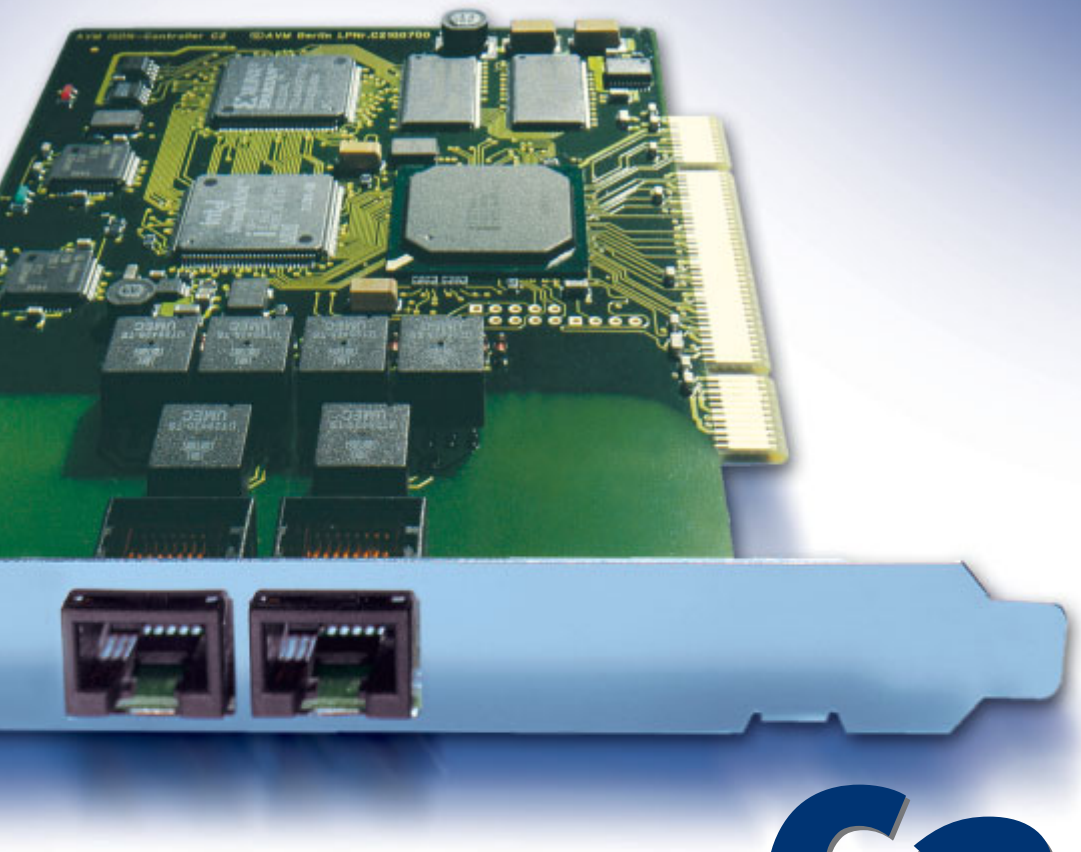

Manual C2

AVM ISDN-Controller

HIGH-PERFORMANCE COMMUNICATION BY ...

AVM ISDN-Controller C2

Documentation release 11/2002

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Contents

Typographical Conventions

The following typographic conventions and symbols have been used to make the contents of this guide clearer and to emphasize important information:

Highlighting

The following table provides a quick overview of the highlighting conventions used in this manual.

Highlighting	Function	Example
Quotation marks	Keys, buttons, icons, tabs, menus, commands	„Start / Programs“ or „Enter“
Capital letters	Path and file names in running text	SOFTWARE\INFO.PDF or README.DOC
Pointed brackets	Variables	‹CD-ROM drive›
Typewriter font	Information to be typed in using the keyboard	`a:\setup`
Gray italics	Hints, instructions and warnings, always accompanied by a symbol in the margin	*... For more information, see ...*

Symbols

The following graphic symbols are used in the guide. These always appear in connection with text printed in gray italics.

This symbol indicates useful tips and supplementary information.

The exclamation mark designates sections which contain important information.

This symbol indicates important instructions that must be observed to avoid malfunctions.

1 Introduction

The AVM ISDN-Controller C2 is the ideal solution for all those who need more than one ISDN BRI line. Equipped with a high-performance CPU and on-board memory, the ISDN-Controller C2 can be used for all kinds of communication tasks. All commonly used digital communication protocols are provided. Analog connections with modems and fax machines are also supported. Incoming or outgoing telefax connections can be processed over all four channels simultaneously.

Up to four active AVM ISDN-Controllers can be used in one PC, so that you can meet your company's growing communication needs by adding more ISDN-Controllers. This means long-term security for your investments in ISDN hardware. Mixed configurations with other active AVM ISDN-Controllers for the PCI or ISA bus in the same computer are also supported.

1.1 The AVM ISDN-Controller C2

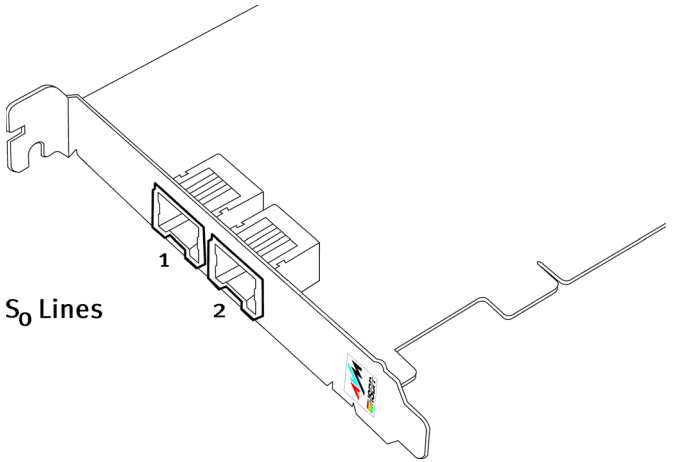
The ISDN-Controller C2 is an active ISDN-Controller with its own high-performance CPU and on-board memory. The architecture and technologies used are especially well suited to the operating conditions found in server environments.

The driver software for the ISDN-Controller C2 supports all important communication protocols. Smooth communication is thus ensured with systems in ISDN, GSM mobile and analog telephone networks as well as other digital networks.

The AVM ISDN-Controller C2 allows you to connect a computer to two basic-rate ISDN lines. You no longer need two bus slots and twice the system resources to use four ISDN B channels. The ISDN-Controller C2 requires only one slot and the system resources for one card.

Each of the S_0 interfaces can be configured independently. Please note the order of the S_0 lines during installation and configuration.

The following illustration shows a schematic illustration of ISDN-Controller C2 showing the numbering of the S_0 lines.



Numbering of the AVM ISDN-Controller C2's S_0 lines

1.2 The Driver Software for the AVM ISDN-Controller C2

The ISDN-Controller's driver software controls the communication processes and the data transfer.

The driver software is loaded to the ISDN-Controller from the PC's hard disk. This procedure ensures that the driver software can be updated quickly and easily at any time, so that new features can be added or adapted without manipulating the ISDN-Controller C2 hardware.

The driver software can compress data according to the V.42 standard. For more information on automatic data compression, see the section "CAPI SoftCompression X75/V42bis" on page 47.

Furthermore, the driver software also supports analog services such as Group 3 fax and modem communication. For details, see the sections "CAPI SoftFax" on page 47 and "CAPI SoftModem" on page 48.

CAPI (COMMON-ISDN-API)

The driver software for the ISDN-Controller C2 provides the industry standard CAPI applications interface on your computer. This interface specified by the international standardization organization ETSI guarantees the universal exchangeability of ISDN applications for the use of fax and speech transmission. This interface allows the ISDN-Controller C2 to be used with a wide range of CAPI 2.0-based ISDN applications.

For more information about CAPI 2.0, see the section “The Applications Interface CAPI 2.0” on page 42.

Supported Protocols

The ISDN-Controller C2’s driver software supports the international D-channel protocol DSS1 (Euro-ISDN).

The driver for the D-channel protocol is included in the software package. It is also available from the AVM Data Call Center or over the Internet (see the section “Information and Updates” on page 57). The driver software supports a wide range of B-channel protocols, including the data protocols X.75, X.25, HDLC transparent, V.110 and V.120.

Supported Operating Systems

Driver software for the AVM ISDN-Controller C2 is available for the following operating systems: Windows XP, Windows 2000, Windows NT 4.0, Novell NetWare 4.11 or higher and Linux.

