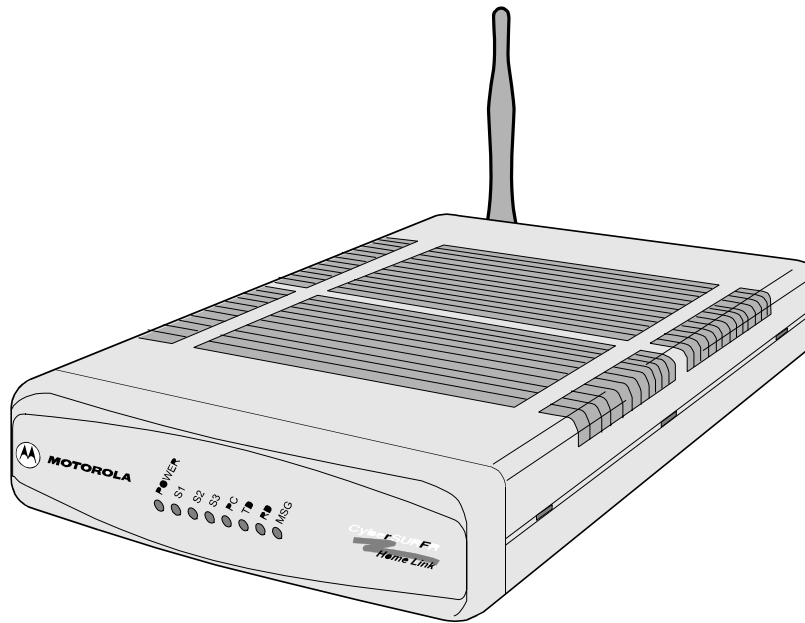

Preliminary



Motorola AL 200 Multi-User Modem Installation Manual

Notice

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This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician to help.

Changes or modifications not expressly approved by Motorola could void the user's authority to operate the equipment.

Notification of Canadian Requirements

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicable aux appareils numériques de classe B prescrites dans le règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.

Note to CATV System Installers in the USA

This reminder is provided to call the cable TV system installer's attention to Article 820-40 of the National Electrical Code (NFPA 70) that provides guidelines for proper grounding and, in particular, specifies that the cable shield shall be connected to the grounding system in the building, as close to the point of cable entry as practical.

Overview

Introduction The *Motorola AL 200 Multi-User Modem Installation Manual* describes how to connect, install, and power up a multi-user modem and start a home network. It also provides basic information about the lights, controls, and connectors on the multi-user modem.

Audience This manual is intended for the installer of the AL 200.

Software Revision Level This manual is current for Release 1.0 of the AL 200 firmware.

AL 200 Modem Documentation Set Motorola provides these manuals to support the AL 200:

- *Motorola AL 200 Multi-User Modem Installation Manual*
- *Motorola AL 200 Multi-User Modem On-line Help* in the Network Manager application

Special Notices The following notices emphasize certain information in the manual. Each serves a special purpose and is displayed in the format shown.



Caution

Caution provides you with information that, if not followed, can result in damage to software, hardware, or data.



Warning

Warning is the most serious notice, indicating that you can be physically hurt.

Trademarks Motorola AL 200 is a trademark of Motorola, Inc.
Windows is either a registered trademark or trademark of Microsoft Corporation in the United States and/or other countries.

Year 2000 Ready The AL 200 is year 2000 ready.

About This Manual (continued)

Important Safety Notices

These are important safety instructions:

- **Read Instructions**
Read all the safety and operating instructions before you operate the product.
- **Retain Instructions**
Retain the safety and operating instructions for future reference.
- **Heed warnings**
Adhere to all the warnings on the product and in the operating instructions.
- **Follow instructions**
Follow all operating and use instructions.
- **Cleaning**
Unplug this product from the AC power before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a dry cloth for cleaning.
- **Attachments**
Do not use attachments not recommended by the product manufacturer as they may cause hazards.
- **Water and Moisture**
Do not use this product near water — for example, near a bath tub, wash bowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool; and the like.
- **Power Sources**
Operate this product only from the type of power source indicated on the marking label of the power supply (or power plug). If you are not sure of the type of power supply, consult your product dealer or local power company. For products intended to operate from other sources, refer to the specific operating instructions.
- **Power-Cord Protection**
Route the power supply cords so that they are not likely to be walked on or pinched by items placed upon or against them. Pay particular attention to cords at plugs, convenience receptacles, and the point where they exit from the product.
- **Replacement Parts**
There are no replacement parts. If necessary, the modem is replaced with a new modem.
- **Heat**
Situate the product away from heat sources such as radiators, heat registers, stoves, and other products that produce heat.
- **Rain or moisture**
To prevent fire or shock hazard, do not expose this unit to rain or moisture.

About This Manual (continued)

- **Damage Requiring Service**

Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:

- The power supply cord or plug is damaged.
- Liquid has been spilled, or objects have fallen into the product.
- The product has been exposed to rain or water.
- The product does not operate normally by following the operating instructions.
- The product has been dropped or the cabinet has been damaged.
- The product exhibits a distinct change in operation.

- **Ventilation**

Holes on the top and side of the modem provide ventilation thereby ensuring reliable operation of the product by protecting it from overheating. Do not block or cover these openings. Do not block the openings by placing the product on a bed, sofa, rug, or other similar surface. Do not place the product in a built-in installation such as a bookcase or rack unless proper ventilation is provided or the manufacturer's instructions have been adhered to.

Do not block the unit's ventilation by placing objects on this product.

- **Overloading**

Do not overload wall outlets and extension cords as this can result in a fire or electric shock.

- **Unit Location**

The AL200 has been certified as a mobile device as per FCC Section 2.1091. In order to comply with the FCC RF exposure requirements the AL200 must only be installed with approved antennas, and a minimum separation distance of 20 cm must be maintained from the antenna to any nearby persons.

Customer Support For technical support within North America, contact Motorola Customer Support at (800) 544-0062.

For technical support outside of North America, refer to the following World Wide Web site for your local Motorola representative:

<http://www.mot.com/MIMS/Multimedia/cont>

Contents (continued)

Important Safety Notices vi

Chapter 1.

The Motorola AL 200 Multi-User Modem

About the Motorola AL 200 Multi-User Modem 1-2
Preparing for Installation 1-4
Installing the AL 200 1-7
Installing Motorola’s Net Manager Software 1-12
Training the Subscriber to Use the AL 200 1-13

Appendix A.

Specifications

Appendix B.

Connector Pinouts

Using the Ethernet Port B-3

Appendix C.

Front and Back Panels

LEDs C-2

Appendix D.

Regulatory Information

Glossary

Chapter 1

The Motorola AL 200 Multi-User Modem

Overview

Introduction

This chapter introduces the Motorola AL 200 Multi-User Modem.

About the Motorola AL 200 Multi-User Modem

Introduction

Motorola's AL 200 Multi-User Modem enables you to access the Internet over broadband cable and share resources in your own home network.

