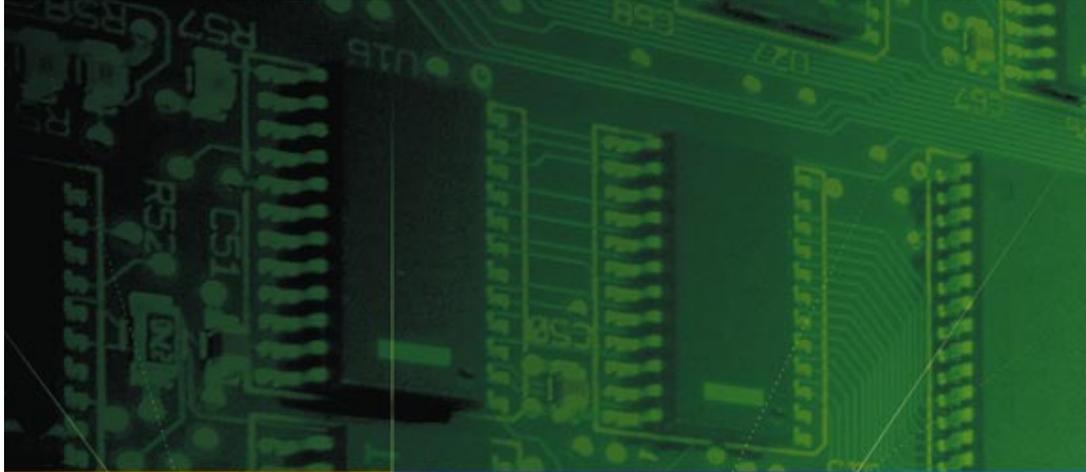




# Cable Headend Manager

## User Guide



Part No. 1.024.1747-00

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 Headend Manager (CHM) to configure and monitor your 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 the components that comprise the 3Com CMTS:

- Cable Access Router (CAR)
- Single Channel QAM Modulator (QAM Modulator)
- Dual Upstream Receiver Card (URC)
- Total Control Chassis

---

## Finding Information in This Guide

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

<b>If you are looking for</b>	<b>Turn to</b>
An overview of the CHM software and its features	Chapter 1
A list of requirements to meet before you can install CHM	Chapter 2
Procedures for installing and uninstalling CHM	Chapter 2
Procedures for performing basic administrative CHM tasks	Chapter 3
Procedures for performing CMTS configuration tasks	Chapter 4
A procedure for configuring the Data over Cable System Interface Specification (DOCSIS) attributes of the CMTS	Chapter 5
Procedures for monitoring the operational status of the CMTS	Chapter 6
A procedure for using the configuration Setup Wizard	Appendix A

## 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"> <li>■ Referred to by their labels, such as “the Return key” or “the Escape key”</li> <li>■ Written with brackets, such as [Return] or [Esc].</li> </ul> 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 <b>bold-face</b> 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 to work with the Cable Access Router.
- *Cable Modem Manager User Guide*: Describes how to install and use 3Com *Cable Modem Manager* software to configure, monitor, and troubleshoot all 3Com cable modems connected to the 3Com data over cable network.
- *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.

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**Year 2000  
Compliance**

The 3Com Cable Access Router 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.

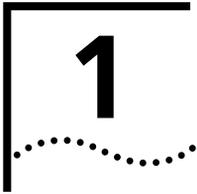


*For European countries that do not have a toll free number listed, call +31 30 602 9900.*

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	<b>All Other Locations (Outside Europe)</b>	1847 7976600



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# PRODUCT OVERVIEW

This chapter provides an overview of Cable Headend Manager (CHM).

- Introduction
- CHM Features
- CHM Operation Overview

---

## Introduction

Cable Headend Manager (CHM) is a software program that uses a Windows-based Graphical User Interface (GUI) and the Simple Network Management Protocol (SNMP) to help you easily configure and manage your 3Com Cable Modem Termination System (CMTS). CHM features automatic detection of many system settings, and a configuration Setup Wizard. CHM runs on Windows 95 and Windows NT.



*For detailed information about CMTS components and their functionality, refer to the Cable Access Router User Guide, Dual Upstream Receiver Card Installation Guide, and Single Channel Stand-alone QAM Modulator NIC Installation Guide.*

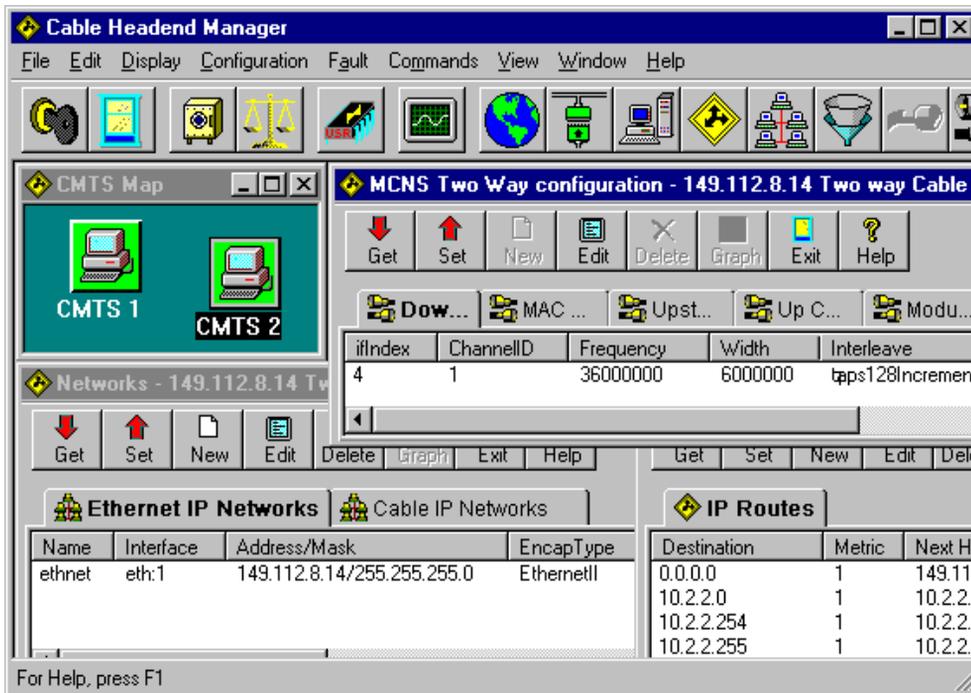
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## CHM Features

The main features of CAM are:

- Windows GUI Application
- Three-way, two-way, and one-way CMTS Management
- SNMP Management
- Performance Monitoring Capabilities
- Software Download of Upgrades
- Configuration Save and Restore
- Configuration Setup Wizard Utility

Each of the features is described in the subsections that follow.



**CHM Graphical User Interface**

### Windows GUI Application

CHM management of the CMTS is performed via a Windows-based GUI application. This application is designed to operate under Windows 95 and Windows NT. CHM provides intuitive toolbar icons, as well as a text-based menu bar to access all features and commands.

### Three-way, Two-way, One-way CMTS Management

CHM allows you to configure and manage your CMTS regardless of your data over cable system architecture. CHM is compatible with telco return (one-way), RF return (two-way), and combined telco return/RF return (three-way) CMTS functionality.

### SNMP Management

CHM uses SNMP to manage the CMTS. CHM 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.

**Performance Monitoring**

CHM tracks several types of counters and data statistics to enable you to monitor the performance of your CARs, including:

- Internet Control Message Protocol (ICMP) counters
- Terminal Control Protocol (TCP) counters
- Ethernet IP interface counters
- QAM interface counters
- SNMP counters
- Media Access Control (MAC) counters
- Universal Data Port (UDP) counters
- Upstream Channel counters

**Software Download of Upgrades**

CHM allows you to download software upgrades (via TFTP) to both the CAR and the Dual Upstream Receiver Card (URC). The download utility allows software upgrades to multiple URCs simultaneously.

**Configuration Save and Restore**

CHM provides the ability to save and restore the files that contain a CMTS configuration. Once the CMTS configuration is saved to the CAR's Non-volatile Random Access Memory (NVRAM), the configuration can be saved off-line on any device capable of storing file images. This gives the user the flexibility of restoring a CMTS that has lost its configuration, or to clone multiple CMTSs with a single configuration.

The following information is saved/restored:

- user configuration
- network configuration
- system event log level configuration
- SNMP configuration
- IP configuration
- filter configuration
- each of the stored filter files
- terminal protocols configuration
- TFTP configuration

## Configuration Setup Wizard Utility

The configuration Setup Wizard is an automated feature that allows you to enter basic IP addressing information for the CAR. You can use this feature to configure new CARs as well as to modify existing CAR configurations.

The Setup Wizard allows you to configure the following information:

- Global Identity Settings
- Default Gateway Settings
- Cable Downstream IP Settings
- Service Provider Descriptor (SPD) settings (telco return systems only)

---

## Functional Overview

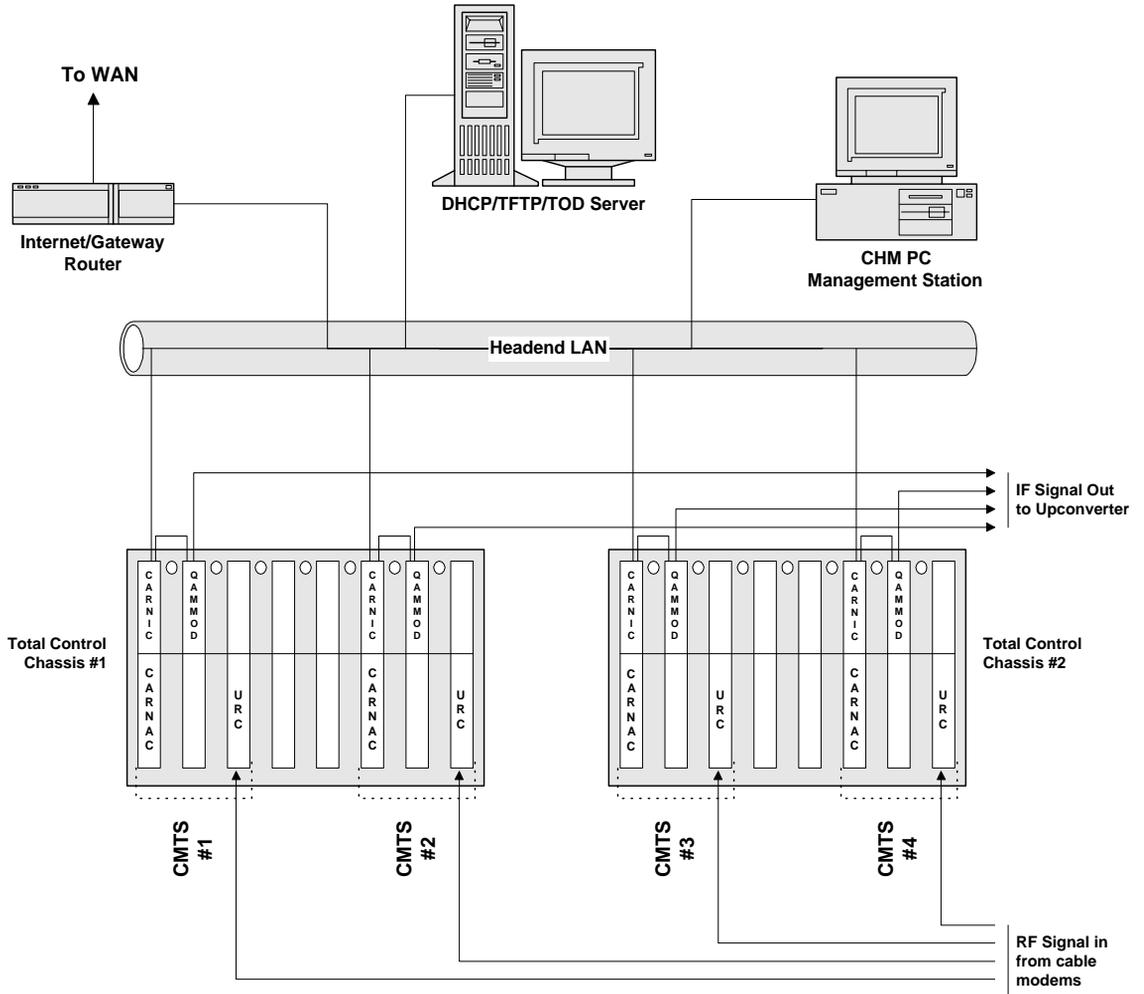
CHM operation centers on the *Cable Modem Termination System (CMTS) Devices* defined in the *CMTS Map* window.

Each *CMTS Device* represents one Cable Access Router and its associated QAM Modulator and Dual Upstream Receiver Card(s) (URCs). Together, these devices are sometimes referred to as a Media Access Control (MAC) domain.

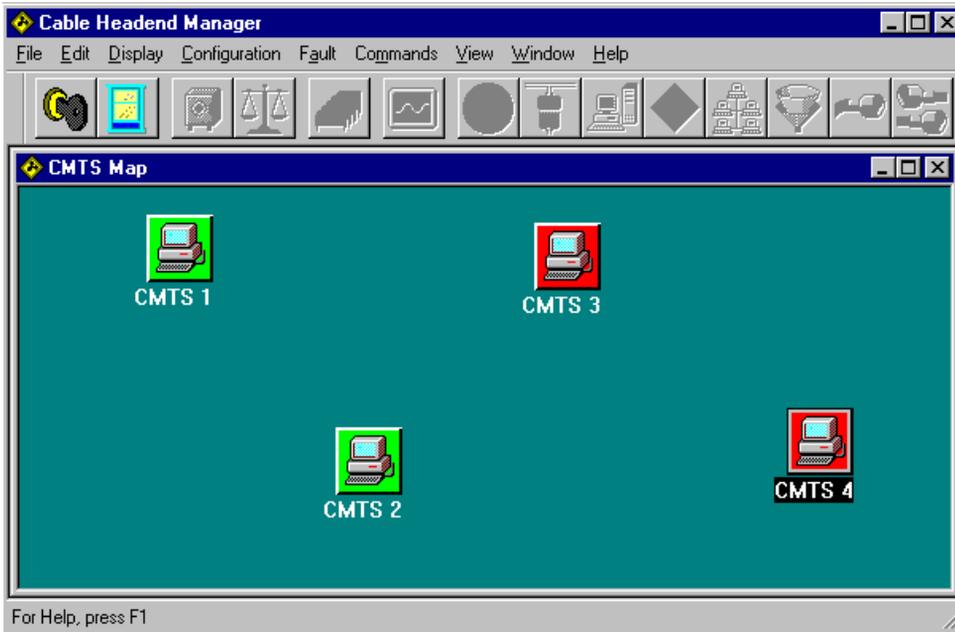
Refer to the illustration that follows. In this simplified example:

- The headend contains two Total Control chassis.
- Each Total Control chassis contains two CMTSs.
- Each CMTS is comprised of:
  - 1 CAR and its associated NIC
  - 1 QAM Modulator NIC
  - 1 URC
- Each CMTS and the CHM PC Management Station are connected to the same headend LAN segment

Therefore, this headend utilizes four CMTSs. Once configured as *CMTS Devices* in CHM, each CMTS appears as a single *CMTS Device* icon in the *CMTS Map* window. You then have management access to each 3Com CMTS at the headend.



Example: CHM Management Access to Multiple CMTS Devices



**CMTS Devices in CMTS Map Window**

# 2

## GETTING STARTED

This chapter provides basic Cable Headend Manager (CHM) installation and navigation information:

- Installation Requirements
- Installing the Software
- Uninstalling the Software
- Elements of the GUI (Graphical User Interface)

---

### Installation Requirements

Verify that the following CHM installation recommendations and requirements have been met before you install CHM 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 CHM 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
  - Ethernet NIC installed
  - Installed on same Ethernet LAN as the 3Com Cable Modem Termination System (CMTS) you will be managing with CHM

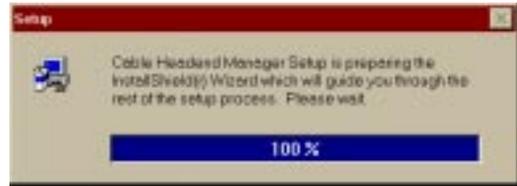
## Installing the Software

To install and launch CHM software:



*Always uninstall previous versions of CHM before reinstalling/upgrading CHM software.*

- 1 Insert CHM diskette #1 in your floppy disk drive. 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 CHM diskette #2 into the floppy drive and click **OK** to complete the installation.
- 6 Double click the *CHM program icon* in the CHM Program group directory to launch the program.



## Uninstalling the Software

To uninstall CHM:



*Always uninstall previous versions of CHM before reinstalling/upgrading CHM software.*

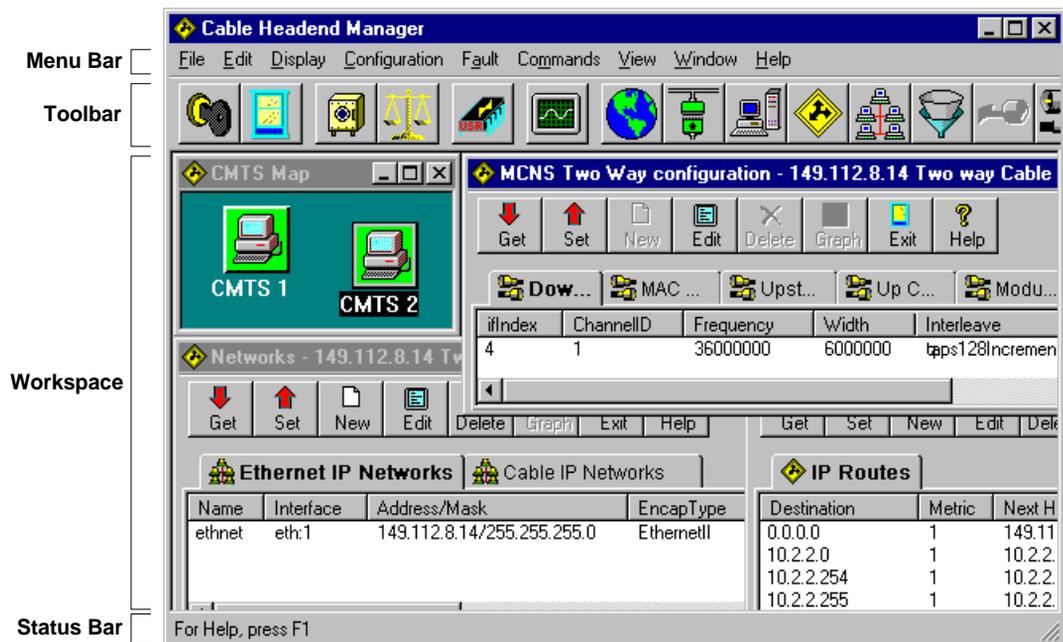
- 1 Double click the *Uninstall Cable Headend Manager* icon in the Cable Headend Manager program group.
- 2 The uninstall shield appears and proceeds to remove files related to the application.
- 3 When the uninstall is complete, CHM asks you to manually delete some files from the Cable Headend Manager program directory. Do so at this time.
- 4 Reboot your workstation before re-installing CHM software.



**Elements of the GUI** The CHM GUI is comprised of four basic elements:

- Menu Bar
- Toolbar
- Workspace
- Status Bar

Each is shown in the illustration that follows.



