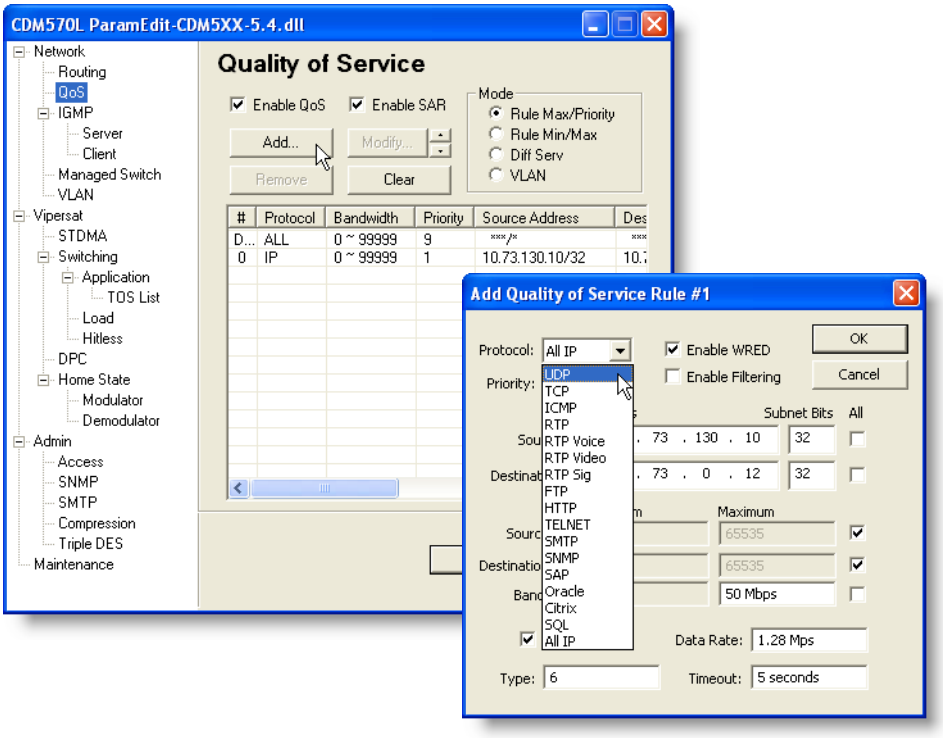
Vipersat CDM-570/L, CDD-56X
Parameter Editor
User Guide



Part Number MN-0000038 Revision 1

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Parameter Editor

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Software version 1.5.4.55

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Revision	Date	Description
0	11/26/08	Initial release.
1	2/06/09	**New functionality in this release:** Tree View user interface.

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CHAPTER

1

GENERAL

How to Use This Manual

This manual documents the features and functions of the Vipersat Parameter Editor software user interface, and guides the user in how to use this product for configuring a Comtech modem/router to operate in a Vipersat satellite network.

Workstation users, as well as network administrators and operators responsible for the configuration and maintenance of the Vipersat satellite network, are the intended audience for this document.

Manual Organization

This User Guide is organized into the following sections:

Chapter 1 — General

Contains Parameter Editor product description, customer support information, and manual conventions and references.

Chapter 2 — Using Parameter Editor

Covers the Parameter Editor dialogs and the associated fields that are used to configure the CDM-570/570L and the CDD-56X series modems.

Appendix A — Glossary

A glossary of terms that pertain to Vipersat satellite network technology.

Conventions and References

The following conventions are utilized in this manual to assist the reader:

Note: Provides important information relevant to the accompanying text.

Tip: Provides complementary information that facilitates the associated actions or instructions.

Caution: Provides explanatory text that notifies the reader of possible consequences of an action.

Warning: Provides precautionary text that describes a potentially hazardous situation. Failure to take or avoid a specified action may result in damage to equipment.

The following documents are referenced in this manual, and provide supplementary information for the reader:

- *CDM-570/570L Modem Installation and Operation Manual* (Part Number MN/CDM570L.IOM)
- *Vipersat CDM-570/570L User Guide* (Part Number MN/22125)
- *CDD-564L Quad Demodulator Installation and Operation Manual* (Part Number MN/CDD564L.IOM)
- *Vipersat CDD-56X Series User Guide* (Part Number MN/22137)
- *Vipersat Management System User Guide* (Part Number MN/22156)
- *Vipersat Load Utility User Guide* (Part Number MN/22117)

Product Description

Introduction

The Parameter (Param) Editor provides a simple graphical user interface (GUI) for making configuration changes to modem/routers used in a Vipersat satellite network. Accessible from both the VMS and VLoad, the Parameter Editor operates on the param files that store the operating parameters for network terminals. This user guide documents the Parameter Editor as it applies to the CDM-570/570L modem and the CDD-56X series of demodulators.

The Parameter Editor is the same in both the VMS and VLoad. However, the way edited parameters are applied to the Vipersat network modem/routers differs between the two. Once a modem's configuration has been changed using the VMS, the change is immediately applied to the modem. In contrast, changes made using the VLoad utility are not applied until the new param file is *Put* (uploaded) to the unit by the operator.

Note: Many of the parameters will interact with other parameters. Carefully read the instructions before making changes to a unit's configuration settings.

Parameter modifications may also be made directly to the modem/router using either a direct console connection or a Telnet connection. Refer to the modem/router's documentation for details on making equipment parameter modifications directly at the unit.

For more information on using the Parameter Editor with the VMS, refer to the *Vipersat Management System User Guide*.

For more information on using the Parameter Editor with VLoad, refer to the *Vipersat Load Utility User Guide*.

Parameter Editor Features

The Parameter Editor software has the following features:

- Simple yet comprehensive graphical user interface.
- Integrated with both the VMS and VLoad.
- Context sensitive for device type as well as for unit role (Hub/Remote).
- Functions with multiple .dll files.

Customer Support

Contact Information

Contact Comtech Vipersat Networks Customer Support for information or assistance with product support, service, or training on any Vipersat product.

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Web: www.comtechefdata.com

Reader Comments / Corrections

If the reader would like to submit any comments or corrections regarding this manual and its contents, please forward them to a Comtech Vipersat Customer Support representative. All input is appreciated.

CHAPTER

2

USING PARAMETER EDITOR

General

DLL Files

The Parameter Editor is a shared run-time Dynamic Link Library (DLL) file which is called from both VLoad and VMS software applications. It is used as an extension to both of these programs in providing an extendable User Interface. This file resides in a locally sourced directory for access by the host application.

To access the Parameter Editor from either the VMS or VLoad, the appropriate DLL files are required. There is a DLL file for each modem firmware version. For example, ParamEdit-5.4.dll is utilized for modems that are running firmware v1.5.4. For networks that have multiple modem firmware versions, multiple DLL files are required.

Please note that the naming convention for these files may differ, depending on what version of VMS or VLoad is used. Prior to *VMS v3.6.2* and *VLoad v3.4.1*, the convention used is ParamEdit-x.x.dll, where x.x identifies the modem firmware version. For *VMS v3.6.2 and later*, and *VLoad v3.4.1 and later*, the convention used includes the modem designation and firmware version (e.g., ParamEdit-CDM5XX-x.x.dll).

Updating DLL Files

To update the Parameter Editor for one or both of the installed applications, VLoad and/or VMS, the new DLL file is simply copied into the appropriate directory for that application.

VMS Update

On both the VMS Client machine and the VMS Server, copy the distributed DLL file to the following directory:

C:\Program Files\Vipersat\VMS\3.0\bin

Vload Update

Copy the distributed DLL file into the same local directory that holds the VLoad application (.exe).

These DLL file updates will not cause any disruption to the host applications.

Configuration Changes

When changes are made to a modem unit configuration with Parameter Editor, these changes can either be saved by clicking on the **OK** button at the bottom of the window, or ignored by clicking on the **Cancel** button or closing the Editor.

Caution: Clicking the OK button saves *all of the data* from *all of the menu categories* simultaneously to the modem unit Param file. The OK and Cancel buttons do not apply to any single category, but apply to all categories in the Parameter Editor.

Because the Parameter Editor closes after a save operation, it is recommended that all changes be input prior to clicking on the OK button.

Parameter Editor Tree Menu

The Parameter Editor displays the editable parameter categories for each network modem/router in the form of a tree menu, as shown in figure 2-1. The tree appearance will vary depending on the selected Network Addressing Mode, the Role Designation, and whether the unit has both a modulator and a demodulator, or a demodulator(s) only.

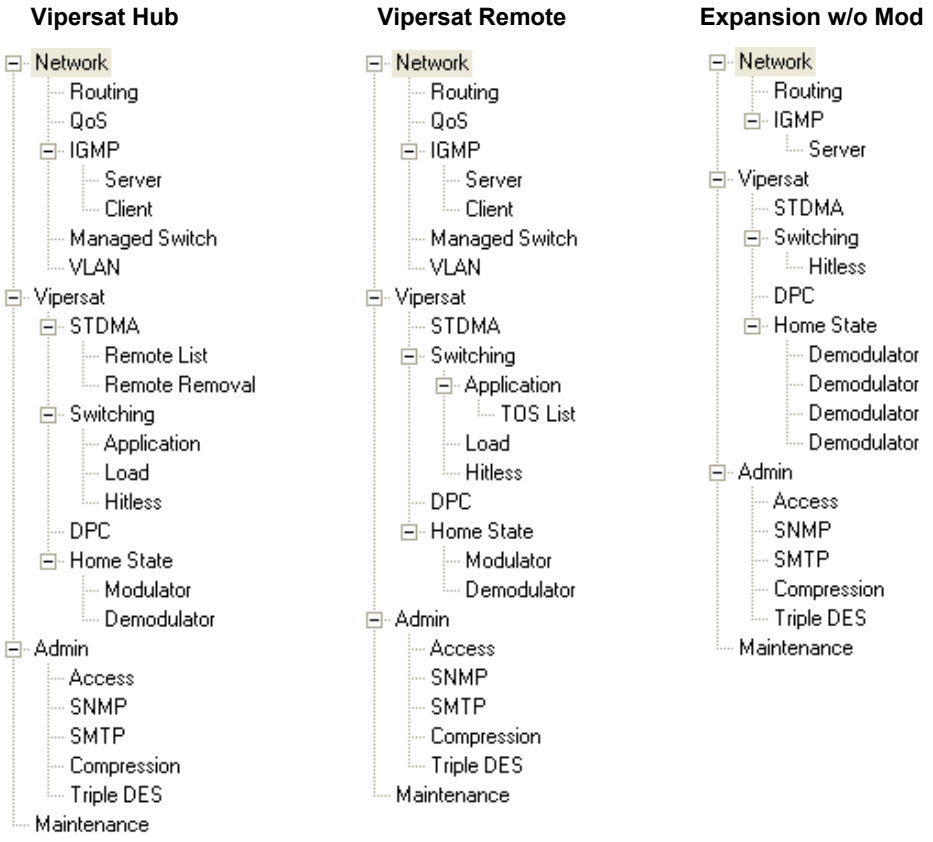

Figure 2-1 Tree Menus, Vipersat Modes

From the VMS, the Parameter Editor is accessed by selecting the modem **Configure** command.

From VLoad, the Parameter Editor is accessed by clicking on the **Edit Param File** button.

Configuration Alert

Parameter Editor performs a check of the configuration settings that are input by the user. If any settings are found to be in conflict for the unit, an alert message is generated to inform the user that an adjustment is necessary. When a dialog containing a conflicting parameter setting is exited, an alert icon will appear in front of the associated menu item (figure 2-2). Upon re-opening the dialog, an alert icon will be displayed next to the field in question. Clicking on the icon will display a pop-up info-tip that explains the conflict.

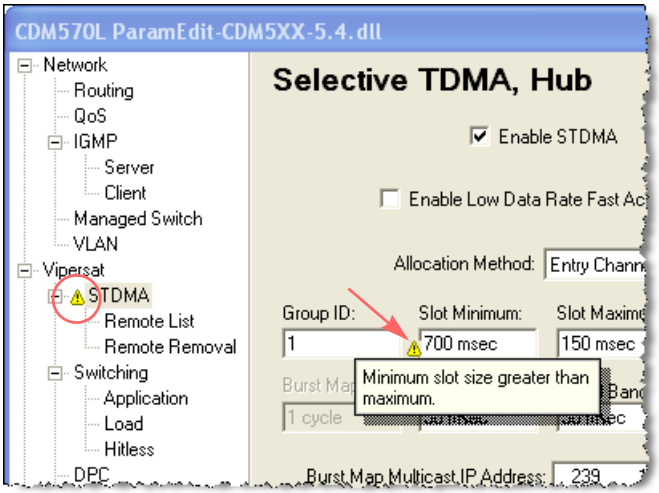

Figure 2-2 Alert, Parameter Conflict

The following sections describe each of the menu items and their associated parameter settings.

Network

The network interface parameters are set in the Network dialog, figure 2-3.

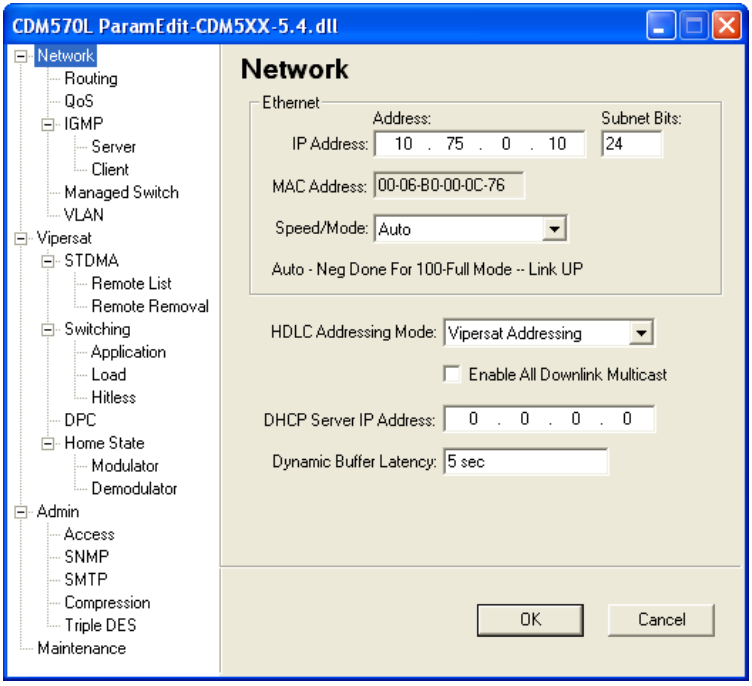

Figure 2-3 Network dialog

Ethernet

The following Ethernet parameters can be configured for this modem unit.

IP Address

Enter the IP address that is assigned to this modem unit.

Subnet Bits

Enter the number of subnet bits associated with this modem unit's IP address.

MAC Address

The modem unit's MAC address is read-only. This parameter can not be modified by the user.

Speed/Mode

Select the speed and mode for the connection from the options on the drop-down menu.

NOTE

Note: Auto mode is recommended unless the operator is absolutely certain the device being connected does not have auto-negotiation available.

HDLC Addressing Mode

The drop-down menu for HDLC (High-level Data Link Control) Addressing Mode shown in figure 2-4 displays five available modes (only the first four modes are displayed for a CDD-56X):

- Small Network Mode
- Large Network Mode
- Point-to-Point Mode
- Vipersat Addressing
- Managed Switch Mode

Caution: Only the **Vipersat Addressing** mode configures the target modem to communicate in a Vipersat network. Selecting any other mode will remove the unit from the network.

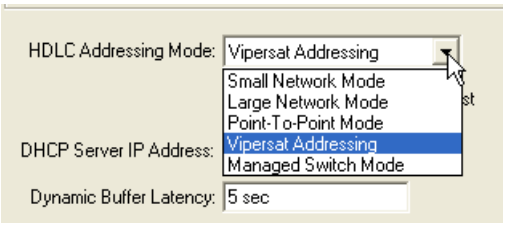

Figure 2-4 HDLC Addressing Mode Menu

When using the ParamEditor to configure a modem for operation in an environment other than a Vipersat network, refer to the unit's documentation for details on setting and configuring the device.

Managed Switch Mode

The Managed Switch mode uses a bridging mode which is not supported in Vipersat networks. Refer to the CDM-570/570L's documentation for availability and detailed information on this mode.

Warning: Selecting the **Managed Switch** mode will invoke bridging mode in the target CDM-570/570L. When the OK button is clicked, the modem will be immediately disconnected from the VMS. The VMS cannot communicate with or control a CDM-570/570L which is operating in the bridging mode.

Enable All Downlink Multicast

When the Enable All Downlink Multicast check box is selected, the IP Module in the modem will automatically forward all multicast packets received from the Satellite interface to the Ethernet LAN port without regard to the Route Table.

When this feature is not selected, multicast traffic from the Satellite will not be forwarded to the LAN unless a multicast route exists in the Route Table to handle this type of traffic.

DHCP Server IP Address

This option allows hosts at this remote site to receive dynamically assigned IP addresses when a DHCP server is located at the Hub site. If applicable, enter the IP address of the DHCP server.

Dynamic Buffer Latency

A buffer period can be specified for the modem for WAN traffic. For real-time applications, such as voice or video, this period would typically be minimized.

This field defaults to 5 seconds; the value range is from 0.200 to 5.000 seconds.

Routing

Clicking the **Routing** menu item displays the modem unit's routing dialog, shown in figure 2-5. All current Static Routes are displayed in the table listing.

Adding a Route

To add a new static route, click the **Add** button at the bottom of the Routing dialog to display the **Add Route** dialog shown in figure 2-6.

Route Name

Enter a designation for the route in the **Route Name** dialog box (maximum 13 characters).