The AL 200 connects computers and other devices in a home or small office network, and connects your personal computers, workstations, or hub to the hybrid fiber/coaxial (HFC) system. After you connect the AL 200 to the HFC network, install Motorola's net manager software on the computers, and make logical connections, you can:

- Share local files and resources on the local network
- Access remote network services, including the Internet and the World Wide Web, from multiple computers, simultaneously

Local Network Hub

In conjunction with broadband Internet access, or without it, the AL 200 performs as a network hub, enabling the computers in your home to communicate with one another. The computers on the home network must each have suitable network adapters (hardware) and network drivers (software). This guide explains how to install the hardware and software, and describes the available options and configurations.

Together, the AL 200's networking and broadband Internet access features form a solution for a home or office that is powerful, yet easy to set up and to use.

Components

Figure 1-1 shows the AL 200 and its packaged components.



Warning

For your safety, do not open the AL 200. There are no serviceable parts in the unit. Refer all service to qualified service personnel.

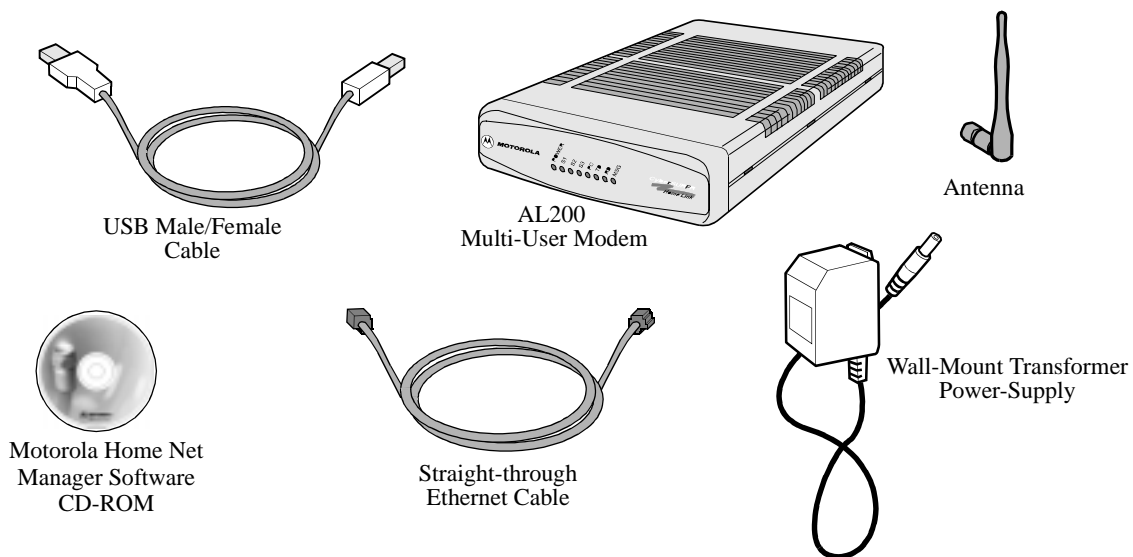


Figure 1-1. Motorola AL 200 Multi-User Modem Components

Preparing for Installation

Introduction

This section describes how to prepare for AL 200 installation.

Local Requirements

Before installation, ensure that:

- Your cable service includes broadband Internet access
- The service is functioning properly
- The coaxial cable is installed and active in the room where the AL 200 is located
- The site chosen for the AL 200 installation is within an appropriate distance of a power source and that the site is free of accumulated dust and environmental extremes

Before installation, decide which computer(s) to connect to the network and determine the type of adapter to use for each computer. The next section provides further information.

Computer or Workstation Requirements

Each computer or workstation must have hardware and software to establish a connection with the AL 200.

Verify that the components listed in this section for the computer's network connection type are installed. The network connection types are:

- RF/USB
- RF/PCMCIA
- Ethernet

RF/USB Connection

The computer connects to the AL 200 with a wireless Home RF USB adapter. This device plugs into the computer's USB connector and communicates on the RF spectrum with the AL 200.

For an RF/USB connection, these components must be installed and available on the computer:

Component	Description
Network driver	Software that lets you connect the AL 200 to the communications software. This software is included with the Home RF adapter.
TCP/IP network protocol	Software installed as part of the operating system that lets computers communicate on a network
Wireless HomeRF USB adapter	Device with an antenna and receiver that plugs into USB port
Data application	Software that lets you connect to the Internet; for example, a Web browser or FTP
USB port	Port that meets USB standards to connect to a USB peripheral
Windows [®] 98	Operating system. Files from the system disk are needed for the AL 200 installation.
Windows Networking	Software for communication among computers

RF/PCMCIA Connection

The computer connects to the AL 200 with a wireless Home RF PCMCIA adapter. This device plugs into the computer's PCMCIA port and communicates on the RF spectrum with the AL 200.

For an RF/PCMCIA connection, these components must be installed and available on the computer:

Component	Description
Network driver	Software that lets you connect the AL 200 to the communications software. This software is included with the Home RF adapter.
TCP/IP network protocol	Software installed as part of the operating system that lets computers communicate on a network
Wireless HomeRF PCMCIA adapter	Device with an antenna and receiver; plugs into PCMCIA port
Data application	Software that lets you connect to the Internet; for example, a Web browser or FTP
PCMCIA port	Port that meets PCMCIA standards
Windows [®] 95 or 98	Operating system. Files from the system disk are needed for the AL 200 installation.
Windows Networking	Software for communication among computers

Ethernet Connection

The computer connects to the AL 200 with an Ethernet network adapter. This device plugs into the computer's Ethernet port (on the adapter card) and communicates on the Ethernet cable with the AL 200.

For an Ethernet connection, these components must be installed and available on the computer:

<i>Component</i>	<i>Description</i>
Network driver	Software that lets you connect the AL 200 to the communications software. This software is included with the Ethernet adapter.
TCP/IP network protocol	Software installed as part of the operating system that lets computers communicate on a network
Ethernet network adapter	Device with an antenna and receiver; plugs into Ethernet port
Data application	Software that lets you connect to the Internet; for example, a Web browser or FTP
Ethernet port	Network card port that meets Ethernet standards
Windows [®] 95 or 98	Operating system. Files from the system disk are needed for the AL 200 installation.
Windows Networking	Software for communication among computers

Installing the AL 200

Introduction

This section explains how to:

- Make antenna and cable connections to the AL 200, and power it up—see the “AL 200 Antenna Connection” section on page 1-7.
- Connect computers to the AL 200:
 - To connect the AL 200 to each computer with a wireless Home RF adapter, see the “Wireless Computer Connections” section on page 1-8
 - To connect the AL 200 to one computer using a higher-rate Ethernet or USB cable, see the “Wireline Computer Connections” section on page 1-10



Caution

Ensure that the AL 200 is disconnected from the power outlet during the cabling procedure, until the step that instructs you to connect it.

To turn the AL 200 on or off, connect or disconnect the power cord at the wall outlet. Do not disconnect using the connector at the back of the unit.

Do not operate a AL 200 with an object physically located on top. This may result in damage to the product or injury to the person.

Use the AL 200 only with the appropriate Motorola power supply.

