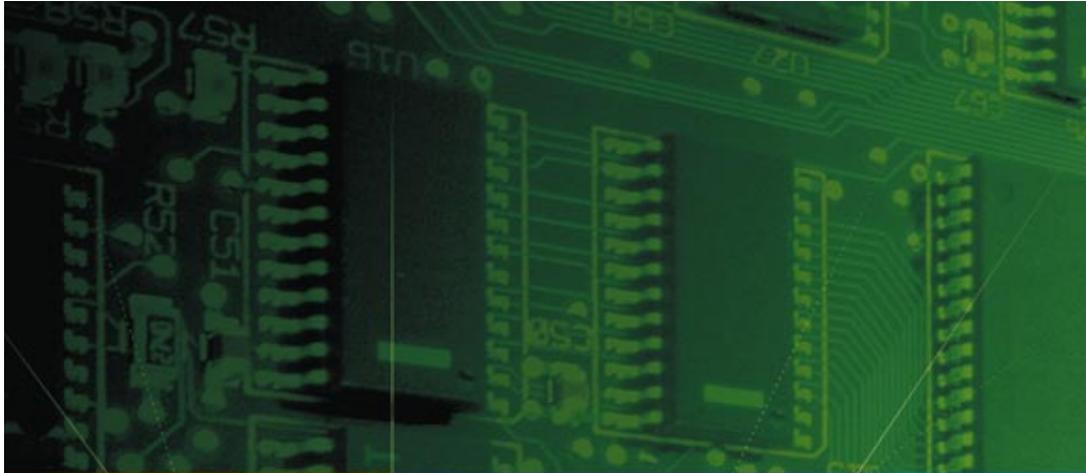




Cable Modem Manager

User Guide



Part No. 1.024.1728-01

Version 2

3Com Corporation
5400 Bayfront Plaza
Santa Clara, California
95052-8145

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ABOUT THIS GUIDE

About This Guide provides an overview of this guide, describes guide conventions, tells you where to look for specific information and lists other publications that may be useful.

This guide describes how to use Cable Modem Manager (CMM) software to configure and monitor 3Com cable modems connected to a 3Com Cable Modem Termination System (CMTS). It provides descriptions of menus and commands, as well as procedures for performing common and advanced administrative tasks.

This guide is intended for cable data network administrators who are responsible for configuring and monitoring cable modems connected to the 3Com data over cable network. It also assumes that you are familiar with all components that comprise the 3Com data over cable network.

Finding Information in This Guide

This table shows the location of specific information in this guide.

If you are looking for	Turn to
An overview of the CMM software and its features	Chapter 1
A list of requirements to meet before you can install CMM	Chapter 2
Procedures for installing and uninstalling CMM	Chapter 2
Information on how to navigate through the CMM GUI	Chapter 2
Instructions on how to detect cable modems connected to the CMTS	Chapter 3
Procedures for upgrading cable modem software	Chapter 4
Procedures for resetting and PINGing cable modems	Chapter 4
Procedures for configuring cable modem data filters	Chapter 5
Procedures for using the CMM Chart Gallery to monitor cable modem performance	Chapter 6

Conventions

The tables below describe conventions that are used in this guide.

Notice Icons

Icon	Notice Type	Description
	Information note	Important features or instructions
	Caution	Information to alert you to potential damage to a program, system, or device
	Warning	Information to alert you to potential personal injury

Text Conventions

Convention	Description
The words “enter” and “type”	When you see the word “enter” in this guide, you must type something, and then press the Return or Enter key. Do not press the Return or Enter key when an instruction simply says “type.”
[Key] names	Key names appear in text in one of two ways: <ul style="list-style-type: none"> ■ Referred to by their labels, such as “the Return key” or “the Escape key” ■ Written with brackets, such as [Return] or [Esc]. If you must press two or more keys simultaneously, the key names are linked with a plus sign (+). Example: Press [Ctrl]+[Alt]+[Del].
<i>Menu commands and buttons</i>	Menu commands or button names appear in italics. Example: From the <i>Help</i> menu, select <i>Contents</i> .
Words in <i>italicized</i> type	Italics emphasize a point or denote new terms at the place where they are defined in the text.
Words in bold-face type	Bold text denotes key features.

Related Documentation

The following 3Com documents provide additional installation, configuration, and maintenance information about the 3Com data over cable system:

- *Cable Access Router User Guide*: Contains a description of the 3Com data over cable system, and installation, configuration, and troubleshooting information for the Cable Access Router.
- *Cable Access Router Release Notes*: Contains helpful information that was not available when the *Cable Access Router User Guide* was printed.
- *Single Channel Stand-alone QAM Modulator Installation Guide*: Provides information required to install and configure the Single Channel QAM Modulator.
- *Dual Upstream Receiver Card Installation Guide*: Provides information required to install and configure the Dual Upstream Receiver card.
- *Cable Headend Manager User Guide*: Describes how to install and use 3Com *Cable Headend Manager* software to configure and monitor 3Com CMTSs.
- *Cable Modem Configuration File Editor User Guide*: Describes how to use 3Com *Cable Modem Configuration Editor* software to create your own customized configuration file. The configuration file is required for all cable modems to initialize themselves and register with the 3Com CMTS.

Year 2000 Compliance

CMM is Year 2000 compliant.

For information on Year 2000 compliance and other 3Com products, visit the 3Com Year 2000 web page:

<http://www.3Com.com/products/yr2000.html>



Contacting 3Com

Call the appropriate toll free number listed below for technical support.

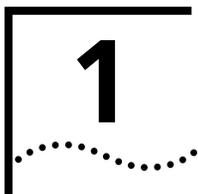


For European countries that do not have a toll free number listed, call +31 30 602 9900.

Country	Toll Free Number	Country	Toll Free Number
Austria	06 607468	Netherlands	0800 0227788
Belgium	0800 71429	Norway	800 11376
Canada	1800 2318770	Poland	00800 3111206
Denmark	800 17309	Portugal	0800 831416
Finland	0800 113153	South Africa	0800 995014
France	0800 917959	Spain	900 983125
Germany	0800 1821502	Sweden	020 795482
Hungary	00800 12813	Switzerland	0800 553072
Ireland	1800 553117	UK	0800 966197
Israel	0800 9453794	United States	1800 2318770
Italy	1678 79489	All Other Locations (Outside Europe)	1847 7976600



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PRODUCT OVERVIEW

This chapter contains a high-level overview of 3Com Cable Modem Manager (CMM) software and its features.

Overview

CMM is a software tool which helps you maintain and monitor 3Com cable modems connected to a 3Com Cable Modem Termination System (CMTS). CMM provides you with configuration, diagnostic, and performance monitoring capabilities.

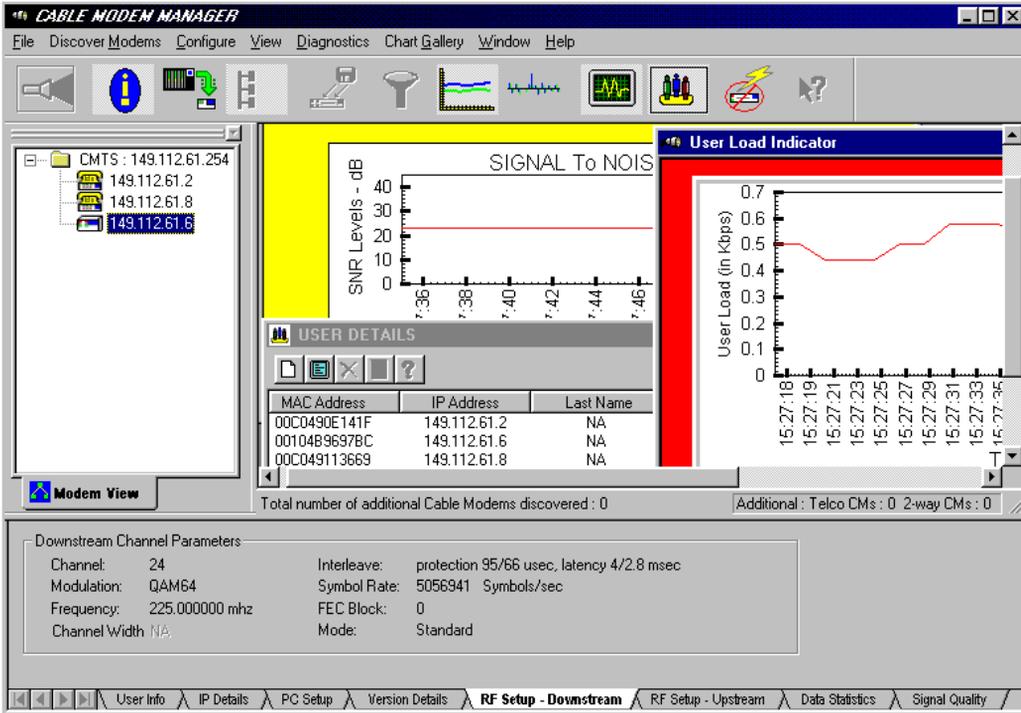
CMM software uses a Windows-based Graphical User Interface and the Simple Network Management Protocol (SNMP) to help you actively manage all active 3Com cable modems connected to the 3Com CMTS. The CMM runs on Windows 95 and Windows NT, and provides an on-line help system.

Features

CMM software provides these features:

- Graphical User Interface
- Two-way and One-way Management
- SNMP Management and Access
- Cable Modem Discovery
- Software Upgrade
- PING and Reset Utilities
- Cable Modem Configuration
- IP Filtering
- Performance Monitoring

Each feature is described in the following subsections.



CMM Graphical User Interface

Graphical User Interface

CMM management of the CMTS is performed via a Windows-based Graphical User Interface (GUI) application. CMM provides intuitive toolbar icons, as well as a text-based menu bar to access all features and commands.

One-way/Two-way Management

CMM allows you to monitor the cable modem regardless of the 3Com data over cable architecture. CMM functionality is compatible with both one-way (telco return) and two-way (RF return) cable modems.

SNMP Management

CMM uses SNMP to manage your cable modems. CMM uses some standard Management Information Base- (MIB) II objects, the Data over Cable System Interface Specification (DOCSIS) MIB objects, and 3Com-specific MIBs that are required to support the 3Com data-over-cable architecture. CMM also allows you to configure various SNMP access parameters for cable modem management.

Cable Modem Discovery

CMM allows you to enter a range of cable modem IP addresses and then detect the active 3Com cable modems within that range that are currently connected to the CMTS.

After a cable modem Discovery, all active cable modem IP addresses are displayed in the *Modem View* window. This allows you to double click on a particular modem's IP address to open the *Information Bar*. From the Information Bar, you can choose from eight different tabbed windows which display all current configuration and statistical information for that device.

Software Upgrade

CMM allows you to download the latest software version to cable modems from a remote location. You can use this feature to upgrade a single cable modem, or you can choose to upgrade multiple cable modem simultaneously.

PING and Reset Utilities

The CMM provides a diagnostic PING utility which allows you to verify cable modem IP addressing and network connectivity. The Reset Cable Modem utility allows you to reboot individual cable modems to resolve minor service affecting problems or initialize new software.

Cable Modem Configuration

CMM allows you to configure individual one-way cable modems remotely without redefining the Telephony Channel Descriptor (TCD) configured in the Cable Access Router at the headend. CMM also provides you with the ability to configure all SNMP access parameters for two-way cable modems from a remote location.

IP Filtering

CMM provides you with the ability to configure IP filters that restrict access and services to cable modems based on the following characteristics.

- source and destination IP addresses
- source and destination MAC addresses
- logical port or application
- IP protocol

You can use this feature to configure either IP DOCSIS Filters (filters based on the Data Over Cable System Interface Specification MIBs), or 3Com-Specific Filters (filters based on 3Com-proprietary MIBs).

**Performance
Monitoring
Capabilities**

CMM provides these charting and graphing capabilities, which help you monitor the performance of individual cable modems:

- *Downstream Signal to Noise Ratio Graph*: Allows you to determine if the cable modem is receiving a usable signal from the headend.
- *Upstream Power Level Graph*: RF return cable modems only. Allows you to monitor the upstream transmit power generated by the selected cable modem.
- *Downstream Power Level Graph*: RF Return cable modems only. Allows you to monitor the receive power level received by the cable modem.
- *User Load Indicator*: Telco return cable modems only. Provides a graphical display that shows you how much bandwidth a given modem is using.
- *RF Equalizer Graph*: Telco return cable modems only. Allows you to determine if the digital filter in the cable modem is cancelling out unwanted RF noise properly. This can help you isolate coaxial cable termination problems.

2

GETTING STARTED

This chapter provides you with information and procedures for installing and using CMM. This chapter contains these sections:

- Installation Requirements
- Installing CMM
- Uninstalling CMM
- Elements of the CMM GUI

Installation Requirements

Verify that the following installation recommendations and requirements have been met before you install CMM software:

- 1 The 3Com CMTS has been provisioned and installed according to the procedures outlined in the *Cable Access Router User Guide*.
- 2 Install the CMM on a Windows 95 or Windows NT PC that meets these recommended requirements:
 - Intel Pentium processor
 - 32 MB RAM
 - 20 MB available hard disk space
 - Windows 95 or Windows NT 4.0 (or greater)
 - Ethernet NIC installed
 - Installed on a WAN or LAN that can access the cable data network you want to manage with CMM

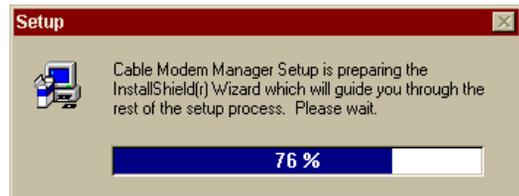
Installing CMM

To install and launch CMM software:



Always uninstall previous versions of CMM before reinstalling/upgrading CMM software.

- 1 Insert CMM diskette #1 in your floppy disk drive (for example, drive a:). This procedure assumes that your floppy disk drive is the a: drive. If your floppy disk drive is assigned a different letter, substitute it appropriately.
- 2 From the Start menu, select **Run**.
- 3 Type **a:\setup** in the *Open:* field, then click **OK** to launch the installation wizard.
- 4 When prompted, click **Next** to continue the installation. Follow the on-screen prompts.
- 5 When prompted, insert CMM diskette #2 into the floppy drive and click **Next**. Follow the on-screen prompts.
- 6 When prompted, insert CMM diskette #3 into the floppy drive and click **OK** to complete the installation.
- 7 Click **OK** to exit the installation wizard.
- 8 Double click the *CMM program icon* in the CMM Program group directory to launch the program.



