% of our total accounts receivable in the aggregate.

We maintain an allowance for doubtful accounts for losses resulting from the inability of our customers to make required payments. We regularly review the allowance for doubtful accounts and consider factors such as the age of accounts receivable balances, the current economic conditions that may affect a customer's ability to pay, significant one-time events and our historical experience. If the financial condition of a customer deteriorates, resulting in an impairment of their ability to make payments, we may be required to make additional allowances. If circumstances change with regard to individual receivable balances that have previously been determined to be uncollectible (and for which a specific reserve has been established), a reduction in our allowance for doubtful accounts may be required. Our allowance for doubtful accounts was $6 thousand at December 31, 2012 and $8 thousand at December 31, 2011.

Other Receivables

Other receivables are comprised primarily of amounts due from subcontract manufacturers for product component transfers, accrued interest on investments and on a restricted certificate of deposit and amounts due from employee stock option exercises. At December 31, 2012, other receivables also included an estimated receivable due from Nokia Siemens Networks (NSN) related to working capital adjustments under negotiation.

Inventory

Inventory is carried at the lower of cost or market, with cost being determined using the first-in, first-out method. Standard costs for material, labor and manufacturing overhead are used to value inventory. Standard costs are updated at least quarterly; therefore, inventory costs approximate actual costs at the end of each reporting period. We establish reserves for estimated excess, obsolete or unmarketable inventory equal to the difference between the cost of the inventory and the estimated fair value of the inventory based upon assumptions about future demand and market conditions. When we dispose of excess and obsolete inventories, the related write-downs are charged against the inventory reserve. See Note 5 of Notes to Consolidated Financial Statements for additional information.

Property, Plant and Equipment

Property, plant and equipment, which is stated at cost, is depreciated using the straight-line method over the estimated useful lives of the assets. We depreciate building and land improvements from five to 39 years, office machinery and equipment from three to seven years, engineering machinery and equipment from three to seven years and computer software from three to five years. Expenditures for repairs and maintenance are charged to expense as incurred. Betterments that materially prolong the lives of the assets are capitalized. The cost of assets retired or otherwise disposed of and the related accumulated depreciation are removed from the accounts, and the gain or loss on such disposition is included in other income (expense), net in the accompanying consolidated statements of income. See Note 6 of Notes to Consolidated Financial Statements for additional information.

Liability for Warranty

Our products generally include warranties of 90 days to ten years for product defects. We accrue for warranty returns at the time revenue is recognized based on our estimate of the cost to repair or replace the defective products. We engage in extensive product quality programs and processes, including actively monitoring and evaluating the quality of our component suppliers. Our products continue to become more complex in both size and functionality as many of our product offerings migrate from line card applications to systems products. The increasing complexity of our products will cause warranty incidences, when they arise, to be more costly. Our estimates regarding future warranty obligations may change due to product failure rates, material usage, and other rework costs incurred in correcting a product failure. In addition, from time to time, specific warranty accruals may be recorded if unforeseen problems arise. Should our actual experience relative to these factors be worse than our estimates, we will be required to record additional warranty expense. Alternatively, if we provide for more reserves than we require, we will reverse a portion of such provisions in future periods. The liability for warranty obligations totaled $9.7 million and $4.1 million at December 31, 2012 and 2011, respectively. These liabilities are included in accrued expenses in the accompanying consolidated balance sheets.

A summary of warranty expense and write-off activity for the years ended December 31, 2012 and 2011 is as follows:

(In thousands)

Year Ended December 31,	2012	2011
Balance at beginning of period	$4,118	$3,304
Plus: Amounts charged to cost and expenses	5,363	2,860
Amounts assumed on acquisition	3,781	33
Less: Deductions	(3,609)	(2,079)
Balance at end of period	**$9,653**	**$4,118**

Pension Benefit Plan Obligations

Pension benefit plan obligations are based on various assumptions used by our actuaries in calculating these amounts. These assumptions include discount rates, compensation rate increases and expected return on plan assets. Actual results that differ from the assumptions and changes in assumptions affect future expenses and obligations.

Stock-Based Compensation

We have two Board and stockholder approved stock option plans from which stock options and other awards are available for grant to employees and directors. All employee and director stock options granted under our stock option plans have an exercise price equal to the fair market value of the award, as defined in the plan, of the underlying common stock on the grant date. There are currently no vesting provisions tied to performance or market conditions for any option awards; vesting for all outstanding option grants is based only on continued service as an employee or director of ADTRAN. All of our outstanding stock option awards are classified as equity awards.

Under the provisions of our approved plans, we made grants of performance-based restricted stock units to five of our executive officers in 2012, 2011 and 2010. The restricted stock units are subject to a market condition based on the relative total shareholder return of ADTRAN against all the companies in the NASDAQ Telecommunications Index and vest at the end of a three-year performance period. The restricted stock units are converted into shares of common stock upon vesting. Depending on the relative total shareholder return over the performance period, the executive officers may earn from 0% to 150% of the number of restricted stock units granted. The fair value of the award is based on the market price of our common stock on the date of grant, adjusted for the expected outcome of the impact of market conditions using a Monte Carlo Simulation valuation method. The recipients of the restricted stock units also earn dividend credits during the performance period, which will be paid in cash upon the issuance of common stock for the restricted stock units.

Stock-based compensation expense recognized in 2012, 2011 and 2010 was approximately $9.3 million, $9.2 million and $7.7 million, respectively. As of December 31, 2012, total compensation cost related to non-vested stock options, restricted stock units and restricted stock not yet recognized was approximately $19.3 million, which is expected to be recognized over an average remaining recognition period of 2.5 years. See Note 3 of Notes to Consolidated Financial Statements for additional information.

Impairment of Long-Lived Assets

We review long-lived assets used in operations for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable and the undiscounted cash flows estimated to be generated by the asset are less than the asset's carrying value. An impairment loss would be recognized in the amount by which the recorded value of the asset exceeds the fair value of the asset, measured by the quoted market price of an asset or an estimate based on the best information available in the circumstances. There were no impairment losses recognized during 2012, 2011 or 2010.

Goodwill and Purchased Intangible Assets

We evaluate the carrying value of goodwill during the fourth quarter of each year and between annual evaluations if events occur or circumstances change that would more likely than not reduce the fair value of the reporting unit below its carrying amount. When evaluating whether goodwill is impaired, we first assess qualitative factors to determine whether it is necessary to perform the two-step quantitative goodwill impairment test. If we determine that the two-step quantitative test is necessary, then we compare the fair value of the reporting unit to which the goodwill is assigned to the reporting unit's carrying amount, including goodwill. If the carrying amount of the reporting unit exceeds its fair value, then the amount of the impairment loss is measured. There were no impairment losses recognized during 2012 or 2011. Purchased intangible assets with finite lives are carried at cost, less accumulated amortization. Amortization is computed over the estimated useful lives of the respective assets, which is 2.5 to 14 years.

Research and Development Costs

Research and development costs include compensation for engineers and support personnel, outside contracted services, depreciation and material costs associated with new product development, the enhancement of current products, and product cost reductions. We continually evaluate new product opportunities and engage in intensive research and product development efforts. Research and development costs totaled $126.0 million, $100.3 million and $90.3 million for the years ended December 31, 2012, 2011 and 2010, respectively.

Comprehensive Income

Comprehensive income consists of all changes in equity (net assets) during a period from non-owner sources. Items included in comprehensive income include net income, changes in unrealized gains and losses on marketable securities, defined benefit plan adjustments and foreign currency translation adjustments. Comprehensive income is presented in the Consolidated Statements of Comprehensive Income.

Income Taxes

The provision for income taxes has been determined using the asset and liability approach of accounting for income taxes. Under this approach, deferred taxes represent the future tax consequences expected to occur when the reported amounts of assets and liabilities are recovered or paid. The provision for income taxes represents income taxes paid or payable for the current year plus the change in deferred taxes during the year. Employment related economic incentives are reported as a reduction in the state income tax provision. Deferred taxes result from the difference between financial and tax bases of our assets and liabilities and are adjusted for changes in tax rates and tax laws when such changes are enacted. Valuation allowances are recorded to reduce deferred tax assets when it is more likely than not that a tax benefit will not be realized.

Foreign Currency

We record transactions denominated in foreign currencies on a monthly basis using exchange rates from throughout the year. Assets and liabilities denominated in foreign currencies are translated at the balance sheet dates using the closing rates of exchange between those foreign currencies and the U.S. dollar with any transaction gains or losses reported in other income (expense). Adjustments from translating financial statements of international subsidiaries are recorded as a component of accumulated other comprehensive income (loss).

Revenue Recognition

Revenue is generally recognized upon shipment of the product to our customer in accordance with the title transfer terms of the sales agreement, generally FOB shipping point. In the case of consigned inventory, revenue is recognized when the end customer assumes ownership of the product. Contracts that contain multiple deliverables are evaluated to determine the units of accounting, and the revenue from the arrangement is allocated to each item requiring separate revenue recognition based on the relative selling price and corresponding terms of the contract. We strive to use vendor-specific objective evidence of selling price. When this evidence is not available, we are generally not able to determine third-party evidence of selling price because of the extent of customization among competing products or services from other companies. We record revenue associated with installation services when all contractual obligations are complete. Contracts that include both installation services and product sales are evaluated for revenue recognition in accordance with contract terms. As a result, depending on contract terms, installation services may be considered as a separate deliverable item or may be considered an element of the delivered product. Either the purchaser, ADTRAN, or a third party can perform the installation of our products. Shipping fees are recorded as revenue and the related cost is included in cost of sales. Revenue is recorded net of discounts. Also, revenue is recorded when the product price is fixed or determinable, collection of the resulting receivable is probable, and product returns are reasonably estimable. Sales returns are accrued based on historical sales return experience, which we believe provides a reasonable estimate of future returns.

A portion of Enterprise Networks products are sold to a non-exclusive distribution network of major technology distributors in the United States. These large organizations then distribute to an extensive network of value-added resellers and system integrators. Value-added resellers and system integrators may be affiliated with us as a channel partner, or they may purchase from the distributor in an unaffiliated fashion. Additionally, with certain limitations our distributors may return unused and unopened product for stock-balancing purposes when such returns are accompanied by offsetting orders for products of equal or greater value.

We participate in cooperative advertising and market development programs with certain customers. We use these programs to reimburse customers for certain forms of advertising, and in general, to allow our customers credits up to a specified percentage of their net purchases. Our costs associated with these programs are estimated and included in marketing expenses in our consolidated statements of income. We also participate in rebate programs to provide sales incentives for certain products. Our costs associated with these programs are estimated and accrued at the time of sale, and are recorded as a reduction of sales in our consolidated statements of income.

Unearned Revenue

Unearned revenue primarily represents customer billings on our maintenance service programs and unearned revenues relating to multiple element contracts where we still have contractual obligations to our customers. We currently offer maintenance contracts ranging from one to five years, primarily on Enterprise Networks Division products sold through distribution channels. Revenue attributable to maintenance contracts is recognized on a straight-line basis over the related contract term. In addition, we provide software maintenance and a variety of hardware maintenance services to Carrier Networks Division customers, which include customers of the acquired NSN BBA business, under contracts with terms up to ten years. At December 31, 2012 and 2011, unearned revenue was as follows:

(In thousands)	2012	2011
Current unearned revenue	$38,051	$9,965
Non-current unearned revenue	23,803	4,874
Total	$61,854	$14,839

Other Income (Expense), Net

Other income (expense), net, is comprised primarily of miscellaneous income and expense, gains and losses on foreign currency transactions, investment account management fees, and gains or losses on the disposal of property, plant and equipment occurring in the normal course of business.

Earnings per Share

Earnings per common share, and earnings per common share assuming dilution, are based on the weighted average number of common shares and, when dilutive, common equivalent shares outstanding during the year. See Note 13 of Notes to Consolidated Financial Statements for additional information.

Dividends

The Board of Directors presently anticipates that it will declare a regular quarterly dividend as long as the current tax treatment of dividends exists and adequate levels of liquidity are maintained. During the years ended December 31, 2012, 2011 and 2010, we paid $22.8 million, $23.1 million and $22.5 million, respectively, in shareholder dividends. On January 15, 2013, the Board of Directors declared a quarterly cash dividend of $0.09 per common share to be paid to shareholders of record at the close of business on February 7, 2013. The ex-dividend date was February 5, 2013 and the payment date was February 21, 2013. The quarterly dividend payment was $5.6 million.

Business Combinations

We use the acquisition method to account for business combinations. Under the acquisition method of accounting, we recognize the assets acquired and liabilities assumed at their fair value on the acquisition date. Goodwill is measured as the excess of the consideration transferred over the net assets acquired. Costs incurred to complete the business combination, such as legal, accounting or other professional fees, are charged to general and administrative expenses as they are incurred.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amounts of revenue and expense during the reporting period. Our more significant estimates include the allowance for doubtful accounts, obsolete and excess inventory reserves, warranty reserves, customer rebates, allowance for sales returns, determination of the unearned revenue components of multiple element sales agreements, estimated costs to complete obligations associated with unearned revenues, estimated income tax contingencies, the fair value of stock-based compensation, impairment of goodwill, value and estimated lives of intangible assets, and the evaluation of other-than-temporary declines in the value of investments. Actual amounts could differ significantly from these estimates.

Recently Issued Accounting Standards

During 2012, we adopted the following accounting standards, which had no material effect on our consolidated results of operations or financial condition:

In June 2011, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update No. 2011-05, Presentation of Comprehensive Income (ASU 2011-05). ASU 2011-05 requires companies to present the components of net income and other comprehensive income either as one continuous statement or as two consecutive statements. ASU 2011-05 eliminates the option to present the components of other comprehensive income as part of the statement of changes in stockholders' equity. While ASU 2011-05 changes the presentation of comprehensive income, it does not change the components that are recognized in net income or comprehensive income under current accounting guidance. This update is effective for fiscal years, and interim periods within those years, ending after December 15, 2011, with early adoption permitted. We adopted this amendment during the first quarter of 2012, and we have provided the revised financial statement presentation required for the period ended December 31, 2012.

In December 2011, the FASB issued Accounting Standards Update No. 2011-12, Deferral of the Effective Date for Amendments to the Presentation of Reclassifications of Items Out of Accumulated Other Comprehensive Income in Accounting Standards Update No. 2011-05 (ASU 2011-12). ASU 2011-12 defers the effective date for certain presentation requirements that relate to reclassification adjustments and the effect of those reclassification adjustments on the financial statements. This update is effective for fiscal years, and interim periods within those years, ending after December 15, 2011, with early adoption permitted. We adopted this amendment during the first quarter of 2012. The adoption of this amendment had no effect on our consolidated results of operations and financial condition for the period ended December 31, 2012.

In May 2011, the FASB issued Accounting Standards Update No. 2011-04, Amendments to Achieve Common Fair Value Measurement and Disclosure Requirements in U.S. GAAP and IFRSs (ASU 2011-04). ASU 2011-04 is intended to improve the comparability of fair value measurements presented and disclosed in financial statements prepared in accordance with U.S. GAAP and IFRS. The amendments are of two types: (i) those that clarify the Board's intent about the application of existing fair value measurement and disclosure requirements and (ii) those that change a particular principle or requirement for measuring fair value or for disclosing information about fair value measurements. This update is effective for annual periods beginning after December 15, 2011. We adopted this amendment during the first quarter of 2012, and we have provided the disclosures required for the period ended December 31, 2012.

In February 2013, the FASB issued Accounting Standards Update No. 2013-02, Reporting of Amounts Reclassified Out of Accumulated Other Comprehensive Income (ASU 2013-02). ASU 2013-02 requires entities to provide information about the amounts reclassified out of accumulated other comprehensive income by component either on the face of the financial statements or in the footnotes. ASU 2013-02 does not change the current requirements for reporting net income or other comprehensive income in the financial statements. This update is effective prospectively for reporting periods beginning after December 15, 2012. We do not expect the adoption of this amendment will have an effect on our consolidated results of operations, financial condition or cash flows.

2 Business Combinations

On May 4, 2012, we acquired the NSN Broadband Access business (NSN BBA business). This acquisition provides us with an established customer base in key markets and complementary, market-focused products and was accounted for as a business combination. We have included the financial results of the NSN BBA business in our consolidated financial statements since the date of acquisition. These revenues are included in the Carrier Networks division in the Broadband Access subcategory.

We received a cash payment of $7.5 million from NSN and recorded a bargain purchase gain of $1.8 million, net of income taxes, subject to customary working capital adjustments between the parties as defined in the purchase agreement. As of December 31, 2012, the parties were in the process of negotiating final working capital adjustments. We have adjusted the purchase price allocation to record additional estimated liabilities and an estimated receivable from NSN related to working capital adjustments under negotiation. The bargain purchase gain of $1.8 million represents the excess of the consideration exchanged over the fair value of the assets acquired and liabilities assumed. We have assessed the recognition and measurements of the assets acquired and liabilities assumed based on historical and pro forma data for future periods and have concluded that our valuation procedures and resulting measures were appropriate. The gain is included in the line item "Gain on bargain purchase of a business" in the 2012 Consolidated Statements of Income.

The preliminary allocation of the purchase price to the estimated fair value of the assets acquired and liabilities assumed at the acquisition date is as follows:

(In thousands)	
Other receivables	$9,486
Inventory	22,278
Property, plant and equipment	5,035
Accounts payable	(5,194)
Unearned revenue	(19,413)
Accrued expenses	(1,931)
Accrued wages and benefits	(2,251)
Deferred tax liability	(788)
Non-current unearned revenue	(21,316)
Net liabilities assumed	**(14,094)**
Customer relationships	5,162
Developed technology	3,176
Other	13
Gain on bargain purchase of a business, net of tax	(1,753)
Net consideration received by buyer	**$(7,496)**

The fair value of the customer relationships acquired was calculated using a discounted cash flow method (excess earnings) and is being amortized using a declining balance method derived from projected customer revenue over an average estimated useful life of 13 years. The fair value of the developed technology acquired was calculated using a discounted cash flow method (relief from royalty) and is being amortized using the straight-line method over an estimated useful life of five years.

The actual revenue and pre-tax loss included in our Consolidated Statements of Income from the acquisition date to December 31, 2012 is as follows:

(In thousands)	
May 4, 2012 to December 31, 2012	
Revenue	$68,170
Pre-tax loss	$(8,562)

For the twelve months ended December 31, 2012, we incurred acquisition and integration related expenses and amortization of acquired intangibles of $7.9 million related to this acquisition.

The following supplemental pro forma information presents the financial results as if the acquisition of the NSN BBA business had occurred on January 1, 2011. This supplemental pro forma information does not purport to be indicative of what would have occurred had the acquisition of the NSN BBA business been completed on January 1, 2011, nor are they indicative of any future results.

(In thousands) (Unaudited)

Twelve Months Ended December 31,	2012	2011
Pro forma revenue	$119,600	$196,256
Pro forma pre-tax loss	$(23,621)	$(36,980)
Weighted average exchange rate during the period (EURO/USD)	€1.00/$1.29	€1.00/$1.38

On August 4, 2011, we acquired all of the outstanding stock of Bluesocket, Inc., a provider of wireless network solutions with virtual control, for $23.7 million in cash. The acquisition provides us with IEEE802.11N enterprise class wireless LAN expertise, technology, and products to address the growing transition within small-medium enterprises and large enterprises to wireless networks and mobile devices. We have included the financial results of Bluesocket in our consolidated financial statements since the date of acquisition. Pro forma results of operations prior to the closing date for the acquisition have not been presented because the effect of the acquisition was not material to our financial results. The allocation of the purchase price to the estimated fair value of the assets acquired and liabilities assumed at the acquisition date is as follows:

(In thousands)

Cash	$1,027
Accounts receivable	298
Inventory	792
Prepaid expenses	357
Property, plant and equipment	173
Deferred tax assets, net	12,962
Accounts payable	(441)
Unearned revenue	(600)
Accrued expenses	(332)
Net assets acquired	**14,236**
Customer relationships	1,530
Developed technology	3,230
Intellectual property	930
Trade names	270
Goodwill	3,492
Total purchase price	**$23,688**

During the fourth quarter of 2011, the purchase price and purchase price allocation were adjusted for our final valuations. The adjustments resulted in a decrease to the goodwill recognized in the transaction.

The net deferred tax assets acquired are primarily related to net operating losses and previously capitalized and unamortized research and development expense for tax deduction purposes.

The fair value of the customer relationships, developed technology and intellectual property acquired was calculated using an income approach (excess earnings method) and is being amortized using the straight-line method. The customer relationships and intellectual property are being amortized over an estimated useful life of 7 years and the developed technology is being amortized over an average estimated useful life of 4.5 years.

The fair value of the trade names acquired was calculated using an income approach (relief from royalty method) and is being amortized using the straight-line method over the estimated useful life of 4.5 years.

The goodwill of $3.5 million generated from this acquisition is primarily related to expected synergies and was assigned to our Enterprise Networks division. The goodwill will not be deductible for U.S. federal income tax purposes.

For the twelve months ended December 31, 2012, we incurred integration related expenses and amortization of acquired intangibles of $1.5 million related to this acquisition.

3 Stock Incentive Plans

Stock Incentive Program Descriptions

Our Board of Directors adopted the 1996 Employee Incentive Stock Option Plan (1996 Plan) effective February 14, 1996, as amended, under which 17.0 million shares of common stock were authorized for issuance to certain employees and officers through incentive stock options and non-qualified stock options. Options granted under the 1996 Plan typically become exercisable beginning after one year of continued employment, normally pursuant to a four or five-year vesting schedule beginning on the first anniversary of the grant date, and have a ten-year contractual term. The 1996 Plan expired February 14, 2006, and expiration dates of options outstanding at December 31, 2012 under the 1996 Plan range from 2013 to 2015.

On January 23, 2006, the Board of Directors adopted the 2006 Employee Stock Incentive Plan (2006 Plan), which authorizes 13.0 million shares of common stock for issuance to certain employees and officers through incentive stock options and non-qualified stock options, stock appreciation rights, restricted stock and restricted stock units. The 2006 Plan was adopted by stockholder approval at our annual meeting of stockholders held on May 9, 2006. Options granted under the 2006 Plan typically become exercisable beginning after one year of continued employment, normally pursuant to a four-year vesting schedule beginning on the first anniversary of the grant date, and have a ten-year contractual term. Expiration dates of options outstanding at December 31, 2012 under the 2006 Plan range from 2016 to 2022.

Our stockholders approved the 2010 Directors Stock Plan (2010 Directors Plan) on May 5, 2010, under which 0.5 million shares of common stock have been reserved. This plan replaces the 2005 Directors Stock Option Plan. The 2010 Directors Plan provides that the Company may issue stock options, restricted stock and restricted stock units to our non-employee directors. Stock awards issued under the 2010 Directors Plan normally become vested in full on the first anniversary of the grant date. Options issued under the 2010 Directors Plan have a ten-year contractual term. We currently also have options outstanding under the 1995 Directors Plan, as amended, and the 2005 Directors Plan. Expiration dates of options outstanding under both plans at December 31, 2012 range from 2013 to 2019.

The following table is a summary of our stock options outstanding as of December 31, 2011 and 2012 and the changes that occurred during 2012:

(In thousands, except per share amounts)	Number of Options	Weighted Average Exercise Price	Weighted Average Remaining Contractual Life in Years	Aggregate Intrinsic Value
Options outstanding, December 31, 2011	**5,400**	**$25.66**	**6.78**	**$27,270**
Options granted	1,104	$17.93		
Options cancelled/forfeited	(106)	$25.73		
Options exercised	(370)	$16.36		
Options outstanding, December 31, 2012	**6,028**	**$24.82**	**6.71**	**$5,138**
Options exercisable, December 31, 2012	**3,552**	**$24.83**	**5.20**	**$2,566**

All of the options above were issued at exercise prices that approximate fair market value at the date of grant. At December 31, 2012, 7.2 million options were available for grant under the shareholder approved plans.

The aggregate intrinsic values in the table above represent the total pre-tax intrinsic value (the difference between ADTRAN's closing stock price on the last trading day of 2012 and the exercise price, multiplied by the number of in-the-money options) that would have been received by the option holders had all option holders exercised their options on December 31, 2012. The amount of aggregate intrinsic value will change based on the fair market value of ADTRAN's stock.

The total pre-tax intrinsic value of options exercised during 2012, 2011 and 2010 was $4.5 million, $39.8 million and $20.3 million, respectively. The fair value of options fully vesting during 2012, 2011 and 2010 was $7.7 million, $7.3 million and $6.9 million, respectively.

The following table further describes our stock options outstanding as of December 31, 2012:

	Options Outstanding			Options Exercisable	
Range of Exercise Prices	Options Outstanding at 12/31/12 *(in thousands)*	Weighted Avg. Remaining Contractual Life in Years	Weighted Average Exercise Price	Options Exercisable at 12/31/12 *(in thousands)*	Weighted Average Exercise Price
$14.88 – 16.96	601	5.86	$15.27	598	$15.27
$16.97 – 20.46	1,026	9.65	$17.03	30	$19.19
$20.47 – 23.02	1,040	4.07	$22.67	1,037	$22.67
$23.03 – 27.90	935	6.96	$24.09	618	$23.72
$27.91 – 30.36	1,327	7.19	$30.24	587	$30.14
$30.37 – 41.92	1,099	6.15	$33.40	682	$33.16
	6,028			3,552	

Restricted Stock Program Description

On November 6, 2008, the Compensation Committee of the Board of Directors approved the Performance Shares Agreement under the 2006 Plan which sets forth the terms and conditions of awards of performance-based restricted stock units (RSUs). Of the 13.0 million shares of common stock authorized for issuance under the 2006 Plan, we may grant up to 5.0 million shares of common stock for issuance to certain employees and officers for awards other than stock options, which would include RSUs. Under a proposal that was approved by the Board of Directors and shareholders at the 2010 annual meeting, the number of shares available for awards other than stock options under all stock plans was reduced to 3.3 million. The number of shares of common stock earned by a recipient pursuant to the RSUs is subject to a market condition based on ADTRAN's relative total shareholder return against all companies in the NASDAQ Telecommunications Index at the end of a three-year performance period. Depending on the relative total shareholder return over the performance period, the recipient may earn from 0% to 150% of the shares underlying the RSUs, with the shares earned distributed upon the vesting of the RSUs at the end of the three-year performance period. The fair value of the award is based on the market price of our common stock on the date of grant, adjusted for the expected outcome of the impact of market conditions using a Monte Carlo Simulation valuation method. A portion of the granted RSUs also vest and the underlying shares become deliverable upon the death or disability of the recipient or upon a change of control of ADTRAN, as defined by the 2006 Plan. The recipients of the RSUs receive dividend credits based on the shares of common stock underlying the RSUs. The dividend credits are vested and earned in the same manner as the RSUs and will be paid in cash upon the issuance of common stock for the RSUs.

The following table is a summary of our RSUs and restricted stock outstanding as of December 31, 2011 and 2012 and the changes that occurred during 2012:

(In thousands except per share amounts)	Number of Shares	Weighted Average Grant Date Fair Value
Unvested RSUs and restricted stock outstanding, December 31, 2011	**90**	**$34.21**
RSUs and restricted stock granted	51	$19.50
RSUs and restricted stock vested	(21)	$27.75
RSUs and restricted stock cancelled/forfeited	—	$—
Adjustments to shares granted due to shares earned at vesting	(17)	$26.65
Unvested RSUs and restricted stock outstanding, December 31, 2012	**103**	**$29.25**

At December 31, 2012, total compensation cost related to non-vested stock options not yet recognized was approximately $17.4 million, which is expected to be recognized over an average remaining recognition period of 2.6 years.

Valuation and Expense Information

We use the Black-Scholes option pricing model (Black-Scholes Model) for the purpose of determining the estimated fair value of stock option awards on the date of grant. The Black-Scholes Model requires the input of certain assumptions that involve judgment. Because our stock options have characteristics significantly different from those of traded options, and because changes in the input assumptions can materially affect the fair value estimate, existing models may not provide reliable measures of fair value of our stock options. We use a Monte Carlo Simulation valuation method to value our

performance-based RSUs. The fair value of restricted stock issued is equal to the closing price of our stock on the date of grant. We will continue to assess the assumptions and methodologies used to calculate the estimated fair value of stock-based compensation. If circumstances change, and additional data becomes available over time, we may change our assumptions and methodologies, which may materially impact our fair value determination.

The following table summarizes stock-based compensation expense related to stock options, RSUs and restricted stock for the years ended December 31, 2012, 2011 and 2010, which was recognized as follows:

(In thousands)	2012	2011	2010
Stock-based compensation expense included in cost of sales	**$422**	**$412**	**$317**
Selling, general and administrative expense	4,351	4,316	3,575
Research and development expense	4,491	4,441	3,825
Stock-based compensation expense included in operating expenses	**8,842**	**8,757**	**7,400**
Total stock-based compensation expense	**9,264**	**9,169**	**7,717**
Tax benefit for expense associated with non-qualified options	(1,234)	(1,321)	(650)
Total stock-based compensation expense, net of tax	**$8,030**	**$7,848**	**$7,067**

At December 31, 2012, total compensation cost related to non-vested stock options not yet recognized was approximately $17.4 million, which is expected to be recognized over an average remaining recognition period of 2.6 years.

The stock option pricing model requires the use of several significant assumptions that impact the fair value estimate. These variables include, but are not limited to, the volatility of our stock price and employee exercise behaviors. There were no material changes made during 2012 to the methodology used to determine our assumptions.

The weighted-average estimated fair value of stock options granted to employees and directors during the twelve months ended December 31, 2012, 2011 and 2010 was $5.60 per share, $9.53 per share and $11.69 per share, respectively, with the following weighted-average assumptions:

	2012	2011	2010
Expected volatility	39.46%	38.32%	39.57%
Risk-free interest rate	0.96%	1.01%	1.35%
Expected dividend yield	2.05%	1.19%	1.08%
Expected life (in years)	6.18	5.15	5.78

We based our estimate of expected volatility for the 12 months ended December 31, 2012, 2011 and 2010 on the sequential historical daily trading data of our common stock for a period equal to the expected life of the options granted. The selection of the historical volatility method was based on available data indicating our historical volatility is as equally representative of our future stock price trends as is our implied volatility. We have no reason to believe the future volatility of our stock price is likely to differ from its past volatility.

The risk-free interest rate assumption is based upon implied yields of U.S. Treasury zero-coupon bonds on the date of grant having a remaining term equal to the expected life of the options granted. The dividend yield is based on our historical and expected dividend payouts.

The expected life of our stock options is based upon historical exercise and cancellation activity of our previous stock-based grants with a ten-year contractual term.

The RSU pricing model also requires the use of several significant assumptions that impact the fair value estimate. The estimated fair value of the RSUs granted to employees in 2012, 2011 and 2010 was $19.46 per share, $38.73 per share and $39.21 per share, respectively, with the following assumptions:

	2012	2011	2010
Expected volatility	37.75%	39.32%	40.82%
Risk-free interest rate	0.38%	0.37%	0.51%
Expected dividend yield	2.12%	1.08%	1.07%

Stock-based compensation expense recognized in our Consolidated Statements of Income for the 12 months ended December 31, 2012, 2011 and 2010 is based on RSUs and options ultimately expected to vest, and has been reduced for estimated forfeitures. Estimates for forfeiture rates are based upon historical experience and are evaluated quarterly. We expect our forfeiture rate for stock option awards to be approximately 1.6% annually. We estimated a 0% forfeiture rate for our RSUs and restricted stock due to the limited number of recipients and historical experience for these awards.

4 Investments

At December 31, 2012, we held the following securities and investments, recorded at either fair value or cost.

(In thousands)	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value/ Carrying Value
Deferred compensation plan assets	$10,688	$846	$(7)	$11,527
Corporate bonds	185,464	966	(18)	186,412
Municipal fixed-rate bonds	174,530	627	(73)	175,084
Municipal variable rate demand notes	34,375	—	—	34,375
Fixed income bond fund	444	12	—	456
Marketable equity securities	20,966	14,630	(392)	35,204
Available-for-sale securities held at fair value	**$426,467**	**$17,081**	**$(490)**	**$443,058**
Restricted investment held at cost				**48,250**
Other investments held at cost				**1,902**
Total carrying value of available-for-sale investments				**$493,210**

At December 31, 2011, we held the following securities and investments, recorded at either fair value or cost.

(In thousands)	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value/ Carrying Value
Deferred compensation plan assets	$7,994	$119	$(401)	$7,712
Corporate bonds	159,077	181	(2,505)	156,753
Municipal fixed-rate bonds	174,300	579	(53)	174,826
Municipal variable rate demand notes	69,660	—	—	69,660
Fixed income bond fund	527	194	—	721
Marketable equity securities	12,771	19,098	(559)	31,310
Available-for-sale securities held at fair value	**$424,329**	**$20,171**	**$(3,518)**	**$440,982**
Restricted investment held at cost				**48,250**
Other investments held at cost				**2,123**
Total carrying value of available-for-sale investments				**$491,355**

As of December 31, 2012, corporate and municipal fixed-rate bonds had the following contractual maturities:

(In thousands)	Corporate bonds	Municipal fixed-rate bonds
Less than one year	$61,318	$60,745
One to two years	97,414	40,981
Two to three years	27,680	21,983
Three to five years	—	51,375
Total	**$186,412**	**$175,084**

Our investment policy provides limitations for issuer concentration, which limits, at the time of purchase, the concentration in any one issuer to 5% of the market value of our total investment portfolio.

We review our investment portfolio for potential "other-than-temporary" declines in value on an individual investment basis. We assess, on a quarterly basis, significant declines in value which may be considered other-than-temporary and, if necessary, recognize and record the appropriate charge to write-down the carrying value of such investments. In making this assessment, we take into consideration qualitative and quantitative information, including but not limited to the following: the magnitude and duration of historical declines in market prices, credit rating activity, assessments of liquidity, public filings, and statements made by the issuer. We generally begin our identification of potential other-than-temporary impairments by reviewing any security with a fair value that has declined from its original or adjusted cost basis by 25% or more for six or more consecutive months. We then evaluate the individual security based on the previously identified factors to determine the amount of the write-down, if any. As a result of our review, we recorded an other-than-temporary impairment charge of $17 thousand during the fourth quarter of 2012. For each of the years ended December 31, 2012, 2011 and 2010 we recorded a charge of $0.7 million, $68 thousand and $43 thousand, respectively, related to the other-than-temporary impairment of certain marketable equity securities, a fixed income bond fund and our deferred compensation plan assets.

Realized gains and losses on sales of securities are computed under the specific identification method. The following table presents gross realized gains and losses related to our investments.

(In thousands)

Year Ended December 31,	2012	2011	2010
Gross realized gains	$11,006	$13,641	$12,191
Gross realized losses	$(1,456)	$(1,187)	$(1,183)

The following table presents the breakdown of investments with unrealized losses at December 31, 2012.

(In thousands)	Continuous Unrealized Loss Position for Less than 12 Months		Continuous Unrealized Loss Position for 12 Months or Greater		Total	
	Fair Value	Unrealized Losses	Fair Value	Unrealized Losses	Fair Value	Unrealized Losses
Deferred compensation plan assets	$915	$(7)	$—	$—	$915	$(7)
Corporate bonds	20,204	(17)	1,600	(1)	21,804	(18)
Municipal fixed-rate bonds	34,297	(73)	—	—	34,297	(73)
Marketable equity securities	6,171	(355)	230	(37)	6,401	(392)
Total	**$61,587**	**$(452)**	**$1,830**	**$(38)**	**$63,417**	**$(490)**

The following table presents the breakdown of investments with unrealized losses at December 31, 2011.

(In thousands)	Continuous Unrealized Loss Position for Less than 12 Months		Continuous Unrealized Loss Position for 12 Months or Greater		Total	
	Fair Value	Unrealized Losses	Fair Value	Unrealized Losses	Fair Value	Unrealized Losses
Deferred compensation plan assets	$5,655	$(401)	$—	$—	$5,655	$(401)
Corporate bonds	112,345	(2,505)	—	—	112,345	(2,505)
Municipal fixed-rate bonds	20,076	(53)	—	—	20,076	(53)
Marketable equity securities	4,418	(543)	48	(16)	4,466	(559)
Total	**$142,494**	**$(3,502)**	**$48**	**$(16)**	**$142,542**	**$(3,518)**

The decrease in unrealized losses during 2012, as reflected in the table above, is primarily due to credit yield spreads tightening during 2012 primarily impacting our corporate bonds. At December 31, 2012, a total of 152 of our marketable equity securities were in an unrealized loss position.

We have categorized our cash equivalents held in money market funds and our investments held at fair value into a three-level fair value hierarchy based on the priority of the inputs to the valuation technique for the cash equivalents and investments as follows: Level 1 - Values based on unadjusted quoted prices for identical assets or liabilities in an active market; Level 2 - Values based on quoted prices in markets that are not active or model inputs that are observable either directly or indirectly; Level 3 - Values based on prices or valuation techniques that require inputs that are both unobservable and significant to the overall fair value measurement. These inputs include information supplied by investees.

Fair Value Measurements at December 31, 2012 Using

(In thousands)	Fair Value	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Cash equivalents				
Money market funds	$28,071	$28,071	$—	$—
Available-for-sale securities				
Deferred compensation plan assets	11,527	11,527	—	—
Available-for-sale debt securities				
Corporate bonds	186,412	—	186,412	—
Municipal fixed-rate bonds	175,084	—	175,084	—
Municipal variable rate demand notes	34,375	—	34,375	—
Fixed income bond fund	456	456	—	—
Available-for-sale marketable equity securities				
Marketable equity securities—technology industry	14,099	14,099	—	—
Marketable equity securities—other	21,105	21,105	—	—
Available-for-sale securities	**443,058**	**47,187**	**395,871**	—
Total	**$471,129**	**$75,258**	**$395,871**	**$—**

Fair Value Measurements at December 31, 2011 Using

(In thousands)	Fair Value	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Cash equivalents				
Money market funds	$13,696	$13,696	$—	$—
Available-for-sale securities				
Deferred compensation plan assets	7,712	7,712	—	—
Available-for-sale debt securities				
Corporate bonds	156,753	—	156,753	—
Municipal fixed-rate bonds	174,826	—	174,826	—
Municipal variable rate demand notes	69,660	—	69,660	—
Fixed income bond fund	721	721	—	—
Available-for-sale marketable equity securities				
Marketable equity securities—technology industry	18,743	18,743	—	—
Marketable equity securities—other	12,567	12,567	—	—
Available-for-sale securities	**440,982**	**39,743**	**401,239**	—
Total	**$454,678**	**$53,439**	**$401,239**	**$—**

The fair value of our Level 2 securities is calculated using a weighted average market price for each security. Market prices are obtained from a variety of industry standard data providers, security master files from large financial institutions, and other third-party sources. These multiple market prices are used as inputs into a distribution-curve-based algorithm to determine the daily market value of each security.

Our municipal variable rate demand notes have a structure that implies a standard expected market price. The frequent interest rate resets make it reasonable to expect the price to stay at par. These securities are priced at the expected market price.

5 Inventory

At December 31, 2012 and 2011, inventory was comprised of the following:

(In thousands)	2012	2011
Raw materials	$47,054	$44,588
Work in process	3,262	3,954
Finished goods	52,267	39,258
Total	**$102,583**	**$87,800**

We establish reserves for estimated excess, obsolete, or unmarketable inventory equal to the difference between the cost of the inventory and the estimated fair value of the inventory based upon assumptions about future demand and market conditions. At December 31, 2012 and 2011, raw materials reserves totaled $9.9 million and $7.9 million, respectively, and finished goods inventory reserves totaled $2.1 million and $1.5 million, respectively.

6 Property, Plant and Equipment

At December 31, 2012 and 2011, property, plant and equipment were comprised of the following:

(In thousands)	2012	2011
Land	$4,263	$4,263
Building and land improvements	20,915	16,857
Building	68,479	68,479
Furniture and fixtures	16,631	16,433
Computer hardware and software	68,596	64,053
Engineering and other equipment	99,081	91,232
Total Property, Plant and Equipment	**277,965**	**261,317**
Less accumulated depreciation	(197,719)	(186,022)
Total Property, Plant and Equipment (net)	**$80,246**	**$75,295**

Depreciation expense was $12.1 million, $10.8 million and $10.2 million in 2012, 2011 and 2010, respectively.

7 Goodwill and Intangible Assets

The changes in the carrying value of goodwill, all of which is included in our Enterprise Networks division, for the year ended December 31, 2012 are as follows:

(In thousands)	
Balance, December 31, 2011	**$3,492**
Acquisitions	—
Impairment losses	—
Balance, December 31, 2012	**$3,492**
Balance as of December 31, 2012	
Goodwill	$3,492
Accumulated impairment losses	—
Total Goodwill	**$3,492**

We evaluate the carrying value of goodwill during the fourth quarter of each year and between annual evaluations if events occur or circumstances change that would more likely than not reduce the fair value of the reporting unit below its carrying amount. When evaluating whether goodwill is impaired, we compare the fair value of the reporting unit to which the goodwill is assigned to the reporting unit's carrying amount, including goodwill. If the carrying amount of the reporting unit exceeds its fair value, then the amount of the impairment loss is measured. There were no impairment losses recognized during 2012 or 2011.

The following table presents our intangible assets as of December 31, 2012 and 2011. Intangible assets are included in other assets in the accompanying Consolidated Balance Sheets and include intangible assets acquired in conjunction with our acquisition of Objectworld Communications Corporation on September 15, 2009, Bluesocket, Inc. on August 4, 2011, and the NSN BBA business on May 4, 2012.

(In thousands)	December 31, 2012			December 31, 2011		
	Gross Value	Accumulated Amortization	Net Value	Gross Value	Accumulated Amortization	Net Value
Customer relationships	$6,769	$(766)	$6,003	$1,623	$(194)	$1,429
Developed technology	6,397	(1,354)	5,043	3,230	(303)	2,927
Intellectual property	2,340	(851)	1,489	2,340	(525)	1,815
Trade names	270	(85)	185	270	(28)	242
Other	13	(3)	10	—	—	—
Total	**$15,789**	**$(3,059)**	**$12,730**	**$7,463**	**$(1,050)**	**$6,413**

Amortization expense was $2.0 million, $0.7 million and $0.4 million in 2012, 2011 and 2010, respectively.

As of December 31, 2012, the estimated future amortization expense of intangible assets is as follows:

(In thousands)	Amount
2013	$2,438
2014	2,284
2015	2,149
2016	1,876
2017	1,273
Thereafter	2,710
Total	**$12,730**

8 Alabama State Industrial Development Authority Financing and Economic Incentives

In conjunction with an expansion of our Huntsville, Alabama, facility, we were approved for participation in an incentive program offered by the State of Alabama Industrial Development Authority (the "Authority"). Pursuant to the program, on January 13, 1995, the Authority issued $20.0 million of its taxable revenue bonds and loaned the proceeds from the sale of the bonds to ADTRAN. The bonds were originally purchased by AmSouth Bank of Alabama, Birmingham, Alabama (the "Bank"). Wachovia Bank, N.A., Nashville, Tennessee (formerly First Union National Bank of Tennessee) (the "Bondholder"), which was acquired by Wells Fargo & Company on December 31, 2008, purchased the original bonds from the Bank and made further advances to the Authority, bringing the total amount outstanding to $50.0 million. An Amended and Restated Taxable Revenue Bond ("Amended and Restated Bond") was issued and the original financing agreement was amended. The Amended and Restated Bond bears interest, payable monthly. The interest rate is 5% per annum. The Amended and Restated Bond matures on January 1, 2020. The estimated fair value of the bond at December 31, 2012 was approximately $48.8 million, based on a debt security with a comparable interest rate and maturity and a Standard & Poor's credit rating of A. We are required to make payments to the Authority in amounts necessary to pay the principal of and interest on the Amended and Restated Bond. Included in long-term investments at December 31, 2012 is $48.3 million which is invested in a restricted certificate of deposit. These funds serve as a collateral deposit against the principal of this bond, and we have the right to set-off the balance of the Bond with the collateral deposit in order to reduce the balance of the indebtedness.

In conjunction with this program, we are eligible to receive certain economic incentives from the state of Alabama that reduce the amount of payroll withholdings that we are required to remit to the state for those employment positions that qualify under the program. For the years ended December 31, 2012, 2011 and 2010, we realized economic incentives related to payroll withholdings totaling $1.4 million, $1.9 million and $1.5 million, respectively.

Due to continued positive cash flow from operating activities, we made a business decision in 2006 to begin an early partial redemption of the Bond. We made principal payments of $0.5 million and $1.0 million for the years ended December 31, 2012 and 2011, respectively. It is our intent to make annual principal payments in addition to the interest amounts that are due. In connection with this decision, $0.5 million of the bond debt has been reclassified to a current liability in accounts payable in the Consolidated Balance Sheets at December 31, 2012 and 2011.

9 Income Taxes

A summary of the components of the provision for income taxes as of December 31, 2012, 2011 and 2010 is as follows:

(In thousands)	2012	2011	2010
Current			
Federal	$26,225	$59,382	$48,870
State	3,766	7,177	6,380
International	(504)	431	274
Total current	29,487	66,990	55,524
Deferred tax expense (benefit)	(3,785)	575	(1,324)
Total Provision for Income Taxes	$25,702	$67,565	$54,200

The effective income tax rate differs from the federal statutory rate due to the following:

	2012	2011	2010
Tax provision computed at the federal statutory rate	35.00%	35.00%	35.00%
State income tax provision, net of federal benefit	3.78	3.19	3.33
Federal research credits	—	(2.50)	(2.90)
Valuation allowance on losses of foreign subsidiaries	3.80	—	—
Tax-exempt income	(1.01)	(0.27)	(0.46)
State tax incentives	(4.46)	(0.90)	(0.86)
Stock-based compensation	2.36	0.03	0.34
Domestic production activity deduction	(3.21)	(1.84)	(2.37)
Other, net	(1.03)	0.07	0.15
Effective Tax Rate	35.23%	32.78%	32.23%

Income before provision for income taxes for the years ended December 31, 2012, 2011 and 2010 is as follows:

(In thousands)	2012	2011	2010
U.S. entities	$80,926	$204,652	$167,118
International	(7,961)	1,490	1,071
Total	$72,965	$206,142	$168,189

Income before provision for income taxes for international entities reflects income based on statutory transfer pricing agreements. This amount does not correlate to consolidated international revenues, many of which occur from our U.S. entity.

Deferred income taxes on the balance sheet result from temporary differences between the amount of assets and liabilities recognized for financial reporting and tax purposes. The principal components of our current and non-current deferred taxes are as follows:

(In thousands)	2012	2011
Current deferred tax assets		
Accounts receivable	$2	$4
Inventory	7,507	6,709
Accrued expenses	5,546	5,412
Total Current Deferred Tax Assets	**13,055**	**12,125**
Non-current deferred tax assets		
Accrued expenses	116	113
Deferred compensation	4,456	3,177
Stock-based compensation	4,569	3,808
Uncertain tax positions related to state taxes and related interest	1,005	947
Pensions	605	—
Foreign and state losses and state credit carry-forwards	11,327	7,891
Federal loss and research carry-forwards	12,210	14,778
Valuation allowance	(10,939)	(7,585)
Total Non-current Deferred Tax Assets	**23,349**	**23,129**
Total Deferred Tax Assets	**$36,404**	**$35,254**
Non-current Deferred Tax Liabilities		
Accumulated depreciation	$(6,405)	$(7,081)
Intellectual property	(1,839)	(2,594)
Investments	(4,844)	(5,109)
Total Non-current Deferred Tax Liabilities	**$(13,088)**	**$(14,784)**
Net Deferred Tax Assets	**$23,316**	**$20,470**

At December 31, 2012 and 2011, non-current deferred tax liabilities and non-current deferred tax assets, respectively, related to investments reflect deferred taxes on unrealized gains and losses on available-for-sale investments. The net change in non-current deferred taxes associated with these investments, a deferred tax benefit of $34 thousand in 2012 and a deferred tax benefit of $7.8 million in 2011, is recorded as an adjustment to other comprehensive income, presented in the Consolidated Statements of Comprehensive Income.

We have deferred tax assets for foreign and domestic loss carry-forwards, unamortized research and development costs and state credit carry-forwards of $23.5 million which will expire between 2013 and 2030. The foreign loss carry-forwards were generated through the acquisition of a foreign entity in 2009 and through current losses at a foreign subsidiary. The unamortized research and development costs are related to our acquisition of Bluesocket in 2011. The state credit carry-forwards result from tax credits in excess of our annual tax liability to an individual state where we do not generate sufficient state income to offset the credit. We believe it is more likely than not that we will not realize the full benefits of the deferred tax asset arising from these losses and credits in various states and foreign countries, and accordingly, we have provided a valuation allowance against these deferred tax assets. We do not provide for U.S. income tax on undistributed earnings of our foreign operations, whose earnings are intended to be permanently reinvested. These earnings are not required to service debt or fund our U.S. operations.

During 2012, 2011 and 2010, we recorded an income tax benefit of $1.9 million, $10.5 million and $4.9 million, respectively, as an adjustment to equity. This deduction is calculated on the difference between the exercise price of stock option exercises and the market price of the underlying common stock upon exercise.

The change in the unrecognized income tax benefits for 2012, 2011 and 2010 is reconciled below:

(In thousands)	2012	2011	2010
Balance at beginning of period	**$2,970**	**$2,593**	**$2,919**
Increases for tax position related to:			
Prior years	965	—	197
Current year	302	840	818
Decreases for tax positions related to:			
Prior years	(49)	(92)	(16)
Settlements with taxing authorities	(507)	(354)	(630)
Expiration of applicable statute of limitations	(755)	(17)	(695)
Balance at end of period	**$2,926**	**$2,970**	**$2,593**

As of December 31, 2012, 2011, and 2010, our total liability for unrecognized tax benefits was $2.9 million, $3.0 million, and $2.6 million, respectively, of which $2.2 million, $2.4 million, and $2.0 million, respectively, would reduce our effective tax rate if we were successful in upholding all of the uncertain positions and recognized the amounts recorded. We classify interest and penalties recognized on the liability for unrecognized tax benefits as income tax expense. As of December 31, 2012, 2011 and 2010, the balances of accrued interest and penalties were $0.8 million, $1.2 million and $1.0 million, respectively.

We do not anticipate a single tax position generating a significant increase or decrease in our liability for unrecognized tax benefits within 12 months of this reporting date. We file income tax returns in the U.S. federal and various state jurisdictions and several foreign jurisdictions. We have been audited by the Internal Revenue Service and the state of Alabama through the 2009 tax year. Generally, we are not subject to changes in income taxes by any taxing jurisdiction for the years prior to 2009.

10 Employee Benefit Plans

Pension Benefit Plan

As a result of our acquisition of the NSN BBA business, we assumed a defined benefit pension plan covering employees in certain foreign countries. We established a Contribution Trust Arrangement (CTA) to hold the pension assets, and NSN transferred assets to us equal to the defined benefit obligation as of the May 4, 2012 acquisition date.

The pension benefit plan obligations and funded status at December 31, 2012, are as follows:

(In thousands)	
Change in projected benefit obligation:	
Projected benefit obligation at beginning of period	$—
Business combination	(18,063)
Service cost	(766)
Interest cost	(494)
Actuarial gain (loss)	(1,862)
Foreign currency exchange rate changes	4
Projected benefit obligation at end of period	**(21,181)**
Change in plan assets:	
Fair value of plan assets at beginning of period	$—
Business combination	18,063
Actual return on plan assets	592
Foreign currency exchange rate changes	(35)
Fair value of plan assets at end of period	**$18,620**
Funded status at end of period	**$(2,561)**

The accumulated benefit obligation was $20.8 million at December 31, 2012.

The amounts recognized in the balance sheet for the unfunded pension liability as of December 31, 2012 are as follows:

(In thousands)	
Current liability	$(609)
Non-current liability	(1,952)
Total	**$(2,561)**

The components of net periodic pension cost and amounts recognized in accumulated other comprehensive income for the period May 4, 2012 to December 31, 2012 were as follows:

(In thousands)	
Net periodic benefit cost:	
Service cost	$766
Interest cost	494
Expected return on plan assets	(674)
Net periodic benefit cost	**586**
Other changes in plan assets and benefit obligations recognized in accumulated other comprehensive income:	
Net actuarial (gain) loss	1,862
Net unrealized (gain) loss on plan assets	90
Total recognized in net periodic benefit cost and accumulated other comprehensive income	**$2,538**

The defined benefit pension plan is accounted for on an actuarial basis, which requires the selection of various assumptions, including an expected rate of return on plan assets and a discount rate. The expected return on our German plan assets that is utilized in determining the benefit obligation and net periodic benefit cost is derived from periodic studies, which include a review of asset allocation strategies, anticipated future long-term performance of individual asset classes, risks using standard deviations and correlations of returns among the asset classes that comprise the plans' asset mix. While the studies give appropriate consideration to recent plan performance and historical returns, the assumptions are primarily long-term, prospective rates of return.

Another key assumption in determining net pension expense is the assumed discount rate to be used to discount plan obligations. The discount rate has been derived from the returns of high-quality, corporate bonds denominated in Euro currency with durations close to the duration of our pension obligations.

The weighted-average assumptions that were used to determine the net periodic benefit cost for the period May 4, 2012 to December 31, 2012 were as follows:

Discount rates	3.96%
Rate of compensation increase	2.25%
Expected long-term rates of return	5.40%

The weighted-average assumptions that were used to determine the benefit obligation at December 31, 2012:

Discount rates	3.50%
Rate of compensation increase	2.25%

No amounts will be amortized from accumulated other comprehensive income into net periodic benefit cost during 2013.

We do not anticipate making a contribution to our pension plan in 2013. The following pension benefit payments, which reflect expected future service, as appropriate, are expected to be paid to participants:

(In thousands)	
2013	$339
2014	226
2015	296
2016	211
2017	370
2018-2022	4,080
Total	**$5,522**

We have categorized our cash equivalents and our investments held at fair value into a three-level fair value hierarchy based on the priority of the inputs to the valuation technique for the cash equivalents and investments as follows: Level 1 - Values based on unadjusted quoted prices for identical assets or liabilities in an active market; Level 2 - Values based on quoted prices in markets that are not active or model inputs that are observable either directly or indirectly; Level 3 - Values based on prices or valuation techniques that require inputs that are both unobservable and significant to the overall fair value measurement. These inputs include information supplied by investees.

	Fair Value Measurements at December 31, 2012 Using			
(In thousands)	Fair Value	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Cash equivalents	$6	$6	$—	$—
Available-for-sale securities				
Bond funds	13,880	13,880	—	—
Equity funds	3,975	3,975	—	—
Balanced funds	759	759	—	—
Available-for-sale securities	**18,614**	**18,614**	—	—
Total	**$18,620**	**$18,620**	**$—**	**$—**

Our investment policy includes various guidelines and procedures designed to ensure assets are invested in a manner necessary to meet expected future benefits earned by participants. The investments guidelines consider a broad range of economic conditions. Central to the policy are target allocation ranges by asset class, which is currently 75% for bond funds and 25% for equity funds.

The objectives of the target allocations are to maintain investment portfolios that diversify risk through prudent asset allocation parameters, achieve asset returns that meet or exceed the plans' actuarial assumptions, and achieve asset returns that are competitive with like institutions employing similar investment strategies.

The investment policy is periodically reviewed by us and a designated third-party fiduciary for investment matters. The policy is established and administered in a manner that is compliant at all times with applicable government regulations.

401(k) Savings Plan

We maintain the ADTRAN, Inc. 401(k) Retirement Plan (Savings Plan) for the benefit of our eligible employees. The Savings Plan is intended to qualify under Sections 401(a) and 401(k) of the Internal Revenue Code of 1986, as amended (Code), and is intended to be a "safe harbor" 401(k) plan under Code Section 401(k)(12). The Savings Plan allows employees to save for retirement by contributing part of their compensation to the plan on a tax-deferred basis. The Savings Plan also requires us to contribute a "safe harbor" amount each year. We match up to 4% of employee contributions (100% of an employee's first 3% of contributions and 50% of their next 2% of contributions), beginning on the employee's one year anniversary date. In calculating our matching contribution, we only use compensation up to the statutory maximum under the Code ($250 thousand for 2012). All contributions under the Savings Plan are 100% vested. Expenses recorded for employer contributions and plan administration costs for the Savings Plan amounted to approximately $4.6 million, $4.3 million and $4.6 million in 2012, 2011 and 2010, respectively.

Deferred Compensation Plans

We maintain the ADTRAN, Inc. Deferred Compensation Plan (Deferred Compensation Plan). This plan is offered as a supplement to our tax-qualified 401(k) plan and is available to certain executive management employees who have been designated by our Board of Directors. The deferred compensation plan allows participants to defer all or a portion of certain specified bonuses and up to 25% of remaining cash compensation, and permits us to make matching contributions on a discretionary basis, without the limitations that apply to the 401(k) plan. To date, we have not made any matching contributions under this plan.

We also maintain the ADTRAN, Inc. Equity Deferral Program for Employees for the purpose of providing deferred compensation for certain executive management employees. Participants may elect to defer all or a portion of their vested Performance Share awards to the Plan. Such deferrals shall continue to be held and deemed to be invested in shares of ADTRAN stock unless and until the amounts are distributed or such deferrals are moved to another deemed investment pursuant to an election made by the Participant.

We have set aside the plan assets for both plans in a rabbi trust (Trust) and all contributions are credited to bookkeeping accounts for the participants. The Trust assets are subject to the claims of our creditors in the event of bankruptcy or insolvency. The assets of the Trust are deemed to be invested in pre-approved mutual funds as directed by each participant, and the participant's bookkeeping account is credited with the earnings and losses attributable to those investments. Benefits are scheduled to be distributed six months after termination of employment in a single lump sum payment or annual installments paid over a three or ten year term. Distributions will be made on a pro rata basis from each of the hypothetical investments of the Participant's account in cash. Any whole shares of ADTRAN, Inc. common stock that are distributed will be distributed in-kind.

Assets of the Trust are deemed invested in mutual funds that cover an investment spectrum ranging from equities to money market instruments. These mutual funds are publicly quoted and reported at fair value. The fair value of the assets held by the Trust and the amounts payable to the plan participants are as follows:

(In thousands)	2012	2011
Fair Value of Plan Assets		
Long-term Investments	$11,526	$7,710
Total Fair Value of Plan Assets	**$11,526**	**$7,710**
Amounts Payable to Plan Participants		
Non-current Liabilities	$11,526	$7,710
Total Amounts Payable to Plan Participants	**$11,526**	**$7,710**

Interest and dividend income of the Trust have been included in interest and dividend income in the accompanying 2012, 2011 and 2010 Consolidated Statements of Income. Changes in the fair value of the plan assets held by the Trust have been included in accumulated other comprehensive income in the accompanying 2012 and 2011 Consolidated Balance Sheets. Changes in the fair value of the deferred compensation liability are included as selling, general and administrative expense in the accompanying 2012, 2011 and 2010 Consolidated Statements of Income. Based on the changes in the total fair value of the Trust's assets, we recorded deferred compensation adjustments in 2012, 2011 and 2010 of $0.9 million, $(0.2) million and $0.4 million, respectively.

Retiree Medical Coverage

We provide medical, dental and prescription drug coverage to one retired former officer and his spouse, for his life, on the same terms as provided to our active officers, and to the spouse of a former deceased officer for up to 30 years. At December 31, 2012 and 2011, this liability totaled $0.2 million.

11 Segment Information and Major Customers

We operate in two reportable segments: (1) the Carrier Networks Division and (2) the Enterprise Networks Division. The accounting policies of the segments are the same as those described in the "Nature of Business and Summary of Significant Accounting Policies" (see Note 1) to the extent that such policies affect the reported segment information. We evaluate the performance of our segments based on gross profit; therefore, selling, general and administrative expense, research and development expenses, interest income and dividend income, interest expense, net realized investment gain/loss, other income/expense and provision for taxes are reported on an entity-wide basis only. There are no inter-segment revenues.

The following table presents information about the reported sales and gross profit of our reportable segments for each of the years ended December 31, 2012, 2011 and 2010. Asset information by reportable segment is not reported, since we do not produce such information internally.

(In thousands)	2012		2011		2010	
Sales and Gross Profit by Market Segment	Sales	Gross Profit	Sales	Gross Profit	Sales	Gross Profit
Carrier Networks	$492,096	$247,380	$569,579	$327,813	$476,030	$283,310
Enterprise Networks	128,518	69,263	147,650	86,505	129,644	75,553
Total	**$620,614**	**$316,643**	**$717,229**	**$414,318**	**$605,674**	**$358,863**

Sales by Product

Our three major product categories are Carrier Systems, Business Networking and Loop Access.

Carrier Systems products are used by communications service providers to provide data, voice and video services to consumers and enterprises. This category includes the following product areas and related services:

Broadband Access

- Total Access 5000 MSAP
- hiX family of MSAPs
- Total Access 1100/1200 Series of FTTN products
- UBE
- DSLAM products

Optical

- ONE
- NetVanta 8000 Series
- OPTI and Total Access 3000 Optical products
- SFP products

TDM Systems

Network Management Solutions

Business Networking products provide access to telecommunication services and facilitate the delivery of cloud connectivity, enterprise communications and virtual mobility to the SME market. This category includes the following product areas and related services:

Internetworking Products

- Total Access IP Business Gateways
- ONTs
- Bluesocket vWLAN
- NetVanta
  - Multiservice Routers
  - Managed Ethernet Switches
  - UC solutions
  - Carrier Ethernet NTE
- Network Management Solutions

IADs

Loop Access products are used by carrier and enterprise customers for access to copper-based telecommunications networks. The Loop Access category includes the following product areas:

- HDSL products
- DDS
- ISDN products
- T1/E1/T3 CSUs/DSUs
- TRACER fixed-wireless products

The table below presents sales information by product category for the years ended December 31, 2012, 2011 and 2010:

(In thousands)	2012	2011	2010
Carrier Systems	$399,646	$420,289	$289,314
Business Networking	149,304	162,186	127,233
Loop Access	71,664	134,754	189,127
Total	**$620,614**	**$717,229**	**$605,674**

In addition, we identify subcategories of product revenues, which we divide into core products and legacy products. Our core products consist of Broadband Access and Optical products (included in Carrier Systems) and Internetworking products (included in Business Networking). Our legacy products include HDSL products (included in Loop Access) and other products not included in the aforementioned core products.

The table below presents subcategory revenues for the years ended December 31, 2012, 2011 and 2010:

(In thousands)	2012	2011	2010
Core Products			
Broadband Access (included in Carrier Systems)	$320,076	$289,776	$176,116
Optical (included in Carrier Systems)	51,755	82,535	66,206
Internetworking (NetVanta and Multi-service Access Gateways) (included in Business Networking)	142,958	151,536	111,123
Subtotal	**$514,789**	**$523,847**	**$353,445**
Legacy Products			
HDSL (does not include T1) (included in Loop Access)	66,974	126,976	177,249
Other products (excluding HDSL)	38,851	66,406	74,980
Subtotal	**$105,825**	**$193,382**	**$252,229**
Total	**$620,614**	**$717,229**	**$605,674**

The following table presents sales information by geographic area for the years ended December 31, 2012, 2011 and 2010. International sales correlate to shipments with a non-U.S. destination.

(In thousands)	2012	2011	2010
United States	$470,369	$632,795	$573,845
International	150,245	84,434	31,829
Total	**$620,614**	**$717,229**	**$605,674**

Only a single customer comprised more than 10% of our revenue in 2012 at 23%. Single customers comprising more than 10% of our revenue in 2011 included two customers at 25% and 10%, respectively. Single customers comprising more than 10% of our revenue in 2010 included three customers at 20%, 18%, and 11%, respectively. No other customer accounted for 10% or more of our sales in 2012, 2011 or 2010.

Sales to our three largest service provider customers for each year were 41%, 44% and 49% of total revenue in 2012, 2011 and 2010, respectively.

As of December 31, 2012, long-lived assets, net totaled $80.2 million, which includes $73.9 million held in the United States and $6.3 million held outside the United States. As of December 31, 2011, long-lived assets, net totaled $75.3 million, which includes $73.9 million held in the United States and $1.4 million held outside the United States.

12 Commitments and Contingencies

In the ordinary course of business, we may be subject to various legal proceedings and claims, including employment disputes, patent claims, disputes over contract agreements and other commercial disputes. In some cases, claimants seek damages or other relief, such as royalty payments related to patents, which, if granted, could require significant expenditures. Although the outcome of any claim or litigation can never be certain, it is our opinion that the outcome of all contingencies of which we are currently aware will not materially affect our business, operations, financial condition or cash flows.

We lease office space and equipment under operating leases which expire at various dates through 2018. As of December 31, 2012, future minimum rental payments under non-cancelable operating leases with original maturities of greater than 12 months are approximately as follows:

(In thousands)	
2013	$4,353
2014	3,687
2015	3,214
2016	2,271
Thereafter	2,722
Total	**$16,247**

Rental expense was approximately $3.9 million, $2.4 million and $1.8 million for the years ended December 31, 2012, 2011 and 2010, respectively.

13 Earnings per Share

A summary of the calculation of basic and diluted earnings per share (EPS) for the years ended December 31, 2011, 2010 and 2009 is as follows:

(In thousands, except for per share amounts)

	2012	2011	2010
Numerator			
Net Income	$47,263	$138,577	$113,989
Denominator			
Weighted average number of shares—basic	63,259	64,145	62,490
Effect of dilutive securities:			
Stock options	488	1,236	1,355
Restricted stock and restricted stock units	27	35	34
Weighted average number of shares—diluted	**63,774**	**65,416**	**63,879**
Net income per share—basic	$0.75	$2.16	$1.82
Net income per share—diluted	$0.74	$2.12	$1.78

For each of the years ended December 31, 2012, 2011 and 2010, 3.2 million, 1.2 million and 2.0 million stock options were outstanding but were not included in the computation of that year's diluted EPS because the options' exercise prices were greater than the average market price of the common shares, therefore making them anti-dilutive under the treasury stock method.

14 Summarized Quarterly Financial Data (Unaudited)

The following table presents unaudited quarterly operating results for each of our last eight fiscal quarters. This information has been prepared on a basis consistent with our audited financial statements and includes all adjustments, consisting only of normal recurring adjustments, considered necessary for a fair presentation of the data.

Unaudited Quarterly Operating Results

(In thousands, except for per share amounts)

Three Months Ended	March 31, 2012	June 30, 2012	September 30, 2012	December 31, 2012
Net sales	$134,735	$183,998	$162,125	$139,756
Gross profit	$74,087	$95,201	$79,972	$67,383
Operating income	$16,181	$26,838	$10,276	$2,874
Net income	$12,960	$21,070	$9,272	$3,961
Earnings per common share	$0.20	$0.33	$0.15	$0.06
Earnings per common share assuming dilution (1)	$0.20	$0.33	$0.15	$0.06
Three Months Ended	**March 31, 2011**	**June 30, 2011**	**September 30, 2011**	**December 31, 2011**
Net sales	$165,522	$184,227	$192,194	$175,286
Gross profit	$98,795	$106,827	$109,476	$99,220
Operating income	$45,606	$51,310	$51,107	$41,115
Net income	$34,258	$36,943	$36,213	$31,163
Earnings per common share	$0.53	$0.57	$0.57	$0.49
Earnings per common share assuming dilution (1)	$0.52	$0.56	$0.56	$0.48

(1) Assumes exercise of dilutive stock options calculated under the treasury stock method.

15 Related Party Transactions

We employ the law firm of our director emeritus for legal services. All bills for services rendered by this firm are reviewed and approved by our Chief Financial Officer. We believe that the fees for such services are comparable to those charged by other firms for services rendered to us. For the years ended 2012, 2011 and 2010, we incurred fees of $10 thousand per month for these legal services.

16 Subsequent Events

On January 15, 2013, the Board declared a quarterly cash dividend of $0.09 per common share to be paid to shareholders of record at the close of business on February 7, 2013. The quarterly dividend payment was $5.6 million and was paid on February 21, 2013. In July 2003, our Board of Directors elected to begin declaring quarterly dividends on our common stock considering the tax treatment of dividends and adequate levels of Company liquidity.

As of February 28, 2013, we have repurchased 0.9 million shares of our common stock through open market purchases at an average cost of $22.45 per share. We currently have the authority to purchase an additional 3.2 million shares of our common stock under the current plan approved by the Board of Directors.

Directors and Executive Officers

Thomas R. Stanton
Chairman and Chief Executive Officer

James E. Matthews
Senior Vice President – Finance,
Chief Financial Officer,
Treasurer, Secretary and Director

H. Fenwick Huss
Director of the Company
Dean of the J. Mack Robinson College of Business at Georgia State University

Ross K. Ireland
Director of the Company
Former Senior Executive Vice President of Services and Chief Technology Officer – SBC Communications, Inc.

William L. Marks
Director of the Company
Former Chairman of the Board and Chief Executive Officer of Whitney Holding Corp. (holding company for Whitney National Bank of New Orleans)

Balan Nair
Director of the Company
Executive Vice President and Chief Technology Officer of Liberty Global, Inc.

Roy J. Nichols
Director of the Company
Founder & former President of
Nichols Research Corporation

James L. North
Director Emeritus
Counsel to the company since its incorporation in 1985, attorney with James L. North & Associates, Birmingham, Alabama

Michael K. Foliano
Senior Vice President – Global Operations

Raymond R. Schansman
Senior Vice President and General Manager,
Enterprise Networks Division

James D. Wilson, Jr.
Senior Vice President and General Manager,
Carrier Networks Division

Robert A. Fredrickson
Vice President – Carrier Networks Sales

Kevin W. Schneider
Vice President – Chief Technology Officer

Transfer Agent
American Stock Transfer and Trust Company
New York, NY

Independent Registered Public Accounting Firm
PricewaterhouseCoopers LLP
Birmingham, Alabama

General Counsel
James L. North, Attorney at Law
Birmingham, Alabama

Special Counsel
McKenna Long & Aldridge LLP
Atlanta, Georgia

Form 10-K
ADTRAN's 2012 Annual Report on Form 10-K (without exhibits) as filed with the Securities and Exchange Commission is available to stockholders without charge upon written request to:

Investor Relations
ADTRAN, Inc.
901 Explorer Blvd.
P.O. Box 140000
Huntsville, Alabama 35814-4000
256 963-8220 or 256 963-7600
investorrelations@adtran.com (email)

Annual Meeting
The 2013 Annual Meeting of Stockholders will be held at ADTRAN corporate headquarters, 901 Explorer Boulevard, Huntsville, Alabama, on Wednesday, May 8, 2013, at 10:30 a.m. Central time.

ADTRAN®

Corporate Headquarters

ADTRAN, Inc.
901 Explorer Boulevard
Huntsville, AL 35806
USA

P.O. Box 140000
Huntsville, AL 35814-4000

1 800 9ADTRAN
1 256 963-8000
1 256 963-8004 fax
investorrelations@adtran.com
www.adtran.com

International Offices

ADTRAN Networks Pty. Ltd.
Sydney and Melbourne, Australia

ADTRAN Singapore Pte. Ltd.
Singapore

ADTRAN Europe Limited
Theale, Reading, United Kingdom

ADTRAN, Inc.
Beijing, China

ADTRAN Canada, Inc.
Montreal and Toronto, Canada

ADTRAN Networks Canada, Inc.
Ottawa, Canada

ADTRAN Networks S.A. de C.V.
Mexico, D.F., Mexico

ADTRAN International, Inc.
Hong Kong

ADTRAN Peru S.R.L.
Lima, Peru

ADTRAN GmbH
Bruchsal, Greifswald, Leipzig, and Munich, Germany

ADTRAN Networks Comunicações Ltda.
Campinas, São Paulo, Brazil

ADTRAN d.o.o.
Zagreb, Croatia

ADTRAN Oy
Helsinki, Finland

ADTRAN M.E.P.E.
Athens, Greece

ADTRAN Networks India Private Limited
Hyderabad, India

ADTRAN Holdings Ltd.
Tel Aviv, Israel

ADTRAN S.R.L.
Milan, Italy

ADTRAN K.K.
Tokyo, Japan

ADTRAN Sp. z.o.o.
Warsaw, Poland

ADTRAN, Unipessoal Lda.
Lisbon, Portugal

ADTRAN LLC
Moscow, Russia

ADTRAN s.r.o.
Bratislava, Slovakia

ADTRAN Switzerland GmbH
Zurich, Switzerland

ADTRAN International, Inc. – Abu Dhabi
Abu Dhabi, United Arab Emirates

TL9000
TL19.1270

nsai
TL 9000 TELECOMMUNICATIONS
ISO 9001:2000 QUALITY
ISO 14001 ENVIRONMENT

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier. ADTRAN, Inc. is an Equal Opportunity Employer committed to utilizing Minority Business Enterprises (MBE), Woman-Owned Business Enterprises (WBE) and Disabled Veteran Business Enterprises (DVBE) whenever possible and practical for procurements supporting ADTRAN and our customers.

An Export License is required if these ADTRAN products are sold to a Government Entity outside of the EU+8 (Austria, Australia, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom). This is per DOC/BIS ruling G030477 issued June 6, 2003.

release notes

ADTRAN®

Optical Networking Edge System Release 4.1 Release Notes

Document Number: 6ONESR41-40A
June 2013

Technical Publications
Carrier Network Division

Revision History

Revision	Date	Description
A	June 2013	Initial release. This document supports the Optical Networking Edge System Release 4.1. All changes for this release are denoted by *(6ONESR41-40A, June 2013)*.

Trademarks

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To the Holder of this Document

The contents of this document are current as of the date of publication. ADTRAN® reserves the right to change the contents without prior notice.

In no event will ADTRAN be liable for any special, incidental, or consequential damages or for commercial losses even if ADTRAN has been advised thereof as a result of issue of this document.

901 Explorer Boulevard
P.O. Box 140000
Huntsville, AL 35814-4000
United States
(256) 963-8000

Conventions

The following typographical conventions are used in this document:

This font indicates a cross-reference link.

This font indicates screen menus, fields, and parameters.

THIS FONT indicates keyboard keys (ENTER, ESC, ALT). Keys that are to be pressed simultaneously are shown with a plus sign (ALT+X indicates that the ALT key and X key should be pressed at the same time).

This font indicates references to other documentation and is also used for emphasis.

`This font` indicates on-screen messages and prompts.

`This font` indicates text to be typed exactly as shown.

This font indicates silk-screen labels or other system label items.

This font is used for strong emphasis.

Hazard Classifications

The following hazard classifications are used in this document:

DANGER

DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury. CAUTION can also be used to alert against unsafe practices associated with events that could lead to personal injury.

NOTICE

Notice call-outs indicate a potentially hazardous situation not related to personal injury, such as messages related to property damage only.

NOTE

Notes inform the user of additional, but essential, information or features.

Icons

The following icons are used throughout the ADTRAN document suite:

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Optical Networking Edge

System Release 4.1 Release Notes

Scope of this Guide

This document provides information relating to the Optical Networking Edge (ONE) System Release 4.1.

Related Documentation

Documentation for ONE products is available for viewing and download directly from the ADTRAN Support Community website. Documents are available in Adobe® Portable Document Format (PDF).

Go to: adtran.com > support > support community

Registration is required.

NEW E-mail Notifications for Newly Available Documents

To regularly receive the latest activity feed on newly available ONE documents, click the **Follow** button on the Optical Networking Edge (ONE) Technical Documents page on the ADTRAN Support Community. Login required. Also, use the **Receive email notifications** button and/or the **Track in Communications** button on the Optical Networking Edge (ONE) Technical Documents page to receive an e-mail notification each time a new document is posted.

System Components

A full list of the system components, product part numbers, and software revisions is provided in Table 1.

NOTE

In Table 1, bold font indicates that the components firmware has changed in Optical Networking Edge System Release 4.1.

Table 1. ONE System Components

Component	Part Number	System Release 3.6	System Release 4.1
System Controller Module (SCM)	1187010L1	G02.001.038	**G03.056**
Bridging System Controller Module (SCM)	1187011G1	G02.001.038	**G03.056**
Ethernet Transport Optical Switch (ETOS-1)	1174101F1	C50.023	**C50.035**
Ethernet Transport Optical Switch w/ OTN (ETOS-1N)	1174101F2	N/A	D10.0022
OTN Transport Optical Switch (OTOS)	1174120F1	C00.041	**C00.044**
OTN Transport Optical Switch (OTOS-1-8)	1174121F1	N/A	D10.0022
Ethernet Transport Optical Switch (ETOS-10)	1174130F2	N/A	D10.0022
10 Gbps 4-Port Transponder (TPR-10-4)	1174211G1	C50.023	**C50.031**
Optical Boost Amp Module (OBAM)	1174401G1	C50.023	C50.023
Optical Pre/Boost Amplifier Module (OPBA-18)	1174402G1	C60.0028	C60.0028
Optical Pre Amp Module (OPAM)	1174411G1	C50.023	C50.023
Dispersion Compensation Module - Fiber Based 20 km (DCM-F20)	1174441G1	C50.023	C50.023
Dispersion Compensation Module - Fiber Based 40 km (DCM-F40)	1174442G1	C50.023	C50.023
Dispersion Compensation Module - Fiber Based 60 km (DCM-F60)	1174443G1	C50.023	C50.023
Dispersion Compensation Module - Fiber Based 80 km (DCM-F80)	1174444G1	C50.023	C50.023
Dispersion Compensation Module - Bragg-Grating Based 20 km (DCM-B20)	1174451G1	C50.023	C50.023
Dispersion Compensation Module - Bragg-Grating Based 40 km (DCM-B40)	1174452G1	C50.023	C50.023
Dispersion Compensation Module - Bragg-Grating Based 60 km (DCM-B60)	1174453G1	C50.023	C50.023
Dispersion Compensation Module - Bragg-Grating Based 80 km (DCM-B80)	1174454G1	C50.023	C50.023
Dispersion Compensation Module - Bragg-Grating Based 100 km (DCM-B100)	1174455G1	C50.023	C50.023
Dispersion Compensation Module - Bragg-Grating Based 120 km (DCM-B120)	1174456G1	C50.023	C50.023
Optical Supervisory Channel Filter (OSCF)	1174461G1	N/A	N/A
Optical Supervisory Channel Processor	1174471G1	C50.023	C50.023
2 Degree Mini-Amplified Reconfigurable Optical Add/ Drop Multiplexer (ROADM) System (MARS-2)	1174501G1	C60.0028	**D10.0022**

Table 1. ONE System Components (Continued)

Component	Part Number	System Release 3.6	System Release 4.1
2 Degree Mini-Amplified Reconfigurable Optical Add/ Drop Multiplexer (ROADM) with Pre-Amplifier (MARS-2P)	1174502G1	C60.0028	**D10.0022**
2 Degree Mini-Amplified Reconfigurable Optical Add/ Drop Multiplexer (ROADM) with Boost Amplifier (MARS-2B)	1174503G1	C60.0028	**D10.0022**
Passive Carrier (CARRIER)	1174510G3	C50.023	**D10.0022**
4 Degree Mini-Amplified Reconfigurable Optical Add/ Drop Multiplexer (ROADM) with Pre and Boost Amplifier (MARS-4PB)	1174512G1	C60.0028	**D10.0022**
4 Degree Mini-Amplified Reconfigurable Optical Add/ Drop Multiplexer (ROADM) with Boost Amplifier (MARS-4B)	1174513G1	C60.0028	**D10.0022**
8 Channel DWDM Mux (21 to 28) (D8M2128)	1174910G1	N/A	N/A
8 Channel DWDM Mux (29 to 36) (D8M2936)	1174911G1	N/A	N/A
8 Channel DWDM Demux (21 to 28) (D8D2128)	1174915G1	N/A	N/A
8 Channel DWDM Demux (29 to 36) (D8D2936)	1174916G1	N/A	N/A
4 Channel DWDM Add/Drop (21 to 24) (D4A2124)	1174920G1	N/A	N/A
4 Channel DWDM Add/Drop (17 to 20) (D4A1720)	1174920G2	N/A	N/A
4 Channel DWDM Add/Drop (25 to 28) (D4A2528)	1174921G1	N/A	N/A
4 Channel DWDM Add/Drop (29 to 32) (D4A2932)	1174922G1	N/A	N/A
4 Channel DWDM Add/Drop (33 to 36) (D4A3336)	1174923G1	N/A	N/A
4 Channel DWDM Add/Drop (37 to 40) (D4A3740)	1174924G1	N/A	N/A
4 Channel DWDM Add/Drop (41 to 44) (D4A4144)	1174925G1	N/A	N/A
4 Channel DWDM Add/Drop (45 to 48) (D4A4548)	1174926G1	N/A	N/A
4 Channel DWDM Add/Drop (49 to 52) (D4A4952)	1174927G1	N/A	N/A
4 Channel DWDM Add/Drop (53 to 56) (D4A5356)	1174928G1	N/A	N/A
4 Channel DWDM Add/Drop (57 to 60) (D4A5760)	1174929G1	N/A	N/A
4 Channel CWDM Mux (1471 to 1531) (C4M4753)	1174950G1	N/A	N/A
4 Channel CWDM Mux (1551 to 1611) (C4M5561)	1174951G1	N/A	N/A
4 Channel CWDM Demux (1471 to 1531) (C4D4753)	1174952G1	N/A	N/A
4 Channel CWDM Demux (1551 to 1611) (C4D5561)	1174953G1	N/A	N/A
44 Channel Mux/Demux	1174980F1	N/A	N/A

Table 2. Total Acces 5000 System Components

Component	Part Number	System Release 3.6	System Release 4.1
System Controller Module (SCM)	1187010L1	Total Access 5000 SR 7.2	**Total Access 5000 SR 7.3**
Bridging System Controller Module (SCM)	1187011G1	Total Access 5000 SR 7.2	**Total Access 5000 SR 7.3**

Total Access 5000 Components

Refer to the *Total Access 5000 System Release 7.3 Release Notes* (P/N 6TA5KSR73-40) for a summary of system notes, feature enhancements, fixes, and errata for the Total Access 5000 Components components as related to Optical Networking Edge System Release 4.1.

Overall System Notes

The following system notes apply to all components.

- Full System CLI support is provided across all modules within the system. *(6ONESR15-40A, December 2011)*
- Resetting an access module, without an installed SCM, can extend the reboot time for the access module to up to 15 minutes. *(6ONESR15-40A, December 2011)*
- ADTRAN recommends using the SCA restore function in lieu of using the output from the show running-config CLI command in order to restore system settings or to transfer settings between Total Access 5000 shelves. *(6ONESR15-40A, December 2011)*
- Changing the S-Tag TPID is a service-affecting change and will disrupt data traffic and module communication within the chassis. *(6ONESR15-40A, December 2011)*
- If the rear panel Ethernet port and the Inband Management (system-managementevc) interface are both used, ensure that each interface is on a different network. *(6ONESR15-40A, December 2011)*
- Following the reboot of both Switch Modules, use the 'force alarm resync <shelf/slot> CLI command for each slot to re-synchronize the alarms between the SCM and the specified shelf/slot. *(6ONESR15-40A, December 2011)*
- Prior to System Upgrades, it is recommended that an SCA save of each system is performed, and used in situations where a system may have to be downgraded. *(6ONESR15-40A, December 2011)*
- Node limits within the ONE assemblies:
  - ETOS-1 supports up to 512 total ERPS nodes per ETOS-1 assembly
  - ETOS-10 supports up to 320 total ERPS nodes per ETOS-10 assembly
  - ETOS-1/10 supports up to 32 ERPS nodes per ERPS ring *(6ONESR41-40A, June 2013)*
- The System CLI requires for all components of the system to be running TA5K SR 7.3 or ONE SR 4.1 to function properly. If any component is not upgraded to this version, CLI errors or missing commands can occur. *(6ONESR41-40A, June 2013)*

Ethernet Transport Optical Switch (ETOS-1)

(P/N 1174101F1)

This section contains a summary of system notes, feature enhancements, fixes, and errata for the Optical Networking Edge Ethernet Transport Optical Switch (ETOS-1) as related to System Release 4.1.

System Notes

- UNI ports only accept VLAN frames with a TPID of 0x8100. *(6ONESR15-40A, December 2011)*
- LAG groups are not supported on UNI ports (only MEN ports). *(6ONESR15-40A, December 2011)*
- LAG switching times are between 400ms and 1sec. *(6ONESR15-40A, December 2011)*
- ERPS ring node limit is 32 nodes *(6ONESR15-40A, December 2011)*
- ERPS nodes per ETOS assembly is 512. *(6ONESR25-40A, May 2012)*
- Recover timing from faceplate port not supported on copper SFPs *(6ONESR15-40A, December 2011)*
- In an EVC-MAP Match using the L2CP configuration, Cisco Discovery Protocol (CDP) frames are not included in the classification. CDP frames are treated as untagged packets. *(6ONESR15-40A, December 2011)*
- Redundancy is enable/ disabled at an equipment level, and protection ports will mirror (example: port1 protects port1 across equipment group). *(6ONESR25-40A, May 2012)*
- During Auto-upgrade sequence, if a Redundant ETOS pair is in StandbyNotReady state, the auto-upgrade process will wait up to 45 minutes before continuing. User can clear the Auto-upgrade waiting time by cancelling current operation, and then manually restarting the Auto-upgrade process. *(6ONESR25-40A, May 2012)*
- Auto-negotiation must be disabled on both ports for Ycable operation. The far-end equipment also needs to have auto-negotiation disabled. *(6ONESR25-40A, May 2012)*
- Removing a module within a protected pair, the module being removed will send a dying gasp message. *(6ONESR25-40A, May 2012)*
- Slow Protocol and LLDP packets on uni-ports: Starting in R3.5, slow protocol and LLDP packets are transported by default on UNI ports tied to evc-maps with no match criteria. To discard these packets (or terminate one), the user needs to add a discard evc-map matched to L2CP. Adding this discard evc-map has the effect of having operation match the behavior of previous releases. For evc-maps with match criteria, a match to L2CP may be added to add transport of the L2CP packets. The transport of Slow protocol and LLDP packets through uni-ports was not available in prior system releases. *(6ONESR35-40A, November 2012)*
- Slow Protocol and LLDP on men-ports: Starting in R3.5, slow protocol and LLDP packets that are tagged with an S-Tag matching an MEVC are transported on men-ports. Untagged slow protocol and LLDP packets continue to be terminated on men-ports and used appropriately for provisioned L2 protocols (SyncE, Link OEM, LLDP, etc). This operation is the same as previous releases. *(6ONESR35-40A, November 2012)*
- Slow Protocol and LLDP on un-used ports: Untagged slow protocol and LLDP packets continue to be terminated on unused ports and used appropriately for provisioned L2 protocols. An Unused port is a port that has been put into service ('no shutdown') but not assigned for use as either a men-port (via mevc) or uni-port (via evc-map). This operation is the same as previous releases. *(6ONESR35-40A, November 2012)*

- Wavelengths entered via CLI must be entered exactly. Use the "show table wavelengths [shelf/slot]" command to see the supported wavelengths. *(6ONESR41-40A, June 2013)*

Fixes

- A port that is used as a UNI and then switched to be a MEN port will not need a shut/ no-shut operation to carry traffic. *(6ONESR41-40A, June 2013)*
- On system upgrades, the Policer link to the MEVC will stay correctly attached. *(6ONESR41-40A, June 2013)*

Errata

- The DSCP value can only be set via CLI. *(6ONESR15-40A, December 2011)*
- Auto-Upgrades via AUC file: An ETOS redundant pair will be software upgraded at same time, and re-booted at same time, causing traffic to be down during this time. *(6ONESR25-40A, May 2012)*
- For a redundant pair of ETOS-1 modules, the CLI (and SCM menus) do not indicate which one is standby (via an '*') as is done for other redundant modules (for example the "show system inventory" command). *(6ONESR25-40A, May 2012)*
- When carrying system management traffic through a redundant ETOS-1 equipment pair (via the system-management-evc), the user may experience disruptions in the management traffic under certain circumstances:
  - When one of the modules is rebooted or extracted, management traffic may be disrupted for up to two minutes.
  - When both modules are rebooted, management traffic may be disrupted for up to ten minutes. *(6ONESR25-40A, May 2012)*
- Adding a MEN port to an existing running MEVC, will not have EVC-advertisement messages sent out the newly added interface until the MEVC is shut / no-shut. *(6ONESR35-40A, November 2012)*
- S-TAG-DEI does not work properly. *(6ONESR41-40A, June 2013)*

Ethernet Transport Optical Switch with OTN (ETOS-1N)

(P/N 1174101F2)

This section contains a summary of system notes, feature enhancements, fixes, and errata for the Optical Networking Edge Ethernet Transport Optical Switch with OTN (ETOS-1N) as related to System Release 4.1.

NOTE

The 1174101F2 is a new Optical Networking Edge component and is being introduced in System Release 4.1.

Features

- Two HighSpeed 10GE/OTU2e ports
- Sixteen MidSpeed 1GE ports
- MEF-9, MEF-14 compliant
- ELINE, ELAN support
- ERPS 10GigE support
- ERPS 1GigE support
- SyncE support

System Notes

- High-Speed ports support either 10G Ethernet LAN or OTU2e modes. *(6ONESR41-40A, June 2013)*
- UNI ports only accept VLAN frames with a TPID of 0x8100. *(6ONESR41-40A, June 2013)*
- LAG groups are not supported on UNI ports (only MEN ports). *(6ONESR41-40A, June 2013)*
- LAG switching times are between 400ms and 1sec. *(6ONESR41-40A, June 2013)*
- ERPS ring node limit is 32 nodes. *(6ONESR41-40A, June 2013)*
- ERPS nodes per ETOS assembly is 512. *(6ONESR41-40A, June 2013)*
- Recover timing from faceplate port not supported on copper SFPs. *(6ONESR41-40A, June 2013)*
- In an EVC-MAP Match using the L2CP configuration, Cisco Discovery Protocol (CDP) frames are not included in the classification. CDP frames are treated as untagged packets. *(6ONESR41-40A, June 2013)*
- Redundancy is enabled/disabled at an equipment level, and protection ports will mirror (example: port1 protects port1 across equipment group). *(6ONESR41-40A, June 2013)*
- During Auto-upgrade sequence, if a Redundant ETOS pair is in StandbyNotReady state, the auto-upgrade process will wait up to 45 minutes before continuing. User can clear the Auto-upgrade waiting time by cancelling current operation, and then manually restarting the Auto-upgrade process. *(6ONESR41-40A, June 2013)*
- Auto-negotiation must be disabled on both ports for Ycable operation. The far-end equipment also needs to have auto-negotiation disabled. *(6ONESR41-40A, June 2013)*

- Removing a module within a protected pair, the module being removed will send a dying gasp message. *(6ONESR41-40A, June 2013)*
- Slow Protocol and LLDP packets on uni-ports: slow protocol and LLDP packets are transported by default on UNI ports tied to evc-maps with no match criteria. To discard these packets (or terminate one), the user needs to add a discard evc-map matched to L2CP. Adding this discard evc-map has the effect of having operation match the behavior of previous releases. For evc-maps with match criteria, a match to L2CP may be added to add transport of the L2CP packets. *(6ONESR41-40A, June 2013)*
- Slow Protocol and LLDP on men-ports: slow protocol and LLDP packets that are tagged with an S-Tag matching an MEVC are transported on men-ports. Un- tagged slow protocol and LLDP packets continue to be terminated on men-ports and used appropriately for provisioned L2 protocols (SyncE, Link OEM, LLDP, etc). *(6ONESR41-40A, June 2013)*
- Slow Protocol and LLDP on un-used ports: Untagged slow protocol and LLDP packets continue to be terminated on unused ports and used appropriately for provisioned L2 protocols. An Unused port is a port that has been put into service ('no shutdown') but not assigned for use as either a men-port (via mevc) or uni-port (via evc-map). *(6ONESR41-40A, June 2013)*

Errata

- S-tag-dei command does not work properly. *(6ONESR41-40A, June 2013)* (CN-15153)
- The DSCP value can only be set via CLI. *(6ONESR41-40A, June 2013)*
- Auto-Upgrades via AUC file: An ETOS-1N redundant pair will be software upgraded at same time, and re-booted at same time, causing traffic to be down during this time. *(6ONESR41-40A, June 2013)*
- For a redundant pair of ETOS-1N modules, the CLI (and SCM menus) do not indicate which one is standby (via an '*') as is done for other redundant modules (for example the "show system inventory" command). *(6ONESR41-40A, June 2013)*
- When carrying system management traffic through a redundant ETOS-1N equipment pair (via the system-management-evc), the user may experience disruptions in the management traffic under certain circumstances:
  - When one of the modules is rebooted or extracted, management traffic may be disrupted for up to two minutes.
  - When both modules are rebooted, management traffic may be disrupted for up to ten minutes. *(6ONESR41-40A, June 2013)*
- OTU2 / GFP mode operation is not supported on HighSpeed ports in this release. *(6ONESR41-40A, June 2013)*

OTN Transport Optical Switch (OTOS)

(P/N 1174120F1)

This section contains a summary of system notes, feature enhancements, fixes, and errata for the Optical Networking Edge OTN Transport Optical Switch (OTOS) as related to System Release 4.1.

System Notes

- 1GE Ethernet Copper SFP only supported at one end of the end-to-end circuit. A fiber SFP needs to be on one end or both. Back-to-back Copper SFP deployment is not supported at this time. *(6ONESR20-40A, April 2012)*
- A generic-AIS signal is not sent on a LOF (loss of frame) condition on an incoming SONET/ SDH Midspeed port. A generic-AIS signal is sent, on a LOS (loss of signal) and incoming AIS condition. *(6ONESR20-40A, April 2012)*
- When Non-Intrusive SM-TIM (section monitoring - trace identifier mismatch) is provisioned, and a TIM condition occurs, near end low order ODU1 will report errored block counts, and BEI is sent to the far-end. Traffic is not affected. Recommended to use intrusive SM-TIM detection. *(6ONESR20-40A, April 2012)*
- OTOS will allow either a Muxponder mode (Midspeed ports mapped to HighSpeed ports) or a Transponder mode (Midspeed ports mapped to Midspeed ports). Only one mode can be active at a time, and is determined by the first mapping/ crossconnect. *(6ONESR30-40A, July 2012)*
- Wavelengths entered via CLI must be entered exactly. Use the "show table wavelengths [shelf/slot]" command to see the supported wavelengths. *(6ONESR41-40A, June 2013)*

Fixes

- The CLI commands for setting the mapping types 'bit-transparent-asynchronous' and 'bit-transparent-synchronous' were too long and exceeded the maximum display length. They were shortened to 'amp' (asynchronous mapping procedure) and 'bmp' (bit-synchronous mapping procedure). *(6ONESR41-40A, June 2013)*

Errata

- Creating a facility loopback on either port of a MidSpeed SONET/ SDH protection group, will create a loopback on both ports of the protection group. *(6ONESR20-40A, April 2012)*

OTN Transport Optical Switch (OTOS-1-8)

(P/N 1174121F1)

This section contains a summary of system notes, feature enhancements, fixes, and errata for the Optical Networking Edge OTN Transport Optical Switch (OTOS-1-8) as related to System Release 4.1.

NOTE

The 1174121F1 is a new Optical Networking Edge component and is being introduced in System Release 4.1.

Features

- Redundancy Support
- One HS port OTU2
- FEC on OTU2/HS (no FEC, GFEC, EFEC(I.4)
- Auto payload type support on HS for interoperability with legacy OTN equipment
- HS passthrough mappings supported across redundant cards in Muxponder mode only.
- Eight MS ports (OTU1 (max of 4), 1GE, OC-3/STM-1, OC-12/STM-4, OC-48/STM-16 (max of 4))
- FEC on MS OTU1 (no FEC, GFEC)
- Muxponder card level mode MS to HS (OTU-2) mappings
- Transponder card level mode MS to MS (OTU-1) (No HS support in this mode)
- ODU0 mapping support ODU0/ODU1/ODU2 or ODU0/ODU2.
- Auto Topology Support: Auto Trail ID for OTN Tx information
- Protection Groups on HS
  - SNC/N ODU1 or ODU0 path protection with redundant card
  - SNC/I Line protection with redundant card
  - Y-cable protection with redundant card
- Protection Group on MS
  - SONET/SDH 1+1 Unidirectional APS
  - OTU1 SNC/I line APS
  - Y-cable support for all clients with redundant card
- Revertive/Non-revertive switching

System Notes

- 1GE Ethernet Copper SFP only supported at one end of the end-to-end circuit. A fiber SFP needs to be on one end or both. Back-to-back Copper SFP deployment is not supported at this time. *(6ONESR41-40A, June 2013)*
- A generic-AIS signal is not sent on a LOF (loss of frame) condition on an incoming SONET/SDH Midspeed port. A generic-AIS signal is sent, on a LOS (loss of signal) and incoming AIS condition. *(6ONESR41-40A, June 2013)*

- When Non-Intrusive SM-TIM (section monitoring - trace identifier mismatch) is provisioned, and a TIM condition occurs, near end low order ODU1 will report errored block counts, and BEI is sent to the far-end. Traffic is not affected. Recommended to use intrusive SM-TIM detection. *(6ONESR41-40A, June 2013)*
- OTOS will allow either a Muxponder mode (Midspeed ports mapped to HighSpeed ports) or a Transponder mode (Midspeed ports mapped to Midspeed ports). Only one mode can be active at a time, and is determined by the first mapping/crossconnect. *(6ONESR41-40A, June 2013)*

Ethernet Transport Optical Switch (ETOS-10)

(P/N 1174130F2)

This section contains a summary of system notes, feature enhancements, fixes, and errata for the Optical Networking Edge Ethernet Transport Optical Switch (ETOS-10) as related to System Release 4.1.

NOTE

The 1174130F2 is a new Optical Networking Edge component and is being introduced in System Release 4.1.

Features

- Eight HighSpeed 10GE ports
- Two MidSpeed 1GE ports
- MEF-9, MEF-14 compliant
- ELINE, ELAN support
- ERPS 10GigE support (upto four separate rings)
- ERPS 1GigE support
- SyncE support

System Notes

- UNI ports only accept VLAN frames with a TPID of 0x8100. *(6ONESR41-40A, June 2013)*
- LAG groups are not supported on UNI ports (only MEN ports). *(6ONESR41-40A, June 2013)*
- LAG switching times are between 400ms and 1sec. *(6ONESR41-40A, June 2013)*
- ERPS ring node limit is 32 nodes. *(6ONESR41-40A, June 2013)*
- ERPS nodes per ETOS assembly is 320. *(6ONESR41-40A, June 2013)*
- Recover timing from faceplate port not supported on copper SFPs. *(6ONESR41-40A, June 2013)*
- In an EVC-MAP Match using the L2CP configuration, Cisco Discovery Protocol (CDP) frames are not included in the classification. CDP frames are treated as untagged packets. *(6ONESR41-40A, June 2013)*
- Redundancy is enable/ disabled at an equipment level, and protection ports will mirror (example: port1 protects port1 across equipment group). *(6ONESR41-40A, June 2013)*
- During Auto-upgrade sequence, if a Redundant ETOS pair is in StandbyNotReady state, the auto-upgrade process will wait up to 45 minutes before continuing. User can clear the Auto-upgrade waiting time by cancelling current operation, and then manually restarting the Auto-upgrade process. *(6ONESR41-40A, June 2013)*
- Auto-negotiation must be disabled on both ports for Ycable operation. The far-end equipment also needs to have auto-negotiation disabled. *(6ONESR41-40A, June 2013)*
- Removing a module within a protected pair, the module being removed will send a dying gasp message. *(6ONESR41-40A, June 2013)*

- Slow Protocol and LLDP packets on uni-ports: slow protocol and LLDP packets are transported by default on UNI ports tied to evc-maps with no match criteria. To discard these packets (or terminate one), the user needs to add a discard evc-map matched to L2CP. Adding this discard evc-map has the effect of having operation match the behavior of previous releases. For evc-maps with match criteria, a match to L2CP may be added to add transport of the L2CP packets. *(6ONESR41-40A, June 2013)*
- Slow Protocol and LLDP on men-ports: slow protocol and LLDP packets that are tagged with an S-Tag matching an MEVC are transported on men-ports. Un-tagged slow protocol and LLDP packets continue to be terminated on men-ports and used appropriately for provisioned L2 protocols (SyncE, Link OEM, LLDP, etc). *(6ONESR41-40A, June 2013)*
- Slow Protocol and LLDP on un-used ports: Untagged slow protocol and LLDP packets continue to be terminated on unused ports and used appropriately for provisioned L2 protocols. An Unused port is a port that has been put into service ('no shutdown') but not assigned for use as either a men-port (via mevc) or uni-port (via evc-map). *(6ONESR41-40A, June 2013)*
- Wavelengths entered via CLI must be entered exactly. Use the "show table wavelengths [shelf/slot]" command to see the supported wavelengths. *(6ONESR41-40A, June 2013)*

Errata

- MS ports with fiber loopback require autoneg to be disabled; will be link down with autoneg enabled. *(6ONESR41-40A, June 2013)*
- The DSCP value can only be set via CLI. *(6ONESR41-40A, June 2013)*

10 Gbps 4-Port Transponder (TPR-10-4)

(P/N 1174211G1)

This section contains a summary of system notes, feature enhancements, fixes, and errata for the Optical Networking Edge 10 Gbps 4-Port Transponder (TPR-10-4) as related to System Release 4.1.

System Notes

- Wavelengths entered via CLI must be entered exactly. Use the "show table wavelengths [shelf/slot]" command to see the supported wavelengths. *(6ONESR20-40A, April 2012)*
- Protection Group is not available when the card is set for redundant operation. *(6ONESR30-40A, July 2012)*
- Protection Group must use Client Port 1:1. *(6ONESR30-40A, July 2012)*
- Card redundancy and Y-cable are not available if protection group is enabled. *(6ONESR30-40A, July 2012)*
- For a channel in transponder mode, the OTN side must be configured on the Line ports. *(6ONESR30-40A, July 2012)*
- Setting the trace message on the SONET interface will have no effect when the channel is in transponder mode. *(6ONESR30-40A, July 2012)*
- When using y-cable protection, the user must make sure to provision the client ports with the same settings for the following items. *(6ONESR30-40A, July 2012)*
  - fec-type gfec
  - fec-type no-fec
  - trace-message expect dapi
  - trace-message expect sapi
  - trace-message send dapi
  - trace-message send operator-specific
  - trace-message send sapi
  - trace-message tim-alarm-control
  - trace-message tim-alarm-control dapi-only
  - trace-message tim-alarm-control disable
  - trace-message tim-alarm-control either
  - trace-message tim-alarm-control sapi-only

Fixes

- The CLI commands for setting the mapping types 'bit-transparent-asynchronous' and 'bit-transparent-synchronous' were too long and exceeded the maximum display length. They were shortened to 'amp' (asynchronous mapping procedure) and 'bmp' (bit-synchronous mapping procedure). *(6ONESR41-40A, June 2013)*

Errata

- TIM-P alarm not cleared when the transponder interface is shutdown under maintenance mode. *(6ONESR35-40A, November 2012)* (CN-12714)

- Cross copy of the mapping type should not occur when redundancy is disabled on the standby card. It should only occur when redundancy is enabled. *(6ONESR35-40A, November 2012)* (CN-12397)

Optical Boost Amp Module (OBAM)

(P/N 1174401G1)

The Optical Networking Edge Optical Boost Amp Module (OBAM) has no system notes, feature enhancements, fixes, and errata related to System Release 4.1.

Optical Pre/Boost Amplifier Module (OPBA-18)

(P/N 1174402G1)

The Optical Networking Edge Optical Pre/Boost Amplifier Module (OPBA-18) has no system notes, feature enhancements, fixes, and errata related to System Release 4.1.

Optical Pre Amp Module (OPAM)

(P/N 1174411G1)

The Optical Networking Edge Optical Pre Amp Module (OPAM) has no system notes, feature enhancements, fixes, and errata related to System Release 4.1.

Dispersion Compensation Module - Fiber Based (DCM-F)

(P/N 1174441G1, 1174442G1, 1174443G1 & 1174444G1)

The Optical Networking Edge Dispersion Compensation Module - Fiber Based (DCM-F) has no system notes, feature enhancements, fixes, and errata related to System Release 4.1.

Dispersion Compensation Module - Bragg-Grating Based (DCM-B)

(P/N 1174451G1, 1174452G1, 1174453G1, 1174454G1, 1174455G1 & 1174456G1)

The Optical Networking Edge Dispersion Compensation Module - Bragg-Grating Based (DCM-B) has no system notes, feature enhancements, fixes, and errata related to System Release 4.1.

Optical Supervisory Channel Filter (OSCF)

(P/N 1174461G1)

The Optical Networking Edge Optical Supervisory Channel Filter (OSCF) has no system notes, feature enhancements, fixes, and errata related to System Release 4.1.

Optical Supervisory Channel Processor

(P/N 1174471G1)

This section contains a summary of system notes, feature enhancements, fixes, and errata for the Optical Networking Edge Optical Supervisory Channel Processor as related to System Release 4.1.

System Notes

- Copper SFPs are not supported. *(6ONESR30-40A, July 2012)*

2 Degree Mini-Amplified Reconfigurable Optical Add/Drop Multiplexer (ROADM) System (MARS-2)

(P/N 1174501G1)

This section contains a summary of system notes, feature enhancements, fixes, and errata for the Optical Networking Edge 2 Degree Mini-Amplified Reconfigurable Optical Add/Drop Multiplexer (ROADM) System (MARS-2) as related to System Release 4.1.

System Notes

- Wavelengths entered via CLI must be entered exactly. Use the "show table wavelengths [shelf/slot]" command to see the supported wavelengths. *(6ONESR20-40A, April 2012)*
- The help messages for the threshold levels is generic and is the same for all versions of the ROADM cards. As an aid to the user, the error response is card specific and provides the range allowed by the card. *(6ONESR35-40A, November 2012)* (CN-8231)
- Auto Power Balancing, Channel Power Level, Total Power Level, and Thresholds allowed on all interfaces on SNMP. It is only valid on the COM OUT interface. Sending the command to the other interfaces will have no affect on the card. *(6ONESR35-40A, November 2012)* (CN-5300)

Feature Enhancements

- Optical power threshold Hi / Low alarms will no longer co-exist. The most recent will clear the opposite alarm. *(6ONESR41-40A, June 2013)*
- When no signal power is detected on a channel, the VOA for that channel will be decreased in steps to zero. Once attenuation reaches zero, the Auto-power Balance alarm for that channel will be cleared. *(6ONESR41-40A, June 2013)*
- Alarms are now suppressed when the administrative status is set to 'shutdown unassigned' or 'shutdown maintenance'. The card level administrative status will suppress all alarms and the port level administrative status will suppress port level alarms. *(6ONESR41-40A, June 2013)*
- Threshold alarms are now reported when provisioned value is above the high level setting or below the low level setting. In prior releases the alarm was raised also when the level was equal to the threshold setting. *(6ONESR41-40A, June 2013)*

Fixes

- Auto power balance alarms on a channel would not clear once generated even after taking the channel out of service. The alarms will now clear when the channel is removed from service. *(6ONESR41-40A, June 2013)* (CN-16982)
- The software algorithm has been enhanced to take account of rare WSS read contention events. These contention events were causing false intermittent power alarms. *(6ONESR41-40A, June 2013)* (CN-16983)

Errata

- Show running-config does not show the cross-connect provisioning. *(6ONESR35-40A, November 2012)* (CN-12305)
- MARS-2 channels come up in OOS-MA instead of OOS-UAS. *(6ONESR35-40A, November 2012)* (CN-12431)

2 Degree Mini-Amplified Reconfigurable Optical Add/Drop Multiplexer (ROADM) with Variable Gain Pre-Amplifier (MARS-2P)

(P/N 1174502G1)

This section contains a summary of system notes, feature enhancements, fixes, and errata for the Optical Networking Edge 2 Degree Mini-Amplified Reconfigurable Optical Add/Drop Multiplexer (ROADM) with Variable Gain Pre-Amplifier (MARS-2P) as related to System Release 4.1.

System Notes

- Wavelengths entered via CLI must be entered exactly. Use the "show table wavelengths [shelf/slot]" command to see the supported wavelengths. *(6ONESR36-40A, February 2013)*
- The help messages for the threshold levels is generic and is the same for all versions of the ROADM cards. As an aid to the user, the error response is card specific and provides the range allowed by the card. *(6ONESR36-40A, February 2013)* (CN-8231)
- Auto Power Balancing, Channel Power Level, Total Power Level, and Thresholds allowed on all interfaces on SNMP. It is only valid on the COM OUT interface. Sending the command to the other interfaces will have no affect on the card. *(6ONESR36-40A, February 2013)* (CN-5300)

Feature Enhancements

- Optical power threshold Hi / Low alarms will no longer co-exist. The most recent will clear the opposite alarm. *(6ONESR41-40A, June 2013)*
- When no signal power is detected on a channel, the VOA for that channel will be decreased in steps to zero. Once attenuation reaches zero, the Auto-power Balance alarm for that channel will be cleared. *(6ONESR41-40A, June 2013)*
- Alarms are now suppressed when the administrative status is set to 'shutdown unassigned' or 'shutdown maintenance'. The card level administrative status will suppress all alarms and the port level administrative status will suppress port level alarms. *(6ONESR41-40A, June 2013)*
- Threshold alarms are now reported when provisioned value is above the high level setting or below the low level setting. In prior releases the alarm was raised also when the level was equal to the threshold setting. *(6ONESR41-40A, June 2013)*

Fixes

- Auto power balance alarms on a channel would not clear once generated even after taking the channel out of service. The alarms will now clear when the channel is removed from service. *(6ONESR41-40A, June 2013)* (CN-16982)
- The software algorithm has been enhanced to take account of rare WSS read contention events. These contention events were causing false intermittent power alarms. *(6ONESR41-40A, June 2013)* (CN-16983)

Errata

- Show running-config does not show the cross-connect provisioning. *(6ONESR36-40A, February 2013)* (CN-12305)

- MARS-2 channels come up in OOS-MA instead of OOS-UAS. *(6ONESR36-40A, February 2013)* (CN-12431)

2 Degree Mini-Amplified Reconfigurable Optical Add/Drop Multiplexer (ROADM) with Booster Amplifier (MARS-2B)

(P/N 1174503G1)

This section contains a summary of system notes, feature enhancements, fixes, and errata for the Optical Networking Edge 2 Degree Mini-Amplified Reconfigurable Optical Add/Drop Multiplexer (ROADM) with Booster Amplifier (MARS-2B) as related to System Release 4.1.

System Notes

- Wavelengths entered via CLI must be entered exactly. Use the "show table wavelengths [shelf/slot]" command to see the supported wavelengths. *(6ONESR36-40A, February 2013)*
- The help messages for the threshold levels is generic and is the same for all versions of the ROADM cards. As an aid to the user, the error response is card specific and provides the range allowed by the card. *(6ONESR36-40A, February 2013)* (CN-8231)
- Auto Power Balancing, Channel Power Level, Total Power Level, and Thresholds allowed on all interfaces on SNMP. It is only valid on the COM OUT interface. Sending the command to the other interfaces will have no affect on the card. *(6ONESR36-40A, February 2013)* (CN-5300)

Feature Enhancements

- Optical power threshold Hi / Low alarms will no longer co-exist. The most recent will clear the opposite alarm. *(6ONESR41-40A, June 2013)*
- When no signal power is detected on a channel, the VOA for that channel will be decreased in steps to zero. Once attenuation reaches zero, the Auto-power Balance alarm for that channel will be cleared. *(6ONESR41-40A, June 2013)*
- Alarms are now suppressed when the administrative status is set to 'shutdown unassigned' or 'shutdown maintenance'. The card level administrative status will suppress all alarms and the port level administrative status will suppress port level alarms. *(6ONESR41-40A, June 2013)*
- Threshold alarms are now reported when provisioned value is above the high level setting or below the low level setting. In prior releases the alarm was raised also when the level was equal to the threshold setting. *(6ONESR41-40A, June 2013)*

Fixes

- Auto power balance alarms on a channel would not clear once generated even after taking the channel out of service. The alarms will now clear when the channel is removed from service. *(6ONESR41-40A, June 2013)* (CN-16982)
- The software algorithm has been enhanced to take account of rare WSS read contention events. These contention events were causing false intermittent power alarms. *(6ONESR41-40A, June 2013)* (CN-16983)

Errata

- Show running-config does not show the cross-connect provisioning. *(6ONESR36-40A, February 2013)* (CN-12305)
- MARS-2 channels come up in OOS-MA instead of OOS-UAS. *(6ONESR36-40A, February 2013)* (CN-12431)

Carrier Module

(P/N 1174510G3)

The Optical Networking Edge Carrier Module has no system notes, feature enhancements, fixes, and errata related to System Release 4.1.

4 Degree Mini-Amplified Reconfigurable Optical Add/Drop Multiplexer (ROADM) with Variable Gain Pre-Amplifier and Booster Amplifier (MARS-4PB)

(P/N 1174512G1)

This section contains a summary of system notes, feature enhancements, fixes, and errata for the Optical Networking Edge 4 Degree Mini-Amplified Reconfigurable Optical Add/Drop Multiplexer (ROADM) with Variable Gain Pre-Amplifier and Booster Amplifier (MARS-4PB) as related to System Release 4.1.

System Notes

- Wavelengths entered via CLI must be entered exactly. Use the "show table wavelengths [shelf/slot]" command to see the supported wavelengths. *(6ONESR36-40A, February 2013)*
- The help messages for the threshold levels is generic and is the same for all versions of the ROADM cards. As an aid to the user, the error response is card specific and provides the range allowed by the card. *(6ONESR36-40A, February 2013)* (CN-8231)
- Auto Power Balancing, Channel Power Level, Total Power Level, and Thresholds allowed on all interfaces on SNMP. It is only valid on the COM OUT interface. Sending the command to the other interfaces will have no affect on the card. *(6ONESR36-40A, February 2013)* (CN-5300)

Feature Enhancements

- Optical power threshold Hi / Low alarms will no longer co-exist. The most recent will clear the opposite alarm. *(6ONESR41-40A, June 2013)*
- When no signal power is detected on a channel, the VOA for that channel will be decreased in steps to zero. Once attenuation reaches zero, the Auto-power Balance alarm for that channel will be cleared. *(6ONESR41-40A, June 2013)*
- Alarms are now suppressed when the administrative status is set to 'shutdown unassigned' or 'shutdown maintenance'. The card level administrative status will suppress all alarms and the port level administrative status will suppress port level alarms. *(6ONESR41-40A, June 2013)*
- Threshold alarms are now reported when provisioned value is above the high level setting or below the low level setting. In prior releases the alarm was raised also when the level was equal to the threshold setting. *(6ONESR41-40A, June 2013)*

Fixes

- Auto power balance alarms on a channel would not clear once generated even after taking the channel out of service. The alarms will now clear when the channel is removed from service. *(6ONESR41-40A, June 2013)* (CN-16982)
- The software algorithm has been enhanced to take account of rare WSS read contention events. These contention events were causing false intermittent power alarms. *(6ONESR41-40A, June 2013)* (CN-16983)

Errata

- Show running-config does not show the cross-connect provisioning. *(6ONESR36-40A, February 2013)* (CN-12305)

4 Degree Mini-Amplified Reconfigurable Optical Add/Drop Multiplexer (ROADM) with Booster Amplifier (MARS-4B)

(P/N 1174513G1)

This section contains a summary of system notes, feature enhancements, fixes, and errata for the Optical Networking Edge 4 Degree Mini-Amplified Reconfigurable Optical Add/Drop Multiplexer (ROADM) with Booster Amplifier (MARS-4B) as related to System Release 4.1.

System Notes

- Wavelengths entered via CLI must be entered exactly. Use the "show table wavelengths [shelf/slot]" command to see the supported wavelengths. *(6ONESR36-40A, February 2013)*
- The help messages for the threshold levels is generic and is the same for all versions of the ROADM cards. As an aid to the user, the error response is card specific and provides the range allowed by the card. *(6ONESR36-40A, February 2013)* (CN-8231)
- Auto Power Balancing, Channel Power Level, Total Power Level, and Thresholds allowed on all interfaces on SNMP. It is only valid on the COM OUT interface. Sending the command to the other interfaces will have no affect on the card. *(6ONESR36-40A, February 2013)* (CN-5300)

Feature Enhancements

- Optical power threshold Hi / Low alarms will no longer co-exist. The most recent will clear the opposite alarm. *(6ONESR41-40A, June 2013)*
- When no signal power is detected on a channel, the VOA for that channel will be decreased in steps to zero. Once attenuation reaches zero, the Auto-power Balance alarm for that channel will be cleared. *(6ONESR41-40A, June 2013)*
- Alarms are now suppressed when the administrative status is set to 'shutdown unassigned' or 'shutdown maintenance'. The card level administrative status will suppress all alarms and the port level administrative status will suppress port level alarms. *(6ONESR41-40A, June 2013)*
- Threshold alarms are now reported when provisioned value is above the high level setting or below the low level setting. In prior releases the alarm was raised also when the level was equal to the threshold setting. *(6ONESR41-40A, June 2013)*

Fixes

- Auto power balance alarms on a channel would not clear once generated even after taking the channel out of service. The alarms will now clear when the channel is removed from service. *(6ONESR41-40A, June 2013)* (CN-16982)
- The software algorithm has been enhanced to take account of rare WSS read contention events. These contention events were causing false intermittent power alarms. *(6ONESR41-40A, June 2013)* (CN-16983)

Errata

- Show running-config does not show the cross-connect provisioning. *(6ONESR36-40A, February 2013)* (CN-12305)

8 Channel DWDM Mux/Demux

(P/N 1174910G1, 1174911G1, 1174915G1 & 1174916G1)

The Optical Networking Edge 8 Channel DWDM Mux/Demux has no system notes, feature enhancements, fixes, and errata related to System Release 4.1.

4 Channel DWDM Add/Drop

(P/N 1174920G1, 1174920G2, 1174921G1, 1174922G1, 1174923G1, 1174924G1, 1174925G1, 1174926G1, 1174927G1, 1174928G1 & 1174929G1)

The Optical Networking Edge 4 Channel DWDM Add/Drop has no system notes, feature enhancements, fixes, and errata related to System Release 4.1.

4 Channel CWDM Mux/Demux

(P/N 1174950G1, 1174951G1, 1174952G1 & 1174953G1)

The Optical Networking Edge 4 Channel CWDM Mux/Demux has no system notes, feature enhancements, fixes, and errata related to System Release 4.1.

44 Channel Mux/Demux

(P/N 1174980F1)

The Optical Networking Edge 44 Channel Mux/Demux has no system notes, feature enhancements, fixes, and errata related to System Release 4.1.

release notes

ADTRAN®

Carrier Networks Division
901 Explorer Blvd.
Huntsville, AL 35806
U.S.A.
http://www.adtran.com

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CLEI: BVM2V10G
Product P/N: 1187001G1

Total Access 5000
23-Inch Chassis

jobAid

Issue Date: May 2010
Document P/N: 61187001G1-22C

DESCRIPTION

This document supports Total Access 5000 System Release 5.1.

The Total Access® 5000 23-Inch Chassis provides the primary platform for distribution of high speed subscriber services. The Chassis consists of two Switch Module slots (**SM A** and **SM B**), a System Controller Module slot (**12/SCM**), and module slots (**1** to **11**) and (**13** to **22**). Cooling is provided by an integral, removable fan assembly above the module slots, with optional fan filter located at the bottom of the Chassis.

Connection

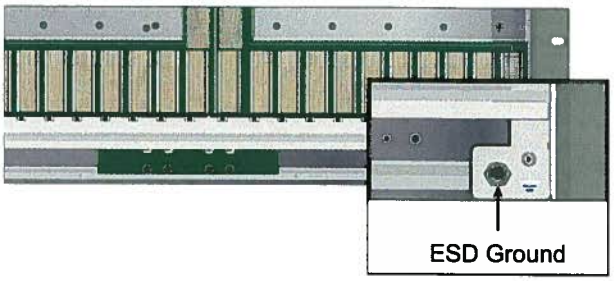
The lower section of the module cage is served by a single back-plane that spans the width of the Chassis and provides interconnects between the modules. In addition to distributing redundant power, ringing, and test buses, the backplane carries high speed data at rates up to 10 Gbps (depending on driver technology) between the common equipment modules and access modules.

INSTALLATION

⚠ CAUTION

- Before beginning installation, read all CAUTION and WARNING statements pertaining to the safe handling and installation of this product.
- Before beginning installation, read and understand the *Total Access 5000/5006 Load Calculation Guidelines* (P/N 65KLOADCALC-22). Calculate the maximum current draw and maximum power requirements for the modules that will be installed in the Chassis. Use these values to determine the applicable Circuit Breaker size and wiring size that complies with the National, State, and Local Electrical Codes. The Local Telephone Company may also specify their own requirements. This product must be installed by qualified Installation Service Personnel only.
- This product must be installed by qualified Installation Service Personnel only.
- This product must be installed in a Restricted Access Location (RAL) only.
- Electrostatic Discharge (ESD) can damage electronic equipment. When handling equipment, wear an antistatic discharge wrist strap to prevent damage to electronic components. ESD shoes can be used when there is ESD flooring present. Place electronic modules in antistatic packing material when transporting or storing. When working with electronic modules, always place them on approved antistatic mat that is electrically grounded.
- Turn the power source **off** before proceeding with the installation. The Chassis may be powered by multiple sources. Disconnect all sources of power prior to installation and servicing.
- The Chassis is shipped with protective cardboard covers over the front and rear to protect the backplane and electrical interface from damage during transport and installation. These covers should only be removed after the Chassis is installed in the rack or cabinet and is ready to accept the installation of Input/Output or circuit modules.

After unpacking the unit, inspect it for damage. If damage is found, file a claim with the carrier, then contact ADTRAN Customer Service. For more information, refer to the *Warranty* for further information.

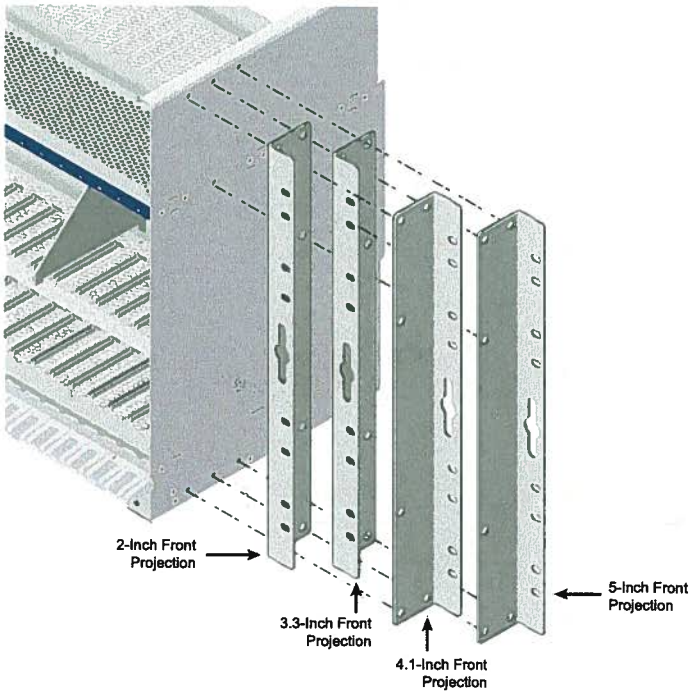


Mounting the Chassis

NOTE

Before installing the Chassis in a Central Office (CO) frame, remove the paint from the surface of the CO frame where the mounting brackets come in contact with that frame and apply an antioxidant.

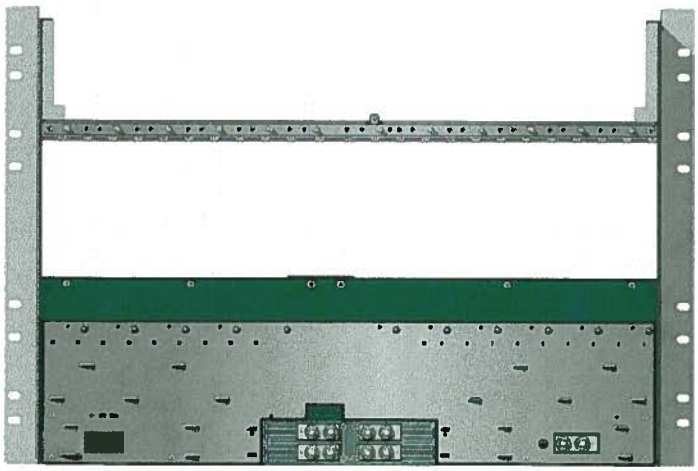
The Chassis is shipped with two mounting brackets that are used to install the Chassis with either a 2-inch, 3.3-inch, 4.1-inch or 5-inch front projection. Each bracket is attached with five screws, which are supplied with the Chassis. For mounting locations, refer to the figure below.



Rear Panel Connections

The rear panel of the Chassis provides connections for the following:

- Frame Ground
- Power
- External Ring Generator



Grounding the Chassis

⚠ CAUTION

- The Chassis Ground Terminal must be connected to a known, reliable Earth Ground at all times during installation, operation, and service. Refer to the National, State, and Local Electrical Codes for details on grounding requirements. The Local Telephone Company Procedures may also specify their grounding methods.
- The Chassis Ground Wire must be of equal or greater ampacity than the wires connected to the Power Source.
- The Chassis Ground Wire leaving the Chassis must be terminated with a Regulatory Agency Approved and Listed grounding lug. The grounding lug must be either a two-hole lug or a one-hole lug that is used in conjunction with an anti-rotation device.

The Total Access 5000 must be grounded to a reliable grounding source. The ground wire must be from 2 AWG to 6 AWG, and the ground wire should be at least as large a gauge as the power connections.