The AL200 has been certified as a mobile device as per FCC Section 2.1091. In order to comply with the FCC RF exposure requirements the AL200 must only be installed with approved antennas, and a minimum separation distance of 20 cm must be maintained from the antenna to any nearby persons.

AL 200 Antenna Connection

Follow these steps:

Steps to Connect the Antenna to the AL 200

Step	Action
1	Unpack the AL 200 antenna.
2	Screw the antenna connector into the AL 200 antenna connector until it is snug.
3	Adjust the antenna elbow joint so that the antenna is vertical when the AL 200 is right side up.

AL 200 Cable Connections

Follow these steps.

Steps to Connect Home RF on AL 200

Step	Action
1	Connect a coaxial cable to the CABLE connector on the back of the AL 200 and to the cable termination point.
2	Connect the power cable to the POWER connector on the back of the AL 200.
3	Plug the wall-mount power supply into a standard electrical outlet. The LEDs blink in the power-up sequence, then the POWER, S1, S2, and S3 LEDs remain on. The PC LED goes on, or flickers rapidly, when a computer is detected on the line. <u>**/Open Issue/from Mike McGovern/ AL 200 must be registered before PC can receive IP address/ resolve w/ Mike</u>

Wireless Computer Connections

Follow these steps for each computer:

Steps to Connect Home RF/USB or RF/PCMCIA Clients

Step	Action
1	Connect an RF antenna/adaptor to the computer's USB or PCMCIA port. Refer to Figure 1-2. The New Hardware Found dialog box appears; then the Add New Hardware Wizard window.
2	Click Next. Follow the on-screen instructions. Windows installs the network adapter driver and the required Windows files. ■ Note This step requires the Windows disk. After loading files from the Windows disk, remove the disk (before restarting the computer).
3	<u>**Set the security ID ?/Mike/Tom</u> <u>**Tell user not to follow Windws instructions--follow Symph instructions--for driver install??</u>

What You See

Figure 1-2 shows examples of Home RF connections.

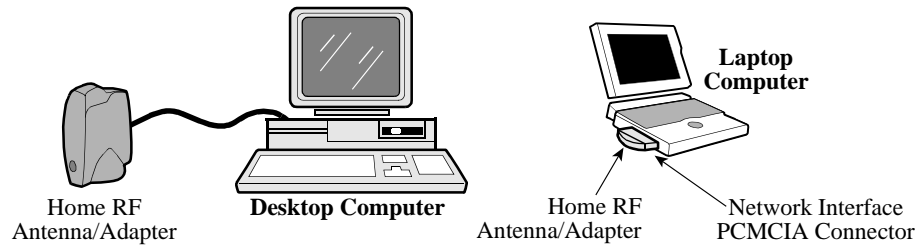


Figure 1-2. RF Network Connections, USB and PCMCIA

Figure 1-3 shows AL 200 connections.

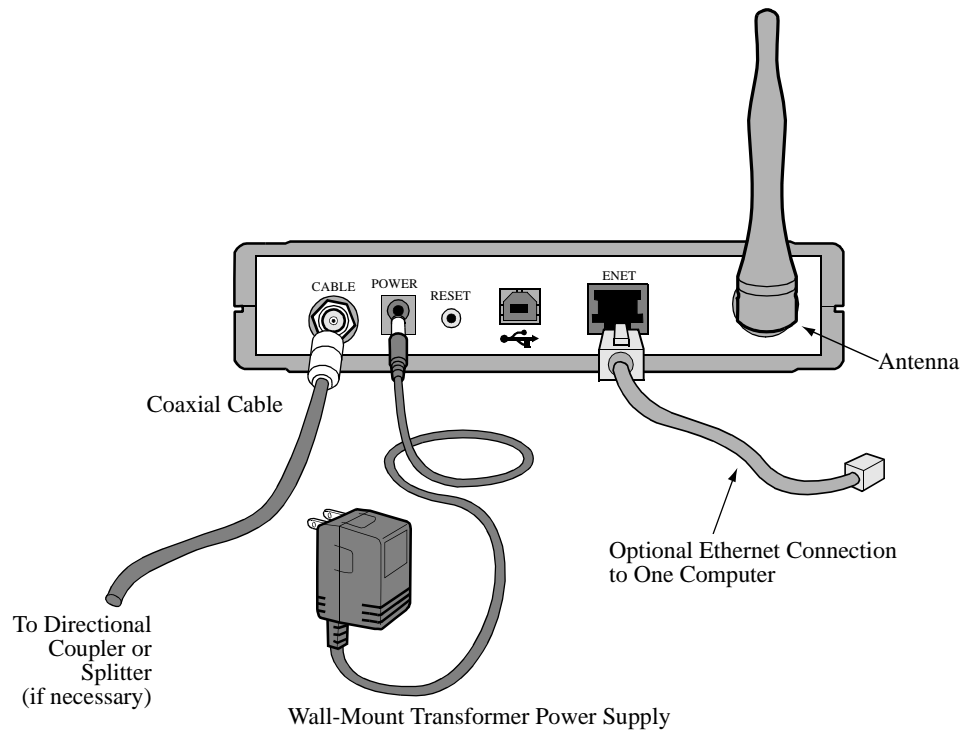


Figure 1-3. AL 200 Multi-User Modem Cable Connections

Wireline Computer Connections

Follow these steps to connect the AL 200 to one computer with Ethernet or USB cable:

Steps to Connect the AL 200, Wireline Ethernet or USB

Step	Action
1	Connect the AL 200 to your computer in one of these ways: a) For an Ethernet connection, use a Category 5 UTP straight-through Ethernet cable to connect the Ethernet port on the computer to the ENET connector on the back of the AL 200. b) For a USB connection, use a USB cable to connect the USB port on the computer to the USB connector on the back of the AL 200.
2	Make the connections shown in Figure 1-4 and Figure 1-5.
3	<u>**ISSUE/Check w/ Peg Burbank, Mike McGovrnre another step? Re USB driver from CD-ROM/ install it/ add a step at appropriate location</u>

What You See

Figures 1-4 and 1-5 show examples of Ethernet connections.