Uninstalling CMM

To uninstall CMM:



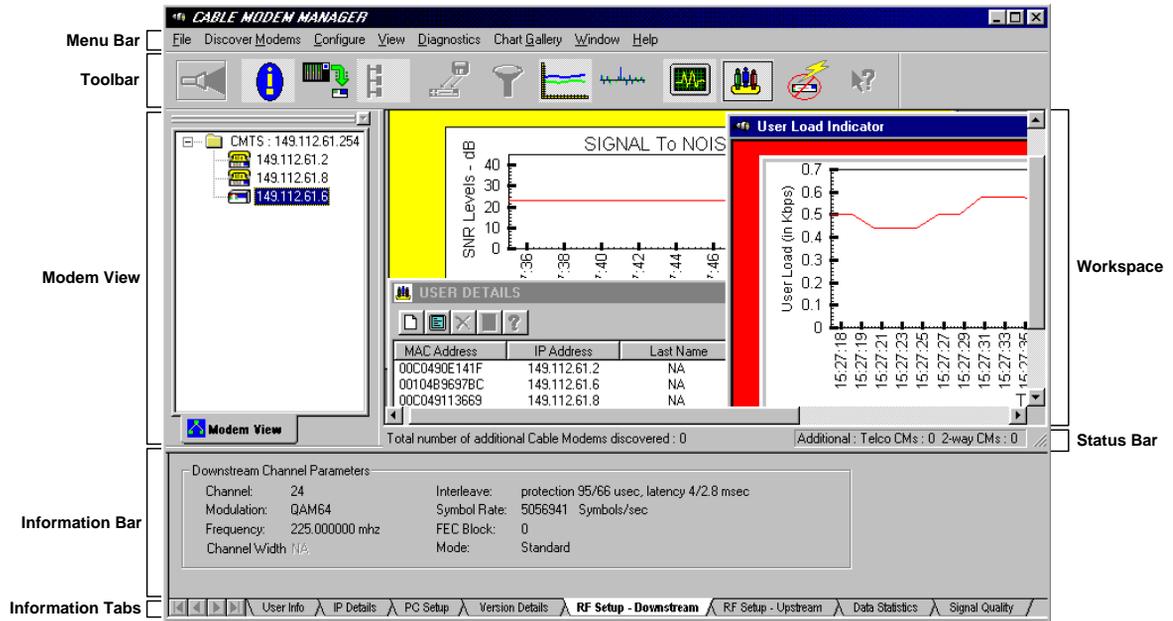
Always uninstall previous versions of CMM and reboot your workstation before you re-install or upgrade CMM software.

- 1 Double click the *Uninstall Cable Modem Manager* icon in the Cable Modem Manager program group.
- 2 The uninstall shield appears and proceeds to remove files related to the application.
- 3 When the uninstall is complete, CMM asks you to manually delete some files from the Cable Modem Manager program directory. Do so at this time.



Elements of the CMM GUI

Before you begin working with CMM, please familiarize yourself with the elements of the CMM GUI described in the illustration and table that follow.



Elements of the CMM GUI

Elements of the CMM GUI

Element	Description
Menu Bar	The <i>Menu Bar</i> contains pull-down menus that provide access all CMM screens and utilities.
Toolbar	The <i>Toolbar</i> provides easy access to those CMM utilities used most often.
Modem View	After you use the CMM Discover feature, the IP addresses of all cable modems currently connected to the cable data network display in a tree-like structure in the <i>Modem View</i> window.
Information Bar	The <i>Information Bar</i> displays configuration information associated with the selected <i>Information Tab</i> .
Information Tabs	The <i>Information Tabs</i> allow you to display specific types of cable modem configuration information in the <i>Information Bar</i> .
Workspace	The <i>Workspace</i> is the area where additional screens, graphs, and dialog boxes are displayed.
Status Bar	The <i>Status Bar</i> is the region at the bottom of the CMM <i>Workspace</i> which displays information on the number and type of cable modems detected by CMM.

The Toolbar The CMM *Toolbar* provides access to CMM features used most often. Refer to the table that follows for the function of each Toolbar icon.

CMM Toolbar Icon Descriptions

Icon	Description	Function
	Discover	Detects active 3Com one- and two-way modems currently connected to a given 3Com CMTS.
	Information Bar	Displays or hides specific groups of configuration details associated with a given cable modem.
	Update Modem View	Use to update the <i>Modem View</i> window with cable modems that have connected to, or disconnected from, the CMTS since the previous Discovery.
	View Cable Modem Network	Not used.
	Download Software	Downloads new cable modem software to one or more cable modems currently connected to the CMTS.
	Filters	Configures Data over Cable System Interface Specification (DOCSIS) compliant or 3Com-specific IP filters for two-way cable modems.
	RF Signal Graph	Provides a graphical display on the physical conditions of the RF line as reported by the cable modem.
	RF Equalizer Graph	Telco return cable modems only. Provides a graphical display which indicates how well the digital filter in the cable modem is cancelling out unwanted RF noise.
	View User Details	Telco return cable modems only. Displays general user identification information associated with a given cable modem.
	User Load Indicator	Telco return cable modems only. Provides a graphical display which shows how much bandwidth a given modem is using.
	Reset Cable Modem	Reboots the cable modem currently selected in the <i>Modem View</i> window.
	What's This?	Click the <i>What's This?</i> icon and then point to a portion of the CMM screen about which you would like more information. If information for the selected field is available, a popup window appears with a description.

Dialog Box Buttons Each CMM screen or dialog box called up from the Toolbar or Menu Bar may contain one or more of the buttons listed in the table that follows. Familiarize yourself with the function of each button.

CMM Dialog Box Buttons

Button	Description
	Removes an entry.
	Modifies existing settings.
	Exits from the screen. If you changed any data on the screen, CMM prompts you save any changes that you made.
	Creates an entry.
	Requests the latest configuration and status information from the CAR.
	Configures the system with the information you entered. <i>Set</i> sends any changes you made to the cable modem. Note: An item is not really added, changed, or deleted until you click <i>Set</i> .
	Provides context-sensitive help in some CMM dialog boxes.
	Exits a CMM dialog box. If you made any changes, CMM prompts you to save them.



3

DISCOVERING CABLE MODEMS

This chapter provides procedures for using the Cable Modem Manager (CMM) *Discovery* feature. This chapter contains these sections:

- Overview
- Configuring Discovery Settings
- Performing a Discovery
- Updating the Modem View

Overview

The *Discovery* feature allows you to generate a graphical display of a range of active 3Com cable modems currently connected to the cable plant.



You must perform a Discover before you can perform any additional CMM tasks (except for PINGing a cable modem).

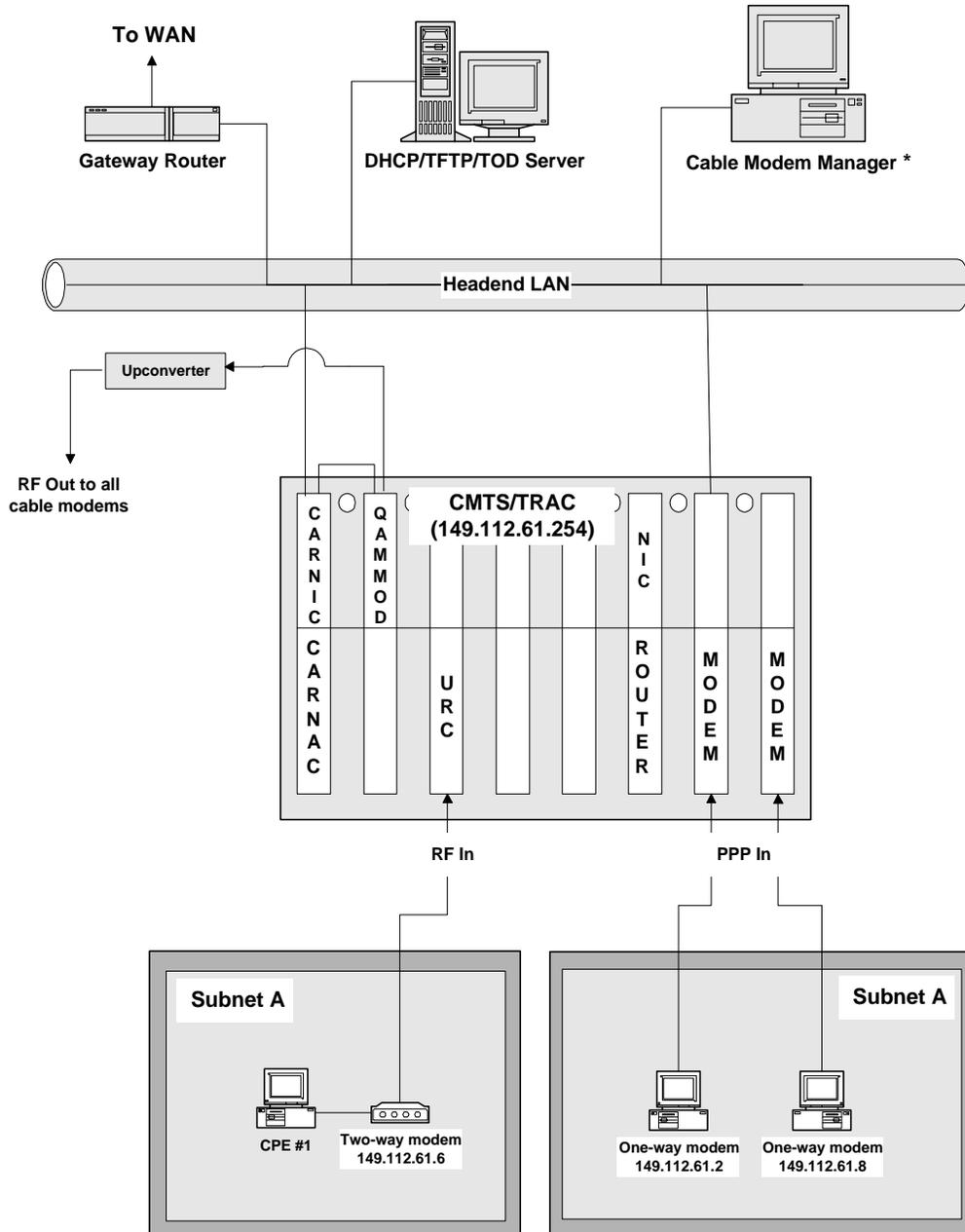
The Discovery feature uses a range of IP addresses to establish an SNMP link from CMM to all one- and two-way 3Com cable modems currently connected to a single 3Com Cable Modem Termination System (CMTS).

A 3Com CMTS can be comprised of the following components:

- Cable Access Router
- Single Channel QAM Modulator
- Dual Upstream Receiver (two-way only)
- Total Control chassis

When used in conjunction with the CMM *Update Modems* feature, you can detect currently connected modems across different IP subnets.

Refer to the illustration that follows.



* Cable Modem Manager can be installed on a WAN or LAN that accesses the cable data network.

Example 3Com Data-over-Cable Architecture

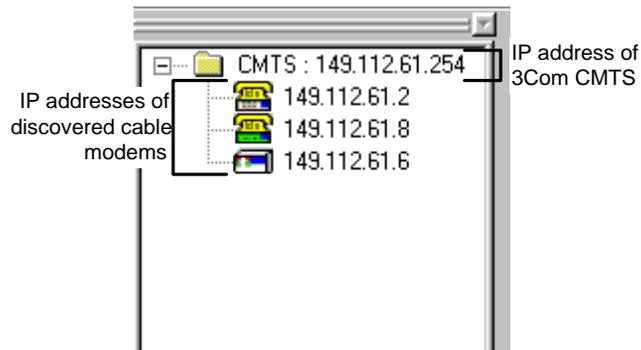
In this simplified example:

- There is one CMTS in the Total Control chassis comprised of:
 - One Cable Access Router
 - One QAM Modulator
 - One URC
- The CMTS is assigned Subnet A, which contains:
 - Two one-way modems
 - One two-way modem
- The Telco Return Access Concentrator (TRAC) is co-located with the CMTS in the same Total Control chassis.

Once the CMM performs its Discovery, detected modems are shown in a tree-like structure in the *Modem View* window:

- Telco return modems are designated by telephone icons
- Two-way modems are designated by rectangular icons

In the figure that follows, the *Modem View* window displays the result of a Discovery performed on the architecture shown on the previous page.



Modem View Window

Configuring Discovery SNMP Settings

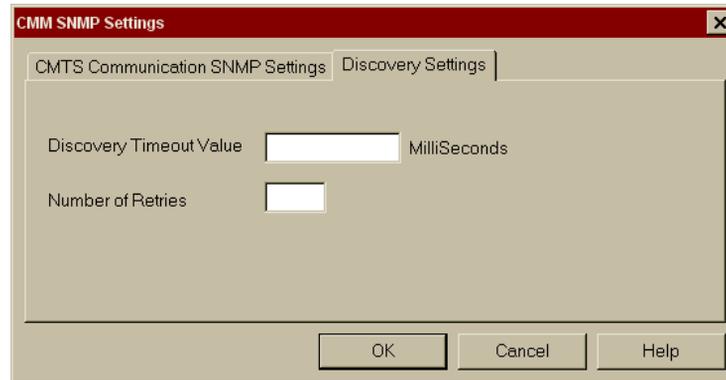
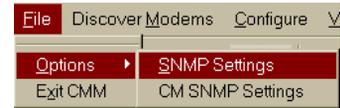
The Discovery SNMP settings allow you to set SNMP parameters that CMM uses whenever it performs a *Discovery*:

- Discovery SNMP Settings: Timeout and number of attempts
- CMTS SNMP Settings: IP and SNMP Community string information
- Cable Modem SNMP Settings: Community string information

Discovery SNMP Settings

To configure general *Discovery* SNMP settings:

- 1 On the Menu Bar, click **File**.
- 2 Click **Options**.
- 3 Click **SNMP Settings**.
- 4 Click the **Discovery Settings** tab. The *Discovery Settings* dialog box appears.



