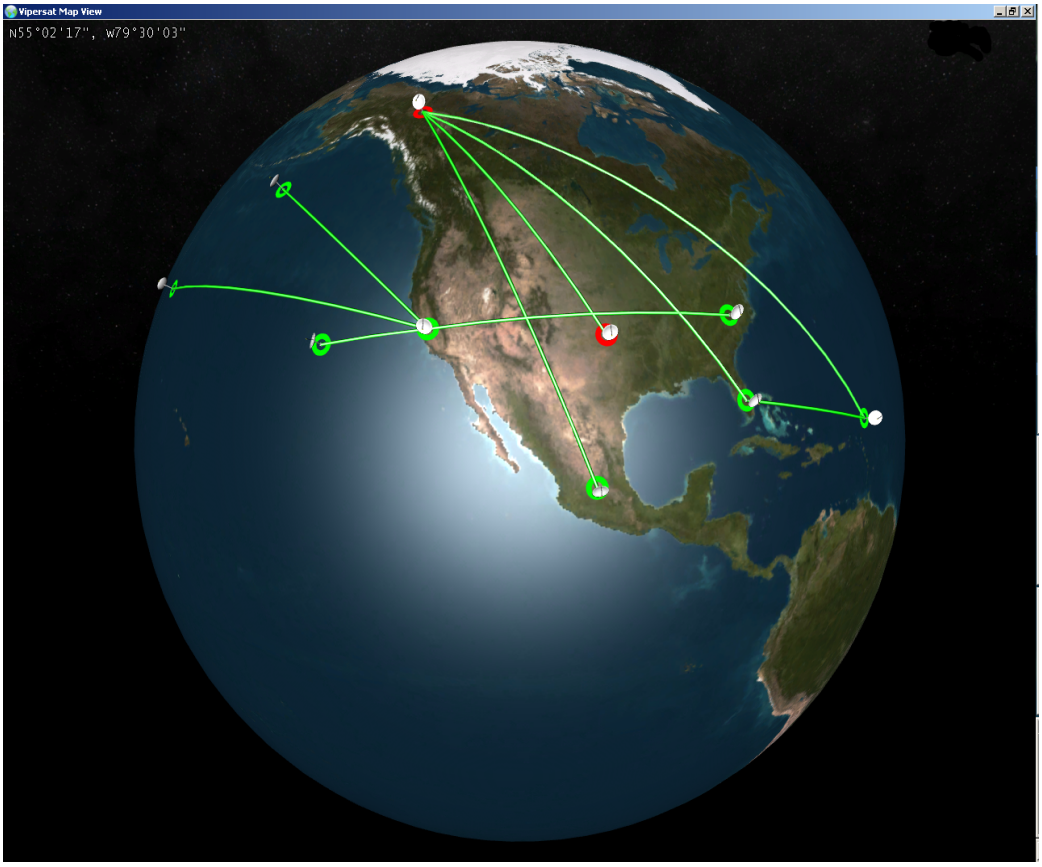
VMS v3.6.x

VIPERSAT Management System

USER GUIDE



Part Number MN/22156 Revision 3

VMS v3.6.x

VIPERSAT Management System

User Guide

Part Number MN/22156
Document Revision 3

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Revision	Description
0	**Initial Release**. *Note*: This new document part number, MN/22156, supersedes the previous VMS User Guide part number, 22156.
1	**New functionality in v3.5.x:** VMS N:1 Redundancy; Site Distribution Lists; CDM-700 Out-of-Band Driver; CDD-564IF InBand Driver
2	**New functionality in v3.6.0:** VMS SOTM, VNO and Global Map View
3	**New functionality in v3.6.3:** SLM-5650A Inband/OOB Driver, OBCM, CDM-570/570L Out-of-Band Driver, Satellite Advanced Switching for SOTM and Antenna Mesh Compensation Factor, Basic Guaranteed Bandwidth and CIR.

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CHAPTER

1

GENERAL

How to Use This Manual

This manual documents the features and functions of the Vipersat Management System (VMS), and guides the user in how to install, configure, and operate this product in a Vipersat network.

NOC administrators and operators responsible for the configuration and maintenance of the Vipersat network, as well as earth station engineers, are the intended audience for this document.

Manual Organization

This User Guide is organized into the following sections:

Chapter 1 — General

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

Chapter 2 — VMS Installation

Covers the steps for installing the VMS software application on a host server, in both standalone and redundant configurations.

Chapter 3 — VMS Configuration

Covers the Quick Configuration procedure as well as detailed steps for full System Configuration in building the Vipersat network.

Chapter 4 — Configuring Network Modems

Describes how VMS is used to configure modems in the Vipersat network.

Chapter 5 — VMS Services

Describes the various service managers that comprise VMS and how Viper-View is used to monitor and control the Vipersat network.

Chapter 6 — Out-of-Band Units

Describes the methods for integrating out-of-band modem units into a VMS-controlled satellite network.

Appendix A — VMS Cross Banding

An explanation of how VMS accommodates applications involving satellite cross strapping and cross banding.

Appendix B — Antenna Visibility

An explanation of how to use the VMS antenna visibility function to control the frequency spectrum used in VMS switching.

Appendix C — Redundancy

Describes the optional redundancy services available for VMS—N:1 Server redundancy and N:M Hub Modem redundancy.

Appendix D — Domain Controller and DNS

Describes the method of configuring VMS servers to perform the role of network Domain Controller and Domain Name Server for the VMS network.

Appendix E — SNMP Traps

Describes the use of SNMP traps by VMS.

Appendix F — Automatic Switching

Reference on how the VMS monitors and automatically responds to changing load, data type, and QoS requirements in the network.

Appendix G — Entry Channel Mode Switching

Supplement on how ECM provides a method for remotes to switch from STDMA to SCPC and back.

Appendix H — VMS Billing Log Translator (VBLT)

Covers how to install and operate VBLT, an application that converts switch events into billing log format.

Appendix I — 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: Explanatory text that notifies the reader of possible consequences of an action.

Warning: Explanatory text that notifies the reader of potential harm as the result of an action.

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-562L/-564 Demodulator with IP Module Installation and Operation Manual* (Part Number MN/CDD562L-564.IOM)
- *Vipersat CDD-56X Series User Guide* (Part Number MN/22137)
- *SLM-5650A Installation & Operation* (Part Number MN-0000031)
- *Vipersat SLM-5650A User Guide* (Part Number MN-0000035)
- *Vipersat Circuit Scheduler User Guide* (Part Number MN/22135)
- *ROSS Getting Started Guide* (Part Number MN/13070)
- *Vload Utility User Guide* (Part Number MN/22117)
- *Vipersat CDM-570/L, CDD-56X Parameter Editor User Guide* (Part Number MN-0000038)
- *SLM-5650/A Parameter Editor User Guide* (Part Number MN-0000041)
- *VNO Web Service ICD* (Document Number, ICD- VNO-WS)

Product Description

Introduction

The Vipersat Management System (VMS) is a network management system that uses information it receives from the network's VMS controlled modems. The VMS controlled modem's internal microprocessor based input/output (I/O) controller measures, captures, and transmits these detected, real-time network operating parameters to VMS via PLDM (Path Loss Data Message) packets.

VMS receives, stores, and processes this data from the network's VMS controlled modems and uses the data to update and display current network status information. The network data is then displayed by VMS in an easy-to-interpret, real-time graphic presentation. The result is a comprehensive, intuitive operator's network Management and Control tool for quick, responsive network control.

VMS is customized at setup for each satellite network it controls recognizing the unique bandwidth resources and limitations available for each network. VMS has trigger points set defining the upper and lower limits for usage, type of service, and other network parameters defining bandwidth resource allocations for each traffic type. These triggers, or set-points, are easily modified at any time by a qualified operator whenever network resource allocations need to be reconfigured.

As VMS receives a switching request from a network VMS controlled modem, it uses sophisticated algorithms to evaluate the request against available network resources and network policies before sending a switch command back to the requesting VMS controlled modem to make a switch to a given frequency and bit rate. If the switch request is denied, because of lack of available network resources for example, the VMS controlled modem will not make the switch until the necessary network resources become available.

The satellite network's VMS controlled modems detect, monitor and, when commanded by VMS, physically make network changes. The VMS collects, analyzes, and displays data, and commands the VMS controlled modems to make network changes. Refer to each VMS controlled modem's *User's Guide* for more details on each device's role in the satellite network.

Note: The Vipersat External Switching Protocol (VESP) is available to equipment manufactures, making it possible for them to smoothly integrate their products into a VMS controlled satellite network. Contact a Vipersat representative for details.

A sample display, shown in figure 1-1, shows VMS **ViperView** display giving the operator a complete view of a network's configuration, the health of all network components, and current bandwidth usage. The VMS display is flexi-

ble and can be modified by the operator at any time, as described in this *User's Guide,* to optimize network Management and Control.

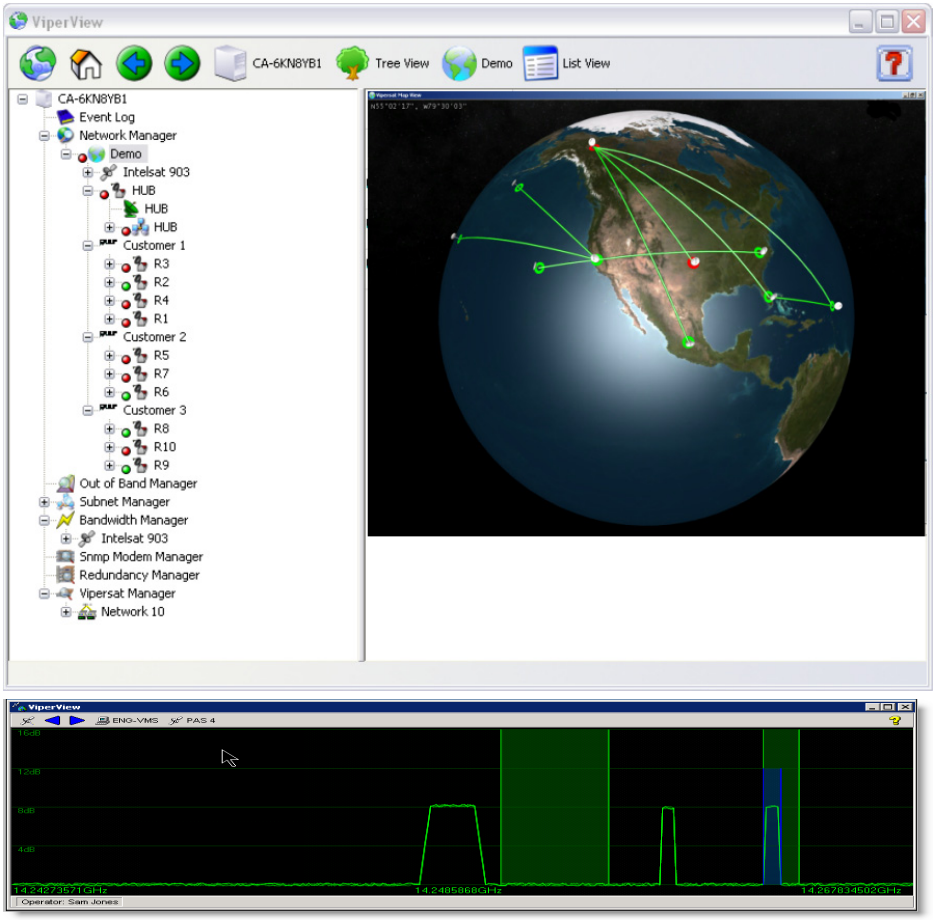


Figure 1-1 VMS ViperView display

Vipersat uses IP connections between network nodes, supporting UDP connectivity. The Vipersat VMS controlled modem, consisting of a satellite modem with an imbedded microprocessor router, which is the interface between LAN traffic and the satellite links that connect remote stations to the hub.

VMS has a client/server architecture, as shown in diagram figure 1-2, with rack servers communicating with remote client PC's. The client/server model has a number of advantages. The server maintains all databases in a central location accessible to all clients. Thus, all network status updates and performance data

is stored in a single place, processed by VMS running on the central server, and the results are available to all clients across the network.

Through its client/server architecture, VMS supports centralized management, control, and distribution of data, alarms, and events. VMS also simultaneously supports multiple clients, network management, and complete visibility of the entire network operation.

VMS Features

The VMS network management software has the following features:

- Configuration Setup
- Network Status Displays (automatic and manual)
- Statistics Gathering (automatic and manual)
- Diagnostics Monitor and Control (automatic and manual)
- Dynamic Bandwidth Management
- Alarm Processing
- Optional VMS and Critical Hardware Redundancy
- Report Generation
- Network Administrator Mode
- Remote Access Capability via Local LAN or Internet/Intranet

VMS Operation

A Vipersat network provides Internet Protocol (IP) connections between network nodes and supporting UDP and Multicast protocols. Vipersat satellite networks rely on VMS controlled modems to provide the interface between LAN traffic and the satellite links that connect remote stations to the hub.

VMS Architecture

The VMS **Client** (ViperView) and **Server** (Vipersat Operating System) architecture figure 1-2 supports centralized management, control, and distribution of data, alarms, and events. Network units, such as a Vipersat VMS controlled modem while functioning as a modulator/demodulator, also detects, analyzes and reports to VMS details on network operation. VMS collects, stores,

analyzes and acts on this information to intelligently control network operation to optimize bandwidth utilization and overall network performance.

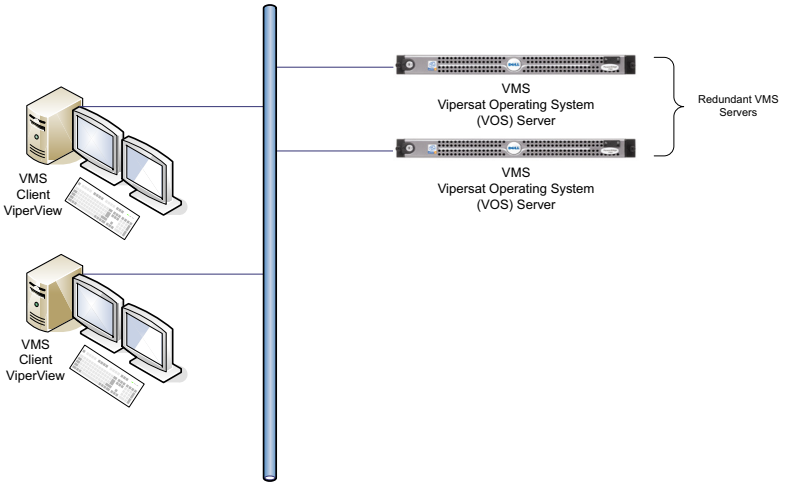


Figure 1-2 ViperView Client, Server (VOS) Relationship

The VMS management and monitoring system uses an intuitive graphic display, as illustrated in figure 1-1. VMS makes visible the entire network's operation and performance. All network status and performance data is collected, processed, and stored at the server. Any client workstation retrieves information from the VMS single, central server's database.

The VMS network management system displays the following information gathered from the network VMS controlled modems:

- System configuration
- Transmission configurations
- Satellite link Status
- QoS displayed as E_bN_o values for each circuit.
- Switching times and connection type and duration for each circuit.
- Network alarms showing health of network hardware IP and RF connections

- Bandwidth resource allocations
- Modem, RF equipment, and VSAT station management

The network map displays an integrated view of the entire network including all nets, subnets, equipment, and equipment interconnections. You can double-click on an icon to display its status information and/or sub-components. Right clicking on an icon displays a drop-down menu allowing the operator to issue commands, change configurations, or change the unit's state, as applicable.

The colors associated with each icon, as shown in the display illustrated in figure 1-1, reflect the current outstanding alarm condition of the network component or its sub-components:

- **Green** = online
- **Red** = alarm
- **Gray** = offline as the result of missing three consecutively PLDMs and not responding to the recovery process

All devices, networks, and carriers displayed by ViperView share the same color scheme indicating their health in the network giving the operator real-time, at-a-glance network health status.