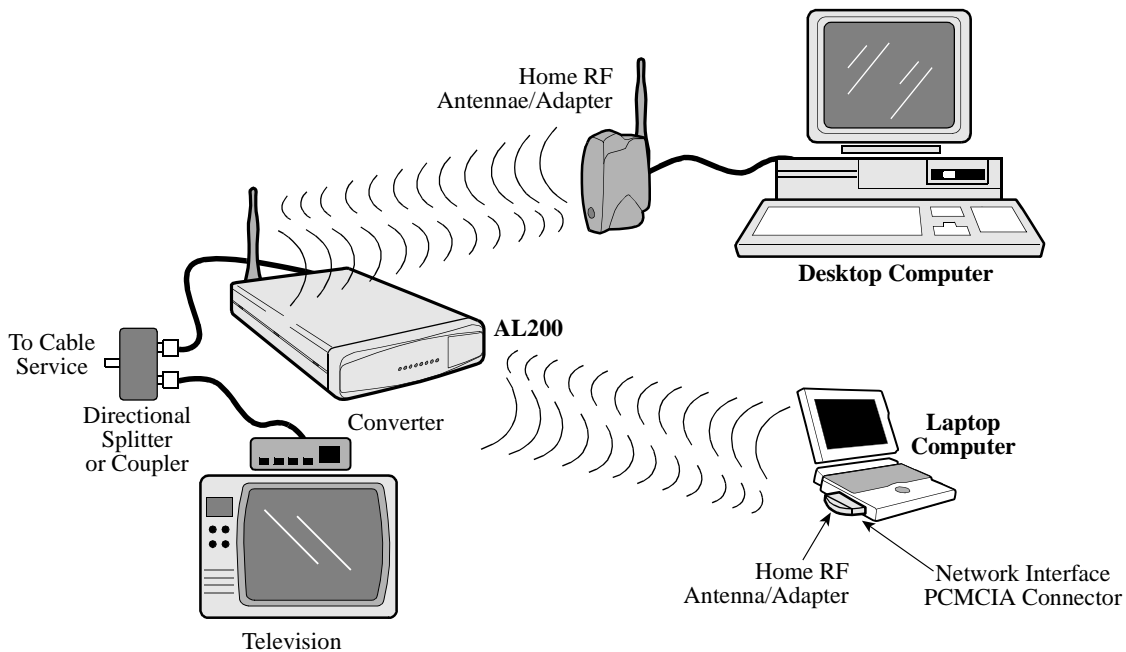


Figure 1-4. Cable Service and Home Network Connections, Ethernet/USB

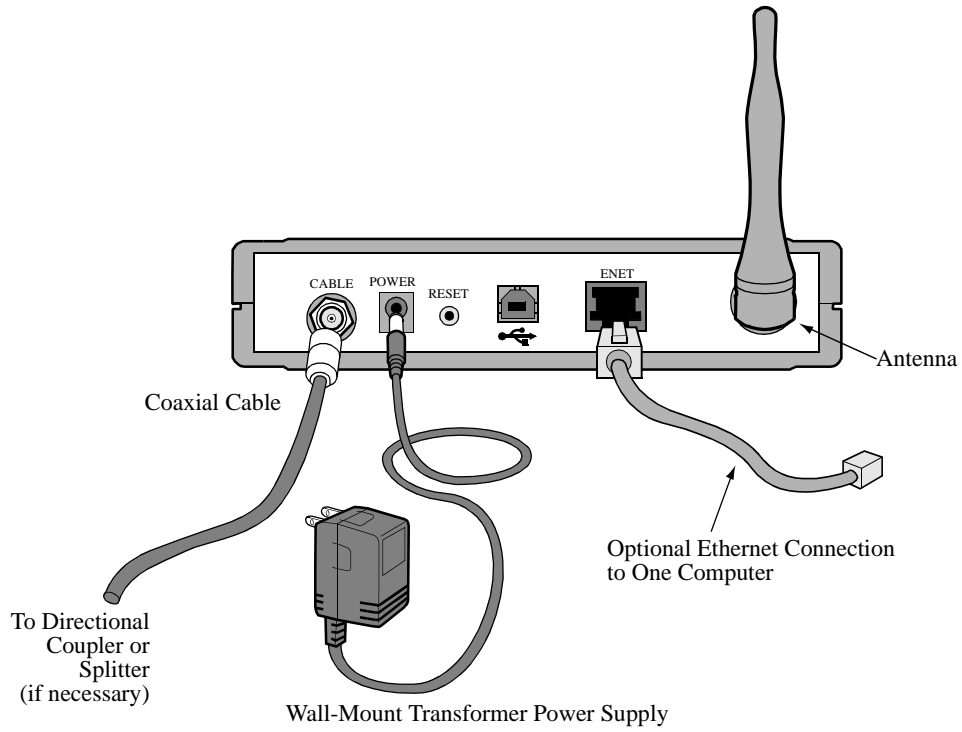


Figure 1-5. AL 200 Multi-User Modem Cable Connections

Installing Motorola's Net Manager Software

Introduction

When you have completed the tasks in the previous section, perform the following steps to install the net manager software on each computer in the local network.

Procedure

Follow these steps to install the net manager software on each computer:

Step	Action
1	Ensure that Microsoft NetBUI and Microsoft Windows Networking are installed on the computer.
2	Insert the Motorola Net Manager Software CD-ROM into the CD-ROM drive. If auto-run is enabled, the net manager setup program begins. Otherwise, double click Motorola Net Manager → setup.exe on the CD-ROM. If you need help during the installation, press F1.
3	Follow the setup instructions, which include restarting the computer.
4	When the computer has been restarted, the Net Manager Device Sharing view appears. This occurs only after the first restart.
5	Optionally, continue with these steps to change the access to one or more resources. The default setting for each resource is Not Shared. Close the Network Sharing window.
6	Locate a resource, such as a CD-ROM drive or a printer, in the list. Click an access setting. For details on access settings, refer to the "Sharing Resources on a Computer" topic in the net manager on-line Help. Click Apply or OK. Optionally, assign access settings to other resources.
7	The Net Manager icon appears in the Windows system tray. You can run Net Manager to update access settings by double clicking the Net Manager icon on the Windows Desktop or selecting Start → Programs → Motorola Network Manager → Network Manager . The Network View appears. You can view the devices on the network. To update access settings, click the Device Sharing tab.

Training the Subscriber to Use the AL 200

Introduction

This section explains how to deliver basic training to the cable subscriber during the installation visit, and lists the materials to leave with the subscriber.

It is extremely important to train the cable subscriber carefully. Providing clear instruction during the installation visit will reduce the number of service calls to subscribers' homes.

What to Teach the Subscriber

Explain and demonstrate the following to the subscriber:

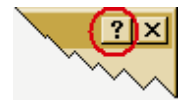
- How to start the net manager application
- How to open the net manager on-line Help
- Troubleshooting local connections and common problems
- Contacting Technical Support

Starting the Net Manager

Run net manager by double clicking its icon or selecting **Start** → **Programs** → **Motorola Network Manager** → **Network Manager**.

Opening the Net Manager On-Line Help

Open the Net Manager on-line Help by double clicking the Help icon in the upper right corner of the net manager window.



Troubleshooting

Check network connections by running net manager and clicking the Link Test tab. Troubleshoot problems by noting changes in the color of the net manager system tray icon. Refer to the "Troubleshooting" topic in the on-line Help.

Contacting Technical Support

If you cannot resolve a problem, contact Motorola Customer Support, as described in the "Customer Support" section in the front of this manual.

Materials for the Subscriber

At the end of the installation visit, *leave the following materials for the subscriber:*

- Motorola Net Manager Software CD-ROM



Net Manager CD-ROM

Figure 1-6. Materials for the Cable Subscriber

Appendix A

Specifications

Introduction

This section describes the specifications for the Motorola AL 200 Multi-User Modem.

IP and MAC Layer Specifications

This table describes the IP and MAC layer specifications for the AL 200.

<i>IP and MAC Layer</i>	<i>Specification</i>
MAC performance	16 CPE MAC addresses and eight downstream encryption SIDs
Upstream bandwidth request	Four independent upstream transmit controllers
Multicast	256 multicast groups
Filtering	272 IP filters

Physical Layer Specifications

This table describes the Physical layer specifications for the AL 200.