Discovery Settings Dialog Box

- 5 Make the entries described in the table that follows.

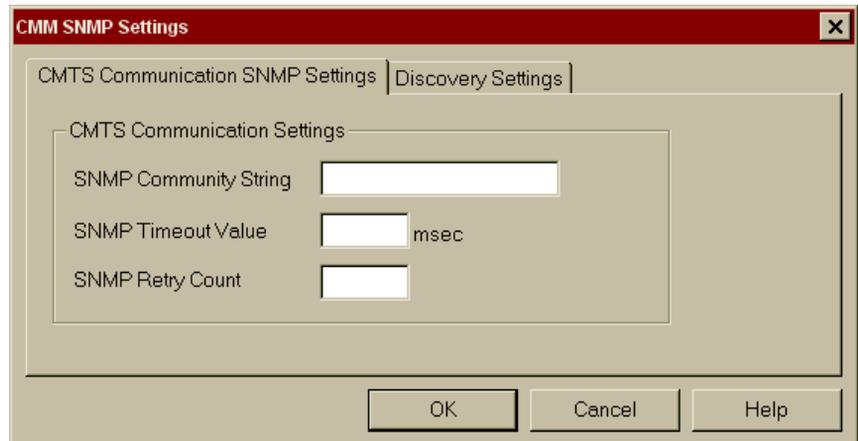
Discovery Settings Entries

Entry	Description
Discovery Timeout Value	Enter a value, in milliseconds, that defines how long CMM will wait for a Discovery acknowledgment from cable modems before considering the cable modems unreachable. The default is 100 milliseconds.
Number of Retries	Enter the number of times you want CMM to attempt the Discovery. The default is 1.

- 6 Click **OK**. Continue with *CMTS SNMP Settings*.

CMTS SNMP Settings To configure SNMP settings CMM will use to access the CMTS at the headend during a *Discovery*:

- 1 Click the **CMTS Communications SNMP Settings** tab.



CMTS Communication SNMP Settings Dialog Box

- 2 Make the entries described in the table below.

CMTS Communication Settings Entries

Entry	Description
SNMP Community String	Enter the text string required for SNMP management access to the CMTS.
SNMP Timeout Value	Enter a value, in milliseconds, that defines how long CMM will attempt to access the CMTS before determining the CMTS is unreachable.
SNMP Retry Count	Enter a value that defines how many times you want CMM to try to gain SNMP access to the CMTS after exceeding the <i>SNMP Timeout Value</i> you entered above.

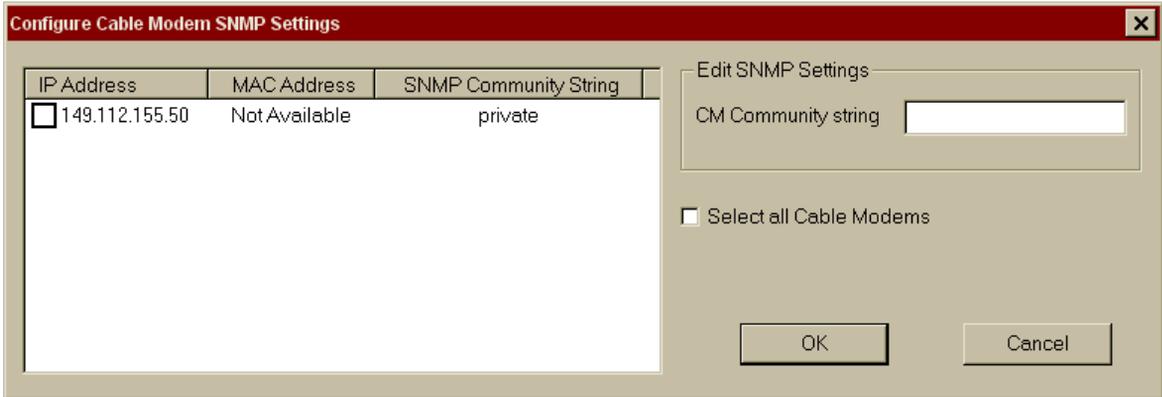
- 3 Click **OK**.
- 4 Close the **CMM SNMP Settings** dialog box to return to the *Modem View* window. Continue with *Cable Modem SNMP Settings*.

Cable Modem SNMP Settings To configure cable modem SNMP settings for *Discovery*:

- 1 On the Menu Bar, click **File**.
- 2 Click **Options**.



- 3 Click **CM SNMP Settings**. The *Cable Modem SNMP Settings* dialog box appears.



Cable Modem SNMP Settings Dialog Box

- 4 Place a check mark in the box next to the IP addresses of all the modems for which you want to configure SNMP access. To configure all cable modems with the same SNMP access string, place a check in *Select all Cable Modems* box.
- 5 In the *CM Community String* field, enter the SNMP community string you want to assign to the cable modem(s) you selected.
- 6 Click **OK** to send the setting to the selected cable modems and return to the *Modem View* window.

Performing a Discovery

To detect all currently connected cable modems:

- 1 On the Menu Bar, click **Discover Modems**.
- 2 Click **Start Discovery**. The *Discover* dialog box appears.



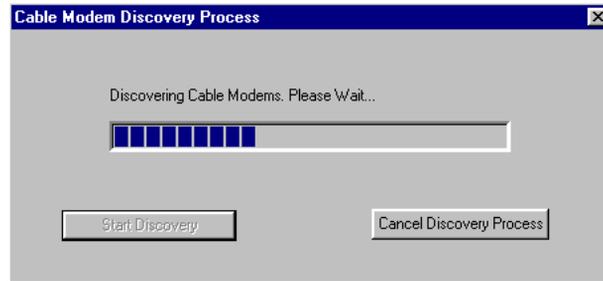
Discover Dialog Box

- 3 Make the entries described in the table that follows.

Discover Entries

Field	Description
Starting IP Address	Enter the first cable modem IP address in your search range. This IP address must be on the same subnet as the <i>Ending IP Address</i> .
Ending IP Address	Enter the last cable modem IP address in your search range. This IP address must be on the same subnet as the <i>Starting IP Address</i> , and greater than the value entered as the Starting IP Address.
CM Community	Enter the SNMP community string required for SNMP access privileges to the cable modem. Note that the string is case-sensitive.
CMTS IP Address	Enter the IP address of the 3Com Cable Modem Termination System (CMTS) at the headend. The CMTS IP address is the same as the IP address assigned to the Cable Access Router Ethernet IP Network port.
CMTS Community	Enter the community string required for SNMP access to the CMTS at the headend. The default is <i>public</i> . Note that the string is case-sensitive.
Remember Address	Place a check mark in the <i>Remember Address</i> check box if you want the CMM to keep a record of the IP addresses you use to perform a Discover. The CMM can store the last 10 IP addresses entered.

- 4 Click **OK** to begin the Discovery process. The CMM communicates with the CMTS to obtain cable modem IP and MAC address information. Then the *Cable Modem Discovery Process* dialog box appears.
- 5 Click **Start Discovery**. CMM begins scanning for cable modems. Progress is shown on the screen. The Status Bar at the bottom of the screen provides a real-time count of the number of cable modems detected.

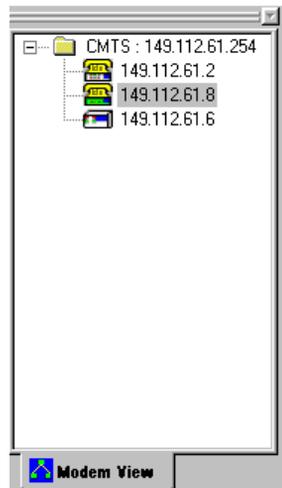


Cable Modem Discovery Process Dialog Box



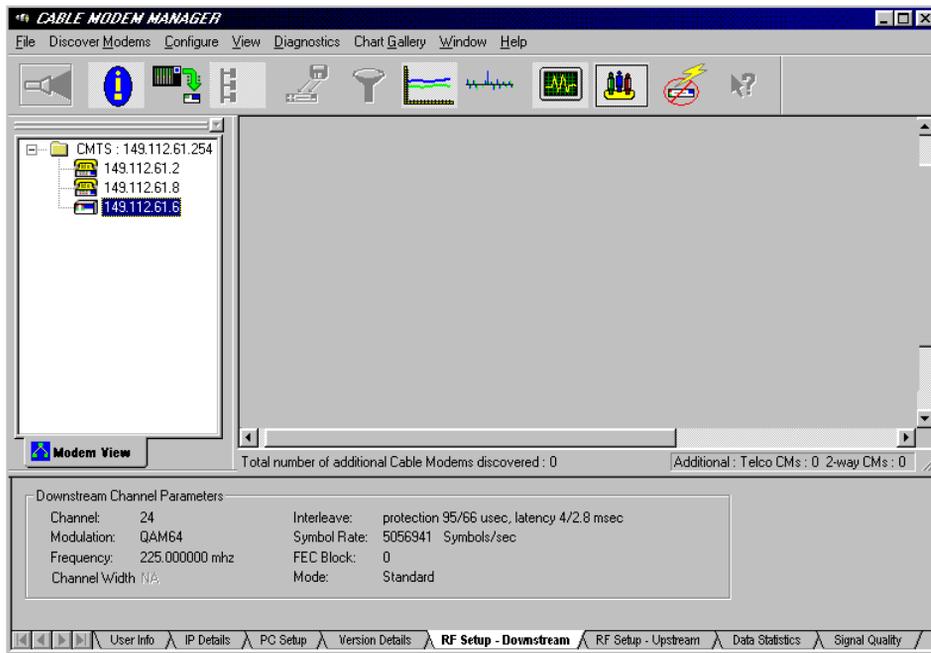
*The Discover process can take several minutes, depending on the number of active cable modems within the IP address range you entered. You can cancel the Discovery at any time by clicking **Cancel Discovery Process**.*

- 6 When the Discover is complete, double click the CMTS IP address folder in the *Modem View* window. The IP addresses of all active cable modems connected to the CMTS display in the *Modem View* window.



Discovered Cable Modems

- 7 Double click a selected cable modem IP address. The *Information Bar* automatically activates as CMM obtains SNMP access to the selected cable modem. Refer to the illustration that follows.



CMM with Active Information Bar

Updating the Modem View

During the course of your CMM session, some cable modems may disconnect from the CMTS, and new ones may have connected. To keep your *Modem View* window current and accurate, you can use the *Update Modem View* feature. This feature performs three basic functions:

- Detects and displays any new modems that have joined the CMTS since the previous Discovery.
- Removes any modems from the *Modem View* window that have disconnected from the CMTS.
- Detects and displays any modems on any additional subnets assigned to a given CMTS.

To update the *Modem View* window:

- 1 On the Menu Bar, click **Discover Modems**.
- 2 Click **Update Modem View**. CMM begins updating the *Modem View* window.



- 3 When the update is complete, additional modems detected appear under the first CMTS IP address in the *Modem View* window.
- 4 The *Status Bar* informs you of the total number of additional modems detected, and also breaks down the additional modems discovered by type.

Total number of additional Cable Modems discovered : 1

Additional : Telco CMs : 0 2-way CMs : 1

Status Bar after Update Modem View Operation



If the CMTS is assigned more than one subnet, CMM detects modems on the additional subnet(s) during the Update Modem View operation. They are listed under the modems detected with the first Discovery.

4

PERFORMING BASIC MAINTENANCE

This chapter provides instructions for performing basic Cable Modem Manager (CMM) maintenance tasks. This chapter contains these sections:

- Resetting Cable Modems
- PINGing a Cable Modem
- Upgrading Cable Modem Software
- Configuring User Details
- Viewing Configuration Information
- Viewing Allowed MAC Addresses
- Configuring Cable Modems

Resetting Cable Modems

The *Reset Cable Modem* feature allows you to clear minor service-affecting problems, or to initialize a cable modem whose software has been upgraded. Reset procedures follow for one- and two-way cable modems.

Resetting a Two-way Cable Modem

Resetting a two-way cable modem terminates the user's connection and causes the cable modem to perform a complete re-registration with the CMTS.

To reset a two-way cable modem:

- 1 On the Menu Bar, click **Configure**.
- 2 Click **Reset Cable Modem**. The *Restart Cable Modem* dialog box appears.



Reset Cable Modem Dialog Box

- 3 Click **Restart**. If you decide not to reset the cable modem, click **Cancel** to return to the *Modem View* window.



Reset Confirmation Message

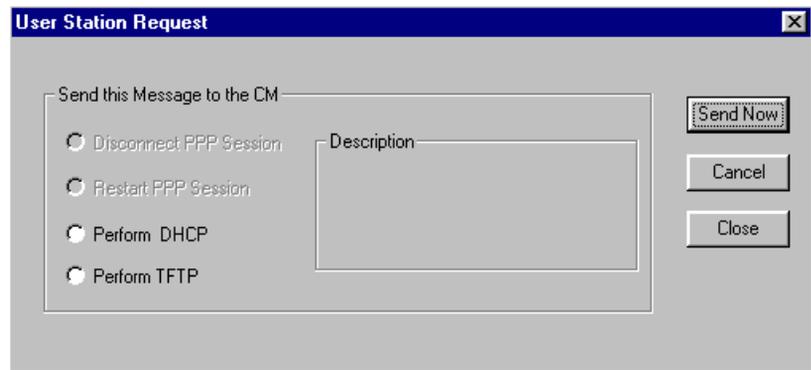
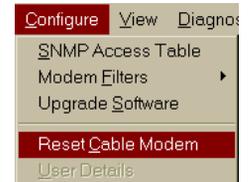
- 4 You are informed that CMM sent the Restart message to the cable modem. Click **OK** to return to the *Modem View* window.

Resetting a One-way Cable Modem

Resetting a one-way cable modem allows you to troubleshoot client modems if they have problems connecting to the Cable Access Router. The command flags available allow you to isolate the problem by narrowing the focus of the User Station Request (USR) information sent to the cable modem.

To reset a one-way modem:

- 1 Select the modem you want to reboot from the *Modem View* window.
- 2 On the Menu Bar, click **Configure**.
- 3 Click **Reset Cable Modem**. The *User Station Request* (USR) dialog box appears.



