GE MDS

PRODUCT RELEASE NOTE

MDS Mercury 900 Firmware – Version 2.3.2

Overview

This section describes Software/Firmware updates for the Mercury 900.

Products: Mercury 900 Access Point, Mercury 900 Remote

Version: 2.3.2

Release Date: 22-JAN-2008

Important Note

GE MDS has determined that approximately 20 Mercury units shipped before 3/17/07 with incorrect hardware version identification. If your access points or remotes report hardware version "1.1.7," do not perform the firmware upgrade to 2.3.2. Instead, please contact SRO to have the units serviced. There is a serious hardware/firmware compatibility issue, which renders the units non-functional (they will not boot).

New Features

1. RSSI and SNR indication available on a channel by channel basis on the Remote.
2. Telnet utility available in the Maintenance/Tools menu. ("Radio-to-radio" telnet)
3. External PPS mode, which allows use of an external timing source instead of connecting a GPS antenna. This feature is only available on AP and RM hardware version 1.0.2 or newer.

Changes to Existing Features

1. Because of various performance issues, the Adaptive Split feature has been disabled. It will be re-enabled in a future release.
2. Modified layout of menus on AP to improve readability of the Remote Database.
3. Added Device Name of Remote to event log entries for Association and Disassociation events.
4. Modified Strict Distance hand-off mode to be truly strict. Remote will now only attempt to connect to closest AP at all times.
5. Modified functionality of Max Scanning Timer on hand-off Remote. If Remote is Ranging, Connecting, or Authenticating when the scanning timer expires, an additional 10 seconds is allowed. The recommended value for the MaxScanningTimer is now 15 seconds.
6. Remote's DHCP client now reacts to association events. Client will attempt to get an address after association occurs if it does not already have an address.

7. Improve download speed of Firmware Reprogramming when connected to TFTP server via wired ethernet port.
8. The Serial Data status and Auto Reprogramming have been added to the Web interface.
9. Enabling of streaming GPS NEMA data to serial console now displays the fact that the baud-rate has been changed to 4800bps.
10. Event log entries for VLAN parameters now explicitly show "DATA" and "MGMT" VLAN identification
11. SNMPv3 mode supports dynamic engine ID

Defect Fixes

1. TDD-sync timing drift issue in the AP when frequency hopping has been fixed. This fix also requires an update of micro-code in the Access Point hardware.
2. Improved association reliability.
3. Improved data passing reliability (fixed "associated but cannot pass data bug")
4. Modified internal communications to improve link stability in high traffic conditions.
5. AP single-channel operation with TDD Sync Mode = Free Run now operates properly when a GPS antenna is connected to the AP. There was an issue where the GPS timing signal could erroneously pull the radio off-frequency leading to loss of association.
6. Improved hop pattern offset configuration. Pattern offset now limited if hop channels are disabled.
7. Wireless Interface packet statistics now accurate.
8. Improved parsing and error handling of AP Locations files.
9. Improved Auto Firmware Download reliability.
10. Fixed issues setting device's date and time from GPS.
11. Stale GPS satellite information is now flushed when GPS fix is lost.
12. Encryption can no longer be enabled until there is a valid encryption phrase entered.
13. Web interface does not crash if 1) User Auth Method is set to "RADIUS" 2) User Auth Fallback is set to "Local" and 3) The Radius server is inaccessible.
14. Changes MODBUS/TCP server settings are now dynamic and do not require a reboot or COM port mode disable/enable switch to take effect.
15. Modbus/TCP Timeout units now read properly (msec)
16. Modbus/TCP config wizard via web now works properly. ("continue wizard" fixed)
17. Ping utility is now accessible from all management interfaces...console, telnet, SSH, HTTP.