<i>Physical Layer Property</i>	<i>Specification</i>	
	<i>Upstream Transmitter</i>	<i>Downstream Receiver</i>
Impedance, return loss	75 Ohms nominal, >6 dB	75 Ohms nominal, >6 dB
Frequency range	5 - 42 MHz	91-857 MHz
Channel assignment	Variable center frequencies	Standard, IRC, and HRC
Channel bandwidth	200, 400, 800, 1600, and 3200 KHz	6 MHz for 64QAM and 256QAM

This table describes the physical specifications for each modulation mode.

<i>Physical Layer Property</i>	<i>Specification</i>			
	<i>Transmitter</i>		<i>Receiver</i>	
	<i>16QAM</i>	<i>QPSK</i>	<i>64QAM</i>	<i>256QAM</i>
Dynamic range	+8 to +55 dBmV	+8 to +58 dBmV	-20 to +15 dBmV Typically -25 to +15 dBmV	-15 to +15 dBmV Typically -20 to +15 dBmV
Symbol rate	160, 320, 640, 1280, 2560 Ksym/s	160, 320, 640, 1280, 2560 Ksym/s	5.056941 Msym/s	5.360537 Msym/s

Raw signaling rate	6.4 to 10.24 Mbps	.32 to 5.12 Mbps	30.34 Mbps	42.88 Mbps
Information rate			26.97 Mbps	38.81 Mbps
FEC	Programmable Reed-Solomon block code		Concatenation of Reed-Solomon block code and Trellis code; ITU J.83-B; DOCSIS RFI Sec 4.3.2	

Physical and Environmental

This table describes the physical and environmental specifications.

<i>Physical</i>	<i>Specification</i>
Dimensions	1.7 in. (H) x 6.8 in. (W) x 10 in. (D) (43.2 mm x 172.7 mm x 254 mm)
Weight	1.8 pounds (.818 kg)
Front panel LEDs	• POWER
	• S1 (System connectivity)
	• S2 (System connectivity)
	• S3 (System connectivity)
	• PC (CPE connectivity)
	• TRANSMIT (Transmit data)
	• RECEIVE (Receive data)
Back panel interfaces, connectors and controls	• MESSAGE (programmable message)
	• IEC 169-25 RF 75 Ohm threaded coaxial, Type F
	• 120VAC power <u>--> **this is not correct/per Peg</u>
	• Reset button, time-triggered dual function: – Reset – Factory setting
	• USB v1.0
	• <u>**need specs for antenna connector</u>
Operating temperature	0° C to +40° C (+32° F to +104° F)

Regulatory and Power

This table describes the regulatory and power specifications.

Regulatory	Wall-mount Transformer Power Supply Specification
Standards compliance	DOCSIS 1.0 Ethernet/IEEE 802.3 ITU J83-B
Safety	UL 1950 CSA C22.2 No. 950 IEC 950 EN 60950 AS/NZS 3260 <u>**last three may be incorrect/Randy Weaner/info</u>
Emissions	FCC Part 15, Class B CISPR 22, Class B EN 55022, Class B AS/NZS 3548, Class B <u>**last four may be incorrect/Randy Weaner/info</u>
Immunity	EN 50082-1
Power Input	
Power supply, input	120Vac +/-10%, 60 Hz +/- 5%, output +12Vdc at 1.2 A Auto-ranging 100-240Vac, 47-63Hz
AC/DC power adapter, output	External Wall-mount Power Supply: Class 2 Type with NEMA 1-15 plug External AC/DC power adapter: Class II 2-wire type with IEC320-C8 inlet, uses country specific power cord with IEC320-C7 connector
Modem	+12Vdc at 1.2 A

Appendix B

Connector Pinouts

Pinouts

Introduction

This appendix describes the connector pinout requirements for the Motorola AL 200 Multi-user Modem.

Ethernet Port Connector

The Ethernet (ENET) port on the rear panel of the modem is an 8-pin modular connector. The connector conforms to the IEEE standard for 10/100BaseT access as defined in *802.3i*.

Ethernet Port

This table describes the pinouts for the Ethernet port on the modem. For examples, refer to the “Using the Ethernet Port” section on page B-3.

<i>Pin</i>	<i>Signal</i>
1	+Receive Data
2	-Receive Data
3	+Transmit Data
4-5	Not Used
6	-Transmit Data
7-8	Not Used

Coax Cable Connector

The coax cable connector uses the following pinouts:

- Center conductor — signal
- External conductor — ground

USB Port Connector

The universal serial bus (USB) connector on the rear of the modem is a standard USB connector. The connector conforms to the USB specifications.

USB Port

This table describes the pinouts of the USB port:

<i>Pin</i>	<i>Signal</i>
1	+ 5 V
2	Data Negative
3	Data Positive
4	Ground

Power Connector

The power supply terminates at a two conductor barrel connector on the back of the AL 200.

This table describes the pinouts for the power connector.

<i>Pin</i>	<i>Signal</i>
Outer Contact	Ground
Inner Contact	+12vdc (nominal)

Using the Ethernet Port

Introduction

This section shows examples of devices that can be connected to the AL 200 using an Ethernet connection and the required cabling.

When You Connect the AL 200 to a PC

Figure B-1 shows the connection between a cable modem ENET (10/100BT) port and the Ethernet LAN PC port using a Cat 5 UTP straight-through Ethernet cable. The wiring diagram is included.

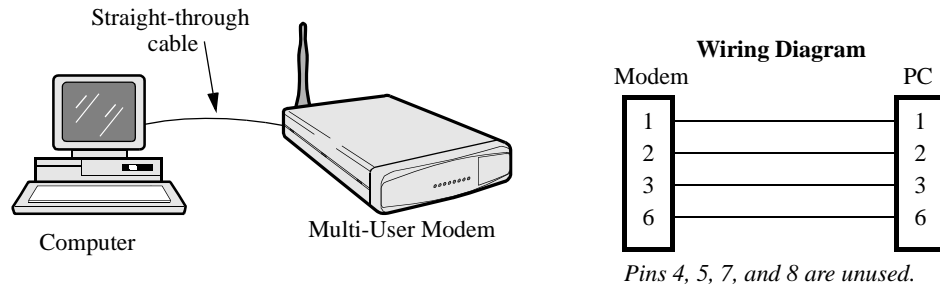


Figure B-1. Modem to PC Connection

When You Connect the AL 200 to a Hub

Figure B-2 shows a connection using crossover Ethernet cable (not supplied) between the AL 200 and a hub. The wiring diagram for the crossover cable is included.

■ Note

If the configuration includes an intelligent hub or a hub with an intelligent port, you may not need crossover cable. Refer to the hub documentation.