User Station Request Dialog Box

- 4 Click the radio button next to the type of reset command you want to send to the selected cable modem. The table that follows describes the available options.

Reset Cable Modem (User Station Request) Entries

Field	Description
Send this Message to the CM	Select one of the command flags available from the list below (each command flag narrows the focus of information sent to the cable modem to more precisely isolate problems):
Disconnect PPP Session	This feature is not currently supported. It will be available in a future CMM release.
Restart PPP Session	This feature is not currently supported. It will be available in a future CMM release.
Perform DHCP	Instructs the Cable Access Router to re-send DHCP and TFTP information to the cable modem. This will re-assign IP address information and re-send the cable modem configuration file to the cable modem.
Perform TFTP	Instructs the Cable Access Router to re-send TFTP information only to the cable modem. This will re-send the cable modem configuration file to the cable modem.

- 5 Click **Send Now**. The USR message is sent to the cable modem.
- 6 Click **Close** to return to the *Modem View* window.



View the message status log on the CPE to see if the cable modem successfully received the reset command flag you sent. To check and see if the command flag that you sent was unsuccessful, view the Last Failure and Reason fields in the User Info tab on the Information Bar.

PINGing a Cable Modem

CMM provides you with the ability to PING a cable modem to verify IP addressing and/or network connectivity. This can be a useful troubleshooting tool when you are having trouble communicating with a client cable modem.

To PING a cable modem:

- 1 On the Menu Bar, click **Diagnostics**.
- 2 Click **Ping Cable Modem**. The *Ping Cable Modem* dialog box appears.



PING Cable Modem Dialog Box

- 3 Make the entries described in the table that follows.

PING Cable Modem Entries

Entry	Description
IP Address of the Cable Modem	Enter the IP address of the cable modem you want to PING, in the nnn.nnn.nnn.nnn format.
Retry Count	Enter the number of times you want the CMM to attempt to PING the cable modem. The default is 5. CMM will stop attempting to retry the operation after the first successful PING.
Timeout	Enter the amount of time, in milliseconds, that you want the CMM to wait before aborting the PING operation and initiating another. The default value is 1000 milliseconds.
Status	This is a read only field that provides status messages on the PING operation once it has been initiated.

- 4 Once you have finished making all of the required entries, click **Ping**. CMM begins the PING operation.
- 5 When you have received the results of the PING operation in the *Status* window, you can either:
 - a Enter an IP address and click **Ping** to initiate another PING operation.
 - b Click **Done** to exit the *Ping Cable Modem* dialog box.

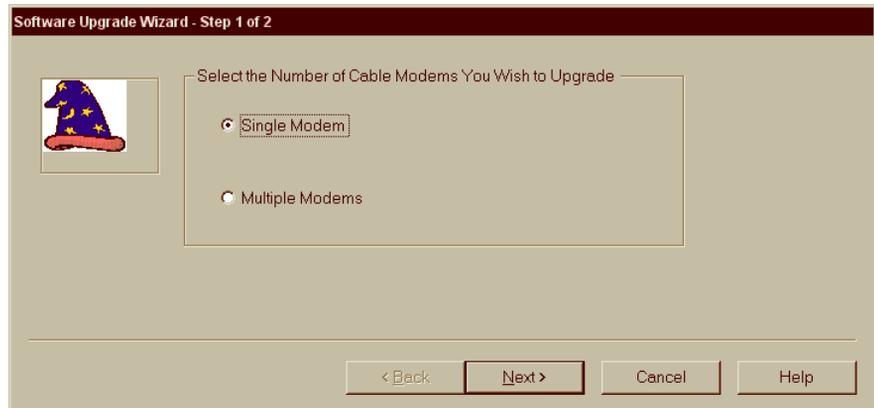
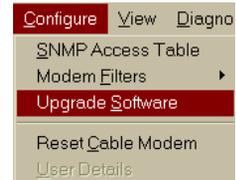
Upgrading Cable Modem Software

CMM allows you to upgrade two-way cable modems to the latest software version from a remote location. You can upgrade one cable modem at a time, or upgrade multiple cable modems simultaneously. This feature is not available for one-way cable modems.

Upgrading a Single Cable Modem

To upgrade a single two-way cable modem to the latest software version:

- 1 Obtain the latest version of 3Com cable modem software. Contact your 3Com sales representative for details.
- 2 Copy the cable modem upgrade file to the cable data network TFTP server. Make a note of the upgrade filename.
- 3 On the Menu Bar, click **Configure**.
- 4 Click **Upgrade Software**. The *Software Upgrade Wizard - Step 1 of 2* dialog box appears.



Software Upgrade Wizard - Step 1 of 2 Dialog Box

- 5 Click the **Single Modem** radio button.
- 6 Click **Next**. The *Software Upgrade Wizard - Step 2 of 2* dialog box appears.

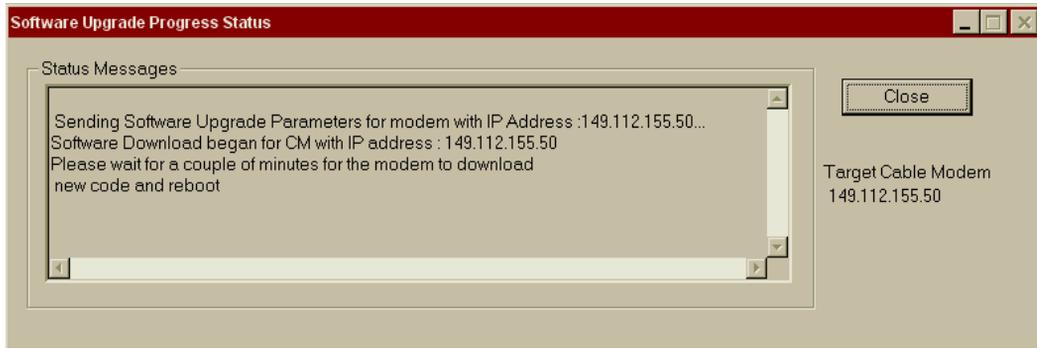
Software Upgrade Wizard - Step 2 of 2 Dialog Box

7 Make the entries described in the table that follows.

Software Upgrade Wizard Entries

Entry	Description
IP Address of the Cable Modem	From the drop-down menu, select the IP address of the cable modem you want to upgrade. If the IP address is not available, enter it in the nnn.nnn.nnn.nnn format.
TFTP Server IP Address	From the drop-down menu, select the IP address of the TFTP server which contains the cable modem software upgrade file. If the IP address is not available, enter it in the nnn.nnn.nnn.nnn format.
Upgrade File Name	From the drop-down menu, select the filename of the cable modem software upgrade file that resides on the TFTP server. If the filename is not available, enter it in the nnn.nnn.nnn.nnn format.
Reboot after Download	Place a check in this box to instruct the cable modem to reboot after the software download is complete to initialize the new software. Otherwise, leave this box blank. If you leave this box blank, you must manually reboot the cable modem with the <i>Reset Cable Modem</i> feature described in this chapter to initialize the new cable modem software.

8 Click **Finish**. A status window appears providing you with information on the progress of the upgrade.



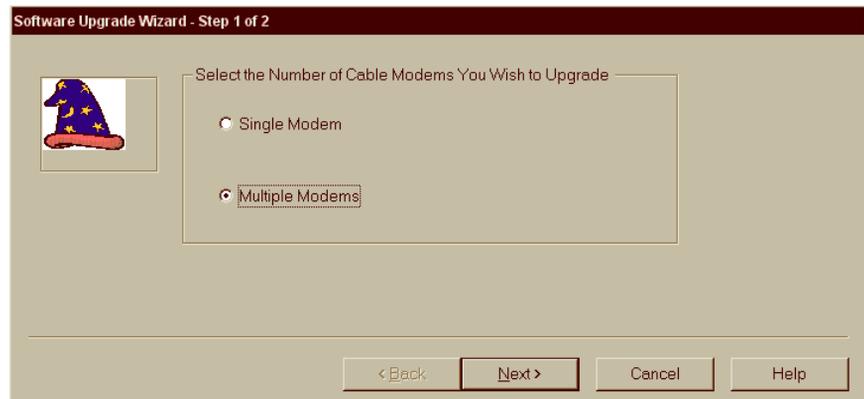
Software Upgrade Progress Status Dialog Box

- 9 Click **Close** at any time to return to the *Modem View* window.

Upgrading Multiple Modems

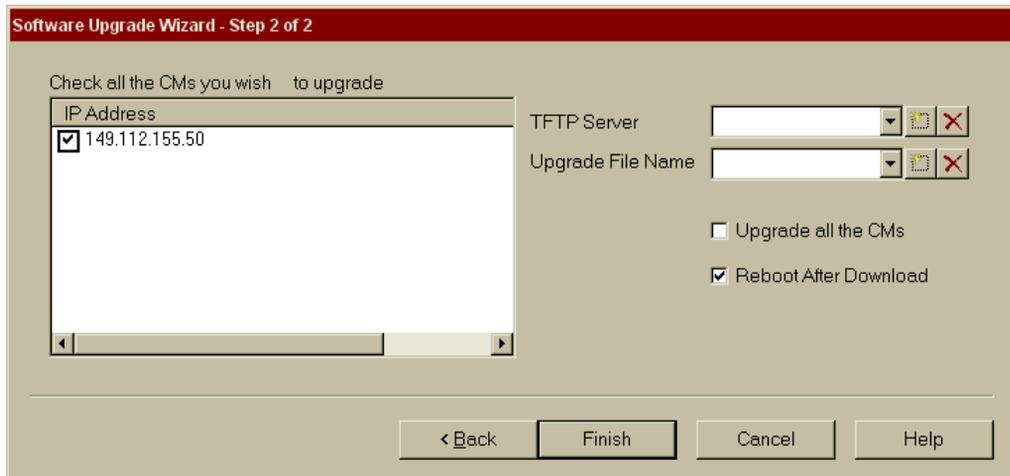
To upgrade multiple two-way cable modems to the latest software version:

- 1 Obtain the latest version of 3Com cable modem software. Contact your 3Com sales representative for details.
- 2 Copy the cable modem upgrade file to the cable data network TFTP server. Make a note of the upgrade filename.
- 3 On the Menu Bar, click **Configure**.
- 4 Click **Upgrade Software**. The *Software Upgrade Wizard - Step 1 of 2* dialog box appears.



Software Upgrade Wizard - Step 1 of 2 Dialog Box

- 5 Click the **Multiple Modems** radio button.
- 6 Click **Next**. The *Software Upgrade Wizard - Step 2 of 2* dialog box appears.



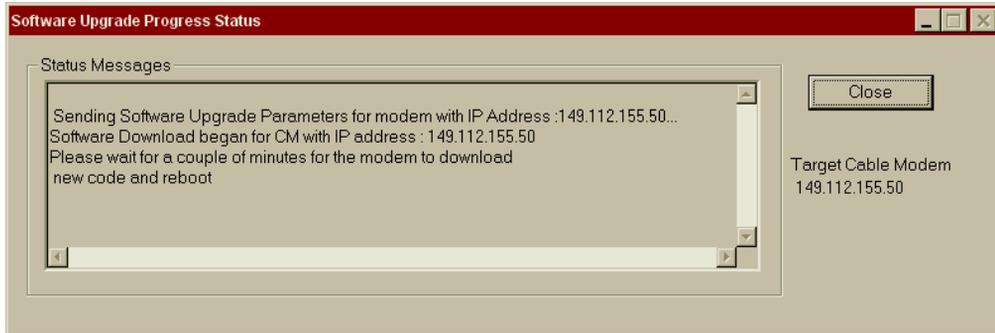
Software Upgrade Wizard - Step 2 of 2 Dialog Box

- 7 Make the entries described in the table that follows.

Multiple Cable Modem Software Upgrade Entries

Entry	Description
IP Address	Place a check in the box next to the IP address of all cable modems you want to upgrade.
TFTP Server	From the drop-down menu, select the IP address of the TFTP server which contains the cable modem software upgrade file. If the address is unavailable, enter it in the nnn.nnn.nnn.nnn format.
Upgrade File Name	From the drop-down menu, select the file name of the software upgrade file that is installed in the TFTP server.
Upgrade all the CMs	Place a check in this box to instruct CMM to upgrade all cable modems that appear in the window.
Reboot After Download	Place a check in this box to have reboot all the cable modems after the upgrade to initialize the new software. If you leave this box blank, you must manually reboot the cable modem with the <i>Reset Cable Modem</i> feature described in this chapter to initialize the new cable modem software.

- 8 Click **Finish**. The download begins, and progress is shown in the *Software Upgrade Progress Status*.



Software Upgrade Progress Status Window

- 9 Click **Close** at any time to return to the *Modem View* window.

Configuring User Details

You can use CMM to configure cable modem User Details. These details provide general identification information about the cable modem user that can be helpful if you need to contact a customer about a service-related issue.

To configure User Details for a selected cable modem:

- 1 On the Menu Bar, click **Configure**.
- 2 Click **User Details**. The *Customer Management* dialog box appears.



Customer Management (User Details) Dialog Box

3 Make the entries described in the table that follows.

User Details Information Entries

Field	Description
MAC Address	From the drop-down menu, select the Media Access Control (MAC) address of the desired cable modem. The MAC addresses of all cable modems are obtained during the <i>CMM Discovery and Update Modem View</i> operations.
Last Name	Enter the last name of the user.
First Name	Enter the first name of the user.
Customer Address	Enter the mailing address of the user.
Telephone	Enter the user's phone number.
City	Enter the city in which the user lives.
Zip	Enter the zip code of city in which the user lives.

4 Click **Add** to save your User Details settings.

5 Click **Close** to return to the *Modem View* window.

6 When prompted to save the customer data, click **OK**. If you choose not to save the user details you entered, click **Cancel**.

Viewing Configuration Information

Once you have performed a *Discovery* on active cable modems connected to the cable data network, you can view various types of configuration information for each cable modem that appears in the *Modem View* window.