1.3 System Requirements

The following hardware and software requirements must be met in order to use the AVM ISDN-Controller C2:

- a computer with a Pentium or Pentium-compatible processor (CPU)
- an available PCI slot that conforms to the specification PCI 2.1 or higher

- operating system: Windows XP, Windows 2000, Windows NT 4.0, Linux or Novell NetWare 4.11 or higher
- one or two basic-rate (S_0) ISDN lines

1.4 Package Contents

The AVM ISDN-Controller C2 package contains:

- AVM ISDN-Controller C2 (plug-in card for the PCI bus)
- two S_0 cables with RJ45 connectors, 6 m
- AVM ISDN-Controller C2 manual
- 1 compact disk (CD-ROM) with all installation programs and the AVM ISDN-Tools

The CD contains:

- driver software for Windows XP, Windows 2000, Windows NT 4.0, Novell NetWare 4.11 or higher and Linux
- Configuration and diagnostic software (C2Setup, C2Test, Connect32)
- AVM system drivers
  - AVM ISDN CAPI Port Driver
  - AVM NDIS WAN CAPI Driver
  - AVM ISDN TAPI Services for CAPI
- AVM ISDN-Tools

  The AVM ISDN-Tools are a collection of ISDN applications based on CAPI 2.0. They include such programs as “Connect 32” for convenient ISDN data transfer. See the ISDN-Tools manual on the CD for installation and operating instructions.
- AVM ISDN-Tools manual in PDF format

Other CAPI-based applications, such as the AVM ISDN Access Server or third-party products, are available from your vendor.

If you need to install the driver software from a floppy disk, you may copy the installation files from the CD to disks for this purpose, or you may order the necessary installation disks from AVM (see the address inside the cover of this manual). Specify the operating system in which you are installing the ISDN-Controller and the disks will be sent to you free of charge.

2 Hardware Installation

The ISDN-Controller C2 hardware is built in to the PC first, before its driver software is installed.

The ISDN-Controller C2 has two S_0 lines, each of which can be configured independently. Please note the order of the S_0 lines during installation and configuration (see the figure page 7).

To install the AVM ISDN-Controller C2, proceed as follows:

1. Switch off your computer and any connected devices and then unplug the power plug.
2. Open the cover of the PC. Touch the metal of the PC housing to discharge any static electricity.
3. Choose a PCI slot, unscrew and remove the slot blanking plate at the back of the PC, and insert the ISDN-Controller C2 in the slot.

   If installing the ISDN-Controller in a Novell NetWare system: note the number of the slot in which you have inserted the ISDN-Controller C2 for use in the configuration procedure.
4. Screw the back plate of the ISDN-Controller C2 on to the back panel of the PC.
5. Close the computer housing and plug the power cord back in to the socket.
6. Connect the S_0 lines to the ISDN socket. The ISDN cables have an RJ45 plug at each end. Insert one end in your ISDN socket and the other end in the socket on the back plate of your ISDN-Controller C2.

This completes the hardware installation.

The individual steps taken to install the driver software differ among the operating systems. Read the section that describes the driver installation for your operating system.

3 Installing the Driver Software in Windows XP

Changing of presentation of menus and folders is a feature of Windows XP. The following instructions are based on a standard Windows XP installation.

The AVM ISDN-Controller C2 is shipped with drivers that are especially developed for use in Microsoft Windows XP. The driver architecture conforms to the Microsoft Win 32 Driver Model (WDM). This true 32-bit device driver offers full support for all features of Windows XP.

The CAPI 2.0 supplied with the controller supports Windows applications and applications in DOS windows simultaneously. Information on CAPI can found in the section “The Applications Interface CAPI 2.0” on page 42.

3.1 Installing the Driver Software

Once the AVM ISDN-Controller C2 has been inserted in your computer, proceed as follows:

1. Switch on your computer.
2. The driver software for the AVM ISDN-Controller C2 is already contained in the Windows XP operating system and is installed automatically when the computer is started.

A status message task bar indicates that the AVM ISDN-Controller C2 has been detected and installed. This message disappears after a few seconds.

This concludes the installation of the ISDN-Controller C2 in Windows XP. ISDN-Controller is now ready for immediate operation.

After installation the CAPI 2.0 and the AVM NDIS WAN CAPI Driver are available on your system. For details about the AVM NDIS WAN CAPI Driver and the other two AVM system drivers, see the section “The AVM System Drivers” on page 45.

3.2 Configuring the ISDN-Controller C2

The default settings for the two S_0 interfaces of the ISDN-Controller C2 are as follows:

Line type	Point-to-multipoint
D-channel protocol	DSS1

After the installation has been completed, you can change the configuration of the ISDN-Controllers's S_0 lines. To configure the ISDN-Controller C2, proceed as follows:

1. Select “Start / Control Panel / (in “Category View”: Performance and Maintenance) / System”. On the “Hardware” dialog page, click the “Device Manager” button.
2. Click on the plus sign “+” next to “Network adapters” to expand the node.
3. Double-click the entry “AVM ISDN-Controller C2” to open the “Properties” window.
4. On the “So connection” dialog page, you can select the appropriate line configuration for each of the ISDN-Controller C2's S_0 lines: point-to-multipoint (“ISDN Basic Rate Access”), point-to-point (“PBX Line with DDI (Direct Dial-in)”) or leased line (“Leased line”).

3.3 Installing Additional Controllers

Up to four active AVM ISDN-Controllers can be installed in your computer. Active AVM ISDN-Controllers for the ISA, PCI, PCMCIA buses and USB can also be combined in the same system.

If you want to add another active ISDN-Controller, carry out the controller installation procedure as described in the appropriate manual. The driver software for all installed ISDN-Controllers is loaded automatically when Windows XP starts.

3.4 Removing the ISDN-Controller C2

Only one ISDN-Controller can be removed at a time. If you have installed several ISDN-Controllers and want to remove them all, then perform the procedure described here several times, without restarting Windows between each operation.

Proceed as follows to remove the AVM ISDN-Controller C2 driver software in Windows XP:

1. Open the “System Properties” of Windows XP by clicking through “Start / Control Panel / (in “Category View”: Performance and Maintenance) / System” and select the “Device Manager” button on the “Hardware” settings page.
2. In the “Network adapters” section of the “Device Manager”, select the “AVM ISDN-Controller C2” entry.
3. In the “Action” menu, select the “Uninstall” command.
4. Confirm the uninstallation in the following security prompt. The AVM ISDN-Controller C2 is then removed from the system.
5. Now switch off the computer and unplug it, then remove the ISDN-Controller card.

This concludes the uninstallation of the AVM ISDN-Controller C2 in Windows XP.

4 Installing the Driver Software in Windows 2000

In Windows 2000, the ISDN-Controller is integrated as a network adapter via the NDIS WAN CAPI Driver and included in the list of network adapters listed in the Device Manager.

After installation, the CAPI 2.0 interface and the NDIS WAN interface are available to the entire system; no separate driver installation is required. You can then use CAPI 2.0-based applications alongside Microsoft's Remote Access Service (RAS) or Internet access with Dial-Up Networking.

The CAPI 2.0 interface supplied supports both 16-bit and 32-bit applications. Applications in DOS windows are not supported. Information on CAPI can found in the section “The Applications Interface CAPI 2.0” on page 42.

4.1 Installing the Driver Software

To configure the ISDN-Controller C2, proceed as follows:

1. Start the computer.

   The “Found New Hardware Wizard” recognizes a new device to be installed. Click “Next”.

2. In the next window, select the option “Search for a suitable driver for my device (recommended)” and confirm your selection with “Next”.

3. Insert the C2 CD-ROM.

4. In the next window, select the option “CD-ROM drives” and confirm by clicking “Next”.

5. The program reports that a driver was found. Click “Next” to install the driver.

6. Enter the multiple subscriber numbers in the “ISDN MultiSubscriber Number (MSN)” window.

   Click “Next”.

7. Conclude the installation by clicking “Finish”.

This concludes the ISDN-Controller C2 installation. ISDN-Controller is now ready for immediate operation.

After installation the CAPI 2.0 and the AVM NDIS WAN CAPI Driver are available on your system. For details about the AVM NDIS WAN CAPI Driver and the other two AVM system drivers, see the section “The AVM System Drivers” on page 45.

4.2 Configuring the ISDN-Controller C2

The default settings for the two S_0 interfaces of the ISDN-Controller C2 are as follows:

Line type	Point-to-multipoint
D-channel protocol	DSS1

After the installation has been completed, you can change the configuration of the ISDN-Controllers's S_0 lines. To configure the ISDN-Controller C2, proceed as follows:

1. Select “Start / Settings / Control Panel / System”. On the “Hardware” dialog page, click the “Device Manager...” button.
2. Click on the plus sign “+” next to “Network adapters” to expand the node.
3. Double-click the entry “AVM ISDN-Controller C2” to open the “Properties” window.
4. On the “S_0 connection” dialog page, you can select the appropriate line configuration for each of the ISDN-Controller C2's S_0 lines: point-to-multipoint (“ISDN Basic Rate Access”), point-to-point (“PBX Line with DDI (Direct Dial-in)”) or leased line (“Leased line”).