To make the frame ground connection to the Chassis, complete the following steps:

1. Cut the ground wire length to reach from the grounding lug on the rack to the Chassis frame ground terminal, located on the lower right corner of the backplane. Leave enough slack to allow for tying to the rack.
2. Using wire strippers, strip 5/8 inches of insulation from each end of the grounding wire.
3. Using an appropriate crimping tool and lugs, fasten a lug to each end of the ground wire.
4. Using an approved thread-forming screw, connect one end of the ground wire to the CO rack or ground bus.
5. Remove the connection hardware from the Frame Ground terminal of the Chassis.
6. Secure the other end of the ground wire to the Frame Ground terminal on the Chassis using the connection hardware removed in step 5.
7. Torque the hex nuts to 24 inch-pounds.
8. To ensure ground, use an ohmmeter to check the continuity between the frame and a known ground. The measurement should be less than 1 ohm.

Power Connections

⚠ CAUTION

- The Total Access 5000 System must be connected to a reliably grounded -48 V nominal DC supply that is electrically isolated from the AC Source. The positive terminal must be referenced to earth ground at either the source (rectifier or battery) or at the chassis/frame. Powering by any other means may void the warranty of this product. Please refer to the applicable Installation and Maintenance Guide for the Chassis or the applicable System Deployment Guide for details and instructions concerning power connections to the Total Access 5000 Chassis.
- Refer to the *Total Access 5000/5006 Load Calculation Guidelines* (P/N 65KLOADCALC-22) and to the previously determined maximum current draw and maximum power requirement calculations. From these values, choose the appropriate wiring size.
- The Chassis may be powered by multiple sources. Disconnect all sources of power prior to installation and servicing.
- The Branch-Circuit Overcurrent Protective Device should be a fuse or circuit breaker rated 60 VDC minimum, 100 Amps maximum. Refer to the National, State, and Local Electrical Codes for details on sizing the Overcurrent Protection. The Local Telephone Company Procedures may also specify their sizing methods.
- Incorporate a readily accessible two-pole Disconnect Device that is approved and suitably rated into the field wiring to power the Chassis.
- Use appropriately sized Copper Conductors only. Refer to the National, State, and Local Electrical Codes for details on sizing the conductors. The Local Telephone Company Procedures may also specify their sizing methods.

NOTE

Clean all power contact surfaces and apply an antioxidant.

The Chassis provides redundant power inputs. After connecting and checking the ground to the Total Access 5000 Chassis, connect power to the Chassis. Check to make sure the power source is providing the correct power and polarity to the shelf.

To connect power to the Chassis, perform the following steps:

1. Ensure the power is disconnected at the source.
2. Open the plastic power terminal covers from the A and B side power terminals.
3. Remove the connection hardware from power terminals **A** and **B**.
4. Cut four lengths of appropriately sized wire to reach from the terminals on the fuse and alarm panel to the power terminals on the Chassis.
5. Strip 5/8 of an inch from the power and return wires, and using a crimping tool, connect an appropriate lug to each end of the wires.
6. Connect the ends of one wire between the "A-Side" CO –48 VDC supply and the "A-Side" **–48V A** terminal on the Total Access 5000 backplane.
7. Connect three more power wires as follows:
   - ◊ "A-Side" CO –48 VDC return to Chassis "A-Side" **RTN**
   - ◊ "B-Side" CO –48 VDC supply to Chassis "B-Side" **–48V B**
   - ◊ "B-Side" CO –48 VDC return to Chassis "B-Side" **RTN**
8. Install the connection hardware removed in step 3.
9. Torque the hex nuts to 24 inch-pounds.
10. Snap the plastic power terminal covers back in place.

Ring Generator Connections

The Total Access 5000 System operates with internal or external ring generator applications.

NOTE

External ring generator applications are currently not supported.

To connect an external ring generator to the Chassis, perform the following steps:

1. Cut three wires to a length that will reach from the external ring generator to the Chassis ring generator terminal, located on the lower left corner of the backplane. Leave enough slack to allow for tying to the rack.
2. Carefully open the ring generator hinged cover by pulling on the upper side.
3. Using a #2 phillips-head screwdriver, loosen the three screws on the ring generator terminals.
4. Strip the ends of the three wires to 1 to 1-1/2 inches.
5. Connect the ringing voltage wire to the 20 Hz terminal.
6. Connect the ringing return wire to the RTN terminal.
7. Connect the ground wire to the ground terminal.
8. Tighten all three screws.
9. Close the Ring Generator Terminal cover.

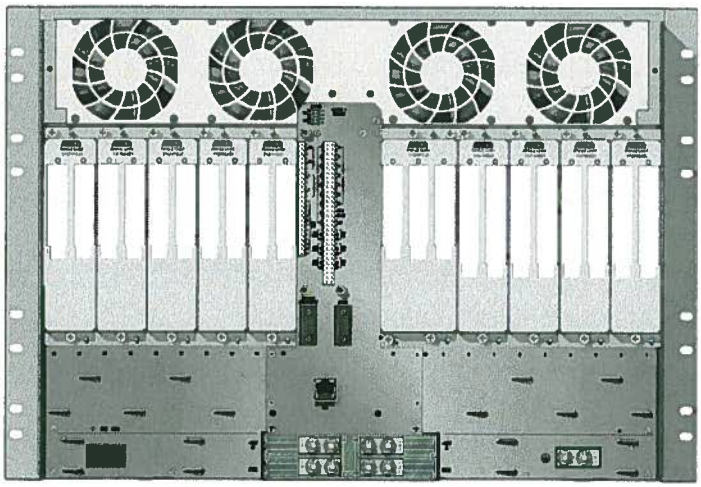
Rear Panel Components

NOTICE

Before adding rear panel I/O modules to the Chassis, carefully remove any protective cardboard panels.

The modular Chassis rear panel allows for interchangeable components to provide an input/output configuration that is tailored to the specific type of modules deployed in the system.

See the *Total Access 5000/5006 Engineering and Ordering Guide* (P/N 65K510ENG-1) for a complete listing of Total Access 5000 Input/Output rear panel components and their applications.



Installation of Circuit Modules

⚠ WARNING

To meet the NEBS compliance and to provide proper airflow through the Total Access 5000 system, **ALL** chassis slots must be populated with either a module and an appropriate rear panel or front and rear panel blanks.
Failure to install front and rear panel blanks in ALL unpopulated slots will void the warranty for modules installed in a misconfigured Total Access 5000 System.

⚠ CAUTION

- Before installing any Circuit Modules, a Fan Assembly must first be installed in the Chassis. The type of Fan Assembly is application-dependent. Please refer to the *Total Access 5000/5006 Load Calculation Guidelines* (P/N 65KLOADCALC-22) or the *Total Access 5000/5006 Engineering and Ordering Guide* (P/N 65K510ENG-1) for information on choosing a Fan Assembly. Please refer to the applicable installation manual for the Fan Assembly chosen.
- The total number of Circuit Modules permitted in a Total Access 5000 Chassis depends upon the total current draw and total chassis heat dissipation of the actual modules installed. Also, typical current draw, power consumption, and heat dissipation are application-dependent. Please refer to the *Total Access 5000/5006 Load Calculation Guidelines* (P/N 65KLOADCALC-22) or the *Total Access 5000/5006 Engineering and Ordering Guide* (P/N 65K510ENG-1) for information required to calculate these values.

Immediately prior to the installation of any circuit modules, remove the protective cardboard panel from the front of the Chassis and thoroughly inspect the backplane and connectors for damage or bent pins.

Maintenance

The Chassis does not require routine hardware maintenance for normal operation. Do not attempt to repair the Chassis in the field. Repair services are obtained by returning the defective unit to ADTRAN. Refer to the *Warranty* for further information.

Operational Specifications

- Height: 15.75 inches (400.05 mm) (including air handler)
- Width: 21.50 inches (546.1 mm)
- Depth: 12.00 inches (304.8 mm)
- Weight: 24.375 pounds (11.056 kg)*
- Powering Voltage Range: –42 VDC to –56 VDC
- Nominal Powering Voltage: –48 VDC
- Maximum Current Draw: 85.0 amps at 48 VDC
- Maximum Power Consumption: 4080 watts
- Maximum Chassis Heat Dissipation with normal flow fan assembly:
  - Remote Terminal: 1350 watts
  - Central Office Terminal: 1950 watts
- Maximum Chassis Heat Dissipation with high flow fan assembly: Remote Terminal: 2000 watts
- Operational Temperature Range: –40°C to +65°C
- Operating Altitude Range :

- ◊ -197 feet (-60 meters) to 6000 feet (1800 meters). The operating ambient temperature is derated by 1.6°C/1000 feet.
- ◊ 6000 feet (1800 meters) to 13000 feet (4000 meters). The operating ambient temperature is derated by 1.4°C/1000 feet.
- Storage Temperature Range: –40°C to +70°C
- Relative Humidity: 95%, noncondensing

For complete specifications, refer to the *Total Access 5000 23-Inch Chassis Installation and Maintenance Guide* (P/N 61187001G1-5).

Safety and Regulatory Compliance

⚠ CAUTION

Electrostatic Discharge (ESD) can damage electronic modules. When handling modules, wear an antistatic discharge wrist strap to prevent damage to electronic components. Place modules in antistatic packing material when transporting or storing. When working on modules, always place them on an approved antistatic mat that is electrically grounded.

The Total Access 5000 23-Inch Chassis is NRTL Listed to the applicable UL safety standards. The 23-Inch Chassis meets or exceeds all the applicable requirements of NEBS, Telcordia GR-63-CORE, and GR-1089-CORE.

The 23-Inch Chassis is intended for deployment in Central Office type facilities, EEEs, EECs, and locations where the NEC applies. Install the 23-Inch Chassis in a Restricted Access Location (RAL) only. Only qualified installation Service Personnel should install the product.

Configuration Code	Input	Output
Power Code (PC)	F	C
Telecommunication Code (TC)	X	X
Installation Code (IC)	A	–

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by ADTRAN could void the user's authority to operate this equipment.

⚠ WARNING

- The LAN Management Port (10Base-T) of the SMIO3, installed in the Chassis, is classified as Type 2 or 4 as defined in Appendix B of GR-1089-CORE, Issue 5 and is suitable for connection to intra-building or unexposed wiring or cabling only. Do not metallically connect this port to interfaces which connect to the Outside Plant (OSP) or to the OSP wiring. The 10Base-T port is designed for use as an intra-building interface only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 5) and requires isolation from exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect this interface metallically to OSP wiring. Other ports can be intra-building only and are described as such in the applicable documentation for the subassembly.
- The OSP interfaces of the Total Access 5000 System are designed to be protected by primary protectors that have voltage limiting characteristics that are equal to or less than those found in the high Voltage category of GR-974-CORE. This includes carbon block protectors and all gas tube and solid state protectors. Solid state protectors are not recommended for ADSLx and VDSLx applications, as the solid state protectors can adversely affect signal integrity.

⚠ CAUTION

- For VDSL2 deployments in a Remote Terminal (RT) **ONLY** where top exhaust is desired, cooling is provided by the Total Access 5000 23-Inch High Flow Fan Module (P/N 1187080G2).
- For VDSL2 deployments in a Remote Terminal (RT) **ONLY** where rear exhaust is desired, cooling is provided by the Total Access 5000 23-Inch High Flow Rear Fan Module (P/N 1187080G3).
- The Chassis ground wire must be of equal or greater ampacity than the wires connected to the power source.
- Per GR-1089-CORE Section 9, the Total Access 5000 System is designed to be deployed in either a DC-C (common) or DC-I (isolated) configuration.
- Per GR-1089-CORE, the Total Access 5000 System is designed and intended for installation as part of a Common Bonding Network (CBN). The Total Access 5000 System is not designed nor intended for installation as part of an Isolated Bonding Network (IBN).
- To meet NEBS compliance and to provide proper airflow through the system, blank panels or I/O modules are required on each applicable slot. For a list of Total Access 5000 Chassis rear panel component part numbers and descriptions, see the *Total Access 5000/5006 Engineering and Ordering Guide*, P/N 65K510ENG-1.

NOTE

- Current limiting protectors are not required.
- The Total Access 5000 23-Inch Chassis is designed to be deployed in GR-3108-CORE environmental class 1 or 2 as defined in GR-3108-CORE issue 2.

For more information, refer to the Installation and Maintenance Practice (P/N 61187001G1-5) available online at www.adtran.com.

Warranty: ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found online at www.adtran.com/warranty.

CAUTION!
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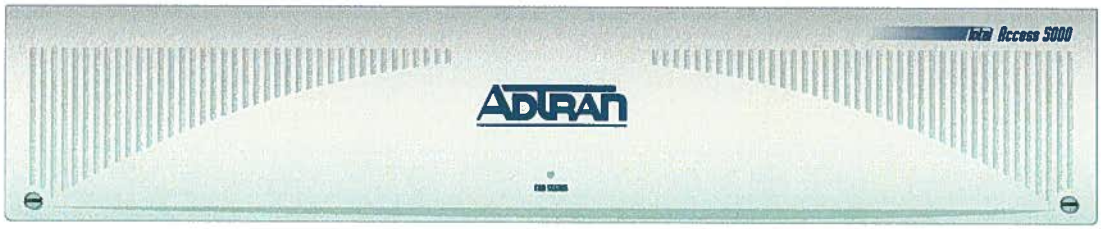
ADTRAN CUSTOMER CARE:
From within the U.S. 1.800.726.8663
From outside the U.S. +1 256.963.8716
PRICING AND AVAILABILITY 1.800.827.0807

* 6 1 1 8 7 0 0 1 G 1 - 2 2 C *

ADTRAN
CLEI: BVPQADGM
Product P/N: 1187080G1

Total Access 5000
23-Inch Fan Module

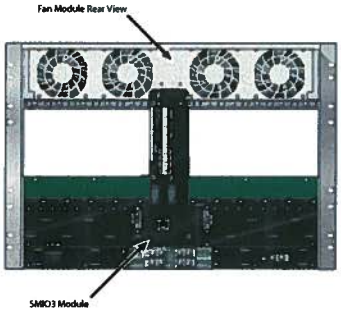
JOBAID
Issue Date: 0902
Document P/N: 61187080G1-22A



DESCRIPTION

The Total Access® 5000 23-Inch Fan Module (P/N 1187080G1) consists of a sheet metal tray that holds four fans rated at a nominal –48 VDC.

The Fan Module is mounted from the front of the rack and is installed into the top slot of the Total Access 5000 23-Inch Chassis (P/N 1187001L1/G1). The Fan Module is designed to provide forced air ventilation to cool a fully populated chassis.



Power is supplied to the Fan Module through two independent circuits that are controlled as a group. Each circuit supplies power to two fans, which are connected in parallel.

When fully inserted, the Fan Module connects to the SMIO3 module (P/N 1187051L1/G1). The SMIO3 routes power and serial communications from the Switch Module (P/N 1187020L1) to the Fan Module. The fan microprocessor samples the speed of each fan and reports an alarm condition for fan failure or eminent fan failure.

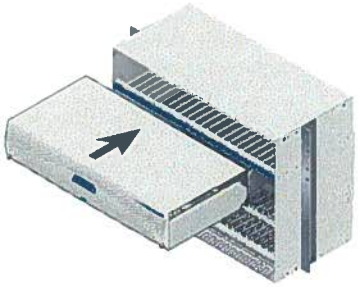
The figure to the left illustrates the rear of the chassis with an installed Fan Module and SMIO3 module.

INSTALLATION

After unpacking the Fan Module, inspect it for damage. If damage is noted, file a claim with the carrier and then contact ADTRAN. For more information, refer to the *Warranty* at the bottom of the reverse page.

To install the Fan Module, complete the following steps:

1. Push the Fan Module firmly into the top slot of the chassis.



2. Use the two thumb-screws on the lower left and right side of the module to attach the Fan Module to the chassis.

An LED indicator, labeled **FAN STATUS**, is located on the front bezel and provides fan status information.

FRONT PANEL LEDS

The Fan Module LED status descriptions are shown below.

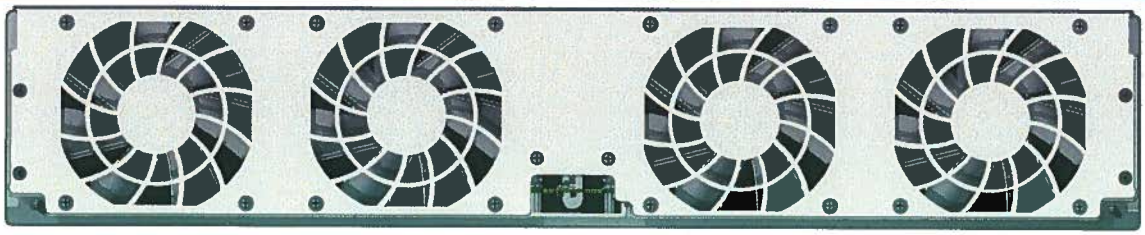
Label	Status		Description
FAN STATUS	○	Off	No Power or Fuse Failure
	●	Green	No Failure
	●	Red	Major Alarm - Multiple Fan Failure or Eminent Failure Detected
	●	Orange	Minor Alarm - Single Fan Failure or Eminent Failure Detected

Alarms

Major and minor fan alarms can be remotely monitored through a variety of management options. For more information, refer the *Total Access 5000 23-Inch Fan Module Installation and Maintenance Practice* (P/N 61187080G1-5) for details on system management.

PROVISIONING

The SCM is always installed in the chassis. The SCM has a front panel-mounted DB-9 connector that supplies an RS-232 interface for connection to a controlling terminal. The supported terminal type is VT100 or compatible and is set for 9600 bps, 8-data bits, no parity, no flow control, and 1-stop bit.



System Access

At the Total Access 5000 System login screen, enter the account name and password. The default account name is **ADMIN** and the password is **PASSWORD**. An account with ADMIN privileges is required to change the account name and password. For more information, refer to the *Total Access 5000 System Controller Module Installation and Maintenance Practice* (P/N 61187010L1-5).

NOTE: The account name and password fields are case-sensitive.

To navigate the menus, select the desired entry, and press ENTER. To return to the previous menu, press ESC.

Factory Defaults

Upon initial installation, the Fan Module is provisioned according to factory default settings.

To access the provisioning options for the Fan Module, complete the following steps:

1. Log in to the system.
2. From the Total Access 5000 main menu, select the Modules Menus option, and press ENTER.

From the Modules Menus menu, select the Fan Module option (F), and press ENTER.

MAINTENANCE

The Fan Module does not require routine hardware maintenance for normal operation. Do not attempt to repair the Fan Module in the field. Repair services are obtained by returning the defective unit to ADTRAN. Refer to the *Warranty* for further information. Field support for software is provided through upgrade facilities.

Removal and Replacement

Complete the following steps to remove and replace the Fan Module.

1. Unscrew the two thumb-screws on the lower left and right side of the module until the screws no longer engage the chassis. The screws should be loose, but still captive in the Fan Module.
2. Grasp the two thumb-screws and pull the Fan Module out of the chassis. The module will disengage from the SMIO3 and lose power.

If replacing the Fan Module, refer to Installation. Replace the module in a timely fashion to prevent any overheating of installed line modules.

Fan Filter

For Fan Filter (P/N 1187081G1) installation, inspection, and replacement procedures, refer to the Total Access 5000 *23-Inch Fan Filter Job Aid* (P/N 61187081L1-22).

OPERATIONAL SPECIFICATIONS

- Powering Voltage Range: –42 VDC to –56 VDC
- Nominal Powering Voltage: –48 VDC
- Typical Current Draw: 0.324 amps @ –48 VDC (Fan Speed Mode = Auto)
- Maximum Current Draw: 0.466 amps @ –48 VDC (Fan Speed Mode = Max)
- Typical Heat Dissipation: 15.5 watts (Fan Speed Mode = Auto)
- Maximum Heat Dissipation: 22.37 watts (Fan Speed Mode = Max)
- Operational Temperature Range: –40°C to +65°C
- Storage Temperature Range: –40°C to +85°C
- Relative Humidity: 95%, noncondensing

For detailed Total Access 5000 system loading information, refer to the "Total Access 5000 Load Calculation Guidelines Job Aid" (P/N 61187000L1-22).

For complete specifications, refer to the *Total Access 5000* 23-Inch Fan Module *Installation and Maintenance Practice* (P/N 61187080G1-5).

COMPLIANCE

For compliance information, refer to the *Total Access 5000 23-Inch Fan Module Compliance Notice* (P/N 61187080G1-17).

For more information, refer to the *Total Access 5000 23-Inch Fan Module Installation and Maintenance Practice* (P/N 61187080G1-5) available online at www.adtran.com.

Warranty: ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found online at www.adtran.com/warranty.

CAUTION!
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HANDLING PRECAUTIONS REQUIRED.

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TECH SUPPORT 800.726.8663
RETURN FOR REPAIR 256.963.8722

ADTRAN

Product P/N: 1187081G1

Total Access 5000
Fan Filter

JOBAID

Issue Date: 0806
Document P/N: 61187081G1-22A

DESCRIPTION

The Total Access® 5000 Fan Filter (P/N 1187081G1) is used in conjunction with the Fan Module to provide forced filtered air ventilation for the Total Access 5000 Chassis and components.

INSTALLATION

After unpacking the Fan Filter, inspect it for damage. If damage is noted, file a claim with the carrier and then contact ADTRAN. For more information, refer to the *Warranty*.

To install the Fan Filter, perform the following steps:

1. Ensure that the Fan Module is turned off.

NOTE: The Fan Filter is located at the bottom of the Total Access 5000 Chassis and is accessed from the front of the chassis.

2. If a Fan Filter is already installed, remove the old filter by grasping the pull tab on the front of the filter toward the rear of the chassis and down.
3. Once the filter disengages from the front of the chassis, pull the filter out.

NOTE: Write the current date on the pull tab of the new Fan Filter before installation.

4. Insert a new filter with the springs toward the back of the chassis.
5. Gently push the filter in and then up until it engages with the chassis.

MAINTENANCE

ADTRAN recommends annual fan filter inspection and replacement.

COMPLIANCE

The Fan Filter is NRTL Listed to the applicable UL Standards. The Fan Filter meets all applicable requirements of Telcordia GR-1089-CORE. Install the Fan Filter in a Total Access 5000 chassis located in a restricted access location.

NOTE: Since the Total Access 5000 chassis is fan-cooled, an installed Total Access 5000 Fan Filter is required for NEBS compliance. ADTRAN recommends Fan Filter inspection and replacement as specified in the "Maintenance" section above.

For more information, refer to the Total Access 5000 Fan Module Installation and Maintenance Practice (P/N 61187080G1-5) available online at www.adtran.com.

Warranty: ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found online at www.adtran.com/warranty.

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TECHNICAL SUPPORT 800.726.8663
RETURN FOR REPAIR 256.963.8722

61187081G1-22A

ADTRAN

CLEI: BVL2PT0C_ _
Product P/N: 1187051G1

Total Access 5000
Switch Module I/O 3 (SMIO3)

JOBAID

Issue Date: 0712
Document P/N: 61187051G1-22A

DESCRIPTION

The Total Access® 5000 Switch Module Input/Output three-Slot (SMIO3) rear panel (P/N P/N 1187051G1) supports one System Controller Module (SCM) and two Switch Modules (SM). The SMIO3 provides the following:

- Physical interface (3 slots) to the Total Access 5000 backplane for the SCM and two SMs
- Physical communication paths between the SCM and SMs
- Communication interface ports to the SCM that enable management of the Total Access 5000 System
- Wire-wrap terminals for external clocks, alarm I/O, testing, and voltage
- Control signals and a power path to the Total Access 5000 23-inch Fan Module

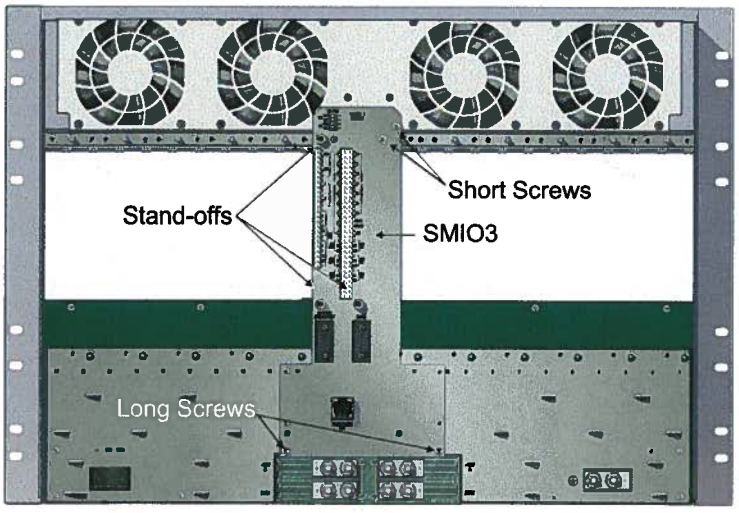
INSTALLATION

After unpacking the SMIO3, inspect it for damage. If damage exists, file a claim with the carrier and contact ADTRAN. For more information, refer to the warranty.

The SMIO3 attaches to the backplane of the Total Access 5000 Chassis. Follow the steps below to install the SMIO3.

CAUTION: If the chassis is rack mounted, be sure that the shelf is square and not distorted before installing the SMIO3. To aid installation, loosen the chassis mounting bolts to allow the chassis to become square.

1. Align the SMIO3 across slots numbered 12/SCM, SM A, and SM B (labeled in the front of the chassis). Seat the SMIO3 onto the installation pegs of the chassis so that it rests firmly against the chassis frame.
2. Secure the SMIO3 to the chassis using the four screws and three stand-offs provided. See the figure below for screw and stand-off locations.

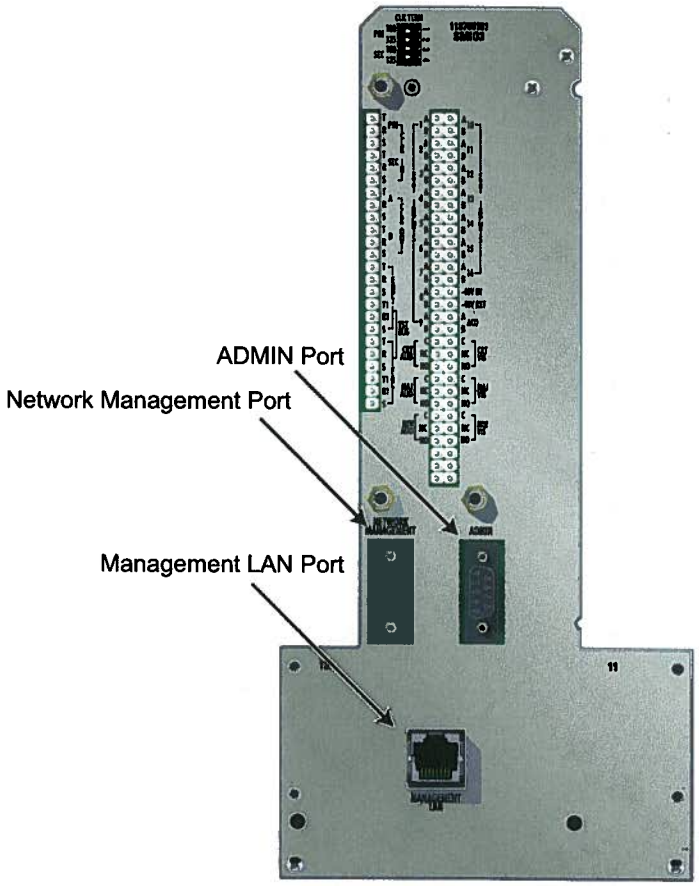


Removing the Terminal Guard

Remove the plastic terminal guard before making connections; reinstall afterward. To remove the guard, use a #1 phillips-head screwdriver to remove the two screws that secure the guard, then carefully pull the guard away from the SMIO3.

COMMUNICATIONS INTERFACE

The SMIO3 has three communications interface ports (see the figure and table below).

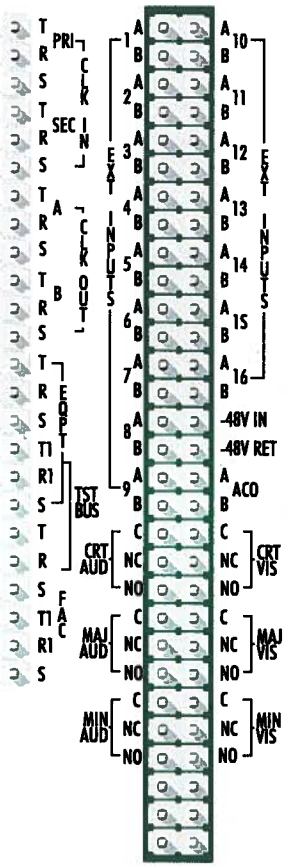


Port Name	Type	Description
ADMIN	DB-9	This port supports the following interfaces to the SCM: ♦ Menu Access ♦ TL1 Mode ♦ TL1 Test Mode ♦ Terminal Server Mode ♦ Craft Access using a modem
NETWORK MANAGEMENT	DB-9	This port supports the following interfaces to the SCM: ♦ TL1 Mode ♦ Terminal Server Mode ♦ Menu Access
MANAGEMENT LAN (Local Area Network)	RJ-45	This port provides Ethernet 10Base-T TCP/IP and in-band access to support the following interfaces to the SCM: ♦ TL1 Mode ♦ SNMP ♦ Telnet

TERMINAL BLOCK CONNECTIONS

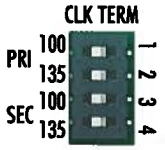
Terminal block connections (see the table below and figure to the right) are either two or three-wire twisted pair inputs. Use standard Telco cross-connect wire for all connections. A wire-wrap tool and wire stripper are required.

Input/Output	Function
EXT INPUTS: 1 (A, B) to 16 (A, B)	Two-wire, twisted pair external inputs for signaling miscellaneous alarms, such as environmental alarms and other status or control alarms. These allow detection of an active –48 VDC signal as an active alarm indication and provide a method to tell the SCM that there has been some external alarm situation. For all inputs, terminal B supplies a –48 VDC source. Terminal A expects –48 VDC if an alarm condition exists on the equipment being alarmed.
–48 V IN –48 V RET	Voltage terminals for an optional –48 VDC source for external equipment. IN is for voltage input; RET is for return voltage.
ACO (A, B)	Two wire, twisted pair external input for stopping a visual or audible external alarm. The ACO indicates that some relay contact closure has taken place; it can be reported to the SCM. Once set, it must be changed at the sending end.
ALARMS: CRT VIS (C, NC, NO) MAJ VIS (C, NC, NO) MIN VIS (C, NC, NO) CRT AUD (C, NC, NO)) MAJ AUD (C, NC, NO) MIN AUD (C, NC, NO))	Standard bank alarm outputs are Form C relay contacts for VIS (Visual) and AUD (Audible) alarms. Alarms are classified as CRT (Critical), MAJ (Major) or MIN (Minor). Each alarm is a three-pin wire-wrap header that connects to the SMIO3 for alarm management. The SCM provides the necessary electronic circuits for a C/NC/NO (Closed/Normally Closed/Normally Open) contact arrangement.
CLK IN: PRI (T, R, S) SEC (T, R, S)	A and B differential inputs for Primary (PRI) or Secondary (SEC) BITS (Building Integrated Timing Supply) or Composite external clock sources.
CLK OUT: A (T, R, S) B (T,R, S)	A and B differential outputs for Primary (PRI) or Secondary (SEC) BITS or Composite clock sources.
TST BUS EQPT: (T, R, S, T1, R1, S)	Equipment connections for metallic test bus.
TST BUS FAC: (T, R, S, T1, R1, S)	Facility connections for metallic test bus.



CLK TERM

The SMIO3 provides a four-position DIP switch, labeled **CLK TERM**, for Primary (PRI) and Secondary (SEC) termination control of the BITS and Composite clock inputs.



NOTE: A composite clock can support up to eight chassis, but only one chassis is terminated.

The table below details the DIP switch positions.

Clock	1 (100)	2 (135)	3 (100)	4 (135)
BITS CLK	Close	Open	Close	Open
Composite CLK Terminated	Open	Close	Open	Close
Composite CLK Un-terminated	Open	Open	Open	Open

MAINTENANCE

The SMIO3 does not require routine hardware maintenance for normal operation. Do not attempt repairs in the field. Return the defective unit to ADTRAN. Refer to the warranty for further information. Field support for software is provided through upgrade facilities.

OPERATIONAL SPECIFICATIONS

- Powering Voltage Range: –42 VDC to –56 VDC
- Nominal Powering Voltage: –48 VDC
- Operational Temperature Range: –40°C to +65°C
- Storage Temperature Range: –40°C to +85°C
- Relative Humidity: 95%, noncondensing

Compliance Notice

For compliance information, refer to the *Total Access 5000 Switch Module I/O 3 Compliance Notice* (P/N 61187051G1-17).

For more information, refer to the Installation and Maintenance Practice (P/N 61187051G1-5) available online at www.adtran.com.

Warranty: ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found online at www.adtran.com/warranty.

CAUTION!
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RETURN FOR REPAIR 256.963.8722

61187051G1-22A

ADTRAN

Total Access 5000

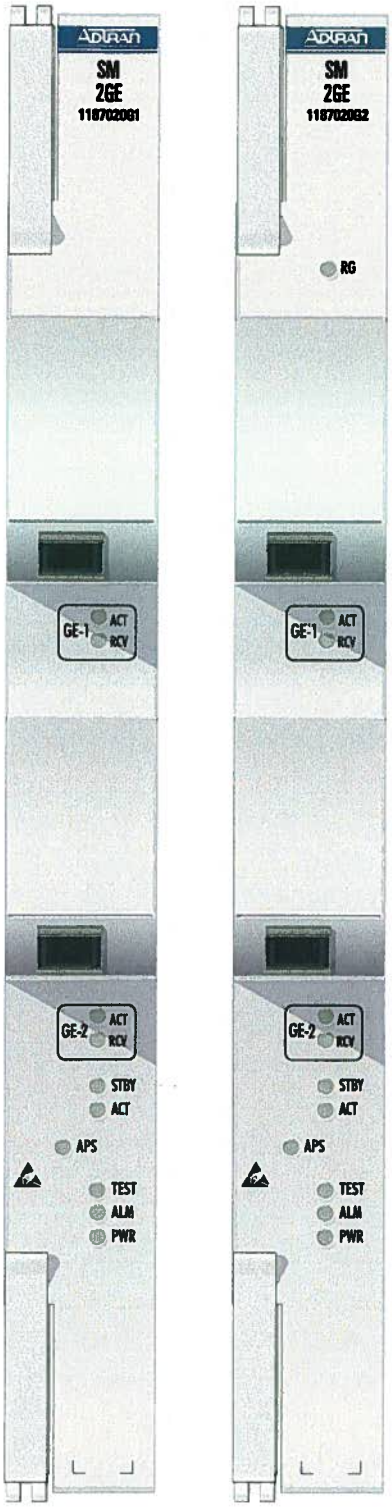
Switch Module 2 GigE

jobAid

Product P/N: 1187020GX

Issue Date: September 2011

Document P/N: 61187020GX-22D



DESCRIPTION

This Job Aid provides information on the features associated with those Total Access 5000® Switch Modules listed in the following table:

PN	Description	CLEI
1187020G1	Switch Module 2 GigE w/out Ring Generator	BVL2N0NC_ _
1187020G2	Switch Module 2 GigE w/Ring Generator	BVL2N0PC_ _

The Total Access 5000 2 GigE Switch Module (2 GigE SM) is intended for deployment with the Total Access 5000 system. The 2 GigE SM provides network data aggregation for the these systems. Small Form-Factor Pluggable (SFP) Gigabit Ethernet ports serve as the network interface to the system and other Total Access nodes. The 2 GigE SM also provides common system functions, controls communication between access modules and the System Controller Module (SCM), and interface to the high-speed backplane through the Total Access Switch Module Input/Output (SMIO).

The Total Access 5000 2 GigE SM is intended for deployment with the Total Access 5000/5006 Chassis.

The 2 GigE SM supports Link Aggregation Control Protocol (LACP). LACP facilitates increased link capacity by creating 802.3ad trunks that exchange packets between Ethernet interfaces more efficiently. 802.1Q and Q-in-Q (double tagging) enables the Total Access 5000 system to support both single and double tagged Ethernet frames. LACP is only available on the Central Office Terminal (COT) network interface.

FEATURES

Features listed below are common to each 2 GigE SM:

- SFP for copper and optical connectivity
- 802.ah for Ethernet Operation, Administration and Maintenance (OAM)
- 802.1p for Class of Service (CoS)
- 802.1q VLAN Tagging
- 802.1 Q-in-Q VLAN Tagging
- 802.3ad Link Aggregation Control Protocol (LACP)
- Support for 1:1 and N:1 VLAN topologies
- Multicast packet replication for IPTV applications
- Network and Subscriber Proxy ARP
- Full range of VLAN ID support
- IGMP v2 Proxy and Snooping
- Supported by Total Access EMS version B02 or higher
- EFM Bonding Group Protection
- Command Line Interface (CLI) deployment option
- Switch Module Input/Output (SMIO3)
- Provides deployment options of either redundant or non-redundant deployment options
- ATM Virtual Channel Interfaces (VCIs) provisioning
- **GE-1** and **GE-2** ports are 1 Gbps interfaces
- Supports Session Initiation Protocol (SIP)
- Two Gigabit Ethernet interfaces with SFP cages to allow for a range of optical and electrical network connections
- Supports Ring Generation (1187020G2 only)

INSTALLATION

After unpacking the 2 GigE SM, inspect it for damage. If damage is noted, file a claim with the carrier and then contact ADTRAN. For more information, refer to the warranty.

⚠ WARNING

A 95 VAC is present on the Ring Generator circuitry. Steps should be taken to prevent accidental contact with the Class B voltage levels (as defined in GR-1089-CORE) from the ring generator.

Before installing the 2 GigE SM, install the copper or optical SFP module(s) into the required front panel port(s). Refer to www.adtran.com/sfp for information on the correct SFP to use.

⚠ CAUTION

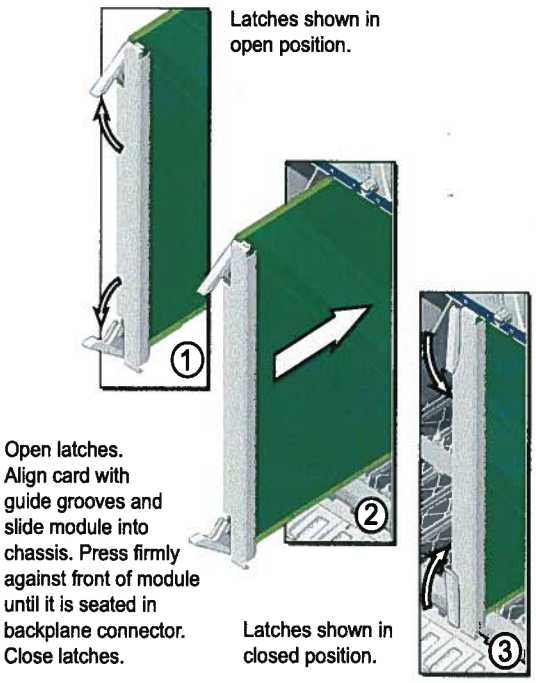
Due to compliance certification requirements, only approved 'Class 1 Laser Product' SFP modules approved by ADTRAN are to be used with the 2 GigE SM modules. ADTRAN cannot certify system integrity with other SFPs.

NOTE

An SMIO3 must be installed prior to installing the Switch Module. Refer to the *Total Access 5000 SMIO3 Job Aid* (P/N: 1187051G1) for installation procedures for the SMIO3.

The 1187020G1 or G2 must be installed in a slot labeled **SM A** or **SM B**.

To install the 2 GigE SM, refer to the figure below.



When the 2 GigE SM first powers up, it performs self-tests. Once the power up self-tests are complete, the status LEDs will reflect the true state of the hardware.

Front Panel LEDs

Label	Status		Indication
PWR	○	Off	No power to unit
	●	Green	Power and initialization OK
	✲	Flashing	Menu Session Active, Color reflects current service state
	●	Yellow	Out of service
	●	Red	Power, temp, or boot failure
ALM	○	Off	No alarm
	✲	Green Flashing	Info alarm
	●	Yellow	Minor alarm
	●	Red	Major alarm
	✲	Red Flashing	Critical alarm
TEST	○	Off	No test
	●	Yellow	Test active
ACT	○	Off	SM not in Active mode
	●	Green	2 GigE SM is in Active mode
	●	Yellow	Fault prevents 2 GigE SM from going on line
STBY	○	Off	2 GigE SM is not in Standby mode
	●	Green	2 GigE SM is in Standby mode
GE-1/2 ACT	○	Off	Network Link in Protect mode
	●	Green	Network Link in Active mode
GE-1/2 RCV	○	Off	Network Link service state is Out of Service-Unassigned
	●	Green	Network Link is Up
	●	Red	Network Link is Down
RG (G2 ONLY)	○	Off	Ringing Generator not equipped
	●	Green	Ringing Generator equipped and active
	●	Red	Ringing Generator failed

Front Panel Pushbutton

Label	Description
APS	The Automatic Protection Switch (**APS**) pushbutton forces a switch to a redundant Switch Module, if present.

PROVISIONING

The System Controller Module (SCM) is always installed in the host Total Access 5000/5006 Chassis. The SCM has a front panel-mounted DB-9 connector that supplies an RS-232 interface for connection to a controlling terminal. The supported terminal type is VT100 or compatible. The terminal settings are as follows: 9600 bps, 8 data bits, no parity, no flow control, and 1 stop bit.

Depending on the intended application for the shelf, the 2 GigE SM can be provisioned by either of the following:

- System access with a the Web Interface
- System access with a CLI driven SCM

System Access with a CLI Driven SCM

To log on the Total Access 5000 Command Line Interface (CLI), complete the following steps:

1. After establishing a connection with the SCM, the User Access Verification screen is displayed.

NOTE

- If the login screen initially appears blank, press ENTER several times or CTRL+R to refresh the screen and access the CLI.
- The account name and password fields are case-sensitive.
- The default account name is ADMIN and the password is PASSWORD. Other default accounts are: READONLY, READWRITE, and TEST. An account with ADMIN privileges is required to change the account name and password.

2. At the command line prompt, type the default account name, **ADMIN** (or the configured account name with System Administrator privileges), and press ENTER.
3. At the resultant prompt, type the default password, **PASSWORD** (or the configured password), and press ENTER.

A successful logon attempt displays the CLI prompt.

The *Total Access 5000 CLI Dictionary* (P/N: 65K60CLI-35) contains all the command line interface (CLI) options necessary to provision the 2 GigE SM.

System Access with Web Interface

The Total Access 5000 Web Interface requires an Internet connection and web browser. Access the Internet through whatever method is usually employed, and launch a web browser.

1. In the browser Address Bar, enter the Total Access 5000 IP Address, then press ENTER.
   The Total Access 5000 Login page appears.
2. In the **Username:** field, type the default, **ADMIN** (or a configured account name with System Administrator privileges).
3. Press the TAB key to advance the cursor to the **Password** field.
4. In the **Password:** field, enter the default, **PASSWORD** (or the configured password).
5. Click **Login**.

   If the username and password are valid, an ADMIN User Statistics dialog box appears.
6. Click **OK** to continue.
   The Total Access 5000 system Status page appears.
7. Select the 2 GigE SM from the Modules list in the left navigation bar.
   The 2 GigE SM Configuration page appears.

   The top navigation bar provides links to the supported Web Interface pages.

Refer to the *Total Access 5000 Switch Module 2GigE User Interface Guide* (P/N: 61187020GX-31) for complete provisioning information.

Factory Defaults

The factory default provisioning options are listed below:

Provisioning Option	Default
Card Service State	
Card Service State	Out of Service-Maintenance
Shelf Identity	
Node (1-64)	0
Network Ports	
Network Port	OOS-UAS
Port Mode	Unused
LACP Mode	Disable
Timing	
Current Source	Primary
Primary Source	Local
Secondary Source	Local
Fallback Source	Local

MAINTENANCE

The 2 GigE SM does not require routine hardware maintenance for normal operation. ADTRAN does not recommend that repairs be attempted in the field. Repair services may be obtained by returning the defective unit to ADTRAN. Refer to the warranty for further information. Field support for software is provided through upgrade facilities.

OPERATIONAL SPECIFICATIONS

- Electrical
  - Powering Voltage Range: –42 VDC to –56 VDC
  - Nominal Powering Voltage: –48 VDC
- Physical
  - Height: 9.5 inches (24.1 cm)
  - Width: 0.75 inches (1.9 cm)
  - Depth: 9.0 inches (22.8)
  - Weight: 1.7 pounds (0.7 kg)
- Environmental
  - Operational Temperature Range: –40°C to +65°C
  - Storage Temperature Range: –40°C to +70°C
  - Relative Humidity: 95%, noncondensing
- 1187020G1 Specific
  - Typical Current Draw: 0.42 amps
  - Maximum Current Draw: 0.52 amps
  - Typical Heat Dissipation: 20 watts
  - Maximum Heat Dissipation: 25 watts

- 1187020G2 Specific
  - Typical Current Draw: 0.52 amps
  - Maximum Current Draw: 1.75 amps
  - Typical Heat Dissipation: 25 watts
  - Maximum Heat Dissipation: 35 watts
  - Ring Generator Voltage: 95 Vrms

NOTE

- For details on system loading information, refer to the *Total Access 5000/5006 Load Calculation Guidelines* (P/N: 65KLOADCALC-7).
- For part ordering information, refer to the *Total Access 5000/5006 Engineering and Ordering Guide* (P/N: 65K60ENG-7).

SAFETY AND REGULATORY COMPLIANCE

Refer to the Safety and Regulatory Compliance Notice for this product (P/N: 61187020G1-17, 61187020G2-17) for detailed safety and regulatory information.

Consultez l'avis sur la sécurité et la conformité à la réglementation pour ce produit (61187020G1-17, 61187020G2-17) pour obtenir des renseignements détaillés sur la sécurité et la réglementation.

Ausführliche Sicherheits- und regulatorische Informationen sind in der Konformitätserklärung zur Sicherheit und Einhaltung von Normen zu diesem Produkt (61187020G1-17, 61187020G2-17) aufgeführt.

CAUTION!
SUBJECT TO ELECTROSTATIC DAMAGE OR DECREASE IN RELIABILITY.
HANDLING PRECAUTIONS REQUIRED.

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From outside the U.S. +1 256.963.8716
PRICING AND AVAILABILITY 1.800.827.0807

ADTRAN

Total Access 5000

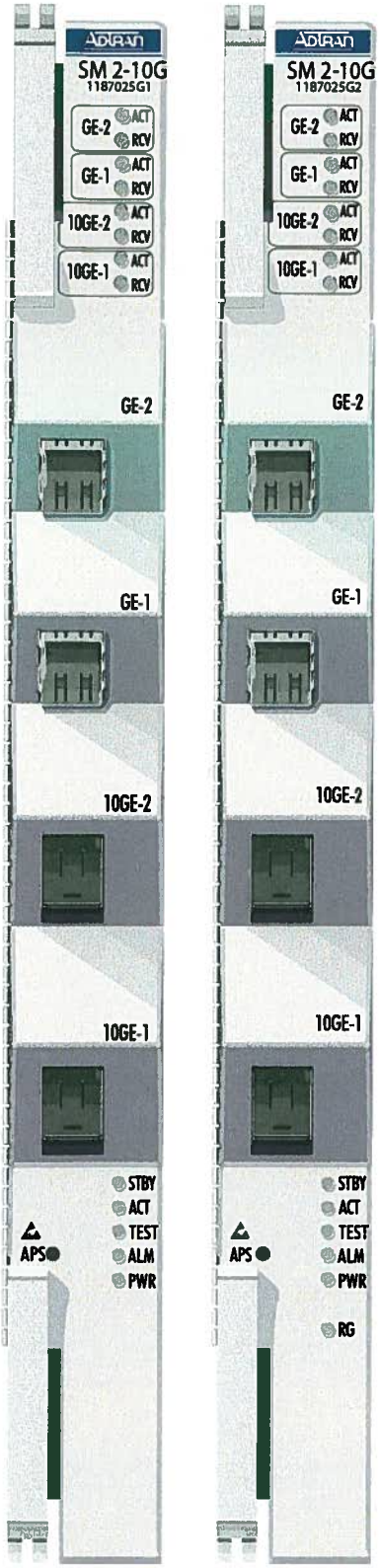
Switch Module 2-10G/2-1 GigE

jobAid

Product P/N: 1187025GX

Issue Date: September 2011

Document P/N: 61187025GX-22D



This Job Aid provides information on the features associated with the Total Access 5000® 2-10/2-1 GigE SM Switch Modules listed in the following table:

PN	Description	CLEI
1187025G1	Switch Module 2-10G/2-1 GigE w/o Ring Generator	BVL3AE4D__
1187025G2	Switch Module 2-10G/2-1 GigE w/Ring Generator	BVL3AE5D__

The Total Access 5000 2 -10/2-1 GigE Switch Module (2-10/2-1 GigE SM) is intended for deployment with the Total Access 5000 system The 2-10/2-1 GigE SM provides network data aggregation for the Total Access 5000 systems. Small Form-Factor Pluggable (SFP) Gigabit Ethernet ports (both SFPs and XFPs) serve as the network interface to the system and other Total Access nodes. The 2-10/2-1 GigE SM also provides common system functions, controls communication between access modules and the System Controller Module (SCM), and interface to the high-speed backplane through the Total Access Switch Module Input/Output (SMIO).

The Total Access 5000 2-10/2-1 GigE SM is intended for deployment with the Total Access 5000/5006 Chassis.

The 2-10/2-1 GigE SM supports Link Aggregation Control Protocol (LACP). LACP facilitates increased link capacity by creating 802.3ad trunks that exchange packets between Ethernet interfaces more efficiently. 802.1Q and Q-in-Q (double tagging) enables the Total Access 5000 system to support both single and double tagged Ethernet frames. LACP is only available on the Central Office Terminal (COT) network interface.

FEATURES

Features listed below are common to each 2-10/2-1 GigE SM:

- SFP and XFPs for copper and optical connectivity
- 802.ah for Ethernet Operation, Administration and Maintenance (OAM) connectivity fault management
- 802.1p for Class of Service (CoS)
- 802.1q VLAN Tagging
- 802.1 Q-in-Q VLAN Tagging
- 802.3ad Link Aggregation Control Protocol (LACP)
- Support for 1:1 and N:1 VLAN topologies
- Multicast packet replication for IPTV applications
- Network and Subscriber Proxy ARP
- Full range of VLAN ID support
- IGMP v2 Proxy and Snooping
- Supported by Total Access EMS version B02 or higher
- EFM Bonding Group Protection
- Command Line Interface (CLI) deployment option.
- Switch Module Input/Output (SMIO3)
- Provides simplex or redundancy deployment options
- ATM Virtual Channel Interfaces (VCIs) provisioning
- Two 1 Gbps SFP ports (**GE-1** and **GE-2**) that can be configured to 2.5 Gbps ports for interconnection between Total Access nodes (with an SFP that supports this rate)
- **10GE-1** and **10GE-2** ports are 10 Gbps interfaces
- ITU G.8032 Ethernet Ring Protection Switching (ERPS)
- Supports Session Initiation Protocol (SIP)
- Supports Ring Generator (1187025G2 only)

INSTALLATION

After unpacking the 2-10/2-1 GigE SM, inspect it for damage. If damage is noted, file a claim with the carrier and then contact ADTRAN. For more information, refer to the warranty.

⚠ WARNING

A 95 VAC is present on the Ring Generator circuitry. Steps should be taken to prevent accidental contact with the Class B voltage levels (as defined in GR-1089-CORE) from the ring generator.

Before installing the 2-10/2-1 GigE SM, install the copper or optical SFP or XFP module(s) into the required front panel port(s). Refer to www.adtran.com/sfp for information on the correct SFP and XFP to use.

⚠ CAUTION

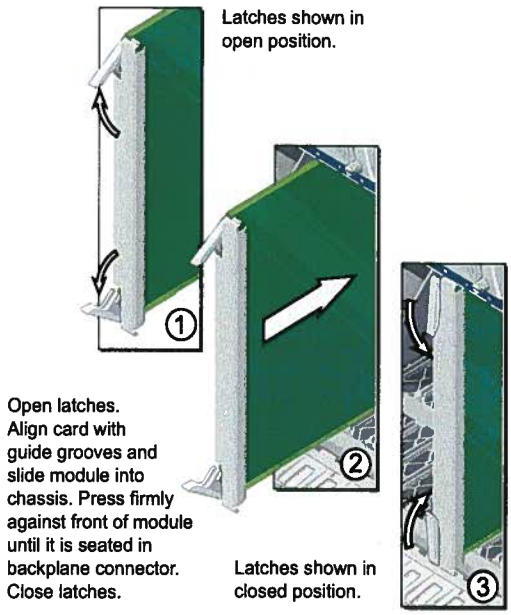
Due to compliance certification requirements, only approved 'Class 1 Laser Product' SFP/XFP modules approved by ADTRAN are to be used with the 2-10/2-1 GigE SM modules. ADTRAN cannot certify system integrity with other SFP/XFPs.

NOTE

An SMIO3 must be installed prior to installing the Switch Module. Refer to the *Total Access 5000 SMIO3 Job Aid* (P/N: 1187051G1) for installation procedures for the SMIO3.

The 2-10/2-1 GigE SM must be installed in a slot labeled **SM A** or **SM B**.

To install the 2-10/2-1 GigE SM, refer to the figure below:



When the 2-10/2-1 GigE SM first powers up, it perform self-tests. Once the power up self-tests are complete, the status LEDs will reflect the true state of the hardware.

Front Panel LEDs

Label	Status		Indication
PWR	○	Off	No power to unit
	●	Green	Power and initialization OK
	☼	Flashing	Menu Session Active, Color reflects current service state
	●	Yellow	Out of service
	●	Red	Power, temp, or boot failure
ALM	○	Off	No alarm
	✸	Green Flashing	Info alarm
	●	Yellow	Minor alarm
	●	Red	Major alarm
	✸	Red Flashing	Critical alarm
TEST	○	Off	No test
	●	Yellow	Test active
ACT	○	Off	SM not in Active mode
	●	Green	SM is in Active mode
	●	Yellow	Fault prevents SM from going on line
STBY	○	Off	SM not in Standby redundancy mode
	●	Green	SM in Standby redundancy mode
GE-1/2 ACT	○	Off	Network Link in Protect mode
	●	Green	Network Link in Active mode
GE-1/2 RCV	○	Off	Network Link service state is Out of Service-Unassigned
	●	Green	Network Link is Up
	●	Red	Network Link is Down
10GE-1/2 ACT	○	Off	Network Link in Protect mode
	●	Green	Network Link in Active mode
10GE-1/2 RCV	○	Off	Network Link service state is Out of Service-Unassigned
	●	Green	Network Link is Up
	●	Red	Network Link is Down
RG (G2 ONLY)	○	Off	Ringing Generator not equipped
	●	Green	Ringing Generator equipped and active
	●	Red	Ringing Generator failed

Front Panel Pushbutton

Label	Description
APS	The Automatic Protection Switch (**APS**) pushbutton forces a switch to a redundant Switch Module, if present.

PROVISIONING

The System Controller Module (SCM) is always installed in the host Total Access 5000 chassis. The SCM has a front panel-mounted DB-9 connector that supplies an RS-232 interface for connection to a controlling terminal. The supported terminal type is VT100 or compatible. The terminal settings are as follows: 9600 bps, 8 data bits, no parity, no flow control, and 1 stop bit.

Depending on the intended application for the shelf, the 2-10/2-1 GigE SM can be provisioned by any of the following:

- System access with CLI driven SCM
- System access with the Web Interface

System Access with a CLI Driven SCM

To log on the Total Access 5000 Command Line Interface (CLI), complete the following steps:

1. After establishing a connection with the SCM, the User Access Verification screen is displayed.

NOTE

- If the login screen initially appears blank, press ENTER several times or CTRL+R to refresh the screen and access the CLI.
- The account name and password fields are case-sensitive.
- The default account name is ADMIN and the password is PASSWORD. Other default accounts are: READONLY, READWRITE, and TEST. An account with ADMIN privileges is required to change the account name and password.

2. At the command line prompt, type the default account name, **ADMIN** (or the configured account name with System Administrator privileges), and press ENTER.
3. At the resultant prompt, type the default password, **PASSWORD** (or the configured password), and press ENTER.

A successful logon attempt displays the CLI prompt.

The *Total Access 5000 CLI Dictionary* (P/N: 65K60CLI-35) contains all the command line interface (CLI) options necessary to provision the 2-10/2-1 GigE SM.

System Access with Web Interface

The Total Access 5000 Web Interface requires an Internet connection and web browser. Access the Internet through whatever method is usually employed, and launch a web browser.

1. In the browser Address Bar, enter the Total Access 5000 IP Address, then press ENTER.
   The Total Access 5000 Login page appears.
2. In the **Username:** field, type the default, **ADMIN** (or a configured account name with System Administrator privileges).
3. Press the TAB key to advance the cursor to the **Password** field.
4. In the **Password:** field, enter the default, **PASSWORD** (or the configured password).
5. Click **Login**.

   If the username and password are valid, an ADMIN User Statistics dialog box appears.
6. Click **OK** to continue.
   The Total Access 5000 system Status page appears.
7. Select the 2-10/2-1 GigE SM from the Modules list in the left navigation bar.
   The 2-10/2-1 GigE SM Configuration page appears.

   The top navigation bar provides links to the supported Web Interface pages.

Refer to the *Total Access 5000 Switch Module 2-10G/2-1 GigE User Interface Guide* (P/N: 61187025GX-31) for complete provisioning information:

Factory Defaults

The factory default provisioning options are listed below:

Provisioning Option	Default
Card Service State	
Card Service State	Out of Service-Maintenance
Shelf Identity	
Node (1-64)	0
Network Ports	
Network Port	OOS-UAS
Port Mode	Unused
LACP Mode	Disabled
Timing	
Current Source	Primary
Primary Source	Local
Secondary Source	Local
Fallback Source	Local

MAINTENANCE

The 2-10/2-1 GigE SM does not require routine hardware maintenance for normal operation. ADTRAN does not recommend that repairs be attempted in the field. Repair services may be obtained by returning the defective unit to ADTRAN. Refer to the warranty for further information. Field support for software is provided through upgrade facilities.

OPERATIONAL SPECIFICATIONS

- Electrical
  - Powering Voltage Range: –42 VDC to –56 VDC
  - Nominal Powering Voltage: –48 VDC
- Physical
  - Height: 9.5 inches (24.1 cm)
  - Width: 0.75 inches (1.9 cm)
  - Depth: 9.0 inches (22.8)
  - Weight: 1.7 pounds (0.7 kg)
- Environmental
  - Operational Temperature Range: –40°C to +65°C
  - Storage Temperature Range: –40°C to +70°C
  - Relative Humidity: 95%, noncondensing

- 1187025G1 Specific
  - Typical Current Draw: 0.67 amps
  - Maximum Current Draw: 0.73 amps
  - Typical Heat Dissipation: 32.0 watts
  - Maximum Heat Dissipation: 35.0 watts
- 1187025G2 Specific
  - Typical Current Draw: 0.79 amps
  - Maximum Current Draw: 2.0 amps
  - Typical Heat Dissipation: 38.0 watts
  - Maximum Heat Dissipation: 48.0 watts
  - Ring Generator Voltage: 95 Vrms

NOTE

- For details on system loading information, refer to the *Total Access 5000/5006 Load Calculation Guidelines* (P/N: 65KLOADCALC-7).
- For part ordering information, refer to the *Total Access 5000/5006 Engineering and Ordering Guide* (P/N: 65K60ENG-7).

SAFETY AND REGULATORY COMPLIANCE

Refer to the Safety and Regulatory Compliance Notice for this product (P/N: 61187025G1-17, 61187025G2-17) for detailed safety and regulatory information.

Consultez l'avis sur la sécurité et la conformité à la réglementation pour ce produit (61187025G1-17, 61187025G2-17) pour obtenir des renseignements détaillés sur la sécurité et la réglementation.

Ausführliche Sicherheits- und regulatorische Informationen sind in der Konformitätserklärung zur Sicherheit und Einhaltung von Normen zu diesem Produkt (61187025G1-17, 61187025G2-17) aufgeführt.

CAUTION!
SUBJECT TO ELECTROSTATIC DAMAGE OR DECREASE IN RELIABILITY.
HANDLING PRECAUTIONS REQUIRED.

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ADTRAN

Total Access 5000

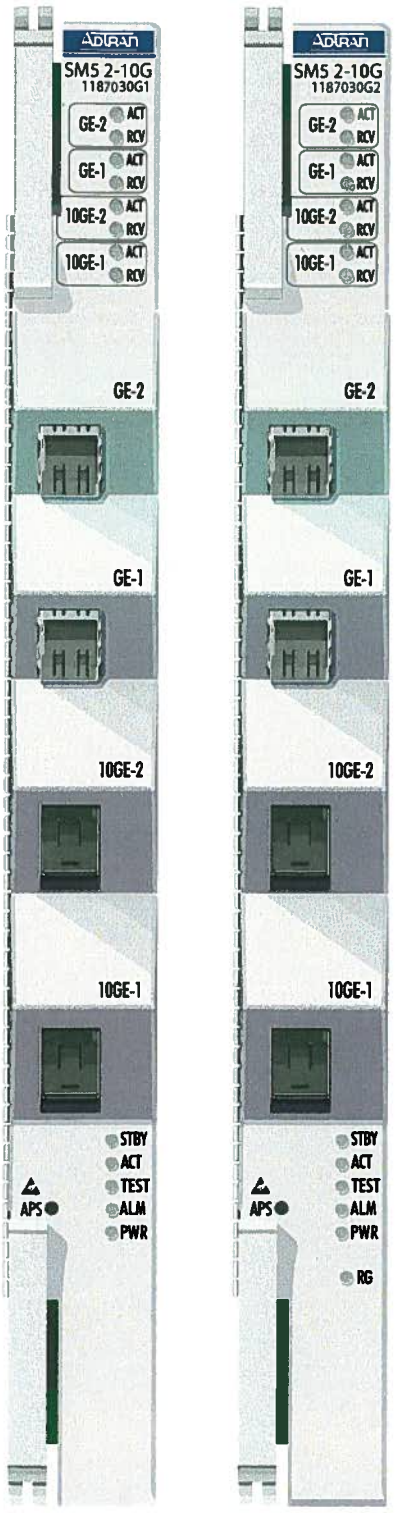
SM5 2-10G/2-1G Switch Module

jobAid

Product P/N: 1187030GX

Issue Date: January 2010

Document P/N: 61187030GX-22B



DESCRIPTION

This Job Aid supports Total Access 5000® System Release 5.1.0 and provides information on the features associated with those Switch Modules (SM5 10G)s listed in the following table:

Part Number	Description	CLEI
1187030G1	SM5 2-10G/2-1G Switch Module w/out Ring Generator	BVL3AE6D_ _
1187030G2	SM5 2-10G/2-1G Switch Module w/Ring Generator	BVC1ABTE_ _

The Total Access 5000 SM5 2-10G/2-1G Switch Module (SM5 10G) is intended for deployment with the Total Access 5000 or 5006 Chassis.

The SM5 10G provide network data aggregation for the Total Access 5000 and 5006 systems. Small Form-factor Pluggable-based Gigabit Ethernet ports (both SFPs and XFPs) serve as the network interface to the system and other Total Access nodes. The SM5 10G also provides common system functions, controls communication between access modules and the System Controller Module (SCM), and interface to the high-speed backplane through the Total Access Switch Module Input/ Output (SMIO).

The SM5 10G supports Link Aggregation Control Protocol (LACP). LACP facilitates increased link capacity by creating 802.3ad trunks that exchange packets between Ethernet interfaces more efficiently. 802.1Q and Q-in-Q allows the Total Access 5000 and 5006 to support both single and double tagged Ethernet frames. LACP is only available on the Central Office Terminal (COT) network interface.

FEATURES

Features listed below are common to the SM5 10G:

- SFP and XFPs for electrical and optical connectivity
- 802.ah for Ethernet Operation, Administration and Maintenance (OAM) connectivity fault management
- 802.1p for CoS
- 802.1q VLAN Tagging
- 802.1 Q-in-Q VLAN Tagging
- 802.3ad Link Aggregation Control Protocol (LACP)
- Support for 1:1 and N:1 VLAN topologies
- Multicast packet replication for IPTV applications
- Network and Subscriber Proxy ARP
- Full range of VLAN ID support
- IGMP v2 Proxy and Snooping
- Supported by Total Access EMS version B02 or higher
- EFM Bonding Group Protection
- Command Line Interface (CLI) only deployment option. Refer to the *Total Access 5000 Switch Modules Installation Guide* (P/N 6118702XGX-5) for CLI information.
- Provides deployment options of either simplex or redundancy
- ATM Virtual Channel Interfaces (VCIs) provisioning
- Supports forty-eight 1 or 2.5 Gbps ports, 2 to each backplane port for each chassis slot
- Two 1 Gbps SFP ports (**GE-1** and **GE-2**) that can be configured to 2.5 Gbps ports for interconnection between Total Access nodes (with an SFP that supports this rate)
- **10GE-1** and **10GE-2** ports are 10 Gbps interfaces
- Two 10 Gbps Ethernet XFP faceplate connectors
- 1187030G2 supports Ring Generator

INSTALLATION

After unpacking the SM5 10G, inspect it for damage. If damage is noted, file a claim with the carrier and then contact ADTRAN. For more information, refer to the warranty.

NOTE

An SMIO3 must be installed prior to installing the Switch Module. Refer to the following Job Aid for installation procedures for the SMIO3 (P/N 1187051G1).

⚠ WARNING

95 VAC is present on the Ring Generator circuitry. Steps should be taken to prevent accidental contact with the Class B voltage levels (as defined in GR-1089-CORE) from the ring generator.

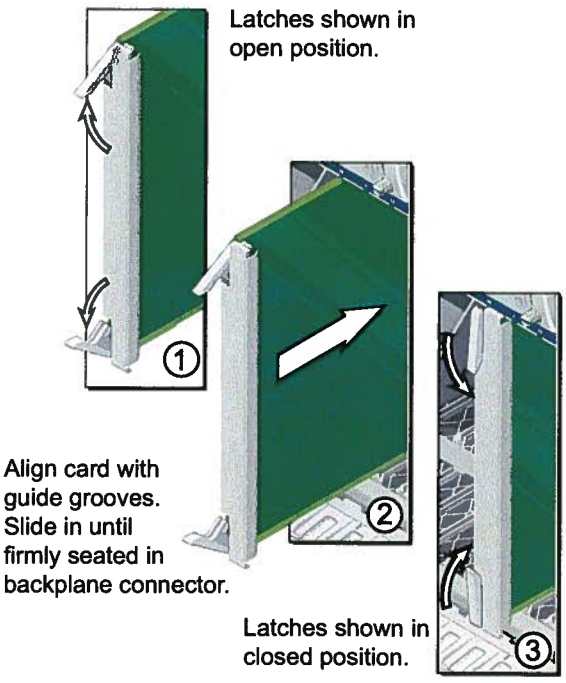
Prior to installing the SM5 10G, install the copper or optical SFP or XFP module(s) into the required front panel port(s). Refer to www.adtran.com/sfp for information on the correct SFP and XFP to use.

⚠ CAUTION

Due to compliance certification requirements, only approved 'Class 1 Laser Product' SFP/XFP modules supplied by ADTRAN are to be used with the SM5 10G modules. ADTRAN cannot certify system integrity with other SFP/XFPs.

The SM5 10G must be installed in a slot labeled **SM A** or **SM B**.

To install the SM5 10G, refer to the figure below.



When the SM5 10G first powers up, it perform self-tests. Once the power up self-tests are complete, the status LEDs will reflect the true state of the hardware.

Front Panel LEDs

Label	Status	Indication
PWR	○ Off	No power to unit
	● Green	Power and initialization OK
	☼ Flashing	Menu Session Active, Color reflects current service state
	● Yellow	Out of service
	● Red	Power, temp, or boot failure
ALM	○ Off	No alarm
	● Green Flashing	Info alarm
	● Yellow	Minor alarm
	● Red	Major alarm
	✸ Red Flashing	Critical alarm
TEST	○ Off	No test
	● Yellow	Test active
ACT	○ Off	SM not in Active mode
	● Green	SM5 10G are in Active mode
	● Yellow	Fault prevents SM5 10G from going on line
STBY	○ Off	SM5 10G is not in Standby mode
	● Green	SM5 10G is in Standby mode
GE-1/2 ACT	○ Off	Network Link in Protect mode
	● Green	Network Link in Active mode
GE-1/2 RCV	○ Off	Network Link service state is Out of Service-Unassigned
	● Green	Network Link is Up
	● Red	Network Link is Down
10GE-1/2 ACT	○ Off	Network Link in Protect mode
	● Green	Network Link in Active mode
10GE-1/2 RCV	○ Off	Network Link service state is Out of Service-Unassigned
	● Green	Network Link is Up
	● Red	Network Link is Down
RG (G2 ONLY)	○ Off	Ringing Generator not equipped
	● Green	Ringing Generator equipped and active
	● Red	Ringing Generator failed

Front Panel Pushbutton

Label	Description
APS	The Automatic Protection Switch (**APS**) pushbutton forces a switch to a redundant Switch Module, if present.

PROVISIONING

The System Controller Module (SCM) is always installed in the host Total Access 5000 chassis. The SCM has a front panel-mounted DB-9 connector that supplies an RS-232 interface for connection to a controlling terminal. The supported terminal type is VT100 or compatible. The terminal settings are as follows: 9600 bps, 8 data bits, no parity, no flow control, and 1 stop bit.

Depending on the intended application for the shelf, the SM5 10G can be provisioned by any of the following:

- System access with a menu driven SCM
- System access with a menu driven SCM and System CLI

Refer to the *Total Access 5000 Switch Modules Installation Guide* (P/N 6118702XGX-5) for additional provisioning information.

System Access with a Menu Driven SCM

At the Total Access 5000 System login screen, enter the account name and password. The default account name is **ADMIN** and the password is **PASSWORD**. An account with ADMIN privileges is required to change the account name and password. For more information, refer to the *Total Access 5000 System Controller Module Installation and Maintenance Practice* for the SCM being used.

NOTE

The account name and password fields are case-sensitive.

To navigate the menus, select the desired entry, and press ENTER. To return to the previous menu, press ESC.

Upon initial installation, the SM5 10G is provisioned according to factory default settings.

To access the provisioning options for the SM5 10G, complete the following steps:

1. Log in to the system.
2. From the Total Access 5000 main menu, select the Module Menus option, and press ENTER.
3. From the Module Menus menu, select the SwitchModule option (A or B), and press ENTER.

System Access with a Menu Driven SCM and System CLI

To access the Total Access 5000 menu structure complete the following steps:

1. After establishing a connection with the SCM, pressing any key displays the Total Access 5000 System logon screen.

NOTE

- The account name and password fields are case-sensitive.
- The default account name is "ADMIN" and the password is "PASSWORD." Other default accounts are: READONLY, READWRITE, and TEST. An account with ADMIN privileges is required to change the account name and password.

2. Type the default account name, **ADMIN** (or the configured account name with System Administrator privileges), and press ENTER.
3. Type the default password, **PASSWORD** (or the configured password), and press ENTER.
4. The Total Access 5000 Main Menu is displayed.
5. From the Main Menu, select System CLI and press ENTER.

   On the CLI menu, verify that the Telnet Port is 2008. This is the default telnet designation. If this is not displayed, select CLI Telnet Port option and set the port to 2008. Press the ESC key to return to the CLI menu.
6. From the CLI menu, select CLI Command Entry and press ENTER.
7. The following response is displayed: `Use EXIT to exit CLI session.`
8. Select **"Y"** to enter the CLI command interface.
9. Log in again using the default ADMIN and PASSWORD options. The CLI prompt is displayed.

The *Total Access 5000/NetVanta Carrier CLI Dictionary* (P/N 6TANVCLI-35) contains all the command line interface (CLI) options necessary to provision the SM5 10G.

Factory Defaults

The factory default provisioning options are listed below:

Provisioning Option	Default
Card Service State	
Card Service State	Out of Service-Maintenance
Shelf Identity	
Node (1-64)	1
Shelf	1
Default Network Interface	GE
Network Ports	
Network Port	OOS-UAS
Port Mode	Unused
LACP Mode	Disabled
Auto-Negotiation	Enabled
Timing	
Current Source	Primary
Primary Source	Local
Secondary Source	Local
Fallback Source	None
Revert Mode	Revertive
Hop Count	Disabled
Force Pri/Sec Switch	Disabled
Redundancy	
Revertive	Disabled
Wait-to-Restore Timer	15 (s)econds

MAINTENANCE

The SM5 10G do not require routine hardware maintenance for normal operation. ADTRAN does not recommend that repairs be attempted in the field. Repair services may be obtained by returning the defective unit to ADTRAN. Refer to the warranty for further information. Field support for software is provided through upgrade facilities.

OPERATIONAL SPECIFICATIONS

- General
  - Powering Voltage Range: –42 VDC to –56 VDC
  - Nominal Powering Voltage: –48 VDC
  - Operational Temperature Range: –40°C to +65°C
  - Storage Temperature Range: –40°C to +70°C
  - Relative Humidity: 95%, noncondensing
- 1187030G1 Specific
  - Typical Current Draw: 1.20 amps
  - Maximum Current Draw: 1.40 amps
  - Typical Heat Dissipation: 58 watts
  - Maximum Heat Dissipation: 66.5 watts
- 1187030G2 Specific
  - Typical Current Draw: 1.23 amps
  - Maximum Current Draw: 1.43 amps
  - Typical Heat Dissipation: 59 watts
  - Maximum Heat Dissipation: 68.6 watts

NOTE

For detailed Total Access 5000 system loading information, refer to the *Total Access 5000 Load Calculation Guidelines* (P/N: 61187000L1-22).

COMPLIANCE

The SM5 10G is NRTL Listed to the applicable UL safety standards. The SM5 10G meets or exceeds all applicable requirements of NEBS, Telcordia GR-63-CORE, and GR-1089-CORE.

The SM5 10G is intended for deployment in Central Office type facilities, EEEs, and locations where the NEC applies (for example, customer premises). Install the SM5 10G in a Total Access 5000 or 5006 Chassis in a restricted access location by trained Service Personnel only.

Configuration Codes	Input	Output
Power Code (PC)	F	C
Telecommunication Code (TC)	–	–
Installation Code (IC)	A	–

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by ADTRAN could void the user's authority to operate this equipment.

⚠ WARNING

The SFP Copper GigE ports are classified as Type 2 or 4 as defined in Appendix B of GR-1089-CORE Issue 4, and are suitable for connection to intra-building or unexposed wiring or cabling only. Do not metallically connect these ports to interfaces which connect to the Outside Plant (OSP) or to the OSP wiring. The SFP Copper GigE ports are designed for use as an intra-building interface only (Type 2 or Type 4 ports as described in GR-1089-CORE Issue 4) and require isolation from exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect this interface metallically to OSP wiring.

⚠ CAUTION

- Electrostatic Discharge (ESD) can damage electronic modules. When handling modules, wear an antistatic discharge wrist strap to prevent damage to electronic components. Place modules in antistatic packing material when transporting or storing. When working on modules, always place them on an approved antistatic mat that is electrically grounded.
- The total number of modules permitted in a Total Access 5000 Chassis is dependant upon the total current and total chassis heat dissipation of the actual modules installed. Refer to the Total Access 5000 *Load Calculation Guide* (P/N 61187000L1-22) located on the ADTRAN Website. Use a current clamp ammeter to verify that the chassis is not overloaded according to these guidelines.
- Per GR-1089-CORE, the Total Access 5000 System is designed and intended for installation as part of a Common Bonding Network (CBN). The Total Access 5000 System is not designed nor intended for installation as part of an Isolated Bonding Network.
- Per GR-1089-CORE Section 9, the SM5 10G are intended to be deployed in either a DC-I (isolated) or DC-C (common) installation of the Total Access 5000 System.
- The Total Access 5000 Chassis frame ground terminal must be connected to a reliable earth ground to ensure that the front panel of the Switch Modules is properly grounded through the backplane connector.

⚠ CAUTION

For continued compliance with NEBS and applicable Laser Safety Standards, only approved 'Class 1 Laser Product' modules from Adtran's approved vendor list (located on the ADTRAN website, www.adtran.com) should be installed in the product.

NOTE

- When using a fiber SFP, the fiber port is not metallic and is therefore not classified as any of the type defined in Appendix B of GR-1089-CORE Issue 4.
- The XFP port(s) are designed for optical modules and therefore are not classified as any type of port as defined in Appendix B of GR-1089-CORE Issue 4.
- The SM5 10G is designed to be deployed in GR-3108-CORE environmental class 1 or 2 as defined in GR-3108-CORE issue 2.
- Current limiting protectors are not required.
- The SM5 10G is designed to operate with a nominal operating voltage of –48 VDC and a minimum operating voltage of –40 VDC. The SM5 10G will not be damaged by any steady state voltage between –40 VDC and –56.7 VDC in magnitude.
- The SM5 10G will power down if steady state voltages below –38 VDC are encountered.

Total Access 5000 Switch Modules are designed to meet the following environmental classes:

- ETSI EN 300 019-1-1 "Classification of environmental conditions; Storage," Class 1.2
- ETSI EN 300 019-1-2 "Classification of environmental conditions; Transportation," Class 2.3
- ETSI EN 019-1-3 "Classification of environmental condition; Stationary use at weather protected locations," Class 3.3
  - ◊ The equipment is designed to function without degradation during exposure to all test severities per Class 1-3.

The equipment is designed to function without degradation during exposure to all test severities per Class 019-1-3 3.3.

The SM5 10G meets the EU's RoHS Directive 2002/95/EC and/or applicable exemptions. Refer to www.adtran.com for further information on RoHS /WEEE.

For more information, refer to the Installation and Maintenance Practice (P/N 61187030GX-5) available online at www.adtran.com.

Warranty: ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found online at www.adtran.com/warranty.

CAUTION!
SUBJECT TO ELECTROSTATIC DAMAGE OR DECREASE IN RELIABILITY.
HANDLING PRECAUTIONS REQUIRED.

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ADTRAN

CLEI: BVCUD09M
Product P/N: 1187010G2

Total Access 5000 Second Generation System Controller Module (SCM G2)

jobAid

Issue Date: September 2011
Document P/N: 61187010G2-22C

DESCRIPTION

The Total Access 5000 Second Generation System Controller Module (SCM G2) provides a logical user interface to the entire system. The SCM G2 enables provisioning of modules, alarm status monitoring, querying of performance data, and initiation of tests for any module in the shelf. The SCM G2 provides various interfaces for both local and remote management of the system, including a secondary Ethernet port on the front panel with an auto cross-over correction that supports a DHCP server. The SCM G2 supports SNMP, CLI, TL1, Telnet, SSHv2, and local craft access for the system.

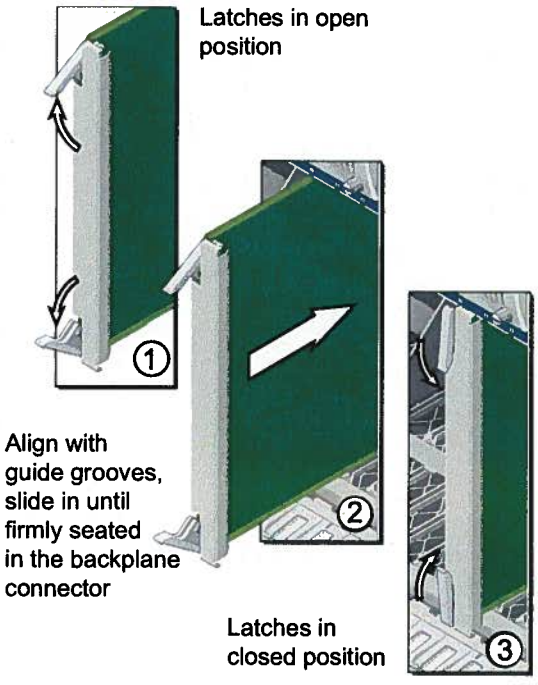
INSTALLATION

Prior to installation, inspect the SCM G2. If damage has occurred during shipping, file a claim with the carrier, and then contact ADTRAN Customer Support. For more information, refer to "Warranty".

NOTE

An SMIO3 (P/N 1187051G1 or 1187052G1, depending on chassis) must be installed prior to installing the SCM G2. For installation procedures, refer to the appropriate Switch Module I/O 3 (SMIO3) Job Aid.

The SCM G2 must be installed in slot **12/SCM** of the Total Access 5000 chassis, or in the **SCM** slot of the Total Access 5006. Remove the Access Module Blank, if present, from the appropriate slot of the chassis. To install the SCM G2, reference the following figure:



When the SCM G2 first powers up it performs self-tests. Once the power up self-tests are complete, the status LEDs will reflect the true state of the hardware.

Front Panel LEDs

Label	Status	Description
PWR	○ Off	No power
	● Green	Power on and fuse OK
	● Red	SCM or fuse failure
ALM	○ Off	No alarm
	● Red	Alarm active
TEST	○ Off	No test
	● Yellow	Test active
CRI	○ Off	No critical alarm
	● Red	Active critical alarm
MAJ	○ Off	No major alarm
	● Red	Active major alarm
MIN	○ Off	No minor alarm
	● Yellow	Active minor alarm
ACO	○ Off	ACO feature not active
	● Green	ACO feature active
HOST	Reserved for future use	
ENET	○ Off	No activity
	● Green	Ethernet link
	✱ Green Flashing	Ethernet link & activity
LNK	○ Off	No ENET2 link
	● Yellow	ENET2 link active
ACT	○ Off	No ENET2 activity
	● Green	ENET2 activity present

Front Panel Push Button

Label	Function
ACO	The front panel ACO (Alarm CutOff) switch disables the alarm indications.

PROVISIONING

The System Controller Module (SCM) must be installed in the chassis. The SCM has a front panel-mounted DB-9 connector (labeled **CRAFT**) that supplies an RS-232 asynchronous access port for connection to a controlling terminal. The supported terminal type is VT100 or compatible and is set for 9600 bps, 8-data bits, no parity, no flow control, and 1-stop bit. The craft port can operate from 9600 to 115200 baud. Minimal 3-wire functionality (pins 2, 3, and 5) is also accommodated.

Depending on the intended application for the shelf, the SCM G2 can be provisioned by either of the following:

- System access with a CLI driven SCM
- System access with the Web Interface

System Access with a CLI Driven SCM

To log on the Total Access 5000 Command Line Interface (CLI), complete the following steps:

1. After establishing a connection with the SCM, the User Access Verification screen is displayed.

NOTE

- If the login screen initially appears blank, press ENTER several times or CTRL+R to refresh the screen and access the CLI.
- The account name and password fields are case-sensitive.
- The default account name is "ADMIN" and the password is "PASSWORD." Other default accounts are: READONLY, READWRITE, and TEST. An account with ADMIN privileges is required to change the account name and password.

2. At the command line prompt, type the default account name, **ADMIN** (or the configured account name with System Administrator privileges), and press ENTER.
3. At the resultant prompt, type the default password, **PASSWORD** (or the configured password), and press ENTER.

A successful logon attempt displays the CLI prompt.

The *Total Access 5000 CLI Dictionary* (P/N 65K60CLI-35) contains all the command line interface (CLI) options necessary to provision the SCM G2.

System Access with the Web Interface

The Total Access 5000 Web Interface requires an Internet connection and web browser. Access the Internet through whatever method is usually employed, and launch a web browser.

1. In the browser's Address Bar, enter the Total Access 5000 IP Address, and then press ENTER.

   The Total Access 5000 Login page appears.
2. In the **Username:** field, enter the username.
3. In the **Password:** field, enter the password.
4. Click **Login** or press ENTER.

   If the login is successful, a User Statistics dialog box appears.
5. Click **OK** to continue. The Total Access 5000 System Status page appears. Use the menus on the left side of the screen to access the options pertinent to your login session.

Refer to the *Total Access 5000 Second Generation System Controller Module User Interface Guide*, P/N 61187010G2-31) for provisioning information.

MAINTENANCE

The SCM G2 does not require routine hardware maintenance for normal operation. ADTRAN does not recommend that repairs be attempted in the field. Repair services may be obtained by returning the defective unit to ADTRAN. Refer to the warranty for further information. Field support for software is provided through upgrade facilities.

SPECIFICATIONS

Specifications for the SCM G2 are as follows:

- Physical
  - Dimensions: Height: 9.25 inches (23.50 centimeters)
    Width: 0.8 inches (2.03 centimeters)
    Depth: 9.5 inches (24.13 centimeters)
  - Weight: 0.656 pounds (0.298 kilograms)
  - Connector: Standard 128-pin DIN RA (male)
  - Diagnostic: LEDs, Alarm Cutoff (ACO) push button, TSCAN
  - Craft Interface: DB-9 connector (female)
  - Ethernet: 10/100Base-T (on SMIO3)
  - Ethernet2: 10/100Base-T
  - Shelf life for nonvolatile memory storage: 10 years, minimum
- Electrical
  - Powering Voltage Range: –42 VDC to -56 VDC
  - Nominal Powering Voltage: –48 VDC
  - Typical Current Draw: 0.07 amps
  - Maximum Current Draw: 0.08 amps
  - Typical Heat Dissipation: 3.4 watts
  - Maximum Heat Dissipation: 4.5 watts
- Environmental
  - Operational Temperature Range: –40°C to +65°C
  - Storage Temperature Range: –40°C to +85°C
  - Relative Humidity: up to 95%, noncondensing

NOTE

For further information, reference the *Total Access 5000/5006 Load Calculation Guidelines* (P/N 65KLOADCALC-7) and the *Total Access 5000/5006 Engineering and Ordering Guide* (P/N 65K60ENG-7).

SAFETY AND REGULATORY COMPLIANCE

Refer to the Safety and Regulatory Compliance Notice for this product (P/N 61187010G2-17) for detailed safety and regulatory information.

Consultez l'avis sur la sécurité et la conformité à la réglementation pour ce produit (61187010G2-17) pour obtenir des renseignements détaillés sur la sécurité et la réglementation.

Ausführliche Sicherheits- und regulatorische Informationen sind in der Konformitätserklärung zur Sicherheit und Einhaltung von Normen zu diesem Produkt (61187010G2-17) aufgeführt.

Warranty: ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found online at www.adtran.com/warranty.

CAUTION!
SUBJECT TO ELECTROSTATIC DAMAGE OR DECREASE IN RELIABILITY
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61187010G2-22C

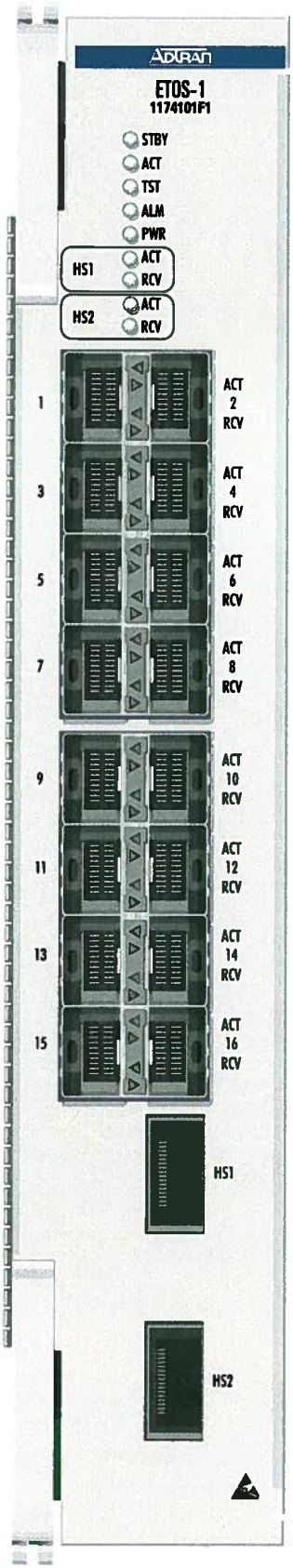
ADTRAN

CLEI: BVL3ALJD
Product P/N: 1174101F1

Total Access 5000/5006 Ethernet Transport Optical Switch (ETOS-1)

jobAid

Issue Date: December, 2010
Document P/N: 61174101F1-22A



DESCRIPTION

This document supports Optical Network Edge (ONE) System Release 1.0.

This product is intended to be installed in a Total Access® 5000/5006 chassis, operating at a minimum of Total Access 5000 System Release 5.8.

The Total Access 5000 Ethernet Transport Optical Switch (ETOS-1) muxponder supports high-speed (HS) network interfaces and mid-speed (MS) client interfaces in a single module. Up to sixteen 1 Gbps (GigE) MS optical or copper Ethernet interfaces, as well as two 10 Gbps (10GigE) HS optical Ethernet network interfaces are supported.

All Ethernet traffic is contained within the ETOS-1, flowing between the front-access ports.

The ETOS-1 operates as an Ethernet infrastructure aggregation platform and an Ethernet service termination platform. It supports both direct customer interfaces (UNI: User-to-Network Interface) and direct connection to customer premises NTE (MEN/NNI: Metro Ethernet Network/Network-to-Network Interface). Any client port can be configured as an MEN/NNI network port or UNI port.

Each physical interface is provided by a Small-Form Factor Pluggable (SFP or XFP), accessed from the ETOS-1 front panel.

The ETOS-1 supports the following features:

- Two HS network ports: 10GigE, optical
- Sixteen MS client ports: GigE, optical or copper
- Traffic Management:
  - ELINE MEF (Metro Ethernet Forum) 10.2
  - Committed/Excess Information Rate and Burst Size (CIR, CBS, EIR, EBS); 64 kbps granularity
  - Up to 4094 VLAN:
    - VLAN Priority TAG manipulation
    - VLAN CE-TAG preservation or swapping with S-TAG
  - Egress Rate shaping
  - Strict priority queueing, programmable queue depths, and Weighted Random Early Discard
  - 10 kB MTU (Maximum Transmission Unit)
  - 4,000 Ethernet Virtual Circuits (EVC)
  - EVC MAPS (UNI type 1 ports): up to 1,536 classifications
  - 1,536 Policers
  - 256 Dynamic Counters
  - Class-of-Service (COS): 8 queues per port
- Up to 9 LAG groups between ports (1 HS, 8 MS), with In-band management support
- Subtended host (Link OAM): provisioning "push down" to 8044(M); auto-population of fields
- EVC advertisement with 8044(M)
- Performance Monitoring:
  - Network/Client port statistics: 15-min, Daily, Real-time
  - Policer Statistics: 15-min and Daily (Ingress Green, Yellow, and Red frames); Real-time
- Manual topology support for CLI and SNMP for declaring Peer (Far-End) connection
- Management via Total Access 5000 CLI, System Management EVC, and SNMP/MIB controls
  - MAC table (up to 32k entries) for mapping system management EVC to ETOS-1 client port
  - Remote chassis management via ETOS-1 network port
- Timing synchronization from Total Access 5000 backplane or Stratum 3 clock (holdover)

SFPs and XFPs

The table below lists the SFP and XFP supported on the ETOS-1.

Part Numbers	Protocol/Rate/Specifications	Cable/Fiber	Leads	Connector	Max Span
GigE SFPs					
1184561P1[1], 1184561PG1	1000Base-LX, 1310nm	SMF	2	LC	10 km
1184561P3[1], 1184561PG3	1000Base-SX, 850nm	MMF	2	LC	0.5 km/0.27 km[2]
1184561P4[1]	1000Base-T, Full-duplex	Shielded Cat 5	1	RJ-45	100 m
1184562P5[1], 1184562PG5	1000Base-ZX, 1550nm	SMF	2	LC	80 km
1442300G1	1000Base-T, Full-duplex	Shielded Cat 5	1	RJ-45	100 m
1442320G1	1000Base-LX, 1310nm	SMF	2	LC	20 km
1442340G1	1000Base-LX, 1310nm	SMF	2	LC	40 km
1442610G1C[3]	1000Base-LX, 1310nm	SMF	2	LC	10 km
1442655G1C[3]	1000Base-LX, 1310nm	MMF	2	LC	0.55 km
GigE SFPs: Bi-Directional (Bi-Di), Single-Fiber					
1442110G1, 1442110G2 1442120G1, 1442120G2 1442140G1, 1442140G2 1442180G1, 1442180G2	• 14421x0G1: 1490nm TX/1310nm RX • 14421x0G2: 1310nm TX/1490nm RX	SMF	1	LC	10 km 20 km 40 km 80 km
GigE SFPs: CWDM					
1442351G1 – 1442351G4	• 1442351G1: 1510nm • 1442351G3: 1550nm • 1442351G2: 1530nm • 1442351G4: 1570nm	SMF	2	LC	50 km
GigE SFPs: DWDM					
1442390G1, 1442390G2	• 1442390G1: 1538.19nm TX/1200–1620nm RX • 1442390G2: 1539.77nm TX/1200–1620nm RX	SMF	2	LC	120 km
10GigE XFPs					
1442901G1	10GBase-SR, 850nm	MMF	2	LC	300 m
1442910G1, 1442910G1C[3]	1310nm TX/1260–1355nm RX	SMF	2	LC	10 km
1442940G1	1550nm TX/1530–1565nm RX	SMF	2	LC	40 km
1442980G1C[3]	1550nm TX/1530–1565nm RX	SMF	2	LC	80 km
10GigE XFPs: DWDM					
1442981G1C – 1442981G9C[3] 1442982G1C – 1442982G7C[3]	These XFPs support the wavelengths/frequencies recommended in ITU-T G.694.1, including DWDM channels 21–36 (1560.61nm to 1548.51nm, with 100GHz spacing).	SMF	2	LC	80 km
Contact ADTRAN regarding the availability of XFPs supporting DWDM channels 37–60 (1547.72nm to 1529.55nm).					
SFP Infiniband Cable (for shelf to shelf chaining)					
1179680G1	1 to 4.25 Gbps, SFP Expansion Cable, 1 meter long, shielded cable with integrated SFPs at both ends				

1. Not RoHS Compliant
2. Range: 0.5 km using 50/125 -m MMF or 0.27 km using 62.5/125 -m MMF
3. Commercial Temperature

NOTE

- For optical power and budget, temperature ranges, and other specifications related to individual SFP/XFP units, refer to the Job Aids included with the SFP/XFP.
- For more information regarding SFP/XFP transceivers, refer to the ADTRAN *Broadband SFP/XFP Matrix* (P/N 61442000G1-49).

NOTICE

Due to compliance certification requirements, only SFP and XFP approved by ADTRAN operate with the ETOS-1. Use of other SFP or XFP causes an alarm condition.

INSTALLATION

⚠ CAUTION

- The ETOS-1 should be installed in a Total Access 5000 located in a restricted access location, by qualified Service Personnel only.
- The Total Access 5000 chassis frame ground terminal must be connected to an earth ground to ensure that the front panel of the ETOS-1 is properly grounded via the backplane connector.

Inspect the ETOS-1 prior to installation. If damage has occurred during shipping, file a claim with the carrier, and then contact ADTRAN Customer Support. Refer to "Warranty".

NOTE

The ETOS-1 installs into the Total Access 5000 in any pair of adjacent, odd/even numbered slots (for example: **1** and **2**, **5** and **6**). The slot pair **11** and **12/SCM** is *excluded*, as is **SM A** and **SM B**.

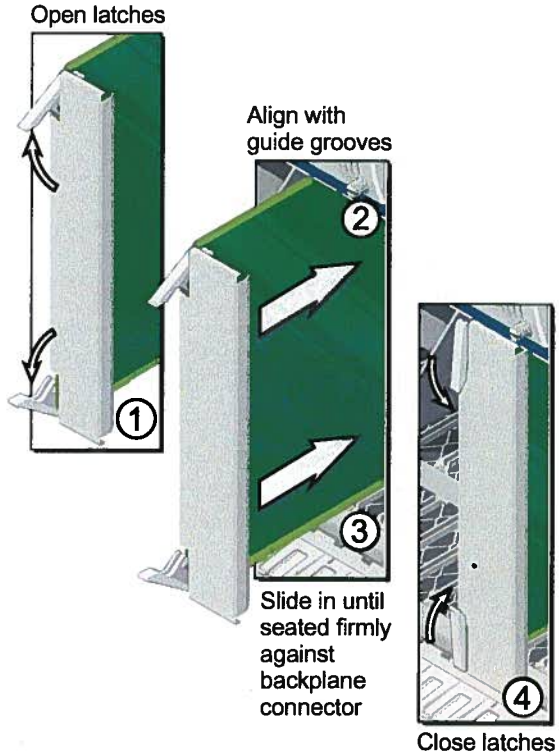
⚠ WARNING

To meet NEBS Level 3 and provide proper airflow and filtration, the AMIO2 Blank (P/N 1187923G1) must be installed in the two rear-panel slots occupied by the ETOS-1 line module.

If present, remove the Access Module Blank(s) (P/N 1187921E1 or 1187922E1) from the appropriate slots of the chassis.

Install all required SFP and XFP. Refer to the "Installation" section of the Job Aid included with the SFP/XFP, as necessary.

Install the ETOS-1 according to the installation diagram (below).



This module performs a self-test at power-up. After testing, the LEDs indicate the current status of the module, as described in "Front Panel LEDs" (right).

Front Panel LEDs

Label	Status	Indication
STBY	○ Off	ETOS-1 not in Standby mode
	● Green	ETOS-1 in Standby mode
	● Yellow	ETOS-1 in Initialization state
ACT (module)	○ Off	ETOS-1 not in Active mode
	● Green	ETOS-1 in Active mode
	● Red	Fault keeps ETOS-1 from going online
TST	○ Off	No test
	● Yellow	Test active
ALM	○ Off	No Alarm
	✸ Green Flashing	Information alarm (alert)
	● Yellow	Minor alarm
	● Red	Major alarm
	✸ Red Flashing	Critical alarm
PWR	○ Off	No power to ETOS-1
	● Green	Power and initialization OK
	● Yellow	ETOS-1 is Out of Service (OOS)
	● Red	Power, temperature, or boot failure
ACT (**HS1, HS2**)	○ Off	HS port is in Protect mode
	● Green	HS port is in Active mode
RCV (**HS1, HS2**)	○ Off	HS port link is OOS-UAS (Unassigned)
	● Green	HS port link is Up
	● Red	HS port link is Down
ACT (**1–16**)	○ Off	MS port is in Protect mode
	● Green	MS port is in Active mode
RCV (**1–16**)	○ Off	MS port link is OOS-UAS
	● Green	MS port link is Up
	● Red	MS port link is Down

PROVISIONING

The ETOS-1 can be provisioned through a CLI-driven SCM.

The SCM **CRAFT** port (DB-9 connector) supports an RS-232 interface to a VT100 terminal or compatible emulator, set for:

- 9600 bps
- 8 data bits
- No parity
- No flow control
- 1 stop bit

System Access with a CLI-Driven SCM

The Login screen is displayed upon connection. If the Login screen does not immediately appear, press ENTER several times or CTRL+R to refresh the screen.

NOTE

- A valid Account Name and Password are required to log in. Default SCM provisioning includes an Admin-level account, with the Account Name **ADMIN** and the Password **PASSWORD**.
- Account Name and Password are provisionable values for all user accounts. For details, refer to the appropriate *Total Access 5000 SCM Installation and Maintenance Guide.*

1. Enter an Account Name with Admin privileges. Press ENTER.
2. Enter the Password for the account specified. Press ENTER.

   A successful login displays the CLI prompt.

For the CLI options necessary for provisioning the ETOS-1, refer to the *Total Access/NetVanta Carrier CLI Dictionary* (P/N 6TANV57CLI-35).

MAINTENANCE

The ETOS-1 does not require routine hardware maintenance for normal operation. ADTRAN does not recommend that repairs be attempted in the field. Repair services may be obtained by returning the defective unit to ADTRAN. Field support for software is provided through upgrade facilities. Refer to "Warranty" for further information.

SPECIFICATIONS

- Physical
  - Height: 9.25 inches
  - Width: 1.70 inches
  - Depth: 9.25 inches
  - Weight: 2.0 pounds
- Electrical
  - Input Voltage, Nominal: –48 VDC
  - Input Voltage, Range: –42.0 VDC to –56.0 VDC
  - Amps drawn @ –48 VDC: 1.3 A (typical), 1.45 A (maximum)
  - Heat dissipation (watts): 62.4 (typical), 69.6 (maximum)
- Environmental
  - Operational temperature: –40°C to +65°C
  - Storage temperature: –40°C to +85°C
  - Relative humidity: up to 95%, noncondensing

SAFETY AND REGULATORY COMPLIANCE

Safety and regulatory information for this product is located in *Safety and Regulatory Compliance Notice* (P/N 61174101F1-17).

Consultez L'avis sur la Sécurité et la Conformité à la Réglementation pour ce produit (P/N 61174101F1-17) pour obtenir des renseignements détaillés sur la sécurité et la réglementation.

Ausführliche sicherheits und regulatorische informationen sind in der Konformitätserklärung zur Sicherheit und Einhaltung von Normen zu diesem Produkt (P/N 61174101F1-17) aufgeführt.

For more information, refer to the *Total Access 5000 Ethernet Transport Optical Switch Deployment Guide* (P/N 61174101F1-50) available online at www.adtran.com.

Warranty: ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found online at www.adtran.com/warranty.

CAUTION!
SUBJECT TO ELECTROSTATIC DAMAGE OR DECREASE IN RELIABILITY.
HANDLING PRECAUTIONS REQUIRED.

ADTRAN CUSTOMER CARE:
From within the U.S. **1.800.726.8663**
From outside the U.S. **1.256.963.8716**
PRICING AND AVAILABILITY **1.800.827.0807**

61174101F1-22A

ADTRAN

CLEI: BVL3AW2D
Product P/N: 1174130F2

Optical Networking Edge (ONE)

Ethernet Transport Optical Switch-10 (ETOS-10)

jobAid

Issue Date: April 2013
Document P/N: 61174130F2-22A

Documentation for ADTRAN Carrier Networks products is available for viewing and download directly from the Support Community portal.

Go to:

https://supportforums.adtran.com/welcome

Registration is required.

The following documents provide additional information for this product:

Total Access 5000 CLI Dictionary
Optical Networking Edge CLI Dictionary
SFP/XFP/SFP+ Compatibility Matrix and Engineering Guide

DESCRIPTION

This product is intended to be installed in a Total Access® 5000/5006 Chassis.

The Optical Networking Edge (ONE) Ethernet Transport Optical Switch-10 (ETOS-10) supports high-speed (HS) network interfaces and mid-speed (MS) client interfaces in a single module. The ETOS-10 supports up to two 1-Gbps (GigE) MS optical or copper Ethernet interfaces, and eight 10-Gbps (10 GigE) HS optical Ethernet network interfaces. All Ethernet traffic is contained within the ETOS-10, flowing between the front-access ports.

The ETOS-10 operates as an Ethernet infrastructure aggregation platform and an Ethernet service termination platform. It supports both direct customer interfaces (UNI: User-to-Network Interface) and direct connection to customer premises NTE (MEN/NNI: Metro Ethernet Network/Network-to-Network Interface). Any client port can be configured as an MEN/NNI network port or UNI port.

Each physical interface is provided by a Small Form-Factor Pluggable (SFP) for 1G or SFP+ for 10GigE accessed from the ETOS-10 front panel.

FEATURES

The ETOS-10 supports the following features:

- Two MS client ports: GigE or 2.5 GigE (optical)
- Eight HS network ports: 10 GigE, optical
- MEF-9 and MEF-14 Certified
- Traffic Management:
  - ELINE MEF (Metro Ethernet Forum)
  - ELAN MEF (Metro Ethernet Forum)
  - Committed/Excess Information Rate and Burst Size (CIR, CBS, EIR, EBS); 64-kbps granularity
  - Up to 4094 VLANs:
    - VLAN Priority TAG manipulation
    - VLAN CE-TAG preservation or swapping with S-TAG
  - Egress Rate shaping
  - Strict priority queueing, programmable queue depths, and Weighted Random Early Discard
  - 10 kB MTU (Maximum Transmission Unit)
  - 4,000 Ethernet Virtual Circuits (EVC)
  - EVC MAPS (UNI type 1 ports): up to 1,536 classifications
  - 1,536 Policers
  - 256 Dynamic Counters
  - Class-of-Service (COS): 8 queues per port
- Up to 5 LAG groups between ports (4 x HS, 1 x MS)
- Subtended host (Link OAM): provisioning "push down" to NetVanta 8044(M); auto-population of fields
- EVC advertisement with NetVanta 8044(M)
- Performance Monitoring:
  - Network/Client port statistics: 15-min, Daily, Real-time
  - Policer Statistics: 15-min and Daily (Ingress Green, Yellow, and Red frames); Real-time
- Manual topology support for Command Line Interface (CLI) and Simple Network Management Protocol (SNMP) for declaring Peer (Far-End) connection
- Management via ONE CLI, System Management EVC, and SNMP/MIB controls
  - MAC table (up to 64k entries) for ELAN switching
  - Remote chassis management via ETOS-10 network port

- Timing synchronization from Total Access 5000 backplane, user provisionable primary and secondary references from front panel ports, or Stratum 3 clock (holdover)
- Front panel port timing references designed for frequency, jitter, wander, and phase transfer functions of G.8262, and ESMC sync messaging of G.8264.
- ERPS 10 GigE support (up to four separate rings on a single module, and eight rings in redundant configuration)
- ERPS 1 GigE support (one ring on a single module, and two rings in redundant configuration)
- Dying Gasp support
- LLDP support
- Physical Topology support
- Policer Threshold support
- Supports Equipment Redundancy with two ETOS-10 modules
  - Uses ETOS-10 LMIO-X (1174131F1 for ANSI or 1174132F1 for ETSI) assembly for data transfer between the two assemblies (rear chassis mount)
  - Up to 10 cross-slot ERPS rings
    - 8 x 10GE ERPS rings
    - 2 x 1GE ERPS rings
  - Supports cross-slot Ycable
  - Supports cross-slot Active/Standby facility protection groups.

SFPs

The table below lists the SFPs supported on the ETOS-10. See the *SFP/XFP/SFP+ Compatibility Matrix and Engineering Guide* (P/N 6SFPMATRIX-7) for a detailed listing of all ADTRAN supported SFP transceivers.

Part Numbers	Protocol/Rate/Specifications	Cable/Fiber	Leads	Connector	Max Span
GigE SFPs					
1184561P1[1], 1184561PG1	1000Base-LX, 1310nm	SMF	2	LC	10 km
1184561P3[1], 1184561PG3	1000Base-SX, 850nm	MMF	2	LC	0.5 km/0.27 km[2]
1184562P5[1], 1184562PG5	1000Base-ZX, 1550nm	SMF	2	LC	80 km
1442300G1	1000Base-T, Full-duplex	Shielded Cat 5	1	RJ-45	100 m
1442320G1	1000Base-LX, 1310nm	SMF	2	LC	20 km
1442340G1	1000Base-LX, 1310nm	SMF	2	LC	40 km
1442610G1C[3]	1000Base-LX, 1310nm	SMF	2	LC	10 km
1442655G1C[3]	1000Base-LX, 1310nm	MMF	2	LC	0.55 km
GigE SFPs: Bi-Directional (Bi-Di), Single-Fiber					
1442110G1, 1442110G2	• 14421x0G1: 1490nm TX/1310nm RX	SMF	1	LC	10 km
1442120G1, 1442120G2	• 14421x0G2: 1310nm TX/1490nm RX				20 km
1442140G1, 1442140G2					40 km
1442180G1, 1442180G2					80 km
GigE SFPs: CWDM					
1442351G1 – 1442351G4	• 1442351G1: 1510nm • 1442351G3: 1550nm • 1442351G2: 1530nm • 1442351G4: 1570nm	SMF	2	LC	50 km
GigE SFPs: DWDM					
1442390G1, 1442390G2	• 1442390G1: 1538.19nm TX/1200–1620nm RX • 1442390G2: 1539.77nm TX/1200–1620nm RX	SMF	2	LC	120 km
1442707G1 - 1442707G16	• Supports the wavelengths/frequencies recommended in ITU-G.694.1, including DWDM channels 21-36				
GigE SFP+s:					
1442401G1	10GigE, 850nm	SMF	2	LC	300 m
1442410G1	10GigE, 1310nm	SMF	2	LC	10 km
1442420G1	10GigE, 1310nm	SMF	2	LC	20 km
1442440G1	10GigE, 1550nm	SMF	2	LC	40 km
1442480G1C[3]	10GigE, 1550nm	SMF	2	LC	80 km

1. Not RoHS Compliant
2. Range: 0.5 km using 50/125 -m MMF or 0.27 km using 62.5/125 -m MMF
3. Commercial Temperature

NOTICE

Due to compliance certification requirements, only SFPs approved by ADTRAN operate with the ETOS-10. Use of other SFPs will result in service interruption.

NOTE

For optical power and budget, temperature ranges, and other specifications related to individual SFP/SFP+ units, refer to the Job Aid included with the SFP/SFP+.

INSTALLATION

Inspect the ETOS-10 before installation. If damage has occurred during shipping, file a claim with the carrier, and then contact ADTRAN Customer Support. Refer to the warranty.

The ETOS-10 installs in a Total Access 5000 or 5006 Chassis, in any slot (for example, **1** and **2**, **5** and **6**). The slot **12/SCM** is **excluded**; slots **SM A** and **SM B** are **excluded**.

⚠ WARNING

- To meet NEBS Level 3 and provide proper airflow and filtration, the AMIO2 Blank (P/N 1187923G1) must be installed in the two rear-panel slots occupied by the ETOS-10.
- To provide proper airflow and protection in this system, **all** chassis slots must be populated with either a module or an appropriate blank panel. Failure to install blank panels in **all** unpopulated slots will void the warranty for modules installed in a misconfigured system.
- Use the proper chassis fan configuration for Central Office (CO) and Remote Terminal (RT) deployments, as specified in the table below.

	Total Access 5000 23-Inch Chassis	Total Access 5006 Chassis
CO (Standard)	Total Access 5000 23-Inch Fan Module (P/N 1187080L1/G1)	Total Access 5006 Fan Module (P/N 1187090E1)
RT (High Flow)	Total Access 5000 High Flow Fan Module (P/N 1187080G2) or Total Access 5000 High Flow Rear Fan Module (P/N 1187080G3)	Total Access 5006 High Flow Rear Fan Module (P/N 1187090G3)

⚠ CAUTION

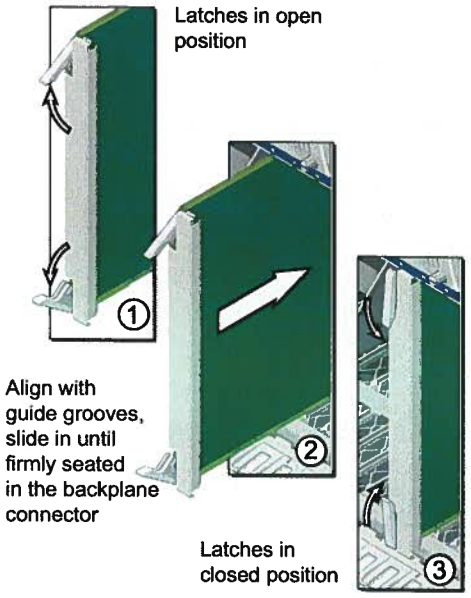
- The ETOS-10 should be installed in a Total Access 5000 or 5006 Chassis that is located in a restricted access location, by qualified Service Personnel only.
- The Total Access 5000 or 5006 Chassis frame ground terminal must be connected to an earth ground to ensure that the front panel of the ETOS-10 is properly grounded via the backplane connector.

Installation Steps

If present, remove the Access Module Blank(s) (P/N 1187921E1 or 1187922E1) from the appropriate slots of the chassis.

Install all required SFPs and SFP+s. Refer to the "Installation" section of the Job Aid included with the SFP/SFP+, as necessary.

Install the ETOS-10 according to the following installation diagram.



This module performs a self-test at power-up. After testing, the LEDs indicate the current status of the module.

Front Panel LEDs

Label	Status	Indication
STBY	○ Off	ETOS-10 not in Standby mode
	● Green	ETOS-10 in Standby mode
	● Yellow	ETOS-10 in Initialization state
ACT (module)	○ Off	ETOS-10 not in Active mode
	● Green	ETOS-10 in Active mode
	● Red	Fault keeps ETOS-10 from going online
TST	○ Off	No test
	● Yellow	Test active
ALM	○ Off	No Alarm
	✸ Green Flashing	Information alarm (alert)
	● Yellow	Minor alarm
	● Red	Major alarm
	✸ Red Flashing	Critical alarm
PWR	○ Off	No power to ETOS-10
	● Green	Power and initialization OK
	● Yellow	ETOS-10 is Out of Service (OOS)
	● Red	Power, temperature, or boot failure
ACT (MS1, MS2)	○ Off	MS port is in Protect mode
	● Green	MS port is in Active mode
RCV (MS1, MS2)	○ Off	MS port link is OOS-UAS (Unassigned)
	● Green	MS port link is Up
	● Red	MS port link is Down
ACT (HS1-HS8)	○ Off	HS port is in Protect mode
	● Green	HS port is in Active mode
RCV (HS1-HS8)	○ Off	HS port link is OOS-UAS
	● Green	HS port link is Up
	● Red	HS port link is Down

PROVISIONING

The ETOS-10 can be provisioned through a CLI-driven Total Access 5000 System Controller Module (SCM).

The SCM **CRAFT** port (DB-9 connector) supports an RS-232 interface to a VT100 terminal or compatible emulator, set for:

- 9600 bps
- 8 data bits
- No parity
- No flow control
- 1 stop bit

System Access with a CLI-Driven SCM

The Login screen is displayed upon connection. If the Login screen does not immediately appear, press ENTER several times or CTRL+R to refresh the screen.

NOTE

- A valid Account Name and Password are required to log in. Default SCM provisioning includes an Admin-level account, with the Account Name **ADMIN** and the Password **PASSWORD**.
- Account Name and Password are provisionable values for all user accounts.

1. Enter an Account Name with Admin privileges. Press ENTER.
2. Enter the Password for the account specified. Press ENTER.

   A successful login displays the CLI prompt.

For the CLI options necessary for provisioning the ETOS-10, refer to the *Total Access 5000 CLI Dictionary* (P/N 65K72CLI-35) or the *Total Access 5000 Optical Networking Edge CLI Dictionary* (P/N 6ONE30CLI-35).

MAINTENANCE

The ETOS-10 does not require routine hardware maintenance for normal operation. Do not attempt repairs in the field. Repair services may be obtained by returning the defective unit to ADTRAN. Field support for software is provided through upgrade facilities. Refer to warranty for further information.

SPECIFICATIONS

- Physical
  - Height: 9.25 inches / 23.5 centimeters
  - Width: 0.80 inches / 2.03 centimeters
  - Depth: 9.25 inches / 23.5 centimeters
  - Weight: 2.0 pounds / 0.9 kilograms
- Electrical
  - Input Voltage, Nominal: –48 VDC
  - Input Voltage, Range: –42.0 VDC to –56.0 VDC
  - Typical current draw: 1.34 A
  - Maximum current draw: 2.25 A
  - Typical heat dissipation: 65 W
  - Maximum heat dissipation: 108 W
- Environmental
  - Operational temperature: –40°C to +65°C
  - Storage temperature: –40°C to +85°C
  - Relative humidity: up to 95%, noncondensing

SAFETY AND REGULATORY COMPLIANCE

Refer to the Safety and Regulatory Compliance Notice for this product (P/N 61174130F2-17) for detailed safety and regulatory information.

Consultez L'avis sur la Sécurité et la Conformité à la Réglementation pour ce produit (P/N 61174130F2-17) pour obtenir des renseignements détaillés sur la sécurité et la réglementation.

Warranty: ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found online at www.adtran.com/warranty.

CAUTION!
SUBJECT TO ELECTROSTATIC DAMAGE OR DECREASE IN RELIABILITY
HANDLING PRECAUTIONS REQUIRED

ADTRAN CUSTOMER CARE:
From within the U.S. 1.800.726.8663
From outside the U.S. +1 256.963.8716
PRICING AND AVAILABILITY 1.800.827.0807

ADTRAN

Optical Networking Edge (ONE)

OTN Transport Optical Switch-1-8 (OTOS-1-8)

jobAid

Product P/N: 1174121F1

Issue Date: April 2013
Document P/N: 61174121F1-22A

Documentation for ADTRAN Carrier Networks products is available for viewing and download directly from the Support Community portal.

Go to:

https://supportforums.adtran.com/welcome

Registration is required.

The following documents provide additional information for this product:

Total Access 5000 CLI Dictionary
Optical Networking Edge CLI Dictionary
Optical Networking Edge OTOS Deployment Guide
SFP/XFP/SFP+ Compatibilty Matrix and Engineering Guide

DESCRIPTION

The Optical Networking Edge (ONE) OTN Transport Optical Switch-1-8 (OTOS-1-8) is a single slot module that installs into any slot in the Total Access 5000/5006 Chassis. The OTOS-1-8 includes a high-speed (HS) network interface and mid-speed (MS) client interfaces in a single module. The OTOS-1-8 provides one OTU2 XFP interface for the Network Port (HS), and up to eight SFP interfaces for the Client Ports (MS). All traffic is contained within the OTOS-1-8, flowing between the front panel ports.

Each optical interface is provided by a Small Form-Factor Pluggable (SFP) or 10G Small Form-Factor Pluggable (XFP), accessed from the OTOS-1-8 front panel. MS interfaces use SFPs to operate at SONET rates of OC-3, OC-12, or OC-48; 1GigE and OTU1 or the SDH equivalents of STM-1, STM-4, and STM-16, respectively. The rate for each MS port can be configured independently. The HS port uses an XFP to operate at OTU2 rate. Mappings supported within the OTU2 include ODU1 and ODU0.

OTOS-1-8 supports equipment redundancy when using an LMIO2 Personality Module (1174122F1, ANSI or 1174122F2, ETSI). The HS ports can be used in a protection group in this equipment redundant pair. The MS ports can also be used in pairs for protection switching.

NOTE

The MS ports can be equipped to operate in any combination of supported optical rates. However, both ports in a protection group must be equipped to operate at the **same** optical line rate.

The OTOS-1-8 supports the following features:

- One HS network port: OTU2
- FEC on OTU2 (HS): No FEC, GFEC, EFEC (I.4)
- FEC support on OTU1 (MS): No FEC, GFEC
- Auto payload type support on HS port for interoperability with legacy OTN equipment
- Eight MS client ports: OTU1, 1GigE, OC-3, OC-12, OC-48; STM-1, STM-4, or STM-16
  - OTU1 clients: maximum of four
  - OC48/STM16 clients: maximum of four
- Muxponder / 2.5G Transponder Operation Mode
  - Muxponder Mode: HS to MS mappings
  - Transponder Mode; MS to MS mappings
    - Only one mode is allowed to be active at a time. The mode is determined by the first mapping/crossconnect assignment
    - Both Modes are supported in a non-equipment redundant and equipment-redundant operation
    - HighSpeed pass-thru mappings, between two redundant modules, are only supported in Muxponder Mode
- Muxponder Mode Mappings:
  - OTU1/ODU1 into OTU2/ODU1
  - OTU1/ODU0 into OTU2/ODU0
  - OTU1/ODU0 into OTU2/ODU1/ODU0
  - OC48 (STM16) into OTU2/ODU1
  - OC12 (STM4) into OTU2/ODU0
  - OC12 (STM4) into OTU2/ODU1/ODU0
  - OC3 (STM1) into OTU2/ODU0
  - OC3 (STM1) into OTU2/ODU1/ODU0
  - 1GigE into OTU2/ODU0
  - 1GigE into OTU2/ODU1/ODU0
  - HS pass-thru mappings between two redundant modules
    - ODU1 to ODU1
    - ODU0 to ODU0
    - ODU1/ODU0 to ODU1/ODU0
- Transponder Mode Mappings:
  - OTU1/ODU1 into OTU1/ODU1
  - OC48 (STM16) into OTU1/ODU1
  - OC12 (STM4) into OTU1/ODU0
  - OC3 (STM1) into OTU1/ODU0
  - 1GigE into OTU1/ODU0

- Protection Group on HS (OTU2) port:
  - SNC/N ODU1 path protection with redundant card
  - SNC/N ODU0 path protection with redundant card
  - SNC/I line Uni-directional protection with redundant card
  - Y-cable support with redundant card
  - Revertive/Non-revertive switching
- Protection Group on MS ports:
  - SONET/SDH 1+1 Uni-directional APS
  - OTU1 SNC/I line Uni-directional APS
  - Y-cable support for all clients with redundant card
  - Revertive/Non-revertive switching
- Manual Topology Support; CLI and SNMP for declaring Peer (Far-End) connection
- Auto Topology Support: Auto Trail ID for TX information
- Loopback support:
  - Facility (HS and MS ports)
  - Terminal (HS and MS ports)
- Performance Monitoring:
  - 15 min, 24 hour
  - Real-time
- Management:
  - CLI and SNMP/MIB controls via the Optical Networking Edge (ONE) System Controller Module (SCM)
  - Remote management via backplane interface
  - TFTP software download
- Timing Transparent

SFPs and XFPs

The following tables list the SFPs/XFPs supported on the OTOS-1-8.

NOTE

- All listed units use LC connectors and single-mode fiber.
- All listed (except copper SFPs) units use two-fiber operation, except for units listed supporting single-fiber, bi-directional (Bi-Di) operation.
- Copper GigE SFPs are only supported on one end of the link, the other end must be a fiber SFP.
- Listed CWDM/DWDM units have an 80-km maximum span.
- Listed RoHS-compliant units are identified by part numbers including a *Gx* or *PGx* suffix.
- Commercial-temperature SFP/XFP units are identified by part numbers that include a *C* as the final character.
- For optical power and budget, temperature ranges, and other specifications related to individual units, refer to the Job Aids included with the SFPs/XFPs, and available at www.adtran.com.
- For more information regarding SFP/XFP transceivers, refer to the *SFP/XFP/SFP+ Compatibilty Matrix and Engineering Guide* (P/N 6SFPMATRIX-7).

NOTICE

Due to compliance certification requirements, only SFPs and XFPs approved by ADTRAN operate with the OTOS-1-8. Use of other SFPs or XFPs causes an alarm condition.

GigE SFPs	
Standard	**Wave Length**
1184561PG1	1310 nm, 1000Base-LX, 10 km
1184561PG3	850 nm, 1000Base-SX, 0.5 km/0.27 km
1184562PG5	1550 nm, 1000Base-ZX, 80 km
1442300G1	Full-duplex, 1000Base-T, 100 m
1442320G1	1310 nm, 1000Base-LX, 20 km
1442340G1	1310 nm, 1000Base-LX, 40 km
1442610G1C	1310 nm, 1000Base-LX, 10 km

GigE SFPs (Continued)	
1442655G1C	1310nm, 1000Base-LX, 0.55 km
Single-Fiber, Bi-Di	**Wave Length**
1442110G1, 1442110G2	14421x0G1: 1490 nm TX/1310nm RX, 10 km
1442120G1, 1442120G2	14421x0G2: 1310 nm TX/1490nm RX, 20 km
1442140G1, 1442140G2	14421x0G1: 1490 nm TX/1310nm RX, 40 km
1442180G1, 1442180G2	14421x0G2: 1310 nm TX/1490nm RX, 80 km
CWDM	**Wave Length**
1442351G1 – 1442351G4	1510nm to 1570 nm, 50 km

OC-3/STM-1 SFPs	
Standard	**Wave Length**
1184543PG1	1310 nm, LR-1, 40 km
1184543PG2	1310 nm, IR-1, 10 km
1184543PG5	1550 nm, LR-2, 80 km
Single-Fiber, Bi-Di	**Wave Length**
1442702PG1	1310 nm Tx/1550 nm Rx
1442702PG2	1550 nm Tx/1310 nm Rx
CWDM	**Wave Length**
1442701PG1 – 1442701PG8	1471 nm to 1611 nm, 80 km

OC-12/STM-4 SFPs	
Standard	**Wave Length**
1184544PG1	1310 nm, LR-1, 40 km
1184544PG2	1310 nm, IR-1, 15 km
Single-Fiber, Bi-Di	**Wave Length**
1442704PG1	1310 nm Tx/1550 nm Rx
1442704PG2	1550 nm Tx/1310 nm Rx
CWDM	**Wave Length**
1442703PG2 – 1442703PG9	1491 nm to 1471 nm, 80 km

OC-48/STM-16 SFPs	
Standard	**Wave Length**
1184560P1	1310 nm, LR-1, 40 km
1184560P2	1310 nm, IR-1, 15 km
1184560P5	1550 nm, LR-2, 80 km
1184560P6	1310 nm, SR-1, 2 km
Single-Fiber, Bi-Di	**Wave Length**
1442705PG1	1310 nm Tx/1550 nm Rx
1442705PG2	1550 nm Tx/1310 nm Rx
CWDM	**Wave Length**
1442706PG1 – 1442706PG8	1471 nm to 1611 nm, 80 km
DWDM	**Wave Length**
1442707G1 – 1442707G44	1563.86 nm to 1529.55 nm, 80 km

OTU2 XFPs	
DWDM	**Wave Length**
1442981G1C – 1442981G9C	1560.61 nm to 1554.13 nm, 80 km
1442982G1C – 1442982G9C	1553.33 nm to 1563.05 nm, 80 km
1442983G1C – 1442983G9C	1562.23 nm to 1542.94 nm, 80 km
1442986G1C – 1442986G9C	1542.14 nm to 1535.82 nm, 80km
1442987G1C – 1442987G8C	1535.04 nm to 1529.55 nm, 80 km

INSTALLATION

⚠ CAUTION

- The OTOS-1-8 should be installed in a Total Access 5000/5006 chassis located in a restricted access location, by qualified Service Personnel only.
- The Total Access 5000/5006 Chassis frame ground terminal must be connected to an earth ground to ensure that the front panel of the OTOS-1-8 is properly grounded via the backplane connector.

Inspect the OTOS-1-8 before installation. If damage has occurred during shipping, file a claim with the carrier, and then contact ADTRAN Customer Support. Refer to the warranty for further information.