VMS provides operator notification in the event of network alarms. This notification can be in the form of both visual and audible alerts. VMS also maintains a log of all network activity making use of analysis and network trouble shooting information readily available.

New in this Release

v3.6.3 Release

SLM-5650A Inband Device Driver

This version now supports monitoring control and switching for SLM-5650A with Network Processor (NP) board. The Inband driver provides for full switching functionality backup and restore of hub device redundancy.

SLM-5650A Full MIB Out-Of-Band M&C

In addition to controlling the SLM-5650A as an inband device optioned with the Network Processor the base modem without the Network Processor will operate as manage OOB circuit controlled link.

CDM-570/570L Full MIB OOB M&C

The CDM-570/570L is supported as an OOB device operating without IP option card. This new device driver provides the monitoring and control of standard base modem control within and IP overlay network through SNMP.

Satellite Advanced Switching (Remote Roaming)

This new remote roaming feature provides advanced switching per remote to any given satellite. The advanced carrier switching from beam-to-beam in roaming applications allows for variable carrier characteristics between satellites per remote, whereby roaming from one satellite to another with different specifications, e.g. modulation, FEC Rate...

Generic VMS Installer

Changed installation authorization to remove serial number check. During the build authorization of VMS installation the packaging generation will not require serialization providing generic distributed install builds. Only key file updates (.vku) will be required to install latest versions of VMS as new or updates. Latest build versions will display on both Server and Client About Menus. This simplifies the distribution of release versions of VMS.

VNO Basic User Authorization

Supported in this release, the VNO server supports a new feature called Basic User Authentication. This feature provides a simple form of user access control to VNO resources and a limited set of privilege levels for specific VNO operations. It allows network operators to configure their VNO interface to expose a subset of all the networks on a per user basis. Users, passwords, and privilege levels are stored in VNO WS service.

Antenna Mesh Compensation Factor

This feature applies a power delta between any mesh remote sites. The hub is used as the reference value when calculating a power delta value between remote's with smaller antennas. This is accomplished through comparing its gain opposed to the gain differences between remotes. If multiple remotes are involved in a SHOD connection the VMS uses the lowest remote gain value for compensation control.

ToS Value Control for Management Messages

The management control messages can be stamped with a Type of Service (ToS) value providing for priority singling control through network routers. This priority control value increases reliability of management messages.

SLM-5650A Demodulator Only Support

The SLM-5650A optioned through FAST Codes produces a new device structure that masks all modulator functions. This new product is supported in this release by reading feature sets from the device providing for demodulator only.

Customer Support

Contact Information

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

Mail: 3215 Skyway Court
Fremont, CA 94539
USA

Phone: 1+510-252-1462

Fax: 1+510-252-1695

Email: supportcvni@comtechefdata.com

Web: www.comtechefdata.com

Return Material Authorization

Any equipment returned to Vipersat must have a Return Material Authorization (RMA) issued prior to return. To return a Comtech Vipersat Networks product for repair or replacement:

- Obtain an RMA form and number from Vipersat Customer Support.
- Be prepared to supply the product model number and serial number of the unit.
- To ensure safe shipping of the product, pack the equipment in the original shipping carton.

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 Vipersat Customer Support representative. All input is appreciated.

CHAPTER

2

VMS INSTALLATION

General

The Vipersat Management System software should be installed on a high-performance, industry-standard computer running the Microsoft Windows Server 2003 or later operating system.

For specifications for the minimum recommended VMS hardware configuration, please refer to the *VMS Release Notes* for the version of software that will be installed. Both Server and Client configurations are provided.

The VMS software is installed using an Installation Wizard. Depending on the desired setup, installation can be performed with the full set of files (both client and server), client-only files, or server-only files. The Wizard guides the installer through the installation process and provides all necessary information to complete typical, compact, and custom installations.

The same procedure for installation of the VMS on a server is used for both standalone and redundant configurations.

Caution: Installing VMS on non-recommended hardware or operating system will void the support warranty. Also, VMS must be installed on a dedicated server to retain support warranty.

Caution: The Automatic Updates function in Microsoft Windows must be properly set to avoid possible disruption of the VMS and the Vipersat network. Please see information below.

VMS Server - MS Automatic Updates Setting

The Microsoft Windows OS Automatic Updates feature provides a selection of configuration settings. The default setting, Automatic, will automatically download and install Windows updates. Typically, this process includes an automatic reboot of the server to implement the updates.

A VMS server with the default setting and an active connection to the Internet is susceptible to experiencing an automatic reboot that may adversely impact Vipersat network functions. This event can be especially damaging to redundant server configurations. When a redundant server reboots, the Primary or Secondary server (depending on which server was on-line) will require "activation" in order to restore proper functionality.

Vipersat therefore strongly recommends that the Automatic Updates configuration NOT be set to Automatic. This feature should be set to either of the two selections below:

- *Notify me, but don't automatically download or install them.*
- *Download updates for me, but let me choose when to install them.*

The Automatic Updates configuration window can be accessed from the **Start Menu** by choosing **Control Panel**, then opening it either directly or as a tab from the **System** panel.

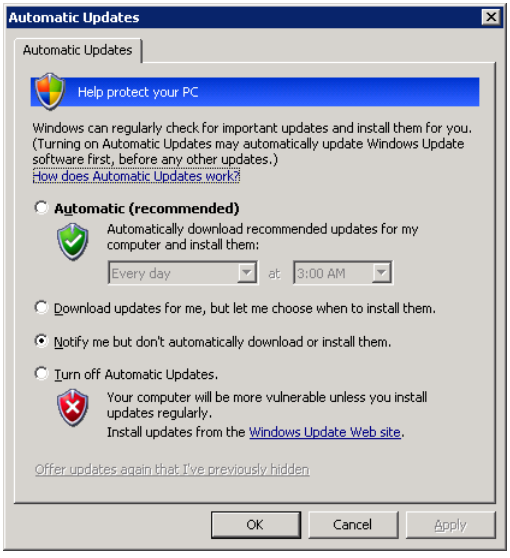


Figure 2-1 Automatic Updates window, Recommended Setting

Types of Installation

The VMS can be installed in three different configurations:

1. On a single VMS server; Vipersat Operating System (VOS).
2. On two or more (N:1) VMS servers in the optional fault-tolerant, redundant configuration; Vipersat Operating System (VOS).
3. On a client workstation; Viperview User Interface.

Each of the first two configurations can be made as a:

- **Clean Installation** - A clean installation is one done on a server that has not previously operated as a VMS server, or that has had its hard drive re-formatted. With no existing network database, a full network configuration (Chapter 3, “VMS Configuration”) must be performed following installation.
- **Upgrade Installation** - An installation to be made on a server that has previously been installed as a VMS server in a Vipersat network, operating with a previous version of VMS. The existing network database will be automatically converted during installation, with minimal configuration changes required.

Upgrading Redundant Server Configuration

Perform the upgrade on the Standby server first. This will allow the installation of the new software and database conversion to be verified without losing VMS service. If successful, continue the upgrade by doing the following:

- Deactivate the Active (Primary) server.
- Activate the Standby (Secondary) server.
- Perform upgrade installation on the now deactive server.

This method provides a seamless upgrade with no VMS downtime.

The installation instructions in the following section include special instructions for each of these various installation types.

Caution: Failure to note and follow the instructions for the intended network configuration may cause the VMS installation to fail or to operate erratically.

Preparing Server for VMS Installation

If not already done, perform the following tasks before proceeding with installation of VMS on the server:

- Limit DEP (Data Execution Prevention) — *see following section*.
- Create a user account in the Active Directory (example: VMS).
- Add the VMS user to the DCOM Limits.
- Reboot the server before continuing with the VMS installation.

Limiting DEP (Data Execution Prevention)

DEP (Data Execution Prevention) is a service, available on some CPUs, which will actively block a virus or program which it determines acts like a virus. Without limiting the action of the DEP feature to essential Windows programs and services, this procedure will prevent DEP from blocking the actions associated with VMS.

Use the following procedure to make certain that this feature is limited to essential Windows programs only.

1. From the server's **Start** menu, go to the **System Properties** menu located at Start > Control Panel > System, as shown in figure 2-2.

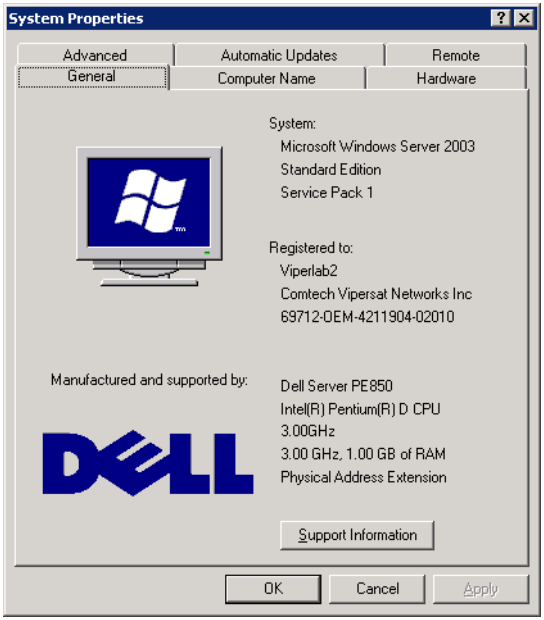


Figure 2-2 System Properties menu

2. Click the **Advanced** tab to display the dialog page shown in figure 2-3.

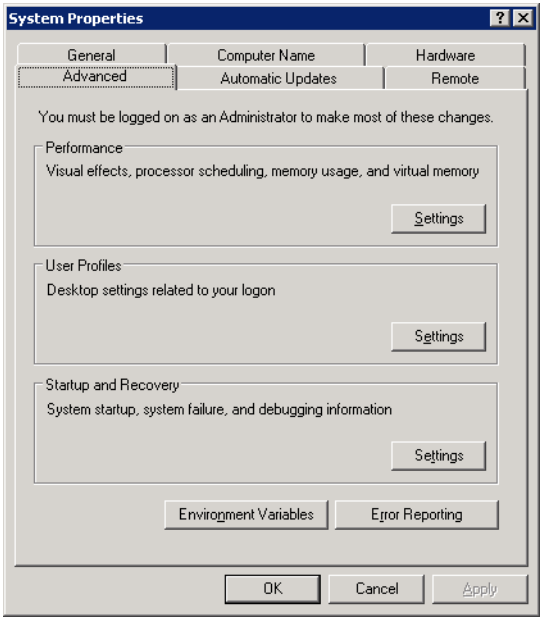


Figure 2-3 Advanced tab

3. In the **Performance** box on the **Advanced** tab, click the **Settings** button then click the Data Execution Prevention tab to show the dialog shown in figure 2-4.

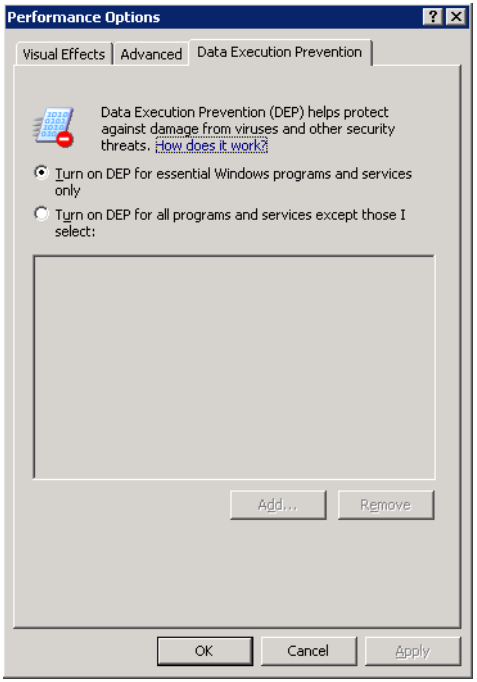


Figure 2-4 DEP tab

4. Select the **Turn on DEP for essential Windows Programs and services only** radio button. If the CPU processor does not support DEP, this radio button will be greyed out and unavailable.

5. Click the **OK** button to complete this procedure.

This action limits DEP to protecting only essential Windows programs without interfering with any other applications.

Enabling Global Catalog Caching (Redundant Configurations)

Enabling Global Catalog Caching on the backup server(s) in a redundant configuration will ensure that the server will not fail on a subsequent boot after

it has been brought online as the active server. Use the following procedure to enable Global Caching on backup servers.

1. From the Server **Start** menu, open the **NTDS Site Settings Properties** window from: Administrative Tools > Active Directory Sites and Services > Default-First-Site-Name.

2. From the **Site Settings** tab shown in figure 2-5, select the **Enable Universal Group Membership Caching** option to enable this function on the backup server.

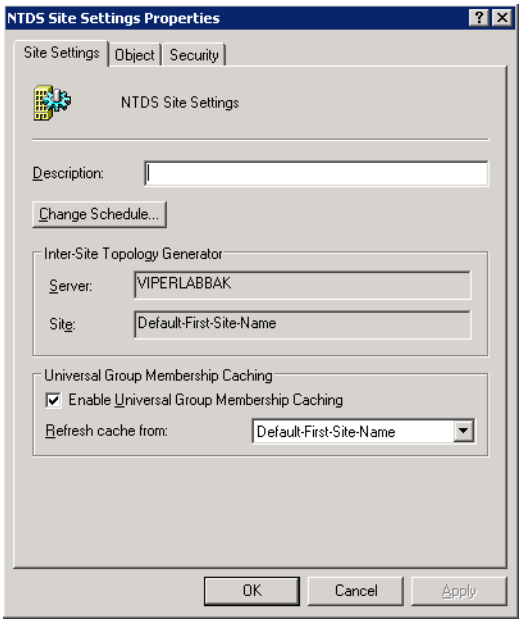


Figure 2-5 NTDS Site Settings

3. Click the **OK** button to complete this setting.

What this does is to cause the backup server to maintain its own global catalog in addition to the catalog resident on the active server. In the event of a switch-over, the backup server will operate until it is rebooted. At that time it will fail to run if it cannot find the Global Catalog on the active server, unless it has its own resident catalog, which this setting provides.

Configuring Server as Domain Controller and/or DNS

Note: If the server is to be used as a domain controller, it must be configured as a domain controller at this time before proceeding with the VMS installation.

In a redundant configuration, the servers must be configured as domain controllers and DNS.

If the VMS server is to be used as a Domain Controller and/or as a Domain Name Server (DNS), or if VMS is to be installed in an existing domain, follow the procedure outlined in Appendix D, “Domain Controller and DNS”, *Redundancy*, before starting the VMS installation.

Backing Up VMS Database (Upgrade)

For VMS upgrades, it is recommended that the current VMS database be backed up prior to installing the new version of VMS. This precaution will allow for the current database to be restored in the event that the new install fails.

Note: This database backup can only be restored on the current VMS version. It is not compatible with the new VMS version because a database conversion is performed during the installation process.

Should the new VMS installation fail, the fall-back procedure would be to re-install the previous version of VMS, then restore the database with the backup.

A successful installation of the new VMS will result in an automatic conversion of the current database. This new database should immediately be backed up, and any previous database backups should be removed from the server to avoid compatibility issues.

1. Right-click on the VMS Server icon and select **Backup** from the drop-down menu (figure 2-6).

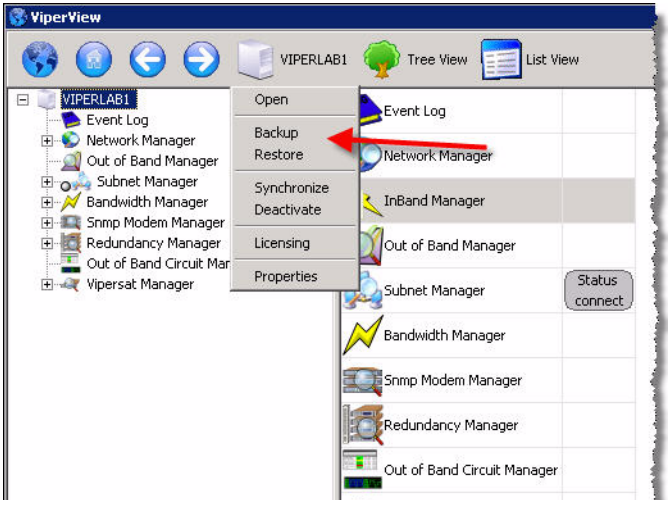


Figure 2-6 Backup Command, VMS Server

2. Enter the **Name** for the backup file and select the directory location for saving the file from the **Save As** dialog window that opens (figure 2-7).