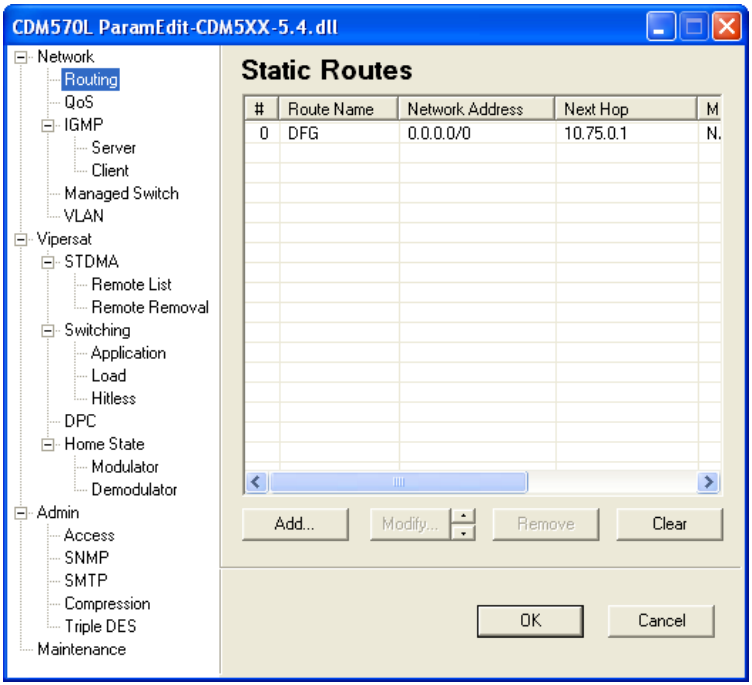

Figure 2-5 Routing dialog

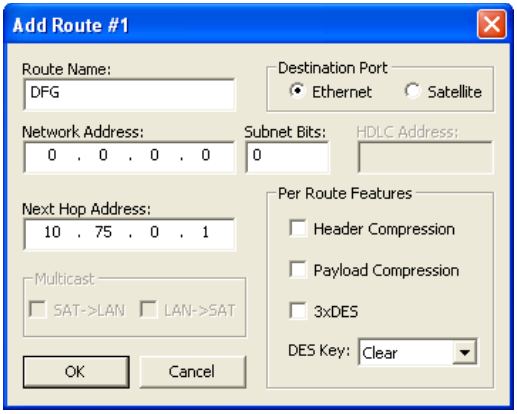

Figure 2-6 Add Route dialog

Destination Port

The **Destination Port** can be either **Ethernet** (LAN) or **Satellite** (WAN). Note that if the *Ethernet* radio button is selected, the **Next Hop Address** box becomes active. If the *Satellite* radio button is selected, the **Next Hop Address**

box becomes inactive and the Next Hop table entry (figure 2-5) will show as NONE.

Network Address

Enter the destination network IP address for this route to be added to the Vipersat unit's routing table.

Subnet Bits

Enter the number of subnet bits associated with the network address.

HDLC Address

This parameter is not supported in Vipersat networks. Refer to the modem's user documentation for additional information.

Next Hop Address

The **Next Hop Address** box allows entering the IP address of the next hop for a route which has an Ethernet destination port selected. This address must be on the local subnet.

Multicast

If the first three digits entered in the **Network Address** box are in the range of 224 to 239, the address will be recognized as multicast, as shown in figure 2-7. The **Multicast** box will become active, allowing the selection of Satellite to LAN, LAN to Satellite, or both.

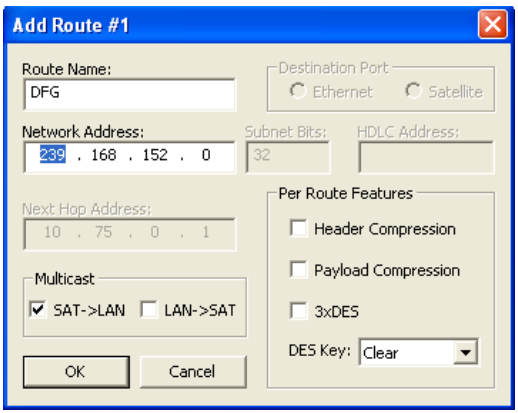

Figure 2-7 Multicast Network Address

Per Route Features

The Per Route Features provide optional functionality choices for the modem/router unit. The per route features are:

- **Header Compression –** Refer to section “Compression” on page 2-60 for details on setting header compression.
- **Payload Compression –** Refer to section “Compression” on page 2-60 for details on setting payload compression.
- **3xDES –** Refer to the section “Triple DES” on page 2-62 for details on setting the DES encryption.
- **DES Key** – Select the key from the drop-down list.

Modifying a Route

Selecting a route from the Routing table enables the **Modify** button. Clicking the Modify button displays the **Modify Route** dialog shown in figure 2-8.

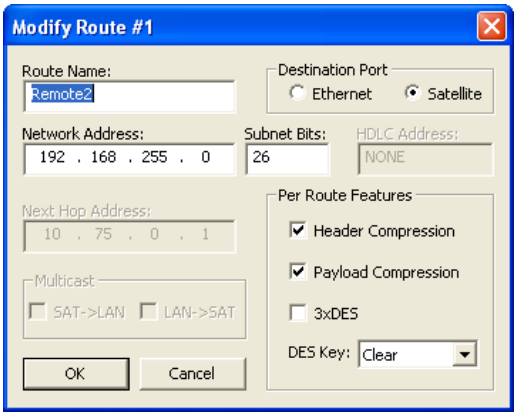

Figure 2-8 Modify Route dialog

The **Modify Route** dialog allows edits to be made to the fields as described above.

QoS

NOTE

Note: If the QoS feature (FAST code) has not been purchased for this modem, the QoS menu item will not be displayed.

The QoS menu item is not displayed for receive-only network units such as the CDD-56X.

Selecting the QoS (Quality of Service) menu item displays the dialog shown in figure 2-9. Quality of Service is an optional modem/router feature. If this feature is enabled, the user may select one of four **Modes** of QoS operation:

- Rule Max/Priority – QoS rules based on maximum bandwidth and priority
- Rule Min/Max – QoS rules based on minimum and maximum bandwidth
- Diff Serv– QoS rules based on Differentiated Services settings
- VLAN – QoS rules based on the user priority field in the VLAN header

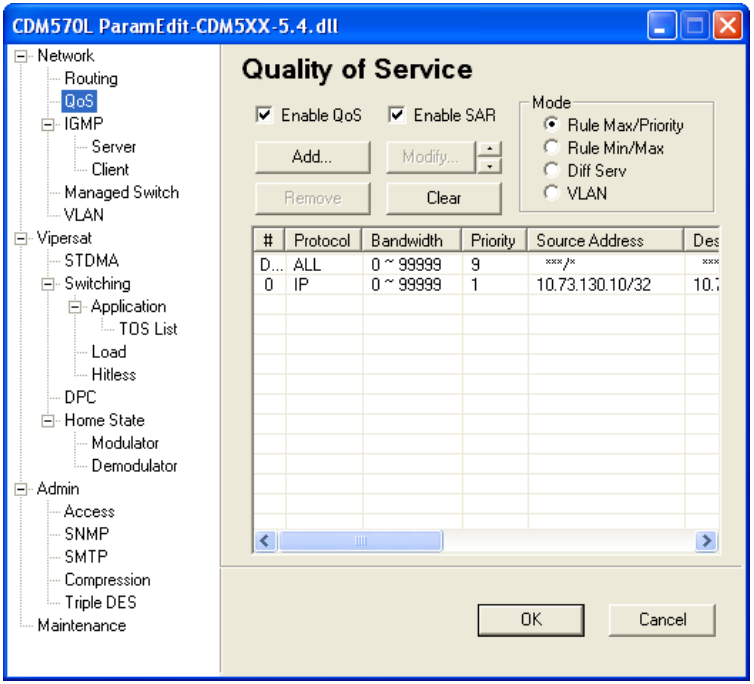

Figure 2-9 QoS dialog, Max/Priority Mode

Enable Quality of Service

Selecting the **Enable Quality of Service** box enables QoS on this modem/router.

Enable SAR

Packet Segmentation and Reassembly (SAR) can be enabled for QoS. With this feature, packets are made smaller to speed them through the network and because of specified packet size restrictions for a given path.

SAR is an adaptive process; it will trigger only if the packet latency exceeds the threshold value (default is 20 msec). Latency value is calculated based on the satellite transmission bandwidth. The minimum segment size is limited to 480 bytes—excluding satellite HDLC header information—in order to avoid satellite overhead and consumption of CPU cycles.

Rules Table

The Rules table appears in the lower portion of the QoS dialog. Just above the table is a button set that acts on the table, and consists of the **Add**, **Remove**, **Modify**, **Up/Down Arrow**, and **Clear** buttons. When an existing rule is selected, that rule can be repositioned in the table listing through the use of the Up/Down Arrow buttons. Note, however, that the Default rule always occupies the first row of the table and can not be repositioned.

Developing QoS Rules in a VMS Network

The optional QoS capabilities available in each modem/router may be utilized whenever a modem will be handling high-priority traffic, such as video or voice. While developing the QoS Rules to be applied to the unit, the type of traffic the modem is expected to handle must be considered.

Defining QoS Rules

The QoS mode that is chosen will determine the settable parameters for defining QoS rules. An example of a dialog for adding a rule is shown below in figure 2-10.

QoS Rules can be assigned to up to 32 different types of flows defined by the user. Flows can be defined by any combination of Protocol (FTP, UDP, RTP, etc.), Source/Destination IP (specific or range), and/or Layer 3 Source/Destination Port.

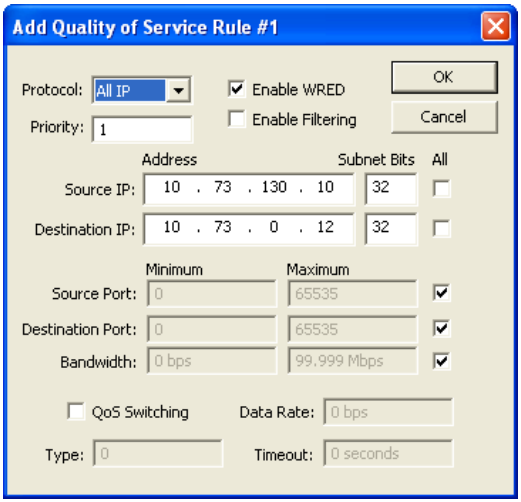

Figure 2-10 Add Quality Of Service Rule dialog

QoS Rule Hierarchy

It is quite possible to have traffic that meets the definitions of several QoS Rules. All traffic will be classified into the first QoS Rule that is a match, or fall into the Default Rule. The most specific QoS Rule will always be first. For example, a QoS Rule that identifies a Source and Destination IP Address will be assigned ahead of a rule that just defines RTP protocol. QoS Rules that have the same amount of variables defined are sorted as follows:

1. By Protocol.

Protocol Priority:

- **a.** VOCE – Voice Real Time Protocol
- **b.** VDEO – Video Real Time Protocol
- **c.** RTPS – Real Time Protocol Signalling
- **d.** RTP – All Real Time Protocols
- **e.** FTP – File Transfer Protocol
- **f.** HTTP – Hypertext Transfer Protocol
- **g.** TELN – Telnet Protocol
- **h.** SMTP – Simple Mail Transfer Protocol
- **i.** SNMP – Simple Network Management Protocol
- **j.** SQL – Structured Query Language Protocol

k. ORCL – ORACLE Protocol

l. CTRX – CITRIX Protocol

m. SAP – Service Announcement Protocol

n. UDP – User Datagram Protocol

o. TCP – Transmission Control Protocol

p. ICMP – Internet Control Message Protocol

q. IP – All Internet Protocol

r. N-IP – All Non-Internet Protocol

2. By Source IP Address or Subnet.

3. By Destination IP Address or Subnet.

4. By Source Port (lowest port number first).

5. By Destination Port (lowest port number first).

The modem/router will sort each QoS rule as they are added, and the QoS Rules Table will be updated to reflect the order with which rules are matched.

Rule Max/Priority & Rule Min/Max Modes

The Rule Max/Priority mode and the Rule Min/Max mode are very similar in configuration. As the names imply, Rule Max/Priority is primarily based on the Priority parameter and the Maximum Bandwidth parameter (the Minimum Bandwidth parameter is not active), while Rule Min/Max is primarily based on the Minimum and Maximum Bandwidth parameters (the Priority parameter is not active).

Select the **Rule** mode radio button in the QoS dialog, then click on the **Add...** button to open the Add QoS Rule dialog. Alternatively, select an existing rule from the table and click on the **Modify** button to open the modify version of the same dialog.

Note that there are **All** check boxes to the right of the IP addresses, Ports, and Bandwidth fields. When an All box is checked, any range of values is accepted, and the specific parameter fields are inactivated. Unchecking an All box, as shown in figure 2-11, activates the fields for that parameter and allows the values to be edited.

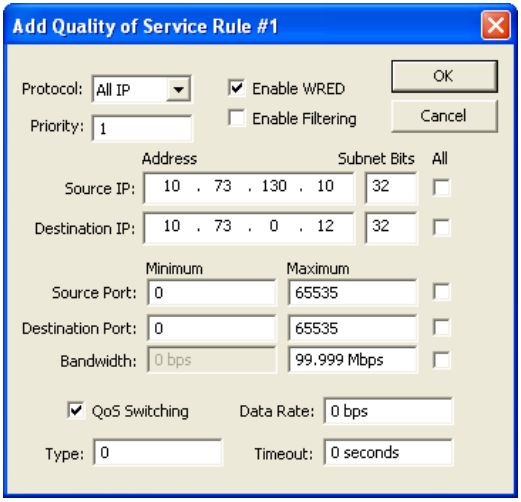

Figure 2-11 Add QoS Rule, Max/Priority Mode

Selecting the **QoS Switching** check box at the bottom of the dialog enables entry of values into the **Type**, **Data Rate**, and **Timeout** fields to be used to determine when a switch will occur.

NOTE

Note: This parameter will not be active/selectable unless the modem is a *Remote* and *Automatic Switching* is enabled. *QoS Application Switching* must be enabled also for QoS switching to occur. See the section "Switching" on page 2-39.

In each of these modes, there exists a Default rule at the top of the table that is preconfigured and can not be removed. This rule can be modified, but the only active parameter is Enable Filtering.

Protocol

Clicking the **Protocol** drop-down menu displays the available protocols. Select the appropriate protocol from the list, as shown in figure 2-12.

When selecting a protocol for a QoS Rule, be aware that the modem/router allows a very broad selection (such as IP) or a very specific protocol. For example, RTP traffic can consist of UDP portion (for voice or video) and a TCP portion (for RTP signaling). These could have separate QoS Rules created or all be included in a single Rule by selecting RTP as the protocol.

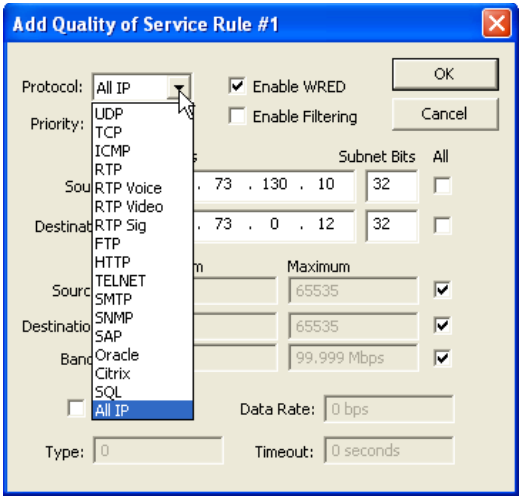

Figure 2-12 Protocol Drop-Down Menu

Priority

This field is active for *Rule Max/Priority* mode only.

A Priority level from 1 (highest) to 9 (lowest) is assigned for each flow using the **Priority** field. The modem/router classifies each packet that is to be forwarded over the satellite using the priority assigned for the selected Protocol.

Any packet that does not meet a QoS Rule is assigned to the Default Rule and will be assigned a Priority of 9. Priority 1 packets will be forwarded immediately, Priority 2 packets will be forwarded as soon as there are no priority 1 packets in the queue, and so on. Any latency-critical traffic, such as VoIP/RTP should always be assigned Priority 1.

Enable WRED

Selecting the **Enable WRED** (Weighted Random Early Detection) check box in the dialog shown in figure 2-11 enables this function in the modem/router. WRED allows for more graceful dropping of packets, as QoS queues get full.

Without WRED, output buffers fill during periods of congestion. When the buffers are full, all additional packets are dropped. Typically, packets are dropped based upon a simple tail drop algorithm applied to packets as they were being added to the QoS queues. This can result in large numbers of contiguous packets being dropped all at once, which causes many protocols such as RTP and TCP to ungracefully degrade performance in an over-consumed or bursty scenario.

WRED applies a randomization, which means that the percentage change to dropped packets increases as the queue becomes full, and minimizes the

chances of global synchronization. Thus, WRED allows the transmission line to be used fully at all times.

Enable Filtering

QoS allows specific flows to be designated as “filtered,” so the modem/router will discard traffic that the user does not want to forward over a satellite link. Selecting the **Enable Filtering** check box enables filtering.

IP Addressing

Specific Source and Destination IP Addresses can be specified for a rule, if desired.

Source and Destination Ports

Selecting Source and Destination Ports should only be done if the user is aware of the port used by the desired protocol or application. There are well known ports for various protocols, but often only command messages use these specific ports and data is transferred through a negotiated port.

Either specific port numbers or a range of ports can be entered using the **Source Port** and **Destination Port** Minimum and Maximum fields.

Minimum & Maximum Bandwidth

Minimum and Maximum Bandwidth values can be assigned to a flow to restrict the bandwidths that any particular flow will utilize. The default of no bandwidth restriction can be set by selecting the All check box.

Note that, for *Rule Max/Priority*, no minimum bandwidth restriction is applied (0 bps) and can not be edited. For *Rule Min/Max*, a minimum value can be assigned to the flow that allows a committed information rate (CIR) to be applied to a user-defined class of traffic.

Tip: Once the QoS rules are defined, each type of traffic flow should be isolated and sent to verify that it is being sent using the intended QoS rule.