NOTE

The OTOS-1-8 installs into the Total Access 5000/5006 chassis in any odd or even numbered slot other than those labeled **12/SCM**, **SM A** or **SM B**.

⚠ WARNING

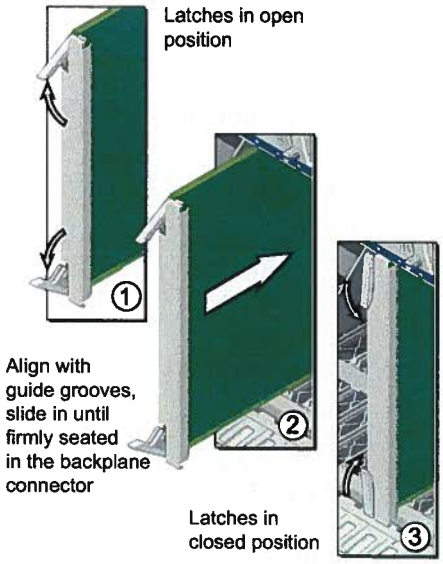
- To meet NEBS Level 3 and provide proper airflow and filtration, the AMIO2 Blank (P/N 1187923G1) must be installed in the rear-panel slot occupied by the OTOS-1-8 line module.
- Use the proper chassis fan configuration for Central Office (CO) and Remote Terminal (RT) deployments, as specified in the table.

Location	Total Access 5000 23-Inch Chassis	Total Access 5006 Chassis
CO (Standard)	Total Access 5000 23-Inch Fan Module (P/N 1187080L1/G1)	Total Access 5006 Fan Module (P/N 1187090E1)
RT (High Flow)	Total Access 5000 High Flow Fan Module (P/N 1187080G2) or Total Access 5000 High Flow Rear Fan Module (P/N 1187080G3)	Total Access 5006 High Flow Rear Fan Module (P/N 1187090G3)

If present, remove the Access Module Blank(s) (P/N 1187921E1 or 1187922E1) from the appropriate slots of the chassis.

Install all required SFPs and XFPs. Refer to the "Installation" section of the Job Aid included with the SFP/XFP, as necessary.

Install the OTOS-1-8 according to the installation diagram in the column to the right.



This module performs a self-test at power-up. After testing, the LEDs indicate the current status of the module, as described in "Front Panel LEDs."

Front Panel LEDs

Label	Status	Indication
STBY	○ Off	OTOS-1-8 not in Standby mode
	● Green	OTOS-1-8 in Standby mode
	● Yellow	OTOS-1-8 in Initialization state
ACT (module)	○ Off	OTOS-1-8 not in Active mode
	● Green	OTOS-1-8 in Active mode
	● Red	Fault keeps OTOS-1-8 from going online
TST	○ Off	No test
	● Yellow	Test active
ALM	○ Off	No Alarm
	✱ Green Flashing	Information alarm (alert)
	● Yellow	Minor alarm
	● Red	Major alarm
	✱ Red Flashing	Critical alarm
PWR	○ Off	No power to OTOS-1-8
	● Green	Power and initialization OK
	● Yellow	Out of Service (OOS)
	● Red	Power, temperature, or boot failure
ACT (MS1–MS8)	○ Off	MS port is in Protect mode
	● Green	MS port is in Active mode
RCV (MS1–MS8)	○ Off	MS port link is OOS-UAS
	● Green	MS port link is Up
	● Red	MS port link is Down
ACT (HS1)	○ Off	HS port is in Protect mode
	● Green	HS port is in Active mode
RCV (HS1)	○ Off	HS port link is OOS-UAS (Unassigned)
	● Green	HS port link is Up
	● Red	HS port link is Down

PROVISIONING

The OTOS-1-8 can be provisioned through a CLI-driven SCM.

The SCM **CRAFT** port (DB-9 connector) supports an RS-232 interface to a VT100 terminal or compatible emulator, set for:

- 9600 bps
- 8 data bits
- No parity
- No flow control
- 1 stop bit

System Access with a CLI-Driven SCM

The Login screen is displayed upon connection. If the Login screen does not immediately appear, press ENTER several times or CTRL+R to refresh the screen.

NOTE

- A valid Account Name and Password are required to log in. Default SCM provisioning includes an Admin-level account, with the Account Name **admin** and the Password **password**.
- Account Name and Password are provisionable values for all user accounts.

1. Enter an Account Name with Admin privileges. Press ENTER.
2. Enter the Password for the account specified. Press ENTER. A successful login displays the CLI prompt.

For the CLI commands necessary for provisioning the OTOS-1-8, refer to the *Total Access 5000 CLI Dictionary* (P/N 65K72CLI-35A) or the *Total Access 5000 Optical Networking Edge CLI Dictionary (P/N* 6ONE30CLI-35A) .

MAINTENANCE

The OTOS-1-8 does not require routine hardware maintenance for normal operation. ADTRAN does not recommend that repairs be attempted in the field. Repair services may be obtained by returning the defective unit to ADTRAN. Field support for software is provided through upgrade facilities. Refer to the warranty for further information.

SPECIFICATIONS

- Physical
  - Height: 9.25 inches / 23.5 centimeters
  - Width: 0.8 inches / 2.03 centimeters
  - Depth: 9.25 inches / 23.5 centimeters
  - Weight: 2.0 pounds / 0.9 kilograms
- Electrical
  - Input Voltage, Nominal: –48 VDC
  - Typical current draw: 0.83 A
  - Maximum current draw: 0.96 A
  - Typical heat dissipation: 40 W
  - Maximum heat dissipation: 46 W
- Environmental
  - Operational temperature: –40°C to +65°C
  - Storage temperature: –40°C to +85°C
  - Relative humidity: 5% to 95%, noncondensing

SAFETY AND REGULATORY COMPLIANCE

Refer to the Safety and Regulatory Compliance Notice for this product (P/N 61174121F1-17) for detailed safety and regulatory information.

Consultez l'avis sur la sécurité et la conformité à la réglementation pour ce produit (61174121F1-17) pour obtenir des renseignements détaillés sur la sécurité et la réglementation.

Warranty: ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found online at www.adtran.com/warranty.

CAUTION!
SUBJECT TO ELECTROSTATIC DAMAGE OR DECREASE IN RELIABILITY
HANDLING PRECAUTIONS REQUIRED

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From within the U.S. 1.800.726.8663
From outside the U.S. +1 256.963.8716
PRICING AND AVAILABILITY 1.800.827.0807

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ADTRAN

Optical Networking Edge (ONE)
OTN Transport Optical Switch-2-16 (OTOS-2-16)

jobAid

CLEI: BVL3AX8D
Product P/N: 1174123F1

Issue Date: July 2013
Document P/N: 61174123F1-22A

Documentation for ADTRAN Carrier Networks products is available for viewing and download directly from the Support Community portal.

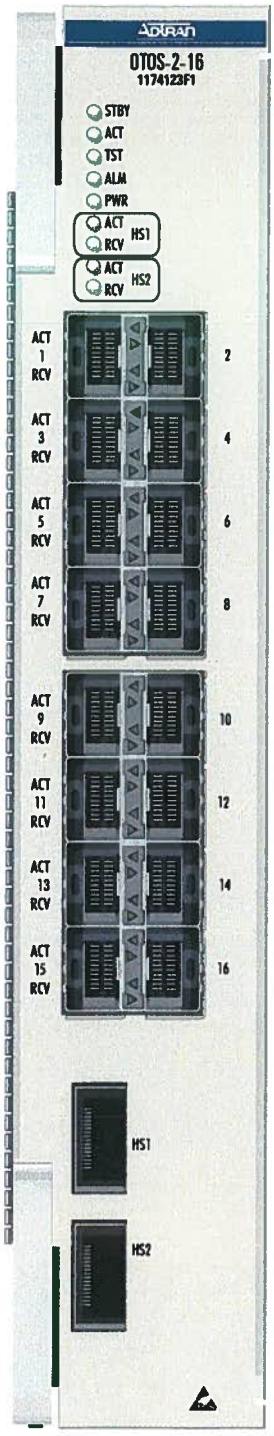
Go to:

https://supportforums.adtran.com/welcome

Registration is required.

The following documents provide additional information for this product:

Total Access 5000 CLI Dictionary
Optical Networking Edge OTOS Deployment Guide
SFP/XFP/SFP+ Compatibility Matrix and Engineering Guide



DESCRIPTION

The Optical Networking Edge (ONE) OTN Transport Optical Switch-2-16 (OTOS-2-16) is a double slot module that installs into any odd numbered slot in the Total Access 5000/5006 Chassis. The OTOS-2-16 includes high-speed (HS) network interfaces and mid-speed (MS) ports (typically used as client interfaces) in a single module. The OTOS-2-16 provides two OTU2 XFP interfaces for the Network Ports (HS), and up to 16 SFP interfaces for the Client Ports (MS). Traffic between each of these front panel ports flows between these ports, and also may flow across the LMIO backplane to the mate redundant OTOS-2-16 (if a redundant OTOS-2-16 is utilized).

Each optical interface is provided by a Small Form-Factor Pluggable (SFP) or 10G Small Form-Factor Pluggable (XFP), accessed from the OTOS-2-16 front panel. MS interfaces use SFPs to operate at SONET rates of OC-3, OC-12, or OC-48; or the SDH equivalents of STM-1, STM-4, and STM-16; Fibre Channel rates of 1GFC or 2GFC, and 1GigE and OTU1. The rate for each MS port can be configured independently. The HS ports use an XFP to operate at OTU2 rate. Mappings supported within the OTU2 include ODU1, ODU1 sub-rate timeslots, and ODU0.

OTOS-2-16 supports equipment redundancy when using an OTOS-LMIO Personality Module (1174111F1, ANSI or 1174112F1, ETSI). The HS and MS ports of an OTOS-2-16 can be used in protection groups with like ports of a mate OTOS-2-16 as part of an equipment redundant pair.

NOTE

The MS ports can be equipped to operate in any combination of supported optical rates. However, both ports in a protection group must be equipped to operate at the same optical line rate.

The OTOS-2-16 supports the following features:

- Two HS network ports: OTU2
- FEC on OTU2 (HS): No FEC, GFEC, EFEC (I.4), UFEC (1.7)
- FEC support on OTU1 (MS): No FEC, GFEC
- Auto payload type support on HS ports for interoperability with legacy OTN equipment
- 16 MS client ports: OTU1, 1GigE, OC-3, OC-12, OC-48; STM-1, STM-4, STM-16, or Fiber Channel 1GFC and 2GFC
  - OTU1 clients: maximum of 16 (HS ports not used)
  - OTU1 clients: maximum of eight (HS ports both in use)
  - OC48/STM16 clients: maximum of eight
- Two Modes of operation: Muxponder Mode (MS to HS mappings) Transponder Mode (MS to MS mappings)
  - Only one mode is allowed to be active at a time. The mode is determined by the first mapping/crossconnect assignment
  - Both non-equipment redundant and equipment redundant configurations support either Muxponder or Transponder Mode
  - High Speed pass-thru mappings between two redundant modules are only supported in Muxponder Mode
- Muxponder Mode Mappings:
  - OTU1/ODU1 into OTU2/ODU1
  - OTU1/ODU0 into OTU2/ODU0
  - OTU1/ODU0 into OTU2/ODU1/ODU0
  - OC48 (STM16) into OTU2/ODU1
  - OC12 (STM4) into OTU2/ODU0
  - OC12 (STM4) into OTU2/ODU1/ODU0
  - OC12 (STM4) into OTU2/ODU1/4 timeslot sub-rate
  - OC3 (STM1) into OTU2/ODU0
  - OC3 (STM1) into OTU2/ODU1/ODU0
  - OC3 (STM1) into OTU2/ODU1/1 timeslot sub-rate
  - 1GigE into OTU2/ODU0
  - 1GigE into OTU2/ODU1/ODU0
  - 1GigE into OTU2/ODU1/8 timeslot sub-rate (GFP-T)
  - 1GFC into OTU2/ODU0
  - 1GFC into OTU2/ODU1/ODU0

- 1GFC into OTU2/ODU1/6 timeslot sub-rate
- 2GFC into OTU2/ODU1
- 2GFC into OTU2/ODU1/12 timeslot sub-rate
- HS pass-thru mappings (equipment redundant and non-redundant)
  - ODU1 to ODU1
  - ODU0 to ODU0
  - ODU1/ODU0 to ODU1/ODU0

- Transponder Mode Mappings:
  - OTU1/ODU1 into OTU1/ODU1
  - OC48 (STM16) into OTU1/ODU1
  - OC12 (STM4) into OTU1/ODU0
  - OC12 (STM4) into OTU1/ODU1/4 timeslot sub-rate
  - OC3 (STM1) into OTU1/ODU0
  - OC3 (STM1) into OTU1/ODU1/1 timeslot sub-rate
  - 1GigE into OTU1/ODU0
  - 1GigE into OTU1/ODU1/8 timeslot sub-rate (GFP-T)
  - 1GFC into OTU1/ODU0
  - 1GFC into OTU1/ODU1/6 timeslot sub-rate
  - 2GFC into OTU1/ODU1
  - 2GFC into OTU1/ODU1/12 timeslot sub-rate
- Protection Group on HS (OTU2) ports:
  - SNC/N ODU1 path protection with redundant and non-redundant card
  - SNC/N ODU0 path protection with redundant and non-redundant card
  - SNC/I line Uni-directional protection with redundant and non-redundant card
  - Y-cable support with redundant card
  - Revertive/Non-revertive switching
- Protection Group on MS ports:
  - SONET/SDH 1+1 Uni-directional APS with redundant and non-redundant card
  - OTU1 SNC/I line Uni-directional APS with redundant and non-redundant card
  - Y-cable support for all clients with redundant card
  - Revertive/Non-revertive switching
- Manual Topology Support; CLI and SNMP for identifying Peer (far-end) connection
- Auto Topology Support: Auto Trail ID for TX information
- Loopback support:
  - Facility (HS and MS ports)
  - Terminal (HS and MS ports)
- Performance Monitoring:
  - 15 min, 24 hour
  - Real-time
- Management:
  - CLI and SNMP/MIB controls via the Optical Networking Edge (ONE) System Controller Module (SCM)
  - Remote management via backplane interface
  - TFTP software download
- Timing Transparent

SFPs and XFPs

NOTICE

Due to compliance certification requirements, only SFPs and XFPs approved by ADTRAN operate with the OTOS-2-16. Use of other SFPs or XFPs will result in service interruption.

The following tables list the SFPs/XFPs supported on the OTOS-2-16.

NOTE

- All listed units (except copper SFPs) use LC connectors.
- All listed units (except copper SFPs) use two-fiber operation, except for units listed supporting single-fiber, bi-directional (Bi-Di) operation.
- Copper GigE SFPs are only supported on one end of the link, the other end must be a fiber SFP.
- Listed Bi-Di units have a 20-km maximum span.
- Listed CWDM/DWDM units have an 80-km maximum span.
- Listed RoHS-compliant units are identified by part numbers including a *Gx* or *PGx* suffix.
- Commercial-temperature SFP/XFP units are identified by part numbers that include a *C* as the final character.
- For optical power and budget, temperature ranges, and other specifications related to individual units, refer to the Job Aids included with the SFPs/XFPs, and available at www.adtran.com.
- For more information regarding SFP/XFP transceivers, refer to the *SFP/XFP/SFP+ Compatibility Matrix and Engineering Guide* (P/N 6SFPMATRIX-7).

GigE SFPs	
Standard	**Wave Length**
1184561PG1	1310 nm, 1000Base-LX, 10 km
1184561PG3	850 nm, 1000Base-SX, 0.5 km/0.27 km
1184562PG5	1550 nm, 1000Base-ZX, 80 km
1442300G1	Full-duplex, 1000Base-T, 100 m
1442320G1	1310 nm, 1000Base-LX, 20 km
1442340G1	1310 nm, 1000Base-LX, 40 km
1442610G1C	1310 nm, 1000Base-LX, 10 km
1442655G1C	1310nm, 1000Base-LX, 0.55 km
Single-Fiber, Bi-Di	**Wave Length**
1442110G1	1490 nm TX/1310 nm RX, 10 km
1442110G2	1310 nm TX / 1490 nm RX, 10 km
1442120G1	1490 nm TX /1310 nm RX, 20 km
1442120G2	1310 nm TX/1490 nm RX, 20 km
1442140G1	1490 nm TX/1310 nm RX, 40 km
1442140G2	1310 nm TX/1490 nm RX, 40 km
1442180G1	1550 nm TX/1490 nm RX, 80 km
1442180G2	1490 nm TX/1550 nm RX, 80 km
CWDM	**Wave Length**
1442351G1 – 1442351G4	1510nm to 1570 nm, 50 km

1G Fibre Channel SFPs	
Standard	**Wave Length**
1184561P1, 1184561PG1	1310nm, 1000Base-LX, 10 km
1184561P3, 1184561PG3	850nm, 1000Base-SX, 0.5 km/0.27 km
1184561P4	Full-duplex, 1000Base-T, 100 m
1184562P5, 1184562PG5	1550nm, 1000Base-ZX, 80 km
1442300G1	Full-duplex, 1000Base-T, 100 m
1442320G1	1310nm, 1000Base-LX, 20 km
1442340G1	1310nm, 1000Base-LX, 40 km
1442610G1C	1310nm, 1000Base-LX, 10 km
1442655G1C	1310nm, 1000Base-LX, 0.55 km

2G Fibre Channel SFPs	
Standard	**Wave Length**
1184560P1	1310 nm, LR-1, 40 km
1184560P2	1310 nm, IR-1, 15 km
1184560P5	1550 nm, LR-2, 80 km
1184560P6	1310 nm, SR-1, 2 km

OC-3/STM-1 SFPs	
Standard	**Wave Length**
1184543PG1	1310 nm, LR-1, 40 km
1184543PG2	1310 nm, IR-1, 10 km
1184543PG5	1550 nm, LR-2, 80 km

OC-3/STM-1 SFPs (Continued)	
Single-Fiber, Bi-Di	**Wave Length**
1442702PG1	1310 nm Tx/1550 nm Rx
1442702PG2	1550 nm Tx/1310 nm Rx
CWDM	**Wave Length**
1442701PG1 - 1442701PG8	1471 nm to 1611 nm, 80 km

OC-12/STM-4 SFPs	
Standard	**Wave Length**
1184544PG1	1310 nm, LR-1, 40 km
1184544PG2	1310 nm, IR-1, 15 km
Single-Fiber, Bi-Di	**Wave Length**
1442704PG1	1310 nm Tx/1550 nm Rx
1442704PG2	1550 nm Tx/1310 nm Rx
CWDM	**Wave Length**
1442703PG2 - 1442703PG9	1491 nm to 1471 nm, 80 km

OC-48/STM-16 SFPs	
Standard	**Wave Length**
1184560P1	1310 nm, LR-1, 40 km
1184560P2	1310 nm, IR-1, 15 km
1184560P5	1550 nm, LR-2, 80 km
1184560P6	1310 nm, SR-1, 2 km
Single-Fiber, Bi-Di	**Wave Length**
1442705PG1	1310 nm Tx/1550 nm Rx
1442705PG2	1550 nm Tx/1310 nm Rx
CWDM	**Wave Length**
1442706PG1 - 1442706PG8	1471 nm to 1611 nm, 80 km
DWDM	**Wave Length**
1442707G1 - 1442707G44	1563.86 nm to 1529.55 nm, 80 km

OTU1 SFPs	
Standard	**Wave Length**
1184560P1	1310 nm, LR-1, 40 km
1184560P2	1310 nm, IR-1, 15 km
1184560P5	1550 nm, LR-2, 80 km
1184560P6	1310 nm, SR-1, 2 km
Single-Fiber, Bi-Di	**Wave Length**
1442705PG1	1310 nm Tx/1550 nm Rx
1442705PG2	1550 nm Tx/1310 nm Rx
CWDM	**Wave Length**
1442706PG1 - 1442706PG8	1471 nm to 1611 nm, 80 km
DWDM	**Wave Length**
1442707G1 - 1442707G44	1563.86 nm to 1529.55 nm, 80 km

OTU2 XFPs	
DWDM	**Wave Length**
1442981G1C - 1442981G9C	1560.61 nm to 1554.13 nm, 80 km
1442982G1C - 1442982G9C	1553.33 nm to 1563.05 nm, 80 km
1442983G1C - 1442983G9C	1562.23 nm to 1542.94 nm, 80 km
1442986G1C - 1442986G9C	1542.14 nm to 1535.82 nm, 80km
1442987G1C - 1442987G8C	1535.04 nm to 1529.55 nm, 80 km

INSTALLATION

⚠ CAUTION

- The OTOS-2-16 should be installed in a Total Access 5000/5006 chassis located in a restricted access location, by qualified Service Personnel only.
- If the OTOS-LMIO is to be used to provide redundancy, the OTOS-LMIO module should be installed prior to the OTOS-2-16 being installed.
- The Total Access 5000/5006 Chassis frame ground terminal must be connected to an earth ground to ensure that the front panel of the OTOS-2-16 is properly grounded via the backplane connector.

Inspect the OTOS-2-16 before installation. If damage has occurred during shipping, file a claim with the carrier, and then contact ADTRAN Customer Support. Refer to the warranty for further information.

⚠ WARNING

- To meet NEBS Level 3 and provide proper airflow and filtration, if the OTOS-LMIO (P/N 1174111F1) for redundancy is not being used then the AMIO2 Blank (P/N 1187923G1) must be installed in the rear-panel slots occupied by the OTOS-2-16 line module.
- Use the proper chassis fan configuration for Central Office (CO) and Remote Terminal (RT) deployments, as specified in the table.

Location	Total Access 5000 23-Inch Chassis	Total Access 5006 Chassis
CO (Standard)	Total Access 5000 23-Inch Fan Module (P/N 1187080L1/G1)	Total Access 5006 Fan Module (P/N 1187090E1)
RT (High Flow)	Total Access 5000 High Flow Fan Module (P/N 1187080G2) or Total Access 5000 High Flow Rear Fan Module (P/N 1187080G3)	Total Access 5006 High Flow Rear Fan Module (P/N 1187090G3)

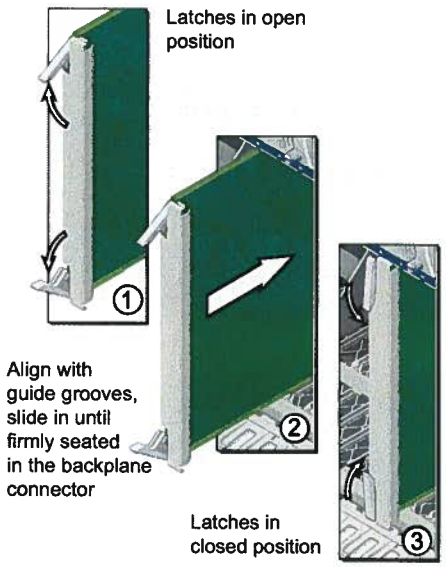
NOTE

The OTOS-2-16 installs in a Total Access 5000 or 5006 Chassis, in any pair of adjacent, odd/even numbered slots (for example, 1 and **2**, 5 and **6**). The slot pair **11** and **12/SCM** is **excluded**; the slot pair **SM A** and **SM B** is **excluded**. Redundant modules must use adjacent odd numbered slots (for example, **1** and **2**, **3** and 4)

If present, remove the Access Module Blank(s) (P/N 1187921E1 or 1187922E1) from the appropriate slots of the chassis.

Install all required SFPs and XFPs. Refer to the "Installation" section of the Job Aid included with the SFP/XFP, as necessary.

Install the OTOS-2-16 according to the installation diagram below.



This module performs a self-test at power-up. After testing, the LEDs indicate the current status of the module, as described in "Front Panel LEDs."

Front Panel LEDs

Label	Status	Indication
STBY	○ Off	OTOS-2-16 not in Standby mode
	● Green	OTOS-2-16 in Standby mode
	● Yellow	OTOS-2-16 in Initialization state
ACT (module)	○ Off	OTOS-2-16 not in Active mode
	● Green	OTOS-2-16 in Active mode
	● Red	Fault keeps OTOS-2-16 from going online
TST	○ Off	No test
	● Yellow	Test active
ALM	○ Off	No Alarm
	✱ Green Flashing	Information alarm (alert)
	● Yellow	Minor alarm
	● Red	Major alarm
	✱ Red Flashing	Critical alarm
PWR	○ Off	No power to OTOS-2-16
	● Green	Power and initialization OK
	✱ Flashing	Menu session active, color reflects current module service state
	● Yellow	Out of Service (OOS)
	● Red	Power, temperature, or boot failure
ACT (HS1 and HS2)	○ Off	HS port is in Protect mode
	● Green	HS port is in Active mode
	● Yellow	HS port is in Test mode
RCV (HS1 and HS2)	○ Off	HS port link is OOS-UAS (Unassigned)
	● Green	HS port link is Up
	● Red	HS port link is Down
ACT (MS1–MS16)	○ Off	MS port is in Protect mode
	● Green	MS port is in Active mode
	● Yellow	MS port is in Test mode
RCV (MS1–MS16)	○ Off	MS port link is OOS-UAS
	● Green	MS port link is Up
	● Red	MS port link is Down

PROVISIONING

The OTOS-2-16 is provisioned through a CLI-driven SCM.

The SCM **CRAFT** port (DB-9 connector) supports an RS-232 interface to a VT100 terminal or compatible emulator, set for:

- 9600 bps
- 8 data bits
- No parity
- No flow control
- 1 stop bit

System Access with a CLI-Driven SCM

The Login screen is displayed upon connection. If the Login screen does not immediately appear, press ENTER several times or CTRL+R to refresh the screen.

NOTE

- A valid Account Name and Password are required to log in. Default SCM provisioning includes an Admin-level account, with the Account Name **admin** and the Password **password**.
- Account Name and Password are provisionable values for all user accounts.

1. Enter an Account Name with Admin privileges. Press ENTER.
2. Enter the Password for the account specified. Press ENTER. A successful login displays the CLI prompt.

For the CLI commands necessary for provisioning the OTOS-2-16, refer to the *Total Access 5000 CLI Dictionary* (P/N 65K73CLI-35A).

MAINTENANCE

The OTOS-2-16 does not require routine hardware maintenance for normal operation. ADTRAN does not recommend that repairs be attempted in the field. Repair services may be obtained by returning the defective unit to ADTRAN. Field support for software is provided through upgrade facilities. Refer to the warranty for further information.

SPECIFICATIONS

- Electrical
  - Input Voltage, Nominal: –48 VDC
  - Typical current draw: 1.44 A
  - Maximum current draw: 2.41 A
  - Typical heat dissipation: 68.6 W
  - Maximum heat dissipation: 101.5 W
- Environmental
  - Operational temperature: –40°C to +65°C
  - Storage temperature: –40°C to +85°C
  - Relative humidity: 5% to 95%, noncondensing
- Physical
  - Height: 9.5 inches / 24.1 centimeters
  - Width: 1.68 inches / 4.26 centimeters
  - Depth: 10.0 inches / 25.4 centimeters
  - Weight: 2.7 pounds / 1.2 kilograms

SAFETY AND REGULATORY COMPLIANCE

Refer to the Safety and Regulatory Compliance Notice for this product (P/N 61174123F1-17) for detailed safety and regulatory information.

Consultez l'avis sur la sécurité et la conformité à la réglementation pour ce produit (61174123F1-17) pour obtenir des renseignements détaillés sur la sécurité et la réglementation.

Warranty: ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found online at www.adtran.com/warranty.

CAUTION!
SUBJECT TO ELECTROSTATIC DAMAGE OR DECREASE IN RELIABILITY
HANDLING PRECAUTIONS REQUIRED

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From outside the U.S. +1 256.963.8716
PRICING AND AVAILABILITY 1.800.827.0807

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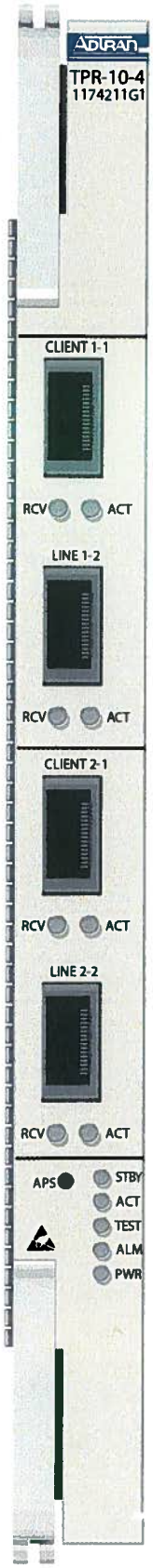
ADTRAN

Total Access 5000
Quad 10G OTN Transponder

jobAid

CLEI: BVL3AP7D
Product P/N: 1174211G1

Issue Date: March 2012
Document P/N: 61174211G1-22A

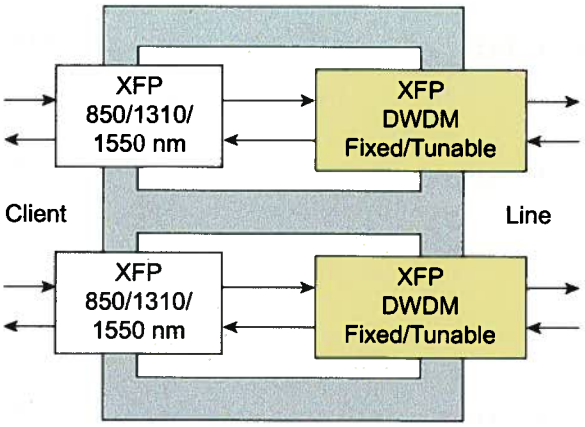


Description

The Total Access 5000 Quad 10G OTN Transponder (TPR-10-4) is a dual channel single slot card that functions as a optical transponder with four 10 Gbps XFP ports. In a transponder application, the client interface is a gray optical (typically 1310 or 1550 nm) 10G signal (OC192, 10GE, etc.), while the line interface is a DWDM optical 10G OTN signal (OTU2, OTU2e, etc.). The OTN wrapper adds overhead for FEC (Forward Error Correction).

The TPR-10-4 monitors performance on all four optical inputs. The signal timing is passed through transparently in both directions unless the client traffic is 10GE LAN mapped into OTU2, in which case the client and line transmits are timed to the Total Access 5000 Switch Module system clock.

Optical fiber access is provided by LC connectors on the XFPs that plug into the cages on the front panel.



Features

The following features are supported on the TPR-10-4.

- 3R functionality (re-amplification, re-shaping and re-timing)
- 2 Channels with 2 Ports, Client and Line
- Supported transponder modes:
  - Client OC192 to Line OTU2 synchronous
  - Client STM64 to Line OTU2 synchronous
  - Client WAN to OTU2 synchronous
  - Client 10GE to OTU2e
  - Client 10GE to OTU2 GFP-F Non-transparent
- OTN modes support GFEC, EFEC, or no FEC options
- Full PM support on all ports
- All ports support 10G XFP modules

Supported XFPs

Part Numbers	Protocol/Rate/ Specifications	Max Span
10 GigE XFPs - SONET and Ethernet Ports		
1442901G1	10GBase-SR, 850nm	300 m
1442910G1, 1442910G1C	1310nm TX/ 1260–1355nm RX	10 km
1442920G1	1310nm TX/ 1260–1355nm RX	20 km
1442940G1, 1442940G1C	1550nm TX/ 1530–1565nm RX	40 km
1442980G1C	1550nm TX/ 1530–1565nm RX	80 km
10 GigE XFPs: DWDM - SONET, Ethernet, and OTN Ports		
1442981G1C – 1442981G9C 1442982G1C – 1442982G9C 1442983G1C – 1442983G9C 1442986G1C – 1442986G9C 1442987G1C – 1442987G8C	These XFPs support the wavelengths/ frequencies recommended in ITU-T G.694.1, including DWDM channels 17–60 (1563.86nm to 1529.55nm, with 100 GHz spacing).	80 km
1442985G1C	10G DWDM Tunable	80km

Installation

Prior to installation, inspect the TPR-10-4. If damage has occurred during shipping, file a claim with the carrier, and then contact ADTRAN Customer Support. For more information, refer to the warranty.

The TPR-10-4 can be installed in any slot labeled **1** through **11**, or **13** through **22**. Do not install the TPR-10-4 in slots **12/SCM**, **SM A**, and **SM B**.

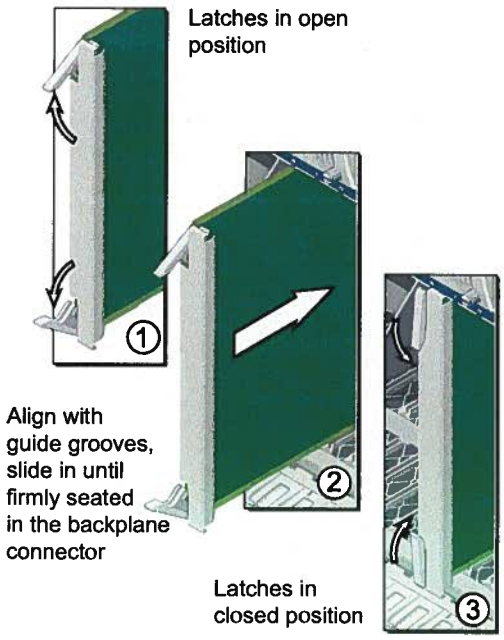
NOTE

To maintain fan cooling efficiency, all empty slots in the Total Access 5000 Chassis must have a blank front and rear panel installed.

- Rear blank panels: AMIO1 Blank (P/N 1187925G1); Dual AMIO2 Blank (P/N 1187923G1)
- Front blank panels: Switch Module Blank (P/N 1187920E1); AM Blank (P/N 1187921E1); Dual Slot AM Blank (P/N 1187922E1)

Since the TPR-10-4 does not use a rear I/O panel, either the AMIO1 or the Dual AMIO2 blank rear panel must be installed.

To install the TPR-10-4, reference the following figure:



When the TPR-10-4 first powers up it performs self-tests. Once the power up self-tests are complete, the PWR LED will reflect the state of the hardware.

Front Panel LEDs

The TPR-10-4 is equipped with 13 LEDs located on the front panel. Front panel LEDs and their descriptions are provided in the following table:

Label	Status		Indication
STANDBY	○	Off	Card not in Standby
	●	Green	In Service, card in Standby
	●	Yellow	Initialization state, not Standby or Active
ACTIVE	○	Off	Card not active
	●	Green	In Service, card Active
	●	Red	Fault prevents unit from going active
TEST	○	Off	No test active
	●	Yellow	Test active - one or more loop-backs enabled
ALM	○	Off	No alarm
	✷	Green Flashing	Info alarm
	●	Yellow	Minor alarm
	●	Red	Major alarm
	✷	Red Flashing	Critical alarm
PWR	○	Off	No power to unit
	●	Green	Power and initialization OK
	✷	Flashing	Color reflects current service state
	●	Yellow	Out of service
	●	Red	Power, temperature, or boot failure
Per Port LEDs			
RECEIVE PORT	○	Off	Service state is OOS-UAS
	●	Green	Receive OK (In frame, link is up)
	●	Red	Receive fail (LOS, LOF, or link is down)
ACTIVE PORT	○	Off	OOS-UAS, (laser off)
	●	Green	Active (laser on)

Maintenance

The TPR-10-4 does not require routine hardware maintenance for normal operation. Do not attempt repairs in the field. Repair services may be obtained by returning the defective unit to ADTRAN. Refer to the warranty for further information.

Specifications

Specifications for the TPR-10-4 are as follows:

- Electrical
  - Maximum Input power (including XFPs): 0.79 A @ –48 V
  - Operating voltage: –42 to –56 VDC
  - Maximum Heat Dissipation: 38 watts
- Physical
  - Height: 9.374 inches; 23.80 centimeters
  - Width: 0.75 inches; 19.0 centimeters
  - Depth: 9.75 inches; 24.8 centimeters
  - Weight: 1.25 pounds; 0.57 kilograms
- Environmental
  - Operational Temperature Range: –40°C to +65°C
  - Storage Temperature Range: –40°C to +85°C
  - Relative Humidity: up to 95%, noncondensing

Safety and Regulatory Compliance

Refer to the Safety and Regulatory Compliance Notice for this product (P/N 61174211G1-17) for detailed safety and regulatory information.

Consultez l'avis sur la sécurité et la conformité à la réglementation pour ce produit (61174211G1-17) pour obtenir des renseignements détaillés sur la sécurité et la réglementation.

Ausführliche Sicherheits- und regulatorische Informationen sind in der Konformitätserklärung zur Sicherheit und Einhaltung von Normen zu diesem Produkt (61174211G1-17) aufgeführt.

Warranty: ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found online at www.adtran.com/warranty.

CAUTION! SUBJECT TO ELECTROSTATIC DAMAGE OR DECREASE IN RELIABILITY HANDLING PRECAUTIONS REQUIRED

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From outside the U.S. +1 256.963.8716
PRICING AND AVAILABILITY 1.800.827.0807

ADTRAN

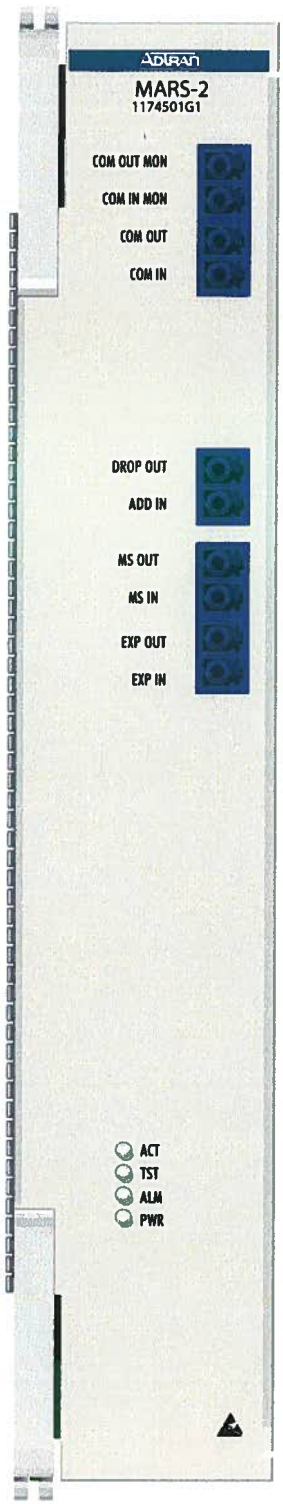
Total Access 5000

2 Degree Mini Amplified ROADM System (MARS-2)

jobAid

CLEI: BVL3ATYD
Product P/N: 1174501G1

Issue Date: February 2012
Document P/N: 61174501G1-22A



DESCRIPTION

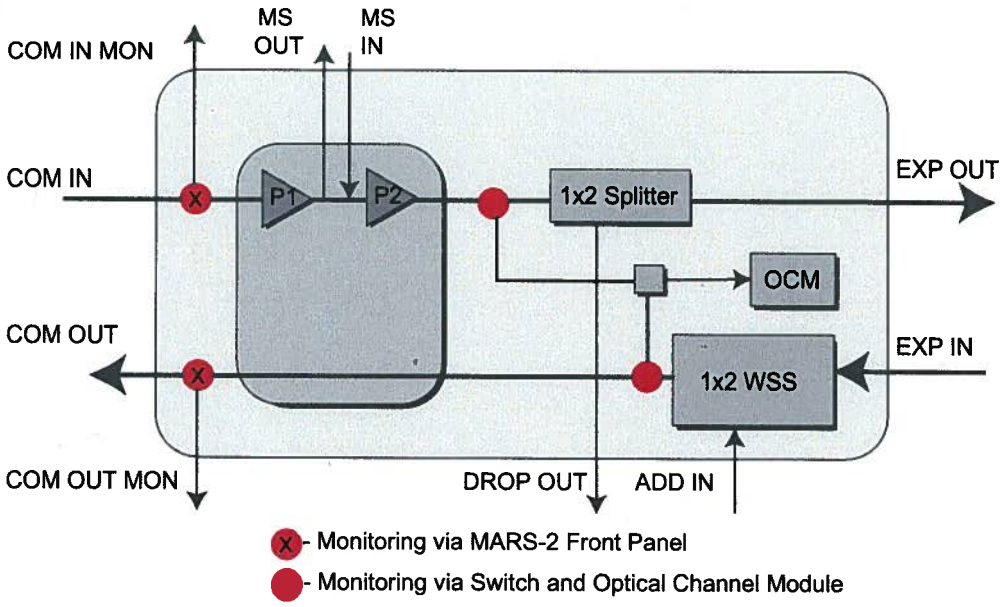
The Total Access® 5000 Mini Amplified 2 Degree (1x2) Reconfigurable Optical Add Drop Multiplexer (ROADM) System (MARS-2) is part of the Optical Networking Edge (ONE) portfolio.

MARS-2 is a single module occupying two slots in the Total Access 5000/5006 chassis to provide a complete ROADM system on a blade.

The MARS-2 module includes the following functions:

- Wavelength provisioning based on Wavelength Selection Switch
  - The card allows flexible add/drop of any C-band wavelength combinations
- Amplification based on dual stage EDFA pre-amplifier with access to the mid-stage
  - Pre-amplifier supports insertion of dispersion compensation module in the mid-stage
- Optical Channel Monitoring capability with two internal monitoring points
  - Optical Channel Monitoring (OCM) simplifies remote channel monitoring and optical equalization process

The following diagram represents this process.



DWDM Channels

MARS-2 supports 100 GHz channel spacing throughout the full C-Band (1563.86 to 1529.16 nm). In 100 GHz channel spacing, the unit supports 44 wavelengths (ITU channels 17-60).

MARS-2 is compatible with modulation schemes for 1 Gbps to 40 Gbps transmission.

NOTE

In order to Add/Drop individual channels, a Total Access 5000/5006 or external MUX/DeMUX or OADM module needs to be added.

Installation

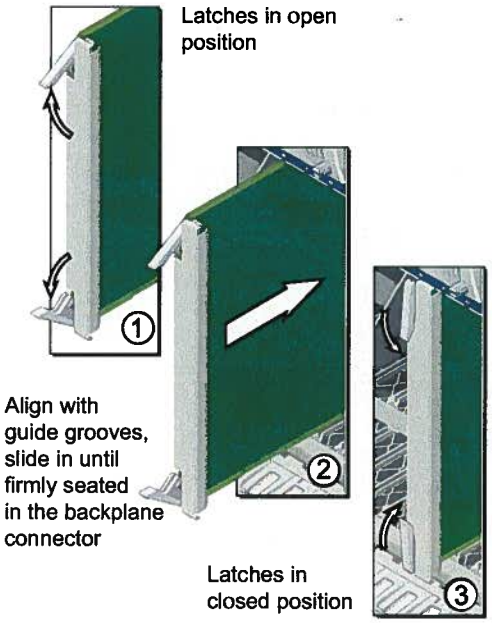
Prior to installation, inspect the MARS-2. If damage has occurred during shipping, file a claim with the carrier, and then contact ADTRAN Customer Support. For more information, refer to "Warranty".

NOTE

- The MARS-2 can be installed in any odd/even slots (for example, slots 1 and 2, 3 and 4) other than those slots labeled **12/SCM**, **SM A** and **SM B**. This eliminates slot **11** for use with the MARS-2.
- To meet NEBS Level 3 and provide proper airflow and filtration, the AMIO2 Blank (P/N 1187923G1) must be installed in the two rear-panel slots occupied by the MARS-2 line module.

Remove the Access Module Blank Panels (P/N 1187921L1) from the appropriate slots of the Total Access 5000 chassis, if present.

To install the MARS-2, reference the figure below.



When MARS-2 first powers up it performs self-tests. Once the power up self-tests are complete, the status LEDs will reflect the true state of the hardware.

Front Panel LEDs

Label	Status		Description
ACT	●	Green	ROADM Active
TST	○	Off	No Test
	●	Yellow	Test Active
ALM	○	Off	No Alarm
	●	Yellow	Minor Alarm
	●	Red	Major/Critical Alarm
PWR	○	Off	Power or Fuse Failure
	●	Green	No Failure
	●	Red	Module Failure

Provisioning

The System Controller Module (SCM) must be installed in the chassis. The SCM has a front panel-mounted DB-9 connector that supplies an RS-232 interface for connection to a controlling terminal. The supported terminal type is VT100 or compatible and is set for 9600 bps, 8-data bits, no parity, no flow control, and 1-stop bit.

System Access with a CLI Driven SCM

To log on the Total Access 5000 Command Line Interface (CLI), complete the following steps:

1. After establishing a connection with the SCM, the User Access Verification screen is displayed.

NOTE

- If the login screen initially appears blank, press ENTER several times or CTRL+R to refresh the screen and access the CLI.
- The account name and password fields are case-sensitive.
- The default account name is "ADMIN" and the password is "PASSWORD." Other default accounts are: READONLY, READWRITE, and TEST. An account with ADMIN privileges is required to change the account name and password.

2. At the command line prompt, type the default account name, **ADMIN** (or the configured account name with System Administrator privileges), and press ENTER.
3. At the resultant prompt, type the default password, **PASSWORD** (or the configured password), and press ENTER.

A successful logon attempt displays the CLI prompt.

Related Documentation

The following documents provide provisioning information for the MARS-2.

- The *Total Access 5000 CLI Dictionary* (P/N 65K60CLI-35) contains all the command line interface (CLI) options necessary to provision the MARS-2.
- The *Optical Network Edge Application Guide* (P/N 65KONEAPP-49) provides application-specific provisioning information.

Optical Path Specifications

Connector	Typical Insertion Loss	
COM IN to EXP OUT	+25.6 dB	Amp provides +29 dB of gain
EXP In to COM OUT	-6.0 dB	
COM IN to DROP OUT	+25.8 dB	Amp provides +29 dB of gain
ADD IN to COM OUT	-6.0 dB	

MAINTENANCE

MARS-2 does not require routine hardware maintenance for normal operation. ADTRAN does not recommend that repairs be attempted in the field. Repair services may be obtained by returning the defective unit to ADTRAN. Refer to the warranty for further information. Field support for software is provided through upgrade facilities.

SPECIFICATIONS

Specifications for the MARS-2 are as follows:

- Electrical
  - Typical Input Power: 15 Watts
  - Maximum Input power: 48 Watts
  - Operating voltage: –48 VDC
  - Maximum Heat Dissipation: 10 Watts
- Optical
  - Max Optical Power Input: +25 dBm
  - Connector: LC/UPC
  - Max Connector Loss: 0.5 dBm
- Physical
  - Height: 9.25 inches (23.5 centimeters)
  - Width: 1.2 inches (3.0 centimeters)
  - Depth: 9.25 inches (23.5 centimeters)
  - Weight: 53 ounces (1.5 kilograms)
- Environmental
  - Operational Temperature Range: 0°C to +60°C
  - Storage Temperature Range: –40°C to +85°C
  - Relative Humidity: up to 95%, noncondensing

NOTE

For further information on Total Access 5000/5006 components, reference the *Total Access 5000/5006 Load Calculation Guidelines* (P/N 65KLOADCALC-22) and the *Total Access 5000/5006 Engineering and Ordering Guide* (P/N 65K60ENG-7).

SAFETY AND REGULATORY COMPLIANCE

Refer to the Safety and Regulatory Compliance Notice for this product (P/N 61174501G1-17) for detailed safety and regulatory information.

Consultez l'avis sur la sécurité et la conformité à la réglementation pour ce produit (61174501G1-17) pour obtenir des. renseignements détaillés sur la sécurité et la réglementation.

Ausführliche Sicherheits- und regulatorische Informationen sind in der Konformitätserklärung zur Sicherheit und Einhaltung von Normen zu diesem Produkt (61174501G1-17) aufgeführt.

Technical Publications
Carrier Network Division

Warranty: ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found online at www.adtran.com/warranty.

CAUTION!
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61174501G1-22A

ADTRAN

Optical Networking Edge (ONE)

Mini Amplified 2 Degree ROADM System with Variable Gain Pre-amplification (MARS-2P)

jobAid

CLEI: BVL3AWLD
Product P/N: 1174502G1

Issue Date: November 2012
Document P/N: 61174502G1-22A

Documentation for ADTRAN Carrier Networks products is available for viewing and download directly from the Support Community portal.

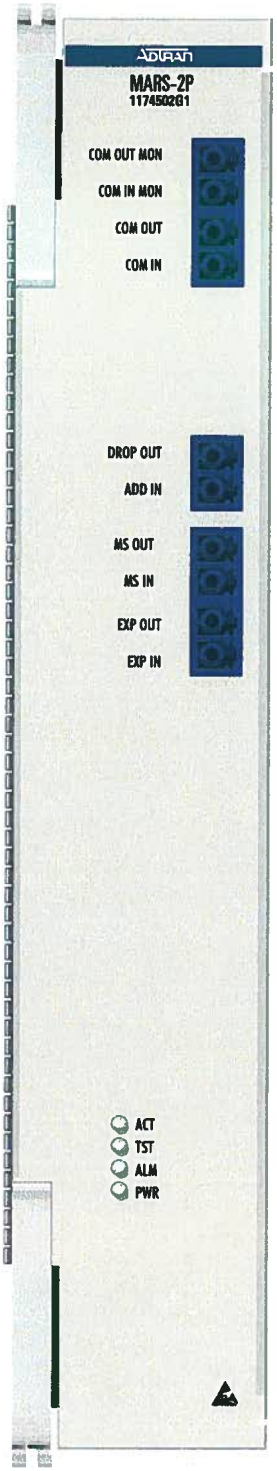
Go to:

adtran.com>support>support community

Registration is required.

The following document provides additional information for this product:

Total Access 5000 CLI Dictionary
Total Access 5000/5006 Load Calculation Guidlines
Total Access 5000/5006 Engineering and Ordering Guide
Optical Networking Edge CLI Dictionary



DESCRIPTION

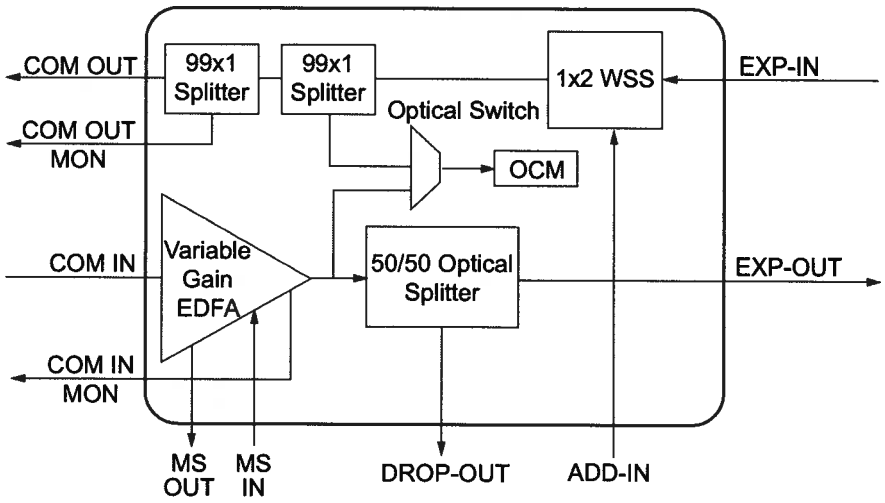
The Optical Networking Edge (ONE) Mini Amplified 2 Degree (1x2) Reconfigurable Optical Add-Drop Multiplexer (ROADM) System with Variable Gain Pre-amplification (MARS-2P) is part of the Optical Networking Edge (ONE) portfolio. The use of a wavelength selection switch allows individual or multiple wavelengths carrying data channels to be added and/or dropped from a transport fiber without converting the signals of the WDM channels to electronic signals then back to optical signals.

MARS-2P is a single module occupying two slots in the Total Access 5000/5006 Chassis. A ROADM site contains up to two ADTRAN MARS-2xx (e.g., MARS-2, MARS-2P) modules connected together via the 'Express' interfaces.

The MARS-2P module includes the following features:

- Total Access 5000 double wide assembly
- Wavelength provisioning based on Wavelength Selection Switch
  - Allows flexible add/drop of any C-band wavelength combinations
  - Supports 100 GHz Channel spacing
  - Supports 44 Wavelengths, ITU Channels 17-60 (1563.86 nm to 1529.55 nm)
- COM IN amplification based on a dual stage EDFA pre-amplifier with access to the mid-stage
  - Pre-amplifier supports insertion of dispersion compensation module in the mid-stage
- Optical Channel Monitoring capability with two internal monitoring points
  - Optical Channel Monitoring (OCM) simplifies remote channel monitoring and optical auto power balancing process
  - Monitors the channels on the COM IN (after the amplifier) and the COM OUT ports
- Auto Power Balancing on the COM OUT port
  - Balances the ADD IN and EXP IN power levels
  - Can override the auto balancing on a per channel basis
- Threshold alarming on power levels at the aggregate and channel levels

The figure below provides a functional block diagram of the MARS-2P.



DWDM CHANNELS

MARS-2P supports 100 GHz channel spacing throughout the full C-Band (1563.86 to 1529.55 nm). In 100 GHz channel spacing, the unit supports 44 wavelengths (ITU channels 17-60).

MARS-2P is compatible with commonly used transmission schemes up to 100 Gbps.

NOTE

In order to Add/Drop individual channels, a Total Access 5000/5006 or external MUX/DeMUX or OADM module is required.

INSTALLATION

Prior to installation, inspect the MARS-2P. If damage has occurred during shipping, file a claim with the carrier, and then contact ADTRAN Customer Support. For more information, refer to the warranty.

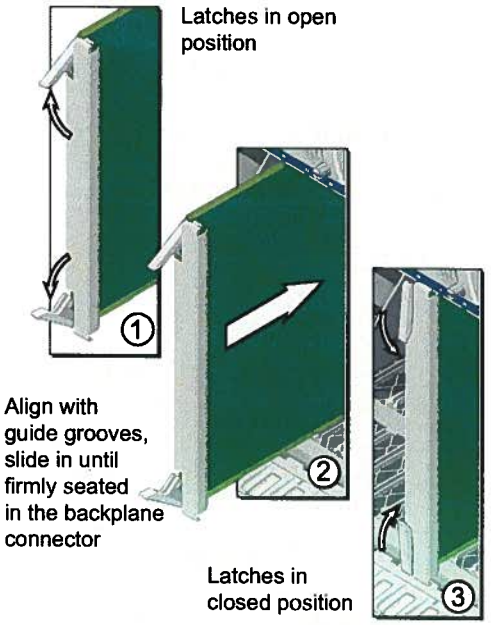
⚠ WARNING

- The MARS-2P can be installed in any odd/even slots (for example, slots 1 and 2, 3 and 4) other than those slots labeled **12/SCM, SM A** and **SM B**. This eliminates slot **11** for use with the MARS-2P.
- To meet NEBS Level 3 and provide proper airflow and filtration, the AMIO2 Blank (P/N 1187923G1) must be installed in the two rear-panel slots occupied by the MARS-2P line module.
- To provide proper airflow and protection in this system, **all** chassis slots must be populated with either a module or an appropriate blank panel. Failure to install blank panels in **all** unpopulated slots will void the warranty for modules installed in a misconfigured system.
- Use the proper chassis fan configuration for Central Office (CO) and Remote Terminal (RT) deployments, as specified in the table below.

	Total Access 5000 23-Inch Chassis	Total Access 5006 Chassis
CO (Standard)	Total Access 5000 23-Inch Fan Module (P/N 1187080L1/G1)	Total Access 5006 Fan Module (P/N 1187090E1)
RT (High Flow)	Total Access 5000 High Flow Fan Module (P/N 1187080G2) or Total Access 5000 High Flow Rear Fan Module (P/N 1187080G3)	Total Access 5006 High Flow Rear Fan Module (P/N 1187090G3)

Remove the Access Module Blank Panels (P/N 1187921L1) from the appropriate slots of the Total Access 5000 chassis, if present.

To install the MARS-2P, reference the figure below.



When the MARS-2P first powers up it performs self-tests. Once the power up self-tests are complete, the status LEDs will reflect the state of the hardware.

Front Panel LEDs

Label	Status	Description
ACT	Green	ROADM Active
TST	Off	No Test
	Yellow	Test Active
ALM	Off	No Alarm
	Yellow	Minor Alarm
	Red	Major/Critical Alarm
PWR	Off	Power or Fuse Failure
	Green	No Failure
	Yellow	Module is in Shutdown or Shutdown Maintenance state
	Red	Module Failure

PROVISIONING

The System Controller Module (SCM) must be installed in the chassis. The SCM has a front panel-mounted DB-9 connector that supplies an RS-232 interface for connection to a controlling terminal. The supported terminal type is VT100 or compatible and is set for 9600 bps, 8-data bits, no parity, no flow control, and 1-stop bit.

System Access with a CLI Driven SCM

To log on to the Total Access 5000 Command Line Interface (CLI), complete the following steps:

1. After establishing a connection with the SCM, the User Access Verification screen is displayed.

NOTE

- If the login screen initially appears blank, press ENTER several times or CTRL+R to refresh the screen and access the CLI.
- The account name and password fields are case-sensitive.
- The default account name is ADMIN and the password is PASSWORD. Other default accounts are: READONLY, READWRITE, and TEST. An account with ADMIN privileges is required to change the account name and password.

2. At the command line prompt, type the default account name, **ADMIN** (or the configured account name with System Administrator privileges), and press ENTER.
3. At the resultant prompt, type the default password, **PASSWORD** (or the configured password), and press ENTER.

A successful logon displays the CLI prompt.

Optical Path Specifications

Connector	Typical Insertion Loss	Notes
COM IN to EXP OUT	-3.4 dB	Amp provides +10 dB to +25 dB of gain
EXP In to COM OUT	-9.4 dB	No Booster
COM IN to DROP OUT	-3.2 dB	Amp provides +10 dB to +25 dB of gain
ADD IN to COM OUT	-9.4 dB	No Booster

MAINTENANCE

The MARS-2P does not require routine hardware maintenance for normal operation. ADTRAN does not recommend that repairs be attempted in the field. Repair services may be obtained by returning the defective unit to ADTRAN. Refer to the warranty for further information.

SPECIFICATIONS

Specifications for the MARS-2P are as follows:

- Electrical
  - Typical Input Power: 15 Watts
  - Maximum Input power: 18 Watts
  - Operating Voltage: –42 VDC to –56 VDC (–48 VDC nominal)
  - Maximum Heat Dissipation: 18 Watts
- Optical
  - Max Optical Power Input: +25 dBm
  - Connector: LC/UPC
  - Max Connector Loss: 0.5 dBm
- Physical
  - Height: 9.44 inches (23.97 centimeters)
  - Width: 1.64 inches (4.16 centimeters)
  - Depth: 9.5 inches (24.13 centimeters)
  - Weight: 3.31 lbs (1.5 kilograms)
- Environmental
  - Operational Temperature Range: –5°C to +60°C
  - Storage Temperature Range: –40°C to +85°C
  - Relative Humidity: up to 95%, noncondensing

SAFETY AND REGULATORY COMPLIANCE

Refer to the Safety and Regulatory Compliance Notice for this product (P/N 61174502G1-17) for detailed safety and regulatory information.

Consultez l'avis sur la sécurité et la conformité à la réglementation pour ce produit (61174502G1-17) pour obtenir des. renseignements détaillés sur la sécurité et la réglementation.

Ausführliche Sicherheits- und regulatorische Informationen sind in der Konformitätserklärung zur Sicherheit und Einhaltung von Normen zu diesem Produkt (61174502G1-17) aufgeführt.

Warranty: ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found online at www.adtran.com/warranty.

CAUTION!
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6117450261-22A

ADTRAN

CLEI: BVL3AWMD
Product P/N: 1174503G1

Optical Networking Edge (ONE)

Mini Amplified 2 Degree ROADM System with Booster Amplifier (MARS-2B)

jobAid

Issue Date: November 2012
Document P/N: 61174503G1-22A

Documentation for ADTRAN Carrier Networks products is available for viewing and download directly from the Support Community portal.

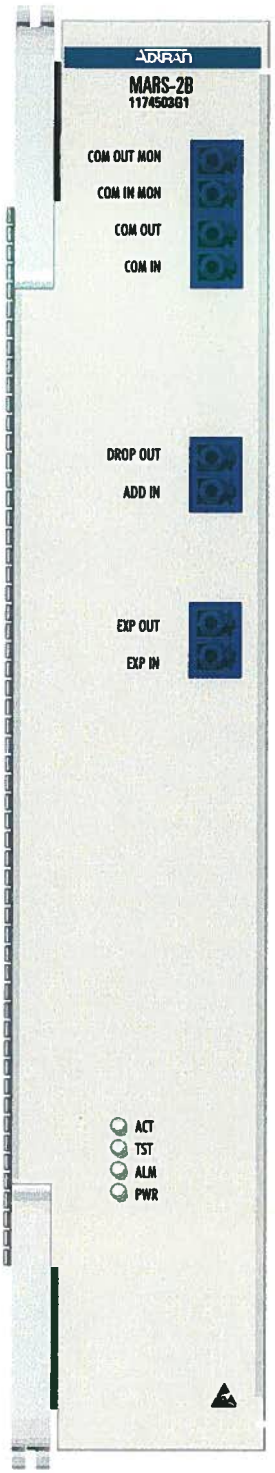
Go to:

adtran.com>support>support community

Registration is required.

The following documents provide additional information for this product:

Total Access 5000 CLI Dictionary
Total Access 5000/5006 Load Calculation Guidlines
Total Access 5000/5006 Engineering and Ordering Guide
Optical Networking Edge CLI Dictionary



DESCRIPTION

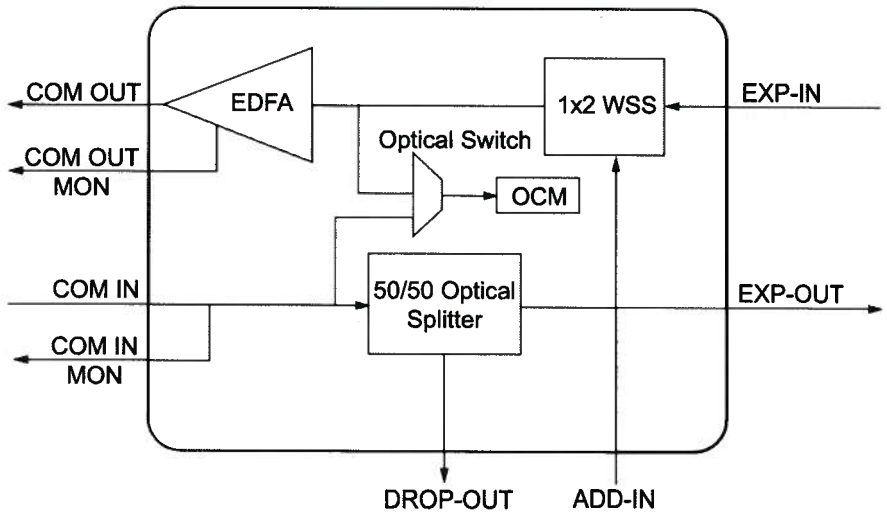
The Optical Networking Edge (ONE) Mini Amplified 2 Degree (1x2) Reconfigurable Optical Add-Drop Multiplexer (ROADM) System with Booster Amplifier (MARS-2B) is part of the Optical Networking Edge (ONE) portfolio. The use of a wavelength selection switch allows individual or multiple wavelengths carrying data channels to be added and/or dropped from a transport fiber without converting the signals of the WDM channels to electronic signals then back to optical signals.

MARS-2B is a single module occupying two slots in the Total Access 5000/5006 chassis. A ROADM site contains up to two ADTRAN MARS-2xx (e.g., MARS-2, MARS-2P) modules connected together via the 'Express' interfaces.

The MARS-2B module includes the following features:

- Total Access 5000 double wide assembly
- Wavelength provisioning based on Wavelength Selection Switch
  - Allows flexible add/drop of any C-band wavelength combinations
  - Supports 100 GHz Channel spacing
  - Supports 44 Wavelengths, ITU Channels 17-60.5 (1563.86 nm to 1529.16 nm)
- COM OUT amplification based on an EDFA Boost amplifier
- Optical Channel Monitoring capability with two internal monitoring points
  - Optical Channel Monitoring (OCM) simplifies remote channel monitoring and optical auto power balancing process
  - Monitors the channels on the COM IN and the COM OUT (after the amplifier) ports
- Auto Power Balancing on the COM OUT port
  - Balances the ADD IN and EXP IN power levels
  - Can override the auto balancing on a per channel basis
- Threshold alarming on power levels at the aggregate and channel levels

The figure below provides a functional block diagram of the MARS-2B.



DWDM CHANNELS

MARS-2B supports 100 GHz channel spacing throughout the full C-Band (1563.86 to 1529.55 nm). In 100 GHz channel spacing, the unit supports 44 wavelengths (ITU channels 17-60).

MARS-2B is compatible with commonly used transmission schemes up to 100 Gbps.

NOTE

In order to Add/Drop individual channels, a Total Access 5000/5006 or external MUX/DeMUX or OADM module is required.

INSTALLATION

Prior to installation, inspect the MARS-2B. If damage has occurred during shipping, file a claim with the carrier, and then contact ADTRAN Customer Support. For more information, refer to the warranty.

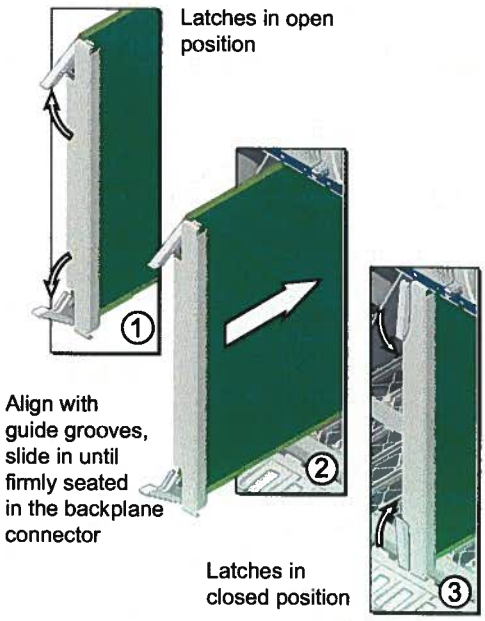
⚠ WARNING

- The MARS-2B can be installed in any odd/even slots (for example, slots 1 and 2, 3 and 4) other than those slots labeled **12/SCM, SM A** and **SM B**. This eliminates slot **11** for use with the MARS-2B.
- To meet NEBS Level 3 and provide proper airflow and filtration, the AMIO2 Blank (P/N 1187923G1) must be installed in the two rear-panel slots occupied by the MARS-2B line module.
- To provide proper airflow and protection in this system, **all** chassis slots must be populated with either a module or an appropriate blank panel. Failure to install blank panels in **all** unpopulated slots will void the warranty for modules installed in a misconfigured system.
- Use the proper chassis fan configuration for Central Office (CO) and Remote Terminal (RT) deployments, as specified in the table below.

	Total Access 5000 23-Inch Chassis	Total Access 5006 Chassis
CO (Standard)	Total Access 5000 23-Inch Fan Module (P/N 1187080L1/G1)	Total Access 5006 Fan Module (P/N 1187090E1)
RT (High Flow)	Total Access 5000 High Flow Fan Module (P/N 1187080G2) or Total Access 5000 High Flow Rear Fan Module (P/N 1187080G3)	Total Access 5006 High Flow Rear Fan Module (P/N 1187090G3)

Remove the Access Module Blank Panels (P/N 1187921L1) from the appropriate slots of the Total Access 5000 chassis, if present.

To install the MARS-2B, reference the figure below.



When the MARS-2B first powers up it performs self-tests. Once the power up self-tests are complete, the status LEDs will reflect the state of the hardware.

Front Panel LEDs

Label	Status	Description
ACT	● Green	ROADM Active
TST	○ Off	No Test
	● Yellow	Test Active
ALM	○ Off	No Alarm
	● Yellow	Minor Alarm
	● Red	Major/Critical Alarm
PWR	○ Off	Power or Fuse Failure
	● Green	No Failure
	● Yellow	Module is in Shutdown or Shutdown Maintenance state
	● Red	Module Failure

PROVISIONING

The System Controller Module (SCM) must be installed in the chassis. The SCM has a front panel-mounted DB-9 connector that supplies an RS-232 interface for connection to a controlling terminal. The supported terminal type is VT100 or compatible and is set for 9600 bps, 8-data bits, no parity, no flow control, and 1-stop bit.

System Access with a CLI Driven SCM

To log on to the Total Access 5000 Command Line Interface (CLI), complete the following steps:

1. After establishing a connection with the SCM, the User Access Verification screen is displayed.

NOTE

- If the login screen initially appears blank, press ENTER several times or CTRL+R to refresh the screen and access the CLI.
- The account name and password fields are case-sensitive.
- The default account name is ADMIN and the password is PASSWORD. Other default accounts are: READONLY, READWRITE, and TEST. An account with ADMIN privileges is required to change the account name and password.

2. At the command line prompt, type the default account name, **ADMIN** (or the configured account name with System Administrator privileges), and press ENTER.
3. At the resultant prompt, type the default password, **PASSWORD** (or the configured password), and press ENTER.

A successful logon displays the CLI prompt.

Optical Path Specifications

Connector	Typical Insertion Loss	Notes
COM IN to EXP OUT	-3.4 dB	No pre-amplifier
EXP In to COM OUT	+5.6dB	Booster Amplifier provides +15 dB of gain
COM IN to DROP OUT	-3.4 dB	No pre-amplifier
ADD IN to COM OUT	+5.6 dB	Booster Amplifier provides +15 dB of gain

MAINTENANCE

MARS-2B does not require routine hardware maintenance for normal operation. ADTRAN does not recommend that repairs be attempted in the field. Repair services may be obtained by returning the defective unit to ADTRAN. Refer to the warranty for further information.

SPECIFICATIONS

Specifications for the MARS-2B are as follows:

- Electrical
  - Typical Input Power: 15 Watts (17.5 Watts max.)
  - Operating voltage: –42 VDC to –56 VDC (–48 VDC nominal)
  - Maximum Heat Dissipation: 17.5 Watts
- Optical
  - Max Optical Power Input: +25 dBm
  - Connector: LC/UPC
  - Max Connector Loss: 0.5 dBm
- Physical
  - Height: 9.44 inches (23.97 centimeters)
  - Width: 1.64 inches (4.16 centimeters)
  - Depth: 9.5 inches (24.13 centimeters)
  - Weight: 3.31 lbs (1.5 kilograms)
- Environmental
  - Operational Temperature Range: –5°C to +60°C
  - Storage Temperature Range: –40°C to +85°C
  - Relative Humidity: up to 95%, noncondensing

SAFETY AND REGULATORY COMPLIANCE

Refer to the Safety and Regulatory Compliance Notice for this product (P/N 61174503G1-17) for detailed safety and regulatory information.

Consultez l'avis sur la sécurité et la conformité à la réglementation pour ce produit (61174503G1-17) pour obtenir des. renseignements détaillés sur la sécurité et la réglementation.

Ausführliche Sicherheits- und regulatorische Informationen sind in der Konformitätserklärung zur Sicherheit und Einhaltung von Normen zu diesem Produkt (61174503G1-17) aufgeführt.

Warranty: ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found online at www.adtran.com/warranty.

CAUTION!
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6117450 3G1-22A

ADTRAN

Optical Networking Edge (ONE)

4 Degree Mini Amplified ROADM System with Booster Amplifier (MARS-4B)

jobAid

CLEI: BVL3AWPD
Product P/N: 1174513G1

Issue Date: November 2012
Document P/N: 61174513G1-22A

Documentation for ADTRAN Carrier Networks products is available for viewing and download directly from the Support Community portal.

Go to:

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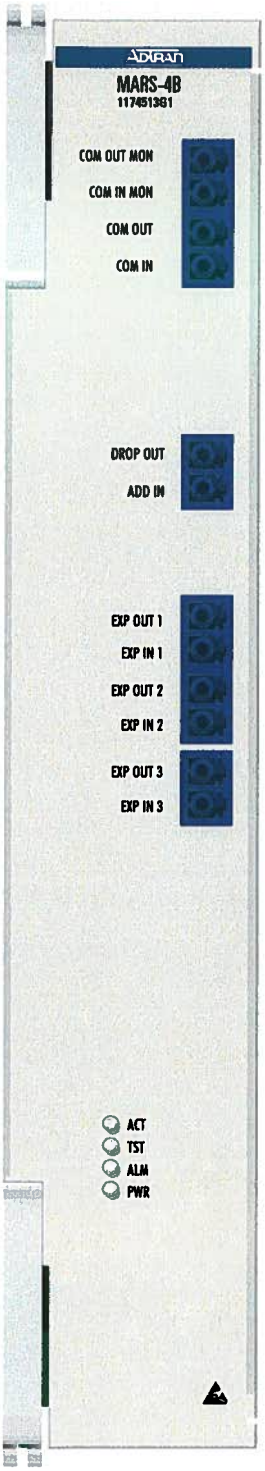
Registration is required.

The following documents provide additional information for this product:

Total Access 5000 CLI Dictionary
Total Access 5000/5006 Load Calculation Guidlines
Total Access 5000/5006 Engineering and Ordering Guide
Optical Networking Edge CLI Dictionary



DESCRIPTION

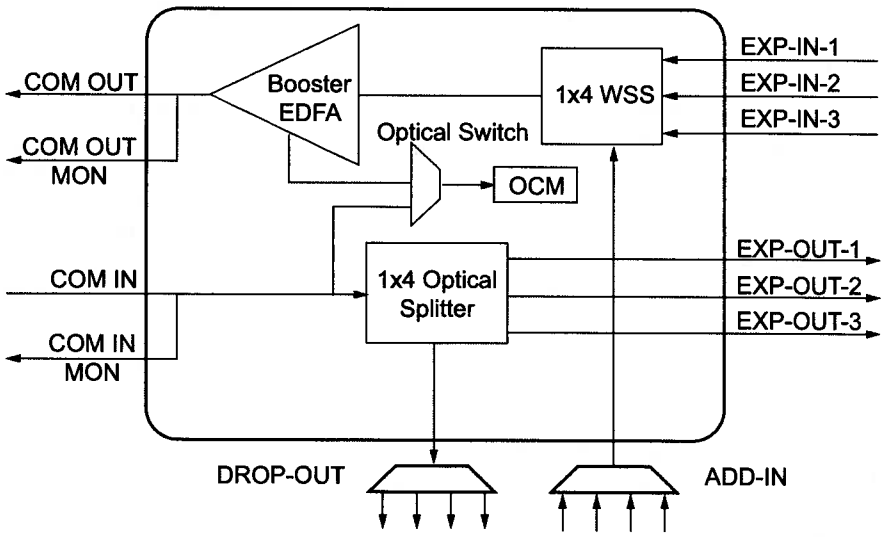
The Optical Networking Edge (ONE) Mini Amplified 4 Degree (1x4) Reconfigurable Optical Add Drop Multiplexer (ROADM) System with Booster Amplifier (MARS-4B) is part of the Optical Networking Edge (ONE) portfolio. The use of a wavelength selection switch allows individual or multiple wavelengths carrying data channels to be added and/or dropped from a transport fiber without converting the signals of the WDM channels to electronic signals then back to optical signals.

MARS-4B is a single module occupying two slots in the Total Access 5000/5006 chassis. A ROADM site contains up to four ADTRAN MARS-4xx (e.g., MARS-4P/MARS-4PB) modules connected together via the 'Express' interfaces.

The MARS-4B module includes the following functions:

- Total Access 5000 double wide assembly
- Wavelength provisioning based on Wavelength Selection Switch
  - The card allows flexible add/drop of any C-band wavelength combinations
  - Supports 50 GHz (88 channels) and 100 GHz (44 channels) Channel spacing
  - Supports 88 Wavelengths, ITU Channels 17-60.5 (1563.86 nm to 1529.16 nm)
- COM OUT amplification based on an EDFA Boost amplifier
- Optical Channel Monitoring capability with two internal monitoring points
  - Optical Channel Monitoring (OCM) simplifies remote channel monitoring and optical auto power balancing process
  - Monitors the channels on the COM IN and the COM OUT (after the booster amplifier) ports
- Auto Power Balancing on the COM OUT port
  - Balances the ADD IN and EXP IN power levels
  - Can override the auto balancing on a per channel basis
- Threshold alarming on power levels at the aggregate and channel levels

The following diagram represents the signal flow.



DWDM Channels

MARS-4B supports 50 GHz and 100 GHz channel spacing throughout the full C-Band (1563.86 to 1529.16 nm). In 50 GHz channel spacing, the unit supports 88 wavelengths (ITU channels 17-60.5). In 100 GHz channel spacing, the unit supports 44 wavelengths (ITU channels 17-60). The MARS-4B also supports mixed 50 GHz and 100 GHz channel spacing.

The MARS-4B is compatible with modulation schemes for up to 100 Gbps transmission.

NOTE

To Add/Drop individual channels, a Total Access 5000/5006 or external MUX/DeMUX or OADM module is required.

Installation

Prior to installation, inspect the MARS-4B. If damage has occurred during shipping, file a claim with the carrier, and then contact ADTRAN Customer Support. For more information, refer to "Warranty".

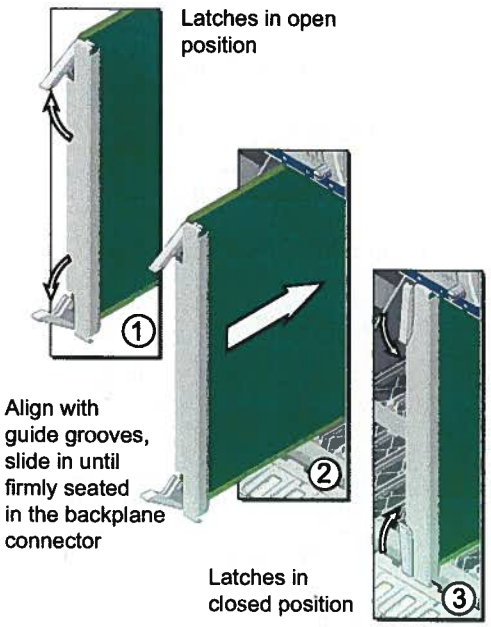
⚠ WARNING

- The MARS-4B can be installed in any odd/even slots (for example, slots 1 and 2, 3 and 4) other than those slots labeled **12/SCM, SM A** and **SM B**. This eliminates slot **11** for use with the MARS-4B.
- To meet NEBS Level 3 and provide proper airflow and filtration, the AMIO2 Blank (P/N 1187923G1) must be installed in the two rear-panel slots occupied by the MARS-4B line module.
- To provide proper airflow and protection in this system, **all** chassis slots must be populated with either a module or an appropriate blank panel. Failure to install blank panels in **all** unpopulated slots will void the warranty for modules installed in a misconfigured system.
- Use the proper chassis fan configuration for Central Office (CO) and Remote Terminal (RT) deployments, as specified in the table below.

	Total Access 5000 23-Inch Chassis	Total Access 5006 Chassis
CO (Standard)	Total Access 5000 23-Inch Fan Module (P/N 1187080L1/G1)	Total Access 5006 Fan Module (P/N 1187090E1)
RT (High Flow)	Total Access 5000 High Flow Fan Module (P/N 1187080G2) or Total Access 5000 High Flow Rear Fan Module (P/N 1187080G3)	Total Access 5006 High Flow Rear Fan Module (P/N 1187090G3)

Remove the Access Module Blank Panels (P/N 1187921L1) from the appropriate slots of the Total Access 5000/5006 chassis, if present.

To install the MARS-4B, reference the figure below.



When MARS-4B first powers up it performs self-tests. Once the power up self-tests are complete, the status LEDs will reflect the state of the hardware.

Front Panel LEDs

Label	Status	Description
ACT	Green	ROADM Active
TST	Off	No Test
	Yellow	Test Active
ALM	Off	No Alarm
	Yellow	Minor Alarm
	Red	Major/Critical Alarm
PWR	Off	Power or Fuse Failure
	Green	No Failure
	Yellow	Module is in Shutdown or Shutdown Maintenance state
	Red	Module Failure

Provisioning

The System Controller Module (SCM) must be installed in the chassis. The SCM has a front panel-mounted DB-9 connector that supplies an RS-232 interface for connection to a controlling terminal. The supported terminal type is VT100 or compatible and is set for 9600 bps, 8-data bits, no parity, no flow control, and 1-stop bit.

System Access with a CLI Driven SCM

To log on the Optical Networking Edge (ONE) Command Line Interface (CLI), complete the following steps:

1. After establishing a connection with the SCM, the User Access Verification screen is displayed.

NOTE

- If the login screen initially appears blank, press ENTER several times or CTRL+R to refresh the screen and access the CLI.
- The account name and password fields are case-sensitive.
- The default account name is "ADMIN" and the password is "PASSWORD." Other default accounts are: READONLY, READWRITE, and TEST. An account with ADMIN privileges is required to change the account name and password.

2. At the command line prompt, type the default account name, **ADMIN** (or the configured account name with System Administrator privileges), and press ENTER.
3. At the resultant prompt, type the default password, **PASSWORD** (or the configured password), and press ENTER.

A successful logon attempt displays the CLI prompt.

Optical Path Specifications

Connector	Typ Insertion Loss	Typical Gain	
COM IN to EXP OUT (EXP OUT 1 - 3)	-7.4 dB	N/A	
EXP IN to COM OUT (EXP IN 1 - 3)	-9.6 dB	+10.4 dB	Amplifier provides 20 dB of gain
COM IN to DROP OUT	-7.4 dB	N/A	
ADD IN to COM OUT	-9.6 dB	+10.4 dB	Booster Amp provides 20 dB of gain

SPECIFICATIONS

Specifications for the MARS-4B are as follows:

- Electrical
  - Typical Input Power: 13 Watts (15 Watts max.)
  - Operating voltage: –42 VDC to –56 VDC (–48 VDC nominal)
  - Maximum Heat Dissipation: 15 Watts
- Optical
  - Input Damage Threshold: +25 dBm
  - Connector: LC/UPC
- Physical
  - Height: 9.374 inches (23.8 centimeters)
  - Width: 1.64 inches (4.16 centimeters)
  - Depth: 9.75 inches (24.8 centimeters)
  - Weight: 5.5 ounces (2.5 kilograms)
- Environmental
  - Operational Temperature Range: -5°C to +60°C
  - Storage Temperature Range: –40°C to +85°C
  - Relative Humidity: up to 95%, noncondensing

MAINTENANCE

MARS-4B does not require routine hardware maintenance for normal operation. ADTRAN does not recommend that repairs be attempted in the field. Repair services may be obtained by returning the defective unit to ADTRAN. Refer to the warranty for further information. Field support for software is provided through upgrade facilities.

SAFETY AND REGULATORY COMPLIANCE

Refer to the Safety and Regulatory Compliance Notice for this product (P/N 61174513G1-17) for detailed safety and regulatory information.

Consultez l'avis sur la sécurité et la conformité à la réglementation pour ce produit (61174513G1-17) pour obtenir des. renseignements détaillés sur la sécurité et la réglementation.

Ausführliche Sicherheits- und regulatorische Informationen sind in der Konformitätserklärung zur Sicherheit und Einhaltung von Normen zu diesem Produkt (61174513G1-17) aufgeführt.

Warranty: ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found online at www.adtran.com/warranty.

CAUTION!
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6117451361-22A

ADTRAN

Optical Networking Edge (ONE)

4 Degree Mini Amplified ROADM System with Variable Gain Pre-Amp and Booster Amp (MARS-4PB)

jobAid

CLEI: BVL3AWND
Product P/N: 1174512G1

Issue Date: November 2012
Document P/N: 61174512G1-22A

Documentation for ADTRAN Carrier Networks products is available for viewing and download directly from the Support Community portal.

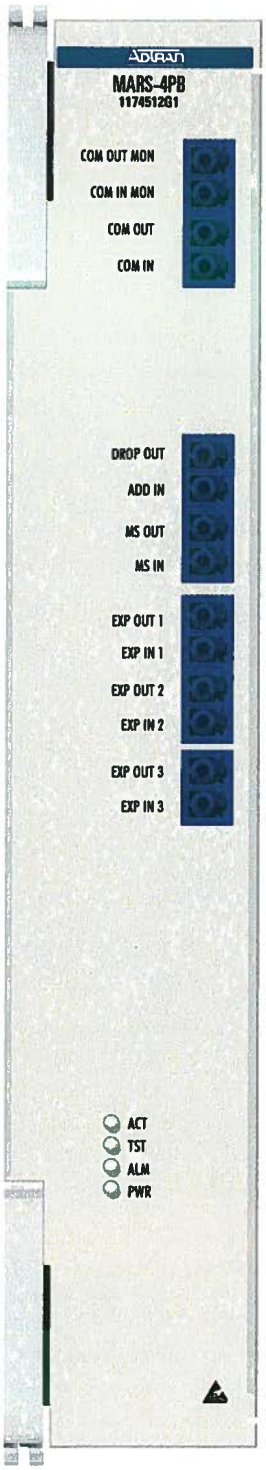
Go to:

adtran.com>support>support community

Registration is required.

The following documents provide additional information for this product:

Total Access 5000 CLI Dictionary
Total Access 5000/5006 Load Calculation Guidlines
Total Access 5000/5006 Engineering and Ordering Guide
Optical Networking Edge CLI Dictionary



DESCRIPTION

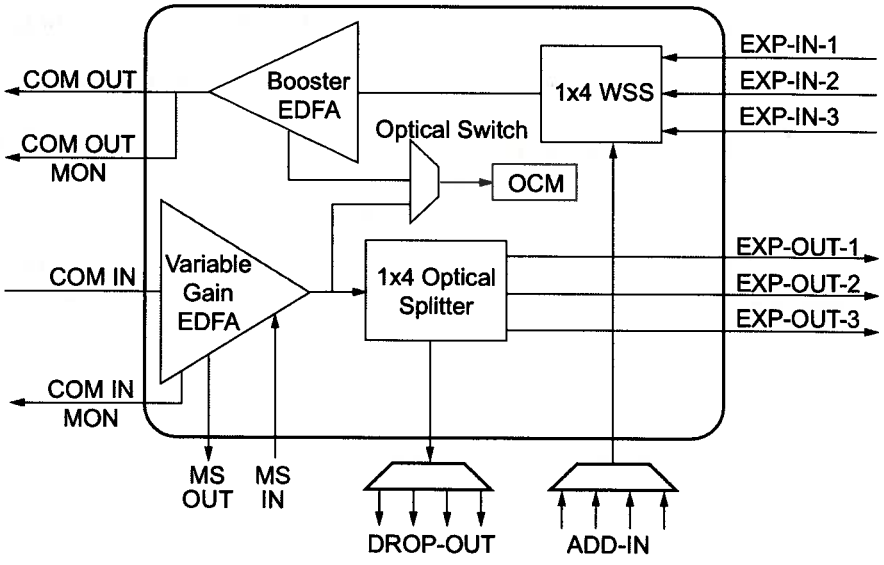
The Optical Networking Edge (ONE) Mini Amplified 4 Degree (1x4) Reconfigurable Optical Add Drop Multiplexer (ROADM) System with Variable Gain Mid-stage Pre-amplifier and Booster Amplifier (MARS-4PB) is part of the Optical Networking Edge (ONE) portfolio. The use of a wavelength selection switch allows individual or multiple wavelengths carrying data channels to be added and/or dropped from a transport fiber without converting the signals of the WDM channels to electronic signals then back to optical signals.

MARS-4PB is a single module occupying two slots in the Total Access 5000/5006 chassis. A ROADM site contains up to four ADTRAN MARS-4xx (e.g., MARS-4P/MARS-4PB) modules connected together via the 'Express' interfaces.

The MARS-4PB module includes the following features:

- Total Access 5000 double wide assembly
- Wavelength provisioning based on Wavelength Selection Switch
  - The card allows flexible add/drop of any C-band wavelength combinations
  - Supports 50 GHz (88 channels) and 100 GHz (44 channels) Channel spacing
  - Supports 88 Wavelengths, ITU Channels 17 - 60.5 (1563.86 nm to 1529.16 nm)
- COM IN amplification based on a variable gain EDFA mid-stage amplifier
  - Pre-amplifier supports insertion of dispersion compensation module in the mid-stage
- COM OUT amplification based on an EDFA Boost amplifier
- Optical Channel Monitoring capability with two internal monitoring points
  - Optical Channel Monitoring (OCM) simplifies remote channel monitoring and optical auto power balancing process
  - Monitors the channels on the COM IN (after the pre-amplifier) and the COM OUT (after the booster amplifier) ports
- Auto Power Balancing on the COM OUT port
  - Balances the ADD IN and EXP IN power levels
  - Can override the auto balancing on a per channel basis
- Threshold alarming on power levels at the aggregate and channel levels

The figure below provides a functional block diagram of the MARS-4PB.



DWDM Channels

MARS-4PB supports 50 GHz and 100 GHz channel spacing throughout the full C-Band (1563.86 to 1529.16 nm). In 50 GHz channel spacing, the unit supports 88 wavelengths (ITU channels 17-60.5). In 100 GHz channel spacing, the unit supports 44 wavelengths (ITU channels 17-60). The MARS-4PB also supports mixed 50 GHz and 100 GHz channel spacing.

The MARS-4PB is compatible with modulation schemes for up to 100 Gbps transmission.

NOTE

To Add/Drop individual channels, a Total Access 5000/5006 or external MUX/DeMUX or OADM module is required.

Installation

Prior to installation, inspect the MARS-4PB. If damage has occurred during shipping, file a claim with the carrier, and then contact ADTRAN Customer Support. For more information, refer to the warranty.

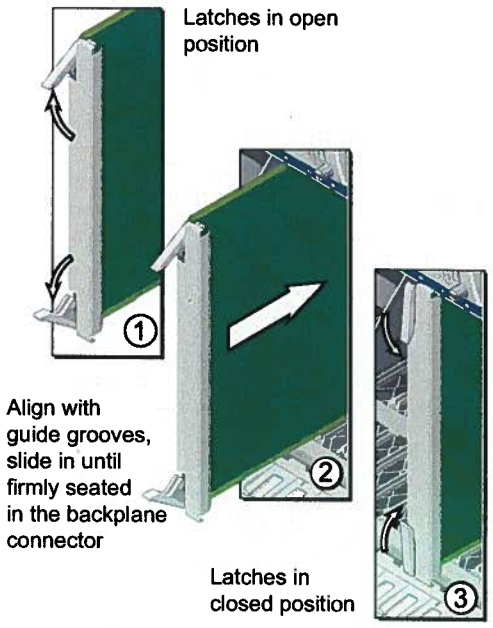
⚠ WARNING

- The MARS-4PB can be installed in any odd/even slots (for example, slots 1 and 2, 3 and 4) other than those slots labeled **12/SCM, SM A** and **SM B**. This eliminates slot **11** for use with the MARS-4PB.
- To meet NEBS Level 3 and provide proper airflow and filtration, the AMIO2 Blank (P/N 1187923G1) must be installed in the two rear-panel slots occupied by the MARS-4PB line module.
- To provide proper airflow and protection in this system, **all** chassis slots must be populated with either a module or an appropriate blank panel. Failure to install blank panels in **all** unpopulated slots will void the warranty for modules installed in a misconfigured system.
- Use the proper chassis fan configuration for Central Office (CO) and Remote Terminal (RT) deployments, as specified in the table below.

	Total Access 5000 23-Inch Chassis	Total Access 5006 Chassis
CO (Standard)	Total Access 5000 23-Inch Fan Module (P/N 1187080L1/G1)	Total Access 5006 Fan Module (P/N 1187090E1)
RT (High Flow)	Total Access 5000 High Flow Fan Module (P/N 1187080G2) or Total Access 5000 High Flow Rear Fan Module (P/N 1187080G3)	Total Access 5006 High Flow Rear Fan Module (P/N 1187090G3)

Remove the Access Module Blank Panels (P/N 1187921L1) from the appropriate slots of the Total Access 5000/5006 chassis, if present.

To install the MARS-4PB, reference the figure below.



When MARS-4PB first powers up it performs self-tests. Once the power up self-tests are complete, the status LEDs will reflect the state of the hardware.

Front Panel LEDs

Label	Status	Description
ACT	Green	ROADM Active
TST	Off	No Test
	Yellow	Test Active
ALM	Off	No Alarm
	Yellow	Minor Alarm
	Red	Major/Critical Alarm
PWR	Off	Power or Fuse Failure
	Green	No Failure
	Yellow	Module is in Shutdown or Shutdown Maintenance state
	Red	Module Failure

Provisioning

The System Controller Module (SCM) must be installed in the chassis. The SCM has a front panel-mounted DB-9 connector that supplies an RS-232 interface for connection to a controlling terminal. The supported terminal type is VT100 or compatible and is set for 9600 bps, 8-data bits, no parity, no flow control, and 1-stop bit.

System Access with a CLI Driven SCM

To log on the Optical Networking Edge (ONE) Command Line Interface (CLI), complete the following steps:

1. After establishing a connection with the SCM, the User Access Verification screen is displayed.

NOTE

- If the login screen initially appears blank, press ENTER several times or CTRL+R to refresh the screen and access the CLI.
- The account name and password fields are case-sensitive.
- The default account name is ADMIN and the password is PASSWORD. Other default accounts are: READONLY, READWRITE, and TEST. An account with ADMIN privileges is required to change the account name and password.

2. At the command line prompt, type the default account name, **ADMIN** (or the configured account name with System Administrator privileges), and press ENTER.
3. At the resultant prompt, type the default password, **PASSWORD** (or the configured password), and press ENTER.

A successful logon attempt displays the CLI prompt.

Optical Path Specifications

Connector	Typ Insertion Loss	Typical Gain	
COM IN to EXP OUT (EXP OUT 1 - 3)	-7.4 dB	+2.6 dB to 17.6 dB	Amp provides 10 dB to 25 dB of gain
EXP IN to COM OUT (EXP IN 1 - 3)	-9.6 dB	+10.4 dB	Amp provides 20 dB of gain
COM IN to DROP OUT	-7.4 dB	+2.6 dB to 17.6 dB	Amp provides 10 dB to 25 dB of gain
ADD IN to COM OUT	-9.6 dB	+10.4 dB	Booster Amp provides 20 dB of gain

SPECIFICATIONS

Specifications for the MARS-4PB are as follows:

- Electrical
  - Typical Input Power: 19 Watts (24 Watts max.)
  - Operating voltage: –42 VDC to –56 VDC (–48 VDC nominal)
  - Maximum Heat Dissipation: 24 Watts
- Optical
  - Input Damage Threshold: +25 dBm
  - Connector: LC/UPC
- Physical
  - Height: 9.44 inches (23.97 centimeters)
  - Width: 1.64 inches (4.16 centimeters)
  - Depth: 9.5 inches (24.13 centimeters)
  - Weight: 5.5 lbs (2.5 kilograms)
- Environmental
  - Operational Temperature Range: –5°C to +60°C
  - Storage Temperature Range: –40°C to +85°C
  - Relative Humidity: up to 95%, noncondensing

MAINTENANCE

MARS-4PB does not require routine hardware maintenance for normal operation. ADTRAN does not recommend that repairs be attempted in the field. Repair services may be obtained by returning the defective unit to ADTRAN. Refer to the warranty for further information. Field support for software is provided through upgrade facilities.

NOTE

For further information on Total Access 5000/5006 components, reference the *Total Access 5000/5006 Load Calculation Guidelines* (P/N 65KLOADCALC-7) and the *Total Access 5000/5006 Engineering and Ordering Guide* (P/N 65K62ENG-7).

SAFETY AND REGULATORY COMPLIANCE

Refer to the Safety and Regulatory Compliance Notice for this product (P/N 61174512G1-17) for detailed safety and regulatory information.

Consultez l'avis sur la sécurité et la conformité à la réglementation pour ce produit (61174512G1-17) pour obtenir des. renseignements détaillés sur la sécurité et la réglementation.

Ausführliche Sicherheits- und regulatorische Informationen sind in der Konformitätserklärung zur Sicherheit und Einhaltung von Normen zu diesem Produkt (61174512G1-17) aufgeführt.

Warranty: ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found online at www.adtran.com/warranty.

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ADTRAN

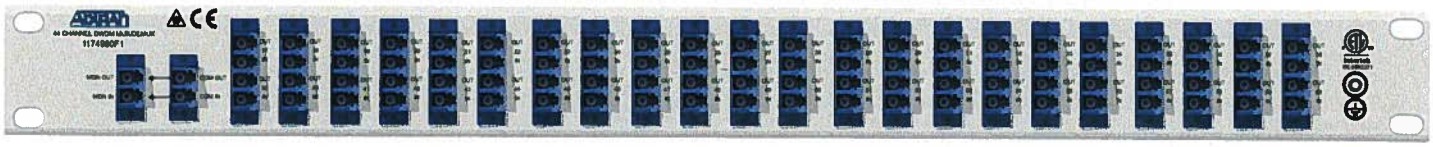
Optical Networking Edge

44-Channel DWDM Mux/Demux

jobAid

CLEI: BVMBT00F
Product P/N: 1174980F1

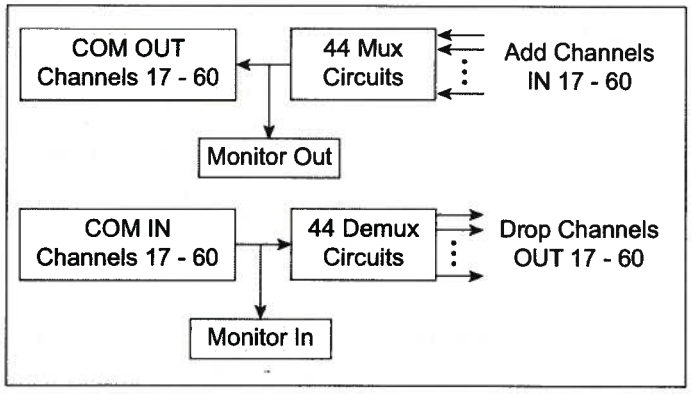
Issue Date: June 2012
Document P/N: 61174980F1-22C



DESCRIPTION

The 1 RU 44-Channel DWDM Mux/Demux is based on athermal Arrayed Waveguide Gratings (AWG) technology with 100GHz channel spacing. The 44-Channel DWDM Mux/Demux operates in the full C-band supporting Channels 17 (1563.86 nm) through 60 (1529.55 nm). In addition to the 44 Mux and Demux ports there are two monitor ports (MON IN and MON OUT) for monitoring the traffic ports.

The figure below is the block diagram of the 44-Channel DWDM Mux/Demux.



CAUTION

The 44-Channel DWDM Mux/Demux is intended for use only with Class 1 or Class 1M laser modules.

The Composite Input (COM IN) port may carry up to 44 DWDM wavelengths at 100 GHz spacing that are demultiplexed into individual wavelengths at the OUT ports for each channel. Individual wavelengths applied to the IN ports for each channel are multiplexed onto the Composite Output (COM OUT) port, which may carry up to 44 DWDM wavelengths at 100 GHz spacing.

The 44-Channel DWDM Mux/Demux supports the following features:

- Fiber connections are located on the faceplate of the module
- Operates in the full C-band
- 100 GHz channel spacing
- 44 wavelengths, Channels 17 to Channel 60 on standard DWDM ITU grid
- Provides monitor ports for COM IN and COM OUT. Monitor ports tap 5% of the optical power from the COM ports

CHANNEL PLAN

Label	ITU Wavelength (nm)	ITU Frequency (THz)
OUT 17 IN	1563.86	191.7
OUT 18 IN	1563.05	191.8
OUT 19 IN	1562.23	191.9
OUT 20 IN	1561.42	192.0
OUT 21 IN	1560.61	192.1
OUT 22 IN	1559.79	192.2
OUT 23 IN	1558.98	192.3
OUT 24 IN	1558.17	192.4
OUT 25 IN	1557.36	192.5
OUT 26 IN	1556.55	192.6
OUT 27 IN	1555.75	192.7
OUT 28 IN	1554.94	192.8
OUT 29 IN	1554.13	192.9
OUT 30 IN	1553.33	193.0
OUT 31 IN	1552.52	193.1
OUT 32 IN	1551.72	193.2
OUT 33 IN	1550.92	193.3
OUT 34 IN	1550.12	193.4
OUT 35 IN	1549.32	193.5
OUT 36 IN	1548.51	193.6
OUT 37 IN	1547.72	193.7
OUT 38 IN	1546.92	193.8
OUT 39 IN	1546.12	193.9
OUT 40 IN	1545.32	194.0
OUT 41 IN	1544.53	194.1
OUT 42 IN	1543.73	194.2
OUT 43 IN	1542.94	194.3
OUT 44 IN	1542.14	194.4
OUT 45 IN	1541.35	194.5
OUT 46 IN	1540.56	194.6
OUT 47 IN	1539.77	194.7
OUT 48 IN	1538.98	194.8
OUT 49 IN	1538.19	194.9
OUT 50 IN	1537.40	195.0
OUT 51 IN	1536.61	195.1
OUT 52 IN	1535.82	195.2
OUT 53 IN	1535.04	195.3
OUT 54 IN	1534.25	195.4
OUT 55 IN	1533.47	195.5
OUT 56 IN	1532.68	195.6
OUT 57 IN	1531.90	195.7
OUT 58 IN	1531.12	195.8
OUT 59 IN	1530.33	195.9
OUT 60 IN	1529.55	196.0

INSTALLATION

To install the 44-Channel DWDM Mux/Demux, complete the following steps:

1. Inspect the 44-Channel DWDM Mux/Demux. If damaged, file a claim with the carrier and then contact ADTRAN Customer Support.

⚠ CAUTION

Do not remove the protective end cap from the LC/UPC fiber connectors until the fiber optic cable is ready to be connected.

2. Secure the chassis into the rack.
3. Ground the unit to the rack using the ground connection on either the front or rear of the chassis.

OPERATIONAL SPECIFICATIONS

- Channels: 44
- Channel Spacing: 100 GHz
- Reference Passband: -12.5 to +12.5 GHz
- Wavelength Accuracy: -70 to +70 pm
- Center Wavelength Slope: 1 pm/°C
- 1 dB Bandwidth: 0.38 nm min, 0.4 nm typical
- 3 dB Bandwidth: 0.58 nm min, 0.6 nm typical
- 20 dB Bandwidth: 1.26 nm max
- 30 dB Bandwidth: 1.76 nm max
- Insertion Loss: 5.8 dB typical, 6.3 db max
- Insertion Loss (IN 17 ~ IN 60 to MON OUT): 21 dB max
- Insertion Loss (COM IN to 5% MON IN): 14 dB max
- Insertion Loss Uniformity: 1.5 dB max
- Ripple: 0.5 dB max
- Adjacent Channel Isolation: 23 dB min
- Non-adjacent Channel Isolation: 30 dB min
- Total Crosstalk: 20 dB min
- Polarization Dependant Loss (PDL): 0.5 dB max
- Return Loss: 40 dB min
- Maximum Continuous Optical Power: 250 mW
- Chromatic Dispersion (CD): -20 ps/nm min, +20 ps/nm max
- Polarization Mode Dispersion (PMD): 0.5 ps max
- Optical connectors: LC/UPC
- Physical
  - Height: 1RU
  - Width: 17.1 inches
  - Depth: 10 inches
  - Weight: 4.5 pounds
- Environmental Support:
  - Operational temperature range: -40°C to +65°C
  - Storage temperature range: -40°C to +85°C
  - Relative humidity: up to 85%, noncondensing

SAFETY AND REGULATORY COMPLIANCE

⚠ WARNING

Read all warnings and cautions before installing or servicing this equipment.

⚠ CAUTION

- Electrostatic Discharge (ESD) can damage electronic modules. When handling modules, wear an antistatic discharge wrist strap to prevent damage to electronic components. Place modules in antistatic packing material when transporting or storing. When working on modules, always place them on an approved antistatic mat that is electrically grounded.
- The chassis frame ground terminal must be connected to an earth ground to ensure that any exposed metal is properly grounded.
- Per GR-1089-CORE, this system is designed and intended for installation as part of either a Common Bonding Network (CBN) or Isolated Bonding Network (IBN).

NOTE

- This product is designed to be deployed in GR-3108-CORE environmental class 1 or 2 as defined in GR-3108-CORE.
- The optical ports are not metallic and are therefore not classified as any of the types defined in Appendix B of GR-1089-CORE.

This product meets or exceeds all the applicable requirements of NEBS, Telcordia GR-63-CORE, GR-1089-CORE, and ETSI EN 300368. This product is intended for deployment in Central Office type facilities, EEEs, EECs, and locations where the NEC applies (for example, Customer Premises).

This product is to be installed in Restricted Access Locations only, and installed by trained service personnel.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by ADTRAN could void the user's authority to operate this equipment.

This product is designed to meet the following environmental classes:

- ETSI EN 300 019-1-1 "Classification of environmental conditions; Storage," Class 1.2
- ETSI EN 300 019-1-2 "Classification of environmental conditions; Transportation," Class 2.3
- ETSI EN 300 019-1-3 "Classification of environmental conditions; Stationary use at weather-protected locations," Class 3.3

The equipment is designed to function without degradation during exposure to all test severities per Class 3.3 of ETSI EN 300 019-1-3.

This product meets EU RoHS Directive 2002/95/EC and/or applicable exemptions. Refer to www.adtran.com for further information on RoHS/WEEE.

FRANÇAIS

⚠ AVERTISSEMENT

Lisez tous les avertissements et mises en garde avant l'installation de cet équipement ou la réalisation de toute opération de maintenance.

⚠ ATTENTION

- Une L'ESD (décharge électrostatique) peut endommager les modules électroniques. Lors de la manipulation des modules, portez un bracelet de décharge antistatique pour éviter d'endommager les composants électroniques. Placez les modules dans un emballage antistatique lors du transport ou du stockage. Lorsque vous travaillez sur les modules, placez-les toujours sur un tapis antistatique certifié muni d'un branchement de mise à la terre.
- La borne de mise à la terre du châssis doit être branchée à une prise de terre afin d'assurer que le boîtier métallique de la SFP est correctement mis à la terre grâce au connecteur de face arrière.
- Selon le document GR-1089-CORE, ce système est conçu et prévu pour une installation intégrée à un réseau de masse maillé ou à un réseau de masse isolé .

Ce produit est conçu pour répondre aux classes environnementales suivantes :

- ETSI EN 300 019-1-1 "Classification des conditions d'environnement; Entreposage," Classe 1.2
- ETSI EN 300 019-1-2 "Classification des conditions d'environnements; Transport," Classe 2.3
- ETSI EN 300 019-1-3 "Classification des conditions d'environnements; l'utilisation à poste fixe dans des endroits protégés contre les intempéries," Classe 3.3

L'équipement est conçu pour fonctionner sans dégradation lors des tests à tous les niveaux de sévérité, suivant les spécifications de la classe 3.3 de l'ETSI EN 300 019-1-3.

Ce produit est conforme à la directive européenne RoHS 2002/95/CE et/ou aux exonérations applicables. Reportez-vous à www.adtran.com pour de plus amples renseignements sur RoHS/WEEE.

DEUTSCH

⚠ WARNUNG

Lesen Sie sich alle Warn- und Sicherheitshinweise durch, bevor Sie dieses Gerät installieren oder warten.

⚠ VORSICHT

- Elektrostatische Entladungen können elektronische Module beschädigen. Tragen Sie beim Umgang mit Modulen ein Erdungsarmband, um Schäden an den elektronischen Komponenten zu vermeiden. Transportieren oder lagern Sie Module in antistatischem Verpackungsmaterial. Bei der Arbeit an den Modulen, achten Sie darauf, diese stets auf antistatische, elektrisch geerdete Matten zu legen.
- Die Erdungsschiene des Rahmens muss an eine Bodenstation angeschlossen werden, um sicherzustellen, dass das Metallgehäuse des SFP vorschriftsmäßig über den Rückwandanschluss geerdet ist.
- Laut GR-1089-CORE dient dieses System zur Installation entweder in einer gemeinsamen Potentialausgleichsanlage (CBN) oder in einer isolierten Potentialausgleichsanlage (IBN).

Dieses Produkt wurde entsprechend der folgenden Umweltklassen entwickelt:

- ETSI EN 300 019-1-1 "Klassifikation von Umweltbedingungen, Lagerung," Klasse 1.2
- ETSI EN 300 019-1-2 "Klassifikation von Umweltbedingungen, Transport," Klasse 2.3
- ETSI EN 300 019-1-3 "Klassifikation von Umweltbedingungen, Stationärer Einsatz ohne Witterungseinflüsse," Klasse 3.3

Dieses Gerät funktioniert ohne Leistungsabfall während aller für Klasse 3.3 von ETSI EN 300 019-1-3 vorgeschriebenen Belastungstests.

Dieses Produkt erfüllt die EU RoHS Richtlinie 2002/95/EC und/oder gültige Ausnahmen. Bitte besuchen Sie www.adtran.com für ausführlichere Informationen zu RoHS/WEEE.

Technical Publications
CarrierNetworkDivision

Warranty: ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found online at www.adtran.com/warranty.

CAUTION!
SUBJECT TO ELECTROSTATIC DAMAGE OR DECREASE IN RELIABILITY.
HANDLING PRECAUTIONS REQUIRED.

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From within the U.S. 1.800.726.8663
From outside the U.S. +1 256.963.8716
PRICING AND AVAILABILITY 1.800.827.0807

ADTRAN

Total Access 5000
88-Channel DWDM Mux/Demux

jobAid

CLEI: BVMBC10F
Product P/N: 1174982F1

Issue Date: April 2013
Document P/N: 61174982F1-22A

Documentation for ADTRAN Carrier Networks products is available for viewing and download directly from the ADTRAN Support Community website.

Go to:

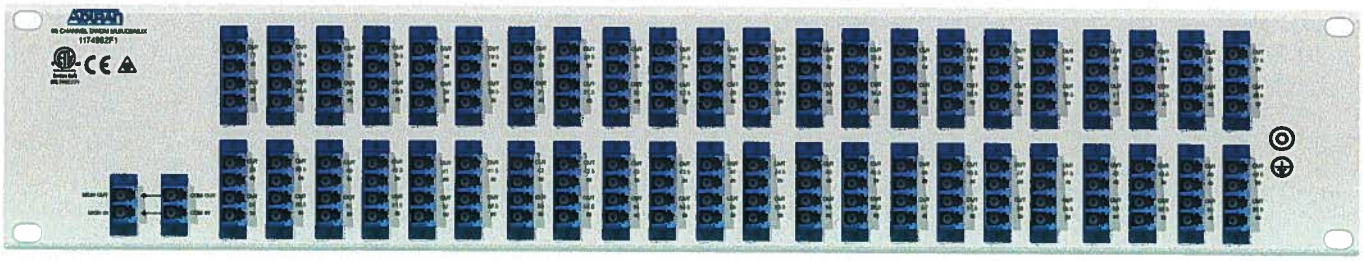
https://supportforums.adtran.com/welcome

Registration is required.

The following documents provide additional information for this product:

Total Access 5000 CLI Dictionary

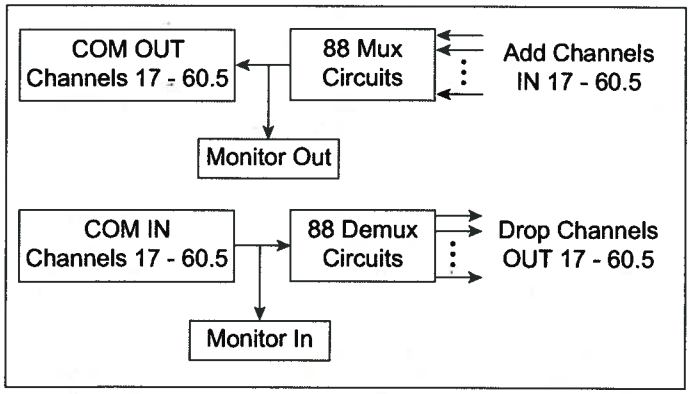
Optical Networking Edge CLI Dictionary



DESCRIPTION

The 88-Channel DWDM Mux/Demux is based on athermal Arrayed Waveguide Gratings (AWG) technology with 50 GHz channel spacing. The 88-Channel DWDM Mux/Demux operates in the full C-band supporting Channels 17 (1563.86 nm) through 60.5 (1529.16 nm). In addition to the 88 Mux and Demux ports there are two monitor ports (**MON IN** and **MON OUT**) for monitoring the traffic ports.

The figure below is the block diagram of the 88-Channel DWDM Mux/Demux.



The Composite Input (**COM IN**) port can carry up to 88 DWDM wavelengths at 50 GHz spacing that are demultiplexed into individual wavelengths at the **OUT** ports for each channel. Individual wavelengths applied to the **IN** ports for each channel are multiplexed onto the Composite Output (**COM OUT**) port, which may carry up to 88 DWDM wavelengths at 50 GHz spacing.

Fiber connections are located on the faceplate of the module. The 88-Channel DWDM Mux/Demux supports the following features:

- Operates in the full C-band
- 50 GHz channel spacing
- 88 wavelengths, Channels 17 to Channel 60.5 on standard DWDM ITU grid
- Provides monitor ports for **COM IN** and **COM OUT**. Monitor ports tap 5% of the optical power from the COM ports

INSTALLATION

To install the 88-Channel DWDM Mux/Demux, complete the following steps:

1. Inspect the 88-Channel DWDM Mux/Demux. If damaged, file a claim with the carrier and then contact ADTRAN Customer Support.

⚠ CAUTION

Do not remove the protective end cap from the LC/UPC fiber connectors until the fiber optic cable is ready to be connected.

2. Secure the chassis into the rack.
3. Ground the unit to the rack using the ground connection on either the front or rear of the chassis.

CHANNEL PLAN

Label	ITU Wavelength (nm)	ITU Frequency (THz)
OUT 17 IN	1563.86	191.70
OUT 17.5 IN	1563.45	191.75
OUT 18 IN	1563.05	191.80
OUT 18.5 IN	1562.64	191.85
OUT 19 IN	1562.23	191.90
OUT 19.5 IN	1561.83	191.95
OUT 20 IN	1561.42	192.00
OUT 20.5 IN	1561.01	192.05
OUT 21 IN	1560.61	192.10
OUT 21.5 IN	1560.20	192.15
OUT 22 IN	1559.79	192.20
OUT 22.5 IN	1559.39	192.25
OUT 23 IN	1558.98	192.30
OUT 23.5 IN	1558.58	192.35
OUT 24 IN	1558.17	192.40
OUT 24.5 IN	1557.77	192.45
OUT 25 IN	1557.36	192.50
OUT 25.5 IN	1556.96	192.55
OUT 26 IN	1556.55	192.60
OUT 26.5 IN	1556.15	192.65
OUT 27 IN	1555.75	192.70
OUT 27.5 IN	1555.34	192.75
OUT 28 IN	1554.94	192.80
OUT 28.5 IN	1554.54	192.85
OUT 29 IN	1554.13	192.90
OUT 29.5 IN	1553.73	192.95
OUT 30 IN	1553.33	193.00
OUT 30.5 IN	1552.93	193.05
OUT 31 IN	1552.52	193.10
OUT 31.5 IN	1552.12	193.15
OUT 32 IN	1551.72	193.20
OUT 32.5 IN	1551.32	193.25
OUT 33 IN	1550.92	193.30
OUT 33.5 IN	1550.52	193.35
OUT 34 IN	1550.12	193.40
OUT 34.5 IN	1549.72	193.45
OUT 35 IN	1549.32	193.50
OUT 35.5 IN	1548.91	193.55
OUT 36 IN	1548.51	193.60
OUT 36.5 IN	1548.11	193.65
OUT 37 IN	1547.72	193.70
OUT 37.5 IN	1547.32	193.75
OUT 38 IN	1546.92	193.80
OUT 38.5 IN	1546.52	193.85
OUT 39 IN	1546.12	193.90
OUT 39.5 IN	1545.72	193.95

Label	ITU Wavelength (nm)	ITU Frequency (THz)
OUT 40 IN	1545.32	194.00
OUT 40.5 IN	1544.92	194.05
OUT 41 IN	1544.53	194.10
OUT 41.5 IN	1544.13	194.15
OUT 42 IN	1543.73	194.20
OUT 42.5 IN	1543.33	194.25
OUT 43 IN	1542.94	194.30
OUT 43.5 IN	1542.54	194.35
OUT 44 IN	1542.14	194.40
OUT 44.5 IN	1541.74	194.45
OUT 45 IN	1541.35	194.50
OUT 45.5 IN	1540.95	194.55
OUT 46 IN	1540.56	194.60
OUT 46.5 IN	1540.16	194.65
OUT 47 IN	1539.77	194.70
OUT 47.5 IN	1539.37	194.75
OUT 48 IN	1538.98	194.80
OUT 48.5 IN	1538.58	194.85
OUT 49 IN	1538.19	194.90
OUT 49.5 IN	1537.79	194.95
OUT 50 IN	1537.40	195.00
OUT 50.5 IN	1537.00	195.05
OUT 51 IN	1536.61	195.10
OUT 51.5 IN	1536.22	195.15
OUT 52 IN	1535.82	195.20
OUT 52.5 IN	1535.43	195.25
OUT 53 IN	1535.04	195.30
OUT 53.5 IN	1534.64	195.35
OUT 54 IN	1534.25	195.40
OUT 54.5 IN	1533.86	195.45
OUT 55 IN	1533.47	195.50
OUT 55.5 IN	1533.07	195.55
OUT 56 IN	1532.68	195.60
OUT 56.5 IN	1532.29	195.65
OUT 57 IN	1531.90	195.70
OUT 57.5 IN	1531.51	195.75
OUT 58 IN	1531.12	195.80
OUT 58.5 IN	1530.72	195.85
OUT 59 IN	1530.33	195.90
OUT 59.5 IN	1529.94	195.95
OUT 60 IN	1529.55	196.00
OUT 60.5 IN	1529.16	196.05

SPECIFICATIONS

- Optical
  - Channels: 88
  - Channel Spacing: 50 GHz
  - Reference Passband: –6.25 to +6.25 GHz
  - Wavelength Accuracy: –50 to +50 pm
  - Center Wavelength Slope: 1.43 pm/°C
  - 0.5 dB Bandwidth: 0.1 nm min
  - 1 dB Bandwidth: 0.2 nm min
  - 3 dB Bandwidth: 0.28 nm min
  - Insertion Loss: 6.5 dB max
  - Insertion Loss (IN 17 ~ IN 60.5 to MON OUT): 21 dB max
  - Insertion Loss (COM IN to 5% MON IN): 14 dB max
  - Insertion Loss Uniformity: 1.5 dB max
  - Ripple: 0.5 dB max
  - Adjacent Channel Isolation: 25 dB min
  - Non-adjacent Channel Isolation: 28 dB min
  - Total Crosstalk: 21 dB min
  - Polarization Dependant Loss (PDL): 0.5 dB max
  - Return Loss: 45 dB min
  - Maximum Continuous Optical Power: 500 mW
  - Chromatic Dispersion (CD): –30 ps/nm min, +30 ps/nm max
  - Polarization Mode Dispersion (PMD): 1 ps max
  - Optical connectors: LC/UPC
- Physical
  - Height: 3.5 inches (8.89 centimeters)
  - Width: 17.1 inches (43.43 centimeters)
  - Depth: 10 inches (25.40 centimeters)
  - Weight: 7.0 pounds (3.17 kilograms)
- Environmental
  - Operational temperature range: –5°C to +65°C
  - Storage temperature range: –40°C to +85°C
  - Relative humidity: up to 85%, noncondensing

SAFETY AND REGULATORY COMPLIANCE

⚠ WARNING

Read all warnings and cautions before installing or servicing this equipment.

⚠ CAUTION

- Electrostatic Discharge (ESD) can damage electronic modules. When handling modules, wear an antistatic discharge wrist strap to prevent damage to electronic components. Place modules in antistatic packing material when transporting or storing. When working on modules, always place them on an approved antistatic mat that is electrically grounded.
- The chassis frame ground terminal must be connected to an earth ground to ensure that the exposed metal on the product is properly grounded.
- Per GR-1089-CORE, this system is designed and intended for installation as part of either a Common Bonding Network (CBN) or Isolated Bonding Network (IBN).

NOTE

- This product is designed to be deployed in GR-3108-CORE environmental class 1 or 2 as defined in GR-3108-CORE.
- The optical ports are not metallic and are therefore not classified as any of the types defined in Appendix B of GR-1089-CORE.

This product meets or exceeds all the applicable requirements of NEBS, Telcordia GR-63-CORE, GR-1089-CORE, and ETSI EN 300368. This product is intended for deployment in Central Office type facilities, EEEs, EECs, and locations where the NEC applies (for example, Customer Premises).

Install this product in a Restricted Access Location. This product is intended to be installed and serviced by qualified Service Personnel only.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by ADTRAN could void the user's authority to operate this equipment.

This product is designed to meet the following environmental classes:

- ETSI EN 300 019-1-1: "Classification of environmental conditions; Storage," Class 1.2
- ETSI EN 300 019-1-2: "Classification of environmental conditions; Transportation," Class 2.3
- ETSI EN 300 019-1-3: "Classification of environmental conditions; Stationary use at weather-protected locations," Class 3.3

The equipment is designed to function without degradation during exposure to all test severities per Class 3.3 of ETSI EN 300 019-1-3.

This product meets EU RoHS Directive 2002/95/EC and/or applicable exemptions. Refer to www.adtran.com for further information on RoHS/WEEE.

FRANÇAIS

⚠ WARNING

Lisez tous les avertissements et mises en garde avant l'installation de cet équipement ou la réalisation de toute opération de maintenance.

⚠ ATTENTION

- Une L'ESD (décharge électrostatique) peut endommager les modules électroniques. Lors de la manipulation des modules, portez un bracelet de décharge antistatique pour éviter d'endommager les composants électroniques. Placez les modules dans un emballage antistatique lors du transport ou du stockage. Lorsque vous travaillez sur les modules, placez-les toujours sur un tapis antistatique certifié muni d'un branchement de mise à la terre.
- La borne de masse du châssis doit être connecté à une prise de terre de sorte que le métal exposée sur le produit est la terre.

Installation du produit dans un emplacement à accès restreint. Ce produit a été conçu pour être installé et entretenu exclusivement par un personnel de service qualifié.

Les changements ou modifications non expressément approuvés par ADTRAN pourraient annuler l'autorisation de l'utilisateur d'utiliser cet équipement.

Ce produit est conçu pour répondre aux classes environnementales suivantes :

- ETSI EN 300 019-1-1: "Classification des conditions d'environnement; Entreposage," Classe 1.2
- ETSI EN 300 019-1-2: "Classification des conditions d'environnements; Transport," Classe 2.3
- ETSI EN 300 019-1-3: "Classification des conditions d'environnements; l'utilisation à poste fixe dans des endroits protégés contre les intempéries," Classe 3.3

L'équipement est conçu pour fonctionner sans dégradation lors des tests à tous les niveaux de sévérité, suivant les spécifications de la classe 3.3 de l'ETSI EN 300 019-1-3.

Ce produit est conforme à la directive européenne RoHS 2002/95/CE et/ou aux exonérations applicables. Reportez-vous à www.adtran.com pour de plus amples renseignements sur RoHS/WEEE.

DEUTSCH

⚠ WARNING

Lesen Sie sich alle Warn- und Sicherheitshinweise durch, bevor Sie dieses Gerät installieren oder warten.

⚠ VORSICHT

- Elektrostatische Entladungen können elektronische Module beschädigen. Tragen Sie beim Umgang mit Modulen ein Erdungsarmband, um Schäden an den elektronischen Komponenten zu vermeiden. Transportieren oder lagern Sie Module in antistatischem Verpackungsmaterial. Bei der Arbeit an den Modulen, achten Sie darauf, diese stets auf antistatische, elektrisch geerdete Matten zu legen.
- Der Fahrgestellrahmen Masseanschluß muß zu einer Erde verbunden um sicherzustellendaß die freiliegenden Metallteile auf das Gerät ordnungsgemäß geerdet ist.

Installieren Sie dieses Produkt an einem nicht öffentlich zugänglichen Ort. Dieses Produkt darf ausschließlich von qualifiziertem Bedienungspersonal installiert und gewartet werden.

Durch Änderungen oder Umbauten, die von ADTRAN nicht ausdrücklich genehmigt wurden, kann der Nutzer die Berechtigung zur Bedienung dieses Geräts verlieren.

Dieses Produkt wurde entsprechend der folgenden Umweltklassen entwickelt:

- ETSI EN 300 019-1-1: "Klassifikation von Umweltbedingungen, Lagerung," Klasse 1.2
- ETSI EN 300 019-1-2: "Klassifikation von Umweltbedingungen, Transport," Klasse 2.3
- ETSI EN 300 019-1-3: "Klassifikation von Umweltbedingungen, Stationärer Einsatz ohne Witterungseinflüsse," Klasse 3.3

Dieses Gerät funktioniert ohne Leistungsabfall während aller für Klasse 3.3 von ETSI EN 300 019-1-3 vorgeschriebenen Belastungstests.

Dieses Produkt erfüllt die EU RoHS Richtlinie 2002/95/EC und/oder gültige Ausnahmen. Bitte besuchen Sie www.adtran.com für ausführlichere Informationen zu RoHS/WEEE.

Warranty: ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found online at www.adtran.com/warranty.

CAUTION!
SUBJECT TO ELECTROSTATIC DAMAGE OR DECREASE IN RELIABILITY
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From outside the U.S. +1 256.963.8716
PRICING AND AVAILABILITY 1.800.827.0807

ADTRAN

Optical Networking Edge (ONE)

Optical Pre-amplifier or Booster Amplifier - 18 (OPBA-18)

jobAid

CLEI: BVUDAA4C
Product P/N: 1174402G1

Issue Date: February 2013
Document P/N: 61174402G1-22A

Documentation for ADTRAN Carrier Networks products is available for viewing and download directly from the Support Community portal.

Go to:

https://supportforums.adtran.com/welcome

Registration is required.