**Elements of the CHM GUI**

### CHM GUI Element Descriptions

GUI Element	Description
Menu Bar	The Menu Bar provides access to all CHM commands and features.
Toolbar	The Toolbar provides point and click access to the CHM features used most often.
Workspace	The Workspace displays all CHM windows and dialog boxes.
Status Bar	This region at the bottom of the screen shows the status of the CHM program, including commands which are pending and alerts that are generated by the attached CMTS.

**The Toolbar** The CHM toolbar icons provide easy access to the CHM features used most often. The table that follows lists and describes the icons.

### CHM Icon Descriptions

Icon	Icon Name	Function
	Open Map	Opens the <i>CMTS Map</i> window, where all defined <i>CMTS Devices</i> appear. From this window, you access all configuration and status information for each CMTS at the headend.
	Close Connection	Closes the active windows for a selected <i>CMTS Device</i> .
	Save Configuration	Saves a new or edited CMTS configuration as a file to a local disk.  <b>Note:</b> Click <i>Save to NVRAM</i> before clicking <i>Save Configuration</i> if you want the saved configuration file on disk to match the configuration on the Cable Access Router.
	Restore Configuration	Restores a CHM configuration that you previously saved with the <i>Save Configuration</i> feature.
	Save to NVRAM	Permanently saves the current CHM configuration to the CAR's NVRAM (Non-volatile Random Access Memory).  <b>Note:</b> Click <i>Save to NVRAM</i> before clicking <i>Save Configuration</i> if you want the saved configuration file on disk to match the configuration on the Cable Access Router.
	Counters	Accesses CAR data traffic counters and statistics.
	Globals	Accesses global system configuration attributes, including RADIUS and Time of Day (TOD) server details.
	Interfaces	Add, edit, view, or remove Ethernet IP and Cable IP networks currently configured in the CAR.
	Hosts	Add, edit, view, or remove current hosts defined in the CAR, such as Log Hosts, SNMP Hosts, and SNMP Trap hosts
	Routes	Add, edit, view, or remove IP Routes currently defined in the CAR.

## CHM Icon Descriptions

Icon	Icon Name	Function
	Networks	Add, edit, view, or remove current Ethernet and Cable IP networks defined in the CAR.
	Filters	Add, edit, view, or remove IP filters currently defined in the CAR.
	One-Way DOCSIS Attributes	Add, edit, view, or remove Data over Cable System Interface Specification (DOCSIS) attributes currently defined on a telco return (1-way) CAR.
	Two-Way DOCSIS Attributes	Add, edit, view, or remove DOCSIS attributes currently defined on an RF return (two-way) CAR.

**Dialog Box Buttons** Familiarize yourself with the buttons described in the table that follows. It will help you navigate through the display screens and dialog boxes

## CHM Dialog Box Button Descriptions

Button	Description
	Removes an entry.
	Modifies existing configuration setting(s).
	Exits from the screen. If you changed any data on the screen, CHM prompts you save any changes made.
	Creates an entry.
	Requests the latest CMTS 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 CAR.

**Note:** A configuration item is not really added, changed, or deleted until you click Set.



# 3

## PERFORMING BASIC MANAGEMENT TASKS

This chapter provides procedures for basic Cable Headend Manager (CHM) management tasks:

- Working with CMTS Devices
- Downloading New Software
- Rebooting CMTS Elements
- Saving and Restoring CMTS Configurations
- Diagnostics

---

### Working with CMTS Devices

This section provides information on adding, deleting, and editing CMTS Devices in the CHM Map window:

- CMTS Device Description
- Creating a CMTS Device
- Editing a CMTS Device
- Deleting a CMTS Device
- Accessing a CMTS Device

### CMTS Device Description

CHM operation centers on the Cable Modem System Termination (CMTS) devices (*CMTS Devices*) defined in the *CMTS Map* window.

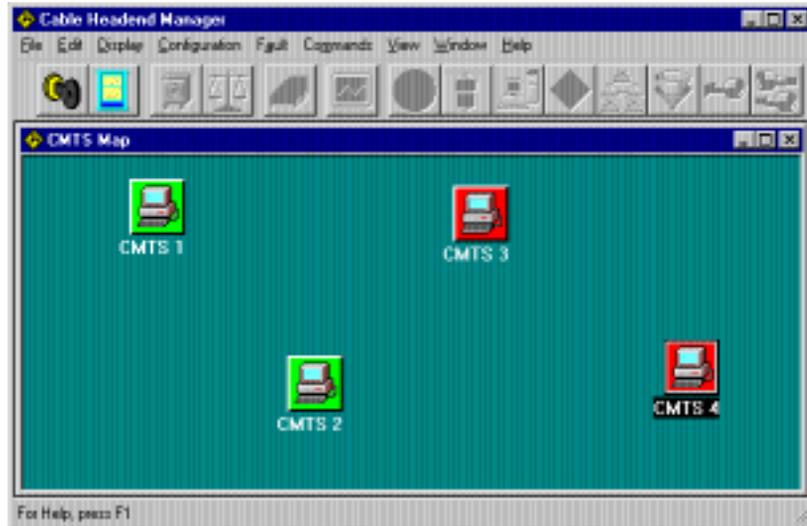
Each CMTS Device icon in the window represents one Cable Access Router (CAR) and its associated QAM Modulator and Dual Upstream Receiver Card(s) (URCs).

Together, these devices are sometimes referred to as a Media Access Control (MAC) domain. The data each CMTS Device receives and transmits is isolated from the other CMTS Devices defined in CHM.

One Total Control chassis can contain more than one CMTS. And one headend LAN may have access to more than one chassis. Therefore, you can have access to many CMTS Devices via the CHM.



*You must first create a CMTS Device for each CMTS in your headend before CHM allows you configuration access to that device.*



**CMTS Devices in CMTS Map Window**

The current operating state of each CMTS Device is shown by color. Refer to the table that follows.

#### **CMTS Device Icon Colors and Operating States**

<b>CMTS Icon Color</b>	<b>Operating Status</b>
Red	Either the Cable Access Router (CAR) is down, rebooting, or you have entered the wrong IP address and SNMP Community String required for access to this CMTS Device.
Green	The CMTS is in its normal operating state. You can change and/or view the CMTS configuration or monitor its status.
Gray	CMTS polling is disabled. In this state, the CMTS is inaccessible. You must enable polling with the <i>Edit Object</i> utility in the <i>Edit</i> menu before you can again access this CMTS.

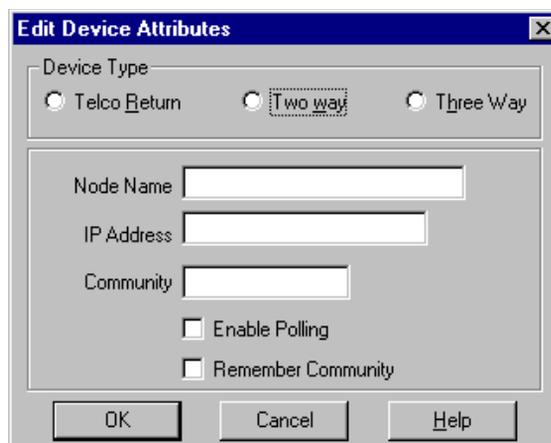
**Creating a CMTS Device** To add a CMTS Device to the *CMTS Map* window:

- 1 On the Menu Bar, click **File**.
- 2 Click **Open Map**. The *CMTS Map* appears.



**CMTS Map Window**

- 3 Click **Edit** on the Menu Bar.
- 4 Click **Add Object**. The *Edit Device Attributes* dialog box appears.



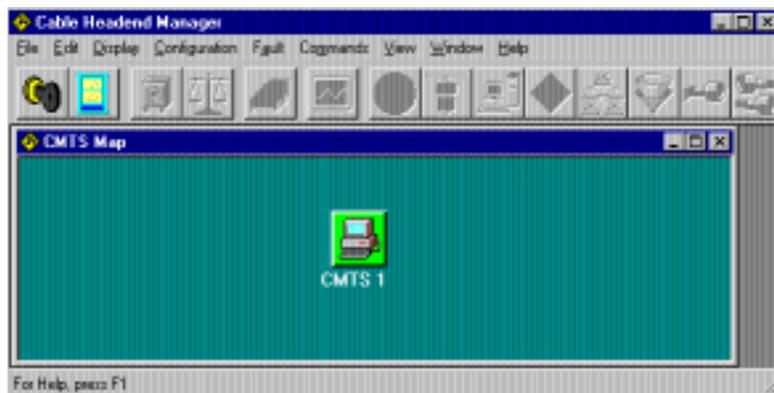
**Edit Device Attributes Dialog Box**

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

### Edit Device Attribute Entries

Section/Field	Description
Device Type	Telco Return Click this radio button if you want to define this CMTS for telco return (one-way) functionality only.
	Two way Click this radio button if you want to define this CMTS for the RF return (two way) functionality only.
	Three way Click this radio button if you want to define this CMTS for combined telco return and RF return (three-way) functionality.
Node Name	Enter a unique name that identifies this CMTS Device.
IP Address	Enter the IP Address of the CAR Ethernet interface in the nnn.nnn.nnn.nnn format.
Community	Enter the text string that allows SNMP access to this CMTS Device.
Enable Polling	Place a check in this box to allow CHM to poll this CMTS Device for its latest configuration and operational status. If you do not enable polling, CHM cannot access this device until you re-enable Polling using the <i>Edit Object</i> utility in the <i>Edit</i> menu.
Remember Community	Place a checkmark in this box if you want CHM to remember the SNMP community name each time to login to this device.

- 6 When you have finished making your entries, click **OK**.
- 7 Move your mouse over the *CMTS Map* window. Your mouse pointer changes into the shape of a PC.
- 8 Click anywhere in the *CMTS Map* window to drop your new *CMTS Device* icon in the window.



**New CMTS Device Dropped in CMTS Map Window**

**Editing a CMTS Device**

To edit the device attributes of an existing CMTS Device:

- 1 In the *CMTS Map* window, click the desired *CMTS Device* icon.
- 2 Click **Edit** on the *Menu Bar*.
- 3 Click **Edit Object**. The *Edit Device Attributes* dialog box appears
- 4 Make the desired changes in the dialog box. If necessary, refer to the *Creating a CMTS Device* section in this chapter for details on the entries.
- 5 Click **OK**. If you decide not to change the attributes, click **Cancel**.

**Deleting a CMTS Device**

To delete a CMTS Device:

- 1 In the *CMTS Map* window, click the *CMTS Device* you want to delete.
- 2 Click **Edit** on the *Menu Bar*.
- 3 Click **Delete**.

**Accessing a CMTS Device**

To access a *CMTS Device*:

- 1 Launch CHM by clicking on the **CHM Program Icon**.
- 2 Click **File** on the *Menu Bar*.
- 3 Click **Open Map**. The *CMTS Map* Window appears.
- 4 Select the *CMTS Device* you want to access in the *CMTS Map* window.
- 5 All toolbar icons related to the functionality of the device (one-way, two-way or three-way) automatically activate. Click on any menu item to access status or configuration information.



---

**Downloading New Software**

The CHM allows you to download the latest version of software to both the CAR and Dual URC in the CMTS. Procedures follow for both the CAR (one-way and two-way) and the Dual URC.

## Upgrading CAR Software

- 1 Obtain the latest version of CAR software. Contact your 3Com sales representative for details on obtaining the latest **nexxxxxx.dmf** file.
- 2 Save the **nexxxxxx.dmf** file to a local drive on your CHM PC.
- 3 Select the CMTS Device you want to upgrade from the *CMTS Map* window.
- 4 Click **File** on the Menu Bar.
- 5 Click **Software Download**. The *Software Download* dialog box appears.



**Software Download Dialog Box**

- 6 If it isn't enabled, click the **Cable Access Router** radio button. (For telco return CARs, the Cable Access Router radio button is enabled by default.)
- 7 Click **Add File...** to locate your **nexxxxxx.dmf** file and add it to the *Image Files* section in the center of the screen.
- 8 In the *Image Files* section, select the **nexxxxxx.dmf** file you want to use to upgrade the CAR.
- 9 Click **OK**. A screen appears informing you that the CAR is being prepared for the download. CHM then begins the software download. Progress is shown on the screen.
- 10 When the download is complete, CHM prompts you to reboot the CAR to initialize the new software. Click **Reboot**.

When the reboot finishes, the software download is complete.

## Upgrading Dual URC Software

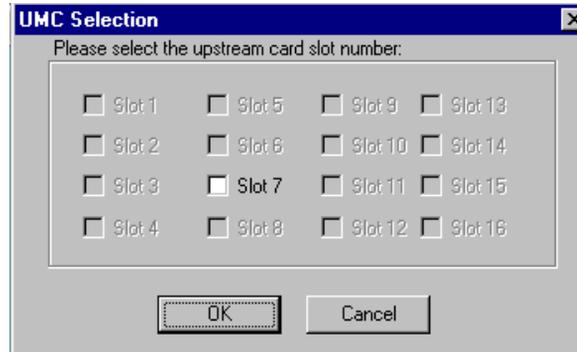
To upgrade an URC to the latest software version:

- 1 Obtain the latest version of URC software. Contact your 3Com sales representative for details on obtaining the latest **umcxxxxxx.lv** file.
- 2 Save the **umcxxxxxx.lv** file to a local drive on your CHM PC.
- 3 Select the *CMTS Device* you want to upgrade from the *CMTS Map* window.
- 4 Click **File** on the Menu Bar.
- 5 Click **Software Download**. The *Software Download* dialog box appears.



**Software Download Dialog Box**

- 6 If it isn't enabled, click the **UpStream** radio button. (For telco return CARs, the *UpStream* radio button is grayed out since the URC is not used in that architecture.)
- 7 Click **Add File...** to locate your **umcxxxxxx.lv** file and add it to the *Image Files* section in the center of the screen.
- 8 In the *Image Files* section, select the **umcxxxxxx.lv** file you want to use to upgrade the URC.
- 9 Click **OK**. A screen appears informing you that the CAR is being prepared for the download. When the preparation is complete, CHM begins to download the **umcxxxxxx.lv** file to the CAR's flash memory. Progress is shown on the screen.
- 10 When the download to the CAR's flash is complete, the *UMC Selection* dialog box appears.



**UMC (URC) Selection Dialog Box**

- 11** Place a check in the box next to the slot number(s) of the URC(s) you want to upgrade. You can choose as many as you like. The CAR can perform multiple downloads simultaneously. Boxes that are grayed out do not contain URCs.
- 12** After you have made your slot selection(s), click **OK**.
- 13** The software download from the CAR to the URC(s) begins. This can take up to 60 seconds per URC.
- 14** When the URC upgrade is complete, CHM prompts you to reboot the URC(s) to initialize the new software. Click **Reboot**.

When the reboot finishes, the software download is complete.

---

## Rebooting CMTS Elements

This subsection provides instructions on performing various types of CMTS reboot procedures:

- Rebooting a one-way CAR
- Rebooting a two-way CAR
- Rebooting a URC
- Rebooting a CMTS

### Rebooting a One-way CAR

To reboot a one-way (telco return) CAR:

- 1** Save any configuration changes you made before rebooting your CAR.
- 2** Click **Commands** on the Menu Bar.
- 3** Click **Reboot**.

- 4 Click **Reboot** in the confirmation dialog box.
- 5 The CAR reboots. The reboot may take two to four minutes. Progress displays on the screen (the *CMTS Device* icon background will change from Green to Red).

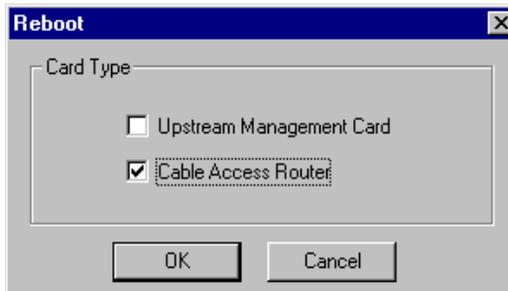


*While this CAR reboots, CHM will not allow you to use any configuration features to access this CAR. However, you can access other CMTS Devices in the CMTS Map window.*

### Rebooting a Two-way CAR

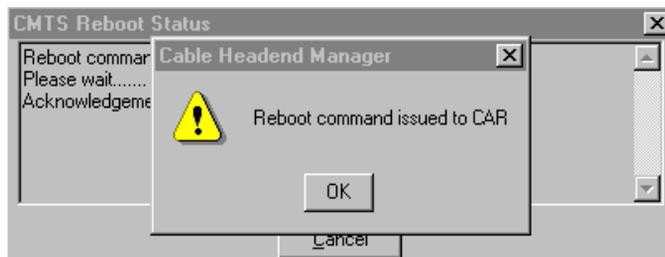
To reboot a two-way (RF return) CAR:

- 1 Save any configuration changes you made before rebooting the CAR.
- 2 Click **Commands** on the Menu Bar.
- 3 Click **Reboot**. The *Reboot* dialog box appears.



**Reboot Dialog Box**

- 4 Place a check in the *Cable Access Router* box.
- 5 Click **OK**.
- 6 The *CMTS Reboot Status* dialog box displays the SNMP reboot request and the response.



**CMTS Reboot Status Dialog Box**

- 7 When CHM informs you that the reboot command was issued to the CAR, click **OK**. The reboot begins. The reboot may take two to four minutes. Progress displays on the screen (the *CMTS Device* icon background will change from Green to Red).

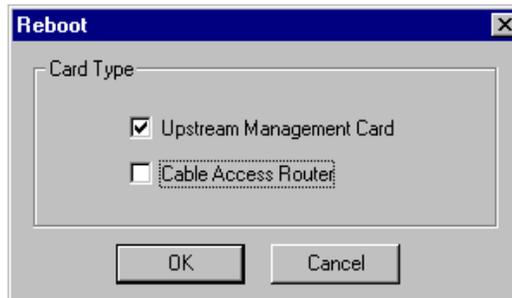


*When you reboot a CAR defined as the system clock master, all URC cards also reboot. However, any CARS defined as system clock backup masters in the chassis do not reboot. Rebooting a backup master CAR does not reboot any of the other cards in the chassis.*

### Rebooting a URC

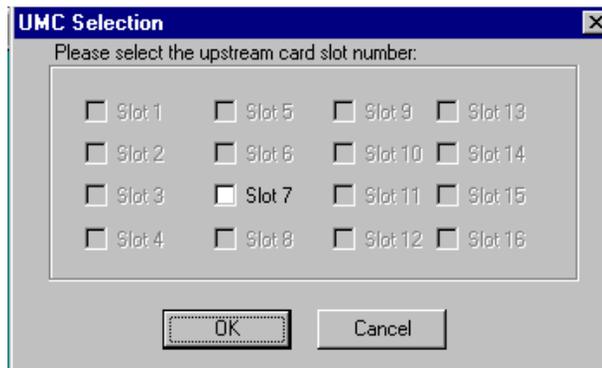
To reboot a URC:

- 1 Click **Commands** on the Menu Bar.
- 2 Click **Reboot**. The *Reboot* dialog box appears.



**Reboot Dialog Box**

- 3 Place a checkmark in the *Upstream Management Card* box.
- 4 Click **OK**. The *UMC (URC) Selection* dialog box appears.



**UMC (URC) Selection Dialog Box**

- 5 Choose the URC(s) you would like to reboot. Select all, if you would like to reboot all URCs.
- 6 Click **OK** to reboot the selected URC(s). The *CMTS Reboot Status* dialog box appears.