Known Errata

1. When operating in environments with high amounts of interference, using Frame Duration = 10 ms can result in loss of association and/or data loss. With these channel conditions it is advisable to operate the system with Frame Duration set to 20 ms.
2. Changes to Device Auth mode (wireless security) should be immediately followed by a reboot in order for the changes to take effect.
3. Changes to Radius configuration need a reboot of the unit to take full effect.
4. The string "+++<carriage return><line feed>" needs to be sent to the unit to break it out of Modbus/ASCII mode. Note that the CRLF may not be sent by your terminal program when pressing the enter key on the keyboard.

5. Config files created prior to 2.3.2 release must have their "Data" VLAN parameters modified to include "DATA" as the prefix to any data VLAN parameters in order for the data VLAN parameters to be configured properly with 2.3.2+ firmware.
6. Auto firmware upgrades from AP to a particular RM can suspend until the RM re-associates. This can happen if the RM misses a key broadcast message from the AP.
7. Reboot Remotes (found in Maintenance / Auto Firmware Upgrade menu) does not work when invoked from the web interface.
8. Modbus/TCP Modbus Timeout is not configurable via web interface…it does not save values in input box. Operation is fine when using console, telnet, and SSH interfaces.
9. Ethernet LEDs on RJ45 connector do not properly indicate 10/100 Mbps operation.
10. See release notes for 2.2.0 firmware

Operation Notes and Optimizations
1. See release notes for 2.2.0 firmware

MDS Mercury 900 Firmware – Version 2.2.0

Overview

This section describes Software/Firmware updates for the Mercury 900.

Products: Mercury 900 Access Point, Mercury 900 Remote

Version: 2.2.0

Release Date: 10-OCT-2007

New Features

1. UDP multicast (point-to-multipoint transparent serial)
2. MODBUS/TCP Server
3. Configurable serial buffer size and inter-character delay for controlling transmission of serial packets

Changes to Existing Features

None

Defect Fixes

1. The AP's TDD-sync timing can drift under certain conditions. This causes all Remotes to lose association. The AP will reset its TDD-sync timing every 6 hours. The timing is only reset when no Remotes are associated.
2. GPS signal anomalies can cause the AP to enter "synchronizing" mode. In this condition, remotes will lose association. The AP will reset the internal GPS receiver if the unit is in "synchronizing" state for more than 20 minutes.
3. Fixed bug in Remote hand-off algorithm (hopping with handoffs). Remote could get stuck selecting an AP that was no longer one of the closest APs.
4. Serial Data connection details and data statistics update properly
5. If bandwidth is set to 3.5MHz, unit properly displays 7 channels (instead of 14)
6. Fixed bug in AP where web interface would offer "Hopping with Handoffs" frequency mode.

Known Errata

1. Changes to any MODBUS/TCP server settings will not take effect while the COM port is enabled. Disable and then enable the COM port (or reboot the unit) for the changes to take effect.
2. Reset to factory defaults does not work from web interface.
3. Serial Escape sequence ("+++") does not cause the unit's serial port to exit MODBUS/TCP mode and enter console mode when format is set to MODBUS/ASCII. Disabling MODBUS/TCP server through other user interfaces (telnet, web, etc.) does work correctly.
4. See release notes for 2.1.0 firmware

Operation Notes and Optimizations

1. See release notes for 2.1.0 firmware

MDS Mercury 900 Firmware – Version 2.1.0

Overview

This section describes Software/Firmware updates for the Mercury 900.

Products: Mercury 900 Access Point, Mercury 900 Remote
Version: 2.1.0
Release Date: 24-AUG-2007