Using the QoS Queue Statistics feature in the modem unit’s CLI, the traffic flows for all of the defined QoS rules can be monitored. Statistics displayed include the packet rate, drop rate, transmit rate, and active flows.

Diff Serv QoS Mode

Selecting the **Diff Serv** Mode radio button displays the QoS dialog appearance shown in figure 2-13. This selection makes the target unit fully compliant with the Differentiated Services QoS standards. All rules are preconfigured.

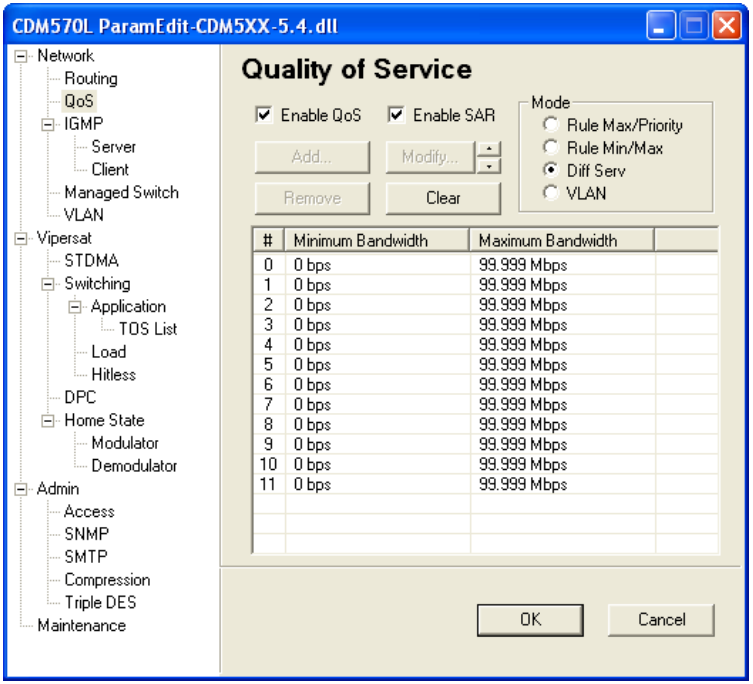

Figure 2-13 QoS Tab, Diff Serv Mode

Rules can not be added, removed, or cleared. To modify the bandwidth settings for a rule, select the rule and click on the **Modify** button. Uncheck the **All** box to edit the Bandwidth settings, as shown in figure 2-14.

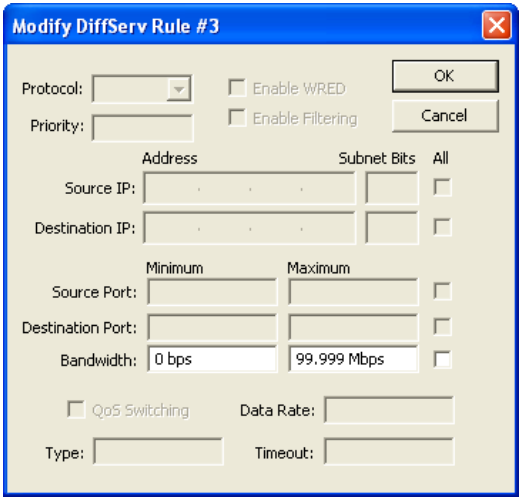

Figure 2-14 Modify DiffServ Rule

Class Selector DiffServ Code Points (DSCP)

Some implementations of DiffServ will prioritize traffic by Class Selector assignment. This is defined in the DiffServ Code Points (DSCP) within the IP header. The first 3 bits of the DSCP define the Class Selector Precedence (or Priority), as shown in table 2-1.

Table 2-1 DiffServ Code Points (DSCP)

Class Selector	DSCP	Modem/Router Priority
Precedence 1	001 000	1
Precedence 2	010 000	2
Precedence 3	011 000	3
Precedence 4	100 000	4
Precedence 5	101 000	5
Precedence 6	110 000	6
Precedence 7	111 000	7
Default	000 000	9

The modem/router will prioritize the traffic based upon the DSCP Class Selector Precedence.

NOTE

Note: All traffic that does not have the DSCP Class Selector Precedence defined (000 000) will be placed in the Default Queue and have a Precedence of 9.

Expedited Forwarding and Assured Forwarding DSCP

Another implementation of DiffServ uses all 6 bits of the DSCP to define Expedited and Assured Forwarding, as shown in table 2-2.

Table 2-2 Expedited and Assured Forwarding, DSCP

DiffServ Type	Class Selector	DSCP	Modem/Router Priority
Expedited Forwarding	Precedence 1	101 110	1
Assured Forwarding – Class 1	Precedence 8	001 xx0	8
Assured Forwarding – Class 2	Precedence 8	010 xx0	8
Assured Forwarding – Class 3	Precedence 8	011 xx0	8
Assured Forwarding – Class 4	Precedence 8	100 xx0	8

Expedited Forwarding (EF) DSCP

This defines premium service and is recommended for real time traffic applications such as VoIP and video conferencing.

Assured Forwarding (AF) DSCP

This defines four service levels and also uses the last three bits of the DSCP to define the Drop Precedence (Low, Medium, or High). The Drop Precedence determines which packets will most likely be dropped during periods of over congestion, similar to WRED. As a result, each of the four AF service levels also have three Drop Precedence levels for which the modem/router provides 12 separate queues.

Minimum Bandwidth (AF only)

The minimum bandwidth specification can be assigned to a flow that allows a committed information rate (CIR) to be applied to user-defined classes of traffic, or the default of no minimum bandwidth can be selected.

Maximum Bandwidth (AF only)

This can be assigned to a flow to restrict the maximum bandwidth that any particular flow will utilize, or the default of no bandwidth restriction can be selected.

Note: Minimum and Maximum Bandwidth is only configurable for each of the four Assured Forwarding classes.

Typically, DiffServ is implemented using exclusively Class Selector DSCP or exclusively Expedited and Assured Forwarding DSCP. The CDM-570/570L is fully DiffServ compliant and will work with either DiffServ implementation or with a combination of both.

IGMP

NOTE

Note: If the IGMP feature (FAST code) has not been purchased for this modem, the IGMP menu item will not be displayed.

Selecting the **Enable IGMP** (Internet Group Management Protocol) box on the IGMP dialog shown in figure 2-15 enables the receive portion of a modem unit to use the modem as an IGMP server. The transmit portion of the terminal utilizes the modem as an IGMP client. The IGMP dialogs configure the unit to report an interest to join a Multicast group on an IGMP server. IGMP is used to regulate multicast traffic on a LAN segment to prevent information of no interest from consuming bandwidth on the LAN.

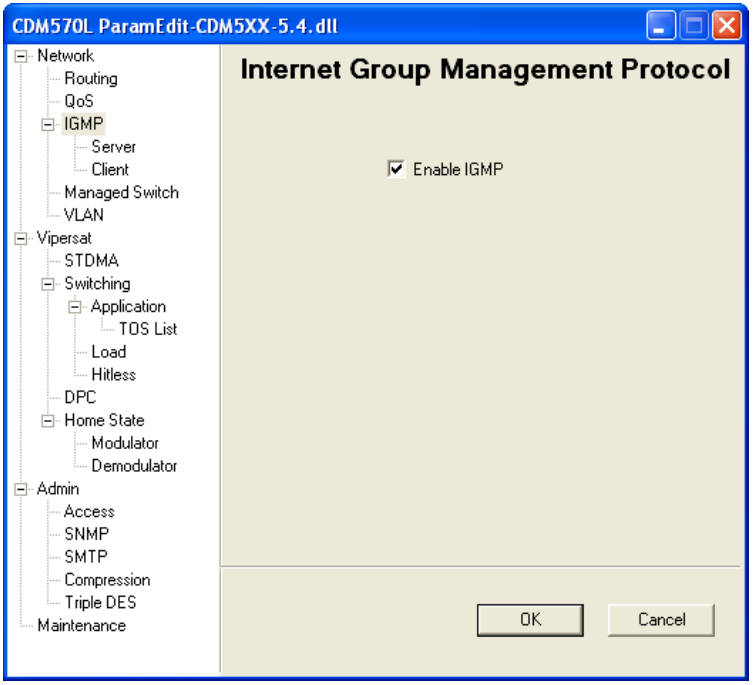

Figure 2-15 IGMP dialog

Modem as IGMP Server

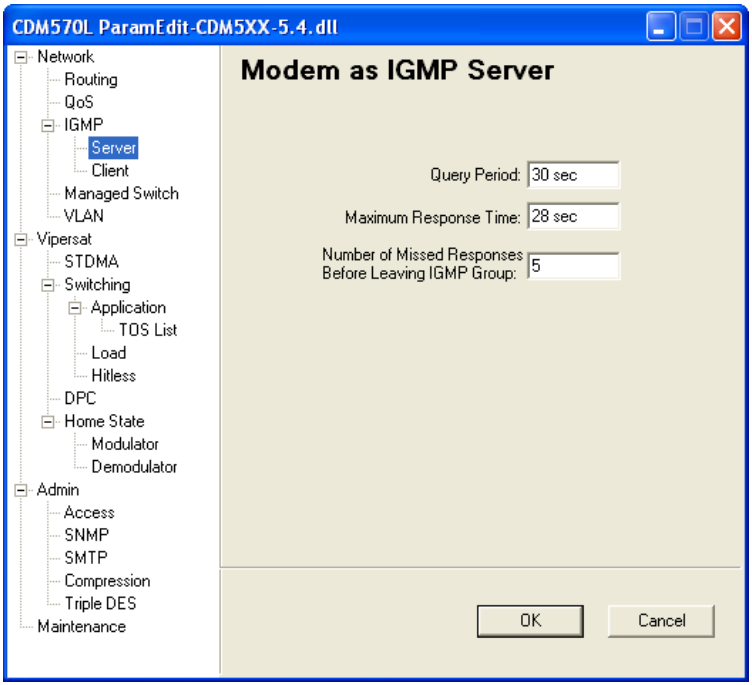

Figure 2-16 IGMP Server dialog

Query Period

The IGMP protocol requests that a server periodically publish to users on the LAN the multicast IP Addresses that it can service. The IGMP Query Period defines the time interval (in seconds) between each of these queries for membership.

Maximum Response Time

The IGMP Maximum Response Time defines the time interval (in seconds) that the unit should wait before it assumes that no parties are interested in the content published via an IGMP query. This option is expressed in seconds and the maximum response time that is accepted by the unit is **Query Period** minus two seconds.

Number of Missed Responses Before Leaving IGMP Group

The number entered in this dialog box defines the number of membership queries that go unanswered from LAN clients before the Ethernet interface will no longer forward data for that IGMP group.

For example, assume that a modem/router has the IGMP Query Period set to 60 seconds and the Number of Missed Responses set to 3. If a client joins an IGMP group, then the service to that group will not be discontinued until no clients respond to a query from the unit for a period of 60x3=180 seconds.

Modem as IGMP Client

NOTE

Note: If the unit is a CDD-56X, it cannot operate as an IGMP client and the options in the **Modem as IGMP Client** dialog box will be grayed out and unavailable.

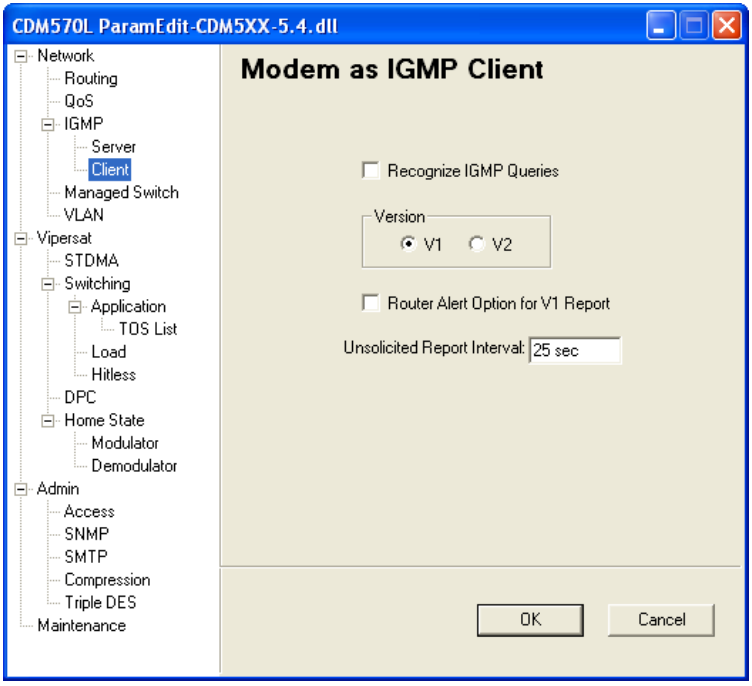

Figure 2-17 IGMP Client dialog

Recognize IGMP Queries

The **Recognize IGMP Queries** box determines whether the modem/router will respond to periodic queries from an IGMP server that publishes a request to join a specified multicast group. If this box is selected, the unit will respond to an IGMP query by requesting to join a multicast group published by the server that is defined in the unit's route table.

If this box is *not* selected, the modem/router will not respond to IGMP queries from a server. In this type of configuration, the unit is configured to uncondi-

tionally request to join an IGMP group at an interval specified in the **Unsolicited Report Interval** dialog box (see below).

Version

Selecting either the **V1** or **V2** radio button determines which version of the IGMP protocol will be used when attempting to join a group on a multicast server via an unsolicited report. When the modem/router is configured to recognize IGMP queries, it will respond to a query in the same version that the server used to initiate the query.

Router Alert Option for V1 Report

Selecting the **Router Alert Option for V1 Report** option enables a special-case ability to use some Cisco routers which require the definition of a router alert option to recognize a report from a client to join a multicast group. The IP Router Alert Option is defined in RFC2113 and was introduced by Cisco.

While this option is not part of the IGMP standard, most IGMP V2 implementations contain this option.

Check whether or not your router requires this option as most implementations of IGMP V1 do not contain this option. This parameter is defined for those special cases, in which a Cisco router is configured as an IGMP V1 server, to prevent possible conflicts in networks.

If the box is selected, the modem/router will generate IGMP reports to join multicast groups as specifically required by some Cisco router configurations. If the box is not selected, the unit will generate IGMP reports to join multicast groups as defined and implemented by most IGMP servers.

Unsolicited Report Interval

The **Unsolicited Report Interval** dialog box configures the modem/router to generate unsolicited reports to join a multicast group at specified time intervals. Each unsolicited report to join a multicast group will use the version of the IGMP protocol as specified by the IGMP version being used.

The value entered for this parameter specifies the number of seconds between unsolicited reports. Entering a zero in the dialog box means no unsolicited reports to join a Multicast group will be generated by the unit.

Managed Switch

The parameters in this dialog are not supported in Vipersat networks. Refer to the modem's user documentation for additional information.

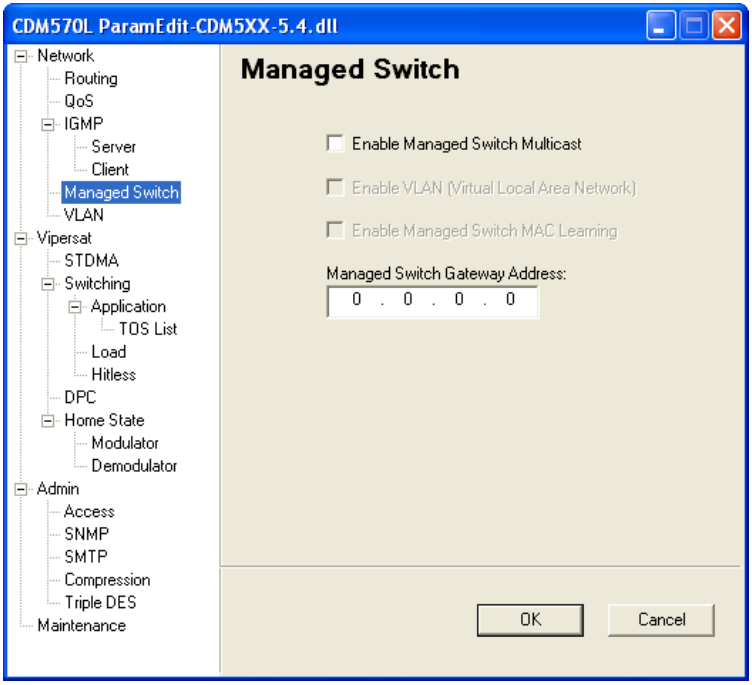

Figure 2-18 Managed Switch dialog

VLAN

The **Virtual Local Area Network** (VLAN) dialog supplements the VLAN Priority/Max QoS mode selection, and allows configuration of tagged identifiers. VLAN tags are compatible with the VMS and Vipersat networks, but automatic switching on tags is not available.

NOTE

Note: IP Header Compression FAST feature code must be purchased and enabled in order for a modem to pass VLAN tags.

The VLAN table listing allows Add, Modify, and Remove operations for setting the Identifier, Priority, Tag, and Name attributes.

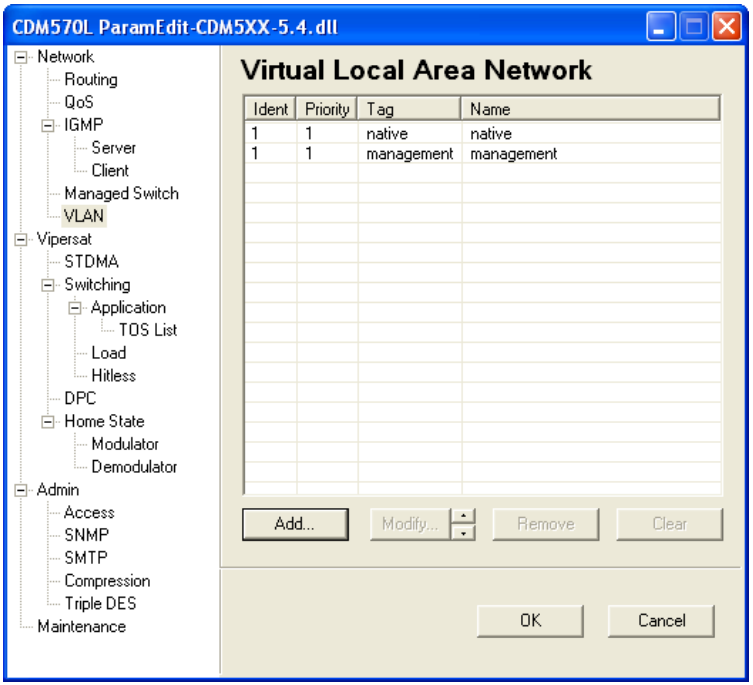

Figure 2-19 VLAN dialog

Vipersat

Note: If the Vipersat feature (FAST code) has not been purchased for this modem, the Vipersat menu item will not be displayed.