4.3 Installing Additional ISDN-Controllers

Up to four active AVM ISDN-Controllers can be installed in your computer. Active AVM ISDN-Controllers for the ISA, PCI, PCMCIA buses and USB can also be combined in the same system. If you want to add another active ISDN-Controller, carry out the controller installation procedure as described in the appropriate manual, using the installation program on the original disk or CD-ROM supplied with it.

If you would like to add another AVM ISDN-Controller C2, repeat the entire installation procedure described above. Begin by installing the hardware. Then switch on your computer. The "Found New Hardware Wizard" recognizes the new device. Follow the instructions on the screen.

4.4 Removing the ISDN-Controller C2

Only one ISDN-Controller can be removed at a time. If you have installed several ISDN-Controllers and want to remove them all, then perform the procedure described here several times, without restarting Windows between each operation.

Proceed as follows to remove the AVM ISDN-Controller C2 driver software in Windows 2000:

1. Open the Windows 2000 "Control Panel" ("Start / Settings") and double-click the "Add/Remove Hardware" icon.
2. The "Add/Remove Hardware Wizard" is started. Click "Next".
3. Select the "Uninstall/Unplug a device" option in the following dialog and click "Next".
4. Then select the "Uninstall a device" option. Confirm by clicking "Next".
5. Select the entry "AVM ISDN-Controller C2" in the following list and confirm with "Next".
6. Confirm the uninstallation by activating the "Yes, I want to uninstall this device" option and click "Next".

7. As a final step, click “Finish”. The ISDN-Controller is then removed from the system.

8. Now switch off the computer and unplug it, then remove the ISDN-Controller card.

This concludes the uninstallation of the AVM ISDN-Controller C2 in Windows 2000.

5 Installing the Driver Software in Windows NT 4.0

Specially developed driver software for Windows NT 4.0 is supplied with the AVM ISDN-Controller C2. The applications interface supplied, COMMON-ISDN-API (CAPI) version 2.0, supports both 16-bit and 32-bit applications. Applications in DOS windows are not supported. Information on CAPI can found in the section “The Applications Interface CAPI 2.0” on page 42.

5.1 Installing the Driver Software

The default settings for the two S_0 lines of the ISDN-Controller C2 are as follows::

Line type	Point-to-multipoint
D-channel protocol	DSS1
CAPI SoftCompression	active

During installation you will have the opportunity to change the settings for each S_0 interface, or for both S_0 interfaces at once.

To install the driver software, proceed as follows:

1. Start the computer.
2. Insert the installation CD in your CD-ROM drive.
3. Select “Run” in the Windows NT 4.0 “Start” menu. In the command line, enter the path to the setup files for Windows NT:

   <CD-ROM drive>:\cardware\c2\windows.nt\english\setup.exe

   You may also click the “Browse” button to search for the path in the directory list. Confirm by clicking “OK”.

4. The welcome window of the installation program appears. From this window you can view the AVM README file for the AVM ISDN-Controller C2. Click “Continue”.

To display a help text on any step in the installation program, press the “F1” key.

5. In the next window, select “New” in the area labelled “To add a controller”. Click “Continue”.

6. Enter the name of the folder in which the driver software is to be installed and click “Continue”.

7. In the next dialog, select an S_0 line to configure, or choose to configure both lines at once. Click “Continue”.

8. In the subsequent dialogs, set the line type and the D-channel protocol for the selected S_0 line(s).

9. The next window displays the settings for both S_0 lines: any changes made to the configured line are shown here along with the default settings for the other interface.

10. To change the settings for the other S_0 lines, click the button “Configure other S_0 interfaces”. You are then prompted once more to choose which S_0 line you want to configure. Go back to step 7 and follow the instructions until both S_0 lines have been configured as needed.

11. When the configuration is complete, click “Continue”. The installation program then copies all files to the specified folder.

12. Finally, a message box displays the current configuration of the ISDN-Controller C2 and its two S_0 lines. Click ”Continue“ to acknowledge and close the window.

This completes the driver software installation for Windows NT 4.0. The ISDN-Controller C2 is now ready to use.

In the “Start / Programs” menu, you will find a new program group named “AVM”. This group contains the entries “AVM Internet Home Page” (link to AVM’s WWW server), “C2 Readme”, “C2 Setup” and “C2 Test”.

By default the ISDN-Controller C2 is loaded automatically every time Windows NT 4.0 is started. Because the controller is loaded before the items in the "Startup" program group, it is no problem to include communications programs based on CAPI in the "Startup" group.

5.2 Configuring the ISDN-Controller C2

To change the settings for the D-channel protocol and line type on the S_0 lines, and to activate or deactivate data compression, start the program "C2 Setup" in the "AVM" program group. Select the ISDN-Controller C2 and follow the instructions displayed.

5.3 Installing Additional ISDN-Controllers

If you would like to add another AVM ISDN-Controller C2, repeat the entire installation procedure described above.

1. Begin by installing the hardware (see the chapter "Hardware Installation" on page 11).
2. Then run the program "C2 Setup" in the "AVM" program group and select "New (Add an ISDN-Controller)".
3. Follow the instructions displayed on the screen.

Active AVM ISDN-Controllers for the ISA, PCI and PCMCIA buses may also be combined in one computer. If you want to add another active ISDN-Controllers, carry out the controller installation procedure as described in the appropriate manual, using the installation program on the original disk or CD-ROM supplied with it.

5.4 Removing the ISDN-Controller C2

Only one ISDN-Controller can be removed at a time. If you have installed several ISDN-Controllers and want to remove them all, repeat the above procedure several times. It is not necessary to restart Windows NT 4.0 between uninstallations.

Proceed as follows to remove the ISDN-Controller C2 driver software in Windows NT 4.0:

1. Open the Windows NT 4.0 “Control Panel” with “Start / Settings”.
2. Double-click the “Add/Remove Software” icon.
3. The AVM ISDN-Controller C2 appears in the list of installed programs. Select this entry.
4. Click the “Add/Remove” button. The deinstallation program is started.
5. First select the ISDN-Controller you want to remove and click “Continue”.
6. The next window displays the folder which contains the corresponding driver software. Confirm once again with “Continue”.
7. To conclude the deinstallation you will be prompted to restart Windows NT 4.0 so that the changes can take effect.
8. Now switch off the computer and unplug it, then remove the ISDN-Controller card.

This concludes the uninstallation of the AVM ISDN-Controller C2 in Windows NT 4.0.

6 Installing the Driver Software in Novell NetWare

Two different drivers are provided for installation in Novell NetWare 4.11 or higher: a Stand-Alone CAPI and a version for Novell CAPI Manager. If you would like to use Novell's CAPI Manager, the program NIAS (Novell Internet Access Server) is also required. Make sure that both the CAPI Manager and NIAS is installed before beginning the AVM ISDN-Controller C2 installation. Also be sure to observe the differences in the installation, configuration and removal procedures for the two drivers.

6.1 Preparing the System

Before the driver software installation begins, the server must be started and the CD-ROM drive mounted. If this is not the case, proceed as follows:

1. To start the server, go to the installation folder of the server. Enter the following commands at the command line:

   cd nwserver

   server

2. To verify whether the CD-ROM drive is installed, insert the CD and enter the following command at the system console:

   volume

   All mounted volumes are listed.

3. If the volume label of the CD does not appear in the list, enter the following command at the system console:

   cdrom

This mounts the CD-ROM drive. The computer is now ready for the driver software installation.

6.2 Installing the Driver Software

The only difference between the installation procedures for the Stand-Alone CAPI and the version for CAPI Manager is the path that must be entered to locate the installation files.

In order to install the driver software, carry out the following steps:

1. Insert the installation CD in your CD-ROM drive.
2. Enter the following command at the system console and confirm by pressing “Return”:

   `nwconfig`
3. This loads the Novell NetWare server's configuration program. The “Configuration Options” menu of the configuration program appears.
4. Select the “Product Options” item from the menu and press “Return”.

   The “Other Installation Actions” menu appears.
5. Select the “Install a product not listed” item from the menu and press “Return”.