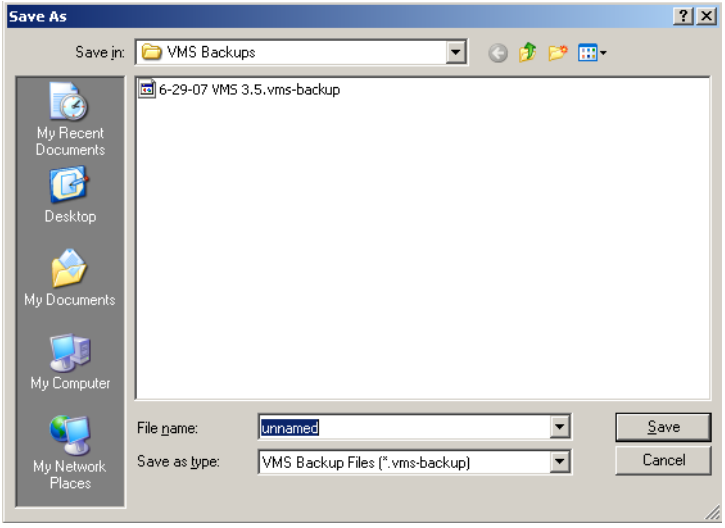


Figure 2-7 VMS Backup Save As dialog

Stopping Previous VMS Version (Upgrade)

If you are installing VMS on a server which does not have a previous version of VMS installed, skip this "Stopping Previous VMS Version (Upgrade)" section and proceed with the instructions in the section "VMS Server Installation" on page 2-14.

Caution: If a prior version of VMS is installed and running on the server, you must first stop, then uninstall, this prior version as described in the following procedure.

Caution: Stopping VMS does not change the configuration of the server. Refer to Appendix D, "Domain Controller and DNS" for detailed instructions.

If there is an earlier version of VMS installed on the server, use the following procedure to stop VMS before proceeding with the new installation.

1. Right-click in the Windows status bar and select **Task Manager** from the pop-up menu. The Windows Task Manager window will appear.

2. From the **Processes** tab, scroll down the list to find the three VMS processes that are running—*VConMgr.exe*, *viperview.exe*, and *VOS.exe*, as shown in figure 2-8.

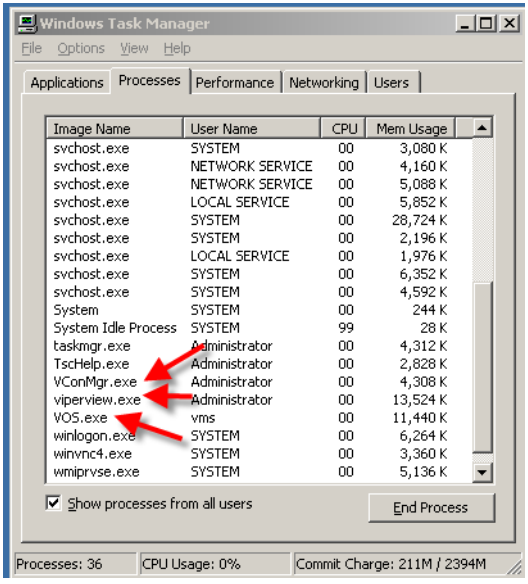


Figure 2-8 Windows Task Manager, Processes tab

3. Select each process and click on the **End Process** button. A Task Manager Warning dialog will appear (figure 2-9)—click on the **Yes** button to terminate the process.

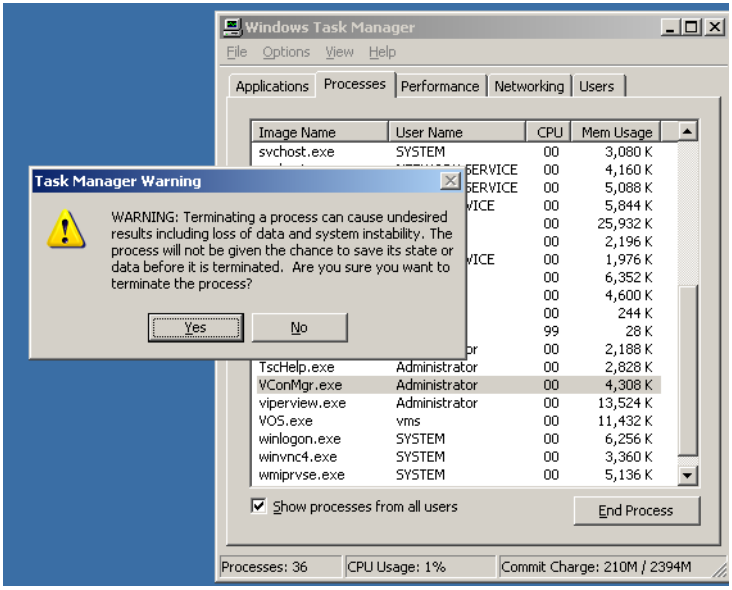


Figure 2-9 Task Manager Warning dialog

4. After each of the three processes have been terminated, close the Task Manager window then re-open it to confirm that the processes are no longer running.

5. Once the Vipersat Management System service has been stopped, uninstall the previous version of VMS from the server as described in the following section.

Uninstall Previous VMS Version (Upgrade)

1. Uninstall the previous version of VMS by selecting **Add or Remove Programs** from the server's **Control Panel**, as shown in figure 2-10.

Figure 2-10 Add or Remove Programs Control Panel

2. Select **Vipersat Management System** and click the **Remove** button (figure 2-11).

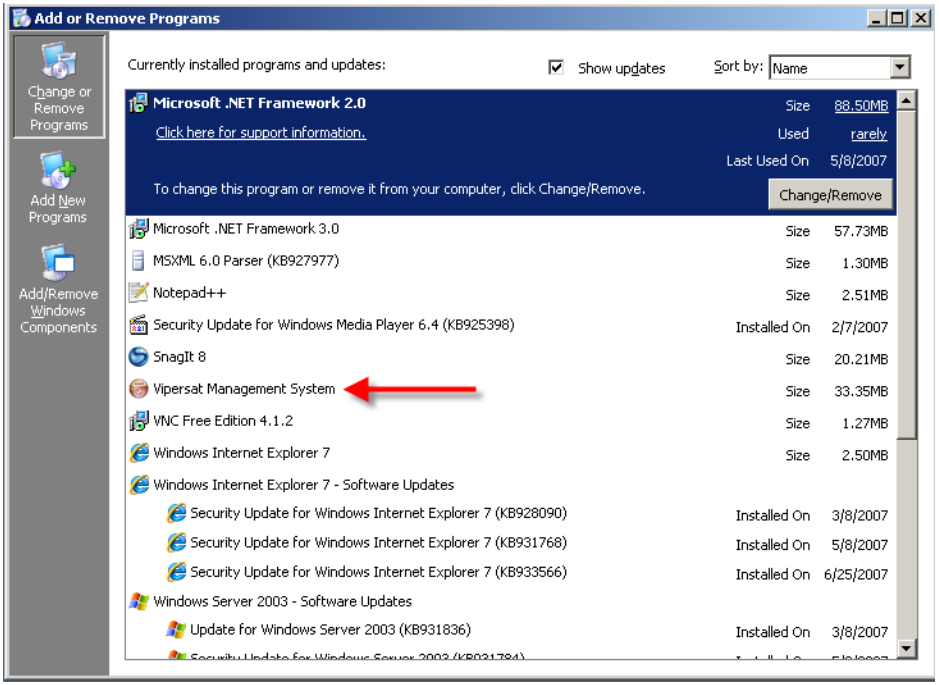


Figure 2-11 VMS, Remove Program

3. Close the **Add or Remove Programs** window.

VMS Server Installation

Note: For VMS Redundancy Server configurations, after installing VMS on each of the servers as described in this section, refer to Appendix C, “Redundancy”, for detailed instructions for configuring the redundant servers.

The installation process is highly automated and typically does not require manual intervention unless the installation is to be non-standard.

1. Locate the file **VMS 3.x Install.exe** on the VMS distribution CD and double-click it to start the VMS Installer.

2. After starting the VMS installer, the **Vipersat Management System Setup Wizard** welcome screen, shown in figure 2-12, is displayed. Click the **Next** button to continue.

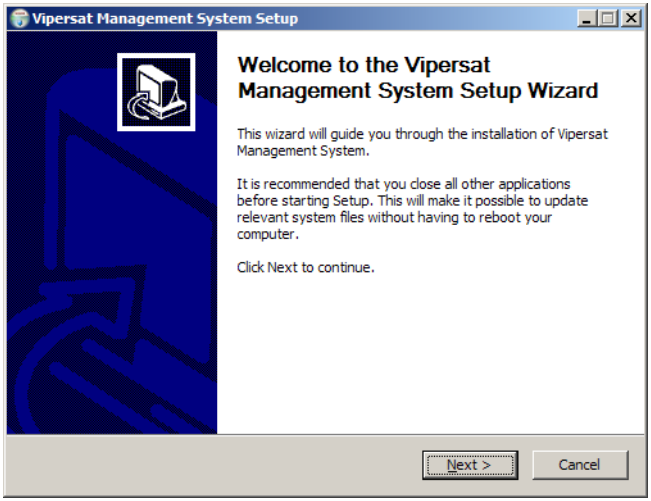


Figure 2-12 Setup Wizard Welcome screen

3. On the **License Agreement** screen, shown in figure 2-13, click the **I Agree** button to proceed.

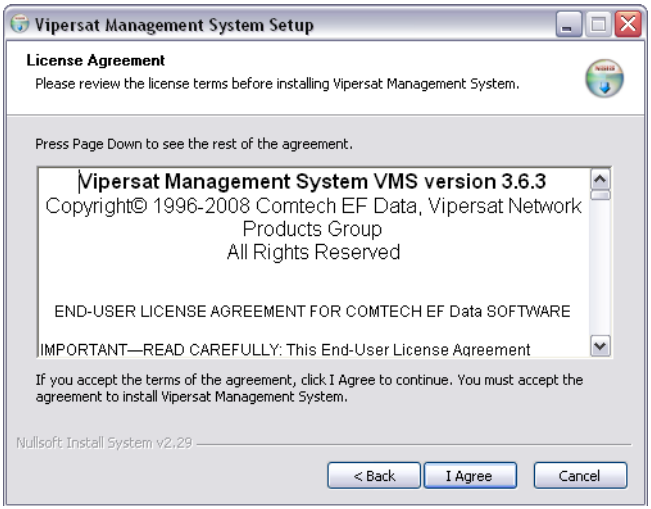


Figure 2-13 License Agreement screen

4. From the **Installation Type** screen shown in figure 2-14, select the radio button for the type of installation you will be making. The VMS software is comprised of two main components, the Server component and the Client component.

- **Full Install** - This type of installation installs both components, and allows a local user to operate VMS locally on the server and also remotely. This installation type requires a USB key to operate VMS.
- **Server Install** - This type of installation only installs the Server component, and allows the VMS server to be operated through a remote connection by a client—the VMS can not be operated from the local server. This installation type requires a USB key to operate VMS.
- **Client Install** - This type of installation only installs the Client component, and is used to install the VMS client on a workstation that will be used to connect remotely to servers on the same LAN that are running the VMS. This installation type does not require a USB key to operate VMS.

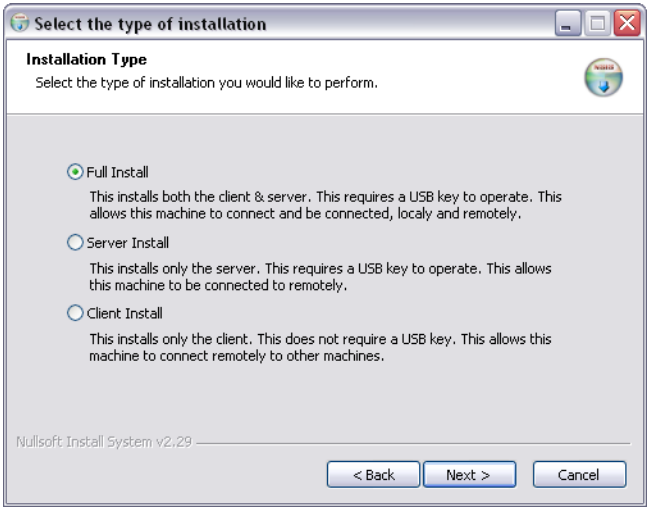


Figure 2-14 Installation Type screen

5. Click the **Next** button to proceed to the VMS Setup screen.

6. The Service Configuration defaults with all three boxes checked as shown in figure 2-15. It should be left this way.

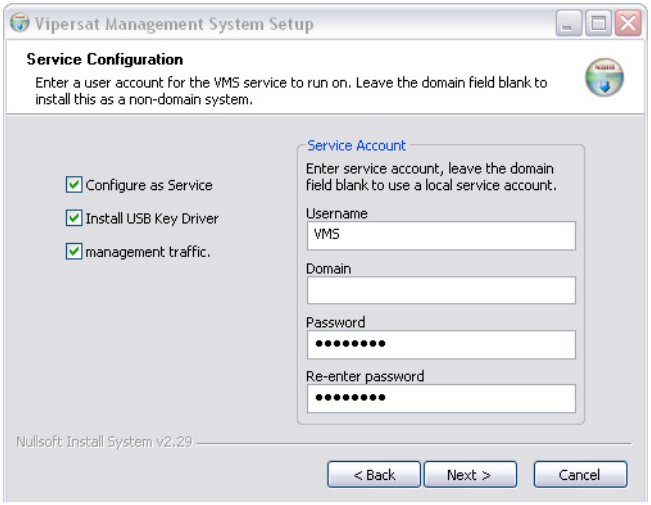


Figure 2-15 Service Configuration dialog

7. Enter the User name for the account (e.g., VMS).

Note: If this is an upgrade, use the same name as before.

8. If the VMS server is to operate in a Domain, enter the domain name in the Domain field exactly as the domain is named.

Caution: Failure to have an exact match between the assigned domain name and the domain name entered in this dialog will cause VMS to fail, requiring re-installation.

9. The **Password** field is auto-filled with the default password, vipersat. Enter a new password, if desired, to change the default setting.

Note: If this is an upgrade of a domain account, enter the password associated with this acount.

10. Click the **Next** button when this dialog is complete.

11. The **Choose Components** dialog appears, as shown in figure 2-16. All services are selected by default for a typical VMS installation. It is recommended that these settings not be changed, except for non-standard installations.

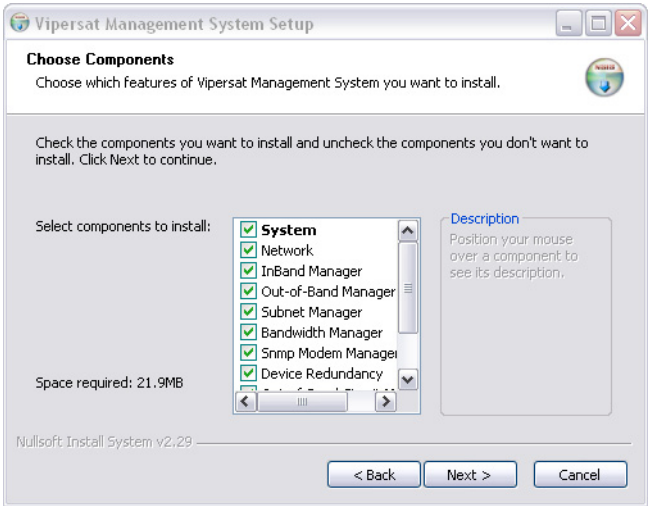


Figure 2-16 Choose Components dialog

12. Click the **Next** button to proceed.

13. In the **Choose Install Location** dialog shown in figure 2-17, it is recommended that the default file location be used. Click the **Next** button to continue.