Clicking the Vipersat menu item displays the dialog shown in figure 2-20. This parameter set is used to configure the modem unit with the function (role) it is to perform in the Vipersat network and to assign associated attributes.

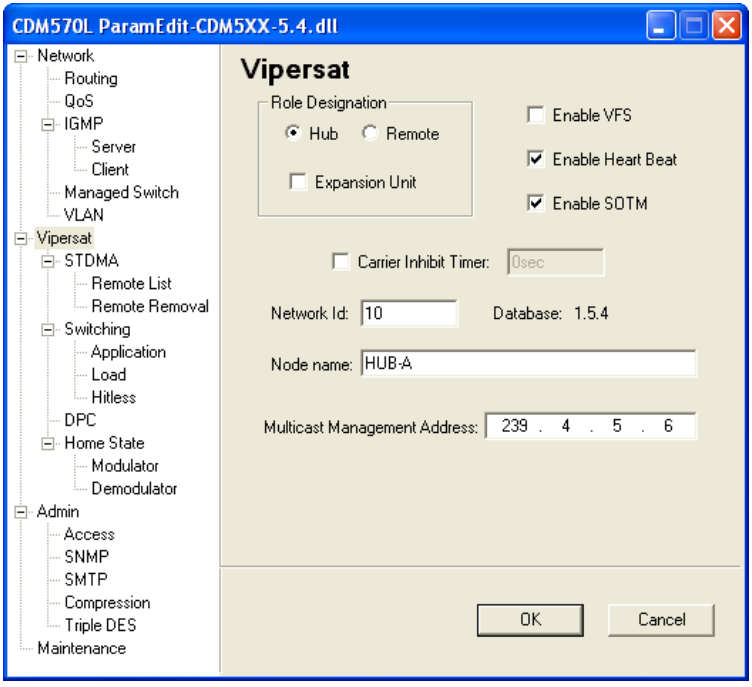

Figure 2-20 Vipersat dialog, Hub Unit

Role Designation

A Comtech modem/router is a flexible network component able to perform different functions, depending on how it is used in a network. Table 2-3 lists some typical network functions and the corresponding network role a modem unit must have to perform its functions.

Using the radio buttons in the **Role Designation** box shown in figure 2-20, the modem/router can be configured to function as a **Hub** or as a **Remote**.

In addition, the unit can be designated as an **Expansion Unit** for either a Hub (switched) or a Remote (mesh) by selecting the check box. This configures the

unit demod to operate in SCPC mode and to be available as a resource for dedicated communications with the other end of the satellite link.

Table 2-3 Vipersat unit Network Functions and Roles

Modem/Router Network Function	Hub	Remote	Expansion
Hub Burst Controller providing STDMA Timing Maps	X		
Hub Switched Demodulator	X		X
Remote STDMA Modem		X	
Remote Mesh Demodulator		X	X

Enable VFS

To allow the use of the Vipersat File Streamer with this unit, select the **Enable VFS** check box.

Enable Heart Beat

Active for Hub units only.

The **Heart Beat** feature is a redundancy heart beat message for primary Hub units that provides the option for a periodic communications check message to be sent from the Hub modem to the VMS for backup recovery in N:M redundancy (protected) configurations.

Enable SOTM

Active for Hub units only.

The SOTM (Satellite On The Move) feature enables RIPv2 (Routing Information Protocol) in forward routes, providing dynamic updates to the routing table. This allows routing configurations for Remotes to be written by the VMS via the Hub TDM. When the VMS writes the routes, the TDM unit will generate a RIPv2 routing update to its default gateway, specifying the new hop router for the Remote. This will ensure that the edge router has a current table of routes to all of the remote sites.

In applications utilizing SOTM where multiple TDMs share one router, this option should be enabled because of the potential that the Hub TDM may change, and thus the path to the default gateway to the Remote will change as well. It is not necessary to enable this option when each TDM has its own router.

Refer to the *Vipersat VMS User Guide* for implementation details.

Carrier Inhibit Timer

The **Carrier Inhibit Timer** parameter provides a time period to be specified that controls when a Remote modem should mute its transmitter in the event that there is a loss of link with the Hub. This feature is useful, for example, in an SNG application for a mobile Remote whose antenna is no longer aligned with the satellite and should not continue to transmit the carrier signal.

Hub Timer Setting

In a Hub unit, this parameter provides a fixed setting that can be specified for the keep alive message sent to the Remote(s). This provides an alternate to the Burst Map, which is variable and may become excessively long in certain applications.

When implemented, this setting is made at either the TDM outbound unit or a switched demod.

Note that this timer setting should be at least three times faster (shorter in duration) than the timer setting at the Remote(s) to ensure that network links are maintained.

Remote Timer Setting

In a Remote unit, this parameter provides a setting for how long the Remote has not received the Burst Map from the Hub STDMA Controller before that Remote mutes its transmitter.

Note that this timer setting should be at least three times greater (longer in duration) than the timer setting at the Hub to ensure that the nework link is maintained.

Network ID

The **Network ID** designation defines to which network the modem/router belongs. All devices in a common network will have the same network ID.

The network ID is used by the VMS to identify Vipersat units within a network and allows the VMS to manage multiple networks, each with its own unique network ID number.

Database Version

The version number is read-only and displays the version of the firmware running in this modem unit.

Node Name

Enter a name (sixteen characters or less) for the node which helps identify the Vipersat unit on the network.

Multicast Management Address

The Multicast Management Address is the multicast IP address assigned to all modem units in the Vipersat network that are managed by the VMS. This address must match the VMS Transmit Multicast Address.

When the modem unit receives a multicast from the VMS server, it receives maintenance and control packets, including the server's IP address. The unit responds to the VMS server with a unicast containing its current configuration data, including the unit's IP address.. When the VMS receives the unicast response, it registers the unit on the network.

STDMA

Clicking the STDMA menu item will display the **Selective TDMA** dialog shown in figure 2-21.

The fields available for edit on this dialog will vary, depending on the function/role that this modem unit is performing in the network.

For example, the CDM-570/570L shown in figure 2-21 is operating as a Hub. All of the fields except for *Enable Power Hunt* appear. In contrast, the screen shown in figure 2-22 shows a CDM-570/570L configured as a Remote, with only a subset of fields available for edit.

If the unit is configured as an Expansion Unit — for either a Hub or a Remote — the only STDMA option available is the Power Hunt setting.

Enable STDMA

Selecting the **Enable STDMA** check box enables Selective TDMA on this unit. This option must be selected for a Remote that is to be included in the STDMA Burst Map, for example.

Enable Power Hunt

The STDMA Power Hunt feature is active for Remote modems only, as shown in figure 2-22. Should link reception from a Remote be incorrect or impaired (e.g., poor environmental conditions), the STDMA Power Hunt feature is an option on the Remote modem that automatically adjusts the Remote transmit

power to ensure that burst map acknowledgements from that unit are received by the Hub burst controller.

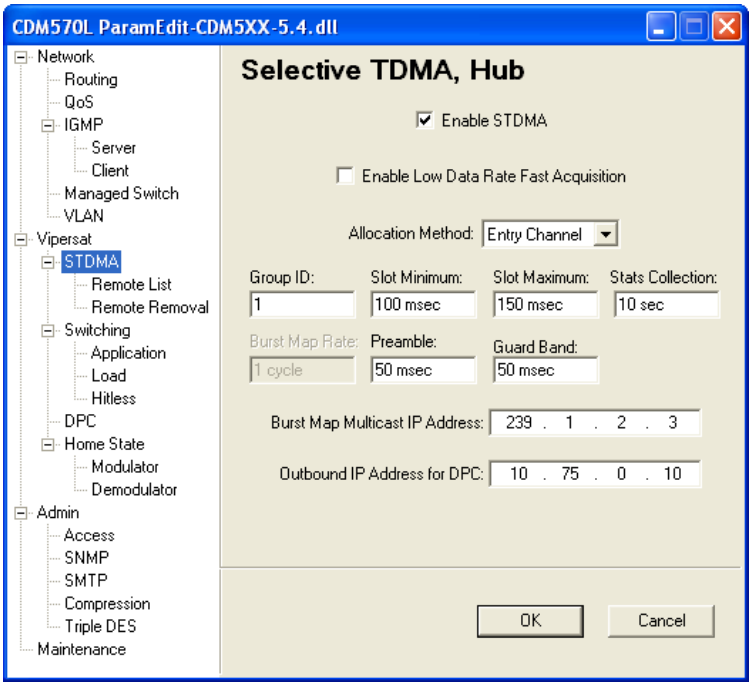

Figure 2-21 STDMA dialog, Hub Unit

When enabled, the burst controller sets a flag in the burst map that indicates it is not receiving acknowledgements from an enabled Remote. When the Remote receives the burst map, it will see the flag and automatically increase power by 3 dB above the default or Home State setting. If this closes the link, the burst controller will clear the flag. Note that if the 3 dB increase is more than is necessary, DPC will make a down adjustment to the appropriate level and this adjustment will be added to the DPC Offset.

This feature is enabled by selecting the check box.

Enable Low Data Rate Fast Acquisition

Configurable on a Hub Burst Controller only.

Selecting this check box enables the Vipersat **Burst Fast Acquisition Timing** (BFAT) feature that functions at low data rates (64 kbps to 256 kbps). This feature allows for significantly faster acquisition times at these data rates, even with higher noise, resulting in improved efficiency of the shared STDMA chan-

nel. Since signal lock is faster at higher data rates, BFAT is not active above 256 kbps.

NOTE

Note: Note that this parameter is only active for units that have the BFAT FAST feature code installed.

Modems must be operating at either 3/4 QPSK or .95 QPSK in order to utilize BFAT.

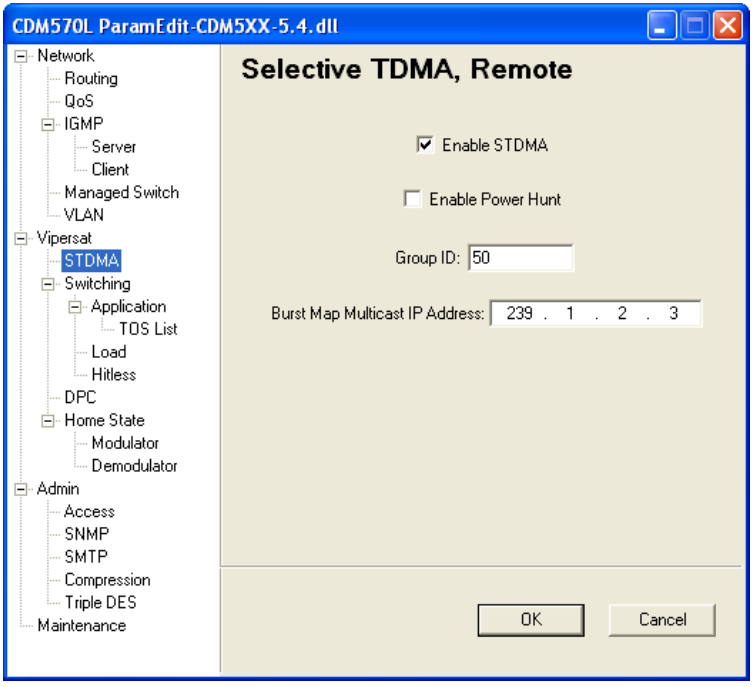

Figure 2-22 STDMA dialog, Remote Unit

Allocation Method

Active for Hub modems only.

When the CDM-570/570L is being used as a Hub, it has five STDMA modes of operation which define the method VMS uses to allocate bandwidth. Select one of these modes from the drop-down Bandwidth **Allocation Method** menu shown in figure 2-23.

- **Fixed** – All remotes get the same size slot, regardless of each remote's activity
- **Dynamic Slot** – size is adjusted each cycle depending on activity during the previous cycle

- **Dynamic Cycle** – A dynamic cycle allows changing the cycle time, and corresponding latency, as loads change always providing minimum latency for the current traffic load.
- **GIR** – Guaranteed Information Rate allows assigning a guaranteed data rate to a channel.
- **Entry Channel** – Entry channel mode provides an on-demand channel for applications such as a mobile remotes.

Figure 2-23 Bandwidth Allocation Method

NOTE

Note: If the Hub STDMA mode is either **GIR** or **Entry Channel**, normal load switching is automatically disabled. In GIR mode, the Remote is switched to SCPC as soon as the GIR threshold is reached, if there is a switch rate defined. In Entry Channel mode, the Remote is switched to SCPC as soon as the Hub receives the first transmission from the Remote.

Dynamic Cycle

In the **Dynamic Cycle** bandwidth allocation method, available bandwidth is allocated to remotes proportionally based on their current bandwidth needs. The bandwidth requirements are determined by the number of bytes in queue for each remote divided by the total number of bytes in queue for all remotes to determine the percentage of bandwidth to allocate for each remote.

Dynamic Slot

In the **Dynamic Slot** mode, the slot size for each remote is computed based on the time (at the current data rate) needed to transmit all the Bytes in Queue. If the result is less than the minimum slot size or more than the maximum slot size, the slot is adjusted accordingly.

Entry Channel

The Entry Channel Mode (ECM) is the same as Dynamic Cycle mode, except that as soon as the Hub receives an STDMA ACK, it initiates a switch to SCPC mode based on the policy set for that remote.

The Entry Channel mode is designed to accommodate the needs of remotes that will not be continuously connected to the network, but which have the need to be able to make an on-demand connection when required, such as in a mobile remote.

Note: In ECM mode, the switch occurs as soon as the Hub receives an STDMA ACK even though there may not be traffic at that time.

Fixed

In the **Fixed** mode, all remotes have the same slot size regardless of the type of traffic or load.

No calculations are made to actively change slot size when operating in this mode.

GIR (Guaranteed Information Rate)

In the **GIR** mode, the initial computed slot size value is the same as the Dynamic Cycle mode except there is no maximum limit. After all remotes have been assigned slots, the burst map is checked to see if the total cycle length exceeds one second. If not, then all requirements are satisfied and the burst map is complete. However, if the cycle is greater than one second, then the slots are adjusted proportionally so that all remotes receive at least their guaranteed rate, plus whatever excess is still available.

When the one second restriction is exceeded, remotes without a specified GIR are reduced to the global minimum slot size and the remaining bandwidth is distributed to remotes that have been assigned a GIR value. Remotes assigned a GIR bandwidth allocation are given available excess bandwidth when needed.

Note: GIR allocations are restricted so that assigned GIR totals cannot exceed the available bandwidth to insure proper bandwidth allocation when the network is overloaded. Attempts to enter a GIR which would result in a spin time of more than one second will error out.

The bandwidth allocation method selected will determine which of the associated parameters are available and applicable for that allocation method. Depending on the capability of the CDM-570/570L and its function in the network, some of the following parameters may be grayed out and unavailable.

Group ID

Active for both Hub and Remote modems.

The STDMA group ID number defines a group of equipment which will respond to the output of a single STDMA burst controller. This group is

addressable within a network which, in turn, is defined by the network ID number assigned to the modem/router.

In an STDMA group, the allocation of bandwidth is shared among the associated remotes. Depending on the number of remotes in a network, a Hub may have multiple burst controllers, each with its own set of remotes. This is accomplished by assigning a unique Group ID number to each controller and its remotes.

Note: The STDMA group number and the network ID are independent. There can be multiple STDMA groups within a single network.

Slot Data Length

This parameter is active for the Hub modem only.

The **Slot Data Length** fields specify the data length, in milliseconds, for each of the remotes in the STDMA group, and represents the amount of data that can be transmitted or received in one spin of the STDMA cycle. This is the amount of time that the remote is provided in the cycle to send data.

Depending on the Allocation Method that is chosen for the Hub STDMA controller, the appearance of this parameter will vary:

- Fixed – *Slot Length*
- Dynamic Slot – *Slot Minimum*, *Slot Nominal*
- Dynamic Cycle – *Slot Minimum*, *Slot Maximum*
- GIR – *Slot Minimum*
- Entry Channel – *Slot Minimum*, *Slot Maximum*

Stats Collection

Active for Hub modems only.

The burst controller monitors statistics in the received ACK from each remote. The statistics report the fill status of the STDMA buffers. The burst controller builds a table of the group and calculates the relative buffer fill for each remote. It then calculates the length of the data slot for each remote based on the Minimum Slot size plus a percentage of the available bandwidth. Idle remotes would receive a data slot equal to the Minimum Slot size.

In the *Dynamic Slot* mode, the dynamic range of STDMA is a function of the difference between the Nominal Slot size and the Minimum Slot size parameters. The speed with which STDMA reacts to changes in dynamic load is a function of the **Stats Collection** parameter and the **Burst Map Rate** parameter.

The value entered in the **Stats Collection** field defines the period of time, in seconds, over which the CDM-570/570L will collect statistics. A longer time will average out peak conditions, a shorter time will shorten VMS reaction time to changing network conditions.

Burst Map Rate

Active for Hub in Fixed or Dynamic Slot only.

The **Burst Map Rate** field specifies the number of spin cycles that will occur prior to each broadcast of the burst map by the burst controller to the remotes. One cycle is the amount of time it takes for all remotes in a group to burst on the common channel. The burst map provides each remote with its allocated bandwidth and position in the cycle.