   An input box appears in which the directory path to the installation files may be entered. The disk drive A:\ is suggested by default.
6. To specify the path to the CD-ROM, press “F3”.
7. For the **Stand-Alone CAPI** driver installation, enter the path as follows:

   `<CD-ROM name>:\cardware\c2\netware\capi20`

   To install the driver version for **Novell CAPI Manager**, enter the path:

   `<CD-ROM name>:\cardware\c2\netware\4capimgr`
8. In the next step, select “Install on this server” and press “Return”.

The files for the AVM ISDN-Controller C2 are now copied to the SYS:SYSTEM directory.

9. At the end of the installation process, the file C2 README for the AVM ISDN-Controller C2 is displayed.

   Press “ESC” to close the display and confirm by selecting “Yes”.

10. Press “Esc” as often as necessary to close all submenus and return to the “Configuration Options” menu.

11. Select “Exit” to close the configuration program.

Once the ISDN-Controller C2 has been installed, it must be configured before it is ready for operation. Follow the configuration instructions in the following section.

6.3 Configuring the ISDN-Controller C2

The ISDN-Controller C2 configuration consists of setting the D-channel protocol and the line types for each S_0 line.

Configuration of Novell NetWare with Stand-Alone CAPI

1. Enter the following command at the system console:

   ```
   load c2setup
   ```

2. The “List of ISDN-Controllers to load” shows the available ISDN-Controllers with their settings for I/O address, interrupt, D-channel protocol and PCI slot.

3. Use the arrow keys to select the ISDN-Controller C2 which was just installed and press “Return”.

The configuration dialog that appears shows the current settings of the ISDN-Controller C2 and its S_0 lines.

Configuration of Controller-2: AVM C2 PCI	
I/O Base	d400
Interrupt Level	7
D-channel Protocol	DSS1
S_0 Port 1 Point to Point:	yes
S_0 Port 2 Point to Point:	yes
Data Compression	no

4. Move the selection to the entry you want to change and press “Return”.
5. Select the new value for the given parameter and confirm with “Return”.
6. Repeat steps 4 and 5 until all of the settings are correct.
7. Close the configuration program by pressing the “Esc” key twice.
8. Answer “Yes” to save your settings.

This concludes the configuration.

Loading the Driver Software

The ISDN-Controller C2 cannot be used until the driver software is loaded. The driver software can be loaded either automatically or manually.

Automatic Loading

The SYS:\SYSTEM folder contains the AUTOEXEC.NCF file. Add the following entry to this file:

```
load capi20
```

Now the driver software will be loaded every time the NetWare Server is started.

Manual Loading

Enter the following command at the NetWare system console:

```
load capi20
```

Press “Return”. A message appears reporting that the ISDN-Controller C2 has been loaded and the CAPI interface is available.

Unloading the Driver Software

To unload the driver software, enter the following command at the NetWare system console and press “Return”:

```
load capi20 -d
```

Configuring and Starting ISDN-Controller C2 Operation with the Novell CAPI Manager

To configure the AVM ISDN-Controller C2, proceed as follows:

1. Enter the following command at the system console:

   ```
   load inetcfg
   ```

   The “Internetworking Configuration” window appears.

2. Select the item “Boards” in this menu and press “Enter”.

   The “Configured Boards” list appears. This list contains all of the network adapters that have already been configured, including the ISDN-Controller.

3. Press the “Ins” key.

4. In the “Select A Driver” dialog, select the “WHSMCAPI” entry and press “Return”.

5. In the “Board Name” text field, enter a name for the new ISDN-Controller C2 and press “Return”.

   This is the name under which the ISDN-Controller will be registered in the “Configured Boards” list after configuration.

6. Configure the ISDN-Controller C2 in the “WHSMCAPI Board Configuration” window. Move the highlight to “Select to View” and press “Return”.
7. When prompted to choose whether the ISDN-Controller should be loaded automatically, select “Yes”.
8. In the next dialog, select the ISDN-Controller “AVMC2” and press “Return”.
9. Then enter your parameters:
   - PCI slot (number of the PCI slot in which the ISDN-Controller C2 hardware has been installed; for more information, see your PC manual)
   - Switch Type (D-channel protocol)
   - Line Config (MTP = multipoint or PPT = point-to-point) for each S_0 line
10. Exit the configuration dialog by pressing “Esc” and select “Yes” to confirm that you want to save the new settings.
11. The final step in the configuration process is to update the system and load the ISDN-Controller C2. In the “Internetworking Configuration” window, select the “Reinitialize System” command and confirm it by selecting “Yes”.
12. After the system is re-initialized, the system console reappears. Press “Alt+Esc” or “Alt+Crtl” to return to the “Internetworking Configuration” window.
13. Exit the configuration by pressing “Esc”.

The ISDN-Controller C2 is now configured for CAPI Manager and loaded.

6.4 Installing Additional ISDN-Controllers

To install another ISDN-Controller C2, first insert the ISDN-Controller C2 into the computer, then configure the driver software. Note the number of the PCI slot in which you install the ISDN-Controller C2: this number is required in the driver configuration.

Each subsequent ISDN-Controller C2 must be configured with the same driver version as the first ISDN-Controller C2 installed (Stand-Alone CAPI or CAPI for Novell CAPI Manager).

Configure the new ISDN-Controller C2 as described in the section “Configuration of Novell NetWare with Stand-Alone CAPI” on page 25 or “Configuring and Starting ISDN-Controller C2 Operation with the Novell CAPI Manager” on page 27.

Active AVM ISDN-Controllers for the ISA and PCI buses may also be combined in one computer. If you want to add another active ISDN-Controller, carry out the controller installation procedure as described in the appropriate manual, using the installation program on the original disk or CD-ROM supplied with it.

6.5 Removing the ISDN-Controller C2

There are a number of procedures for removing the ISDN-Controller C2. The amount of ISDN-Controller C2 installed and the amount of ISDN-Controller C2 to be removed determine which procedure should be used in each case. It also makes a difference whether the ISDN-Controller C2 is used with Stand-Alone CAPI or with the Novell CAPI Manager.

Removing One of Multiple ISDN-Controllers

Select this uninstallation program when multiple ISDN-Controller C2s are installed in your computer and you want to remove only one of them. The method of uninstallation from the Stand-Alone CAPI version is different from that for the Novell CAPI Manager.

In both versions, start uninstallation by following the instructions below:

1. Switch off the computer and disconnect it from its power supply, then remove the ISDN-Controller card.
2. Plug in the power cable again and restart the computer.
3. Switch to the installation folder and enter the following command at the system console:

   ```
   cd nwserver
   ```

4. Load the server with the following command:

   ```
   server
   ```

5. Continue with the instructions in the section “Removing the ISDN-Controller C2 with Stand-Alone CAPI” on page 30 or “Removing the ISDN-Controller C2 with Novell CAPI Manager” on page 31.

Removing the ISDN-Controller C2 with Stand-Alone CAPI

1. Enter the following command at the system console:

   ```
   load c2setup
   ```

   The “List of ISDN-Controllers to load” appears. The ISDN-Controller you have just removed is already missing from this list.
2. Press the “Esc” key.
3. When prompted to confirm that you want to save the changes, select “Yes”.
4. Exit the menu by selecting “Exit”.

The ISDN-Controller C2 is no longer available to the system.

Removing the ISDN-Controller C2 with Novell CAPI Manager

1. Enter the following command at the system console:

   `load inetcfg`

   The “Internetworking Configuration” window appears.

2. Select the item “Boards” in this menu and press “Enter”.

   A list of all of the network adapters configured appears. The ISDN-Controller is included in this list.

3. Select the ISDN-Controller to be removed and press “Del”.

4. Confirm that you want to remove the selected component by clicking on “Yes” at the safety prompt. The selected ISDN-Controller is removed from the list and is no longer available to the system.

5. Exit the list of boards configured with “Esc” to return to the “Internetworking Configuration” window.

6. Select the “Reinitialize System” command to implement the changed configuration.

   After the system is re-initialized, the system console reappears.

7. Press “Alt+Esc” or “Alt+Ctrl” to return to the “Internetworking Configuration” window.

8. Exit the “Internetworking Configuration” window by selecting “Esc” and confirm with “Yes”.

The ISDN-Controller C2 is no longer available to the system.

Removing All ISDN-Controllers and Their Driver Software

If you want to remove the only ISDN-Controller C2 installed in your computer, also proceed as described below.

To remove all of the installed C2 ISDN-Controllers and their drivers at once, proceed as follows:

The uninstallation sequence for the driver version with Stand-Alone CAPI is slightly different from that for the version for the Novell CAPI Manager. The steps which differ between versions are marked accordingly.