New Features

1. Increased throughput
    a. Added 16-QAM and 64-QAM modulation support
    b. Configurable Downlink %: Both manual and auto modes can be configured on the AP
    c. Configurable maximum modulation rate
2. Enhanced VLAN
    a. Remote wired port may act as a VLAN Trunk or Access Port.
3. Serial Data
    a. Transparent encapsulation
    b. COM1 may be configured as a payload data port or serial console
    NOTE: No support for UDP Multicast (Point-Multipoint) serial
4. MAC filtering
    a. For Ethernet devices
    b. Only traffic from configured MAC addresses will be bridged over the air
5. Automatic Firmware Download
    a. Remotes now able to download firmware directly from the Access Point
    NOTE: Access Point and Remote must be running 2.1.0 or later firmware.
6. Approved Access Points list
    a. The AP Locations file now doubles as a Approved Access Points list
7. Channel Selection
    a. Each of the 7 or 14 (according to bandwidth) channels may be selected for inclusion in the hopping pattern.
8. Additional hand-off status information on Remote
9. Configurable maximum TX Power – Remote
10. PA Temperature status
11. One firmware package for both AP and RM

Changes to Existing Features

None

Defect Fixes

1. Mismatch of encryption settings (Data Encryption Enable, Encryption Phrase) will now prevent association
2. Device Auth Mode Local when configured on the Remote now uses the AP Locations file as an Approved APs list.
3. If the IP address mode is switched from "Dynamic" to "Static" before the unit obtains an address from the DHCP server, the static address is now applied properly.

4. Changes to the VLAN IDs DO NOT require a reboot to take effect
5. Changes to the IP gateway address DO NOT require a reboot to take effect
6. Changes to the ARQ settings cause a link reset but do not otherwise affect operation.
7. The ICMP Ping utility works correctly
8. Single firmware package for both AP and RM eliminates the possibility of incorrectly loading AP firmware on a RM and vice versa.
9. When using "Hopping with Hand-offs" mode on the Remote, reboot not necessary after loading a new AP Locations file.

Known Errata

1. The combination of 1.75MHz bandwidth with 8-millisecond frame duration does not operate properly.
2. SNMP Traps are delivered in V1 format when the Trap Version parameter is set to V3.
3. Changes to RADIUS configuration (Device and Network Authentication) require a reboot to properly take affect
4. Serial Data connection details and data statistics do not update properly
5. Changing Remote VLAN mode (trunk or access port) requires reboot to properly take affect
6. Switching COM1 from data to console mode does not work when device is configured for Radius User authentication (Web and Telnet/SSH work fine). Console will be usable following a reboot.
7. Wireless data statistics are not accurate
8. Test Mode Transmit does not always work correctly. Disabling and then re-enabling transmitter will restore proper operation.
9. UTC offset not being properly applied to event logs. As a result, event log timestamps to not match time reported by device user interface
10. Changes to the frequency hopping configuration sometimes do not properly take affect until after a reboot
11. Maximum RM TX Power setting requires a link reset (disassociation, re-association) to take affect
12. AP locations file: AP Name CANNOT contain white spaces
13. High amounts of traffic can cause momentary erroneous RSSI and/or SNR to be reported (RSSI = -115 dBm and SNR = -3 dB for example)
14. Auto Firmware Upgrade configuration is not accessible through the HTTP ("web") interface

Operation Notes and Optimizations

1. When operating with frequency hopping at 1.75MHz bandwidth, 10-millisecond frame duration, with ARQ enabled and using BPSK, the ARQ block size should be set to 50 bytes.
2. When Adaptive Split is enabled, the Downlink % parameter should be set to 50%.
3. See release notes for 1.4.4 firmware

MDS Mercury 900 Firmware – Version 1.4.4

Overview

This section describes Software/Firmware updates for the Mercury 900.

Products: Mercury 900 Access Point, Mercury 900 Remote
Version: 1.4.4
Release Date: 25-JUL-2007

New Features

None

Changes to Existing Features

None

Defect Fixes

1. Fixed issue in Access Point which caused Access Point to lock-up after 2-3 days of operation
2. Fixed improper GPS operation (erroneous timing fix) following power-cycle

Known Errata

See release notes for 1.4.0 firmware

Operation Notes and Optimizations

See release notes for 1.4.0 firmware

MDS Mercury 900 Firmware – Version 1.4.0
(Initial Product Release)

Overview

This section describes Software/Firmware updates for the Mercury 900.