- Cable modem configuration details
- User details
- Allowed MAC addresses

Viewing Configuration Details

To view a selected cable modem's configuration parameters:

- 1 In the *Modem View* window, double click the modem for which you want to view configuration details.
- 2 Click the **Information Bar icon** on the *Toolbar*. Eight information tabs appear at the bottom of the screen.
- 3 To view all user and cable modem configuration information associated with the selected cable modem IP address, click each of the *Information*



Bar Tabs that appear the bottom of the screen. As you do, the configuration information associated with each tab displays in the *Information Bar* below the *Modem View* window.



Refer to *Appendix A* in this guide for detailed explanations of each field that appears in each *Information Bar Tabs*.

Upstream channel parameters

Upstream Channel Parameters - Two Way Modems Only			
Channel ID	17	Upstream Ranging Algorithm Parameters	Symbol Rate
Upstream Frequency	22000000 Hz	Ranging Backoff Start	1279999 Symbols/sec
Upstream Modulation	0	Ranging Backoff End	Upstream Timing Offset
Upstream Slot Size	8	Transmit Backoff Start	4204.1016 microseconds
Channel Width	1600000 Hz	Transmit Backoff End	1024

Information Bar Tabs

Modem View Window and Information Bar

Viewing User Details To view user details for a selected cable modem:

- 1 In the Modem View window, double click the IP address of the modem for which you want to view user details.
- 2 On the Menu Bar, click **View**.
- 3 Click **User Details**.
- 4 The *User Details* window appears. It provides the information listed in the table below for each cable modem.



User Details Information Entries

Field	Description
MAC Address	The Media Access Control Address (MAC) of the user's cable modem.
IP Address	The IP address assigned to the user's cable modem.
Last Name	The last name of the user.
First Name	The first name of the user.
Customer Address	The mailing address of the user.
Telephone	The user's phone number.
City	The city in which the user lives.
State	The state in which the user lives.
Zip	The zip code of the city in which the user lives.

- 5 Close the *User Details* window to return to the *Modem View* window.

Viewing the Event Table Log

This feature is not currently supported.

Viewing Allowed MAC Addresses

3Com cable modems allocate up to sixteen MAC addresses to the devices connected to it. Viewing the allowed MAC addresses shows you which CPE MAC addresses are permitted access to the network via a given cable modem. If a cable modem is having trouble connecting to the CMTS, it may be for one of these reasons:

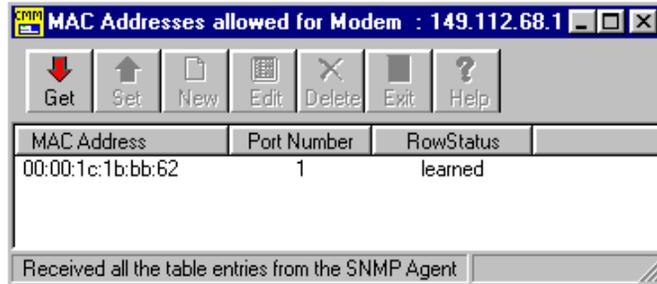
- The MAC address is not defined in the cable modem configuration file on the TFTP server.
- The cable modem has not yet learned a given CPE MAC address.
- The number of allowed CPE MAC addresses per cable modem has been exceeded.

To view the allowed MAC addresses for a particular cable modem:

- 1 Select the desired cable modem from the *Modem View* window.
- 2 On the Menu Bar, click **View**.
- 3 Click **Allowed MAC Addresses**.



- Click **Get** to obtain the latest information from the cable modem. The MAC addresses for this cable modem display.



Viewing Allowed MAC Addresses

The table that follows describes the information displayed.

Allowed MAC Addresses Fields

Field	Description
MAC Address	This is the CPE MAC address currently authorized to access the cable data network via the selected cable modem. A 3Com two-way cable modem can support up to sixteen MAC addresses.
Port Number	The port number of the port on which a frame having a source address equal to the value of the corresponding instance of <i>dot1tpFdbAddress</i> has been seen. If 0 displays, it indicates that the port number has not been learned but that the cable modem does have some forwarding or filtering information about this address.
Row Status	The current operational status of this MAC address: <ul style="list-style-type: none"> invalid: This MAC address is no longer valid, but has not yet been deleted from the CMTS ARP table. learned: This MAC address is being used.

- Close the *MAC Addresses* dialog box to return the *Modem View* window.

Configuring Cable Modems

CMM allows you to configure SNMP access parameters for two-way cable modems, and downstream and TCD information for one-way cable modems. Configuration procedures follow for one- and two-way modems.

Two-way Modem Configuration

To configure SNMP access parameters for a two-way cable modem:

- 1 Select the cable modem you want to configure from the *Modem View* window.
- 2 On the Menu Bar, click **Configure**.
- 3 Click **SNMP Access Table**.
- 4 Click **New**. The *SNMP Access Entry* dialog box appears.



The image shows the 'SNMP Access Entry' dialog box. It contains the following fields and controls:

- Index: Text input field
- IP Address: Text input field
- IP Mask: Text input field
- Row Status: Dropdown menu
- Community Name: Text input field
- Access Control: Dropdown menu
- Access Interface: Dropdown menu
- Buttons: 'Enter' and 'Cancel'

SNMP Access Entry Dialog Box

- 5 Make the entries described in the table that follows.

SNMP Access Entry Configuration Entries

Field	Description
Index	Read only field. This number is assigned by CMM to identify this SNMP Access Entry definition.
IP Address	Enter the IP address of the CMM PC management station from which you want to allow SNMP access to cable modems.
IP Mask	Enter the IP subnet mask of the <i>IP Address</i> you entered above.
Row Status	Read only. While you are creating an entry, the value <i>createAndGo</i> appears.
Community Name	Enter the text string to which the cable modem SNMP agent will respond to when requests are sent from the CMM PC management station.

SNMP Access Entry Configuration Entries

Field	Description
Access Control	<p>From the drop-down menu, select the type of SNMP access control allowed for this CMM PC management station. Options are:</p> <ul style="list-style-type: none"> ■ none: no SNMP access permission ■ Read: Can view SNMP information from the management station, but cannot to modify any information. ■ Read/Write: View and modify SNMP information from this management station. ■ ReadOnlyWithTraps: View SNMP information and SNMP Traps sent by network SNMP agent software. ■ ReadWriteWithTraps: View and modify SNMP information on cable modem, as well as view SNMP traps sent by cable modem SNMP agent software. ■ TrapsOnly: View SNMP Traps sent by cable modem SNMP agent software.
Access Interface	<p>From the drop down-menu, select the CMTS interfaces over which CMM is allowed SNMP access to cable modems. Options are:</p> <ul style="list-style-type: none"> ■ Ethernet: Allows CMM access to cable modems from the CPE side of the network only. ■ All: Allow CMM access to cable modems from both the RF and Ethernet (CPE side) of the network.

6 Click **Enter**.

7 Click **Set** to send your changes to the cable modem.

8 Click **Exit** to return to the *Modem View* window.

One-way Modem Configuration

You can configure individual one-way cable modems remotely without redefining the Telephony Channel Descriptor (TCD) configured in the Cable Access Router at the headend. You may find yourself in situations where you want to off-load a frequency or channel, or find that an access number is out of service. In such situations, you can re-configure the cable modem from the CMM.

The configuration changes you make with this utility remain in effect until the cable modem user ends his or her session. When the user reestablishes a connection with the cable data network, the cable modem will again be connected with the TCD information sent from the Cable Access Router at the headend.

To access the one-way cable modem configuration dialog box:

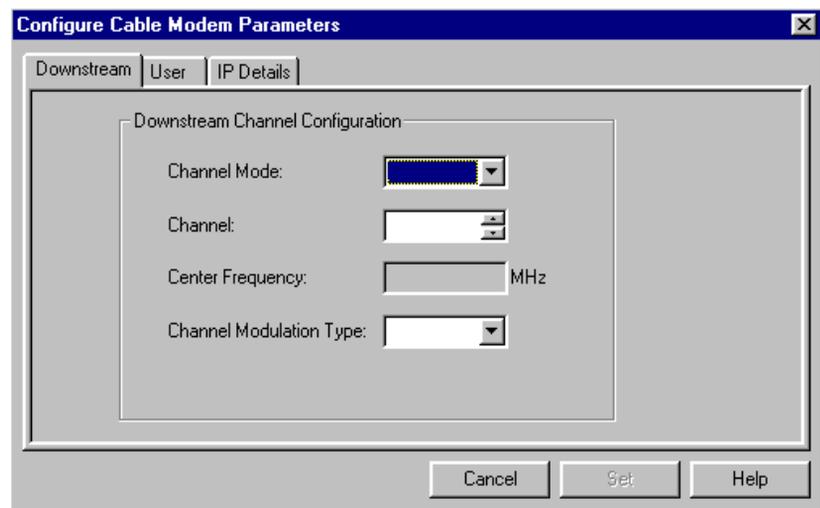
- 1 Select the modem you want to configure in the *Modem View* window.
- 2 On the Menu Bar, click **Configure**.
- 3 Click **Modem Parameters**.
- 4 Click **New**. The *Configure Cable Modem Parameters* dialog box appears.
- 5 Continue with *Downstream Configuration*.



Downstream Configuration

To configure downstream parameters for a one-way cable modem:

- 1 Click the **Downstream** tab.



Configuring a One-way Cable Modem: Downstream Tab

- 2 Make the entries described in the table that follows.

Downstream Tab Entries

Field	Description
Channel Mode	Select a CATV frequency assignment from the drop-down menu for the cable modem. Options are: <ul style="list-style-type: none"> ■ Std (Standard) ■ HRC (Harmonically Related Carrier) ■ IRC (Incrementally Related Carrier) ■ Custom
Channel	Enter the CATV channel number you want to assign to the cable modem. The channel number must be an integer from 2 to 255.
Center Frequency	This field is enabled only if you selected <i>Custom</i> as the <i>Channel Mode</i> . Enter the center of the frequency band you want to associate with this downstream channel. Valid entries are from 91 MHz to 860 MHz. Note: <i>This is the center frequency of the 6 MHz band. It is not the analog carrier frequency of the channel.</i>
Channel Modulation Type	Select the modulation type associated with this downstream channel from the drop-down menu. Options are: <ul style="list-style-type: none"> ■ QAM16 (not used) ■ QAM32 (not used) ■ QAM64 ■ QAM256

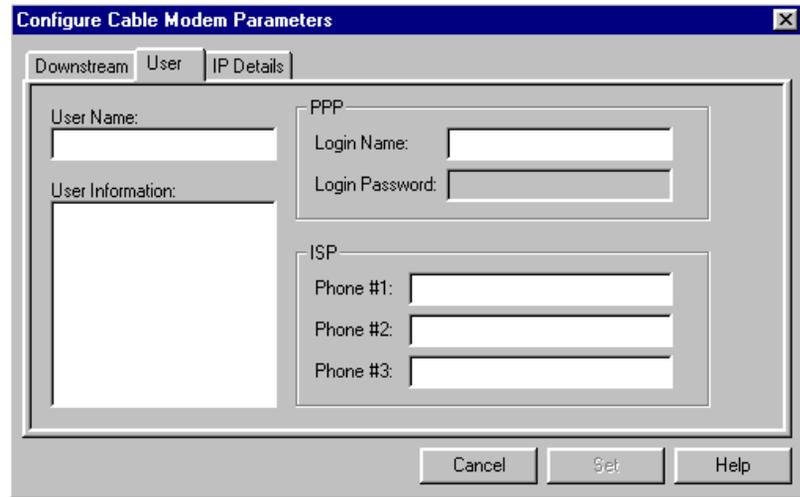
3 Click **Set** to send your changes to the cable modem.

4 Continue with *User Configuration*.

User Configuration

To configure user parameters for a one-way cable modem:

1 Click the **User** tab.



Configuring a One-way Cable Modem: User Tab

2 Make the entries described in the table that follows.

User Tab Entries

Section	Description	
User Name	Enter a User Name that helps you identify this cable modem user.	
User Information	Enter general identification about the cable modem user, e.g., name, address, phone number, etc.	
PPP	Login Name	Enter the name that the cable modem must use to login to a dial-up PPP connection.
	Login Password	Read only field. You cannot change this value.
ISP	Phone #1	Enter the primary phone number cable modems must dial to establish a dial-up (PPP) Internet Service Provider connection.
	Phone #2	Enter an alternate phone number cable modems must dial to establish a dial-up (PPP) Internet Service Provider connection in case Phone #1 fails.
	Phone #3	Enter an alternate phone number cable modems must dial to establish a dial-up (PPP) Internet Service Provider connection in case Phone #2 fails.

3 Click **Set** to send your changes to the selected cable modem.

4 Continue with *IP Details Configuration*.

IP Details Configuration

To configure IP details information for a one-way cable modem:

- 1 Click the **IP Details** tab.

The screenshot shows a window titled "Configure Cable Modem Parameters" with a close button (X) in the top right corner. The window has three tabs: "Downstream", "User", and "IP Details". The "IP Details" tab is selected. The main area contains several input fields: "IP Address:", "IP Mask:", "IP Gateway:", "Radius Realm:", "DHCP Server Address:", and "TFTP Server Address:". To the right, there is a sub-section titled "SNMP Access" with "Console:" and "Community:" fields. At the bottom of the window are three buttons: "Cancel", "Set", and "Help".

Configuring a One-way Cable Modem: IP Details Tab

- 2 Make the entries described in the table that follows.

IP Details Entries

Field	Description
IP Address	Do not change this value. This is the IP address the cable modem was assigned at registration.
IP Mask	Do not change this value. This is the IP subnet mask assigned to the cable modem at registration.
IP Gateway	Do not change this value. This is the IP Gateway address assigned to the cable modem. The IP Gateway is the address that the cable modem will route IP packets if they are not addressed to the CPE side of the cable modem. The IP Gateway address is usually the same as the IP address of the router attached to the Telco Return Access Concentrator (TRAC).
RADIUS Realm	Currently not used.
DHCP Server Address	Enter the IP address of the DHCP server you want to assign to the cable modem. The DHCP server provides an IP address, network configuration information, and TFTP information to the cable modem.
TFTP Server Address	Enter the IP address of the TFTP server you want to assign to the cable modem.