1. **Stand-Alone CAPI only:** When the driver software is loaded automatically by the AUTOEXEC.NCF file, delete the entry "load capi20" from the AUTOEXEC.NCF file in the SYS:\SYSTEM folder.
2. Switch off the computer and disconnect it from its power supply, then remove all ISDN-Controller cards.
3. Plug in the power cable again and restart the computer.
4. Switch to the installation folder. Enter the following commands at the command line:

   ```
   cd nwserver
   ```

5. Load the server with the following command:

   ```
   server
   ```

6. **Stand-Alone CAPI only:** Enter the following command at the system console:

   ```
   load inetcfg
   ```

   The "Internetworking Configuration" window appears.

7. **Stand-Alone CAPI only:** Select the item "Boards" in this menu and press "Enter".

   The "Configured Boards" list appears. This list contains all of the network adapters that have already been configured, including the ISDN-Controller.

8. **Stand-Alone CAPI only:** Select an ISDN-Controller C2 and press "Del".

9. **Stand-Alone CAPI only:** Repeat the previous step as often as necessary to remove all ISDN-Controller C2s from the “Configured Boards” list.

10. **Stand-Alone CAPI only:** Press “Esc” to close the board overview and save your entries when prompted by clicking “Yes”.

11. Enter the following command at the system console and confirm by pressing “Return”:

    `nwconfig`

    The “Configuration Options” menu appears.

12. Select the “Product Options” item from the menu and press “Return”.

    The “Other Installation Actions” menu appears.

13. Select here the entry “View/Configure/Remove installed products” and press “Return”. A list of the programs already installed is displayed.

14. Move the highlight to the “AVM ISDN-Controller C2” entry and press “Del”. Confirm with “Yes”.

15. Press “Esc” as often as necessary to close all submenus and return to the “Configuration Options” menu.

This completes the uninstallation of all ISDN-Controller C2s and their driver software.

7 Installation in Linux

The AVM ISDN-Controller C2 can be used with all current Linux distributions. AVM supplies pre-compiled driver archives for the distributions SuSE Linux 8.0, 7.1-7.3, 7.0, 6.4 and 6.3. The installation for these distributions is described here.

The pre-compiled driver software directly supports the INTEL i386 platform. The drivers must be re-translated and compiled to be used in other distributions or kernel versions, on other CPU platforms or on a multi-processor system. Tips about generating the source code are included in the “src” directory created by extracting the respective “tar” archive.

The driver software supports up to four active AVM ISDN-Controllers installed in one system. For details, see the section “Installing Additional ISDN-Controllers” on page 40.

The AVM ISDN-Controller C2 is designed for operation on a point-to-multipoint line, but can also be used on a point-to-point line.

CAPI4Linux

The CAPI 2.0 standard for Linux makes it possible to develop applications and drivers that can run on any ISDN-Controller with a compatible CAPI 2.0 driver. The CAPI4Linux software package is based on this standard.

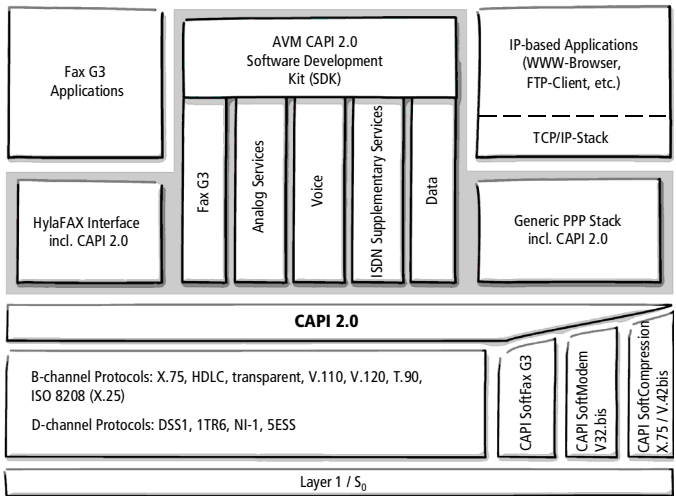
Information on CAPI can be found in the section “The Applications Interface CAPI 2.0” on page 42.

CAPI4Linux allows the entire range of ISDN services such as Internet access, Remote Access Service, telephony, G3 fax and file transfer to be used with ISDN applications over the standardized CAPI interface.

The CAPI4Linux software package consists of:

- 1 CAPI 2.0 driver
- 1 CAPI plug-in: 1 adaptation of the Generic PPP stack (pppd = Point-to-Point Daemon) for the use of Internet applications like web browsers and FTP clients
- 1 CAPI 2.0 interface for the popular Fax G3 application “HylaFAX” (CAPI4HylaFAX)
- 1 AVM Software Development Kit (SDK), including tips and the resources for generating CAPI 2.0-compatible applications

The following diagram shows a schematic illustration of CAPI4Linux.



Architecture of CAPI4Linux

For more information about the CAPI plug-in for the Generic PPP stack (pppd), see the “install_active.de” file after extracting the archive and the relevant Unix manual page. Open the manual page by entering “man capiplugin” at the system console.

Documentation on the supplementary components of the CAPI4Linux package like CAPI4HylaFAX and the AVM Software Development Kit (SDK) are located as Readme files in the corresponding “tar” archives on the installation CD.

SuSE Linux

AVM supplies pre-compiled driver archives for simple installation in the following distributions:

- SuSE Linux 7.3 (Kernel 2.2.18 / 2.4.0)
- SuSE Linux 7.2 (Kernel 2.4.4)
- SuSE Linux 7.1 (Kernel 2.4.10)
- SuSE Linux 7.0 (Kernel 2.2.16)
- SuSE Linux 6.4 (Kernel 2.2.14)
- SuSE Linux 6.3 (Kernel 2.2.13)

Other Distributions

The AVM ISDN-Controller C2 can be used with all current Linux distributions.

Installation in other distributions or kernel versions must be adapted individually depending on the components used. All driver components required for integration into other software distributions or kernel versions, including the source code and short instructions, are supplied in the “src” directory of the corresponding “tar” archive. The binary-only modules contained in the drivers are kernel-independent. They cannot perform any direct kernel calls. This means that they can be integrated into any Linux kernel.

The ISDN4Linux package is not required for the installation of CAPI4Linux.

AVM plans to support further distributions with pre-compiled driver archives. For the latest information on such support, see the AVM Internet pages or contact the AVM Data Call Center (ADC).

7.1 Installing CAPI4Linux in SuSE Linux

Make sure to perform the installation as a "root" user! That means you must have write rights as a superuser in the "root" directory.

Once the AVM ISDN-Controller C2 has been physically installed in your computer, the next step is to install the driver software.

Once installation has been completed, CAPI 2.0 applications can be started immediately. The first step we recommend is to use the CAPI Plug-in for the Generic PPP-Stack (pppd) to establish a test connection to the AVM Data Call Center (ADC).

To install the software, proceed as follows:

1. Start a console (command prompt).
2. Insert the installation CD and switch to the following directory:

   <CD-ROM drive>:/Cardware/C2/Linux

3. Copy the archive "c2-suse‹SuSE version›-‹driver version›.tar.gz" to your computer.
4. Extract the archive with the following command:

   tar -xzvf c2-suse<SuSE version>-<driver version>.tar.gz

   Example for SuSE 7.3:

   tar -xzvf c2-suse7.3-03.09.10.tar.gz

   A directory called "active" is created.
5. Switch to the new "active" directory.
6. Start installation by entering the following:

   ./install c2

7. In the following selection menus, enter the line type (only for DSS1: point-to-multipoint or point-to-point line) for each of the S_0 lines of your ISDN-Controller C2. By default, both S_0 lines are configured as point-to-point lines.

   Confirm your entries.

   The resources required for the ISDN-Controller C2 are determined by the PCI BIOS of the computer.

   Your entries are automatically registered under the relevant controller type "c2" in the "/etc/capi.conf" file.

8. Restart your computer. The CAPI 2.0 driver is initialized automatically.

9. Use the following command to determine whether the CAPI driver software is present in the system:

   `lsmod`

   The "lsmod" command is available only if you are logged on as "root".

   The screen output should now contain the following loaded modules:

   c4
   b1
   capi
   capifs
   kernelcapi
   capiutil

This concludes the installation of CAPI4Linux.

7.2 Testing the Installation

At the end of the installation, perform a PING test to check whether the software has been installed correctly. For this purpose a test connection to the AVM Data Call Center (ADC) in Berlin is established over the “pppd” module. This simulates dialing in to any ISP (Internet Service Provider) using PPP sync in accordance with RFC1618 over HDLC. The necessary parameters for the test connection are pre-defined in the “AVM” dialing script.