The following documentation provides additional information for this product:

Total Access 5000 CLI Dictionary

Total Access 5000/5006 Load Calculation Guidelines

Total Access 5000/5006 Engineering and Ordering Guide

DESCRIPTION

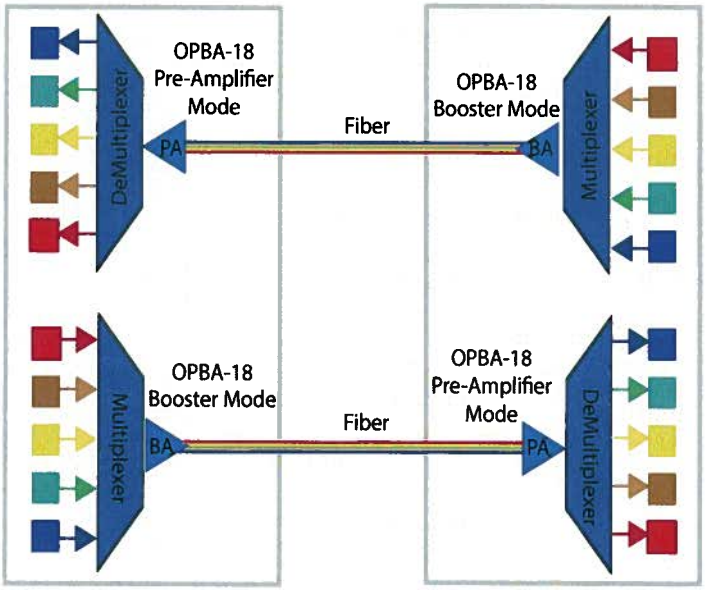
The Optical Pre-amplifier or Booster Amplifier - 18 (OPBA-18), with 18 dBm of saturated output power, is part of the Optical Networking Edge (ONE) portfolio. This Job Aid provides information on the features associated with the OPBA-18.

The OPBA-18 is based on Erbium-Doped Fiber Amplifier (EDFA) technology, and designed to extend the reach of a multi-wavelength optical signal. The OPBA-18 is an important building blocks for edge, metro and regional optical networks. EDFA amplifiers help overcome the optical attenuation caused by the fiber the signals pass through, and the insertion loss of Dense Wavelength Division Multiplexing (DWDM) modules such as Optical Add/Drop Multiplexers (OADMs) and Reconfigurable Add/Drop Multiplexers (ROADMs). The EDFA amplifiers enable the implementation of longer transport networks without costly regeneration.

The OPBA-18 can be used as either a Pre-amplifier or a Booster amplifier via software provisioning. In the pre-amp mode the OPBA-18 can also function as an In-line amplifier.

In the Pre-Amplifier mode the OPBA-18 is used to amplify the composite DWDM incoming signal to a power level greater than the minimum receiver sensitivity of the receiver. It is usually placed at the end of the span before the DWDM DeMux module. The diagram below represents this process.

In the Booster mode the OPBA-18 boosts the composite DWDM signal at the beginning of the fiber span. It is usually connected to the DWDM outgoing signal from a Mux, and designed to overcome the attenuation of the fiber span. The diagram below represents this process.



FEATURES

The following are features of the OPBA-18:

- Fixed gain amplification
- Power level reading on both input and output through the SCM
- Monitor port provided on output
- Compatible with Total Access 5000 and 5006 chassis and future ONE compatable chassis

INSTALLATION

After unpacking the OPBA-18, inspect it for damage. If damage is noted, file a claim with the carrier and then contact ADTRAN. For more information, refer to the warranty.

Refer to the illustration in the next column when installing the OPBA-18.

NOTE

To maintain fan cooling efficiency, all Total Access 5000/5006 empty chassis slots must have a blank front and rear panel installed.

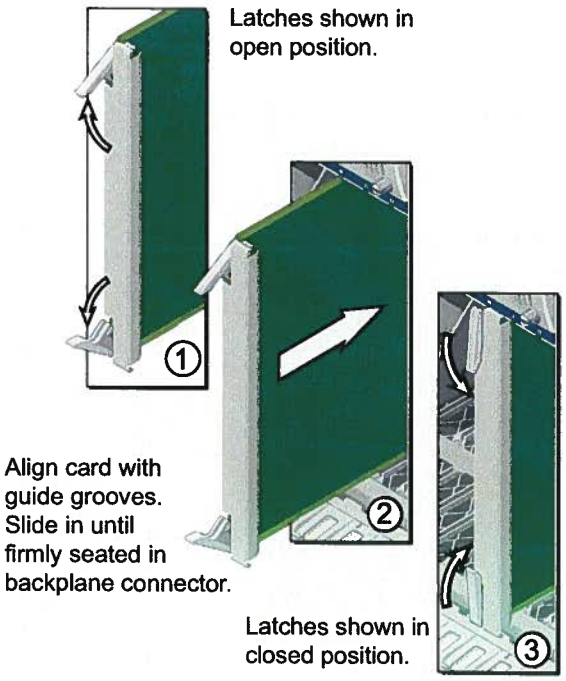
- Rear blank panels:
  - AMIO1 Blank, P/N: 1187925G1
  - Dual AMIO2 Blank, P/N: 1187923G1
- Front blank panels:
  - Switch Module Blank, P/N: 1187920E1
  - AM Blank, P/N: 1187921E1
  - Dual Slot AM Blank, P/N: 1187922E1

NOTE

- If a module does not have a rear I/O peer-to-peer connection, use one of the rear panel blanks listed above.
- The OPBA-18 can be installed in any slot labeled **1** through **11** and **13** to **22** of the Total Access 5000. Do not install the OPBA-18 in slots labeled **12/SCM, SM A** and **SM B**.

To install the OPBA-18, use the illustration in the next column to complete these steps:

1. If present, remove the front blank panel from the module slot of the Total Access 5000 chassis intended for the OPBA-18.
2. Pull the ejector latches, found on the upper and lower left-hand side of the OPBA-18 front panel, from the closed positions.
3. Hold the OPBA-18 by the front panel while supporting the bottom edge of the module with the ejector latches opened to engage the chassis edges.
4. Align the module edges to fit in the lower and upper guide grooves of the module slot.
5. Slide the module into the module slot. Apply simultaneous thumb pressure at the top and bottom of the module (to the right of the ejector latches) to ensure that the module is firmly seated in the backplane.
6. Secure the OPBA-18 in place by rotating the ejector latches into the locked positions.



When the OPBA-18 first powers up a series of self-tests are performed. Once the self-tests are complete, the status LEDs reflect the true state of the hardware.

Front Panel LEDs

Label	Status		Description
PWR IN	●	Green	Amplifier Input power within range
	●	Red	Amplifier Input power is above or below operating range
PWR OUT	●	Green	Pump Laser is On
	●	Red	Pump Laser is Off
TEST	○	Off	No test
	●	Yellow	Test active
ALM	○	Off	No alarm
	●	Green Flashing	Info alarm
	●	Yellow	Minor alarm
	●	Red	Major alarm
	✸	Red Flashing	Critical alarm
PWR	○	Off	No power to unit
	●	Green	Power and initialization OK
	●	Yellow	Out of service
	●	Red	Power, temp, or boot failure

PROVISIONING

The System Controller Module (SCM) must be installed in the Total Access 5000/5006 chassis. The SCM has a front panel-mounted DB-9 connector that supplies an RS-232 interface for connection to a controlling terminal. The supported terminal type is VT100 or compatible. The terminal settings are as follows: 9600 bps, 8 data bits, no parity, no flow control, and 1 stop bit.

The OPBA-18 is provisioned using the Total Access 5000 Command Line Interface (CLI)

System Access with a CLI Driven SCM

To log on the Total Access 5000 CLI complete the following steps:

1. After establishing a connection with the SCM, the User Access Verification screen is displayed.

NOTE

- If the login screen initially appears blank, press ENTER several times or CTRL+R to refresh the screen and access the CLI.
- The account name and password fields are case-sensitive.
- The default account name is ADMIN and the password is PASSWORD. Other default accounts are: READONLY, READWRITE, and TEST. An account with ADMIN privileges is required to change the account name and password.

2. At the command line prompt, type the default account name, **ADMIN** (or the configured account name with System Administrator privileges), and press ENTER.
3. At the resultant prompt, type the default password, **PASSWORD** (or the configured password), and press ENTER.

A successful logon attempt displays the CLI prompt.

The *Total Access 5000 CLI Dictionary* contains all the command line interface (CLI) options necessary to provision the OPBA-18.

MAINTENANCE

The OPBA-18 does not require routine hardware maintenance for normal operation. Do not attempt repairs in the field. Repair services may be obtained by returning the defective unit to ADTRAN. Refer to the warranty for further information. Field support for software is provided through upgrade facilities.

SPECIFICATIONS

- Electrical
  - Powering Voltage Range: –42 to –56 VDC
  - Nominal Powering Voltage: –48 V
  - Power Consumption: < 12 Watts
- Optical Specifications
  - Input Power Level (Boost-amp): -25.0 min. to +8.0 max. dBm
  - Input Power Level (Pre-amp): -34.0 min. to -1.0 max. dBm
  - Output Power: -19.0 to +18.0 dBm
  - Saturated Output Power: 18.0 dBm
  - Gain: 15.0 dBm
  - Gain Flatness: ± 1.0 dB
  - Noise Figure: 5.5 dB max.
  - Wavelength Bandwidth: 1528.8 to 1563 nm
  - Overshoot/Undershoot for 15 dB Add/Drop: ± 1.0 dB
  - Stabilization Time: 500 usec
  - In/Out Return Loss: 45/45 dB
  - PDG + RDL: 0.5 dB
  - Power Measurement Accuracy: ± 0.5 dB
- Physical
  - Height: 9.44 inches (23.97 cm)
  - Width: 0.8 inches (0.203 cm)
  - Depth: 9.5 inches (2.41 cm)
  - Weight: < 1 pound (<0.45 kg)
- Environmental
  - Operational Temperature Range: –5 to +60°C
  - Storage Temperature Range: –40 to +85°C
  - Relative Humidity: 95%, noncondensing

SAFETY AND REGULATORY COMPLIANCE

Refer to the Safety and Regulatory Compliance Notice for this product (P/N 61174402G1) for detailed safety and regulatory information.

Consultez l'avis sur la sécurité et la conformité à la réglementation pour ce produit (61174402G1) pour obtenir des renseignements détaillés sur la sécurité et la réglementation.

Ausführliche Sicherheits- und regulatorische Informationen sind in der Konformitätserklärung zur Sicherheit und Einhaltung von Normen zu diesem Produkt (61174402G1) aufgeführt.

Warranty: ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found online at www.adtran.com/warranty.

CAUTION!
SUBJECT TO ELECTROSTATIC DAMAGE OR DECREASE IN RELIABILITY.
HANDLING PRECAUTIONS REQUIRED.

ADTRAN CUSTOMER CARE:
From within the U.S. 1.800.726.8663
From outside the U.S. +1 256.963.8716
PRICING AND AVAILABILITY 1.800.827.0807

ADTRAN

Total Access 5000

Dispersion Compensation Module Bragg-Grating Based

jobAid

Product P/N: 117445XG1

Issue Date: January 2012
Document P/N: 6117445XG1-22A

DESCRIPTION

The Total Access 5000© Dispersion Compensation Module, Bragg-Grating Based (DCM-B), is a single slot card that compensates for different lengths of non-dispersion shifted Single Mode Fiber (SMF) over the ITU-T C-band spaced at 100 GHz. Each module is placed at the end of a fiber span to remove the dispersion from the optical signal over a fixed length of fiber. The fiber carrying the signal with the dispersion is plugged into the IN port and the dispersion compensated signal exits through the OUT port. The fiber lengths are 20 km, 40 km, 60 km, 80 km, 100 km, or 120 km. The various Bragg-Grating Based modules are listed in the table below.

Description	P/N	CLEI
Total Access 5000 DCM-B20	1174451G1	BVUDAA1C _ _
Total Access 5000 DCM-B40	1174452G1	BVUDAAYC _ _
Total Access 5000 DCM-B60	1174453G1	BVUDAAZC _ _
Total Access 5000 DCM-B80	1174454G1	BVUDAA0C _ _
Total Access 5000 DCM-B100	1174455G1	BVUDAA2C _ _
Total Access 5000 DCM-B120	1174456G1	BVUDAA3C _ _

Optical fiber access is provided by LC connectors on the front panel. These modules occupy a single card slot in the Total Access 5000 or Total Access 5006 Chassis. When inserted into a Total Access 5000 shelf, the DCM-B communicates with the Total Access 5000 switch modules (SMs) and provides inventory information about which modules are installed.

INSTALLATION

Prior to installation, inspect the DCM-B. If damage has occurred during shipping, file a claim with the carrier, and then contact ADTRAN Customer Support. For more information, refer to the warranty.

The DCM-B can be installed in any slot labeled **1** through **11**, or **13** through **22**. Do not install the DCM-B in slots **12/SCM**, **SM A**, and **SM B**.

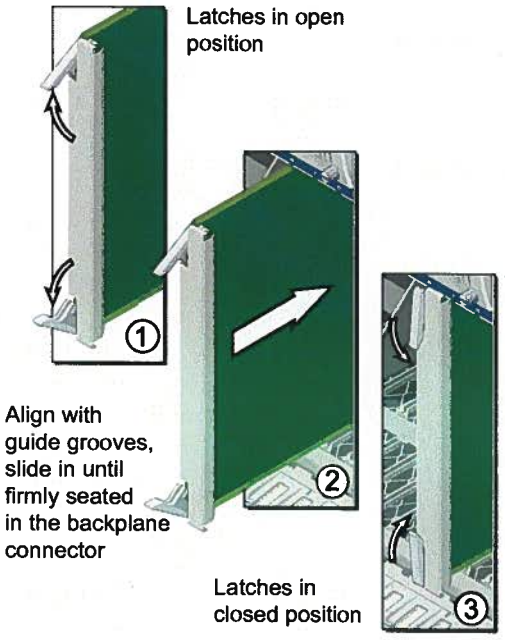
NOTE

To maintain fan cooling efficiency, all empty slots in the Total Access 5000 Chassis must have a blank front and rear panel installed.

- Rear blank panels: AMIO1 Blank (P/N 1187925G1); Dual AMIO2 Blank (P/N 1187923G1)
- Front blank panels: Switch Module Blank (P/N 1187920E1); AM Blank (P/N 1187921E1); Dual Slot AM Blank (P/N 1187922E1)

Since the DCM-B does not use a rear I/O panel, either the AMIO1 or the Dual AMIO2 blank rear panel must be installed.

To install the DCM-B, reference the following figure:



When the DCM-B first powers up it performs self-tests. Once the power up self-tests are complete, the PWR LED will reflect the state of the hardware.

Front Panel LEDs

The DCM-B is equipped with three LEDs located on the lower part of the front panel. Only the **PWR** LED is currently in use. Front panel LEDs and their descriptions are provided in the following table:

Label	Status		Indication
TEST	○	Off	Not in use
ALM	○	Off	Not in use
PWR	●	Green	Card is In Service
	●	Yellow	Card is Out of Service

Compensation Specifications

The table below lists a summary of the compensation specifications.

Description	20km	40km	60km	80km	100km	120km
Dispersion @ 1st channel (ps/nm)	-310	-619	-929	-1238	-1548	-1857
Dispersion @ last channel (ps/nm)	-356	-712	-1068	-1423	-1779	-2135
Insertion Loss @ 1525 - 1565 nm (dB)	≤3.0	≤3.0	≤3.0	≤3.0	≤3.0	≤3.0
PMD (ps)	≤0.5	≤0.5	≤0.5	≤0.7	≤0.7	≤1.0
PDL (dB)	≤0.3	≤0.3	≤0.3	≤0.3	≤0.3	≤0.3

MAINTENANCE

The DCM-B does not require routine hardware maintenance for normal operation. Do not attempt repairs in the field. Repair services may be obtained by returning the defective unit to ADTRAN. Refer to the warranty for further information.

SPECIFICATIONS

Specifications for the DCM-B are as follows:

- Electrical
  - Maximum Input power: 0.1 A @ –48 V
  - Operating voltage: –48 VDC
  - Maximum Heat Dissipation: 4.8 watts
- Physical
  - Height: 9.374 inches; 23.80 centimeters
  - Width: 0.75 inches; 19.0 centimeters
  - Depth: 9.75 inches; 24.8 centimeters
  - Weight: 1.25 pounds; 0.57 kilograms
- Environmental
  - Operational Temperature Range: –40°C to +65°C
  - Storage Temperature Range: –40°C to +85°C
  - Relative Humidity: up to 95%, noncondensing

SAFETY AND REGULATORY COMPLIANCE

Refer to the Safety and Regulatory Compliance Notice for this product (P/N 6117445XG1-17) for detailed safety and regulatory information.

Consultez l'avis sur la sécurité et la conformité à la réglementation pour ce produit (6117445XG1-17) pour obtenir des renseignements détaillés sur la sécurité et la réglementation.

Ausführliche Sicherheits- und regulatorische Informationen sind in der Konformitätserklärung zur Sicherheit und Einhaltung von Normen zu diesem Produkt (6117445XG1-17) aufgeführt.

Warranty: ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found online at www.adtran.com/warranty.

CAUTION!
SUBJECT TO ELECTROSTATIC DAMAGE OR DECREASE IN RELIABILITY
HANDLING PRECAUTIONS REQUIRED

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PRICING AND AVAILABILITY 1.800.827.0807

NetVanta 3430

Modular Access Router

Product Features

- Modular access router supporting up to two T1s
- *RapidRoute*™ technology for greater performance
- Voice Quality Monitoring (VQM) and Mean Opinion Score (MOS) prediction
- Inherent URL filtering
- Standards-based routing/ switching protocols
- Feature-rich ADTRAN® Operating System (AOS)
- IPv6 ready
- CompactFlash® slot for auto-provisioning
- Stateful inspection firewall for network security
- Optional IPSec Virtual Private Network (VPN) for secure corporate connectivity across the Internet
- Onboard hardware encryption accelerator
- Recognizable Command Line Interface (CLI) and intuitive Web-based Graphical User Interface (GUI)
- Network Address Translation (NAT)-compatible Session Initiation Protocol (SIP) Application Layer Gateway (ALG) for Voice over IP (VoIP)
- Wi-Fi® Access Controller for centralized management of NetVanta Wireless Access Points (WAPs)
- Industry-leading five-year North American warranty

The NetVanta® 3430 is a modular access router that uses *RapidRoute* technology to deliver the high-packet throughput required for IP telephony, corporate connectivity, and Internet access. This performance-enhanced platform delivers wire-speed throughput, even with advanced services enabled like Quality of Service (QoS), NAT, firewall, and VPN.

Modular Hardware

The NetVanta 3430 is a modular, 1U-high, rackmountable metal chassis that offers two 10/100Base-T Ethernet interfaces for WAN access LAN segmentation, DMZ, or even broadband backup. The single slot houses any of the NetVanta Series Network Interface Modules (NIMs) and Dial Backup Interface Modules (DIMs). For dial backup, an analog modem DIM or an ISDN BRI DIM is available, preventing downtime by dialing around a failed circuit to any PPP-compliant device.

Standards Protocols

Complementing the versatile hardware, the AOS allows for the support of standards-based switching, Virtual LAN (VLAN) tagging, static and default routes, and demand routing. This enables fast, accurate network convergence using industry-standard routing protocols such as BGP, OSPF, and RIP. In addition, the AOS terminates MPLS, Frame Relay, Multilink Frame Relay, PPP, Multilink PPP, Carrier Ethernet and HDLC Wide Area Network (WAN) protocols. Multihoming is also available to provide redundant or backup WAN links to multiple ISPs, guaranteeing a wide-area connection.

Hierarchal QoS

QoS is also supported for delay-sensitive traffic like VoIP or video. To prioritize mission-critical traffic and control network congestion, the NetVanta 3430 uses Low Latency Queuing, Weighted Fair Queuing (WFQ), Class-based WFQ, and DiffServ marking to establish the priority of IP packets routed over the WAN.

VoIP Ready

In combination with the QoS features, a specialized SIP ALG allows SIP traffic to traverse NAT-enabled firewalls. For enterprise networks, this interoperability allows IP PBXs, phones, and other SIP-based devices to set up, tear down, and pass voice and call control messages seamlessly through the integral NAT-enabled firewall.

The NetVanta 3430 also deploys VQM to capture MOS, jitter, delay, and packet loss statistics necessary to troubleshoot VoIP calls over the WAN. This powerful, yet graphically intuitive, diagnostic tool allows for quick isolation of network issues to ensure superior call quality.

Security

The AOS provides a powerful, high performance stateful inspection firewall that can identify and protect against common Denial of Service (DoS) attacks like TCP syn flooding, IP spoofing, ICMP redirect, ping of death, and IP reassembly problems.

In addition, the AOS is capable of providing an inherent URL-filtering package without the use of an external server. URL-filtering is another level of security that allows system administrators to restrict Internet access by permitting or denying specific URLs. This URL filtering feature also includes the ability to produce top website reports of the most frequently requested websites, allowing system administrators to modify the URL filter lists.

The NetVanta 3430 offers enhanced performance IPSec VPN throughput capabilities to allow for fast network convergence of voice and data traffic through an encrypted network. By supporting IPSec, the NetVanta 3430 is fully compatible with other IPSec VPN-equipped NetVanta products.

Administration

The AOS offers both a CLI that mimics the widely deployed industry *de facto* standard and an intuitive Web-based GUI with step-by-step configuration wizards.

Smart Solutions for a Connected World.

ADTRAN®

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
800 615-1176 toll-free
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www.adtran.com/support

International Inquiries
256 963 8000 voice
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international@adtran.com
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TL19.1270

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

NetVanta 3430

Modular Access Router

Product Specifications

Physical Interface

- **NIM:** 56/64k, T1/FT1, T1/FT1 with DSX-1, Dual T1, E1/FE1, E1/FE1 with G.703, ADSL, SHDSL, and Serial
- **DIM:** Analog Modem and ISDN BRI (U and S/T)
- **LAN:** Two auto-sensing 10/100Base-T ports (RJ-45)

Diagnostics LEDs

- Status
- WAN
- DBU
- Ethernet 1
- Ethernet 2

Memory

- CompactFlash® Slot

Protocols

- eBGP/iBGP
- OSPF
- RIP (v1 and v2)
- PIM Sparse Mode
- Demand Routing
- Policy-based Routing
- GRE
- ATM (ADSL)
- Frame Relay
- Multilink Frame Relay
- Layer 3 Backup
- Multi-VRF CE
- PPP
- Multilink PPP
- PPPoE
- PPPoA
- IGMP v2
- RFC 1483
- HDLC
- PPP Dial Backup
- PAP and CHAP
- Multihoming
- VRRP

Quality of Service

- Low Latency, WFQ and Class-based WFQ
- DiffServ Packet Marking and Recognition
- Frame Relay Fragmentation
- Traffic Monitoring (NetFlow 9)

Voice Quality Monitoring (Optional)

- Mean Opinion Score (MOS) prediction
- Jitter, Delay and Packet Loss
- Past and Active Calls

Administration

- CLI
- Email Alerts (SMTP)
- Policy Statistics
- TCL Scripting
- Flash Provisioning
- Web-based GUI
- n-Command® Support
- SNMP v3
- SYSLOG Logging

DHCP

- Client, Server, and Relay

Security

Firewall

- Stateful Inspection Firewall
- DoS Protection
- Access Control Lists
- ALGs

Network Address Translation

- Basic NAT (1:1), NAPT (Many:1), and Port Translation
- NAT-compatible SIP ALG

Secure Management

- Multi-level access control
- RADIUS AAA
- Port Authentication (802.1x)
- TACACS+
- SSH CLI and SSL GUI

Content Filtering

- Inherent URL filter
- Integration with Websense®
- Top website reports

Optional VPN

- **IPSec Tunnel Mode:** 100 Tunnels
- **Encryption:** DES, 3DES, and AES
- **Authentication Mechanisms:** XAUTH, Digital certificates, Pre-Shared Keys, and Secure ID

Environment

- **Operating temperature:** 0° to 50 °C (32° to 122 °F)
- **Storage temperature:** -20° to 70 °C (-4° to 158 °F)
- **Relative humidity:** Up to 95%, non-condensing

Physical

- **Chassis:** 1U, metal chassis
- **Dimensions:** 1.72" H, 10.5" W, 5.8" D
- **Weight:** 4 lbs.
- **Auto-ranging Power:** 100–250 VAC, 50–60Hz, 25 watts

Agency Approvals

- CE Mark, UL & Canadian UL (CUL), IEC/EN
- RoHS

Ordering Information

Equipment	Part #
NetVanta 3430	1202820G1
NetVanta 3430 with VPN and VQM	4200820E2
VPN and VQM Software Upgrade	1950820E2

NetVanta 3448

Multiservice Access Router

Product Features

- Multiservice access router supporting up to two T1s
- *RapidRoute*™ technology for greater performance
- Integral eight-port non-blocking Ethernet switch, with Power over Ethernet (PoE) option
- Voice Quality Monitoring (VQM) and Mean Opinion Score (MOS) prediction
- Inherent URL filtering
- Standards-based routing/switching protocols
- Feature-rich ADTRAN® Operating System (AOS)
- IPv6 ready
- CompactFlash® slot for auto-provisioning
- Stateful inspection firewall for network security
- Optional IPSec Virtual Private Network (VPN) for secure corporate connectivity across the Internet
- Onboard hardware encryption accelerator
- Recognizable Command Line Interface (CLI) and intuitive Web-based Graphical User Interface (GUI)
- Network Address Translation (NAT)-compatible Session Initiation Protocol (SIP) Application Layer Gateway (ALG) for Voice over IP (VoIP)
- Wi-Fi® Access Controller for centralized management of NetVanta® Wireless Access Points (WAPs)
- Industry-leading five-year North American warranty

As a multiservice access router, the NetVanta® 3448 uses *RapidRoute* technology to deliver the high-packet throughput required for IP telephony, corporate connectivity, and Internet access. This performance-enhanced platform delivers wire-speed throughput, even with advanced services enabled like Quality of Service (QoS), NAT, firewall, and VPN.

Modular Hardware

The NetVanta 3448 is a modular, 1U-high, rackmountable metal chassis that offers a single slot to house any of the NetVanta Series Network Interface Modules (NIMs) and Dial Backup Interface Modules (DIMs). For dial backup, an analog modem DIM or an ISDN BRI DIM is available, preventing downtime by dialing around a failed circuit to any PPP-compliant device. The NetVanta 3448 also includes two 10/100Base-T Ethernet interfaces and a fully managed, non-blocking, eight-port switch which can be separately powered to yield an 802.3af-compliant PoE switch delivering a full 15.4 watts per port.

Standards Protocols

Complementing the versatile hardware, the AOS allows for the support of standards-based switching, Virtual LAN (VLAN) tagging, static and default routes, and demand routing. This enables fast, accurate network convergence using routing protocols such as BGP, OSPF, and RIP. In addition, the AOS terminates MPLS, Frame Relay, Multilink Frame Relay, PPP, Multilink PPP, and HDLC Wide Area Network (WAN) protocols. Multihoming is also available to provide redundant or backup WAN links to multiple ISPs, guaranteeing a wide-area connection.

QoS

QoS is also supported for delay-sensitive traffic like VoIP or video. To prioritize mission-critical traffic and control network congestion, the NetVanta 3448 uses Low Latency Queuing, Weighted Fair Queuing (WFQ), Class-based WFQ, and DiffServ marking to establish the priority of IP packets routed over the WAN.

VoIP Ready

In combination with the QoS features, a specialized SIP ALG allows SIP traffic to traverse NAT-enabled firewalls. For enterprise networks, this interoperability allows IP PBXs, phones, and other SIP-based devices to set up, tear down, and pass voice and call control messages seamlessly through the integral NAT-enabled firewall.

The NetVanta 3448 also deploys VQM to capture MOS, jitter, delay, and packet loss statistics necessary to troubleshoot VoIP calls over the WAN. This powerful, yet graphically intuitive, diagnostic tool allows for quick isolation of network issues to ensure superior call quality.

Security

The AOS provides a powerful, high performance stateful inspection firewall that can identify and protect against common Denial of Service (DoS) attacks like TCP syn flooding, IP spoofing, ICMP redirect, ping of death, and IP reassembly problems.

In addition, the AOS is capable of providing an inherent URL-filtering package without the use of an external server. URL filtering is another level of security that allows system administrators to restrict Internet access by permitting or denying specific URLs. This URL-filtering feature also includes the ability to produce top website reports of the most frequently requested websites, allowing system administrators to modify the URL filter lists.

The NetVanta 3448 also supports up to 100 simultaneous IPSec VPN tunnels and encryption algorithms like DES, 3DES, and AES. By supporting IPSec, the NetVanta 3448 is fully compatible with other IPSec VPN-equipped NetVanta products.

Administration

The AOS offers both a CLI that mimics the widely deployed industry *de facto* standard and an intuitive Web-based GUI with step-by-step configuration wizards.

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
800 615-1176 toll-free
application.engineer@adtran.com
www.adtran.com/support

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TL19.1270

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

NetVanta 3448

Multiservice Access Router

Product Specifications

Physical Interface

- **NIM:** 56/64k, T1/FT1, T1/FT1 with DSX-1, Dual T1, E1/FE1, E1/FE1 with G.703, ADSL, SHDSL, and Serial
- **DIM:** Analog Modem and ISDN BRI (U and S/T)
- **LAN:** Two Auto-sensing 10/100Base-T ports (RJ-45) RJ
- **Switch:** Eight-port, Auto-sensing Ethernet Switch 10/100Base-T Full Duplex (Optional PoE support)

Diagnostics LEDs

- Status
- Ethernet 1
- Switch 1–8
- WAN
- Ethernet 2
- PoE
- DBU

Memory

- **RAM:** 128 MB
- **FLASH:** 32 MB
- CompactFlash® Slot

Protocols

- eBGP/iBGP
- OSPF
- RIP (v1 and v2)
- PIM Sparse Mode
- Demand Routing
- Policy-based Routing
- GRE
- ATM (ADSL)
- Frame Relay
- Multilink Frame Relay
- Layer 3 Backup
- Multi-VRF CE
- PPP
- Multilink PPP
- PPPoE
- PPPoA
- IGMP v2
- RFC 1483
- HDLC
- PPP Dial Backup
- PAP and CHAP
- Multihoming
- VRRP

Quality of Service

- Low Latency, WFQ and Class-based WFQ
- DiffServ Packet Marking and Recognition
- Frame Relay Fragmentation
- Traffic Monitoring (NetFlow 9)

Voice Quality Monitoring (Optional)

- Mean Opinion Score (MOS) prediction
- Jitter, Delay and Packet Loss
- Past and Active Calls

Switching

- Weighted Round Robin (WRR) and Strict Priority Queuing
- VLAN Support (802.1Q)
- Spanning Tree (802.1D)
- Rapid Spanning Tree (802.1w)
- 802.1p and DiffServ QoS
- Optional 802.3af PoE Delivering 15.4 watts per Port

Administration

- CLI
- Email Alerts (SMTP)
- Policy Statistics
- TCL Scripting
- FLASH provisioning
- Web-based GUI
- n-Command ® Support
- SNMP v3
- SYSLOG Logging

DHCP

- Client, Server, and Relay

Security

Firewall

- Stateful Inspection Firewall
- DoS Protection
- Access Control Lists (ACLs)
- ALGs

Network Address Translation

- Basic NAT (1:1), NAPT (Many:1), and Port Translation
- NAT compatible SIP ALG

Secure Management

- Multi-level Access Control
- RADIUS AAA
- Port Authentication (802.1x)
- TACACS+
- SSH CLI and SSL GUI

Content Filtering

- Inherent URL filter
- Integration with Websense®
- Top website reports

Optional VPN

- **IPSec Tunnel Mode:** 100 Tunnels
- **Encryption:** DES, 3DES, and AES
- **Authentication Mechanisms:** XAUTH, Digital certificates, Pre-Shared Keys, and Secure ID

Environment

- **Operating Temperature:** 0° to 50 °C (32° to 122 °F)
- **Storage Temperature:** -20° to 70 °C (-4° to 158 °F)
- **Relative Humidity:** Up to 95%, non-condensing

Physical

- **Chassis:** 1U, metal chassis
- **Dimensions:** 1.75" H, 11.75" W, 7.5" D
- **Weight:** 4 lbs.
- **Power:** 100–250 VAC, 50–60Hz, 25 watts

Agency Approvals

- CE Mark, UL & Canadian UL (CUL), IEC/EN
- RoHS

Ordering Information

Equipment	Part #
NetVanta 3448	1200821E1
NetVanta 3448 with VPN and VQM	4200821E2
NetVanta 3448 PoE	4200821G11#120
NetVanta 3448 PoE with VPN and VQM	4200821G12#120
VPN and VQM Software Upgrade	1950821E2

NetVanta 3450

Modular Access Router Supporting Metro Ethernet and up to Four T1s of Bandwidth

Product Features

- Modular access router supporting up to four T1s
- *RapidRoute*™ technology for greater performance
- Voice Quality Monitoring (VQM) and Mean Opinion Score (MOS) prediction
- Inherent URL filtering
- Standards-based routing/ switching protocols
- Feature-rich ADTRAN® Operating System (AOS)
- IPv6 ready
- CompactFlash® slot for auto-provisioning
- Stateful inspection firewall for network security
- Optional IPSec Virtual Private Network (VPN) for secure corporate connectivity across the Internet
- Onboard hardware encryption accelerator
- Recognizable Command Line Interface (CLI) and intuitive Web-based Graphical User Interface (GUI)
- Network Address Translation (NAT)-compatible Session Initiation Protocol (SIP) Application Layer Gateway (ALG) for Voice over IP (VoIP)
- Wi-Fi® Access Controller for centralized management of NetVanta Wireless Access Points (WAPs)
- Industry-leading five-year North American warranty

The NetVanta® 3450 is an ideal solution for multi-T1 and Metro Ethernet deployments. This modular access router uses *RapidRoute* technology to deliver the high-packet throughput required for IP telephony, corporate connectivity, and Internet access. Supporting up to 4 T1s worth of bandwidth and 100 Mbps for Metro Ethernet throughput, this performance-enhanced platform delivers wire-speed throughput, even with advanced services enabled like Quality of Service (QoS), NAT, firewall, and VPN.

Modular Hardware

The NetVanta 3450 is a modular, 1U-high, rackmountable metal chassis that offers two 10/100Base-T Ethernet interfaces for WAN access LAN segmentation, DMZ, or even broadband backup. The dual-slot chassis houses any of the NetVanta Series Network Interface Modules (NIMs) and Dial Backup Interface Modules (DIMs). For dial backup, an analog modem DIM or an ISDN BRI DIM is available, preventing downtime by dialing around a failed circuit to any PPP-compliant device.

Standards Protocols

Complementing the versatile hardware, the AOS allows for the support of standards-based switching, Virtual LAN (VLAN) tagging, static and default routes, and demand routing. This enables fast, accurate network convergence using routing protocols such as BGP, OSPF, and RIP. In addition, the AOS terminates Ethernet, MPLS, Frame Relay, Multilink Frame Relay, PPP, Multilink PPP, and HDLC Wide Area Network (WAN) protocols. Multihoming is also available to provide redundant or backup WAN links to multiple ISPs, guaranteeing a wide-area connection.

QoS

QoS is also supported for delay-sensitive traffic like VoIP or video. To prioritize mission-critical traffic and control network congestion, the NetVanta 3450 uses Low Latency Queuing, Weighted Fair Queuing (WFQ), Class-based WFQ, and DiffServ marking to establish the priority of IP packets routed over the WAN.

VoIP Ready

In combination with the QoS features, a specialized SIP ALG allows SIP traffic to traverse NAT-enabled firewalls. For enterprise networks, this interoperability allows IP PBXs, phones, and other SIP-based devices to set up, tear down, and pass voice and call control messages seamlessly through the integral NAT-enabled firewall.

The NetVanta 3450 also features VQM to capture MOS, jitter, delay, and packet loss statistics necessary to troubleshoot VoIP calls over the WAN. This powerful, yet graphically intuitive, diagnostic tool allows for quick isolation of network issues to ensure superior call quality.

Security

The AOS provides a powerful, high performance stateful inspection firewall that can identify and protect against common Denial of Service (DoS) attacks like TCP syn flooding, IP spoofing, ICMP redirect, ping of death, and IP reassembly problems.

In addition, the AOS is capable of providing an inherent URL-filtering package without the use of an external server. URL-filtering is another level of security that allows system administrators to restrict Internet access by permitting or denying specific URLs. This URL filtering feature also includes the ability to produce top website reports of the most frequently requested websites, allowing system administrators to modify the URL filter lists.

The NetVanta 3450 also supports up to 500 simultaneous IPSec VPN tunnels and encryption algorithms like DES, 3DES, and AES. By supporting IPSec, the NetVanta 3450 is fully compatible with other IPSec VPN-equipped NetVanta products.

Administration

The AOS offers both a GUI and a CLI for configuration and management. The Web-based GUI provides ease of management including step-by-step configuration wizards. The CLI mimics the widely deployed industry *de facto* standard.

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ADTRAN®

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
800 615-1176 toll-free
application.engineer@adtran.com
www.adtran.com/support

Where to Buy
877 280-8416 toll-free
channel.sales@adtran.com
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Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
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aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963 8000 voice
256 963-6300 fax
international@adtran.com
www.adtran.com/global

For the regional office nearest you, visit:
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TL19.1270

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

NetVanta 3450

Modular Access Router

Product Specifications

Physical Interface
- **NIM:** 56/64k, T1/FT1, T1/FT1 with DSX-1, Dual T1, 3G Cellular, E1/FE1, E1/FE1 with G.703, ADSL, SHDSL, and Serial
- **DIM:** Analog Modem and ISDN BRI (U and S/T)
- **LAN:** Two auto-sensing 10/100Base-T ports (RJ-45)

Diagnostics LEDs
- Status
- WAN
- DBU
- Ethernet 1
- Ethernet 2

Memory
- RAM: 128 MB
- FLASH: 32 MB
- CompactFlash® Slot

Protocols
- eBGP/iBGP
- OSPF
- RIP (v1 and v2)
- PIM Sparse Mode
- Demand Routing
- Policy-based Routing
- GRE
- ATM (ADSL)
- Frame Relay
- Multilink Frame Relay
- Layer 3 Backup
- Multi-VRF CE
- PPP
- Multilink PPP
- PPPoE
- PPPoA
- IGMP v2
- RFC 1483
- HDLC
- PPP Dial Backup
- PAP and CHAP
- Multihoming
- VRRP

Quality of Service
- Low Latency, WFQ and Class-based WFQ
- DiffServ Packet Marking and Recognition
- Frame Relay Fragmentation
- Traffic Monitoring (NetFlow 9)

Voice Quality Monitoring (Optional)
- Mean Opinion Score (MOS) prediction
- Jitter, Delay and Packet Loss
- Past and Active Calls

Administration
- CLI
- Email Alerts (SMTP)
- Policy Statistics
- TCL Scripting
- Flash Provisioning
- Web-based GUI
- n-Command® Support
- SNMP v3
- SYSLOG Logging

DHCP
- Client, Server, and Relay

Firewall
- Stateful Inspection Firewall
- DoS Protection
- Access Control Lists
- ALGs

Network Address Translation
- Basic NAT (1:1), NAPT (Many:1), and Port Translation
- NAT-compatible SIP ALG

Secure Management
- Multi-level access control
- RADIUS AAA
- Port Authentication (802.1x)
- TACACS+
- SSH CLI and SSL GUI

Content Filtering
- Inherent URL filter
- Integration with Websense®
- Top website reports

Optional VPN
- **IPSec Tunnel Mode:** 500 Tunnels
- **Encryption:** DES, 3DES, and AES
- **Authentication Mechanisms:** XAUTH, Digital certificates, Pre-Shared Keys, and Secure ID

Environment
- **Operating Temperature:** 0° to 50 °C (32° to 122 °F)
- **Storage Temperature:** -20° to 70 °C (-4° to 158 °F)
- **Relative Humidity:** Up to 95%, non-condensing

Physical
- **Chassis:** 1U, rackmountable metal enclosure
- **Dimensions:** 1.25" H, 17.25" W, 7.75" D
- **Weight:** 7.5 lbs.
- **Power:** 100-250 VAC, 50/60 Hz, 6 W max.

Agency Approvals
- FCC Part 68
- Industry Canada CS03
- UL & Canadian UL (CUL), IEC/EN, CSA
- CE Mark
- RoHS

Ordering Information

Equipment	Part #
NetVanta 3450	1200823G1
NetVanta 3450 EFP	4200823G2
NetVanta 3450 EFP Upgrade	1950823G2

NetVanta 3458

Multiservice Access Router Supporting Metro Ethernet and up to Four T1s of Bandwidth

Product Features

- Modular access router supporting up to four T1s
- *RapidRoute*™ technology for greater performance
- Integral eight-port nonblocking Ethernet switch, with Power over Ethernet (PoE) option
- Voice Quality Monitoring (VQM) and Mean Opinion Score (MOS) prediction
- Inherent URL filtering
- Standards-based routing/ switching protocols
- Feature-rich ADTRAN® Operating System (AOS)
- IPv6 ready
- CompactFlash® slot for auto-provisioning
- Stateful inspection firewall for network security
- Optional IPSec Virtual Private Network (VPN) for secure corporate connectivity across the Internet
- Onboard hardware encryption accelerator
- Recognizable Command Line Interface (CLI) and intuitive Web-based Graphical User Interface (GUI)
- Network Address Translation (NAT)-compatible Session Initiation Protocol (SIP) Application Layer Gateway (ALG) for Voice over IP (VoIP)
- Wi-Fi® Access Controller for centralized management of NetVanta Wireless Access Points (WAPs)
- Industry-leading five-year North American warranty

The NetVanta® 3458 is an ideal solution for multi-T1 and Metro Ethernet deployments. This modular access router uses *RapidRoute* technology to deliver the high-packet throughput required for IP telephony, corporate connectivity, and Internet access. Supporting up to 4 T1s worth of bandwidth and 40 Mbps for Metro Ethernet throughput, as well as providing 8 PoE switch ports for LAN connectivity, this performance-enhanced platform delivers wire-speed throughput, even with advanced services enabled like Quality of Service (QoS), NAT, firewall, and VPN.

Modular Hardware

The NetVanta 3458 is a modular, 1U-high, rackmountable metal chassis that offers two 10/100Base-T Ethernet interfaces for WAN access LAN segmentation, DMZ, or even broadband backup. The dual-slot chassis houses any of the NetVanta Series Network Interface Modules (NIMs) and Dial Backup Interface Modules (DIMs). For dial backup, an analog modem DIM or an ISDN BRI DIM is available, preventing downtime by dialing around a failed circuit to any PPP-compliant device. The NetVanta 3458 also includes two 10/100Base-T Ethernet interfaces and a fully managed, eight-port switch which can be powered to yield an 802.3af-compliant PoE switch delivering a full 15.4 watts per port.

Standards Protocols

Complementing the versatile hardware, the AOS allows for the support of standards-based switching, Virtual LAN (VLAN) tagging, static and default routes, and demand routing. This enables fast, accurate network convergence using routing protocols such as BGP, OSPF, and RIP. In addition, the AOS terminates Ethernet, MPLS, Frame Relay, Multilink Frame Relay, PPP, Multilink PPP, and HDLC Wide Area Network (WAN) protocols. Multihoming is also available to provide redundant or backup WAN links to multiple ISPs, guaranteeing a wide-area connection.

QoS

QoS is also supported for delay-sensitive traffic like VoIP or video. To prioritize mission-critical traffic and control network congestion, the NetVanta 3458 uses Low Latency Queuing, Weighted Fair Queuing (WFQ), Class-based WFQ, and DiffServ marking to establish the priority of IP packets routed over the WAN.

VoIP Ready

In combination with the QoS features, a specialized SIP ALG allows SIP traffic to traverse NAT-enabled firewalls. For enterprise networks, this interoperability allows IP PBXs, phones, and other SIP-based devices to set up, tear down, and pass voice and call control messages seamlessly through the integral NAT-enabled firewall. The NetVanta 3458 also deploys VQM to capture MOS, jitter, delay, and packet loss statistics necessary to troubleshoot VoIP calls over the WAN. This powerful, yet graphically intuitive, diagnostic tool allows for quick isolation of network issues to ensure superior call quality.

Security

The AOS provides a powerful, high performance stateful inspection firewall that can identify and protect against common Denial of Service (DoS) attacks like TCP syn flooding, IP spoofing, ICMP redirect, ping of death, and IP reassembly problems.

In addition, the AOS is capable of providing an inherent URL-filtering package without the use of an external server. URL-filtering is another level of security that allows system administrators to restrict Internet access by permitting or denying specific URLs. This URL filtering feature also includes the ability to produce top website reports of the most frequently requested websites, allowing system administrators to modify the URL filter lists.

The NetVanta 3458 also supports up to 500 simultaneous IPSec VPN tunnels and encryption algorithms like DES, 3DES, and AES. By supporting IPSec, the NetVanta 3458 is fully compatible with other IPSec VPN-equipped NetVanta products.

Administration

The AOS offers both a GUI and a CLI for configuration and management. The Web-based GUI provides ease of management including step-by-step configuration wizards. The CLI mimics the widely deployed industry *de facto* standard.

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ADTRAN®

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
800 615-1176 toll-free
application.engineer@adtran.com
www.adtran.com/support

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support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
888 874-ACES
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www.adtran.com/support

Global Inquiries
256 963 8000 voice
256 963-6300 fax
international@adtran.com
www.adtran.com/global

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NetVanta 3458

Multiservice Access Router

Product Specifications

Physical Interface
- **NIM:** 56/64k, T1/FT1, T1/FT1 with DSX-1, Dual T1, 3G Cellular, E1/FE1, E1/FE1 with G.703, ADSL, SHDSL, and Serial
- **DIM:** Analog Modem and ISDN BRI (U and S/T)
- **LAN:** Two auto-sensing 10/100Base-T ports (RJ-45)
- **Switch:** Eight-port, Auto-sensing Ethernet Switch 10/100Base-T Full Duplex (Optional PoE support)

Diagnostics LEDs
- Status
- WAN
- DBU
- Ethernet 1
- Ethernet 2

Memory
- **RAM:** 128 MB
- CompactFlash® Slot
- FLASH: 32 MB

Protocols
- BGP/iBGP
- OSPF
- RIP (v1 and v2)
- PIM Sparse Mode
- Demand Routing
- Policy-based Routing
- GRE
- PPP Dial Backup
- Multi-VRF CE
- VRRP
- Layer 3 Backup
- Multihoming
- PPP
- Multilink PPP
- PPPoE
- PPPoA
- IGMP v2
- RFC 1483
- HDLC
- ATM (ADSL)
- Frame Relay
- PAP and CHAP
- Multilink Frame Relay

Quality of Service
- Low Latency, WFQ and Class-based WFQ
- DiffServ Packet Marking and Recognition
- Frame Relay Fragmentation
- Traffic Monitoring (NetFlow 9)

Voice Quality Monitoring (Optional)
- Mean Opinion Score (MOS) prediction
- Jitter, Delay and Packet Loss
- Past and Active Calls

Administration
- CLI
- Email Alerts (SMTP)
- Policy Statistics
- TCL Scripting
- Flash Provisioning
- Web-based GUI
- n-Command® Support
- SNMP v3
- SYSLOG Logging

DHCP
- Client, Server, and Relay

Firewall
- Stateful Inspection Firewall
- DoS Protection
- Access Control Lists
- ALGs

Network Address Translation
- Basic NAT (1:1), NAPT (Many:1), and Port Translation
- NAT-compatible SIP ALG

Secure Management
- Multi-level access control
- RADIUS AAA
- Port Authentication (802.1x)
- TACACS+
- SSH CLI and SSL GUI

Content Filtering
- Inherent URL filter
- Integration with Websense
- Top website reports

Optional VPN
- IPSec Tunnel Mode: 500 Tunnels
- **Encryption:** DES, 3DES, and AES
- **Authentication Mechanisms:** XAUTH, Digital certificates, Pre-Shared Keys, and Secure ID

Environment
- **Operating Temperature:** 0° to 50 °C (32° to 122 °F)
- **Storage Temperature:** -20° to 70 °C (-4° to 158 °F)
- **Relative Humidity:** Up to 95%, non-condensing

Physical
- **Chassis:** 1U rackmountable metal enclosure
- Dimensions: 1.25" H, 17.25" W, 7.75" D
- **Weight:** 7.5 lbs.
- **Power:** 100-250 VAC, 50/60 Hz, 6 W max.

Agency Approvals
- FCC Part 68
- UL & Canadian UL (CUL), IEC/EN, CSA
- CE Mark
- Industry Canada CS03
- RoHS

Ordering Information

Equipment	Part #
NetVanta 3458	1200824G1
NetVanta 3458 EFP	4200824G2
NetVanta 3458 PoE	4200824G11#120
NetVanta 3458 PoE EFP	4200824G12#120
NetVanta 3458 EFP Upgrade	1950824G2
NetVanta 3458 PoE Upgrade	4200825G1#120

TL9000 TL19.1270

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

61200824G1-8C October 2011

NetVanta 4430

Multi-slot Access Router Supporting Multiple T1s and Carrier Ethernet

Product Features

- Three-slot, three-Ethernet IP access router for eight T1s of bandwidth
- Dual auto-sensing Gigabit Ethernet interfaces for LAN segmentation
- CompactFlash® slot for auto-provisioning
- *RapidRoute*™ technology for greater performance
- Stateful inspection firewall for network security
- Quality of Service (QoS) for delay-sensitive traffic like Voice over IP (VoIP)
- Optional Voice Quality Monitoring (VQM) and Mean Opinion Score (MOS) prediction
- Inherent URL filtering
- IPv6 ready
- VLAN Trunking (802.1Q) for routing between VLANs
- Optional Virtual Private Network (VPN) for secure corporate connectivity across the Internet
- Recognizable Command Line Interface (CLI) and intuitive Web-based Graphical User Interface (GUI)
- Network Address Translation (NAT) conceals private IP addresses
- Software upgrade for IPSec-based VPN
- Feature-rich ADTRAN® Operating System (AOS)
- Industry-leading five-year North American warranty

The NetVanta® 4430 is an access router designed for higher-bandwidth applications supporting up to eight T1s for Internet access, corporate Frame Relay, point-to-point connectivity, ADSL, VPN, and carrier Ethernet connections.

Modular Hardware

Residing in a 1U high, 19" rackmountable metal enclosure, the NetVanta 4430 is a single platform that offers one wide module slot, two Network Interface Module (NIM) slots, dual Gigabit Ethernet LAN ports (copper or fiber) for true LAN segmentation or DMZ applications, and one 10/100Base-T Fast Ethernet port for management or routing. The single wide module slot within the NetVanta 4430 will house the Octal T1/E1 Wide Module, while the NIM slots will support a variety of the NetVanta NIMs and Dial Backup Modules (DIMs). For dial backup, an analog modem DIM or an ISDN BRI DIM is available for preventing downtime by dialing around a failed circuit to any PPP-compliant device.

Standards Protocols

The versatile hardware platform of the NetVanta 4430 is further complemented with the AOS. The AOS allows for the support of static and default routes, demand and policy-based routing, and allows for fast, accurate network convergence using routing protocols such as BGP, OSPF, RIP, and PIM Sparse Mode for multicast routing. In addition, the AOS terminates MPLS, Frame Relay, Multilink Frame Relay, PPP, Multilink PPP, PPPoE, PPPoA, RFC 1483, and HDLC Wide Area Network (WAN) protocols. Multihoming is also available to provide redundant or backup WAN links to multiple ISPs, guaranteeing a wide-area connection.

QoS

QoS is also supported for delay-sensitive traffic like VoIP or video. To prioritize mission-critical traffic and control network congestion, the NetVanta 4430 uses Low Latency Queuing, Weighted Fair Queuing (WFQ), Class-based WFQ, and DiffServ marking to establish priority of IP packets routed over the WAN. The NetVanta 4430 also includes Enhanced QoS support for Ethernet WAN connections including the ability to prioritize traffic by VLAN.

VoIP Ready

In combination with the QoS features, a specialized Session Initiation Protocol (SIP) Application Layer Gateway (ALG) allows SIP traffic to traverse NAT-enabled firewalls. For an enterprise network, this interoperability allows IP PBXs, phones, and other SIP-based devices to set up, tear down, and pass voice and call control messages seamlessly through the integral NAT-enabled firewall. The NetVanta 4430 also supports VQM to capture MOS, jitter, delay, and packet loss statistics necessary to troubleshoot VoIP calls over the WAN. This powerful, yet graphically intuitive, diagnostic tool allows for quick isolation of network issues to ensure superior call quality.

Security

The AOS provides a powerful, high-performance stateful inspection firewall. The firewall can identify and protect against common Denial of Service (DoS) attacks like TCP syn flooding, IP spoofing, ICMP redirect, ping-of-death, and IP reassembly problems. In addition, the AOS is capable of providing an inherent URL-filtering package without the use of an external server. URL filtering is another level of security that allows system administrators to restrict Internet access by permitting or denying specific URLs. This URL-filtering feature also includes the ability to produce top website reports of the most frequently requested websites, allowing system administrators to modify the URL filter lists. The NetVanta 4430 also adds the support for IPSec-compliant VPN. The NetVanta 4430 supports up to 1,000 simultaneous VPN tunnels, while also supporting encryption algorithms like DES, 3DES, and AES. With this upgrade, the NetVanta 4430 is fully compatible with other IPSec VPN-equipped NetVanta products.

Administration

The AOS offers both a CLI that mimics the widely deployed industry de facto standard and an intuitive Web-based GUI with step-by- step configuration wizards.

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ADTRAN®

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/presales

Where to Buy
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channel.sales@adtran.com
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Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
888 874-2237
aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963-8000
256 963-6300 fax
international@adtran.com

NetVanta 4430

Multi-slot Access Router Supporting Multiple T1s and Carrier Ethernet

Physical Interface
- **One Wide Slot:** Octal T1/E1 Wide Module
- **Dual NIM Slots:** 56/64k, T1/FT1, T1/FT1 with DSX-1, Dual T1, ADSL, SHDSL, E1/FE1, E1/FE1 with G.703, and Serial
- **DIM:** Analog Modem and ISDN BRI (U and S/T)
- **LAN Ports:**
  - 10/100Base-T Ethernet Port (RJ-45)
  - Two combo 10/100/1000Base-T/SFP Ports
- Console Port

Diagnostics LEDs
- Power
- **Slots:** status, activity, test
- **LANs:** link, transmit, receive

Processor and Memory
- 833 Mhz, MPC 8555E
- **RAM:** 256 MB
- **FLASH:** 32 MB
- CompactFlash®

Protocols
- eBGP/iBGP
- OSPF
- RIP (v1 and v2)
- Demand Routing
- GRE
- IGMP v2
- ATM (ADSL)
- Frame Relay
- Multilink Frame Relay
- Layer 3 Backup
- Multi-VRF CE
- PPP
- PPPoE
- PPPoA
- RFC 1483
- Multilink PPP
- HDLC
- PPP Dial Backup
- PAP and CHAP
- Multihoming
- VRRP

Quality of Service (QoS)
- Class-based Weighted Fair Queuing, Low Latency, and Weighted Fair Queuing
- DiffServ marking and packet recognition
- Frame Relay Fragmentation
- Traffic Monitoring (NetFlow 9)

Voice Quality Monitoring (Optional)
- Mean Opinion Score (MOS) prediction
- Jitter, Delay and Packet Loss
- Past and Active Calls

Administration
- Familiar Command Line Interface (CLI)
- Web-based GUI
- n-Command® support
- SNMP v3
- TCL Scripting
- SYSLOG logging
- Email alerts (SMTP)
- Policy statistics

Frame Relay
- Point-to-point
- RFC 1490 Encapsulation (Multiprotocol Over Frame Relay)
- LMI types: LMI, ANSI (Annex D), CCITT (Annex A) and Static

DHCP
- Client, Server, and Relay

Security
Firewall
- Stateful Inspection Firewall
- Denial of Service (DoS) Protection
- Access Control Lists
- Application Level Gateways (ALGs)

Network Address Translation
- Basic NAT (1:1), NAPT (Many:1), and 1:1 Port Translation
- NAT-compatible SIP ALG

Secure Management
- Multi-level access control
- RADIUS AAA
- Port Authentication (802.1x)
- TACACS+
- SSH CLI and SSL GUI

Content Filtering
- Inherent URL filter
- Top website reports
- Integration with Websense®

Virtual Private Network (VPN) (Optional)
- **IPSec Tunnel Mode:** Tunnels 1,000
- **Encryption:** DES, 3DES, and AES
- **Authentication Mechanisms:**
  - XAUTH
  - X.509 Digital certificates
  - Preshared keys
  - Secure ID
  - DSS Signatures

Environment
- **Operating Temperature:** 0° to 50 °C (32° to 122 °F)
- **Storage Temperature:** -20° to 70 °C (-4° to 158 °F)
- **Relative Humidity:** Up to 95%, non-condensing

Physical
- **Chassis:** 1U, rack mountable metal enclosure
- **Dimensions:** 1.75" H, 17.25" W, 11" D
- **Weight:** 7.5 lbs.
- **Power:** 100-120V, 60Hz, 75W max.

Agency Approvals
- FCC Part 15
- Industry Canada CS03
- UL & Canadian UL (CUL), IEC/EN, CSA
- CE Mark
- RoHS

Ordering Information

Equipment	Part #
NetVanta 4430 Chassis	1700630E1
NetVanta 4430 Chassis with VPN and VQM	4700630G2
VPN and VQM Upgrade	1950730G2

TL9000
TL19.1270

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

61700630E1-8E January

NetVanta 6250

High Performance IP Business Gateways

DATA SHEET DS DATA SHEET

Product Features

- ADTRAN's highest performing IP Business Gateway for delivering business services
- Seamless voice and data integration over VoIP-based network architectures
- Includes five routed Ethernet interfaces
- Up to 24 analog POTS interfaces
- Perfect for multi-T1 through higher bandwidth Ethernet services
- VQM for advance troubleshooting
- QoS ensures priority for voice traffic
- Packet Capture (PCAP) for easy troubleshooting
- Designed to support both legacy and SIP PBX connectivity
- Compatible with industry-leading softswitches and call agents
- Dynamic bandwidth allocation affords more efficient utilization
- Standardized voice compression requires less bandwidth per voice call
- Integral full-featured business class IP router for data support and Internet access
- Full featured SBC for robust network security and voice interoperability
- Supports 802.1q Virtual LAN (VLAN) Trunking
- NAT for IP address concealment
- Feature-rich AOS
- Rugged metal case
- Optional battery backup
- Industry-leading, five-year warranty (North America)
- Dual AC/DC power supply

The NetVanta® 6250 IP Business Gateways are designed for carrier Ethernet and Voice over IP (VoIP) networks delivering high speed services to the customer premises. These products feature all of the same robust routing and voice features of the market leading Total Access® 900e IP Business Gateways, along with a host of new features and functions that enable cost effective, reliable IP service delivery. These devices use the ADTRAN® Operating System (AOS) to simplify management and administration. Multiple models offer flexibility for various applications from PRI delivery and trunking services to Hosted IP PBX offerings.

The NetVanta 6250 is designed for legacy T1 access as well as emerging Ethernet delivery. User interfaces include:

- Five routed Ethernet ports (one Gigabit/SFP and four Fast Ethernet) for WAN/LAN connectivity, and access to the NetVanta 6250's router
- One USB interface for wireless backup or local storage
- Four T1 ports for network connectivity or legacy PBX connection
- Up to 24 FXS analog voice ports, up to nine FXO

This solution can be coupled with a NetVanta Power over Ethernet (PoE) switch to provide connectivity to a variety of network devices and personal computers, as well as to power IP phones and Wireless Access Points (WAPs).

VoIP Gateway

The NetVanta 6250 Series utilizes SIP or MGCP for VoIP applications, providing interoperability with industry-leading softswitches, feature servers, and gateways. Acting as a gateway, these devices convert IP signaling from the carrier into traditional TDM analog and digital voice services. This functionality allows the NetVanta 6250 to deliver voice services to both IP phones and traditional telephony equipment simultaneously. For customers implementing a hosted PBX or IP Centrex service, the NetVanta 6250 is ideal for providing customers additional analog ports necessary to support their remaining analog phones, fax machines, or modems. The NetVanta 6250 supports many popular calling features such as caller ID, call hold, forward, transfer, and call waiting. Voice Activity Detection (VAD) and silence suppression are supported and the flexible design allows the NetVanta 6250 to deliver high quality voice service assurance.

Enterprise Session Border Control (eSBC)

The NetVanta 6250 also can provide eSBC functionality delivering a truly converged application platform at the customer premises. This feature is becoming mandatory in today's service deployment to normalize, secure and troubleshoot the SIP to SIP communication between a carrier network and the customer's SIP compliant equipment. The strength of the NetVanta 6250 in your VoIP service deployment is its ability to grow as your services expand.

Local and Remote Survivability

In addition, the NetVanta 6250 can act as a registrar and Back-to-Back User Agent (B2BUA) or as a SIP-transparent proxy to facilitate remote survivability and Network Address Translation (NAT) traversal. In the event of a service interruption on the wide area network or if the carrier's call agent were to become unavailable, calls may continue locally at the customer premises between IP-based or analog phones. In addition, local call survivability to the PSTN is provided via the optional FXO, or over one of the T1/PRI interfaces.

Superior Call Quality

Inherent Quality of Service (QoS) methods ensure appropriate classification and prioritization of VoIP traffic. These methods include low latency, weighted fair queuing, class-based weighted fair queuing, Voice Quality Monitoring (VQM) captures Mean Opinion Score (MOS), jitter, delay, and packet loss statistics necessary to troubleshoot VoIP calls over your network to help ensure superior call quality. The AOS packet capture feature is used with network monitoring to effectively capture data packets as they traverse the network. As data packets pass through an interface on which the packet capture feature is enabled, a packet-capture monitors the traffic and captures the header and payload of specified packets as they pass through. The captured packets are then exported and stored in either flash memory or CompactFlash® storage, and can then be reviewed to determine the cause of network problems, identify security threats, and to maintain efficient data transmission over the network.

Security/Routing

The NetVanta 6250 uses the AOS to provide a stateful inspection firewall; NAT; DHCP server/client; and feature-rich, standards-based, IP routing functionality including BGP, OSPF, and RIP routing protocols.

Management

The NetVanta 6250 can be remotely managed by ADTRAN n-Command® MSP, offering the ability to discover devices, make mass configuration changes or firmware upgrades, backup/restore configuration, and generate inventory reports for asset management. ADTRAN's n-Command MSP also offers VoIP VQM and reporting, SIP ladder diagram, as well as an industry leading, easy-to-use, Graphical User Interface (GUI).

Reliability

NetVanta 6250 products are housed in a rugged metal enclosure; available in wallmount, rackmount, and desktop mountings; and offer a battery backup system for up to eight hours of uninterrupted service upon a customer-site power outage. NetVanta 6250 is backed by an industry-leading, five-year warranty and ADTRAN's world-class technical support.

ADTRAN

NetVanta 6250

High Performance IP Business Gateways

Features	Benefits
Designed for Feature Rich, Higher Bandwidth Applications	• The NetVanta 6250 features the performance demanded in today's communications networks, with up to 175 Mbps throughput. • Resources within the platform support up to 3 PRI's of simultaneous voice traffic. • Support for 200 simultaneous calls using SBC Feature Pack • Perfect for any type of business service offering with: full functioning router, analog and IP services support, enabling migration path from legacy offerings to newer SIP services
Multiple Connectivity Options	• The NetVanta 6250 is one of the most flexible platforms for deploying services for next generation networking with built-in interfaces for fiber and gigabit Ethernet, while maintaining the necessary failover functionality of analog interfaces. • ADTRAN's experience in this market allows us to provide platforms such as the NetVanta 6250 with optimal configurations depending on how you are utilizing our technology. • Includes a built-in USB slot for future 3G/4G backup connectivity and storage.
Service Reliability	• Built by the market leader for in IP Business Gateways with carrier-class quality. • Battery backup ensures a power failure doesn't equal communications failure.
Session Border Control	• Say goodbye to expensive, multi-appliance deployments for business connectivity demanding session border control functionality. • Field upgrade any NetVanta 6250 with Session Border Control functionality, providing a future proof solution in your network. • Deploy services quickly with ADTRAN's help on SIP interoperability to industry-leading IP PBX's platforms. • Know that your network, and your customer's network well secured.
Superior Call Quality	• Ensure VoIP traffic prioritization with Quality of Service • Meet proper service level agreements (SLAs) with Voice Quality Monitoring • Simplify troubleshooting with Packet Capture

Product Specifications

Physical Interfaces

Ethernet

- Single Gigabit Ethernet (10/100/1000Base-T)
  - Copper or Fiber SFP
- Four Fast Ethernet (10/100Base-T)
- RJ-45
- Supports 802.1q VLAN trunking

T1

- Four T1/FT1 (Auto sensing)
- RJ-48C

USB

- Single USB 2.0 Interface

Digital Voice

- RJ-48C
- T1 CAS support
- PRI
- **Signaling Methods**
  - E&M Wink
  - E&M Immediate
- Feature Group D

Analog Voice

- 8, 16, and 24 FXS POTS via 50-pin Amphenol
- 68.5 Vrms with 20VDC Offset Maximum Ring Voltage
- Sinusoidal Ringer Waveform
- 48 V, Nominal On-hook Battery Voltage
- 30 mA, Nominal Loop Current

NetVanta 6250

High Performance IP Business Gateways

- **FXS 2-wire Impedances**
  - 600Ω
  - 900Ω
  - 600Ω +2.16μF
  - 900Ω +2.16μF
- **FXO 2-wire Impedances (Lifeline FXO)**
  - 600Ω
  - 900Ω
  - 600Ω +2.16μF
  - 900Ω +2.16μF
- **Signaling Methods**
  - Loop Start
- **FXO 2-wire Impedances (Standard FXOs)**
  - 600Ω
  - 900Ω
  - 600Ω +2.16μF
  - 900Ω +2.16μF
- Integral FXO (900e Series)
- **Signaling Methods**
  - Loop Start
  - Ground Start
- **FXO 2-wire Impedances**
  - 600Ω +2.16μF
  - 900Ω +2.16μF
  - Rs 220 ohms, Rp 820 ohms, Cp 115nF
  - Rs 270 ohms, Rp 750 ohms, Cp 150nF
  - Rs 270 ohms, Rp 750 ohms, Cp 150nF, Zin 600r
  - Rs 320 ohms, Rp 1,050 ohms, Cp 230nF
  - Rs 350 ohms, Rp 1,000 ohms, Cp 210nF, Zin 600r
  - Rs 370 ohms, Rp 620 ohms, Cp 310nF
  - Rs 800 ohms, Rp 100 ohms, Cp 50nF
- **Signaling Methods**
  - Loop Start
  - Ground Start
  - DPT

Craft

- DB-9

Processor and Memory

- **RAM:** 512 Mb RAM
- **Flash:** 256 Mb Flash

VoIP Protocol

- SIP
- MGCP (FXS Interfaces Only)

Packet-based Voice Resources

- **CODECs**
  - G.711-64k PCM
  - G.729a-8k CS-ACELP
- G.168 Echo Cancellation
- Up to 64ms Echo-tail Length
- Supports up to 60 Channels
- Supports T.38 Sessions

Media Stream

- RTP/UDP/IP (RFC 3550)
- RTP Payload for DTMF Digits (RFC 2833)
- Supports Port-to-port Hairpin Call
- SDP (RFC 2327)

NAT Traversal and Remote Survivability

- B2BUA
- SIP Registrar for IP Phones
- SIP Transparent Proxy with Survivability

Tone Services

- Local DTMF Detection
- Local Tone Generation
  - Dialtone
  - Busy
  - Call Waiting
  - Alternate Call Waiting
  - Receiver Off Hook
- Ringing
  - Distinctive Ring

Calling Feature Support

(Varies with feature server/gateway)

- Caller ID
  - Name and Number (MDMF, SDMF)
  - Call Waiting Caller ID
- Voice Mail
  - Stutter dialtone
  - Visual Message Waiting Indicator (VMWI)
- Call Hold
- Call Forward
  - Busy Line
  - No Answer
- Call Transfer
  - Blind, Attended
- Call Waiting
- Distinctive Ring
- Do Not Disturb
- Three-way Calling
- Call Return
- Speed Dial
- 3-way Conferencing (3WC)

Firewall

- Stateful Inspection Firewall
- Denial of Service (DOS) Protection
- Access Control Lists
- Application Level Gateways
- Packet Filtering

NAT

- Basic NAT (1:1) and NAPT (Many:1)

QoS

- Low Latency and WFQ
- Hierarchical QoS
- DiffServ packet marking and recognition
- Frame Relay Fragmentation
- Traffic Monitoring (NetFlow 9)

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806
P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/presales

Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

Where to Buy
888 423-8726
channel.sales@adtran.com
www.adtran.com/where2buy

ProServices
888 874-2237
proservices@adtran.com
www.adtran.com/proservices

Global Inquiries
256 963-8000
256 963-6300 fax
international@adtran.com

TL9000 TL.19.1270

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

6470025xFx-8A August

NetVanta 6250

High Performance IP Business Gateways

Product Specifications

VQM

- MOS prediction
- Jitter, Delay and Packet Loss
- Past and Active Calls
- Supports PCAP

Protocols

- BGP
- OSPF
- RIP (v1 and v2)
- GRE
- IGMP V2
- Frame Relay
- IPv4
- Multilink Frame Relay
- PPP
- Multilink PPP
- HDLC
- PAP and CHAP
- Multi-VRF
- IPv6

Routed Protocols

- IP

DHCP

- Client
- Relay
- Server

Mangagement and Utilities

- Familiar CLI
- Web-based GUI
- n-Command support
- SNMP v2 and v3
- SYSLOG logging
- Telnet, Craft/Console Port, SSH, Ping, Trace route, NTP
- TCL Scripting

Firmware Upgrade

- FTP
- TFTP
- X-Modem
- HTTP

Environment

- **Operating Temperature:** 32° to 122 °F (0° to 50 °C)
- **Storage Temperature:** -40° to 158 °F (-40° to 70 °C)
- **Relative Humidity:** Up to 95%, Non-condensing
- **Maximum Altitude:** 10,000 Feet

Physical and Power

Chassis

- Wallmount
- 1U Rackmount
- Desktop Metal Enclosure

Dimensions

- 1.72 in. x 17.2 in. x 10.5 in. (H x W x D)

Weight

- 7 lbs.

Power

- 120 VAC, 60 Hz, 110W
- **Battery Backup:** Optional eight-hour system
- LEDs
  - Voice
  - Status
  - Gig 1
  - USB
  - T1 1 - 4
  - Ethernet 1 - 4

Agency Approvals

- FCC Part 15, Class A
- FCC Part 68
- Industry Canada CS03
- ETL and Canadian ETL (C-ETL)

Battery Backup Options

- Rackmount or Wallmount

Warranty

- Five Years (North America)

Ordering Information

Equipment	Part No.
Total Access 6250 8 FXS	**4700252F1**
Total Access 6250 8 FXS with Lifeline FXO	**4700252F2**
Total Access 6250 8 FXS with Session Border Control and Lifeline FXO	**4700252F2SBC**
Total Access 6250 16 FXS	**4700254F1**
Total Access 6250 16 FXS with Lifeline FXO	**4700254F2**
Total Access 6250 24 FXS	**4700256F1**
Total Access 6250 24 FXS with Lifeline FXO	**4700256F2**
Total Access 6250 16 FXS + 9 FXO (1 Lifeline)	**4700256F3**
Battery Backup Systems	
Total Access 6250 Eight-hour, Wallmount/Rackmount	**1175044L1**
Total Access 6250 Eight-hour, Wallmount	**1175044L2**

Total Access 900e

Market Leading Gen 3 IP Business Gateways

DATA SHEET DS DATA SHEET

Product Features

- Market leading IP Business Gateways, with 66 percent higher performance than previous generations
- Seamless voice and data integration over VoIP-based network architectures
- Designed for Ethernet and Multi-T1 applications
- Optional eSBC functionality
- Up to 24 analog POTS interfaces
- Optional outbound lifeline via FXO
- Compatible with industry-leading softswitches and call agents
- Dynamic bandwidth allocation affords more efficient utilization
- Integral full-featured business-class IP router
- Stateful inspection firewall for network security
- Quality of Service (QoS) for delay and jitter sensitive traffic like VoIP
- Supports 802.1q Virtual LAN (VLAN) Trunking
- Voice Quality Monitoring (VQM)
- Command Line Interface (CLI) mimics industry *de facto* standard
- Network Address Translation (NAT) for IP address concealment
- Feature-rich ADTRAN Operating System (AOS)
- Rugged metal case
- Optional battery backup
- Industry-leading five-year warranty

The Total Access® 900e (Gen 3) Series of market leading IP Business Gateways for Ethernet and multi-T1 applications from ADTRAN® are designed for carrier Ethernet and SIP/MGCP Voice over IP (VoIP) networks. These products feature all the same robust routing and voice features of the previous generation IPBGs, along with a host of new features and functions that enable cost effective, reliable IP service delivery. These devices use the ADTRAN Operating System (AOS) to simplify management and administration. Multiple models offer flexibility for varied applications from PRI delivery and SIP trunking services to Hosted IP PBX offerings.

The Total Access 900e Series offers up to 24 FXS ports for analog voice delivery, and three Ethernet interfaces (one Gigabit and two Fast) for access to the Total Access 900e's router or WAN/LAN access. The Total Access 900e Series can be coupled with a NetVanta® Power over Ethernet (PoE) switch to provide connectivity to a variety of network devices and personal computers, as well as to power IP phones and Wireless Access Points (WAPs).

VoIP Gateway

The Total Access 900e Series utilizes SIP or MGCP for VoIP applications, providing interoperability with industry-leading soft switches, feature servers, and gateways. Acting as a gateway, the Total Access 900e converts IP signaling from the carrier into traditional TDM analog and digital voice services. This functionality allows the Total Access 900e Series to deliver voice services to both IP phones and traditional telephony equipment simultaneously. For customers implementing a hosted PBX or IP Centrex service, the Total Access 900e Series is ideal for providing customers additional analog ports necessary to support their remaining analog phones, fax machines, or modems. The Total Access 900e Series supports many popular calling features such as caller ID, call hold, forward, transfer, and call waiting. Voice Activity Detection (VAD) and silence suppression are supported to ensure reliable VoIP call quality.

Enterprise Session Border Control (eSBC)

The Total Access 900e also can provide eSBC functionality delivering a truly converged application platform at the customer premises. This feature is becoming mandatory in today's service deployment to normalize, secure and troubleshoot the SIP to SIP communication between a carrier network and the customers SIP compliant equipment.

Remote Survivability

In addition, the Total Access 900e Series can act as a registrar and Back-to-Back User Agent (B2BUA) or as a SIP-transparent proxy to facilitate remote survivability and NAT traversal. In the event of a service interruption on the wide area network or if the carrier's call agent were to become unavailable, calls may continue locally at the customer premises between IP-based or analog phones. In addition, the embedded FXO port can be used as a survivable interface for outbound calls to the PSTN.

QoS, Security, Routing, and VQM

The Total Access 900e Series uses the AOS to provide a stateful inspection firewall; NAT; DHCP server/client; and feature-rich, standards-based, IP routing functionality supporting BGP, OSPF, and RIP routing protocols. Inherent QoS methods ensure appropriate classification and prioritization of VoIP traffic. These methods include Low Latency Weighted Fair Queuing, class based weighted fair queing, support for Differentiated Services (DiffServ) protocol, Frame Relay Fragmentation (FRF.12), and Frame Relay traffic shaping. Voice Quality Monitoring (VQM) captures Mean Opinion Score (MOS), jitter, delay, and packet loss statistics necessary to troubleshoot VoIP calls over the WAN to help ensure superior call quality.

Management

The Total Access 900e Series can be remotely managed by ADTRAN's n-Command® MSP platform. ADTRAN n-Command MSP offers the ability to discover devices, make mass configuration changes or firmware upgrades, backup/restore configuration, and generate inventory reports for asset management. ADTRAN's n-Command MSP also offers VoIP VQM and reporting, SIP ladder diagram, as well as as an industry leading, easy-to-use, Graphical User Interface (GUI). Total Access 900e products are housed in a rugged metal enclosure; available in wallmount, rackmount, and desktop mountings; and offer a battery backup system for up to eight hours of uninterrupted service upon a customer-site power outage. Total Access 900e products are backed by an industry-leading warranty.

ADTRAN

Total Access 900e

Market Leading Gen 3 IP Business Gateways

Product Specifications

Physical Interfaces

T1

- Quad T1/FT1
- RJ-48C

Ethernet

- **Three Ethernet Interfaces (WAN/LAN Support):**
  - One Gigabit
  - Two Fast
- Full Duplex
- RJ-45
- Supports 802.1q VLAN Trunking

USB 2.0

- One Interface

Digital Voice

- PRI
- T1 CAS Support
- **Signaling Methods**
  - E&M Wink
  - E&M Immediate
- Feature Group D
- RJ-48C

Analog Voice

- 8, 16, and 24 FXS POTS via 50-pin Amphenol
- 68.5 Vrms with 20VDC Offset Maximum Ring Voltage
- Sinusoidal Ringer Waveform
- 48 V, Nominal On-hook Battery Voltage
- 30 mA, Nominal Loop Current
- **FXS 2-wire Impedances**
  - 600Ω
  - 900Ω
  - 600Ω +2.16μF
  - 900Ω +2.16μF
- **FXO 2-wire Impedances (Lifeline FXO)**
  - 600Ω
  - 900Ω
  - 600Ω +2.16μF
  - 900Ω +2.16μF
- **Signaling Methods**
  - Loop Start
- **FXO 2-wire impedances (Standard FXOs)**
  - 600Ω
  - 900Ω
  - 600Ω +2.16μF
  - 900Ω +2.16μF
- Integral FXO (900e Series)
- **Signaling Methods**
  - Loop Start
  - Ground Start
- **FXO 2-wire Impedances**
  - 600Ω +2.16μF
  - 900Ω +2.16μF
  - Rs 220 ohms, Rp 820 ohms, Cp 115nF
  - Rs 270 ohms, Rp 750 ohms, Cp 150nF
  - Rs 270 ohms, Rp 750 ohms, Cp 150nF, Zin 600r
  - Rs 320 ohms, Rp 1,050 ohms, Cp 230nF
  - Rs 350 ohms, Rp 1,000 ohms, Cp 210nF, Zin 600r
  - Rs 370 ohms, Rp 620 ohms, Cp 310nF
  - Rs 800 ohms, Rp 100 ohms, Cp 50nF
- **Signaling Methods**
  - Loop Start
  - Ground Start
  - DPT

Craft

- DB-9

Memory

- **RAM:** 512 MB RAM
- **Flash:** 128 MB Flash

VoIP

- SIP
- MGCP (FXS Interfaces Only)

Packet-based Voice Resources

- **CODECs**
  - G.711-64k PCM
  - G.729a-8k CS-ACELP
- G.168 Echo Cancellation
- Up to 64ms Echo-tail length
- Supports up to 60 Channels DSP
- Supports 30 T.38 Sessions

Media Stream

- RTP/UDP/IP (RFC 3550)
- RTP Payload for DTMF Digits (RFC 2833)
- Supports Port-to-port Hairpin Call
- SDP (RFC 2327)

Total Access 900e

Market Leading Gen 3 IP Business Gateways

NAT Traversal and Remote Survivability

- B2BUA
- SIP Registrar for IP Phones
- SIP proxy with Survivability
- Transparent/Stateful/Outbound

Tone Services

- Local DTMF Detection
- Local Tone Generation
  - Dialtone
  - Busy
  - Call Waiting
  - Alternate Call Waiting
  - Receiver Off Hook
- Ringing
  - Distinctive Ring

Calling Feature Support

(Varies with feature server/gateway)

- Caller ID
  - Name and Number (MDMF, SDMF)
  - Call Waiting Caller ID
- Voice Mail
  - Stutter dialtone
  - Visual Message Waiting Indicator (VMWI)
- Call Hold
- Call Forward
  - Busy Line
  - No Answer
- Call Transfer
  - Blind, Attended
- Call Waiting
- Distinctive Ring
- Do Not Disturb
- Three-way Calling
- Call Return
- Speed Dial
- 3-way Conferencing (3WC)

Security

Firewall

- Stateful Inspection Firewall
- Denial of Service (DOS) Protection
- Access Control Lists
- Application Level Gateways
- Packet Filtering

NAT

- Basic NAT (1:1) and NAPT (Many:1)

QoS

- Low Latency and WFQ
- Hierarchical QoS
- DiffServ packet marking and recognition
- Frame Relay Fragmentation
- Traffic Monitoring (NetFlow 9)

VQM

- Packet Capture (PCAP)
- MOS prediction
- Jitter, Delay and Packet Loss
- Past and Active Calls

Protocols

- BGP
- Multilink Frame Relay
- OSPF
- PPP
- RIP (v1 and v2)
- Multilink PPP
- GRE
- HDLC
- IGMP V2
- PAP and CHAP
- Frame Relay
- Multi-VRF

Routed Protocols

- IP

DHCP

- Client
- Relay
- Server

Mangagement and Utilities

- Familiar CLI
- Web-based GUI
- n-Command Support
- SNMP v2 and v3
- SYSLOG Logging
- Telnet, Craft/Console Port, SSH, Ping, Trace route, NTP
- TCL Scripting

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806
P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/presales

Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

Where to Buy
888 423-8726
channel.sales@adtran.com
www.adtran.com/where2buy

ProServices
888 874-2237
proservices@adtran.com
www.adtran.com/proservices

Global Inquiries
256 963-8000
256 963-6300 fax
international@adtran.com

TL9000 TL10.1270

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

642439xxF1-8A August

Total Access 900e

Market Leading Gen 3 IP Business Gateways

Product Specifications

Firmware Upgrade

- FTP
- X-Modem
- TFTP
- HTTP

Environment

- **Operating Temperature:** 32° to 122 °F (0° to 50 °C)
- **Storage Temperature:** -40° to 158 °F (-40° to 70 °C)
- **Relative Humidity:** Up to 95%, Non-condensing
- **Maximum Altitude:** 10,000 Feet

Physical and Power

Chassis

- Wallmount
- 1U Rackmount
- Desktop Metal Enclosure

Dimensions

- **Total Access 908e:** 1.75 in. x 17 in. x 8 in. (H x W x D)
- **Total Access 916e/924e:** 1.75 in. x 17 in. x 10 in. (H x W x D)

Weight

- **Total Access 908e:** 5.5 lbs.
- **Total Access 916e/924e:** 7 lbs.

Power

- **Total Access 908e:** 120 VAC, 60 Hz, 75W
- **Total Access 916e and 924e:** 120 VAC, 60 Hz, 110W
- **Battery Backup:** Optional eight-hour system
- **LEDs Total Access 900e**
  - Voice
  - Status
  - Gig 1
  - USB
  - T1 1 - 4
  - Ethernet 1 - 2

Agency Approvals

- FCC Part 15, Class A
- FCC Part 68
- Industry Canada CS03
- ETL and Canadian ETL (C-ETL)

Battery Backup Options

- Rackmount or Wallmount

Warranty

- Five Years (North America)

Ordering Information

Equipment	Part No.
Total Access 908e Gen 3	**4243908F1**
Total Access 908e Gen 3 with Lifeline FXO	**4243908F2**
Total Access 908e Gen 3 with Session Border Control with Lifeline FXO	**4243908F2SBC**
Total Access 916e Gen 3	**4243916F1**
Total Access 916e Gen 3 with Lifeline FXO	**4243916F2**
Total Access 924e Gen 3	**4243924F1**
Total Access 924e Gen 3 with Lifeline FXO	**4243924F2**
Total Access 924e Gen 3, 16 FXS, 9 FXO (1 Lifeline)	**4243924F3**
Total Access 900e Gen 3, SBC Feature Pack Upgrade	**1950900G3**
Battery Backup Systems	
Total Access 908e Gen 3, Eight-hour, Wallmount	**1200641L1**
Total Access 916e/924e Gen 3, Eight-hour, Wallmount/Rackmount	**1175044L1**
Total Access 916e/924e Gen 3, Eight-hour, Wallmount	**1175044L2**

n-Command MSP

Network Management Platform

ADTRAN® n-Command® MSP is a powerful and easy-to-use network management system that provides monitoring and management for a wide range of ADTRAN business networking solutions. Using ADTRAN n-Command MSP can improve network operations and business-class Voice over IP (VoIP) performance for service providers and enterprise organizations who are implementing ADTRAN's industry-leading NetVanta® and Total Access® 900 Series equipment running the ADTRAN Operating System (AOS).

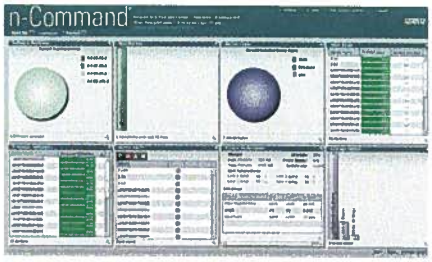
n-Command MSP is an appliance-based solution with options for the n-Command MSP Basic Server supporting up to 10,000 remote devices or the n-Command MSP Advanced Server supporting up to 25,000 remote devices. n-Command MSP includes the following management features for ADTRAN devices: Firmware Management, Configuration Management, Auto-device Discovery, Device Inventory and Control, Automatic Configuration Backup, and Voice Quality Monitoring (VQM).

As increasing numbers of hosted and premise-based VoIP networks are deployed, it is becoming more important to implement a centralized network management framework. Network planners, operators, and managers require a system that empowers them to deal with the operational challenges and customer support demands associated with next-generation telecom services. Customers also expect to have the same, or higher, level of quality and reliability from these new-generation services as they had with traditional phone services.

VoIP and IP telephony applications involve call quality and performance management challenges that require an easy-to-use and sophisticated management system. The system should enable service providers and enterprise IT organizations to deliver on Service Level Agreements (SLAs), increase customer service response, reduce network downtime, and proactively monitor and report the performance of the VoIP network and users.

The ADTRAN n-Command MSP solution delivers advanced and easy-to-use capabilities for network managers to address those issues. The n-Command MSP Dashboard features an easy-to-use Graphical User Interface and a suite of device management features including Remote Installation, Automated Device Discovery and Device Inventory, Configuration Management, Firmware Management, and VQM.

Dashboard – Graphical User Interface (GUI)
The Dashboard is the first screen to appear after logging into the system. It provides an intuitive and easy-to-use graphical display with point-and-click/drag-and-drop operations for monitoring and management of all devices being managed by the system.



The ADTRAN n-Command MSP GUI enables the network administrator to quickly and easily organize all the managed devices. To promote flexibility and customization for each n-Command MSP user, the system is designed so each user can drag and drop modules and resize or move them around within the screen to tailor the views.

Through the main GUI dashboard modules, n-Command MSP users have visibility and reporting on critical performance data for each managed device including the following:

- **Average Uptime** displays the average number of days the devices have been operational
- **Device Types** summarizes the number of devices by type in a pie chart
- **Heap Usage** displays the percent of heap used on each device
- **New Devices** displays all the new devices discovered on the network in the last 10 days

Product Features

- Configuration management
- Firmware management
- Inventory management
- VoIP performance monitoring
- Voice quality data reporting including Mean Opinion Scoring (MOS)
- Customizable dashboard
- Automated device discovery and registration using *Auto-Link*
- Automated device registration
- Automated Backups
- Supports Total Access 900 Series and NetVanta Series
- Web browser GUI
- Monitors and reports daily call activity
- Filter, group, and label devices
- Eliminates the need for costly network probes and appliances
- Solutions that support up to 25,000 remote devices
- Simplifies management and reduces operations costs
- n-Command MSP Virtualization Support

vmware READY

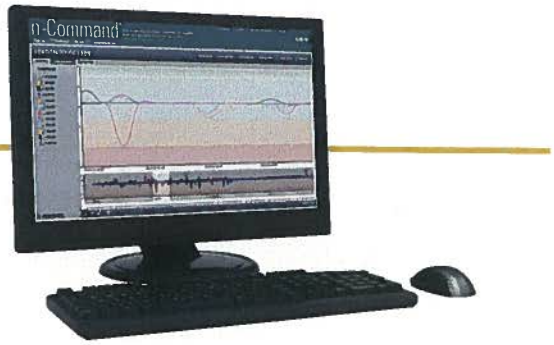
vmware PARTNER TECHNOLOGY ALLIANCE

Smart Solutions for a Connected World.

ADTRAN®

n-Command MSP

Network Management Platform



- **Processor Utilization** displays the percent of processor being used on each device
- **Software Revisions** depicts the software revisions in a pie chart including primary, backup, or running firmware versions
- **Device Alerts** displays all alerts present throughout the network system and the icons change to a red color when alerts of any of the following occur:

Management Alerts are issued when problems are detected with the device's auto-link, check-in, or running configuration.

Exception Alerts are issued when an exception file is present on the device.

Firmware Alerts are issued when the primary or backup firmware image is not on the system; the currently executing firmware version is not the same as the primary firmware image; or the specified primary and backup firmware images are the same file.

VQM

As voice and data networks converge into a single communications network, the ability to implement and manage voice Quality of Service (QoS) is becoming a critical part of successful operations. QoS-enabled network devices can provide better performance and higher service levels for delay-sensitive VoIP or other mission-critical applications, as well as accommodating the lower priority traffic on the same infrastructure.

ADTRAN VQM builds on QoS to provide a sophisticated level of network performance visibility. ADTRAN VQM examines VoIP data streams for each voice call, records the voice quality information, and enables network managers to identify problem areas in an easy-to-use, graphical interface.

ADTRAN n-Command MSP collects VQM data from remote Total Access 900 Series and NetVanta equipment running voice. After each VoIP call is completed, the remote devices communicate with n-Command MSP via a low-bandwidth SIP message that includes the voice quality data such as MOS, delay, jitter, and dropped packets.

ADTRAN n-Command MSP then provides a graphical display of the voice quality statistics so network managers can easily and quickly select any call or extension, and expand into the performance details on each VoIP data stream.

Managers can proactively access call streams and network performance details, often before a customer may call into the help desk inquiring about low VoIP performance.

ADTRAN n-Command MSP saves a database of voice quality data based on the device, day of week, time of day, and phone extension. The database stores up to two weeks of voice quality data and is designed to provide key metrics relating to network congestion, endpoint configuration, and other system issues, which make diagnosing and resolving customer calls faster and easier. This information can be exported and utilized for long-term VoIP quality reports.

Remote Installation Management and Automated Device Discovery

Remote Installation and Automated Device Discovery are accomplished with the help of ADTRAN's "Auto Link" feature. This communication improves productivity by cutting costs and saving time. It is used for remote inventory and device management, configuration, and backup/restore operations, as well.

ADTRAN's "Auto Link" feature enables remote devices to communicate with the central n-Command MSP server. Auto Link is embedded into the AOS software, alleviating the need for intervention to enable this feature. ADTRAN n-Command MSP is firewall-friendly, reaching devices behind firewalls. Since the check-in is initiated from a remote device sitting behind the firewall, this allows firewall traversal while maintaining a customer's firewall protection and security. Remote devices use the ADTRAN "Auto Link" feature to check into the n-Command MSP server, opening up an IP session in the firewall. By detecting or setting the IP address of the n-Command MSP Server in remote devices, new devices can automatically contact the n-Command MSP Server upon turn-up. The n-Command MSP system also provides a visual update when a new device has been added to the network.

Device Inventory Management
While the ADTRAN "Auto Link" feature enables automated device discovery, n-Command MSP tracks discovered devices into an inventory database and records device type, serial number, IP address, firmware version, system contact information, and other pertinent information decided upon by the network administrator or manager.

Using the ADTRAN n-Command MSP system, network managers can quickly and easily see a complete listing of all managed devices and organize all managed devices for a visual display and for reporting of the field assets and inventory. Devices can be easily associated and labeled into groups to make it significantly quicker and easier to identify remote devices. User-defined device labels can be created easily or filters may also be applied for device organization. Additional user-defined fields can be created in the device tab for network-specific or service-provider specific information that users wish to record. Inventory data can be organized into labels such as customer name and location; and exported to a CSV file.

Firmware Management
The ADTRAN n-Command MSP offers an easy-to-use interface that enables network mangers to automate firmware upgrades to an individual or a group of remote devices.

Once configured, the n-Command MSP system maintains a database repository for all AOS firmware files and knows which firmware to load for any managed device. Network managers can set up auto-running firmware jobs in the MSP system that will simplify firmware management and put network managers in full control allowing them to push new firmware updates to devices or roll-back to previous firmware revisions when necessary.

With the initial screening process complete, n-Command MSP can upgrade a single firmware version to a single device or easily facilitate a network-wide upgrade. As part of the upgrade process, the network manager can schedule a date and time range when n-Command MSP will update the firmware and when the devices will reboot. This helps eliminate unnecessary network downtime, avoids use of network bandwidth during production hours, and enables managers to upgrade the network quickly and easily.

Once the firmware push is performed, n-Command MSP provides a job detail report that gives a complete summary including successful loads and specific details associated with any unsuccessful attempts so managers can resolve the issue and load firmware efficiently. This is another productivity enhancement and significant time-saving feature that frees network managers from continually
monitoring the upgrade process for remote devices.

Configuration Management
In addition to firmware management, the ADTRAN n-Command MSP system also provides configuration management for the Total Access 900 Series and NetVanta devices. The ADTRAN n-Command MSP system enables network managers to create a job to update configurations by pushing device or interface configuration changes to remotely-managed devices and automate configuration restoration for individual or groups of managed devices. Managers can create a job to update configurations during s scheduled maintenance window.

The n-Command MSP system enables network managers to install entire configuration files, pre-install configurations to a soon-to-be installed device, and make individual or global configuration changes to the network by pushing a Command Line Interface (CLI) Script to selected NetVanta or Total Access 900 devices. These scripts can be created, using the built-in CLI editor. Managers can also use n-Command MSP to roll-back to a previous configuration. This allows managers to see a history of previous configurations, as well as restore devices to a previous version of the startup configuration. Additionally, managers can reboot devices, remove exception reports, write to start-up config and much more, remotely using n-Command MSP.

Device configuration images can be backed up and stored on the n-Command MSP Server. To empower network managers, configuration backups are performed automatically upon check-in when a change to the device is detected. When the device checks-in, the configuration is automatically downloaded. For the ADTRAN NetVanta 7000 Series of IP Telephony solutions, the n-Command MSP system can backup the phone configurations and auto attendant files as well.

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/support

Where to Buy
877 280-8416
channel.sales@adtran.com
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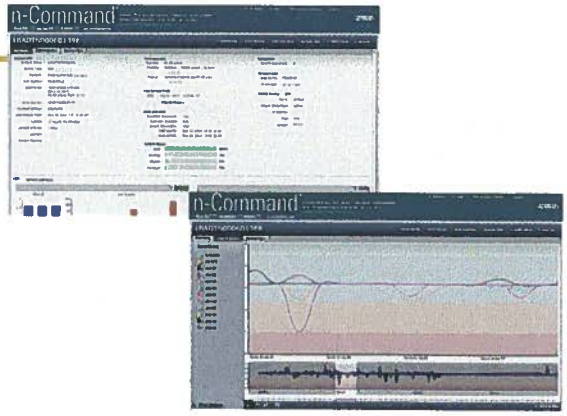
888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
888 423-8726
aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963 8000
256 963-6300 fax
global@adtran.com

n-Command MSP

Network Management Platform



n-Command MSP Server
ADTRAN offers two n-Command MSP Server options with the storage capacity, performance, and features to allow large networks and service providers to manage up to 25,000 ADTRAN devices.

n-Command MSP Server (Basic)

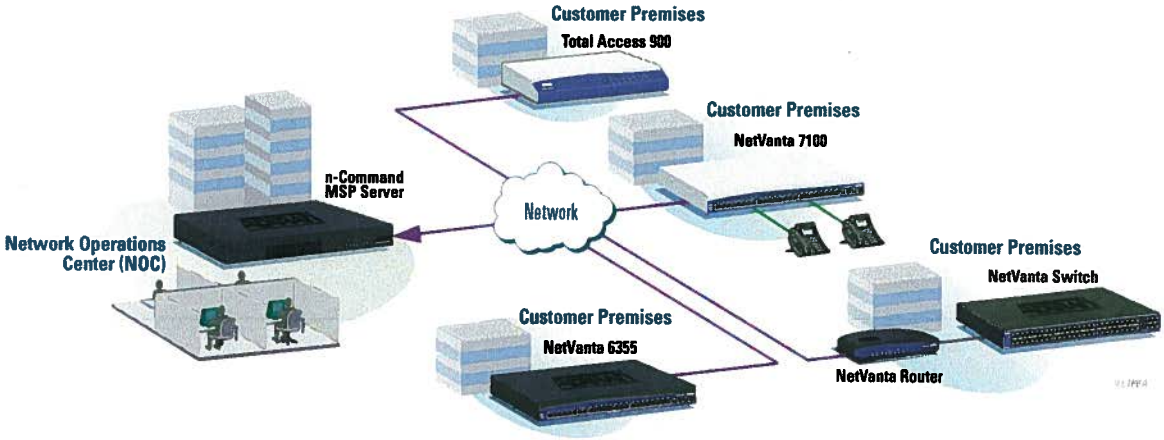
- 1 RU (1.67" H x 17.10" W x 24" D)
- Quad-core Intel Xeon Processor
- Qty 2-250 GB Hard Drive
  - RAID 1
- 8 GB RAM
- 3 Year Warranty
- 10,000 Devices at one hour check-in interval

n-Command MSP Server (Advanced)

- 1 RU (1.67" H x 17.10" W x 24" D)
- Dual Quad-core Intel Xeon Processor
- Quantity 6-300 GB Hard Drive
  - RAID 10
- 32 GB RAM
- Dual Redundant Power Supply
- 3 Year Warranty
- 25,000 Devices at one hour check-in interval

Ordering Information

Equipment	Part #
n-Command MSP with Advanced Server (25,000 devices supported)	1700842G1
n-Command MSP with Basic Server (10,000 devices supported)	1700841G1
VMware Ready n-Command MSP (10,000 devices supported)	1700845G1



n-Command MSP

- ADTRAN AOS-based devices "check-in" to MSP using Auto-Link Feature for touch-free updates and provisioning
- Provides management for devices behind a firewall
- n-Command MSP can be used on a private network or the public Internet
- Pre-install configurations for ease of turn-up

NetVanta 1638P

Multi-Layer Gigabit PoE Ethernet Switch

Product Features

- 48-port multi-layer Gigabit Ethernet switch with up to four 10-Gigabit uplink ports
- 48 – 10/100/1000Base-T Ports
- Two high-speed interface slots
- 802.3af (PoE), 802.3at (PoE+), and Legacy PoE
- Non-blocking, up to 176 Gbps switching capacity
- Line rate Layer 2 and Layer 3 switching
- Static routes, RIP, OSPF, BGP and VRRP
- Advanced QoS with support for 802.1p and DiffServ prioritization with four queues per egress port
- 802.1Q VLANs, Private VLANs and VLAN assignment via 802.1x
- VoIP ready with LLDP/LLDP-MED and voice VLANS
- Automate actions with integrated Port Scheduler and TCL scripting
- Business-class security with RADIUS, TACACS+, 802.1x and port security
- Field replaceable power supply and fans
- Optimized for iSCSI storage area networks (SANs) solutions
- Wi-Fi® Access Controller for centralized management of NetVanta Wireless Access Points
- Cable diagnostics provide easy to use troubleshooting tools for copper cable
- Familiar CLI and WEB GUI
- Next business day advance replacements
- Limited Lifetime Warranty

VoIP Ready

The NetVanta® 1638P is a managed, 48-port PoE, Layer 3, Gigabit Ethernet switch providing advanced access and distribution capabilities for Small to Medium-sized Enterprises (SMEs). With the combination of the advanced multi-layer switching fabric, high-bandwidth capabilities, and enhanced Quality of Service(QoS) features, the NetVanta 1638P is ideal in Gigabit-to-the-desktop deployments, and converged voice and data networks.

Hardware

The NetVanta 1638P rackmount switch provides 48 Gigabit Ethernet ports and 2 high speed option slots. Together these option slots can accommodate up to four 10-Gigabit Ethernet high speed links and can provide up to 80 Gbps of bandwidth between interconnected NetVanta 1638P switches. A field replaceable power supply and fan assembly ensure maximum uptime.

Multi-layer Switching

The NetVanta 1638P supports advanced multi-layer (Layer 2 and Layer 3) switching. It supports static routes, RIP V1/V2, OSPF, Border Gateway Protocol (BGP) and Virtual Router Redundancy Protocol (VRRP), allowing it to easily scale from small businesses to enterprise-sized networks.

Standards Based Protocols

Based on the ADTRAN® Operating System (AOS), this device supports Link Layer Discovery Protocol (LLDP) which autodiscovers neighboring Ethernet devices, simplifying integration into multi-vendor environments.

VoIP Ready

The NetVanta 1638P has been designed specifically for VoIP. The ability to automatically configure IP phones using LLDP-MED, and the ability to separate voice traffic onto voice VLANs, helps ease the deployment of VoIP.

Quality of Service

NetVanta switches also support QoS to prioritize mission-critical traffic like VoIP and control network congestion. The NetVanta 1638P offers 802.1p and DiffServ Class of Service (CoS). It also supports frame tagging, as well as enforcement of tagged traffic received from trusted sources. Four egress queues (per port) are available for assigning traffic priorities using Weighted Round Robin (WRR) and Strict Priority Scheduling.

PoE

The NetVanta 1638P provides up to 370 watts of 802.3af (PoE), 802.3at (PoE+) and Legacy PoE for powering IP phones, Wireless Access Points (WAPs), IP video cameras and other devices requiring LAN Power.

Security

Rest assured, with the NetVanta 1638P your network is protected. This product offers a variety of data security features including denial of service protection, port security, multilevel user passwords, Secure Shell (SSH) and Secure Socket Layer (SSL) for encrypted user login, and Access Authentication and Authorization (AAA) for authentication with RADIUS and TACACS+. With features such as 802.1x and port security, administrators can assure that only authorized users are allowed access to the network. AOS also features desktop auditing using DHCP in conjunction with Microsoft Network Access Protection (NAP) protocol to monitor the health of client computers. The two protocols work together to ensure that systems connected to the network are compliant with appropriate corporate policies. Desktop auditing provides client details such as firewall settings, antivirus settings and other client health information.

Port Scheduler

The NetVanta 1638P allows ports to be enabled or disabled based on time of day. This ability to schedule available ports allows for added security and can significantly lower power consumption during off hours saving on utility cost.

iSCSI Optimized

All ADTRAN NetVanta Gigabit Ethernet switches are optimized for iSCSI Storage Area Networks (SANs) deployments. Network administrators can take advantage of features such as Jumbo frame support (up to 13K), separation of iSCSI network traffic utilizing VLANs, and 802.3x flow control to seamlessly integrate ADTRAN switches with iSCSI SANs devices.

Administration

AOS offers both a Command Line Interface (CLI) that mimics the widely deployed, industry de facto standard and an intuitive Web-based Graphical User Interface (GUI) with step-by-step configuration wizards. For automating setup and configuration, The NetVanta 1638P supports Auto-Config which provides the ability to automatically obtain the switch configuration via DHCP. AOS also offers network forensics to aid in troubleshooting network problems by allowing network administrators to easily locate devices on the network by MAC or IP address.

ADTRAN®

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/support

Where to Buy
877 280-8416 toll-free
channel.sales@adtran.com
www.adtran.com/where2buy

Post-Sales Technical Support
888 423-8726
support@adtran.com
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ACES Installation & Maintenance Service
888 423-8726
aces@adtran.com
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International Inquiries
256 963 8000 voice
256 963-6300 fax
international@adtran.com

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NetVanta 1638P

Multi-Layer Gigabit PoE Ethernet Switch

Product Specifications

Physical Interface

Ethernet Ports
- 48 10/100/1000Base-T
- Auto rate/duplex/MDI/MDI-X

Option Slots
- 2 High Speed Option Slots

XIM Modules
- Dual Stacking XIM
- Dual SFP+ XIM

Switching Performance
- Non-blocking Layer 2/3 Switching

Maximum Forwarding Bandwidth
- 176 Gbps

Layer 2 Support
- 802.1D Spanning Tree
- 802.1w Rapid STP
- 802.3ad Link Aggregation
- 32,000 MAC Addresses
- Jumbo Frames (12K)
- 802.3x Flow Control

Layer 3 Support
- Static Routes
- RIP V1/V2
- OSPF
- BGP
- VRRP
- UDP Relay
- 256 Layer 3 Interfaces
- 1k ARP Entries
- 2k Unicast Routes
- IPv6 Management

Diagnostics
- Port Mirroring
- Troubleshooting Page
- LLDP-MED
- LLDP (802.1AB)
- Cable Diagnostics
- Ping

Front Panel Status LEDs
- Power Status
- LAN: link, activity

Port Statistics
- TX/RX Frames, Collisions, Errors

Quality of Service
- 802.1p and DiffServ
- Four output queues per egress port
- Weighted Round Robin (WRR)
- Strict Priority Scheduling

VLAN Support
- Port-based VLANs
- 802.1Q tagged trunked VLANs
- Voice VLANs
- Private VLAN Edge
- Dynamic 802.1x assigned VLANs
- Support for up to 255 active VLANs

Storm Control
Broadcast, Unicast, and Multicast

Administration
- CLI (Console/Telenet/SSH)
- SNMP v3
- Web-based GUI (HTTP/SSL)
- SYSLOG
- n-Command™ support
- Email Alerts
- RADIUS
- TACACS+
- TCL Scripting
- Auto Config
- Port Scheduler
- DHCP Network Forensics

PoE
- 802.3af (PoE), 802.3at (PoE+), and Legacy PoE
- 370 Watts (Total)

Security
- Port authentication (802.1x)
- Port Security
- DoS Protection
- Hardware ACLs
- Microsoft Desktop Auditing

Wi-Fi Controller
- Controls up to 24 NetVanta Wireless Access Points

Environment
- Operating temperature: 0° to 50 °C (32° to 122 °F)
- Storage temperature: -20° to 70 °C (-4° to 158 °F)
- Relative humidity: Up to 95%, non-condensing

Physical
- Chassis: 1U, 19" rackmountable metal enclosure
- Dimensions: 1.7" H, 17.2" W, 16.7" D
- Weight: 13.5 lbs.
- AC power: 110–230 VAC, 50/60 Hz
- Power: 630 Watts, 7A

Agency Approvals
- FCC Part 15 Class A, UL 1950/CSA, RoHS

Ordering Information

Equipment	Part #
NetVanta 1638P w/Power Supply	4700569F1
Dual Stacking XIM	1700470F1
Dual SFP+ and XIM	1700471F1
Power Supply	1700462F1
.5 Meter Stacking Cable	1700500F1
2 Meter Stacking Cable	1700500F2
5 Meter Stacking Cable	1700500F5

TL9000
TL19.1270

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

64700569F1-8B March

NetVanta 1638 with ActivChassis

Multi-Layer Gigabit Ethernet Switch

Product Features

- 48-port multi-layer Gigabit Ethernet switch with up to four 10-Gigabit uplink ports
- 48 – 10/100/1000Base-T Ports
- Advanced stacking capabilities with ActivChassis
- Two high-speed interface slots
- Non-blocking, up to 224 Gbps switching capacity
- Line rate Layer 2 and Layer 3 switching
- Static routes, RIP, OSPF, BGP and VRRP
- Advanced QoS with support for 802.1p and DiffServ prioritization with four queues per egress port
- 802.1Q VLANs, Private VLANs and VLAN assignment via 802.1x
- VoIP ready with LLDP/LLDP-MED and voice VLANS
- Automate actions with integrated Port Scheduler and TCL scripting
- Business-class security with RADIUS, TACACS+, 802.1x and port security
- Field replaceable power supply and fans
- Optimized for iSCSI SANs solutions
- Wi-Fi® Access Controller for centralized management of NetVanta Wireless Access Points
- Cable diagnostics provide easy to use troubleshooting tools for copper cable
- Familiar CLI and Web GUI
- Next business day advance replacements
- Limited Lifetime Warranty

The NetVanta® 1638 is a managed, 48-port, Layer 3, Gigabit Ethernet switch providing advanced access and distribution capabilities for Small to Medium-sized Enterprises (SMEs). With the combination of the advanced multi-layer switching fabric, ActivChassis stacking, high-bandwidth capabilities, and enhanced Quality of Service (QoS) features, the NetVanta 1638 is ideal in Gigabit-to-the-desktop deployments, and converged voice and data networks.

Hardware

The NetVanta 1638 rackmount switch provides 48 Gigabit Ethernet ports and two high-speed option slots. Together these option slots can accommodate up to four 16-Gigabit Ethernet high-speed links and provide up to 128 Gbps of bandwidth between interconnected NetVanta 1638 switches. A field replaceable power supply and fan assembly ensure maximum uptime.

ActivChassis

The NetVanta 1638 supports ADTRAN's ActivChassis stacking technology, which allows up to eight NetVanta 1600 Series switches to be interconnected and actively managed as a single, logical chassis-like system—up to 400 switch ports can share a single configuration file and single IP address—allowing SMEs to cost-effectively add capacity, simplify administration of interconnected switches and improve network resiliency. When used with the NetVanta 1600 Dual Stacking XIM, backplane capacity can be enhanced up to 128 Gbps, to support the most demanding business applications. ActivChassis also enables switches located in multiple wiring closets across distances up to 10,000 meters to be connected and managed as single switch, providing ultimate flexibility in network configurations. Combined with features designed for redundancy and high-availability, the NetVanta 1600 Series switches provide the best performance and value in the industry.

Multi-layer Switching

The NetVanta 1638 supports advanced multi-layer (Layer 2 and Layer 3) switching. It supports static routes, RIP V1/V2, OSPF, Border Gateway Protocol (BGP) and Virtual Router Redundancy Protocol (VRRP), allowing it to easily scale from small businesses to enterprise-sized networks.

Standards Protocols

Based on the ADTRAN® Operating System (AOS), this device supports Link Layer Discovery Protocol (LLDP) which autodiscovers neighboring Ethernet devices, simplifying integration into multi-vendor environments.

VoIP Ready

The NetVanta 1638 is VoIP-ready out of the box. The ability to automatically configure IP phones using LLDP-MED, and the ability to separate voice traffic onto voice VLANs, helps ease the deployment of Voice over IP (VoIP).

Quality of Service

NetVanta switches also support QoS to prioritize mission-critical traffic like VoIP and control network congestion. The NetVanta 1638 offers 802.1p and DiffServ Class of Service (CoS). It also supports frame tagging, as well as enforcement of tagged traffic received from trusted sources. Four egress queues per port are available for assigning traffic priorities using Weighted Round Robin (WRR) and Strict Priority Scheduling.

Security

The NetVanta 1638 offers a variety of data security features including denial of service protection, port security, multilevel user passwords, Secure Shell (SSH) and Secure Socket Layer (SSL) for encrypted user login, and Access Authentication and Authorization (AAA) for authentication with RADIUS and TACACS+. With features such as 802.1x and port security, administrators can be assured that only authorized users are allowed access to the network. AOS also features DHCP Network forensics allowing administrators to quickly locate specific clients on the network directly from the management session. This protocol in conjunction with Desktop auditing allows administrators to verify client security information.

Port Scheduler

The NetVanta 1638 allows ports to be enabled or disabled based on time of day. This ability to schedule available ports allows for added security and can significantly lower power consumption during off hours saving on utility cost.

iSCSI Optimized

All ADTRAN NetVanta Gigabit Ethernet switches are optimized for iSCSI Storage Area Networks (SANs) deployments. Network administrators can take advantage of features such as Jumbo frame support (up to 12K), separation of iSCSI network traffic utilizing VLANs, and 802.3x flow control to seamlessly integrate ADTRAN switches with iSCSI SANs devices.

Administration

AOS offers both a Command Line Interface (CLI) that mimics the widely deployed, industry de facto standard and an intuitive Web-based Graphical User Interface (GUI) with step-by-step configuration wizards. For automating setup and configuration, NetVanta 1638 supports Auto-Config which provides the ability to automatically obtain the switch configuration via DHCP.

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/presales

Where to Buy
888 423-8726
channel.sales@adtran.com
www.adtran.com/where2buy

Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
888 874-2237
aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963-8000
256 963-6300 fax
international@adtran.com

TL9000 TL191270

AOTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

64700568F1-8D December

NetVanta 1638 with ActivChassis

Multi-Layer Gigabit Ethernet Switch

Product Specifications

Physical Interface

Ethernet Ports
- 48 10/100/1000Base-T
- Auto rate/duplex/MDI/MDI-X

Option Slots
- 2 High Speed Option Slots

XIM Modules
- Dual Stacking XIM
- Dual SFP+ XIM
- Dual SFP XIM

Switching Performance
- Non-blocking Layer 2/3 Switching

Maximum Forwarding Bandwidth
- 224 Gbps

Layer 2 Support
- 802.1D Spanning Tree
- 802.1w Rapid STP
- 802.3ad Link Aggregation
- 32,000 MAC Addresses
- Jumbo Frames (12K)
- 802.3x Flow Control

Layer 3 Support
- Static Routes
- RIP V1/V2
- OSPF
- BGP
- VRRP
- UDP Relay
- 256 Layer 3 Interfaces
- 1k ARP Entries
- 2k Unicast Routes
- IPv6 Management

Diagnostics
- Port Mirroring
- Troubleshooting Page
- LLDP-MED
- LLDP (802.1AB)
- Cable Diagnostics
- Ping

Front Panel Status LEDs
- Power Status
- LAN: link, activity

Port Statistics
- Number of TX/RX Frames, Collisions, Errors

Quality of Service
- 802.1p and DiffServ
- Four output queues per egress port
- Weighted Round Robin (WRR)
- Strict Priority Scheduling

VLAN
- Port-based VLANs
- 802.1Q tagged trunked VLANs
- Voice VLANs
- Private VLAN Edge
- Dynamic 802.1x assigned VLANs
- Support for up to 255 active VLANs

Storm Control
- Broadcast, Unicast, and Multicast

Administration
- CLI (Console/Telnet/SSH)
- SNMP v3
- Web-based GUI (HTTP/SSL)
- SYSLOG
- n-Command® support
- Email Alerts
- ActivChassis support
- TACACS+
- RADIUS
- Auto Config
- TCL Scripting
- DHCP Network Forensics
- Port Scheduler

Security
- Port authentication (802.1x)
- Port Security
- DoS Protection
- Hardware ACLs
- Microsoft Desktop Auditing

Wi-Fi Controller
- Controls up to 24 NetVanta Wireless Access Points

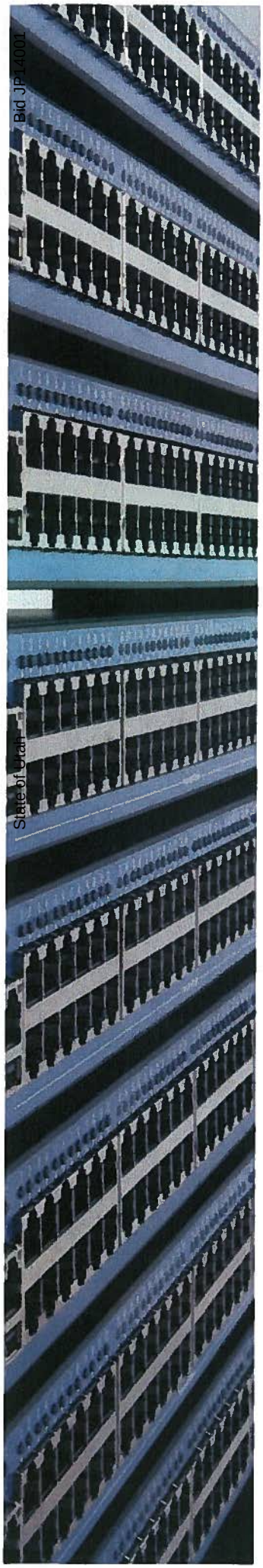
Environment
- **Operating Temperature:** 32° to 122° F (0° to 50° C)
- **Storage Temperature:** -4° to 158° F (-20° to 70° C)
- **Relative Humidity:** Up to 95%, non-condensing

Physical
- **Chassis:** 1U, 19" Rackmountable Metal Enclosure
- **Dimensions:** 1.7" H, 17.2" W, 16.7" D
- **Weight:** 11.5 lbs.
- **AC Power:** 110–230 VAC, 50/60 Hz
- **Power:** 160 Watts, 1.75 A

Agency Approvals
- FCC Part 15 Class A, UL 1950/CSA, RoHS

Ordering Information

Equipment	Part #
NetVanta 1638 w/ Power Supply	4700568F1
Dual Stacking XIM	1700470F1
Dual SFP+ XIM	1700471F1
Dual SFP XIM	1700473F1
Power Supply	1700460F1
.5 Meter Stacking Cable	1700500F1
2 Meter Stacking Cable	1700500F2
5 Meter Stacking Cable	1700500F5
Dual Stacking XIM w/ .5 Meter Stacking Cable	4700470F1
Dual Stacking XIM w/ 2 Meter Stacking Cable	4700470F2
Dual Stacking XIM w/ 5 Meter Stacking Cable	4700470F5



*Activ*Chassis

On the NetVanta 1600 Series Layer 3 Gigabit Ethernet Switches

ActivChassis

ADTRAN's innovative, feature-rich ActivChassis stacking technology brings chassis-switch capability and resiliency in a build-as-you grow deployment model. ActivChassis, now available on the NetVanta® 1600 series Gigabit Ethernet switches, allows the ability to stack up to eight switches and manage them as single, logical switch. With ActivChassis, enterprises benefit from:

- **Ease of management** of up to eight stacked switches, actively managed as a single, logical chassis-like system
- **Flexibility** to configure and manage switch stacks, distributed across multiple wiring closets up to 10 km (6 miles) apart
- Ability to add **port capacity on-demand** up to 400 ports
- **Increased backplane capacity** up to 128 Gbps to support the most demanding of business applications
- Features designed for **redundancy and network high-availability** to ensure a high-performance, always-on network

Ease of Management

ActivChassis supports a variety of protocols for provisioning and control. Using a single management IP address, administrators can access the stack via HTTP, SSH, telnet, or SNMP to view statistics, access utilities, or make network changes for each switch port in the ActivChassis configuration. Each physical switch within the stack can be identified through a unique VCID number assigned to it when the switch joins the ActivChassis configuration. In addition, bulk changes can be made to up to 400 switch ports simultaneously, significantly reducing management overhead costs.

Increased Backplane Capacity

Today's business applications demand high-speed connections within the switching infrastructure to ensure data availability at all times and for all users. In addition, the proliferation of wireless devices only exacerbates the need to maximize throughput between devices through the core switching fabric.

When the NetVanta 1600 Dual Stacking XIMs are used to construct ActivChassis configurations, the 10 Gbps local stacking ports are automatically boosted to 16 Gbps of uni-directional throughput. This equates to 32 Gbps for a single port and a total of 128 Gbps when using both option modules on the NV1600 series switches. The result is an extremely efficient switching backplane that is fully capable of meeting the demands of high-bandwidth business applications.

KEY FEATURES

- Stack up to 8 switches in a single ActivChassis configuration
- Manage all switches under a single IP address using HTTP, SNMP, SSH, telnet, FTP, etc.
- Add port capacity on-demand up to 400 ports
- Increase backplane throughput up to 128 Gbps
- Configure and manage switch stacks across multiple wiring closets up to 10 km (6miles) apart
- Improve network resiliency and redundancy with ring topology
- Automatic firmware upgrade between Master switch and Line cards
- Port Mirroring and Port Aggregation across ActivChassis switches

APPLICATIONS

- Ease of Management
- Core, Distribution, or Access Layer
- Manage switches across multiple wiring closets
- Improve network resiliency and High-Availability

Applicable Products

4700568F1 - NetVanta 1638 - 48-port, Layer 3, Gigabit Switch
4700569F1 - NetVanta 1638P - 48-port, PoE, Layer 3, Gigabit Switch
4700470F1 - NetVanta 1600 Dual Stacking XIM with 0.5m Stacking Cable
4700470F2 - NetVanta 1600 Dual Stacking XIM with 2.0m Stacking Cable
4700470F5 - NetVanta 1600 Dual Stacking XIM with 5.0m Stacking Cable
1700471F1 - NetVanta 1600 Dual SFP+ XIM
1700485F1 - 10GBase-SR SFP+ Transceiver
1700486F1 - 10GBase-LR SFP+ Transceiver

ADTRAN®

ADTRAN, Inc.
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
www.adtran.com

Where to Buy
888 423-8726
www.adtran.com/where2buy
channel.sales@adtran.com

Pre-sales Technical Support
888 423-8726
application.engineering@adtran.com
www.adtran.com/presales

*Activ*Chassis

On the NetVanta 1600 Series Layer 3 Gigabit Ethernet Switches

Manage Across Multiple Wiring Closets

With K-12 schools, universities, or medium size enterprises in a campus environment the distribution or access layer switches are often spread across several wiring closets to provide connectivity to all users and devices across the organization. Some buildings may only house one or two switches, all of which must be managed separately across the unified campus network. With ActivChassis, it is possible to consolidate the management of these physically-dispersed hardware platforms into a single IP address and a single configuration file. When the NetVanta 1600 Dual SFP+ XIM is installed, 10 gigabit fiber connections can be put in place making multiple switches distributed across distances up to 10,000 meters look, feel, and operate as a single, logical switch.

Network Resiliency

Using Ring Topology

Minimizing network downtime is quite often the biggest challenge faced by network administrators today. While the reliability of hardware pieces has steadily increased over the years, certain components of switching platforms such as fans and power-supply parts can still fail over an extended period of time. When these failures occur, it is essential that the impact be minimal and short-lived.

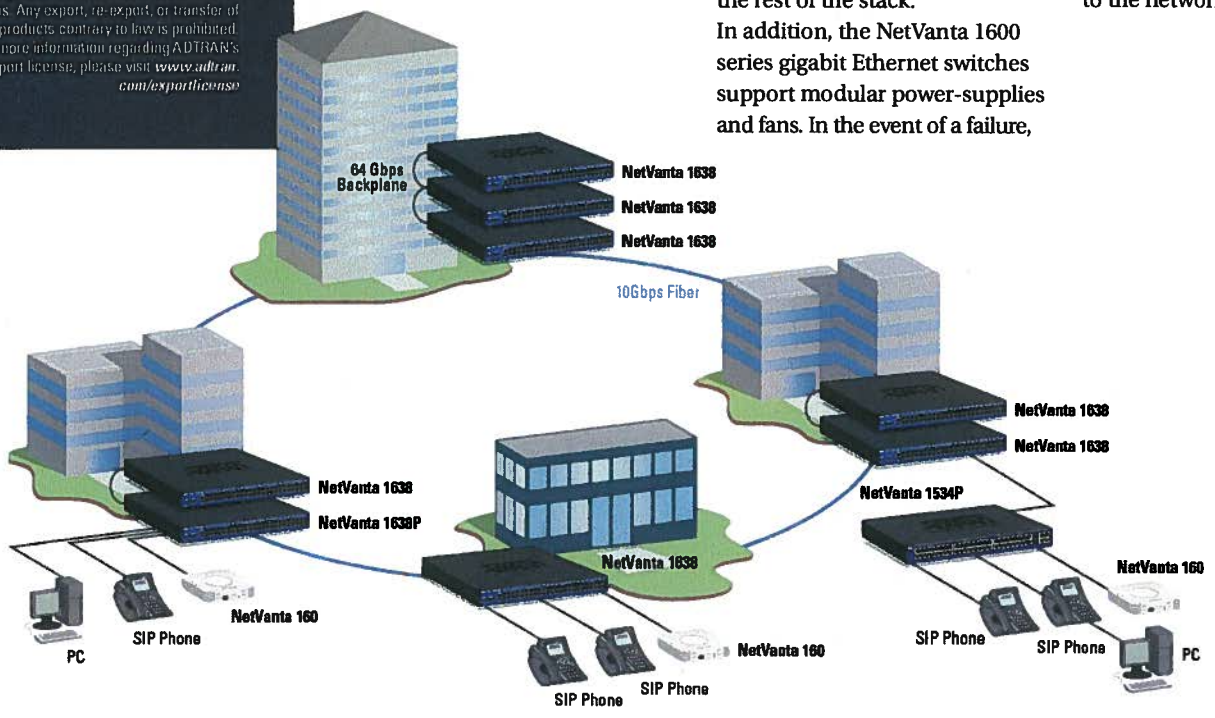
ActivChassis improves network resiliency through the use of a redundant link in the ActivChassis configuration. This ring topology creates a persistent, redundant connection across the stack that is fully utilized during normal operations to minimize the number of hops a packet has to make across an 8 unit stack. In addition, if a switch failure does occur, the redundant connection prevents the isolation of any other network users across the rest of the stack.

In addition, the NetVanta 1600 series gigabit Ethernet switches support modular power-supplies and fans. In the event of a failure, a spare power-supply/fan unit can be installed in a matter of minutes without needing to physically remove the switch from the rack. This allows network administrators to cost-effectively reduce maintenance overhead and minimize network downtime.

Using Port Aggregation

ActivChassis also allows multiple switches to look, feel, and operate like a single chassis-like system, enabling certain features such as port-mirroring and link-aggregation to be applied across multiple physical switches that comprise the stack.

Therefore, using ActivChassis, it is possible to aggregate multiple physical links that span wiring closets to create a single, logical highly-available network uplink connection. In this configuration, there is no single point of failure in the network—if one switch goes down or if one cable is disconnected, the logical link remains active and network users retain full connectivity to the network.