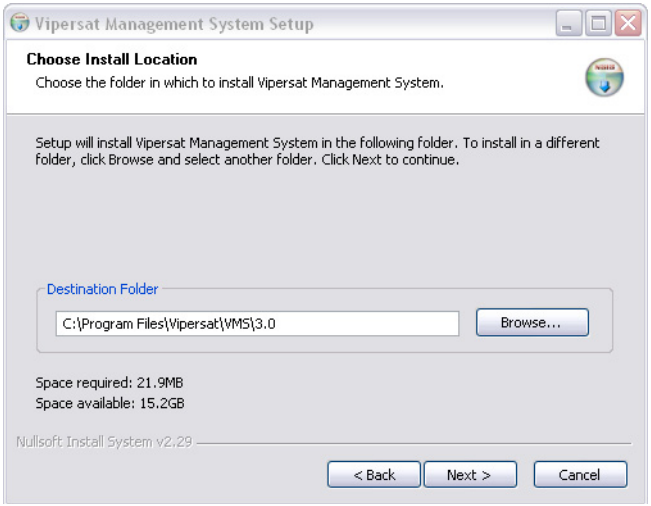


Figure 2-17 Choose Install Location dialog

14. From the **Choose Start Menu Folder** dialog shown in figure 2-18, accept the default folder name, VMS 3.x, and click the **Install** button to start the installation process.

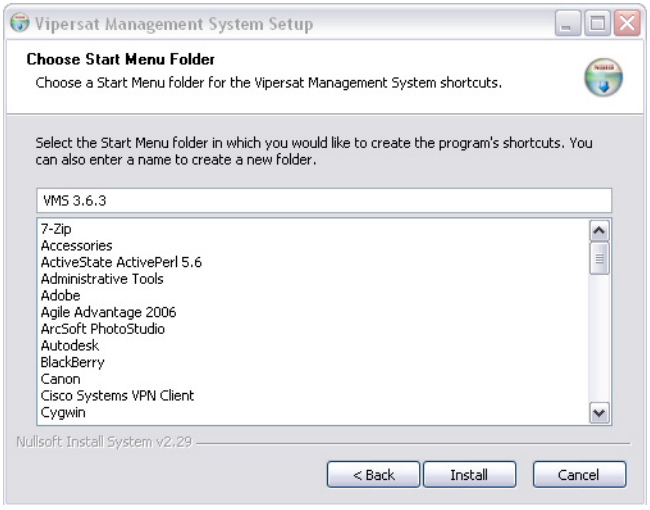


Figure 2-18 Choose Start Menu Folder dialog

15. The installation process will be interrupted with the notice shown in figure 2-19. Click on the **Continue Anyway** button to continue.

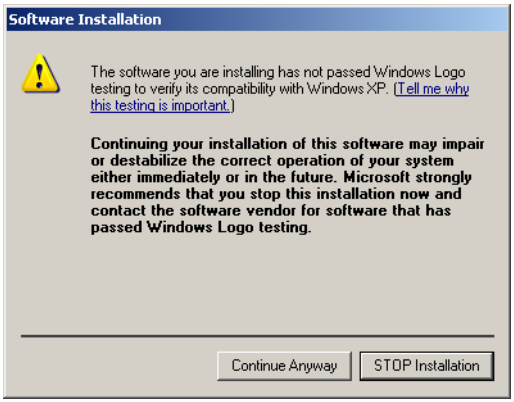


Figure 2-19 Software Installation notice

16. During installation, the **Waiting** dialog shown in figure 2-20 asking you to insert USB key will pop up and the installation progress bar will stop.

Note: This step will not occur if the key is already plugged in or when performing a Client Install, since a USB key is not required for this installation type.

Install the Vipersat Crypto-Box key by plugging it into an available USB port on the VMS server.

If this is an *Upgrade Installation*, proceed to step 19.
If this is a *Clean Installation*, continue with the next step.

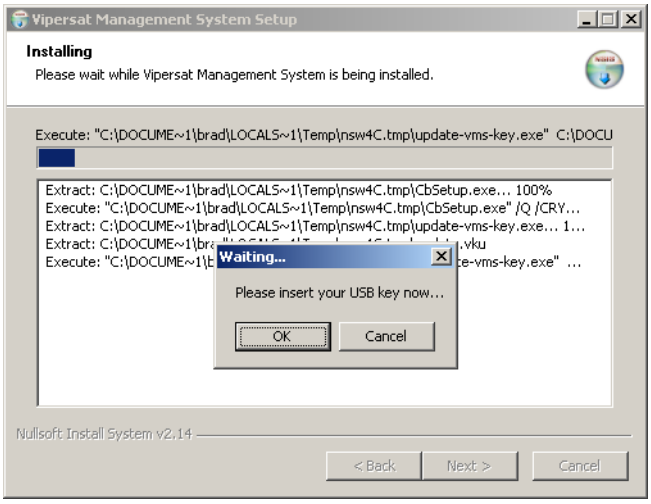


Figure 2-20 Install Cypto-Box Key prompt

17. The Found New Hardware Wizard will start.

Select the **No, not this time** radio button, then click **Next** to continue.

Figure 2-21 Found New Hardware Wizard

18. On the Hardware Installation notice shown in figure 2-22, click the **Continue Anyway** button to continue.

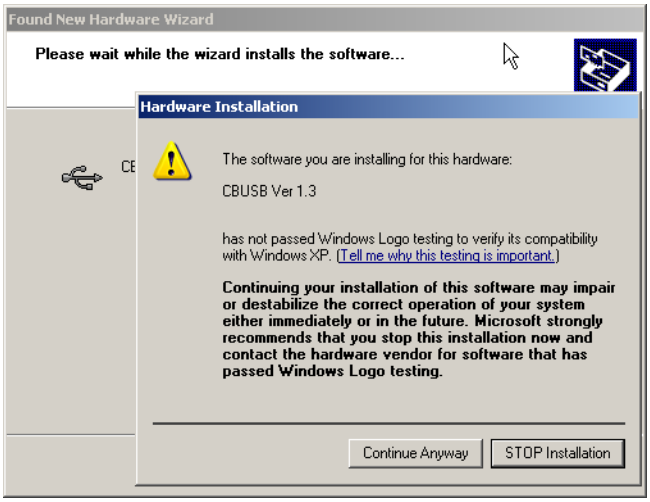


Figure 2-22 Hardware Installation

19. The installation process will continue and, when completed, the screen shown in figure 2-23 will be displayed. Click the **Finish** button to exit.

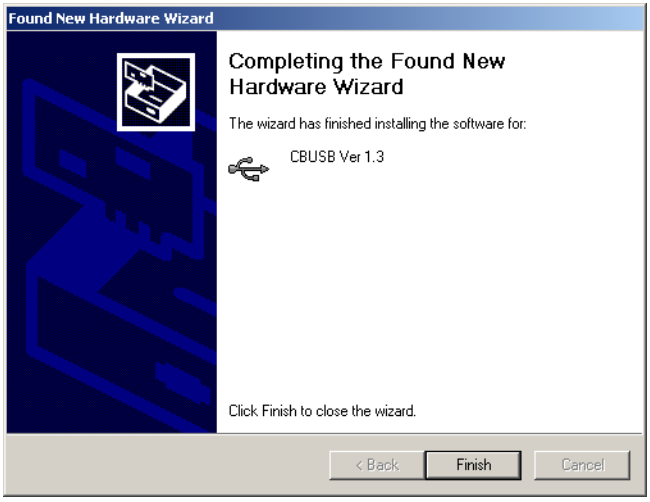


Figure 2-23 Hardware Installation Completed screen

20. Click the **OK** button in the **Waiting** dialog shown in figure 2-20 to complete the installation and updating of the Crypto-Box Key.

21. After installing and/or updating the key, the installation will complete as shown in figure 2-24. Click the **Next** and then the **Finish** button to exit the installation wizard.

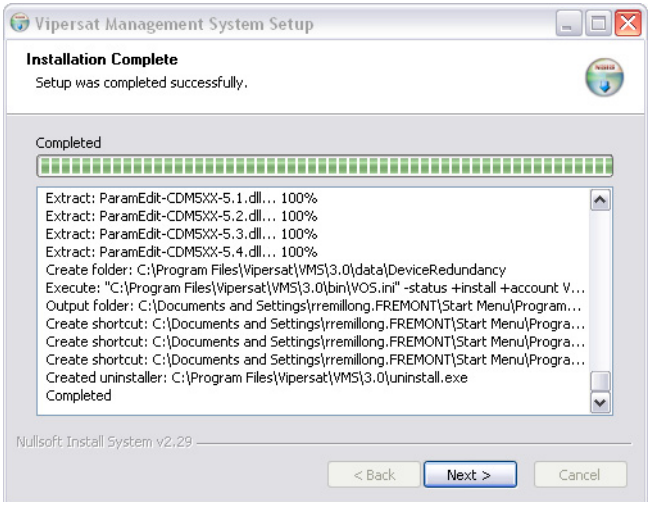


Figure 2-24 Installation Complete dialog

NOTE

Note: If this is a standalone on a workgroup server, or an upgrade installation, move on to the section “Verifying Successful Server Installation” on page 2-27.

If this is an installation on a new or completely rebuilt Domain Controller, continue with the following section, “Setting Com Security for VMS”.

Setting Com Security for VMS

1. From the Windows **Start** menu, select **Settings** and open up the **Control Panel**, as shown in figure 2-25 below.

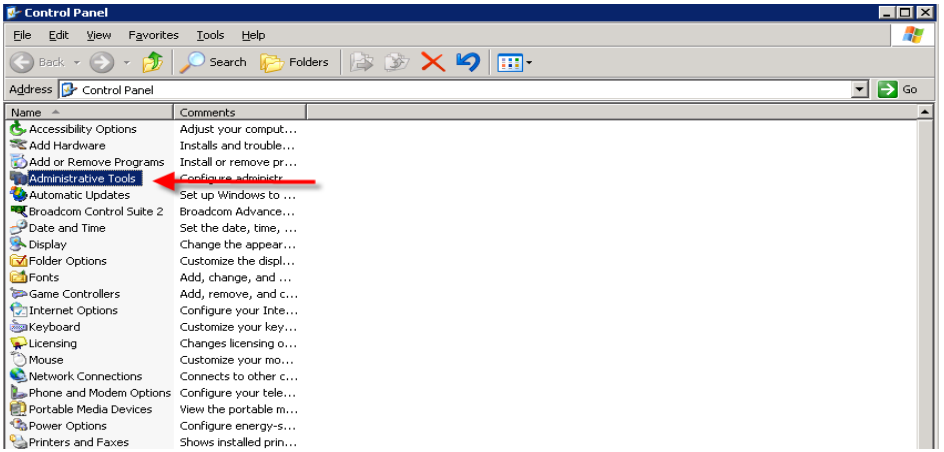


Figure 2-25 Control Panel

2. Select **Administrative Tools** and then **Component Services**, as shown in figure 2-26.

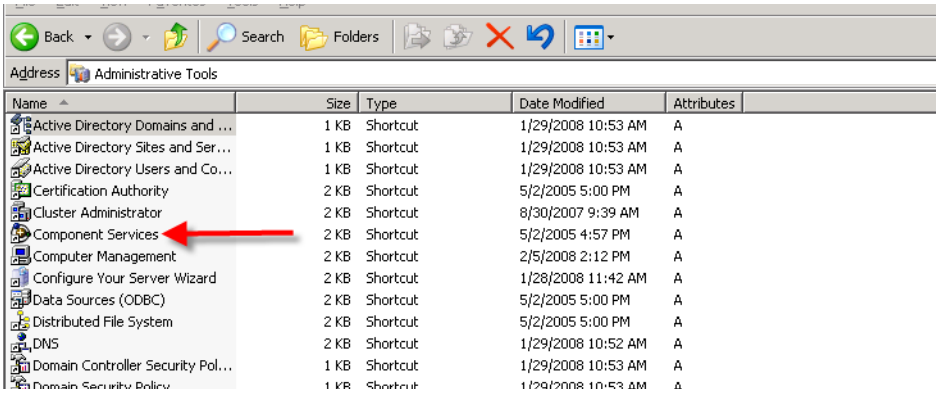


Figure 2-26 Administrative Tools

3. Expand the Component Services tree until “My Computer” appears, and select **Properties**, as shown in figure 2-27.

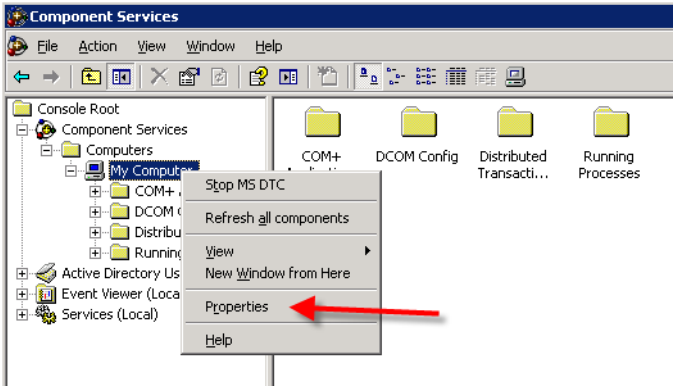


Figure 2-27 Component Services, My Computer Menu

4. Select the **COM Security** tab, then the **Edit Limits** button under *Launch and Activation Permissions*, as shown below in figure 2-28.

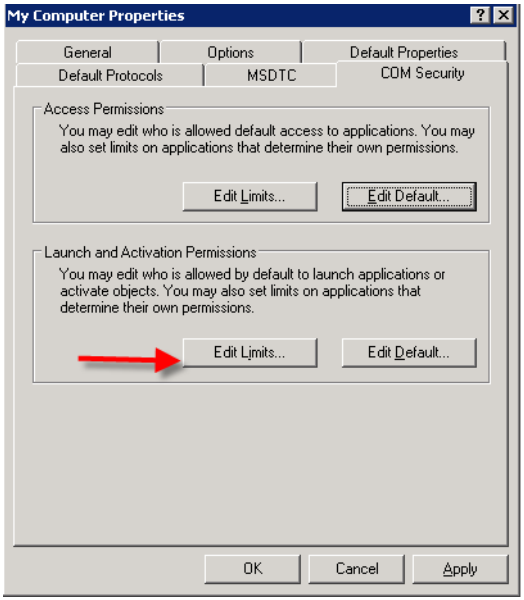


Figure 2-28 Com Security, Edit Limits

5. In the Launch Permissions window, select **Add** as shown in figure 2-29.

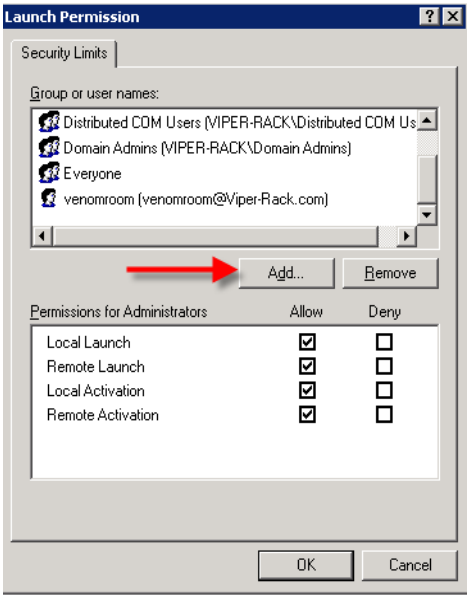


Figure 2-29 Launch Permissions

6. Ensure the Location is the domain, then type "VMS" in the object box and select **Check Names**. If the location was correct you should see the result shown in figure 2-30.

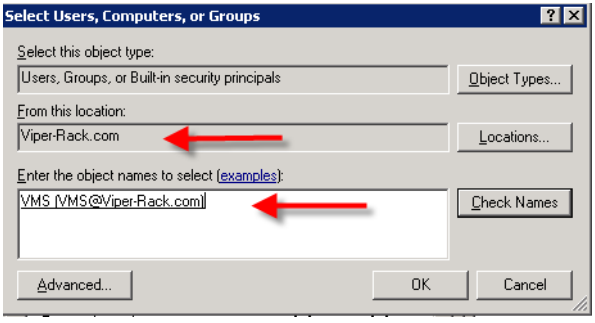


Figure 2-30 Select Users

7. Click on **OK**. This will return you to the Launch Permissions window with the new user highlighted. Check **Allow** on any boxes that are blank as shown in figure 2-31, then click the **OK** button.