Version ppp-2.3.11-24 or higher of the Generic PPP Stack (pppd) is required for Internet access. These versions are included in all operating system packages from SuSE 6.4 onwards.

Proceed as follows to establish a test connection:

1. Start a console (command prompt).
2. Establish a pppd connection with the following command:

   `pppd call isdn/avm usepeerdns`

   For extensions with outside dialing access “o”, use the following command:

   `pppd call isdn/avm numberprefix 0 usepeerdns`

Once the test connection has been established, the output window contains the PING transit time to the AVM server over your ISDN-Controller. This means that installation was successful.

Now you can start a web browser and access the AVM home page. Enter **`www.avm.de/en`**.

Pre-defined scripts for dialing into different Internet Service Providers are included in the AVM software package.

7.3 Installing Additional ISDN-Controllers

Up to four active AVM ISDN-Controllers can be installed in your computer. Active AVM ISDN-Controllers for the ISA, PCI and PCMCIA buses can also be combined in the same system. It is not possible to use active and passive AVM ISDN-Controllers (like FRITZ!Card) at the same time.

To install an additional active AVM ISDN-Controller, simply perform the installation routine for the desired controller again. An individual configuration (D-channel protocol and line type) can be assigned to each ISDN-Controller.

If a mixed installation of an ISDN-Controller C2 together with an AVM ISDN-Controller C4 is intended, please install the Controller C4 first to ensure the correct S_0 interface assignment.

Only CAPI applications which can be configured for multiple ISDN-Controllers can be used. The CAPI4HylaFAX module and the CAPI plug-in allow the configuration of multiple controllers.

7.4 Removing the ISDN-Controller C2

To remove the AVM ISDN-Controller C2, proceed as follows:

1. Exit all CAPI applications.
2. Open a console and enter the following command:

   ```
   capiinit stop
   ```

3. Delete the AVM ISDN-Controller C2 entry in the "/etc/capi.conf" file.
4. Shut down the computer and remove the ISDN-Controller C2.
5. Restart your computer.

This completes the removal of your AVM ISDN-Controller C2.

7.5 Updating the Driver Software

The latest driver software is available at the ADC and from the AVM Internet pages. See the associated information files.

Remove the existing driver software from your computer before installing a newer version of the CAPI 2.0 driver!

Proceed as follows:

1. Exit all CAPI applications.
2. Open a console and enter the following command:

   ```
   capiinit stop
   ```

3. Remove the entry for the AVM ISDN-Controller in the "/etc/capi.conf" file.
4. Restart your computer.
5. Start the installation of the new driver software as described in section "Installing CAPI4Linux in SuSE Linux" from page 37.

This completes the update operation for the driver software.

8 AVM System Architecture

This chapter presents information about the ISDN interface CAPI 2.0, the IDM architecture, the AVM system drivers included in the package, and about special CAPI features of the AVM ISDN-Controller C2.

8.1 The Applications Interface CAPI 2.0

After the AVM ISDN-Controller C2 has been installed, the ISDN interface CAPI 2.0 is available to the computer. This interface allows you to use all features of ISDN.

What Is CAPI?

CAPI (COMMON-ISDN-API) is a standardized software interface that provides applications with access to ISDN-Controllers on basic-rate and primary-rate lines. Applications that build on this standard interface use uniform mechanisms for communication over ISDN connections, and thus do not need to adapt to the peculiarities of particular manufacturers' hardware. This means that such applications are also unaffected by future extensions or hardware modifications: CAPI makes such changes transparent to the application. ISDN hardware manufacturers benefit from this standard too, since it makes all kinds of applications compatible with their products.

CAPI contains an abstract definition of ISDN services which is not dependent on the specifics of underlying telecommunications networks or the adapters used to connect computers to ISDN. The specification provides an interface that is easy for application programmers to use, and thus offers uniform access to the various ISDN services, such as data, voice and fax transmission, video conferencing and telephony.

Benefits of CAPI

CAPI has evolved into an internationally recognized standard. The key factor in this development has been the numerous advantages offered by this uniform interface: independence from specific manufacturers and resulting high investment security, a wide variety of compatible applications for all kinds of operating systems and ISDN protocols, etc. ISDN (**I**ntegrated **S**ervices **D**igital **N**etwork) is becoming attractive for more and more telecommunications users since it affords fast and reliable transfer of information in many different forms.

CAPI 2.0 has all the advantages of an open interface, and covers most of the ISDN features. Since the CAPI interface handles most ISDN subscriber interface control functions, these no longer have to be programmed. This simplifies the development of ISDN applications. Furthermore, applications no longer have to be tailored to national or manufacturer-specific systems, so that a greater variety of applications is available.

For more information about the CAPI applications interface, see the CAPI Association's Internet site:

www.capi.org

Features of CAPI

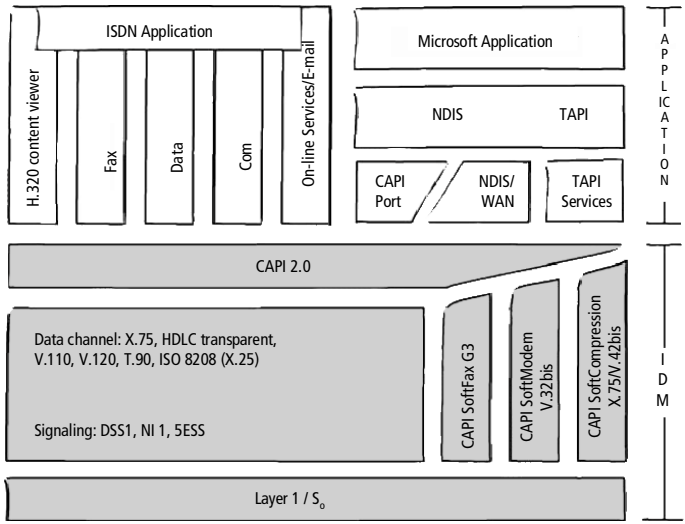
CAPI offers a number of important features:

- Support for basic call features such as establishing and clearing a connection
- Multiple B channels for data and/or voice connections
- Supports multiple logical data connections within a single physical connection
- Selection of specific services and protocols on dialing and in answering incoming calls
- Transparent interface for protocols above OSI Layer 3
- Support for one or several BRIs and PRIs through one or several ISDN-Controllers

- Support for multiple concurrent applications
- Message definitions independent of the operating systems
- A message-passing mechanism tailored to specific operating systems for optimum system integration
- High throughput through an asynchronous, event-driven mechanism

8.2 The IDM Architecture

The ISDN Driver Model (**I**SDN **D**river **M**odel - IDM) illustrated below shows how ISDN is integrated in Microsoft operating systems.



IDM Architecture

The ISDN Driver Model is the framework for all driver components of AVM ISDN products. The IDM describes how ISDN services are integrated and how they are accessed by applications. It also defines the transparent integration of ISDN hardware resources in the operating system.

One of the most important features the IDM enables is the coupling of existing communication components such as RAS with CAPI-based hardware. This connection is realized by the AVM system drivers such as the AVM CAPI Port Driver or the AVM NDIS WAN CAPI Driver.

This architecture permits the simultaneous use of CAPI, modem and networking applications over ISDN. Most importantly, it also permits the definition and implementation of new, extended capabilities. Examples to date include the incorporation of V.42bis data compression and Group 3 Fax.

8.3 The AVM System Drivers

AVM provides two system drivers for Windows with similar capabilities: the AVM ISDN CAPI Port Driver and the AVM NDIS WAN CAPI Driver. Both drivers are controlled over Dial-Up Networking, although they use different interfaces and protocols in the operating system. These drivers achieve the same transfer speeds in data communications.

The ISDN CAPI Port Driver and the NDIS WAN CAPI Driver can be installed and operated on the same computer if desired.

The AVM system drivers make it possible to use CAPI-based ISDN applications, such as Windows' Dial-Up Networking, alongside communications programs that do not have built-in CAPI support.

The third AVM system driver, AVM ISDN TAPI Services for CAPI, permits the use of telephony applications with the AVM ISDN-Controller C2 in the Windows operating system.

The AVM system drivers are located on the installation CD in the PROGRAMS\‹DRIVER›\‹DRIVER.OPERATING SYSTEM› folder. The latest versions are also available for downloading from the AVM Data Call Center or from AVM's FTP server on the Internet.

For a detailed description of each driver's functions, please see the Help file in the corresponding folder. The Help file also contains complete installation instructions.

AVM ISDN CAPI Port Driver

The AVM ISDN CAPI Port Driver allows you to use the AVM ISDN-Controller C2 as if it were a modem.