IP Details Entries

Field	Description	
SNMP	Console	Enter the IP address of the CMM PC management station that will be used to monitor this cable modem. This limits SNMP management access to the cable modem. The default is 0.0.0.0, which allows SNMP management access from any PC.
	Community	Enter the community string assigned for access to the CMM PC defined in the <i>Console</i> field above. The default is <i>public</i> .

- 3 Click **Set** to send your changes to the selected cable modem.
- 4 One-way cable modem configuration is complete. Close the *Configure Modem Parameters* dialog box to return to the *Modem View* window.



5

CONFIGURING FILTERS

This chapter describes how to use CMM to configure cable modems data filters. This chapter contains these sections:

- Overview
- Configuring an IP (DOCSIS) Filter
- Configuring a 3Com-Specific Filter
- Configuring Filter Attributes

Overview

Filters allow you to restrict access and services to cable modems based on the following characteristics.

- source and destination IP addresses
- source and destination MAC addresses
- logical port or application
- IP protocol

CMM allows you to configure two types of data filters for a selected cable modem.

- IP (DOCSIS) Filter(s): Filters based on the Data Over Cable System Interface Specification MIBs.
- 3Com-Specific Filters: Filters based on 3Com-proprietary MIBs.



You can apply Filters to two-way modems only.

Configuring a DOCSIS IP Filter

To configure a DOCSIS IP filter for a selected cable modem:

Select the desired cable modem from the *Modem View* window.

- 1 On the Menu Bar, click **Configure**.
- 2 Click **Modem Filters**.
- 3 Click **Filter Tables**.
- 4 Click the **IP Filter Table** tab.
- 5 Click **New**. The *IP Filter Settings* dialog box appears.



 A screenshot of the 'IP Filter Settings' dialog box. It contains several input fields and dropdown menus:

- Index: text input field
- Status: dropdown menu with 'createAndGo' selected
- IP Control: dropdown menu
- Interface: dropdown menu
- Direction: dropdown menu
- Broadcast Traffic Only: dropdown menu
- Source IP Address: text input field
- Source IP Mask: text input field
- Destination IP Address: text input field
- Destination IP Mask: text input field
- IP Protocol: dropdown menu
- Source Port Low: text input field
- Source Port High: text input field
- Destination Port Low: text input field
- Destination Port High: text input field

 At the bottom are 'OK' and 'Cancel' buttons.

DOCSIS IP Filter Settings Dialog Box

- 6 Make the entries described in the table that follows.

DOCSIS IP Filter Settings Entries

Entry	Description
Index	Read only field. This is a filter index number CMM uses to keep track of the filters. You can apply a maximum of 16 filters per cable modem. The lowest numbered filter is applied first.
Status	Read only field. While you are creating a filter, this field reads <i>createAndGo</i> .
IP Control	Indicate whether you want the IP packets that match this filter to be accepted or discarded. There are two options <ul style="list-style-type: none"> ■ accept: accept all packets matching this filter and do not scan the rest of the filter list. ■ discard: discard all packets matching this filter and do not scan the rest of the filter list.

DOCSIS IP Filter Settings Entries

Entry	Description
Interface	<p>From the drop-down menu, select the CMTS interface to which you want to apply this filter definition. There are three options:</p> <ul style="list-style-type: none"> ■ All: Apply the filter to both the Cable IP (RF) and Ethernet IP interfaces. ■ Cable: Apply the filter to the Cable IP (RF) interface only. ■ Ethernet: Apply the filter to the Ethernet IP interface only.
Direction	<p>From the drop-down menu, select the type of data traffic to which you want to apply the filter. There are three options:</p> <ul style="list-style-type: none"> ■ inbound: Apply the filter to data traffic destined for the cable modem. ■ outbound: Apply the filter to data traffic from the cable modem to the CMTS. ■ both: Apply the filter to both <i>inbound</i> and <i>outbound</i> data traffic.
Broadcast Traffic Only	<p>From the drop-down menu, indicate whether you want the filter to apply to broadcast traffic only. There are two options:</p> <p>false: Apply the filter to all data traffic.</p> <p>true: Apply the filter to multicast and broadcast traffic only.</p>
Source IP Address	Enter the source IP address to be matched for this filter.
Source IP Mask	Enter a bit mask to be applied to the source IP address prior to matching. This mask is not necessarily the same as a subnet mask, but 1's bits must be left-most and contiguous. If this value is 0.0.0.0, the <i>Source IP Address</i> is ignored.
Destination IP Address	The destination IP address that is to be matched for this filter.
Destination IP Mask	Enter a bit mask to be applied to the destination IP address prior to matching. This mask is not necessarily the same as a subnet mask, but 1's bits must be left-most and contiguous. If this value is 0.0.0.0, the <i>Destination IP Address</i> is ignored.
IP Protocol	<p>From the drop-down menu, select the IP protocol type to which this filter applies. There are four options:</p> <ul style="list-style-type: none"> ■ icmp: Internet Control Message Protocol ■ tcp: Terminal Control Protocol ■ udp: Universal Datagram Protocol ■ any: All protocols listed above.
Source Port Low	Applies only if you selected <i>udp</i> or <i>tcp</i> as the <i>IP Protocol</i> above. Enter the inclusive lower boundary of the transport-layer source port range to be matched by this filter. Valid entries are from 0 to 65535. If <i>IP Source Port High</i> is 0, IP source port filtering is ignored.
Source Port High	Applies only if you selected <i>udp</i> or <i>tcp</i> as the <i>IP Protocol</i> above. Enter the inclusive upper boundary of the transport-layer source port range to be matched by this filter. Valid entries are from 0 to 65535. If the <i>IP Destination Port High</i> is set to 0, IP destination port filtering is ignored. This value should be greater than the <i>Source Port Low</i> .

DOCSIS IP Filter Settings Entries

Entry	Description
Destination Port Low	Applies only if you selected <i>udp</i> or <i>tcp</i> as the <i>IP Protocol</i> above. Enter the inclusive lower boundary of the transport-layer destination port range to be matched by this filter. Valid entries are from 0 to 65535. If the <i>IP Destination Port High</i> is set to 0, IP Destination port filtering is ignored.
Destination Port High	Applies only if you selected <i>udp</i> or <i>tcp</i> as the <i>IP Protocol</i> above. Enter the inclusive upper boundary of the transport-layer destination port range to be matched by this filter. Valid entries are from 0 to 65535. If the <i>IP Destination Port High</i> is set to 0, IP destination port filtering is ignored. This value should be greater than the <i>Destination Port Low</i> .
Matches	Read only field that appears only when you view a currently defined DOCSIS IP filters configuration. This is the number of times CMM has matched this filter to cable modem data requests.

- 7 Click **OK**.
- 8 Click **Set** to send the filter settings to the cable modem.
- 9 Click **Exit** to return to the *Modem View* window.

Configuring a 3Com-Specific Filter

In addition to the DOCSIS IP Filter Table, there is a set of IP source address filters supplied through a set of 3Com proprietary MIBs. These filters apply to incoming CPE (Ethernet) traffic. These filters take less time for the cable modem to process.

- All traffic matching a defined filter is forwarded to the CMTS.
- All traffic not matching any defined filter is discarded.
- All traffic is forwarded if no filters are defined in the CMTS.

To configure a 3Com-specific filter:

- 1 Select the desired cable modem IP address from the *Modem View* window.
- 2 On the Menu Bar, click **Configure**.
- 3 Click **Filters**.
- 4 Click **Filter Tables**.
- 5 Click the **3Com-Specific Filter Table** tab.
- 6 Click **New**. The *3Com Specific Filter Settings* dialog box appears.



3Com Specific Filter Settings Dialog Box

7 Make the entries described in the table below.

3Com Specific Filter Settings Entries

Entry	Description
Index	This is an index number automatically assigned to this filter entry by CMM.
Row Status	Read only field. While you are configuring the filter, this field reads <i>createAndGo</i> .
Source IP Address	Enter the source IP address to which you want to apply the filter.
Source MAC Address	Enter the source MAC address to which you want to apply the filter. Note that the MAC address is ignored if it is all zeroes. The default is zero.

- 8 Click **OK**.
- 9 Click **Set** to send your settings to the cable modem.
- 10 Click **Exit** to return to the *Modem View* window.

Configuring Filter Attributes

Configuring Filter Attributes is not currently supported.





USING THE CHART GALLERY

This chapter provides information that helps you use the Cable Modem Manager (CMM) *Chart Gallery* to monitor the performance of cable modems. This chapter contains these sections:

- Overview
- SNR Graph
- Downstream Signal Level Graph
- Upstream Signal Level Graph
- Setting Graph Options

Overview

The CMM *Chart Gallery* provides charting and graphing capabilities that allow you to monitor these cable modem network performance characteristics:

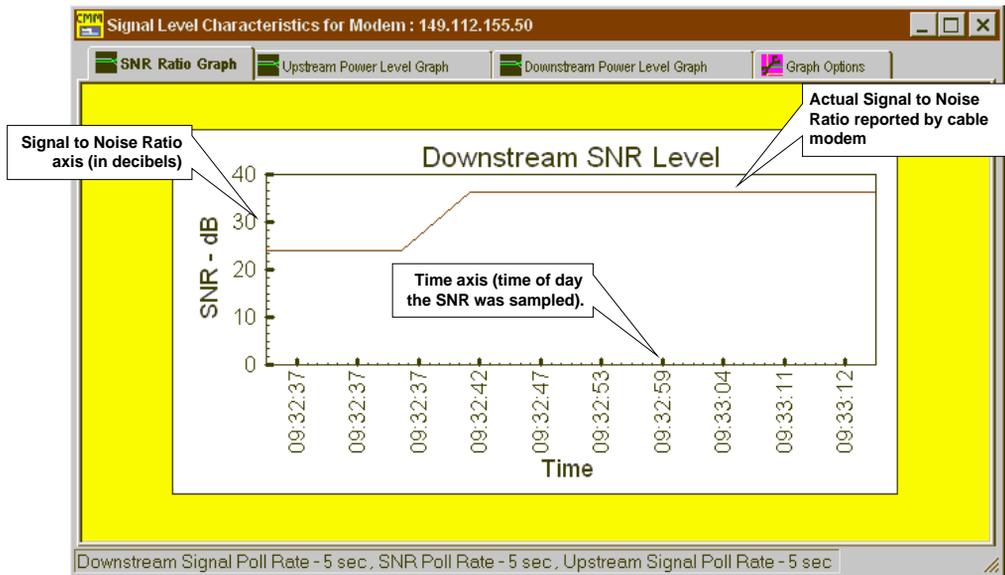
- Upstream Power Signal
- Downstream Power Signal
- Signal to Noise Ratio
- RF Equalizer (one-way cable modems only)
- User Load Indicator (one-way cable modems only)

Signal to Noise Ratio Graph

The RF Signal-to-Noise Ratio graph displays the quality of the received signal as reported by either a two-way or one-way cable modem. This can help you to determine if the cable modem is receiving a usable signal.

Viewing To display the RF Signal graph for a selected cable modem:

- 1 Select the desired cable modem from *Modem View* window.
- 2 On the Menu Bar, click **Chart Gallery**.
- 3 Click **RF Signal**. The *Signal Level Characteristics* window appears.



Viewing the Signal to Noise Ratio Graph

RF Signal Graph Field Descriptions

Field	Description
SNR - dB	This axis represents the SNR Level (in decibels).
Time axis	This axis represents the time of day that the CMM sampled the SNR. The default is one measurement every 5 seconds. To change the default value, refer to the <i>Setting Graph Options</i> section in this chapter.
SNR Line	This red line plots the actual SNR reported by the cable modem.

Interpreting The RF Signal Graph displays a line graph, which is plotted over time. It shows, in decibels, what the signal-to-noise ratio (SNR) is at the cable modem.

The SNR is an indication of the quality of the data signal that the cable modem is receiving. Higher values indicate a “cleaner” received signal. Lower values indicate a “noisier” signal. The quality of the received signal is affected by many things including the received signal strength and quality of the cable network itself.

How you interpret the graph depends on the QAM setting for the cable modem. Use the appropriate subsection below depending on your QAM setting.

QAM64

In 64-QAM mode, your cable modem will operate with error-free reception as long as the SNR is above 24 dB. In practice, you should see SNR values 3 dB or more above this limit. If you are experiencing difficulties, it could be that the quality of the received signal is too poor for the cable modem to accept.

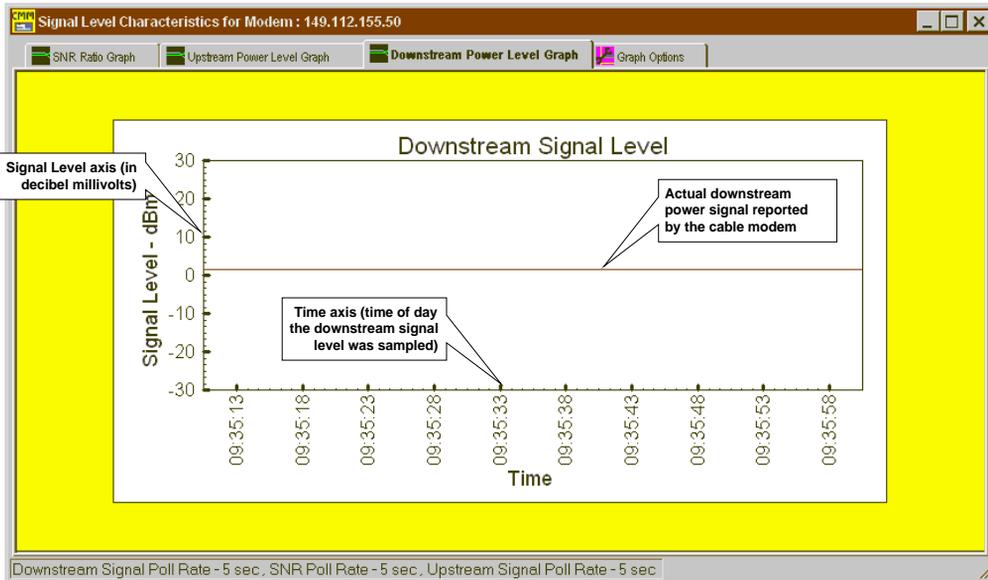
QAM256

In 256-QAM mode, your cable modem will operate with error-free reception as long as the SNR is above 30 dB. In practice, you should see SNR values 3 dB or more above this limit. If you are experiencing difficulties, it could be that the quality of the received signal is too poor for the cable modem to accept.