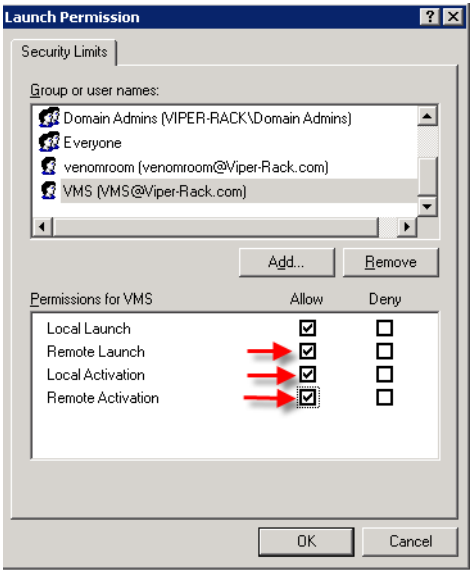


Figure 2-31 Launch Permissions with New User

This concludes setting the Component Securities on the Domain Controller.

Verifying Successful Server Installation

1. Open the Services window on the server by selecting **Services** from the **Start>Administrative Tools** menu.

Figure 2-32 Services, Administrative Tools menu

2. Select **Vipersat Management System** from the Services list as shown in figure 2-33, then click on **Start** the service.

   This will start the VOS (Vipersat Operating System).

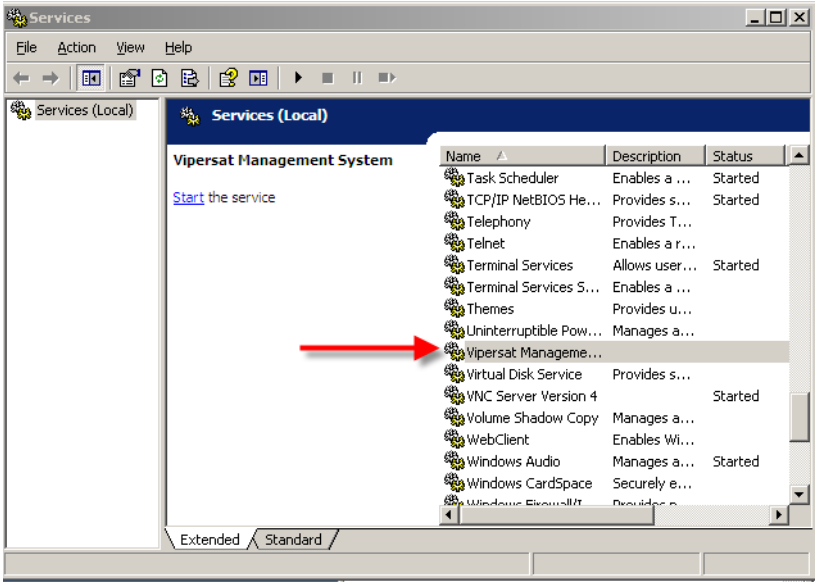


Figure 2-33 Vipersat Management System Service

3. From the Program File directory, find **VMS 3.x** and click the **Connection Manager**. Accept "localhost" and click on the **OK** button in the **Connect To** dialog. The **Viperview** window will appear, as shown in figure 2-34.

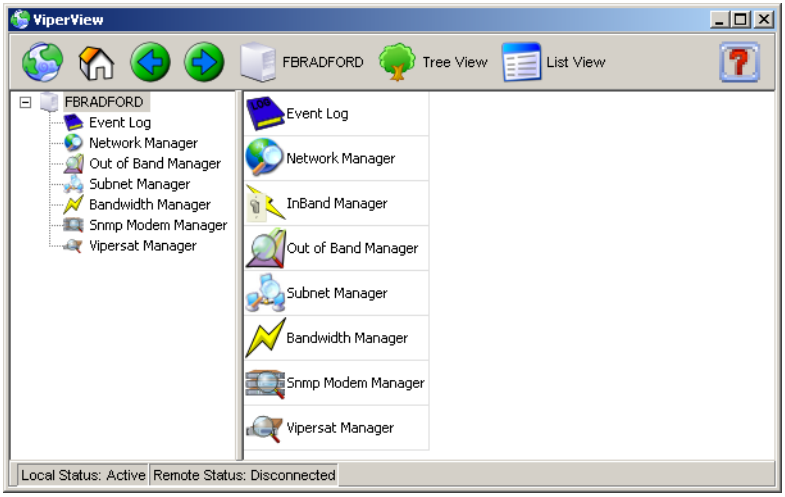


Figure 2-34 Successful Installation, ViperView

This completes the VMS server installation procedure.

- For *VMS Standalone Server configurations*, proceed to Chapter 3, “VMS Configuration”, to configure the VMS database for the satellite network.

  Note: If this is an upgrade, the network database will already exist and configuration is not required.

- For *VMS Redundancy Server configurations*, proceed to Appendix C, “Redundancy”, for instructions on configuring redundant servers.

VMS Client Installation

The Vipersat Management System client software should be installed on a high-performance, industry-standard workstation computer running Microsoft Windows XP Professional with SP2. For specifications for the minimum recommended VMS platform configuration, please refer to the *VMS Release Notes* for the version of software that will be installed.

NOTE

Note: To view the Global Map application, it is necessary to have a video graphics card that supports a minimum of 256 MB of video memory and supports Pixel Shader Model 2.0 - 3.0 (reference NVIDIA™ Graphics Card family, 7000 series or equivalent).

Dual monitors are recommended for greater viewing of multiple windows.

The VMS client software is installed using the same installation disk used for server installation. The Installation Wizard will prompt the user for Full Install, Server Install, or Client Install. Selection of the Client will only install the necessary files without prompting for USB key and password. This type of installation only installs the Client component, and is used to install the VMS client on a workstation that will be used to connect remotely to servers on the same LAN that are running the VMS. This installation type does not require a USB key to operate VMS.

NOTE

Note: The installation does not require the USB Key as there are no services running on the client workstation. This machine will require network connections and proper security configurations to connect to the active VMS sever.

NOTE

Note: The install must be done from an account with Administrator Privileges.

For VMS Client installation, follow the same procedure used for Server installation provided in the section “VMS Server Installation” on page 2-14. In step 4., select the radial button **Client Install**, as shown below in figure 2-35.

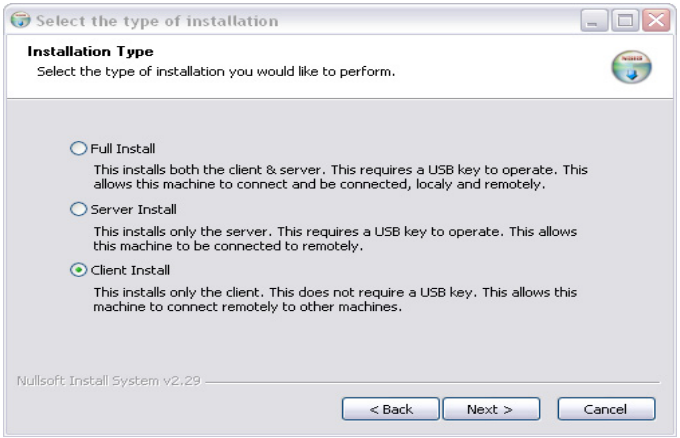


Figure 2-35 Client Install

Once the installation wizard is finished, return to continue with the following section.

Creating Client Accounts

It is necessary to configure the appropriate security settings for the Client workstation to gain network access privileges to the VMS server.

If this is a client for a *standalone VMS*, an account must be created on the VMS server for the client to log into. The VMS account must also be added to the Client machine.

If this is a client for a *redundant VMS*, perform the following steps to create an account on the Primary VMS Domain Controller and set COM Security.

1. Open up Adminsitrative Tools and select **Active Directory Users and Computers**, as shown in figure 2-36 below.

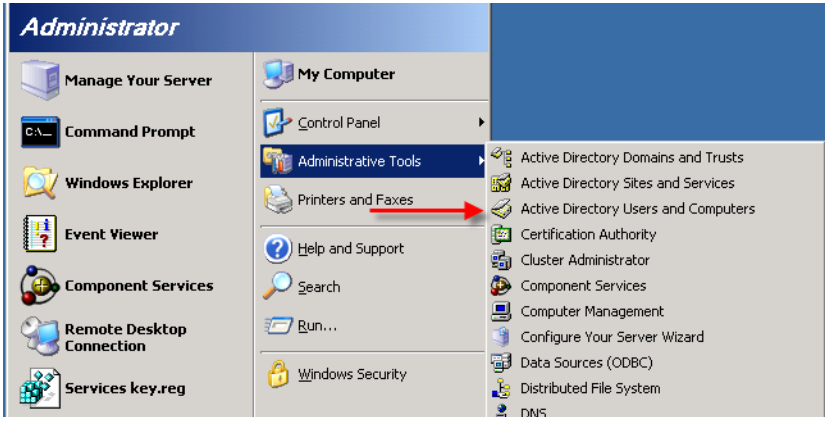


Figure 2-36 Admistrative Tools menu

2. Expand the Domain name tree, right-click on **Users** and select **New Group** from the drop-down menu, as shown below in figure 2-37.

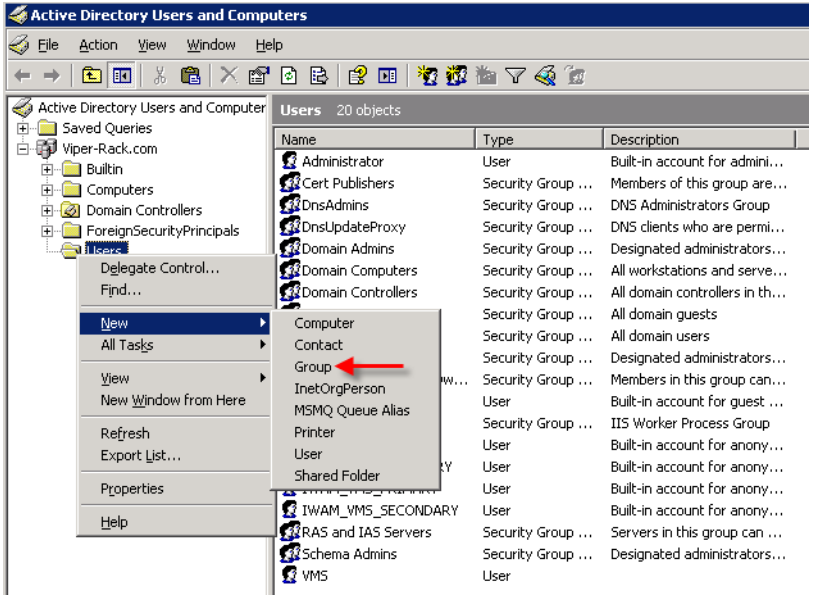


Figure 2-37 Create Group

3. The New Object–Group dialog will open. Under *Group Name*, enter **VMS Users** and ensure that the *Group Scope* and *Group Type* are set as shown in figure 2-38.

Click on the **OK** button to close the dialog.

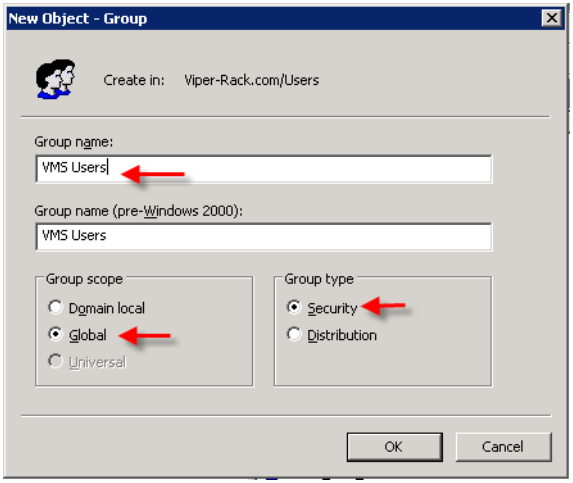


Figure 2-38 Create Group Dialog

4. Right-click on **Users** again in the Active Directory window and select **New User**. The New Object–User dialog will open (figure 2-39). The user name can be anything desired and will be used to log onto the server from the client machine.

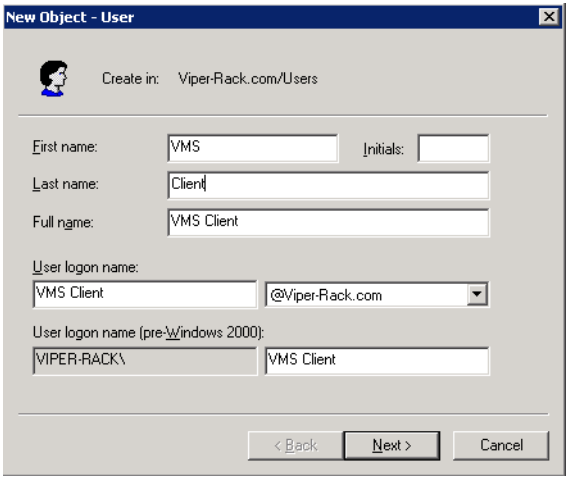


Figure 2-39 Create User Dialog

5. Click **Next** and the User Password dialog will open, as shown in figure 2-40. Create and confirm a password and set the properties as indicated.

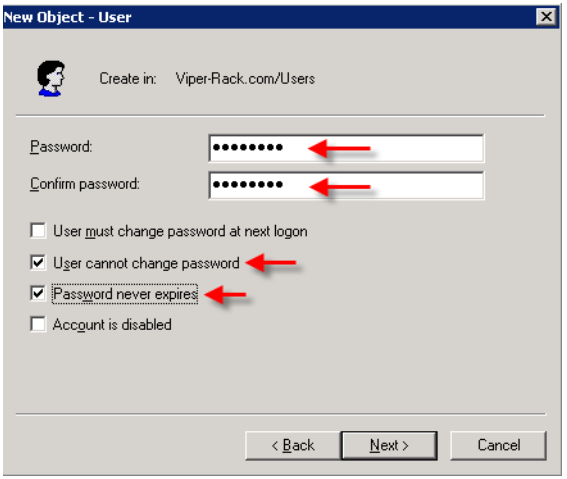


Figure 2-40 Setting the User Password

6. Move the new user to the VMS users group. Do this by right-clicking on the user that was just created and opening the **Client Properties** page shown below in figure 2-41. Open the **Member Of** tab.

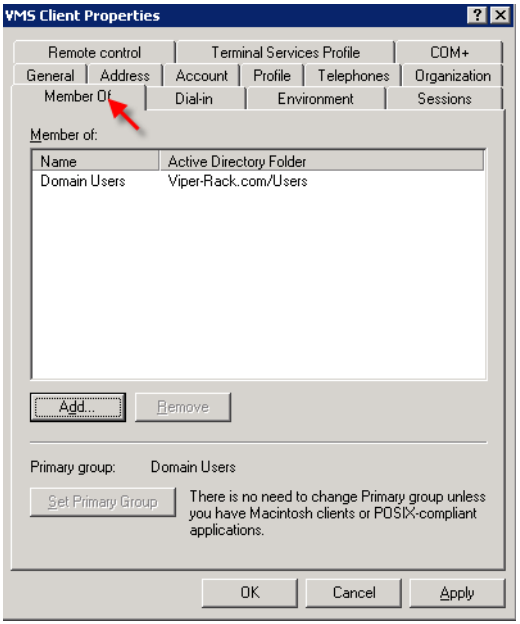


Figure 2-41 Client Properties

7. Click the **Add** button. The Select Group dialog will open, as shown in figure 2-42. Ensure that the location is the domain, then enter **VMS Users** as the object name and click **Check Names** to verify.

Click **OK** to close the dialog.