The AVM ISDN CAPI Port Driver makes it possible for even programs designed for analog modems to communicate over the ISDN interface. This means that the various communication functions of Windows can be used with the AVM ISDN-Controller C2.

The AVM ISDN CAPI Port Driver generates a number of virtual modems in your system. The various modems are pre-configured for different types of connections. Virtual modems allow you to dial up ISDN connections to the Internet or to BBS services, for example, or to set up RAS (**R**emote **A**ccess **S**ervice) connections to other computers over ISDN.

AVM NDIS WAN CAPI Driver

The AVM NDIS WAN CAPI Driver for Windows allows use of RAS (Remote Access Service) and dialing into Internet Service Providers over ISDN.

NDIS (**N**etwork **D**evice **I**nterface **S**pecification) is a standard for connecting network adapters (hardware) to network protocols (software). NDIS WAN is a Microsoft extension of this standard for wide-area networking (WAN). The AVM NDIS WAN CAPI Driver thus allows the ISDN-Controller C2 to be used as a network adapter, mediating between network protocols and the AVM ISDN-Controller C2's applications interface CAPI 2.0.

Unlike the AVM ISDN CAPI Port Driver, the AVM NDIS WAN CAPI driver cannot be controlled by AT commands. It uses the standard protocols for network connections over ISDN (“HDLC” and “PPP over ISDN”).

AVM ISDN TAPI Services for CAPI

AVM ISDN TAPI Services for CAPI are universal drivers which can be used to implement TAPI applications with AVM ISDN-Controllers in Windows.

TAPI (**T**elephony **A**pplication **P**rogramming **I**nterface) is a telephony interface by Microsoft that allows telephony applications to be controlled from Windows. Using AVM ISDN TAPI Services for CAPI, phone calls can be made or voice-mail systems controlled on the computer. For instance, Windows's "Phone Dialer" can be used to establish connections to analog or ISDN phones. The conversation then takes place using a sound card and a headset or speakers and a microphone. With the appropriate TAPI applications, a variety of other features are available, including direct dialing of contacts listed in Microsoft Outlook.

TAPI applications based on the Microsoft standard TAPI 2.1 or higher can be used in combination with AVM ISDN-Controllers and the AVM ISDN TAPI Services for CAPI.

8.4 CAPI SoftCompression X75/V42bis

CAPI SoftCompression X.75/V.42bis is a feature of the ISDN-Controller C2's driver software. For data connections using the X.75 protocol, the controller can perform data compression in accordance with the V.42bis standard. This reduces transfer times and connection costs.

When the driver software is installed, CAPI SoftCompression X.75/V.42bis is activated by default. Upon request by CAPI applications that support the V.42bis standard, data compression is negotiated with the remote system for the duration of a connection.

8.5 CAPI SoftFax

The CAPI SoftFax feature allows to send and receive faxes on all four B channels simultaneously. The ISDN-Controller C2 sends and receives like a standard Group 3 fax device and supports the following fax protocols:

- V.17 (14.4 kbit/s)
- G3 Annex F (14.4 kbit/s)
- G3 Annex A (color fax)

8.6 CAPI SoftModem

The CAPI SoftModem feature permits connections to remote systems that are connected to the telephone network by an analog modem. This modem emulation allows connections at up to 14.4 kbit/s.

9 Technical Summary

This chapter contains a summary of the AVM ISDN-Controller C2's features and technical specifications.

9.1 Connector Pin Assignments

The ISDN-Controller C2 is connected to the ISDN socket by an RJ45 plug. The pin assignments of this connector are shown in the following table.

Pin assignments of the ISDN cable

RJ45	Function
1-	
2-	
- 5 (b1)	transmit
- 4 (a1)	transmit
- 3 (a2)	receive
- 6 (b2)	receive
7-	
8-	

9.2 The AVM ISDN-Controller C2 on Point-to-Point Lines

By default, the AVM ISDN-Controller C2 is installed with settings for BRI lines in point-to-multipoint configuration. However, it also can be operated with point-to-point lines (also called Direct Dial-In or DDI lines).

When using the ISDN-Controller C2 on point-to-point BRIs, please observe the following guidelines:

- Only **one** terminal device can be connected to a point-to-point BRI.
- Configure the ISDN-Controller C2 for operation on point-to-point lines. See the corresponding section in the installation chapter for your operating system.

- Your CAPI application, such as a fax server, also must support operation on point-to-point lines.
- The CAPI application also must be configured to interpret the DDI (Direct Dial-In) ISDN numbers correctly. Consult your application software documentation for more information.

9.3 Technical Specifications and Features

- ISDN-Controller for ISDN BRI lines and the PCI bus
- One or two BRI lines
- Active ISDN-Controller with its own CPU and on-board RAM
- High-performance StrongARM SA-110 processor with 270 MIPS at 233 MHz
- 16 MB of SDRAM
- State-of-the-art technologies, including BGA devices, SDRAM, 3.3 V supply voltage, etc.
- Low power consumption: approx. 3 W
- PCI Bus Mastering DMA: minimum system load and maximum throughput
- Suitable for all ISDN services:

  Internet access, internetworking, remote access, file transfer, fax, voice, video, digital data communication with other networks
- COMMON-ISDN-API 2.0 applications interface
- CAPI SoftCompression V.42bis and channel bundling in accordance with the CAPI specification
- CAPI SoftFax for fax communication at 2,400, 4,800, 9,600 and 14,400 bit/s
- CAPI SoftModem for analog modem connections at 1200/75, 2,400, 4,800, 9,600 and 14,400 bit/s

- Digital protocols:

  X.75, HDLC transparent, bit-transparent, X.25, ISO 8208 (X.25 DTE-DTE), X.31 Cases A and B, T.70, T.90, Mobile ISDN (ISO 3309) including HSCSD, V.110, V.120, DTMF recognition

- Analog protocols:

  Fax G3 (T.30, V.17, V.29, V.27ter), Fax G3 Annex A (Error Correction Mode) and Group 3 fax Annex F (faxing with two-dimensional data compression)

  Modem emulation: V.21, V.22, V.22bis, V.32, V.32bis

- Support for point-to-point and leased lines
- Supplementary Services, including Hold & Retrieve, Suspend & Resume (TP), 3PTY, ECT,...
- All protocol software loadable on the ISDN-Controller
- AVM ISDN CAPI Port Driver Installation
- AVM NDIS WAN Driver for Windows XP, Windows 2000 and Windows NT 4.0
- AVM ISDN TAPI Services for CAPI for Windows XP, Windows 2000 and Windows NT 4.0
- Designed for use with the operation systems Windows XP, Windows 2000, Windows NT 4.0, Novell NetWare 4.11 or higher and Linux
- Up to four ISDN-Controller C2s installable in one computer, or combined operation with other active AVM ISDN-Controllers
- International certification

10 Troubleshooting

This chapter describes the general malfunctions and specific error message with their most likely causes and remedies. The error messages are grouped according to the operating systems in which the AVM ISDN-Controller C2 can be operated.

10.1 General Malfunctions

The AVM ISDN-Controller is not detected or not initialized.

Have you installed new hardware components or changed the configuration of existing hardware?

If you combine adapters without Plug-and-Play support (Legacy) and PCI or ISA Plug-and-Play cards in one system, then the resources (I/O addresses and IRQ levels) used by the hardware without Plug-and-Play support should be so designated in the computer's BIOS. Otherwise, system resources may be allocated to more than one adapter, resulting in malfunctions. Please see your PC or mainboard manual.

You are unable to establish an ISDN connection.

If the ISDN-Controller C2 is correctly installed but you are unable to establish a connection, check for the following conditions:

- Is the ISDN-Controller C2 firmly inserted in the PCI slot? Is its slot plate screwed down?
- Are the ISDN cable connectors firmly connected to the AVM ISDN-Controller C2 and the ISDN socket?
- Is your ISDN line active? Use another terminal device, such as an ISDN telephone, to check it.
- Is your network terminator (NT) installed correctly? Some NTs must be connected to an electricity supply as well as to the incoming ISDN line.

- If your ISDN-Controller is connected to a point-to-point line, have you included the outside dialing prefix (usually “0”) in the numbers dialed?
- Are all the pertinent services (for data connections) available and enabled at your PBX?

Problems arise during operation of your ISDN-Controller C2:

If problems occur regularly during operation of the ISDN-Controller C2, open the “Device Manager” to verify if the AVM ISDN-Controller C2 is listed with an error message.

If the “Device Manager” reports no malfunctions in the ISDN-Controller hardware, attempt a test connection to the AVM Data Call Center (ISDN file transfer server). You may do so using the program “Connect32” (Windows NT 4.0), which is among the AVM ISDN-Tools included with your ISDN-Controller.