For *Dynamic Cycle*, *GIR*, and *Entry Channel* modes, the number of cycles is automatically set to **one** in order to ensure optimum performance for these Hub types.

Preamble

Active for Hub modems only.

The **Preamble** field specifies the preamble duration, in milliseconds, for the remotes in the group. This is the period between when the remote begins to transmit (sends an ACK) to the Hub and when the first data packet is sent. This allows time for signal lock to occur before data is sent, thus preventing data loss.

Higher data rates allow for a shorter preamble, since it is easier to achieve signal lock.

Tip: Refer to the Viper Calculator for determining preamble length values to enter at the command prompt. For a copy of the latest Viper Calculator, contact your Comtech Vipersat Networks representative.

Note: When the Low Data Rate Fast Acquisition feature is enabled, the Preamble length is set automatically for the unit.

Guard Band

Active for Hub modems only.

The **Guard Band** field defines the length of the guardband, in milliseconds, for the remotes in the group. The Slot Guardband is the amount of time between the point when one remote completes transmitting data and the point when the next

remote in the cycle begins transmitting. This delay prevents the remote from overrunning the next terminal in the cycle.

The setting for this parameter should be obtained using the Vipersat STDMA Calculator.

Remote List

Appears for Hub modems only.

Clicking the Remote List menu item below STDMA brings up the **STDMA Remote List** dialog shown in figure 2-24.

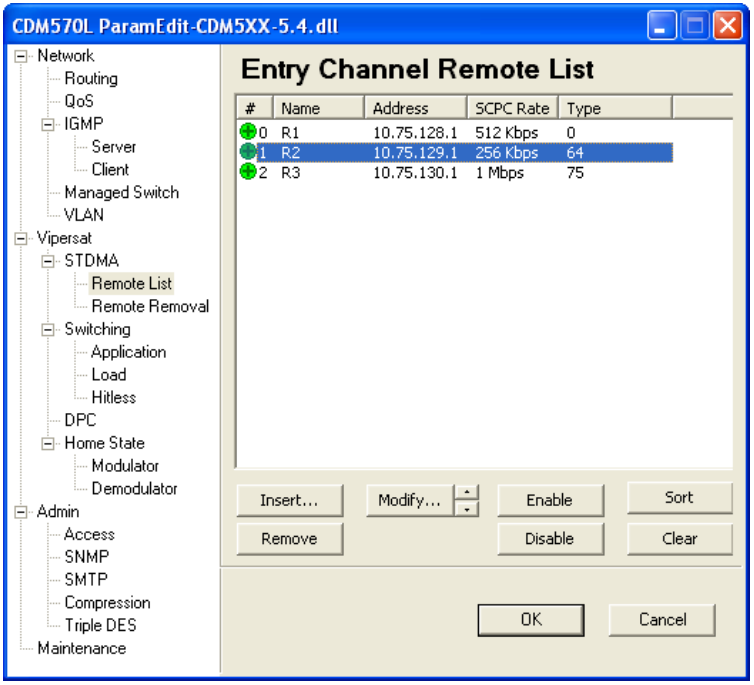

Figure 2-24 STDMA Remote List, ECM

Use the buttons at the bottom of the dialog to perform the following actions:

- **Add/Insert -** Clicking the **Add** (**Insert** when a remote is selected) button displays the **Remote Entry** dialog (figure 2-25). Use this dialog to enter the Name of a remote, the remote's IP Address, and to either disable or enable the remote with the **Disable** check-box.

  For STDMA set to *GIR* mode, enter the Switch Rate and the GIR value to be used by this remote.

For STDMA set to *ECM*, enter the SCPC Data Rate and the Switch Type to be used by this remote.

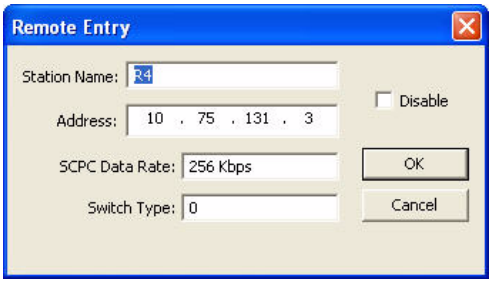

Figure 2-25 Remote Entry dialog, ECM

- **Remove** - Selecting a remote from the list, then clicking the **Remove** button will remove the remote from the VMS.
- **Disable** - Selecting a remote from the list, then clicking the **Disable** button will disable the selected remote.
- **Modify** - Selecting a remote from the list then clicking the **Modify** button will display the **Remote Entry** dialog shown in figure 2-25, allowing the information for the remote to be edited.
- **Sort** - Clicking the **Sort** button will sort the remotes in the list
- **Clear** - Clicking the **Clear** button will clear all remotes from the list.

Automatic Remote Removal

Appears for Hub modems only.

Selecting the **Remote Removal** menu item below STDMA displays the Automatic STDMA Remote Removal dialog shown in figure 2-26. Clicking the **Enable Remote Removal** check box activates the editable fields in this dialog that provide settings to define when an associated remote will be removed from the group.

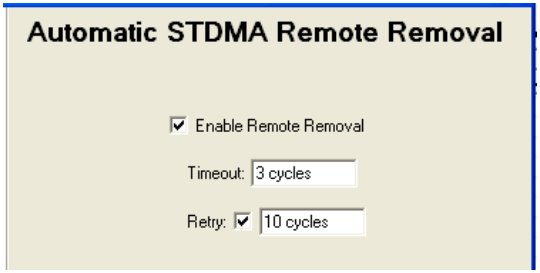

Figure 2-26 Automatic Remote Removal

Timeout

The value entered in the **Timeout** field determines the number of cycles with no connection (received ACKs) before a remote is removed from the network (the burst map). This would be used, for example, where a mobile remote has finished its assignment and has shut down.

After the number of cycles entered in the dialog above, the remote is removed from the network and the bandwidth resources it had been using are available for other uses.

Retry

The **Retry** field value determines the number of cycles which are allowed to pass, following the removal of a remote, before that remote is returned to the burst map and an attempt is made to re-establish a link.

This allows, again using a mobile remote as an example, shutting down the remote at one location, moving it to a new location, and then automatically re-establishing a connection to the satellite network.

Switching

For a detailed description of Automatic Switching in the VMS, refer to the *Vipersat Management System User Guide*.

Clicking the **Switching** menu item displays the dialog shown in figure 2-27. The fields available for edit on the sub-menu dialogs will vary, depending on the function/role that this modem unit is performing in the network.

The Vipersat Automatic Switching feature allows the modem unit to automatically adjust to varying bandwidth demands in the Vipersat network by switching between STDMA and SCPC. Automatic Switching must be enabled on a

modem that will be required to send switching requests to the VMS in response to either traffic type (Application switching) or network traffic loads (Load switching).

Use the **Enable Automatic Switching** check box to enable/disable the Automatic Switching feature for this modem.

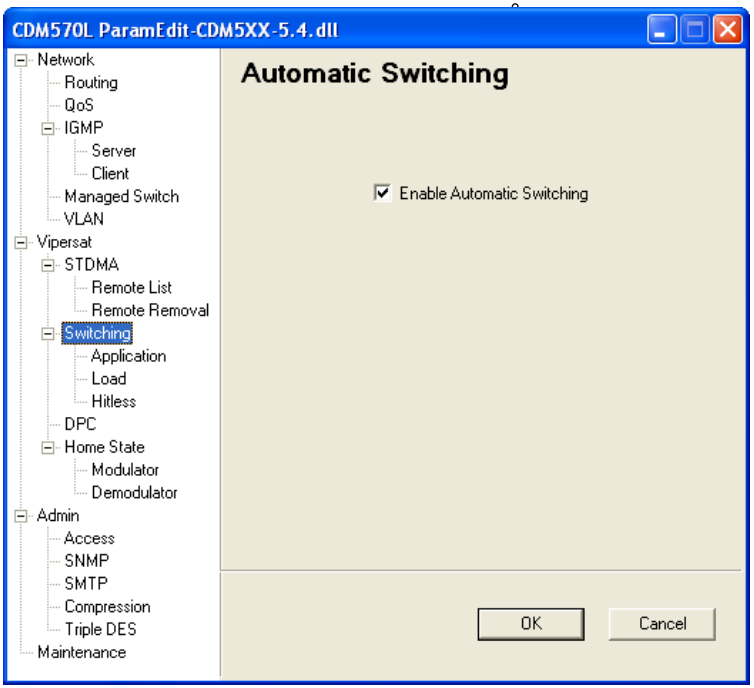

Figure 2-27 Switching dialog

Application Switch Detection

Application switching can be enabled for Video, Voice, Quality of Service (QoS), and/or Type of Service (ToS) by selecting the appropriate check box in the **Application Switch Detection** dialog (figure 2-28). Application switching controls are only available on units configured as remotes.

NOTE **Note:** Load switching by VMS is not affected by this setting.

Application switching is capable of changing the bandwidth used, but the change is determined entirely by the type of application being requested while ignoring load requirements.

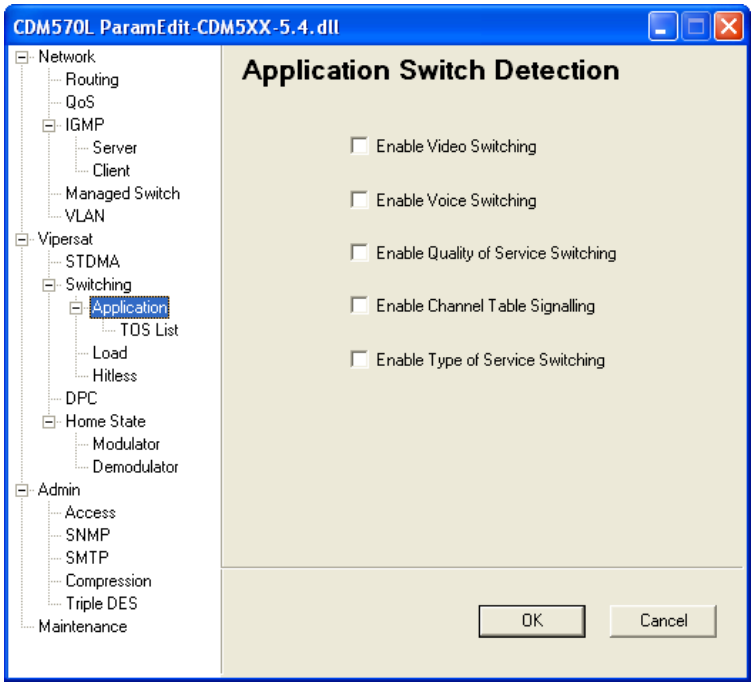

Figure 2-28 Application Switch Detection, Remote Unit

In a system configured for application switching, the remote site CDM-570/570L looks for a packet in the data stream coming from the LAN that is configured using the H.323 stack protocol and contains an H.225 signaling protocol. VMS also recognizes and supports SIP signaling.

The packet is first examined to determine the port number, then, from the allocated port ranges, determines the type of application being sent.

The CDM-570/570L sends a switch request to the VMS requesting a carrier for the application type.

Each application type will have been assigned a bandwidth allocation when the policy for the remote site is established. A voice application, for example might have had the bandwidth set in the policy to handle three simultaneous voice connections. When a VoIP protocol is detected in the H.225 signaling protocol, the CDM-570/570L requests the VMS to switch the bandwidth to accommodate three voice circuits.

The same process applies if the protocol detected is Video.

When *both* VoIP and Video are requested, the bandwidth required for the Video is used and the VoIP, which has priority, shares the SCPC with the Video.

Once the VMS receives the request to switch, it determines if there is a free demodulator and whether there is bandwidth space available to handle the requested application. If the resources are available, the VMS then performs the switch.

Applications are streaming data. The remote CDM-570/570L looks at the streaming data flow until it sees a break in the data exceeding 10 seconds. Once a break is detected, the CDM-570/570L presumes that the application is terminated (or has malfunctioned), drops the carrier, and makes the bandwidth resources available for another service.

Video Switching

Select the **Video** switch detection option to configure the CDM-570/570L to recognize the presence of a video signal and request a switch by the VMS.

Voice Switching

Select the **Voice** switch detection option to configure the CDM-570/570L to recognize the presence of a voice signal and request a switch by the VMS.

Quality of Service Switching

Select the **Quality of Service** switch detection option to configure the CDM-570/570L to request a switch from VMS as determined by the parameters entered for QoS, as described in the section "QoS" on page 2-10.

QoS Rule based switching is a flexible and powerful mechanism for initiating a Vipersat switch from STDMA to SCPC mode. This feature allows traffic to be prioritized in situations where bandwidth availability exceeds demand. QoS based switching, in addition to prioritizing traffic, will anticipate increased demand and preemptively allocate more bandwidth as required.

Note: The **DiffServ** Mode is not supported for QoS switching.

Caution: If the QoS switching rule is not carefully defined, it is possible to generate many more switches resulting in using more bandwidth than intended. This is because the QoS rules can be defined very generally but switches are done based on the concept of a flow which is defined as a unique combination of the following parameters: source IP and port, destination IP and port, and protocol.

For example, if a rule is defined for UDP traffic with no restrictions on IP or Port, then each time the system detects a new stream of traffic with a new IP address or port number, another switch will be made.

Channel Table Signaling Detection

This feature is no longer supported.

ToS Switching

Select the **Type of Service** switch detection check box to enable the ToS detection function for this unit.

Applying a ToS value to an application (VoIP, IPVC, or priority data) through either preservation or classification packet stamping, allows the Vipersat switching system to function in an encrypted network.

NOTE

Note: In addition to setting the CDM-570/570L to recognize ToS enabled traffic, the ToS switch type must be included in the subnet or global policy statement in order for the VMS to act on the switch request.

To configure the ToS switching parameters, click the **ToS List** menu item below Application.

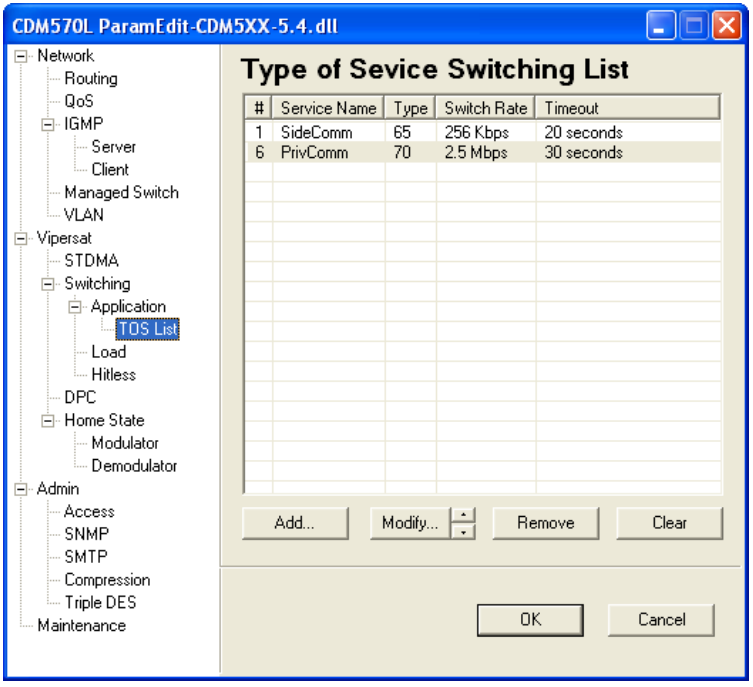

Figure 2-29 Type of Service Switching List

Clicking the **Add** button displays the **Type of Service Entry** dialog shown in figure 2-30.

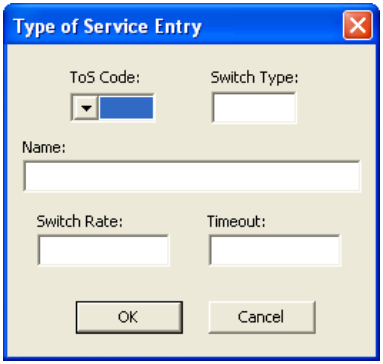

Figure 2-30 Type of Service Entry

Using the drop-down menu in the **ToS Code** box, select the number identifying the type of service to be made. Numbers from 1 to 63 are recognized by the VMS as ToS codes.

In the **Switch Type** box, enter the number to assign for this switch type. Numbers from 64-254 are recognized as switch types, with switch type 254 pre-assigned for limited priority switching. Switch type 1 is pre-assigned for Voice and switch type 2 is pre-assigned for Video.

NOTE

Note: Setting the switch type value to 254 will not allow any other switches to occur until it is taken down. The 254 switch type affects all types of switching including ToS, VESP, and QoS. While a 254 type switch is in effect, the VMS continues to track switching requests then will resize to meet these bandwidth requests when the 254 type switch is completed.

In the **Name** box, enter the identifying name for the ToS switch type that is being created.

The **Switch Rate (kbps)** can be any value between 0 and 5000. Realistically in an operating circuit, depending on the settings for modulation and FEC, this value should not exceed 9.98 MHz.

The **Timeout (seconds)** can be any value between 0 and 60 and is the value used to determine how long that no data is detected before closing the circuit.

Normally in a non-encrypted Vipersat network, packets are classified by the remote CDM-570/570L using protocol classification detection and the results are forwarded to the VMS via Automatic Switch Request (ASR) messages. The VMS switch detector service then applies the requested bandwidth using policies which have been pre-configured in the VMS.

For example, in a non-encrypted network, if a voice application service connection is started, the CDM-570/570L's classifier analyzes signaling and data protocols (H.323, SIP, & Data RTP) being routed through the modem. After

connection detection, the process waits for data (RTP). Data is normally sent after the receiving party answers, which then triggers the system to process an ASR.

NOTE **Note:** ToS switching differs from other application switching in that a ToS switch passes a data rate to the VMS.

Using the ToS classification, the detection function allows application-based switching in encrypted networks where the signaling protocols are encrypted or effectively hidden.

NOTE **Note:** Load switching by the VMS is not affected by enabling ToS detection.