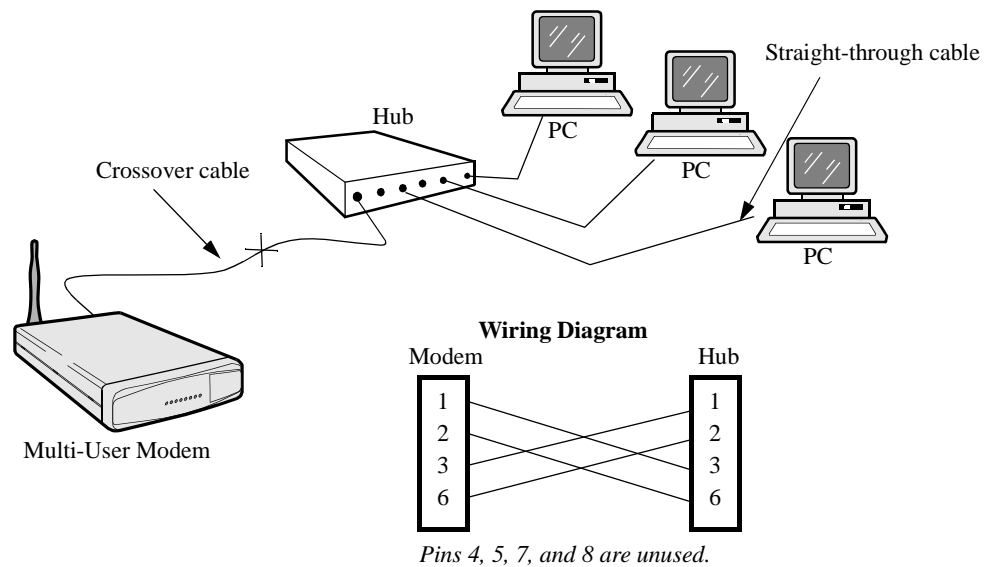


Figure B-2. Modem to Hub Connection

When You Connect the AL 200 to a Customer Premise Router

Figure B-3 shows a connection between the AL 200 and a customer premise router using a crossover Ethernet cable (not supplied). The wiring diagram is included.

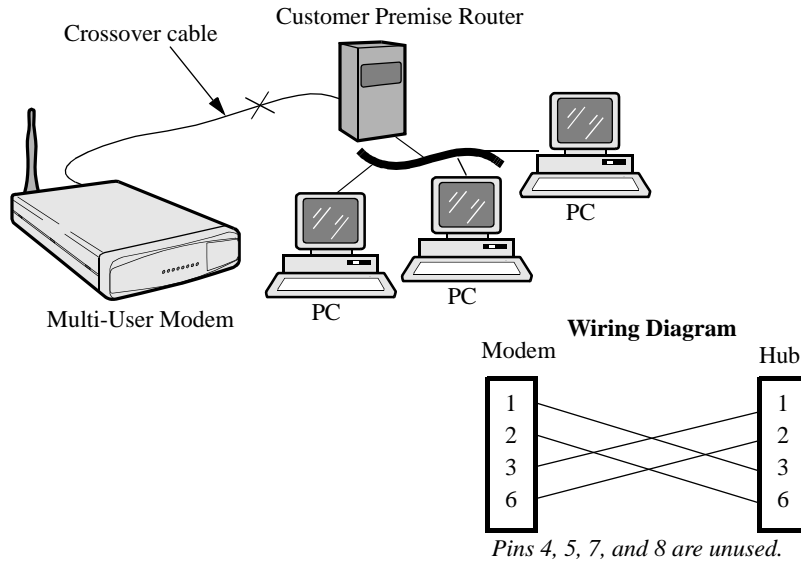


Figure B-3. Modem to Customer Premise Router Connection

*****MikeMcg/wants to represent bridging here? Get sketch from him; have Tim Kinch update the graphic; paste it in.**

■Note

This set-up may require configuration by the service provider.

Appendix C

Front and Back Panels

Introduction

This appendix describes the AL 200 front and back panel lights and buttons.

Front Panel

Figure C-1 shows the front panel of the AL 200. The LEDs indicate connectivity status and also act as a diagnostic aid. Refer to the “LEDs” section on page C-2.



Figure C-1. AL 200 Front Panel

Back Panel

Figure C-2 shows the back panel of the AL 200.

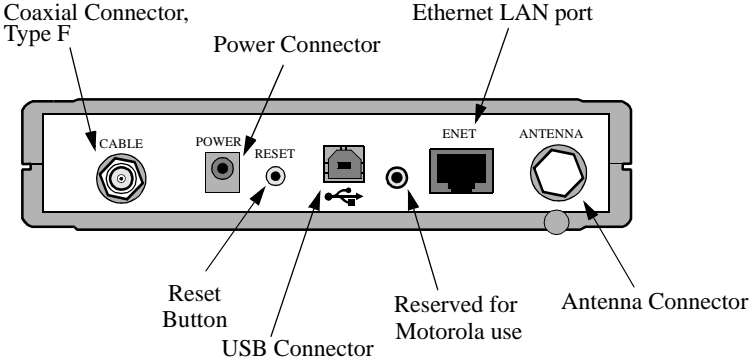


Figure C-2. AL 200 Back Panel

LEDs

Introduction

The AL 200 front-panel LEDs offer diagnostic and connectivity status information. This section lists the LED states.

LEDs

This table describes the AL 200's front-panel LEDs. For information on LED status during modem states of operation, refer to the Diagnostics section in the *Motorola io cable modem DM 100 Installation Manual*.

-->>>this statemnt comes from the older PL 100 manual. COnfirm with Peg Burbank or remove. Same for the same statement, next page.**

Cable Modem LEDs

LED	Name	Indicates
Power	Power	Whether electrical power is applied to the modem
S1	Status 1	The modem state (refer to the "S1, S2, and S3 LEDs" section on page C-3)
S2	Status 2	
S3	Status 3	
PC	Personal Computer	Whether the cable modem is connected to customer premise equipment (CPE)
TRANSMIT	Transmit Data	That the multi-user modem is transmitting data (on the HPNA port, Ethernet port, or both) to a computer or CPE on the home network
RECEIVE	Receive Data	That the multi-user modem is receiving data (on the HPNA port, Ethernet port, or both) from a computer or CPE on the home network
MESSAGE	Message	The function of this LED is defined by the cable system operator

S1, S2, and S3 LEDs

This table describes the status LEDs for the AL 200 during initial power-up. For information on changes in LEDs that indicate failures or other problems, refer to the *Motorola io cable modem DM 100 Installation Manual*.

S1, S2, and S3 LED Status

S1 LED	S2 LED	S3 LED	State
Flashing	Flashing	Off	Power-up testing
Flashing	Flashing	On	Power-up failure
Flashing	Flashing	Flashing	Boot load failure
Flashing	Off	Off	Scanning for downstream data channel
Flashing	On	Off	Locked on downstream channel
Flashing	On	On	Performing ranging function
Flashing	Off	On	Obtaining upstream channel configuration
Off	Flashing	Off	Establishing IP connectivity
On	Flashing	Off	Establishing time of day
On	Flashing	On	Transferring modem configuration from the TFTP Server
Off	Off	Flashing	Downloading software from the TFTP Server
On	Off	Flashing	Registering
On	On	Flashing	Establishing Baseline Privacy encryption
On	Off	Off	Network access is disabled
Off	On	Off	Changing upstream channel
On	On	Off	Changing upstream channel with ranging
Off	Off	On	Changing downstream channel
On	Off	On	Software download initiated by SNMP
On	On	On	Fully registered and operating normally

Appendix D

Regulatory Information



Regulatory Marking

Type-approval labels indicate compliance with country regulations. AL 200s carry country-specific labels to indicate compliance.