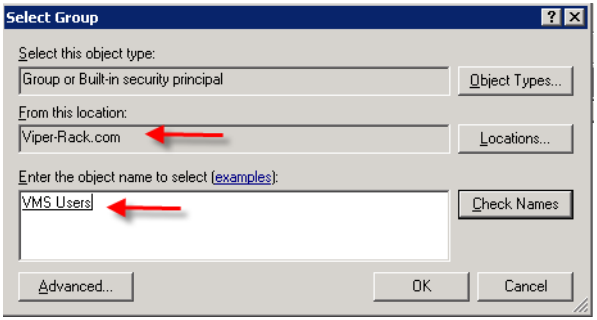


Figure 2-42 Select Group Dialog

8. Close the Active Directory window.

9. Open up Adminsitrative Tools and select **Component Services** to open the Component Services window, as shown below in figure 2-43.

10. Expand the Component Services tree and right-click on **My Computer**, then select **Properties** from the drop-down menu.

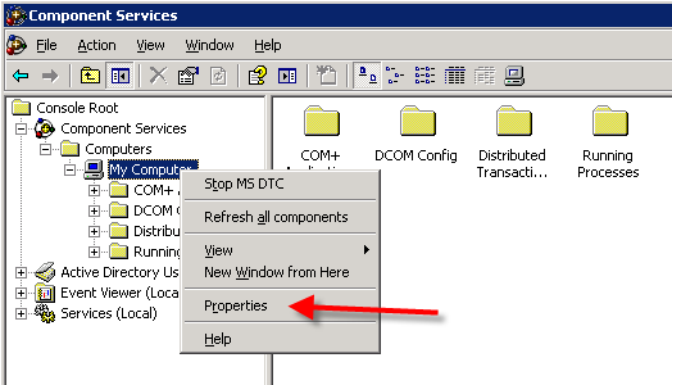


Figure 2-43 My Computer Properties

11. In the My Computer Properties window, open the **COM Security** tab as shown in figure 2-44. Under *Launch and Activation Permissions*, click on the **Edit Limits** button.

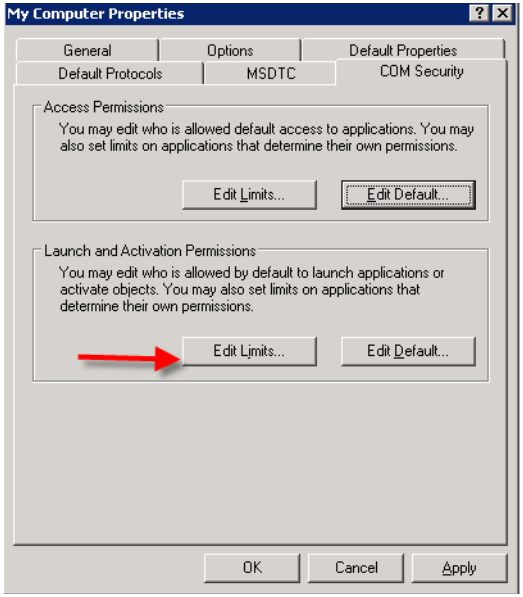


Figure 2-44 Edit Limits

12. From the Launch Permission dialog, click on the **Add** button.

- Enter **VMS Users** in the Select Users, Computers, or Groups dialog to add the group to the launch permissions.
- Check all of the **Allow** boxes for VMS Users, as shown in figure 2-45.

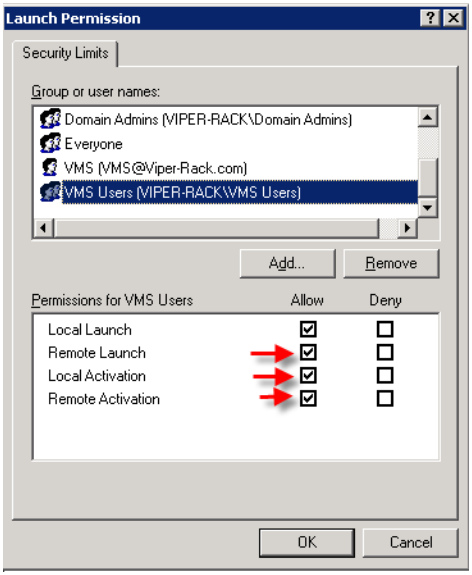


Figure 2-45 Launch Permissions

13. Click on the **OK** button to launch the selected permissions and close the dialog.

Verifying Successful Client Installation

After installation, verify that the VMS Client installation was successful by running the program. The VMS Server must be running VOS.

1. From the Program File directory, find VMS 3.x and click the **Connection Manager**.

2. At the connection prompt in the **Connect** dialog, enter the IP address of the VMS Server and click on the **OK** button (figure 2-46).

Figure 2-46 Connect dialog

3. The **ViperView** window will appear, as shown in figure 2-47.

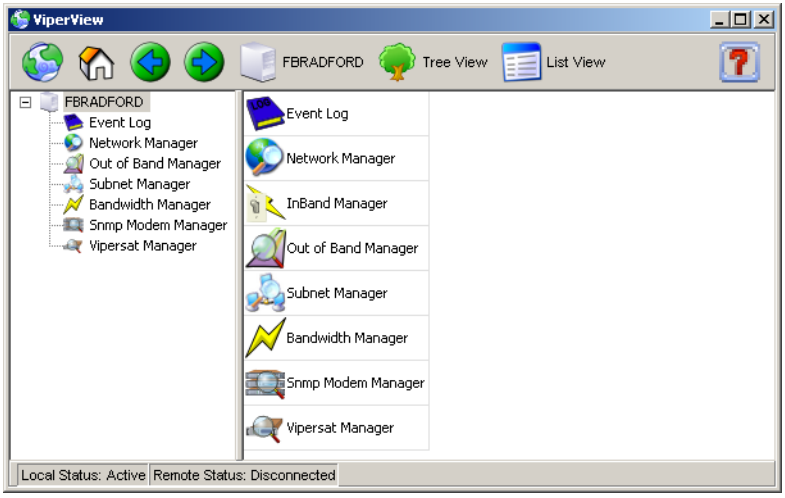


Figure 2-47 ViperView window, VMS Client

ViperGlobe Install

ViperGlobe is a small separate installation and is installed only on a VMS Client workstation that has the necessary supporting video graphic hardware. Located on the VMS install disk, **VMS 3.6.x.xxx Globe View Setup** will install in the same directory as the VMS Client.

Double-click on the Setup file to install the application.

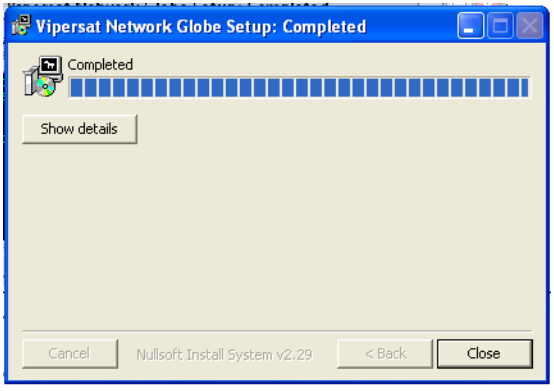


Figure 2-48 Vipersat Network Globe Setup

Verifying ViperGlobe Installation

After installation, and with all Client connections established to the VMS server, launch ViperGlobe:

1. From the Program File directory, find **VMS 3.x** and click the **Vipersat Network Globe** shortcut.

2. At the connection prompt, enter the IP address of the Active VMS server and click on the **OK** button in the **Connect To** dialog.

3. The **Vipersat Map View** window will appear, as shown in figure 2-49.

   Note that this Vipersat Map View example shows an existing Vipersat network that has already been configured.

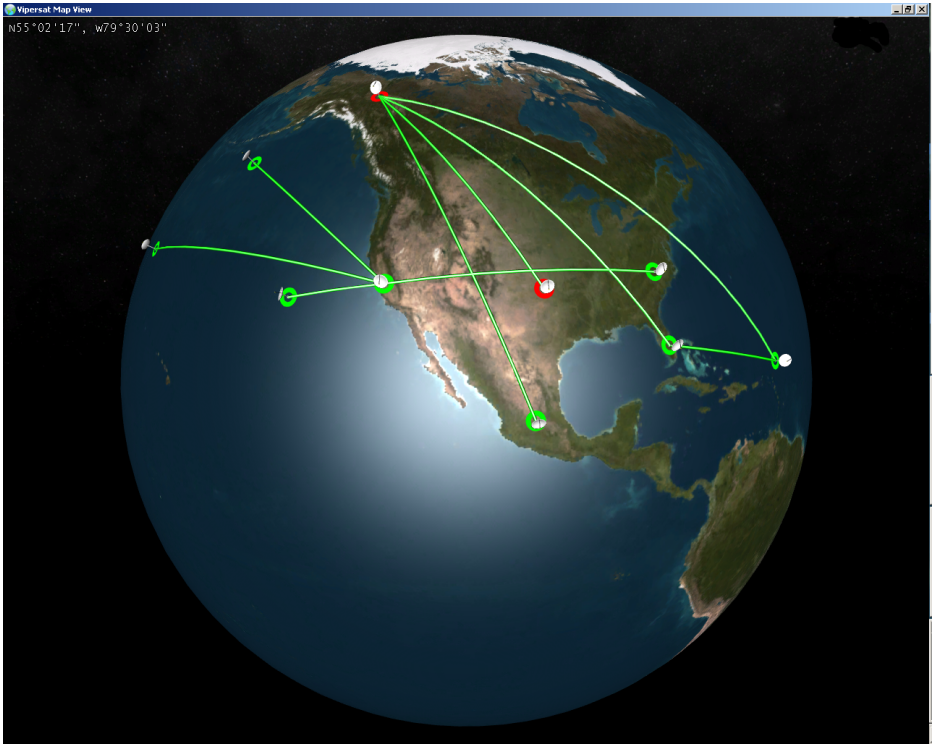


Figure 2-49 Vipersat Map View window

VNO Install

VNO Overview

Comtech EF Data - Vipersat Network Products Group VNO solution provides an interface into a defined subset of the actual network managed by VMS. This is exposed as a Web Services SOAP interface provided by the VNO-WS.exe service. The VNO web service supports both non-redundant stand-alone and redundant VMS deployments.

With redundant VMS servers, figure 2-50 depicts the VNO-WS.exe installed on a separate Windows workstation running the same service providing active awareness between the VMS Servers. It is recommended that this separate workstation be the same workstation running ViperView (Client PC workstation).

The VNO-WS service accepts requests from the VNO Web application running on an IIS server. Requests and responses transmitted between the web application on the IIS server and VNO-WS web service uses SOAP over HTTP protocol. The SOAP request is translated into an RPC call into VOS and the response is returned to the web application, which usually transforms into HTML and sends the HTML back to a web browser where a VNO user interface is presented to the VNO user.

The Viperview client communicates directly with VOS using DCOM/RPC protocols. Viperview is used by the Central Network Operator for administrative functions, such as creating VNO networks, and other resources in the network. Refer to the *VNO User Guide* for details.

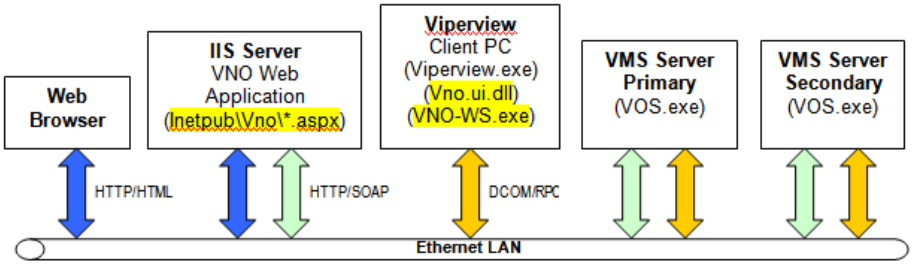


Figure 2-50 VNO Deployment with Redundant VMS Servers

Installation Procedure

The VNO installation process consists of installing software, highlighted in yellow sections in figure 2-50, on the IIS Server and the Client PC. Although the VNO_WS Server can run on the VMS server, it is recommended that it be installed only on the client PC running Viperview.

1. If running, terminate the Viperview.exe and VConMgr.exe applications on the server. Use the Task Manager to end the applications and processes.

2. Execute the VMS 3.6.x.xxx SOAP Proxy setup.exe application. This will install VNO-WS.exe and VNO.ui.dll in the default Vipersat\VMS\3.0\bin directory.

3. As shown in figure 2-51, the Installer will present a dialog requesting VNO configuration parameters.

   - **VNO Host IP**

     This parameter is the IP address for the network interface that the VNO web service will use for TCP/IP communications with VNO client applications. A value of 0.0.0.0 will use all network interfaces on the server. This is the recommended setting unless a specific network interface is required.

   - **VNO Host Port**

     This parameter specifies the TCP port used by VNO-WS. The default port is decimal 8080. Any available port can be specified provided that the client applications send their request to this port.

   - **Basic User Authentication**

     This check box indicates whether the Basic User Authentication is enabled or not. If enabled, each client request contains a user name and password in the HTTP header. The VNO.admin.exe utility is used to configure the user database and privilege levels. This utility is located in the VMS-installed directory Vipersat\VMS\3.0\bin.

   - **VMS Server IP**

     This parameter specifies the IP address(es) of the VMS server(s). In a standalone VMS configuration, enter the one VMS server IP addresses. In a redundant VMS configuration, up to nine addresses can be entered (e.g., for all VMS servers in the same redundancy group).

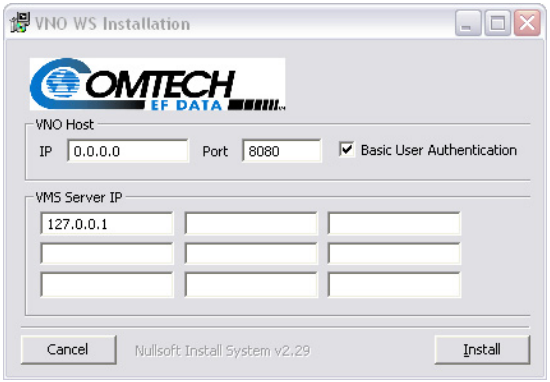


Figure 2-51 VNO-WS Installer

4. Refresh the Service Control Manager and verify that the VMS VNO WS services entry is displayed in the list of services.

5. Start the VMS VNO service. A single beep will indicate that the service started. Verify that the status has changed to *Running*. The vno-ws-log.txt log file in the Vipersat\VMS\3.0\Data directory will also show if the service started.

CHAPTER

3

VMS CONFIGURATION

General

Note: For a *Redundant VMS Server* configuration, perform the VMS configuration procedure on the **Active** server only. When completed, perform a server synchronization to synchronize the server databases.

Before proceeding with configuring the network using VMS, the following network information should be available, for reference.

- A list of all equipment used in the network, broken down by site.
- A schematic or other documentation of the network's topology.
- A Physical site map where each piece of equipment is located.
- IP addresses assigned to all network hardware.
- Documentation assigning IP address numbers and subnet masks to each site in the network, the multicast address(s) to be used, and the IP address of the VMS server's connection to the network.
- The functions each piece of equipment is to perform in the network (Hub, Remote, Expansion unit, etc.) and the equipment type (CDM-570/570L, CDD-564/564L, CDM-600L, SLM-5650A, ROSS, etc.).
- All frequencies and frequency allocations to be used by each site and each piece of equipment, and available pool frequencies.
- Types of traffic expected to be handled by each site and corresponding bandwidth allocations to accommodate the expected traffic volume and type.

- A list of the VMS licensing options that have been purchased. Details can be found on the Purchase Order, or a Vipersat representative can provide detailed information on licensing options and pricing for the VMS-managed network.
- A list of network modem equipment and the FAST features associated with each. This information can be obtained either via Telnet from the Main>Administration>Feature Configuration screen, or with Vload and the use of the Parameter Editor (Features tab).

The following sections describe configuring the VMS to the network topology, traffic type, and bandwidth requirements for the network. This information can then be compared to the physical network configuration displayed by the VMS, once it has completed its network analysis and displays the results, as shown in the sample network in figure 3-1.