Downstream Power Level Graph

This feature measures the current downstream (receive) power level as reported by a two-way cable modem. It allows you to monitor whether the downstream power level is fluctuating too much for the cable modem to receive registration and maintenance broadcast messages from the CMTS.

- Viewing** To view the downstream power level for a selected modem:
- 1 Select the desired cable modem in the *Modem View* window.
 - 2 On the Menu Bar, click **Chart Gallery**.
 - 3 Click **RF Signal**. The *Signal Level Characteristics* window appears.
 - 4 Click the **Downstream Power Level** tab. The *Downstream Signal Level Graph* appears.



Viewing the Downstream Power Level Graph

Downstream Power Signal Graph Fields

Field	Description
Signal Level axis	Tracks the power level, in decibel millivolts, of the downstream signal.
Time axis	Shows the time (hours:minutes:seconds) of day that the downstream power signal measurement was taken. The default is one measurement every 5 seconds. To change the default value, refer to the <i>Setting Graph Options</i> section in this chapter.
Downstream Signal Line	This is a red line, plotted over time, that shows the actual downstream power level signal as seen by the cable modem.

Viewing the Upstream Signal Level Graph

The table that follows describes the graph fields.

Upstream Power Signal Graph Fields

Field	Description
Signal Level axis	Tracks the power level, in decibel millivolts, of the upstream signal.
Time axis	Shows the time (hours:minutes:seconds) of day that the upstream power signal measurement was taken. The default is one measurement every 5 seconds. To change the default value, refer to the <i>Setting Graph Options</i> section in this chapter.
Upstream Signal Line	This is a red line, plotted over time, that shows the actual upstream power level signal as seen by the cable modem.

Interpreting The correct operating ranges for a cable modem depend upon the type of modulation being used on the upstream channel:

- 16 QAM: 8 to 55 dbmV
- QPSK: 8 to 58 dbmV

If you see values out of the above ranges, the cable modem may need to have its power signal adjusted to within specifications.

RF Equalizer Graph

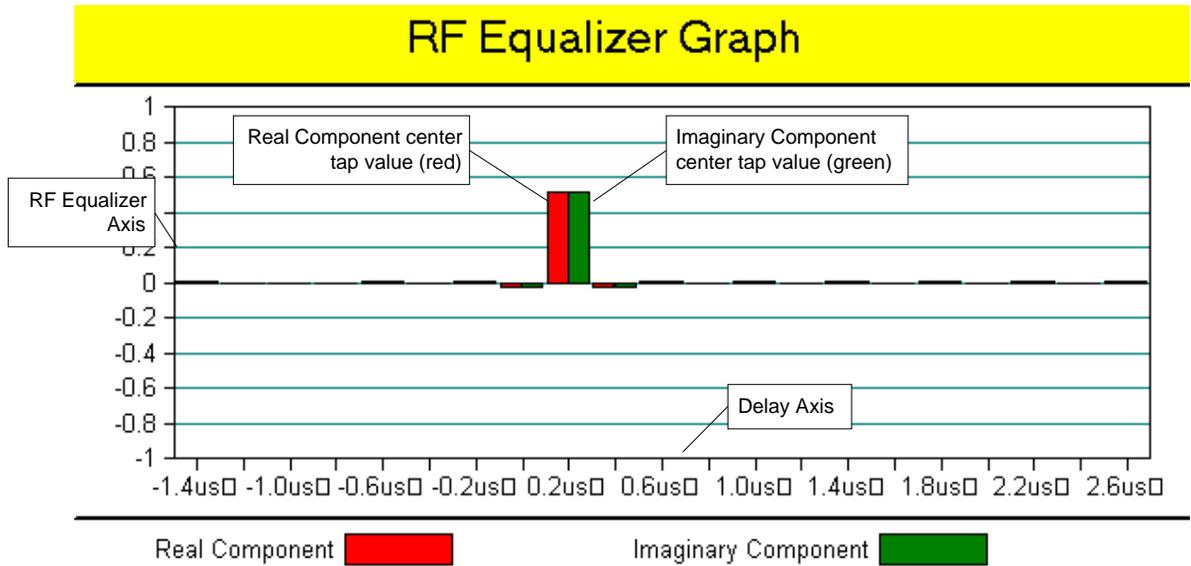
As the digital cable signal is transmitted from the cable headend to a one-way cable modem, a distortion of the signal occurs. This distortion can be due to the non-ideal nature of the cable network, or to unterminated coaxial stubs. This distortion can vary from cable modem to cable modem.

The cable modem has an adaptive digital filter called an “equalizer” that attempts to overcome the effects of this distortion. The *RF Equalizer Graph* displays parameters of this equalizer and can be useful for diagnosing performance problems in the cable network. The graph displays the filter tap weights of the cable modem receiver equalizer.

Viewing To display the RF Equalizer Graph for a selected cable modem:

- 1 Select the cable modem for which you want to display the RF Equalizer Graph in the Modem View window.
- 2 On the toolbar, click the **RF Equalizer** icon. The *RF Equalizer Graph* appears.





RF Equalizer Graph

The table that follows describes the information displayed.

RF Equalizer Graph Fields

Field	Description
RF Equalizer Axis	This axis plots the values of the in-phase (Real) and quadrature-phase (Imaginary) equalizer tap values. Each tap consists of a "Real" and "Imaginary" component.
Delay Axis	This axis plots the time sample spacing (in microseconds) between each of the equalizer tap values.
Real Component Bar (Red)	Displays the value of the "Real" tap value.
Imaginary Component Bar (Green)	Displays the value of the "Imaginary" tap value.

Interpreting Typically, the center tap Real Component and Imaginary Component values should be the largest of all the tap values on the graph. All other tap readings to the left or right of center should be less than 10% of the center tap readings. Refer to the illustration and table on the previous page.

If any of the other tap readings to the left or right of center read more than 10% of the center tap:

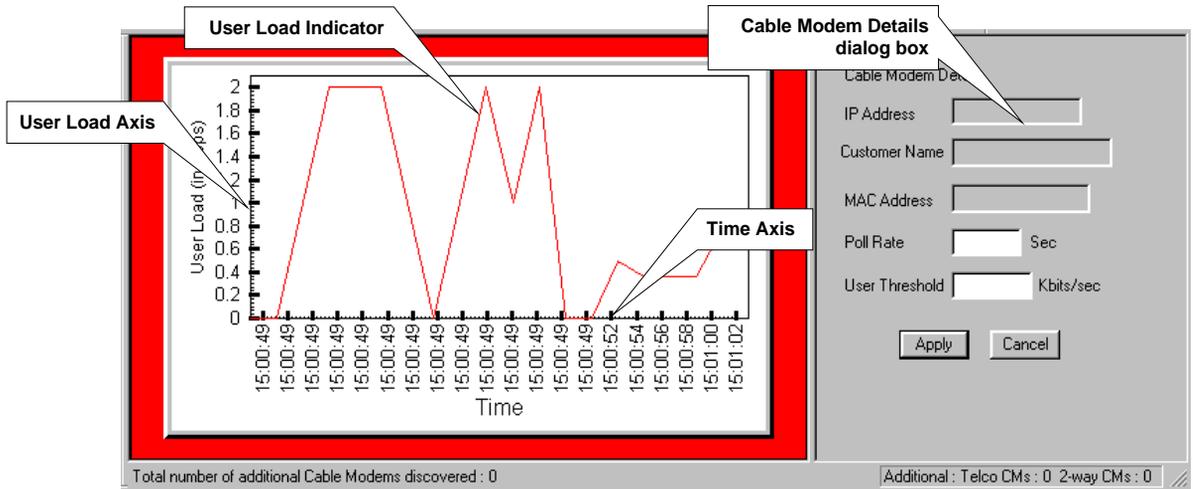
- 1 Use the RF Equalizer Graph to display readings for several other known working cable modems in the same segment of the cable data network.
- 2 Compare the additional RF Equalizer readings with the original:
 - a If the original looks significantly different from the rest, it may suggest a coaxial termination problem near the cable modem.
 - b If all the RF Equalizer Graphs look similar, it may indicate that this is the normal RF Equalizer display for working cable modems in that segment of the cable network.

User Load Indicator The *User Load Indicator* displays a graph which shows you how much bandwidth a given one-way cable modem is using.

Viewing To display the User Load indicator for a selected cable modem:

- 1 Select the modem for which you want to view User Load data in the Modem View window.
- 2 On the toolbar, click the **User Load** icon. The *User Load Indicator Graph* appears.





User Load Indicator Graph

The table that follows describes the information displayed.

User Load Indicator Fields

Section	Description
User Load Indicator Graph	The User Load Indicator Graph displays information related to the bandwidth being used by the selected cable modem. There are two axes:
User Load Axis	This axis measures, in Kbps, the amount of bandwidth being used by the cable modem.
Time Axis	This axis displays how often cable modem bandwidth usage is being measured. The time between measurements is set in the Poll Rate field in the <i>Cable Modem Details</i> dialog box.
User Load Indicator	This line plots the actual bandwidth (in kbps) being used by the selected cable modem.

User Load Indicator Fields

Section	Description
Cable Modem Details	This dialog box contains general information about the cable modem, and the bandwidth measurements made:
IP Address	This is the IP address of the selected client cable modem.
Customer Name	This is the customer name assigned to this cable modem. It is the same as the name defined in the User Details dialog box.
MAC Address	This is the Media Access Control address of the client cable modem. It is discovered automatically by the CMM.
Poll Rate	Specifies how frequently (in seconds) you want the CMM to obtain User Load data from the selected cable modem. The default is 2 seconds, but you may specify any time interval you like. If you change the default Poll Rate value, click <i>Apply</i> to activate the change.
User Threshold	Specifies a baseline reference amount of bandwidth (in kilobytes per second) for this cable modem. If you specify a value, click <i>Apply</i> to activate the change. Note: Neither the cable modem nor the CMM attempt to enforce the baseline reference amount of bandwidth that you specified.

Interpreting The User Load Indicator graph plots the downstream transmission rate of a selected cable modem over time. The User Threshold appears on the graph as a solid line against which you can compare the actual User Load discovered by the CMM.

Setting Graph Options

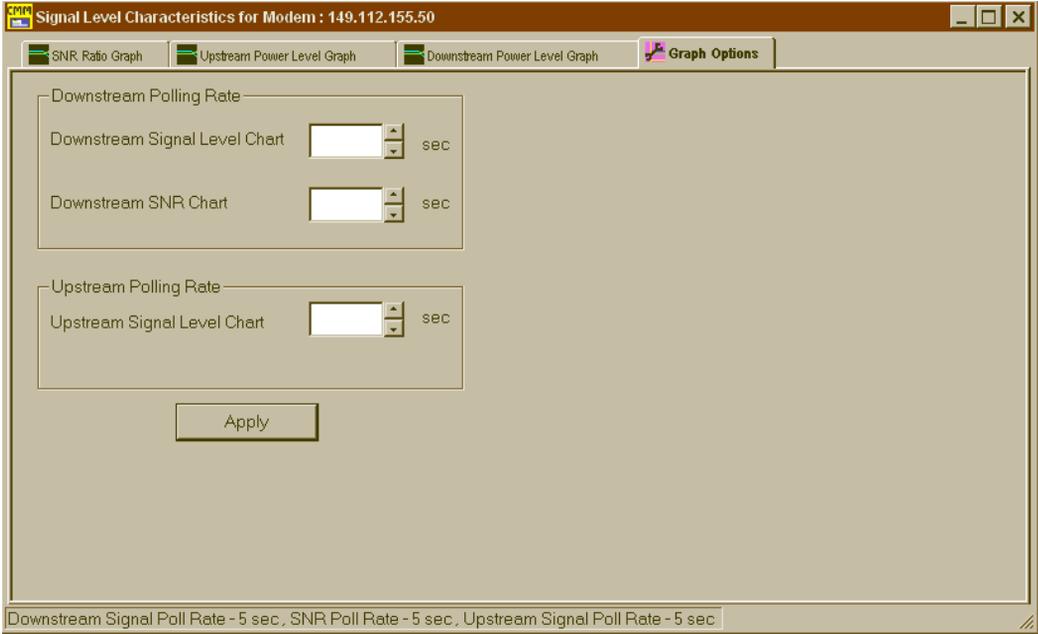
CMM allows you to change the rate at which measurements for two-way cable modems are taken for the following *Chart Gallery* graphs:

- Downstream Power Level Signal (two-way cable modems only)
- Upstream Power Level Signal (two-way cable modems only)
- Signal to Noise Ratio

To set the graph options:

- 1 On the Menu Bar, click **Chart Gallery**.
- 2 Click **RF Signal**. The *Signal Level Characteristics* window appears.
- 3 Click the **Graph Options** tab.





Graph Options Dialog Box

4 Make the entries described in the table that follows.

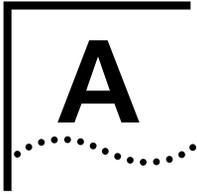
Graph Options Entries

Entry	Description
Downstream Polling Rate	This section allows you to change the poll rate for the CMM downstream signal graphs.
Downstream Signal Level Chart	Enter the rate at which you want CMM to poll a cable modem for its downstream power signal level. Valid entries are from 5 to 600 seconds. The default is 5 seconds.
Downstream SNR Chart	Enter the rate at which you want CMM to poll a cable modem for its downstream signal to noise ratio. Valid entries are from 5 to 600 seconds. The default is 5 seconds.
Upstream Polling Rate	This section allows you to change the poll rate for the CMM upstream signal graph.
Upstream Signal Level Chart	Enter the rate at which you want CMM to poll a cable modem for its upstream power signal level. Valid entries are from 5 to 600 seconds. The default is 5 seconds.

5 Click **Apply**.

Your new settings become effective immediately. They will remain effective until you use the *Graph Options* dialog box to change them.





INFORMATION BAR TAB FIELD DESCRIPTIONS

This chapter provides descriptions of each field that appears on each Information Bar tab.