Canadian Emission Statements

AL 200: This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Product Safety Regulatory Marking

Regulatory labels indicate compliance with safety standards. AL 200s. Modems and enclosures carry one of the following labels:

UL, CSA

10BaseT	Unshielded, twisted pair cable with an RJ-45 connector used with an Ethernet LAN. “10” indicates the speed: 10Mbps; “Base” means that it is baseband technology; and “T” means that it is a twisted pair cable.
16 QAM	Modulation scheme used by a modem transmitter. QAM uses amplitude and phase modulation to encode multiple bits of data in one signaling element, thus achieving higher data transfer rates than amplitude or phase modulation alone. 16 QAM encodes four bits per symbol as one of sixteen amplitude and phase combinations. 16 QAM refers to the number of discrete phase/amplitude states that represent data bits.
64 QAM	A modulation scheme used by a cable modem receiver. 64 QAM uses amplitude and phase modulation to encode multiple bits of data in one signaling element. 64 QAM encodes 6 bits per symbol as one of 64 amplitude and phase combinations.
256 QAM	A modulation scheme used by a cable modem receiver. 256 QAM uses amplitude and phase modulation to encode multiple bits of data in one signaling element. 256 QAM encodes 8 bits per symbol as one of 256 possible amplitude and phase combinations.
bandwidth	The range of frequencies that can be passed over a channel.
bridge	A device used to connect two LANs that use similar LAN protocols. The bridge acts as an address filter, picking up packets from one LAN that are intended for a destination on another LAN and passing them on. The bridge does not modify the contents of a packet and does not add anything to the packet. The bridge operates at Layer 2 of the Open System Interconnect (OSI) model.
broadband	Network technology that multiplexes multiple, independent network carriers onto a single cable. The technology is used to carry voice, video, and data over a cable.
broadcast	Transmission to two or more devices at the same time, such as over network or by satellite; protocol mechanism by which group and universal addressing is supported.
Cable Modem Termination System (CMTS)	A device located in the cable system headend that interfaces the hybrid fiber/coaxial (HFC) network to local or remote Internet Protocol (IP) networks. Motorola’s CMTS (Cable Router) provides connections between IP hosts and cable modems, and between the cable modems and the connected subscribers. It also manages cable modem bandwidth.
coaxial cable (coax)	Cable that consists of an inner conductor surrounded by insulation. An outer conductor is wrapped around the insulation, which is typically covered by plastic. Coaxial cable has large bandwidth and can support transmission over long distances.

communication network	A facility that provides a data transfer service among the equipment attached to a network.
Customer Premise Equipment (CPE)	Equipment at the end user premises. This equipment may be provided by the end user or service provider.
DOCSIS	The Data-Over-Cable Service Interface Specifications.
downstream	The direction of data flow from a CMTS to a cable modem.
Dynamic Host Configuration Protocol (DHCP)	A protocol that allows dynamic assignment of IP addresses to other computers. DHCP is also used to assign IP addresses to cable modems. This protocol can also provide other parameters such as a TFTP server address and TFTP path and filename.
encryption	A method of encoding data.
encryption key	A key that is used to encrypt data to deter unauthorized interception.
Ethernet	A networking standard running at speeds of 10 Mbps (10BaseT) or 100 Mbps (100BaseT).
Ethernet address	The physical address of the Ethernet port. It is also known as a MAC address or a NIC address.
Ethernet card	A card that resides in an expansion slot of a PC. It can be a built-in Ethernet port or an Ethernet port with a 10BaseT adapter. The Ethernet card takes data from the computer, converts it to serial data, puts it into a packet format, and sends it over the 10BaseT or 100BaseT LAN. The Ethernet card has a 48-bit address burned into the ROM. It is also referred to as a Network Interface Card (NIC).
event	A message generated by a cable modem to inform an operator that something has occurred.
F connector	Connector on a cable modem that connects it to the cable system.
File Transfer Protocol (FTP)	A protocol that allows users to log into a remote system, identify themselves, list remote directories, and copy files to and from the remote machine. FTP understands a few basic file formats. It is more complex than Telnet in that it maintains separate TCP connections for control and data transfer.
firewall	A method of preventing a network from unauthorized access by filtering access packets. This is done by the software on a cable modem or a dedicated server.
Forward Error Correction (FEC)	A technique for correcting errors incurred in transmission over a communications channel by the receiver, without requiring the retransmission of information by the transmitter; typically it involves a convolution of the transmitted bits and the appending of extra bits, using a common algorithm by the receiver and transmitter.
headend	The central office of the service provider where cable signals originate.
Home Phone Networking Alliance (HPNA)	Industry organization that defines a set of standards for home phoneline networking technologies (www.homephna.org).

hub	A device used to connect multiple devices to a LAN or similar structure to a headend.
Hybrid Fiber/Coaxial (HFC) network	A network where the trunk of the cable plant is fiber technology. The fiber is connected to a coaxial cable and the signal is converted so that it is compatible to that media. The coaxial cable runs through the branches of the network and is dropped into the subscriber's home.
Initial Maintenance (IM)	A contention interval that provides an opportunity for modems to join a network.
Internet	A collection of interconnected networks used for world-wide communications. These networks use the TCP/IP protocol.
IP address	<p>A 32-bit address assigned to every device in a network. An IP address has two parts: a network address and a host address. Each network is assigned an address by a governing agency, and each company administrator assigns an address to each host. Network addresses can be 8, 16, or 24 bits long corresponding to classes A, B, and C, respectively, with the host address occupying the remainder of the 32 bits. If a service provider uses Class C addresses, for example, the first 24 bits are the network address and 8 bits are used for host addresses.</p> <p>An IP network address can be further divided by using classless addressing or subnetting. See subnet.</p>
IP filtering	IP filtering allows IP packets to be dropped according to information in the packet, such as its source or destination address. IP filtering can prevent subscribers from accessing headend servers, enforce subscribers to log on to the cable network, enforce separately-billed service packages for data, and provide group access control for IP Multicast.
IP network	A group of IP routers that route IP datagrams. These routers are sometimes referred to as internet gateways. Single users access the IP network from a host. Each individual network in the Internet includes some combination of hosts and IP routers.
Local Area Network (LAN)	A privately owned and administered network for data communications. A LAN provides a relatively high bandwidth over a limited geographical area for communication among the attached devices, typically personal computers and servers. Communication is usually accomplished by broadcasting on a connectionless basis over a shared media.
MAC Layer Domain	A collection of upstream and downstream channels for which a single Media Access Control (MAC) Allocation and Management Protocol operates. Its attachments include one CMTS and a number of cable modems.
Maximum Transmission Unit (MTU)	The largest amount of data that can be transmitted in one discrete message on a physical network. MTUs can be user configurable.
Mbps	Mega (million) bits per second. A rate of data transfer.