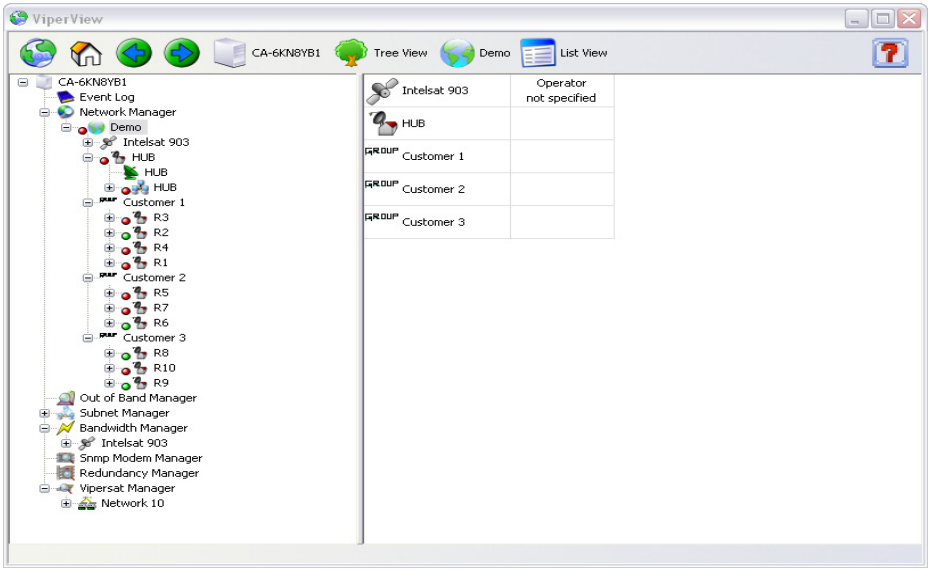


Figure 3-1 Sample Network Configuration

By comparing the planned network configuration with the actual network configuration, any missing nodes or potential trouble spots can be quickly identified. The tools described in this chapter can then be used to modify and optimize the network's configuration and operation.

NOTE

Note: An Out-of-Band network is displayed in the same manner as other elements in the network.

Hardware Configuration

NOTE

Note: For VMS compatibility, see the product *Release Notes* for specific versions of each modem supported.

Once all of the needed information is obtained, configuration can begin. Before making the physical installation of hardware into a network, each modem/router must be pre-configured using either Telnet (CLI) or HTTP. Refer to the modem/router's documentation for details.

Comtech EF Data ships all modem/routers with FAST Codes pre-configured. The modem/routers are always configured at the factory as type Remote, with the Default Gateway pointed toward the Satellite, and with STDMA disabled.

At this point, VMS cannot discover the node. The operator can either use Telnet (CLI) or HTTP to set up these parameters as shown in the example CDM-570/570L CLI interface shown in figure 3-2, or flash a configuration file using VLoad.

As a minimum, the following items in the modem/router will have to be configured before it will be able to communicate with the VMS following installation in the network:

- Network ID
- Receive Multicast Address
- Managing IP address is set through reception of VMS announcement multicast message that is sent continuously on timed intervals.

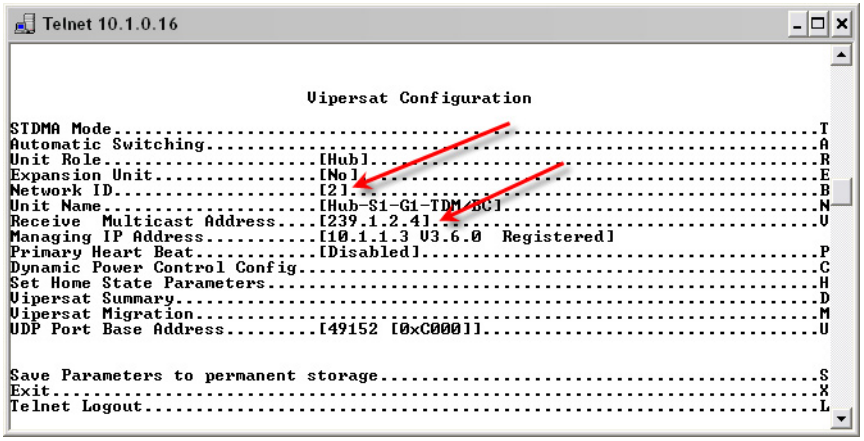


Figure 3-2 CDM-570/570L Telnet Vipersat Configuration

Once the modem/routers have the minumum required configuration and an installer successfully points the antenna at the satellite and establishes a receive link, the operator at the Hub site can push frequencies, bit rates, and FEC code rates to the units at remote sites using the VMS. The frequencies can be anywhere in the customer's frequency pool, allowing a thin-route SCPC connection to be established with the satellite network's modems.

For example, once communication is established, the Hub operator can set up the unit for STDMA using the instructions found in each modem manual. After a reset, the unit will come back online operating in STDMA mode with the desired configuration.

Once communication is established between VMS and all network devices, the network is ready to be configured.

VMS Network Configuration

This procedure assumes that the user is experienced with the VMS or has attended the System Operator training course, and gives summary instructions for configuring an installed VMS. If difficulties are experienced during configuration, contact Comtech EF Data's Vipersat CTAC for assistance.

Once VMS is installed and started up, the VMS immediately starts gathering and storing information from the units which make up the network.

Tip: Watch the devices as they are discovered by the VMS, as viewed in the ViperView window. Be certain that all of the known units in the network have been discovered before proceeding. It is suggested that, once it has been verified that all known devices are present in the VMS database, a VMS backup be performed.Then, in the event that difficulties are encountered, the database can be restored to this point.

VMS Initial Setup Procedure

This procedure must be executed in the following order to insure proper setup and configuration. After file installation and network hardware is in place and operational, you can assume that most of the equipment is communicating with the network management system. That is, the VMS has IP access to each unit either through a LAN or satellite connection.

Configure Server Connection

Start the Vipersat Management System service on the VMS Server and open the Connection Manager on the VMS Client.

1. On the VMS Server, select **Vipersat Management System** from Windows Services and **Start** the service, if it is not already running.

   Starting the service is described in Chapter 2, *VMS Installation*, in the section "Verifying Successful Server Installation" on page 2-27.

   Note: It is recommended that this service be configured for **Automatic** Startup.

2. On the VMS Client, open the **Connection Manager**, using either the Desktop shortcut, or from the path Start > Programs > VMS > Connection Manager.

   Although the Connection Manager can be opened on the VMS Server, it is **NOT RECOMMENDED** to run ViperView on the same machine as the VOS.

3. The Connection Manager will prompt for the server with which to connect (figure 3-3). Enter the **IP address** of the active VMS Server and click the **OK** button.

Figure 3-3 Connect dialog

The ViperView window will open.

Activate the Server Processes

In ViperView, right-click on the Server icon on the top menu bar and select **Activate** from the drop-down menu (figure 3-4) to manually initialize the VMS server processes.

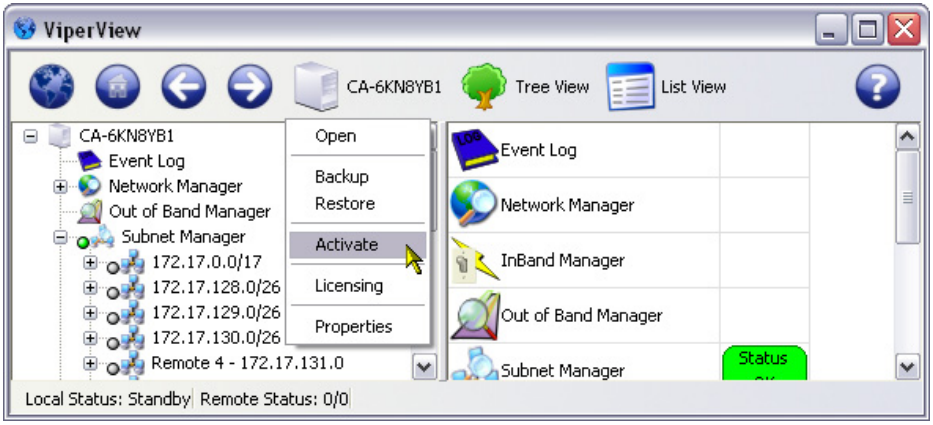


Figure 3-4 Server Processes, Manual Activation

The windows task bar will pop-up a text bubble indicating activation.

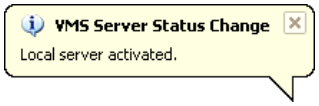


Figure 3-5 Activated Server Notification

Configure Auto Activate

1. Right-click on the Server icon and select **Properties** from the drop-down menu.

2. In the **General** tab, check the box for **Auto Activate** as shown in figure 3-6. This will automatically activate the server processes the next time the VOS service is started.

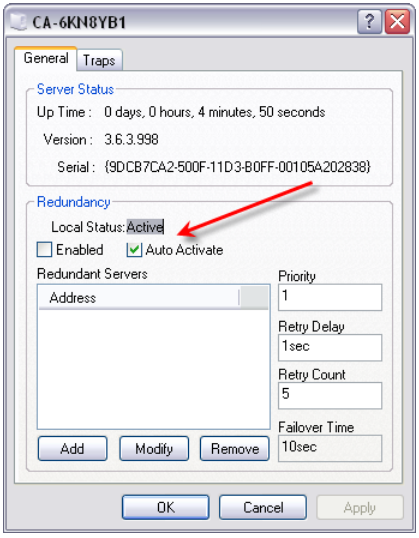


Figure 3-6 Server Properties, Auto Activate

Configure Addresses and Assign ID

1. Right click on **Vipersat Manager** from the ViperView tree view list and select **Properties**. The Vipersat Manager window will open.

2. Select the **General** tab shown in figure 3-7, and make sure that the **Management Multicast Address** of the VMS matches the Receive Multicast Address for each modem in the network that is controlled by this VMS. This address is used to propagate managing multi-command messages from the VMS to all receiving IP network modems.

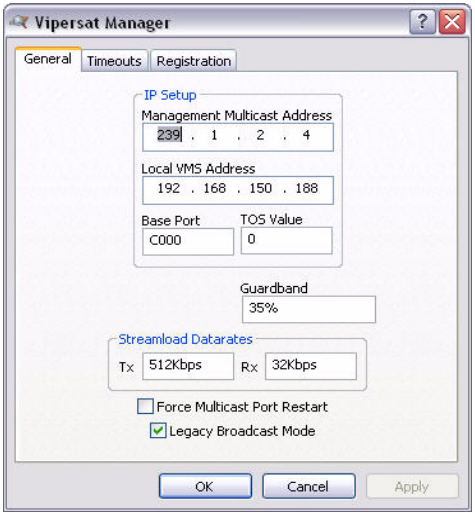


Figure 3-7 Vipersat Manager, General tab

3. The **Local VMS Address** will default to 0.0.0.0 on new installations and must be changed to reflect the IP address of the NIC that connects the VMS server to the Vipersat Hub LAN. This address configuration is necessary because of multiple LAN ports on the server.

4. The **Base Port** sets the starting IP port addressing for all VMS messages. Changing this address base will affect the entire network requiring configuration changes to all modems. Leave this setting at default **C000** to avoid unnecessary configuration changes. This setting is ONLY necessary if network port addressing is in contention.

5. The **TOS** (Type Of Service) **Value** provides prioritization of VMS messages in cases where the forwarding router is congested or overloaded. The value typically is set to Class Selector 6 or “192” for priority queuing to allow management/singling messages the highest passage level.

6. The **Guardband** is the center carrier-to-carrier frequency slot allocation setting. The default setting of 35% will place carriers within the bandwidth pools at 1.35 times the carrier symbol rate. Contact your satellite service provider for proper setting of carrier spacing.

7. The **Streamload Data Rate** values determine the amount of bandwidth required to GET and PUT modem configuration files. Set the rates not to exceeded the network transmission bandwidths, forward and return channel rates. These values are typically set low as the file transferred is small and requires little overhead. Default settings are usually acceptable.

8. The **Force Multicast Port Restart** check box provides the option to reset the port used by the VMS server for multicast transmissions. This action is recommended whenever the Local VMS Address or base port setting is changed, especially for servers that have multiple NICs.

Activate the check box, then click on the **Apply** button to execute the restart.

9. The **Legacy Broadcast Mode** check box provides support for the previous method of sending the active management IP address message using an acknowledged multi-command packet. This message updates the **Managing IP Address** field in all listening modems set to receive the management multicast message. The message interval is defaulted to send an update every 15 seconds. *See Timeouts tab for timer interval setting.*

If all modems are running CDM-570/570L, CDD-564/564L–v1.5.4, SLM-5650A–v1.3.2 or greater, uncheck this box to use the unsolicited message type.

10. Select the **Timeouts** tab shown in figure 3-8. The default timer settings are adjustable to accomodate communications that require additional time because of network congestion.

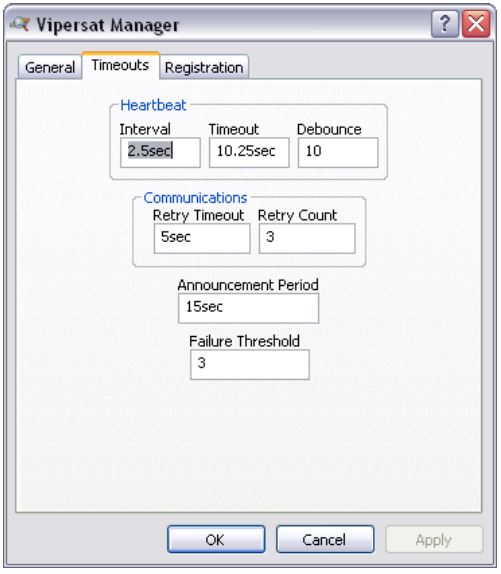


Figure 3-8 Vipersat Manager, Timeouts tab

11. The **Heartbeat** timer values sets the Interval, Timeout and Debounce of hub device redundancy messaging. The **Interval** of 2.5 seconds updates the modem to send it's heartbeat message to the VMS at set rate. The **Timeout**

is how long the VMS will wait before determining communications failure commanding a device redundancy switchover. The **Debounce** is a message count on how long the VMS will receive messages sent from the modem with alarm information set. This value is important to reduce the possible spurious alarm redundancy triggers.

12. The **Communications** timer values set timeouts for command messages. The **Retry Timeout** is the wait between messages which works in conjunction with **Retry Count**. The default setting with a count of 3 and a timeout of 5 seconds would set the message failure at a total timeout of 15 seconds with 3 attempts to command the modem.

If communication latencies are greater than default settings (command communication failures), increase the **Retry Timeout** value.

13. The **Announcement Period** is a the interval at which VMS will multicast its management IP address to all listening modems within the network. This ensures, for example, that remotes that are not online during a redundancy switch will pick up the new managing address when they come back online.

The default value (15 sec) enables the VMS to send the update message on a 15 second interval to establish the current managing address in all modems set to receive the message.

14. The **Failure Threshold** parameter specifies the number of consecutive attempts that the VMS will make for a single remote unit to switch using an available demodulator before that demodulator is made unavailable.

15. Select the **Registration** tab shown in figure 3-9 and click the **Add** button to add the **Network ID** number (any number between 1 – 255) that will identify this network. This number must match the Network ID established in the modems for this network.

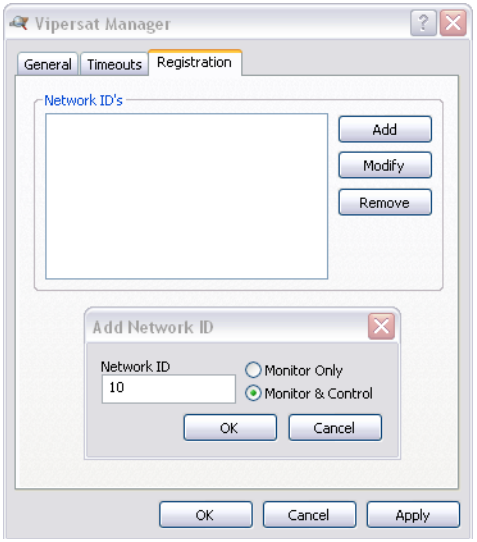


Figure 3-9 Vipersat Manager, Registration tab

16. Select the **Monitor & Control** radio button if this network is to be managed by this VMS, otherwise select **Monitor Only**.