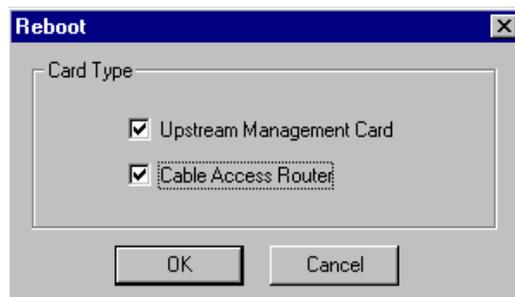


**CMTS Reboot Status Window**

- 7 When CHM informs you that the *Reboot* command was issued to the URC(s) you selected, click **OK**.
- 8 After the reboot completes, the URC(s) automatically re-connect to the CAR. To verify the URC connection status:
  - a Click **Display** on the Menu Bar.
  - b Click **Slot Status Info**. The connect status of all the URC(s) you rebooted displays.

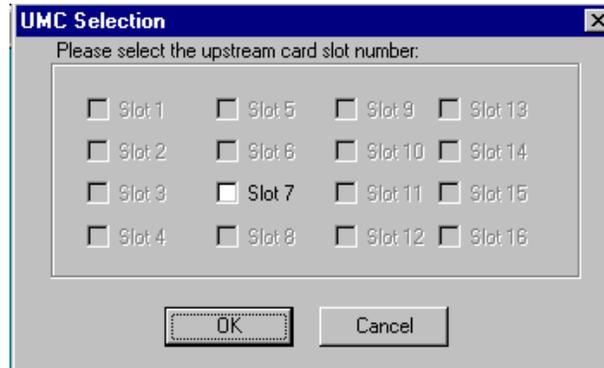
**Rebooting a CMTS** To reboot a CMTS:

- 1 Save any configuration changes you made before rebooting the CMTS.
- 1 Click **Commands** on the Menu Bar.
- 2 Click **Reboot**. The *Reboot* dialog box appears.



**Reboot Dialog Box**

- 3 Place checkmarks in both the *Upstream Management Card* and *Cable Access Router* boxes.
- 4 Click **OK**. The *UMC (URC) Selection* dialog box appears.



**UMC (URC) Selection Dialog Box**

- 5 Choose the URC(s) you would like to reboot.
- 6 Click **OK** to reboot the selected URCs.



**CMTS Reboot Status Dialog Box**

- 7 When CHM informs you that the *Reboot* command was issued to the CAR and URC(s), click **OK**. The reboot may take two to four minutes and progress is shown in the *CMTS Map* window (the *CMTS Device* icon background will change from Green to Red).



*When you reboot a CAR defined as the system clock master, all URC cards also reboot. However, any CARS defined as system clock backup masters in the chassis do not reboot. Rebooting a backup master CAR does not reboot any of the other cards in the chassis.*

## Saving and Restoring CMTS Configurations

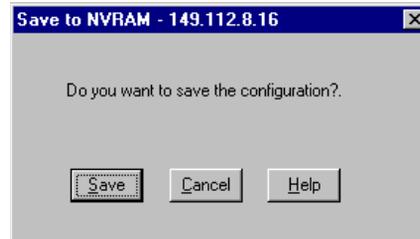
CHM allows you to backup and restore CMTS configurations so that you can always keep a duplicate copy and restore it if the currently installed configuration becomes damaged or otherwise unusable.

### Saving to NVRAM

CHM allows you to save your *CMTS Device* configuration to the CAR's Non-volatile Random Access Memory (NVRAM). Save your changes frequently.

To save your CMTS configuration to the CAR's NVRAM:

- 1 Click the **Save to NVRAM icon** on the toolbar. The *Save to NVRAM* dialog box appears.



**Save to NVRAM Dialog Box**

- 2 Click **Save**. If you decide you do not want to save to NVRAM, click **Cancel**.

Your configuration is saved to the CAR's NVRAM.



*Always use the Save to NVRAM feature before you use the Save Configuration utility to ensure that the saved configuration file on a local disk matches the configuration saved to the CAR's NVRAM.*

### Saving to a Local File

This feature allows you to save a copy of the CMTS configuration to a local disk drive. This allows you to restore an existing CMTS configuration, or to clone multiple *CMTS Devices* with the same configuration.



*Always use the Save to NVRAM feature before you use the Save Configuration utility if you want to ensure that the saved configuration file on a local disk matches the configuration saved to the CAR's NVRAM.*

- 1 Click the **Save Configuration icon** on the toolbar.
- 2 The Save As dialog box appears.



#### Save As Dialog Box

- 3 Specify a location and filename for the configuration.
- 4 Click **Save**. CHM saves the file, informs you of the results of the save, and displays the directory path where the file resides.



*If you have previously saved a configuration file to this location, CHM will ask you if you want to replace the existing one. To replace the existing file, click Yes, otherwise, click No.*



#### Save Configuration Confirmation Dialog Box

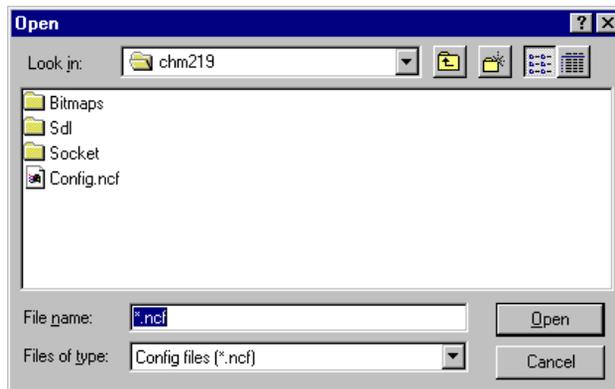
- 5 Click **OK** to return to the *CMTS Map* window.

## Restoring the Configuration

CHM allows you to restore a CMTS configuration that you saved to a local file with the *Save Configuration* feature. This feature is especially useful for restoring a CMTS whose configuration file has become damaged or unusable, or to clone multiple *CMTS Devices* with the same configuration.

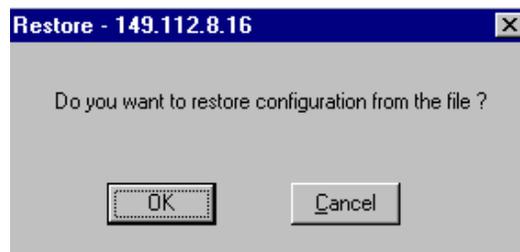
To restore a CMTS configuration:

- 1 Click the **Restore Configuration icon** on the toolbar.
- 2 Click **OK**. The *Open* dialog box appears.



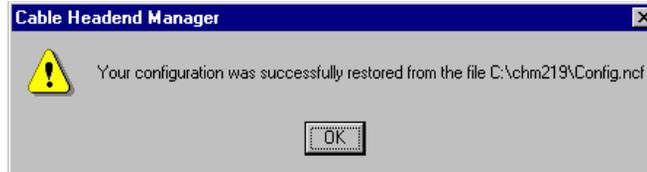
**Open Dialog Box**

- 3 Locate and select the configuration file (it has an **.ncf** extension) you want to restore.
- 4 Click **Open**. CHM prompts you for confirmation.



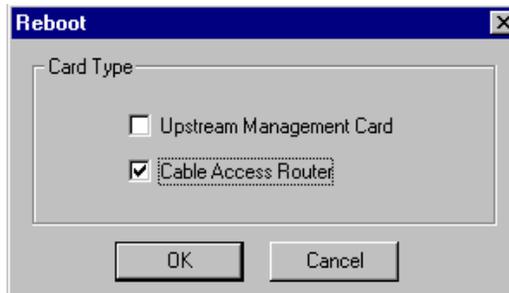
**CHM Restore Confirmation Dialog Box**

- 5 Click **OK** to initiate the restore (otherwise click **Cancel** to return to the *CMTS Map* window).



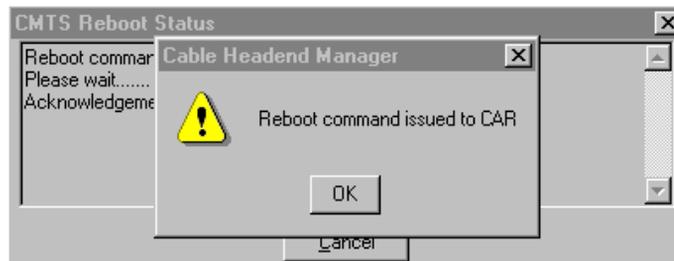
**Restore Status Dialog Box**

- 6 Click **OK**:
  - For one-way CARs, you are prompted to reboot the CMTS to initialize the restored configuration. Click **Reboot** to initialize the restored configuration file and complete the restore procedure.
  - For two-and three-way CARs, the *Reboot* dialog box appears.



**Reboot Dialog Box**

- 7 Place a check in the *Cable Access Router* box.
- 8 Click **OK**. The *CMTS Reboot Status* dialog box appears.



**CMTS Reboot Status Dialog Box**

- 9 When CHM informs you that the reboot command was sent to the CAR, click **OK**. The CAR reboots to initialize the restored configuration file. The reboot may take two to four minutes. Progress displays on the screen (the *CMTS Device* icon background will change from Green to Red).



When you reboot a CAR defined as the system clock master, all URC cards also reboot. However, any CARS defined as system clock backup masters in the chassis do not reboot. Rebooting a backup master CAR does not reboot any of the other cards in the chassis.

## Diagnostics

CHM provides you with several diagnostic tools which you can use to test network connectivity and view CMTS system event log messages.

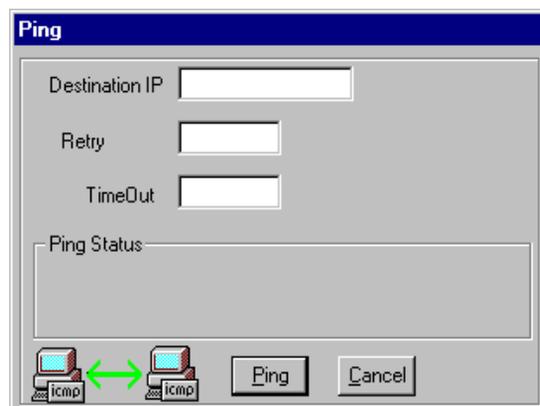
### PINGing a CMTS Network Device

The Packet InterNet Groper (PING) command tests CMTS network connectivity by sending an Internet Control Message Protocol (ICMP) message to the IP address of another device on the network. This helps you determine if another network component is up and connected properly.

This PING operation is performed from the CHM PC management station.

To PING a Device on the CMTS network:

- 1 Select a *CMTS Device* in the *CMTS Map* window.
- 2 Click **Fault** on the Menu Bar.
- 3 Click **Ping**. The *Ping* dialog box appears.



**PING Dialog Box**

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

### PING Dialog Box Entries

Entry	Description
Destination IP	Enter the IP address of the device you want to PING in the nnn.nnn.nnn.nnn format.
Retry	Enter how many times you want the CHM to attempt the PING operation before determining the device is unreachable. The default is 5.
Timeout	Enter the timeout, in milliseconds, for each PING <i>Retry</i> . The default is 5.
Ping Status	This section provides results of the PING operation once it starts.

- 5 Click **Ping**. The status of the operation displays in the *Ping Status* field.
- 6 Once you receive the results of the operation. You can either:
  - a Enter a *Destination IP* address and perform another *Ping*.
  - b Click **Cancel** to exit the *Ping* dialog box and return to the CHM main screen.

### PINGing Periodically

This feature is similar to the PING feature described above, with the following exceptions:

- The PING is performed by the CAR, and not the CHM PC management station.
- You can save customized PING operations and run them at any specified time.

To PING Periodically:

- 1 Select the *CMTS Device* from which you want to PING in the *CMTS Map* window.
- 2 Click **Fault** on the Menu Bar.
- 3 Click **Ping Periodic**.
- 4 Click **New**. The *Ping Entry* dialog box appears.

**PING (Periodic) Entry Dialog Box**

5 Make the entries described in the table that follows:

#### PING Periodic Entries

Entry	Description
Index	Enter a number that CHM will use to identify this <i>PING Periodic</i> definition. Valid entries are from 1 to 20.
Destination	Enter the IP address of the device you want to PING (in the nnn.nnn.nnn.nnn format).
Data Size	Enter the <i>number</i> of characters that you want to send in the PING data field.
Data	Enter the <i>actual</i> characters you want to send in the PING. The number of characters you enter must be identical to the number you entered in the <i>Data Size</i> field.
Timeout	Enter the amount of time, in seconds, that you want this CMTS Device to wait for a response before aborting the PING. This field <b>cannot</b> be modified when the <i>Row Status</i> field is set to <i>active</i> .
Count	Enter the number of ICMP ECHO requests you want sent in this PING sequence. If you enter 0, the CAR will continue to PING indefinitely until you delete this index entry, or disable it by changing the <i>Row Status</i> value to <i>NotInService</i> and clicking the <i>Set</i> button.
Interval	Enter the number of seconds between successive ECHO REQUEST request transmissions.
Time to Live	Enter the lifetime (in seconds) to be used for the ECHO REQUEST commands. If you enter 0 (zero) the CAR will use the previously configured value.

## PING Periodic Entries

Entry	Description
Self Destroy Delay	<p>Enter the number of minutes this PING definition is allowed to be in a state of inactivity before the CAR deletes it. If you enter 0, the CAR will not delete this entry. An entry is considered inactive anytime status is one of:</p> <ul style="list-style-type: none"> <li>■ notActive</li> <li>■ dnsFailed</li> <li>■ badAddress</li> <li>■ completed</li> <li>■ allocFailed</li> </ul>
Row Status	<p>Select one of these options to describe the operating status of this PING Periodic definition. Options are:</p> <ul style="list-style-type: none"> <li>■ Active: Activates an existing definition that has been set to the <i>NotInService</i> state.</li> <li>■ CreateAndGo: Activates a new PING Periodic definition.</li> <li>■ CreateAndWait: Select this status when you create a new definition, but don't want to activate it right away.</li> <li>■ Destroy: Deletes a definition.</li> <li>■ NotInService: Suspends the operation of a PING Periodic definition that is set to the <i>Active</i> status.</li> <li>■ Not Ready: Not used.</li> </ul>

6 Click **OK**.

7 Click **Set** to send your changes to the CAR.



*The PING Periodic dialog box updates its fields once every 15 seconds after you issue the Set command.*

8 Click **Exit** to return to the *CMTS Map* window.

### Sending USR Messages to a Cable Modem

CHM allows you to send User Station Restart (USR) messages to telco return cable modems. USR Request messages allow you to troubleshoot client modems in the event they have problems connecting to the Cable Access Router properly.

The command flags allow you to progressively narrow the focus of the USR message to isolate a problem.

To send USR messages to a cable modem:

- 1 Select the desired *CMTS Device* from the *CMTS Map* window.
- 2 Click **Commands** on the Menu Bar.
- 3 Click **Issue USR Msg**. The Issue USR Msg dialog box appears.

**USR Request**

CM's IP Address:

Command Flags

- Restart PPP Link
- Restart DHCP process
- Re-perform transfer of operational parameters
- Re-register with the CMTS
- Hang up Telco connection

Backoff Time:  Resend Count:

#### **Issue USR Message Dialog Box**

Make the entries described in the table that follows:

### Issue USR Message Entries

Entry	Description										
CM's IP Address	Enter the IP address of the cable modem to which you want to send USR messages.										
Command	Enter the command flag you want to send to the cable modem. There are five options. Each narrows the focus of information sent to the cable modem to help you isolate problems. Each is described below: <table border="1" data-bbox="344 444 1285 861"> <tbody> <tr> <td>Restart PPP Link</td> <td>Instructs the cable modem to tear down and then re-establish its link with the CMTS. The link is reestablished, and the cable modem asks the CMTS to resend PPP, DHCP, TFTP, and Registration information.</td> </tr> <tr> <td>Restart DHCP Process</td> <td>Instructs the cable modem to preserve its PPP link with the TRAC, but asks the CMTS to resend DHCP, TFTP, and Registration information.</td> </tr> <tr> <td>Re-perform transfer of operational parameters</td> <td>Instructs the cable modem to ask the CMTS to resend TFTP and Registration information.</td> </tr> <tr> <td>Re-register with the CMTS</td> <td>Instructs the cable modem to ask the CMTS to resend Registration information only.</td> </tr> <tr> <td>Hang up Telco Connection</td> <td>Instructs the CAR to hang up an existing connection with the cable modem.</td> </tr> </tbody> </table>	Restart PPP Link	Instructs the cable modem to tear down and then re-establish its link with the CMTS. The link is reestablished, and the cable modem asks the CMTS to resend PPP, DHCP, TFTP, and Registration information.	Restart DHCP Process	Instructs the cable modem to preserve its PPP link with the TRAC, but asks the CMTS to resend DHCP, TFTP, and Registration information.	Re-perform transfer of operational parameters	Instructs the cable modem to ask the CMTS to resend TFTP and Registration information.	Re-register with the CMTS	Instructs the cable modem to ask the CMTS to resend Registration information only.	Hang up Telco Connection	Instructs the CAR to hang up an existing connection with the cable modem.
Restart PPP Link	Instructs the cable modem to tear down and then re-establish its link with the CMTS. The link is reestablished, and the cable modem asks the CMTS to resend PPP, DHCP, TFTP, and Registration information.										
Restart DHCP Process	Instructs the cable modem to preserve its PPP link with the TRAC, but asks the CMTS to resend DHCP, TFTP, and Registration information.										
Re-perform transfer of operational parameters	Instructs the cable modem to ask the CMTS to resend TFTP and Registration information.										
Re-register with the CMTS	Instructs the cable modem to ask the CMTS to resend Registration information only.										
Hang up Telco Connection	Instructs the CAR to hang up an existing connection with the cable modem.										
Backoff Time	Enter the amount of time, in seconds, that you want the CMTS to wait for acknowledgment of a command flag from the cable modem before resending the command.										
Resend Count	Enter the number of times you want the CMTS to resend a command flag if the cable modem fails to respond during the specified <i>Backoff Time</i> .										

- 4 Click **Send** to issue the USR message to the cable modem.



*CHM provides no confirmation that the cable modem received the message. If the cable modem has a status message log, that log will notify you that if the USR message was received.*

### Viewing Syslog Messages

System event log (Syslog) messages allow you to view real-time logs that describe the events and traffic flow through all CMTS Devices connected to CHM.