Products: Mercury 900 Access Point, Mercury 900 Remote
Version: 1.4.0
Release Date: 11-MAY-2007

New Features

Short summary of features...see product manual for details.

1. Single channel and Frequency Hopping operation in 1.75 and 3.5 MHz bandwidths
2. Interfaces: Ethernet, serial console, primary antenna, GPS, LEDs
3. Modulation modes: BPSK, QPSK with FEC rate ½, and QPSK with FEC rate ¾
4. Mobile Handoff (15-20 seconds with 1.75MHz bandwidth)
5. Automatic Repeat reQuest (ARQ)
6. AP TDD-synchronization
7. Layer-2 transparent Ethernet bridging over the air with spanning tree support
8. 2-port VLAN
9. GPS NMEA data available at serial console or via UDP
10. Device management via: serial console, telnet/SSH, HTTP/HTTPS, SNMP, NetView
11. DHCP client and server
12. Payload encryption (AES-128) and compression
13. IEEE 802.1x device authentication
14. RADIUS user authentication
15. P23 redundant AP
16. Mobile handoff based on strict signal, strict distance, or combination of distance and signal

Changes to Existing Features
None – Initial Product Release

Defect Fixes
None – Initial Product Release

Known Errata

1. The combination of 1.75MHz bandwidth with 8-millisecond frame duration does not operate properly.

2. When operating with frequency hopping at 1.75MHz bandwidth with ARQ enabled and using BPSK, the throughput for ethernet frames greater than about 1000 bytes is highly degraded.
3. If the IP address mode is switched from "Dynamic" to "Static" before the unit obtains an address from the DHCP server, the static address is not applied properly. Rebooting the unit clears the error condition.
4. Changes to the VLAN IDs require a reboot.
5. Changes to the IP gateway address require a reboot.
6. Changes to the frequency-hopping configuration may require a reboot. If Association cannot be obtained after a configuration change, a reboot is recommended.
7. Changes to the ARQ settings will re-initialize the modem. The Access Point's user interfaces will be sluggish during this time, typically 15-20 seconds.
8. The ICMP Ping utility in the menu does not operate correctly under some conditions. The utility will report "Host name lookup failure" when it fails.
9. There are different firmware packages (.mpk files) for the Access Point and Remote. Loading Access Point code on a Remote or Remote code on an AP, will cause an Initialization Error and Firmware Alarm. Switching back to the other image or downloading the correct package will clear the error condition. The unit will not communicate over the air while the error condition persists.
10. A mismatch of the encryption settings (Data Encryption Enable, Encryption Phrase) between the Access Point and Remote will cause the Remote to only reach "Authenticating" when trying to associate, or, it will Associate but be unable to pass traffic.
11. SNMP Traps are delivered in V1 format when the Trap Version parameter is set to V3.
12. Device Auth Mode Local has no effect when configured on the Remote.
13. When using "Hopping with Hand-offs" mode on the Remote, the unit should be rebooted after loading a new AP Locations file.

Operation Notes and Optimizations

1. The "Channel Type" parameter on the Access Point must be set appropriately according to the type of installation. The Channel Type parameter may be set to Static or Dynamic. Mercury installations that are strong signal, low interference, and have minimal fading should have the Channel Type parameter set to "Static". The "Static" setting is appropriate for Access Points who's Remotes are in fixed locations. The "Static" setting supports a large offered payload with high packet rates. On the other hand, installations that have much interference and fading or nomadic / mobile Remotes should have the Channel Type parameter set to "Dynamic". When performing bench top tests, the Channel Type should be set to Static.
2. In order to operate in Frequency Hopping Mode, the Access Point's TDD Sync Mode parameter *must* be set to "GPS Required".
3. In order to operate in Frequency Hopping Mode, all units must have a GPS antenna connected and the internal GPS receiver must have satellite fix.
4. When operating in Frequency Hopping Mode with TDD Sync Mode "GPS Required", the Access Point's Device Status may display "Synchronizing" for a short period of time. While "Synchronizing", the Access Point waits for the GPS receiver to get satellite fix and then synchronizes its internal clock to the GPS timing. Once this process is complete, the Access Point will begin transmitting.
5. In order to operate with a configuration of 1.75MHz bandwidth, 10-millisecond frame duration, ARQ enabled, and BPSK modulation, the ARQ block size must be set below 90 bytes.
6. Reprogramming the firmware using the over-the-air link will typically take 15-20 minutes.
7. If the Network Name is mis-configured, the Remote will go between Scanning and Connecting and never get to Associated.