Load Switching

Load switching allows SCPC switching to occur to meet bandwidth requirements in response to changing network traffic loads. Use the **Enable Load Switching** check box to enable/disable this feature.

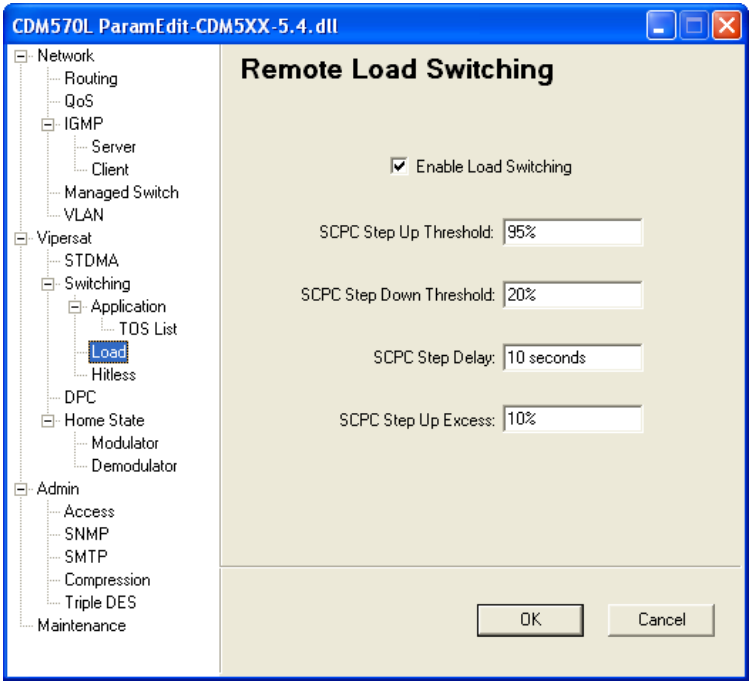

Figure 2-31 Load Switching, Remote Unit

NOTE

Note: Load switching must be enabled on all CDM-570/570Ls in a network in order for the VMS to utilize load switching when dynamically optimizing network performance as load conditions change.

If the application rate is less than the load, the VMS will not switch. It will, however, set up SHOD (Single Hop on Demand) if the application requires it.

Application switching by the VMS (such as Voice and/or Video) is not affected by this setting. However, using Load switching for real-time applications is not recommended.

The appearance of parameters for Load Switching will differ, depending on whether the unit is configured as a Hub or as a Remote.

SCPC Step Up Threshold

Appears for Remote modems only.

The **SCPC Step Up Threshold** field establishes the percentage of bandwidth use that will trigger a switch up from the present SCPC rate to a higher rate to ensure that there is sufficent bandwidth available for current conditions. Valid range is from 65 to 100 %.

Typically, the default value will be acceptable, but this value can be changed to accommodate a unique network configuration or application. Note that this value must be greater than the value specified for the *SCPC Step Down Threshold* (see below).

SCPC Step Down Threshold

Appears for Remote modems only.

The **SCPC Step Down Threshold** field establishes the percentage of bandwidth use that will trigger a switch down from the present SCPC rate to a lower rate to ensure efficient bandwidth usage. Valid range is from 1 to 95 %.

Typically, the default value will be acceptable, but this value can be changed to accommodate a unique network configuration or application. Note that this value must be less than the value specified for the *SCPC Step Up Threshold* (see above).

SCPC Step Delay

Appears for Remote modems only.

The **SCPC Step Delay** field allows a switching delay period to be specified to ensure that a premature switch up or down in the SCPC rate does not occur due to a temporary rise or fall in traffic.

Typically, the default value will be acceptable, but this value can be changed to accommodate a unique network configuration or application.

SCPC Step Up Excess

Appears for Remote modems only.

The **SCPC Step Up Excess** field allows adding a fixed percentage to the channel bandwidth request to accommodate additional bandwidth requirements which may occur after a switch is made. This excess is added each time an SCPC Step Up switch occurs, and makes additional bandwidth available for when the demand arises while minimizing Step Up switching events.

A default value is provided and need not be changed unless it is known that there will be a larger bandwidth requirement after the switch.

STDMA Slot Capacity

Appears for Hub modems only.

The **STDMA Slot Capacity** field allows setting the threshold or level of slot capacity at which the Burst Controller sends a switch request to the VMS to switch the Remote from STDMA mode to SCPC mode.

Typically, the default value will be acceptable, but this value can be changed to accommodate a unique network configuration or application.

STDMA Switch Delay

Appears for Hub modems only.

In order to minimize unnecessary switching due to transient conditions, such as a temporary spike in network traffic for example, the **STDMA Switch Delay** parameter is provided. This setting is used to specify a delay before the Burst Controller sends a switch request to the VMS to switch the Remote from STDMA mode to SCPC mode.

Typically, the default value will be acceptable, but this value can be changed to accommodate a unique network configuration or application.

Percent Allocation

Appears for Hub modems only.

The **Percent Allocation** field allows adding a fixed percentage to the channel bandwidth request to accommodate additional bandwidth requirements which may occur after the switch is made from STDMA to SCPC mode.

Typically, the default value (10 %) will be sufficient, but if there may be a larger bandwidth requirement after the switch, this value can be increased. In

choosing a value for this allocation, future bandwidth requirements for the channel must be balanced against efficient bandwidth utilization.

Hitless Switching

Unless inherent delays in configuring both ends of a satellite bandwidth link during dynamic switching are accounted for, transmitted data may be lost during the transition. The time for a switch command to be sent across the satellite link (~ 250 ms), the command processing time, as well as receiver acquisition time must be considered. The Vipersat Hitless Switching feature provides a means to coordinate timing and utilize buffering to eliminate these data outages.

Click on the **Hitless** Switching menu item below Application to display the dialog shown in figure 2-32.

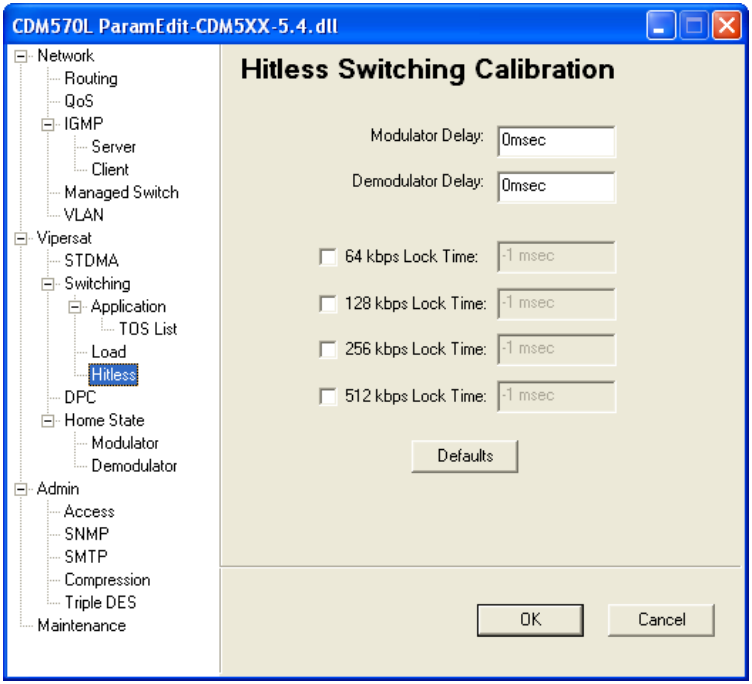

Figure 2-32 Hitless Switching dialog

Modulator Delay

This field allows the operator to insert additional delay to buffer more data after modulator transmission is ceased.

Demodulator Delay

This field allows the operator to insert additional delay to account for the tuning of the demodulator.

Lock Times

Lock Time settings for the four data rates displayed can be adjusted either up or down, but default settings based on satellite testing should be used as a starting point. These defaults are stored in each modem unit and are restored by clicking on the **Defaults** button.

The initial setting is with Hitless Switching disabled—all check boxes are unchecked, and the lock times are displayed as -1 msec. Selecting the check box for a data rate will activate the field for that rate, display the current lock time, and allow that value to be edited.

DPC

The DPC dialog for a Hub or Remote operating in STDMA mode is displayed in figure 2-33. Note that, for an Expansion unit, only the *Speed Up Eb/N0* and the *Target IP Addresses* fields are active.

Dynamic Power Control (DPC) is a Vipersat feature that acts to regulate the transmit power of the Vipersat satellite modem, such that the specified receive signal level (E_b/N_0) is met for the receiving Vipersat units in the group. DPC is driven by the receiver demod, which notifies the transmitting modem of the current E_b/N_0 value.

Before enabling DPC, the operator should verify that a demodulator at another terminal is receiving from this modulator, and that there is a working communications channel from that receiving station back to the modulator terminal (InBand communications). Additionally, since DPC potentially controls the full power range of the modulator's output power, it is recommended that the terminal be commissioned and calibrated before usage.

Warning: Make certain that all CDM-570/570L's in the network have their Automatic Uplink Power Control (AUPC) turned off. Although this Comtech modem function is available for a connection between two point-to-point units, it will conflict when used in a network using the network-wide DPC. Using both in a circuit will produce erratic and unstable operation with potential data loss, low QoS, and potential loss of the circuit connection.

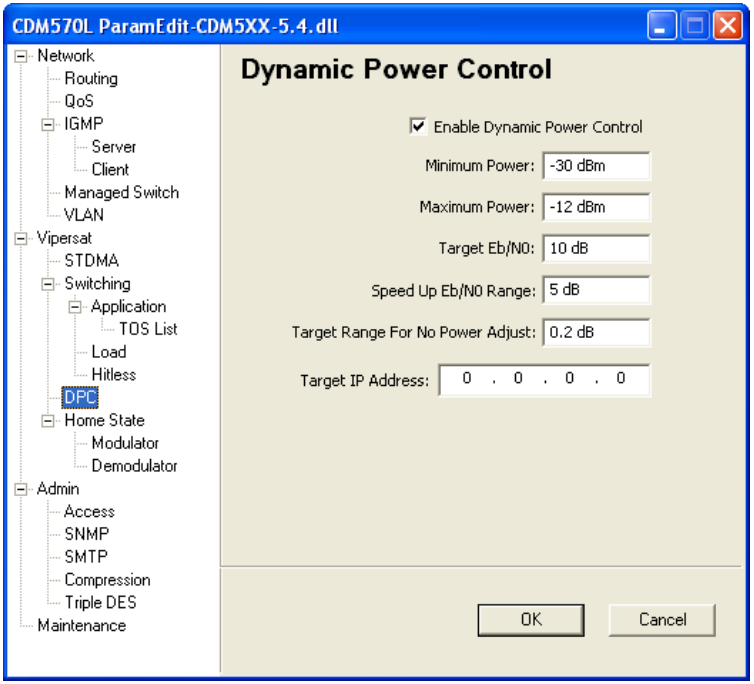

Figure 2-33 DPC dialog

Enable Dynamic Power Control

Selecting the **Enable Dynamic Power Control** function on the DPC tab enables the DPC function on the modem/router.

Minimum Power

The set value for the **Minimum Power** is the minimum level allowed by all SCPC modulators. Using the values entered in the *Home State* dialog (see "Home State" on page 2-52) together with the value entered for the *Maximum Power*, the modem scales the Maximum Power to optimize the E_b/N_o for whatever data rate the unit is transmitting. For this reason, it is recommended that the Minimum Power be set to the lowest possible setting (-40.0 dBm), giving the power adjustment the largest possible working range.

In the majority of applications, the minimum power level parameter can be set to the default power value of -40.0 dBm. Typically, there is no problem in allowing the modulator(s) to back off decreasing power levels to better the quality of link conditions.

Maximum Power

Commissioning a terminal is following the calculated link budget before terminal installation. Using these calculations, the maximum limit for modulator(s) output power can be determined. This is the value entered in the **Maximum Power** field shown in figure 2-33.

If more than one modulator is used at this location, that must also be taken into consideration and applied to this value set point. The value set point assures that the maximum power level is within the acceptable range for this modem and the circuit.

The value entered sets the maximum power level allowed by all SCPC modulators.

Target Eb/N0

Enter the desired operating receive level for closed loop servo control. This is the value used by the receiving modem's modulator to control its output power level.

Speed Up Eb/N0

Normally, the DPC message is sent every 60 seconds from each terminal in the network. If the target E_b/N_0 value drops below the value set in the **Speed Up Eb/N0** box, the corresponding terminal increases its DPC message send rate to every five seconds until the target value is greater than the Speed Up E_b/N_o value. This provides a loop speedup to rapidly regain link quality.

Target Range For No Power Adjust

The **Target Range For No Power Adjust** sets the differential between the current E_b/N_0 and the Target E_b/N_0 value that, when reached, causes the modulator to stop adjusting its power output. The default value for this parameter is 0.2 dB.

Target IP Address

In a VMS network, the VMS automatically assigns the **Target IP Addresses**. The user will only need to fill in these addresses if the network configuration is not a normal VMS configuration and requires a fixed IP address for DPC communications.

Enter the IP address for the target transmitting site from which this unit will be receiving. Up to four sites—such as for a CDD-564 quad demodulator—can be entered.

Home State

A Vipersat unit's Home State consists of those parameters which provide a known RF configuration that the unit will return to, either as the result of a command by the VMS, or as it comes back on line from a reset or a power cycle. These Home State settings are typically selected so that the unit goes to a configuration which is optimum for its function in the network.

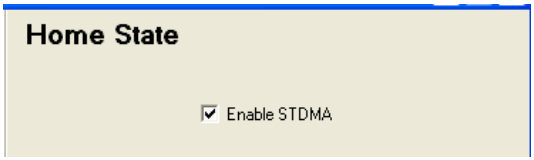

Figure 2-34 Home State, Enable STDMA

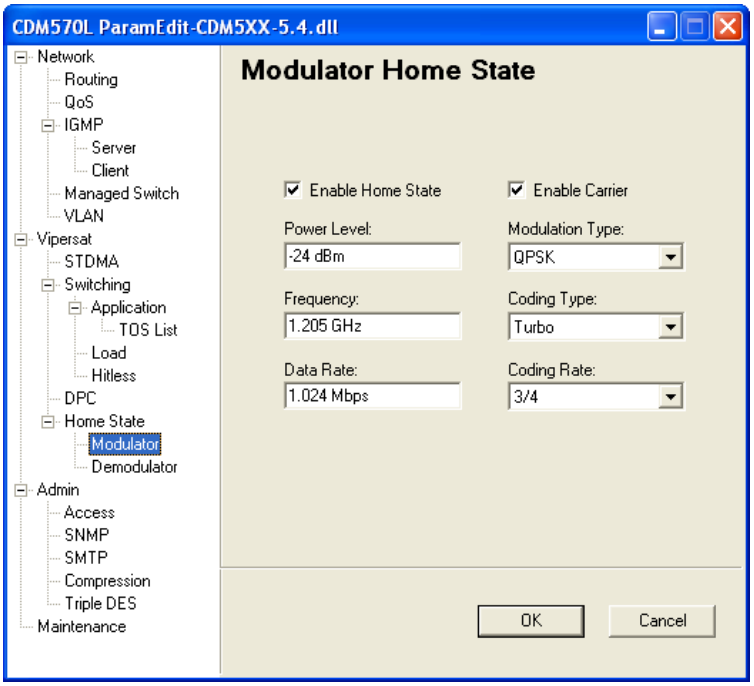

Figure 2-35 Home State dialog, Modulator

The **Home State** menu items allow enabling STDMA, Home State, and Carrier, and setting the unit's Transmit and Receive frequencies, data rates, coding rates, modulation types, and power level (Transmit only) which are applied at boot-up.

If the modem is a CDD-56X, each of the demodulators has a sub-menu item for its own unique home state.

As with the CDM-570/570L, each of the CDD-56X's demodulator home states should be configured for optimum performance of its function in the network when the unit is returned to its home state for any reason.

The home state for each demodulator can be individually enabled and each can have its own unique parameters assigned.

Admin

The **Admin** dialog allows a user to define the administrative privileges for the Vipersat unit.

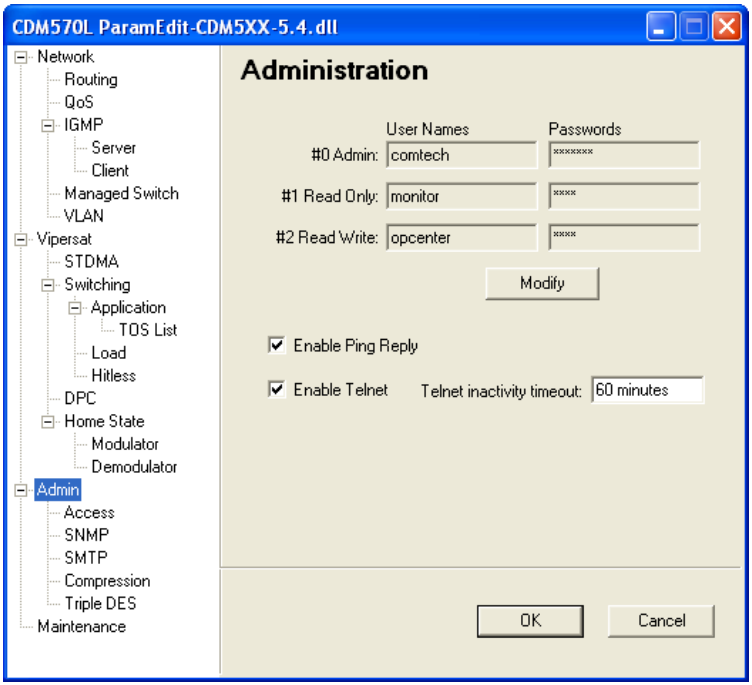

Figure 2-36 Admin dialog

User Names and Passwords

NOTE

Note: All User names and passwords are case sensitive.

Up to three levels of log in can be configured. A minimum of one and a maximum of 11 characters can be entered in the **User Names** and **Passwords** fields. Any or all of the user names and passwords can be removed by entering "NONE" in the field. Removing all user names and Passwords would only allow access to the IP functions when connected via the Terminal Emulator (serial port) connection because there is no log in required.