No connection to analog remote sites.

To connect to analog systems, you need appropriate communication software in addition to the AVM ISDN-Controller C2. With fax software, for example, you can dial connections to Group 3 (analog) fax machines.

No connection charge information is displayed.

The drivers for the AVM ISDN-Controller C2 allow CAPI-based applications to display charge information. This information is only available if the corresponding ISDN service has been enabled by your ISDN service provider. Contact your ISDN service provider to request charge information on each of your S_0 lines individually.

Using dual-boot systems:

To use the AVM ISDN-Controller C2 in a dual-boot system, install the drivers for each of the relevant operating systems in a separate directory, such as IDRIVER.WNT.

Upgrade from Windows NT 4.0 to Windows 2000

Before you switch your computer over from Windows NT 4.0 to Windows 2000, both the hardware and the software of the ISDN-Controller must be removed. Once the computer has been updated, the ISDN-Controller hardware and software have to be re-installed and configured as described.

10.2 Error Messages

Error Messages in Windows NT 4.0

Error Message on loading the ISDN-Controller with "C2 Load: Installation Error. Interrupt ‹xx› not available."

Possible cause: There are no IRQs available to the PCI bus.

Remedy: Run your BIOS setup and release at least one free IRQ for use by PCI adapters. Please see your PC or mainboard manual.

Example (Award BIOS): in the BIOS main menu, select "PM/PCI Configuration", then set "IRQ x assigned to: PCI/ISA PnP".

If you combine adapters without Plug-and-Play support (Legacy) and PCI or ISA Plug-and-Play cards in one system, then the resources (I/O addresses and IRQ levels) used by the hardware without Plug-and-Play support should be so designated in the computer's BIOS. Otherwise, system resources may be allocated to more than one adapter, resulting in malfunctions. Please see your PC or mainboard manual.

Error Messages in Novell NetWare

Error message on loading the controller: “Installation Error. Interrupt ‹xx› not available.”

Possible cause: There are no IRQs available to the PCI bus.

Remedy: Run your BIOS setup and release at least one free IRQ for use by PCI adapters. Please see your PC or mainboard manual.

Example (Award BIOS): in the BIOS main menu, select “PM/PCI Configuration”, then set “IRQ x assigned to: PCI/ISA PnP”.

If you combine adapters without Plug-and-Play support (Legacy) and PCI or ISA Plug-and-Play cards in one system, then the resources (I/O addresses and IRQ levels) used by the hardware without Plug-and-Play support should be so designated in the computer’s BIOS. Otherwise, system resources may be allocated to more than one adapter, resulting in malfunctions. Please see your PC or mainboard manual.

Error message: “CAPI not loaded.”

Possible cause: You tried to start an ISDN application without loading the AVM ISDN-Controller C2 first.

Remedy: Load the ISDN-Controller C2 by entering **`capi20`** at the system console and then start your ISDN application.

Error message: “Error in configuration file, no ISDN-Controller defined.”

Possible cause: During the ISDN-Controller C2's installation, the configuration file CAPI20.CFG is created. If you later edit this file manually and corrupt the ISDN-Controller’s definition(s) it contains, the error occurs.

Remedy: Repeat the complete installation of the AVM ISDN-Controller C2.

Error Messages: “Deinstallation error, wrong CAPI driver loaded.”

“Installation error, wrong CAPI driver loaded.”

“Installation error, ISDN-Controller-xx unknown keyword ‹xx›.”

„Installation error, ISDN-Controller-xx ‹xxxx› value too long.“

“Installation error, ISDN-Controller-xx ‹xxxx› illegal value.”

Possible cause: You have replaced some files in the ISDN-Controller driver installation directory (on obtaining updated drivers from the AVM Data Call Center, for example). Older files in the same directory cause version conflicts.

Remedy: Always perform the full AVM ISDN-Controller C2 installation procedure; never replace individual files.

Error message: “Installation error, Controller-xx with I/O address ‹xxx› does not answer.”

Possible cause: The ISDN-Controller C2 was not fully loaded or the hardware is damaged.

Remedy: Repeat the complete installation of the ISDN-Controller C2. In case of a hardware defect, please contact your dealer or AVM.

Error message: “... at least one application is registered.”

Possible cause: You attempted to unload or uninstall the AVM ISDN-Controller C2 while an application such as a terminal or fax program was still using it.

Remedy: First end all applications that use the AVM ISDN-Controller C2. Then you can unload or uninstall the ISDN-Controller.

11 Technical Support from AVM

AVM provides numerous sources of information to assist you in your day-to-day work with the ISDN-Controller C2. New drivers and software updates for your AVM ISDN-Controller C2 are available for downloading free of charge from AVM's Internet site or the AVM Data Call Center. If you are not able to resolve a problem using these resources, AVM Support is available to assist you.

11.1 Information and Updates

The following documenation ISDN-Controller C2 is provided:

Documentation

- A PDF version of this manual is included in the C2\ENGLISH\MANUAL folder on the CD. If you do not have the Adobe Acrobat Reader to display PDF documents, you can install this program from the \PROGRAMS\ACROBAT folder on the CD.

- The "C2 Readme" file contains current information that was not yet available at the time the manual was printed. The Readme file is located in the CARDWARE\C2\‹OPERATING SYSTEM›\‹LANGUAGE› folder on the CD. In Windows NT 4.0, the file can also be accessed from the "AVM" program group after installation of the ISDN-Controller C2.

Internet

AVM publishes detailed information and free software updates in the Internet. Direct your browser to **www.avm.de/en**.

- Click "Products" for detailed information on all current AVM products, as well as announcements of new products and product versions.

- Click “Service” to contact support or consult the “ISDN Info Guide”.
- Under “Download” you will find the latest driver software to download for the AVM ISDN-Controller C2.

The AVM Data Call Center

The AVM Data Call Center (ADC) contains all of the programs and drivers found on AVM's Internet site. Dial the AVM Data Call Center using FRITZ!data (IDtrans protocol) at the number: +49 (0)30 / 39 98 43 00.

11.2 AVM Support

Please take advantage of the information sources listed above before contacting AVM Support!

If the tips and information sources listed above have not assisted you in solving your problem, please contact AVM Support for further information. AVM Support can be reached by fax.

Support by E-mail

Support requests may be submitted to AVM by E-mail. Please use the support request form on the AVM Internet pages at:

http://www.avm.de/en/service/support

Fill out the form and send it to AVM support by clicking the “Send” button.

Support by Fax

If you have no connection to the Internet, AVM Support can be reached at the fax number:

+49 (0)30 / 39 00 42 66

Please supply the following information in your support request:

- Which AVM ISDN-Controller model are you having trouble with?

- What is the version number of the driver you are using? You can find this information in the "C2 README" file in the "AVM" program group.
- Is your ISDN-Controller connected directly to the ISDN Network Terminator (NT)?
- What operating system is running on the computer in which you have installed the AVM ISDN-Controller C2?
- Please specify the exact text of all error messages you encountered.
- Describe the problem in as much detail as possible: in what context does the error occur; what application software are you using; etc.

Please answer the following questions in your support request as well, as these points can be very helpful in solving your problem:

- Is the error reproducible?
- Does the "C2 Test" program in the "AVM" group detect problems with your ISDN-Controller?

  If so, what messages does it display?
- Are you able to dial up a data connection to the AVM Data Call Center (ADC) with your AVM ISDN-Controller C2?

  Attempt to make a test connection to the ADC with the ISDN Tool Connect32 or with FRITZ!data. Use the IDtrans protocol and dial the number +49 (0)30 / 39 98 43 00.

  If the connection to the ADC fails, what error messages are displayed?
- Describe your PC configuration in as much detail as possible, including the system type, sound card type, the allocated resources (interrupts and I/O addresses) and any other components installed.

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Declaration of CE Conformity

The manufacturer	AVM GmbH
Address	Alt-Moabit 95
	D-10559 Berlin

herewith declares that the product

Type	ISDN-Controller
Product	C2

complies with the following directives:

- 91/263/EEC — Telecommunications Terminal Equipment and Satellite Earth Station Equipment
- 89/336/EEC — EMC Directive: Electromagnetic Compatibility
- 73/23/EEC — Low Voltage Directive: Electrical equipment designed for use within certain voltage limits

The following norms were consulted to assess conformity:

- CTR 3/1998.06.17
- EN 55022/1997 Class B
  EN 55024/9.98
- EN 60950/1992+A1+A2+A3+A4+A11
  EN 41003/1998

CE The CE symbol confirms that this product conforms with the above mentioned norms and regulations.

Berlin, 01.12.2000 Peter Faxel, Technical Director