Media Access Control Address (MAC)	The hardware address usually “burned in” on a ROM for any device connected to the network. Ethernet cards in the subscriber PC have a MAC address. The cable modem and the network interface card on a CMTS have MAC addresses. The MAC address is used by the link layer protocol to forward packets “one hop at a time” between the host and the first router and between the first router and the next router and so on through the network until the packet arrives at its final destination. In contrast, an IP address is a “source” to “destination” address. It does not include all the intermediate hops.
Media Access Control (MAC) sublayer	The part of the data link layer that supports topology-dependent functions and uses the services of the physical layer to provide services to the logical link control (LLC) sublayer.
MHz	Mega Hertz. A measure of radio frequency - millions of cycles per second.
modem registration	The process by which a cable modem makes itself known to a CMTS. The modem configuration and authorization are verified and the COS is negotiated.
network driver	A file packaged with the Ethernet card that connects the card to the PC communications software.
network layer	Layer 3 in the Open System Interconnection (OSI) architecture. This layer provides services to establish a path between open systems.
packet data	Each IP datagram consists of one or more packets. A packet has a header that contains the source address and a destination address for routing (and other housekeeping information). Since both the header and the data area can vary in length, an IP datagram itself is variable in length.
PING	A program that tests host reachability by using the Internet Control Message Protocol (ICMP) echo request and waiting for a reply. It is initiated and verified from an IP device.
physical layer (PHY)	Layer 1 in the Open System Interconnection (OSI) architecture. It is the layer that provides services to transmit bits or groups of bits over a transmission link between open systems. It includes the electrical, mechanical, and handshaking procedures.
Physical Media Dependent (PMD) Sublayer	A sublayer of the physical layer that transmits bits or groups of bits over particular types of transmission links between open systems. It entails the electrical, mechanical, and handshaking procedures.
piggybacking	A process that occurs when a modem transmits data and requests additional bandwidth at the same time.
Quadrature Amplitude Modulation (QAM)	Modulation scheme that uses both amplitude and phase modulation to encode multiple bits of data in one signaling element, thus achieving higher data transfer rates than just amplitude or phase modulation alone. However, the signal is more prone to errors caused by noise and so requires a better quality transmission circuit than QPSK (lower noise and therefore higher Carrier to Noise Ratio (CNR) value).

Quadrature Phase Shift Key (QPSK)	<p>Modulation that sends two bits of information per symbol period with one bit 90 degrees out of phase with the other bit being sent. There are only four constellation points. These points represent the four combinations that can take place and are represented by the coordinates: (0,0 - 0,1 - 1,0 - 1,1).</p> <p>DQPSK modulation states that the information bits are differentially encoded prior to being modulated.</p>
quality of service	The accumulation of the cell loss, delay, and delay variation incurred by cells belonging to a connection.
radio frequency (RF)	Signals that are used by a cable modem transmitter and receiver to send data over the HFC network. A radio frequency carrier is modulated to encode the digital data stream for transmission across the cable network.
return loss	A measurement of the quality of the match of the device to the cable system. Return loss is the ratio of the amount of power reflected by the device.
RJ-45	An 8-pin modular connector on a Motorola cable modem or CMTS that connects the modem to a PC or external hub. Used as a 10BaseT or 100BaseT standard connector.
router	A device used to connect two subnetworks at the network layer. These subnetworks may be similar. An internet protocol is used in each router and in each host of the network. A router operates at Layer 3 of the OSI model.
service provider	A company providing cable data services to subscribers.
splitter	A piece of coax equipment that divides a single spectrum into multiple identical spectrums.
TCP/IP	A set of protocols that provides the standards and rules for controlling and managing communications between networks. TCP/IP has become the worldwide standard for internetworking and is the basis for the worldwide Internet. TCP/IP stands for Transmission Control Protocol/Internet Protocol. There are related protocols, services, and applications that are part of the TCP/IP protocol suite.
TCP/IP Communications Stack	Software in the subscriber PC that processes packets through the communication layers. The TCP/IP communication stack handles the communications between the subscriber's application, for example, an Internet browser, and servers on the Internet.
Transmission Control Protocol (TCP)	A reliable transport protocol of the Internet suite. TCP is a connection-oriented protocol that uses IP to transmit the data across the network. TCP is an end-to-end protocol defining the rules and procedures for exchanging information between communicating partners (hosts). Transmission Control Protocol resides in the Transport Layer of the OSI stack. It works on top of connectionless Network Layer IP. TCP segments messages into datagrams, uses a timer to keep track of outstanding datagrams, retransmits datagrams if requested, and performs error checking on incoming datagrams.
Universal Serial Bus (USB)	A device that allows PCs to connect to peripherals, eliminating the need for an Ethernet Card.

upstream

The direction of data flow from a cable modem subscriber to a CMTS.

World Wide Web

An interface to the Internet. You use the World Wide Web to navigate and hyperlink to other information on the Internet.

A

access setting 1-12

B

back panel A-2, C-1

C

cable connector B-1

cable subscriber 1-13

caution

- disconnected 1-7

- modem connection and disconnection 1-7

- operation with object on top of cable modem 1-7

- power supply 1-7

caution description v

CD-ROM 1-12

CISPR D-1

components 1-2

connecting multiple PCs to modem B-3

connections C-1

connectors

- async B-1

- cable B-1

- PHONE (HPNA) B-2

CSA D-1

D

data application 1-5, 1-6

diagnostic information C-2

disconnecting a cable modem 1-7

driver, network 1-5, 1-6

E

ENET connector B-1

ENET port B-3

environmental specifications A-2

Ethernet 1-6

Ethernet cable

- connecting 1-10

Ethernet connections 1-10

F

FCC D-1

front panel C-1

H

HPNA (PHONE) connector B-2

I

installation

- requirements 1-4

- tasks 1-4

installing net manager software 1-12

L

LED states C-2
LEDs A-2, C-1

M

MESSAGE LED C-2
multi-user modem
 front and back panels C-1

N

net manager software
 installing 1-12
network driver 1-5, 1-6

O

on-line Help 1-13

P

PC LED C-2
PCMCIA 1-5
PHONE (HPNA) connector B-2
physical specifications A-2
pinouts
 ENET port B-1
 modem to customer premise router B-4
 modem to hub B-3
 modem to PC B-3
 power connector B-2
power specifications A-3

R

RECEIVE LED C-2
regulatory specifications A-3
requirements 1-4
resource 1-12

S

S1, S2, S3 LEDs C-2
safety notices vi
safety standards D-1
specifications A-1
 IP and MAC layer A-1
 modulation mode physical A-1
 physical layer A-1
 physical/environmental A-2
 power A-3
 regulatory/power A-3
subscriber 1-13

T

TCP/IP network protocol 1-5, 1-6
temperature A-2
TRANSMIT LED C-2

troubleshooting 1-13

TUV D-1

U

UL D-1

USB cable

connecting 1-10

USB port 1-5

W

warning

service 1-2

warning description v

Windows 1-5, 1-6

Wireless HomeRF PCMCIA adapter 1-5

Wireless HomeRF USB adapter 1-5