NetVanta 1534P

Layer 3 Lite Gigabit Ethernet Switch

Product Features

- 28-port multi-layer Gigabit Ethernet switch
- 24-Gigabit Ethernet ports and four SFP optical ports
- Two standard 1 Gbps SFP ports and two enhanced 2.5 Gbps SFP ports
- 802.3af (PoE), 802.3at (PoE+) and Legacy PoE
- Non-blocking, up to 62 Gbps switching capacity
- Line rate Layer 2 and Layer 3 Lite capabilities
- Desktop security audit
- DHCP network forensics
- 802.1Q VLANs, Private VLANs and VLAN assignment via 802.1x
- Advanced QoS with support for 802.1p and DiffServ prioritization with four queues per egress port
- Automate actions with Port Scheduler and TCL scripting
- VoIP ready with LLDP/LLDP-MED and voice VLANS
- Business-class security with RADIUS, TACACS+, 802.1x and port security
- Optimized for iSCSI storage area networks (SANs) solutions
- Wi-Fi® access controller for centralized management of NetVanta Wireless Access Points (WAPs)
- Cable and SFP diagnostics provides easy to use troubleshooting tools for copper and fiber cable
- Familiar CLI and Web GUI
- Next business day advance replacement
- Limited lifetime warranty

The NetVanta® 1534P is a managed, 28-port PoE, Layer 3 Lite, Gigabit Ethernet switch designed for fast, secure, cost-effective Local Area Network (LAN) switching. This scalable, full-featured business-class switch is perfect for higher-bandwidth Voice over IP (VoIP) applications needing PoE to power IP Phones, as well as Gigabit-to-the-desktop deployments. Experience the ease of management with an easy-to-use Web-based Graphical User Interface (GUI) and familiar Command Line Interface (CLI).

Hardware

The NetVanta 1534P rackmount switch provides 28 Gigabit Ethernet ports, consisting of 24 fixed 10/100/1000Base-T Ethernet ports, two 1.0 Gbps Small Form-factor Pluggable (SFP) ports, and two 2.5 Gbps enhanced SFP ports. Together the four SFP ports can provide up to 14 Gbps of bandwidth between interconnected NetVanta 1534P switches.

Multi-layer Switching

The NetVanta 1534P supports advanced multi-layer (Layer 2 and Layer 3 Lite) switching with up to 16 static routes allowing it to easily scale from SMBs to enterprise-size networks.

Standards Protocols

Based on the ADTRAN® Operating System (AOS), this device supports Link Layer Discovery Protocol (LLDP) which auto-discovers neighboring Ethernet devices, simplifying integration into multi-vendor environments.

VoIP Ready

NetVanta 1534P has been designed specifically for VoIP. The ability to automatically configure IP phones using LLDP-MED, and the ability to separate voice traffic onto voice VLANs, helps ease the deployment of VoIP.

Quality of Service

NetVanta switches also support QoS to prioritize mission-critical traffic like VoIP and control network congestion. The NetVanta 1534P offers 802.1p and DiffServ Class of Service (CoS). It also supports frame tagging, as well as enforcement of tagged traffic received from trusted sources. Four egress queues (per port) are available for assigning traffic priorities using Weighted Round Robin (WRR) and Strict Priority Scheduling.

PoE

The NetVanta 1534P provides standards-based 802.3af (PoE), 802.3at (PoE+) and Legacy PoE functionality for powering IP phones, Wireless Access Points (WAPs), or other devices requiring LAN power.

Security

Rest assured, with the NetVanta 1534P your network is protected. This product offers a variety of data security features including DoS protection, MAC-based port security, multilevel user passwords, Secure Shell (SSH) and Secure Socket Layer (SSL) for encrypted user login, and Access Authentication and Authorization (AAA) for authentication with RADIUS and TACACS+. With features such as 802.1x and port security, administrators can assure that only authorized users are allowed access to the network.

AOS also features desktop auditing using DHCP in conjunction with Microsoft® Network Access Protection (NAP) to monitor the health of client computers. The two protocols work together to ensure that systems connected to the network are using appropriate corporate policies, such as firewall settings and antivirus settings.

Port Scheduler

The NetVanta 1534P allows ports to be enable or disabled based on time of day. This ability to schedule available ports allows for added security and reduces power consumption during off hours saving on utility cost.

iSCSI Optimized

All ADTRAN NetVanta Gigabit Ethernet switches are optimized for iSCSI Storage Area Networks (SANs) deployments. Network administrators can take advantage of features such as Jumbo frame support (up to 13K), separation of iSCSI network traffic utilizing VLANs, and 802.3x flow control to seamlessly integrate ADTRAN switches with iSCSI SANs devices.

Administration

AOS offers both a Command Line Interface (CLI) that mimics the widely deployed, industry *de facto* standard and an intuitive Web-based Graphical User Interface (GUI) with step-by-step configuration wizards. For automating setup and configuration, the NetVanta 1534P supports Auto-Config which provides the ability to automatically obtain the switch configuration via DHCP.

AOS also offers network forensics to aid in troubleshooting network problems by allowing network administrators to easily locate devices on the network by MAC or IP address.

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/support

Where to Buy
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support@adtran.com
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888 423-8726
aces@adtran.com
www.adtran.com/support

International Inquiries
256 963 8000 voice
256 963-6300 fax
international@adtran.com

For the regional office nearest you, visit:
www.adtran.com/where2buy

NetVanta 1534P

Layer 3 Lite Gigabit Ethernet Switch

Product Specifications

Physcial Interface

Ethernet Ports

- 24–10/100/1000Base-T
- 2–Standard 1 Gbps SFP ports
- 2–Enhanced 1.0/2.5 Gbps SFP Ports
- Auto rate/duplex/MDI/MDI-X

Console Port

- DB-9, RS-232

Switching Performance

- Non-blocking Layer 2/3 Switching

Maximum Forwarding Bandwidth

- 62 Gbps

Layer 2 Support

- 802.1D Spanning Tree
- 802.1w Rapid STP
- 802.3ad Link Aggregation
- 8,000 MAC Addresses
- Jumbo Frames (9K)
- IGMP Snooping
- 802.3x Flow Control

Layer 3 Support

- 16 Static Routes
- 8 Layer 3 Interfaces
- UDP Relay
- 225 ARP Entries
- IPv6 Management

Diagnostics

- Port Mirroring
- LLDP (802.1AB)
- LLDP-MED
- Cable Diagnostics
- SFP Diagnostics
- Troubleshooting Page

Front Panel Status LEDs

- Power Status
- **LAN:** link, activity

Port Statistics

- Number of TX/RX Frames, Collisions, Errors

Quality of Service

- 802.1p and DiffServ
- Four output queues per egress port
- Weighted Round Robin (WRR)
- Strict Priority Scheduling

VLAN

- Port-based VLANs
- 802.1Q tagged trunked VLANs
- Voice VLANs
- Private VLAN Edge
- Dynamic 802.1x assigned VLANs
- Support for up to 255 active VLANs

Storm Control

- Broadcast, Unicast, and Multicast

PoE

- 802.3af (PoE) and 802.3at (PoE+) and Legacy PoE
- 370 Watts (Total)

Administration

- CLI (Console/Telnet/SSH)
- SNMP v3
- Web-based GUI (HTTP/SSL)
- SYSLOG
- n-Command® support
- Email Alerts
- RADIUS
- TACACS+
- TCL Scripting
- Auto Config
- Port Scheduler
- DHCP Network Forensics

Security

- Port authentication (802.1x)
- Port Security
- DoS Protection
- Hardware ACLs
- Microsoft Desktop Auditing

Wi-Fi Controller

- Controls up to 24 NetVanta Wireless Access Points

Environment

- **Operating temperature:** 0° to 45° C (32° to 122° F)
- **Storage temperature:** -20° to 70° C (-4° to 158° F)
- **Relative humidity:** Up to 95%, non-condensing

Physical

- **Chassis:** 1U, 19" Rackmountable Metal Enclosure (Rackmount Brackets Included)
- **Dimensions:** 1.72" H, 17.2" W, 10" D
- **Weight:** 9.5 lbs.
- **AC power:** 110–230 VAC, 50/60 Hz
- **Power:** 500 Watts, 4.9 A Max

Agency Approvals

- FCC Part 15 Class A, UL 1950/CSA, RoHS

Ordering Information

Equipment	Part #
NetVanta 1534P	1702591G1
NetVanta 1000BaseSX SFP Transceiver	1200480E1
NetVanta 1000BaseLX SFP Transceiver	1200481E1
NetVanta 2.5 Gbps Multimode SFP Transceiver	1200482G1
NetVanta 2.5 Gbps Singlemode SFP Transceiver	1200483G1
NetVanta 1 Meter SFP Interconnect Cable	1200484G1
NetVanta 3 Meter SFP Interconnect Cable	1200484G3

TL9000
TL19.1270

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

61702591G1-8F March

NetVanta 1534

Layer 3 Lite Gigabit Ethernet Switch

Product Features

- 28-port multi-layer Gigabit Ethernet switch
- 24-Gigabit Ethernet ports and four SFP optical ports
- Two standard 1 Gbps SFP ports and two enhanced 2.5 Gbps SFP ports
- Non-blocking, up to 62 Gbps switching capacity
- Line rate Layer 2 and Layer 3 Lite capabilities
- Static routes
- 802.1Q VLANs, Private VLANs and VLAN assignment via 802.1x
- Advanced QoS with support for 802.1p and DiffServ prioritization with four queues per egress port
- Automate actions with Port Scheduler and TCL scripting
- VoIP ready with LLDP/LLDP-MED and voice VLANS
- Business-class security with RADIUS, TACACS+, 802.1x and port security
- Optimized for iSCSI storage area networks (SANs) solutions
- Wi-Fi® access controller for centralized management of NetVanta Wireless Access Points (WAPs)
- Cable and SFP diagnostics provides easy to use trouble-shooting tools for copper and fiber cable
- Familiar CLI and Web GUI
- Limited lifetime warranty
- Next business day advance replacement

NetVanta® 1534 is a managed, 28-port, Layer 3 Lite, Gigabit Ethernet switch designed as an access layer or network backbone switch for Small to Medium-sized Enterprises (SMEs). With the combination of the advanced multi-layer switching fabric, high-bandwidth capabilities, and enhanced Quality of Service (QoS) features, the NetVanta 1534 is ideal in Gigabit-to-the-desktop deployments, and converged voice and data networks.

Hardware

The NetVanta 1534 rackmountable switch provides 28 Gigabit Ethernet ports, consisting of 24 fixed 10/100/1000Base-T Ethernet ports, two 1.0 Gbps Small Form-factor Pluggable (SFP) ports, and two 2.5 Gbps enhanced SFP ports located on the back. Together the four SFP ports can provide up to 14 Gbps of bandwidth between interconnected NetVanta 1534 switches. "Half-rack" in size, you can scale to 48 Gigabit Ethernet ports and eight SFP optical ports utilizing two NetVanta 1543 switches side-by-side in a single 19-inch rack space.

Multi-layer Switching

The NetVanta 1534 supports advanced multi-layer (Layer 2 and Layer 3 Lite) switching with up to 16 static routes allowing it to easily scale from SMBs to enterprise-size networks.

Standards Protocols

Based on the ADTRAN® Operating System (AOS), this device supports Link Layer Discovery Protocol (LLDP) which auto-discovers neighboring Ethernet devices, simplifying integration into multi-vendor environments.

VoIP Ready

NetVanta 1534 has been designed specifically for VoIP. The ability to automatically configure IP phones using LLDP-MED, and the ability to separate voice traffic onto voice VLANs, helps ease the deployment of VoIP.

Quality of Service

NetVanta switches also support QoS to prioritize mission-critical traffic like VoIP and control network congestion. NetVanta 1534 offers 802.1p and DiffServ Class of Service (CoS). It also supports frame tagging, as well as enforcement of tagged traffic received from trusted sources. Four egress queues (per port) are available for assigning traffic priorities using Weighted Round Robin (WRR) and Strict Priority Scheduling.

Security

Rest assured, with NetVanta 1534 your network is protected. This product offers a variety of data security features including DoS protection, MAC-based port security, multilevel user passwords, Secure Shell (SSH) and Secure Socket Layer (SSL) for encrypted user login, and Access Authentication and Authorization (AAA) for authentication with RADIUS and TACACS+. With features such as 802.1x and port security, administrators can assure that only authorized users are allowed access to the network.

AOS also features desktop auditing using DHCP in conjunction with Microsoft Network Access Protection (NAP) protocol to monitor the health of client computers. The two protocols work together to ensure that systems connected to the network are using appropriate corporate policies, such as firewall settings, antivirus settings and other client health information.

Port Scheduler

NetVanta 1534 allows ports to be enable or disabled based on time of day. This ability to schedule available ports allows for added security and can provide less power consumption during off hours saving on utility cost.

iSCSI Optimized

All ADTRAN NetVanta Gigabit Ethernet switches are optimized for iSCSI Storage Area Networks (SANs) deployments. Network administrators can take advantage of features such as Jumbo frame support (up to 13K), separation of iSCSI network traffic utilizing VLANs, and 802.3x flow control to seamlessly integrate ADTRAN switches with iSCSI SANs devices.

Administration

AOS offers both a Command Line Interface (CLI) that mimics the widely deployed, industry *de facto* standard and an intuitive Web-based Graphical User Interface (GUI) with step-by-step configuration wizards. For automating setup and configuration, NetVanta 1534 supports Auto-Config which provides the ability to automatically obtain the switch configuration via DHCP.

AOS also offers network forensics to aid in troubleshooting network problems by allowing network administrators to easily locate devices on the network by MAC or IP address.

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/support

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888 423-8726
support@adtran.com
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ACES Installation & Maintenance Service
888 423-8726
aces@adtran.com
www.adtran.com/support

International Inquiries
256 963 8000 voice
256 963-6300 fax
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www.adtran.com/where2buy

TL19.1270

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

NetVanta 1534

Layer 3 Lite Gigabit Ethernet Switch

Product Specifications

Physcial Interface

Ethernet Ports

- 24–10/100/1000Base-T
- 2–Standard 1 Gbps SFP ports
- 2–Enhanced 1.0/2.5 Gbps SFP Ports
- Auto rate/duplex/MDI/MDI-X

Console Port

- DB-9, RS-232

Switching Performance

- Non-blocking Layer 2/3 Switching

Maximum Forwarding Bandwidth

- 62 Gbps

Layer 2 Support

- 802.1D Spanning Tree
- 802.1w Rapid STP
- 802.3ad Link Aggregation
- 8,000 MAC Addresses
- Jumbo Frames (9K)
- IGMP Snooping
- 802.3x Flow Control

Layer 3 Support

- 16 Static Routes
- 8 Layer 3 Interfaces
- UDP Relay
- 225 ARP Entries
- IPv6 Management

Diagnostics

- Port Mirroring
- LLDP (802.1AB)
- LLDP-MED
- Cable Diagnostics
- SFP Diagnostics
- Troubleshooting Page

Front Panel Status LEDs

- Power Status
- **LAN:** link, activity

Port Statistics

- Number of TX/RX Frames, Collisions, Errors

Quality of Service

- 802.1p and DiffServ
- Four output queues per egress port
- Weighted Round Robin (WRR)
- Strict Priority Scheduling

VLAN

- Port-based VLANs
- 802.1Q tagged trunked VLANs
- Voice VLANs
- Private VLAN Edge
- Dynamic 802.1x assigned VLANs
- Support for up to 255 active VLANs

Storm Control

- Broadcast, Unicast, and Multicast

Administration

- CLI (Console/Telnet/SSH)
- SNMP v3
- Web-based GUI (HTTP/SSL)
- SYSLOG
- n-Command® support
- Email Alerts
- RADIUS
- TACACS+
- TCL Scripting
- Auto Config
- Port Scheduler
- DHCP Network Forensics

Security

- Port authentication (802.1x)
- Port Security
- DoS Protection
- Hardware ACLs
- Microsoft Desktop Auditing

Wi-Fi Controller

- Controls up to 24 NetVanta Wireless Access Points

Environment

- **Operating temperature:** 0° to 50° C (32° to 122° F)
- **Storage temperature:** -20° to 70° C (-4° to 158° F)
- **Relative humidity:** Up to 95%, non-condensing

Physical

- **Chassis:** 1U, 19" Rackmountable Metal Enclosure (Rackmount Brackets Included)
- **Dimensions:** H 1.72", 8" W, 11" D
- **Weight:** 4 lbs.
- **AC power:** 100–250 VAC, 50/60 Hz
- **Power:** 30 Watts, 1 A Max

Agency Approvals

- FCC Part 15 Class A, UL 1950/CSA, CE Mark, C-tick, RoHS

Ordering Information

Equipment	Part #
NetVanta 1534	1702590G1
NetVanta 1000BaseSX SFP Transceiver	1200480E1
NetVanta 1000BaseLX SFP Transceiver	1200481E1
NetVanta 2.5Gbps Multimode SFP Transceiver	1200482G1
NetVanta 2.5Gbps Singlemode SFP Transceiver	1200483G1
NetVanta 1 Meter SFP Interconnect Cable	1200484G1
NetVanta 3 Meter SFP Interconnect Cable	1200484G3
Dual Mounting Tray	1700508F1
Wall Mount Brackets	1700507F1

NetVanta 1234P/1238P

Power over Ethernet (PoE), Layer 2 Fast Ethernet Switches

Product Features

- 24/48-port auto-sensing 10/100Base-T managed Layer 2 Ethernet switch
- Two standard 1 Gbps (shared copper and SFP) ports and Two enhanced 2.5 Gbps SFP ports
- 802.3af (PoE) and Legacy PoE
- Non-blocking, up to 23.6 Gbps switching capacity
- 802.1Q tagged and port-based VLANs
- Support for up to 255 active VLANs
- 802.1p and DiffServ prioritization with 4 queues per egress port
- Link aggregation, LLDP and LLDP-MED
- Weighted Round Robin (WRR) and WRR + expedite
- 802.1D Spanning Tree and 802.1w Rapid Spanning Tree support
- DHCP network forensics
- Business-class security with RADIUS, TACACS+, 802.1x and port security
- Port mirroring
- TFTP/FTP firmware upgrades
- Broadcast, Unicast, and Multicast storm control
- Wi-Fi® access controller for centralized management of NetVanta Wireless Access Points
- Cable diagnostics identifies cable length and detects shorts or open twisted pair
- Familiar CLI and Web GUI
- Limited Lifetime Warranty
- Next Business Day Advance Replacement

The NetVanta® 1000 Series of managed, Layer 2, Ethernet switches is designed for fast, secure, cost-effective Local Area Network (LAN) switching. These scalable, full-featured business-class switches are perfect for Voice over IP (VoIP) applications. The switches use robust Quality of Service (QoS) features and Power over Ethernet (PoE) capabilities to power IP Phones, protecting the organization with advanced security capabilities, and ease of management with an easy-to-use Web-based Graphical User Interface (GUI) and familiar Command Line Interface (CLI).

Hardware

The NetVanta 1234P and 1238P rackmount switches support 24 and 48 10/100Base-T Ethernet ports with auto-rate, auto-duplexing and MDI/MDI-X sensing. In addition, each switch supports two 1.0 Gbps shared Small Form-factor Pluggable (SFP) or copper ports, and two 2.5 Gbps enhanced SFP ports. Together the four uplink ports can provide up to 14 Gbps of bandwidth between interconnected NetVanta 1234P or 1238P switches.

Standards-based Protocols

Based on the ADTRAN® Operating System (AOS), these devices offer support for Link Aggregation (802.3ad); Port Mirroring; and Port-based switching features including Broadcast Storm Control, Spanning Tree (802.1D) and Rapid Spanning Tree (802.1w) for faster network convergence, link redundancy, and recovery from topology changes. Link Layer Discovery Protocol (LLDP) auto-discovers neighboring Ethernet devices, simplifying integration into multi-vendor environments.

VLANs

All NetVanta switches support 802.1Q trunking and up to 255 port-based Virtual LANs (VLANs) to allow network managers to separate broadcast domains for efficient network performance and traffic control.

Power over Ethernet

The NetVanta 1234P and 1238P platforms provide standards-based 802.3af and Legacy PoE functionality for powering IP phones, Wireless Access Points (WAPs), or other devices requiring LAN power.

Security

Rest assured, with the NetVanta 1234P and 1238P your network is protected. These products also offer a variety of data security features including multilevel user passwords, Secure Shell (SSH) and Secure Socket Layer (SSL) for encrypted user login, and Access Authentication and Authorization (AAA) for authentication with a RADIUS, RSA SecurID and TACACS+.

Quality of Service

NetVanta switches also support QoS to ensure network managers have the ability to prioritize mission-critical traffic like VoIP and control network congestion. The NetVanta 1000 Series offers 802.1p and DiffServ Class of Service (CoS). Each switch supports frame tagging, as well as enforcement of tagged traffic received from trusted sources. Four egress queues (per port) are available for assigning traffic priorities using Weighted Round Robin (WRR).

Administration

The AOS offers both a CLI that mimics the widely deployed, industry *de facto* standard and an intuitive Web-based GUI with step-by-step configuration wizards. For a centralized enterprise-wide management scheme, ADTRAN offers n-Command®, an intuitive, scalable software suite to manage firmware revisions, push firmware upgrades and configuration changes, backup and restore configurations, and manage security policies and Access Control Lists (ACLs).

NetVanta 1000 Series of Ethernet switches are easily coupled with other ADTRAN products including access routers, Wireless Access Points, IP Business Gateways, IP phones, and VoIP telephony solutions. All of these solutions are backed by ADTRAN's outstanding support and services, and an industry-leading warranty.

VoIP Ready

ADTRAN PoE 802.3af Power over Ethernet

ADTRAN® Smart Solutions for a Connected World.

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/support

Where to Buy
877 280-8416
channel.sales@adtran.com
www.adtran.com/where2buy

Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
888 423-8726
aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963-8000 voice
256 963-6300 fax
international@adtran.com

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NetVanta 1234P/1238P

Power over Ethernet (PoE), Layer 2 Ethernet Switches

Product Specifications

Physical Interface

Ethernet Ports

- **NetVanta 1234P:** 24 10/100Base-T
- **NetVanta 1238P:** 48 10/100Base-T
- Two Combo 10/100/1000Base-T/SFP
- Two Enhanced 1.0/2.5 Gbps SFP ports
- Auto rate/Duplex/MDI/MDI-X

Console Port

- DB-9, RS-232

Switching Performance

- Non-blocking
- 8,000 MAC Addresses

Maximum Forwarding Bandwidth

- **NetVanta 1234P:** 18.8 Gbps
- **NetVanta 1238P:** 23.6 Gbps

Diagnostics

- Port Mirroring
- LLDP (802.1AB)
- LLDP-MED
- Ping
- Cable Diagnostics

Front Panel Status LEDs

- Status
- **LAN:** Push-button displays Link/Activity or PoE status

Port Statistics

- Number of TX/RX Frames
- Number of Collisions
- Number of Errors

Spanning Tree Support

- 802.1D Spanning Tree
- 802.1w Rapid Spanning Tree

Link Aggregation

- 802.3ad Link Aggregation
- Support for 6 Trunk Groups
- Trunk groups consist of up to 8 access ports or 2 uplink ports

Quality of Service (QoS)

- 802.1p and DiffServ
- Four output queues per egress port
- Weighted Round Robin (WRR)

VLAN Support

- Port-based Virtual LANs (VLANs)
- 802.1Q Tagged Trunked VLANs
- Support for up to 255 active VLANs

Power Over Ethernet

- 802.3af and Legacy Support
- Up to 15.4 W/Port
- **NetVanta 1234P:** 370 total watts
- **NetVanta 1238P:** 370 total watts
- Power Management

Wi-Fi Controller

- Controls up to 24 NetVanta Wireless Access Points

Storm Control

- Broadcast, Unicast, and Multicast

Administration

- Familiar Command Line Interface (CLI)
- Web-based GUI
- n-Command® Support
- SNMP v3
- IPv6 Management
- SYSLOG Logging
- Email Alerts (SMTP)
- TCL Scripting

Network Access Control

- Port Authentication (802.1x)

Environment

- **Operating Temperature:** 0° to 50 °C (32° to 122 °F)
- **Storage Temperature:** -20° to 70 °C (-4° to 158 °F)
- **Relative Humidity:** Up to 95%, Non-condensing

Physical

- **Chassis:** 1U, 19" Rackmountable Metal Enclosure
- **NetVanta 1234P**
  - **Dimensions:** 1.7" H, 17.2" W, 10.9" D
  - **Weight:** 10 lbs
  - **Power:** 500 watts
- **NetVanta 1238P**
  - **Dimensions:** 1.7" H, 17.2" W, 13.9" D
  - **Weight:** 12.5 lbs
  - **Power:** 500 watts
- **AC Power:** 100–250 VAC, 50/60 Hz

Agency Approvals

- FCC Part 15 Class A, UL 1950/CSA

Ordering Information

Equipment	Part #
NetVanta 1234P	1702595G1
NetVanta 1238P	1702599G1
NetVanta 1000BaseSX SFP (LC Connectors)	1200480E1
NetVanta 1000BaseLX SFP (LC Connectors)	1200481E1
NetVanta 1000Base-T SFP	1200485G1
NetVanta 2.5 Gbps multi-mode SFP Transceiver	1200482G1
NetVanta 2.5 Gbps single-mode SFP Transceiver	1200483G1
NetVanta 1 meter SFP Interconnect cable	1200484G1
NetVanta 3 meter SFP Interconnect cable	1200484G3

NetVanta 1234P

NetVanta 1238P

NetVanta 1234/1238

Layer 2 Fast Ethernet Switches

Product Features

- 24/48-port auto-sensing 10/100Base-T managed Layer 2 Ethernet switch
- Two standard 1 Gbps (shared copper and SFP) ports and Two enhanced 2.5 Gbps SFP ports
- Non-blocking, up to 23.6 Gbps switching capacity
- 802.1Q tagged and port-based VLANs
- Support for up to 255 active VLANs
- 802.1p and DiffServ prioritization with 4 queues per egress port
- Link aggregation, LLDP and LLDP-MED
- Weighted Round Robin (WRR) and WRR + expedite
- 802.1D Spanning Tree and 802.1w Rapid Spanning Tree support
- DHCP network forensics
- Business-class security with RADIUS, TACACS+, 802.1x and port security
- Port mirroring
- TFTP/FTP firmware upgrades
- Broadcast, Unicast, and Multicast storm control
- Wi-Fi® Access Controller for centralized management of NetVanta Wireless Access Points (WAPs)
- Cable diagnostics identifies cable length and detects shorts or open twisted pair
- Familiar CLI and Web GUI
- Limited Lifetime Warranty
- Next Business Day Advance Replacement

The NetVanta® 1000 Series of managed, Layer 2, Ethernet switches is designed for fast, secure, cost-effective Local Area Network (LAN) switching. These scalable, full-featured business-class switches are perfect for Voice over IP (VoIP) applications. The switches use robust Quality of Service (QoS) features, protecting the organization with advanced security capabilities, and ease of management with an easy-to-use Web-based Graphical User Interface (GUI) and familiar Command Line Interface (CLI).

Hardware

The NetVanta 1234 and 1238 rackmount switches support 24 and 48 10/100Base-T Ethernet ports with auto-rate, auto-duplexing and MDI/MDI-X sensing. In addition, each switch supports two 1.0 Gbps shared Small Form-factor Pluggable (SFP) or copper ports, and two 2.5 Gbps enhanced SFP ports. Together the four uplink ports can provide up to 14 Gbps of bandwidth between interconnected NetVanta 1234 or 1238 switches.

Standards-based Protocols

Based on the ADTRAN® Operating System (AOS), these devices offer support for Link Aggregation (802.3ad); Port Mirroring; and Port-based switching features including Broadcast Storm Control, Spanning Tree (802.1D) and Rapid Spanning Tree (802.1w) for faster network convergence, link redundancy, and recovery from topology changes. Link Layer Discovery Protocol (LLDP) auto-discovers neighboring Ethernet devices, simplifying integration into multi-vendor environments.

VLANs

All NetVanta switches support 802.1Q trunking and up to 255 port-based Virtual LANs (VLANs) to allow network managers to separate broadcast domains for efficient network performance and traffic control.

Security

Rest assured, with the NetVanta 1234 and 1238 your network is protected. These products also offer a variety of data security features including multilevel user passwords, Secure Shell (SSH) and Secure Socket Layer (SSL) for encrypted user login, and Access Authentication and Authorization (AAA) for authentication with a RADIUS, RSA SecurID and TACACS+.

Quality of Service

NetVanta switches also support QoS to ensure network managers have the ability to prioritize mission-critical traffic like VoIP and control network congestion. The NetVanta 1000 Series offers 802.1p and DiffServ Class of Service (CoS). Each switch supports frame tagging, as well as enforcement of tagged traffic received from trusted sources. Four egress queues (per port) are available for assigning traffic priorities using Weighted Round Robin (WRR).

Administration

The AOS offers both a CLI that mimics the widely-deployed, industry *de facto* standard and an intuitive Web-based GUI with step-by-step configuration wizards. For a centralized enterprise-wide management scheme, ADTRAN offers n-Command®, an intuitive, scalable software suite to manage firmware revisions, push firmware upgrades and configuration changes, backup and restore configurations, and manage security policies and Access Control Lists (ACLs).

NetVanta 1000 Series of Ethernet switches are easily coupled with other ADTRAN products including access routers, Wireless Access Points, IP Business Gateways, IP phones, and VoIP telephony solutions. All of these solutions are backed by ADTRAN's outstanding support and services, and an industry-leading warranty.

VoIP Ready

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ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/support

Where to Buy
877 280-8416
channel.sales@adtran.com
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Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
888 423-8726
aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963-8000 voice
256 963-6300 fax
international@adtran.com

TL9000
TL19.1270

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

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NetVanta 1234/1238

Layer 2 Fast Ethernet Switches

Product Specifications

Physical Interface

Ethernet Ports

- **NetVanta 1234:** 24 10/100Base-T
- **NetVanta 1238:** 48 10/100Base-T
- Two Combo 10/100/1000Base-T/SFP
- Two Enhanced 1.0/2.5 Gbps SFP ports
- Auto Rate/Duplex/MDI/MDI-X

Console Port

- DB-9, RS-232

Switching Performance

- Non-blocking
- 8,000 MAC Addresses

Maximum Forwarding Bandwidth

- **NetVanta 1234:** 18.8 Gbps
- **NetVanta 1238:** 23.6 Gbps

Diagnostics

- Port Mirroring
- LLDP (802.1AB)
- LLDP-MED
- Ping
- Cable Diagnostics

Front Panel Status LEDs

- Status
- **LAN:** Link, Activity

Port Statistics

- Number of TX/RX Frames
- Number of Collisions
- Number of Errors

Spanning Tree Support

- 802.1D Spanning Tree
- 802.1w Rapid Spanning Tree

Link Aggregation

- 802.3ad Link Aggregation
- Support for 6 Trunk Groups
- Trunk groups consist of up to 8 access ports or 2 uplink ports

Quality of Service (QoS)

- 802.1p and DiffServ
- 4 output queues per egress port
- Weighted Round Robin (WRR)

VLAN Support

- Port-based VLANs
- 802.1Q Tagged Trunked VLANs
- Support for up to 255 Active VLANs

Wi-Fi® Controller

- Controls up to 24 NetVanta Wireless Access Points

Storm Control

- Broadcast, Unicast, and Multicast

Administration

- Familiar Command Line Interface (CLI)
- Web-based GUI
- n-Command® Support
- SNMP v3
- IPv6 Management
- SYSLOG Logging
- Email Alerts (SMTP)
- TCL Scripting

Network Access Control

- Port Authentication (802.1x)

Environment

- **Operating Temperature:** 0° to 50 °C (32° to 122 °F)
- **Storage Temperature:** -20° to 70 °C (-4° to 158 °F)
- **Relative Humidity:** Up to 95%, Non-condensing

Physical

- **Chassis:** 1U, 19" Rackmountable Metal Enclosure
- **NetVanta 1234**
  - **Dimensions:** 1.7" H, 17.2" W, 10.1" D
  - **Weight:** 5 lbs
  - **Power:** 25 watts
- **NetVanta 1238**
  - **Dimensions:** 1.7" H, 17.2" W, 10.8" D
  - **Weight:** 8.5 lbs
  - **Power:** 40 watts
- **AC Power:** 100–250 VAC, 50/60 Hz

Agency Approvals

- FCC Part 15 Class A and UL 1950/CSA

Ordering Information

Equipment	Part #
NetVanta 1234	1702594G1
NetVanta 1238	1702598G1
NetVanta 1000BaseSX SFP (LC Connectors)	1200480E1
NetVanta 1000BaseLX SFP (LC Connectors)	1200481E1
NetVanta 1000Base-T SFP	1200485G1
NetVanta 2.5 Gbps multi-mode SFP Transceiver	1200482G1
NetVanta 2.5 Gbps single-mode SFP Transceiver	1200483G1
NetVanta 1 meter SFP Interconnect cable	1200484G1
NetVanta 3 meter SFP Interconnect cable	1200484G3

NetVanta 1234

NetVanta 1238

NetVanta 1544P

Layer 3 Gigabit Ethernet Switch

Product Features

- 28-port multi-layer Gigabit Ethernet aggregation switch
- 24-Gigabit Ethernet ports and four SFP optical ports
- Four enhanced 2.5 Gbps SFP ports
- 802.3af (PoE), 802.3at (PoE+) and Legacy PoE
- Non-blocking, up to 68 Gbps switching capacity
- Line rate Layer 2 and Layer 3 switching
- Static routes, RIP V1/V2, OSPF and BGP
- Desktop security audit
- DHCP network forensics
- VRRP
- 802.1Q VLANs, Private VLANs and VLAN assignment via 802.1x
- Advanced QoS with support for 802.1p and DiffServ prioritization with four queues per egress port
- Automate actions with Port Scheduler and TCL scripting
- VoIP ready with LLDP/LLDP-MED and voice VLANS
- Business-class security with RADIUS, TACACS+, 802.1x and port security
- Optimized for iSCSI storage area networks (SANs) solutions
- Wi-Fi® access controller for centralized management of NetVanta Wireless Access Points (WAPs)
- Cable and SFP diagnostics provides easy to use troubleshooting tools for copper and fiber cable
- Familiar CLI and Web GUI
- Next business day advance replacement
- Limited lifetime warranty

The NetVanta® 1544P is a managed, 28-port PoE, Layer 3, Gigabit Ethernet switch designed as an access layer or network backbone switch for Small to Medium-sized Enterprises (SMEs). With the combination of the advanced multi-layer switching fabric, high-bandwidth capabilities, and enhanced Quality of Service (QoS) features, the NetVanta 1544P is ideal in Gigabit-to-the-desktop deployments, and converged voice and data networks.

Hardware

The NetVanta 1544P rackmount switch provides 28 Gigabit Ethernet ports, consisting of 24 fixed 10/100/1000Base-T Ethernet ports and four 2.5 Gbps Small Form-factor Pluggable (SFP) ports. Together the four SFP ports can provide up to 20 Gbps of bandwidth between interconnected NetVanta 1544P switches.

Multi-layer Switching

The NetVanta 1544P supports advanced multi-layer (Layer 2 and Layer 3) switching. It supports static routes, RIP V1/V2, OSPF, Border Gateway Protocol (BGP) and Virtual Router Redundancy Protocol (VRRP), allowing it to easily scale from small businesses to enterprise-sized networks.

Standards Protocols

Based on the ADTRAN® Operating System (AOS), this device supports Link Layer Discovery Protocol (LLDP) which auto-discovers neighboring Ethernet devices, simplifying integration into multi-vendor environments.

VoIP Ready

The NetVanta 1544P has been designed specifically for VoIP. The ability to automatically configure IP phones using LLDP-MED, and the ability to separate voice traffic onto voice VLANs, helps ease the deployment of VoIP.

Quality of Service

NetVanta switches also support QoS to prioritize mission-critical traffic like VoIP and control network congestion. The NetVanta 1544P offers 802.1p and DiffServ Class of Service (CoS). It also supports frame tagging, as well as enforcement of tagged traffic received from trusted sources. Four egress queues (per port) are available for assigning traffic priorities using Weighted Round Robin (WRR) and Strict Priority Scheduling.

PoE

The NetVanta 1544P provides up to 370 watts of 802.3af (PoE), 802.3at (PoE+) and Legacy PoE for powering IP phones, Wireless Access Points (WAPs), and other devices requiring LAN power.

Security

Rest assured, with the NetVanta 1544P your network is protected. This product offers a variety of data security features including DoS protection, MAC-based port security, multilevel user passwords, Secure Shell (SSH) and Secure Socket Layer (SSL) for encrypted user login, and Access Authentication and Authorization (AAA) for authentication with RADIUS and TACACS+. With features such as 802.1x and port security, administrators can assure that only authorized users are allowed access to the network.

AOS also features desktop auditing using DHCP in conjunction with Microsoft® Network Access Protection (NAP) to monitor the health of client computers. The two protocols work together to ensure that systems connected to the network are using appropriate corporate policies, such as firewall settings and antivirus settings.

Port Scheduler

The NetVanta 1544P allows ports to be enabled or disabled based on time of day. This ability to schedule available ports allows for added security and can provide less power consumption during off hours saving on utility cost.

iSCSI Optimized

All ADTRAN NetVanta Gigabit Ethernet switches are optimized for iSCSI Storage Area Networks (SANs) deployments. Network administrators can take advantage of features such as Jumbo frame support (up to 13K), separation of iSCSI network traffic utilizing VLANs, and 802.3x flow control to seamlessly integrate ADTRAN switches with iSCSI SANs devices.

Administration

AOS offers both a Command Line Interface (CLI) that mimics the widely deployed, industry *de facto* standard and an intuitive Web-based Graphical User Interface (GUI) with step-by-step configuration wizards. For automating setup and configuration, the NetVanta 1544P supports Auto-Config which provides the ability to automatically obtain the switch configuration via DHCP.

AOS also offers network forensics to aid in troubleshooting network problems by allowing network administrators to easily locate devices on the network by MAC or IP address.

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/support

Where to Buy
877 280-8416 toll-free
channel.sales@adtran.com
www.adtran.com/where2buy

Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
888 423-8726
aces@adtran.com
www.adtran.com/support

International Inquiries
256 963 8000 voice
256 963-6300 fax
international@adtran.com

For the regional office nearest you, visit:
www.adtran.com/where2buy

TL19.1270

ADTRAN is an ISO 9001, ISD 14001, and a TL 9000 certified supplier.

NetVanta 1544P

Layer 3 Gigabit Ethernet Switch

Product Specifications

Physcial Interface

Ethernet Ports

- 24–10/100/1000Base-T
- 4–1.0/2.5 Gbps SFP Ports
- Auto rate/duplex/MDI/MDI-X

Console Port

- DB-9, RS-232

Switching Performance

- Non-blocking Layer 2/3 Switching

Maximum Forwarding Bandwidth

- 68 Gbps

Layer 2 Support

- 802.1D Spanning Tree
- 802.1w Rapid STP
- 802.3ad Link Aggregation
- 16,000 MAC Addresses
- Jumbo Frames (13K)
- 802.3x Flow Control

Layer 3 Support

- Static Routes
- RIP V1/V2
- OSPF
- BGP
- VRRP
- UDP Relay
- 128 Layer 3 Interfaces
- 1k ARP Entries
- 1k Unicast Routes
- IPv6 Management

Diagnostics

- Port Mirroring
- LLDP (802.1AB)
- Ping
- LLDP-MED
- Cable Diagnostics
- SFP Diagnostics
- Troubleshooting Page

Front Panel Status LEDs

- Power Status
- **LAN:** link, activity

Port Statistics

- Number of TX/RX Frames, Collisions, Errors

Quality of Service

- 802.1p and DiffServ
- Four output queues per egress port
- Weighted Round Robin (WRR)
- Strict Priority Scheduling

VLAN

- Port-based VLANs
- 802.1Q tagged trunked VLANs
- Voice VLANs
- Private VLAN Edge
- Dynamic 802.1x assigned VLANs
- Support for up to 255 active VLANs

Storm Control

- Broadcast, Unicast, and Multicast

PoE

- 802.3af (PoE) and 802.3at (PoE+) and Legacy PoE
- 370 Watts (Total)

Administration

- CLI (Console/Telnet/SSH)
- SNMP v3
- Web-based GUI (HTTP/SSL)
- SYSLOG
- n-Command® support
- Email Alerts
- RADIUS
- TACACS+
- TCL Scripting
- Auto Config
- Port Scheduler
- DHCP Network Forensics

Security

- Port authentication (802.1x)
- Port Security
- DoS Protection
- Hardware ACLs
- Microsoft Desktop Auditing

Wi-Fi Controller

- Controls up to 24 NetVanta Wireless Access Points

Environment

- **Operating temperature:** 0° to 45° C (32° to 122° F)
- **Storage temperature:** -20° to 70° C (-4° to 158° F)
- **Relative humidity:** Up to 95%, non-condensing

Physical

- **Chassis:** 1U, 19" Rackmountable Metal Enclosure (Rackmount Brackets Included)
- **Dimensions:** 1.72" H, 17.2" W, 10" D
- **Weight:** 9.5 lbs.
- **AC power:** 110–230 VAC, 50/60 Hz
- **Power:** 500 Watts, 4.9 A Max

Agency Approvals

- FCC Part 15 Class A, UL 1950/CSA, RoHS

Ordering Information

Equipment	Part #
NetVanta 1544P	1702545G1
NetVanta 1000BaseSX SFP Transceiver	1200480E1
NetVanta 1000BaseLX SFP Transceiver	1200481E1
NetVanta 2.5 Gbps Multimode SFP Transceiver	1200482G1
NetVanta 2.5 Gbps Singlemode SFP Transceiver	1200483G1
NetVanta 1 Meter SFP Interconnect Cable	1200484G1
NetVanta 3 Meter SFP Interconnect Cable	1200484G3

NetVanta 1544

Layer 3 Gigabit Ethernet Switch

Product Features

- 28-port multi-layer Gigabit Ethernet aggregation switch
- 24-Gigabit Ethernet ports and four SFP optical ports
- Four enhanced 2.5 Gbps SFP ports
- Non-blocking, up to 68 Gbps switching capacity
- Line rate Layer 2 and Layer 3 switching
- Static routes, RIP V1/V2, OSPF and BGP
- VRRP
- 802.1Q VLANs, Private VLANs and VLAN assignment via 802.1x
- Advanced QoS with support for 802.1p and DiffServ prioritization with four queues per egress port
- Automate actions with Port Scheduler and TCL scripting
- VoIP ready with LLDP/LLDP-MED and voice VLANS
- Business-class security with RADIUS, TACACS+, 802.1x and port security
- Optimized for iSCSI storage area networks (SANs) solutions
- Wi-Fi® access controller for centralized management of NetVanta Wireless Access Points (WAPs)
- Cable and SFP diagnostics provides easy to use trouble-shooting tools for copper and fiber cable
- Familiar CLI and Web GUI
- Next business day advance replacement
- Limited lifetime warranty

NetVanta® 1544 is a managed, 28-port, Layer 3, Gigabit Ethernet switch designed as an access layer or network backbone switch for Small to Medium-sized Enterprises (SMEs). With the combination of the advanced multi-layer switching fabric, high-bandwidth capabilities, and enhanced Quality of Service (QoS) features, the NetVanta 1544 is ideal in Gigabit-to-the-desktop deployments, and converged voice and data networks.

Hardware

The NetVanta 1544 rackmount switch provides 28 Gigabit Ethernet ports, consisting of 24 fixed 10/100/1000Base-T Ethernet ports and four 2.5 Gbps Small Form-factor Pluggable (SFP) ports located on the back. Together the four SFP ports can provide up to 20 Gbps of bandwidth between interconnected NetVanta 1544 switches. "Half-rack" in size, you can scale to 48 Gigabit Ethernet ports and eight SFP optical ports using two NetVanta 1544 switches side-by-side in a single 19-inch rack space.

Multi-layer Switching

The NetVanta 1544 supports advanced multi-layer (Layer 2 and Layer 3) switching. It supports static routes, RIP V1/V2, OSPF, Border Gateway Protocol (BGP) and Virtual Router Redundancy Protocol (VRRP), allowing it to easily scale from small businesses to enterprise-sized networks.

Standards Protocols

Based on the ADTRAN® Operating System (AOS), this device supports Link Layer Discovery Protocol (LLDP) which auto-discovers neighboring Ethernet devices, simplifying integration into multi-vendor environments.

VoIP Ready

NetVanta 1544 has been designed specifically for VoIP. The ability to automatically configure IP phones using LLDP-MED, and the ability to separate voice traffic onto voice VLANs, helps ease the deployment of VoIP.

Quality of Service

NetVanta switches also support QoS to prioritize mission-critical traffic like VoIP and control network congestion. NetVanta 1544 offers 802.1p and DiffServ Class of Service (CoS). It also supports frame tagging, as well as enforcement of tagged traffic received from trusted sources. Four egress queues (per port) are available for assigning traffic priorities using Weighted Round Robin (WRR) and Strict Priority Scheduling.

Security

Rest assured, with NetVanta 1544 your network is protected. This product offers a variety of data security features including DoS protection, MAC-based port security, multilevel user passwords, Secure Shell (SSH) and Secure Socket Layer (SSL) for encrypted user login, and Access Authentication and Authorization (AAA) for authentication with RADIUS and TACACS+. With features such as 802.1x and port security, administrators can assure that only authorized users are allowed access to the network.

AOS also features desktop auditing using DHCP in conjunction with Microsoft Network Access Protection (NAP) protocol to monitor the health of client computers. The two protocols work together to ensure that systems connected to the network are using appropriate corporate policies, such as firewall settings, antivirus settings and other client health information.

Port Scheduler

NetVanta 1544 allows ports to be enabled or disabled based on time of day. This ability to schedule available ports allows for added security and can provide less power consumption during off hours saving on utility cost.

iSCSI Optimized

All ADTRAN NetVanta Gigabit Ethernet switches are optimized for iSCSI Storage Area Networks (SANs) deployments. Network administrators can take advantage of features such as Jumbo frame support (up to 13K), separation of iSCSI network traffic utilizing VLANs, and 802.3x flow control to seamlessly integrate ADTRAN switches with iSCSI SANs devices.

Administration

AOS offers both a Command Line Interface (CLI) that mimics the widely deployed, industry *de facto* standard and an intuitive Web-based Graphical User Interface (GUI) with step-by-step configuration wizards. For automating setup and configuration, NetVanta 1544 supports Auto-Config which provides the ability to automatically obtain the switch configuration via DHCP.

AOS also offers network forensics to aid in troubleshooting network problems by allowing network administrators to easily locate devices on the network by MAC or IP address.

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/support

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TL19.1270

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

NetVanta 1544

Layer 3 Gigabit Ethernet Switch

Product Specifications

Physcial Interface

Ethernet Ports

- 24–10/100/1000Base-T
- 4–1.0/2.5 Gbps SFP Ports
- Auto rate/duplex/MDI/MDI-X

Console Port

- DB-9, RS-232

Switching Performance

- Non-blocking Layer 2/3 Switching

Maximum Forwarding Bandwidth

- 68 Gbps

Layer 2 Support

- 802.1D Spanning Tree
- 802.1w Rapid STP
- 802.3ad Link Aggregation
- 16,000 MAC Addresses
- Jumbo Frames (13K)
- 802.3x Flow Control

Layer 3 Support

- Static Routes
- RIP V1/V2
- OSPF
- BGP
- VRRP
- UDP Relay
- 128 Layer 3 Interfaces
- 1k ARP Entries
- 1k Unicast Routes
- IPv6 Management

Diagnostics

- Port Mirroring
- LLDP (802.1AB)
- Ping
- LLDP-MED
- Cable Diagnostics
- SFP Diagnostics
- Troubleshooting Page

Front Panel Status LEDs

- Power Status
- **LAN:** link, activity

Port Statistics

- Number of TX/RX Frames, Collisions, Errors

Quality of Service

- 802.1p and DiffServ
- Four output queues per egress port
- Weighted Round Robin (WRR)
- Strict Priority Scheduling

VLAN

- Port-based VLANs
- 802.1Q tagged trunked VLANs
- Voice VLANs
- Private VLAN Edge
- Dynamic 802.1x assigned VLANs
- Support for up to 255 active VLANs

Storm Control

- Broadcast, Unicast, and Multicast

Administration

- CLI (Console/Telnet/SSH)
- SNMP v3
- Web-based GUI (HTTP/SSL)
- SYSLOG
- n-Command® support
- Email Alerts
- RADIUS
- TACACS+
- TCL Scripting
- Auto Config
- Port Scheduler
- DHCP Network Forensics

Security

- Port authentication (802.1x)
- Port Security
- DoS Protection
- Hardware ACLs
- Microsoft Desktop Auditing

Wi-Fi Controller

- Controls up to 24 NetVanta Wireless Access Points

Environment

- **Operating temperature:** 0° to 50° C (32° to 122° F)
- **Storage temperature:** -20° to 70° C (-4° to 158° F)
- **Relative humidity:** Up to 95%, non-condensing

Physical

- **Chassis:** 1U, 19" Rackmountable Metal Enclosure (Rackmount Brackets Included)
- **Dimensions:** H 1.72", 8" W, 11" D
- **Weight:** 4 lbs.
- **AC power:** 100–250 VAC, 50/60 Hz
- **Power:** 30 Watts, 1 A Max

Agency Approvals

- FCC Part 15 Class A, UL 1950/CSA, CE Mark, C-tick, RoHS

Ordering Information

Equipment	Part #
NetVanta 1544	1702544G1
NetVanta 1000BaseSX SFP Transceiver	1200480E1
NetVanta 1000BaseLX SFP Transceiver	1200481E1
NetVanta 2.5Gbps Multimode SFP Transceiver	1200482G1
NetVanta 2.5Gbps Singlemode SFP Transceiver	1200483G1
NetVanta 1 Meter SFP Interconnect Cable	1200484G1
NetVanta 3 Meter SFP Interconnect Cable	1200484G3
Dual Mounting Tray	1700508F1
Wall Mount Brackets	1700507F1

NetVanta 1544F

Fiber, Layer 3 Gigabit Ethernet Switch

Product Features

- 28-port multi-layer Gigabit Ethernet aggregation switch
- 24-standard Gigabit SFP ports and four enhanced SFP ports
- Enhanced SFP ports support standard 1 Gbps or 2.5 Gbps data rates
- Non-blocking, up to 68 Gbps switching capacity
- Line rate Layer 2 and Layer 3 switching
- Static routes, RIP V1/V2, OSPF and BGP
- VRRP
- Hardware ACLs
- 802.1Q VLANs, Private VLANs and VLAN assignment via 802.1x
- Advanced QoS with support for 802.1p and DiffServ prioritization with four queues per egress port
- Automate actions with Port Scheduler and TCL scripting
- VoIP Ready with LLDP/LLDP-MED and Voice VLANS
- Business-class security with RADIUS, TACACS+, 802.1x and port security
- CompactFlash® slot for auto provisioning
- Wi-Fi® access controller for centralized management of NetVanta Wireless Access Points
- Familiar CLI and Web GUI
- Limited Lifetime Warranty
- Next Business Day Advance Replacement

NetVanta® 1544F is a managed, 28-port, Layer 3, Gigabit Ethernet switch designed as an access layer or network backbone switch for small to medium-sized businesses. With the combination of the advanced multi-layer switching fabric, high-bandwidth capabilities, and enhanced Quality of Service(QoS) features, the NetVanta 1544F is ideal as an aggregation switch for high-bandwidth Voice over IP (VoIP), and converged voice and data networks.

Hardware

The NetVanta 1544F rackmount switch provides 28 Gigabit Ethernet ports, consisting of 24 standard 1 Gbps Small Form-factor Pluggable (SFP) Ethernet ports and four enhanced 2.5 Gbps SFP ports. The enhanced SFP ports support standard 1 Gbps up to 2.5 Gbps data rates. Together the four enhanced SFP ports can provide up to 20 Gbps of bi-directional bandwidth between interconnected NetVanta 1544 switches.

Multi-layer Switching

The NetVanta 1544F supports advanced multi-layer (Layer 2 and Layer 3) switching. It supports static routes, RIP V1/V2, OSPF, Border Gateway Protocol (BGP) and Virtual Router Redundancy Protocol (VRRP), allowing it to easily scale from small and medium-sized businesses to enterprise-sized customers.

Standards Protocols

Based on the ADTRAN® Operating System (AOS), this device offers support for Link Aggregation (802.3ad); Port Mirroring; port-based switching features including Broadcast Storm Control, Spanning Tree (802.1D) and Rapid Spanning Tree (802.1w) for faster network convergence, link redundancy, and recovery from topology changes. Link Layer Discovery Protocol (LLDP) auto-discovers neighboring Ethernet devices, simplifying integration into multi-vendor environments.

Virtual LANs (VLANs)

All NetVanta switches support 802.1Q trunking and up to 255 VLANs to allow network managers to separate broadcast domains for efficient network performance and traffic control. NetVanta 1544F also supports dynamic VLANs assigned via 802.1x. This is an ideal way to make sure users are automatically assigned to the correct VLAN, based on the login. Private VLANs are also available to provide extra security by isolating upstream traffic from user ports.

VoIP Ready

NetVanta 1544F has been designed specifically for VoIP. The ability to automatically configure IP phones using LLDP-MED, and the ability to separate voice traffic onto voice VLANs, helps ease the deployment of VoIP.

Quality of Service

NetVanta switches also support QoS to prioritize mission-critical traffic like VoIP and control network congestion. NetVanta 1544F offers 802.1p and DiffServ Class of Service (CoS). It also supports frame tagging, as well as enforcement of tagged traffic received from trusted sources. Four egress queues (per port) are available for assigning traffic priorities using Weighted Round Robin (WRR) and Strict Priority Scheduling.

Security

Rest assured, with NetVanta 1544F your network is protected. This product offers a variety of data security features including MAC-based port security, multilevel user passwords, Secure Shell (SSH) and Secure Socket Layer (SSL) for encrypted user login, and Access Authentication and Authorization (AAA) for authentication with RADIUS, RSA SecurID and TACACS+. With features such as 802.1x and port security, administrators can assure that only authorized users are allowed access to the network.

Port Scheduler

NetVanta 1544F allows ports to be scheduled, or turned on or off based on time of day. This ability to schedule available ports allows for added security.

Administration

AOS offers both a Command Line Interface (CLI) that mimics the widely deployed, industry *de facto* standard and an intuitive Web-based Graphical User Interface (GUI) with step-by-step configuration wizards. For automating setup and configuration, NetVanta 1544F also supports features like Auto-Provisioning which allows automatic configuration scripts to be run from the integrated CompactFlash slot and Auto-Config which provides the ability to automatically obtain the switch configuration via DHCP.

Smart Solutions for a Connected World.

ADTRAN®

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
800 615-1176 toll-free
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ACES Installation & Maintenance Service
888 874-ACES
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www.adtran.com/support

Global Inquiries
256 963 8000 voice
256 963-6300 fax
international@adtran.com
www.adtran.com/global

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TL19.1270

ADTRAN is an ISD 9001, ISD 14001, and a TL 9000 certified supplier.

NetVanta 1544F

Fiber, Layer 3 Gigabit Ethernet Switch

Product Specifications

Physcial Interface

Ethernet Ports

- 24-10/100/1000 Mbps SFP Ports
- 4-1 Gbps/2.5 Gbps SFP Ports

Console Port

- DB-9, RS-232

Switching Performance

- Non-blocking Layer 2/3 Switching
- Jumbo Frames: supports frames up to 13k bytes

Maximum Forwarding Bandwidth

- 68 Gbps

Layer 2 Support

- 802.1D Spanning Tree
- 802.1w Rapid STP
- 802.3ad Link Aggregation
- 16,000 MAC Addresses

Layer 3 Support

- Static Routes
- RIP V1/V2
- OSPF
- BGP
- VRRP
- UDP Relay
- 128 Layer 3 Interfaces
- 1k ARP Entries
- 1k Unicast Routes

Diagnostics

- Port Mirroring
- LLDP (802.1AB)
- LLDP-MED
- Ping
- Troubleshooting Page

Front Panel Status LEDs

- Power Status
- **LAN:** link, activity

Port Statistics

- Number of TX/RX Frames
- Number of Collisions
- Number of Errors

Quality of Service

- 802.1p and DiffServ
- Four output queues per egress port
- Weighted Round Robin (WRR)
- Strict Priority Scheduling

VLAN

- Port-based VLANs
- 802.1Q tagged trunked VLANs
- Voice VLANs
- Private VLAN Edge
- Dynamic 802.1x assigned VLANs
- Support for up to 255 active VLANs

Storm Control

- Broadcast, Unicast, and Multicast

Administration

- CLI (Console/Telnet/SSH)
- SNMP v3
- Web-based GUI (HTTP/SSL)
- SYSLOG
- n-Command® support
- Email Alerts
- RADIUS
- TACACS+
- FLASH Provisioning
- Auto Config
- TCL Scripting
- Port Scheduler

Network Access Control

- Port authentication (802.1x)
- Port Security

Wi-Fi Controller

- Controls up to 24 NetVanta Wireless Access Points

Environment

- **Operating temperature:** 0° to 50° C (32° to 122° F)
- **Storage temperature:** -20° to 70° C (-4° to 158° F)
- **Relative humidity:** Up to 95%, non-condensing

Physical

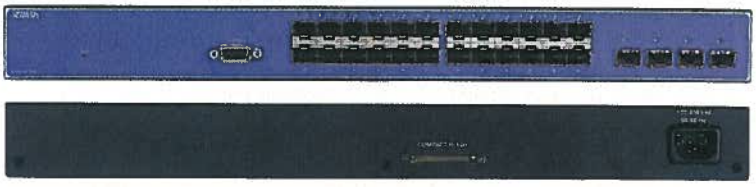
- **Chassis:** 1U, 19" Rackmountable Metal Enclosure
- **Dimensions:** 1.7" H, 17.2" W, 9.2" D
- **Weight:** 6.0 lbs.
- **AC power:** 100–250 VAC, 50/60 Hz
- **Power:** 80 Watts

Agency Approvals

- FCC Part 15 Class A, UL 1950/CSA, CE Mark, C-tick, RoHS

Ordering Information

Equipment	Part #
NetVanta 1544F	1700546G1
NetVanta 1000BaseSX SFP Transceiver	1200480E1
NetVanta 1000BaseLX SFP Transceiver	1200481E1
NetVanta 10/100/1000Base-T SFP Transceiver	1200485G1
NetVanta 2.5Gbps Multimode SFP Transceiver	1200482G1
NetVanta 2.5Gbps Singlemode SFP Transceiver	1200483G1
NetVanta 1 Meter SFP Interconnect Cable	1200484G1
NetVanta 3 Meter SFP Interconnect Cable	1200484G3



n-Command MSP

Network Management Platform

ADTRAN® n-Command® MSP is a powerful and easy-to-use network management system that provides monitoring and management for a wide range of ADTRAN business networking solutions. Using ADTRAN n-Command MSP can improve network operations and business-class Voice over IP (VoIP) performance for service providers and enterprise organizations who are implementing ADTRAN's industry-leading NetVanta® and Total Access® 900 Series equipment running the ADTRAN Operating System (AOS).

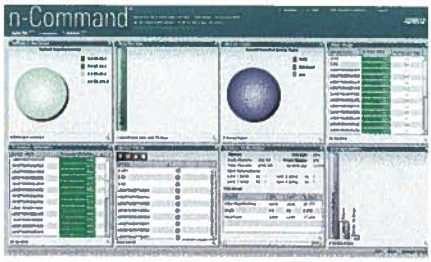
n-Command MSP is an appliance-based solution with options for the n-Command MSP Basic Server supporting up to 10,000 remote devices or the n-Command MSP Advanced Server supporting up to 25,000 remote devices. n-Command MSP includes the following management features for ADTRAN devices: Firmware Management, Configuration Management, Auto-device Discovery, Device Inventory and Control, Automatic Configuration Backup, and Voice Quality Monitoring (VQM).

As increasing numbers of hosted and premise-based VoIP networks are deployed, it is becoming more important to implement a centralized network management framework. Network planners, operators, and managers require a system that empowers them to deal with the operational challenges and customer support demands associated with next-generation telecom services. Customers also expect to have the same, or higher, level of quality and reliability from these new-generation services as they had with traditional phone services.

VoIP and IP telephony applications involve call quality and performance management challenges that require an easy-to-use and sophisticated management system. The system should enable service providers and enterprise IT organizations to deliver on Service Level Agreements (SLAs), increase customer service response, reduce network downtime, and proactively monitor and report the performance of the VoIP network and users.

The ADTRAN n-Command MSP solution delivers advanced and easy-to-use capabilities for network managers to address those issues. The n-Command MSP Dashboard features an easy-to-use Graphical User Interface and a suite of device management features including Remote Installation, Automated Device Discovery and Device Inventory, Configuration Management, Firmware Management, and VQM.

Dashboard – Graphical User Interface (GUI)
The Dashboard is the first screen to appear after logging into the system. It provides an intuitive and easy-to-use graphical display with point-and-click/drag-and-drop operations for monitoring and management of all devices being managed by the system.



The ADTRAN n-Command MSP GUI enables the network administrator to quickly and easily organize all the managed devices. To promote flexibility and customization for each n-Command MSP user, the system is designed so each user can drag and drop modules and resize or move them around within the screen to tailor the views.

Through the main GUI dashboard modules, n-Command MSP users have visibility and reporting on critical performance data for each managed device including the following:

- **Average Uptime** displays the average number of days the devices have been operational
- **Device Types** summarizes the number of devices by type in a pie chart
- **Heap Usage** displays the percent of heap used on each device
- **New Devices** displays all the new devices discovered on the network in the last 10 days

Product Features

- Configuration management
- Firmware management
- Inventory management
- VoIP performance monitoring
- Voice quality data reporting including Mean Opinion Scoring (MOS)
- Customizable dashboard
- Automated device discovery and registration using *Auto-Link*
- Automated device registration
- Automated Backups
- Supports Total Access 900 Series and NetVanta Series
- Web browser GUI
- Monitors and reports daily call activity
- Filter, group, and label devices
- Eliminates the need for costly network probes and appliances
- Solutions that support up to 25,000 remote devices
- Simplifies management and reduces operations costs
- n-Command MSP Virtualization Support

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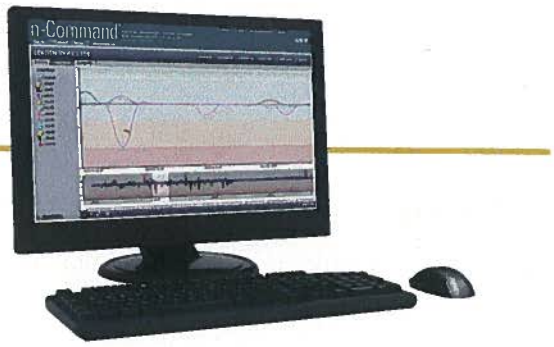
ADTRAN

n-Command MSP

Network Management Platform



- **Processor Utilization** displays the percent of processor being used on each device
- **Software Revisions** depicts the software revisions in a pie chart including primary, backup, or running firmware versions
- **Device Alerts** displays all alerts present throughout the network system and the icons change to a red color when alerts of any of the following occur:

Management Alerts are issued when problems are detected with the device's auto-link, check-in, or running configuration.

Exception Alerts are issued when an exception file is present on the device.

Firmware Alerts are issued when the primary or backup firmware image is not on the system; the currently executing firmware version is not the same as the primary firmware image; or the specified primary and backup firmware images are the same file.

VQM

As voice and data networks converge into a single communications network, the ability to implement and manage voice Quality of Service (QoS) is becoming a critical part of successful operations. QoS-enabled network devices can provide better performance and higher service levels for delay-sensitive VoIP or other mission-critical applications, as well as accommodating the lower priority traffic on the same infrastructure.

ADTRAN VQM builds on QoS to provide a sophisticated level of network performance visibility. ADTRAN VQM examines VoIP data streams for each voice call, records the voice quality information, and enables network managers to identify problem areas in an easy-to-use, graphical interface.

ADTRAN n-Command MSP collects VQM data from remote Total Access 900 Series and NetVanta equipment running voice. After each VoIP call is completed, the remote devices communicate with n-Command MSP via a low-bandwidth SIP message that includes the voice quality data such as MOS, delay, jitter, and dropped packets.

ADTRAN n-Command MSP then provides a graphical display of the voice quality statistics so network managers can easily and quickly select any call or extension, and expand into the performance details on each VoIP data stream.

Managers can proactively access call streams and network performance details, often before a customer may call into the help desk inquiring about low VoIP performance.

ADTRAN n-Command MSP saves a database of voice quality data based on the device, day of week, time of day, and phone extension. The database stores up to two weeks of voice quality data and is designed to provide key metrics relating to network congestion, endpoint configuration, and other system issues, which make diagnosing and resolving customer calls faster and easier. This information can be exported and utilized for long-term VoIP quality reports.

Remote Installation Management and Automated Device Discovery

Remote Installation and Automated Device Discovery are accomplished with the help of ADTRAN's "Auto Link" feature. This communication improves productivity by cutting costs and saving time. It is used for remote inventory and device management, configuration, and backup/restore operations, as well.

ADTRAN's "Auto Link" feature enables remote devices to communicate with the central n-Command MSP server. Auto Link is embedded into the AOS software, alleviating the need for intervention to enable this feature. ADTRAN n-Command MSP is firewall-friendly, reaching devices behind firewalls. Since the check-in is initiated from a remote device sitting behind the firewall, this allows firewall traversal while maintaining a customer's firewall protection and security. Remote devices use the ADTRAN "Auto Link" feature to check into the n-Command MSP server, opening up an IP session in the firewall. By detecting or setting the IP address of the n-Command MSP Server in remote devices, new devices can automatically contact the n-Command MSP Server upon turn-up. The n-Command MSP system also provides a visual update when a new device has been added to the network.

Device Inventory Management
While the ADTRAN "Auto Link" feature enables automated device discovery, n-Command MSP tracks discovered devices into an inventory database and records device type, serial number, IP address, firmware version, system contact information, and other pertinent information decided upon by the network administrator or manager.

Using the ADTRAN n-Command MSP system, network managers can quickly and easily see a complete listing of all managed devices and organize all managed devices for a visual display and for reporting of the field assets and inventory. Devices can be easily associated and labeled into groups to make it significantly quicker and easier to identify remote devices. User-defined device labels can be created easily or filters may also be applied for device organization. Additional user-defined fields can be created in the device tab for network-specific or service-provider specific information that users wish to record. Inventory data can be organized into labels such as customer name and location; and exported to a CSV file.

Firmware Management
The ADTRAN n-Command MSP offers an easy-to-use interface that enables network mangers to automate firmware upgrades to an individual or a group of remote devices.

Once configured, the n-Command MSP system maintains a database repository for all AOS firmware files and knows which firmware to load for any managed device. Network managers can set up auto-running firmware jobs in the MSP system that will simplify firmware management and put network managers in full control allowing them to push new firmware updates to devices or roll-back to previous firmware revisions when necessary.

With the initial screening process complete, n-Command MSP can upgrade a single firmware version to a single device or easily facilitate a network-wide upgrade. As part of the upgrade process, the network manager can schedule a date and time range when n-Command MSP will update the firmware and when the devices will reboot. This helps eliminate unnecessary network downtime, avoids use of network bandwidth during production hours, and enables managers to upgrade the network quickly and easily.

Once the firmware push is performed, n-Command MSP provides a job detail report that gives a complete summary including successful loads and specific details associated with any unsuccessful attempts so managers can resolve the issue and load firmware efficiently. This is another productivity enhancement and significant time-saving feature that frees network managers from continually
monitoring the upgrade process for remote devices.

Configuration Management
In addition to firmware management, the ADTRAN n-Command MSP system also provides configuration management for the Total Access 900 Series and NetVanta devices. The ADTRAN n-Command MSP system enables network managers to create a job to update configurations by pushing device or interface configuration changes to remotely-managed devices and automate configuration restoration for individual or groups of managed devices. Managers can create a job to update configurations during s scheduled maintenance window.

The n-Command MSP system enables network managers to install entire configuration files, pre-install configurations to a soon-to-be installed device, and make individual or global configuration changes to the network by pushing a Command Line Interface (CLI) Script to selected NetVanta or Total Access 900 devices. These scripts can be created, using the built-in CLI editor. Managers can also use n-Command MSP to roll-back to a previous configuration. This allows managers to see a history of previous configurations, as well as restore devices to a previous version of the startup configuration. Additionally, managers can reboot devices, remove exception reports, write to start-up config and much more, remotely using n-Command MSP.

Device configuration images can be backed up and stored on the n-Command MSP Server. To empower network managers, configuration backups are performed automatically upon check-in when a change to the device is detected. When the device checks-in, the configuration is automatically downloaded. For the ADTRAN NetVanta 7000 Series of IP Telephony solutions, the n-Command MSP system can backup the phone configurations and auto attendant files as well.

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/support

Where to Buy
877 280-8416
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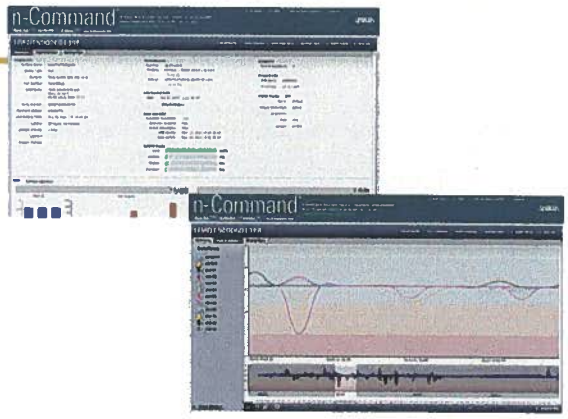
888 423-8726
aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963 8000
256 963-6300 fax
global@adtran.com

n-Command MSP

Network Management Platform



n-Command MSP Server
ADTRAN offers two n-Command MSP Server options with the storage capacity, performance, and features to allow large networks and service providers to manage up to 25,000 ADTRAN devices.

n-Command MSP Server (Basic)

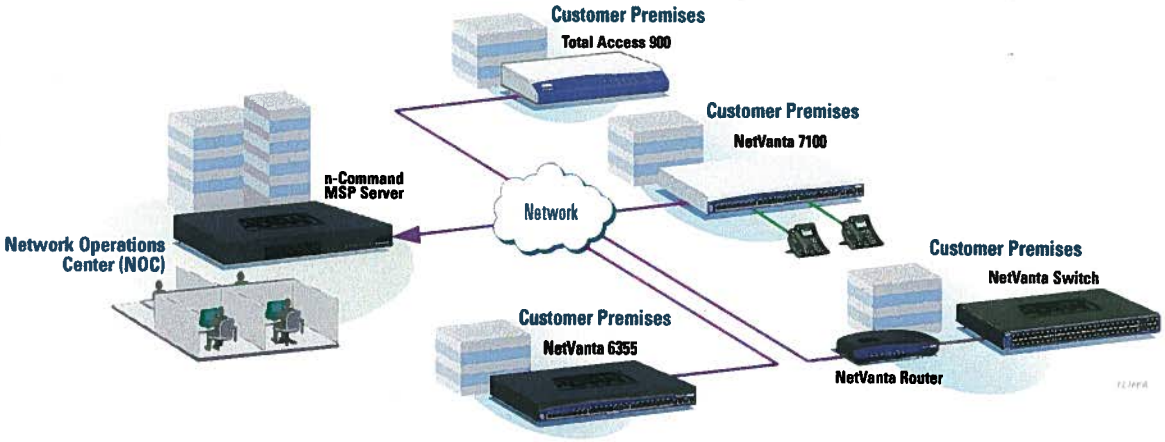
- 1 RU (1.67" H x 17.10" W x 24" D)
- Quad-core Intel Xeon Processor
- Qty 2-250 GB Hard Drive
  - RAID 1
- 8 GB RAM
- 3 Year Warranty
- 10,000 Devices at one hour check-in interval

n-Command MSP Server (Advanced)

- 1 RU (1.67" H x 17.10" W x 24" D)
- Dual Quad-core Intel Xeon Processor
- Quantity 6-300 GB Hard Drive
  - RAID 10
- 32 GB RAM
- Dual Redundant Power Supply
- 3 Year Warranty
- 25,000 Devices at one hour check-in interval

Ordering Information

Equipment	Part #
n-Command MSP with Advanced Server (25,000 devices supported)	1700842G1
n-Command MSP with Basic Server (10,000 devices supported)	1700841G1
VMware Ready n-Command MSP (10,000 devices supported)	1700845G1



n-Command MSP

- ADTRAN AOS-based devices "check-in" to MSP using Auto-Link Feature for touch-free updates and provisioning
- Provides management for devices behind a firewall
- n-Command MSP can be used on a private network or the public Internet
- Pre-install configurations for ease of turn-up

ADTRAN® Solution Overview For:

State of Utah/WSCA-NASPO Data Communications & Services

ADTRAN Response No. 121342181

Executive Summary

ADTRAN is pleased to provide this solution overview to the State of Utah/WSCA-NASPO in response to your Data Communications Products & Services RFP.

ADTRAN's Bluesocket™ virtual Wireless LAN (vWLAN™) technology eliminates the traditional costs, complexities, and bottlenecks associated with hardware-based WLAN controllers, making it the ideal architecture for building out highly-scalable and secure networks. The Bluesocket vWLAN technology provides an innovative approach to the deployment of large-scale Wi-Fi networks, separating the control plane from the data plane, distributing the security functions to the edge of the network where they belong, and utilizing a cloud-based 802.11n controller that runs on VMware™ in a secure data center location and is capable of managing and enforcing security policies for hundreds of remote APs. By taking advantage of virtualization, the vWLAN solution provides unmatched scalability, flexibility, and high availability, all of which are key characteristics of a carrier-grade Wi-Fi solution.

ADTRAN Bluesocket vWLAN Solution

ADTRAN's Bluesocket vWLAN architecture was designed around a concept of simplified scalability. In the era of wireless advancements including 802.11n, voice, and larger wireless networks, maintainability and total cost of ownership are at the forefront of new network designs. vWLAN removes the complexities of dealing with controller capacity by centralizing the management and control functions. Further, security and mobility are distributed at the edge of the network, the logical placement in networks that are designed for scalability and high availability. Adding additional access points to the vWLAN system is as easy as installing a Bluesocket software license, which extends coverage to thousands of APs without needing to worry about controller capacity.

vWLAN's architecture was the first of its kind to create a truly unified wireless and wired network which delivers maximum efficiency by separating the data plane from the wireless network management and control plane. This is achieved through the use of smart 802.11n Access Points which can support user authentication and traffic forwarding decisions at the edge of the network. Forwarding data traffic directly to the wired network frees enormous capacity within the wireless controller. More capacity means the vWLAN can deliver enhanced wireless management and control performance with far less dedicated hardware. ADTRAN's fully virtualized, software-based solution gives customers the flexibility to run vWLAN on a variety of server, blade, and hypervisor platforms

The appetite for wireless continues to grow rapidly. At the same time new bandwidth hungry multimedia applications compete for wireless airwaves and are consuming more airtime than ever before. IT departments are feeling the pressure to enable a faster, more powerful wireless solution that is secure, easy to manage and cost-effective to maintain and scale.

ADTRAN's engineering has evolved the Bluesocket solution with WLAN technology, redesigning the architecture and technology to meet the needs of the increasingly demanding wireless eco-system. This technology overhaul has led to break-through and the now market leading improvements in throughput, reliability and scalability. 10x more users can be supported and managed, using 90% less server hardware. The architecture supports up to 300 Gbps of distributed throughput on a single server and is the only wireless solution, today, that delivers Zero failover time and Zero packet loss.

vWLAN Technology Architecture

The Bluesocket vWLAN solution is comprised of a uniquely distributed architecture that supports decisions at the edge of the network and manages them with one centralized server. Forwarding data traffic directly to the wired network frees enormous capacity within the wireless server. More capacity means the server can deliver enhanced wireless management and control functionality and scalability with far less dedicated hardware.

ADTRAN's Bluesocket vWLAN makes it easy and efficient for customers to scale their wireless networks. Customers can simply add additional APs and licenses to expand the footprint of their network and/or the number of users/devices supported. Flexible, software-based architecture greatly simplifies expanding, reconfiguring, and managing the network, resulting in significant ongoing costs savings for customers. Bluesocket vWLAN's energy efficient configuration supports customers' sustainability efforts by reducing carbon emissions in two ways. First, vWLAN reduces hardware requirements up to 90%, thereby eliminating the energy required to produce, ship, install, store, maintain and dispose of that hardware. Second, significantly less required hardware reduces the amount of electricity required to operate the vWLAN. Since electricity generation is one of the largest producers of CO2, the vWLAN can be a strong contributor to a company's sustainability initiatives and the reduction of a company's CO2 footprint.

As an industry leader in leveraging existing wired infrastructure with emerging wireless technology, ADTRAN's integrated, highly efficient, virtual approach results in significant savings for the customer. ADTRAN is focused on reducing costs while enhancing performance across the full solution, not only on up front deployment costs, but also on ongoing maintenance and energy costs. By deploying ADTRAN's Bluesocket vWLAN solutions customers can expect a significant reduction in Total Cost of Ownership now and in the future.

Key Benefits of vWLAN technology

- Accelerated Wireless Performance
  ADTRAN's innovative solution is architected to scale to thousands of access points with a vWLAN solution. As the number of wireless devices steadily increases, vWLAN makes it easy and efficient for their customers to scale their wireless networks. Customers can simply add additional access points and licenses to expand the footprint of their network.

- Fast Roaming Capabilities
  Bluesocket vWLAN's Layer 3 roaming and optimized packet routing creates a better user experience for the wireless user. vWLAN offers seamless roaming to anywhere in the network - Layer 2 or Layer 3. A sophisticated centralized control algorithm runs in the vWLAN appliance to guarantee sub-50ms roaming for applications like voice and video. Client's security key material and role information is present in the roamed-to AP before the client arrives at the AP thus the client maintains their authentication state and IP address.

- Flexibility
  vWLAN provides a flexible solution that can operate in multiple deployments from a branch office to a large campus environment while offering low cost of ownership and optimal performance. Remote office deployments are demanding more from the WLAN networks and vWLAN responded by integrating flexibility into the security and data forwarding modules.

- Delivering 100% Uptime
  Bluesocket vWLAN's guarantee of Zero Failover Time and Zero packet loss ensures your critical processes are never interrupted. High availability eliminates disruption to end users if a failover occurs. The distributed architecture ensures that in the case of interruption to the main server the users are still up and running locally.

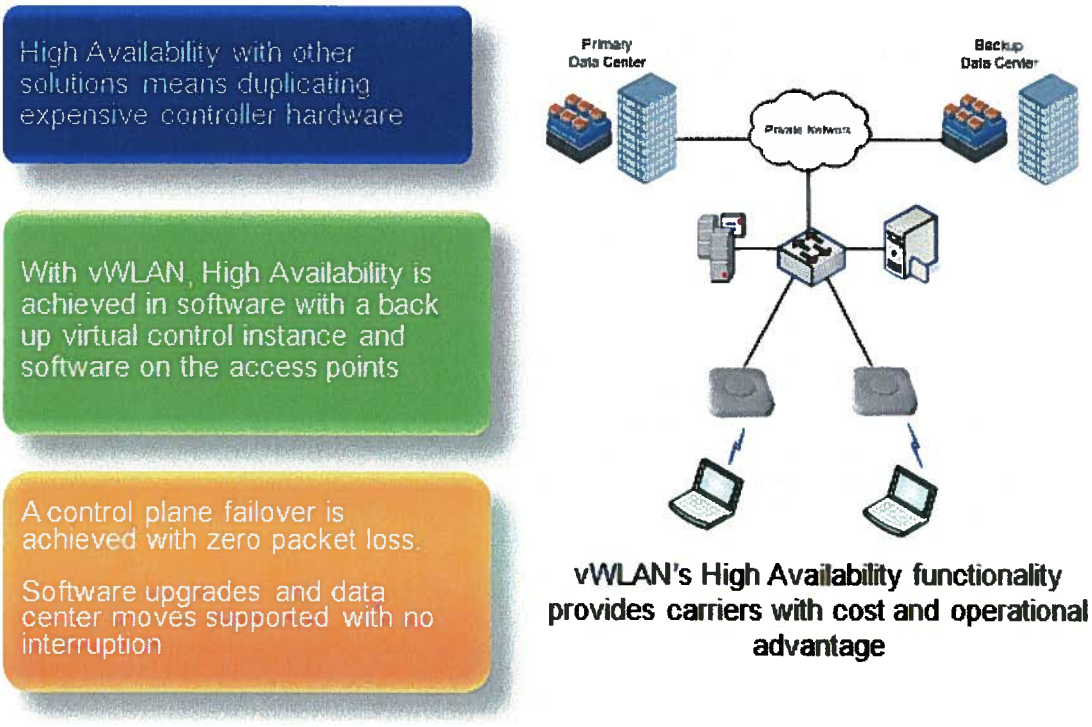


Figure 1: Virtualization Improves Availability

- **Scaling to additional users and software without infrastructure build-outs**
  he Bluesocket vWLAN distributed architecture delivers hundreds of gigabits of distributed throughput. Because the packet forwarding functionality is offloaded from the controller to the access point, the controller is free to now manage thousands of AP's and 10s of thousands of users.

Figure 2: vWLAN Separation of Data Plane and Control Plane

The data flow is from the wireless client to the Access Point to the network. This allows for infinite data plane scalability. There is no central bottleneck at a controller, as in other centralized WLAN architectures. This also allows for user based VLANs at the edge, Layer 2 and 3 Mobility, QoS/CoS at the edge, and High Availability - the data still flows even when the connection to the appliance is lost.

- Protected data
  Identity-based QoS, Packet Prioritization and Fairness Algorithms are applied at the access point. Tightly integrated security modules offer robust and scalable NAC, Guest Access, AAA and WIDS capability.

- Easily managed users
  Bluesocket vWLAN includes WLAN management software to provide a rich set of visual tools for analyzing and troubleshooting the wireless network. The integrated management solution includes location and heat maps, health summary, enhanced reporting, notifications, and summary of the overall RF environment.

ADTRAN Bluesocket vWLAN Unified User Access Control:

Supporting Users from Third-Party Access Points

Introduction:

Most wireless networks in the enterprise evolved independently of the wired network. At first, the wireless network was an access methodology of convenience, sometimes used only in conference rooms or by guests. Over time, the wireless network has become the preferred access method many different types of users. To support a multitude of users, wireless networks have evolved a number of powerful security and user management features.

While this evolution has led to more sophisticated wireless networks, it has created a divide between the wireless network and the wired network. IT staffs are burdened with the responsibility to support both. ADTRAN introduced Bluesocket vWLAN which is based on the principle of leveraging existing LAN infrastructure and reduce the burden of two networks. ADTRAN has introduced a new capability under Bluesocket vWLAN which unifies the support of users, regardless of the method they connect to the Enterprise network.

By using one system and approach to supporting wired and wireless users, IT managers can enforce a consistent policy for any class of user irrespective of access methodology. For example, a guest user would be authorized in the same process whether the guest accesses the network from a wired port or a wireless access point. Likewise, any class of user would experience the same authentication process whether they access the network wired or wirelessly. Because Bluesocket vWLAN lends itself to central control over multiple sites, this consistent approach can easily be applied over a large organization with locations around the world. Simple, consistent user management—wired and wireless—that's what Bluesocket vWLAN brings.

Solution

ADTRAN's unique approach to unified user access control requires no additional hardware. Bluesocket vWLAN provides this functionality by using only the access points and the most basic functions of a LAN switch, making the solution applicable with any type of switch.

This software- based solution leverages the processing power of the access points and configurable VLANs of the LAN switch. This solution enables endpoint visibility and control to ensure that all wired and wireless devices attempting to access a network meet corporate security policies plus all traffic priority policies are applied.

Bluesocket vWLAN is a big leap from a traditional wireless overlay network to a unified solution that integrates with existing switching, routing, security and network management. IT administrators can be confident applying ADTRAN's Bluesocket vWLAN solution designed specifically for seamless mobility, along with the most advanced levels of reliability, scalability, and security across all the connected devices independent of the medium used. With this solution, ADTRAN has reached a value point of doing more with less.

The ADTRAN Bluesocket vWLAN Advantage:

- Unifies wired and wireless management, security, and data
- Leverages existing network services
- Requires no additional hardware
- Eliminates central bottleneck - Horizontal scaling of thousands of users and gigabytes of data due to distributing the data across the network.
- Eliminates single point of failure through distributed intelligence
- Balances the load with automatic and dynamically changing AP configuration
- Flexible authentication strategy, including Captive Portal (Guest Access or Credit Card)

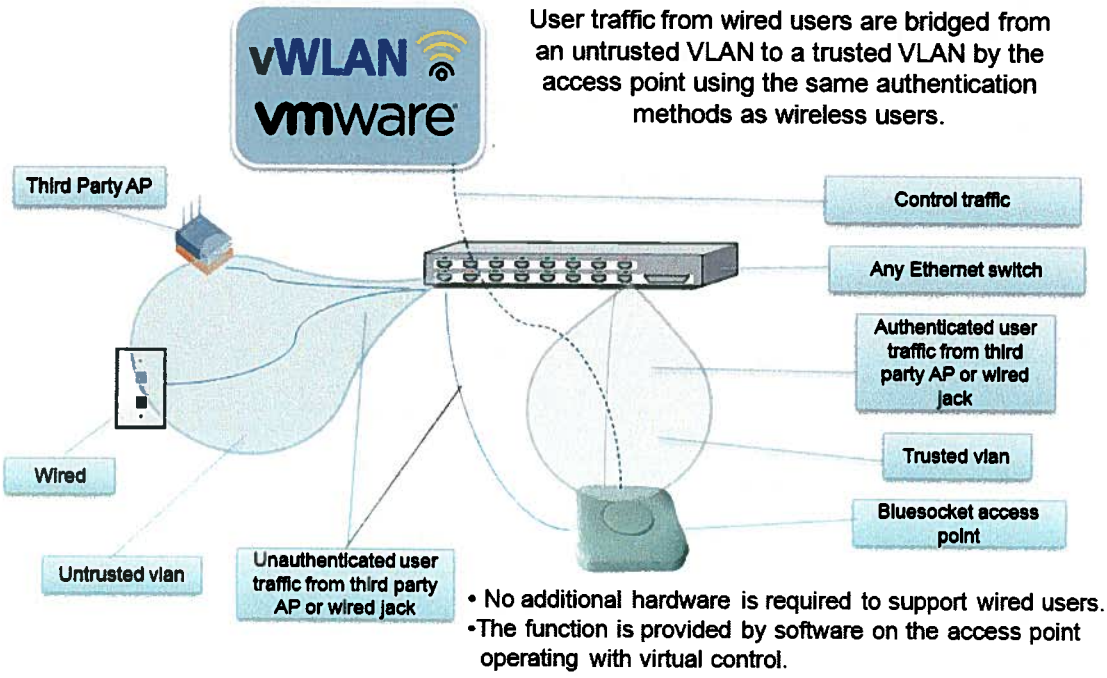


Figure 3: Supporting Users from Third Party Access Point

Roaming to and from Third Party APs

The Unified Roaming SSID determines whether roaming is allowed between Bluesocket and 3rd party APs. When Wired traffic is seen by the BSAP, the BSAP has no way to know whether it's from a hard-wired client or bridged through a 3rd party AP. If the Access Group has this value set, then vWLAN will treat the Access Group as being from a 3rd party AP with the SSID specified. Then if a user roams from/to this Access Group to an actual BSAP with the SAME SSID, the user is not required to re-authenticate. Therefore the Unified Roaming SSID is only valuable if it matches an advertised SSID under the Wireless->SSID tab.

ADTRAN Bluesocket Product Proposal for Managed Wi-Fi

ADTRAN proposes the following solution

1. Bluesocket vWLAN – Virtual Wireless Local Area Network Wi-Fi System
2. Bluesocket BSAP-1900 series of indoor and outdoor access points

Bluesocket vWLAN

ADTRAN's next-generation Virtual Wireless LAN (vWLAN) architecture unifies wireless and existing wired networks to produce a truly integrated and optimized networking solution. vWLAN enables customers to dramatically reduce the cost of deploying and operating large-scale Wi-Fi networks while providing wired-equivalent performance to wireless users, with seamless roaming and enterprise-class security and policy management.

Product Features Includes:

- Add more users, additional access points, even more locations without adding control hardware.
- Eliminate the cost and constraints of a physical controller.
- Base your WLAN on the scale and reliability of your data center.
- Eliminate mobility seams caused by multiple controllers.
- Control is freed from the LAN, making cloud control possible.
- Access points discover the control software and automatically self-configure upon installation.
- Enforce network security at the edge.

Capabilities:

- Capable to Manage thousands of Access Points
- Guest Access license
- Network Management
- Security Client Scanning: Firewall Enforcement, Antivirus compliance
- DynamicRF
- Power Management
- RF Detail View and Heat Maps

- RFIDS (with Containment)
- AP Load Balancing
- Fast Roaming
- Full Layer 4 Stateful Firewall at AP
- QoS/Cos: Bandwidth Management, Traffic prioritization, airtime fairness

Further detail of technical specification of ADTRAN vWLAN is listed on Bluesocket vWLAN Datasheet in appendix section

Bluesocket BSAP-1920

The ADTRAN Bluesocket family of high-performance access points is the perfect fit for enterprises looking to deploy secure wireless networks. Bluesocket access points are completely plug-and-play requiring no manual configuration and deliver optimal performance with ADTRAN's DynamicRF radio resource management technology. Whether you want to add wireless to your office or deploy across an entire campus, ADTRAN's access points are designed to meet your needs.

The Bluesocket family of access points is ideally suited for organizations requiring true enterprise mobility. Designed for environments and applications that require high capacity, scale and speed, these access points provide predictable and reliable wireless coverage that improve client performance and the end-user experience.

Product Features

- 802.11a/b/g/n wireless access points supporting MIMO antenna technology
- Dual radio 2.4 Ghz and 5 Ghz
- Full 2x2:2 MIMO performance
- powered by 802.3af Power over Ethernet (PoE)
- Supports auto discovery and plug-and-play, "zero-configuration" deployment
- Supports WMM/802.11e and QoS for Enterprise-class Voice over Wi-Fi
- Automatic channel and power adjustments to optimize coverage and maximize performance
- Integrated wireless intrusion detection system to identify rogue access points and wireless attacks
- Supports stateful firewall for highest security at the edge

Further detail of technical specification of ADTRAN Bluesocket BSAP-1920 is listed on Bluesocket BSAP-1920 & BASP-1925 Datasheet in appendix section

Bluesocket BSAP-1930/35, BSAP-1940

The Bluesocket 1930 and BSAP 1940 series of access points are high performance, 802.11n, MIMO, industrial class access point. Engineered for outdoor deployments, the Bluesocket 1940 access point is fully weatherized to provide optimal performance in all weather conditions.

The Bluesocket 1930 and BSAP 1935 access points support indoor applications with internal and external antennas while the BSAP 1940 access point continues wireless access outdoors to ensure the highest level of user connectivity. The BSAP 1940 can provide point to point bridging to connect buildings or to blanket a large outdoor area. The Bluesocket 1940 access point can seamlessly extend access by providing wireless services in areas where cabling infrastructure is nonexistent or cost prohibitive.

Product Features Includes:

- 802.11a/b/g/n wireless access points supporting MIMO antenna technology
- Dual radio 2.4 Ghz and 5 Ghz
- 6 internal antennas (BSAP-1930), 6 RP-SMA antennas (BSAP-1935) or 6 N-type Connectors (BSAP-1940)
- Full 3x3:3 MIMO performance powered by 802.3af or 802.3at Power over Ethernet (PoE)
- Supports auto discovery and plug-and-play, "zero-configuration" deployment
- Supports WMM/802.11e and QoS for Enterprise-class Voice over Wi-Fi
- Automatic channel and power adjustments to optimize coverage and maximize performance
- Integrated wireless intrusion detection system to identify rogue access points and wireless attacks
- Supports stateful firewall

Further detail of technical specification of ADTRAN Bluesocket BSAP-1900 series are listed on BSAP-1930, BSAP-1935, BSAP-1940 Datasheet in appendix section

ADTRAN Bluesocket Solution is Green

Most every company across the globe has instituted green policies in its operation. These policies are designed to reduce waste and create less of an impact on the environment. ADTRAN has certainly taken these steps but ADTRAN also joins a select few companies that have fundamentally redesigned their products to support more sustainable practices. In its access layer products, ADTRAN has made a number of advances in design that allow the product to be manufactured and operated in a way that has minimal impact on the environment.

With its leading wireless access product, vWLAN, ADTRAN has completely eliminated the wireless controller. This has two major sustainability advantages. First, the whole life cycle (manufacture, shipping, and disposal) of an expensive product is eliminated. The component supply chain behind a complex product like a wireless controller is massive and involves non-biodegradable materials.

These components must be assembled and shipped. That entire carbon footprint is eliminated. Once the product fails or becomes obsolete, it must be properly disposed. With vWLAN this final, environmentally unfriendly step is not necessary.

Along with eliminating the lifecycle of a complex product, vWLAN reduces electricity consumption. In a WLAN, 80% of the power consumption is drawn by the controller. With vWLAN, there is no controller to draw power.

The commitment to sustainability in product design and function extends to ADTRAN's wired access products. All ADTRAN switches have a port schedule which allows ports to be selectively shut down based on a time of day and day of week schedule automatically. This capability reduces power consumption of connected devices plus the switch runs cooler thereby reducing the HVAC load.

Most companies view power supplies as a commodity item and source these devices rather than build them. ADTRAN sees these simple, common devices as an opportunity to improve sustainability practices. ADTRAN custom designs its own power supplies for all products. By taking control of this process, these power supplies are highly efficient and designed for the specific power draw of a particular device. An off- the-shelf power supply will most often be overkill to the actual needs of the device. Consequently, a like-for-like switch from ADTRAN will

draw less power than other leading competitors. The key to this advance in sustainability is attributed to a focus on the unheralded power supply and a commitment to sustainability

In the WLAN space, ADTRAN and its partners, see the sustainability message as a competitive differentiator. The ability to demonstrate the elimination or reduction in carbon footprint puts ADTRAN's vWLAN solution in a unique position versus most of its competitors. There are already over 2,500 companies participating in the Voluntary Carbon Disclosure (VDC) program. It is fully expected that within a certain period, the VDC program will become mandatory in bid responses to demonstrate that networking (or other) solutions meet the carbon footprint requirements of the end users and/or service providers. As an example, Microsoft has already announced that vendors must meet their sustainability requirements in 2013. Again, ADTRAN with its Bluesocket vWLAN solution is leading the market in this key area for customers.

ADTRAN Bluesocket vWLAN Cuts Costs and Reduces Your Carbon Footprint

The design and engineering behind the development of Bluesocket vWLAN addresses customer's increasing concerns over the environmental impact of IT purchasing and operating decisions. The next generation vWLAN architecture delivers industry leading performance, minimizes carbon emissions and energy consumption, while continuing to provide the state-of-the-art wireless security for which ADTRAN's Bluesocket solution is known. A reduced carbon footprint and ongoing energy savings are the result of a significant reduction in required hardware:

- ADTRAN's engineers have redesigned their solution to push many functions to the 802.11n Access Points (APs). This solution is architected to allow a single appliance or server to handle ten times (10X) the number of Access Points, from 150 up to 1500, dramatically improving scalability.
- By leveraging the IEEE 802.11n wireless standard, the wireless coverage of ADTRAN's award-winning APs has increased five times (5X), reducing power consumption of the APs as the radios consume less power when clients are connected at higher data rates.
- The reduction in required hardware translates into reduced CO2 output by eliminating the manufacturing, shipping, installation, storage, maintenance, and end of life disposal for that hardware.
- Most importantly, ADTRAN's highly efficient Bluesocket vWLAN design results in ongoing energy savings of up to 80% throughout the life of the product.

- Future ADTRAN innovations will continue to deliver increasingly virtual solutions which will decrease dependency on dedicated hardware and allow customers to run control management software on a variety of servers, blades, and hypervisor platforms.

The vastly improved scalability of Bluesocket vWLAN also contributes to sustainability and efficiency. As the number of wireless devices steadily increases, Bluesocket vWLAN makes it easy and efficient for their customers to scale their wireless networks. Customers can simply add additional APs and licenses to expand the footprint of their network and/or the number of users/devices supported.

As an industry leader and innovator in the network access, mobile backhaul, and secure wireless market, ADTRAN's state-of-the-art products help its customers migrate traditionally wired applications to wireless platforms while maintaining wired quality of service and security. Across the board, organizations are finding that usage of their network increases substantially overall with the introduction of secure wireless access. vWLAN is easy to install, expand and reconfigure which provides customers with significantly more flexibility in managing their overall wired and wireless networks. This creates efficiency and cost savings by reducing the need for expensive time and energy consuming infrastructure changes as networking needs evolve.

ADTRAN Bluesocket Is an Industry Leader in Green Technology

ADTRAN is was early on to the energy and cost efficient Power over Ethernet (PoE) technology. PoE provides a means to transmit electrical power, along with data, to remote devices such as vWLAN access points (APs) over an unmodified Ethernet network. One of the primary benefits of PoE is negating the need for AC power in the ceiling, thus simplifying and reducing the cost of wireless LAN installations. As the 802.11n Wi-Fi standard was emerging, one of the challenges product vendors encountered was how to deliver "full feature" solutions within the existing 802.3af power standard. Bluesocket was the first wireless LAN (WLAN) vendor to deliver an enterprise-class MIMO Access Point in 2006. We have since been working diligently with customers and partners to further understand their needs for standards-based, enterprise-class, high throughput wireless solutions. Having deployed thousands of MIMO access points across a variety of markets, our extensive real-world experience has resulted in significant market-leading technology advancements.

Building on this technology leadership position, the BSAP-1800 802.11n Access Point was developed. Among other feature-level advantages, the BSAP-1800 was the market's first 802.11n Access Point able to support the 802.3af power standard and deliver full-feature performance with a single-port Power over Ethernet (PoE) solution. This first-to-market advantage provided a significant benefit to customers planning 802.11n deployments. Power conservation features developed in the BSAP-1800 series continued as standard features in the BSAP-1900 series. Not only did customers leverage our extensive high throughput/coverage solution best practices, but they did not have to make trade-off between performance, security, and other critical wireless network functions.

How Driving Technology Delivers Energy Savings

It was important when designing 802.11n hardware to understand this power budget and select components that would allow the AP to meet these constraints including CPU type, amount of memory, radio module, etc. Along with hardware selection, software architecture was also important to consider. This dictated the functionality that would be handled by the AP and was an important factor in selecting an appropriate CPU. The BSAP-1800 802.11n AP solution delivers more than enough power for our base platform to provide the necessary processing power to handle simultaneous 802.11a/n and 802.11b/g/n streams. To achieve this, the industry's most power efficient hardware and chipset technology was selected, allowing them to design a "power-sipping" 802.11n AP without having to limit the functionality of the units' radio usage configuration or CPU speed.

Other ADTRAN Bluesocket Product Features

1. Voice (VoWLAN)

ADTRAN's vWLAN architecture unifies the wireless and wired networks to deliver maximum efficiency by separating the data plane from the wireless network management and control plane. This is achieved through the use of smart 802.11n access points which can support traffic forwarding decisions at the edge of the network. ADTRAN's 802.11n Access Points incorporate our award winning fairness algorithm to provide optimal voice performance in a mix mode deployment. Prioritizing traffic at the edge is just one of the key, industry-leading features to support the highly secure and efficient vWLAN design. All data traffic in the system is handled by the access points and switched directly onto the Layer 2 network. If the user's role specifies a particular VLAN, their traffic is tagged appropriately.

vWLAN provides high-performance subnet roaming so that users can roam anywhere (keeping their original IP address) and continue passing traffic without interruption. Subnet roaming is handled by tunneling traffic between access points rather than forwarding traffic to a central controller. All user traffic from their original subnet is forwarded to the client, regardless of where they are on the network. vWLAN tracks user location and session information at the access point level to guarantee seamless roaming (within 40 milliseconds), wherever the client roams. Seamless roaming means that a client's security key material and role information is present in the roamed-to access point before the client arrives at the access point thus the client maintains their authentication state and IP address. Layer 3 mobility across subnets is accomplished by establishing an L3 tunnel between access points. Centralized Mobility Control Service uses Adjacent AP and Dynamic RF information to determine where tunnels should be established so roaming occurs seamlessly in less than 40 ms for voice and data clients.

vWLAN also supports different QoS mechanism, WMM and intelligent Airtime Fairness algorithm to further optimize voice performance. vWLAN's distributed architecture is suited and designed to run real time applications like voice and provide optimal performance.

2. Video

vWLAN's architecture unifies the wireless and wired networks to deliver maximum efficiency by separating the data plane from the wireless network management and control plane. This is achieved through the use of smart 802.11n access points which can support traffic forwarding

decisions at the edge of the network. ADTRAN's 802.11n Access Points incorporate our award winning fairness algorithm to provide optimal voice and video performance in a mix mode deployment.

Prioritizing traffic at the edge is just one of the key, industry-leading features to support the highly secure and efficient vWLAN design. All data traffic in the system is handled by the access points and switched directly onto the Layer 2 network. If the user's role specifies a particular VLAN, their traffic is tagged appropriately. vWLAN provides high-performance subnet roaming so that users can roam anywhere (keeping their original IP address) and continue passing traffic without interruption. Subnet roaming is handled by tunneling traffic between access points rather than forwarding traffic to a central controller. All user traffic from their original subnet is forwarded to the client, regardless of where they are on the network. vWLAN tracks user location and session information at the access point level to guarantee seamless roaming (within 40 milliseconds), wherever the client roams. vWLAN supports QoS at the edge, of which there are four main components: Bandwidth Management, Packet Prioritization, Over the Air Fairness, and Packet Remarking, along with its award winning Airtime Fairness algorithm.

Airtime Fairness algorithm guarantees fairness by intelligently allocating transmission units at the AP for each client.

- Transmission unit (TU) may contain one or more 802.11 packet depending on clients capacity (11n Vs 11b Vs 11g/a). Algorithm works on TU and hence is agnostic to client type (11n or legacy).

- TU allocation occurs at the level of traffic type per client (i.e. voice, best effort, etc.) ensuring optimal performance for voice and video applications.

Besides Airtime Fairness algorithm vWLAN solution ensures the client's connectivity is at best rates possible and also to ensure optimal system performance. vWLAN solution also allows administrator to select minimum transmit rate on per radio basis. ADTRAN Access Point advertises rates which are higher than or equal to selected minimum rate. All access point frames are transmitted at rate higher than or equal to this rate. This ensures that client's associating to the access point with a minimum transmit rate set by the administrator allowing optimal performance for video applications.

3. Guest/3rd Party WLAN

vWLAN solution eliminates the hardware based controller and puts the control and management into the hypervisor like VMware and utilizes the smart ADTRAN 802.11n Access Point at the edge to handle data and security providing significant performance benefits to the end users. In this approach since critical decisions are made at the edge it is required to use smart ADTRAN AP's.

vWLAN added support for Wired users to provide a unified system to manage and secure wireless and wired users. This functionality can be extended to secure and manage users coming from 3rd party Access points.

vWLAN makes use of 802.1q capable switches and its intelligent ADTRAN access points to draw the boundary between the Untrusted and the Trusted network. Normally an in-line NAC device has ingress and egress ports; however the AP only has a single Ethernet port so it must leverage VLANs to direct untrusted traffic into the AP and forward trusted traffic out of the AP over the same physical interface. ADTRAN's vWLAN is capable of extending network access control to wired users or users coming from 3rd party AP's by switching the wired traffic through the AP on these untrusted VLANs.

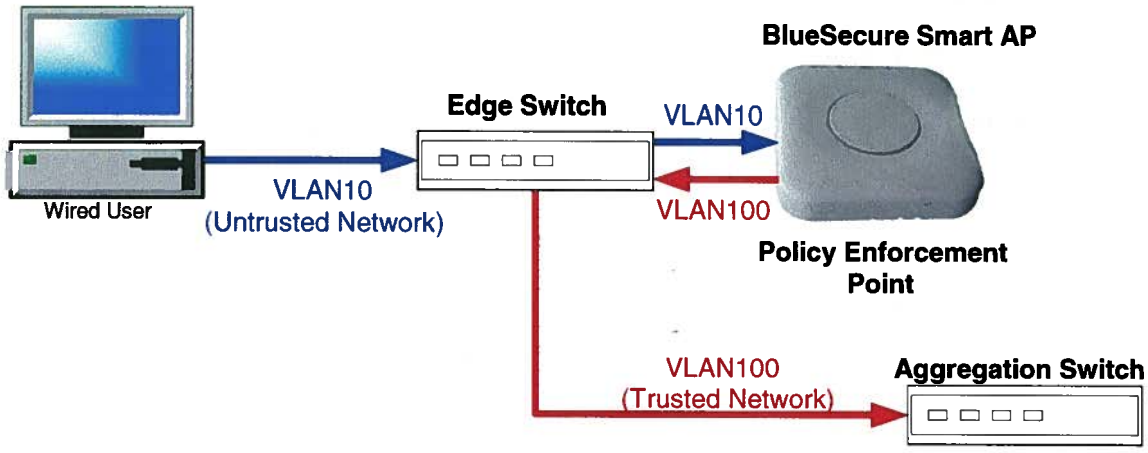


Figure 4: Unifying 3rd Party and Wired User Access

4. Security (including 802.1x and NAC)

vWLAN system provides full support for RADIUS and Active Directory. ADTRAN's vWLAN solution provides an open, multi-vendor solution that integrates easily into existing infrastructure. vWLAN solution interoperates with a variety of solutions from 3rd party vendors.

- LDAP:
  - Microsoft Active Directory
  - Open LDAP
  - Apple Open Directory

- RADIUS
  - Cisco ACS/TACACS
  - Microsoft Internet Authentication Service
  - Juniper Steel Belted Radius
  - Free Radius

- 802.1x authentication – Full support for WPA/WPA2 encryption and support for external and internal 802.1x

- ADTRAN Access points support all industry standard encryption types:
  WPA-PSK with AES
  WPA-PSK with TKIP
  WPA2-PSK with AES
  WPA2-PSK with TKIP
  WEP 64 and 128
  WPA with AES
  WPA with TKIP
  WPA2 with AES
  WPA2 with TKIP

vWLAN provides Out of band NAC Security- Clients are placed in an unregistered role when first connected to vWLAN. The unregistered role provides support for DNS resolution only. Clients who open a web browser will resolve the home page name to an IP address using DNS. The web browser will then generate HTTP or HTTPS traffic to the IP address of the home page. vWLAN system will block this traffic and redirect the client to a secure login page. Guest users can authenticate by entering an e-mail address or credentials provided by ADTRAN's guest manager tool. Registered users can authenticate by entering a valid username and a password.

Role based authorizations are applied as configured for each different method of user authentication. Accounting is provided by generating RADIUS accounting packets. Authorization is done via several techniques - either VLAN only or VLAN and Stateful Firewall combination- using Role based policy enforcement. vWLAN implements intelligent VLAN capability at the AP, including the ability to dynamically assign a user VLAN based on 802.1x, MacAuth or WebAuth credentials. Once the system identifies the User, a profile for that specific user will be created and following parameters are associated with it.

- VLAN/Location via Role
- Stateful Firewall policies
- Bandwidth
- QoS/CoS
- Schedule based access
- Airtime Fairness
- Post URL redirection

Web pages are fully customizable, allowing for multiple login screens to be created.

5. Intrusion Prevention System / Intrusion Detection System

ADTRAN Access Points are capable of running in Dual or Sensor Mode which provides the RF-IDs functionality. RF Intrusion Protection System is an economical way to deploy RF-based monitoring and analysis for your WLANs. vWLAN's RF-IDS protects the enterprise from all types of rogue devices including access points, rogue clients, neighboring WLANs, and software access points as they appear. Not only can RF-IDS alert you to potential WLAN threats, it can also actively contain or block threatening rogue devices. RF-IDS provides a complete security monitoring solution that protects your information assets from current and emerging wireless threats.

Access points scan their RF environment when they are in Dual Mode or Sensor Mode. They report all clients, Access points and suspected RF attacks through the control channel to the vWLAN system. vWLAN system logs this information and key information is entered in a database. The list of Access point beacons is compared to "White List" and rogues are identified. Alarms are shown on the GUI of the vWLAN system.

ADTRAN understands the challenges of managing an 802.11 based wireless network which operates over a shared and dynamic medium and hence integrated features which allow a network administrator to visualize understand and analyze a dynamic RF environment. ADTRAN has integrated sophisticated debugging tools like allowing administrator to run a Wireless Packet Capture from an ADTRAN Access Point to gather RF details, client and access point statistics providing detailed RF information. For each access point, detailed information can be seen, for access point radios, adjacent access points and associated clients. On a per radio basis, the channel load is shown. Associate client data is also shown, allowing the administrator to look for transmits or receives errors – high errors suggest client side issues. The transmit rate

and signal strength are also shown, to help the administrator look for dead-spots or low coverage areas.

6. Outdoor wireless (802.11)

ADTRAN BSAP-1940 is outdoor, environmental harden, IP-66 approved outdoor access point

7. 802.1x security

vWLAN has full support for 802.1x security and can integrate with any form of Radius based server for 802.1x Authentication.

8. NAC security

With the introduction of 802.11n, there is a shift in WLAN architectures from centralized data plane architecture to distributed data plane architecture to support the higher bandwidth applications. The shift to a distributed architecture not only has performance benefits but also security benefits over the legacy centralized architecture. With distributed architectures, the data plane has been migrated from the centralized controller to the access points primarily to achieve performance and scalability benefits. As a result, the trust boundary for wireless networks moved from the core of the network (in the case of centralized) to the edge of the network (in the case of distributed) to protect customer networks right at the point of entry.

ADTRAN APs in a distributed architecture have a full stateful firewall supporting L3-L4 policy enforcement along with support for multiple types of authentication. If a user shouldn't have access to the network, their traffic is dropped by the AP's firewall rather than being encrypted and tunneled to the core of the network, to be dropped later. The trust boundary for the distributed architecture is at the edge rather than the core and security is applied at the point of entry into the network. The AP provides the first barrier to entry; however, there are typically multiple Layers of security behind the AP. A distributed architecture fully leverages the security infrastructure that is deployed throughout the customer network which has been thoughtfully designed by the security infrastructure team. Core and aggregate switches implement sophisticated algorithms to perform threat mitigation, intrusion detection, as well as a host of other behavioral based algorithms in custom ASICs. So, if a customer invested in this security infrastructure, it should be leveraged by both wired and wireless users. vWLAN leverages the existing security infrastructure and adds Layers of security for the wireless network which includes Identity Based Access Control to ensure only authorized users and devices get on the network and apply different policies based on user roles, stateful firewall to ensure ACL's are applied right at the point of entry before any traffic hits the corporate

network, Integrated RF-IDS to detect and contain rogues users and rogue access points. ADTRAN's out of band security approach gives the customers the confidence to design the wireless networks for next generation mobile devices and applications.

9. Prioritization of Voice, Video and other time critical data

vWLAN solution permits intelligent decisions at the edge. ADTRAN Access Points run a stateful firewall which can be configured to restrict or permit certain traffic. The firewall rules could be configured based on protocol type, source/destination IP or source/destination port. This can be done per user or per role. vWLAN supports class of service (CoS) at the edge, of which there are three main components: Packet Prioritization, Over the Air Fairness, and Packet Remarking.

- **WMM/ Packet Prioritization**

When WMM (Wi-Fi Multimedia) is enabled, 802.11 frames contain a prioritization based on application. It is useful to prioritize and assign wireless traffic to certain roles. The Access Point prioritizes traffic based on the input wired packet QoS tags (either 802.1p or DSCP or the greater of the two), or can prioritize to a static value.

- **Airtime Fairness**

ADTRAN's Airtime Fairness is integrated into all of its 802.11n APs. This algorithm guarantees that bandwidth is shared among clients in a mixed environment (legacy a/b/g and 802.11n clients) providing optimal network performance. The Airtime Fairness algorithm factors in the user's role when determining fairness. If the administrator would like to "bias" users in a particular role higher than users in another role, the algorithm uses the bias when allocating tokens for transmission. For example, an administrator could de-prioritize traffic for guests allowing corporate users more airtime to send wireless traffic.

- **Packet Remarking**

Packet remarking is useful when the upstream network (i.e. switches/routers) is CoS aware of 802.1p or DSCP. 802.1p uses the VLAN header to apply a priority on a packet (0-7 where 7 is highest priority). DSCP uses the IP header to apply a priority on a packet (0-63, where 63 is the highest). Alternately, the administrator can choose to set a static 802.1p or DSCP mark for all traffic in the role. This is useful for Roles like IP Phones or other voice devices.

10. Both 2.4Ghz & 5Ghz frequency operation

ADTRAN's BSAP 1900 series access points are dual band 802.11a/b/g/n access points supporting 2.4Ghz and 5GHz frequency operation simultaneously.

11. IEEE 802.11 a/b/g/n

ADTRAN's BSAP 1900 series access points support IEEE 802.11a/b/g/n standards and have passed industry standard Wi-Fi certifications.

12. Power over Ethernet

The ADTRAN Bluesocket solution was the first to deliver an enterprise-class MIMO Access Point and we have since been working diligently with customers and partners to further understand their needs for standards-based, enterprise-class, high throughput wireless solutions. Having deployed thousands of MIMO access points across a variety of markets, our extensive real-world experience has resulted in significant market-leading technology advancements. Building on this technology leadership position, The Bluesocket solution was the first WLAN product to support the 802.3af power standard with a dual radio 802.11n access point and deliver full-feature performance with a single-port Power over Ethernet (PoE) solution.

13. IEEE 802.1p standards for traffic prioritization

In vWLAN DSCP and 802.1p both are supported for Packet prioritization.

14. IEEE 802.1Q VLAN

vWLAN has full support for 802.1Q VLAN.

vWLAN tightly integrates with the wired network to guarantee wired-equivalent performance for high bandwidth and time sensitive applications. Adding vWLAN to your existing network is a simple plug-in rather than requiring time-consuming reconfigurations. All data traffic in the system is handled by the APs and switched directly onto the Layer 2 network. If the user's role specifies a particular VLAN, their traffic is tagged appropriately.

vWLAN has a concept of "locations" which is defined as a unique subnet and VLAN id combination. The locations can be pre-configured through the management UI or automatically discovered by the access point through probing the switch port where they are connected. A location can be assigned to one or more access points. Once clients are assigned to a role, the role places the user into a particular location. If the client is associated to an access point that supports the users location, their traffic is switched directly onto the network. If the access point does not support the user's location (i.e. the access point doesn't have

access to the VLAN), the client's traffic is tunneled to an access point that has access to the VLAN/location.

vWLAN provides high-performance subnet roaming so that users can roam anywhere (keeping their original IP address) and continue passing traffic without interruption. Subnet roaming is handled by tunneling traffic between access points rather than forwarding traffic to a central controller. All user traffic from their original subnet is forwarded to the client, regardless of where they are on the network.

15. Support for multiple VLANs

Yes, vWLAN supports multiple VLAN's. ADTRAN's smart 802.11n Access Points which handle the data can support multiple VLAN's when plugged into a trunk port.

vWLAN's identity-based access control removes restrictions that were part of traditional WLAN solutions where static mapping was required between SSID and VLAN. In vWLAN, the user's policy is determined based on the user's identity. User roles are managed by the central control software but are enforced by the access point. The roles contain multiple attributes including VLAN/Subnet assignment, bandwidth and QoS, and other security related attributes. Since vWLAN is based on **identity-based access control**, a single SSID per encryption type can be used to support multiple roles eliminating the need to manage multiple SSIDs.

vWLAN does not require that every Access Point be on a trunk port. vWLAN introduces concept about VLAN extension into the network.

16. The ability to separate Voice from all other data types by means of a separate VLAN.

vWLAN supports multiple prioritization techniques form over the air fairness, CoS/QoS, Packet remarking and Role based prioritization.

vWLAN allows administrator to put VoIP devices into a separate User Role which can be mapped to a Voice based VLAN and all prioritizations can be configured for this role. This allows Voice to be completely segregated from any other clients at Layer 2.

17. IEEE 802.3 10BASE-T specification

In vWLAN architecture since the control and management is virtualized and no data flows through the central software, only requirement for running vWLAN is to be on a network where all the ADTRAN AP's can communicate to.

ADTRAN 802.11n access point supports 802.310BASE-T.

18. IEEE 802.3u 100BASE-TX specification

ADTRAN 802.11n access point supports IEEE 802.3u 100BASE-TX

19. IEEE 802.3ab 1000BASE-T specification

ADTRAN 802.11n access point supports IEEE 802.3ab 1000BASE-T

20. SNMP V1,2&3

vWLAN supports SNMP V2C and V3

21. Technical differentiators

Robust and Flexible Single Instance Architecture

The single vWLAN instance provides robust services to meet the broad needs of Wireless Deployments. Instead of requiring a separate hardware box for PMS Billing, Captive Portal, RADIUS/AAA, and NAC, as well separate hardware controllers, vWLAN combines all these services into a single package of software that can run on a virtual machine or reference hardware appliance. The advantages are

1. Ability to enable/disable features as needed without a need to add licenses or hardware.

2. Ease of deployment and management – the ability to deploy a single instance instead of multiple.

3. Simple upgrade – only a single instance needs to be tested by the customer's lab, and then a single upgrade is needed

4. Easy scaling – as more Access Points and Users require services, only a single instance must be added, as opposed to N more instances if the services are split.

5. High availability – only a single backup instance is needed to backup all the services, as opposed to N backup boxes if the services are split.

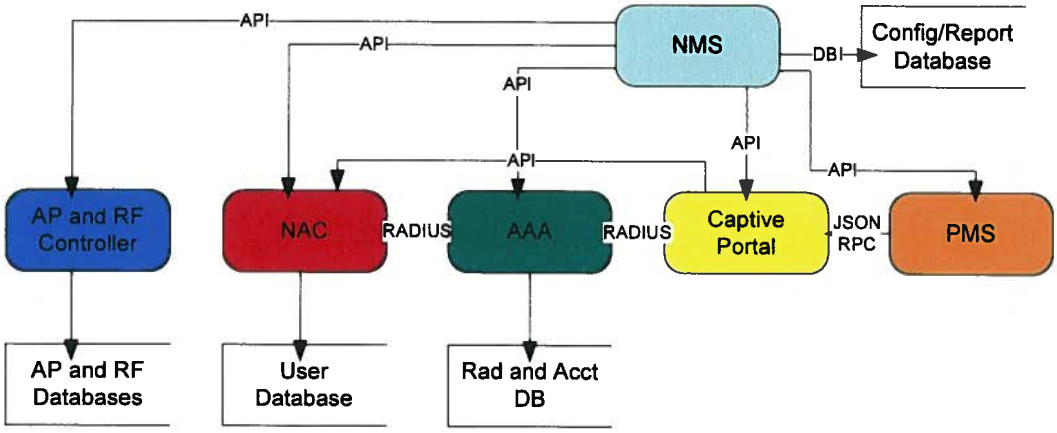


Figure 5: vWLAN Architecture on Single VMware

From an architecture perspective, standard interfaces are used between components. For example, the NAC talks to the AAA service through RADIUS over the loop-back port. If instead the customer wanted to use a different AAA server, the NAC component communicates externally - using the same RADIUS protocol. Similarly with the other components - if another application wanted to us the PMS module, they could leverage the API to do so.

vWLAN- Flexible Architecture Deployments

One of the most compelling capabilities of vWLAN is control from a public or private cloud. This capability profoundly changes the economics or operating multiple wireless networks. One instance of ADTRAN's control software running on one virtual machine on one VMware deployment can control access points anywhere in the networked world. The State of Utah/WSCA-NASPO can control and manage WLANs without the expense of placing dedicated physical Wi-Fi controllers on the property site. Eliminating the physical controller centralizes all provisioning and management while generating a substantial cost savings. The initial purchase is the most obvious cost savings, but ongoing operational expense is also saved because there simply is no dedicated device that has to be maintained. Along with cloud control, vWLAN offers an extraordinarily simple deployment process. ADTRAN APs are capable of auto-discovering the virtual controller and automatically pull down a configuration. Again, no physical controller has to be set up on site. The APs need a clear path to the networked world (VPN, MPLS, WAN, Internet) and will automatically become operational.

In terms of reliability, vWLAN offers a solution that is unmatched. By leveraging a distributed data plane, a control plane interruption does not affect the data plane. In conventional controller-based solutions, the control plane and data plane are intertwined; therefore, an

interruption in the control plane means an interruption in the data plane. In vWLAN, the control plane can be interrupted and the data plane continues with zero packet loss. vWLAN can operate a High-Availability mode whereby the control plane can fail over to another instance of VMware that may be running on a different continent. In conventional controller-based approaches, HA requires yet another controller that has to synchronize with the primary controller. In vWLAN, no additional hardware is needed. Each individual will fail over to the secondary control when a control plane interruption takes place.

Security is an important consideration in any wireless network. vWLAN takes an approach that is different than conventional controller-based solutions. Rather than allow unwanted traffic to enter the LAN and traverse the network for a controller to render judgment, vWLAN applies the security policy at the access point. Through a stateful firewall, unwanted traffic is denied before it enters the network. By the same token, allowed traffic is differentiated at the access point. QoS policies are applied immediately at the access point. In controller-based solutions, traffic is ungroomed as it makes its way to the controller for differentiation.
Not all users of the network at a property are wireless. Many guests prefer to access the network on a wired connection. The challenge is to provide a consistent management and security policy to users whether they access the network via a wired or wireless connection. By leveraging computing capacity on access points and the vlan functions on the property's installed Ethernet switch, ADTRAN can support wired users without adding any additional hardware.

vWLAN Solution Benefits:

Key Advantages over other Wi-Fi Solutions
ADTRAN is the leader in advanced "Controller-less" WLAN and the first to deliver a Virtual VMware solution known as vWLAN that delivers:

- Investment Protection
  - Highest Performance delivering the highest quality user experience
  - Scalability and Simplified Deployment
  - Reduced Operational Costs
  - Integrated Security and Controls

- Best Overall Wireless and Wired LAN Solution
  - Intelligent Access Points
  - Best in Class 802.11a/b/g/n performance – delivers highest quality user experience
  - Centralized Virtualized Management
  - Advanced Access Controls and Protection for Wireless and Wired networks

Performance

Despite significant advances in performance through new standards like 802.11n, many wireless LAN's suffer poor performance. Three key areas that ADTRAN uniquely targets to increase performance and insure the highest user experience:

- Elimination of Controller based Choke Points
- Control of *Bandwidth Abuse* at the edge, off the LAN
- Maximized Quality of Service across the network

Older generation WLAN solutions rely on a central controller that becomes a choke point for performance. vWLAN is a "controller-less" design that uses intelligent access points eliminating the central choke point. With ADTRAN, all the controls are at the AP. The intelligent AP's manage all the user data traffic seamlessly routing it directly over the LAN to the target end point. The LAN that connects the WLAN users to other systems and the internet can become congested with unauthorized or inappropriate user data traffic. With ADTRAN, the AP's have a built in firewall. Wireless users are granted access to approved services based on role. The AP's enforce access at the edge and drop all unapproved data traffic before it gets to the LAN enhancing performance. Quality of Service (QoS) enforcement across a large WLAN can be quite challenging. ADTRAN simplifies QoS management using role and location QoS that carry across the WLAN. This insures the end user maintains the highest experience across the WLAN from any access point on the WLAN.

Bluesocket	Controller Based	Bluesocket vWLAN Advantage
Controller-less – no central choke point (Intelligent APs)	Controller based choke point	***Increased performance*** without latency caused by backhauling traffic to controller. Intelligent Access Points control all user data traffic.
Role based firewall controls at the edge	LAN may be saturated with unauthorized traffic until it reaches the controller	***Reduced network abuse*** caused by unauthorized user data traffic on LAN. Bluesocket APs include a built in firewall that eliminates unauthorized traffic at the edge so it never reaches the LAN.

Role based QoS		***Optimal Quality of Service*** is insured via Role based QoS across the network. Using powerful Role definitions associated to users, QoS for applications like Voice over WLAN (VoWLAN) can be easily configured insuring network wide optimal performance.

Scalability

Central controller based solutions do not scale very well. They require constant management and review of the access points and controllers to determine bottlenecks and operational latency. vWLAN simplifies scalability, as additional access points are required they are easily deployed without additional controllers. Further, even though many controller-required systems claim support for hundreds of access points or users, the controllers themselves may be the real bottleneck with increased demand and may require replacement or reconfiguration. Many controller based systems rely on the majority of traffic running at speeds less than 802.11n. They are not built to fully optimize the use of these faster technologies. vWLAN™ was designed to be scalable and easy to manage.

Bluesocket	Controller Based	Bluesocket vWLAN Advantage
Plug and Play AP's	Controller could require re-config or may be maxed out	As additional AP's are required with vWLAN, simply "plug and play" AP's. With controller based models the controller(s) may require upgrade or reconfiguration to support the additional AP's

Reduced Operational Costs

Controller-less based approaches like ADTRAN's vWLAN result in less hardware to be managed, configured, and supported that greatly reduces the cost to operate a WLAN. In addition, the simplified deployment approach of "plug and play" access points from ADTRAN means that as additional AP's are required it is very easy to deploy without expert WLAN staff. The central server manages all the AP configurations and is pushed out to the AP's once they connect to the server.

Bluesocket	Controller Based	Bluesocket vWLAN Advantage
No controllers to manage	Controllers require constant monitoring	vWLAN's controller-less approach means that the controller bottleneck is removed. With older systems the controller requires constant monitoring to insure

		optimal operation and performance.
No controller failure	Controller failure may cause network outage	With older based systems controllers may fail that will require replacement or repair. During this time, the system may be degraded or may be down. With Bluesocket vWLAN, the AP's do not rely on a controller.