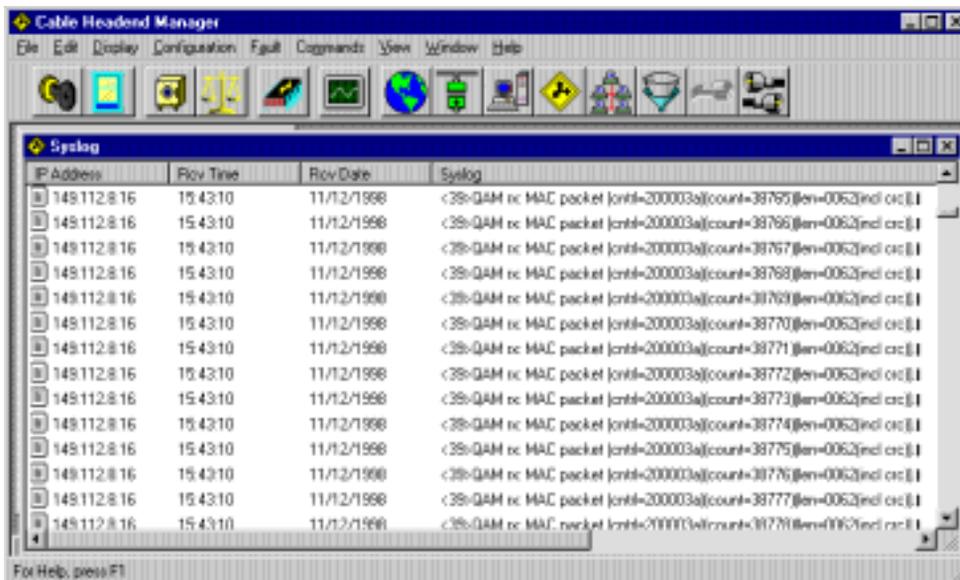
The messages display in real-time and begin logging only when you open the *Syslog* window. No events that occurred before opening the *Syslog* window are available for display. Once you close the *Syslog* window, the messages are lost unless you first save them with the *Save Syslog* feature on the *File* menu.



You must define your CHM PC management station as a Log Host for each CMTS Device which will be sending their Syslog messages to CHM. Refer to the Adding a Log Host procedure in this chapter for details.

To view syslog messages via CHM:

- 1 Select the *CMTS Device* for which you want to view syslog messages from the *CMTS Map* window.
- 2 Click **Fault** on the Menu Bar.
- 3 Click **View Syslog**. The *Syslog Message* window appears. An example follows.



**Syslog Window**

The *Syslog* window fields are described in the table that follows.

### Syslog Field Descriptions

Field	Description
IP Address	This is the Ethernet IP address of the CAR that is associated with this syslog message.
Rcv Time	Time of day (in military format) that this system event occurred.
Rcv Date	Month, date, and year that corresponds to the <i>Rcv Time</i> .
Syslog	A description of the event.

- 4 Close the *Syslog* window to return to the *CMTS Map* window.

### Saving Syslog Messages

This feature allows you to save Syslog (System Event Log) messages to a local file on your CHM PC management station. Syslog messages allow you to view real-time logs that describe the events and traffic flow through all CMTS Devices connected to a CHM PC management station.

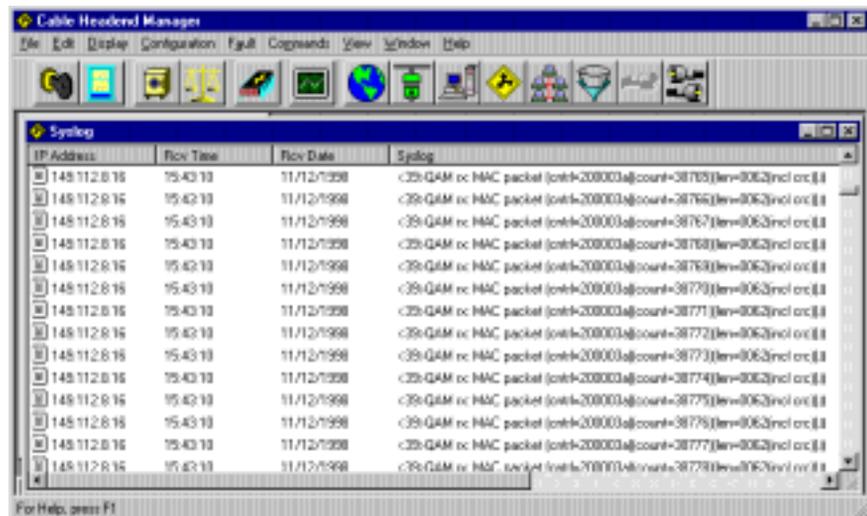
The messages display in real-time and begin logging only when you open the *Syslog* window. No events that occur before opening the *Syslog* window are available for display. Once you close the *Syslog* window, the messages are lost unless you first save them with the *Save Syslog* feature.



*You must define your CHM PC management station as a Log Host for each CMTS Device that will be sending their Syslog messages to CHM. Refer to the Adding a Log Host procedure in this chapter for details.*

To save syslog messages:

- 1 Select the *CMTS Device* for which you want to view syslog messages from the *CMTS Map* window.
- 2 Click **Fault** on the Menu Bar.
- 3 Click **View Syslog**. The *Syslog Message* window appears.



**Syslog Message Window**

- 4 Click **File** on the Menu Bar.

- 5 Click **Save Syslog**.
- 6 Enter a filename and specify directory path to which you want to save the syslog messages.
- 7 Click **Save**. The system event log for this CMTS is saved to a file.
- 8 Close the *Syslog* window to return to the *CMTS Map* window.



# 4

## CONFIGURATION TASKS

This chapter describes how to use the Cable Headend Manager (CHM) Configuration menu to perform a variety of configuration tasks to help you run the 3Com data over cable system.

- Configuring Networks
- Adding Hosts
- Adding Routes
- Adding and Applying Filters
- Configuring Global System Information
- Configuring Servers

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### Configuring Networks

This section provides details editing/configuring the following networks CMTS networks:

- Ethernet IP Network
- Cable IP Network

### Editing the Ethernet IP Network

The CMTS *Ethernet IP Network* allows the CAR to communicate with the cable headend LAN and the Internet/Gateway Router.

To edit the Ethernet IP Network:

- 1 Click **File** on the *Menu Bar*.
- 2 Click **Open Map**. The *CMTS Map* window appears.
- 3 Select the *CMTS Device* for which you want to define the Ethernet IP Network.
- 4 Click **Configuration** on the Menu Bar.
- 5 Click **Networks**. The *Interfaces* dialog box appears.

- 6 Select the **eth:1** interface from the list.
- 7 Click **Edit**. The *Ethernet IP Network Configuration* dialog box appears.

**Ethernet IP Network Configuration Dialog Box**

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

#### Ethernet IP Network Configuration Entries

Section/Field	Description
Name	Enter a unique name that identifies this network to the CAR. Limited to 32 characters. This name will appear on the <i>Ethernet IP Networks</i> tab of the <i>Networks</i> dialog box.
Frame	Choose the Ethernet frame type you want used on this network from the drop-down menu: <ul style="list-style-type: none"> <li>■ Ethernet II: Ethernet Version 2 frame.</li> <li>■ SNAP: (Subnetwork access protocol) IEEE 802.3 frame with a SNAP field.</li> </ul>
Address/Mask	Enter the IP address and subnet mask you want to assign to this Ethernet IP network. For example: 192.77.102.110/255.255.255.255. The subnet mask is optional. If you do not specify a subnet mask, the system assigns the default mask for the address class you enter.
Routing Protocol	Optional. Specify the IP routing protocol you want to use on this Ethernet interface, if any: <ul style="list-style-type: none"> <li>■ none: Don't use a routing protocol.</li> <li>■ RIPV1: Use Routing Information Protocol Version 1</li> <li>■ RIPV2: Use Routing Information Protocol Version 2.</li> </ul>

## Ethernet IP Network Configuration Entries

Section/Field	Description
Routing Policies	If you enabled a <i>Routing Protocol</i> , place a checkmark to activate, or remove a checkmark to disable, the following routing policies (all are enabled by default).
Send Default	Causes the router to advertise itself as the default router.
Send Routes	Tells RIP to advertise (broadcast) its routes on the network every 30 seconds
Send Subnets	Send only routes with the same network and with subnets on the same network.
Accept Defaults	Accept default route advertisements from other routers.
Silent	For use only if you enabled RIPV2 as the Routing Protocol. Instructs the CAR not to send out route updates to other routers.
Split Horizon	Use the split horizon route update technique. This can help avoid routing loops and slow convergence of routing tables.
Poison Reverse	Can be used with Split Horizon for further help in avoiding loops and slow convergence of routing tables.
Flash Update	Also known as triggered update. Immediately sends a routing table update when a router becomes unavailable, without waiting for the next periodic update.
Simple Authentication	For use only if the RIPV2 routing protocol is enabled. Instructs the CAR not to send out route updates to other routers.
Send RIPV1	Send RIPV1 updates through this interface. Enabling this policy has no effect if you set the Routing Protocol to RIPV2.
Receive RIPV1	Controls the receipt of RIPV1 updates. When RIPV1 is enabled as the Routing Protocol, this policy is enabled by default. This means that RIPV1 packets are received. When RIPV2 is enabled as the Routing Protocol, this policy is enabled by default, meaning RIPV1 packets are received.
Receive RIPV2	Controls receipt of RIP version 2 updates. When RIPV1 is selected as the Routing Protocol, this policy is enabled by default. It allows RIPV1 packets to be received. When RIPV2 is selected as the Routing Protocol, this policy is enabled by default, allowing RIPV2 packets to be received.
Broadcast Address	Specify which IP broadcast address to use: <ul style="list-style-type: none"> <li>■ all 1's (used by most networks)</li> <li>■ all 0's (zeroes)</li> </ul>
Max Reassembly	Specify the maximum size IP datagram (in bytes) that the system will try to reassemble when the datagram has been fragmented to fit in the network packet size. The default is 3468 bytes.

9 Click **OK**. (The *Networks* dialog box now displays your Ethernet IP Network).

10 Click **Set** to send your settings to the CAR.

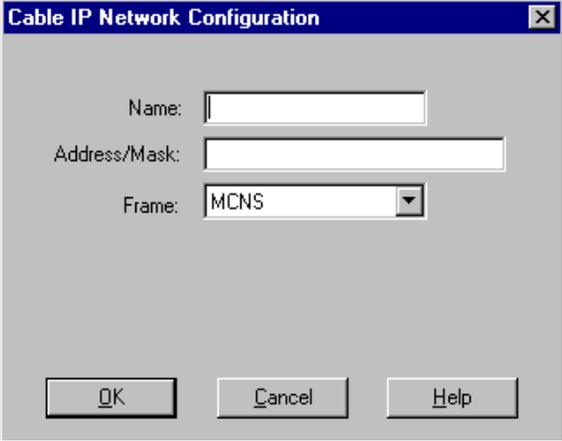
- 11 Click **Exit** to return to the *CMTS Map* window.

### Configuring a Cable IP Network

The *Cable IP Network* allows the CAR to transmit data to the QAM Modulator for transmission downstream to cable modems.

To configure a Cable IP Network:

- 1 Select the *CMTS Device* for which you want to create a Cable IP Network from the *CTMS Map* window.
- 2 Click **Configuration** on the Menu Bar.
- 3 Click **Networks**.
- 4 Click the **Cable IP Network** tab.
- 5 Click **New**. The *Cable IP Network Configuration* dialog box appears.



The screenshot shows a dialog box titled "Cable IP Network Configuration". It has a blue title bar with a close button (X) on the right. The main area is light gray and contains three input fields: "Name:" with an empty text box, "Address/Mask:" with an empty text box, and "Frame:" with a dropdown menu showing "MCNS". At the bottom, there are three buttons: "OK", "Cancel", and "Help".

**Cable IP Network Configuration Dialog Box**

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

## Cable IP Network Configuration Entries

Field	Description
Name	Enter a unique name that the CAR can use to identify this Cable IP Network. Limited to 32 characters. This name will appear on the <i>Cable IP Networks</i> tab in the <i>Networks</i> dialog box.
Address/Mask	Enter the IP address and subnet mask you want to assign to this Cable IP Network. For example: 192.77.102.110/255.255.255.255. The subnet mask is optional. If you do not specify a subnet mask, the system assigns the default mask for the address class you enter. If you enter a subnet mask, you must enter it in the nnn.nnn.nnn.nnn format.
Frame	The only choice is <i>MCNS</i> (DOCSIS). This is the frame type (encapsulation) used on this Cable IP Network.

7 Click **OK**.

8 Click **Set** to send your settings to the CAR.

9 Click **Exit** to return to the *CMTS Map* window.

## Adding Hosts

This section provides instructions for adding Hosts to the CMTS via CHM:

- Adding a System Event Log Host
- Adding an SNMP Host
- Adding an SNMP Trap Host
- Adding a TFTP Client

### Adding a System Event Log Host

The CHM can send system event log (Syslog) messages to a host workstation defined on your network. You can use this host to view real-time messages that describe the events and data traffic occurring in a particular CMTS.

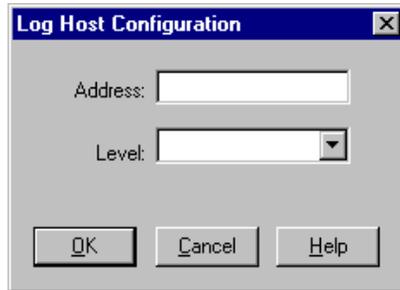
To add a System Event Log Host:

1 Click **Configuration** on the Menu Bar.

2 Click **Hosts**.

3 Click the **Log Hosts** tab.

4 Click **New**. The *Log Host Configuration* dialog box appears.



**Log Host Configuration Dialog Box**

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

#### Log Host Configuration Entries

Field	Description
Address	Enter the IP address of the System Event Log Host workstation to which you want to send system event log messages in the nnn.nnn.nnn.nnn format. Event Log messages are not sent if you do not specify an IP address.
Level	Select the error reporting level for system event log messages that you want to send to the <i>Address</i> you specified above. There are five options, listed from the least output to the most output. Each succeeding level includes the output from the preceding level.
Critical	A serious error from which the system may not be able to recover.
Unusual	An abnormal event from which the system should be able to recover.
Common	A regularly occurring, infrequent event.
Verbose	A regular periodic event. For example, a routing update message.
Debug	For low-level debugging and diagnostics only.

- 6 Click **OK**.
- 7 Click **Set** to send your settings to the CAR.
- 8 Click **Exit** to return to the *CMTS Map* window.



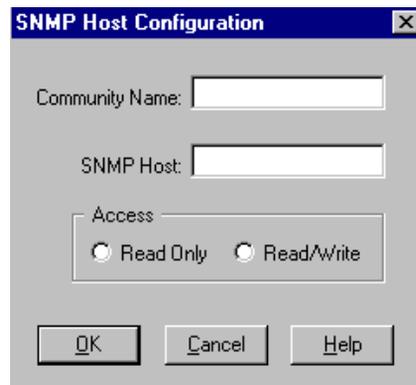
*Use the View Syslog feature described in Chapter 3 or a third-party syslog daemon to view the system event log messages.*

#### **Adding an SNMP Host**

An SNMP host provides SNMP (and CHM) access to the *CMTS Device* selected in the *CMTS Map* window. These hosts allow you to manage where and how personnel can gain configuration access to CMTS Devices defined on your network.

To create an SNMP host:

- 1 Click **Configuration** on the Menu Bar.
- 2 Click **Hosts**.
- 3 Click the **SNMP** tab.
- 4 Click **New**. The *SNMP Host Configuration* dialog box appears.



**SNMP Host Configuration Dialog Box**

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

#### SNMP Host Configuration Entries

Field	Description
Community Name	Enter the string required for SNMP access to this CMTS Device. Limited to 32 characters.
SNMP Host	Enter the IP address of the host (an SNMP manager such as CHM) in the nnn.nnn.nnn.nnn format. If you enter an address of 0.0.0.0, CHM allows SNMP access from any workstation.
Access	Specify the type of access you want to allow to SNMP MIB files available on the <i>SNMP Host</i> you identified above:
Read Only	Allow viewing only of SNMP MIB files. This is the default.
Read/Write	Allow both viewing and configuration access to SNMP MIB files.

- 6 Click **OK**.
- 7 Click **Set** to send your settings to the CAR.
- 8 Click **Exit** to return to the *CMTS Map* window.

## Adding an SNMP Trap Host

SNMP Trap Hosts receive SNMP-specific events sent by SNMP software agents on cable headend network devices.



*You must use a third-party SNMP Trap viewing software to view the SNMP Trap messages.*

To create an SNMP Trap Host:

- 1 Click **Configuration** on the Menu Bar.
- 2 Click **Hosts**.
- 3 Click the **SNMP Trap Hosts** tab.
- 4 Click **New**. The *SNMP Trap Host Configuration* dialog box appears.

**SNMP Trap Host Configuration Dialog Box**

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

### SNMP Trap Host Configuration Entries

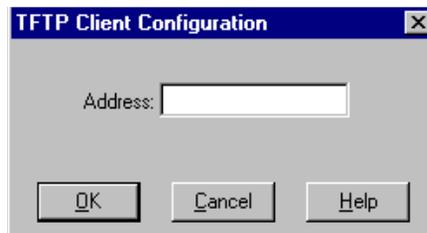
Parameter	Description
Community Name	Enter a string which must be entered by the user who wants to view SNMP Trap information. Limited to 32 characters.
SNMP Trap Host	Enter the IP address of the workstation you want to define as the SNMP Trap Host (in the nnn.nnn.nnn.nnn format).

- 6 Click **OK**.
- 7 Click **Set** to send your settings to the CAR.
- 8 Click **Exit** to return to the *CMTS Map* window.

**Adding a TFTP Client** When you create a TFTP client, you provide that client with the ability to use the Trivial File Transfer Protocol to transfer CMTS software upgrade files to the CAR.

To create a TFTP client:

- 1 Click **Configuration** on the Menu Bar.
- 2 Click **Hosts**.
- 3 Click the **TFTP Host** tab.
- 4 Click **New**. The *TFTP Client Configuration* dialog box appears.



**TFTP Client Configuration Dialog Box**

- 5 In the *Address* field, enter the IP address of the client to which you want to allow TFTP access to the CAR. Enter the address in the nnn.nnn.nnn.nnn format.
- 6 Click **OK**.
- 7 Click **Set** to send your setting to the CAR.
- 8 Click **Exit** to return to the *CMTS Map* window.

---

## Adding Routes

This section provides instructions for adding IP route information to the CMTS via CHM:

- Adding an IP Route
- Adding an ARP Table Entry
- Configuring a Default Gateway

### Adding an IP Route

This feature allows you to add IP routes (static routes) manually to the CAR's routing table. The IP routes you add with this feature take precedence over routes learned dynamically through RIP.

To add an IP route:

- 1 Select the desired *CMTS Device* from the *CMTS Map* window.
- 2 Click **Configuration** on the Menu Bar.
- 3 Click **Internet Protocol**.
- 4 Click **Routes Table**.
- 5 Click **New**. The *IP Route Configuration* dialog box appears.

**IP Route Configuration Dialog Box**

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

#### IP Route Configuration Entries

Entry	Description
Destination	Enter the IP network address (in the nnn.nnn.nnn.nnn format) of the network requiring a static route,
Metric	Enter a number which expresses the distance from the CAR to the <i>Destination</i> IP address. Valid entries are from 1 to 15.
Gateway	Enter the IP address of the Default Internet/Gateway router, in the nnn.nnn.nnn.nnn format.
Netmask	Enter the subnet mask for the <i>Destination</i> IP address, the format nnn.nnn.nnn.nnn (e.g., 255.0.0.0). If you do not specify a mask, the system assigns the default mask for the class of address you entered.

- 7 Click **OK**.
- 8 Click **Set** to send your setting to the CAR.
- 9 Click **Exit** to return to the *CMTS Map* window.

**Adding an ARP Entry** This feature allows you to configure the CAR Address Resolution Protocol (ARP) table. It allows you to map MAC addresses to IP addresses. TCP/IP requires ARP for use with Ethernet.