- Introduction
- User Information Tab
- IP Details Tab
- PC Setup Tab
- Version Details Tab
- RF Setup - Downstream Tab
- RF Setup - Upstream Statistics Tab
- Data Statistics Tab
- Signal Quality Tab

Introduction

When you click the *Information Bar* toolbar icon after selecting a discovered cable modem's IP address, the bottom of the CMM screen displays eight tabs which you can click to view user and cable modem configuration information.



If necessary, refer to the “Viewing a Cable Modem Configuration” section in this chapter for instructions on accessing the Information Bar.

Each tab is described in the following sections.

User Info Tab

This tab applies to one-way cable modems only. When you click the *User* tab on the Information Bar, the CMM displays general identification information associated with the cable modem and cable modem user.

Each field is described in the table that follows.

User Tab Fields

Field	Description
PPP	Displays current configuration information for the cable modem PPP link. There are five fields:
Login Name	This is the login name the cable modem must use to establish its PPP link with the TRAC.
Password	This is the password the cable modem must use to establish a PPP link with the TRAC.
RADIUS Realm	Not used.
ISP Phone #1	This is the primary phone number the cable modem must dial to establish a link to the Internet Service Provider.
ISP Phone #2	This is the phone number the cable modem must dial to establish a link to the Internet Service Provider if ISP Phone #1 fails.
ISP Phone #3	This is the phone number the cable modem must dial to establish a link to the Internet Service Provider if ISP Phone #2 fails.
Last Connection	The time the analog modem last established a PPP connection on the upstream channel.
Last Failure	The time the analog modem last failed to establish a PPP connection.
Reason	This is the reason for the last analog modem connection failure (<i>Last Failure</i>) described above. Possible Last Failure Reasons are: <i>Registration Failed</i> , <i>DHCP Failed</i> , or <i>TFTP Failed</i> .

IP Details Tab

The *IP Details* tab displays all relevant information about the IP addresses to which the cable modem is connected when it registers with the headend.

Each field is described in the table that follows.

IP Details Tab Fields

Field	Description	
IP Addressing Schema	These fields contain all IP addressing information related to this cable modem:	
	IP Address	This is the IP address of the cable modem in the nnn.nnn.nnn.nnn format.
	IP Mask	The IP subnet mask of the cable modem in the nnn.nnn.nnn.nnn format.
	IP Gateway	The IP address of the default Gateway for the cable modem.
	Time Server	The IP address of the Time of Day (TOD) server.
	CMTS Address	The IP address of the <i>Ethernet IP Network</i> interface of the CMTS to which this cable modem is connected.
	DHCP Server	The IP address of the DHCP server for the cable modem.
	TFTP Server	The IP address of the TFTP server for the cable modem.
Config File	The name of the software currently installed in the cable modem.	
SNMP	These fields provide all IP addressing information related to the SNMP functions of the cable modem:	
	Console	This is the IP address of the management station (PC) on which the CMM software is installed.
	Community	This is the SNMP community string required for access to the management station (PC) on which the CMM software is installed.
	Access Control	This is the type of SNMP access control allowed to this cable modem from the CMM PC management station. Possible values are: <ul style="list-style-type: none"> ■ none: no SNMP access permission ■ Read: Can view SNMP information from the management station, but cannot to modify any information. ■ Read/Write: View and modify SNMP information from this management station. ■ ReadOnlyWithTraps: View SNMP information and SNMP Traps sent by network SNMP agent software. ■ ReadWriteWithTraps: View and modify SNMP information on cable modem, as well as view SNMP traps sent by cable modem SNMP agent software. TrapsOnly: View SNMP Traps sent by cable modem SNMP agent software.
	Console IP Mask	This is the IP subnet mask of the CMM PC management station.

PC Setup Tab

The *PC Setup* tab allows you to view one-way cable modem configuration associated with the user's PC.

Each field is described in the table that follows.

PC Setup Tab Fields

Field	Description
Telco Modem	These fields provide basic configuration information related to the telco modem installed on the client PC.
I/O Address	Indicates the I/O (Input/Output) address on the PC assigned to the analog modem.
Interrupt	Displays the IRQ on the PC which is being used by the analog modem.
COM Port	Displays the COM port on the PC which is being used by the analog modem.
Country Code	<p>Displays the country code(s) for which the cable modem was designed to be used. Possible country codes are:</p> <ul style="list-style-type: none"> ■ 1: Unknown ■ 2: North America ■ 3: Japan ■ 4: Finland ■ 5: Sweden ■ 6: UK ■ 7: Norway ■ 8: Switzerland ■ 9: Netherlands ■ 10: South Africa ■ 11: Italy ■ 12: New Zealand ■ 13: Czech ■ 14: Belgium ■ 15: Denmark ■ 16: Australia ■ 17: France ■ 18: Germany ■ 19: CCITT ■ 20: Austria ■ 21: Ireland ■ 22: Spain ■ 23: Portugal
Product Code	<p>Displays the product code of the cable modem. One of the following product codes can display:</p> <ul style="list-style-type: none"> ■ Telco CM (one-way) ■ N/A ■ Cable Modem (2-way)
Hardware Revision	This is the hardware version revision level of the analog modem.

PC Setup Tab Fields

Field	Description
Cable Modem	These fields provide basic configuration information related to the cable modem installed on the client PC.
Interrupt	Displays the IRQ on the PC used by the cable modem.
I/O Address	Displays the I/O address on the PC used by the cable modem.
PC Operating System	Displays the operating system (either Windows 95 or Windows NT) being used on the PC in which the cable modem is installed:

Version Details Tab The *Version Details* tab allows you to determine the current software and hardware versions running on the cable modem selected in the *Modem View* window. This allows you to troubleshoot problems related to hardware and software incompatibility.

Each field is described in the table that follows.

Version Details Tab Fields

Section	Field	Description
Version Numbers		This section provides general hardware and software information on the client cable modem. There are five fields:
	Software Version	This is the software version installed on the cable modem.
	Hardware Version	This is the hardware version of the cable modem.
	SNMP Agent	Displays the current version of the SNMP Agent software running in the cable modem.
	Driver Details	Displays the version of the TCP/IP software driver installed on the cable modem.
Cable Modem	Serial Number	The vendor's serial number on the cable modem.
	Date/Time	This is the current time, day, date, and year.
	Type	Displays the type of client cable modem installed on the client PC. The cable modem can be one of these types: <ul style="list-style-type: none"> ■ External Generic ■ Internal ISA (Industry Standard Architecture) ■ Internal PCI (Peripheral Component Interconnect) ■ Internal MAC (Macintosh) ■ Internal SBUS (SUN SPARC) ■ Other (any cable modem that does not fit any of the above descriptions)
	Resets	Not used.

RF Setup - Downstream Tab

The RF Setup - *Downstream* tab allows you to view RF downstream traffic information about the cable modem selected in the *Modem View* window. This tab applies to both one-way and two-way cable modems.

Each field is described in the table that follows.

RF Setup - Downstream Tab Fields

Field	Description
Channel	This is the CATV channel currently being used to communicate with the selected cable modem. Always displays 0 for one-way modems.
Modulation	The type of QAM modulation associated with this downstream channel. Valid entries are: <ul style="list-style-type: none"> ■ QAM64 ■ QAM256
Frequency	This is the center of the frequency band (in Hz) associated with this downstream channel assigned to this cable modem.
Channel Width	This is the total bandwidth (in Hz) of this downstream channel.
Interleave	The type of Forward Error Correction interleaving being used on this downstream channel. Possible values are: <ul style="list-style-type: none"> ■ TAPS8INCREMENT16: taps 8, increment 16 (least thorough error checking) ■ TAPS16INCREMENT8: taps 16, increment 8 ■ TAPS32INCREMENT4: taps 32, increment 4 ■ TAP64INCREMENT2: tap64, increment 2 ■ TAP128INCREMENT1: tap128, increment 1 (most thorough error checking)
Symbol Rate	The current symbol rate in symbols per second.
FEC Block	Currently not used.
Mode	One-way modems only. The current CATV frequency mode assignment for this downstream channel. Possible values are: <ul style="list-style-type: none"> ■ Std (Standard) ■ HRC (Harmonically Related Carrier) ■ IRC (Incrementally Related Carrier) ■ Custom

RF Setup - Upstream Tab

The RF Setup - *Upstream* tab allows you to view upstream traffic data sent by the cable modem selected in the *Modem View* window. This tab applies to two-way cable modems only.

Each field is described in the table that follows.

RF Setup - Upstream Tab Fields

Field	Description	
Channel ID	This is the upstream channel identifier provisioned to the cable modem by the CMTS.	
Upstream Frequency	This is the center of the frequency band associated with this upstream channel.	
Upstream Modulation	This is the type of modulation assigned to this upstream channel. Either QPSK or QAM16.	
Upstream Slot Size	The mini-slot size for this upstream channel. Expressed in units of the Timebase Tick of 6.25 microseconds.	
Channel Width	The total bandwidth of this upstream channel.	
Upstream Ranging Algorithm Parameters	Ranging Backoff Start	This is the initial random backoff window used by the cable modem when retrying ranging requests. Expresses as a power of 2.
	Ranging Backoff End	The final random backoff window to used by the cable modem when retrying ranging requests. Expressed as a power of 2.
	Transmit Backoff Start	The initial random backoff window to used by the cable modem when retrying data requests transmissions. Expressed as a power of 2.
	Transmit Backoff End	The final random backoff window to used by the cable modem when retrying data requests transmissions. Expressed as a power of 2.
Symbol Rate	A multiple of the base rate of 160 ksym/sec being used on the upstream channel.	
Upstream Timing Offset	The offset of the preamble value (in bits) into the preamble string that the preamble will begin at for this upstream channel. Expressed in bits.	

Data Statistics Tab

The *Data Statistics* tab provides general data transmission information for the selected one-way or two-way cable modem.

Each field is described in the table that follows.

Data Statistics Tab Fields

Field	Description	
Cable Modem Upstream Statistics (two-way cable modems only)	These fields display data transmission statistics for the information sent along the upstream analog modem connection from a two-way cable modem to the headend.	
	Total Bytes	The total amount of information (in bytes) that the analog modem has sent on the upstream channel to the headend.
	Frames	The total number of IP packets that the analog modem has sent on the upstream channel to the headend.
	Rate	The average data transmission rate (in bytes/sec) over the last five seconds for the analog modem on the upstream channel to the headend.
	Errors	The total number of upstream data transmission errors on the ISP (Internet Service Provider) link from the analog modem to the headend.
	Discarded Packets	The number of packets discarded (for example, due to corruption).
	Interface Status	This is the current operational status of the upstream interface (<i>Up</i> or <i>Down</i>).
Cable Modem Downstream Statistics (one-way and two-way cable modems)	These fields display data transmission statistics for the information sent along the upstream analog modem connection from the headend to a two-way cable modem.	
	Total Bytes	The total amount of information (in bytes) that the headend has sent on the upstream channel to the analog modem.
	Frames	The total number of IP packets that the analog modem has sent on the upstream channel.
	Rate	The average data transmission rate (in bytes/sec) averaged over the last five seconds from the headend to the analog modem.
	Errors	The total number of upstream data transmission errors on the ISP (Internet Service Provider) link from the headend to the analog modem.
	Discarded Packets	The number of packets discarded (for example, due to corruption).
	Interface Status	This is the current operational status of the downstream interface (<i>Up</i> or <i>Down</i>).

Data Statistics Tab Fields

Field	Description
Telco Return Modem - Data Sent (one-way cable modems only)	These fields display data transmission statistics for the information sent along the upstream analog modem connection from a one-way cable modem to the headend.
	Total Bytes The total amount of information (in bytes) that the analog modem has sent on the upstream channel to the headend.
	Frames The total number of IP packets that the analog modem has sent on the upstream channel to the headend.
	Rate The average data transmission rate (in bytes/sec) over the last five seconds for the analog modem on the upstream channel to the headend.
Data Received by Phone Modem (one-way cable modems only)	These fields display data transmission statistics for the information sent along the upstream analog modem connection from the headend to a one-way cable modem.
	Total Bytes The total amount of information (in bytes) that the headend has sent on the upstream channel to the analog modem.
	Frames The total number of IP packets that the analog modem has sent on the upstream channel.
	Rate The average data transmission rate (in bytes/sec) averaged over the last five seconds from the headend to the analog modem.
Errors The total number of upstream data transmission errors on the ISP (Internet Service Provider) link from the headend to the analog modem.	

Signal Quality Tab

The *Signal Quality* tab provides basic information on the quality of the upstream and downstream signal being received by a selected cable modem.

Each field is described in the table that follows.

Signal Quality Tab Fields

Field	Description	
Downstream Channel Characteristics (one- and two-way modems)	Received Power Level	This is the downstream power level signal being received by the cable modem (in dbmV). It is identical to the value reported in the Downstream Power Signal Graph in the CMM Chart Gallery.
	SNR Ratio	This is the downstream signal-to-noise ration reported by the cable modem. It is identical to the value displayed in the Signal to Noise Ratio Graph in the CMM Chart Gallery.
	Total Number of Codewords	The number of codewords received on this downstream channel without error. This includes all codewords, regardless of whether or not they were part of frames destined for this cable modem.
	Correctable Codewords	Codewords received on this channel with correctable errors. This includes all codewords, whether or not they were part of frames destined for this cable modem.
	Uncorrectable Codewords	Codewords received on this channel with uncorrectable errors. This includes all codewords, whether or not they were part of frames destined for this cable modem.
	Total Microreflections	Total microreflections including in-channel response as reported by this cable modem. Displayed in dbC below the signal level.
Upstream Channel Characteristics (two-way modems)	Transmit Power Level	This is the upstream power level signal being generated by the selected cable modem (in dbmV). It is identical to the value reported by the Upstream Power Signal Graph in the CMM Chart Gallery.
	Lost Syncs	The number of times this cable modem has lost synchronization with the downstream channel.
	Invalid UCDs	The number of times the cable modem has received an invalid UCD message.
	Invalid MAPs	The number of times the cable modem received an invalid Message Allocation Protocol message.
	Invalid Ranging Responses	The number of times the cable modem has received an invalid ranging response.
	Invalid Registration Requests	The number of times the cable modem has received an invalid registration request.
	Ranging Aborts	The number of times the ranging process was aborted for this cable modem.

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