Modify button

To edit the User Names and Passwords fields, click on the **Modify** button. The **Authentication** dialog shown in figure 2-37 will be displayed.

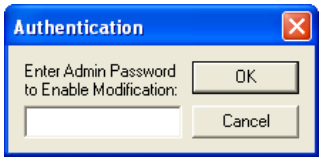

Figure 2-37 Authentication dialog

For security purposes, the Admin password must be entered before any changes are allowed. Clicking the **OK** button will enable the User Names and Passwords fields, as shown in figure 2-38.

Figure 2-38 Admin dialog, Enabled

Enable Ping Reply

Select this check box to have this unit reply to Ping requests.

Enable Telnet

Select this check box to allow a telnet connection to this unit.

Telnet Inactivity Timeout

Enter the time, in minutes, of inactivity before a telnet session times out and is disconnected from this unit.

Access

The **Access** dialog allows controlling access to the Vipersat unit by defining up to four IP and subnet client addresses which are allowed to access the modem.

Restricting access to the unit requires that the **Access Enforcement** check box be selected. If this box is checked, only those units with listed **Access Client**'s IP addresses can access this modem. All other units will be denied access.

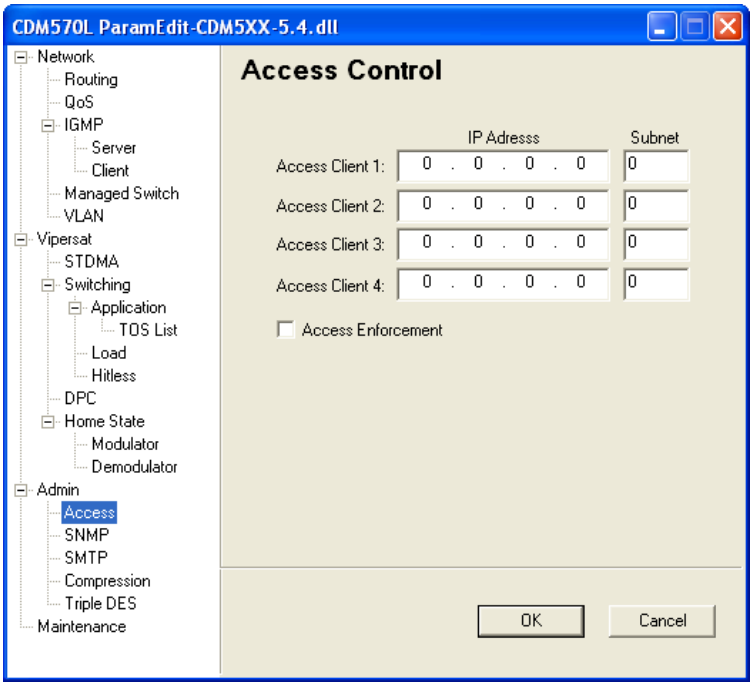

Figure 2-39 Access dialog

For detailed use and explanation of the unit's access features, please refer to the section "Access Lists Page" in the unit's user documentation.

SNMP

Clicking the **SNMP** menu item displays the dialog shown in figure 2-40. The Simple Network Management Protocol (SNMP) is an application-layer protocol designed to facilitate the exchange of management information between network devices. The Vipersat unit's SNMP agent supports both SNMP v1 and v2c.

NOTE

Note: For proper SNMP operation, the Vipersat unit's MIB files must be used with the associated version of the unit's base modem M&C and the IP Controller's SW. Please refer to the Vipersat unit's documentation for information on the required FW/SW compatibility.

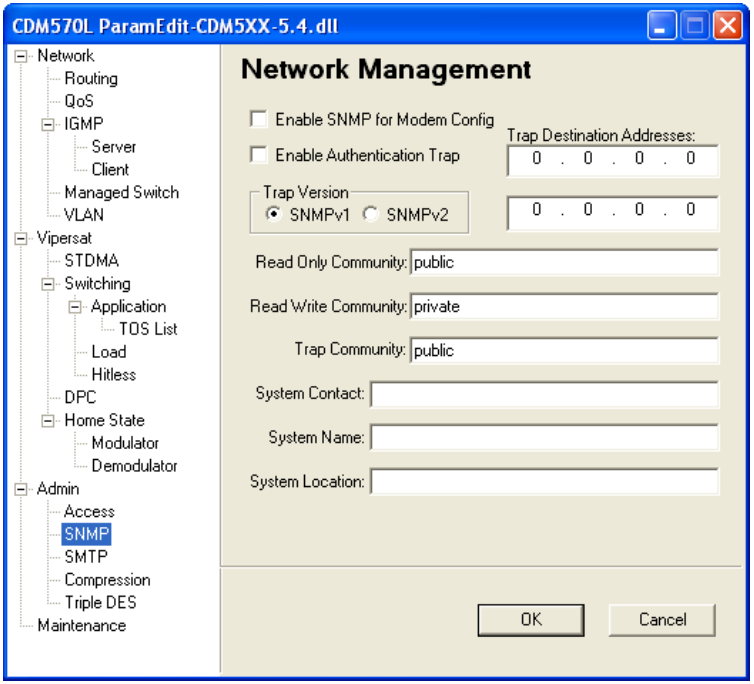

Figure 2-40 SNMP dialog

Enable SNMP for Modem Configuration

Selecting the **Enable SNMP for Modem Config** box, shown in figure 2-40, enables SNMP on this modem/router.

Tip: The VMS does not use SNMP management messages. Only enable this function if other software exists on the network which uses this information.

Enable Authentication Trap

Selecting the **Enable Authentication Trap** box determines whether a MIB2 authentication trap will be sent when a protocol data unit (PDU) with an invalid community string is encountered. A community string is invalid when it does not match the Admin, the Read Write, or the Read Only community strings.

Trap Version

Select either SNMP version 1 or SNMP version 2 using the radio button in the **Trap Version** box.

Trap Destination Addresses

Enter the trap destination IP addresses in the **Trap Destination Address** dialog boxes. These are the IP addresses where all traps/notifications will be sent. If a network management application is running in the network, it should be configured to receive traps and its IP address should be entered here.

Note: The VMS does not use SNMP trapped messages; do not enter the VMS server address in this field.

Community Strings

The modem/router uses community strings as a password scheme that provides authentication before gaining access to the agent's MIBs. In SNMP v1/v2c, the community string is sent un-encrypted in the SNMP packets.

Caution: The network administrator must ensure that SNMP packets only travel over a secure and private network, if security is a concern. A packet sniffer can easily obtain the community string by viewing the SNMP traffic on the network.

The community strings are entered into the modem/router using the fields shown in figure 2-40, and are used to authenticate users and determine access privileges to the SNMP agent.

The user defines three Community Strings for SNMP access:

- **Read Only Community** (default = public) — GET community string that allows GET operations to all portions of the IP Module Controller and modem MIBs.
- **Read Write Community** (default = private) — SET community string that allows SET operations to all portions of the IP Module Controller and modem MIBs.
- **Trap Community** (default = public) — Community string that will be set in the Community field of all outgoing traps. This field on the trap PDU may be checked by the network manager application to determine if the trap came from a "trusted" agent.

System Contact

Enter user-defined SNMP contact information in this field.

System Name

Enter user-defined SNMP name information in this field.

System Location

Enter user-defined SNMP location information in this field.

SMTP

Clicking the **SMTP** (Simple Mail Transfer Protocol) menu item displays the dialog shown in figure 2-41, allowing the user to specify the appropriate settings for the SMTP email server.

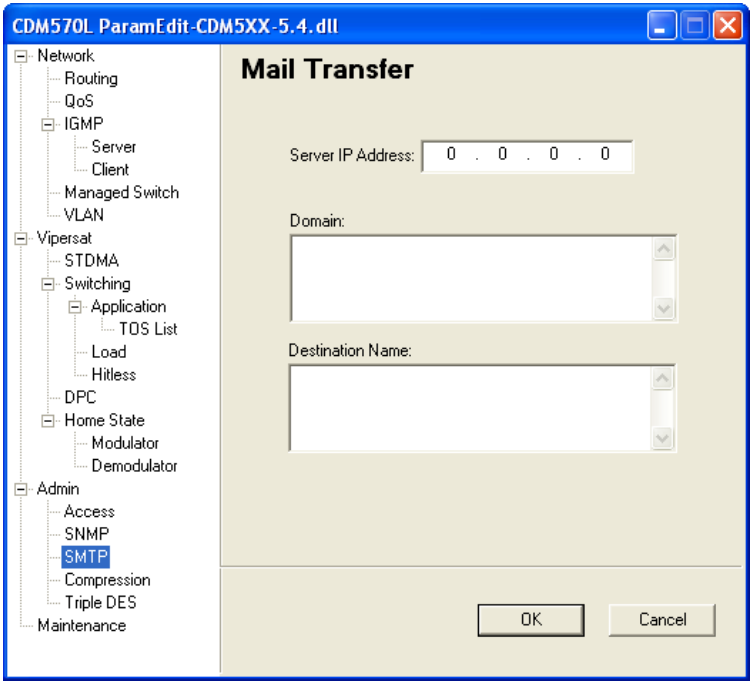

Figure 2-41 SMTP Tab

The SMTP settings are utilized when sending an email via the modem/router's Home/Support Web page by a user who is connected to the IP module through a Web browser. Examples of these settings would be for a network administrator or technical product support.

Refer to the modem/router user documentation for additional information on this feature.

Server IP Address

Enter the mail server address from where email is to be sent.

Domain

Enter the domain of the email server (usually found to the right of the @ symbol in an email address).

Destination Name

Set the email recipient name (typically found to the left of the @ symbol in an email address).

Compression

NOTE

Note: If the Compression feature (FAST code) has not been purchased for this modem/router, the Compression menu item will not be displayed.

The **Compression** dialog, shown in figure 2-42, sets the parameters for header and payload compression in the modem.

This feature only applies to units that have modulators. The parameters are not applicable to CDD-56X units or to Expansion units, since all demodulators will automatically detect compressed packets that are received and perform decompression.

Tx Header Compression

If the **Enable** check box is selected, this modem will transmit packets with compressed headers.

NOTE

Note: When compression is enabled, the modem/router checks the HDLC header to determine whether a received packet has a compressed header. It is possible, for example, to have header compression enabled only on some of the modems in a single STDMA group.

The first check box, for L3/L4/L5 (IP, UDP, TCP, and RTP traffic) header compression, is always set to Enabled and appears grayed out (inactive). This compression is configured on a *per route* basis, as described in the section “Routing” on page 2-7.

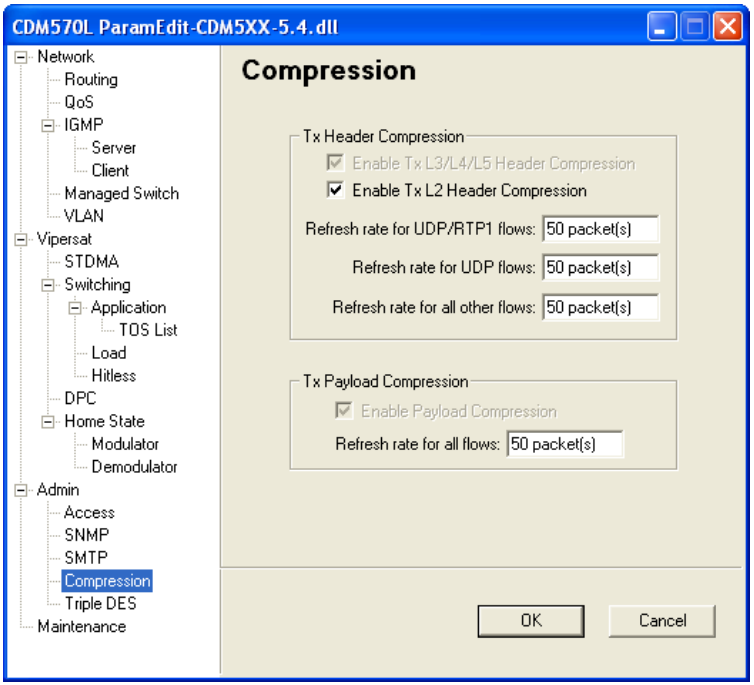

Figure 2-42 Compression dialog

The second check box is for setting compression for Ethernet (L2) traffic. This parameter is active and is configured on a *per modem* basis.

When L2 compression is enabled, some of the initial traffic sent between two devices will not be received over the satellite until a full header is transmitted (based on the **Refresh** rate). If a ping is sent over the satellite, it will time out until the full header packet is sent. The header compression refresh rate can be reduced to minimize the amount of traffic lost when traffic is first sent between two devices.

The default refresh values (50 packets) reflect the recommended settings for a typical modem/router used in a VMS network. However, the refresh rates can be decreased for poor satellite link conditions, or they can be increased to reduce overhead even further. The valid range is 1 to 600 packet(s).

Tx Payload Compression

When selecting the *Per Route Features* options for a route, as described in the section “Routing” on page 2-7, header compression compresses the IP Header and the TCP/UDP headers. Only traffic past these headers is effected by payload compression. Payload is considered everything inside the HDLC satel-

lite frame. Therefore, IP headers could be compressed as well. Payload compression is an optional feature of the modem and has the following features:

- All modems used in a VMS network operate in router mode requiring that payload compression be set on a *per route* basis, as described in the section "Routing" on page 2-7.
- The compression algorithm is applied to all data (HDLC header excluded).
- Compression statistics are fed back to QoS in order to maximize WAN utilization while optimizing priority, jitter and latency.
- The modem runs 1024 simultaneous compression sessions to maximize compression across multiple distinct traffic flows.
- Compression algorithm is not applied to RTP streams because this traffic is already compressed and would only *increase* the satellite bandwidth if compressed again.

Receive payload compression is auto-sensed by a bit carried in packet headers and the modem unit will perform decompression. This function is always available if the payload compression FAST code option has been purchased.

Triple DES

The **Triple DES** dialog, shown in figure 2-43, sets the parameters for Data Encryption Standard in the modem.

Each modulator and demodulator in the modem has a tab for its own unique DES keys. For example, a CDM-570/570L has one TX Encryption sub-tab and one Rx Decryption sub-tab, while a CDD-564/564L has no Tx Encryption sub-tab but has four Rx Decryption sub-tabs. Thus, the DES tab can have sub-tabs for:

- Tx Encryption Keys
- Rx Decryption Keys

The following discussion applies to the keys on both types of sub-tabs.

A 24 Byte [192-bit] 3xDES key is actually a combination of 3 single DES keys of 8 Bytes [64-bits]. The DES tab displays each key with spaces separating the key into 3 sections. In figure 2-43, the Transmit Keys are displayed as:

2222222222222222 4444444444444444 6666666666666666

Note: The sequence 6666666666666666 does not fully show in the window; use the scroll bar to make it visible.

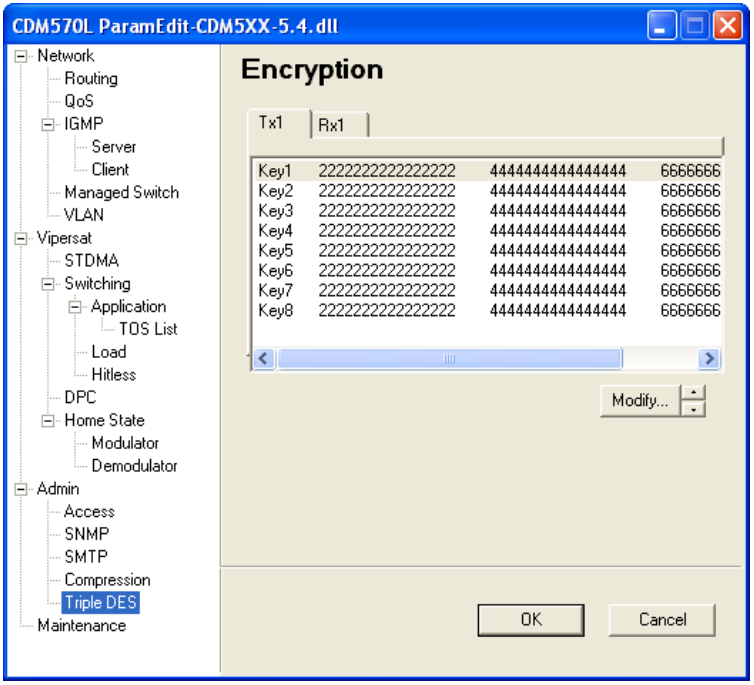

Figure 2-43 Triple DES dialog

Using Key1 as an example, consider the first section as Key1A, the second as Key1B, and the third as Key1C. Data is first encrypted with Key1A and then decrypted with Key1B and again encrypted with Key1C. So, if a user specifies all of the three Keys the same, (like 48 '1's OR all the characters in DES key the same) the cumulative effect of 3xDES is just a single DES: when data is first encrypted with Key1A and decrypted with Key1B, we get back the original data, and then when encrypted with Key1C, results in a total effect of single DES key.

Because of this, the user is required to enter unique 64-bit keys. If any 2 sections of the Key match, the entry will not be accepted and the alert message **Each Segment Must Be Unique** will appear. Also, the least significant bit of each byte in a 3xDES key is reserved for the DES algorithm for parity. Entries of 1, 3, 5, 7, 9, B, D, or F will have all the corresponding bit positions masked. So a Key entry of:

1111111133333333 5555555577777777 99999999BBBBBBBB

becomes

1010101032323232 5454545476767676 98989898BABABABA

To edit a DES key, select the desired key and click the **Modify** button. Use the up-down arrow buttons to move the selected key to a different position.

Tip: Double-click on the key entry to be modified and the **Modify Key** dialog will be displayed.

Enter the value for each of the three portions of the DES key in the **Modify Key** dialog shown in figure 2-44, then click the **OK** button to enter the change.