To add an ARP entry:

- 1 Select the desired *CMTS Device* from the *CMTS Map* window.
- 2 Click **Configuration** on the Menu Bar.
- 3 Click **Internet Protocol**.
- 4 Click **ARP Table**.
- 5 Click **New**. The *Update ARP Table* dialog box appears.

**Update ARP Table Dialog Box**

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

#### Update ARP Table Entries

Entry	Description
Interface Name	Select the interface to which you want to map this network device. Choices are: <ul style="list-style-type: none"> <li>■ eth:1: The CAR's Ethernet IP Network interface</li> <li>■ qam:1: The CAR's Cable IP Network interface</li> </ul>
IP Address	Enter the IP address of the device you want to add to the ARP table, in the nnn.nnn.nnn.nnn format.
MAC Address	Enter the MAC (or physical) address of the device in the nn-nn-nn-nn-nn-nn format.

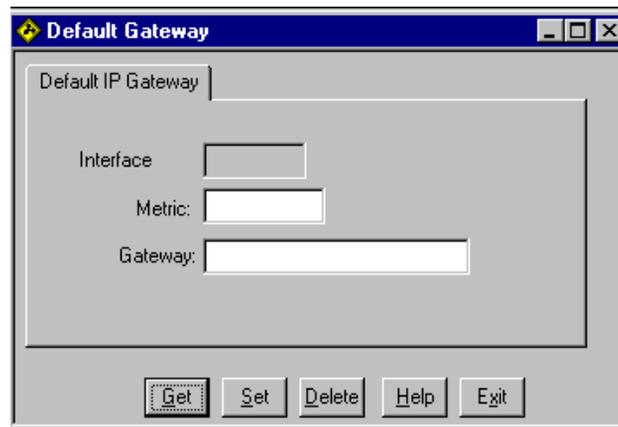
- 7 Click **OK**.
- 8 Click **Set** to send your setting to the CAR.
- 9 Click **Exit** to return to the *CMTS Map* window.

## Configuring a Default Gateway

The Default Gateway is the headend network router to which the CAR sends data not addressed to the headend LAN.

To configure a default gateway:

- 1 Select the desired *CMTS Device* from the *CMTS Map* window.
- 2 Click **Configuration** on the Menu Bar.
- 3 Click **Internet Protocol**.
- 4 Click **Default Gateway**. The *Default Gateway* dialog box appears.



**Default Gateway Dialog Box**

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

### Default Gateway Configuration Entries

Entry	Description
Interface	Read only. This is the interface index name assigned to the CAR's Ethernet IP Network.
Metric	Enter the number of hops from the CAR to the Default Gateway Router.
Gateway	Enter the IP address of the Default Gateway router in the nnn.nnn.nnn.nnn format.

- 6 Click **Set** to send your settings to the CAR.
- 7 Click **Exit** to return to the *CMTS Map* window.

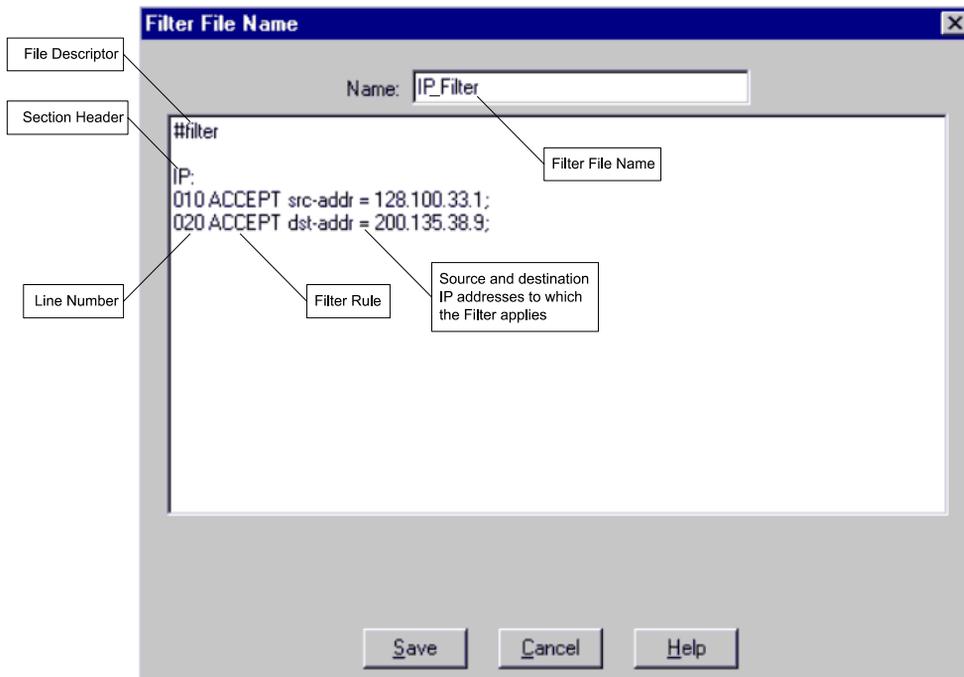
## Adding and Applying Filters

This section describes how to add and apply filters to a selected *CMTS Device* interface. Filters allow you to restrict access and services based on the following network characteristics.

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

**Adding a Filter** To create a filter:

- 1 Click **Configuration** on the Menu Bar.
- 2 Click **Filters**.
- 3 Click **New** (or to modify an existing filter, select a filter from the list and click **Edit**). The *Filter File Name* Dialog Box appears.



### Filter File Configuration Screen

- 4 In the *Name* field, type a name for the filter file you will create.

- 5 Move the cursor to the text section of the screen.
- 6 Create the filter (refer to the illustration above):
  - a Type the following file descriptor exactly as it appears below on the first line:  
**#filter**
  - b Type a file section header followed by a colon for the protocol rules you want to define. For example, to define IP filtering rules, type the following section header:  
**IP:**
  - c Type the protocol rules for the protocol section you are defining. Observe the following guidelines:
    - Begin each rule with a unique line number (from 1 to 999).
    - Arrange rules in increasing order within each protocol section.
    - Arrange rules so the rules you expect to be matched most frequently are toward the top of the list.
    - Delimit each rule with a semi-colon.

*For example:*

```
IP:
010 ACCEPT scr-addr = 128.100.33.1;
020 ACCEPT dst-addr = 200.135.23.9;
```

In this example, IP data is transmitted by the CAR from the source IP address of 128.100.33.1 to the destination IP address 200.135.23.9.

- d Continue to define protocol rules for each protocol section you want to define.
- e Click **Save** to return to the *Files* tab.
- f Click **Set** to send the Filter File to the CAR.
- g Click **Get** to verify that your Filter File contains no errors. If CHM informs you of any errors, repeat this procedure to correct them.



*You can comment out any portion of the filter file **after** the file descriptor by entering # at the beginning of the line. This is useful if you want to insert a placeholder for a filter file element you will define in the future. For example:*

```
#010 ACCEPT scr-addr = 128.100.33.1;
```

## Applying Filters to an Interface

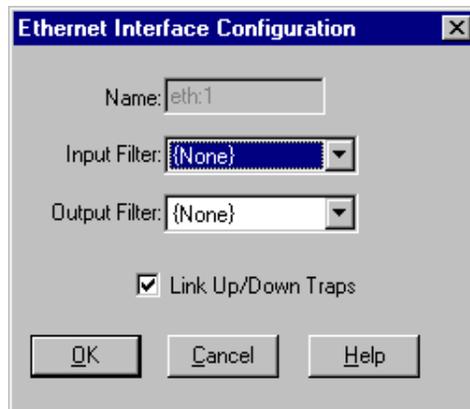
Filters can be applied to the Ethernet IP Network or Cable IP Network Interfaces that you define for each CMTS Device.



For an explanation of filters and instructions on creating them, see the *Adding a Filter* section in this chapter.

To apply a filter to a defined CMTS interface:

- 1 Select the desired *CMTS Device* from the CMTS Map window.
- 2 Click **Configuration** on the Menu Bar.
- 3 Click **Interfaces**.
- 4 Click the **Ethernet** or **Cable Downstream** tab, depending on the type of interface to which you want to apply the filter(s). In this example, we use the *Ethernet IP Interface*.
- 5 Select the interface on which you want to apply the filter(s).
- 6 Click **Edit**. The *Ethernet Interface Configuration* dialog box appears.



**Ethernet Interface Configuration Dialog Box**

- 7 From the *Input Filter* drop-down menu, select the filter you want to apply to data transmitted *to* the CAR Ethernet Interface.
- 8 From the *Output Filter* drop-down menu, select the filter you want to apply to data transmitted *from* the CAR Ethernet Interface.
- 9 Click **OK**.
- 10 Click **Set** to send your changes to the CAR.
- 11 Click **Exit** to return to the *CMTS Map* window.

## Configuring Global System Information

Global System Information provides you with basic identification information about the *CMTS Device* selected in the *CMTS Map* window.

To configure global system information:

- 1 Select the desired *CMTS Device* from the *CMTS Map* window.
- 2 Click **Configuration** on the Menu Bar.
- 3 Click **Globals**. The *Globals System Configuration* dialog box appears.

**Globals System Configuration Dialog Box**

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

### Global System Configuration Entries

Entry	Description
Name	Optional. Enter a name that identifies this CMTS Device to the networks to which you will be connecting. Limited to 64 characters.
Location	Optional. Enter a name that identifies where this CMTS Device is located. Limited to 64 characters.
Contact	Enter the name and/or work phone number of the person who is the primary administrative contact for this CMTS.
Host Type	Not used.

## Global System Configuration Entries

Entry	Description
Host Selection	Not used.
SNMP Traps	Place a check in this box to enable SNMP traps. Leave it unchecked to disable SNMP traps. If you enable SNMP traps, certain error conditions cause the CAR to send an alert message to your SNMP management application.
Command Prompt	Enter a string that displays when a dial-in remote site is connected to this CMTS Device.
Message Prompt	Not used.
Service Prompt	Not used.
Authorization String	Enter the authorization string identical to that the one used in the cable modem configuration file that resides on the TFTP server at the cable headend. If this string is not identical, no cable modems will be able to register with this CMTS Device. For more information on the authorization string and the cable modem configuration file, refer to the <i>Cable Modem Configuration File Editor User Guide</i> .

- 5 Click **OK**.
- 6 Click **Set** to send your changes to the CAR.
- 7 Click **Exit** to return to the *CMTS Map* window.

**Configuring Servers** This section provides instructions for configuring RADIUS and TOD servers.

**Configuring a RADIUS Server** Remote Authentication Dial-in User Service (RADIUS) servers can be used to authenticate dial-in users in both one-way and three-way 3Com data over cable systems.



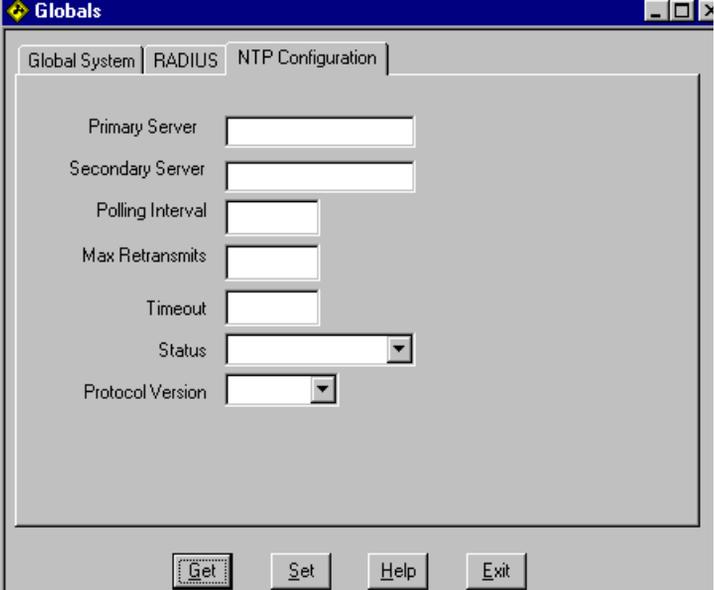
*RADIUS server configuration is not currently supported in CHM. For information on configuring RADIUS servers, refer to your Telco Return Access Concentrator (TRAC) documentation.*

### Configuring a TOD Server

The Time of Day (TOD) server is required to synchronize the time value in the CMTS with the cable modems assigned to that CMTS. This ensures that related cable modem and CMTS event log messages display an accurate time sequence.

To configure the TOD Server:

- 1 Select the desired *CMTS Device* in the *CMTS Map* window.
- 2 Click **Configuration** on the Menu Bar.
- 3 Click **Globals**.
- 4 Click the **NTP Configuration** tab. The *NTP Configuration* dialog box appears.



The screenshot shows a window titled "Globals" with three tabs: "Global System", "RADIUS", and "NTP Configuration". The "NTP Configuration" tab is active. The dialog box contains the following fields and controls:

- Primary Server:
- Secondary Server:
- Polling Interval:
- Max Retransmits:
- Timeout:
- Status:  (dropdown arrow)
- Protocol Version:  (dropdown arrow)

At the bottom of the dialog box, there are four buttons: "Get", "Set", "Help", and "Exit".

**NTP Configuration Dialog Box**

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

**NTP Configuration Entries**

<b>Entry</b>	<b>Description</b>
Primary Server	Enter the IP address or host name of the primary Network Time Protocol (NTP) server that this CMTS Device will query for time synchronization.
Secondary Server	Enter the IP address or host name of the secondary NTP server that CMTS Device will query for time synchronization if the Primary Server is unavailable.
Polling Interval	Enter the interval (in seconds) used by this CMTS Device to obtain time synchronization information from the NTP Server. Valid entries are from 64 seconds to 1024 seconds. The default is 600 seconds (10 minutes).
Max Retransmits	Enter the maximum number of times the CMTS should transmit time synchronization requests to the NTP Server before the server is considered unavailable. Valid entries are from 1 to 200. The default is 5.
Timeout	Enter the number of seconds you want to define as an NTP Server request time-out. For example, if you enter 5, the CMTS will wait for a response 5 seconds after sending a time synchronization request to an NTP server before considering it unreachable. Valid entries are from 1 to 60 seconds. The default is 10 seconds.
Status	From the drop-down menu, select <b>True</b> to enable NTP time synchronization for this CMTS. Otherwise, select <b>False</b> to disable it.
Protocol Version	From the drop-down menu, select the protocol version that CMTS Device will use to send NTP client requests to an NTP Server. Options are: <ul style="list-style-type: none"><li>■ ntpV3</li><li>■ ntpV4</li></ul>

**6** Click **OK**.

**7** Click **Set** to send your changes to the CAR.

**8** Click **Exit** to return to the *CMTS Map* window.



# 5

## CONFIGURING DOCSIS ATTRIBUTES

This chapter describes how to use Cable Headend Manager (CHM) to configure all Data Over Cable System Interface Specification (DOCSIS) attributes on the 3Com Cable Modem Termination System (CMTS).

- DOCSIS Attribute Overview
- Configuring a One-way CMTS
- Configuring a Two-way CMTS

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### DOCSIS Attribute Overview

DOCSIS attributes are required for all *CMTS Devices* to interoperate with DOCSIS compliant cable modems.

The table that follows describes the configuration tasks required for both one-way and two-way DOCSIS attribute configuration of a CMTS Device. Perform all of the tasks described if you are using the CMTS for three-way functionality.



*Only configure these attributes if you are familiar with the DOCSIS standards and if you have advanced knowledge of the physical layer of an RF signal.*

### MCNS Attributes Configuration Task Descriptions

CAR Type	Configuration Task	Description
One-way (telco return) only	Attributes	Defines the characteristics of the broadcast messages sent downstream to enable cable modems to register and connect with the CMTS.
	Termination System Information	Defines the content of the Telephony Channel Descriptor broadcast messages sent downstream to cable modems.
	Service Provider Descriptor	Provides dialing and access instructions for cable modems connecting and registering with the CMTS.
Two-way (RF return only)	Downstream Channel	Sets the downstream channel data transmission parameters that will be used by the QAM Modulator to send data to cable modems.
	Upstream Channel	Defines the DOCSIS-specific Universal Channel Descriptor (UCD) settings that the CAR will broadcast to two-way modems so they can lock onto an upstream channel identifier and register with the CMTS.
	Upstream Channel Vendor Extension	Defines the 3Com-specific upstream parameters required by the Upstream Receiver Card (URC) so that it can function properly in the 3Com CMTS. Also sets the error thresholds that determine whether the CMTS should automatically change the frequency being used for upstream data transmissions.
	Upstream Burst Profile	Sets the 3Com-specific upstream burst profile that governs how URCs can send data during their assigned mini-slot.
	UFC Frequency	Defines the frequency the CMTS will automatically change to when the <i>Upstream Channel Vendor Extension</i> error thresholds are exceeded.
	MAC Interface	Sets the Media Access Control (MAC) interface attributes that are common to all URC(s) installed in a <i>CMTS Device</i> .
	Three-way (both telco return and RF return)	All tasks listed above.

### Configuring DOCSIS Attributes for a One-Way CMTS

To configure the Telco Return CAR DOCSIS attributes:

- 1 Select a Telco Return or three-way CMTS Device from the *CMTS Map Window*.
- 2 Click **Configuration** on the Menu Bar.
- 3 Click **MCNS**.
- 4 Click **Telco Return**. The *MCNS Telco Return Configuration* dialog box appears.

5 Continue with *Attributes*.

**Attributes** To configure the *Attributes*:

1 Click the **Attributes** tab. The *Attributes* dialog box appears.

**Attributes Dialog Box**

2 Make the entries described in the table that follows.

#### Telco Return CAR Attributes Configuration Entries

Entry	Description
Frequency of TCD Msg	Enter how often, in milliseconds, you want the CAR to broadcast TCD messages downstream to cable modems. The TCD message contains the <i>Service Provider Descriptor</i> , which is configured on the <i>Service Providers</i> tab. Valid entries are from 1 to 5000 milliseconds. The default is 500 milliseconds (1/2 a second).
Frequency of TSI Msg	Enter how often, in milliseconds, you want the CAR to broadcast TSI messages downstream to cable modems. You configure the information in the TSI message on the <i>Termination System Info.</i> tab. Valid entries are from 1 to 5000 milliseconds. The default is 500 milliseconds (1/2 a second).
Enable TCD	Place a check in this box to enable the sending of TCD messages. Leave it blank to disable the sending of TCD messages.
Enable TSI	Place a check in this box to enable the sending of TSI messages. Leave it blank to disable the sending of TSI messages.

## Telco Return CAR Attributes Configuration Entries

Entry	Description
Registration UDP Port Num	Enter the UDP (Universal Datagram Port) number on which registration requests will be sent and received. The default value is 3311.
MAC Management Style	<p>From the drop down menu, select the broadcast method format you want to use to transmit Termination System Information (TSI) and Telephony Channel Descriptor (TCD) messages downstream from this CMTS Device to telco return cable modems.</p> <ul style="list-style-type: none"> <li>■ Old: Sends TCD-TSI messages in the old format. <b>Note:</b> The old_tcdtsi setting is rarely required. Some older telco-return cable modem types may require it, but this is very rare.</li> <li>■ New: Sends TCD-TSI messages in the new format (this is the default)</li> <li>■ Both: Sends the TCD-TSI messages in a format that is compatible with both Old and New formats.</li> </ul>

3 Click **Set** to send your changes to the CAR.

4 Continue with *Termination System Information*.

### Termination System Information

To configure the Termination System Information:

1 Click the **Termination System Information** tab. The *Termination System Information* dialog box appears.

The screenshot shows a dialog box titled "MCNS Telco Return configuration - 149.112.8.16 Telco ...". It has three tabs: "Attributes", "Termination System Info.", and "Service Providers". The "Termination System Info." tab is selected. The dialog contains five input fields with labels: "Down Chan IP Address:", "Epoch Value:", "Boot Time:", "Registration IP Address:", and "Down Chan ID:". At the bottom of the dialog, there are seven buttons: "Get", "Set", "Edit", "New", "Delete", "Help", and "Exit".