8. If operating in an area of high interference, performance may improve by raising the Access Point's Receive Power to –60dBm.
9. Signal strength from other devices (such as the MDS iNET) begins to interfere at –60 dBm signal strength. Mercury will continue to operate at a somewhat degraded performance with this interference. With a 1.75 MHz radio, it is ideal to deliver a 10 dB stronger signal over the nearest interferer, the 3.5 MHz radio needs a 20 dB stronger signal
10. The 1.75 MHz radio contains a different hardware filter than the 3.5 MHz radios, which narrows the available bandwidth, but can improve the radio's performance in the face of interference. Setting a 3.5 MHz unit to the 1.75 MHz setting is possible, but does not provide the advantages seen with the 1.75 MHz BW radio hardware. Generally, the 1.75 MHz unit provides throughput of ½ that of the 3.5 MHz units, but average throughput may be better with a 1.75 MHz unit because it is less challenged by interference.
11. The AP names in the AP locations file on the Remote should be limited to alphanumeric characters and underscores (_) and should not contain any white space (spaces or tabs).
12. Depending on configuration, the RSSI and SNR seen by the Access Point may be substantially different than what is seen by the Remote. The Access Point's Receive Power parameter determines the maximum RSSI that it will see from the Remote. The Access Point's Transmit Power and the over the-air path loss will determine the RSSI that the Remote sees from the AP. Note that the highest possible SNR is about 30dB.
13. The following table provides the specific operating frequencies:

Channel	1.75MHz BW	3.5MHz BW
0	903000000	904000000
1	904800000	907600000
2	906600000	911400000
3	908600000	915000000
4	910400000	918600000
5	912200000	922400000
6	914000000	926000000
7	916000000	
8	917800000	
9	919600000	
10	921400000	
11	923400000	
12	925200000	
13	927000000	

14. There are six parameters that affect throughput and latency. The following table shows these parameters, their ranges, the pros and cons of the various settings.

Parameter	Range	Pros & Cons
Bandwidth	1.75MHz, 3.5MHz	3.5MHz gives about twice the throughput over 1.75MHz, but is more susceptible to interference.
Frequency Mode	Single channel Frequency Hopping	Single channel operation gives slightly higher throughput results than Frequency Hopping.
Frame Duration	10 or 20 milliseconds	Frame duration provides a trade-off between throughput and latency. 10msec duration has better latency, 20msec duration has better throughput.
Cyclic prefix	1/16, 1/8, 1/4	A lower prefix (1/16) gives better throughput. A higher prefix (1/4) gives better immunity to multipath interference.
ARQ	enabled, disabled	Enabling ARQ causes the Mercury to re-transmit lost packets. This can be beneficial on challenged links to reduce packet loss. However, it comes at the expense of lower throughput and higher latency.
Adaptive Modulation Modulation / FEC	enabled, disabled	Enabling Adaptive Modulation allows the Mercury to automatically shift to the best modulation/FEC combination based on SNR. The higher the modulation/FEC, the higher the throughput and lower the latency.

15. The best configuration for a bench top test to measure throughput is:
   - Bandwidth: 3.5MHz if available
   - Frequency mode: Single channel
   - Frame duration: 20msec
   - Cyclic prefix: 1/16
   - ARQ: disabled
   - Adaptive modulation: Enabled