Figure 2-44 Modify DES Key dialog

Maintenance

The **Maintenance** dialog, shown in figure 2-45, determines what parameters will be used during the next modem/router reboot and how errors are to be logged by the unit.

Warning: The selections made in the Maintenance dialog are critical. Selecting incorrect options can cause the unit to fail.

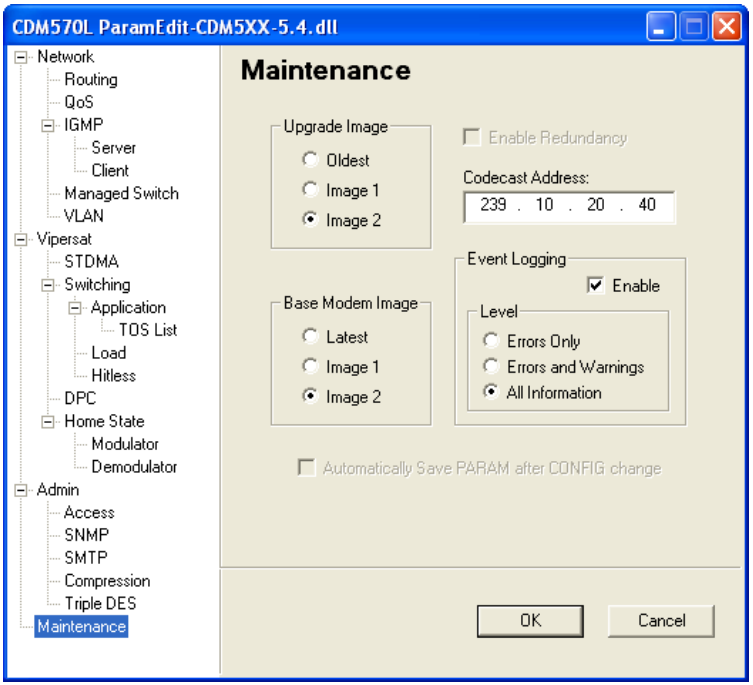

Figure 2-45 Maintenance dialog

Upgrade Image

Using the radio buttons in the **Upgrade Image** box determines the image which will be used during the next firmware upgrade. Selecting *Oldest* image to be upgraded is probably the safest selection, as it does not require the operator to know which of the two images has the most recent firmware. The available options are:

- Oldest - The oldest available image
- Image 1

- Image 2

Base Modem Image

The radio button options available in the Base Modem Image determine which image will be used to boot from following a reset of the modem unit.

Enable Redundancy

When a Remote modem is in a 1:1 redundant configuration, this parameter will be Enabled (checked), and ParamEditor can be used to change this setting to Disable redundancy (unchecked) for the modem.

Caution: ParamEditor can not be used to Enable Redundancy—it can only Disable it when it has been Enabled. Once this parameter is Disabled and the configuration is saved, this parameter will become inactive (grayed out).

Codecast Address

Enter the multicast address to be used by the modem/router to receive Codecast messages in this field.

Event Logging

Enable

Selecting the **Enable** box will enable event logging on the modem/router.

Level

The radio buttons available in the **Level** box allow selecting the type of data to be logged:

- Errors only
- Errors and Warnings
- All information

Automatically Save PARAM After CONFIG Change

This parameter is not supported in Vipersat networks, and will appear grayed out (inactive). Refer to the modem's user documentation for additional information on this setting.

APPENDIX

A

GLOSSARY

A

ACK A signal used in computing and other fields to indicate **ack**nowledgement, such as a packet message used in TCP to acknowledge the receipt of a packet.

ARP **A**ddress **R**esolution **P**rotocol – A protocol for a LAN device to determine the MAC address of a locally connected device given its IP address. See also MAC.

ASR **A**utomatic **S**witch **R**equest – A switch request message generated by older Vipersat modems (e.g., CDM-570/L) that is sent to the VMS to establish a new satellite link or adjust bandwidth between source and destination IP addresses.

B

Base Modem The main component in a satellite communications modem that consists of a circuit board with the modem hardware and firmware and the associated interfaces.

BER **B**it **E**rror **R**ate (sometimes **R**atio) – A measure of the number of data bits received incorrectly compared to the total number of bits transmitted.

BPS **B**its **P**er **S**econd – A measure of transmission speed. See also Kb/s & Mb/s.

BPSK **B**inary **P**hase-**S**hift **K**eying – A digital modulation technique in which the carrier is phase shifted +/-180 degrees (two phases). The most robust of all PSKs, but unsuitable for high data-rate applications when bandwidth is limited due to encoding just one bit per symbol.

BUC **B**lock **U**p **C**onverter – An upconverter so called because it converts a whole band or "block" of frequencies to a higher band. The IF is converted to final transmit frequency for satellite communications. The BUC is part of the satellite ODU/transceiver.

C

C-Band A frequency band commonly used for satellite communications (and sometimes terrestrial microwave). For terrestrial earth stations, the receive frequency band is 3.625–4.2 GHz and the transmit band is 5.850–6.425 GHz. See also Ku-band.

CDD **C**omtech **D**ata **D**emodulator

CDM **C**omtech **D**ata **M**odem

CIR **C**ommitted **I**nformation **R**ate – The guaranteed minimum bandwidth assigned to a remote terminal.

CLI **C**ommand **L**ine **I**nterface – A mechanism for interacting with a computer operating system or software by typing commands to perform specific tasks.

Codecast A network coding based ad hoc multicast protocol well-suited for multimedia applications with low-loss, low-latency constraints. Because data is streamed with no verification, high delivery ratios are obtained with very low overhead.

CRC **C**yclic **R**edundancy **C**heck – A method of applying a checksum to a block of data to determine if any errors occurred during transmission over communications links.

CXR Carrier – A radio frequency transmission linking points and over which information may be carried.

D

DAMA **D**emand **A**ssigned **M**ultiple **A**ccess – A process whereby communications links are only activated when there is an actual demand.

dBm **D**eci**b**el referenced to 1 **m**illiwatt.

DES **D**ata **E**ncryption **S**tandard – A federal standard method for encrypting information for secure transmission. The Vipersat system offers 3xDES (Triple DES) for encrypting traffic.

DHCP **D**ynamic **H**ost **C**onfiguration **P**rotocol – An Internet protocol for automating the configuration of computers that use TCP/IP.

DLL **D**ynamic **L**ink **L**ibrary – The implementation of the shared library concept in the Microsoft Windows system.

DPC **D**ynamic **P**ower **C**ontrol

DSCP **D**ifferentiated **S**ervices **C**ode **P**oint – The 6-bit field in an IP packet header that is used for packet classification purposes and is the portion of ToS that is detected by Vipersat modems.

DVB **D**igital **V**ideo **B**roadcast

DVP **D**igital **V**oice **P**rocessor – Used in packet voice applications.

E

E_b/N_o $\mathbf{E_b/N_o}$ is the ratio of $\mathbf{E_b}$ (energy per bit) and $\mathbf{N_o}$ (noise power density per Hz). The bit error rate (BER) for digital data is a decreasing function of this ratio. $\mathbf{E_b}$ is the energy of an information bit measured in Joules or, equivalently, in Watts per Hertz.

F

FAST Code **F**ully **A**ccessible **S**ystem **T**opology Code – Designation for feature code used by Comtech EF Data for their satellite modems. The FAST method makes it easy to quickly upgrade the feature options of a modem while it is running live in the network, either on site or remotely.

FEC **F**orward **E**rror **C**orrection – A process whereby data being transmitted over a communications link can have error correction bits added which may be used at the receiving end to determine/correct any transmission errors which may occur.

Flash Non-volatile computer memory that can be electrically erased and reprogrammed.

FTP **F**ile **T**ransfer **P**rotocol – An application for transferring computer files over the Internet. See also TFTP.

G

G.729 ITU standard for LD-CELP (**L**ow **D**elay – **C**ode **E**xcited **L**inear **P**rediction) voice encoding at 8 kb/s.

GIR **G**uaranteed **I**nformation **R**ate

Group ID A number assigned to equipment which defines it as a member of a group when addressed by the VMS burst controller.

GUI **G**raphical **U**ser **I**nterface – A form of graphical shell or user interface to a computer operating system or software application.

H

H.323 A protocol standard for multimedia communications designed to support real-time transfer of audio (such as voice over IP) and video data over packet networks. Quality of Service is a key feature of H.323. An alternative to SIP.

HDLC **H**igh-Level **D**ata **L**ink **C**ontrol – A standard defining how data may be transmitted down a synchronous serial link.

HPA **H**igh **P**ower **A**mplifier – The amplifier used in satellite communications to raise the transmit signal to the correct power level prior to transmission to satellite.

HTTP **H**yper **T**ext **T**ransfer **P**rotocol – The Internet standard for **W**orld **W**ide **W**eb (**WWW**) operation.

Hub The central site of a network which links to a number of satellite earth sites (remotes).

I

ICMP **I**nternet **C**ontrol **M**essage **P**rotocol

IDU **Ind**oor **U**nit – In a VSAT system, the satellite modem is referred to as the IDU.

IF **I**ntermediate **F**requency – In satellite systems, IF frequencies are usually centered around 70 or 140 MHz (video/TV), or 1200 MHz (L-band).

IFL **I**ntra-**F**acility **L**ink – The coaxial cabling used to connect the satellite ODU to the IDU. Carries the inbound and the outbound signals, and the 24 VDC for the LNB.

Image A binary firmware file that provides the operational code for the processor(s) in a network unit.

IP **I**nternet **P**rotocol – A format for data packets used on networks accessing the Internet.

ISP **I**nternet **S**ervice **P**rovider – A company providing Internet access.

ITU **I**nternational **T**elecommunications **U**nion

K

Kb/s **K**ilo **b**its per **s**econd – 1000 bits/second. A measure of transmission speed. See also bps & Mb/s.

Ku-Band A frequency band used for satellite communications. For terrestrial earth stations the receive frequency band is in the range 10.95–12.75 GHz and the transmit frequency band is 13.75–14.5 GHz. See also C-band.

L

L-Band A frequency band commonly used as an IF for satellite systems using block up/down conversion. Typically 950–1450 MHz Rx, 1250–1750 MHz Tx.

LAN **L**ocal **A**rea **N**etwork

LLA **L**ow **L**atency **A**pplication

LNA **L**ow **N**oise **A**mplifier – An amplifier with very low noise temperature used as the first amplifier in the receive chain of a satellite system.

LNB **L**ow **N**oise **B**lock – A downconvertor so called because it converts a whole band or "block" of frequencies to a lower band. The LNB (similar to an LNA) is part of the satellite ODU/transceiver.

LNC **L**ow **N**oise **C**onverter – A combined low noise amplifier and block down converter, typically with an L-band IF.

LO **L**ocal **O**scillator – Component used in upconverters, downconverters, and transponders for frequency translation (heterodyne) of the carrier signal.

M

M&C **M**onitor **&** **C**ontrol

MAC **M**edia **A**ccess **C**ontrol – A protocol controlling access to the physical layer of an Ethernet network.

Mb/s **M**ega **B**its per **S**econd – 1 Million bits/second. A measure of transmission speed. See also bps & kb/s.

Modem **Mod**ulator and **dem**odulator units combined.

Multicast Transmitting a single message simultaneously to multiple destinations (group) on the IP network.

Multi-command A command that allows multiple input choices in a single command execution.

N

NAT **N**etwork **A**ddress **T**ranslation – An Internet standard that enables a LAN to use one set of IP addresses for internal (private) traffic and a second set of addresses for external (public) traffic.

NIC **N**etwork **I**nterface **C**ontroller – The network interface for a PC/workstation that provides Ethernet connectivity. Depending on the computer, the NIC can either be built into the motherboard, or be an expansion card. Some computers (e.g., servers) have multiple NICs, each identified by a unique IP address.

NMS **N**etwork **M**anagement **S**ystem

NOC **N**etwork **O**peration **C**enter – Has access to any earth station installed using the VIPERSAT Management System (VMS). A NOC can remotely interrogate, control, and log network activities.

NP **N**etwork **P**rocessor

O

ODU **O**ut**d**oor **U**nit – In a VSAT system, the RF components (transceiver) are usually installed outdoors on the antenna structure itself and are thus referred to as an ODU. The ODU typically includes the BUC and LNB, and is connected to the IDU/modem by the IFL cabling.

P

PLDM **P**ath **L**oss **D**ata **M**essage – A packet message that is sent by older Vipersat modems (e.g., CDM-570/L) to the VMS every sixty seconds, providing status update and operating parameter information.

PSK **P**hase-**S**hift **K**eying – A digital modulation scheme that conveys data by changing the phase of a base reference signal, the carrier wave. Different PSKs are used, depending on the data rate required. Examples are binary phase-shift keying (BPSK or 2-PSK) which uses two phases, and quadrature phase-shift keying (QPSK) which uses four phases.

PSTN **P**ublic **S**witched **T**elephone **N**etwork – The world's public circuit-switched telephone network, digital and analog, and includes mobile as well as land-line voice and data communications.

Q

QAM **Q**uadrature **A**mplitude **M**odulation – A digital modulation technique in which the amplitude of two carrier waves is changed to represent the data signal. These two waves are 90 degrees out of phase with each other.

QoS **Q**uality **o**f **S**ervice

QPSK **Q**uadrature **P**hase-**S**hift **K**eying – A digital modulation technique in which the carrier is phase shifted +/- 90 or +/-180 degrees. With four phases, QPSK can encode two bits per symbol—twice the rate of BPSK. However, it also uses twice the power. Also known as 4-PSK or 4-QAM.

R

Remote Satellite earth site that links to a central network site (Hub).

RF **R**adio **F**requency – A generic term for signals at frequencies above those used for baseband or IF.

RFC **R**equest **F**or **C**omment – The official publication channel for Internet standards (such as communication protocols) issued by the Internet Engineering Task Force (IETF).

RIP **R**outing **I**nformation **P**rotocol

RS-232 A common electrical/physical standard issued by the IEEE used for point to point serial communications up to approximately 115 kb/s.

RTP **R**eal-time **T**ransport **P**rotocol – A standardized packet format for delivering real-time applications such as audio and video over the Internet. Frequently used in streaming media systems, videoconferencing, and VoIP.

Rx **R**eceive

S

SCPC **S**ingle **C**hannel **P**er **C**arrier – A satellite communications technique where an individual channel is transmitted to the designated carrier frequency. Some applications use SCPC instead of burst transmissions because they require guaranteed, unrestricted bandwidth.

SIP **S**ession **I**nitiation **P**rotocol – A general purpose protocol for multimedia communications, commonly used for voice over IP (VoIP) signaling. An alternative to the H.323 protocol.

SNG **S**atellite **N**ews **G**athering – A satellite uplink van/truck with television crew on location conducting a live report for a newscast.

SNMP **S**imple **N**etwork **M**anagement **P**rotocol – A protocol defining how devices from different vendors may be managed using a common network management system.

SOTM **S**atellite **O**n **T**he **M**ove – The ability of a mobile remote terminal to roam across satellite beams to preserve link integrity and to automatically connect from one satellite and/or hub to another in a global network.

Star Topology A network topology which, if drawn as a logical representation, resembles a star with a hub at the center.

STDMA **S**elective **T**ime **D**ivision **M**ultiple **A**ccess – A multiple access technique where users time-share access to a common channel with variable-sized time slots allocated on usage.

Streamload Protocol A proprietary Vipersat data streaming protocol.

SUM **S**tatus **U**pdate **M**essage – A packet message that is sent by newer Vipersat modems (e.g., SLM-5650A) to the VMS every sixty seconds, providing status update and operating parameter information.

T

TCP/IP **T**ransmission **C**ontrol **P**rotocol / **I**nternet **P**rotocol – A standard for networking over unreliable transmission paths. See also UDP.

TDM **T**ime **D**ivision **M**ultiplexing – A method of multiplexing that provides the transmission of two or more signals on the same communication path or channel, but at different times by utilizing recurrent timeslots.

TFTP **T**rivial **F**ile **T**ransfer **P**rotocol – A simple file transfer protocol used over reliable transmission paths. See also FTP.

ToS **T**ype **o**f **S**ervice

Tx **T**ransmit

U

UDP **U**ser **D**atagram **P**rotocol – A standard for networking over reliable transmission paths.

UDP multicast A multicast transmission using the UDP protocol.

Unicast Transmitting information/data packets to a single destination on the IP network.

V

VESP **V**ipersat **E**xternal **S**witching **P**rotocol – A switch-request protocol that allows external VPN equipment and Real-time proprietary applications to negotiate bandwidth requests between any two subnets on a Vipersat network. VESP is used by newer Vipersat modems (e.g., SLM-5650A) to send a switch request to the VMS to establish a new satellite link or adjust bandwidth for an existing link.

VCS **V**ipersat **C**ircuit **S**cheduler – A proprietary satellite communication scheduling system used to schedule Vipersat network resources in support of a variety of high-priority applications such as video conferencing and scheduled broadcasting.

VFS **V**ipersat **F**ile **S**treamer – A file transfer application utilizing UDP and a proprietary Streamload protocol to transmit data across the Vipersat network.

VLoad **V**ipersat **Load** Utility – A comprehensive tool for managing and distributing application, configuration, and identification information for the modem/routers in Vipersat satellite networks.

VMS **V**ipersat **M**anagement **S**ystem – A comprehensive M&C tool providing rapid and responsive control of Vipersat satellite networks. Comprised of client and server components.

VNO **V**irtual **N**etwork **O**perator – A provider of management services that does not own the telecommunication infrastructure. The Comtech Vipersat Network Products' VNO solution allows satellite space segment operators to selectively expose resources in their satellite network to other service providers, customers, or partners.

VoIP **V**oice **o**ver **IP –** The routing of voice communications over the Internet or through any IP-based network.

VOS **V**ipersat **O**bject **S**ervice – The main software service of the VMS application.

W

Wizard A specialized program which performs a specific function, such as installing an application.

WRED **W**eighted **R**andom **E**arly **D**etection – A queue management algorithm with congestion avoidance capabilities and packet classification (QoS) providing prioritization.

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