Integrated Security

Security is a key feature integrated into vWLAN and never a later design feature. ADTRAN AP's have built in firewalls and integrated anomaly based Intrusion Detection Systems. ADTRAN fully supports a wide range of access controls including user web authentication, customizable guest access controls, MAC authentication, to the latest 802.1x authentication integrated with standards based Extensible Authentication Protocols (EAP). vWLAN solution has a built in NAC to provide AAA functionality

Integrated Guest Access Solution

ADTRAN's vWLAN has the most feature rich solution for Simple, Secured Guest Access. vWLAN™ allows creation of fully customizable login page. vWLAN supports having an Authorized Front-Desk/Receptionist/IT person to use centralized Web page to create guest accounts.

Provisioning of guest access is completely secured and does not affect controller's configuration. vWLAN system will verify the identity of the user creating Guest accounts against LDAP/Radius/Local database. If the user is allowed to create accounts they will have access only for Guest Creation and will not be able to modify or view controller configuration. vWLAN also supports creating multiple sub-admin accounts with different read/write access for monitoring purpose.

Multiple Guest Access Options:

1. Enter any Email Address
2. Account Provisioned by User on Captive Portal
3. Front Desk Creation- Account created by Receptionist/Front Desk User via Guest ManagerTool

4. Sponsored Access

5. Password sent to PDA or Phone: Zero Touch Guest Access

Bluesocket vWLAN

Bringing the Power of Network Virtualization to Wi-Fi

DATA SHEET DS DATA SHEET

Product Features

- Centralized management and control virtualized in the cloud or data center
- Distributed data with intelligent APs that enforce network security at the edge
- Seamless, cost-effective scaling leverages the power of virtualization
- Inherent reliability of the data center rather than single purpose hardware controllers or "cooperative" control
- Support multiple tenants or business entities on a single vWLAN instance
- Built-in Guest Access and Wireless IDS modules
- Unified user access control for integrated wired-wireless user management
- Simplified upgrades
- Portfolio of plug-and-play 802.11n APs
- Support for Apple's Bonjour-based services
- Flexible deployment options—on-premises, cloud-hosted, and fully managed (via ProCloud℠ Wi-Fi)

Wi Fi CERTIFIED

ADTRAN's Bluesocket® virtual Wireless LAN (vWLAN) offers the industry's first cloud-based, virtualized management and control solution for wireless LANs, eliminating physical, hardware-based controllers from the network. By removing 100 percent of the controller hardware, Bluesocket vWLAN® eliminates scale limitations, and enables management and control of Access Points (APs) across multiple buildings, the corporate campus or across any geographic location.

Controller-less Architecture
The Bluesocket vWLAN was built from the ground up to solve the challenges associated with hardware-based controllers. vWLAN's unique distributed, out-of-band, controller-less architecture introduces the concept of splitting the management and control plane from the data plane. vWLAN centralizes management and control in the data center or server room (on a hypervisor), and distributes data with intelligent APs that enforce policies at the edge of the network. With vWLAN, there are no single points of failure, bottlenecks, traffic u-turns, or scalability concerns associated with hardware-based controllers.

Cloud-based Management and Control
This enables network administrators to configure, control and manage APs across multiple locations anywhere in the world, via the public or private cloud. Cloud management ensures, consistent policy management and seamless mobility. In addition, with an HTML5-based administrative interface users can access vWLAN from any iOS-, Android- or Windows-based mobile device.

Multi-tenant Support
Bluesocket vWLAN includes multi-tenant support with the ability to support multiple customers, enterprise divisions, or campuses on a single instance of vWLAN. This also enables Service Providers to provide managed and hosted wireless LAN service offerings to their customers.

Simplified Scalability and High-Density
Most hardware-based controllers can support approximately 150 access points and 4,000 users. By separating and virtualizing the management and control plane from the data plane, vWLAN breaks the constraints of hardware controllers allowing for massive scale. A single instance of vWLAN can

support thousands of APs and users, across multiple locations or even multiple customers. Scalability of the vWLAN Virtual Appliance (hypervisor) is based on the virtual machine's specifications (CPU/Cores and Memory). In addition, for high density Wi-Fi® deployments, Bluesocket 1900 APs do not include a hard limit on the number of clients per radio. Instead, customers can configure the maximum number of associated clients per radio based on application requirements to ensure a better user experience.

Optimized Performance
A typical hardware controller has a fixed backplane capacity, which limits the available throughput to the APs that the controller manages. With vWLAN's unique distributed data architecture, data is switched at the AP and system capacity is no longer dictated by the backplane capacity. Rather, it is determined by the aggregate throughput of the APs. This provides an additional advantage, as there is no need for a forklift upgrades as new 802.11 standards come into play. The vWLAN architecture is 802.11ac-ready, providing you a future-proof solution and increased Return on Investment (ROI).

Security at the Edge
A conventional hardware controller-based wireless network allows unwanted traffic to enter the LAN and reach the controller. vWLAN takes advantage of intelligent APs that operate a stateful firewall to enforce security at the edge and turn away all unwanted traffic—never allowing potential security risks to enter the network.

ADTRAN bluesocket®

Bluesocket vWLAN

Bringing the Power of Network Virtualization to Wi-Fi

Unified Access with Wired and Third-party AP Support
Bluesocket vWLAN offers the industry's first software-enabled support for both wired and wireless users. This is a software upgrade option that allows integrated management and control of all users irrespective of method of access—Bluesocket APs, wired ports or even from any third-party AP. This simplifies administration, and enables an enterprise to create a truly unified wireless and wired network providing a seamless user experience, and consistent authentication irrespective of a user's access method.

Business Continuity
A key feature of Bluesocket vWLAN is the ability to provide High Availability (HA) by simply creating an additional instance of the virtualized software in a backup data center and upgrading the AP license to HA mode. In the event the link to the primary vWLAN instance goes down, the APs will simply establish a control channel to the secondary vWLAN. Even if the primary vWLAN instance fails, the APs automatically failover to the secondary vWLAN ensuring business continuity.

Flexible Deployment Options
Bluesocket vWLAN can be deployed on a no cost vWLAN Virtual Appliance (VMware®) or a low cost vWLAN Appliance (hardware). In addition, ADTRAN offers ProCloud Wi-Fi, a cloud-hosted and fully managed wireless LAN for a worry free Wi-Fi experience.

Portfolio of High-Performance APs
The Bluesocket vWLAN solution includes a family of high-performance APs that are a perfect fit for enterprises, educational institutions, hospitality, and healthcare providers who are looking to move their organizations to a pervasive mobility environment. The Bluesocket 1800 and 1900 Series of enterprise-class APs are completely plug-and-play requiring no manual configuration.

They include:

- 802.11a/b/g/n with Multiple-Input Multiple-Output (MIMO) support
- Configurable maximum associated clients per radio
- Load balancing for high-density deplooyments
- DynamicRF (Radio Resource Management) for automatic channel, transmission power and neighbor discovery
- Multi-cast to unicast conversion, fast roaming, and standards-based transmit beamforming (TxBF)
- Increased sensitivity for mobile devices with low transmission power (tablets, smartphones)
- Support for Apple Bonjour-based services, Apple Captive Network Assistant (CNA) and Microsoft's Network Connectivity Status Indicator (NCSI)

Equipment	APs	Users	Tenants
Appliance (Hardware)	1,500	48,000	50
Virtual Appliance (VMware)	1,500+*	48,000+*	50

**Scalability (APs/Users)of the vWLAN Virtual Appliance is based on the VMware server's specifications (CPU/Cores, Memory). See page #3 for minimum resource requirements to support 1,500 APs.*

Bluesocket vWLAN

Bringing the Power of
Network Virtualization to Wi-Fi

Product Specifications

vWLAN Virtual Appliance (VMware) Specifications

- Resource Requirements (1,500 APs)
  - **CPU:** 4 Cores
  - **Memory:** 4 GB
  - **Disk:** 41 GB
- Supported and Tested VMware Versions
  - ESX/ESXi 4.X
  - ESXi 5.0
  - ESXi 5.1

vWLAN Appliance (Hardware) Specifications

Temperature

- **Operating Temperature:** 50° F to 95° F (10° C to 35° C)

Power

- **Power:** 300W max
- **Input Voltage:** 100 - 240V
- **Frequency:** 50/60Hz

Physical

- **Dimensions:** 1.67 in. H, 16.93 in. W, 20 in. D (H x W x D) (42 mm x 430mm x 508 mm)
- **Weight:** 33 pounds (15kg)

Architecture

- Centralized Management and Control Virtualized in the Cloud or Data Center
- Distributed Data with Intelligent APs that Enforce Policies at the Edge
- Multi-tenant support
- Flexible Deployments Options: on-premises, cloud-hosted, or managed (ProCloud Wi-Fi)
- Layer 2 and Layer 3 Roaming with Layer 3 Tunnel Load Balancing
- Selective Tunneling for Guest Access in DMZ
- Auto Discovery of Locations (VLANS and Subnets)
- IPv6 Client Support
- NAC DHCP IP Address Assignment Isolating Un-registered Clients at the Edge
- Unified Access with Wired and 3rd Party AP Support
- Zero Touch AP Provisioning
- Software Based Virtualized Solution, Future Proof for 802.11ac and Other Emerging Technologies

Authentication

- Local Database (Internal Users)
- Full or Wild Card MAC Address (MAC Devices)
- 802.1X Machine and User for WPA and WPA2
- EAP Methods - EAP-PEAP, EAP-TLS, EAP-TTLS, EAP-FAST, EAP-SIM, EAP-AKA
- Enforce Machine Auth. (Distinguish Between Corp Owned Windows Domain Computers and BYODs such as iPads, iPhones, and Androids
- Web Based (Captive Portal) RADIUS
- Web Based (Captive Portal) LDAP, Secure LDAP, and Microsoft Active Directory (AD)
- Web-based (Captive Portal) SIP2 Library
- Dynamic Role Assignment Using RADIUS and LDAP/AD Attributes
- RADIUS Accounting
- RADIUS Session-Timeout
- RADIUS Administrative Authentication

Captive Portal

- Fully Customizable Captive Portals for Guest Access, RADIUS, LDAP/AD, and SIP2 Library Authentication
- URL Filtering in Un-registered Role for Walled Garden
- External Redirects for 3rd Party Captive Portal Integrations

Diagnostics

- Wired and Wireless AP Traffic Capture
- Ping, Traceroute, Netstat, ARP, Show Processes
- Phone Home to ADTRAN Technical Support
- Show Tech (System Snapshot for Troubleshooting)

Guest Access

- Enter Email Address With or Without Email Account Validation
- Click to Accept Terms and Conditions
- Lobby Administrators, Security Personnel, and Conference/Training Organizers Can Create Single and Bulk Accounts that Automatically Expire
- Print, Email/SMS Text Customized Receipts for Account Validation (DNA)
- Self Sponsored Accounts
- Sponsored Accounts
- Require RADIUS and or LDAP/AD Authentication to Sponsor Accounts (Friends and Family)
- Guest Access Logging and Reporting for Security and Marketing

High Availability

- 1+1 High Availability with Configuration Sync and Zero Packet Loss Failover

Management

- Secure HTML5-based Administrative Graphical User Interface (GUI)
- Granular Administrative Role Based Access Control
- Dashboard with Customizable Widgets
- Per Admin Time Zone
- Customizable Reports
- Customizable Notification Templates for Logs, Alarms, and Wireless IDS Alerts (Email, Syslog, SNMP Traps)
- SNMPv2c and Syslog
- vWLAN CLI via Console, AP CLI via Console/SSH
- Secure RESTful Web Services API with Multi-tenant and Granular Administrative Access Support
- Heatmaps for AP Placement, RF Planning/Visualization and Rogue AP Location Tracking
- AP Templates Enable Simple Configuration Updates to Groups of APs

QOS for Voice, Video, and Data

- Bandwidth Management (Incoming, Outgoing)
- WMM (802.11e)
- 802.1p or Differentiated Service Code Point (DSCP)
- WMM Power Save (U-APSD)
- Over the Air Fairness

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806
P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Bluesocket Business Group
866 633-3358
vWLAN@adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/presales

Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

Where to Buy
888 423-8726
channel.sales@adtran.com
www.adtran.com/where2buy

ProServices℠
888 874-2237
proservices@adtran.com
www.adtran.com/proservices

Global Inquiries
256 963-8000
256 963-6300 fax
international@adtran.com

619519xxG1-8F August

Bluesocket vWLAN

Bringing the Power of Network Virtualization to Wi-Fi

Product Specifications

Security

- Role Based Access Control—User, Location (VLAN/Subnet), Block Client to Client Traffic, Over the Air Fairness, QOS, Bandwidth Allocation, Stateful Firewall Rules
- Stateful Firewall Enforced by the AP
- Wi-Fi CERTIFIED WPA and WPA2, 802.11i, 802.1X, PSK, WEP
- Encryption: AES-CCM, TKIP
- VPN Pass-through
- Secure TLS Management/Control Channel

Wireless Intrusion Detection

- Rogue AP Detection
- Rogue AP Location Tracking
- More than 40 Wireless IDS Signatures Detecting Spoofed APs, Attacks and Exploits

Smart and Secure AP Upgrades

- AP Pre-Imaging Allows APs to Download Firmware While Operating, Reducing Downtime During Software Maintenance
- Secure AP Upgrades Allow APs to Download Firmware from the vWLAN or Server Local to the APs Using Secure Copy (SCP)
- Optional Local AP Upgrades Allow the AP to Download Firmware from Server Local to the AP Rather than Using Precious WAN bandwidth

Wireless

- 802.11a/b/g/n Support
- Multiple-Input Multiple-Output (MIMO)
- A-MPDU and A-MSDU Frame Aggregation
- HT20 and HT40 (High-Throughput) Support
- Minimum Data Rate
- Configurable Maximum Associated Clients Per Radio
- DynamicRF (Radio Resource Management) for Automatic Channel, TX Power, and Neighbor Discovery
- Set Once and Hold and Continuous DynamicRF Modes of Operation
- DynamicRF Calibration
- Load Balancing for High Density Deployments
- Fast Roaming (OKC)
- Multicast/Broadcast to Unicast Conversion
- Standards Based Transmit Beamforming (TxBF) with Explicit Feedback
- Increased Receive Sensitivity for Handheld Devices with Low TX Power such as iPads, iPhones, and Androids
- Support for Apple Bonjour Based Services (Airprint, Airplay), Apple CNA and Microsoft NCSI

Warranty

- **Hardware:** One year parts/labor*
- **Software:** 90 days*

* Extended with support contract

Ordering Information

Equipment	Part #
vWLAN Virtual Appliance (VMware)	**1951900G1**
vWLAN Appliance (Hardware)	**1700900F1**
Bluesocket 1800 Access Point: 802.11a/b/g/n; 2x3:2 with six internal MIMO antennas	**1700910F1**
Bluesocket 1840 Access Point: 802.11a/b/g/n; 2x3:2 with six external RP-SMA connectors	**1700911F1**
Bluesocket 1920 Access Point: 802.11a/b/g/n; 2x2:2 with four internal MIMO antennas	**1700954F1**
Bluesocket 1925 Access Point: 802.11a/b/g/n; 2x2:2 with four external RP-SMA connectors	**1700955F1**
Bluesocket 1930 Access Point: 802.11a/b/g/n; 3x3:3 with six internal MIMO antennas	**1700950F1**
Bluesocket 1935 Indoor Access Point: 802.11a/b/g/n, 3x3:3, with six external RP-SMA connectors	**1700951F1**
Bluesocket 1940 Outdoor Access Point: 802.11a/b/g/n, 3x3:3, with six external N-type connectors	**1700952F1**
Access Point vWLAN Software License	**1951901G1**
Access Point High Availability Software License (Optional)	**1951904G1**
Access Point Unified User Access (Wired and Third-Party AP Support) Software License (Optional)	**1951910G1**
ProCloud Wi-Fi (5x8xNBD) – 1-year (managed Wi-Fi service with NBD hardware replacement	**1100MSPM200112**
ProCloud Wi-Fi (5x8xNBD) – 3-years (managed Wi-Fi service with NBD hardware replacement)	**1100MSPM200136**
ProCloud Wi-Fi (5x8xNBD) – 5-years (managed Wi-Fi service with NBD hardware replacement)	**1100MSPM200160**
ProCloud Wi-Fi (7x24x4) – 1-year (managed Wi-Fi service with 4-hour hardware replacement)	**1100MSPM300112**
ProCloud Wi-Fi (7x24x4) – 3-years (managed Wi-Fi service with 4-hour hardware replacement)	**1100MSPM300136**
ProCloud Wi-Fi (7x24x4) – 5-years (managed Wi-Fi service with 4-hour hardware replacement)	**1100MSPM300160**

Bluesocket 1920 and 1925 Access Points

High-performance Dual Radio 802.11n Access Point

Product Features

- 802.11a/b/g/n wireless access points supporting MIMO antenna technology
- Dual radio 2.4 GHz and 5 GHz
- Full 2x2:2 MIMO performance
- Powered by 802.3af Power over Ethernet (PoE) or 802.3at (PoE+)
- Supports up to 128 users per AP
- Supports auto discovery and plug-and-play, "zero-configuration" deployment
- Supports WMM/802.11e and QoS for Enterprise-class
- Voice over Wi-Fi® automatic channel and power adjustments to optimize coverage and maximize performance
- Integrated wireless intrusion detection system to identify rogue access points and wireless attacks
- Integrated stateful firewall for highest security at the edge
- Provides greater range through beamforming

The ADTRAN® Bluesocket® family of high-performance Access Points (APs) is the perfect fit for educational institutions, enterprises, and service providers who are looking to deploy secure wireless networks. Bluesocket APs are completely plug-and-play requiring no manual configuration and deliver optimal performance. Whether you want to add wireless to your office or deploy across an entire campus, the Bluesocket APs are designed to meet your needs.

Cost-Effective, High-Performance Solution
The Bluesocket 1920 and 1925 APs offer enterprise-grade performance, with two transmit and two receive streams providing data rates up to 600 Mbps

The Bluesocket 1920 and 1925 APs come in a revolutionary, smoke detector style, cost-effective package that is ideal for educational institutions, small and medium enterprises (SMEs), and large enterprises who are on a tight budget but cannot compromise on performance. The APs offer higher receive sensitivity on both the 2.4 Ghz and 5 Ghz radios to compensate for Bring Your Own Device (BYOD) type handheld devices such as smartphones and tablets that have a fraction of the transmit power of traditional laptops. This results in more reliable wireless coverage for an improved end-user experience.

The Bluesocket 1920 AP includes four MIMO internal antennas with up to 4dBi peak gain, and the Bluesocket 1925 AP includes four RP-SMA connectors for external antennas. The Bluesocket 1920 and 1925 APs are fully functional with the power delivered by a single-port 802.3af PoE solution.

Cloud-Based Control and Management
The Bluesocket APs operate in conjunction with the ADTRAN Bluesocket virtual Wireless LAN (vWLAN), the industry's first cloud-based control and management software. By removing 100 percent of the controller hardware, Bluesocket vWLAN® eliminates scale limitations, and enables centralized control and management of APs across multiple buildings, the corporate campus or across any geographic location. Cloud control also ensures consistent policy management, seamless roaming, and the ability to trouble-shoot APs without physically traveling to each location. The Bluesocket vWLAN is available as a software download running on a hypervisor (VMware®), or pre-installed on a 1U cloud appliance.

Unmatched Security at the Edge
The Bluesocket family of APs includes a built-in stateful firewall that enforces security policies at the edge to turn away malicious traffic before it hits the LAN. In addition, with Wireless Intrusion Detection System (W-IDS) as a standard feature, comprehensive user authentication options, support for many encryption protocols, combined with Bluesocket vWLAN's role-based authentication, ensures a secure wireless environment.

Smart Bandwidth Management
Leveraging ADTRAN's technology leadership, the Bluesocket APs offer many smart bandwidth management features including beamforming, granular bandwidth management, Wi-Fi Multimedia (WMM) enabled packet prioritization, and packet remarking, to provide the highest level of performance.

DynamicRF Management
The Bluesocket APs incorporate ADTRAN's DynamicRF™ radio resource management technology that ensures your entire wireless network is setup with the right balance of channels and power. DynamicRF reduces the effort to setup and maintain your wireless network—the system detects any non-optimal environmental conditions, and can automatically adjust RF parameters, or provide administrators with a recommended list of changes.

Zero Touch, Plug-and-Play Deployment
ADTRAN's Bluesocket APs are completely plug-and-play and self-configuring, requiring no manual configuration, ensuring faster deployment of your wireless network.

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Bluesocket Business Group
866-633-3358
vWLAN@adtran.com
www.adtran.com/bluesocket

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/presales

Where to Buy
888 423-8726
channel.sales@adtran.com
www.adtran.com/where2buy

Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
888 874-2237
aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963-8000
256 963-6300 fax
international@adtran.com

TL9000 TL9.1270

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

61700954F1-8D March

Bluesocket 1920 and 1925 Access Points

High-performance Dual Radio 802.11n Access Point

Product Specifications

Interfaces
- One auto-sensing, 10/100/1000Base-T, RJ-45 connector

Antenna
- **Bluesocket 1920:** Four internal MIMO antennas with up to 4dBi peak gain
- **Bluesocket 1925:** Four external RP-SMA connectors

Radios
- 802.11a/n and 802.11b/g/n
- Configurable for sensor-mode RF scanning
- A-MPDU and A-MSDU frame aggregation
- HT20 and HT40 high throughput
- Max transmit power—100mW
- Beamforming

Certifications
- Wi-Fi 802.11a/b/g/n Certification

Mobility Services
- Eight SSIDs per radio
- Wireless client load balancing
- Secure fast roaming
- High Availability
- Opportunistic Key Caching (OKC)

Voice Quality of Service
- Wireless Multi-Media QoS
- Seamless Layer 2 and 3 roaming
- WMM Power Save (U-APSD)
- Single click voice configuration
  - Simple and automatic policy configuration
  - Advanced quality of service

Security
- 802.1X port-based authentication
- Open System (WEP-64/128)
- Shared System (WEP-64/128)
- WPA/WPA2-Personal
- WPA/WPA2-Enterprise
- EAP-TTLS
- EAP-PEAP
- EAP-FAST
- EAP-TLS
- EAP-SIM
- EAP-AKA

Environment
- **Operating:** 32° F to 104° F (0° C to 40° C)
- **Storage:** -40° F to 158° F (-40° C to 70° C)
- **Humidity:** 5% to 90% typical

Physical
Bluesocket 1920 AP:
- Dimensions: DIA 6.3 in. (160 mm), H 1.5 in. (35 mm)
- Weight: .44 lbs (0.2 kg)

Bluesocket 1925 AP:
- Dimensions: DIA 6.3 in. (160 mm), H 1.5 in. (35 mm)
- Weight: .44 lbs (0.2 kg)

Power
- 802.3af or 802.3at compliant Power over Ethernet
- External 12V DC power adapter (optional)

Mounting
- Wall/ceiling/t-bar mount kit included
- Plenum rated
- Anti-theft: Compatible with Kensington-style locks

Agency Approvals
Electrical/Safety Compliance
- UL 1950
- CSA 22.2
- IEC 60950
- EN 60950

Radio Approvals
- FCC Part 15.247
- RSS-210 (Canada)
- EN 300.328 (Europe)
- AS/NZS 4771 (Australia & New Zealand)
- NCC (Taiwan) and IDA (Singapore)
- EMI and Susceptibility (Class A)
- FCC Part 15.107 and 15.109
- ICES-003 (Canada)
- EN 301.489-1 and -17 (Europe)
- AS/NZS 3548

Warranty
- Limited lifetime warranty

Ordering Information

Equipment	Part #
Bluesocket 1920 Access Point: 802.11a/b/g/n, 2x2:2, four internal MIMO antennas	1700954F1
Bluesocket 1925 Access Point: 802.11a/b/g/n, 2x2:2, four external RP-SMA connectors	1700955F1
Access Point vWLAN Software License	1951901G1
Accessories and Software Options:	
802.3af Compliant PoE Injector	1700926F1
AC/DC Power Adapter	1700928F1
Ceiling Mount kits/accessories (included with AP purchase)	1700941F1
BSAP 1925 2.4 GHz and 5 GHz Antennas (Set of four)	1700932F1
Access Point High Availability Software License	1951904G1
Access Point Unified User Access (Wired and Third- Party AP Support) Software License	1951910G1

Bluesocket 1930 and 1935 Access Points

High-performance Dual Radio 802.11n Access Point

Product Features

- 802.11a/b/g/n wireless access points supporting MIMO antenna technology
- Dual radio 2.4 GHz and 5 GHz
- Full 3x3:3 MIMO performance
- Powered by 802.3af Power over Ethernet (PoE) or 802.3at (PoE+)
- Supports up to 128 users per AP
- Supports auto discovery and plug-and-play, "zero-configuration" deployment
- Supports WMM/802.11e and QoS for Enterprise-class Voice over Wi-Fi®
- Automatic channel and power adjustments to optimize coverage and maximize performance
- Integrated wireless intrusion detection system to identify rogue access points and wireless attacks
- Supports stateful firewall for highest security at the edge
- Provides greater range through beamforming

The ADTRAN® Bluesocket® family of high-performance Access Points (APs) is the perfect fit for educational institutions, enterprises, and service providers who are looking to deploy secure wireless networks. Bluesocket APs are completely plug-and-play requiring no manual configuration and deliver optimal performance. Whether you want to add wireless to your office or deploy across an entire campus, the Bluesocket APs are designed to meet your needs.

High-Performance, Reliable Connectivity
The Bluesocket 1930 and 1935 indoor APs offer enterprise-grade performance, with three transmit and three receive streams providing data rates up to 900 Mbps per AP. The Bluesocket 1930 AP includes six MIMO internal antennas with up to 4dBi peak gain, and the Bluesocket 1935 includes six RP-SMA connectors for external antennas.

The Bluesocket 1930 and 1935 APs provide high performance, reliable coverage in ultra-high density wireless environments, such as indoor arenas, conference centers, libraries, and other high traffic areas. The Bluesocket 1930s Series APs support the newer generation of laptops with three-stream radio support, and offer higher receive sensitivity on both the 2.4 Ghz and 5 Ghz radios to compensate for Bring Your Own Device (BYOD) type mobile devices such as smartphones and tablets that have a fraction of the transmit power of traditional laptops.

The Bluesocket 1930 and 1935 APs are fully functional with the power delivered by a single-port 802.3af PoE solution.

Cloud-Based Control and Management
The Bluesocket APs operate in conjunction with the ADTRAN Bluesocket virtual Wireless LAN (vWLAN), the industry's first cloud-based control and management software. By removing 100 percent of the controller hardware, Bluesocket vWLAN® eliminates scale limitations, and enables centralized control and management of APs across multiple buildings, the corporate campus or across any geographic location. Cloud control also ensures consistent policy management, seamless roaming, and the ability to trouble-shoot APs without physically traveling to each location. Bluesocket vWLAN is available as a software download running on a hypervisor (VMware®), or pre-installed on a 1U cloud appliance.

Unmatched Security at the Edge
The Bluesocket family of APs includes a built-in stateful firewall that enforces security policies at the edge to turn away malicious traffic before it hits the LAN. In addition, with Wireless Intrusion Detection System (W-IDS) as a standard feature, comprehensive user authentication options, support for many encryption protocols, combined with Bluesocket vWLAN's role-based authentication, ensures a secure wireless environment.

Smart Bandwidth Management
Leveraging ADTRAN's technology leadership, the Bluesocket APs offer smart bandwidth management features including beamforming, granular bandwidth management, Wi-Fi Multimedia (WMM) enabled packet prioritization, and packet remarking, to provide the highest level of performance.

DynamicRF Management
The Bluesocket APs incorporate ADTRAN's DynamicRF™ radio resource management technology that ensures your entire wireless network is setup with the right balance of channels and power. DynamicRF reduces the effort to setup and maintain your wireless network – the system detects any non-optimal environmental conditions, and can automatically adjust RF parameters, or provide administrators with a recommended list of changes.

Zero Touch, Plug-and-Play Deployment
ADTRAN's Bluesocket APs are completely plug-and-play and self-configuring, requiring no manual configuration, ensuring faster deployment of your wireless network.

Wi Fi CERTIFIED

ADTRAN bluesocket

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Bluesocket Business Group
866-633-3358
vWLAN@adtran.com
www.adtran.com/bluesocket

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/presales

Where to Buy
888 423-8726
channel.sales@adtran.com
www.adtran.com/where2buy

Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
888 874-2237
aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963-8000
256 963-6300 fax
international@adtran.com

Bluesocket 1930 and 1935 Access Points

High-performance Dual Radio 802.11n Access Point

Product Specifications

Interfaces
- Two auto-sensing, 10/100/1000Base-T, RJ-45 connector

Antenna
- **Bluesocket 1930:** Six internal MIMO antennas with 4dBi gain
- **Bluesocket 1935:** Six external RP-SMA connectors

Radios
- 802.11a/n and 802.11b/g/n
- Configurable for sensor-mode RF scanning
- A-MPDU and A-MSDU frame aggregation
- HT20 and HT40 high throughput
- Max transmit power—100mW
- Beamforming

Certifications
- Wi-Fi 802.11a/b/g/n Certification

Mobility Services
- Eight SSIDs per radio
- Wireless client load balancing
- Secure fast roaming
- High Availability
- Opportunistic Key Caching (OKC)

Voice Quality of Service
- Wireless Multi-Media QoS
- Seamless Layer 2 and 3 roaming
- WMM Power Save (U-APSD)
- Single click voice configuration
  - Simple and automatic policy configuration
  - Advanced quality of service

Security
- 802.1X port-based authentication
- Open System (WEP-64/128)
- Shared System (WEP-64/128)
- WPA/WPA2-Personal
- WPA/WPA2-Enterprise
- EAP-TTLS
- EAP-PEAP
- EAP-FAST
- EAP-TLS
- EAP-SIM
- EAP-AKA

Environment
- **Operating:** 32° F to 104° F (0° C to 40° C)
- **Storage:** -40° F to 158° F (-40° C to 70° C)
- **Humidity:** 5% to 90% typical

Physical
Bluesocket 1930 AP:
- **Dimensions:** 6.5 in. x 6.5 in. x 1.5 in. (W x D x H) (165 mm x 165 mm x 35 mm)
- **Weight:** 1.25 lbs (0.6 kg)

Bluesocket 1935 AP:
- **Dimensions:** 6.5 in. x 6.5 in. x 1.5 in. (W x D x H) (165 mm x 165 mm x 35 mm)
- **Weight:** 1.25 lbs (0.6 kg)

Power
- 802.3af or 802.3at compliant Power over Ethernet
- External 12V DC power adapter (optional)

Mounting
- Wall/ceiling/t-bar mount kit included
- Plenum rated
- Anti-theft: Compatible with Kensington-style locks

Agency Approvals
Electrical/Safety Compliance
- UL 1950
- CSA 22.2
- IEC 60950
- EN 60950

Radio Approvals
- FCC Part 15.247
- RSS-210 (Canada)
- EN 300.328 (Europe)
- AS/NZS 4771 (Australia & New Zealand)
- NCC (Taiwan) and IDA (Singapore)
- EMI and Susceptibility (Class A)
- FCC Part 15.107 and 15.109
- ICES-003 (Canada)
- EN 301.489-1 and -17 (Europe)
- AS/NZS 3548

Warranty
- Limited lifetime warranty

Ordering Information

Equipment	Part #
Bluesocket 1930 Access Point: 802.11a/b/g/n, 3x3:3, six internal MIMO antennas	1700950F1
Bluesocket 1935 Access Point: 802.11a/b/g/n, 3x3:3, six external RP-SMA connectors	1700951F1
Access Point vWLAN Software License	1951901G1
Accessories and Software Options:	
802.3af Compliant PoE Injector	1700926F1
AC/DC Power Adapter	1700929F1
Ceiling Mount kits/accessories (included with AP purchase)	1700942F1
BSAP 1935 2.4 GHz and 5 GHz Antennas (Set of six)	1700931F1
Access Point High Availability Software License	1951904G1
Access Point Unified User Access (Wired and Third- Party AP Support) Software License	1951910G1

Bluesocket 1940 Access Point

High-performance Outdoor 802.11n Access Point

The ADTRAN® Bluesocket® family of high-performance Access Points (APs) is the perfect fit for educational institutions, enterprises, and service providers who are looking to deploy secure wireless networks. Bluesocket APs are completely plug-and-play requiring no manual configuration and deliver optimal performance. Whether you want to add wireless to your office or deploy across an entire campus, the Bluesocket APs are designed to meet your needs.

Product Features

- 802.11a/b/g/n wireless access points supporting MIMO antenna technology
- Dual radio 2.4 GHz and 5 GHz
- 6 N-type Connectors
- Full 3x3:3 MIMO Performance
- Powered by 802.3at Power over Ethernet (PoE+)
- Supports up to 128 users per AP
- Supports auto discovery and plug-and-play, "zero-configuration" deployment
- Supports WMM/802.11e and QoS for Enterprise-class Voice over Wi-Fi
- Automatic channel and power adjustments to optimize coverage and maximize performance
- Integrated wireless intrusion detection system to identify rogue APs and wireless attacks
- Integrated stateful firewall for highest security at the edge
- Provides greater range through beamforming

Wi Fi CERTIFIED

Smart Solutions for a Connected World.

ADTRAN®

High-Performance
The Bluesocket 1940 outdoor APs include three transmit and three receive streams providing data rates up to 900 Mbps per AP.

With a weather resistant, industrial-grade enclosure, the Bluesocket 1940 APs provide the highest performance, extended range wireless coverage in the most harsh outdoor environments. The Bluesocket 1940 APs are ideal for warehouses, outdoor sports arenas, outdoor malls, campuses, and Municipal Wi-Fi® deployments. The Bluesocket 1940 Series APs support the newer generation of laptops with three-stream radio support, and offer higher receive sensitivity on both the 2.4 Ghz and 5 Ghz radios to compensate for Bring Your Own Device (BYOD) type mobile devices such as smartphones and tablets that have a fraction of the transmit power of traditional laptops.

The Bluesocket 1940 outdoor AP includes six N-type connectors for external antennas. It is fully functional with the power delivered by a single-port 802.3at PoE+ solution.

Cloud-Based Control and Management
The Bluesocket APs operate in conjunction with the ADTRAN Bluesocket virtual Wireless LAN (vWLAN), the industry's first cloud-based control and management software. By removing 100 percent of the controller hardware, Bluesocket vWLAN® eliminates scale limitations, and enables centralized control and management of APs across multiple buildings, the corporate campus or across any geographic location. Cloud control also ensures consistent policy management, seamless roaming, and the ability to trouble-shoot APs without physically traveling to each location. Bluesocket vWLAN is available as a software download running on a hypervisor (VMware®), or pre-installed on a 1U cloud appliance.

Unmatched Security at the Edge
The Bluesocket family of APs includes a built-in stateful firewall that enforces security policies at the edge to turn away malicious traffic before it hits the LAN. In addition, with Wireless Intrusion Detection System (W-IDS) as a standard feature, comprehensive user authentication options, support for many encryption protocols, combined with Bluesocket vWLAN's role-based authentication, ensures a secure wireless environment.

Smart Bandwidth Management
Leveraging ADTRAN's technology leadership, the Bluesocket APs offer many smart bandwidth management features including beamforming, granular bandwidth management, Wi-Fi Multimedia (WMM) enabled packet prioritization, and packet remarking, to provide the highest level of performance.

DynamicRF Management
The Bluesocket APs incorporate ADTRAN's DynamicRF™ radio resource management technology that ensures your entire wireless network is setup with the right balance of channels and power. DynamicRF reduces the effort to setup and maintain your wireless network—the system detects any non-optimal environmental conditions, and can automatically adjust RF parameters, or provide administrators with a recommended list of changes.

Zero Touch, Plug-and-Play Deployment
ADTRAN's Bluesocket APs are completely plug-and-play and self-configuring, requiring no manual configuration, ensuring faster deployment of your wireless network.

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Bluesocket Business Group
866-633-3358
vWLAN@adtran.com
www.adtran.com/bluesocket

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/presales

Where to Buy
888 423-8726
channel.sales@adtran.com
www.adtran.com/where2buy

Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
888 874-2237
aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963-8000
256 963-6300 fax
international@adtran.com

TL19.1270

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

Bluesocket 1940 Access Point

High-performance Outdoor 802.11n Access Point

Product Specifications

Interfaces
- One auto-sensing, 10/100/1000Base-T, RJ-45 connector

Antenna
- Six N-type external connectors

Radios
- 802.11a/n and 802.11b/g/n
- Configurable for sensor-mode RF scanning
- A-MPDU and A-MSDU frame aggregation
- HT20 and HT40 high throughput
- Max transmit power—100mW
- Beamforming

Certifications
- Wi-Fi 802.11a/b/g/n Certification

Mobility Services
- Eight SSIDs per radio
- Wireless client load balancing
- Secure fast roaming
- High Availability
- Opportunistic Key Caching (OKC)

Voice Quality of Service
- Wireless Multi-Media QoS
- Seamless Layer 2 and 3 roaming
- WMM Power Save (U-APSD)
- Single click voice configuration
  - Simple and automatic policy configuration
  - Advanced quality of service

Security
- 802.1X port-based authentication
- Open System (WEP-64/128)
- Shared System (WEP-64/128)
- WPA/WPA2-Personal
- WPA/WPA2-Enterprise
- EAP-TTLS
- EAP-PEAP
- EAP-FAST
- EAP-TLS
- EAP-SIM
- EAP-AKA

Environment
- **Operating:** -40° F to 140° F (-40° C to 55° C)
- **Storage:** -58° F to 150° F (-40° C to 70° C)
- **Humidity:** 5% to 90% typical
- **Waterproof:**
  - IP67
  - Slat-spray resistant

Physical
- **Dimensions:** 9.6 in. x 7.8 in. x 1.9 in. (LxWxH) (245 mm x 200 mm x 75 mm)
- **Weight:** 3.2lbs (1.45 kg)

Power
- 802.3at compliant Power over Ethernet

Agency Approvals
Electrical/Safety Compliance
- UL 1950 m CSA 22.2
- IEC 60950 m EN 60950

Radio Approvals
- FCC Part 15.247
- RSS-210 (Canada)
- ICES-003 (Canada)
- EN 300.328 (Europe)
- EN 300.893 (Europe)
- EN 301.489-1/-17 (Europe)
- AS/NZS 44268/C-Tick (Australia & New Zealand)

Warranty
- One-year hardware warranty

Ordering Information

Equipment	Part #
Bluesocket 1940 Outdoor Access Point	1700952F1
Access Point vWLAN Software License	1951901G1
Accessories and Software Options:	
802.3at Compliant PoE Injector	1700923F1
2.4 GHz and 5 GHz Antennas bundle	1700930F1
Universal mounting kit (included with AP purchase)	1700943F1
High Availability Access Point Software:	1951904G1
Wired and 3rd Party Access Point Software:	1951910G1

NetVanta Business Communications System

SME IP PBX and Unified Communications System

Product Features

- Complete IP communications system: hardware-based IP PBX and software-based unified communications
- IP PBX supports up to 100 SIP stations per site
- Multi–site support for centralized messaging
- SIP trunking and multi-site networking for Off Net Calls
- PBX and key system modes supported
- Includes IP router, PoE switch, firewall, and VPN
- Full unified messaging: voice, fax, email
- Scalable architecture for future growth
- Microsoft Outlook integration with click-to-dial
- Fax server for convenient desktop faxing
- Conference server
- Personal, rule-based call control/redirection
- Text-to-speech
- Find-me/Follow-me
- Easy to create personal assistants with drag-and-drop service creation
- Database integration to streamline business processes
- Inbound/outbound IVR
- ODBC-enabled IVR and CEBP
- Active Directory administration for UC users
- One number for voice and fax for UC users
- UC Virtualization Support
- Presence and Instant Messaging

As a member of the NetVanta® Unified Communications (UC) family, the NetVanta Business Communications System is a bundled system of hardware and software combining the ADTRAN® NetVanta 7000 Series IP PBXs and the NetVanta UC Server software. Together this hardware/software system targets small to medium enterprises requiring full unified communications capabilities with a complete IP-based voice system supporting up to 100 users per device. This feature-rich system offers a complete voice and data solution with advanced UC services like unified messaging, voice mail, integrated messaging, fax server, graphical drag-and-drop service creation, inbound and outbound Interactive Voice Response (IVR) services, personal assistants, one number services, conferencing, click-to-dial, notifications, and auto-attendants.

NetVanta 7000 Series
ADTRAN's NetVanta 7000 Series provides an innovative Voice over IP (VoIP) communications solution for business to simplify the migration to VoIP and resolve complicated network assessments and equipment interoperability issues. A single chassis provides a complete LAN-to-WAN infrastructure, simplifying IP convergence by combining multiple functions in one compact platform: integrated IP PBX, router, Power over Ethernet (PoE) switch, firewall, SIP Gateway, wireless LAN controller and even Virtual Private Networking (VPN).

NetVanta Unified Communications (UC) Server
NetVanta UC Server is a software-only package designed for Microsoft Windows® platforms that provides full UC capabilities with the NetVanta 7000 Series. This feature-rich software offers advanced UC services like unified messaging, voice mail, integrated messaging, fax server, graphical drag-and-drop service creation, inbound and outbound IVR services, personal assistants, one number services, call redirection services, notifications, auto-attendants and mobile support.

Unified Messaging
Unified messaging is the ability to quickly and effectively retrieve and manage voice mail, faxes, and email messages, all from the familiar interface of your email client or from any telephone. The NetVanta Business Communications System integrates with Microsoft Outlook®/Exchange Server™, Lotus Notes®/Domino®, Google® Gmail, and a host of other email clients with Internet Message Access Protocol (IMAP4).

Fax Server
The NetVanta UC Server includes a full fax server. Desktop faxing is available from any Windows application supporting a print function. The built-in fax server provides advanced features such as DID fax, single number voice and fax number, and individual "fax on demand" using the multimedia personal call control capabilities. In addition, the NetVanta UC Server uses standard TIFF or PDF formats so that you can view faxes on any PC.

Text-to-speech Engine
The NetVanta Business Communications System includes a speech engine to provide text-to-speech conversion. This enables you to listen to email messages from any telephone and speak text from your auto-attendants, database-enabled IVR applications, or Personal Assistants.

Auto-attendant and Personal Call Control
The NetVanta Business Communications System provides users the ability to create multiple auto-attendants and Personal Business Assistants (PBAs) using its award-winning drag-and-drop, database-enabled, non-programmatic, graphical service creation environment. PBAs integrate with Microsoft Outlook contacts and internal/external databases, allowing employees to easily configure their own assistants to establish multifaceted business rules for call screening, call routing, find-me/follow-me, and call notifications, all depending on the defined rules like the caller ID, time-of-day/day-of-week, and many others. These assistants provide unprecedented accessibility for employees to their customers, co-workers and partners. Alternatively, the NetVanta Business Communications System allows administrators to create and exclusively assign assistants for each system user.

Smart Solutions for a Connected World.

ADTRAN®

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NetVanta Business Communications System

SME IP PBX and Unified Communications System

Message Stores for Voice, Fax and Email

- Microsoft Exchange Server 2010, 2007, and 2003
- IBM Lotus Notes/Domino: Integration with Lotus Notes v6.51 and higher
- Novell® GroupWise®
- Industry standard IMAP4 servers
- Google Gmail
- Local storage on NetVanta Business Communications System

Contact Integration with Calling Line ID Support

- Contact match recorded in message
- Outlook MAPI and Internet mode 2010 (32-bit mode), 2007, 2003, and 2002
- Outlook Express®

Message Retrieval

- Telephone User Interface (TUI)
- Visual message management
  - Microsoft Outlook plug-in
  - Lotus Notes plug-in
  - NetVanta UC Client
- Other clients (provides message waiting light synchronization with Exchange integration)
  - Outlook Web Access (OWA)
  - RIM BlackBerry Enterprise Server (BES)
  - Windows Mobile® based Smartphones
  - Other Smartphone Devices–ActiveSync

Message Management Features

- Manage messages from any telephone
- Listen to voice, fax and email messages (text-to-speech)
- Replay, delete, save, skip, pause or rewind messages
- Forward voice, fax and email messages to another mailbox, contact email address or fax number
- Reply to voice and email message with a voice attachment
- Call back sender of voice or email message
- Calling line ID or contact match recorded in subject of message
- Message archiving for quality and audit purposes
- System and personal distribution lists: Manage lists from UC Client or over the telephone
- Contact searching: Listen to address, email and telephone information from a telephone

Fax Server

- T.38 soft IP fax or supported Dialogic media cards
- Receive fax
- Send fax from desktop
- Send fax from any Microsoft Windows application (supporting printing), database, or NetVanta UC Client
- Fax on demand from prepared faxes or from database
- Choose fax recipients from personal contacts (Outlook, Windows Address Book)
- Incoming DID fax directly to mailbox or database
- Uses standard TIFF/PDF image format when reviewing faxes or forwarding to external email address

Conference Server Features

- Mute self
- Mute others
- Disable entry and exit notifications
- Close conference to other callers
- End the conference
- Audible report of the number of participants

Speech Engine

- Read email messages over the telephone
- Personal contact information using text-to-speech
- Database IVR responses using the results of database queries

Presence and Instant Messaging

- Desktop and telephony presence
- Personal status
- Contact search
- Click-to-dial
- Managed groups
- Speed dials
- Single sign-on

Auto Attendant and Personal Call Control Features

- 42 drag-and-drop service elements
  - 16 basic elements
  - 19 advanced elements
  - 7 database elements
- 27 elements include embedded database integration
- 23 built-in variables for date, time, parsed calling and called party numbers, names, matched contact name, unique identifier generation, etc.

Personal Calling Party ID Routing

- Calling line ID
- Contact integration
- Database access
- Find-me/Follow-me
- Blind transfer
- Assisted transfer (accept or deny)

Message Notification
- Message waiting lights
- Active message delivery
- Send email
- SMS support (email to SMS)
- Pager notification

Auto-Attendant Features
- Dial-by-name or extension
- Time-of-day/day-of-week schedules
- Drag-and-drop visual service editor
- Local user time zone support

NetVanta UC Client Administration
- User administration
- User profiles and messaging
- Extensions and identities
- Authorizations
- Features and system parameters
- Automated attendants and IVR
- Announcements
- Services
- ODBC and personal table data source management
- Faxes, fax cover pages and fax queue
- Logging

Active Directory Administration
- Users and Computers MMC snap-in
- Users profiles and messaging
- Extensions and identities
- Authorizations
- Service discovery
- Global policies
- User information
- Single sign-on
- Authorization and permissions
- Delegation of control
- Authorization Manager (AzMan) role-based authorization
- Auto-populate primary identity address in Active Directory

ODBC-enabled Business and Personal IVR
- Database formats
  - ODBC-compliant databases
  - Built-in personal tables
- Database Capabilities
  - Retrieve, update, add, delete rows
  - Retrieved results navigation (move to first, last, next and previous rows)
  - Dial for data–similar to dial-by-name
  - Multimedia–voice, fax and text-to-speech support
  - Data types–audio, date, day of week, day of year, fax, logical, number, phone number, text, time of day, time range

Router Features
- RIP V1, RIP V2 and Static routes
- PPP, PPPoE, Frame Relay WAN protocols
- DHCP Client/Server
- Class-based Weighted Fair Queuing, Priority Queuing, Weighted Fair Queuing
- Diffserv aware/mark
- MLPPP/MLFR

VPN Features
- Five IPSec tunnels
- DES/3DES/AES encryption

Firewall Features
- Stateful Packet Inspection
- NAT (1:1), NAPT (Many:1)
- Denial of Service (DoS) Protection
- Access Control Lists
- SIP aware (B2BUA)

Ethernet Switch Features
- 10/100Base-T (24)
- 10/100/1000Base-T (2)
- Two SFP slots
- Auto-Rate
- Auto-Duplex
- Auto-MDI/MDI-X
- 802.1d Spanning Tree
- 802.1p Class of Service (CoS) aware/mark
- 802.1Q VLANs
- 802.3af PoE (15.4 watts for each of the 24 ports)

NetVanta Business Communications System

SME IP PBX and Unified Communications System

IP PBX System Features

- Analog Trunks (Loop Start/Ground Start; FSK Capture of Caller ID name/number; two integral, 10 maximum)
- Analog Stations (Loop Start DTMF; 1500 feet over 26 AWG; two integral, 10 maximum)
- Shared Line Appearance (SLA)
- Shared call appearance
- Paging through IP phones
- Busy Lamp Field/Direct Station Select (BLF/DSS)
- System scheduler (seven configurable modes: i.e., night, lunch, weekend)
- Public hold
- Call detail records
- Caller ID name/number override (internal and external)
- Classes of Service
- Codec support includes G.711, G.729, G.722 (wideband)
- Configurable dial plan
- Door relay
- Door phone
- Global call coverage lists
- IP Stations (100 maximum; SIP hard or soft phone)
- Least-cost routing
- Operator groups
- Outgoing number substitution
- PRI or integrated voice/data PRI
- Ring groups (ring all, circular hunt group, UCD, executive)
- System speed dial
- T1 or integrated voice/data T1
- Trunk groups
- Variable length extension numbers (three-digit, four-digit)
- Virtual extensions (20)
- 24 DSP resources
- 64ms echo cancellation for VoIP calls
- Centralized UC server

IP Station Features

- Call Drop
- Call Forward (All, Busy, No Answer)
- Call Forward to Outside Line (cell phone)
- Call Hold
- Call Logs
- Call Waiting
- Hands free intercom
- Do Not Disturb
- Headset jack
- Missed Call Indicator
- Music on Hold
- Overhead Paging
- Redial
- Speakerphone
- Caller ID Name/Number
- Call Park
- Call Park Retrieve
- Call Transfer
- Conferencing (3-person)
- Emergency call override
- Message Waiting Light
- Multiple Call Appearances
- Mute
- Personal Call Routing
- Volume Control

NetVanta Unified Communications Server

- Hardware (minimum)
  - CPU: Intel Pentium Dual-Core (E2140)
  - RAM:
    - 2GB
    - 4GB (Windows Small Business Server 2003)
    - 6GB (Windows Small Business Server 2008)
  - Hard Drive: 80GB (usable space)–7,200 RPM
- Supported Operating Systems
  - Microsoft Windows Server 2008 R2 (x64)
  - Microsoft Windows Small Business Server 2008 (x64)
  - Microsoft Windows Server 2008 (x86, x64)
  - Microsoft Windows Server 2003 R2 SP1, SP2 (x86)
  - Microsoft Windows Server 2003 SP1, SP2 (x86)
  - Microsoft Windows Small Business Server 2003 SP1 (x86)
  - VMware vSphere 4.1/5.0
- Network Card minimum: 100 Mbps
- Peripherals: mouse, keyboard, monitor (opt.), CD ROM

NetVanta 7000 Series Chassis Includes

- 24 10/100 Ethernet (802.3af PoE) ports
- 2 analog station (FXS) ports
- 2 analog trunk (FXO) ports
- 2 10/100/1000 Base-T ports
- 2 SFP slots
- 2 option module slots
- 1 WAN Ethernet for broadband Internet/IP access
- MoH or overhead paging ports

NetVanta 7000 Series Environment Characteristics

- **Operating Temperature:** 0 to 50° C
- **Storage Temperature:** -20 to 70° C
- **Relative Humidity:** Up to 95%, non-condensing

NetVanta 7000 Series Physical Characteristics

- **Chassis:** 1U, 19" rackmountable metal enclosure
- **Dimensions:** 1.7" H, 17.2" W, 12.8" D
- **Weight:** 11 lbs.
- AC Power: 100–250 VAC, 50/60 Hz
- **Power:** 450 watts

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
800 615-1176 toll-free
application.engineer@adtran.com
www.adtran.com/support

Where to Buy
877 280-8416 toll-free
channel.sales@adtran.com
www.adtran.com/where2buy

Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
888 874-ACES
aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963 8000
256 963-6300 fax
global@adtran.com
www.adtran.com/global

For the regional office nearest you, visit:
www.adtran.com/regional

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TL19.1270

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NetVanta 7100

IP Communications Platform

Product Features

- IP PBX, voice mail, auto attendant, integrated PoE switch, router, firewall and VPN
- Supports SIP trunking
- Supports SIP multisite networking
- IP PBX supports up to 100 SIP stations
- Supports ADTRAN IP 706/712 and certified Polycom® phones
- Supports PBX and key system modes
- Call queuing
- Transfer voicemail-to-email
- Supports Source and ANI Based Routing (SABR)
- SIP/PSTN Gateway
- Voice mail (3,000 messages, 50 hours, eight ports)
- Multi-level auto attendant
- Shared Line and Call Appearance
- Busy Lamp Field/Direct Station Select (BLF/DSS)
- Dial by name directory
- IP handset paging
- DHCP server
- System scheduler
- Native find-me/follow-me with simultaneous ring
- URL filtering
- Wi-Fi® access controller for NetVanta wireless access points (eight)
- Voice Quality Monitoring (VQM), Mean Opinion Score (MOS) reporting
- Software music-on-hold
- Paging output, door relay
- Graphical User Interface (GUI)
- Industry-leading North American five-year warranty

NetVanta® 7100 is an integrated IP data networking and telephony solution designed to simplify Voice over IP (VoIP) and IP telephony for business locations of up to 100 employees. This one-box solution combines multiple data and voice functions into a single, affordable platform. The ADTRAN® NetVanta 7100 IP Communications Platform includes a router, 24-port Power over Ethernet (PoE) switch, firewall, Virtual Private Network (VPN), Wireless LAN controller, SIP Gateway, and business-class phone system with integrated voice mail and multi-level automated attendant.

PBX and Key System

The NetVanta 7100 IP PBX functionality includes SIP-based telephony features, voice mail, multi-level auto attendant, caller ID name/number, classes of service, trunk groups, music-on-hold and overhead paging. Additional call options include call coverage list and forwarding of calls to an outside cell phone. The NetVanta 7100 also provides email/voice mail integration and enhanced communications productivity by enabling voice mail messages to be sent as .WAV files to email.

Shared Line Appearance (SLA), Shared Call Appearance (SCA) and Busy Lamp Field/Direct Station Select are popular key system functions and are also supported in the NetVanta 7100. SLA enables one or more lines to appear on multiple phones within the system. For example, trunk lines such as Line 1, Line 2 and Line 3 could appear on each phone so users can "pick up Line 1," or an incoming 1-800 line could appear on all phones as the sales line. BLF/DSS provides a visual indication of the status of phones configured in the system with a specific button to directly connect to stations.

SIP Trunking and Networking

The NetVanta 7100 supports SIP trunking to dynamically combine voice and data across a single SIP link to the service provider. The NetVanta 7100 also supports multisite SIP networking for linking sites together to provide direct dial between sites and reduce inter-office communications costs.

Hardware and Software Platform

The NetVanta 7100 is powered by the ADTRAN Operating System (AOS), and integrates the functionality of ADTRAN's highly successful NetVanta 7100 IP Communications Platform NetVanta switches and routers. Data networking features include a stateful inspection and SIP-aware firewall, IP router including DHCP client/server, multiple routing protocols and Layer 3 QoS. The integral switch provides 24 powered (802.3af) 10/100 Ethernet ports, with 802.1Q VLANs, 802.1p Class of Service, and VQM making the system fully ready and ideal for VoIP applications. Additional PoE switches can be uplinked to the NetVanta 7100 to increase the physical Ethernet port count and capacity to 100.

The NetVanta 7100 chassis includes two analog trunk and station interfaces and two expansion slots. For additional trunk and station connectivity, the NetVanta 7100 offers several Voice Interface Modules (VIMs). These include a four-port analog (FXO) trunk module, TI/PRI trunk module which supports voice or integrated voice and data, and a four-port analog (FXS) station module. A combination module which provides two analog stations and two analog trunks is also available.

Unified Communications

ADTRAN's Business Communications Systems provides a complete IP communications system with the NetVanta 7000 Series, hardware-based IP PBX bundled with the software-based Unified Communications (UC) solution with full unified messaging for voice, fax and email. This solution easily integrates with existing Microsoft Outlook® and Active Directory® platforms for click-to-dial, inbound/outbound IVR, conference server, fax server for desktop faxing, text-to-speech, find-me/follow-me, as well as a host of other features to enable business communications.

Integrated Functionality

The NetVanta 7100 adds the flexibility and functionality SME's gain value from. Call Queuing allows for a call center-like experience without the high cost. The find-me/follow-me function enables a mobile workforce with no drop-off in customer service and interaction. 911 support, for email notification to administrator of 911 being dialed, is available for no additional charge and builds peace of mind.

Smart Solutions for a Connected World.

ADTRAN®

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
800 615-1176 toll-free
application.engineer@adtran.com
www.adtran.com/support

Where to Buy
877 280-8416 toll-free
channel.sales@adtran.com
www.adtran.com/where2buy

Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
888 874-ACES
aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963 8000 voice
256 963-6300 fax
international@adtran.com
www.adtran.com/global

For the regional office nearest you, visit:
www.adtran.com/where2buy

NetVanta 7100

IP Comunications Platform

Product Specifications

IP PBX System Features

- Analog Trunks (Loop Start/Ground Start; FSK Capture of Caller ID name/number; two integral, 10 maximum)
- Analog Stations (Loop Start DTMF; 1500 feet over 26 AWG; two integral, 10 maximum)
- Auto-attendant (multilevel, eight-port)
- Shared Line Appearance (SLA)
- Shared Call Appearance
- Call queuing
- Paging through IP Phones
- Busy Lamp Field/Direct Station Select (BLF/DSS)
- System Scheduler (seven configurable modes: i.e., night, lunch, weekend)
- Public hold
- Find-Me/Follow-Me with simultaneous ring
- Call Detail Records
- Caller ID Name/Number Override (internal and external)
- Classes of Service
- Codec support includes G.711, G.729, G.722 (wideband)
- Configurable dial plan
- Software music-on-hold
- Door relay
- Door phone
- Email notification of voice mail message
- Global call coverage lists
- IP Stations (100 maximum; SIP hardphone or softphone)
- Least-cost routing
- Operator groups
- Outgoing number substitution
- PRI or integrated voice/data PRI
- Personal phone manager Web page
- Ring groups (ring all, circular hunt group, UCD, executive)
- System Speed Dial
- T1 or integrated voice/data T1
- Trunk groups
- Variable length extension numbers (three-digit, four-digit)
- Voice mail (3,000 messages, eight ports)
- Virtual extensions (20)
- Voice mail accounts (130)
- 24 DSP resources
- 64ms echo cancellation for VoIP calls

IP Station Features

- Call Drop
- Call Forward (All, Busy, No Answer)
- Call Forward to Outside Line (cell phone)
- Call Hold
- Call logs
- Call Waiting
- Hands free intercom
- Do Not Disturb
- Headset jack
- Missed call indicator
- Music on Hold
- Overhead paging
- Redial
- Speakerphone
- Volume control
- Caller ID Name/Number
- Call Park
- Call Park Retrieve
- Call Transfer
- Conferencing (3-person)
- Emergency call override
- Message waiting light
- Multiple Call Appearances
- Mute
- Personal call routing (Call Coverages)

Router Features

- RIP V1, RIP V2 and Static routes
- PPP, PPPoE, Frame Relay WAN protocols
- DHCP Client/Server
- Class-based Weighted Fair Queuing, Priority Queuing, Weighted Fair Queuing
- Diffserv aware/mark
- MLPPP/MLFR

Firewall Features

- Stateful Packet Inspection
- NAT (1:1), NAPT (Many:1)
- Denial of Service (DoS) protection
- Access Control Lists
- SIP aware (B2BUA)

Content Filtering

- Inherent URL filter
- Top website reports
- Integration with Websense®

VPN Features

- Five tunnels
- IPSec
- DES/3DES/AES encryption

Ethernet Switch Features

- 10/100Base-T (24)
- 10/100/1000Base-T (2)
- Two SFP slots
- Auto-Rate
- Auto-Duplex
- Auto-MDI/MDI-X
- 802.1d Spanning Tree
- 802.1p Class of Service aware/mark
- 802.1Q VLANs
- 802.3af Power over Ethernet (15.4 watts for each of the 24 ports)

Management Features

- Command Line Interface (CLI)
- Telnet
- HTTP, HTTPS (Web browser)
- SSH

Environment

- **Operating Temperature:** 0 to 50° C
- **Storage Temperature:** -20 to 70° C
- **Relative Humidity:** Up to 95%, non-condensing

Physical

- **Chassis:** 1U, 19" rackmountable metal enclosure
- **Dimensions:** 1.7" H, 17.2" W, 12.8" D
- **Weight:** 11 lbs.
- **AC Power:** 100–250 VAC, 50/60 Hz
- **Power:** 450 watts

Chassis Includes

- 24 10/100 Ethernet (802.3af PoE) ports
- 2 analog station/trunk (FXS/FXO) ports
- 2 10/100/1000 Base-T ports
- 2 SFP slots
- 2 option module slots
- 1 WAN Ethernet for broadband Internet/IP access
- MoH or overhead paging ports
- Door relay

Ordering Information

Equipment	Part #
NetVanta 7100	1200796E1
NVU BCS BNDL 100 LIC (UC Software Only)	1950101BSG1
NVU BCS BNDL w/7100 (UC Software and NetVanta 7100)	4200796G1#UC
Network Interface Modules (NIMs)	
T1	1202862L1
Dual T1	1200872L1
ADSL	1202869E1
Voice Interface Modules (VIMs)	
Analog 4-Port Station (FXS)	1200690E1
Analog 4-Port Trunk (FXO)	1202691G1
Analog 2-Port Trunk/2-Port Station	1202692G1
T1/PRI 1	200695L1
Fiber Expansion Modules	
SFP Module, 1000Base-SXSFP 1200480E1	
SFP Module, 1000Base-LXSFP 1200481E1	

NetVanta 7060

IP PBX

Product Features

- Integrated IP PBX, voice mail, auto attendant and 24-port PoE switch
- Supports SIP trunking
- Supports SIP multisite networking
- IP PBX supports up to 100 SIP stations
- Supports ADTRAN IP 706/712 and certified Polycom® phones
- Supports PBX and key system modes
- Call queuing
- Transfer voicemail-to-email
- Supports Source and ANI Based Routing (SABR)
- SIP/PSTN Gateway
- Voice mail (3,000 messages, eight ports)
- Multi-level auto attendant
- Shared Line and Call Appearance
- Busy Lamp Field/Direct Station Select (BLF/DSS)
- Dial by name directory
- IP handset paging
- System scheduler
- Chassis includes:
  - 24 10/100 Ethernet (802.3af PoE) ports
  - Two analog station (FXS) ports
  - Two analog trunk (FXO) ports
  - Two 10/100/1000 Base-T ports
  - Two SFP slots
  - Two option module slots
  - One WAN Ethernet
- Multisite zone paging
- Native find-me/follow-me with simultaneous ring
- Wi-Fi® access controller for NetVanta Wireless Access Points (WAPs)
- DHCP Server
- Software music-on-hold
- Paging output, door relay
- Graphical User Interface (GUI)
- Industry-leading North American five-year warranty

The NetVanta® 7060 is an IP PBX for business locations of up to 100 employees and is designed to complement an existing VoIP-ready data network. The NetVanta 7060 includes SIP-based telephony features such as voice mail, multi-level auto attendant, caller ID name/number, classes of service, trunk groups, music-on-hold and overhead paging. Additional call options include call coverage lists, forwarding of calls to a cell phone, voice mail-to-email integration, as well as a 24-port fully powered PoE switch.

PBX and Key System

Shared Line Appearance (SLA), Shared Call Appearance (SCA) and Busy Lamp Field/Direct Station Select (DSS) are popular key system functions and are also supported in the NetVanta 7060. SLA enables one or more lines to appear on multiple phones within the system. For example, trunk lines such as Line 1, Line 2 and Line 3 could appear on each phone so users can "pick up Line 1," or an incoming 1-800 line could appear on all phones as the sales line. BLF/DSS provides a visual indication of the status of phones configured in the system with a button to directly connect to stations.

SIP Trunking and Networking

The NetVanta 7060 supports SIP trunking which dynamically combines voice and data across a single SIP link to the service provider. The NetVanta 7060 also supports multi-site SIP networking for linking sites together to provide direct dial between sites and reduce inter-office communications costs.

Hardware and Software Platform

The NetVanta 7060 is powered by the ADTRAN® Operating System (AOS), and the integral switch provides 24 powered (802.3af) 10/100 Ethernet ports, with 802.1Q VLANs, 802.1p Class of Service, making the system fully ready and ideal for VoIP applications.

The NetVanta 7060 chassis includes two analog trunk and station interfaces and two expansion slots. For additional trunk and station connectivity, the NetVanta 7060 offers several Voice Interface Modules (VIMs). These include a four-port analog (FXO) trunk module, TI/PRI trunk module supporting voice or integrated voice and data, and a four-port analog (FXS) station module. A combination module which provides two analog stations and two analog trunks is also available.

A dual IP and TDM backplane architecture supports both IP and analog devices to eliminate common performance problems associated with converting TDM analog devices to IP Fax and modem devices connect directly to the NetVanta 7060 and achieve full-rate performance across the PSTN.

Additional PoE switches can be uplinked with the NetVanta 7060 and expand the physical port count to 100.

Unified Communications

ADTRAN's Business Communications System provides a complete IP communications system with the NetVanta 7000 Series, harware-based IP PBX bundled with the software-based Unified Communications solution with full unified messaging for voice, fax and email. This solution easily integrates with existing Microsoft Outlook® and Active Directory® platforms for click-to-dial, inbound/outbound IVR, conference server, fax server for desktop faxing, text-to-speech, find-me/follow-me, as well as a host of other features to enable business communications.

Integrated Functionality

The NetVanta 7060 adds the flexibility and functionality SME's gain value from. Call Queuing allows for a call center-like experience without the high cost. The find-me/follow-me function enables a mobile workforce with no drop-off in customer service and interaction. 911 support, for email notification to administrator of 911 being dialed, is available for no additional charge and builds peace of mind.

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
800 615-1176 toll-free
application.engineer@adtran.com
www.adtran.com/support

Where to Buy
877 280-8416 toll-free
channel.sales@adtran.com
www.adtran.com/where2buy

Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
888 874-ACES
aces@adtran.com
www.adtran.com/support

International Inquiries
256 963 8000 voice
256 963-6300 fax
international@adtran.com
www.adtran.com/international

For the regional office nearest you, visit:
www.adtran.com/regional

TL19.1270

ADTRAN is an ISO 9001, ISO 14001 and a TL 9000 certified supplier.

61700706G1-8F June 2010

NetVanta 7060

IP PBX

Product Specifications

IP PBX System Features

- Analog Trunks (Loop Start/Ground Start; FSK Capture of Caller ID name/number; two integral, 10 maximum)
- Analog Stations (Loop Start DTMF; 1500 feet over 26 AWG; two integral, 10 maximum)
- Auto-attendant (multilevel, eight-port)
- Shared Line Appearance (SLA)
- Shared Call Appearance
- Call queuing
- Paging through IP Phones
- Busy Lamp Field/Direct Station Select (BLF/DSS)
- System Scheduler (seven configurable modes: i.e., night, lunch, weekend)
- Public hold
- Find-Me/Follow-Me with simultaneous ring
- Call Detail Records
- Caller ID Name/Number Override (internal and external)
- Classes of Service
- Codec support includes G.711, G.729, G.722 (wideband)
- Configurable dial plan
- Software music-on-hold
- Door relay
- Door phone
- Email notification of voice mail message
- Global call coverage lists
- IP stations (100 maximum; SIP hardphone or softphone)
- Least-cost routing
- Operator groups
- Outgoing number substitution
- PRI or integrated voice/data PRI
- Personal phone manager Web page
- Ring groups (ring all, circular hunt group, UCD, executive)
- System Speed Dial
- T1 or integrated voice/data T1
- Trunk groups
- Variable length extension numbers (three-digit, four-digit)
- Voice mail (3,000 messages, eight ports)
- Virtual Extensions (20)
- Voice mail accounts (130)
- 24 DSP resources
- 64ms echo cancellation for VoIP calls

IP Station Features

- Call Drop
- Call Forward (All, Busy, No Answer)
- Call Forward to Outside Line (cell phone)
- Call Hold
- Call logs
- Call Waiting
- Hands free intercom
- Do Not Disturb
- Headset jack
- Missed call indicator
- Music on Hold
- Overhead paging
- Redial
- Speakerphone
- Volume control
- Caller ID Name/Number
- Call Park
- Call Park Retrieve
- Call Transfer
- Conferencing (3-person)
- Emergency call override
- Message waiting light
- Multiple Call Appearances
- Mute
- Personal call routing (Call Coverages)

Ethernet Switch Features

- 10/100Base-T (24)
- 10/100/1000Base-T (2)
- Two SFP slots
- Auto-Rate
- Auto-Duplex
- Auto-MDI/MDI-X
- 802.1d Spanning Tree
- 802.1p Class of Service aware/mark
- 802.1Q VLANs
- 802.3af Power over Ethernet (15.4 watts for each of the 24 ports)

Management Features

- Command Line Interface (CLI)
- HTTP, HTTPS (Web browser)
- Telnet
- SSH

Environment

- **Operating Temperature:** 0 to 50° C
- **Storage Temperature:** -20 to 70° C
- **Relative Humidity:** Up to 95%, non-condensing

Physical

- **Chassis:** 1U, 19" rackmountable metal enclosure
- **Dimensions:** 1.7" H, 17.2" W, 12.8" D
- **Weight:** 11 lbs.
- **AC Power:** 100–250 VAC, 50/60 Hz
- **Power:** 450 watts

Chassis Includes

- 24 10/100 Ethernet (802.3af PoE) ports
- 2 analog station (FXS) ports
- 2 analog trunk (FXO) ports
- 2 10/100/1000 Base-T ports
- 2 SFP slots
- 2 option module slots
- 1 WAN Ethernet for broadband Internet/IP access
- MoH or overhead paging ports
- Door relay

Ordering Information

Equipment	Part #
NetVanta 7060	1700706G1
NVU BCS BNDL 100 LIC (UC Software Only)	1950101BSG1
NVU BCS BNDL w/7060 (UC Software and NetVanta 7060)	4200706G1#UC
Voice Interface Modules (VIMs)	
Analog 4-Port Station (FXS)	1200690E1
Analog 4-Port Trunk (FXO)	1202691G1
Analog 2-Port Trunk/2-Port Station	1202692G1
T1/PRI	1200695E1
Fiber Expansion Modules	
SFP Module, 1000Base-SXSFP	1200480E1
SFP Module, 1000Base-LXSFP	1200481E1

ADTRAN IP 321

Enterprise Grade SIP Phone for Remarkable Value

Product Features

Excellent Sound Quality
Acoustic Clarity Technology enables crystal-clear simultaneous hands-free conversations as natural as being there.

Enterprise-Grade Feature Set
Two lines, support of shared line presence, 3-way local conferencing, and built-in XML microbrowser.

Broad and Robust Interoperability
While designed to work with ADTRAN's NetVanta Unified Communications suite of products, the ADTRAN IP 321 is certified to interoperate with a broad array of SIP call control platforms.

The ADTRAN® IP 321 is a two-line SIP phone delivering superb sound quality as well as a wide range of supported business telephony features. The ADTRAN IP 321 phone has a single 10/100 Ethernet port and is designed for common areas, such as lobbies, hallways, and break rooms, as well as various wall-mounted deployments.

Superb Sound Quality
The ADTRAN IP 321 features a full-duplex IEEE 1329 Type 1-compliant speakerphone with legendary Acoustic Clarity Technology that delivers excellent sound quality and enables noise-free and echo-free conversations that are as natural as being there.

Enterprise-Grade Feature Set
The ADTRAN IP 321 phone delivers through an intuitive user interface a full feature set encompassing both traditional business telephony features such as call hold, park, pick-up, transfer, and three-way local conferencing, and more advanced capabilities such as shared call/bridged line appearance, hosts built-in XML microbrowser, and distinctive call treatment.

Efficient Installation and Provisioning
The ADTRAN IP 321 phone is engineered to make installation, configuration, and upgrades as simple and efficient as possible. The phones' standard base stand can be reversed to become a wall mount, eliminating the need for a separate accessory. Built-in IEEE 802.3af PoE circuitry enables flexible deployment options and savings on cabling expenses.

Make Great Things Happen with the ADTRAN IP 321
In today's Internet driven world, the ability to conduct real time communication and collaboration has become critical to an organizations survival. As the market leader in voice, video, data and Web solutions, our award-winning IP telephony and conference technology makes it easy for people to interact and maximize productivity over any network, in just about an environment, anywhere around the globe. That's why more organizations worldwide use and prefer ADTRAN IP telephony and application solutions. Because when people work together, great things happen. See how you, too, can achieve great things with the ADTRAN IP 321 desktop phone.

Smart Solutions for a Connected World.

ADTRAN®

ADTRAN IP 321

Enterprise Grade SIP Phone for Remarkable Value

Product Specifications

Lines (Directory Numbers)

- Up to 2 lines with up to 8 simultaneous calls

Display

- 102 x 33 pixel-graphical LCD
- Message Waiting Indicator (MWI) LED

Feature Keys

- 3 context-sensitive "soft" keys
- 2 line keys with bi-color (red/green) LED
- 2 feature keys ("Menu" and "Dial")
- 4-way navigation key cluster with center "Select" key
- 2 volume control keys
- Dedicated hold key
- Dedicated headset key
- Dedicated hands-free speakerphone key
- Optional Messages Key
- Dedicated microphone mute key
- Dedicated 2.5-mm headset port compatible with most monaural mobile phone headsets

Headset and Hearing Aid Compatibility

- Compliant with ADA Section 508

Recommendations: Subpart B 1194.23 (all)

- Headset Compatibility
- Hearing Aid Compatible (HAC) handset for magnetic coupling to approved HAC hearing aids
- Compatible with commercially-available TTY adapter equipment

Audio Features

- Full-duplex hands-free speakerphone with

ADTRAN

- Acoustic Clarity Technology
  - Type 1 compliant with IEEE 1329 full duplex standards
- **Frequency Response:** 300Hz - 3300Hz for handset, headset and hands-free speakerphone modes
- **Codecs:** G.711 μ/A, G.729A (Annex B), and iLBC
- Individual volume settings with visual feedback for each audio path
- Voice activity detection
- Comfort noise fill
- DTMF tone generation/DTMF event RTP payload
- Low-delay audio packet transmission
- Adaptive jitter buffers
- Packet loss concealment
- Acoustic echo cancellation
- Background noise suppression

Call Handling Features[1]

- Shared call / bridged line appearance
- Flexible line appearance (one or more line keys can be assigned for each line extension)
- Distinctive incoming call treatment/call waiting
- Call timer
- Call transfer, hold, divert (forward), pickup
- Called, calling, connected party information
- Local three-way conferencing
- One-touch speed dial, redial
- Call waiting
- Remote missed call notification
- Intercom
- Automatic off-hook call placement
- Do not disturb function

ADTRAN IP 321

Enterprise Grade SIP Phone for Remarkable Value

Other Features
- Local feature-rich GUI
- Time and date display
- User-configurable contact directory and call history (missed, placed and received)
- Wave file support for call progress tones
- Unicode UTF-8 character support. Multilingual user interface encompassing Danish, Dutch, English (Canada/US/UK), French, German, Italian, Norwegian, Russian, Spanish, Swedish

Protocol Support
- IETF SIP (RFC 3261 and companion RFCs)

Network and Provisioning
- ADTRAN IP 321: Single 10/100 Mbps

Ethernet port
- Manual or dynamic host configuration protocol (DHCP) network setup
- Time and date synchronization using SNTP
- FTP / TFTP / HTTP / HTTPS server-based central provisioning for mass deployments
- Provisioning and call server redundancy supported
- Web portal for individual unit configuration
- QoS Support: IEEE 802.1p/Q tagging (VLAN), Layer 3
- TOS, and DSCP
- Network Address Translation (NAT) support for static configuration and "Keep-Alive" SIP signalling
- RTCP support (RFC 1889)
- Event logging
- Syslog
- Local digit map
- Hardware diagnostics
- Status and statistics reporting

Security[1]
- Transport Layer Security (TLS)
- Secure Real-time Transport Protocol (SRTP)
- Shipped with X.509 certificate installed
- Encrypted configuration files
- Digest authentication
- Password login
- Support for URL syntax with password for boot server
- HTTPS secure provisioning
- Support for signed software executables

Power
- Built-in, auto-sensing IEEE 802.3af Power over Ethernet (Class 1)
- External universal input AC adapter (optional[4]; 24V DC @ 500mA)

Approvals
- FCC Part 15 (CFR 47) Class B
- ICES-003 Class B
- EN55022 Class B
- CISPR22 Class B
- AS/NZS CISPR 22 Class
- VCCI Class B
- EN55024 Class B
- EN61000-3-2; EN61000-3-3; EN-61000-6-1
- ROHS compliant
- Anatel
- GOST
- C-tick
- CCC

Safety
- CE Mark
- EN 60950-1
- IEC 60950-1
- NRTL
- CAB/CSA-C22.2 No. 60950-1-03
- AS/NZS 60950-1

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/support

Where to Buy
888 423-8726
channel.sales@adtran.com
www.adtran.com/where2buy

Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
888 874-2237
aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963-8000 voice
256 963-6300 fax
international@adtran.com

ADTRAN IP 321

Enterprise Grade SIP Phone for Remarkable Value

Operating Conditions
- **Temperature**: 0 to 40°C (+32 to 104°F)
- **Relative Humidity**: 5% to 95%, non-condensing

Storage Temperature
- -40 to +70°C (-40 to +160°F)

ADTRAN IP 321 Comes With:
- ADTRAN IP 321 console
- Handset with handset cord
- Base stand
- Network (LAN) cable
- Quick Start Guide
- Product registration card

Size
- 6.7 in x 5.7 in x 6.9 in x 1.4 in (17 cm x 14.5 cm x 17.5 cm x 3.5 cm)

Phone Weight
- 1.37 lb (0.625 kg)

Unit Box Dimensions/Weight
- 10 in x 4.2 in x 11.6 in (W x H x D) (25 cm x 10.5 cm x 29.5 cm)
- 3 lb 4 oz (1.49 kg)

Master Carton Quantity
- Ten

Country of Origin
- Thailand

Warranty
- One year

1. Some of these features need to be supported by an appropriate call/applications server
2. For a list of supported platforms, please visit: ***http://www.polycom.com/techpartners.htm***
3. Requires SIP version 3.1.3 Rev C or higher
4. Optional AC Adapter 5-packs. Part Numbers/ UPC Codes

Ordering Information

Equipment	Part #
ADTRAN IP321	1202742G1

TL9000
TL19.1270

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

ADTRAN IP 335

Dual-line SIP Phone with the Unmatched Clarity of HD Voice

Product Features

More Efficient and Productive Conversations
Unparalleled clarity through HD Voice and Acoustic Clarity

Broad Interoperability
Certified to interoperate with a broad array of SIP call control platforms to enable flexibility and choice for customers

Intuitive Interface
High resolution graphical 102 x 33 pixel grayscale LCD with adjustable backlighting

The ADTRAN® IP 335 phone is designed to bring a high-quality, cost effective solution to cubicle workers/call center operators through advanced telephony features and HD Voice technology, making voice communication more clear and productive. Utilizing its high resolution backlit display, RJ-9 headset port, and HD Voice technology, the ADTRAN IP 335 phone delivers a business grade telephony endpoint at an entry-level price.

Unsurpassed Voice Quality and Clarity
With a best-in-class design for high-fidelity voice reproduction, the ADTRAN IP 335 also incorporates wideband audio for over twice the voice clarity of standard phones. Acoustic Clarity technology provides crystal-clear, noise- and echo-free audio, while hold, pick-up, transfer, and three-way local conferencing features make managing calls simple and intuitive. Capabilities such as shared call/bridged line appearance, built-in xHTML microbrowser, and a RJ-9 headset port extend functionality for more advanced requirements.

ADTRAN Powers Smarter Conversations
The ADTRAN IP 335 is a key element in a broader ADTRAN portfolio of best in class solutions for voice, video, and collaboration. As a global leader in open standard Unified Communications (UC) solutions, ADTRAN's award-winning IP telephony solutions make it easy for people to interact and maximize productivity over any network, in just about any environment, anywhere around the globe.

Smart Solutions for a Connected World.

ADTRAN®

ADTRAN IP 335

Dual-line SIP Phone with the Unmatched Clarity of HD Voice

Product Specifications

Lines (Direct Numbers)

- Up to 2 lines with up to 8 simultaneous calls total

Display

- 102 x 33 pixel backlit grayscale graphical LCD
- LED backlight with custom intensity control
- Message Waiting Indicator (MWI) LED

Feature Keys

- 3 context-sensitive "soft" keys
- 2 line keys with bi-color (red/green) LED
- 2 feature keys ("Menu" and "Dial")
- 4-way navigation key cluster with center "Select" key
- 2 volume control keys
- Dedicated hold key
- Dedicated headset key
- Dedicated hands-free speakerphone key
- Dedicated microphone mute key
- Optional Messages Key

Headset and Hearing Aid Compatibility

- Dedicated RJ-9 headset port
- Compliant with ADA Section 508 Recommendations: Subpart B 1194.23 (all)
- Hearing Aid Compatible (HAC) handset for magnetic coupling to TIA 504-A and ITU P.370 standards
- Compatible with commercially available TTY adapter equipment

Audio Features

- HD Voice technology delivers life-like voice quality f or each audio path – the handset, the hands-free speakerphone and the optional headset[1]
- Full-duplex hands-free speakerphone
- Type 1 compliant with IEEE 1329 full duplex standards
- Codecs: G.722 (wideband), G.711 μ/A, G.729A (Annex B) and iLBC
- Individual volume settings with visual feedback for each audio path
- Voice activity detection
- Comfort noise fill
- DTMF tone generation/DTMF event RTP payload
- Low-delay audio packet transmission
- Adaptive jitter buffers
- Packet loss concealment
- Acoustic echo cancellations
- Background noise suppression

Call Handling Features[2]

- Shared call/bridged line appearance
- Busy Lamp Field (BLF)
- Flexible line appearance (one or more line keys can be assigned for each line extension)
- Distinctive incoming call treatment/call waiting
- Call timer
- Call transfer, hold, divert (forward), pickup
- Called, calling, connected party information
- Local three-way conferencing
- One-touch speed dial
- Call waiting
- Remote missed call notification
- Intercom
- Automatic off-hook call placement
- Do not disturb function

ADTRAN IP 335

Dual-line SIP Phone with the Unmatched Clarity of HD Voice

Other Features

- Enabled for Polycom Productivity Suite
- Local feature-rich GUI
- Time and date display
- User-configurable contact directory and call history (missed, placed and received)
- Wave file support for call progress tones
- Unicode UTF-8 character support. Multilingual user interface encompassing Danish, Dutch, English (Canada/US/UK), French, German, Italian, Norwegian, Polish, Russian, Slovenian, Spanish, Swedish

Protocol Support

- IETF SIP (RFC 3261 and companion RFCs)

Network and Provisioning

- Two 10/100 Mbps Ethernet ports
- Manual or dynamic host configuration protocol (DHCP) network setup
- Time and date synchronization using SNTP
- FTP/TFTP/HTTP/HTTPS server-based central provisioning for mass deployments
- Provisioning and call server redundancy supported
- Web portal for individual unit configuration
- QoS Support – IEEE 802.1p/Q tagging (VLAN), Layer 3
- TOS and DSCP
- Network Address Translation (NAT) support for static configuration and "Keep-Alive" SIP signaling
- RTCP support (RFC 1889)
- Event logging
- Syslog
- Local digit map
- Hardware diagnostics
- Status and statistics reporting

Security

- Transport Layer Security (TLS)
- Secure Real-time Transport Protocol (SRTP)
- Encrypted configuration files
- Shipped with X.509 certificate installed
- Digest authentication
- Password login
- Support for URL syntax with password for boot server
- HTTPS secure provisioning
- Support for signed software executables

Power

- Built-in, auto-sensing IEEE 802.3af Power Over Ethernet (Class2)
- External universal input AC adapter (optional[4]; 24V DC@500mA)

Approvals

- FCC Part 15 (CFR 47) Class B
- ICES-003 Class B
- EN55022 Class B
- CISPR22 Class B
- AS/NZS CISPR22 Class B
- VCCI Class B
- EN55024
- CE
- RoHS Compliant
- GOST-R
- A-Tick
- C-Tick
- KCC
- ANATEL
- NZ Telepermit
- TRA

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/support

Where to Buy
888 423-8726
channel.sales@adtran.com
www.adtran.com/where2buy

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888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
888 874-2237
aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963-8000 voice
256 963-6300 fax
international@adtran.com

ADTRAN IP 335

Dual-line SIP Phone with the Unmatched Clarity of HD Voice

Safety
- IEC60950-1
- EN60950-1
- UL60950-1
- CAN/CSA C22.2 No.60950-1-03
- AS/NZS 60950-1

Operating Conditions
- **Temperature**: 0 to 40°C (+32 to 104°F)
- **Relative Humidity**: 5% to 95%, non-condensing

Storage Temperature
- -40 to +70°C (-40 to +160°F)

SoundPoint IP 335 Comes with:
- SoundPoint IP 335 console
- Handset with handset cord
- Base stand
- Network (LAN) cable
- Quick Start Guide
- Product registration card

Size
- 6.7 in x 5.7 in x 6.9 in

Phone Weight
- 1.9 lb (0.861 kg)[5]

Unit Box Dimensions/Weight
- 10 in x 4.2 in x 11.6 in (W x H x D) (25 cm x 10.5 cm x 29.5 cm)
- 2.9 lbs (1.3 kg) [5]

Master Carton Quantity
- Ten

Country of Origin
- Thailand

Warranty
- One Year

1. To enjoy all the benefits of HD Voice when using the phone in the headset mode, you must use a wideband headset.
2. Some of these features need to be supported by an appropriate call/applications server.
3. Features supported on SoundPoint IP 335 require SIP 3.2.2 or later.
4. Measurements taken for PoE. Power supply weights estimated at 0.65 lb (0.294 kg)
5. Refer to the Administrator's Guide for UC Software for a more complete listing/description of features

Ordering Information

Equipment	Part #
ADTRAN IP335	1202752G1

TL19.1270

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

ADTRAN IP 550

Exceptional sound quality and advanced features in a four-line SIP phone

Product Features

Revolutionary Voice Quality
HD Voice technology enables life-like richness, clarity, and interactivity of voice communications[5]

Advanced Features and Applications[1]

- Four lines
- Backlit 320 x 160-pixel graphical grayscale LCD
- Shared call/bridged line appearance
- Busy lamp field (BLF)
- Presence, buddy lists XHTML micro-browser for Web applications

Efficient Installation and Provisioning

- Integrated IEEE 802.3af Power over Ethernet (PoE) support

Introducing the ADTRAN IP 550 desktop phone, a four-line SIP phone that delivers calls of unprecedented richness and clarity and supports a comprehensive range of cutting-edge features.

Unparalleled Sound Quality
The ADTRAN IP 550 desktop phone features HD Voice technology, which brings life-like richness and clarity to every call. HD Voice technology incorporates wideband audio for over twice the voice clarity; Acoustic Clarity Technology for crystal-clear, noise- and echo-free sound, plus best-in-class system design for high-fidelity, faithful voice reproduction.

Comprehensive, Cutting-Edge Feature Set[1]
The ADTRAN IP 550 desktop phone delivers advanced features and capabilities, such as shared call/bridged line appearance, busy lamp field (BLF), presence, text messaging, and buddy lists. The ADTRAN IP 550 phone also boasts an integrated XHTML micro-browser that allows users to take advantage of productivity-enhancing Web-based applications. Add the support of four lines, a backlit, high-resolution, easy-to-read graphical display and flexible customizations options, and it becomes clear why the ADTRAN IP 550 is certain to meet the voice communication needs of the most demanding managers and professionals.

Efficient Installation and Provisioning
The ADTRAN IP 550 desktop phone is engineered to make installation, configuration, and upgrades as simple and efficient as possible. The phone's built-in IEEE 802.3af PoE circuitry and a dual-port Ethernet switch enable flexible deployment options and savings on cabling expenses. To ensure reliable, uninterrupted performance, the phone supports boot[4] and call server redundancy.

Smart Solutions for a Connected World.

ADTRAN®

ADTRAN IP 550

Exceptional sound quality and advanced features in a four-line SIP phone

Product Specifications

Lines (Direct Numbers)

- Up to 4 lines with up to 24 concurrent calls

Display

- 320 x 160 backlit grayscale graphical LCD
- White LED backlight with custom intensity control
- Message Waiting Indicator (MWI) LED

Feature Keys

- 4 context-sensitive "soft" keys
- 26 dedicated "hard" keys
- 6 line keys with bi-color (red/green) LED
- 8 feature keys
- 6 display/menu navigation keys
- 2 volume control keys
- Illuminated mute key
- Illuminated headset key
- Illuminated hands-free speakerphone key
- Dedicated hold key

Headset and Hearing Aid Compatibility

- Compliant with ADA Section 508

Recommendations: Subpart B 1194.23 (all)

- Hearing Aid Compatible (HAC) handset for magnetic coupling to approved HAC hearing aids
- Compatibility with commercially-available TTY adapter equipment

Audio Features

- HD Voice technology delivers life like voice quality for each audio path - the handset, the hands-free speakerphone, and the headset[1.5]
- Full-duplex hands-free speakerphone
- Type 1 compliant with IEEE 1329 full duplex standards
- Frequency response - 150Hz - 7kHz for handset, headset1 and hands-free speakerphone modes
- Codecs: G.722 (wideband), G.711 μ/A, G.729A (Annex B), and iLBC
- Individual volume settings with visual feedback for each audio path
- Voice activity detection
- Comfort noise fill
- DTMF tone generation/DTMF event RTP payload
- Low-delay audio packet transmission
- Adaptive jitter buffers
- Packet loss concealment
- Acoustic echo cancellation
- Background noise suppression

Call Handling Features[1]

- Shared call/bridged line appearance
- Flexible line appearance (one or more line keys can be assigned for each line extension)
- Busy Lamp Field (BLF)
- Distinctive incoming call treatment/call waiting
- Call timer
- Call transfer, hold, divert (forward), pickup
- Called, calling, connected party information
- Local three-way conferencing
- One-touch speed dial, redial
- Call waiting
- Remote missed call notification
- Intercom
- Automatic off-hook call placement
- Do not disturb function

ADTRAN IP 550

Exceptional sound quality and advanced features in a four-line SIP phone

Other Features
- Integration with Microsoft LCS 2005 for telephone and presence
- Local feature-rich GUI
- Time and date display
- User-configurable contact directory and call history (missed, placed, and received)
- Customizable call progress tones
- Wave file support for call progress tones
- Unicode UTF-8 character support. Multilingual user interface encompassing Chinese, Danish, Dutch, English (Canada/US/UK), French, German, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Slovenian, Spanish, Swedish

Protocol Support
- IETF SIP (RFC 3261 and companion RFCs)

Network and Provisioning
- Two-port 10/100 Mbps Ethernet switch
- Manual or dynamic host configuration protocol (DHCP) network setup
- Time and date synchronization using SNTP
- FTP/TFTP/HTTP/HTTPS3 server-based central provisioning for mass deployments.
- Provisioning[4] server redundancy supported
- Web portal for individual unit configuration
- QoS Support – IEEE 802.1p/Q tagging (VLAN), Layer 3 TOS, and DSCP
- Network Address Translation (NAT) support – static
- RTCP support (RFC 1889)
- Event logging
- Syslog
- Local digit map
- Hardware diagnostics
- Status and statistics

Security[1]
- Transport Layer Security (TLS)[3]
- Secure Real-time Transport Protocol (SRTP)
- Shipped with X.509 certificate installed
- Encrypted configuration files[3]
- Digest authentication
- Password login
- Support for URL syntax with password for boot server
- HTTPS secure provisioning[3]
- Support for signed software executables[3]

Power
- Built-in, auto-sensing IEEE 802.3af PoE
- External Universal AC adapter (included 48V DC)

Approvals
- FCC Part 15 (CFR 47) Class B
- ICES-003 Class B
- EN55022 Class B
- CISPR22 Class B
- AS/NZS CISPR 22 Class B
- VCCI Class B
- EN55024
- EN61000-3-2; EN61000-3-3
- ROHS compliant
- Anatel
- GOST
- C-tick
- CCC

Safety
- UL/C-UL
- CE Mark
  - EN 60950-1
  - IEC 60950-1
  - AS/NZS 60950

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/support

Where to Buy
888 423-8726
channel.sales@adtran.com
www.adtran.com/where2buy

Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
888 874-2237
aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963-8000 voice
256 963-6300 fax
international@adtran.com

ADTRAN IP 550

Exceptional sound quality and advanced features in a four-line SIP phone

Operating Conditions
- **Temperature**: 0 to 40°C (+32 to 104°F)
- **Relative Humidity**: 5%-95% (noncondensing)

Storage Temperature
- -40 to +70 degrees C (-40 to +160 degrees F)

SoundPoint IP 550 Comes with:
- SoundPoint IP 550 console
- Handset with handset cord
- Base stand
- Network (LAN) cable
- Universal power adapter (including country-specific cord kit)[5]
- Quick Start Guide
- Product registration card

Size
- 10.5 in W x 6 in H x 7.5 in D x 2.5 in T (26.5 cm W x 15 cm H x 19 cm D x 6.5 cm T)

Box Dimensions/Weight
- 12.5 in x 13.25 in x 3.5 in
- 2045 g

Master Carton Quantity
- Five

Country of Origin
- Thailand

Warranty
- One year

1. Some of these features need to be supported by an appropriate call/applications server.
2. Please visit ***www.polycom.com/techpartners.htm*** for a list of supported platforms.
3. Requires BootROM version 3.2.x or higher.
4. Requires SIP version 2.0.x or higher.
5. In some calling scenarios, such as IP to PSTN, HD Voice will not be available and the call will progress in narrowband instead.

Ordering Information

Equipment	Part #
ADTRAN IP550	1202755G1

TL19.1270

AOTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

61202755G1-8A August

ADTRAN IP 650

High Performance IP Phone with HD Voice

Product Features

Revolutionary Voice Quality
HD Voice enables life-like interactivity, richness, and clarity of voice communications

Advanced Features and Applications

- USB port for future applications
- XHTML microbrowser Backlit 320x160 graphical grayscale LCD
- Integrated PoE support

Advanced Call Handling Capabilities

- Six lines (standalone)/12 lines with Expansion Module(s)
- Shared call/bridged line appearance[2]
- Busy lamp field (BLF)[2]

Expandability
Supports up to three SoundPoint IP Expansion Modules for an attendant console application

Designed to appeal to both executive users who require advanced features and applications, and telephone attendants who need multiple line support, the ADTRAN® IP 650 sets the standard for high-performance IP phones.

Revolutionary Voice Quality
The ADTRAN IP 650 features HD Voice technology to bring life-like richness and clarity to voice communications incorporating wideband audio for over twice the voice clarity, Acoustic Clarity Technology[2], as well as best-in-class system design to deliver unprecedented voice quality.

Enhanced Call Handling Capabilities
The ADTRAN IP 650 accommodates 6 lines in standalone mode, and 12 lines as an attendant console, when equipped with SoundPoint IP Expansion Modules. The phone supports shared call/bridged line appearance[2], an essential feature for effective phone interaction between executives and their assistants. The phone's busy lamp field (BLF)[2] functionality enables phone attendants to monitor the on-hook/off-hook status of key contacts, and dispatch incoming calls for those contacts more efficiently.

Expandability
When equipped with up to three Expansion Modules, the ADTRAN IP 650 delivers the advanced call handling capabilities and enhanced user interface of a high-performance attendant console. Designed to improve productivity of telephone attendants, the SoundPoint IP attendant console allows effective and efficient management and monitoring of up to 24 simultaneous calls on up to 12 lines.

Efficient Installation and Provisioning
Designed to make installation, configuration, and upgrade as simple and efficient as possible, the ADTRAN IP 650 boasts a two-port Ethernet switch and integrated Power over Ethernet circuitry. The ADTRAN IP 650 can be centrally configured and upgraded in the field from an FTP, TFTP, HTTP4, or HTTPS4 server.

Smart Solutions for a Connected World.

ADTRAN®

ADTRAN IP 650

High Performance IP Phone with HD Voice

Product Specifications

Lines (Direct Numbers)

- Up to six lines (standalone mode)
- Up to 24 concurrent calls

Expansion Module Mode

- Up to 48 line keys/appearances
- Up to 47 remote party BLF line monitors
- Up to 34 SIP registrations

SoundPoint IP Expansion Module Support

- Supports up to three Expansion Modules

Display

- 320 x 160 backlit grayscale graphical LCD
- White LED backlight with custom intensity control
- Message Waiting Indicator (MWI) LED

Feature Keys

- 4 context-sensitive "soft" keys
- 26 dedicated "hard" keys
  - 6 line keys with bi-color (red/green) LED
  - 8 feature keys
  - 6 display/menu navigation keys
  - 2 volume control keys
  - Illuminated mute key
  - Illuminated headset key
  - Illuminated hands-free speakerphone key
  - Dedicated hold key

Headset and Hearing Aid Compatibility

- Dedicated RJ-9 headset port
  - Amplified headsets are recommended
- Compliant with ADA Section 508 Recommendations: Subpart B 1194.23 (all)
- Hearing Aid Compatible (HAC) handset for magnetic coupling to approved HAC hearing aids
- Compatibility with commercially-available TTY adapter equipment

Audio Features

- HD Voice technology delivers life-like voice quality for each audio path - the handset, the hands-free speakerphone, and the headset1
- Full-duplex hands-free speakerphone
  - Type 1 compliant with IEEE 1329 full duplex standards
- Frequency response: 150Hz - 7kHz for handset, headset1 and hands-free speakerphone modes
- Codecs: G.722 (wideband), G.711 μ/A, G.729A (Annex B) and iLBC
- Individual volume settings with visual feedback for each audio path
- Voice activity detection
- Comfort noise fill
- DTMF tone generation/DTMF event RTP payload
- Low-delay audio packet transmission
- Adaptive jitter buffers
- Packet loss concealment
- Acoustic echo cancellation
- Background noise suppression

Call Handling Features[2]

- Shared call/bridged line appearance
- Flexible line appearance (one or more line keys can be assigned for each line extension)
- Busy Lamp Field (BLF)
- Distinctive incoming call treatment/call waiting
- Call timer
- Call transfer, hold, divert (forward), pickup
- Called, calling, connected party information
- Local three-way conferencing
- One-touch speed dial, redial
- Call waiting
- Remote missed call notification
- Intercom
- Automatic off-hook call placement
- Do not disturb function

ADTRAN IP 650

High Performance IP Phone with HD Voice

Other Features

- Integration with Microsoft LCS 2005 for telephone and presence3
  - Compatibility with Microsoft Office Communicator and Windows® Messenger 5.1
- Clients Universal Serial Bus (USB)
  - Full Host Controller
  - Compliant with OHCI 1.1 specification
  - Support for Full-speed and Low-speed peripherals
  - Type-A receptacle interface
- Local feature-rich GUI
- Time and date display
- User-configurable contact directory and call history (missed, placed, and received)
- Customizable call progress tones
- Wave file support for call progress tones
- Unicode UTF-8 character support. Multilingual user interface encompassing Chinese, Danish, Dutch, English (Canada/US/UK), French, German, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Slovenian, Spanish, Swedish

Protocol Support

- IETF SIP (RFC 3261 and companion RFCs)

Network and Provisioning

- Two-port 10/100 Mbps Ethernet switch
- Manual or dynamic host configuration protocol (DHCP) network setup
- Time and date synchronization using SNTP
- FTP/TFTP/HTTP/HTTPS4 server-based central provisioning for mass deployments.
- Provisioning server redundancy supported
- Web portal for individual unit configuration
- QoS Support – IEEE 802.1p/Q tagging (VLAN), Layer 3 TOS, and DSCP
- Network Address Translation (NAT) support – static
- RTCP support (RFC 1889)
- Event logging
- Local digit map
- Hardware diagnostics
- Status and statistics

Security[2]

- Transport Layer Security (TLS)[3]
- Secure Real-time Transport Protocol (SRTP)
- Shipped with X.509 certificate installed
- Encrypted configuration files3
- Digest authentication
- Password login
- Support for URL syntax with password for boot server[4]
- HTTPS secure provisioning[4]
- Support for signed software executables[4]

Power

- Built-in, auto-sensing IEEE 802.3af Power over Ethernet
- External Universal AC adapter (included 48V DC)[5]

Approvals

- FCC Part 15 (CFR 47) Class B
- ICES-003 Class B
- EN55022 Class B
- CISPR22 Class B
- AS/NZS CISPR 22 Class B
- VCCI Class B
- EN55024
- EN61000-3-2; EN61000-3-3
- ROHS compliant

Safety

- UL 60950
- CE Mark
- CAN/CSA-C22.2 No. 60950
- EN 60950-1
- IEC 60950-1
- AS/NZS 60950

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www.adtran.com/support

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888 874-2237
aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963-8000 voice
256 963-6300 fax
international@adtran.com

ADTRAN IP 650

High Performance IP Phone with HD Voice

Operating Conditions
- **Temperature**: 0 to 40°C (+32 to 104°F)
- **Relative Humidity**: 5% to 95% (noncondensing)

Storage Temperature
- -40 to +70 degrees C (-40 to +160 degrees F)

ADTRAN IP 650 Comes with:
- ADTRAN IP 650 console
- Handset with handset cord
- Base stand
- Network (LAN) cable
- Universal power adapter (including country-specific cord kit)[5]
- Quick Start Guide
- Product registration card

Size
- 10.5 in x 6 in x 7.5 in x 2.5 in(26.5 cm x 15 cm x 19 cm x 6.5 cm) (W x H x D x T)

Weight
- **Shipping**: 2.75 lb (1.26 kg)

Box Dimensions/Weight
- 12.5 in x 13.25 in x 3.5 in
- 2045g (for all countries)

Master Carton Quantity
- Five

Country of Origin
- Thailand

Warranty
- One year

1. To enjoy the benefits of HD Voice when using the phone in the headset mode, you must use a wideband headset.
2. Most software-enabled features and capabilities must be supported by the server. Please contact your IP PBX/Softswitch vendor or service provider for a list of supported features.
3. Requires SIP version 2.0.1 or higher.
4. Requires BootROM version 3.2.X or higher.
5. Please contact ADTRAN for current device driver support.

Ordering Information

Equipment	Part #
ADTRAN IP650	1202758G1

TL19.1270

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

61202758G1-8B October

ADTRAN VVX 300 and 310

Entry-level Business Media Phones

Product Features

- Improve productivity for office staff through an intuitive easy to use user interface
- Make more efficient and productive calls with the unparalleled voice clarity of HD Voice
- Reduce deployment and maintenance costs—Zero Touch Provisioning and web-based configuration tool makes the VVX 300 simple to deploy, easy to administer, upgrade, and maintain
- Leverage previous IT infrastructure investments—deploy VVX 300 business media phones on your existing network without needing to upgrade your call control platform
- Easily integrate with third-party web-based UC and productivity applications for broad, standards-based, open APIs

The ADTRAN® VVX 300 is an expandable business media phone that delivers crystal clear communications, enhanced collaboration and personal productivity.

Simplicity and Ease-of-use
The VVX 300 phones bring high-quality, cost effective solutions to business staff through advanced UC telephony features. Building on the behavior common to smartphones and tablets, the intuitive user interface of the VVX 300 makes navigation easy and requires minimal training.

Unsurpassed Voice Quality and Clarity
The VVX 300 delivers breakthrough HD Voice quality for life-like conversations making calls more efficient and productive.

Maximize Productivity
Give your front line workers the best experience with this high quality six-line business media phone. The VVX 300 improves personal productivity by complementing the workplace applications on their computer. Users can view and manage their Microsoft Exchange Calendars, receive meeting reminders and alerts, access the corporate directory and Instant Messaging/presence[2] status right on their phone display, even while waiting for their PC to boot. They can also extend their PC's desktop to include the VVX 300 phone's screen for mouse/keyboard navigation and interaction.

Best-in-class Deployment and Administration
The VVX 300 phone is easy to deploy and simple to manage. Using an enterprise-grade, web-based configuration method allows administrators to easily provision and maintain even a small number of phones throughout the entire enterprise. Additionally, the extensive administrative feature set ensures that IT departments have the latest technologies to integrate the VVX 300 seamlessly into their environment while minimizing cabling costs with an integrated gigabit Ethernet (ADTRAN VVX 310) connection.

Customizable and Expandable
The VVX 300 phone provides personalized information at a glance, through built-in web applications and custom backgrounds. The VVX 300 phone also comes ready for future expansion modules as your users' needs and business grows.

Market-leading Open Standards Interoperability
Designed for enhanced interoperability, the VVX 300 leverages and complements the other existing IT investments in your business becoming the flexible and future-proof foundation for any organization's unified communications strategy.

Smart Solutions for a Connected World.

ADTRAN®

ADTRAN VX 300 and 310

Entry-level Business Media Phones

Product Specifications

User Interface Features

- Backlit 8-level Grayscale graphical LCD (208 x 104) resolution
- Screen saver mode
- On-screen virtual keyboard
- Voicemail support[2]
- WebKit-based Browser
- Adjustable base height
- Unicode UTF-8 character support. Multilingual user interface including Chinese, Danish, Dutch, English (Canada/ US/UK), French, German, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Slovenian, Spanish, and Swedish

Audio Features

- HD Voice technology delivers life-like voice quality for each audio path-handset, the hands-free speakerphone, and the optional headset[1]
- Acoustic Clarity technology providing full-duplex conversations, acoustic echo cancellation and background noise suppression
  - Type 1 compliant (IEEE 1329 full duplex)
- Frequency response—150 Hz – 7 kHz for handset, optional headset and hands-free speakerphone modes
- Codecs: G.711 (A-law and μ-law), G.729AB, G.722, G.722.1
- Individual volume settings with visual feedback for each audio path
- Voice activity detection
- Comfort noise generation
- DTMF tone generation (RFC 2833 and in-band)
- Low-delay audio packet transmission
- Adaptive jitter buffers
- Packet loss concealment

Headset and Handset Compatibility

- Dedicated RJ-9 headset port
- Hearing aid compatibility to ITU-T P.370 and TIA 504A standards
- Compliant with ADA Section 508 Subpart B 1194.23 (all)
- Hearing aid compatible (HAC) handset for magnetic coupling to hearing aids
- Compatible with commercially-available TTY adapter equipment

Call Handling Features[2]

- 6 lines (programmable line keys)
- Shared call/bridged line appearance
- Busy Lamp Field (BLF)
- Flexible line appearance (one or more line keys can be assigned for each line extension)
- Distinctive incoming call treatment/call waiting
- Call timer and call waiting
- Call transfer, hold, divert (forward), pickup
- Called, calling, connected party information
- Local three-way audio conferencing
- One-touch speed dial, redial
- Remote missed call notification
- Do not disturb function
- Electronic hook switch capable
- Local configurable digit map/dial plan

Open Application Platform[2]

- WebKit enabled full browser that supports HTML5, CSS, SSL security, and JavaScript
- Supports Polycom Apps SDK and API for third-party business and personal applications
- Bundled with Polycom UC Software: Corporate Directory Access using LDAP Visual Conference Management

ADTRAN VVX 300 and 310

Entry-level Business Media Phones

Network and Provisioning

- SIP Protocol Support
- SDP
- IETF SIP (RFC 3261 and companion RFCs)
- Two-port Ethernet switch
  - 10/100Base-TX across LAN and PC ports (VVX 300)
  - 1000Base-TX available on VVX 310
  - Conforms to IEEE802.3-2005 (Clause 40) for Physical Media Attachment
- Conforms to IEEE802.3-2002 (Clause 28) for link Partner Auto-Negotiation
- Manual or dynamic host configuration protocol (DHCP) network setup
- Time and date synchronization using SNTP
- FTP/TFTP/HTTP/HTTPS server-based central provisioning for mass deployments
- Provisioning and call server redundancy supported[2]
- QoS Support – IEEE 802.1p/Q tagging (VLAN), Layer 3 TOS, and DHCP
- VLAN - CDP, DHCP VLAN discovery, LLDP-MED for VLAN discovery
  - Network Address Translation (NAT) support for static configuration and "Keep-Alive" SIP signaling
- RTCP and RTP support
- Event logging
- Syslog
- Hardware diagnostics
- Status and statistics reporting
- IPv4
- TCP
- UDP
- DNS-SRV

Security

- 802.1X Authentication and EAPOL
- Media encryption via SRTP
- Transport Layer Security (TLS)
- Encrypted configuration files
- Digest authentication
- Password login
- Support for URL syntax with password for boot server address
- HTTPS secure provisioning
- Support for signed software executables

Power

- Built-in auto sensing IEEE 802.3 at Power over Ethernet (Class 2)
- External Universal AC Adapter (optional, 48V 12W DC)

Approvals

- FCC Part 15 (CFR 47) Class B
- ICES-003 Class B
- EN55022 Class B
- CISPR22 Class B
- VCCI Class B
- EN55024
- EN61000-3-2; EN61000-3-3
- NZ Telepermit
- Korea KC
- UAE TRA
- Russia GOST-R
- Brazil ANATEL
- Australia A & C Tick
- RoHS compliant

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P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

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888 874-2237
aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963-8000
256 963-6300 fax
international@adtran.com

ADTRAN VVX 300 and 310

Entry-level Business Media Phones

Safety
- UL 60950-1
- CE Mark
- CAN/CSA C22.2 No 60950-1
- EN 60950-1
- IEC 60950-1
- AS/NZS 60950-1
- ICASA
- CITC

Operating Conditions
- **Temperature:** +32 to 104°F (0 to 40°C)
- **Relative Humidity:** 5% to 95%, noncondensing

Storage Temperature
- -40 to +160°F (-40 to +70°C)

ADTRAN VVX 300 and 310 Comes With:
- VVX 300 or VVX 310 console
- Handset with handset cord
- Network (LAN) cable
- Quick Start Guide
- A ferrite clamp is included in the box

Size
- 7.5 x 6 x 7 in (19 x 15 x 18 cm) (W x H x D)

Weight
- Unit weight: 2.0 lbs (0.9 kg)

Unit Box Dimensions/Weight
- 12 x 8.25 x 4.25 in
- 3.1 lbs (1.4 kg)

Master Carton Quantity
- Ten

Country of Origin
- China

Warranty
- One year

Notes
1. To enjoy all the benefits of HD Voice when using the phone in the headset mode, you must use a wideband headset.
2. Most software-enabled features and capabilities must be supported by the IP PBX/Softswitch.

Ordering Information

Equipment	Part #
ADTRAN VVX 300	1200853G1
ADTRAN VVX 310	1200853G1#GB

TL19.1270

AOTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

61200853G1-8A March

ADTRAN VVX 400 and 410

Mid-Range Color Business Media Phones

Product Features

- Improve worker productivity via a large, intuitive color display and easy to use line appearances
- Make more efficient and productive calls with the unparalleled voice clarity of Polycom HD Voice™
- Reduce deployment and maintenance costs—the Zero Touch Provisioning and web based configuration tool makes the VVX 400 simple to deploy, easy to administer, upgrade, and maintain
- Leverage previous IT infrastructure investments—deploy VVX 400 business media phones on your existing network without needing to upgrade your call control platform
- Easily integrate with third-party web-based UC and productivity applications for broad, standards-based, open APIs

The ADTRAN® VVX 400 is an expandable color business media phone that delivers crystal clear communications, enhanced collaboration and personal productivity.

Simplicity and Ease-of-use
The ADTRAN VVX 400 phones brings a high-quality, cost effective solution to front line staff handling any volume of calls through advanced UC telephony features. The intuitive color user interface of the VVX 400 makes navigation easy and requires minimal training.

Unsurpassed Voice Quality and Clarity
The VVX 400 delivers breakthrough HD Voice quality for life-like conversations, making calls more efficient and productive.

Maximize Productivity
Give your front line staff the best experience with this high quality twelve line color business media phone. The VVX 400 improves personal productivity by complementing the workplace applications on the computer. Users can view and manage their Microsoft Exchange Calendars, receive meeting reminders and alerts, access the corporate directory and Instant Messaging/presence[2] status right on their phone display, even while waiting for their PC to boot. They can also extend their PC's desktop to include the VVX 400 phone's screen for mouse/keyboard navigation and interaction.

Best-in-class Deployment and Administration
The VVX 400 phone is easy to deploy and simple to manage. Using an enterprise-grade, web-based, configuration method allows administrators to easily provision and maintain a large number of phones throughout the entire organization. Additionally the extensive administrative feature set ensures that IT departments have the latest technology to integrate the VVX 400 seamlessly into their environment while minimizing cabling cost with an integrated gigabit Ethernet (ADTRAN VVX 410) connection.

Customizable and Expandable
The VVX 400 phone provides personalized information at a glance, through built-in web applications and custom backgrounds. The VVX 400 phone also comes ready for future expansion modules as your users' need and business grows.

Market-leading Open Standards Interoperability
Designed for enhanced interoperability, the VVX 400 leverages and complements the other existing IT investments in your business. The ADTRAN VVX 400 mid-range business media phone can become the flexible and future-proof foundation for any organization's unified communications strategy.

Smart Solutions for a Connected World.

ADTRAN®

ADTRAN WX 400 and 410

Mid-Range Color Business Media Phones

Product Specifications

User Interface Features

- Backlit 3.5" color LCD (320 x 240)
- Voicemail support[2]
- WebKit-based Browser
- Adjustable base height
- Unicode UTF-8 character support. Multilingual user interface including Chinese, Danish, Dutch, English (Canada/ US/UK), French, German, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Slovenian, Spanish, and Swedish

Audio Features

- HD Voice technology delivers life-like voice quality for each audio path-handset, the hands-free speakerphone, and the optional headset[1]
- Acoustic Clarity™ technology providing full-duplex conversations, acoustic echo cancellation and background noise suppression
  - Type 1 compliant (IEEE 1329 full duplex)
- Frequency response—150 Hz – 7 kHz for handset, optional headset and hands-free speakerphone modes
- Codecs: G.711 (A-law and μ-law), G.729AB, G.722, G.722.1, G.722.1C
- Individual volume settings with visual feedback for each audio path
- Voice activity detection
- Comfort noise generation
- DTMF tone generation (RFC 2833 and in-band)
- Low-delay audio packet transmission
- Adaptive jitter buffers
- Packet loss concealment

Headset and Handset Compatibility

- Dedicated RJ-9 headset port
- Hearing aid compatibility to ITU-T P.370 and TIA 504A standards
- Compliant with ADA Section 508 Subpart B 1194.23 (all)
- Hearing aid compatible (HAC) handset for magnetic coupling to hearing aids
- Compatible with commercially-available TTY adapter equipment

Call Handling Features[2]

- 12 lines (programmable line keys)
- Shared call/bridged line appearance
- Busy Lamp Field (BLF)
- Flexible line appearance (one or more line keys can be assigned for each line extension)
- Distinctive incoming call treatment/call waiting
- Call timer and call waiting
- Call transfer, hold, divert (forward), pickup
- Called, calling, connected party information
- Local three-way audio conferencing
- One-touch speed dial, redial
- Remote missed call notification
- Do not disturb function
- Electronic hook switch capable
- Local configurable digit map/dial plan

Open Application Platform[2]

- WebKit enabled full browser that supports HTML5, CSS, SSL security, and JavaScript
- Supports Polycom Apps SDK and API for third-party business and personal applications
- Local Voice Call Recording on USB flash drive
- Bundled with Polycom UC software: corporate directory access using LDAP visual conference management

ADTRAN VVX 400 and 410

Mid-Range Color Business Media Phones

Network and Provisioning

- SIP Protocol Support
- SDP
- IETF SIP (RFC 3261 and companion RFCs)
- Two-port Ethernet switch
  - 10/100Base-TX across LAN and PC Ports
  - 1000Base-TX available on VVX 410
  - Physical Media Attachment Conforms to IEEE802.3-2002 (Clause 28) for Link Partner Auto-Negotiation
- Manual or dynamic host configuration protocol (DHCP) network setup
- Time and date synchronization using SNTP
- FTP/TFTP/HTTP/HTTPS server-based central provisioning for mass deployments[2]
- Provisioning and call server redundancy supported[2]
- QoS Support – IEEE 802.1p/Q tagging (VLAN), Layer 3 TOS, and DHCP
- VLAN-CDP, DHCP VLAN discovery, LLDP-MED for VLAN discovery
  - Network Address Translation (NAT)– support for static configuration and "Keep-Alive" SIP signaling
- RTCP and RTP support
- Event logging
- Syslog
- Hardware diagnostics
- Status and statistics reporting
- IPv4
- TCP
- UDP
- DNS-SRV

Security

- 802.1X Authentication and EAPOL
- Media encryption via SRTP
- Transport Layer Security (TLS)
- Encrypted configuration files
- Digest authentication
- Password login
- Support for URL syntax with password for boot server address
- HTTPS secure provisioning
- Support for signed software executables

Power

- Built-in auto sensing IEEE 802.3 at Power over Ethernet (Class 2)
- External Universal AC Adapter (optional, 48V 12W DC)

Approvals

- FCC Part 15 (CFR 47) Class B
- ICES-003 Class B
- EN55022 Class B
- CISPR22 Class B
- VCCI Class B
- EN55024
- EN61000-3-2; EN61000-3-3
- NZ Telepermit
- Korea KC
- UAE TRA
- Russia GOST-R
- Brazil ANATEL
- Australia A & C Tick
- RoHS compliant

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/presales

Where to Buy
888 423-8726
channel.sales@adtran.com
www.adtran.com/where2buy

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888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
888 874-2237
aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963-8000
256 963-6300 fax
international@adtran.com

ADTRAN VVX 400 and 410

Mid-Range Color Business Media Phones

Safety
- UL 60950-1
- CE Mark
- CAN/CSA C22.2 No 60950-1
- EN 60950-1
- IEC 60950-1
- AS/NZS 60950-1
- ICASA
- CITC

Operating Conditions
- **Temperature:** +32 to 104°F (0 to 40°C)
- **Relative Humidity:** 5% to 95%, noncondensing

Storage Temperature
- -40 to +160°F (-40 to +70°C)

ADTRAN VVX 400 and 410 Comes With:
- VVX 400 or VVX410 console
- Handset with handset cord
- Network (LAN) cable
- Quick Start Guide
- A ferrite clamp is included in the box

Size
- 7.5 x 6 x 7 in (19 x 15 x 18 cm) (W x H x D)

Weight
- Unit weight: 2.0 lbs (0.9 kg)

Unit Box Dimensions/Weight
- 12 x 8.25 x 4.25 in
- 3.1 lbs (1.4 kg)

Master Carton Quantity
- Ten

Country of Origin
- China

Warranty
- One year

Notes
1. To enjoy all the benefits of HD Voice when using the phone in the headset mode, you must use a wideband headset.
2. Most software-enabled features and capabilities must be supported by the IP PBX/Softswitch.

Ordering Information

Equipment	Part #
ADTRAN VVX 400	1200854G1
ADTRAN VVX 410	1200854G1#GB

TL9000
TL.19.1270

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

61200854G1-8A March

ADTRAN VVX 500

Performance Business Media Phone

Product Features

- Improves knowledge-worker productivity
- Reduces training time through superior calling features in a sleek design and simple-to-use phone
- Reduces telephony administration and maintenance costs
- Leverages previous IT infrastructure investments
- Is simple to deploy and easy to administer, upgrade, and maintain
- Delivers easy integration productivity applications

The ADTRAN® VVX 500 performance business media phone unifies superior voice capabilities and applications into a simple-to-use, yet high performance unified communications (UC) solution. It is the ideal, all-in-one knowledge worker productivity tool, built to integrate seamlessly into a wide range of UC environments.

Simplicity and Ease of Use

The ADTRAN VVX 500 phone is built for today's busy managers and knowledge workers who need a powerful, yet intuitive, expandable office phone that keeps up with their multi-tasking and schedule-juggling. Building on the behavior common to mobile phones, the intuitive, multi-touch, gesture-based user interface of the VVX 500 phone makes navigation easy and requires no learning curve.

Maximize Productivity

Designed for a broad range of environments from small and medium businesses to large enterprises, the VVX 500 performance business media phone improves productivity, by complimenting the workplace applications on the user's computer. Users benefit from such capabilities as viewing and managing their Exchange calendars and contacts on the phone and receive meeting reminders while still having access to their corporate directory—and all while waiting for their PCs to boot. Users can also extend their PC desktop to include the VVX 500 phone's screen, enabling simplified interactions and dialing using their PC's mouse and keyboard. Training and multipoint communication applications are complemented by the VVX 500 video playback capability for streaming content.

Best-in-Class Deployment and Administration

The VVX 500 phone is easy to deploy and simple to manage. Its enterprise-grade, Web-based, intuitive configuration method gives administrators the ability to easily provision and maintain a large number of phones throughout the entire enterprise. The built-in, broad interoperability capabilities allow IT departments to leverage previous IT infrastructure investments and achieve easy integration with third-party UC and productivity applications, expansion modules and accessories for applications such as video conferencing and even wireless networking.

Smart Solutions for a Connected World.

ADTRAN®

ADTRAN VVX 500

Performance Business Media Phone

Product Specifications

User Interface Features

- Gesture-based, multitouch-capable, capacitive touchscreen
- 3.5-in TFT LCD display at QVGA (320x240 pixel) resolution, 4:3 aspect ratio
- Screensaver and digital picture frame mode
- On-screen virtual keyboard
- Voicemail and videomail support1
- Dual USB ports (2.0 compliant) for media and storage applications
- WebKit-based Browser
- Adjustable base height
- Unicode UTF-8 character support. Multilingual user interface including Chinese, Danish, Dutch, English (Canada/US/UK), French, German, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Slovenian, Spanish, and Swedish

Audio Features

- Polycom HD Voice technology delivers life-like voice quality for each audio path-handset, the hands-free speakerphone, and the optional headset
- Acoustic Clarity™ technology providing full-duplex conversations, acoustic echo cancellation and background noise suppression
  - Type 1 compliant (IEEE 1329 full duplex)
- Frequency response: 100 Hz – 20 kHz for handset, optional headset and hands-free speakerphone modes
- Codecs: G.711 (A-law and μ-law), G.729AB, G.722, G.722.1, G.722.1C
- Individual volume settings with visual feedback for each audio path
- Voice activity detection
- Comfort noise generation
- DTMF tone generation (RFC 2833 and in-band)
- Low-delay audio packet transmission
- Adaptive jitter buffers
- Packet loss concealment

Headset and Handset Compatibility

- Dedicated RJ-9 headset port
- Hearing aid compatibility ITU-T P.370 and TIA 504A standards
- Compliant with ADA Section 508 Subpart B 1194.23 (all)
- Hearing aid compatible (HAC) handset for magnetic coupling to hearing aids
- Compatible with commercially-available TTY

Adapter equipment

- Support USB Headsets (see TB37477 for list of compatible headsets)

Call Handling Features[1]

- 12 lines (registrations)
- Up to 24 simultaneous calls
- Shared call/bridged line appearance
- Flexible line appearance (one or more line keys can be assigned for each line extension)
- Distinctive incoming call treatment/call waiting
- Call timer and call waiting
- Call transfer, hold, divert (forward), pickup
- Called, calling, connected party information
- Local three-way audio conferencing
- One-touch speed dial, redial
- Remote missed call notification
- Do not disturb function
- Electronic hook switch capable
- Local configurable digit map/dial plan

Open Application Platform

- WebKit enabled full browser that supports HTML5, CSS, SSL security, and JavaScript
- Supports Polycom Apps SDK and API for thirdparty business and personal applications
- Bundled with Polycom Productivity Suite:
  - Corporate Directory Access using LDAP
  - Local Voice Call Recording on USB flash drive
  - Visual Conference Management

ADTRAN VVX 500

Performance Business Media Phone

Network and Provisioning

- SIP Protocol Support
- SDP
- IETF SIP (RFC 3261 and companion RFCs)
- Two-port Gigabit Ethernet switch
  - 10/100/1000Base-TX across LAN and PC ports
  - Conforms to IEEE802.3-2005 (Clause 40) for Physical Media Attachment
  - Conforms to IEEE802.3-2002 (Clause 28) for Link Partner Auto-Negotiation
- Manual or dynamic host configuration protocol
- (DHCP) network setup
- Time and date synchronization using SNTP
- FTP/TFTP/HTTP/HTTPS4 server-based central provisioning for mass deployments
- Provisioning and call server redundancy supported1
- QoS Support: IEEE 802.1p/Q tagging (VLAN), Layer 3 TOS, and DSCP
- VLAN: CDP, DHCP VLAN discovery, LLDPMED for VLAN discovery
- Network Address Translation (NAT) – support for static configuration and "Keep-Alive" SIP signaling
- RTCP and RTP support
- Event logging
- Syslog
- Local configurable digit map/dial plan
- Hardware diagnostics
- Status and statistics reporting
- IPv4
- TCP
- UDP
- DNS-SRV

Security

- 802.1X Authentication and EAPOL
- Media encryption via SRTP
- Transport Layer Security (TLS)3
- Encrypted configuration files3
- Digest authentication
- Password login
- Support for URL syntax with password for boot server address3
- HTTPS secure provisioning3
- Support for signed software executables3

Power

- Built-in auto sensing IEEE 802.3 at Power over Ethernet (Class 4)
- Energy-saving smart motion detector enables the screen to go into power-save mode when no one is in the office.
- External Universal AC Adaptor (optional, 48V 380mA DC)

Approvals

- FCC Part 15 (CFR 47) Class B
- ICES-003 Class B
- EN55022 Class B
- CISPR22 Class B
- VCCI Class B
- EN55024
- EN61000-3-2; EN61000-3-3
- NZ Telepermit
- Korea KC
- China CCC
- ROHS compliant
- UAE TRA
- Russia GOST-R
- Brazil ANATEL
- Australia A & C Tick

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/support

Where to Buy
888 423-8726
channel.sales@adtran.com
www.adtran.com/where2buy

Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
888 874-2237
aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963-8000 voice
256 963-6300 fax
international@adtran.com

ADTRAN VVX 500

Performance Business Media Phone

Safety
- UL 60950-1
- CE Mark
- CAN/CSA-C22.2 No. 60950-1-03
- EN 60950-1
- IEC 60950-1
- AS/NZS 60950-1

Operating Conditions
- **Temperature:** (+32 to 104°F (0 to 40°C)
- **Relative Humidity:** 5% to 95%, noncondensing

Storage Temperature
- -40 to +160°F (-40 to +70°C)

ADTRAN VVX 500 Comes With:
- VVX 500 console
- Handset with handset cord
- Network (LAN) cable
- Quick Start Guide
- Product registration card

Size
- 7.5 x 6 x 7 in (19 x 15 x 18 cm) (W x H x D)

Weight
- **Unit Weight:** 2.0 lbs (0.9 kg)

Unit Box Dimensions/Weight
- 12 x 9 x5 in
- 3.1 lbs (1.4 kg)

Master Carton Quantity
- Five

Country of Origin
- China

Warranty
- One year

1. Most software-enabled features and capabilities must be supported by the server. Please contact your IP PBX/Softswitch vendor or service provider for a list of supported features.
2. To enjoy all the benefits of HD Voice when using the phone in the headset mode, you must use a wideband headset.
3. Requires UCS SW version 4.0.1 or higher.