**Termination System Information Dialog Box**

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

### Termination System Information Entries

Entry	Description
Down Chan IP Address	Read only field. This is the IP address assigned to the downstream channel. It is set on the <i>Cable IP Networks</i> tab of the <i>Networks</i> dialog box.
Epoch Value	Read only field. The CAR increments this value by one each time it reboots and each time it flushes the Address Resolution Protocol (ARP) cache.
Boot Time	Read only field. Displays the time, in seconds, since the last reboot of the CAR.
Registration IP Address	Enter the IP address to which a cable modem should always send its CMTS registration request messages. (This is usually the same as the <i>Down Chan IP Address</i> .)
Down Chan ID	This number identifies the downstream channel associated with this CMTS Device's QAM Modulator. The default is 0. 3Com recommends that you do not change this value.

- 3 Click **Set** to send your settings to the CAR.
- 4 Continue with *Service Provider Descriptor*.

### Service Provider Descriptor

To configure the Service Provider Descriptor settings:

- 1 Click the **Service Providers** tab.
- 2 Click **Add** (to create a new set of Service Provider Settings) or **Edit** (to modify existing Service Provider Settings). The *Service Provider Descriptor* dialog box appears. ( \*\* denotes required entries).

The screenshot shows the 'Service Provider Descriptor' dialog box with the following fields and controls:

- Index: \*\***: Text input field.
- Name:**: Disabled text input field.
- Phone Num1: \*\***: Text input field.
- Phone Num2:**: Disabled text input field.
- Phone Num3:**: Disabled text input field.
- Connection Threshold: \*\***: Text input field.
- Username:**: Disabled text input field.
- Password:**: Disabled text input field.
- PPP Authentication:**: Dropdown menu.
- Radius Realm:**: Disabled text input field.
- DHCP Authenticate:**: Dropdown menu.
- DHCP Address: \*\***: Text input field.
- DHCP Hop Count: \*\***: Text input field.
- Factory Default**: Unchecked checkbox.
- Status**: Unchecked checkbox.
- Buttons**: Ok, Cancel, and Help.

**Service Provider Descriptor Dialog Box**

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

#### Service Provider Descriptor Entries

Entry	Description
Index	Enter a number which allows the CAR software to reference this Service Provider Descriptor (SPD). The first defined SPD number should be 0. The second should be 1, the third 2, and so on. The maximum number of defined SPDs the CAR can store is 11.
Name	Enter a descriptive name for this SPD setting. Limited to 32 characters.
Phone Num1	Enter the primary phone number that cable modems must dial to establish a PPP connection with the Telco Return Access Concentrator (TRAC). You can include a standard modem command string. These differ between modem vendors.
Phone Num2	Optional. Enter an alternate phone number that cable modems must dial to establish a PPP connection in case Phone Num1 fails.
Phone Num3	Optional. Enter an alternate phone number that cable modems must dial to establish a PPP connection in case Phone Num2 fails.
Connection Threshold	Enter a number from 1 to 10 that defines the number of times a client is allowed to dial a phone number before the system decides a connection cannot be made. For example, if you set this to 2, all configured phone numbers are tried twice: Phone Num1, Phone Num2, Phone Num3, then Phone Num1, Phone Num2, Phone Num3.
Username	Optional. Enter the PAP/CHAP authentication username that cable modems must use to establish a PPP connection (see PPP_auth_type below).
Password	Optional. Enter a password that cable modems must use to establish a PPP connection.
PPP Authentication	From the drop-down menu, select the type of PPP authentication you want to use: <ul style="list-style-type: none"> <li>■ Negotiate: Negotiate with the peer machine on whether to use PAP or CHAP.</li> <li>■ PAP: Use PAP for authentication. If the peer machine can only use CHAP or no authentication, the connection will be refused.</li> <li>■ CHAP: Use CHAP for authentication. If the peer machine can only use PAP or no authentication, the connection will be refused.</li> </ul>
RADIUS Realm	If you are using RADIUS and the RADIUS server is not in the same domain as the TRAC, enter the full qualified name of the dial-in user, in the format username@name.xxx. For example: john_doe@company.com.
DHCP Authenticate	From the drop-down menu, select a value that indicates how you want the dial-in host to use DHCP: <ul style="list-style-type: none"> <li>■ Enabled: Instructs the dial-in host to use DHCP when dialing in.</li> <li>■ Disabled: Do not use DHCP when dialing in.</li> </ul>
DHCP Address	Enter the IP address of the DHCP server in the nnn.nnn.nnn.nnn format.
DHCP Hop Count	Enter the number of hops from the client cable modem to the DHCP server. Valid entries are from 1 to 15.
Factory Default	Place a check in the box to define this SPD as the default. You must define only one SPD as the default.

## Service Provider Descriptor Entries

Entry	Description
Status	Place a checkmark in the box to enable this SPD. Leave the box unchecked if you do not want to activate this SPD. It remains and can be enabled later.

- 4 Click **OK**.
- 5 Click **Exit** to return to the *CMTS Map* window.
- 6 One-way DOCSIS attributes configuration is complete. If you are configuring your CMTS for three-way functionality, continue with *Configuring DOCSIS Attributes for a Two-Way CMTS*.

## Configuring DOCSIS Attributes for a Two-Way CMTS

Configuring the MCNS Attributes for a two-way CMTS requires that you configure the following DOCSIS attributes:

- Downstream Channel
- MAC Interface
- Upstream Channel
- Upstream Channel Vendor Extension
- UFC Frequency
- Modulation Profile
- Upstream Burst Profile
- MAC Interface

To configure the DOCSIS attributes for a two-way *CMTS Device*:

- 1 Select a two-way or three-way *CMTS Device* from the CMTS Map window.
- 2 Click **Configuration** on the Menu Bar.
- 3 Click **MCNS**.
- 4 Click **Two Way**.
- 5 Continue with *Downstream Channel*.

**Downstream Channel** To configure the downstream channel:

- 1 Click the **Downstream Channel** tab.
- 2 Select the downstream interface you want to configure from the list.
- 3 Click **Edit**. The *Downstream Channel Edit* dialog box appears.

**Downstream Channel Edit Dialog Box**

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

#### Downstream Channel Edit Entries

Entry	Description
Frequency	Read only. This is the frequency (in Hz) being used for downstream data transmission.
Width	Read only. This is the total bandwidth (in Hz) available on this downstream channel.
Modulation	From the drop-down menu, select the type of modulation you want to use on this downstream channel. Choices are: <ul style="list-style-type: none"> <li>■ QAM64 (this is the default)</li> <li>■ QAM256</li> </ul>
Interleave	From the drop-down menu, select the type of FEC (Forward Error Correction) interleaving you want to use on this downstream channel. The higher the taps value, the more thorough the error checking performed by the CMTS. However, higher taps values slow data throughput. The options are: <ul style="list-style-type: none"> <li>■ taps8Increment16: protection 5.9/4.1 usec, latency .22/.15 msec</li> <li>■ taps16Increment8: protection 12/8.2 usec, latency .48/.33 msec</li> <li>■ taps32Increment4: protection 24/16 usec, latency .98/.68 msec</li> <li>■ taps64Increment2: protection 47/33 usec, latency 2/1.4 msec</li> <li>■ taps128Increment1: protection 95/66 usec, latency 4/2.8 msec (this is the default)</li> </ul>
Tx Power	Not used.

- 5 Click **Set** to send your changes to the CAR.
- 6 Click **OK**. Continue with *MAC Interface*.

**MAC Interface** To configure the MAC Interface:

- 1 Click the **MAC Interface** tab.
- 2 Select the interface you want to configure from the table.
- 3 Click **Edit**. The *MAC Configuration Edit* dialog box appears.

**MAC Configuration Edit Dialog Box**

- 4 Make the entries described in the table below.

#### MAC Configuration Edit Entries

Entry	Description
Sync Interval	Enter a value, in milliseconds, that defines the interval between CMTS transmissions of successive SYNC messages for each upstream channel. Valid entries are from 1 to 2000 milliseconds. There is no default.
UCD Interval	Enter a value, in milliseconds, that defines the interval between CMTS transmissions of successive Upstream Channel Descriptor (UCD) messages for each upstream channel. Valid entries are from 1 to 2000 milliseconds. The default is 1000 (one second).
Insertion Interval	Enter a value that defines the amount of time between each broadcast station maintenance grant. Broadcast station maintenance grants are used to allow new cable modems to join the network. Zero indicates that a vendor-specific algorithm is used instead of a fixed time. Valid entries are from 1 to 200 centiseconds. The default is 100 centiseconds (one second).
Invited Ranging Retries	Enter a value which defines the maximum number of attempts to make on invitations for ranging requests from client cable modems. Valid entries are from 0 to 1024. The default is 15. A value of zero means the system should attempt to range forever.

- 5 Click **Set** to send your settings to the CAR.

- 6 Click **OK**.
- 7 Continue with *Upstream Channel*.

**Upstream Channel** To configure the upstream channel:

- 1 Click the **Upstream Channel** tab.
- 2 Select the interface you want to configure from the list.
- 3 Click **Edit**. The *Upstream Channel Edit* dialog box appears.

**Upstream Channel Edit Dialog Box**

### Upstream Channel Edit Entries

Entry	Description
Frequency	Enter a number (in Hz) that defines the center of the frequency band associated with this upstream channel. Valid entries are from 0 to 20000000 Hz. 3Com strongly recommends that you change this frequency if you do not want to use the default value. The default is card-dependent.
Channel Width	Enter a number (in Hz) that describes the total bandwidth of this upstream channel. Valid entries are from 5000000 to 1600000 Hz. The default is 1600000 Hz (1.6 MHz).
Modulation Profile Index	Enter a number from number from 1 to 100 that identifies this upstream channel setting to the CAR.
Slot size	Enter a value that defines the mini-slot size for this upstream channel. Expressed in units of the Timebase Tick of 6.25 microseconds. Valid entries are 2, 4, 8, 16, 32, 64, or 128. The default is 8.

### Upstream Channel Edit Entries

Entry	Description
Ranging Backoff Start	Enter a value that describes the initial random backoff window to use when retrying ranging requests. Expressed as a power of 2. A value of 16 at the CMTS indicates that a proprietary adaptive retry mechanism is to be used. Valid entries are from 0 to 16. The default is 2.
Ranging Backoff End	Enter a value that describes the final random backoff window to use when retrying ranging requests. Expressed as a power of 2. A value of 16 at the CMTS indicates that a proprietary adaptive retry mechanism is to be used. Valid entries are from 0 to 16. The default is 10.
TxBackoff Start	Enter a value that describes the initial random backoff window to use when retrying data requests transmissions. Expressed as a power of 2. Valid entries are from 0 to 16. A value of 16 at the CMTS indicates that a proprietary adaptive retry mechanism is to be used. The default is 2.
TxBackoff End	Enter a value that describes the final random backoff window to use when retrying data requests transmissions. Expressed as a power of 2. Valid entries are from 0 to 16. A value of 16 at the CMTS indicates that a proprietary adaptive retry mechanism is to be used. The default is 10.

- 4 Click **Set** to send your settings to the URC.
- 5 Click **OK**.
- 6 Continue with *Upstream Channel Vendor Extension*.

**Upstream Channel Vendor Extension** To configure the Upstream Channel Vendor Extension:

- 1 Click the **Up Channel Vendor Ext** tab
- 2 Select the interface you want to configure.
- 3 Click **Edit**. The *Upstream Channel Vendor Ext* dialog box appears.

**Upstream Channel Vendor Extension Dialog Box**

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

#### Upstream Channel Vendor Extension Edit Entries

Entry	Description
Config Change Count	Read only. This field increments by one whenever any value in this Upstream Channel Vendor Extension change. It allows the cable modem to quickly decide whether the remaining fields have not changed, and therefore disregard the remainder of the message.
Spectrum Inv	Spectral Inversion: Enter a value that indicates whether the Unique Word constellation is inverted in the imaginary (Q) direction, assuming that four-phase ambiguity has not occurred. Valid entries are 0 (normal) and 1 (inverted). The default is 0.

## Upstream Channel Vendor Extension Edit Entries

Entry	Description
Preamble	<p>Enter a number that identifies the bits to be used for the preamble value. This is specified as the starting offset into the Preamble Pattern. That is, a value of zero means that the first bit of the preamble for this burst type is the value of the first bit of the Preamble Pattern. A value of 100 means that the preamble is to use the 101st and succeeding bits from the Preamble Pattern. This value must be a multiple of the symbol size. Valid entry is a range of byte values (in hexadecimal format) from 1 to 128 bytes. The default value is:</p> <pre> cccccccccccccccccccccccccccc0d0d a917d9c3522fb386a45f670d48bece1a 917d9c3522fb386a45f670d48bece1a9 17d9c3522fb386a45f670d48bece1a91 f3f3f3f3f3f3f3f3f3f3f3f3f3f3f3f3 f3f3f3f3f3f3f3f3f3f3f3f3f3f3f3f7 8884044cc484c00c440808cc8c0c8048 884044cc484c00c440808cc8c0c8048 </pre>
Sym Rate	<p>Specifies the value of the symbol rate multiplier.</p> <p><b>Note: Do not change this value from this dialog box.</b> Changing this value changes the symbol rate, which in turn also changes the upstream channel width. Therefore, 3Com recommends that you use the Channel Width parameter in the <i>Upstream Channel Edit</i> dialog box to change the symbol rate. Refer to the <i>Upstream Channel</i> procedure in this chapter for details.</p>
CRCErrThreshold	<p>Enter the number of CRC (cyclic redundancy check) errors per second to be allowed by the CMTS on this upstream channel. If the allowed number of errors is exceeded, the CMTS will automatically change to the upstream frequency you set with the <i>UFC Frequency</i> procedure in this chapter. Valid entries are from 1 to 9999 errors per second. The default is 1000.</p>
HeaderChecksumErrorThreshold	<p>Enter the number of header checksum errors per second that will be allowed by the CMTS on this upstream channel. If the allowed number of errors is exceeded, the CMTS will automatically change to the upstream frequency you set with the <i>UFC Frequency</i> procedure in this chapter. Valid entries are from 1 to 9999 errors per second. The default is 1000.</p>
UncorrectableThreshold	<p>Enter the number of uncorrectable FEC (forward error correction) errors per second that will be allowed by the CMTS on this upstream channel before automatically change to the upstream frequency you set with the <i>UFC Frequency</i> procedure in this chapter. Valid entries are from 1 to 9999 errors per second. The default is 1000.</p>
ErrorDetectionInterval	<p>Enter how often, in seconds, you want the CMTS to check the above defined upstream error thresholds. Valid entries are from 1 to 9999 seconds. The default is 5.</p>

### Upstream Channel Vendor Extension Edit Entries

Entry	Description
AGC	<p>Enter a value that determines how the CMTS will attempt to boost the automatic gain control (AGC - dBmV). For example, if you are receiving a very faint signal from cable modems, you may want to set the AGC to <i>verystrong</i> to compensate. The options are:</p> <ul style="list-style-type: none"><li>■ overweak</li><li>■ weak</li><li>■ mid (the default)</li><li>■ strong</li><li>■ verystrong</li></ul>

- 5 Click **OK**.
- 6 Click **Set** to send you settings to the URC.
- 7 Continue with *Modulation Profile*.

**Modulation Profile** To configure the Modulation Profile:

- 1 Click the **Modulation Profile** tab.
- 2 Select the modulation profile you want to configure from the modulation table.
- 3 Click **Edit**.
- 4 Select **NotInService** from the *Control* drop-down menu.
- 5 Click **OK**.
- 6 Click **Set**.
- 7 Click **Get**.
- 8 Make sure the *Control* state reads **NotInService**. If it does not, repeat steps 2 - 8 until it does.
- 9 Select the modulation profile you set to **NotInService**.
- 10 Click **Edit**. The *Modulation Profile Edit* dialog box appears again.

**Modulation Profile Edit Dialog Box**

**11** Make the entries described in the table that follows.

### Modulation Profile Entries

Entry	Description
Profile Index	Enter a value that identifies this modulation profile entry to the CAR. Valid entries are from 1 to 16. The default is 1.
Interval Usage Code	From the drop-down menu, enter a value that defines an index entry into the Channel Modulation table which, when grouped with other Interval Usage Codes, fully represent all modulation sets for a given upstream channel. Valid entries are: <ul style="list-style-type: none"> <li>■ 1: request - starting offset of REQ region (the default)</li> <li>■ 2: requestData - starting offset of IMMEDIATE Data region.</li> <li>■ 3: initialRanging - starting offset of MAINT region if the service identifier (SID) is broadcast or multicast (used in Periodic Ranging).</li> <li>■ 4: periodicRanging: starting offset of MAINT region if SID is unicast (used in Periodic Ranging)</li> <li>■ 5: shortData: starting offset of Data Grant assignment, if inferred length = 0, then it is a Data Grant Pending.</li> <li>■ 6: longData: starting offset of Data Grant assignment if, if inferred length = 0, then it is a Data Grant Pending.</li> </ul>
Type	From the drop-down menu, select the type of Modulation you want to use on this upstream channel. The options are: <ul style="list-style-type: none"> <li>■ QPSK (the default)</li> <li>■ QAM16</li> </ul>

## Modulation Profile Entries

Entry	Description
PreambleLen	Enter a number that defines the preamble length for this modulation profile. Valid entries are from 1 to 1024 (bits). Expressed as a multiple of 2 for QPSK and a multiple of 4 for QAM16. The default is 128 bits.
Differential Encoding	From the drop-down menu, select <b>enabled</b> to specify that differential encoding is used on this channel. Otherwise, select <b>disabled</b> . The default is disabled.
FEC Error Correction	Enter a number which defines the number of correctable errored bytes used in the forward error correction code. The number of check bytes appended will be twice this value. Valid entries are from 0 to 10. The default is 0, indicating that no correction is used.
FEC Codeword Length	Enter a value that defines the number of data bytes in the forward error correction codeword. Valid entries are from 1 to 255 (Kbytes). The default value is 32 (Kbytes).
Scrambler Seed	Enter the 15 bit seed value left justified in the two-byte field. Bit 15 is the most significant bit of the first byte. The least significant bit of the second byte is not used. Valid entries are from 0 to 32767. The default is 0.
Max Burst Size	Enter a number which defines the maximum number of min-slots that can be transmitted during this channel's burst time. Valid entries are from 0 to 255. The default is 0. When the <i>usagecode</i> is set to <i>ShortData</i> this value must be present and greater than 0.
Last codeword shortened	From the drop-down menu, select <b>enable</b> to indicate if the last FEC code word is truncated. Select <b>disabled</b> if it is not truncated. The default is disabled.
Scrambler	From the drop-down menu, select <b>enable</b> to indicate if the scrambler is employed. If it is not employed, select <b>disabled</b> . The default is enabled.
Control	From the drop-down menu, select the control value that determines the operating status of this modulation profile. The options are: <ul style="list-style-type: none"> <li>■ ACTIVE: activates a new or existing modulation index entry.</li> <li>■ NOTINSERVICE: suspends operation of a defined modulation index entry until it is re-enabled with ACTIVE.</li> <li>■ NOTREADY: not used</li> <li>■ CREATEANDGO: not used</li> <li>■ CREATEANDWAIT: not used</li> <li>■ DESTROY: not used</li> </ul>

**12** At the *Control* drop-down menu, select **Active**.

**13** Click **OK**.

**14** Click **Set** to send the settings to the CAR.

**15** Click **OK**.

**16** Continue with *Burst Profile*.

**Burst Profile** To configure the burst profile:

- 1 Click the **Burst Profile** tab.
- 2 Select the profile you want to configure.
- 3 Click **Edit**. The *Burst Profile Edit* dialog box appears.