Ordering Information

Equipment	Part #
ADTRAN VVX 500	1202855G1

TL9000
TL19.1270

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

61202855G1-8A August

ADTRAN VVX 600

Executive Business Media Phone

Product Features

- Improves Executive and Executive Administrators productivity through larger, color multi-touch display and more line appearances
- HD Voice—Unparalleled voice clarity to make your calls more efficient and productive
- Video conference ready—optional VVX Camera turns your VVX Business Media Phone into a desktop video conferencing solution
- Improve work space mobility through Bluetooth headset integration
- Reduces deployment and maintenance costs—Zero Touch Provisioning Web-based configuration tool makes the VVX 600 simple to deploy, easy to administer, upgrade, and maintain.
- Leverages previous IT infrastructure investments—deploy VVX 600 business media phones on your existing network without needing to upgrade your call control platform
- Broad, standards-based, open APIs make integration easy with third-party UC and productivity applications

The ADTRAN® VVX 600 is an advanced, expandable executive business media phone designed to enhance collaboration and personal productivity.

Simplicity and Ease of Use

The ADTRAN VVX 600 phone is built for executives who need a powerful, yet intuitive, expandable office phone that helps them stay connected to the organizations they lead. Building on the behavior common to smartphones and tablets, the intuitive gesture-based, multi-touch user interface of the VVX 600 phone makes navigation easy and requires minimal training. Combining its ergonomic design with HD Voice quality and a large, high resolution color, multi-touch screen, the VVX 600 is ideal for busy executives.

Maximize Productivity

Give your executives the best UC experience and the industry's highest quality Executive Business Media phone. Designed for a broad range of environments from small and medium businesses to large enterprises, the VVX 600 improves personal productivity by complimenting the workplace applications on the user's computer. Users can view and manage their Microsoft Exchange Calendars, receive meeting reminders and alerts, access the corporate directory and Instant Messaging/presence status right on their phone's display, even while waiting for their PC to boot. Users can also extend their PC's desktop to include the VVX 600 phone's screen for mouse/keyboard navigation and interaction.

Best-in-Class Deployment and Administration

The VVX 600 phone is easy to deploy and simple to manage via the Web- based, intuitive configuration tool. Its enterprise-grade Zero Touch Provisioning, Server-based configuration on large scale deployments as well as our redirection services, gives administrators the ability to easily provision and maintain a large number of phones throughout the entire enterprise.

Highly Customizable and Expandable

The VVX 600 phone provides personalized information at a glance, through built-in Web applications and even a Digital Photo Frame. VVX 600 users can also access streaming content using the included video playback feature.

The VVX 600 phone even comes ready for future expansion modules and applications such as video conferencing with the VVX Camera. The optional VVX Camera installs in seconds and enables the VVX600 to connect into video conferences directly from the user's desk, without requiring a costly, dedicated video conference room.

Smart Solutions for a Connected World.

ADTRAN®

ADTRAN VVX 600

Executive Business Media Phone

Product Specifications

User Interface Features

- Gesture based, multi-touch capable capacitive touchscreen
- 4.3in LCD (480x272 pixel) resolution
- 16:9 aspect ratio
- Screen saver and digital picture frame mode
- On-screen virtual keyboard
- Voicemail and videomail support[2]
- Dual USB ports (2.0 compliant) for media and storage applications
- WebKit-based Browser
- Adjustable base height
- Unicode UTF-8 character support. Multilingual user interface including Chinese, Danish, Dutch, English (Canada/US/UK), French, German, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Slovenian, Spanish, and Swedish

Audio Features

- HD Voice technology delivers life-like voice quality for each audio path-handset, the hands-free speakerphone, and the optional headset[1]
- Acoustic Clarity technology providing full-duplex conversations, acoustic echo cancellation and background noise suppression
  - Type 1 compliant (IEEE 1329 full duplex)
- Frequency response—100 Hz to 20 kHz for handset, optional headset and hands-free speakerphone modes
- Codecs: G.711 (A-law and μ-law), G.729AB, G.722, G.722.1, G.722.1C, iLBC
- Individual volume settings with visual feedback for each audio path
- Voice activity detection
- Comfort noise generation
- DTMF tone generation (RFC 2833 and in-band)
- Low-delay audio packet transmission
- Adaptive jitter buffers
- Packet loss concealment

Headset and Handset Compatibility

- Bluetooth v2.1+EDR pairing (HFP/HSP)
- Dedicated RJ-9 headset port
- Hearing aid compatibility to ITU-T P.370 and TIA 504A standards
- Compliant with ADA Section 508 Subpart B 1194.23 (all)
- Hearing aid compatible (HAC) handset for magnetic coupling to hearing aids
- Compatible with commercially-available TTY adapter equipment
- USB headsets are supported.

Call Handling Features[2]

- 16 lines (registrations)
- Shared call/bridged line appearance
- Busy Lamp Field (BLF)
- Flexible line appearance (one or more line keys can be assigned for each line extension)
- Distinctive incoming call treatment/call waiting
- Call timer and call waiting
- Call transfer, hold, divert (forward), pickup
- Called, calling, connected party information
- Local three-way audio conferencing
- One-touch speed dial, redial
- Remote missed call notification
- Do not disturb function
- Electronic hook switch capable
- Local configurable digit map/dial plan

Open Application Platform

- WebKit enabled full browser that supports HTML5, CSS, SSL security, and JavaScript
- Supports Polycom Apps SDK and API for third- party business and personal applications
- Bundled with Polycom UC Software:
  - Corporate Directory Access using LDAP
  - Local Voice Call Recording on USB flash drive
  - Visual Conference Management

ADTRAN VVX 600

Executive Business Media Phone

Network and Provisioning

- SIP Protocol Support
- SDP
- IETF SIP (RFC 3261 and companion RFCs)
- Two-port Gigabit Ethernet switch
  - 10/100/1000Base-TX across LAN and PC ports
  - Conforms to IEEE802.3-2005 (Clause 40) for Physical Media Attachment
  - Conforms to IEEE802.3-2002 (Clause 28) for Link Partner Auto-Negotiation
- Manual or dynamic host configuration protocol (DHCP) network setup
- Time and date synchronization using SNTP
- FTP/TFTP/HTTP/HTTPS server-based central provisioning for mass deployments

Support for Zero Touch Provisioning (ZTP)

- Provisioning and call server redundancy supported2
- QoS Support—IEEE 802.1p/Q tagging (VLAN), Layer 3 TOS, and DHCP
- VLAN—CDP, DHCP VLAN discovery, LLDP-MED for VLAN discovery
- Network Address Translation (NAT)—support for static configuration and "Keep-Alive" SIP signaling
- RTCP and RTP support
- Event logging
- Syslog
- Hardware diagnostics
- Status and statistics reporting
- IPv4
- TCP
- UDP
- DNS-SRV

Security

- 802.1X Authentication and EAPOL

Media encryption via SRTP

- Transport Layer Security (TLS)[3]
- Encrypted configuration files[3]
- Digest authentication
- Password login
- Support for URL syntax with password for boot server address[3]
- HTTPS secure provisioning[3]
- Support for signed software executables[3]

Power

- Built-in auto sensing IEEE 802.3at Power over Ethernet (Class 4). Backwards compatibility with IEEE 802.3af.
- Energy-saving smart motion detector enables the screen to go into power-save mode when no one is in the office.
- External Universal AC Adaptor (optional, 48V 380mA DC)

Approvals[3]

- FCC Part 15 (CFR 47) Class B
- ICES-003 Class B
- EN55022 Class B
- CISPR22 Class B
- VCCI Class B
- EN55024
- EN61000-3-2; EN61000-3-3
- NZ Telepermit
- Korea KC
- UAE TRA
- Russia GOST-R
- Brazil ANATEL
- Australia A & C Tick
- ROHS compliant

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/support

Where to Buy
888 423-8726
channel.sales@adtran.com
www.adtran.com/where2buy

Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
888 874-2237
aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963-8000 voice
256 963-6300 fax
international@adtran.com

ADTRAN VVX 600

Executive Business Media Phone

Safety[3]
- UL 60950-1
- CE Mark
- CAN/CSA-C22.2 No. 60950-1-03
- EN 60950-1
- IEC 60950-1
- AS/NZS 60950-1

Operating Conditions
- **Temperature:** +32 to 104°F (0 to 40°C)
- **Relative Humidity:** 5% to 95%, noncondensing

Storage Temperature
- -40 to +160°F (-40 to +70°C)

ADTRAN VVX 600 Comes With:
- VVX 600 console
- Handset with handset cord
- Network (LAN) cable
- Quick Start Guide
- Product registration card

Size
- 7.5 W x 6 H x 7 D in (19 W x 15 H x 18 cm D)

Weight
- **Unit weight:** 2.0 lbs (0.9 kg)

Unit Box Dimensions/Weight
- 12 x 9 x5 in
- 3.1 lbs (1.4 kg)

Master Carton Quantity
- Five

Country of Origin
- China

Warranty
- One year

1. To enjoy all the benefits of HD Voice when using the phone in the headset mode, you must use a wideband headset.
2. Most software-enabled features and capabilities must be supported by the server. Please contact your IP PBX/Softswitch vendor or service provider for a list of supported features.
3. Planned future compliance.

Ordering Information

Equipment	Part #
ADTRAN VVX 600	1200856G1

TL19.1270

ADTRAN is an ISO 9001, ISD 14001, and a TL 9000 certified supplier.

61200856G1-8A October

Polycom™

DATA SHEET

HDvoice

Polycom® SoundStation® IP 5000 IP Conference Phone

Advanced IP conference phone with Polycom HD Voice™ clarity, designed for small conference rooms and executive offices

The Polycom® SoundStation® IP 5000 conference phone delivers remarkably clear conference calls for small conference rooms and executive offices. It features Polycom HD Voice™ technology, broad SIP interoperability, and a modern design that is ideal for smaller rooms—all at an affordable price.

With Polycom HD Voice technology, the SoundStation IP 5000 conference phone boosts productivity and reduces listener fatigue by turning ordinary conference calls into crystal-clear, interactive conversations. It captures both the deeper lows and higher frequencies of the human voice for conference calls that sound as natural as being there.

For all calls, the SoundStation IP 5000 conference phone delivers advanced audio performance that is designed for executive offices and smaller conference rooms with up to 6 participants. From full-duplex technology that eliminates distracting drop-outs to the latest echo cancellation advancements, only Polycom can deliver a conference phone experience with no compromises. Conference calls are made more productive and efficient by three sensitive microphones with 360° coverage that allow users to speak in a normal voice and be heard clearly from up to 7 feet away. The phone also features technology that resists interference from mobile phones and other wireless devices, delivering clear communications without distractions.

The SoundStation IP 5000 leverages Polycom's strong history in both conference phone and VoIP technology to deliver the most robust standards-based SIP interoperability in the industry. It shares the same SIP phone software base with Polycom's award-winning SoundPoint IP products—the most comprehensive, reliable and feature-rich SIP products in the industry with proven interoperability with a broad array of IP PBX and hosted platforms.

Robust provisioning, management, and security features make Polycom's family of IP conference phones the only choice for meeting rooms in SIP-based environments. Integrated Power over Ethernet (PoE) simplifies setup, with an optional AC power kit available for non-PoE environments. Plus, the SoundStation IP 5000 conference phone includes a high-resolution backlit display for vital call information and multi-language support.

Benefits

- **Unparalleled clarity** – Polycom HD Voice makes your conference calls sound amazingly clear and life-like
- **More productive conference calls** – Patented Polycom Acoustic Clarity™ technology delivers the best conference phone experience with no compromises
- **Ideal for smaller rooms** – 7-foot microphone pickup and a small footprint designed for executive offices and smaller conference rooms with up to 6 participants
- **Advanced IP feature support** – the most feature-rich family of IP conference phones available, with advanced call handling, security, and provisioning features
- **Robust interoperability** – compatible with a broad array of SIP call platforms to maximize voice quality and feature availability while simplifying management and administration

Product specifications

Power

- IEEE 802.3af Power over Ethernet (built in)
- Optional external universal AC power supply kit: 100-240V, 0.4A, 48V/19W

Display

- Size (pixels): 248 x 68 (W x H)
- White LED backlight with custom intensity control

Keypad

- Standard 12-key keypad
- Context-dependent soft keys: 4
- On-hook/Off-hook, redial, mute, volume up/down
- 5-way navigation
- Menu

Audio features

- Loudspeaker
  - Frequency: 250 – 7,000 HZ
  - Volume: Adjustable to peak volume 84 dB at 1/2 meter distance
- Voice activity detection
- Comfort noise fill
- DTMF tone generation / DTMF event RTP payload
- Low-delay audio packet transmission
- Adaptive jitter buffers
- Packet loss concealment
- Acoustic echo cancellation
- Background noise suppression
- Supported Codecs
  - G.711 (A-law and μ-law)
  - G.729a (Annex A, B)
  - G.722
  - iLBC

Call handling features

- Shared call / bridged line appearance
- Busy Lamp Field (BLF)
- Distinctive incoming call treatment / call waiting
- Call timer
- Call transfer, hold, divert (forward), pickup
- Called, calling, connected party information
- Advanced Local three-way conferencing (conference, join, split, hold, resume)
- One-touch speed dial, redial
- Call waiting
- Remote missed call notification
- Automatic off-hook call placement
- Do not disturb function

Other features

- Local feature-rich GUI
- Time and date display
- Corporate Directory Access (search, dial, save to local directory)
- Convenient volume adjustment keys
- User-configurable contact directory and call history (missed, placed, and received)
- Customizable call progress tones
- Wav file support for call progress tones
- Unicode UTF-8 character support. Multilingual user interface encompassing Simplified Chinese, Danish, Dutch, English (Canada / US / UK), French, German, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Slovenian, Spanish, Swedish

Network and provisioning

- Ethernet 10/100 Base-T
- IP Address Configuration: DHCP and Static IP
- Time synchronization with SNTP server
- FTP / TFTP / HTTP / HTTPS server-based central provisioning for mass deployments. Provisioning server redundancy supported.
- Web portal for individual unit configuration
- QoS Support – IEEE 802.1p/Q tagging (VLAN), Layer 3 TOS and DSCP
- Network Address Translation (NAT) support – static
- RTCP support (RFC 1889)
- Event logging
- Local dial plan
- Hardware diagnostics
- Status and statistics
- User selectable ringer tones
- Field upgradeable

Security

- Transport Layer Security (TLS)
- Encrypted configuration files
- Digest authentication
- Password login
- Support for URL syntax with password for boot server
- HTTPS secure provisioning
- Support for signed software executables

Safety

- CE Mark
- EN60950-1
- IEC60950-1
- UL60950-1
- CAN/CSA C22.2 No.60950-1-03
- AS/NZS60950-1
- RoHS Compliant

EMC

- FCC Part 15 (CFR 47) Class B
- ICES-003 Class B
- EN55022 Class B
- CISPR22 Class B
- AS/NZS CISPR22 Class B
- VCCI Class B
- EN22024

Protocol support

- IETF SIP (RFC 3261 and companion RFCs)

Product ships with

- Conference Phone Console
- 25 foot Ethernet cable
- Quick Start Guide

Optional AC power kit ships with

- Universal Power Supply
- 7 foot region-specific power cord
- Power Insertion Cable

Environmental conditions

- Operating temperature: 41 – 104 degrees F (5 – 40 degrees C)
- Relative humidity: 20% – 85% (noncondensing)
- Storage temperature: -22 – 131 degrees F (-30 – 55 degrees C)

Warranty

- 1 year

Country of Origin

- China

Phone dimensions

- 11.4 x 10.6 x 2.6 in (28.5 x 26.5x 6.5 cm) (L x W x H)

Phone console weight

- 1.14 lb (0.52 kg)

Box dimensions

- 14.88 x 11.76 x 3.8 in (37.2 x 29.4 x 9.5 cm) (L x W x H)

Box weight

- 2.99 lb (1.36 kg)

About Polycom

Polycom is the global leader in standards-based unified communications (UC) solutions for telepresence, video, and voice powered by the Polycom® RealPresence® Platform. The RealPresence Platform interoperates with the broadest range of business, mobile, and social applications and devices. More than 400,000 organizations trust Polycom solutions to collaborate and meet face-to-face from any location for more productive and effective engagement with colleagues, partners, customers, specialists, and prospects. Polycom, together with its broad partner ecosystem, provides customers with the best TCO, scalability, and security for video collaboration, whether on-premises, hosted, or cloud-delivered. Visit *www.polycom.com* or connect with Polycom on Twitter, Facebook, and LinkedIn.

Polycom, Inc.
1.800.POLYCOM
www.polycom.com

Polycom Asia Pacific Pte Ltd
+65 6389 9200
www.polycom.asia

Polycom EMEA
+44 (0)1753 723282
www.polycom.co.uk

Polycom

Polycom™

DATA SHEET

Polycom® SoundStation® IP 6000

SIP-based IP conference phone

Next-generation IP conference phone designed for small to midsize rooms

The SoundStation IP 6000 is an advanced IP conference phone that delivers superior performance for small to midsize conference rooms. With advanced features, broad SIP interoperability and remarkable voice quality, the SoundStation IP 6000 offers a price/performance breakthrough for SIP-enabled IP environments.

The SoundStation IP 6000 features Polycom® HD Voice™ technology, boosting productivity and reducing listener fatigue by turning ordinary conference calls into crystal-clear interactive conversations. It delivers high-fidelity audio from 220 Hz to 14 kHz, capturing both the deeper lows and higher frequencies of the human voice for conference calls that sound as natural as being there.

For all conference calls, the SoundStation IP 6000 delivers advanced audio performance that far exceeds previous generations of conference phones. From full-duplex technology that eliminates distracting drop-outs to the latest echo cancellation advancements, only Polycom can deliver a conference phone experience with no compromises. Plus, Automatic Gain Control intelligently adjusts the microphone sensitivity based on where participants are seated in the conference room, making the conversations clearer for all participants. It also features technology that resists interference from mobile phones and other wireless devices, delivering clear communications without distractions.

The SoundStation IP 6000 leverages Polycom's strong history in both conference phone and VoIP technology to deliver the most robust standards-based SIP interoperability in the industry. It shares the same SIP phone software base with Polycom's award-winning SoundPoint® IP products—the most comprehensive, reliable and feature-rich SIP products in the industry, with proven interoperability with a broad array of IP PBX and hosted platforms.

Robust provisioning, management and security features make Polycom's family of IP conference phones the only choice for meeting rooms in SIP-based environments. Integrated Power over Ethernet (PoE) simplifies setup, with an AC power kit available for non-PoE environments. Plus, the SoundStation IP 6000 includes a high-resolution backlit display for vital call information and multi-language support.

Benefits

- **Polycom HD Voice** – unparalleled clarity to make your conference calls more efficient and productive
- **Polycom's patented Acoustic Clarity Technology** – Deliver the best conference phone experience with no compromises
- **12-foot microphone pickup** – combined with Automatic Gain Control for performance far beyond older SoundStation IP conference phones. Add up to two optional expansion microphones for even greater coverage.
- **Industry-leading SIP software** – leveraging the most advanced SIP endpoint software in the industry, with advanced call handing, security, and provisioning features
- **Robust interoperability** – compatible with a broad array of SIP call platforms to maximize voice quality and feature availability while simplifying management and administration
- **High-resolution display** – enables robust call information and multi-language support

Product Specifications

Power

- IEEE 802.3af Power over Ethernet (built in)
- Optional external universal AC power supply: 100-240V, 0.4A, 48V/19W

Display

- Size (pixels): 248 x 68 (W x H)
- White LED backlight with custom intensity control

Keypad

- Standard 12-key keypad
- Context-dependent soft keys: 3
- On-hook/Off-hook, redial, mute, volume up/down

Audio features

- Loudspeaker
- Frequency: 220-14,000 Hz
- Volume: Adjustable to 86 dB at 1/2 meter peak volume
- Individual volume settings with visual feedback for each audio path
- Voice activity detection
- Comfort noise fill
- DTMF tone generation / DTMF event RTP payload
- Low-delay audio packet transmission
- Adaptive jitter buffers
- Packet loss concealment
- Acoustic echo cancellation
- Background noise suppression
- Supported Codecs
- G.711 (A-law and Mu-law)
- G.729a (Annex B)
- G.722, G.722.1
- G.722.1C
- Siren 14

Call handling features

- Shared call / bridged line appearance
- Busy Lamp Field (BLF)
- Distinctive incoming call treatment/ call waiting
- Call timer
- Call transfer, hold, divert (forward), pickup
- Called, calling, connected party information
- Local three-way conferencing
- One-touch speed dial, redial
- Call waiting
- Remote missed call notification
- Automatic off-hook call placement
- Do not disturb function

Other features

- Local feature-rich GUI
- Time and date display
- User-configurable contact directory and call history (missed, placed, and received)
- Customizable call progress tones
- Wave file support for call progress tones
- Unicode UTF-8 character support. Multilingual user interface encompassing Simplified Chinese, Danish, Dutch, English (Canada / US / UK), French, German, Italian, Japanese, Korean, Norwegian, Polish, Portuguese, Russian, Slovenian, Spanish, Swedish

Network and provisioning

- Ethernet 10/100 Base-T
- 2.5mm connection port
- EX mic ports: Two RJ-9 ports
- IP Address Configuration: DHCP and Static IP
- Time synchronization with SNTP server
- FTP / TFTP / HTTP / HTTPS server-based central provisioning for mass deployments. Provisioning server redundancy supported.
- Web portal for individual unit configuration
- QoS Support – IEEE 802.1p/Q tagging (VLAN), Layer 3 TOS and DSCP
- Network Address Translation (NAT) support – static
- RTCP support (RFC 1889)
- Event logging
- Local digit map
- Hardware diagnostics
- Status and statistics
- User selectable ringer tones
- Convenient volume adjustment keys
- Field upgradeable

Security

- Transport Layer Security (TLS)
- Encrypted configuration files
- Digest authentication
- Password login
- Support for URL syntax with password for boot server
- HTTPS secure provisioning
- Support for signed software executables

Safety

- CE Mark
- EN60950-1
- IEC60950-1
- UL60950-1
- CAN/CSA C22.2 No.60950-1-03
- AS/NZS60950-1
- RoHS Compliant

EMC

- FCC Part 15 (CFR 47) Class B
- ICES-003 Class B
- EN55022 Class B
- CISPR22 Class B
- AS/NZS CISPR22 Class B
- VCCI Class B
- EN22024

Telecom

- AS/ACIF S004
- Telepermit
- KCC
- GOST-R
- TRA

Protocol support

- IETF SIP (RFC 3261 and companion RFCs

IEEE 802.3af Power over Ethernet version ships with

- Telephone Console
- 25 foot Ethernet cable
- Quick Start Guide
- Quick User Guide

AC Power version ships with

- Telephone Console
- 25 foot Ethernet cable
- Universal Power Supply
- 7 foot region-specific power cord
- Power Insertion Cable
- Quick Start Guide
- Quick User Guide

Environmental conditions

- Operating temperature: 32 - 104 degrees F (0 - 40 degrees C)
- Relative humidity: 20%-85% (noncondensing)
- Storage temperature: -22 - 131 degrees F (-30 - 55 degrees C)

Warranty

- 1 year
- Country of Origin
- Thailand

Phone dimensions

- 14.5 x 12.25 x 2.5 in (36.8 x 31.1 x 6.4 cm) (L x W x H)

Phone console weight

- 1.75 lb (0.8 kg)

Box dimensions

- 13.0 x 15.5 x 6.0 in (33 x 39.5 x 15 cm) (L x W x H)

Box weight

- 5.1 lb (2.32 kg)

About Polycom

Polycom is the global leader in standards-based unified communications (UC) solutions for telepresence, video, and voice powered by the Polycom® RealPresence® Platform. The RealPresence Platform interoperates with the broadest range of business, mobile, and social applications and devices. More than 400,000 organizations trust Polycom solutions to collaborate and meet face-to-face from any location for more productive and effective engagement with colleagues, partners, customers, specialists, and prospects. Polycom, together with its broad partner ecosystem, provides customers with the best TCO, scalability, and security for video collaboration, whether on-premises, hosted, or cloud-delivered. Visit *www.polycom.com* or connect with Polycom on Twitter, Facebook, and LinkedIn.

Polycom, Inc.
1.800.POLYCOM
www.polycom.com

Polycom™

DATA SHEET

Polycom® SoundStation® IP 7000 SIP-Based IP Conference Phone

Astounding voice quality and clarity from the world's most advanced IP conference phone

The Polycom® SoundStation® IP 7000 is a breakthrough conference phone that delivers outstanding performance and a robust feature set for SIP-based VoIP platforms. It is the most advanced conference phone ever developed, and is ideal for executive offices, conference rooms, and boardrooms.

The SoundStation IP 7000 features Polycom® HD Voice™ technology, boosting productivity and reducing listener fatigue by turning ordinary conference calls into crystal-clear interactive conversations. It delivers high-fidelity audio from 160 Hz to 22 kHz, capturing both the deeper lows and higher frequencies of the human voice for conference calls that sound as natural as being there.

For all conference calls, the SoundStation IP 7000 delivers advanced audio performance that far exceeds previous generations of conference phones. From full-duplex technology that eliminates distracting drop-outs to the latest echo cancellation advancements, only Polycom can deliver a conference phone experience with no compromises.

The SoundStation IP 7000 is the most flexible and expandable conference phone ever developed. Connect two units together for increased loudness and microphone pickup, as well as multiple call control interfaces in the conference room. Connect up to two optional expansion microphones to a single phone to ensure close proximity for everyone in the room. In addition, you can connect the SoundStation IP 7000 to Polycom® HDX® rooom telepresence system for a complete, integrated voice and video conferencing solution.

In the SoundStation IP 7000, Polycom has combined its rich history in voice conferencing and VoIP technology to develop a groundbreaking new conference phone that is the clear choice for SIP-enabled environments. It shares the same SIP phone software with Polycom's award-winning Polycom® SoundPoint® IP desktop phones—the most comprehensive, reliable and feature-rich SIP products in the industry, with proven interoperability with a broad array of IP PBX and hosted platforms.

Plus, the SoundStation IP 7000 features a large multi-line high-resolution LCD display with a full XHTML microbrowser, turning your conference phone into a robust applications platform for your conference room. Bundled applications include advanced three-party conference features and LDAP corporate directory integration.

Benefits

- **Polycom® HD Voice™**—unparalleled clarity to make your conference calls more efficient and productive
- **Polycom® Acoustic Clarity™ technology**—delivers the best conference phone experience with no compromises
- **Flexible configuration options**—multi-unit connectivity, expansion microphones and integration with Polycom HDX room telepresence solutions to meet the needs of many different types of rooms
- **Strong, robust SIP software**—leverages the most advanced SIP endpoint software in the industry, with advanced call handing, security, and provisioning features
- **Robust interoperability**—compatible with a broad array of SIP call platforms to maximize voice quality and feature availability while simplifying management and administration
- **Large high-resolution display with XHTML microbrowser**—enables new applications that make conference calling easier and more functional

Additional Polycom SoundStation IP 7000 features/benefits

- Equipped with built-in Power over Ethernet (PoE). An optional A/C power kit also available.
- 20 ft (6.1 m) microphone pickup, and even more with optional expansion microphones or multi-unit connectivity, reaching all corners of the room.
- Automatic Gain Control intelligently adjusts the microphone sensitivity based on where participants are seated in the conference room.
- Features technology that resists interference from mobile phones and other wireless devices, delivering clear communications without distractions.
- Built-in 2.5 mm applications port allows you to connect the conference phone to a mobile phone for productive calls even where no network connection is available, or to a computer for calls using PC-based soft phone clients.

Product specifications

Power

- IEEE 802.3af Power over Ethernet (built in)
- Optional external universal AC power supply: 100-240V, 1.3A, 48V/50W

Display

- Size (W x H): 255 x 128 pixels
- White LED backlight with custom intensity control

Keypad

- Standard 12-key keypad
- Context-dependent soft keys: 4
- On-hook/Off-hook, redial, mute, volume up/down
- Directional navigation wheel

Audio features

- Loudspeaker
  - Frequency: 160–22,000 Hz
  - Volume: Adjustable to 88 dB at 1/2 meter peak volume
- Full-duplex: Type 1 compliant with IEEE 1329 full duplex standards
- Individual volume settings with visual feedback for each audio path
- Voice activity detection
- Comfort noise fill
- DTMF tone generation/DTMF event RTP payload
- Low-delay audio packet transmission
- Adaptive jitter buffers
- Packet loss concealment
- Acoustic echo cancellation
- Background noise suppression
- Supported codecs
  - G.711 (A-law and Mu-law)
  - G.729a (Annex B)
  - G.722, G.722.1
  - G.722.1C
  - Polycom® Siren™ 14
  - Polycom® Siren™ 22

Call handling features

- Shared call/bridged line appearance
- Busy Lamp Field (BLF)
- Distinctive incoming call treatment/ call waiting
- Call timer
- Call transfer, hold, divert (forward), pickup
- Called, calling, connected party information
- Local three-way conferencing
- One-touch speed dial, redial
- Call waiting
- Remote missed call notification
- Automatic off-hook call placement
- Do not disturb function

Other features

- Local feature-rich GUI
- Time and date display
- User-configurable contact directory and call history (missed, placed, and received)
- Customizable call progress tones
- Wave file support for call progress tones
- Unicode UTF-8 character support. Multilingual user interface encompassing Chinese, Danish, Dutch, English (Canada/US/UK), French, German, Italian, Japanese, Korean, Norwegian, Portuguese, Russian, Spanish, Swedish

Network and provisioning

- Ethernet 10/100 Base-T
- 2.5 mm connection port
- USB ports: Mini and regular USB 1.1
- EX mic ports: Two Walta ports
- IP Address Configuration: DHCP and Static IP
- Time synchronization with SNTP server
- FTP/TFTP/HTTP/HTTPS server-based central provisioning for mass deployments. provisioning server redundancy supported.
- Web portal for individual unit configuration
- QoS Support—IEEE 802.1p/Q tagging (VLAN), Layer 3 TOS and DSCP
- Network Address Translation (NAT) support—static
- RTCP support (RFC 1889)
- Event logging
- Local digit map
- Hardware diagnostics
- Status and statistics
- User selectable ringer tones
- Convenient volume adjustment keys
- Field upgradeable

Security

- Transport Layer Security (TLS)
- Encrypted configuration files
- Digest authentication
- Password login
- Support for URL syntax with password for boot server
- HTTPS secure provisioning
  - Support for signed software executables

Safety

- UL60950-1
- IEC60950-1
- EN60950-1
- CE Mark
- CSA C22.2, No. 60950-1-03
- AS/NZS60950-1

EMC

- FCC (47 CFR Part 15) Class A
- ICES-003 Class A
- EN55022 Class A

- CISPR22 Class A
- AS/NZS CISPR22 Class A
- VCCI Class A
- EN55024
- RoHS compliant

Protocol support

- IETF SIP (RFC 3261 and companion RFCs)
- IEEE 802.3af Power over Ethernet version

AC Power version ships with

- Telephone console
- 25 ft (7.6 m) Ethernet cable
- Universal power supply
- 7 ft (2.1 m) region-specific power cord
- Power insertion cable
- Quick Start Guide
- Quick User Guide

HDX room telepresence systems ready version ships with

- Telephone console
- 25 ft (7.6 m) Ethernet cable
- 15 ft (4.6) C-link cable for connection to HDX room telepresence systems
- Quick Start Guide
- Quick User Guide

Environmental conditions

- Operating temperature: 32–104° F (0–40° C)
- Relative humidity: 20–85% (non-condensing)
- Storage temperature: -22–131° F (-30–55° C)

Warranty

- 1 year

Country of origin

- Thailand

Phone dimensions (L x W x H)

- 15.5 x 14.6 x 2.9 in (39.4 x 37.2 x 7.3 cm)

Phone console weight

- 2.4 lb (1.08 kg)

Box dimensions (L x W x H)

- 19.1 x 17.0 x 5.1 in (48.4 x 43.3 x 13 cm)

Box weight

- 5.4 lb (2.43 kg)

About Polycom

Polycom is the global leader in open standards-based unified communications and collaboration (UC&C) solutions for voice and video collaboration, trusted by more than 415,000 customers around the world. Polycom solutions are powered by the Polycom® RealPresence® Platform, comprehensive software infrastructure and rich APIs that interoperate with the broadest set of communication, business, mobile and cloud applications and devices to deliver secure face-to-face video collaboration in any environment.

Polycom, Inc.
1.800.POLYCOM
www.polycom.com

Polycom Asia Pacific Pte Ltd
+65 6389 9200
www.polycom.asia

Polycom EMEA
+44 (0)1753 723282
www.polycom.co.uk

Polycom™

ADTRAN® IP SoftPhone

Version 1.1 for Windows

Benefits

- Supports multiple SIP accounts and six simultaneous call appearances
- Offers the mobility and flexibility to place or receive calls from any Internet connection
- Compatible with most VPN configurations
- Shortcut keys allow the use of a PC keyboard to dial numbers
- Import or export contact lists
- Maintains detailed call history with phone number, timestamp, and call duration
- Double-click any call history event or contact to initiate a call
- Quick access to contacts and call logs via slider drawer
- Message waiting indicator
- Flexibility to select any audio device installed on a PC (USB headset, PC speakers, etc.)
- Conference up to six simultaneous calls
- Easily transfer calls or place phone in 'Do Not Disturb' mode
- Mute and speakerphone buttons
- Audio-tuning wizard ensures easy setup
- Speaker and microphone volume controls for PC speakers and USB headsets

The ADTRAN IP SoftPhone is an intuitive software application designed to enable Voice over Internet Protocol (VoIP) communication from your laptop or desktop PC and works seamlessly with ADTRAN's IP telephony product lines.

The IP SoftPhone is easy to use and offers a built-in audio tuning wizard that helps simplify setup. Any audio devices available to the host PC such as USB headsets or PC speakers can be used with the SoftPhone. The "Speaker" button offers single-button selection to switch between headset or speaker phone devices.

The IP SoftPhone offers six call appearances with conferencing capability and other familiar features like transfer, hold, do-not-disturb, and a message waiting indicator. These features offer mobile employees many of the same convenient capabilities they enjoy when in the office.

The ADTRAN IP SoftPhone improves productivity by enabling users to have quick access to their address book and call logs to identify recently received calls, missed calls, and dialed calls. The ADTRAN IP SoftPhone can be configured using the same extension as the user's office phone or as a completely separate extension.

By using Virtual Private Networks (VPNs), remote and mobile workers can use the ADTRAN IP SoftPhone with any Internet connection and be confident that the voice and data traffic is secure and private. VPNs provide encryption and ensure the security of the data and voice traffic between the corporate network and a remote office Internet connection or wireless hotspot or hotel broadband connection.

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000 voice
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
800 615-1176 toll-free
application.engineer@adtran.com
www.adtran.com/support

Where to Buy
877 280-8416 toll-free
channel.sales@adtran.com
www.adtran.com/where2buy

Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

ACES Installation & Maintenance Service
888 874-ACES
aces@adtran.com
www.adtran.com/support

International Inquiries
256 963 8000 voice
256 963-6300 fax
international@adtran.com
www.adtran.com/international

For the regional office nearest you, visit:
www.adtran.com/regional

To download a searchable version of the ADTRAN Enterprise Networks Catalog, visit:
www.adtran.com/ecatalog

ADTRAN® IP SoftPhone

Version 1.1 for Windows

Product Specifications

Telephony Features

- Acoustic Echo Cancellation (AEC)
- Message Waiting Indicator
- Audio-tuning Wizard
- Touch-tones (RFC 2833, in-band, out of band and INFO DTMF)
- Automatic Gain Control
- Audio Concealment
- Adaptive Jitter Buffer
- Voice Activity Detection
- Microphone & Speaker Device Selector
- Advanced Codec Settings
- Call Forwarding URI/URL
- Voicemail URL
- Six-party conferencing (IP & PSTN)
- Speakerphone (Uses AEC)
- Auto-conference
- Dial/Redial/Hang up
- Flash
- Auto-answer
- Caller ID (SIP ID)
- Call Timer
- Silence Threshold
- Backspace/Clear/Delete
- Mute
- Microphone & Speaker Levels
- Sound Device Selection
- Direct IP to IP Calling
- Speed Dial
- Line Hold
- Line Transfer
- Do Not Disturb
- Inbound Call 'Ignore'
- Inbound Call 'Go to Voicemail'

Protocols/Codecs

- IETF SIP (RFC 3261)
- G.711 u-law
- G.729A

Contact List Features

- Detachable Sliding Drawer
- Add Received, Dialed or Missed Call as New Contact
- Add New Group
- Import or export contacts
- Ban Contact
- Delete Contact
- Edit Contact

Network Features

- SIP UDP Support
- SIP TCP Support
- Multiple SIP Accounts (10+)
- Multiple 6 Lines
- NAT Traversal using STUN and ICE
- Auto-Detect IP Address
- Manual IP Address
- Manual DNS Settings
- Received Calls
- Dialed Calls
- Missed Calls
- Last Caller-ID

System Requirements

- **Processor:** Intel® Pentium® or compatible with 500MHz or greater
- **Operating System:** Windows® 2000, XP, or Windows® 2003
- **RAM:** 128 MB
- **IP Network Connection:** Broadband, local, or wireless (dialup not recommended)
- **Sound Adapter:** Full-duplex, 16-bit
- **Other:** Speakers and microphone, or headset (headset is recommended for best sound quality)

Ordering Information

Equipment	Part #
ADTRAN IP SoftPhone 5-Pack	1950859L1

ADTRAN is an ISO 9001, ISO 14001, and a TL 9000 certified supplier.

61950859L1-8E December 2005

Feature Profile 85401

Accessibility Features on Polycom® Phones

Polycom designs and builds products for people who have many and varied abilities. In this feature profile, you'll learn about the accessibility features available on Polycom® SoundPoint® IP desktop phones, Polycom® SoundStation® and Polycom® VoiceStation® conference phones (Polycom Conference Phones), Polycom® VVX® business media phones, and Polycom® CX series phones and conference phones. The accessibility features make these phones easy to use, especially for individuals who are hearing-, vision-, or mobility-impaired.

Many accessibility features included in Polycom phones are standard, and require no additional configuration, such as:

- Visual alerts
- Customizable backlighting (models with LCD only)
- Hearing-aid compatibility
- Tactile "5" key with raised "bumps"

Other features, such as TTY (telephone typewriter) support, or the Polycom® Desktop Connector application for the VVX series phones—using a mouse and keyboard with your phone—require additional configuration.

This feature profile contains the following sections:

Note: Contact Polycom If You Have Questions

If you have questions about accessibility features on Polycom phones, phone Polycom at 1-408-586-3780 or email accessibility@polycom.com.

Accessibility Features on SoundPoint IP Phones

In this section, you'll learn about the accessibility features available on SoundPoint IP phones.

Note: SoundPoint Phones Excluded

This feature profile does not apply to SoundPoint analog desktop phones.

The topics in this section describe the following:

- Features for Hearing-Impaired Users on SoundPoint IP Phones
- Features for Vision-Impaired and Blind Users on SoundPoint IP Phones
- Features for Mobility-Impaired Users on SoundPoint IP Phones

Web Info: Where Do I Find More Information About Using Accessibility Features on SoundPoint IP Phones?

For information on how to use accessibility features on SoundPoint IP phones, navigate to your phone's Support page from the SoundPoint IP Support page.

Features for Hearing-Impaired Users on SoundPoint IP Phones

Table 1 lists the accessibility features on SoundPoint IP phones for hearing-impaired users.

Table 1: Accessibility Features on SoundPoint IP Phones for Hearing-Impaired Users

Accessibility Feature	*Description*
Visual Message Waiting Indicator (MWI)	An indicator light on the phone indicates that new messages are waiting. Icons on the phone screen also indicate that the phone has new messages.
Adjustable ring tone and volume	You can choose from a variety of ring tones for your phone. You can also change the volume of the ringer to suit your needs, and choose different ring tones for contacts.

Accessibility Feature	*Description*
Adjustable call volume	If you're in a call, you can raise or lower the volume of the voice on the far end and of other phone sounds you hear.
Visual notifications	Indicators on the phone screen (such as flashing bars or icons) let you know when calls are incoming, outgoing, or if a call is active or held. Indicators can also indicate phone status and if certain features are activated.
Electronic hookswitch support	If you use a headset that supports electronic hookswitch (EHS), you can use the controls on your headset to answer and end calls. In addition, you may be able to mute calls and control volume from your headset.
Headset Memory Mode	If you use a headset, you can set up your phone so that all calls use your headset.
Hearing Aid Compatible (HAC) handsets	All SoundPoint IP handsets are Hearing Aid Compatible (HAC) and have telecoils that magnetically couple to most forms of wearable hearing aids per FCC section 508 (compliant to ADA Section 508 Recommendations: Subpart B 1194.23).
TTY support	SoundPoint IP phones support commercial TTY devices such as Ultratec Superprint. In addition, SoundPoint IP phones provide acoustic coupled TTY support.

Features for Vision-Impaired and Blind Users on SoundPoint IP Phones

Table 2 lists accessibility features on SoundPoint IP phones for visually-impaired and blind users.

Table 2: Accessibility Features on SoundPoint IP Phones for Vision-Impaired and Blind Users

Accessibility Feature	*Description*
Adjustable backlight settings	You can change the brightness of the screen by adjusting backlight intensity settings.

Accessibility Feature	*Description*
Tactile "5" key with raised "bumps"	The "5" key has two bumps that let you easily discern the position of other keys on the keypad.
Large keys	Large keys on the phone console enable you to easily access phone features and functions.
Physical line keys	SoundPoint IP phones have physical line keys that you can press to answer and end calls.
Variety of feature keys that you can press	Many features on SoundPoint IP phones are accessible by pressing feature keys on the phone console.
Tactile-discernible number, feature, and navigation keys	Keys on the phone console are easily discernible by their size and shape.
Illuminated feature keys	Many feature keys are illuminated when activated, so you're easily alerted when a feature is enabled.

Features for Mobility-Impaired Users on SoundPoint IP Phones

Table 3 lists accessibility features on SoundPoint IP phones for mobility-impaired users.

Table 3: Accessibility Features on SoundPoint IP Phones for Mobility-Impaired Users

Accessibility Feature	*Description*
Auto-answer feature	SoundPoint IP phones can auto-answer calls, so you don't have to lift a handset, push a button, or tap a key to answer a call. If you enable this feature, your phone will automatically answer incoming calls using the speakerphone.
Dedicated headset jack that enables the auto-answer function	If you use a headset, you can set up your phone so that all calls use your headset.
Large keys	SoundPoint IP phones have large keys that are well-spaced on the phone console.
Built-in speakerphone	A built-in speakerphone allows you to use the phone without having to use a handset or headset.
Adjustable phone stand	SoundPoint IP phones have stands that you can adjust to various angles so your phone sits at a comfortable angle on your desktop.

Accessibility Features on SoundStation and VoiceStation Conference Phones

In this section, you'll learn about the accessibility features available on SoundStation (includes SoundStation and SoundStation IP phones) and VoiceStation conference phones. In this document, these phones are called Polycom Conference Phones.

The topics in this section describe the following:

- Features for Hearing-Impaired Users on Polycom Conference Phones
- Features for Vision-Impaired and Blind Users on Polycom Conference Phones
- Features for Mobility-Impaired Users on Polycom Conference Phones

Web Info: Where Do I Find More Information About Using Accessibility Features on SoundStation and VoiceStation Phones?

For information on how to use accessibility features on SoundStation and VoiceStation phones, navigate to your phone's Support page from the Polycom Voice Support page.

Features for Hearing-Impaired Users on Polycom Conference Phones

Table 4 lists the accessibility features on Polycom Conference Phones for hearing-impaired users.

Table 4: Accessibility Features on Polycom Conference Phones for Hearing-Impaired Users

Accessibility Feature	*Description*
Adjustable ring tones	You can choose from a variety of ring tones for your phone. You can also choose different ring tones for contacts (IP models only).
Adjustable ring tone volume	You can change the volume of the ringer to suit your needs.
Adjustable dial tone volume	You can change the volume of the dial tone to suit your needs.
Adjustable call volume	If you're in a call, you can raise or lower the volume of the voice on the far end and of other phone sounds you hear.

Accessibility Feature	*Description*
Visual notifications	Indicators on the phone screen such as flashing LEDs and icons on the screen (models with displays) let you know when calls are incoming, outgoing, or if a call is active or held. Indicators can also indicate phone status and if certain features are activated.
Visual ringing	Visual ringing enables the LED indicators to flash. On models with displays, the screen icons indicate call status.
Parallel Connection	Several models include an option to share the telephone line with a second device such as a TTY.
Auxiliary Audio Out	Several models include an Auxiliary Audio Out option that allows the far-end audio signal received to be used with systems designed to support hearing-impaired users.

Features for Vision-Impaired and Blind Users on Polycom Conference Phones

Table 5 lists accessibility features on Polycom Conference Phones for visually-impaired and blind users.

Table 5: Accessibility Features on Polycom Conference Phones for Vision-Impaired and Blind Users

Accessibility Feature	*Description*
Illuminated call status LEDs	Colored LEDs flash to indicate an incoming call and illuminate when a call is active or when the microphone is muted.
Adjustable backlight settings	You can change the brightness of the screen by adjusting backlight intensity settings (not applicable to models without a display).
Tactile keypad with "5" key identification "bumps"	The "5" key has two bumps that let you easily discern the position of other keys on the keypad.
Large tactilely discernible keys	Large keys on the phone console are easily discernible by their size and shape, and enable you to access phone features and functions.

Accessibility Feature	*Description*
Answer/hang-up buttons	Polycom Conference Phones have physical buttons that you can press to answer and end calls.
Simple keypad with single function keys	The main features on Polycom Conference Phones are accessible by pressing single function feature keys on the phone console.
Keys have a positive action	Keys provide a firm touch and have a positive action, providing you with confirmation of a key press.
Application port	With the application port (available on select models), you can use a mobile device or your computer mouse and keyboard to enter dialing information and place calls. For example, you can enter phone numbers and contact directory information via a softphone application running on your computer, without using the phone's keypad.

Features for Mobility-Impaired Users on Polycom Conference Phones

Table 6 lists accessibility features on Polycom Conference Phones for mobility-impaired users.

Table 6: Accessibility Features on Polycom Conference Phones for Mobility-Impaired Users

Accessibility Feature	*Description*
Large keys with a positive action	Polycom Conference Phones have large keys that are well-spaced on the phone console. The keys provide a firm touch and have a positive action, providing you with confirmation of a key press.
Built-in speakerphone	A built-in speakerphone allows you to use the phone without having to use a handset or headset.

Accessibility Feature	*Description*
Application port	With the application port (available on select models), you can use a mobile device or your computer mouse and keyboard to enter dialing information and place calls. For example, you can enter phone numbers and contact directory information via a softphone application running on your computer, without using the phone's keypad.

Accessibility Features on VVX Business Media Phones

In this section, you'll learn about the accessibility features available on VVX business media phones.

The topics in this section describe the following:

- Features for Hearing-Impaired Users on VVX Business Media Phones
- Features for Vision-Impaired and Blind Users on VVX Business Media Phones
- Features for Mobility-Impaired Users on VVX Business Media Phones

Web Info: Where Do I Find More Information About Using Accessibility Features on VVX Series Phones?

For information on how to use accessibility features on VVX business media phones, navigate to your phone's Support page from the Business Media Phones Support page.

Features for Hearing-Impaired Users on VVX Business Media Phones

Table 7 lists the accessibility features on VVX business media phones for hearing-impaired users.

Table 7: Accessibility Features on VVX Business Media Phones for Hearing-Impaired Users

Accessibility Feature	*Description*
Visual Message Waiting Indicator (MWI)	An indicator light on the phone indicates that new messages are waiting. Icons on the phone screen also indicate that the phone has new messages.
Adjustable ring tone and volume	You can choose from a variety of ring tones for your phone. You can also change the volume of the ringer to suit your needs, and choose different ring tones for contacts.
Adjustable call volume	If you're in a call, you can raise or lower the volume of the voice on the far end and of other phone sounds you hear.
Visual notifications	Indicators on the phone screen (such as flashing bars or icons) let you know when calls are incoming are outgoing, or if a call is active or held. Indicators can also indicate phone status and if certain features are activated.
Visual ringing	Certain VVX models have visual ringing that enables the screen to flash bright orange for incoming calls.
Electronic hookswitch support	If you use a headset that supports electronic hookswitch (EHS), you can use the controls on your headset to answer and end calls. In addition, you may be able to mute calls and control volume from your headset.
Headset Memory Mode	If you use a headset, you can set up your phone so that all calls use your headset.
Hearing Aid Compatible (HAC) handsets	All VVX handsets are Hearing Aid Compatible (HAC) and have telecoils that magnetically couple to most forms of wearable hearing aids per FCC section 508 (compliant to ADA Section 508 Recommendations: Subpart B 1194.23).
TTY support	VVX phones support commercial TTY devices such as Ultratec Superprint. In addition, VVX phones provide acoustic coupled TTY support.

Features for Vision-Impaired and Blind Users on VVX Business Media Phones

Table 8 lists accessibility features on VVX business media phones for visually-impaired and blind users.

Table 8: Accessibility Features on VVX Business Media Phones for Vision-Impaired and Blind Users

Accessibility Feature	*Description*
Adjustable backlight settings	You can change the brightness of the screen by adjusting backlight intensity settings.
Tactile "5" key with raised "bumps"	The "5" key has two bumps that let you easily discern the position of other keys on the keypad.
Large keys	Large keys on the phone console enable you to easily access phone features and functions.
Physical line keys (VVX 300/310, VVX 400/410)	Certain VVX phones have physical line keys that you can press to answer and end calls.
Variety of feature keys that you can press	Many features on VVX phones are accessible by pressing feature keys on the phone console.
Tactile-discernible number, feature, and navigation keys	Keys on the phone console are easily discernible by their size and shape.
Illuminated feature keys	Many feature keys are illuminated when activated, so you're easily alerted when a feature is enabled.

Features for Mobility-Impaired Users on VVX Business Media Phones

Table 9 lists accessibility features on VVX business media phones for mobility-impaired users.

Table 9: Accessibility Features on VVX Business Media Phones for Mobility-Impaired Users

Accessibility Feature	*Description*
Auto-answer feature	VVX phones can auto-answer calls, so you don't have to lift a handset, push a button, or tap a key to answer a call. If you enable this feature, your phone will automatically answer incoming calls using the speakerphone.
Dedicated headset jack that enables the auto-answer function	If you use a headset, you can set up your phone so that all calls use your headset.

Accessibility Feature	*Description*
Touchscreen (VVX 500, VVX 600, VVX 1500)	Certain VVX phones have large touchscreens that you can tap, swipe, and press to perform phone functions and activate features.
Large keys	VVX phones have large keys that are well-spaced on the phone console.
Built-in speakerphone	A built-in speakerphone allows you to use the phone without having to use a handset or headset.
Adjustable phone stand	VVX phones have stands that you can adjust to various angles so your phone sits at a comfortable angle on your desktop.
"Polycom Desktop Connector" application	You can use your computer's mouse and keyboard to enter information and navigate screens on VVX phones. For example, you can enter phone numbers, contact directory information, and select touchscreen objects without using the phone's keypad or tapping the touchscreen. You can easily move the mouse pointer back and forth between your computer and your phone, depending on your task.

Accessibility Features on CX Series Phones and Conference Phones

In this section, you'll learn about the accessibility features available on Polycom CX300, CX500, CX600, and CX700 phones, and on Polycom CX3000 and CX5000 conference phones.

The topics in this section describe the following:

- Features for Hearing-Impaired Users on CX Series Phones and Conference Phones
- Features for Vision-Impaired and Blind Users on CX Series Phones and Conference Phones
- Features for Mobility-Impaired Users on CX Series Phones and Conference Phones

Web Info: Where Do I Find More Information About Using Accessibility Features on CX Series Phones and Conference Phones?

For information on how to use accessibility features on CX series phones and conference phones, navigate to your phone's Support page from the CX Series Support page.

Features for Hearing-Impaired Users on CX Series Phones and Conference Phones

Table 10 lists the accessibility features on CX series phones and conference phones for hearing-impaired users.

Table 10: Accessibility Features on CX Series Phones and Conference Phones for Hearing-Impaired Users

Accessibility Feature	*Description*
Visual Message Waiting Indicator (MWI)	An indicator light on the phone indicates that new messages are waiting (CX600, CX700). Icons on the phone screen also indicate that the phone has new messages.
Adjustable ring tone and volume	You can choose from a variety of ring tones for your phone or conference phone. You can also change the volume of the ringer to suit your needs, and choose different ring tones for contacts.
Adjustable call volume	If you're in a call, you can raise or lower the volume of the voice on the far end and of other phone sounds you hear.
Visual notifications	Indicators on the phone screen (such as flashing bars or icons) let you know when calls are incoming are outgoing, or if a call is active or held. Indicators can also indicate phone status and if certain features are activated.
Visual ringing (CX500, CX600, CX700, CX3000)	Visual ringing enables the screen to flash bright white for incoming calls.

Accessibility Feature	*Description*
Hearing Aid Compatible (HAC) handsets	All CX series handsets are Hearing Aid Compatible (HAC) and have telecoils that magnetically couple to most forms of wearable hearing aids per FCC section 508 (compliant to ADA Section 508 Recommendations: Subpart B 1194.23).
TTY support	CX500, CX600, CX700, and CX3000 phones support commercial TTY devices such as Ultratec Superprint. In addition, CX500, CX600, and CX700 phones provide acoustic coupled TTY support.
"Better Together" operation mode (CX600, CX700, CX3000)	The "Better Together" mode adds several features leveraging Microsoft Lync's capabilities when the phone is connected to the PC via USB. Users can switch the audio between the phone and the desktop or escalate the call on the phone to a desktop video call.

Features for Vision-Impaired and Blind Users on CX Series Phones and Conference Phones

Table 11 lists accessibility features on CX series phones and conference phones for visually-impaired and blind users.

Table 11: Accessibility Features on CX Series Phones and Conference Phones for Vision-Impaired and Blind Users

Accessibility Feature	*Description*
Adjustable backlight settings	You can change the brightness of the screen by adjusting backlight intensity settings.
Tactile "5" key with raised "bumps"	The "5" key has two bumps that let you easily discern the position of other keys on the keypad.
Large keys	Large keys on the phone console enable you to easily access phone features and functions.
Variety of feature keys that you can press	Many features on CX series phones and conference phones are accessible by pressing feature keys on the phone console.

Accessibility Feature	*Description*
Tactile-discernible number, feature, and navigation keys	Keys on the phone console are easily discernible by their size and shape.
Illuminated feature keys	Many feature keys are illuminated when activated, so you're easily alerted when a feature is enabled.
"Better Together" operation mode (CX600, CX700, CX3000)	The "Better Together" mode adds several features leveraging Microsoft Lync's capabilities when the phone is connected to the PC via USB. This includes access to voicemails, call logs, and calendar information. The user also has access to click-to-call on the phone and gives them desktop control of calling features such as transfer, hold, and conferencing. For example, you can simply click on a calendar entry to join a conference call. Users can also switch the audio between the phone and the desktop or escalate the call on the phone to a desktop video call.

Features for Mobility-Impaired Users on CX Series Phones and Conference Phones

Table 12 lists accessibility features on CX series phones and conference phones for mobility-impaired users.

Table 12: Accessibility Features on CX Series Phones and Conference Phones for Mobility-Impaired Users

Accessibility Feature	*Description*
Large keys	CX series phones and conference phones have large keys that are well-spaced on the phone console.
Built-in speakerphone (CX300, CX600, CX700, CX3000, CX5000, CX500 (monitor only))	A built-in speakerphone allows you to use the phone without having to use a handset or headset.
Adjustable phone stand (CX300, CX500, CX600, CX700)	Some CX series phones have stands that you can adjust to various angles so your phone sits at a comfortable angle on your desktop.

Accessibility Feature	*Description*
"Better Together" operation mode (CX600, CX700, CX3000)	The "Better Together" mode adds several features leveraging Microsoft Lync's capabilities when the phone is connected to the PC via USB. This includes access to voicemails, call logs, and calendar information. The user also has access to click-to-call on the phone and gives them desktop control of calling features such as transfer, hold, and conferencing. For example, you can simply click on a calendar entry to join a conference call. Users can also switch the audio between the phone and the desktop or escalate the call on the phone to a desktop video call.

Trademarks

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ADTRAN

Support

Network Care Programs

The Value of Peace of Mind

Network downtime—for a service provider this is lost revenue and increased cost. If downtime is frequent or an extended event it can even mean loss of customers. You need a way to protect your customers, by reducing, or even eliminating network outages, while also reducing costs.

ADTRAN® Network Care Programs are designed to provide peace of mind. These flexible, cost-effective programs allow you to control budgets, protect assets and provide superior customer service. An investment in these programs is an investment in your customer. High quality of service and service availability are essential. These service attributes truly separate you from your competition. To deliver service that is superior to the competition, you must have software that is regularly kept up to date, equipment that is updated or replaced when needed and all with little or no downtime.

There are a variety of program options including high-value support like priority technical assistance, advance parts replacement and feature-enriched software upgrades. Each of the Network Care Program options provides all of the coverage of the Standard Warranty and is enhanced in a tiered fashion to provide the right coverage for any network.

Network Care Program Summary

	Program Components	Standard Warranty	Extended Network Care	Premium Network Care	Total Network Care
Hardware Maintenance	Equipment Repair	●	●	●	not applicable
	Advanced Replacement (Next Business Day)				●
Remote Technical Support	Technical Support Priority			●	●
	Outage TAC Response Target	Best Effort[1] 7x24[2]	Best Effort[1] 7x24[2]	Priority < 30 Min.–90%[3] 7x24[2]	Priority < 20 Min.–90%[3] 7x24[2]
	Non-Outage TAC Response Target	Best Effort[1] 7am–7pm 7am–7pm (M-F CST)[4]	Best Effort[1] 7am–7pm 7am–7pm (M-F CST)[4]	Priority < 6 hrs.–90%[3] < 8 hrs.–90%[3] 7am–7pm (M-F CST)[4]	Priority < 4 hrs.–90%[3] < 6 hrs.–90%[3] 7am–7pm (M-F CST)[4]
Software/ Firmware Maintenance	Access to Patches and Updates CN Product Firmware Management Software	●	●	●	●
	Access to Feature Upgrades Product System Releases Management Major Releases			●	●
Extra Support	ADTRAN Online Community Forum			●	●

[1]best effort based on resource availability; [2]including weekends and holidays; [3]90% of cases; [4]excluding weekends and holidays

ADTRAN Warranty and Network Care

ADTRAN Network Care Programs are designed to provide continual coverage and eliminate unplanned support costs for all of your ADTRAN equipment. These plans minimize network downtime, increase productivity and increase return on investment. ADTRAN offers a variety of components that are available as part of all ADTRAN Warranty and Network Care offerings. These include:

- **ADTRAN Technical Assistance Center (TAC)** access:
  - Support provided for trouble issues, initial installation questions and general usage questions
  - 7x24 service for outages (including weekends and holidays)
  - 7am–7pm (Monday-Friday (M-F) CST) service for non-outages (excluding weekends and holidays)
  - Response times are based on technical severity as defined below:

    OUTAGE: The condition is a complete or partial system failure and the equipment is inoperative. The customer's use of product has a critical effect on its operations. The customer is at risk of losing business due to network impairment. All requests must be initiated via telephone with clear communication that the issue is an outage.

    NON-OUTAGE: Non-critical conditions; customer operations are not severely restricted and the system is usable with little impact to the system functionality. Requests for service made after normal business hours will be placed in the priority queue the following business day. Please note that email responses in these cases may take up to two hours longer than phone support.

- **Software/Firmware Maintenance** provides periodic software patches and updates for Carrier Network (CN) Division product firmware and management software.
- **Hardware Maintenance Support** provides equipment repairs and for Dead on Arrival (DOA) advanced replacement (within first 90 days).
- **ADTRAN Support Community** 24x7 online access at ***www.adtran.com/support***
  - Email support—logs and test results are quickly made available for product experts
  - Ability to receive support documentation via email

Total Network Care

Total Network Care is an annual, renewable blanket program offering priority service and next-business day advanced replacement. Total Network Care offers the highest level service components for programs of this type:

Technical Support

- **Priority Remote Technical Support** provides customers with remote access to ADTRAN product engineers for assistance with isolating product problems, answering product questions and performing diagnostics to resolve network issues for the maintained products.
- **Hardware Maintenance Support** extends Next-Business Day Advanced Replacement to include equipment repairs.
- **Software/Firmware Maintenance**
  - Access to patches and/or updates for CN product firmware and Advanced Operational Environment (AOE) software
  - Access to feature upgrades and product system releases
  - Access to AOE management software major releases
- **ADTRAN Community Online Forum**
  - Knowledge database and history of customer-reported issues
  - Research questions or issues at your leisure

Total Network Care

Program Components	Non-Outage	Outage
TAC Availability	7am–7pm (M-F CST)[1]	7x24[2]
TAC Access Method	Telephone Email	Telephone
TAC Response Targets	< 4 hrs. for 90% of Cases < 6 hrs. for 90% of Cases	< 20 mins. for 90% of Cases
Software/ Firmware Maintenance	• Access to Patches and Updates, CN Product Firmware and Management Software • Access to Feature Upgrades, Product System Releases and Management Software Major Releases	
Hardware Maintenance	• Equipment Repairs	
Advanced Replacement	• Next-Business Day for Broadband and Optical Products	
Extra Support	• ADTRAN Online Support Community (7x24 Access)	
Prerequisites	• AOE Registration and Operational • Product Registration • Product Installed and Operational	

[1]excluding weekends and holidays; [2]including weekends and holidays

Programs

Premium Network Care

Premium Network Care is an annual, renewable blanket program offering with priority service. Premium Network Care offers all the benefits of the Standard Warranty with the addition of the following advanced network care benefits:

Technical Support

- **Priority Remote Technical Support** provides customers with remote access to ADTRAN product engineers for assistance with isolating product problems, answering product questions and performing diagnostics to resolve network issues for the maintained products.
- **Software/Firmware Maintenance**
  - Access to patches and/or updates for CN product firmware and AOE software
  - Access to feature upgrades and product system releases
  - Access to AOE management software major releases
- **ADTRAN Community Online Forum**
  - Knowledge database and history of customer-reported issues
  - Research questions or issues at your leisure

Premium Network Care

Program Components	Non-Outage	Outage
TAC Availability	7am–7pm (M-F CST)[1]	7x24[2]
TAC Access Method	Telephone Email	Telephone
TAC Response Targets	< 6 hrs. for 90% of Cases < 8 hrs. for 90% of Cases	< 30 mins. for 90% of Cases
Software/ Firmware Maintenance	• Access to Patches and Updates, CN Product Firmware and Management Software • Access to Feature Upgrades, Product System Releases and Management Software Major Releases	
Hardware Maintenance	• Equipment Repairs	
Extra Support	• ADTRAN Online Support Community (7x24 Access)	
Prerequisites	• AOE Registration and Operational • Product Registration • Product Installed and Operational	

[1]excluding weekends and holidays; [2]including weekends and holidays

Standard Warranty

ADTRAN Standard Warranty is provided with the purchase of each new product. The length of the warranty depends on the ADTRAN product family to which the purchased product belongs. The ADTRAN TAC provides best effort support to resolve trouble issues and respond to initial installation and general usage questions during the warranty period.

Technical Support

- **Remote Technical Support** provides customers with remote access to ADTRAN product engineers for assistance with isolating product problems, answering product questions and performing diagnostics to resolve network issues for the maintained products.
- **Software/Firmware Maintenance**
  - Access to patches and/or updates for CN product firmware and AOE software

Standard Warranty

Support Type	Non-Outage	Outage
TAC Availability	7am–7pm (M-F CST)[1]	7x24[2]
TAC Access Method	Telephone Email	Telephone
TAC Response Targets	Best Effort[3]	Best Effort[3]
Software/ Firmware Maintenance	• Access to Patches and Updates, CN Product Firmware and Management Software	
Hardware Support	• Equipment Repairs	

[1]excluding weekends and holidays; [2]including weekends and holidays; [3]best effort—as resources become available

Extended Network Care

Extended Network Care lengthens the timeframe of the Standard Warranty for an additional 12 months from the date of expiration. This option is available at the time of initial purchase and is renewable on an annual basis.

Extended Network Care

Support Type	Non-Outage	Outage
TAC Availability	7am–7pm (M-F CST)[1]	7x24[2]
TAC Response Targets	Best Effort[3]	Best Effort[3]
Software/Firmware Maintenance	• Access to Patches and Updates, CN Product Firmware and Management Software	
Hardware Support	• Equipment Repairs	

[1]excluding weekends and holidays; [2]including weekends and holidays; [3]best effort—as resources become available

ADTRAN, Inc.
Attn: Carrier Networks
901 Explorer Boulevard
Huntsville, AL 35806

P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Canada Headquarters—Toronto, Ontario
+1 877 923 8726
+1 905 625 2515
sales.canada@adtran.com

Canada—Montreal, Quebec
+1 877 923 8726
+1 514 940 2888
sales.canada@adtran.com

Pre-sales Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/presales

Post-sales Support
888 423-8726
support@adtran.com
www.adtran.com/support

Where to Buy
888 423-8726
www.adtran.com/where2buy

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ADTRAN ProServices
Description of Service Offering

ProCare

This Description of Service Offering (DSO) is provided by ADTRAN, Inc., to describe the support services generally available under ADTRAN ProCare Service Plans. ADTRAN may publish DSOs of a more specific nature, based on the product type, geography, or other factors. In these cases, the more specific DSO will take precedence over similar specifications provided in this general DSO. The appropriate DSO, along with the ADTRAN Manufacturer's Warranty, the ProCare Letter of Verification, and the ProServices Terms and Conditions cover the agreement between ADTRAN and the purchaser of these services (hereinafter referred to as "Customer"). ADTRAN recommends Customers read the documents carefully, as they contain not only the details of the coverage offered by ADTRAN but also Customer responsibilities in obtaining service.

1. OVERVIEW

ADTRAN offers several plans for ProCare Services. Some common plans are below:

ProCare Service Plan	Technical Support	Replacement	On-Site Technician (OST) Arrival	Other Entitlements
Basic	Access to a Technical Support Engineer for non-service affecting emergencies is available Monday through Friday between the hours of 7am and 7pm central time excluding ADTRAN holidays. Access to a Technical Support Engineer for a service affecting emergency (severity level=critical) is available 7 days/week, 24 hours/day. The Technical Support Engineer will apply best effort to reach the contact person in a timely fashion.	NA	NA	Access to software releases and patches
Next Business Day Remote	Access to a Technical Support Engineer for non-service affecting emergencies is available Monday through Friday between the hours of 7am and 7pm central time excluding ADTRAN holidays. Access to a Technical Support Engineer for a service affecting emergency (severity level=critical) is available 7 days/week, 24 hours/day. The response time for a Technical Support Engineer to attempt to reach the contact person on the case will be no more than 60 business minutes after the case is logged, for support cases opened via telephone.	Equipment determined by ADTRAN to be defective will be dispatched to the site for arrival no later than 5pm local time on the next business day. It is the customer's responsibility to return the failed unit to ADTRAN.	NA	Access to software releases and patches Automatic configuration backup of AOS devices Discount on purchase of remote Professional Service Vouchers (PSVs)
Next business Day On-Site	Access to a Technical Support Engineer for non-service affecting emergencies is available Monday through Friday between the hours of 7am and 7pm central time excluding ADTRAN holidays. Access to a Technical Support Engineer for a service affecting emergency (severity level=critical) is available 7 days/week, 24 hours/day. The response time for a Technical Support Engineer to attempt to reach the contact person on the case will be no more than 60 business minutes after the case is logged, for support cases opened via telephone.	Equipment determined by ADTRAN to be defective will be dispatched to the site for arrival no later than 5pm local time on the next business day. The OST will be responsible for pick up and return to ADTRAN of defective equipment.	An OST will travel to the site to install the replacement unit no later than 5:00pm local site time on the next business day	Access to software releases and patches Automatic configuration backup of AOS devices Discount on purchase of remote Professional Service Vouchers (PSVs)

Service Plan	Technical Support	Replacement	On-Site Technician (OST) Arrival	Other Entitlements
7x24x4 Remote	Access to a Technical Support Engineer for non-service affecting emergencies is available Monday through Friday between the hours of 7am and 7pm central time excluding ADTRAN holidays. Access to a Technical Support Engineer for a service affecting emergency (severity level=critical) is available 7 days/week, 24 hours/day. The response time for a Technical Support Engineer to attempt to reach the contact person on the case will be no more than 30 minutes after the case is logged, for support cases opened via telephone.	Equipment determined by ADTRAN to be defective will be dispatched to the site for arrival within 4 hours of the determination of failure by an ADTRAN representative.	NA	Access to software releases and patches Automatic configuration backup of AOS devices Discount on purchase of remote Professional Service Vouchers (PSVs)
7x24x4 On-Site	Access to a Technical Support Engineer for non-service affecting emergencies is available Monday through Friday between the hours of 7am and 7pm central time excluding ADTRAN holidays. Access to a Technical Support Engineer for a service affecting emergency (severity level=critical) is available 7 days/week, 24 hours/day. The response time for a Technical Support Engineer to attempt to reach the contact person on the case will be no more than 30 minutes after the case is logged, for support cases opened via telephone.	Equipment determined by ADTRAN to be defective will be dispatched to the site for arrival within 4 business hours of the determination of failure by an ADTRAN representative. The OST will be responsible for pick up and return to ADTRAN of defective equipment.	An OST will travel to the site to install the replacement unit within 4 business hours of determination of failure by an ADTRAN representative.	Access to software releases and patches Automatic configuration backup of AOS devices Discount on purchase of remote Professional Service Vouchers (PSVs)

(Please refer to www.adtran.com for the most current offerings and plan descriptions.)

Severity Level Classifications

Upon receipt of trouble report, ADTRAN will evaluate the issue and classify into one of the following severity levels based upon the following criteria:

Severity Level	Severity Classification Criteria
Critical	Critical system or service outage in a live environment that results in a severe degradation of overall network performance and/or significant reduction in capacity.
High	Intermittent degradation of system or service performance that impacts Customer service quality or impairs network operator control or operational effectiveness. Also includes loss of redundancy or diagnostic capabilities.
Medium	Minor degradation of system or service performance that does not impact Customer service quality and minimal impact on network operations.
Low	No impact on system or network operation. Information requests or standard questions on configuration or functionality of equipment.

Coverage Availability

With 7x24, coverage is available any day, any time, including holidays. 5x8 coverage is available Monday through Friday (excluding holidays), 8:00am to 5:00pm local site time in the continental USA and Canada. For 5x8 coverage, all service time is measured in "business hours." Holidays are subject to change in each calendar year, but may include New Year's Day, MLK Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and the day after Thanksgiving, Christmas Eve and

Christmas Day. Business days are Monday through Friday, excluding holidays.

Advance Hardware Replacement
In the event ADTRAN determines a covered hardware product is defective during the term of the ProCare Service Plan, an advance hardware replacement will be dispatched for delivery in accordance with the plan purchased. Advance hardware replacement is subject to ADTRAN's determination that the hardware product is defective and that the issue is not due to some other component of the system, mis-configuration, or misuse of the product. For NBD plans, ADTRAN will use commercially reasonable efforts to ship an advance hardware replacement unit of the same or equivalent model type within one business day via overnight delivery service or equal method (where available). Destination country importation, compliance with U.S. export controls, and customs processes may condition actual delivery times.

On-Site Technician
Four-hour on-site coverage guarantees arrival of an ADTRAN authorized On-Site Technician (OST) within four hours from the determination by ADTRAN that the equipment has failed. NBD on-site coverage guarantees arrival of an ADTRAN authorized OST during the next business day (Monday through Friday, excluding holidays). On-site coverage includes transportation of replaced equipment to ADTRAN via the OST.

Software Support
During the ProCare Service Plan term, the Customer is entitled to software releases and patches licensed by the Customer in conjunction with the applicable ADTRAN hardware products for which ProCare Service has been purchased (upgrades and updates, but excluding separately sold modules). Such software releases and patches are made available through ADTRAN's website. Any use of ADTRAN software products not properly licensed by ADTRAN, or software releases when the ProCare Service Plan is not in effect are a direct violation of the applicable license agreement, with the exception of any patches provided under the ADTRAN warranty program. Software licensing and support may be sold separately.

Configuration Backup
For those plans that include this entitlement, ADTRAN provides an automatic configuration backup utility for ADTRAN products that run ADTRAN OS. This includes NetVanta 7000 series, NetVanta routers, switches, IP Business Gateways, and other products. This service provides periodic backup of the system configuration as long as the system can communicate with the ADTRAN n-Command MSP server over the internet and the backup commands are properly configured. In the event of a hardware failure, at Customer's request, ADTRAN will provide the latest backed-up version of the configuration to the Customer. By default, changes to system configuration will be backed up each time the configuration is modified.

If ADTRAN ProStart did not install the device that is covered under a ProCare Service Plan with this backup entitlement, the Customer must have the qualified installer of the equipment contact ProCare to request activation of system configuration backup. Upon receipt of instructions from ProCare, the installer must configure the equipment for backup. An ADTRAN Support Representative will verify the proper configuration of the backup service by the installer. To qualify for backup of the system configuration, Customer must provide ADTRAN with continuous broadband access to the covered

equipment.

Supported Software Version Policy
ADTRAN will provide a support for ADTRAN software for current and the last most recent historical release of such software.

2. CONTACTS FOR SUPPORT SERVICES

Most questions can be answered by visiting the ADTRAN website at www.adtran.com or the ADTRAN Support Community at https://supportforums.adtran.com. If you still require assistance, please contact the appropriate department:

Purpose/Need	Contact	Hours of Operation	Contact Information
Questions about ProCare Service Plan	ProService Sales Operations	Monday – Friday 8:00am-5:00pm Central Time excluding ADTRAN holidays	888-874-2237 256-963-8716 proservices@adtran.com www.adtran.com
Questions about ProStart Installation, technical support during install	ProStart Install Group	Monday – Friday 8:00am-5:00pm Central Time excluding ADTRAN holidays	888-874-2237 256-963-8716 prostart@adtran.com www.adtran.com
Technical Support (post-install)	ADTRAN Technical Support	Monday – Friday 7:00am-7:00pm Central Time excluding ADTRAN holidays Service affecting emergencies: 24 hours/day 7 days/week	888-874-2237 256-963-8716 support@adtran.com supportforums.adtran.com
ProServices Purchase Orders	ProService Sales Operations	Monday – Friday 8:00am-5:00pm Central Time excluding ADTRAN holidays	Fax: 256-963-7956 Email: proservices.po@adtran.com

Customer acknowledges that there may be a delayed response to inquiries submitted via the web ticket or email. Critical issues and escalations should be submitted via telephone for fastest response.

3. CUSTOMER RESPONSIBILITIES

Purchasing ProCare Services
Customer must submit to ADTRAN a valid purchase order for ProCare Services including:

1. Equipment identification, including part number and serial number(s) for all covered equipment, including modules
2. ProCare part number appropriate for equipment and for desired term length
3. Quantity of ProCare part number (considering term included in part number)
4. Price
5. Coverage dates, if specific dates needed (must match item #3)
6. Partner (reseller) contact information, including name, phone number, email address, and billing address
7. End-user site information, including company name, street address, and equipment location including zip code

8. End-user site contact information, including name, phone number, and email address
9. PO number
10. PO number(s) for the original purchase of the hardware to be covered by the ProCare Service Plans(s)
11. PO number(s) for the original ProStart installation of the hardware to be covered by the ProCare Service Plans(s) if ADTRAN ProStart performed the installation

Stable Installation

Customer must verify that the equipment is properly installed and located in a suitable environment as specified in the equipment documentation. When the installation is performed by ADTRAN ProStart and the "in service" date is accepted in writing by the Customer, this requirement is automatically met, and coverage begins on the "in service" date. For non-ADTRAN installations, installation issues are the responsibility of the Customer. ProCare Service Plan coverage may begin after the network in which the equipment is installed is functional and stable. ADTRAN reserves the right to require and execute a fee-based network assessment prior to accepting a purchase order for ProCare Service on systems not installed by ADTRAN ProStart.

Relocation

Customer must notify ADTRAN at least 30 days in advance of relocating covered equipment to ensure that replacement equipment and OST personnel are available in the new location. Relocation of equipment to a zip code served by a different warehouse may be a billable item. Contact ProServices Sales Operations for more information.

No Modification

The Customer agrees not to modify, enhance, or otherwise alter the ADTRAN product except as expressly described or authorized in ADTRAN's Technical Reference Manuals, User Manuals, or Help Files, unless the prior written consent of ADTRAN is obtained.

Broadband Access

Customer must provide ADTRAN with secure remote broadband access (i.e., port forward via a Cable, DSL, etc.) and login credentials for the equipment for configuring, monitoring, troubleshooting, testing, and for configuration management. Dial-up modem access does not provide adequate bandwidth to provide proper support under ProCare. Broadband connectivity must be continuous to ensure ADTRAN continues to provide the full range of support services. ADTRAN reserves the right to deny service for any product for which remote access is not available. Specific circumstances, especially as they may relate to certain compliance regulations, may affect the existence or extent of remote access available to ADTRAN. In any such instance where ADTRAN's access may be limited, ADTRAN reserves the right to deny or delay services to the customer. Customer must ensure that their network is properly secured.

Problem Reporting Procedures

When reporting an issue to ADTRAN technical support, the Customer will be required to provide the following information:

- Customer contact information including:
  - Company name which appears on the ProCare Service Plan Verification letter
  - Contact name
  - Call back telephone number

  - Valid email address
- Model Number
- Serial Number
- ProCare Services Plan number
- Nature of the issue
- Circumstances under which the issue was encountered
- Technical information relating to the operating environment
- The steps, if any, that Customer took immediately following the issue
- The immediate impact of the issue upon the ability of Customer's network to function

On-Site Technician
When dispatched for on-site support, Customer must allow the ADTRAN authorized OST access to the covered equipment within 30 minutes of arrival.

Shipping / Return of Equipment
If a request for service under an ProCare Services Plan results in the dispatch of advance replacement equipment, the Customer is responsible for shipping the replaced products to ADTRAN within thirty (30) days. If the Customer fails to ship the defective products to ADTRAN within thirty (30) days, ADTRAN will invoice the Customer the list price for the hardware. If the plan includes dispatch of an OST to install the equipment, ADTRAN is responsible for the return, via the OST, of the defective equipment.

Trained Personnel
The Customer will ensure that all of its personnel who request support under the ProCare Service Plan are familiar with the ADTRAN products to the extent necessary for them to operate with reasonable competence. Without limiting the generality of the foregoing, Customer will cause all Customer Technical Personnel to complete such training and instruction as ADTRAN may reasonably require from time to time. Upon the appointment of any new Technical Personnel, Customer will take reasonable steps to train the new individual to appropriate standards of technical competence.

Personnel Access
The Customer agrees to grant ADTRAN any needed access to the Customer's systems and personnel concerned with the operation of the ADTRAN product to enable ADTRAN to provide ProCare Service Plan support as defined in this DSO.

Installation of Software Releases or Patches
The customer will be responsible for installing any software releases or patches to obtain new features. If the covered unit encounters a software problem ADTRAN will be responsible for providing assistance to upgrade the unit under ProCare Service support.

Error Documentation
Upon detection of any error or defect in the ADTRAN product, the Customer, as requested by ADTRAN, agrees to provide ADTRAN a listing of output (trace or log data) and any other data, including database and backup systems, that ADTRAN reasonably may request in order to reproduce operating conditions similar to those present when the error occurred.

4. OUT OF SCOPE

Exclusions

ADTRAN ProCare Service does ***NOT*** include:

1. Any problems with equipment not listed on the Letter of Verification, such as other equipment on the customer premises or in the telephone company or service provider's network
2. Services made necessary by failures related to misuse, neglect, accident, alteration, modification, or willful or negligent acts by the Customer.
3. Equipment that has been altered or modified by non-ADTRAN representatives or damaged due to negligence or willful act or omission, or used other than as specified in the ADTRAN-supplied documentation
4. Support for problems caused by other devices in the network; resolution of software or hardware incompatibilities with third party products
5. Troubleshooting with individuals who are unfamiliar and untrained in the operation of ADTRAN equipment and/or software.
6. Failures due to Customer supplied cabling or power.
7. Training.
8. Force majeure: acts of God, acts of public enemy, acts of government, freight embargoes, strikes, quarantine restrictions, unusually severe weather conditions, insurrection, riot, and other such causes beyond our control.
9. Problems with the covered equipment that existed before the commencement of coverage.
10. Wiring or cabling: supply, assembly, installation (unless specifically included by ProStart), maintenance, or support of racks, shelves, or any other physical structure to which the covered equipment is mounted (unless specifically included in the ProCare Service Plan); ancillary materials such as power/extension cords.
11. Damage caused by electrical stress, including power fluctuations or lightning.
12. Design or optimization of the customer's network or the applications that run on it.
13. Configuration changes required to accommodate changes in the design of the network, or the addition, deletion, or relocation of covered equipment.
14. Reconfiguration of replacement equipment when, a) covered equipment is ineligible or not activated for configuration backup, and b) the original configuration is not accessible from the failed unit, and c) a backup copy is not provided by the customer, and d) configuration from scratch cannot be completed within two hours.
15. Multi-vendor meetings, except when it is suspected by ADTRAN that the covered equipment has failed.
16. Software upgrades, except when the upgrade is recommended by ADTRAN Technical Support to address a problem on the equipment under a ProCare Service Plan.
17. Implementation or consulting services
18. Move-add-change (MAC) services. MAC services are offered by ADTRAN separately from ProCare Service Plans.

Additional Charges for ProCare Services

Beyond the services offered as part of an ProCare Service Plan, ADTRAN can arrange for additional services, which are charged separately. Such expenses include:

1. Time and Materials (T&M): hourly rate for services performed beyond those covered by ProCare. At Customer's request, ADTRAN can arrange for an on-site visit by a trained and skilled OST.
2. No Trouble Found (NTF): fee to cover costs of dispatching replacement equipment and/or an OST to a Customer site without ADTRAN Technical Support Engineer ("TSE") determination of failure of that equipment. This fee will become payable when the problem is determined to be something other than the covered equipment. NTF is waived when an ADTRAN TSE determines that the covered equipment has failed. NTF for equipment is a flat rate; NTF for an OST is at T&M rates.
3. Expedite: fixed rate surcharge to commence coverage earlier than the normal start date. Customer may request that coverage start earlier than normal processing allows. The expedite fee helps to offset the additional costs of special processing and rush shipment of equipment to the appropriate depot. ADTRAN will grant an expedite request and accept the fee only if the service and equipment are available.
4. Site Not Ready (SNR): fixed rate surcharge to be levied in any instance where a Customer is not available to accept replacement equipment at the designated date/time, necessitating a subsequent delivery attempt. Replacement equipment will only be delivered to street addresses accessible by common carriers, and for which the Customer's representative is available to confirm its acceptance by signature.
5. Return Shipping: the cost of returning defective/replaced equipment to ADTRAN; waived for plans that include on-site service. Equipment that is replaced under ProCare coverage becomes the property of ADTRAN. For ProCare plans that include on-site service, the OST will collect the replaced equipment and return it to ADTRAN at no additional cost. For plans that do not include on-site service, Customer is responsible for returning the replaced equipment to ADTRAN, including the shipping cost.
6. Non-returned Equipment: charge for equipment belonging to ADTRAN that is not received within 30 days. Non-returned equipment is invoiced to Customer at the current list price.
7. Excessive Wait Time: hourly rate for periods during which the OST is unable to perform the service because of a non-ADTRAN issue. If a non-ADTRAN problem prevents the OST from starting or continuing the service, Customer may choose to keep the OST on site until that problem is resolved. Time accrual begins upon thirty minutes of inactivity and is billed in one-hour increments at the T&M rate.

5. GENERAL INFORMATION

Service Plan Renewal

ProCare Service Plans are initially in effect for the period shown on the Letter of Verification. Coverage may be renewed by sending a complete and correct purchase order to the ProServices Business Office. If equipment and/or services are still available, coverage will be extended without interruption provided the valid purchase order is received prior to the expiration date of the current coverage. In the event of a lapse between the expiration date and our receipt of a valid purchase order, ADTRAN may require a 30-day reinstatement period to ensure that equipment and services are available and that the

equipment is in proper working order. The original manufacturer's warranty applies regardless of any lapse in ProCare coverage.

Commencement of ProCare Coverage

ProCare Service Plan coverage begins up to 30 days after a valid purchase order is received by ADTRAN. For all ProCare plans, ADTRAN requires a period of up to 30 days to ensure proper staffing and stocking of local depots to cover the equipment site. If ProStart Installation and ProCare Service are purchased at the same time, coverage begins immediately upon completion and customer acceptance of the installation. If a ProCare Service Plan is purchased after the installation is complete, or on equipment not installed by ADTRAN, a waiting period of up to 30 days will be required to verify a stable installation, insure OST availability, and adjust local product depot inventories.

Lapsed Support

After any lapse of ProCare Service through the termination or expiration of the plan (other than ADTRAN's termination for Customer's breach), the parties subsequently may elect to reinstate such ProCare Service Plan for ADTRAN Products for which the plan lapsed upon the terms and conditions set forth in this DSO; provided the Customer agrees to pay for the period of time that has lapsed as well as the Renewal Term and such ADTRAN products must be in good working condition as determined by ADTRAN.

Refusal of Coverage

ADTRAN reserves the right to refuse a purchase order for ProCare Services for any reason, including, but not limited to: four-hour replacement or on-site coverage for sites outside the four hour range of dispatch locations, or incomplete purchase order.

Cancellation

The customer may, at its discretion, cancel any portion of the plan for any reason, during the plan term; however, all ProCare Service Plans are 100% non-refundable.

Language

Technical Support is provided in English.

Closing a Support Case

ADTRAN's Customer Support staff will contact the Customer to determine if the issue is resolved. Any case for which a resolution has been provided and for which no Customer response can be obtained for two business days will be automatically closed without direct approval of the Customer.

ADTRAN ProCare Maintenance

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ProCare Overview

ADTRAN's ProCare™ services ensure you get the most out of your ADTRAN® solutions with ongoing access to technical support, after hour's assistance, the latest software releases and patches, as well as hardware replacement. All of these benefits are delivered by ADTRAN's award winning ProServices support team with options that provide the flexibility to choose what fits your business the best.

High Level Overview of ProCare Offerings

Options	ADTRAN Technical Support SLA*	Automatic Configuration Back up**	Hardware Replacement SLA	Eligible for Discounted Remote Professional Service Vouchers (PSVs)	Common ProCare Features
Basic Maintenance	4 hours				Access to Technical Support Monday – Friday, 7 am until 7 pm Central time Emergency after hours support Access to software releases and patches
NBD Remote	1 hour	●	Next Business Day	●	
7x24x4 Remote	30 minutes	●	4 hour	●	
NBD Onsite	1 hour	●	Next Business Day with onsite technician	●	
7x24x4 Onsite	30 minutes	●	4 hour with on-site technician	●	

Please note some legacy products do not receive access to technical support with their maintenance plan. Please also note that the Atlas series product receives Best Effort SLA for all maintenance offerings.

Please note that the maintenance contract holder must submit a ticket to ADTRAN ProServices in order to set up the automatic configuration back up.

ProCare Benefits

- "I Cannot afford my business to have communications downtime"
  - —Multiple technical support response time SLA's offered to meet your needs including after business hours support.
  - —Various levels of hardware replacement SLA's with options for onsite technicians.
  - —Automatic configuration back-ups ensuring quick recovery during downtime.
- Limited communications expertise
  - —ADTRAN ProCare can serve as an extension of your businesses IT staff, or act as your complete technical resource for ADTRAN solutions.
- "I have out of warranty ADTRAN products"
  - —Specific options designed to provide warranty-like feature extension (access to software and technical support) providing you peace of mind.
  - —You can add ProCare at any time, regardless of warranty status.
  - —Hardware replacement options are also available for most out of warranty products.

ADTRAN

ADTRAN ProCare Maintenance

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806
P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/presales

Where to Buy
888 423-8726
channel.sales@adtran.com
www.adtran.com/where2buy

ProServices
888 874-2237
proservices@adtran.com
www.adtran.com/proservices

Why Buy ProCare Basic Services?

- The ProCare Basic plan is ideal if you have an existing software assurance or software maintenance contract with ADTRAN today.
- ProCare Basic provides an extended warranty if you have an out of warranty product.

Why Buy ProCare Next Business Day Remote Services?

- The ProCare Next Business Day Remote (NBD Remote) plan is designed for our customers who require expedited hardware replacement with remote guidance for physical equipment replacement.
- ProCare NBD Remote balances the advantages of ProCare Basic with sensitivity to both price and on staff technical expertise.

Why Buy ProCare 7x24x4 Remote Services?

- The ProCare 7x24x4 Remote plan is ideal if you have mission critical equipment requiring the quickest route to hardware replacement.
- ProCare 7x24x4 Remote provides your IT staff with remote guidance to complete any necessary replacement.

Why Buy ProCare Next Business Day Onsite Services?

- The ProCare Next Business Day Onsite (NDB Onsite) plan ensures expedited hardware replacement.
- ProCare NBD Onsite provides you the value add of a technician to perform the hardware replacement and subsequent testing.

Why Buy ProCare 7x24x4 Onsite Maintenance?

- The ProCare 7x24x4 Onsite plan is ADTRAN's premium offering for your business when downtime is not an option.
- ProCare 7x24x4 Onsite provides 4 hour, expedited hardware replacement with an onsite technician 24 hours a day, 7 days a week!

Valuable additions that come with your ProCare plan?

- Access to technical support (see table on page 1 for specific SLAs).
- After-hours Emergency support, 7x24x365 (see table on page 1 for specific SLA's)
- Access to software releases and patches
- Discounted remote Professional Service Vouchers – PSVs (not included with Basic Maintenance)

ADTRAN ProCloud Wi-Fi

No Worry, Fully Managed Business-class Wi-Fi

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The Mobility Challenge

The era of mobility has transformed businesses of all sizes. Both enterprises and Small to Medium Businesses (SMBs) are seeing a surge in Bring Your Own Device (BYOD), allowing employees the freedom to communicate from any device and work from anywhere. At the same time, businesses are seeing an increasing number of their customers and partners needing Wi-Fi® access while on premises. All this is driving increased investments to build out the wireless network. However, as these businesses rush to expand their wireless networks they face key challenges:

- **Building a business-class wireless network:** With employees, customers and partners demanding access, combined with a growing a number of Wi-Fi enabled handheld devices, businesses need to invest in a more robust solution that can meet the increasingly complex wireless needs.
- **Need for reliable, always-on service:** The wireless network has moved from one of convenience to becoming a critical part of the business. Having a reliable, always-on wireless network is now a must.
- **Limited technical resources:** The complexity of installing and maintaining a business-class Wi-Fi network requires having dedicated IT staff or network managers, and this can quickly become expensive.
- **Security is a major concern:** Businesses need to ensure that guest/customer access is separate from business operations. In addition, the wireless network needs to be secure from hacking threats or rogue Access Points (APs).

The Solution—ProCloud Wi-Fi

ADTRAN® ProCloud™ Wi-Fi offers a "No Worry" fully managed, business-class Wi-Fi service, built on Bluesocket® virtual Wireless LAN (vWLAN). ProCloud Wi-Fi service is flexible and scalable, ensures a secure, always-on wireless network, provides proactive network monitoring and monthly management reports, and includes turn-key services to reduce IT support burdens.

Now businesses of all sizes can benefit from an enterprise class Wi-Fi network, while focusing their resources on what they do best—serving their customers.

Key Features

- Fully managed, cloud-based business-class Wi-Fi service
  - —Proactive 7x24 monitoring
  - —Technical issue resolution
  - —Hardware replacement
  - —Moves/adds/changes
- Plans starting at under $12 per month per AP
- Guaranteed 99.99% uptime
- Freedom to migrate to in-house management anytime
- Unmatched security with role-based access control, enforcement at the network edge and support for multiple encryption protocols
- Monthly management reports on network health and usage
- All software and firmware upgrades included free for the term of the agreement

ADTRAN

ADTRAN ProCloud Wi-Fi

No Worry, Fully Managed Business-class Wi-Fi

The ADTRAN Advantage

- Industry-first cloud-based vWLAN® solution
- Innovative high-availability architecture with "zero-packet-loss"
- Complete portfolio of on-premise and cloud-based connectivity solutions
- Secure, high-availability data centers ensures business continuity
- ADTRAN-certified, degreed engineers guarantee quality across all aspects of the service
- Industry-leading SLAs (NBD or 4-hour hardware replacement: 1-hour or 30-min phone response)
- Backed by award-winning, world-class support organization based in the United States

Features and Benefits

Affordable Business-class Wi-Fi
With ProCloud Wi-Fi, SMBs and educational institutions have access to an affordable business-class Wi-Fi that includes:

- The award-winning, cloud-based Bluesocket vWLAN
- Hosting and management supported by ADTRAN's infrastructure and resources
- Plans starting at under $12 per month per AP

"No Worry" Managed Service
ProCloud Wi-Fi offers a "No Worry", fully managed Wi-Fi service which includes:

- Proactive 7x24 monitoring
- Priority technical issue resolution
- Hardware replacement
- Moves/adds/changes
- Monthly reports
- Optional services including network planning and installation

Guaranteed Uptime
ProCloud Wi-Fi managed services ensures you have an always-on wireless network with:

- High-availability (HA), redundant datacenter infrastructure
- Guaranteed 99.99% uptime

Unmatched Security
The Bluesocket vWLAN solution has been built from the ground up to ensure highest levels of security with:

- Intelligent APs with built-in firewalls that detect and turn-away malicious attacks at the edge
- Role-based access and segmentation of guest and employee traffic to ensure secure computing environment
- Encrypted tunnels between APs and cloud-controller to ensure highest levels of security

Reporting
ProCloud Wi-Fi managed services provides detailed management reports to offer insight into system health:

- 24x7 network monitoring to proactively identify potential issues and optimize performance
- Monthly performance reports to monitor system health

Take Control Anytime
With ProCloud Wi-Fi and Bluesocket, customers have the freedom to migrate between deployment models

- Migrate to in-house hosting and management anytime, enabling business continuity
- Choice of management options (hardware or virtual) with lifetime AP license
- ADTRAN technical resources will assist for a smooth migration

ProServices Description

ProStart	
Assessment	
Remote site survey	Optional
Network diagram and application quote	Optional
Remediation quote (if required)	Optional
Remediation installation	Optional
Installation	
Project Manager to manage schedules and agreed deliverables, and to assist in data gathering	●
Project Engineer to help build configurations, verify ADTRAN solution, and participate in acceptance testing and customer training	●
Physical AP Installation	Optional
Cabling	Optional
Host configuration	●
Acceptance test	●
WLAN connection instructions leave behind	Optional
Configuration file, software and patch version, and network diagram secure storage	●
Basic customer training	Remote
Post-installation site survey	Optional

ProCloud	
Management and Support	
Network health monitoring and proactive alerts	●
Monthly network performance reports	●
After hours support for business impacting emergencies	●
Moves, adds, changes	●
Proactive issue resolution and notification	●
Hardware Maintenance	
Advance remote replacement of defective hardware (NBD)	●
Advance remote replacement of defective hardware (4 hour)	Optional
Software Maintenance	
On-going software updates scheduled and performed by ADTRAN	●

ADTRAN, Inc.
Attn: Enterprise Networks
901 Explorer Boulevard
Huntsville, AL 35806
P.O. Box 140000
Huntsville, AL 35814-4000

256 963-8000
256 963-8699 fax

General Information
800 9ADTRAN
info@adtran.com
www.adtran.com

Bluesocket Business Group
866-633-3358
vWLAN@adtran.com
www.adtran.com/bluesocket

Pre-Sales Technical Support
888 423-8726
application.engineer@adtran.com
www.adtran.com/presales

Post-Sales Technical Support
888 423-8726
support@adtran.com
www.adtran.com/support

Where to Buy
888 423-8726
channel.sales@adtran.com
www.adtran.com/where2buy

ACES Installation & Maintenance Service
888 874-2237
aces@adtran.com
www.adtran.com/support

Global Inquiries
256 963-8000
256 963-6300 fax
international@adtran.com

ADTRAN ProCloud Wi-Fi

No Worry, Fully Managed Business-class Wi-Fi

Ordering Information

Choose Your AP	PN
Bluesocket 1920 Indoor AP: 802.11a/b/g/n, 2x2:2, four internal MIMO antennas	1700954F1
Bluesocket 1925 Indoor AP: 802.11a/b/g/n, 2x2:2, four external RP-SMA connectors	1700955F1
Bluesocket 1930 Indoor AP: 802.11a/b/g/n, 3x3:3, six internal MIMO antennas	1700950F1
Bluesocket 1935 Indoor AP: 802.11a/b/g/n, 3x3:3, six external RP-SMA connectors	1700951F1
Bluesocket 1940 Outdoor AP: 802.11a/b/g/n, 3x3:3, six external N-type connectors	1700952F1

Choose Your ProCloud (per AP)	PN
ProCloud Wi-Fi Managed Service: • Hosting and management services • 99.99% system uptime, high-availability • 24x7 network monitoring and alerts • Network optimization • Proactive issue resolution • Moves/adds/changes • NBD/4-hour hardware replacement • Software upgrades • 1-hour/30-minute priority technical support response • Online access to support community	
ProCloud Wi-Fi (5x8xNBD) – 1-year	1100MSPM200112
ProCloud Wi-Fi (5x8xNBD) – 3-years	1100MSPM200136
ProCloud Wi-Fi (5x8xNBD) – 5-years	1100MSPM200160
ProCloud Wi-Fi (7x24x4) – 1-years	1100MSPM300112
ProCloud Wi-Fi (7x24x4) – 3-years	1100MSPM300136
ProCloud Wi-Fi (7x24x4) – 5-years	1100MSPM300160

ADTRAN Custom Extended Services
Description of Service Offering

On-Site Installation Services

This Description of Service Offering (DSO) is provided by ADTRAN, Inc. to describe the on-site installation services available for ADTRAN products under ADTRAN Custom Extended Services (ACES). This DSO combined with the ADTRAN Manufacturer's Warranty, the specific ACES Statement of Work (SOW) as applicable, the ACES Terms and Conditions, and the specific ACES installation items on the order cover the agreement between ADTRAN and the purchaser of the service from ADTRAN. Purchasers are encouraged to read this DSO carefully, as it contains details of the coverage offered, and the responsibilities associated with obtaining this service.

1. OVERVIEW

ADTRAN offers ACES installation services for Enterprise Networks Division customer premises equipment (CPE) and select Carrier Networks Division (Telco) equipment manufactured by ADTRAN, as well as for approved third party products as part of an overall ADTRAN solution. This document describes the installation services specific to ADTRAN products that are not covered by product-specific DSOs (e.g. Unified Communications and Wireless LAN solutions). ADTRAN solutions (hardware, software, and ACES services) are purchased by the End-User customer from a Channel Partner which may be either a Value Added Reseller (VAR) or a Network Service Provider (NSP) such as a telephone company. The Channel Partner may purchase the ADTRAN solution from an authorized distributor or directly from ADTRAN.

ACES offers two levels of installation services for most ADTRAN products: On-site and remote. This DSO specifically covers the services that are included with on-site installations. There is a separate DSO for remote installations.

ACES Staff Roles

For each on-site installation ACES provides staff to cover the following roles: Project Coordinator (PC), Project Manager (PM), Project Engineer (PE), and On-site Technician (OST).

The ACES Project Coordinator (PC) is the person that initially receives the order for the ACES Installation. The PC gathers and validates the preliminary information that is required to assign a Project Manager to the installation. The required information includes: one or more valid purchase orders, contact information for key project stakeholders, and a network diagram with sufficient detail to identify the ADTRAN components to be installed and all relevant network elements with which the ADTRAN components will integrate.

The ACES Project Manager (PM) is the primary point of contact for all stakeholders throughout the project. The PM will work with the project stakeholders remotely over the phone, via email, and using web collaboration tools throughout the project to coordinate all tasks and ensure the success of the installation.

The ACES Project Engineer (PE) will configure, stage, and test the system. Some of these tasks may be performed in an ACES staging center before the equipment is shipped to the End-User's place of business. The PE will also direct the efforts of the On-site Technician remotely over the phone during the physical installation.

The ACES On-site Technician (OST) will go to the End-User's place of business to physically install, configure, and test the equipment under the direction of the ACES PE (remotely over the phone) to ensure a working installation.

Installation Services

Upon receipt of a valid Purchase Order (PO) from the Channel Partner, the ACES PC will gather preliminary data in order to assign a PM to each installation. Once assigned to the project, the PM will coordinate detailed data gathering, staging and will serve as the primary point of contact for all stakeholders throughout the ACES installation.

For an ACES On-Site Installation the ACES team will:

1. Review and validate the application in which the equipment will be used
2. Provide Project Management Support and Coordination: Working remotely over the phone the ACES PM will gather circuit / network / application / End-User configuration parameters required for proper configuration of equipment; will schedule and conduct a site survey if applicable to verify that the site is physically ready for the installation using an ACES OST working under the direction of an ACES PE (remotely over the phone); coordinate the installation schedule among ACES, End-User, and other vendors / providers as needed; and monitor the installation process, escalating as necessary to the End-User, other vendors / providers, and within ADTRAN
3. Provide Project Engineering: The ACES PE will create and verify equipment configuration; configure, stage, and test configured equipment. Remotely over the phone the ACES PE will direct the on-site activities of the OST. Those activities include: unpacking, mounting of the equipment, connecting the equipment to the End-User's network, verify success of power-on self-test and diagnostics, testing the installed equipment and assist in testing the associated networks and applications to ensure proper operation.

Scheduling

The ACES PM will schedule the installation as soon as practical. The data gathering timeline will vary according to End-User's, Channel Partner's, and Service Provider's (i.e. telephone company) availability and/or responsiveness to ACES' requests for information. ACES requires a minimum scheduling interval after the End-User has confirmed the completeness and accuracy of all equipment and application data assembled by ACES in order to schedule the on-site installation tasks. In general that minimum scheduling interval is fifteen business days for NetVanta UC (covered under a separate DSO), ten business days for any service requiring ACES to install IP phones, and five business days for other products. These scheduling intervals ensure that there is sufficient time for ACES to acquire, configure, test, and ship the equipment per the End-User's specifications. These intervals may be accelerated only if ACES receives payment for an expedite fee and has the resources available to meet the requested installation date. Installation dates are not guaranteed until confirmed by the ACES PM.

2. CONTACTS FOR SUPPORT SERVICES

Purpose/Need	Contact	Hours of Operation	Contact Information
Questions about ACES Maintenance Plans	ACES Business Office	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	888-874-ACES (2237) aces@adtran.com www.adtran.com
Questions about ACES Installation, technical support during install	ACES Install Group	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	888-874-ACES (2237) aces.installation@adtran.com www.adtran.com
Technical Support (post-install)	ADTRAN Technical Support	Monday – Friday 7:00am-7:00pm Central excluding ADTRAN holidays Service affecting emergencies: 24 hours/day 7 days/week	888-4ADTRAN (423-8726) support@adtran.com supportforums.adtran.com
ACES Purchase Orders	ACES Business Office	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	Fax: 256-963-7956 Email: acespo@adtran.com

There may be a delayed response to inquiries submitted via the web or email. Critical issues and escalations should be submitted via telephone for fastest response.

3. CHANNEL PARTNER AND END-USER RESPONSIBILITIES

Purchasing ACES Installation Services

Purchase orders (POs) for ACES Installation must include the following:

1. ACES part number(s), quantity, and pricing;
2. End-User site information, including company name and street address (shipping address);

In order to facilitate the installation process it is helpful to include the following supplemental information on or with ACES Installation POs:

1. Channel Partner contact information including company name, billing address, contact name, email address and phone number;
2. Channel Partner or End-User installation coordinator contact information including name, email address, and phone number;
3. End-User site contact information, including name, phone number, and email address;
4. Equipment information, including hardware, maintenance, software, and software assurance PO number(s); and
5. ***Requested*** date of installation (PLEASE NOTE: Installation date is dependent upon many variables and is not guaranteed until confirmed by the ACES PM).

End-User Installation Responsibilities

To ensure a successful installation ACES requires the following End-User responsibilities:

1. Communicate with the ACES PM, providing appropriate advance notice for all changes;
2. Submit site and site contact information including company name, street address, contact name, email address, and phone number;
3. Collect and submit specific network configuration and technical information as requested. End-User can help to avoid schedule delays by ensuring that ACES receives complete information no later than three weeks prior to the requested installation date to allow for verification and equipment staging. Some examples of the needed information include:
    a. Network diagram of the application and all pertinent equipment. This diagram should include all of the proposed equipment and any existing equipment with which it is expected to interact (phone systems, routers, Ethernet switches, firewalls, wireless access points, paging systems, fax servers, etc.);
    b. Data network service parameters if applicable, such as quantity and types of Wide Area Network connections (Ethernet, T1, MPLS, Internet, VPN, etc.) and Local Area Network connections (Ethernet, Fast Ethernet, Gigabit Ethernet, Power over Ethernet, WiFi, etc.);
    c. Voice network service parameters if applicable, such as quantity and types of voice trunks (PRI, analog, SIP) and a phone extension list that includes a complete inventory of telephone numbers and the associated user names (voice, fax, IVR systems, alarm lines, etc.);
    d. Interface configuration and addressing information for other equipment with which the installed equipment will interoperate;
    e. Network security requirements and parameters, such as firewall rules and NAT configuration, port forwards; and
    f. Premises layout or floor plan to be used in planning equipment placement;
4. Verify and submit documentation of site qualifications to be sure that:
    a. Installation impacting results communicated from any on-site surveys have been resolved prior to installation
    b. The location meets the environmental requirements specified in the equipment documentation;

c. Physical mounting points and interfaces are compatible with the ADTRAN equipment;
d. Adequate electrical power and proper electrical ground bus bar is available and within six feet (cable length) of the ADTRAN equipment, protected by a surge protector or uninterruptable power supply (UPS);
e. Telephone and/or data circuit cables/jacks are labeled, mapped, terminated, fully installed with proper demarcation, have been tested and certified by the provider, and the points of demarcation are within six feet (cable length) of the ADTRAN equipment;
f. End-User premise wiring is installed, toned, tagged, and properly terminated. In general, properly installed standard Category 5 wiring is adequate;
g. Other equipment or networks to which the ADTRAN equipment is connected are available and accessible, all interfaces are compatible, and that the networks are capable and properly configured for carrying the network traffic;
h. Arrange for representatives of other vendors and providers (such as the telephone company, IT vendor, PBX vendor, wiring vendor, etc.) to be available during data gathering and at the time of installation as appropriate for configuration and testing of other equipment and networks with which the ADTRAN equipment interacts;

5. Provide secure remote broadband access (i.e., port forward via a Cable, DSL, etc.) to the equipment via the public Internet to allow testing, configuration, and maintenance. End-User must ensure that their network is properly secured;
6. Verify that all equipment, supplies, and materials have been received and are on-site and available before the installation commences;
7. Provide supplies and materials that are not provided by ACES but are required for the installation. Examples include: equipment racks, rack mount screws, patch cables, extension cords, etc.; and
8. Provide access to the equipment installation location at the time of arrival of the OST.
9. Secure the ADTRAN equipment by changing the passwords when the installation is complete.

The PM and/or PC will provide appropriate checklists and worksheets to assist the End-User in gathering and submitting the required information and in planning for the installation. In order to ensure that installations are successful and timely, ACES schedules resources in advance. Scheduling changes within five business days of a planned event or cancellations may result in additional costs to End-User. ACES encourages End-User to notify the PM of any requested schedule changes or cancellations as soon as practical.

Installation Acceptance and Warranty

The system will be considered "in service" when it has been physically installed, configured, and is capable of passing the End-User's traffic (voice and/or data). At this point ACES will notify the appropriate project stakeholders via email that the system is in service. This notification initiates the 30-calendar-day installation warranty, during which ACES will make configuration adjustments based on written customer requests to fine-tune the network parameters, provided remote access is available. The ACES PM will review these requests and schedule the changes provided they are within the scope of what was purchased. If the End-User has purchased an ACES maintenance plan then the maintenance plan will be activated on the same "in service" date as the beginning of the installation warranty. At the end of the 30-day installation warranty ACES will request email acceptance from the appropriate project stakeholder, indicating that the installation is complete and that the installed equipment is operating properly. No response to this email request for five business days will be considered a tacit acceptance that the installation is complete.

4. OUT OF SCOPE

Exclusions

ACES Installation Service does ***NOT*** include:

1. Implementation or installation of products for which there is no installation order, or for those products not described in the Statement of Work, including labor, hardware, cables, etc.
2. Equipment required to perform installation services at the End-User location
3. Troubleshooting or managing third party vendor issues
4. Services made necessary by failures related to misuse, neglect, accident, alteration, modification, or willful or negligent acts by the End-User or other parties beyond the control of ACES
5. Force majeure: acts of God, acts of public enemy, acts of government, freight embargoes, strikes, quarantine restrictions, unusually severe weather conditions, insurrection, riot, etc
6. Wiring or cabling: installation or modification of End-User's in-house wiring; extension of telephone company demarcation point (DMARC); ancillary materials such as power/extension cords
7. Racks, shelves, or wall boards: supply, assembly, installation of racks, shelves, wall boards or any other physical structure to which the covered equipment is mounted (unless specifically included in the ACES Statement of Work)
8. Optimization or troubleshooting of the End-User's network or applications

5. ADDITIONAL CHARGES FOR INSTALLATION SERVICES

Beyond the services offered as part of an ACES Installation, ADTRAN can arrange for additional services that are charged separately. Such expenses include:

1. Time and Materials (T&M): hourly rate for services performed beyond those covered by the specific ACES installation items that were purchased or the Statement of Work created for a project implementation by the assigned PM. With advance notice and at ACES PM discretion, ACES can arrange for the ACES PE or OST to perform work in addition to the tasks covered in ACES installation.
2. Site Not Ready (SNR), Rescheduling, or Cancellation: fees to cover costs of canceling or rescheduling the installation. ACES will waive these fees if five business days' notice is given.
3. Expedite: fixed rate surcharge to schedule the installation with less than the required scheduling interval. You may request that your installation process be accelerated. ACES will grant an expedite request and accept the fee only if the service personnel and equipment are available.

6. GENERAL INFORMATION

Language

Installation services are provided in English.

Invoicing of Installation Services

Upon completion of each phase of an installation, ADTRAN reserves the right to invoice ADTRAN's direct customer (typically the Channel Partner) for that portion of the installation service that has been completed and accepted by the appropriate project stakeholder to be in service or complete. ADTRAN further reserves the right to invoice the direct customer at the completion of each site installation, even in a case where multiple installation sites were submitted on a single purchase order.

Cancellation

ADTRAN reserves the right to cancel any installation project in whole or in part at ADTRAN's sole discretion. ADTRAN will submit its cancellation notice to the project stakeholders in writing and may then invoice any portion of the installation services performed on or prior to the date of cancellation. End-User or Channel Partner may cancel any pending installation service without penalty by submitting its cancellation notice in writing and this notice must be received prior to the occurrence of any combination of the following activities, otherwise charges may apply: 1) the shipment of any ADTRAN equipment purchased for installation, or 2) the performance of any fee-based service or site survey, or 3) the appointment of an ACES Project Manager.

ADTRAN Custom Extended Services
Description of Service Offering

Remote Installation Services

This Description of Service Offering (DSO) is provided by ADTRAN, Inc. to describe the remote installation services available for ADTRAN products under ADTRAN Custom Extended Services (ACES). This DSO combined with the ADTRAN Manufacturer's Warranty, the specific ACES Statement of Work (SOW) as applicable, the ACES Terms and Conditions, and the specific ACES installation items on the order cover the agreement between ADTRAN and the purchaser of the service from ADTRAN. Purchasers are encouraged to read this DSO carefully, as it contains details of the coverage offered, and the responsibilities associated with obtaining this service.

1. OVERVIEW

ADTRAN offers ACES installation services for Enterprise Networks Division customer premises equipment (CPE) and select Carrier Networks Division (Telco) equipment manufactured by ADTRAN, as well as for approved third party products as part of an overall ADTRAN solution. This document describes the installation services specific to ADTRAN products that are not covered by product-specific DSOs (e.g. Unified Communications and Wireless LAN solutions). ADTRAN solutions (hardware, software, and ACES services) are purchased by the End-User customer from a Channel Partner which may be either a Value Added Reseller (VAR) or a Network Service Provider (NSP) such as a telephone company. The Channel Partner may purchase the ADTRAN solution from an authorized distributor or directly from ADTRAN.

ACES offers two levels of installation services for most ADTRAN products: on-site and remote. This DSO specifically covers the services that are included with remote installations. There is a separate DSO for on-site installations.

ACES Staff Roles

For each remote installation ACES provides staff to cover the following roles: Project Coordinator (PC), Project Manager (PM), and Project Engineer (PE).

The ACES Project Coordinator (PC) is the person that initially receives the order for the ACES installation. The PC gathers and validates the preliminary information that is required to assign a Project Manager to the installation. The required information includes: one or more valid purchase orders, contact information for key project stakeholders, and a network diagram with sufficient detail to identify the ADTRAN components to be installed and all relevant network elements with which the ADTRAN components will integrate.

The ACES Project Manager (PM) is the primary point of contact for all stakeholders throughout the project. The PM will work with the project stakeholders remotely over the phone, via email, and using web collaboration tools throughout the project to coordinate all tasks and ensure the success of the installation.

The ACES Project Engineer (PE) will configure, stage, and test the system. Some of these tasks may be performed in an ACES staging center before the equipment is shipped to the End-User's place of business. The PE will also direct the efforts of the On-site Technician remotely over the phone during the physical installation.

Installation Services

Upon receipt of a valid Purchase Order (PO) from the Channel Partner, the ACES PC will gather preliminary data in

order to assign a PM to each installation. Once assigned to the project, the PM will coordinate detailed data gathering, staging and will serve as the primary point of contact for all stakeholders throughout the ACES installation.

For an ACES remote installation the ACES team will:

1. Review and validate the application in which the equipment will be used
2. Provide Project Management Support and Coordination: Working remotely over the phone the ACES PM will gather circuit / network / application / End-User configuration parameters required for proper configuration of equipment; coordinate the installation schedule among ACES, End-User, and other vendors / providers as needed; and monitor the installation process, escalating as necessary to the End-User, other vendors / providers, and within ADTRAN
3. Provide Project Engineering: The ACES PE will create and verify equipment configuration; configure, stage, and test configured equipment. Remotely over the phone the ACES PE will direct the on-site activities of the OST. Those activities include: unpacking, mounting of the equipment, connecting the equipment to the End-User's network, verify success of power-on self-test and diagnostics, testing the installed equipment and assist in testing the associated networks and applications to ensure proper operation.

Scheduling

The ACES PM will schedule the installation as soon as practical. The data gathering timeline will vary according to End-User's, Channel Partner's, and Service Provider's (i.e. telephone company) availability and/or responsiveness to ACES' requests for information. ACES requires a minimum scheduling interval after the End-User has confirmed the completeness and accuracy of all equipment and application data assembled by ACES in order to schedule the on-site installation tasks. In general that minimum scheduling interval is fifteen business days for NetVanta UC (covered under a separate DSO), ten business days for any service requiring ACES to install IP phones, and five business days for other products. These scheduling intervals ensure that there is sufficient time for ACES to acquire, configure, test, and ship the equipment per the End-User's specifications. These intervals may be accelerated only if ACES receives payment for an expedite fee and has the resources available to meet the requested installation date. Installation dates are not guaranteed until confirmed by the ACES PM.

2. CONTACTS FOR SUPPORT SERVICES

Purpose/Need	Contact	Hours of Operation	Contact Information
Questions about ACES Maintenance Plans	ACES Business Office	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	888-874-ACES (2237) aces@adtran.com www.adtran.com
Questions about ACES installation, technical support during install	ACES Install Group	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	888-874-ACES (2237) aces.installation@adtran.com www.adtran.com
Technical Support (post-install)	ADTRAN Technical Support	Monday – Friday 7:00am-7:00pm Central excluding ADTRAN holidays Service affecting emergencies: 24 hours/day 7 days/week	888-4ADTRAN (423-8726) support@adtran.com supportforums.adtran.com
ACES Purchase Orders	ACES Business Office	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	Fax: 256-963-7956 Email: acespo@adtran.com

There may be a delayed response to inquiries submitted via the web or email. Critical issues and escalations should be submitted via telephone for fastest response.

3. CHANNEL PARTNER AND END-USER RESPONSIBILITIES

Purchasing ACES Installation Services

Purchase orders (POs) for ACES installation must include the following:

1. ACES part number(s), quantity, and pricing;
2. End-User site information, including company name and street address (shipping address);

In order to facilitate the installation process it is helpful to include the following supplemental information on or with ACES installation POs:

1. Channel Partner contact information including company name, billing address, contact name, email address and phone number;
2. Channel Partner or End-User installation coordinator contact information including name, email address, and phone number;
3. End-User site contact information, including name, phone number, and email address;
4. Equipment information, including hardware, maintenance, software, and software assurance PO number(s); and
5. ***Requested*** date of installation (PLEASE NOTE: Installation date is dependent upon many variables and is not guaranteed until confirmed by the ACES PM).

Channel Partner or End-User Staff Role

Remote installations require that the Channel Partner or the End user provide a competent individual to serve as the On-site Technician (OST) under the direction of the ACES PE (remotely over the phone).

The OST will go to the End-User's place of business to physically install, configure, and test the equipment under the direction of the ACES PE (remotely over the phone) to ensure a working installation.

End-User Installation Responsibilities

To ensure a successful installation ACES requires the following End-User responsibilities:

1. Communicate with the ACES PM, providing appropriate advance notice for all changes;
2. Submit site and site contact information including company name, street address, contact name, email address, and phone number;
3. Collect and submit specific network configuration and technical information as requested. End-User can help to avoid schedule delays by ensuring that ACES receives complete information no later than three weeks prior to the requested installation date to allow for verification and equipment staging. Some examples of the needed information include:
    a. Network diagram of the application and all pertinent equipment. This diagram should include all of the proposed equipment and any existing equipment with which it is expected to interact (phone systems, routers, Ethernet switches, firewalls, wireless access points, paging systems, fax servers, etc.);
    b. Data network service parameters if applicable, such as quantity and types of Wide Area Network connections (Ethernet, T1, MPLS, Internet, VPN, etc.) and Local Area Network connections (Ethernet, Fast Ethernet, Gigabit Ethernet, Power over Ethernet, WiFi, etc.);
    c. Voice network service parameters if applicable, such as quantity and types of voice trunks (PRI, analog, SIP) and a phone extension list that includes a complete inventory of telephone numbers and the associated user names (voice, fax, IVR systems, alarm lines, etc.);
    d. Interface configuration and addressing information for other equipment with which the installed

equipment will interoperate;

e. Network security requirements and parameters, such as firewall rules and NAT configuration, port forwards; and
f. Premises layout or floor plan to be used in planning equipment placement;

4. Verify and submit documentation of site qualifications to be sure that:
   a. The location meets the environmental requirements specified in the equipment documentation;
   b. Physical mounting points and interfaces are compatible with the ADTRAN equipment;
   c. Adequate electrical power and proper electrical ground bus bar is available and within six feet (cable length) of the ADTRAN equipment, protected by a surge protector or uninterruptable power supply (UPS);
   d. Telephone and/or data circuit cables/jacks are labeled, mapped, terminated, fully installed with proper demarcation, have been tested and certified by the provider, and the points of demarcation are within six feet (cable length) of the ADTRAN equipment;
   e. End-User premise wiring is installed, toned, tagged, and properly terminated. In general, properly installed standard Category 5 wiring is adequate;
   f. Other equipment or networks to which the ADTRAN equipment is connected are available and accessible, all interfaces are compatible, and that the networks are capable and properly configured for carrying the network traffic;
   g. Arrange for representatives of other vendors and providers (such as the telephone company, IT vendor, PBX vendor, wiring vendor, etc.) to be available during data gathering and at the time of installation as appropriate for configuration and testing of other equipment and networks with which the ADTRAN equipment interacts;
5. Provide secure remote broadband access (i.e., port forward via a Cable, DSL, etc.) to the equipment via the public Internet to allow testing, configuration, and maintenance. End-User must ensure that their network is properly secured;
6. Verify that all equipment, supplies, and materials have been received and are on-site and available before the installation commences;
7. Provide supplies and materials that are not provided by ACES but are required for the installation. Examples include: equipment racks, rack mount screws, patch cables, extension cords, etc.; and
8. Provide access to the equipment installation location at the time of arrival of the OST.
9. Secure the ADTRAN equipment by changing the passwords when the installation is complete.

The PM and/or PC will provide appropriate checklists and worksheets to assist the End-User in gathering and submitting the required information and in planning for the installation. In order to ensure that installations are successful and timely, ACES schedules resources in advance. Scheduling changes within five business days of a planned event or cancellations may result in additional costs to End-User. ACES encourages End-User to notify the PM of any requested schedule changes or cancellations as soon as practical.

Installation Acceptance and Warranty

The system will be considered "in service" when it has been physically installed, configured, and is capable of passing the End-User's traffic (voice and/or data). At this point ACES will notify the appropriate project stakeholders via email that the system is in service. This notification initiates the 30-calendar-day installation warranty, during which ACES will make configuration adjustments based on written customer requests to fine-tune the network parameters, provided remote access is available. The ACES PM will review these requests and schedule the changes provided they are within the scope of what was purchased. If the End-User has purchased an ACES maintenance plan then the maintenance plan will be activated on the same "in service" date as the beginning of the installation warranty. At the end of the 30-day installation warranty ACES will request email acceptance from the appropriate project stakeholder, indicating that the installation is complete and that the

installed equipment is operating properly. No response to this email request for five business days will be considered a tacit acceptance that the installation is complete.

4. OUT OF SCOPE

Exclusions
ACES Installation Service does ***NOT*** include:

1. Implementation or installation of products for which there is no installation order, or for those products not described in the Statement of Work, including labor, hardware, cables, etc.
2. Equipment required to perform installation services at the End-User location
3. Troubleshooting or managing third party vendor issues
4. Services made necessary by failures related to misuse, neglect, accident, alteration, modification, or willful or negligent acts by the End-User or other parties beyond the control of ACES
5. Force majeure: acts of God, acts of public enemy, acts of government, freight embargoes, strikes, quarantine restrictions, unusually severe weather conditions, insurrection, riot, etc
6. Wiring or cabling: installation or modification of End-User's in-house wiring; extension of telephone company demarcation point (DMARC); ancillary materials such as power/extension cords
7. Racks, shelves, or wall boards: supply, assembly, installation of racks, shelves, wall boards or any other physical structure to which the covered equipment is mounted (unless specifically included in the ACES Statement of Work)
8. Optimization or troubleshooting of the End-User's network or applications

5. ADDITIONAL CHARGES FOR INSTALLATION SERVICES

Beyond the services offered as part of an ACES installation, ADTRAN can arrange for additional services that are charged separately. Such expenses include:

1. Time and Materials (T&M): hourly rate for services performed beyond those covered by the specific ACES installation items that were purchased or the Statement of Work created for a project implementation by the assigned PM. With advance notice and at ACES PM discretion, ACES can arrange for the ACES PE or OST to perform work in addition to the tasks covered in ACES installation.
2. Site Not Ready (SNR), Rescheduling, or Cancellation: fees to cover costs of canceling or rescheduling the installation. ACES will waive these fees if five business days' notice is given.
3. Expedite: fixed rate surcharge to schedule the installation with less than the required scheduling interval. You may request that your installation process be accelerated. ACES will grant an expedite request and accept the fee only if the service personnel and equipment are available.

6. GENERAL INFORMATION

Language
Installation services are provided in English.

Invoicing of Installation Services
Upon completion of each phase of an installation, ADTRAN reserves the right to invoice ADTRAN's direct customer (typically the Channel Partner) for that portion of the installation service that has been completed and accepted by the appropriate project stakeholder to be in service or complete. ADTRAN further reserves the right to invoice the direct customer at the completion of each site installation, even in a case where multiple installation sites were submitted on a single purchase order.

Cancellation

ADTRAN reserves the right to cancel any installation project in whole or in part at ADTRAN's sole discretion. ADTRAN will submit its cancellation notice to the project stakeholders in writing and may then invoice any portion of the installation services performed on or prior to the date of cancellation. End-User or Channel Partner may cancel any pending installation service without penalty by submitting its cancellation notice in writing and this notice must be received prior to the occurrence of any combination of the following activities, otherwise charges may apply: 1) the shipment of any ADTRAN equipment purchased for installation, or 2) the performance of any fee-based service or site survey, or 3) the appointment of an ACES Project Manager.

ADTRAN ProServices
Description of Service Offering
ProCare - Unified Communications Appliance Solutions

This Description of Service Offering (DSO) is provided by ADTRAN, Inc., to describe the support services generally available under ADTRAN ProCare Service Plans for ADTRAN's Unified Communications (UC) solutions. ADTRAN's UC solutions include the NetVanta 7000 Series IP PBX and IP phones for which ProCare Service Plans are available. These solutions are referred to as UC Appliance Solutions (UCAS). This DSO, along with the ADTRAN Manufacturer's Warranty, the ProCare Letter of Verification, and the ProServices Terms and Conditions cover the agreement between ADTRAN and the purchaser of these services (hereinafter referred to as "Customer"). ADTRAN recommends that Customers read the documents carefully, as they contain not only the details of the coverage offered by ADTRAN but also Customer responsibilities in obtaining service.

1. OVERVIEW

ADTRAN offers the following plans for ProCare Services on most UCAS products:

ProCare Service Plan	Technical Support	Replacement	On-Site Technician (OST) Arrival	Other Entitlements
Basic	Access to a Technical Support Engineer for non-service affecting emergencies is available Monday through Friday between the hours of 7am and 7pm central time excluding ADTRAN holidays. Access to a Technical Support Engineer for a service affecting emergency (severity level=critical) is available 7 days/week, 24 hours/day. The Technical Support Engineer will apply best effort to reach the contact person in a timely fashion.	NA	NA	Access to software releases and patches
Next Business Day Remote	Access to a Technical Support Engineer for non-service affecting emergencies is available Monday through Friday between the hours of 7am and 7pm central time excluding ADTRAN holidays. Access to a Technical Support Engineer for a service affecting emergency (severity level=critical) is available 7 days/week, 24 hours/day. The response time for a Technical Support Engineer to attempt to reach the contact person on the case will be no more than 30 business minutes after the case is logged, for support cases opened via telephone.	Equipment determined by ADTRAN to be defective will be dispatched to the site for arrival no later than 5pm local time on the next business day. It is the customer's responsibility to return the failed unit to ADTRAN.	NA	Access to software releases and patches Automatic configuration backup of AOS devices Discount on purchase of remote Professional Service Vouchers (PSVs)

Description of Service Offering – ProCare - UC Solutions

ProCare Service Plan	Technical Support	Replacement	On-Site Technician (OST) Arrival	Other Entitlements
Next Business Day On-Site	Access to a Technical Support Engineer for non-service affecting emergencies is available Monday through Friday between the hours of 7am and 7pm central time excluding ADTRAN holidays. Access to a Technical Support Engineer for a service affecting emergency (severity level=critical) is available 7 days/week, 24 hours/day. The response time for a Technical Support Engineer to attempt to reach the contact person on the case will be no more than 30 business minutes after the case is logged, for support cases opened via telephone.	Equipment determined by ADTRAN to be defective will be dispatched to the site for arrival no later than 5pm local time on the next business day. The OST will be responsible for pick up and return to ADTRAN of defective equipment.	An OST will travel to the site to install the replacement unit no later than 5:00pm local site time on the next business day	Access to software releases and patches Automatic configuration backup of AOS devices Discount on purchase of remote Professional Service Vouchers (PSVs)
7x24x4 Remote	Access to a Technical Support Engineer for non-service affecting emergencies is available Monday through Friday between the hours of 7am and 7pm central time excluding ADTRAN holidays. Access to a Technical Support Engineer for a service affecting emergency (severity level=critical) is available 7 days/week, 24 hours/day. The response time for a Technical Support Engineer to attempt to reach the contact person on the case will be no more than 30 minutes after the case is logged, for support cases opened via telephone.	Equipment determined by ADTRAN to be defective will be dispatched to the site for arrival within 4 hours of the determination of failure by an ADTRAN representative.	NA	Access to software releases and patches Automatic configuration backup of AOS devices Discount on purchase of remote Professional Service Vouchers (PSVs)
7x24x4 On-Site	Access to a Technical Support Engineer for non-service affecting emergencies is available Monday through Friday between the hours of 7am and 7pm central time excluding ADTRAN holidays. Access to a Technical Support Engineer for a service affecting emergency (severity level=critical) is available 7 days/week, 24 hours/day. The response time for a Technical Support Engineer to attempt to reach the contact person on the case will be no more than 30 minutes after the case is logged, for support cases opened via telephone.	Equipment determined by ADTRAN to be defective will be dispatched to the site for arrival within 4 business hours of the determination of failure by an ADTRAN representative. The OST will be responsible for pick up and return to ADTRAN of defective equipment.	An OST will travel to the site to install the replacement unit within 4 business hours of determination of failure by an ADTRAN representative.	Access to software releases and patches Automatic configuration backup of AOS devices Discount on purchase of remote Professional Service Vouchers (PSVs)

(Please refer to www.adtran.com for the most current plan descriptions.)

Severity Level Classifications

Upon receipt of trouble report, ADTRAN will evaluate the issue and classify into one of the following severity levels based upon the following criteria:

Severity Level	Severity Classification Criteria
Critical	Critical system or service outage in a live environment that results in a severe degradation of overall network performance and/or significant reduction in capacity.
High	Intermittent degradation of system or service performance that impacts Customer service quality or impairs network operator control or operational effectiveness. Also includes loss of redundancy or diagnostic capabilities.
Medium	Minor degradation of system or service performance that does not impact Customer service quality and minimal impact on network operations.
Low	No impact on system or network operation. Information requests or standard questions on configuration or functionality of equipment.

Coverage Availability

With 7x24, coverage is available any day, any time, including holidays. 5x8 coverage is available Monday through Friday (excluding holidays), 8:00am to 5:00pm local time in the continental USA and Canada. For 5x8 coverage, all service time is measured in "business hours." Holidays are subject to change in each calendar year, but may include New Year's Day, MLK Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and the day after Thanksgiving, Christmas Eve and Christmas Day. Business days are Monday through Friday, excluding holidays.

Advance Hardware Replacement

In the event ADTRAN determines a covered hardware product is defective during the term of the ProCare Service Plan, an advance hardware replacement will be dispatched for delivery in accordance with the plan purchased. Advance hardware replacement is subject to ADTRAN's determination that the hardware product is defective and that the issue is not due to some other component of the system, mis-configuration, or misuse of the product. ADTRAN will use commercially reasonable efforts to ship an advance hardware replacement unit of the same or equivalent model type within one business day via an established overnight delivery service or equal method (where available). Destination country importation, compliance with U.S. export controls, and customs processes may condition actual delivery times.

On-Site Technician

Four-hour on-site coverage guarantees arrival of an ADTRAN authorized On-site Technician (OST) within four hours from the determination by ADTRAN that the equipment has failed. NBD coverage guarantees arrival of an ADTRAN authorized OST on the next business day (Monday through Friday, excluding holidays). All on-site coverage includes transportation of replaced equipment back to ADTRAN via the OST.

Configuration Backup/Restoration

ProCare Service Plans for NetVanta 7000 Series devices include periodic backup of the system configuration as long as the system can communicate with the ADTRAN n-Command MSP server over the Internet and the backup commands are properly configured. In the event of a hardware failure, at Customer's request, ADTRAN will provide the latest backed-up version of the configuration to the Customer. By default changes to system configuration will be backed up each time the configuration is modified.

If ProStart did not install the NetVanta 7000 Series device that is covered under an ProCare Service Plan then the Customer must have their qualified installer of the equipment contact ADTRAN Technical Support to request activation of system configuration backup. Upon receipt of instructions from ADTRAN, the installer must configure the equipment for backup. An ADTRAN Support Representative will verify the proper configuration of the backup service by the installer. To qualify for backup of the system configuration, Customer must provide ADTRAN with continuous broadband access to the covered equipment.

Software Support

During the ProCare Service Plan term, the Customer is entitled to software releases and patches licensed by the Customer in conjunction with the applicable ADTRAN UCAS hardware products for which the ProCare Service Plan has been purchased (upgrades and updates, but excluding separately sold modules). Such software releases and patches are made available through ADTRAN's website. Any use of ADTRAN software products not properly licensed by ADTRAN, or software releases when a ProCare Service Plan is not in effect are a direct violation of the applicable license agreement, with the exception of any patches provided under the ADTRAN warranty program.

Supported Software Version Policy

ADTRAN will provide a support for ADTRAN software for current and the last most recent historical release of such software.

2. CONTACTS FOR SUPPORT SERVICES

Most questions can be answered by visiting the ADTRAN website at www.adtran.com or the ADTRAN Support Community at https://supportforums.adtran.com. If you still require assistance, please contact the appropriate department:

Purpose/Need	Contact	Hours of Operation	Contact Information
Questions about ProCare Service Plan	ProService Sales Operations	Monday – Friday 8:00am-5:00pm Central Time excluding ADTRAN holidays	888-874-2237 256-963-8716 proservices@adtran.com www.adtran.com
Questions about ProStart Installation, technical support during install	ProStart Install Group	Monday – Friday 8:00am-5:00pm Central Time excluding ADTRAN holidays	888-874-2237 256-963-8716 prostart@adtran.com www.adtran.com
Technical Support (post-install)	ADTRAN Technical Support	Monday – Friday 7:00am-7:00pm Central Time excluding ADTRAN holidays Service affecting emergencies: 24 hours/day 7 days/week	888-874-2237 256-963-8716 support@adtran.com supportforums.adtran.com
ProServices Purchase Orders	ProService Sales Operations	Monday – Friday 8:00am-5:00pm Central Time excluding ADTRAN holidays	Fax: 256-963-7956 Email: proservices.po@adtran.com

Customer acknowledges that there may be a delayed response to inquiries submitted via the web ticket or email. Critical issues and escalations should be submitted via telephone for fastest response.

3. CUSTOMER RESPONSIBILITIES

Purchasing ProCare Services

Customer must submit to ADTRAN a valid purchase order (PO) for ProCare Services including:

1. Equipment identification, including part number and serial number(s) for all covered equipment, including modules
2. ProCare part number appropriate for equipment and for desired term length
3. Quantity of ProCare part number (considering term included in part number)
4. Price
5. Coverage dates, if specific dates needed (must match item #3)
6. Channel Partner (reseller or carrier) contact information, including name, phone number, email address, and billing address
7. End-user site information, including company name, street address, and equipment location including zip code
8. End-user site contact information, including name, phone number, and email address
9. PO number
10. PO number(s) for the original purchase of the hardware to be covered by the ProCare Service Plans(s)
11. PO number(s) for the original ProStart installation of the hardware to be covered by the ProCare Service Plans(s) if ADTRAN ProStart performed the installation

Stable Installation

Customer must verify that the equipment is properly installed and is located in a suitable environment as specified in the equipment's documentation. When the installation is performed by ProStart and the "in service" date is accepted in writing by the Customer, this requirement is automatically met, and coverage begins on the "in service" date. For non-ADTRAN installations, installation issues are the responsibility of the Customer. ProCare Service coverage may begin after the network in which the equipment is installed is functional and stable. ADTRAN reserves the right to require and execute a fee-based network assessment prior to accepting a purchase order for ProCare Service on UC systems not installed by ADTRAN ProStart.

Relocation

Customer must notify ADTRAN at least 30 days in advance of relocating covered equipment to ensure that replacement equipment and OST personnel are available in the new location.

No Modification

The Customer agrees not to modify, enhance, or otherwise alter the ADTRAN product except as expressly described or authorized in ADTRAN's Technical Reference Manuals, User Manuals, or Help Files, unless the prior written consent of ADTRAN is obtained.

Broadband Access

Customer must provide ADTRAN with secure remote broadband access (i.e., port forward via a Cable, DSL, etc.) and login credentials for the equipment for configuring, monitoring, troubleshooting, testing, and for configuration management. Dial-up modem access does not provide adequate bandwidth to provide proper support under ProCare. Broadband connectivity must be continuous to ensure ADTRAN continues to provide the full range of support services. ADTRAN reserves the right to deny service for any product for which remote access is not available. Specific circumstances, especially as they may relate to certain compliance regulations, may affect the existence or extent of remote access available to ADTRAN. In any such instance where ADTRAN's access may be limited, ADTRAN reserves the right to deny or delay services to the Customer. Customer must ensure that their network is properly secured.

Problem Reporting Procedures

When reporting an issue to ADTRAN technical support, the Customer will be required to provide the following information:

- Customer contact information including:
  - Company name which appears on the ProCare Letter of Verification
  - Contact name
  - Call back telephone number
  - Valid email address
- Model Number
- Serial Number
- ProCare Service Plan number
- Nature of the issue
- Circumstances under which the issue was encountered
- Technical information relating to the operating environment
- The steps, if any, that Customer took immediately following the issue
- The immediate impact of the issue upon the ability of Customer's network to function

On-site Technician

When dispatched for on-site support, Customer must allow the ADTRAN authorized OST access to the covered equipment within 30 minutes of arrival.

Shipping / Return of Equipment

If a request for service under an ProCare Service Plan results in the dispatch of advance replacement equipment, the Customer is responsible for shipping the replaced products to ADTRAN within thirty (30) days. If the Customer fails to ship the defective products to ADTRAN within thirty (30) days, ADTRAN will invoice the Customer the list price for the hardware. If the plan includes dispatch of an OST to install the equipment, ADTRAN is responsible for the return, via the OST, of the defective equipment.

Trained Personnel

The Customer will ensure that all of its personnel who request support under the ProCare Service Plan are familiar with the UC products to the extent necessary for them to operate with reasonable

competence. Without limiting the generality of the foregoing, Customer will cause all Customer Technical Personnel to complete such training and instruction as ADTRAN may reasonably require from time to time. Upon the appointment of any new Technical Personnel, Customer will take reasonable steps to expeditiously train the new individual to appropriate standards of technical competence.

Personnel Access

The Customer agrees to grant ADTRAN any needed access to the Customer's systems and personnel concerned with the operation of the ADTRAN product to enable ADTRAN to provide ProCare Services as defined in this DSO.

Installation of Software Releases or Patches

The Customer will be responsible for installing any software releases or patches to obtain new features. If the covered unit encounters a software problem ADTRAN will be responsible for providing assistance to upgrade the unit under ProCare Services support.

Error Documentation

Upon detection of any error or defect in the ADTRAN product, the Customer, as requested by ADTRAN, agrees to provide ADTRAN a listing of output (trace or log data) and any other data, including database and backup systems, that ADTRAN reasonably may request in order to reproduce operating conditions similar to those present when the error occurred.

4. OUT OF SCOPE

Exclusions

ADTRAN ProCare Service does ***NOT*** include:

1. Coverage for UC systems not installed by ProStart installation, without network assessment and approval by ADTRAN.
2. Any problems with equipment not listed on the Letter of Verification, such as other equipment on the customer premises or in the telephone company or service provider's network
3. Services made necessary by failures related to misuse, neglect, accident, alteration, modification, or willful or negligent acts by the Customer.
4. Equipment that has been altered or modified by non-ADTRAN representatives or damaged due to negligence or willful act or omission, or used other than as specified in the ADTRAN-supplied documentation
5. Support for problems caused by other devices in the network; resolution of software or hardware incompatibilities with third party products
6. Troubleshooting with individuals who are unfamiliar and untrained in the operation of ADTRAN equipment and/or software.
7. Failures due to Customer supplied cabling or power.
8. Training.
9. Force majeure: acts of God, acts of public enemy, acts of government, freight embargoes, strikes, quarantine restrictions, unusually severe weather conditions, insurrection, riot, and other such causes beyond our control.
10. Problems with the covered equipment that existed before the commencement of coverage.

11. Wiring or cabling: supply, assembly, installation, maintenance or support of racks, shelves, or any other physical structure to which the covered equipment is mounted (unless specifically included in the ProCare Service Plan); ancillary materials such as power/extension cords.
12. Damage caused by electrical stress, including power fluctuations or lightning.
13. Design or optimization of the customer's network or the applications that run on it.
14. Configuration changes required to accommodate changes in the design of the network, or the addition, deletion, or relocation of covered equipment.
15. Reconfiguration of replacement equipment when, a) covered equipment is ineligible or not activated for configuration backup, and b) the original configuration is not accessible from the failed unit, and c) a backup copy is not provided by the customer, and d) configuration from scratch cannot be completed within two hours.
16. Multi-vendor meetings, except when it is suspected by ADTRAN that the covered equipment has failed.
17. Software upgrades, except when the upgrade is recommended by ADTRAN Technical Support to address a problem on the equipment under a ProCare Service Plan.
18. Implementation or consulting services
19. Move-add-change (MAC) services. MAC services are offered by ADTRAN separately from ProCare Service Plans

Additional Charges for ProCare Services

Beyond the services offered as part of a ProCare Service Plan, ADTRAN can arrange for additional services, which are charged separately. Such expenses include:

1. Time and Materials (T&M): hourly rate for services performed beyond those covered by ProCare. At Customer's request, ADTRAN can arrange for an on-site visit by an authorized OST.

2. No Trouble Found (NTF): fee to cover costs of dispatching replacement equipment and/or an OST to a Customer site without ADTRAN Technical Support Engineer (TSE) determination of failure of that equipment. This fee will become payable when the problem is determined to be something other than the covered equipment. NTF is waived when an ADTRAN TSE determines that the covered equipment has failed. NTF for equipment is a flat rate; NTF for an OST is at T&M rates.

3. Expedite: fixed rate surcharge to commence coverage earlier than the normal start date. Customer may request that coverage start earlier than normal processing allows. The expedite fee helps to offset the additional costs of special processing and rush shipment of equipment to the appropriate depot. ADTRAN will grant an expedite request and accept the fee only if the service and equipment are available.

4. Site Not Ready (SNR): fixed rate surcharge to be levied in any instance where a Customer is not available to accept replacement equipment at the designated date/time, necessitating a subsequent delivery attempt. Replacement equipment will only be delivered to street addresses accessible by common carriers, and for which the Customer's representative is available to confirm its acceptance by signature.

5. Return Shipping: the cost of returning defective/replaced equipment to ADTRAN; waived for plans that include on-site service. Equipment that is replaced under ProCare coverage becomes the property of ADTRAN. For ProCare Service Plans that include on-site service, the

OST will collect the replaced equipment and return it to ADTRAN at no additional cost. For plans that do not include on-site service, Customer is responsible for returning the replaced equipment to ADTRAN, including the shipping cost.

6. Non-returned Equipment: For those plans where the customer is responsible for shipping the failed equipment to ADTRAN, this charge will be imposed for equipment belonging to ADTRAN that is not received within 30 days. Non-returned equipment is invoiced to Customer at the then current list price.
7. Excessive Wait Time: hourly rate for periods during which the OST is unable to perform the service because of a non-ADTRAN issue. If a non-ADTRAN problem prevents the OST from starting or continuing the service, Customer may choose to keep the OST on site until that problem is resolved. Time accrual begins upon thirty minutes of inactivity and is billed in one-hour increments at the T&M rate.

5. GENERAL INFORMATION

Service Plan Renewal

ProCare Service Plans are initially in effect for the period shown on the Letter of Verification. Coverage may be renewed by sending a complete and correct purchase order to the ProServices Sales Operations. If equipment and/or services are still available, coverage will be extended without interruption provided the valid purchase order is received prior to the expiration date of the current coverage. In the event of a lapse between the expiration date and our receipt of a valid purchase order, ADTRAN may require a 30-day reinstatement period to ensure that equipment and services are available and that the equipment for which coverage renewal is desired is still in proper working order. The original manufacturer's warranty applies regardless of any lapse in ProCare coverage.

Commencement of ProCare Coverage

ProCare Service Plan coverage begins up to 30 days after a valid purchase order is received by ADTRAN. For all four-hour or on-site plans, ADTRAN requires a period of up to 30 days to ensure proper staffing and stocking of local depots to cover the equipment site. If a ProStart Installation and the ProCare Service Plan are purchased at the same time, coverage begins immediately upon customer acceptance of the "in service" date of the installation. If a ProCare Service Plan is purchased after the installation is complete, a waiting period of up to 30 days will be required to adjust product depot inventories accordingly.

Lapsed Support

After any lapse of a ProCare Service Plan through the termination or expiration of the plan (other than ADTRAN's termination for Customer's breach), the parties subsequently may elect to reinstate such ProCare Service Plan for ADTRAN Products for which the plan lapsed upon the terms and conditions set forth in this DSO; provided the Customer agrees to pay for the period of time that has lapsed as well as the Renewal Term and such ADTRAN products must be in good working condition as determined by ADTRAN.

Refusal of Coverage

ADTRAN reserves the right to refuse a purchase order for ProCare Services for any reason, including, but not limited to: four-hour replacement or on-site coverage for sites outside the four hour range of dispatch locations, installations not performed by ADTRAN, or incomplete purchase order.

Cancellation

The customer may, at its discretion, cancel any portion of the plan for any reason, during the plan term; however, all ProCare Services are 100% non-refundable.

Language

Technical Support is provided in English.

Closing a Support Case

ADTRAN's Customer Support staff will contact the Customer to determine if the issue is resolved. Any case for which a resolution has been provided and for which no Customer response can be obtained for two business days will be automatically closed without direct approval of the Customer.

ADTRAN Custom Extended Services
Description of Service Offering

On-Site Installation Services – Wireless Local Area Networking

This Description of Service Offering (DSO) is provided by ADTRAN, Inc. to describe the on-site installation services available for ADTRAN's Wireless Local Area Networking (WLAN) solutions under ADTRAN Custom Extended Services (ACES). This DSO combined with the ADTRAN Manufacturer's Warranty, the WLAN-specific ACES Statement of Work (SOW) as applicable, the ACES Terms and Conditions, and the specific ACES installation items on the order cover the agreement between ADTRAN and the purchaser of the service from ADTRAN. Purchasers are encouraged to read this DSO carefully, as it contains details of the coverage offered, and the responsibilities associated with obtaining this service.

1. OVERVIEW

ADTRAN offers ACES installation services for Enterprise Networks Division customer premises equipment (CPE) and select Carrier Networks Division (Telco) equipment manufactured by ADTRAN, as well as for approved third party products as part of an overall ADTRAN solution. This document describes the installation services specific to ADTRAN's Wireless Local Area Networking (WLAN) solutions which include products branded as "Bluesocket" and products branded as "NetVanta." ADTRAN solutions (hardware, software, and ACES services) are purchased by the End-User customer from a Channel Partner which may be either a Value Added Reseller (VAR) or a Network Service Provider (NSP) such as a telephone company. The Channel Partner may purchase the ADTRAN solution from an authorized distributor or directly from ADTRAN.

ACES offers two levels of installation services for ADTRAN's WLAN products: on-site and remote. This DSO specifically covers the services that are included with On-site WLAN Installations. There is a separate DSO for remote installations.

ACES Staff Roles
For each on-site installation ACES provides staff to cover the following roles: Project Coordinator (PC), Project Manager (PM), Project Engineer (PE), and On-site Technician (OST).

The ACES Project Coordinator (PC) is the person that initially receives the order for the ACES installation. The PC gathers and validates the preliminary information that is required to assign a Project Manager to the installation. The required information includes: one or more valid purchase orders, contact information for key project stakeholders, and a network diagram with sufficient detail to identify the ADTRAN WLAN solution components to be installed and all relevant network elements with which the WLAN solution will integrate.

The ACES Project Manager (PM) is the primary point of contact for all stakeholders throughout the project. The PM will work with the project stakeholders remotely over the phone, via email, and using web collaboration tools throughout the project to coordinate all tasks and ensure the success of the installation.

The ACES Project Engineer (PE) will configure, stage, and test the system. Some of these tasks may be performed in an ACES staging center before the equipment is shipped to the End-User's place of business. The PE will also direct the efforts of the On-site Technician remotely over the phone during the physical installation.

The ACES On-site Technician (OST) will go to the End-User's place of business to physically install, configure, and

test the equipment under the direction of the ACES PE (remotely over the phone) to ensure a working installation.

Pre-Installation Services

To ensure a professional deployment that will meet the End-user's expectations, ACES strongly recommends that the optional ACES remote "Predictive Site Survey" be completed prior to installation. Though the site survey does not guarantee every aspect of the network, such surveys are designed to provide for the optimum deployment and placement of wireless access points (WAPs). The predictive site survey requires that the End-User provide to ACES a scaled floor plan of their facility, a general description of the building materials, and the number of users that will utilize the WLAN. ACES will use that information to model the End-User's environment using a WLAN modeling software package. The software will produce a report with recommendations of how many WAPs are required and diagrams indicating where they should be placed for optimal signal coverage. This survey is not included with the installation service. It is a service that must be ordered separately.

Installation Services

Upon receipt of a valid purchase order (PO) from the Channel Partner, the ACES PC will gather preliminary data in order to assign a PM to each installation. Once assigned to the project, the PM will coordinate detailed data gathering, staging and will serve as the primary point of contact for all stakeholders throughout the ACES installation.

For an ACES On-Site WLAN Installation the ACES team will:

1. Review and validate the application in which the equipment will be used
2. Provide Project Management Support and Coordination: Working remotely over the phone the ACES PM will gather circuit / network / application / End-User configuration parameters required for proper configuration of equipment; coordinate the installation schedule among ACES, End-User, and other vendors / providers as needed; and monitor the installation process, escalating as necessary to the End-User, other vendors / providers, and within ADTRAN
3. Provide Project Engineering: The ACES PE will create and verify equipment configuration; configure, stage, and test configured equipment. Remotely over the phone the ACES PE will direct the on-site activities of the ACES OST. Those activities include: unpacking, mounting of the equipment, connecting the equipment to the End-User's network, verify success of power-on self-test and diagnostics, testing the installed equipment and assist in testing the associated networks and applications to ensure proper operation.

Post-Installation Services

To ensure that the installation provided the signal coverage and throughput that was forecast in the predictive site survey ACES offers an optional on-site post-installation survey to measure the signal strength and throughput values. In this survey ACES will dispatch an ACES OST with a laptop running site survey software to measure the signal strength and signal to noise ratio at various points in the End-User's production environment. This information can be used to identify sources that interfere with the WLAN signal and to determine if WAPs should be moved or if more WAPs are required to provide the desired coverage and throughput. This survey is not included with the installation service. It is a service that must be ordered separately.

Scheduling

The ACES PM will schedule the installation as soon as practical. The data gathering timeline will vary according to End-User's, Channel Partner's, and Service Provider's (i.e. telephone company) availability and/or responsiveness to ACES' requests for information. ACES requires a minimum scheduling interval after the End-User has confirmed the completeness and accuracy of all equipment and application data assembled by ACES in order to schedule the on-site installation tasks. In general that minimum scheduling interval is fifteen business days for

NetVanta UC (covered under a separate DSO), ten business days for any service requiring ACES to install IP phones or wireless access points, and five business days for other products. These scheduling intervals ensure that there is sufficient time for ACES to acquire, configure, test, and ship the equipment per the End-User's specifications. These intervals may be accelerated only if ACES receives payment for an expedite fee and has the resources available to meet the requested installation date. Installation dates are not guaranteed until confirmed by the ACES PM.

2. CONTACTS FOR SUPPORT SERVICES

Purpose/Need	Contact	Hours of Operation	Contact Information
Questions about ACES Maintenance Plans	ACES Business Office	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	888-874-ACES (2237) aces@adtran.com www.adtran.com
Questions about ACES Installation, technical support during install	ACES Install Group	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	888-874-ACES (2237) aces.installation@adtran.com www.adtran.com
Technical Support (post-install)	ADTRAN Technical Support	Monday – Friday 7:00am-7:00pm Central excluding ADTRAN holidays Service affecting emergencies: 24 hours/day 7 days/week	888-4ADTRAN (423-8726) support@adtran.com supportforums.adtran.com
ACES Purchase Orders	ACES Business Office	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	Fax: 256-963-7956 Email: acespo@adtran.com

There may be a delayed response to inquiries submitted via the web or email. Critical issues and escalations should be submitted via telephone for fastest response.

3. CHANNEL PARTNER AND END-USER RESPONSIBILITIES

Purchasing ACES Installation Services

Purchase orders (POs) for ACES Installation must include the following:

1. ACES part number(s), quantity, and pricing;
2. End-User site information, including company name and street address (shipping address);

In order to facilitate the installation process it is helpful to include the following supplemental information on or with ACES Installation POs:

1. Channel Partner contact information including company name, billing address, contact name, email address and phone number;
2. Channel Partner or End-User installation coordinator contact information including name, email address, and phone number;
3. End-User site contact information, including name, phone number, and email address;
4. Equipment information, including hardware, maintenance, software, and software assurance PO number(s); and
5. ***Requested*** date of installation (PLEASE NOTE: Installation date is dependent upon many variables and is not guaranteed until confirmed by the ACES PM).

End-User Installation Responsibilities

To ensure a successful installation ACES requires the following End-User responsibilities:

1. Communicate with the ACES PM, providing appropriate advance notice for all changes;
2. Submit site and site contact information including company name, street address, contact name, email address, and phone number;
3. Collect and submit specific network configuration and technical information as requested. End-User can help to avoid schedule delays by ensuring that ACES receives complete information no later than three weeks prior to the requested installation date to allow for verification and equipment staging. Some examples of the needed information include:
    a. Network diagram of the application and all pertinent equipment. This diagram should include all of the proposed equipment and any existing equipment with which it is expected to interact (Power over Ethernet (PoE) switches, Wi-Fi phones, scanners, firewalls, routers, etc.);
    b. Network service parameters, such as numbers of WLAN users, Wi-Fi protocols (IEEE 802.11 a/b/g/n), SSIDs, authentication, encryption, etc.;
    c. Interface configuration and addressing information for other equipment with which the installed equipment will interoperate;
    d. Network security requirements and parameters, such as firewall rules and NAT configuration, port forwards; and
    e. Premises layout or floor plan diagram(s) for the requested wireless coverage areas and recommended placement of wireless access points (WAPs). If the optional ACES Predictive Site Survey was not purchased then it is the End-User's responsibility to specify the location for each WAP to be installed.
4. Verify and submit documentation of site qualifications to be sure that:
    a. All WAP mounting points are accessible with a standard 12 foot portable ladder (no lifts)
    b. The location meets the environmental requirements specified in the equipment documentation;
    c. Physical mounting points and interfaces are compatible with the ADTRAN equipment;
    d. Adequate electrical power and proper electrical ground bus bar is available and within six feet (cable length) of the ADTRAN equipment, protected by a surge protector or uninterruptable power supply (UPS);
    e. If the WAPs are not going to receive power from a PoE switch then the End-user must ensure that there is 120 VAC / 60 HZ power available within six feet (cable length) of the recommended placement point for each of the WAPs;
    f. End-User premises wiring is installed, toned, tagged, and properly terminated. In general, properly installed standard Category 5 wiring with RJ45 connectors is adequate. ADTRAN strongly encourages the End-user to allow for cable tolerance should minor WAP placement adjustments be needed;
    g. Other equipment or networks to which the ADTRAN equipment is connected are available and accessible, all interfaces are compatible, and that the networks are capable and properly configured for carrying the network traffic;
    h. Arrange for representatives of other vendors and providers (such as the telephone company, IT vendor, wiring vendor, PBX vendor, etc.) to be available during data gathering and at the time of installation as appropriate for configuration and testing of other equipment and networks with which the ADTRAN equipment interacts;
5. Provide secure remote broadband access (i.e., port forward via a Cable, DSL, etc.) to the equipment via the public Internet to allow testing, configuration, and maintenance. End-User must ensure that their network is properly secured;
6. Verify that all equipment, supplies, and materials have been received and are on-site and available before the installation commences;

7. Provide supplies and materials that are not provided by ACES but are required for the installation. Examples include: equipment racks, rack mount screws, patch cables, extension cords, etc.; and
8. Provide access to the equipment installation location at the time of arrival of the OST.
9. Secure the ADTRAN equipment by changing the passwords when the installation is complete.

The PM and/or PC will provide appropriate checklists and worksheets to assist the End-User in gathering and submitting the required information and in planning for the installation. In order to ensure that installations are successful and timely, ACES schedules resources in advance. Scheduling changes within five business days of a planned event or cancellations may result in additional costs to End-User. ACES encourages End-User to notify the PM of any requested schedule changes or cancellations as soon as practical.

Installation Acceptance and Warranty

The system will be considered "in service" when it has been physically installed, configured, and is capable of passing the End-User's traffic (voice and/or data). At this point ACES will notify the project stakeholders via email that the system is in service. This notification initiates the 30-calendar-day installation warranty, during which ACES will make configuration adjustments based on written customer requests to fine-tune the network parameters, provided remote access is available. The ACES PM will review these requests and schedule the changes provided they are within the scope of what was purchased. If the End-User has purchased an ACES maintenance plan then the maintenance plan will be activated on the same "in service" date as the beginning of the installation warranty. At the end of the 30-day installation warranty ACES will request email acceptance from the End-User, indicating that the installation is complete and that the installed equipment is operating properly. No response to this email request for five business days will be considered a tacit acceptance that the installation is complete.

4. OUT OF SCOPE

Exclusions

ACES Installation Service does ***NOT*** include:

1. Implementation or installation of products for which there is no installation order, or for those products not described in the Statement of Work, including labor, hardware, cables, etc.
2. Equipment required to perform installation services at the End-User location
3. Troubleshooting or managing third party vendor issues
4. Services made necessary by failures related to misuse, neglect, accident, alteration, modification, or willful or negligent acts by the End-User or other parties beyond the control of ACES
5. Force majeure: acts of God, acts of public enemy, acts of government, freight embargoes, strikes, quarantine restrictions, unusually severe weather conditions, insurrection, riot, etc
6. Wiring or cabling: installation or modification of End-User's in-house wiring; extension of telephone company demarcation point (DMARC); ancillary materials such as power/extension cords
7. Racks, shelves, or wall boards: supply, assembly, installation of racks, shelves, wall boards or any other physical structure to which the covered equipment is mounted (unless specifically included in the ACES Statement of Work)
8. Optimization or troubleshooting of the End-User's network or applications

5. ADDITIONAL CHARGES FOR INSTALLATION SERVICES

Beyond the services offered as part of an ACES Installation, ADTRAN can arrange for additional services that are charged separately. Such expenses include:

1. Time and Materials (T&M): hourly rate for services performed beyond those covered by the specific ACES installation items that were purchased or the Statement of Work created for a project implementation by the assigned PM. With advance notice and at ACES PM discretion, ACES can arrange for the ACES PE or OST to perform work in addition to the tasks covered in ACES installation.
2. Site Not Ready (SNR), Rescheduling, or Cancellation: fees to cover costs of canceling or rescheduling the installation. ACES will waive these fees if five business days' notice is given.
3. Expedite: fixed rate surcharge to schedule the installation with less than the required scheduling interval. You may request that your installation process be accelerated. ACES will grant an expedite request and accept the fee only if the service personnel and equipment are available.

6. GENERAL INFORMATION

Language
Installation services are provided in English.

Invoicing of Installation Services
Upon completion of each phase of an installation, ADTRAN reserves the right to invoice ADTRAN's direct customer (typically the Channel Partner) for that portion of the installation service that has been completed and accepted by the End-User to be in service or complete. ADTRAN further reserves the right to invoice the direct customer at the completion of each site installation, even in a case where multiple installation sites were submitted on a single purchase order.

Cancellation
ADTRAN reserves the right to cancel any installation project in whole or in part at ADTRAN's sole discretion. ADTRAN will submit its cancellation notice to the project stakeholders in writing and may then invoice any portion of the installation services performed on or prior to the date of cancellation. End-User or Channel Partner may cancel any pending installation service without penalty by submitting its cancellation notice in writing and this notice must be received prior to the occurrence of any combination of the following activities, otherwise charges may apply: 1) the shipment of any ADTRAN equipment purchased for installation, or 2) the performance of any fee-based service or site survey, or 3) the appointment of an ACES Project Manager.

ADTRAN Custom Extended Services
Description of Service Offering

Remote Installation Services – Wireless Local Area Networking

This Description of Service Offering (DSO) is provided by ADTRAN, Inc. to describe the remote installation services available for ADTRAN's Wireless Local Area Networking (WLAN) solutions under ADTRAN Custom Extended Services (ACES). This DSO combined with the ADTRAN Manufacturer's Warranty, the WLAN-specific ACES Statement of Work (SOW) as applicable, the ACES Terms and Conditions, and the specific ACES installation items on the order cover the agreement between ADTRAN and the purchaser of the service from ADTRAN. Purchasers are encouraged to read this DSO carefully, as it contains details of the coverage offered, and the responsibilities associated with obtaining this service.

1. OVERVIEW

ADTRAN offers ACES installation services for Enterprise Networks Division customer premises equipment (CPE) and select Carrier Networks Division (Telco) equipment manufactured by ADTRAN, as well as for approved third party products as part of an overall ADTRAN solution. This document describes the installation services specific to ADTRAN's Wireless Local Area Networking (WLAN) solutions which include products branded as "Bluesocket" and products branded as "NetVanta." ADTRAN solutions (hardware, software, and ACES services) are purchased by the End-User customer from a Channel Partner which may be either a Value Added Reseller (VAR) or a Network Service Provider (NSP) such as a telephone company. The Channel Partner may purchase the ADTRAN solution from an authorized distributor or directly from ADTRAN.

ACES offers two levels of installation services for ADTRAN's WLAN products: on-site and remote. This DSO specifically covers the services that are included with remote WLAN installations. There is a separate DSO for on-site installations.

ACES Staff Roles
For each remote installation ACES provides staff to cover the following roles: Project Coordinator (PC), Project Manager (PM), and Project Engineer (PE).

The ACES Project Coordinator (PC) is the person that initially receives the order for the ACES installation. The PC gathers and validates the preliminary information that is required to assign a Project Manager to the installation. The required information includes: one or more valid purchase orders, contact information for key project stakeholders, and a network diagram with sufficient detail to identify the ADTRAN WLAN solution components to be installed and all relevant network elements with which the WLAN solution will integrate.

The ACES Project Manager (PM) is the primary point of contact for all stakeholders throughout the project. The PM will work with the project stakeholders remotely over the phone, via email, and using web collaboration tools throughout the project to coordinate all tasks and ensure the success of the installation.

The ACES Project Engineer (PE) will configure, stage, and test the system. Some of these tasks may be performed in an ACES staging center before the equipment is shipped to the End-User's place of business. The PE will also direct the efforts of the On-site Technician remotely over the phone during the physical installation.

Pre-Installation Services

To ensure a professional deployment that will meet the End-user's expectations, ACES strongly recommends that the optional ACES remote "Predictive Site Survey" be completed prior to installation. Though the site survey does not guarantee every aspect of the network, such surveys are designed to provide for the optimum deployment and placement of wireless access points (WAPs). The predictive site survey requires that the End-User provide to ACES a scaled floor plan of their facility, a general description of the building materials, and the number of users that will utilize the WLAN. ACES will use that information to model the End-User's environment using a WLAN modeling software package. The software will produce a report with recommendations of how many WAPs are required and diagrams indicating where they should be placed for optimal signal coverage. This survey is not included with the installation service. It is a service that must be ordered separately.

Installation Services

Upon receipt of a valid Purchase Order (PO) from the Channel Partner, the ACES PC will gather preliminary data in order to assign a PM to each installation. Once assigned to the project, the PM will coordinate detailed data gathering, staging and will serve as the primary point of contact for all stakeholders throughout the ACES installation.

For an ACES Remote WLAN Installation the ACES team will:

1. Review and validate the application in which the equipment will be used
2. Provide Project Management Support and Coordination: Working remotely over the phone the ACES PM will gather circuit / network / application / End-User configuration parameters required for proper configuration of equipment; coordinate the installation schedule among ACES, End-User, and other vendors / providers as needed; and monitor the installation process, escalating as necessary to the End-User, other vendors / providers, and within ADTRAN
3. Provide Project Engineering: The ACES PE will create and verify equipment configuration; configure, stage, and test configured equipment. Remotely over the phone the ACES PE will direct the on-site activities of the OST. Those activities include: unpacking, mounting of the equipment, connecting the equipment to the End-User's network, verify success of power-on self-test and diagnostics, testing the installed equipment and assist in testing the associated networks and applications to ensure proper operation.

Post-Installation Services

To ensure that the installation provided the signal coverage and throughput that was forecast in the Predictive Site Survey ACES offers an optional on-site Post-Installation Survey to measure the signal strength and throughput values. In this survey ACES will dispatch an ACES OST with a laptop running site survey software to measure the signal strength and signal to noise ratio at various points in the End-User's production environment. This information can be used to identify sources that interfere with the WLAN signal and to determine if WAPs should be moved or if more WAPs are required to provide the desired coverage and throughput. This survey is not included with the installation service. It is a service that must be ordered separately.

Scheduling

The ACES PM will schedule the installation as soon as practical. The data gathering timeline will vary according to End-User's, Channel Partner's, and Service Provider's (i.e. telephone company) availability and/or responsiveness to ACES' requests for information. ACES requires a minimum scheduling interval after the End-User has confirmed the completeness and accuracy of all equipment and application data assembled by ACES in order to schedule the on-site installation tasks. In general that minimum scheduling interval is fifteen business days for NetVanta UC (covered under a separate DSO), ten business days for any service requiring ACES to install IP phones or wireless access points, and five business days for other products. These scheduling intervals ensure that there is sufficient time for ACES to acquire, configure, test, and ship the equipment per the End-User's

specifications. These intervals may be accelerated only if ACES receives payment for an expedite fee and has the resources available to meet the requested installation date. Installation dates are not guaranteed until confirmed by the ACES PM.

2. CONTACTS FOR SUPPORT SERVICES

Purpose/Need	Contact	Hours of Operation	Contact Information
Questions about ACES Maintenance Plans	ACES Business Office	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	888-874-ACES (2237) aces@adtran.com www.adtran.com
Questions about ACES Installation, technical support during install	ACES Install Group	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	888-874-ACES (2237) aces.installation@adtran.com www.adtran.com
Technical Support (post-install)	ADTRAN Technical Support	Monday – Friday 7:00am-7:00pm Central excluding ADTRAN holidays Service affecting emergencies: 24 hours/day 7 days/week	888-4ADTRAN (423-8726) support@adtran.com supportforums.adtran.com
ACES Purchase Orders	ACES Business Office	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	Fax: 256-963-7956 Email: acespo@adtran.com

There may be a delayed response to inquiries submitted via the web or email. Critical issues and escalations should be submitted via telephone for fastest response.

3. CHANNEL PARTNER AND END-USER RESPONSIBILITIES

Purchasing ACES Installation Services

Purchase orders (POs) for ACES installation must include the following:

1. ACES part number(s), quantity, and pricing;
2. End-User site information, including company name and street address (shipping address);

In order to facilitate the installation process it is helpful to include the following supplemental information on or with ACES installation POs:

1. Channel Partner contact information including company name, billing address, contact name, email address and phone number;
2. Channel Partner or End-User installation coordinator contact information including name, email address, and phone number;
3. End-User site contact information, including name, phone number, and email address;
4. Equipment information, including hardware, maintenance, software, and software assurance PO number(s); and
5. ***Requested*** date of installation (PLEASE NOTE: Installation date is dependent upon many variables and is not guaranteed until confirmed by the ACES PM).

Channel Partner or End-User Staff Role

Remote installations require that the Channel Partner or the End user provide a competent individual to serve as the On-site Technician (OST). The OST will go to the End-User's place of business to physically install, configure,

and test the equipment under the direction of the ACES PE (remotely over the phone) to ensure a working installation.

End-User Installation Responsibilities

To ensure a successful installation ACES requires the following End-User responsibilities:

1. Communicate with the ACES PM, providing appropriate advance notice for all changes;
2. Submit site and site contact information including company name, street address, contact name, email address, and phone number;
3. Collect and submit specific network configuration and technical information as requested. End-User can help to avoid schedule delays by ensuring that ACES receives complete information no later than three weeks prior to the requested installation date to allow for verification and equipment staging. Some examples of the needed information include:
    a. Network diagram of the application and all pertinent equipment. This diagram should include all of the proposed equipment and any existing equipment with which it is expected to interact (Power over Ethernet (PoE) switches, Wi-Fi phones, scanners, firewalls, routers, etc.);
    b. Network service parameters, such as numbers of WLAN users, Wi-Fi protocols (IEEE 802.11 a/b/g/n), SSIDs, authentication, encryption, etc.;
    c. Interface configuration and addressing information for other equipment with which the installed equipment will interoperate;
    d. Network security requirements and parameters, such as firewall rules and NAT configuration, port forwards; and
    e. Premises layout or floor plan diagram(s) for the requested wireless coverage areas and recommended placement of wireless access points (WAPs). If the optional ACES Predictive Site Survey was not purchased then it is the End-User's responsibility to specify the location for each WAP to be installed;
4. Verify and submit documentation of site qualifications to be sure that:
    a. All WAP mounting points are accessible with a standard 12 foot portable ladder (no lifts)
    b. The location meets the environmental requirements specified in the equipment documentation;
    c. Physical mounting points and interfaces are compatible with the ADTRAN equipment;
    d. Adequate electrical power and proper electrical ground bus bar is available and within six feet (cable length) of the ADTRAN equipment, protected by a surge protector or uninterruptable power supply (UPS);
    e. If the WAPs are not going to receive power from a PoE switch then the End-user must ensure that there is 120 VAC / 60 HZ power available within six feet (cable length) of the recommended placement point for each of the WAPs;
    f. End-User premises wiring is installed, toned, tagged, and properly terminated. In general, properly installed standard Category 5 wiring with RJ45 connectors is adequate. ADTRAN strongly encourages the End-user to allow for cable tolerance should minor WAP placement adjustments be needed;
    g. Other equipment or networks to which the ADTRAN equipment is connected are available and accessible, all interfaces are compatible, and that the networks are capable and properly configured for carrying the network traffic;
    h. Arrange for representatives of other vendors and providers (such as the telephone company, IT vendor, wiring vendor, PBX vendor, etc.) to be available during data gathering and at the time of installation as appropriate for configuration and testing of other equipment and networks with which the ADTRAN equipment interacts;
5. Provide secure remote broadband access (i.e., port forward via a Cable, DSL, etc.) to the equipment via the public Internet to allow testing, configuration, and maintenance. End-User must ensure that their network is properly secured;

6. Verify that all equipment, supplies, and materials have been received and are on-site and available before the installation commences;
7. Provide supplies and materials that are not provided by ACES but are required for the installation. Examples include: equipment racks, rack mount screws, patch cables, extension cords, etc.; and
8. Provide access to the equipment installation location at the time of arrival of the OST.
9. Secure the ADTRAN equipment by changing the passwords when the installation is complete.

The PM and/or PC will provide appropriate checklists and worksheets to assist the End-User in gathering and submitting the required information and in planning for the installation. In order to ensure that installations are successful and timely, ACES schedules resources in advance. Scheduling changes within five business days of a planned event or cancellations may result in additional costs to End-User. ACES encourages End-User to notify the PM of any requested schedule changes or cancellations as soon as practical.

Installation Acceptance and Warranty

The system will be considered "in service" when it has been physically installed, configured, and is capable of passing the End-User's traffic (voice and/or data). At this point ACES will notify the project stakeholders via email that the system is in service. This notification initiates the 30-calendar-day installation warranty, during which ACES will make configuration adjustments based on written customer requests to fine-tune the network parameters, provided remote access is available. The ACES PM will review these requests and schedule the changes provided they are within the scope of what was purchased. If the End-User has purchased an ACES maintenance plan then the maintenance plan will be activated on the same "in service" date as the beginning of the installation warranty. At the end of the 30-day installation warranty ACES will request email acceptance from the End-User, indicating that the installation is complete and that the installed equipment is operating properly. No response to this email request for five business days will be considered a tacit acceptance that the installation is complete.

4. OUT OF SCOPE

Exclusions

ACES Installation Service does ***NOT*** include:

1. Implementation or installation of products for which there is no installation order, or for those products not described in the Statement of Work, including labor, hardware, cables, etc.
2. Equipment required to perform installation services at the End-User location
3. Troubleshooting or managing third party vendor issues
4. Services made necessary by failures related to misuse, neglect, accident, alteration, modification, or willful or negligent acts by the End-User or other parties beyond the control of ACES
5. Force majeure: acts of God, acts of public enemy, acts of government, freight embargoes, strikes, quarantine restrictions, unusually severe weather conditions, insurrection, riot, etc
6. Wiring or cabling: installation or modification of End-User's in-house wiring; extension of telephone company demarcation point (DMARC); ancillary materials such as power/extension cords
7. Racks, shelves, or wall boards: supply, assembly, installation of racks, shelves, wall boards or any other physical structure to which the covered equipment is mounted (unless specifically included in the ACES Statement of Work)
8. Optimization or troubleshooting of the End-User's network or applications

5. ADDITIONAL CHARGES FOR INSTALLATION SERVICES

Beyond the services offered as part of an ACES installation, ADTRAN can arrange for additional services that are

charged separately. Such expenses include:

1. Time and Materials (T&M): hourly rate for services performed beyond those covered by the specific ACES installation items that were purchased or the Statement of Work created for a project implementation by the assigned PM. With advance notice and at ACES PM discretion, ACES can arrange for the ACES PE or OST to perform work in addition to the tasks covered in ACES installation.
2. Site Not Ready (SNR), Rescheduling, or Cancellation: fees to cover costs of canceling or rescheduling the installation. ACES will waive these fees if five business days' notice is given.
3. Expedite: fixed rate surcharge to schedule the installation with less than the required scheduling interval. You may request that your installation process be accelerated. ACES will grant an expedite request and accept the fee only if the service personnel and equipment are available.

6. GENERAL INFORMATION

Language

Installation services are provided in English.

Invoicing of Installation Services

Upon completion of each phase of an installation, ADTRAN reserves the right to invoice ADTRAN's direct customer (typically the Channel Partner) for that portion of the installation service that has been completed and accepted by the End-User to be in service or complete. ADTRAN further reserves the right to invoice the direct customer at the completion of each site installation, even in a case where multiple installation sites were submitted on a single purchase order.

Cancellation

ADTRAN reserves the right to cancel any installation project in whole or in part at ADTRAN's sole discretion. ADTRAN will submit its cancellation notice to the project stakeholders in writing and may then invoice any portion of the installation services performed on or prior to the date of cancellation. End-User or Channel Partner may cancel any pending installation service without penalty by submitting its cancellation notice in writing and this notice must be received prior to the occurrence of any combination of the following activities, otherwise charges may apply: 1) the shipment of any ADTRAN equipment purchased for installation, or 2) the performance of any fee-based service or site survey, or 3) the appointment of an ACES Project Manager.

ADTRAN Custom Extended Services
Description of Service Offering

On-Site Installation Services – Unified Communications

This Description of Service Offering (DSO) is provided by ADTRAN, Inc. to describe the on-site installation services available for ADTRAN's Unified Communications (UC) solutions under ADTRAN Custom Extended Services (ACES). This DSO combined with the ADTRAN Manufacturer's Warranty, the UC-specific ACES Statement of Work (SOW) as applicable, the ACES Terms and Conditions, and the specific ACES installation items on the order cover the agreement between ADTRAN and the purchaser of the service from ADTRAN. Purchasers are encouraged to read this DSO carefully, as it contains details of the coverage offered, and the responsibilities associated with obtaining this service.

1. OVERVIEW

ADTRAN offers ACES installation services for Enterprise Networks Division customer premises equipment (CPE) and select Carrier Networks Division (Telco) equipment manufactured by ADTRAN, as well as for approved third party products as part of an overall ADTRAN solution. This document describes the installation services specific to ADTRAN's Unified Communications (UC) solutions. ADTRAN solutions (hardware, software, and ACES services) are purchased by the End-User customer from a Channel Partner which may be either a Value Added Reseller (VAR) or a Network Service Provider (NSP) such as a telephone company. The Channel Partner may purchase the ADTRAN solution from an authorized distributor or directly from ADTRAN.

ACES offers three levels of installation services for ADTRAN's UC products: on-site, remote, and assisted. For on-site and remote installations ACES is ultimately responsible for the success of the installation. For assisted installations the Channel Partner or End-User is responsible for the success of the installation with ACES providing guidance and support to the Channel Partner or End-User. This DSO specifically covers the services that are included with on-site UC installations. There are separate DSOs for remote and assisted installations.

ACES Staff Roles

For each on-site installation ACES provides staff to cover the following roles: Project Coordinator (PC), Project Manager (PM), Project Engineer (PE), and On-site Technician (OST).

The ACES Project Coordinator (PC) is the person that initially receives the order for the ACES installation. The PC gathers and validates the preliminary information that is required to assign a Project Manager to the installation. The required information includes: one or more valid purchase orders, contact information for key project stakeholders, and a network diagram with sufficient detail to identify the ADTRAN UC solution components to be installed and all relevant network elements with which the UC solution will integrate.

The ACES Project Manager (PM) is the primary point of contact for all stakeholders throughout the project. The PM will work with the project stakeholders remotely over the phone, via email, and using web collaboration tools throughout the project to coordinate all tasks and ensure the success of the installation.

The ACES Project Engineer (PE) will configure, stage, and test the system. Much of this work is typically performed in an ACES staging center before it is shipped to the End-User's place of business. The PE will also direct the efforts of the On-site Technician remotely over the phone during the physical installation.

The ACES On-site Technician (OST) will go to the End-User's place of business to physically install, configure, and test the equipment under the direction of the ACES PE (remotely over the phone) to ensure a working installation.

Installation Services

Upon receipt of a valid Purchase Order (PO) from the Channel Partner, the ACES PC will gather preliminary data in order to assign a PM to each installation. Once assigned to the project, the PM will coordinate detailed data gathering, staging and will serve as the primary point of contact for all stakeholders throughout the ACES installation.

For an ACES On-Site UC Installation the installation team will:

1. Review and validate the application in which the equipment will be used
2. Provide Project Management Support and Coordination: Working remotely over the phone the ACES PM will gather circuit / network / application / End-User configuration parameters required for proper configuration of equipment; will schedule and conduct a site survey to verify that the site is physically ready for the installation using an ACES OST working under the direction of an ACES PE (remotely over the phone); coordinate the installation schedule among ACES, End-User, and other vendors / providers as needed; and monitor the installation process, escalating as necessary to the End-User, other vendors / providers, and within ADTRAN
3. Provide Project Engineering: The ACES PE will create and verify equipment configuration; configure, stage, and test configured equipment. Remotely over the phone the ACES PE will direct the on-site activities of the ACES OST. Those activities include: unpacking, mounting of the equipment, connecting the equipment to the End-User's network, verify success of power-on self-test and diagnostics, testing the installed equipment and assist in testing the associated networks and applications to ensure proper operation.
4. Provide End-User Phone Training: Self-paced computer based training tutorials and User Guides are available to the public on ADTRAN's training website at www.adtran.com/ippt. The ACES OST will train the End-User's designated contact on the basic use of the phones that were installed. That basic training should take approximately 30 minutes and will demonstrate how to use features such as: Place a call on the handset and speaker phone, answer a call on the handset and speaker phone, transfer a call, mute a call, park and retrieve a call, utilize voicemail.
5. Provide System Administrator Training
    a. For NetVanta 7000 Series installations the "NetVanta 7000 Administration" training class is available as a live virtual instructor-led-training (VILT) course over the Internet. It is approximately four hours in length. A recorded version of that class is available for those students that cannot attend a scheduled live session. There is a course fee required to attend the live or recorded class. Class details and schedule are available at www.adtranuniversity.com.
    b. Each on-site installation of a NetVanta 7000 Series chassis (including the NetVanta Business Communications System (BCS) bundles) includes a training voucher for the End-User's designated administrator to attend the "NetVanta 7000 Administration" training class.
    c. Each on-site NetVanta UC Series installation (including the Enterprise Communications Server (ECS), Business Communications System (BCS), and Unified Communications Server (UCS)) includes one custom Administrator Training class to be delivered live over the Internet to the End-User's designated Administrator by the ACES PE.

Scheduling

The ACES PM will schedule the installation as soon as practical. The data gathering timeline will vary according to End-User's, Channel Partner's, and Service Provider's (i.e. telephone company) availability and/or responsiveness

to ACES' requests for information. ACES requires a minimum of ten (for NetVanta 7000 Series) or fifteen (for NetVanta UC Series) business days after the End-User has confirmed the completeness and accuracy of all equipment and application data assembled by ACES in order to schedule the on-site installation tasks. These scheduling intervals ensure that there is sufficient time for ACES to acquire, configure, test, and ship the equipment per the End-User's specifications. These intervals may be accelerated only if ACES receives payment for an expedite fee and has the resources available to meet the requested installation date. Installation dates are not guaranteed until confirmed by the ACES PM.

2. CONTACTS FOR SUPPORT SERVICES

Purpose/Need	Contact	Hours of Operation	Contact Information
Questions about ACES Maintenance Plans	ACES Business Office	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	888-874-ACES (2237) aces@adtran.com www.adtran.com
Questions about ACES Installation, technical support during install	ACES Install Group	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	888-874-ACES (2237) aces.installation@adtran.com www.adtran.com
Technical Support (post-install)	ADTRAN Technical Support	Monday – Friday 7:00am-7:00pm Central excluding ADTRAN holidays Service affecting emergencies: 24 hours/day 7 days/week	888-4ADTRAN (423-8726) support@adtran.com supportforums.adtran.com
ACES Purchase Orders	ACES Business Office	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	Fax: 256-963-7956 Email: acespo@adtran.com

There may be a delayed response to inquiries submitted via the web or email. Critical issues and escalations should be submitted via telephone for fastest response.

3. CHANNEL PARTNER AND END-USER RESPONSIBILITIES

Purchasing ACES Installation Services

Purchase orders (POs) for ACES installation must include the following:

1. ACES part number(s), quantity, and pricing;
2. End-User site information, including company name and street address (shipping address);

In order to facilitate the installation process it is helpful to include the following supplemental information on or with ACES installation POs:

1. Channel Partner contact information including company name, billing address, contact name, email address and phone number;
2. Channel Partner or End-User installation coordinator contact information including name, email address, and phone number;
3. End-User site contact information, including name, phone number, and email address;
4. Equipment information, including hardware, maintenance, software, and software assurance PO number(s); and
5. ***Requested*** date of installation (PLEASE NOTE: Installation date is dependent upon many variables and is not guaranteed until confirmed by the ACES PM).

End-User Installation Responsibilities

To ensure a successful installation ACES requires the following End-User responsibilities:

1. Communicate with the ACES PM, providing appropriate advance notice for all changes;
2. Submit site and site contact information including company name, street address, contact name, email address, and phone number;
3. Collect and submit specific network configuration and technical information as requested. End-User can help to avoid schedule delays by ensuring that ACES receives complete information no later than three weeks prior to the requested installation date to allow for verification and equipment staging. Some examples of the needed information include:
    a. Network diagram of the application and all pertinent equipment. This diagram should include all of the proposed equipment and any existing equipment with which it is expected to interact (firewalls, paging systems, fax servers, etc.);
    b. Network service parameters, such as quantity and types of voice trunks (PRI, analog, SIP) and a phone extension list that includes a complete inventory of telephone numbers and the associated user names (voice, fax, IVR systems, alarm lines, etc.);
    c. Interface configuration and addressing information for other equipment with which the installed equipment will interoperate;
    d. Network security requirements and parameters, such as firewall rules and NAT configuration, port forwards; and
    e. Premises layout or floor plan to be used in planning phone set placement;
4. Verify and submit documentation of site qualifications to be sure that:
    a. Installation impacting results communicated from the on-site survey performed by ACES have been resolved prior to installation
    b. The location meets the environmental requirements specified in the equipment documentation;
    c. Physical mounting points and interfaces are compatible with the ADTRAN equipment;
    d. Adequate electrical power and proper electrical ground bus bar is available and within six feet (cable length) of the ADTRAN equipment, protected by a surge protector (required) or uninterruptable power supply (UPS – recommended);
    e. Telephone and/or data circuit cables/jacks are labeled, mapped, terminated, fully installed with proper demarcation, have been tested and certified by the provider, and the points of demarcation are within six feet (cable length) of the ADTRAN equipment;
    f. End-User premise wiring is installed, toned, tagged, and properly terminated. In general, properly installed standard Category 5 wiring is adequate;
    g. Other equipment or networks to which the ADTRAN equipment is connected are available and accessible, all interfaces are compatible, and that the networks are capable and properly configured for carrying the network traffic including Quality of Service (QoS) settings required to prioritize voice traffic over less delay-sensitive traffic on the network;
    h. Arrange for representatives of other vendors and providers (such as the telephone company, IT vendor, PBX vendor, etc.) to be available during data gathering and at the time of installation as appropriate for configuration and testing of other equipment and networks with which the ADTRAN equipment interacts;
5. Provide secure remote broadband access (i.e., port forward via a Cable, DSL, etc.) to the equipment via the public Internet to allow testing, configuration, and maintenance. End-User must ensure that their network is properly secured;
6. Verify that all equipment, supplies, and materials have been received and are on-site and available before the installation commences;
7. Provide supplies and materials that are not provided by ACES but are required for the installation.

Examples include: equipment racks, rack mount screws, patch cables, extension cords, etc.; and
8. Provide access to the equipment installation location at the time of arrival of the OST.
9. Secure the ADTRAN equipment by changing the passwords when the installation is complete.

The PM and/or PC will provide appropriate checklists and worksheets to assist the End-User in gathering and submitting the required information and in planning for the installation. In order to ensure that installations are successful and timely, ACES schedules resources in advance. Scheduling changes within five business days of a planned event or cancellations may result in additional costs to End-User. ACES encourages End-User to notify the PM of any requested schedule changes or cancellations as soon as practical.

Installation Acceptance and Warranty

The system will be considered "in service" when it has been physically installed, configured, and is capable of passing the End-User's traffic (voice and/or data). At this point ACES will notify the project stakeholders via email that the system is in service. This notification initiates the 30-calendar-day installation warranty, during which ACES will make configuration adjustments based on written customer requests to fine-tune the network parameters, provided remote access is available. The ACES PM will review these requests and schedule the changes provided they are within the scope of what was purchased. If the End-User has purchased an ACES maintenance plan then the maintenance plan will be activated on the same "in service" date as the beginning of the installation warranty. At the end of the 30-day installation warranty ACES will request email acceptance from the End-User, indicating that the installation is complete and that the installed equipment is operating properly. No response to this email request for five business days will be considered a tacit acceptance that the installation is complete.

4. OUT OF SCOPE

Exclusions

ACES Installation Service does ***NOT*** include:

1. Implementation or installation of products for which there is no installation order, or for those products not described in the Statement of Work, including labor, hardware, cables, etc.
2. Equipment required to perform installation services at the End-User location
3. Troubleshooting or managing third party vendor issues
4. Services made necessary by failures related to misuse, neglect, accident, alteration, modification, or willful or negligent acts by the End-User or other parties beyond the control of ACES
5. Force majeure: acts of God, acts of public enemy, acts of government, freight embargoes, strikes, quarantine restrictions, unusually severe weather conditions, insurrection, riot, etc
6. Wiring or cabling: installation or modification of End-User's in-house wiring; extension of telephone company demarcation point (DMARC); ancillary materials such as power/extension cords
7. Racks, shelves, or wall boards: supply, assembly, installation of racks, shelves, wall boards or any other physical structure to which the covered equipment is mounted (unless specifically included in the ACES Statement of Work)
8. Optimization or troubleshooting of the End-User's network or applications

5. ADDITIONAL CHARGES FOR INSTALLATION SERVICES

Beyond the services offered as part of an ACES installation, ADTRAN can arrange for additional services that are charged separately. Such expenses include:

1. Time and Materials (T&M): hourly rate for services performed beyond those covered by the specific ACES installation items that were purchased or the Statement of Work created for a project implementation by

the assigned PM. With advance notice and at ACES PM discretion, ACES can arrange for the ACES PE or OST to perform work in addition to the tasks covered in ACES installation.

2. Site Not Ready (SNR), Rescheduling, or Cancellation: fees to cover costs of canceling or rescheduling the installation. ACES will waive these fees if five business days' notice is given.
3. Expedite: fixed rate surcharge to schedule the installation with less than the required scheduling interval. You may request that your installation process be accelerated. ACES will grant an expedite request and accept the fee only if the service personnel and equipment are available.

6. GENERAL INFORMATION

Language
Installation services are provided in English.

Invoicing of Installation Services
Upon completion of each phase of an installation, ADTRAN reserves the right to invoice ADTRAN's direct customer (typically the Channel Partner) for that portion of the installation service that has been completed and accepted by the End-User to be in service or complete. ADTRAN further reserves the right to invoice the direct customer at the completion of each site installation, even in a case where multiple installation sites were submitted on a single purchase order.

Cancellation
ADTRAN reserves the right to cancel any installation project in whole or in part at ADTRAN's sole discretion. ADTRAN will submit its cancellation notice to the project stakeholders in writing and may then invoice any portion of the installation services performed on or prior to the date of cancellation. End-User or Channel Partner may cancel any pending installation service without penalty by submitting its cancellation notice in writing and this notice must be received prior to the occurrence of any combination of the following activities, otherwise charges may apply: 1) the shipment of any ADTRAN equipment purchased for installation, or 2) the performance of any fee-based service or site survey, or 3) the appointment of an ACES Project Manager.

ADTRAN Custom Extended Services
Description of Service Offering

Remote Installation Services – Unified Communications

This Description of Service Offering (DSO) is provided by ADTRAN, Inc. to describe the remote installation services available for ADTRAN's Unified Communications (UC) solutions under ADTRAN Custom Extended Services (ACES). This DSO combined with the ADTRAN Manufacturer's Warranty, the UC-specific ACES Statement of Work (SOW) as applicable, the ACES Terms and Conditions, and the specific ACES installation items on the order cover the agreement between ADTRAN and the purchaser of the service from ADTRAN. Purchasers are encouraged to read this DSO carefully, as it contains details of the coverage offered, and the responsibilities associated with obtaining this service.

1. OVERVIEW

ADTRAN offers ACES installation services for Enterprise Networks Division customer premises equipment (CPE) and select Carrier Networks Division (Telco) equipment manufactured by ADTRAN, as well as for approved third party products as part of an overall ADTRAN solution. This document describes the installation services specific to ADTRAN's Unified Communications (UC) solutions. ADTRAN solutions (hardware, software, and ACES services) are purchased by the End-User customer from a Channel Partner which may be either a Value Added Reseller (VAR) or a Network Service Provider (NSP) such as a telephone company. The Channel Partner may purchase the ADTRAN solution from an authorized distributor or directly from ADTRAN.

ACES offers three levels of installation services for ADTRAN's UC products: on-site, remote, and assisted. For on-site and remote installations ACES is ultimately responsible for the success of the installation. For assisted installations the Channel Partner or End-User is responsible for the success of the installation with ACES providing guidance and support to the Channel Partner or End-User. This DSO specifically covers the services that are included with remote UC installations. There are separate DSOs for on-site and assisted installations.

ACES Staff Roles

For each remote installation ACES provides staff to cover the following roles: Project Coordinator (PC), Project Manager (PM), and Project Engineer (PE).

The ACES Project Coordinator (PC) is the person that initially receives the order for the ACES installation. The PC gathers and validates the preliminary information that is required to assign a Project Manager to the installation. The required information includes: one or more valid purchase orders, contact information for key project stakeholders, and a network diagram with sufficient detail to identify the ADTRAN UC solution components to be installed and all relevant network elements with which the UC solution will integrate.

The ACES Project Manager (PM) is the primary point of contact for all stakeholders throughout the project. The PM will work with the project stakeholders remotely over the phone, via email, and using web collaboration tools throughout the project to coordinate all tasks and ensure the success of the installation.

The ACES Project Engineer (PE) will configure, stage, and test the system. Much of this work is typically performed in an ACES staging center before it is shipped to the End-User's place of business. The PE will also direct the efforts of the On-site Technician remotely over the phone during the physical installation.

Channel Partner or End-User Staff Role

remote installations require that the Channel Partner or the End user provide an individual with the ADTRAN Technical Support Associate (ATSA) level certification on the product being installed to serve as the On-site Technician (OST) under the direction of the ACES PE (remotely over the phone). ADTRAN certification training information can be found at www.adtran.com/certifications.

The OST will go to the End-User's place of business to physically install, configure, and test the equipment under the direction of the ACES PE (remotely over the phone) to ensure a working installation.

Installation Services

Upon receipt of a valid purchase order (PO) from the Channel Partner, the ACES PC will gather preliminary data in order to assign a PM to each installation. Once assigned to the project, the PM will coordinate detailed data gathering, staging and will serve as the primary point of contact for all stakeholders throughout the ACES installation.

For an ACES Remote UC Installation the ACES team will:

1. Review and validate the application in which the equipment will be used
2. Provide Project Management Support and Coordination: Working remotely over the phone the ACES PM will gather circuit / network / application / End-User configuration parameters required for proper configuration of equipment; coordinate the installation schedule among ACES, End-User, and other vendors / providers as needed; and monitor the installation process, escalating as necessary to the End-User, other vendors / providers, and within ADTRAN
3. Provide Project Engineering: The ACES PE will create and verify equipment configuration; configure, stage, and test configured equipment. Remotely over the phone the ACES PE will direct the on-site activities of the OST. Those activities include: unpacking, mounting of the equipment, connecting the equipment to the End-User's network, verify success of power-on self-test and diagnostics, testing the installed equipment and assist in testing the associated networks and applications to ensure proper operation.

For an ACES Remote UC Installation the Channel Partner or End-User is responsible to:

1. Provide End-User Phone Training: Self-paced computer based training tutorials and User Guides are available to the public on ADTRAN's training website at www.adtran.com/ippt. The OST will train the End-User's designated contact on the basic use of the phones that were installed. That basic training should demonstrate how to use features such as: Place a call on the handset and speaker phone, answer a call on the handset and speaker phone, transfer a call, mute a call, park and retrieve a call, utilize voicemail.
2. Provide System Administrator Training
    a. For NetVanta 7000 Series installations the "NetVanta 7000 Administration" training class is available as a live virtual instructor-led-training (VILT) course over the Internet. It is approximately four hours in length. A recorded version of that class is available for those students that cannot attend a scheduled live session. There is a course fee required to attend the live or recorded class. Class details and schedule are available at www.adtranuniversity.com. The Channel Partner or End-User can purchase seats in this class as a means to provide Administrator Training in conjunction with an installation.
    b. For NetVanta UC Series installations (including the Enterprise Communications Server (ECS), Business Communications System (BCS), and Unified Communications Server (UCS)) the Channel Partner or End-User is responsible for providing the appropriate level of Administrator Training.

Scheduling

The ACES PM will schedule the installation as soon as practical. The data gathering timeline will vary according to End-User's, Channel Partner's, and Service Provider's (i.e. telephone company) availability and/or responsiveness to ACES' requests for information. ACES requires a minimum of ten (for NetVanta 7000 Series) or fifteen (for NetVanta UC Series) business days after the End-User has confirmed the completeness and accuracy of all equipment and application data assembled by ACES in order to schedule the on-site installation tasks. These scheduling intervals ensure that there is sufficient time for ACES to acquire, configure, test, and ship the equipment per the End-User's specifications. These intervals may be accelerated only if ACES receives payment for an expedite fee and has the resources available to meet the requested installation date. Installation dates are not guaranteed until confirmed by the ACES PM.

2. CONTACTS FOR SUPPORT SERVICES

Purpose/Need	Contact	Hours of Operation	Contact Information
Questions about ACES Maintenance Plans	ACES Business Office	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	888-874-ACES (2237) aces@adtran.com www.adtran.com
Questions about ACES Installation, technical support during install	ACES Install Group	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	888-874-ACES (2237) aces.installation@adtran.com www.adtran.com
Technical Support (post-install)	ADTRAN Technical Support	Monday – Friday 7:00am-7:00pm Central excluding ADTRAN holidays Service affecting emergencies: 24 hours/day 7 days/week	888-4ADTRAN (423-8726) support@adtran.com supportforums.adtran.com
ACES Purchase Orders	ACES Business Office	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	Fax: 256-963-7956 Email: acespo@adtran.com

There may be a delayed response to inquiries submitted via the web or email. Critical issues and escalations should be submitted via telephone for fastest response.

3. CHANNEL PARTNER AND END-USER RESPONSIBILITIES

Purchasing ACES Installation Services

Purchase orders (POs) for ACES installation must include the following:

1. ACES part number(s), quantity, and pricing;
2. End-User site information, including company name and street address (shipping address);

In order to facilitate the installation process it is helpful to include the following supplemental information on or with ACES installation POs:

1. Channel Partner contact information including company name, billing address, contact name, email address and phone number;
2. Channel Partner or End-User installation coordinator contact information including name, email address, and phone number;
3. End-User site contact information, including name, phone number, and email address;
4. Equipment information, including hardware, maintenance, software, and software assurance PO number(s); and

5. ***Requested*** date of installation (PLEASE NOTE: Installation date is dependent upon many variables and is not guaranteed until confirmed by the ACES PM).

Providing a certified On-site Technician (OST)

For remote UC installations either the Channel Partner or the End-User must provide a competent OST with a current ADTRAN Technical Support Associate (ATSA) level certification for the product(s) being installed. NetVanta 7000 Series installations require ATSA/UCAS (UC Appliance Solutions) certification. NetVanta UC Series (ECS and UCS) require ATSA/UCSS (UC Server Solutions) certification. NetVanta BCS installations require both ATSA/UCAS and ATSA/UCSS certification.

End-User Installation Responsibilities

To ensure a successful installation ACES requires the following End-User responsibilities:

1. Communicate with the ACES PM, providing appropriate advance notice for all changes;
2. Submit site and site contact information including company name, street address, contact name, email address, and phone number;
3. Collect and submit specific network configuration and technical information as requested. End-User can help to avoid schedule delays by ensuring that ACES receives complete information no later than three weeks prior to the requested installation date to allow for verification and equipment staging. Some examples of the needed information include:
    a. Network diagram of the application and all pertinent equipment. This diagram should include all of the proposed equipment and any existing equipment with which it is expected to interact (firewalls, paging systems, fax servers, etc.);
    b. Network service parameters, such as quantity and types of voice trunks (PRI, analog, SIP) and a phone extension list that includes a complete inventory of telephone numbers and the associated user names (voice, fax, IVR systems, alarm lines, etc.);
    c. Interface configuration and addressing information for other equipment with which the installed equipment will interoperate;
    d. Network security requirements and parameters, such as firewall rules and NAT configuration, port forwards; and
    e. Premises layout or floor plan to be used in planning phone set placement;
4. Verify and submit documentation of site qualifications to be sure that:
    a. The location meets the environmental requirements specified in the equipment documentation;
    b. Physical mounting points and interfaces are compatible with the ADTRAN equipment;
    c. Adequate electrical power and proper electrical ground bus bar is available and within six feet (cable length) of the ADTRAN equipment, protected by a surge protector (required) or uninterruptable power supply (UPS – recommended);
    d. Telephone and/or data circuit cables/jacks are labeled, mapped, terminated, fully installed with proper demarcation, have been tested and certified by the provider, and the points of demarcation are within six feet (cable length) of the ADTRAN equipment;
    e. End-User premise wiring is installed, toned, tagged, and properly terminated. In general, properly installed standard Category 5 wiring is adequate;
    f. Other equipment or networks to which the ADTRAN equipment is connected are available and accessible, all interfaces are compatible, and that the networks are capable and properly configured for carrying the network traffic including Quality of Service (QoS) settings required to prioritize voice traffic over less delay-sensitive traffic on the network;
    g. Arrange for representatives of other vendors and providers (such as the telephone company, IT vendor, PBX vendor, etc.) to be available during data gathering and at the time of installation as appropriate for configuration and testing of other equipment and networks with which the ADTRAN equipment interacts;

5. Provide secure remote broadband access (i.e., port forward via a Cable, DSL, etc.) to the equipment via the public Internet to allow testing, configuration, and maintenance. End-User must ensure that their network is properly secured;
6. Verify that all equipment, supplies, and materials have been received and are on-site and available before the installation commences;
7. Provide supplies and materials that are not provided by ACES but are required for the installation. Examples include: equipment racks, rack mount screws, patch cables, extension cords, etc.; and
8. Provide access to the equipment installation location at the time of arrival of the OST.
9. Secure the ADTRAN equipment by changing the passwords when the installation is complete.

The PM and/or PC will provide appropriate checklists and worksheets to assist the End-User in gathering and submitting the required information and in planning for the installation. In order to ensure that installations are successful and timely, ACES schedules resources in advance. Scheduling changes within five business days of a planned event or cancellations may result in additional costs to End-User. ACES encourages End-User to notify the PM of any requested schedule changes or cancellations as soon as practical.

Installation Acceptance and Warranty

The system will be considered "in service" when it has been physically installed, configured, and is capable of passing the End-User's traffic (voice and/or data). At this point ACES will notify the project stakeholders via email that the system is in service. This notification initiates the 30-calendar-day installation warranty, during which ACES will make configuration adjustments based on written customer requests to fine-tune the network parameters, provided remote access is available. The ACES PM will review these requests and schedule the changes provided they are within the scope of what was purchased. If the End-User has purchased an ACES maintenance plan then the maintenance plan will be activated on the same "in service" date as the beginning of the installation warranty. At the end of the 30-day installation warranty ACES will request email acceptance from the End-User, indicating that the installation is complete and that the installed equipment is operating properly. No response to this email request for five business days will be considered a tacit acceptance that the installation is complete.

4. OUT OF SCOPE

Exclusions

ACES installation Service does ***NOT*** include:

1. Implementation or installation of products for which there is no installation order, or for those products not described in the Statement of Work, including labor, hardware, cables, etc.
2. Equipment required to perform installation services at the End-User location
3. Troubleshooting or managing third party vendor issues
4. Services made necessary by failures related to misuse, neglect, accident, alteration, modification, or willful or negligent acts by the End-User or other parties beyond the control of ACES
5. Force majeure: acts of God, acts of public enemy, acts of government, freight embargoes, strikes, quarantine restrictions, unusually severe weather conditions, insurrection, riot, etc
6. Wiring or cabling: installation or modification of End-User's in-house wiring; extension of telephone company demarcation point (DMARC); ancillary materials such as power/extension cords
7. Racks, shelves, or wall boards: supply, assembly, installation of racks, shelves, wall boards or any other physical structure to which the covered equipment is mounted (unless specifically included in the ACES Statement of Work)
8. Optimization or troubleshooting of the End-User's network or applications

5. ADDITIONAL CHARGES FOR INSTALLATION SERVICES

Beyond the services offered as part of an ACES installation, ADTRAN can arrange for additional services that are charged separately. Such expenses include:

1. Time and Materials (T&M): hourly rate for services performed beyond those covered by the specific ACES installation items that were purchased or the Statement of Work created for a project implementation by the assigned PM. With advance notice and at ACES PM discretion, ACES can arrange for the ACES PE or OST to perform work in addition to the tasks covered in ACES installation.
2. Site Not Ready (SNR), Rescheduling, or Cancellation: fees to cover costs of canceling or rescheduling the installation. ACES will waive these fees if five business days' notice is given.
3. Expedite: fixed rate surcharge to schedule the installation with less than the required scheduling interval. You may request that your installation process be accelerated. ACES will grant an expedite request and accept the fee only if the service personnel and equipment are available.

6. GENERAL INFORMATION

Language
Installation services are provided in English.

Invoicing of Installation Services
Upon completion of each phase of an installation, ADTRAN reserves the right to invoice ADTRAN's direct customer (typically the Channel Partner) for that portion of the installation service that has been completed and accepted by the End-User to be in service or complete. ADTRAN further reserves the right to invoice the direct customer at the completion of each site installation, even in a case where multiple installation sites were submitted on a single purchase order.

Cancellation
ADTRAN reserves the right to cancel any installation project in whole or in part at ADTRAN's sole discretion. ADTRAN will submit its cancellation notice to the project stakeholders in writing and may then invoice any portion of the installation services performed on or prior to the date of cancellation. End-User or Channel Partner may cancel any pending installation service without penalty by submitting its cancellation notice in writing and this notice must be received prior to the occurrence of any combination of the following activities, otherwise charges may apply: 1) the shipment of any ADTRAN equipment purchased for installation, or 2) the performance of any fee-based service or site survey, or 3) the appointment of an ACES Project Manager.

ADTRAN Custom Extended Services
Description of Service Offering

Assisted Installation Services – Unified Communications

This Description of Service Offering (DSO) is provided by ADTRAN, Inc. to describe the assisted installation services available for ADTRAN's Unified Communications (UC) solutions under ADTRAN Custom Extended Services (ACES). This DSO combined with the ADTRAN Manufacturer's Warranty, the UC-specific ACES Statement of Work (SOW) as applicable, the ACES Terms and Conditions, and the specific ACES installation items on the order cover the agreement between ADTRAN and the purchaser of the service from ADTRAN. Purchasers are encouraged to read this DSO carefully, as it contains details of the coverage offered, and the responsibilities associated with obtaining this service.

1. OVERVIEW

ADTRAN offers ACES installation services for Enterprise Networks Division customer premises equipment (CPE) and select Carrier Networks Division (Telco) equipment manufactured by ADTRAN, as well as for approved third party products as part of an overall ADTRAN solution. This document describes the installation services specific to ADTRAN's Unified Communications (UC) solutions. ADTRAN solutions (hardware, software, and ACES services) are purchased by the End-User customer from a Channel Partner which may be either a Value Added Reseller (VAR) or a Network Service Provider (NSP) such as a telephone company. The Channel Partner may purchase the ADTRAN solution from an authorized distributor or directly from ADTRAN.

ACES offers three levels of installation services for ADTRAN's UC products: on-site, remote, and assisted. For on-site and remote installations ACES is ultimately responsible for the success of the installation. For assisted installations the Channel Partner or End-User is responsible for the success of the installation with ACES providing guidance and support to the Channel Partner or End-User. This DSO specifically covers the services that are included with assisted UC installations. There are separate DSOs for on-site and remote installations.

ACES Staff Roles
For each assisted installation ACES provides staff to cover the following roles: Project Coordinator (PC), Project Manager (PM), and Project Engineer (PE).

The ACES Project Coordinator (PC) is the person that initially receives the order for the ACES installation. The PC gathers and validates the preliminary information that is required to assign a Project Manager to the installation. The required information includes: one or more valid purchase orders, contact information for key project stakeholders, and a network diagram with sufficient detail to identify the ADTRAN UC solution components to be installed and all relevant network elements with which the UC solution will integrate.

The ACES Project Manager (PM) is the primary point of contact for the Channel Partner's or the End-User's ATSP certified primary point of contact (PPOC) throughout the project. On a scheduled basis the PM will work with the PPOC throughout the project remotely over the phone, via email, and using web collaboration tools to ensure that the PPOC understands how to use the ACES Project Plan Workbook (PPW) to execute the installation project. The amount of scheduled time that the ACES PM can be available for a project is defined in the description of the ACES assisted installation part number that was purchased.

The ACES Project Engineer (PE) will work with the PPOC on a scheduled basis throughout the project remotely

over the phone, via email, and using web collaboration tools to review the system configuration that was designed and implemented by the PPOC and to answer technical questions regarding configuration and troubleshooting during installation project. The amount of scheduled time that the ACES PE can be available for a project is defined in the description of the ACES assisted installation part number that was purchased.

Installation Services

Upon receipt of a valid purchase order (PO) from the Channel Partner, the ACES PC will gather preliminary data in order to assign an ACES PM to each installation. Once assigned to the project the ACES PM will contact the Channel Partner's or the End-User's ATSP certified Primary Point of Contact (PPOC) to initiate the installation project.

For an ACES Assisted UC Installation the ACES team will:

1. Review and validate the application in which the equipment will be used
2. Provide Project Management Support: Working remotely over the phone the ACES PM will support the Channel Partner's or End-User's PPOC by reviewing the ACES UC Installation Project Plan Workbook (PPW), explaining the milestones and timeline, reviewing the data gathering information, monitoring the installation process, and escalating as necessary within ADTRAN. All ACES PM tasks must be scheduled in advance. The amount of scheduled time that the ACES PM can be available for a project is defined in the description of the ACES assisted installation part number that was purchased.
3. Provide Project Engineering Support: The ACES PE will verify the equipment configuration and support testing the configured application as requested by the PPOC. All ACES PEM tasks must be scheduled in advance. The amount of scheduled time that the ACES PE can be available for a project is defined in the description of the ACES assisted installation part number that was purchased.

For an ACES Assisted UC Installation the Channel Partner or End-User is responsible to:

1. Provide End-User Phone Training: Self-paced computer based training tutorials and User Guides are available to the public on ADTRAN's training website at www.adtran.com/ippt. The PPOC is responsible for providing the appropriate level of basic phone training. That basic training should demonstrate how to use features such as: Place a call on the handset and speaker phone, answer a call on the handset and speaker phone, transfer a call, mute a call, park and retrieve a call, utilize voicemail.
2. Provide System Administrator Training
    a. For NetVanta 7000 Series installations the "NetVanta 7000 Administration" training class is available as a live virtual instructor-led-training (VILT) course over the Internet. It is approximately four hours in length. A recorded version of that class is available for those students that cannot attend a scheduled live session. There is a course fee required to attend the live or recorded class. Class details and schedule are available at www.adtranuniversity.com. The Channel Partner or End-User can purchase seats in this class as a means to provide Administrator Training in conjunction with an installation.
    b. For NetVanta UC Series installations (including the Enterprise Communications Server (ECS), Business Communications System (BCS), and Unified Communications Server (UCS)) the Channel Partner or End-User is responsible for providing the appropriate level of administrator training.

Scheduling

The Channel Partner's or the End-User's ATSP certified PPOC is responsible for the project timeline. The ACES PM will provide appropriate checklists and worksheets to assist the PPOC in gathering the information that is required for the installation. In order to ensure that installations are successful and timely, ACES schedules resources in advance. Scheduling changes within five business days of a planned event or cancellations may result in additional costs. ACES encourages PPOC to notify the ACES PM of any requested schedule changes or cancellations as soon as practical.

2. CONTACTS FOR SUPPORT SERVICES

Purpose/Need	Contact	Hours of Operation	Contact Information
Questions about ACES Maintenance Plans	ACES Business Office	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	888-874-ACES (2237) aces@adtran.com www.adtran.com
Questions about ACES Installation, technical support during install	ACES Install Group	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	888-874-ACES (2237) aces.installation@adtran.com www.adtran.com
Technical Support (post-install)	ADTRAN Technical Support	Monday – Friday 7:00am-7:00pm Central excluding ADTRAN holidays Service affecting emergencies: 24 hours/day 7 days/week	888-4ADTRAN (423-8726) support@adtran.com supportforums.adtran.com
ACES Purchase Orders	ACES Business Office	Monday – Friday 8:00am-5:00pm Central excluding ADTRAN holidays	Fax: 256-963-7956 Email: acespo@adtran.com

There may be a delayed response to inquiries submitted via the web or email. Critical issues and escalations should be submitted via telephone for fastest response.

3. CHANNEL PARTNER AND END-USER RESPONSIBILITIES

Purchasing ACES Installation Services

Purchase orders (POs) for ACES installation must include the following:

1. ACES part number(s), quantity, and pricing;
2. End-User site information, including company name and street address (shipping address);

In order to facilitate the installation process it is helpful to include the following supplemental information on or with ACES installation POs:

1. Channel Partner contact information including company name, billing address, contact name, email address and phone number;
2. Channel Partner or End-User installation coordinator contact information including name, email address, and phone number;
3. End-User site contact information, including name, phone number, and email address;
4. Equipment information, including hardware, maintenance, software, and software assurance PO number(s); and
5. ***Requested*** date of installation (PLEASE NOTE: Installation date is dependent upon many variables and is not guaranteed until confirmed by the ACES PM).

Channel Partner or End-User Staff Role

assisted installations require that the Channel Partner or the End-User provide an individual with the ADTRAN Technical Support Professional (ATSP) level certification on the product being installed to serve as the Primary Point of Contact (PPOC) throughout the project. NetVanta 7000 Series installations require ATSP/UCAS (UC Appliance Solutions) certification. NetVanta UC Series (ECS and UCS) require ATSP/UCSS (UC Server Solutions) certification. NetVanta BCS installations require both ATSP/UCAS and ATSP/UCSS certification. ADTRAN certification training information can be found at www.adtran.com/certifications. This PPOC will serve multiple

customer-facing roles.

As the Project Manager the PPOC will be the primary point of contact for all project stakeholders throughout all phases of the project including Kick-off, Data Gathering, Design Review, Staging, Installation, Fine Tuning, Training, and Close-out.

The PPOC will also serve as the Project Engineer responsible for staging, configuring, installing, and testing the UC solution. If one or more On-site Technicians (OST) is required for the installation then it is the responsibility of the PPOC to acquire, coordinate, and direct the services of the OST(s).

This PPOC must communicate with the ACES PM providing appropriate advance notice for all changes.

End-User Installation Responsibilities

To ensure a successful installation ACES requires the following End-User responsibilities:

1. Communicate with the Channel Partner's or the End-User's ATSP certified PPOC, providing appropriate advance notice for all changes;
2. Submit site and site contact information including company name, street address, contact name, email address, and phone number;
3. Collect and submit specific network configuration and technical information as requested. End-User can help to avoid schedule delays by ensuring that PPOC receives complete information no later than three weeks prior to the requested installation date to allow for verification and equipment staging. Some examples of the needed information include:
    a. Network diagram of the application and all pertinent equipment. This diagram should include all of the proposed equipment and any existing equipment with which it is expected to interact (firewalls, paging systems, fax servers, etc.);
    b. Network service parameters, such as quantity and types of voice trunks (PRI, analog, SIP) and a phone extension list that includes a complete inventory of telephone numbers and the associated user names (voice, fax, IVR systems, alarm lines, etc.);
    c. Interface configuration and addressing information for other equipment with which the installed equipment will interoperate;
    d. Network security requirements and parameters, such as firewall rules and NAT configuration, port forwards; and
    e. Premises layout or floor plan to be used in planning phone set placement;
4. Verify and submit documentation of site qualifications to be sure that:
    a. Installation impacting results communicated from any on-site surveys have been resolved prior to installation
    b. The location meets the environmental requirements specified in the equipment documentation;
    c. Physical mounting points and interfaces are compatible with the ADTRAN equipment;
    d. Adequate electrical power and proper electrical ground bus bar is available and within six feet (cable length) of the ADTRAN equipment, protected by a surge protector (required) or uninterruptable power supply (UPS – recommended);
    e. Telephone and/or data circuit cables/jacks are labeled, mapped, terminated, fully installed with proper demarcation, have been tested and certified by the provider, and the points of demarcation are within six feet (cable length) of the ADTRAN equipment;
    f. End-User premise wiring is installed, toned, tagged, and properly terminated. In general, properly installed standard Category 5 wiring is adequate;
    g. Other equipment or networks to which the ADTRAN equipment is connected are available and accessible, all interfaces are compatible, and that the networks are capable and properly configured for carrying the network traffic including Quality of Service (QoS) settings required to

prioritize voice traffic over less delay-sensitive traffic on the network;

h. Arrange for representatives of other vendors and providers (such as the telephone company, IT vendor, PBX vendor, etc.) to be available during data gathering and at the time of installation as appropriate for configuration and testing of other equipment and networks with which the ADTRAN equipment interacts;

5. Provide secure remote broadband access (i.e., port forward via a Cable, DSL, etc.) to the equipment via the public Internet to allow testing, configuration, and maintenance. End-User must ensure that their network is properly secured;
6. Verify that all equipment, supplies, and materials have been received and are on-site and available before the installation commences;
7. Provide supplies and materials that are not provided by ACES but are required for the installation. Examples include: equipment racks, rack mount screws, patch cables, extension cords, etc.; and
8. Provide access to the equipment installation location at the time of arrival of any OSTs that may be involved in the installation.
9. Secure the ADTRAN equipment by changing the passwords when the installation is complete.

Installation Acceptance and Warranty

Upon completion of the physical installation when the system is capable of passing End-User traffic (voice and/or data) the system will be considered "in service." At this point the PPOC should notify the ACES PM that the installation has been completed and that the installed equipment is operating properly. If the hours purchased for the assisted installation are all utilized prior to completion then additional hours must be purchased. See section five of this document for details.

ACES does not provide an installation warranty for the assisted installation service since the ATSP certified PPOC is responsible for the quality of the assisted installation.

If the End-User has purchased an ACES maintenance plan then the maintenance plan will be activated on the in-service date.

4. OUT OF SCOPE

Exclusions

ACES Installation Service does ***NOT*** include:

1. Implementation or installation of products for which there is no installation order, or for those products not described in the Statement of Work, including labor, hardware, cables, etc.
2. Equipment required to perform installation services at the End-User location
3. Troubleshooting or managing third party vendor issues
4. Services made necessary by failures related to misuse, neglect, accident, alteration, modification, or willful or negligent acts by the End-User or other parties beyond the control of ACES
5. Force majeure: acts of God, acts of public enemy, acts of government, freight embargoes, strikes, quarantine restrictions, unusually severe weather conditions, insurrection, riot, etc
6. Wiring or cabling: installation or modification of End-User's in-house wiring; extension of telephone company demarcation point (DMARC); ancillary materials such as power/extension cords
7. Racks, shelves, or wall boards: supply, assembly, installation of racks, shelves, wall boards or any other physical structure to which the covered equipment is mounted (unless specifically included in the ACES Statement of Work)
8. Optimization or troubleshooting of the End-User's network or applications

5. ADDITIONAL CHARGES FOR INSTALLATION SERVICES

Beyond the services offered as part of an ACES installation, ADTRAN can arrange for additional services that are charged separately. Such expenses include:

1. Time and Materials (T&M): hourly rate for services performed beyond those covered by the specific ACES installation items that were purchased or the Statement of Work created for a project implementation by the assigned PM. With advance notice and at ACES PM discretion, ACES can arrange for the ACES PE or OST to perform work in addition to the tasks covered in ACES installation.
2. Site Not Ready (SNR), Rescheduling, or Cancellation: fees to cover costs of canceling or rescheduling the installation. ACES will waive these fees if five business days' notice is given.
3. Expedite: fixed rate surcharge to schedule the installation with less than the required scheduling interval. You may request that your installation process be accelerated. ACES will grant an expedite request and accept the fee only if the service personnel and equipment are available.

6. GENERAL INFORMATION

Language
Installation services are provided in English.

Invoicing of Installation Services
Upon completion of each phase of an installation, ADTRAN reserves the right to invoice ADTRAN's direct customer (typically the Channel Partner) for that portion of the installation service that has been completed and accepted by the ATSP certified PPOC to be in service or complete. ADTRAN further reserves the right to invoice the direct customer at the completion of each site installation, even in a case where multiple installation sites were submitted on a single purchase order.

Cancellation
ADTRAN reserves the right to cancel any installation project in whole or in part at ADTRAN's sole discretion. ADTRAN will submit its cancellation notice to the project stakeholders in writing and may then invoice any portion of the installation services performed on or prior to the date of cancellation. End-User or Channel Partner may cancel any pending installation service without penalty by submitting its cancellation notice in writing and this notice must be received prior to the occurrence of any combination of the following activities, otherwise charges may apply: 1) the shipment of any ADTRAN equipment purchased for installation, or 2) the performance of any fee-based service or site survey, or 3) the appointment of an ACES Project Manager.

AOE

ADTRAN Services Management
Advanced Operation Environment (AOE) Software – P/N 4150800G1
The 4150800G1 part number includes the following:

AOE/EMS Application Software (for all supported platforms: Solaris, Windows and Linux
All AOE Product keys – see list below
100 Category I licenses (support for ALL CN managed devices)
Unlimited Category IV Licenses (support for ADTRAN and ACP ONTs)
OSS GW Key – supports automated provisioning
AOE/EMS documentation
AOE maintenance (to the end of the current maintenance period)

Additional details on the above components are provided below.
AOE basic features include:

- AOE Basic Package contents
  - Dashboards – alarm summary, scheduler status, CapacityMonitor Alerts
  - Alarm reporting – network wide alarm details
  - Discovery – manual initiation for discovery
  - Network View – complete tree/topology view
  - Software Upgrades – single GUI for all managed ADTRAN CN devices
  - Scheduler – network device resync, network device heartbeat, network c
  - Disaster recovery – SCA collection and push
  - Detailed Provisioning – per device/port provisioning, status, configuratio

AOE Product keys enable the following applications (refer to Appendix A for details):

ServiceActivator
ServiceDesigner
ServiceCheck
ServiceMonitor
CapacityManager
InventoryManager
LinkDesigner
Ethernet and Optical Service

The AOE Annual Maintenance Package includes:
- Updates to the Total Access AOE software
- Planned feature enhancements to the Total Access AOE software
- New product support within the Total Access AOE software
- Total Access AOE software patches and bug fixes
- Telephone Technical Support during ADTRAN's normal business hours (7 a.m. to 7 p.m. CST, Monday through Friday, excluding holidays)

APPENDIX A – AOE Features

AOE features include:
Service Definition and Activation (MACD/SR)

- **ServiceActivator®** – end to end service activation
- **ServiceDesigner®**– service profile/template manager (basic)
- **Ethernet Access Services** – service activation for EoX
- **OPTI6100 Services –** TDM service activation on OPTI-6100 subtend

Network Design

- **LinkManager®**
  Optical infrastructure definition
  Optical infrastructure provisioning
  Protection Domain configuration

Troubleshooting: includes the following functions:

- **ServiceCheck®** – knowledge based troubleshooting

Service Assurance

- **ServiceMonitor®** – proactive monitoring of service BW and parame
- **CapacityManager®** – trunk utilization over time
- **Alarm Window** – human readable alarm listing with color coded sev
-

Asset Management

- **InventoryManager®** – network wide provisioning and inventory infor
- **Discovery** – manual initiation for discovery for new managed objects
- **SW upgrade** – single GUI for all managed ADTRAN CN devices
- **SW Auto-Upgrade** – single GUI for centralized ONT firmware mana
- **Scheduler** – network device resync, network device heartbeat, netw

Administrative

- **Licenses/Keys** – application and viewing of keys
- **AOE Client** – administrative control of client access
- **Administrator Settings** – controls for email alerts, users, user group

Help

- **About AOE** – AOE version and license key status
- **Port Status Legend** – key for port status in Network Device Manage

AOE	
Short Description	**Part**
AOE SERVICE MGMNT PACKAGE	4150800G1
TA EMS ANNUAL MAINT AGRMNT	1150TAEMSL1
TA5000 ONE TRAINING	1600CSYS5020E
TA5000 ONE COURSE	1600CSYS5020C

MODEL	PART NUMBER
TA5000 CHASSIS STARTER KIT	4187001L1
TA5000 SCM G2	1187010G2
TA5000 SM 2GE RG	1187020G2
TA5000 SM 2-10GE RG	1187025G2
TA5K SM5 2-10G/2-1G SM RG	1187030G2
TA5000 OSCP, OSC PROCESSOR	1174471G1
TA5000 OSCF, OSC FILTER	1174461G1

SFP, OC-3 1511 nm 80 km	1442701PG3
TA5000 Blank Panels	
TA5000 AM BLANK DUAL SLOT	1187922E1
TA5000 AM BLANK	1187921E1
TA5000 AMIO2 BLANK	1187923G1
TA5000 AMIO1 BLANK	1187925G1
TA5000 Carrier Module Blank Panel	1174510G5
TA5000 Reconfigurable Optical Add/Drop Multiplexers (ROADMs)	
TA5000 MARS-2, ROADM System	1174501G1
TA5000 MARS-2P, ROADM System	1174502G1
TA5000 MARS-2B, ROADM System	1174503G1
TA5000 MARS-4PB, ROADM System	1174512G1
TA5000 MARS-4B, ROADM System	1174513G1
TA5000 Optical Multiplexers	
44 CH MUX/DeMUX	1174980F1
88 CH MUX/DeMUX	1174982F1
Carrier Module	1174510G3
TA5000 D4A1720, 4-CH DWDM OADM	1174920G2
TA5000 D4A2124, 4-CH DWDM OADM	1174920G1
TA5000 D4A2528, 4-CH DWDM OADM	1174921G1
TA5000 D4A2932, 4-CH DWDM OADM	1174922G1
TA5000 D4A3336, 4-CH DWDM OADM	1174923G1
TA5000 D4A3740, 4-CH DWDM OADM	1174924G1
TA5000 D4A4144, 4-CH DWDM OADM	1174925G1
TA5000 D4A4548, 4-CH DWDM OADM	1174926G1
TA5000 D4A4952, 4-CH DWDM OADM	1174927G1
TA5000 D4A5356, 4-CH DWDM OADM	1174928G1
TA5000 D4A5960, 4-CH DWDM OADM	1174929G1
TA5000 D8M2128, 8-CH DWDM MUX	1174910G1
TA5000 D8M2936, 8-CH DWDM MUX	1174911G1
TA5000 D8D2128, 8-CH DWDM DMUX	1174915G1
TA5000 D8D2936, 8-CH DWDM DMUX	1174916G1
Dispersion Compensation	
TA5000 DCM-B20	1174451G1

TA5000 DCM-B40	1174452G1
TA5000 DCM-B60	1174453G1
TA5000 DCM-B80	1174454G1
TA5000 DCM-B100	1174455G1
TA5000 DCM-B120	1174456G1
Amplifiers	
TA5000, OPBA-18 Booster Amp	1174402G1
TA5000 OPAM, Pre-Amp	1174411G1
TA 5000/5006 ONE Transport Modules	
TA5000 ETOS-1	1174101F1
TA5000 ETOS-1N	1174101F2
TA5000 ETOS-1 PMOD LMIO4,ANSI	1174102F1
TA5000 ETOS-10	1174130F2
TA5000 ETOS-10 PMOD LMI02,ANSI	1174131F1
TA5000 OTOS-2-16	1174123F1
TA5K OTOS-2-16 PMOD LMI04,ANSI	1174111F1
TA5000 OTOS-1-8	1174121F1
TA5K OTOS-1-8 PMOD LMI02,ANSI	1174122F1
TA5000 TPR-10-4	1174211G1
WDM XFP C-Temp	
XFP 10G 1563.86NM 80KM ET, 17	1442982G8C
XFP 10G 1563.05NM 80KM ET, 18	1442982G9C
XFP 10G 1562.23NM 80KM ET, 19	1442983G1C
XFP 10G 1561.42NM 80KM ET, 20	1442983G2C
XFP 10G 1560.61NM 80KM ET, 21	1442981G1C
XFP 10G 1559.79NM 80KM ET, 22	1442981G2C
XFP 10G 1558.98NM 80KM ET, 23	1442981G3C
XFP 10G 1558.17NM 80KM ET, 24	1442981G4C
XFP 10G 1557.36NM 80KM ET, 25	1442981G5C
XFP 10G 1556.56NM 80KM ET, 26	1442981G6C
XFP 10G 1555.75NM 80KM ET, 27	1442981G7C
XFP 10G 1554.94NM 80KM ET, 28	1442981G8C
XFP 10G 1554.13NM 80KM ET, 29	1442981G9C
XFP 10G 1553.33NM 80KM ET, 30	1442982G1C
XFP 10G 1552.52NM 80KM ET, 31	1442982G2C

XFP 10G 1551.72NM 80KM ET, 32	1442982G3C
XFP 10G 1550.92NM 80KM ET, 33	1442982G4C
XFP 10G 1550.12NM 80KM ET, 34	1442982G5C
XFP 10G 1549.32NM 80KM ET, 35	1442982G6C
XFP 10G 1548.52NM 80KM ET, 36	1442982G7C
XFP 10G 1547.72NM 80KM ET, 37	1442983G3C
XFP 10G 1546.92NM 80KM ET, 38	1442983G4C
XFP 10G 1546.12NM 80KM ET, 39	1442983G5C
XFP 10G 1545.32NM 80KM ET. 40	1442983G6C
XFP 10G 1544.53NM 80KM ET, 41	1442983G7C
XFP 10G 1543.73NM 80KM ET, 42	1442983G8C
XFP 10G 1542.94NM 80KM ET, 43	1442983G9C
XFP 10G 1542.14NM 80KM ET, 44	1442986G1C
XFP 10G 1541.35NM 80KM ET. 45	1442986G2C
XFP 10G 1540.56NM 80KM ET. 46	1442986G3C
XFP 10G 1539.77NM 80KM ET, 47	1442986G4C
XFP 10G 1538.98NM 80KM ET, 48	1442986G5C
XFP 10G 1538.19NM 80KM ET, 49	1442986G6C
XFO 10G 1537.40NM 80KM ET, 50	1442986G7C
XFP 10G 1536.61NM 80KM ET, 51	1442986G8C
XFP 10G 1535.82NM 80KM ET, 52	1442986G9C
XFP 10G 1535.04NM 80KM ET, 53	1442987G1C
XFP 10G 1534.25NM 80KM ET, 54	1442987G2C
XFP 10G 1533.47NM 80KM ET, 55	1442987G3C
XFP 10G 1532.68NM 80KM ET, 56	1442987G4C
XFP 10G 1531.90NM 80KM ET, 57	1442987G5C
XFP 10G 1531.12NM 80KM ET, 58	1442987G6C
XFP 10G 1530.33NM 80KM ET, 59	1442987G7C
XFP 10G 1529.55NM 80KM ET, 60	1442987G8C
WDM Tunable XFP C-Temp	
XFP 10G Tunable 80KM ET	1442985G1C
WDM SFP+ (10.7G)	
SFP+ 10G 1563.86NM DWDM CH17 CT, 80 KM	1442485G5C
SFP+ 10G 1563.05NM DWDM CH18 CT, 80 KM	1442485G6C
SFP+ 10G 1562.23NM DWDM CH19 CT, 80 KM	1442485G7C
SFP+ 10G 1561.42NM DWDM CH20 CT, 80 KM	1442485G8C
SFP+ 10G 1560.61 DWDM CH21 CT, 80 km	1442481G1C
SFP+ 10G 1559.79 DWDM CH22 CT, 80 km	1442481G2C
SFP+ 10G 1558.98 DWDM CH23 CT, 80 km	1442481G3C
SFP+ 10G 1558.17 DWDM CH24 CT, 80 km	1442481G4C
SFP+ 10G 1557.36 DWDM CH25 CT, 80 km	1442481G5C
SFP+ 10G 1556.56 DWDM CH26 CT, 80 km	1442481G6C
SFP+ 10G 1555.75 DWDM CH27 CT, 80 km	1442481G7C
SFP+ 10G 1554.94 DWDM CH28 CT, 80 km	1442481G8C
SFP+ 10G 1554.13NM DWDM CH29 CT, 80KM	1442481G9C
SFP+ 10G 1553.33NM DWDM CH30 CT, 80KM	1442482G1C
SFP+ 10G 1552.52NM DWDM CH31 CT, 80KM	1442482G2C
SFP+ 10G 1551.72NM DWDM CH32 CT, 80KM	1442482G3C
SFP+ 10G 1550.92NM DWDM CH33 CT, 80KM	1442482G4C
SFP+ 10G 1550.12NM DWDM CH34 CT, 80KM	1442482G5C
SFP+ 10G 1549.32NM DWDM CH35 CT, 80KM	1442482G6C
SFP+ 10G 1548.52NM DWDM CH36 CT, 80KM	1442482G7C
SFP+ 10G 1547.72NM DWDM CH37 CT, 80KM	1442482G8C
SFP+ 10G 1546.92NM DWDM CH38 CT, 80KM	1442482G9C

SFP+ 10G 1546.12NM DWDM CH39 CT, 80KM	1442483G1C
SFP+ 10G 1545.32NM DWDM CH40 CT, 80KM	1442483G2C
SFP+ 10G 1544.53NM DWDM CH41 CT, 80KM	1442483G3C
SFP+ 10G 1543.73NM DWDM CH42 CT, 80KM	1442483G4C
SFP+ 10G 1542.94NM DWDM CH43 CT, 80KM	1442483G5C
SFP+ 10G 1542.14NM DWDM CH44 CT, 80KM	1442483G6C
SFP+ 10G 1541.35NM DWDM CH45 CT, 80KM	1442483G7C
SFP+ 10G 1540.56NM DWDM CH46 CT, 80KM	1442483G8C
SFP+ 10G 1539.77NM DWDM CH47 CT, 80KM	1442483G9C
SFP+ 10G 1538.98NM DWDM CH48 CT, 80KM	1442484G1C
SFP+ 10G 1538.19NM DWDM CH49 CT, 80KM	1442484G2C
SFP+ 10G 1537.40NM DWDM CH50 CT, 80KM	1442484G3C
SFP+ 10G 1536.61NM DWDM CH51 CT, 80KM	1442484G4C
SFP+ 10G 1535.82NM DWDM CH52 CT, 80KM	1442484G5C
SFP+ 10G 1535.04NM DWDM CH53 CT, 80KM	1442484G6C
SFP+ 10G 1534.25NM DWDM CH54 CT, 80KM	1442484G7C
SFP+ 10G 1533.47NM DWDM CH55 CT, 80KM	1442484G8C
SFP+ 10G 1532.68NM DWDM CH56 CT, 80KM	1442484G9C
SFP+ 10G 1531.90NM DWDM CH57 CT, 80KM	1442485G1C
SFP+ 10G 1531.12NM DWDM CH58 CT, 80KM	1442485G2C
SFP+ 10G 1530.33NM DWDM CH59 CT, 80KM	1442485G3C
SFP+ 10G 1529.55NM DWDM CH60 CT, 80KM	1442485G4C
Non-WDM SFP / XFP	
XFP 10G MULTI-MODE FIBER	1442901G1
XFP, 10G, 1310NM, 10KM	1442910G1
XFP 10G 1550NM 80KM CTEMP	1442980G1C
SFP+ 10G INFINIBAND 3M CTMP	1442400G1C
SFP+ 10G MMF	1442401G1
SFP+ 10G 1310NM SMF 10KM	1442410G1
SFP+ 10G 1310NM SMF 20KM	1442420G1
SFP+ 10G 1550NM SMF 40KM	1442440G1
SFP+ 10G 1550NM SMF 80KM CTMP	1442480G1C
SFP, OC-48, 5KM, 1310NM SR	1184560P6
SFP, 3.123 G, 1510 nm, 60 km	1442861G1
SFP, OC-48 1310 nm, IR-1, 15 km	1184560P2
SFP, OC-48 1550 nm, LR-2, 80 km	1184560P5
SFP, OC-48 1310 nm, SR-1, 2 km	1184560P6
SFP GIGE 1310NM SMF 10KM	1184561PG1
SFP GIGE 850NM MMF SHORT	1184561PG3
SFP GigE 1550 nm, 1000Base-ZX, 80 km	1184562PG5
SFP, OC-12 1310 nm, IR-1, 15 km	1184544PG2
SFP, OC3 IR SFP 1310 nm 10 km	1184543PG2

SERVICES

Pricing for Test & Turn-up is based on the number of cards, types of cards, number of no

Cutover is optional.

However, is ADTRAN is requested to perform or support this service, ADTRAN will price imposed by the customer's methods and procedures.
Typically ADTRAN will estimate the number of cutovers that can be performed based on For example, if customer has 100 cutovers to be performed and ADTRAN has estimated required methods and procedures ADTRAN will charge quantity 4 of the specific part belo

Remote Test & Turn-up Support	1901BRTUC4HDAY01
	1901BRTUC4HNGT01
	1901BRTUC4HWEH01
Onsite Test and Turn-up	1901BTTUPPXNEGA1
	1901BTTUPPXNEGA2
	1901BTTUPPXNEGA3
	1901BTTUPPXNEGA4
	1901BTTUPPXNEGA5
Optional Services	1901BFBCBPONEGA1
	1901BFCADPONEGA1
REMOTE TURN/CUT SUPPORT-4HR	1901BRTUC4HDAY01
REMOTE TURN/CUT SUP(NIGHT-4HR)	1901BRTUC4HNGT01
REMOTE TURN/CUT SUP(WEHOL-4HR)	1901BRTUC4HWEH01
ON-SITE SUPPORT (DAILY-NBH)	1901AOISUDAYTM01
ON-SITE SUPPORT (DAILY-NIGHT)	1901AOISUNIGHT01
ON-SITE SUPPORT (WEEKLY)	1901BOTUCWEKLY01
ON-SITE SUPPORT (WEEKENDHOL)	1901BOTUCWEHOL01
Network Care Program	P/N
PREMIUM NETWORK CARE(T3-5K)	1902PTACR7AT3C01
PREMIUM NETWORK CARE(T3-5K10K)	1902PTACR7AT3B01
PREMIUM NETWORK CARE(T3-10K)	1902PTACR7AT3A01
PREMIUM NETWORK CARE for access lines > 100,000 as determined by ADTRAN CN Services	TBD
TOTAL NETWORK CARE(T3-5K)	1902ADVRS7AT3C01
TOTAL NETWORK CARE(T3-5K10K)	1902ADVRS7AT3B01
TOTAL NETWORK CARE(T3-10K)	1902ADVRS7AT3A01
TOTAL NETWORK CARE for access lines > 100,000 as determined by ADTRAN CN Services	TBD
Service	**Part**
INSTALLATION TA5K	1901ADPLYT5K0GA1
REMOTE TURN/CUT SUPPORT-4HR	1901BRTUC4HDAY01
REMOTE TURN/CUT SUP(NIGHT-4HR)	1901BRTUC4HNGT01
REMOTE TURN/CUT SUP(WEHOL-4HR)	1901BRTUC4HWEH01
ONSITE T&TU (TOS CARDS)	1901BTTUPPXNEGA1
ONSITE T&TU (MUXES, CARRIER	1901BTTUPPXNEGA2
ONSITE T&TU (ROADM, DCM)	1901BTTUPPXNEGA3
ONSITE T&TU TOS PORT DWDM	1901BTTUPPXNEGA4
ONSITE T&TU TOS PORT 1G-10G	1901BTTUPPXNEGA5
FIBER CHARACTERIZATION BASE	1901BFBCBPONEGA1
FIBER CHARACTERIZATION ADD-ON	1901BFCADPONEGA1

:)

, ServiceMonitor Alerts

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Supplier: **ADTRAN**

STATE OF UTAH

SOLICITATION NO. JP14001

WSCA-NASPO Data Communications Products & Services

RESPONSES DUE NO LATER THAN:

Aug 30, 2013 11:00:00 AM MDT

RESPONSES MAY BE SUBMITTED ELECTRONICALLY TO:

www.bidsync.com

RESPONSES MAY BE MAILED OR DELIVERED TO:

State of Utah
Division of Purchasing
3150 State Office Building, Capitol Hill
Salt Lake City, Utah 84114-1061

Supplier: **ADTRAN**

State of Utah
Request for Proposal

Legal Company Name (include d/b/a if applicable) **ADTRAN, Inc.**	Federal Tax Identification Number **63-0918200**	State of Utah Sales Tax ID Number **12055930-004-STC**	
Ordering Address **Authorized Reseller/Distributor**	City	State	Zip Code
Remittance Address (if different from ordering address) **Authorized Reseller/Distributor**	City	State	Zip Code
Type Corporation ☒ Partnership ☐ Proprietorship ☐ Government ☐	Company Contact Person **Darrell Rogers**		
Telephone Number (include area code) **970.482.2216**	Fax Number (include area code) **970.482.2216**		
Company=s Internet Web Address **www.adtran.com**	Email Address **Darrell.Rogers@adtran.com**		
Discount Terms (for bid purposes, bid discounts less than 30 days will not be considered) **Net 30 Days**	Days Required for Delivery After Receipt of Order (see attached for any required minimums) **Dependent on product and volume.**		

The undersigned certifies that the goods or services offered are produced, mined, grown, manufactured, or performed in Utah. Yes No ☒ . If no, enter where produced, etc. **Huntsville, AL/China/Taiwan/Vietnam**

Offeror=s Authorized Representative=s Signature	Date **August 27, 2013**
Type or Print Name **Rick Schansman**	Position or Title **Senior VP & General Manager EN Division**

N O T I C E

When submitting a response (proposal, quote or bid) electronically through BidSync, it is the sole responsibility of the supplier to ensure that the response is received by BidSync prior to the closing date and time. Each of the following steps in BidSync MUST be completed in order to place an offer:

A. Login to www.bidsync.com;
B. Locate the bid (solicitation) to which you are responding;
    a. Click the "Search" tab on the top left of the page;
    b. Enter keyword or bid (solicitation) number and click "Search";
C. Click on the "Bid title/description" to open the Bid (solicitation) Information Page;
D. "View and Accept" all documents in the document section;
E. Select "Place Offer" found at the bottom of the page;
F. Enter your pricing, notes, other required information and upload attachments to this page;
G. Click "Submit" at the bottom of the page;
H. Review Offer(s); and
I. Enter your password and click "Confirm".

Note that the final step in submitting a response involves the supplier's acknowledgement that the information and documents entered into the BidSync system are accurate and represent the supplier's actual proposal, quote or bid. This acknowledgement is registered in BidSync when the supplier clicks "Confirm". BidSync will post a notice that the offer has been received. This notice from BidSync MUST be recorded prior to the closing date and time or the response will be considered late and will not be accepted.

Be aware that entering information and uploading documents into BidSync may take considerable time. Please allow sufficient time to complete the online forms and upload documents. Suppliers should not wait until the last minute to submit a response. It is recommended that suppliers submit responses a minimum of 24 hours prior to the closing deadline. The deadline for submitting information and documents will end at the closing time indicated in the solicitation. All information and documents must be fully entered, uploaded, acknowledged (Confirm) and recorded into BidSync before the closing time or the system will stop the process and the response will be considered late and will not be accepted.

Responses submitted in BidSync are completely secure. No one (including state purchasing staff) can see responses until after the deadline. Suppliers may modify or change their response at any time prior to the closing deadline. However, all modifications or changes must be completed and acknowledged (Confirm) in the BidSync system prior to the deadline. BidSync will post a notice that the modification/change (new offer) has been received. This notice from BidSync MUST be recorded prior to the closing date and time or the response will be considered late and will not be accepted.

Utah Code 46-4-402(2) Unless otherwise agreed between a sender (supplier) and the recipient (State Purchasing), an electronic record is received when: (a) it enters an information processing system that the recipient has designated or uses for the purpose of receiving electronic records or information of the type sent and from which the recipient is able to retrieve the electronic record; and (b) it is in a form capable of being processed by that system.

REQUEST FOR PROPOSAL - INSTRUCTIONS AND GENERAL PROVISIONS

1. SUBMITTING THE PROPOSAL: (a) The Utah Division of Purchasing and General Services (DIVISION) prefers that proposals be submitted electronically. Electronic proposals may be submitted through a secure mailbox at BidSync (formerly RFP Depot, LLC) (www.bidsync.com) until the date and time as indicated in this document. It is the sole responsibility of the supplier to ensure their proposal reaches BidSync before the closing date and time. There is no cost to the supplier to submit Utah's electronic proposals via BidSync. (b) Electronic proposals may require the uploading of electronic attachments. The submission of attachments containing embedded documents is prohibited. All documents should be attached as separate files. (c) If the supplier chooses to submit the proposal directly to the DIVISION in writing: The proposal must be signed in ink, sealed, and delivered to the Division of Purchasing, 3150 State Office Building, Capitol Hill, Salt Lake City, UT 84114-1061 by the "Due Date and Time." The "Solicitation Number" and "Due Date" must appear on the outside of the envelope. All prices and notations must be in ink or typewritten. Each item must be priced separately. Unit price shall be shown and a total price shall be entered for each item offered. Errors may be crossed out and corrections printed in ink or typewritten adjacent and must be initialed in ink by person signing offer. Unit price will govern, if there is an error in the extension. Written offers will be considered only if it is submitted on the forms provided by the DIVISION. (d) Proposals, modifications, or corrections received after the closing time on the "Due Date" will be considered late and handled in accordance with the Utah Procurement Rules, section R33-3-209. (e) Facsimile transmission of proposals to DIVISION will not be considered.

2. PROPOSAL PREPARATION: (a) Delivery time of products and services is critical and must be adhered to as specified. (b) Wherever in this document an item is defined by using a trade name of a manufacturer and/or model number, it is intended that the words, "or equivalent" apply. "Or equivalent" means any other brand that is equal in use, quality, economy and performance to the brand listed as determined by the DIVISION. If the supplier lists a trade name and/or catalog number in the offer, the DIVISION will assume the item meets the specifications unless the offer clearly states it is an alternate, and describes specifically how it differs from the item specified. All offers must include complete manufacturer=s descriptive literature if quoting an equivalent product. All products are to be of new, unused condition, unless otherwise requested in this solicitation. (c) Incomplete proposals may be rejected. (d) Where applicable, all proposals must include complete manufacturer=s descriptive literature. (e) By submitting the proposal the offeror certifies that all of the information provided is accurate, that they are willing and able to furnish the item(s) specified, and that prices offered are correct. (f) This proposal may not be withdrawn for a period of 60 days from the due date.

3. FREIGHT COST: Suppliers are to provide line item pricing FOB Destination Freight Prepaid. Unless otherwise indicated on the contract/purchase order, shipping terms will be FOB Destination Freight Prepaid.

4. SOLICITATION AMENDMENTS: All changes to this solicitation will be made through written addendum only. Answers to questions submitted through BidSync shall be considered addenda to the solicitation documents. Bidders are cautioned not to consider verbal modifications.

5. PROTECTED INFORMATION: Suppliers are required to mark any specific information contained in their offer which they are claiming as protected and not to be disclosed to the public or used for purposes other than the evaluation of the offer. Each request for non-disclosure must be made by completing the "Confidentiality Claim Form" located at: http://www.purchasing.utah.gov/contract/documents/confidentialityclaimform.doc with a specific justification explaining why the information is to be protected. Pricing and service elements of any proposal will not be considered proprietary. All material becomes the property of the DIVISION and may be returned only at the DIVISION 's option.

6. BEST AND FINAL OFFERS: Discussions may be conducted with offerors who submit proposals determined to be reasonably susceptible of being selected for award for the purpose of assuring full understanding of, and responsiveness to, solicitation requirements. Prior to award, these offerors may be asked to submit best and final offers. In conducting discussions, there shall be no disclosure of any information derived from proposals submitted by a competing offeror.

7. SAMPLES: Samples of item(s) specified in this offer, brochures, etc., when required by the DIVISION, must be furnished free of expense to the DIVISION. Any item not destroyed by tests may, upon request made at the time the sample is furnished, be returned at the offeror's expense.

8. AWARD OF CONTRACT: (a) The contract will be awarded with reasonable promptness, by written notice, to the responsible offeror whose proposal is determined to be the most advantageous to the DIVISION, taking into consideration price and evaluation factors set forth in the RFP. No other factors or criteria will be used in the evaluation. The contract file shall contain the basis on which the award is made. Refer to Utah Code Annotated 65-

56-408. (b) The DIVISION may accept any item or group of items, or overall best offer. The DIVISION can reject any or all proposals, and it can waive any informality, or technicality in any proposal received, if the DIVISION believes it would serve the best interests of the DIVISION. (c) Before, or after, the award of a contract the DIVISION has the right to inspect the offeror's premises and all business records to determine the offeror's ability to meet contract requirements. (d) The DIVISION will open proposals publicly, identifying only the names of the offerors. During the evaluation process, proposals will be seen only by authorized DIVISION staff and those selected by DIVISION to evaluate the proposals. Following the award decision, all proposals become public information except for protected information (see number 5 above). A register of proposals and contract awards are posted at http://purchasing.utah.gov/vendor/bidtab.html. (e) Estimated quantities are for bidding purposes only, and not to be interpreted as a guarantee to purchase any amount. (f) Utah has a reciprocal preference law which will be applied against offerors offering products or services produced in states which discriminate against Utah products. For details see Section 63G-6-404 and 63G-6-405, Utah Code Annotated. (g) Multiple contracts may be awarded if the DIVISION determines it would be in its best interest.

9. DEBRIEFING OF UNSUCCESSFUL OFFERORS:
State Purchasing does not conduct face to face or teleconference debriefings. All debriefings are to be conducted in writing. A debrief request must be submitted in writing to the Purchasing Agent within seven (7) calendar days of the award notification or rejection notification made through written correspondence or posted on BidSync. The debrief response will be limited to critiquing the strength/weakness of an offeror's proposal based on the evaluation criteria. The debriefing is intended as a courtesy to offerors, providing feedback to be used for future opportunities. Comparisons between proposals or evaluations of other proposals will not be allowed.

10. DIVISION APPROVAL: Contracts written with the State of Utah, as a result of this proposal, will not be legally binding without the written approval of the Director of the DIVISION.

11. DEBARMENT: The CONTRACTOR certifies that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction (contract) by any governmental department or agency. If the CONTRACTOR cannot certify this statement, attach a written explanation for review by the DIVISION.

12. ENERGY CONSERVATION AND RECYCLED PRODUCTS: The contractor is encouraged to offer Energy Star certified products or products that meet FEMP (Federal Energy Management Program) standards for energy consumption. The State of Utah also encourages contractors to offer products that are produced with recycled materials, where appropriate, unless otherwise requested in this solicitation.

13. GOVERNING LAWS AND REGULATIONS: All State purchases are subject to the Utah Procurement Code, Title 63 Chapter 56 U.C.A. 1953, as amended, and the Procurement Rules as adopted by the Utah State Procurement Policy Board. These are available on the Internet at www.purchasing.utah.gov. By submitting a bid or offer, the bidder/offeror warrants that the bidder/offeror and any and all supplies, services equipment, and construction purchased by the State shall comply fully with all applicable Federal and State laws and regulations, including applicable licensure and certification requirements.

14. SALES TAX ID NUMBER: Utah Code Annotated (UCA) 59-12-106 requires anyone filing a bid with the state for the sale of tangible personal property or any other taxable transaction under UCA 59-12-103(1) to include their Utah sales tax license number with their bid. For information regarding a Utah sales tax license see the Utah State Tax Commission's website at www.tax.utah.gov/sales. The Tax Commission is located at 210 North 1950 West, Salt Lake City, UT 84134, and can be reached by phone at (801) 297-2200.

(Revision Date: 05 Nov 2012 - RFP Instructions)