**Burst Profile Edit Dialog Box**

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

#### Burst Profile Edit Entries

Entry	Description
BP Len	Burst Profile Unique Word Length. Enter a value which specifies the length of the Unique Word region (in symbols). Valid entries are 2, 4, 8, or 12 symbols. The default is 8 symbols.
BP Pattern	Burst Profile Unique Word Pattern. Enter a value that specifies the exact pattern (in hexadecimal) that the cable modem will transmit during the Unique Word region of the preamble. The pattern cannot exceed 3 bytes in length. The default value is 0X0D0D0D.
BP Detection Window	Burst Profile Unique Word Detection Timing Margin (window). Enter a value which indicates the width of a window (in symbols) that the CMTS will use to find the unique work of an arriving burst. For example, if you enter 3, the CMTS will attempt to find the unique word within a window that begins 3 symbols before, and 3 symbols after, the nominal burst arrival time. Valid entries are from 0 to 255 symbols. The default is 4.

### Burst Profile Edit Entries

Entry	Description
BP Correlation Threshold	Burst Profile Unique Word Correlation Threshold. Enter a value which specifies the number of bits in the received burst that can be different from the expected unique word and still be claimed successful. A value of 0 indicates a perfect match is required. Valid entries are from 0 to 3 (bits). The default is 0.
BP DerandomizerPRS	Burst Profile Derandomizer Initial Seed Control. From the drop-down menu, select <b>enabled</b> to activate the FEC derandomizer seed used by the URC. Otherwise select <b>disabled</b> . The default is disabled.
BP EqualizerTrainingSeqLength	Burst Profile Equalizer Training Sequence Length. Enter a value which specifies the length of the equalizer training sequence (in symbols) to be used by the URC. Valid entries are from 0 to 511 symbols. The default is 0.
BP PreambleValOffset	Burst Profile Preamble Value Offset. Enter a value that specifies the offset of the preamble value (in bits) into the preamble string at which the preamble will begin. Together these two parameters identify the portion of the preamble superstring that will be used for the preamble. Valid entries are from 0 to 1023 bits. The default is 0.

- 5 Click **OK**.
- 6 Click **Set** to send the settings to the CAR.
- 7 Continue with *UFC Frequency*.

**UFC Frequency** The Upstream Frequency Change (UFC) frequency is the frequency the CMTS will automatically change to when any of the following error thresholds are exceeded:

- CRC error threshold
- Header checksum threshold
- Uncorrectable threshold

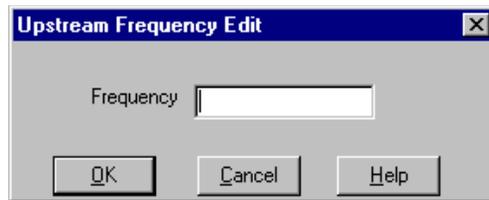


*For details on the above thresholds, refer to the description of how to configure the Upstream Channel Vendor Extension in this chapter.*

To set the UFC Frequency:

- 1 Select the desired *CMTS Device* from the *CMTS Map* window.
- 2 Click **Configuration** on the Menu Bar.
- 3 Click **UFC Configuration**.
- 4 Select the upstream interface index (*IfIndex*) you want to configure from the list.

- 5 Click **Edit**. The *Upstream Frequency Edit* dialog box appears.



**Upstream Frequency Edit Dialog Box**

- 6 Enter the frequency (in Hz) to which the CMTS will automatically change when the error thresholds described above are exceeded. Valid entries are from 5000000 to 42000000 Hz.
- 7 Click **OK**.
- 8 Click **Set** to send your changes to the CAR.
- 9 Continue with *Modulation Profile*.

Two-way CAR DOCSIS attribute configuration is complete.





# MONITORING THE CMTS

This chapter describes how to use Cable Headend Manager to monitor your CMTS and view system details and settings.

---

## Monitoring Tasks

This section describes how to use the CHM to perform the following monitoring tasks:

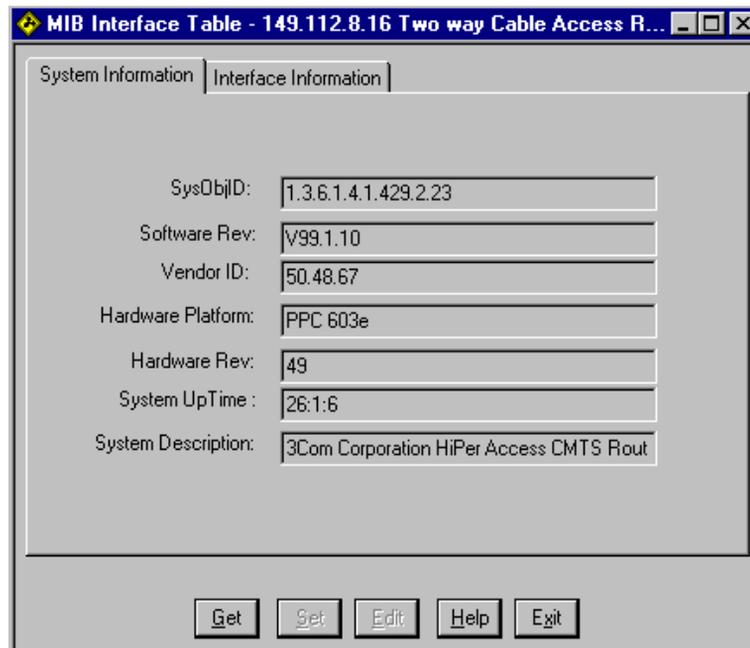
- Viewing System Information
- Viewing Interface Details
- Viewing Signal Quality Information
- Viewing CMTS Status Information
- Viewing CMTS CM Status Information
- Viewing CMTS Service Information
- Viewing Chassis Connection Information
- Viewing Chassis Slot Information

### Viewing System Information

System information provides you with basic hardware and software information for a selected *CMTS Device*. It can be useful for resolving hardware and software compatibility issues.

To obtain system information:

- 1 Select the desired *CMTS Device* from the *CMTS Map* window.
- 2 Click **Display** on the Menu Bar.
- 3 Click **System Information**. The *System Information* window appears. An example follows.



**Example: Viewing Global System Information for a CMTS Device**

- 4 Click **Get** to obtain the latest system information from the CMTS. The table that follows describes the information displayed.

### Global System Information Fields

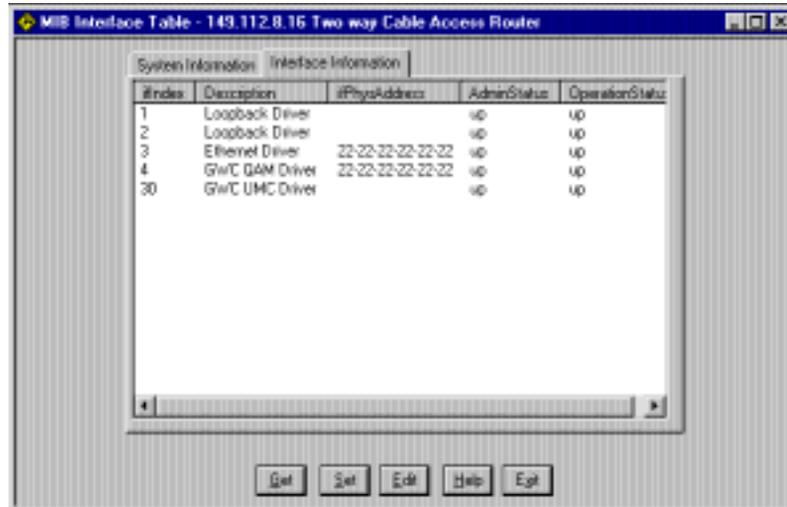
Field	Description
SysObjID	The SNMP object identifier of the CAR.
Software Rev	The software version currently installed in the CAR.
Vendor ID	Vendor-specific identification code.
Hardware Platform	Hardware version currently installed in the CAR.
Hardware Rev	The hardware version revision level of the CAR.
System UpTime	The amount of time the CMTS has been running (in the hours:minutes:seconds format) since the last reboot.
System Description	A text description of the system (for informational purposes).

- 5 Click **OK** to return to the *CHM Map* window.

**Viewing Interface Details** This feature allows you to view specific information about each interface defined in a CMTS.

To obtain details on an interface:

- 1 Select the desired *CMTS Device* from the *CMTS Map* window.
- 2 Click **Display** on the Menu Bar.
- 3 Click **System Information**.
- 4 Click the **Interface Information** tab. The *MIB Interface Table* window appears.
- 5 Click **Get** to update the screen with the latest information from the CAR. An example follows.



**Example: Viewing CMTS Interface Details**

The table that follows describes the information displayed.

### Interface Information Fields

Field	Description
IfIndex	A unique value for each defined interface. This value remains constant.
Description	This is the type of CMTS interface.
IfPhyAddress	This interface address at the protocol layer, immediately below the network layer in the protocol stack.
AdminStatus	The desired administrative state of this interface. The <i>testing</i> state indicates that no operational packets can be passed. You must define this field as <i>up</i> to have configuration access to the <i>CMTS Device</i> .
Operation Status	The actual operational state of this interface. if the <i>Operation Status</i> value of <i>testing</i> displays, it indicates that no operational packets can be passed.

**6** Click **Exit** to return to the *CMTS Map* window.

### Viewing Signal Quality Information

This allows you to obtain basic signal quality information for two and three-way *CMTS Devices*.

To obtain CAR signal quality information:

- 1** Select the desired *CMTS Device* from the *CMTS Map* window.
- 2** Click **Display** on the Menu Bar.
- 3** Click **Signal Quality**. The *Signal Quality Information* window appears.

- Click **Get** to obtain the latest information from the CAR. An example follows.

#Index	SignalNoise	IncludesContention	Unerrored	Corrected	UnCorrectables	Microreflections
30	0	2	0	0	0	0

### Example: Viewing CMTS Signal Quality Information

The table that follows describes the information displayed.

#### Signal Quality Information Fields

Field	Description
IfIndex	A unique value for each defined interface. This value remains constant.
SignalNoise	The current signal-to-noise ratio on the upstream channel at the CMTS.
IncludesContention	Displays <b>True</b> if this CMTS includes contention intervals in the counters in this table. Otherwise, this field displays <b>False</b> .
Unerrored	Total code words received on this channel without error. This includes all code words, whether or not they were part of frames destined for this device.
Corrected	Total code words received on this channel with correctable errors. This includes all code words, whether or not they were part of frames destined for this device.
UnCorrectables	Total code words received on this channel with uncorrectable errors. This includes all code words, whether or not they were part of frames destined for this device.
Microreflections	Total microreflections including in-channel response as detected on this interface, measured in dBc below the signal level. This value is not an absolutely accurate value, but gives a rough indication of microreflections received on this interface.

- Click **OK** to return to the CMTS Map window.

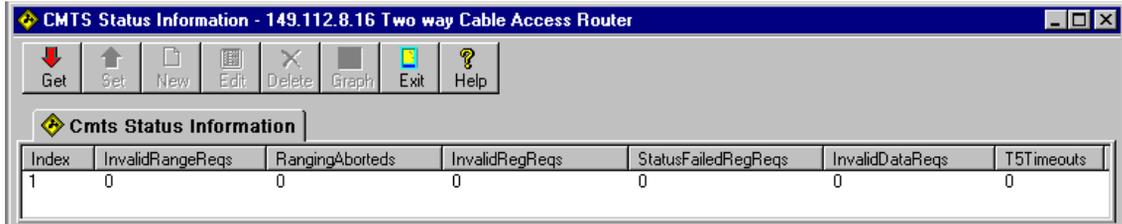
#### Viewing CMTS Status Information

CMTS Status information provides a high-level view of the reasons why cable modems assigned to this CMTS have failed registration. The CMTS bins the failures by total and cause of failure.

To obtain two- or three-way CMTS status information:

- Select the desired *CMTS Device* from the *CMTS Map* window.
- Click **Display** from the Menu Bar.
- Click **CMTS Status Table**. The *CMTS Status Information* table appears.

- Click **Get** to obtain the latest information from the CAR. An example follows.



### Example: Viewing CMTS Status Information

The table that follows describes the *CMTS Status Information* fields.

#### CMTS Status Information Fields

Field	Description
Index	This is the index number used to define this CMTS Device.
InvalidRangeReqs	Total number of invalid RNG-REQ (ranging requests) messages received on this interface.
RangingAborted	Total number of ranging attempts that were aborted by the CMTS.
InvalidRegReqs	Total number of invalid REG-REQ (registration requests) messages received on this interface.
FailedRegReqs	Total number of failed registration attempts, i.e -- authentication failures and class of service failures -- on this interface.
InvalidDataReqs	Total number of invalid data request messages received on this interface.
T5Timeouts	Total number of times counter T5 expired on this interface.

- Click **Exit** to return to the CMTS Map window.

#### Viewing CMTS CM Status Information

CMTS Status Information provides you with the connection status of all cable modems that have attempted to connect and register with the 3Com CMTS.

To obtain CMTS CM Status Information:

- Click the desired *CMTS Device* in the *CMTS Map* window.
- Click **Display** on the Menu Bar.
- Click **CMTS CM Status**. The *CMTS Cable Modem Status Information* window appears.
- Click **Get** to obtain the latest information from the CAR. An example follows.

Index	Value	MacAddress	IpAddress	DownChannelIndex	UpChannelIndex	RxPower	TimingOffset	EqualizationData
1	rangingAborted	00-10-48-37-74-40	0.0.0.0	4	30	0	0	
2	rangingAborted	00-10-48-37-72-C0	0.0.0.0	4	30	0	0	
3	rangingAborted	00-10-48-37-73-D6	0.0.0.0	4	30	0	0	
4	rangingAborted	00-10-48-36-80-00	0.0.0.0	4	30	0	0	

### Example: Viewing CMTS Cable Modem Status Information

The table that follows describes the information displayed.

#### CMTS Cable Modem Status Information Fields

Field	Description
Index	Index value to uniquely identify an entry in this table. For an individual cable modem, this index value should not change during CMTS uptime.
Value	This field displays the current cable modem connection status. The status will be one of the following: <ul style="list-style-type: none"> <li>Ranging      The cable modem has sent a ranging request to the CMTS (as a result of being powered up for the first time, or if the cable modem has been rebooted).</li> <li>Ranging Aborted      The cable modem ranging process has been aborted, either due to a problem with the cable connection, or the ranging parameters sent by the CMTS to the cable modem.</li> <li>Ranging Complete      The cable modem has successfully completed ranging with the CMTS.</li> <li>IP Complete      The cable modem has received an IP network address from a DHCP server that is connected to the Ethernet side of the CMTS.</li> <li>Registration Complete      The cable modem has successfully registered with the CMTS and is authorized to transmit and receive data.</li> <li>Access Denied      The CMTS has denied access to the cable modem associated with this MAC address. This indicates that the Message Integrity Check (MIC) has failed, or that the authorization string is incorrect.</li> </ul>
MacAddress	The MAC address of this cable modem. If the cable modem has multiple MAC addresses, the displayed one is associated with the Cable IP Network interface defined in this CMTS Device.
IpAddress	The IP address of this Cable Modem. If the Cable Modem has no IP address assigned, or the IP address is unknown, 0.0.0.0 displays. If the cable modem has multiple IP addresses, the displayed address is associated with the Cable IP Network interface defined in this CMTS Device.
DownChannelIndex	Interface index number of the downstream channel this CM is connected to. If the downstream channel is unknown, this object returns a value of 0.

### CMTS Cable Modem Status Information Fields

Field	Description
UpChannellIndex	Interface index number of the upstream channel this CM is connected to. If the upstream channel is unknown, this object returns a value of 0.
RxPower	The receive power as perceived for upstream data from this Cable Modem. If the receive power is unknown, this object returns a value of 0.
TimingOffset	A measure of the current round trip time for this CM. Used for timing of CM upstream transmissions to ensure synchronized arrivals at the CMTS. Units are in terms of (6.25 microseconds/64). Returns zero if the value is unknown.
EqualizationData	Equalization data for this CM. Returns an empty string if the value is unknown or if there is no equalization data available or defined.

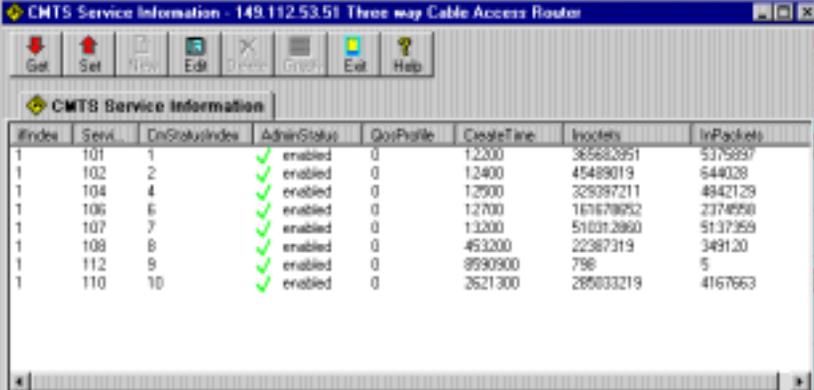
- Click **Exit** to return to the *CMTS Map* window.

### Viewing CMTS Service Information

CMTS Service information provides you details on the type of service currently allocated to a cable modem.

To obtain CMTS Service Information:

- Select the desired *CMTS Device* from the *CMTS Map* window.
- Click **Display** on the Menu Bar.
- Click **CMTS Service Information**. The *CMTS Service Information* window appears.



The screenshot shows a window titled "CMTS Service Information - 149.112.53.51 Three way Cable Access Router". The window contains a table with the following data:

#Index	Serv	OnStatus/Index	AdminStatus	QoSProfile	CreateTime	Inoctets	InPackets
1	101	1	enabled	0	1200	365682951	5375697
1	102	2	enabled	0	12400	45489019	644028
1	104	4	enabled	0	12900	325097211	4942129
1	106	6	enabled	0	12700	161678652	2374998
1	107	7	enabled	0	13200	510312860	5137369
1	108	8	enabled	0	453200	22987319	349120
1	112	9	enabled	0	8990900	796	5
1	110	10	enabled	0	2621300	288033219	4167663

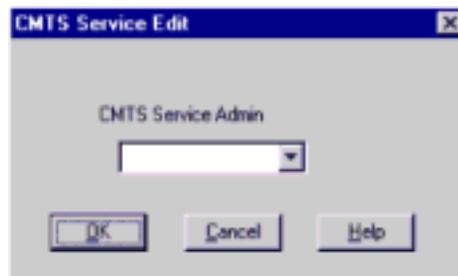
### Example: Viewing CMTS Service Information

- Click **Get** to obtain the latest information from the CAR. The table that follows describes the information displayed.

### CMTS Service Information Fields

Entry	Description
ifIndex	This is the interface index defined in the CAR for this service information entry.
ServiceID	Identifies a service queue for upstream bandwidth. The attributes of this service queue are shared between the cable modem and the CMTS. The CMTS allocates upstream bandwidth to this service queue based on requests from the cable modem and on the class of service associated with this queue.
CMStatusIndex	A pointer to an entry in <i>docsIfCmtsCmStatusTable</i> identifying the cable modem using this service queue. If more than one cable modems are using this service queue, the value is 0.
AdminStatus	Displays the desired administrative status of this cable modem. <ul style="list-style-type: none"> <li>■ Enabled</li> <li>■ Disabled</li> <li>■ Destroyed</li> </ul>
QoSProfile	The index in the <i>docsIfQoSProfileTable</i> describing the quality of service (QoS) attributes associated with this particular service. If no associated <i>docsIfQoSProfileTable</i> entry exists, this object returns a value of zero.
Create Time	The time and date this entry was created.
InOctets	The total number of packet data octets received on this service identifier. The count does not include the size of the cable MAC header.
InPackets	The total number of packet data packets received on this Service ID.

- 4 To change the Admin Status value, click **Edit**. The *CMTS Service Edit* dialog box appears.



**CMTS Service Edit Dialog Box**

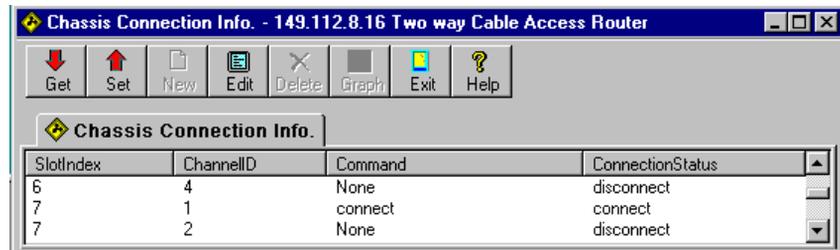
- 5 Select the desired *CMTS Service Admin* status from the drop-down menu.
- 6 Click **OK**.
- 7 Click **Set** to send your setting to the CAR.
- 8 Click **Exit** to return to the *CMTS Map* window.

## Viewing Chassis Connection Information

Chassis connection information provides you with a quick look at connection status of all cards associated with a particular *CMTS Device*.

To obtain chassis connection information:

- 1 Select the desired *CMTS Device* from the *CMTS Map* window.
- 2 Click **Display** on the Menu Bar.
- 3 Click **Chassis Connection Info**. The *Chassis Connection Info.* window appears.
- 4 Click **Get** to obtain the latest information from the CAR. An example follows.



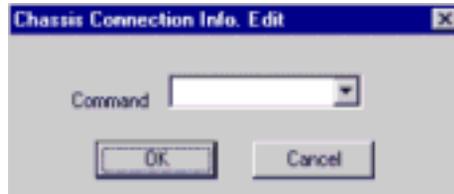
### Example: Viewing Chassis Connection Information in a CMTS

The table that follows describes the information displayed.

#### Chassis Connection Information Fields

Field	Description
Slot Index	The Total Control chassis slot number.
ChannelID	Channel ID number. URCs only. Channel ID 1 corresponds to the top coaxial connector on the front of the URC. Channel ID 2 corresponds to the bottom coaxial connector.
Command	Displays the desired connection state of the component in this slot. <ul style="list-style-type: none"> <li>■ Connect</li> <li>■ Disconnect</li> </ul>
ConnectionStatus	Displays the actual connection status of the component installed in this slot: <ul style="list-style-type: none"> <li>■ Connected</li> <li>■ Disconnected</li> <li>■ Trying</li> </ul>

- 5 To change the desired connection state of a slot, click **Edit**. The *Chassis Connect Info. Edit* dialog box appears.



**Chassis Connection Info. Edit Dialog Box**

- 6 Select the desired connection state you want to assign to this slot (either *Connect* or *Disconnect*) from the *Command* drop-down menu.
- 7 Click **OK**.
- 8 Click **Set** to send the command to the CAR.
- 9 Click **Exit** to return to the *CMTS Map* window.

### Viewing Chassis Slot Information

This allows you to get a quick look at the type of cards currently installed in the Total Control chassis.

To obtain chassis slot information:

- 1 Select the desired *CMTS Device* from the *CMTS Map* window.
- 2 Click **Display** on the Menu Bar.
- 3 Click **Slot Information**. The *Slot Information* window appears.
- 4 Click **Get** to obtain the latest information from the CAR. An example follows.

SlotIndex	Slot Type	Software Version	Card Health
1	empty	unk.scrn	good
2	empty	unk.scrn	good
3	empty	unk.scrn	good
4	empty	unk.scrn	good
5	empty	unk.scrn	good
6	empty	unk.scrn	good
7	upstreamManagementCard	DC B3.0814 BC.04 B1.06 UF a2 PL.04 8M 3210 001 a.31 37 8001	good
8	empty	unk.scrn	good
9	empty	unk.scrn	good
10	empty	unk.scrn	good
11	empty	unk.scrn	good
12	empty	unk.scrn	good
13	empty	unk.scrn	good
14	empty	unk.scrn	good
15	multiCableAccessRouter	V98.1.1011.057/UNKNOWN	good
16	empty	unk.scrn	good

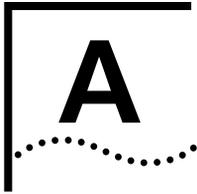
**Example: Viewing CMTS Chassis Slot Information**

The table that follows describes the information displayed.

### Slot Information Fields

Field	Description
SlotIndex	Chassis slot number (1 to 16).
Slot Type	Displays the type of card installed in this slot: <ul style="list-style-type: none"><li>■ Empty: no card is installed in this slot</li><li>■ Upstream Management Card (URC)</li><li>■ Master Cable Access Router: A CAR that has been defined to serve as the System Clock Master for this Total Control chassis.</li><li>■ Backup Master Cable Access Router: A CAR that has been defined as a system clock backup master for this Total Control chassis.</li><li>■ Other: Displays if the CMTS cannot determine the type of card in this slot.</li></ul>
Software Version	The software version currently installed in this card.
Card Health	The current operating health of this card: <ul style="list-style-type: none"><li>■ Good</li><li>■ Bad</li><li>■ Other (displays if the CMTS cannot determine the health of this card)</li></ul>

5 Click **OK** to return to the *CMTS Map* window.



# USING THE SETUP WIZARD

This appendix describes how to use the Cable Headend Manager (CHM) configuration Setup Wizard utility to perform a basic configuration of your Cable Access Router (CAR).

- Obtaining Configuration Wizard Setup Information
- Running the Configuration Setup Wizard

---

## Obtaining Setup Wizard Information

This section describes how to gather user configuration information required for the CHM configuration Setup Wizard utility.



**CAUTION:** *Do not perform any of the procedures in this document until you have installed the CAR according to the instructions provided in the Cable Access Router User Guide.*

## Setup Wizard Overview

The Setup Wizard is a feature of the CHM software program. It is a Windows-based program that allows you to configure the CAR for basic IP and user access. The Setup Wizard will prompt you to enter information for these CAR configuration parameters:

- Basic IP Addressing Settings
- Global Identity Settings
- Default Gateway Settings
- Cable Downstream IP Settings
- Service Provider Settings

## How to Use This Planning Form

Follow the instructions in this section to record CMTS configuration data for each cable headend system you plan to configure with the CHM. You will then run the configuration Setup Wizard and enter the data you obtained.

## Obtain Configuration Data



To obtain the Setup Wizard configuration data:

*All characters are case-sensitive. Write the information you obtain in the information fields that follow exactly as you want it typed when you run the Setup Wizard.*

- 1 Obtain the following Basic IP Settings Information:

The following table describes each of the *Basic IP Address Settings* fields:

Field	Description
MAC Address	<i>No entry is required for this field.</i> This is the Media Access Control address that will be discovered automatically by the CHM.
IP Address	Enter the IP address you want to assign to this CAR.
Netmask	Enter the subnet mask you want to assign to this CAR.
Community String	Enter the community string required to gain access to the PC management station that accesses this CAR.

- 2 Obtain the following *Global Identity Settings* information:

The following table describes each of the *Global Identity Settings* fields:

### Global Identity Settings

Field	Description
Name	Optional field. Enter a name that identifies this CAR to the networks to which you are connecting. Limited to 64 characters.
Location	Optional field. Enter a name that identifies where this CAR is located. Limited to 64 characters.
Contact	Optional field. Enter a name that identifies the support contact point for this CAR. This is a good place to record any helpful information regarding the person to contact for assistance with your CAR (e.g., the name or phone number of your LAN administrator). Limited to 64 characters.
Command Prompt	Not used.
Message Prompt	Not used.
Service Prompt	Not used.
Primary Server	Optional field. Enter the IP address of the primary server with which the CAR will exchange information.
Alternate Server	Optional field. Enter the IP address of the alternate server with which the CAR will exchange information if the Primary Server is unavailable.

**3** Obtain the following *Default Gateway Settings* information:

Default IP Gateway

Interface:

Metric:

Gateway:

The following table describes each of the *Default Gateway Settings* fields:

#### Default Gateway Settings Information

Field	Definition
Interface	<i>No entry is required for this field.</i>
Metric	Enter a number from 1 to 15, which expresses the distance in network hops from the CAR to the LAN hub.
Gateway	Enter the IP address assigned to the default router, in the nnn.nnn.nnn.nnn format.

- Obtain the following *Cable Downstream Network Settings* information:

Name:

Address/Mask:

Frame:

The following table describes the *Cable Downstream Network Settings* fields:

#### Cable Downstream Network Settings

Field	Description
Name	Enter a descriptive name for the Cable IP Network Interface.
Address/Mask	Enter the IP address and subnet mask assigned to the interface in the format Address/Mask. Do not use a class letter or the number of bits for the subnet mask. Enter the mask in numerical form. For example: <b>10.1.2.3/255.255.255.0</b>
Frame	Select <i>MCNS</i> as the Frame type from the drop-down menu.

- If you will be configuring the CMTS as one-way or three-way, obtain the following *Service Provider Descriptor Settings* information:

The following table describes the *Service Provider Descriptor Settings* fields.

### Service Provider Descriptor Entries

Entry	Description
Index	Enter a number which allows the CAR software to reference this Service Provider Descriptor (SPD). The first defined SPD number should be 0. The second should be 1, the third 2, and so on. The maximum number of defined SPDs the CAR can store is 11.
Name	Enter a descriptive name for this SPD setting. Limited to 32 characters.
Phone Num1	Enter the primary phone number that cable modems must dial to establish a PPP connection with the Telco Return Access Concentrator (TRAC). You can include a standard modem command string. These differ between modem vendors.
Phone Num2	Optional. Enter an alternate phone number that cable modems must dial to establish a PPP connection in case Phone Num1 fails.
Phone Num3	Optional. Enter an alternate phone number that cable modems must dial to establish a PPP connection in case Phone Num2 fails.
Connection Threshold	Enter a number from 1 to 10 that defines the number of times a client is allowed to dial a phone number before the system decides a connection cannot be made. For example, if you set this to 2, all configured phone numbers are tried twice: Phone Num1, Phone Num2, Phone Num3, then Phone Num1, Phone Num2, Phone Num3.
Username	Optional. Enter the PAP/CHAP authentication username that cable modems must use to establish a PPP connection (see PPP_auth_type below).
Password	Optional. Enter a password that cable modems must use to establish a PPP connection.

## Service Provider Descriptor Entries

Entry	Description
PPP Authentication	<p>From the drop-down menu, select the type of PPP authentication you want to use:</p> <ul style="list-style-type: none"> <li>■ Negotiate: Negotiate with the peer machine on whether to use PAP or CHAP.</li> <li>■ PAP: Use PAP for authentication. If the peer machine can only use CHAP or no authentication, the connection will be refused.</li> <li>■ CHAP: Use CHAP for authentication. If the peer machine can only use PAP or no authentication, the connection will be refused.</li> </ul>
RADIUS Realm	<p>If you are using RADIUS and the RADIUS server is not in the same domain as the TRAC, enter the full qualified name of the dial-in user, in the format <code>username@name.xxx</code>. For example: <code>john_doe@company.com</code>.</p>
DHCP Authenticate	<p>From the drop-down menu, select a value that indicates how you want the dial-in host to use DHCP:</p> <ul style="list-style-type: none"> <li>■ Enabled: Instructs the dial-in host to use DHCP when dialing in.</li> <li>■ Disabled: Do not use DHCP when dialing in.</li> </ul>
DHCP Address	<p>Enter the IP address of the DHCP server in the <code>nnn.nnn.nnn.nnn</code> format.</p>
DHCP Hop Count	<p>Enter the number of hops from the client cable modem to the DHCP server. Valid entries are from 1 to 15.</p>
Factory Default	<p>Place a check in the box to define this SPD as the default. You must define only one SPD as the default.</p>
Status	<p>Place a checkmark in the box to enable this SPD. Leave the box unchecked if you do not want to activate this SPD. It remains and can be enabled later.</p>

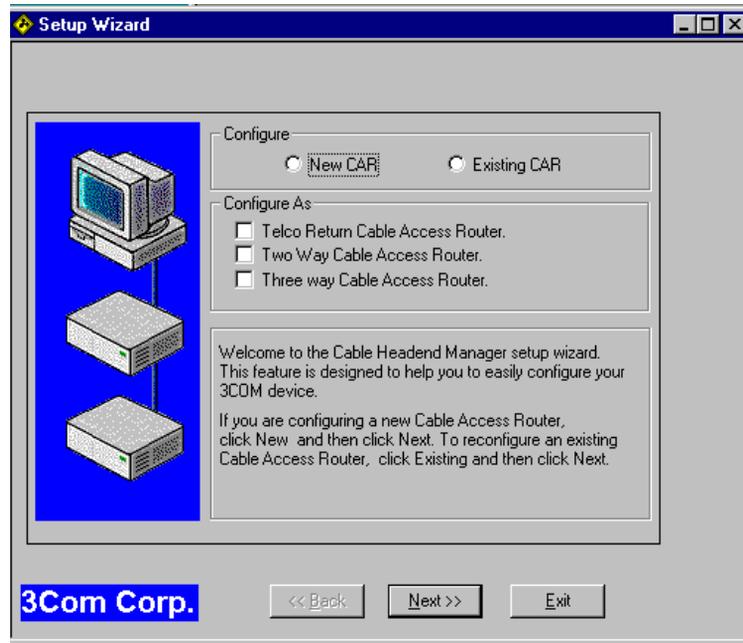
**6** Continue with *Section 5: Running the Configuration Setup Wizard*.

## Running the Configuration Setup Wizard

After you have gathered all of the information required in the previous section, you are ready to run the Configuration Setup Wizard.

To configure the CAR via the configuration Setup Wizard:

- 1** Double click the **CHM program icon** to launch the application.
- 2** Click the **File** pull-down menu above the toolbar.
- 3** Click **Setup Wizard**. The following screen appears:



- 4 In the *Configure* field, Click **New** or **Existing**, depending on whether you are configuring a new CAR, or reconfiguring an existing one.
- 5 In the *Configure As* field, place a check next to the type of CAR you want to configure.
- 6 Click **Next**.
- 7 Follow the instructions below, depending on whether you are configuring a new CAR, or reconfiguring an existing one:

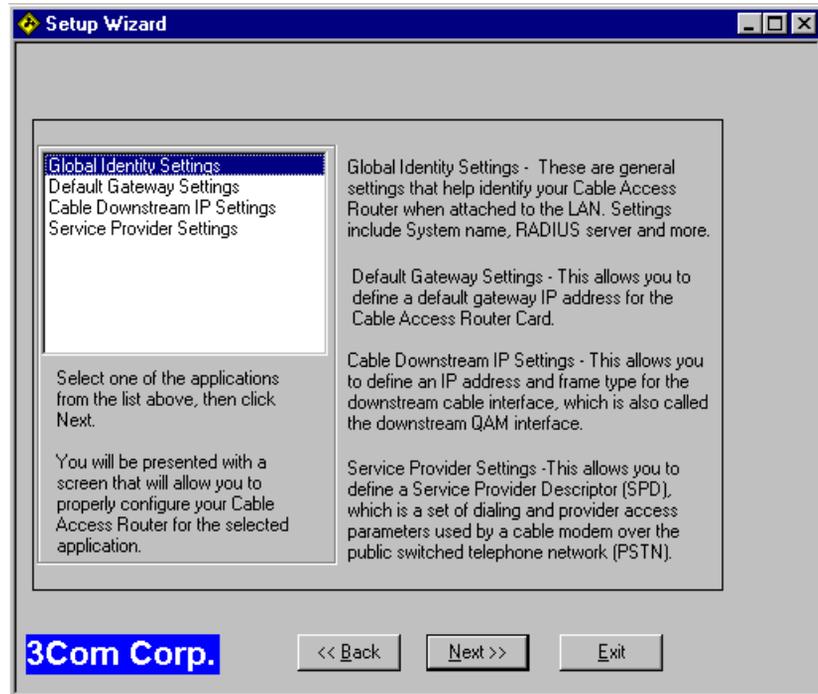
*New CAR:*

- a The MAC address for the new CAR is discovered automatically by the CHM. Select it with the mouse.
- b Enter the *IP Address* and the *SNMP Community* name you want to assign to the new CAR.
- c Click **Next**.

*Existing CAR:*

- a Enter the *IP Address* and *SNMP Community* name currently defined for this CAR.

- b** Click **Next**.
- 8** Enter the information you obtained in step 1 of the previous section in this guide. Then click **Next**.
- 9** The following screen appears (Service Provider Settings does not appear if you chose to configure the CMTS as two-way):



- 10** Select *Global Identity Settings*, and click **Next**.
- 11** The Global Identity Settings dialog box appears. Enter the information you gathered in step 2 of the previous section of this guide. Then click **Commit**.
- 12** Select *Default Gateway Settings* from the list and click **Next**. The Default Gateway dialog box appears.
- 13** Enter the information you gathered in step 3 of the previous section of this guide. Then click **Commit**.
- 14** Select *Cable Downstream IP Settings* from the list and click **Next**.
- 15** Click **New**. The *Cable IP Network Configuration* dialog box appears.

- 16 Enter the information you gathered in step 4 of the previous section of this guide. Then click **C**ommit.
- 17 If you:
  - Chose to configure this CMTS as two-way, Setup Wizard configuration is complete.
  - Chose to configure this CMTS as one-way or three-way, select *Service Provider Descriptor* from the list and click **N**ext.
- 18 Click **N**ew. The *Service Provider Descriptor* dialog box appears.
- 19 Enter the information you gathered in step 5 of the previous section of this guide. Then click **O**K.
- 20 Click **C**ommit.
- 21 Click **O**K and then **E**xit to return to the CHM main window.

Setup Wizard configuration is complete.



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