17. Click the **OK** button to save these settings for the Vipersat Manager Properties.

VMS Network Build Procedure

Subnet Manager Configuration

Most of the work here will be done by VMS. The operator needs to verify that each subnet has all of the expected elements populated in the subnet.

Once all the management addresses are correct and communicating, the Subnet Manager will start to populate with VMS controlled modem IP subnets. If some or all units are not populating, the managing VMS address (configured in each VMS controlled modem during the automatic registration) may not correct.

After the subnet list population is complete, the VMS stores all listed subnets, any reference to nodes within each subnet, and in-band configurations in the VMS database.

NOTE

Note: All VMS controlled modems that have IP communications with the VMS will have their subnet address added to the VMS database.

Setting the Alarm Masks

Network alarms must be set to insure an alarm alerts the operator to an actual problem. If there are spurious alarms, or alarms which have no operational meaning the operator will become desensitized and critical network failures can be missed. This section addresses masking alarms that represent normal network conditions. VMS allows the masking of these nuisance alarms. Do not skip this step if you want your operators to manage the network pro-actively and respond quickly to alarms.

In a Vipersat network, there are burst controllers that are locking and unlocking multiple times per second, and expansion units whose normal parked or quiescent state is to be unlocked. Perform the following procedure for all network units that function as either a Burst Controller or an Expansion unit.

Note: On SLM-5650A modems, masking is pre-configured when set to Hub and Selective TDMA is enabled.

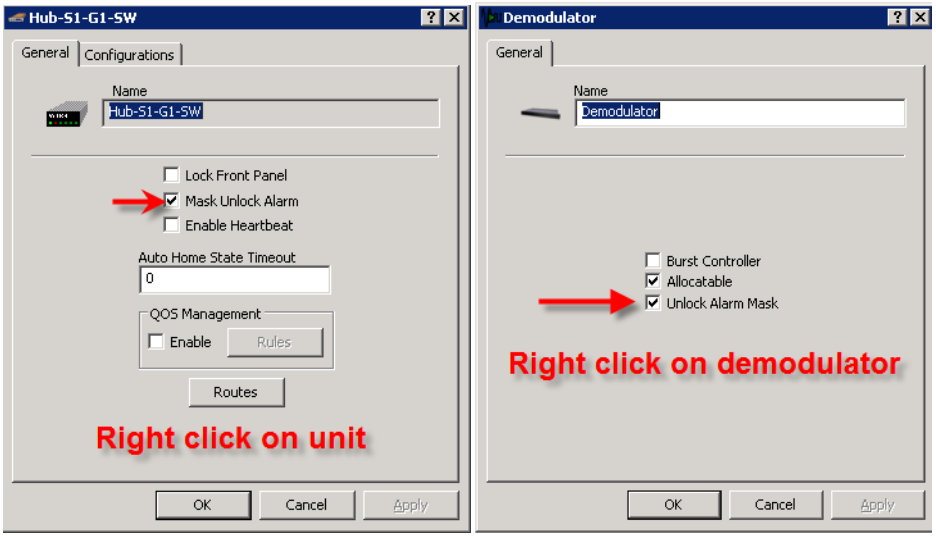
1. From the *Tree View*, select the unit and open the Properties window as shown in figure 3-10.

   For CDM-570/570L and CDD-56X units, right-click on the unit icon and select **Properties** from the drop-down menu.

   For SLM-5650A units, right-click on the demodulator icon and select **Properties** from the drop-down menu.

2. Select **Mask Unlock Alarm**, then click on **OK**.

3. Right-click on the unit's icon again and select **Force Registration** to activate the flag.



CDM-570/570L, CDD-56X **SLM-5650A**

Figure 3-10 Mask Unlock Alarm setting

Enabling Auto Home State

A critical feature of Vipersat Networks is the modem Home State. Since the topology of the network is changing on the fly, it is necessary to ensure that remote units will recover from a communications outage in a known state. If a remote loses power, its home state parameters will cause it to boot up into its burst configuration, awaiting maps from the hub. Knowing this, the VMS can free up assets (switched demodulators and bandwidth) if it loses communications with a remote for a settable period of time. This is the Auto Home State concept.

The recovery cycle is automatic once the operator sets the Auto Home State parameter in the remote unit.

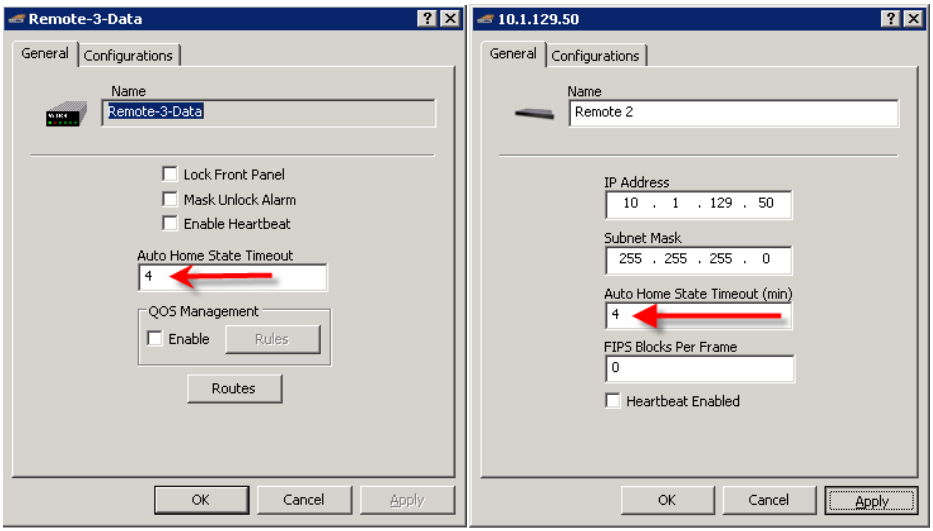
1. From the VMS Tree View, right-click on each remote data unit (*not expansion units and never any hub units*) and open the **Properties** window(figure 3-11).

2. Enter a time in minutes for the **Auto Home State** to take effect, then click **OK**.

Caution: A Timeout of no less than 4 minutes is recommended; warning values less than 4 minutes will create undesirable recovery effects.

3. Right-click on the unit icon again and select **Force Registration**.

   This will force the parameter set in the modem. VMS will then set the parameter every time it registers the unit.



CDM-570/570L **SLM-5650A**

Figure 3-11 Auto Home State Timeout setting

Bandwidth Manager Configuration

Create Satellite(s)

The first step is to create the satellite for the network with the appropriate operating frequency information.

1. Right-click on the Bandwidth Manager and select **Create Satellite** from the drop-down menu (figure 3-12).

2. Enter the satellite **Name** and the **Center** and **Translation Frequency** settings in the Create Satellite dialog (figure 3-13).

   Check with your service provider if unknown. Bandwidth Allocation and Location entries will be defined later, if necessary.

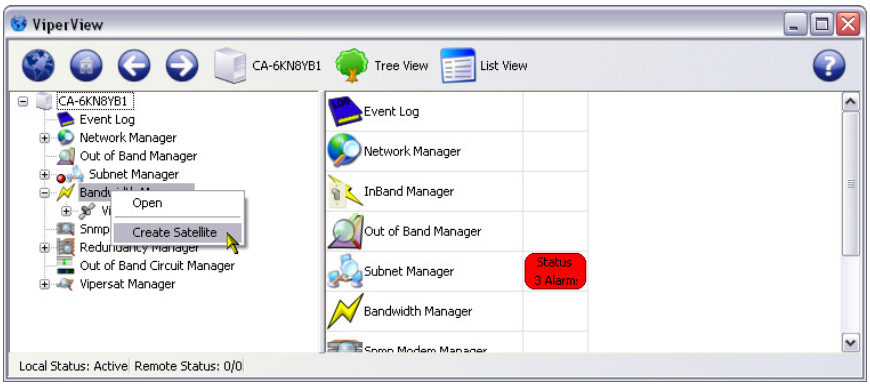


Figure 3-12 Create Satellite menu command

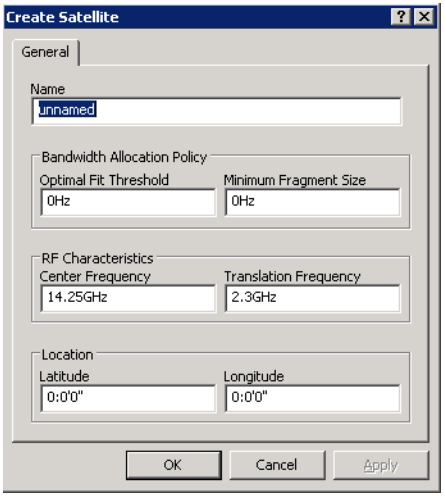


Figure 3-13 Create Satellite dialog

3. After a **Refresh** command, the newly created satellite will appear under Bandwidth Manager in the ViperView window.

4. Repeat the previous steps to create additional satellites, as required

Create Transponders

The next step is to create transponders in the newly created satellite. Each transponder is entered with its center frequency and bandwidth.

1. Right-click on the satellite icon and select **Create Transponder** from the drop-down menu (figure 3-14).

2. Enter the transponder **Name**, **Center Frequency**, and **Bandwidth Span** in the Create Transponder dialog (figure 3-15).

   Leave the Pad and Translation Override entries at the default values, if unknown. The Pad value sets the gain variation between transponders for automatic switching power calculations. The Translation Override parameter is used for specific applications and represents a frequency offset for cross-banded transponders (refer to Appendix A, "VMS Cross Banding" for more information).

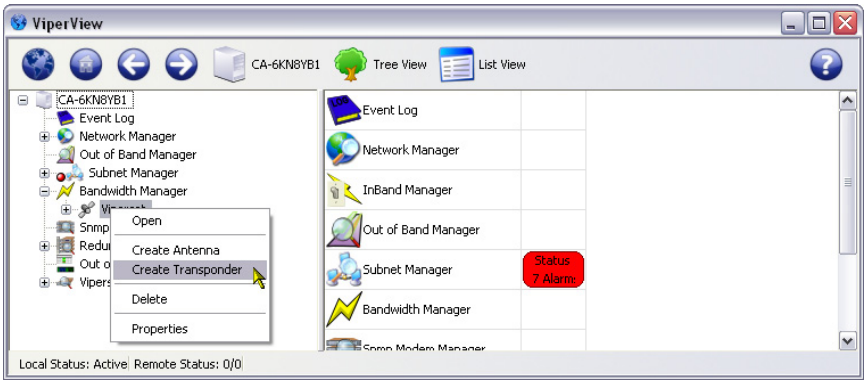


Figure 3-14 Create Transponder menu command

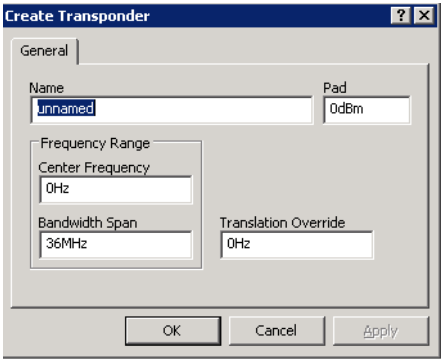


Figure 3-15 Create Transponder dialog

3. Repeat the previous steps to create multiple transponders.

Create Antennas

The following steps cover creation of the network antennas. Each antenna is a site container for upconversion/downconversion and modem devices. First create a Hub antenna, followed by the Remote antennas, as described below.

1. Right-click on the satellite icon and select **Create Antenna** from the drop-down menu.

2. In the General tab of the Create Antenna dialog (figure 3-16), enter the **Name**, **Operator** and **Contact Information**.

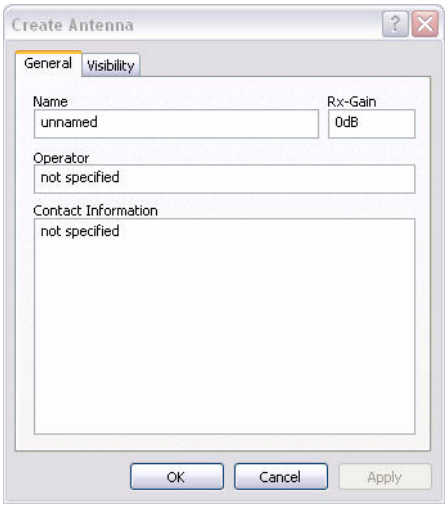


Figure 3-16 Create Antenna dialog

3. Set the Antenna **Receive-Gain** for the Mesh Compensation Factor.

   Refer to link budgets and antenna manufacture specifications for gain settings. If meshing is not required, leave Rx-Gain at the default setting of 0 dB.

   This feature applies a power delta between any meshed remote sites. The hub is used as the reference value when calculating a power delta value between remotes with smaller antennas. This is accomplished through comparing its receive gain to the gain differences between remotes.

   During a mesh switch setup, the VMS compares the delta values and modifies the power adjustments at each remote site to compensate differences in receive gain. If DPC is enabled, the system will then further fine tune power to the targeted configuration values.

If multiple remotes are involved in a SHOD connection, the VMS uses the lowest remote gain value for compensation control.

4. Select the Visibility tab to configure the **Antenna Visibility** range, as shown in figure 3-17.

Caution: Unless specific limitations are required for the antenna range, the recommended settings are 500 GHz center frequency and 1 THz bandwidth (defaults). Refer to Appendix B, "Antenna Visibility", for more information on this feature.

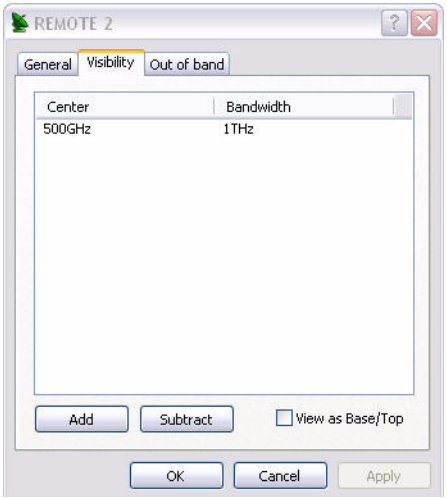


Figure 3-17 Antenna Visibility, Default Settings

5. Click on the **OK** button to complete the antenna creation.
The new antenna will appear under the satellite in the ViperView window.

6. Repeat the previous steps to create additional antennas.

Create Antenna Devices

The following steps cover the creation of the antenna up converters and down converters, and binding the modem modulators and demodulators to the converters.

1. Right-click on an Antenna icon and select **Create Up Converter**. The dialog box shown below(figure 3-18) will open.

It is important to ensure that the **Up Converter** frequencies are correct, as this is a very common error which breaks the switching engine.

Also, check the **Bandwidth** and **Power Limit** settings. If the RF hardware does not exactly match the satellite parameters, the Bandwidth setting may have to be changed.

Contact the Vipersat Network Product Group CTAC for further information.

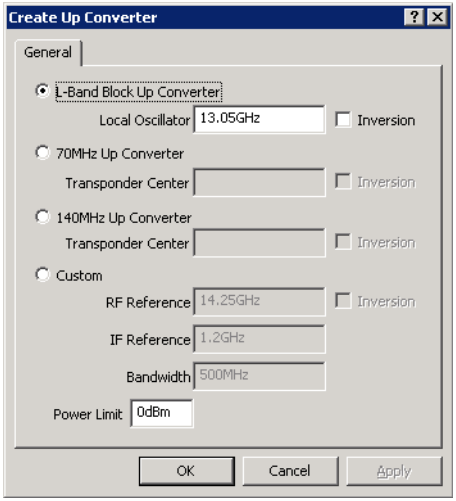


Figure 3-18 Create Up Converter dialog

2. Right-click on the Antenna icon again and select **Create Down Converter** (figure 3-19). Ensure that the frequency settings here are correct.

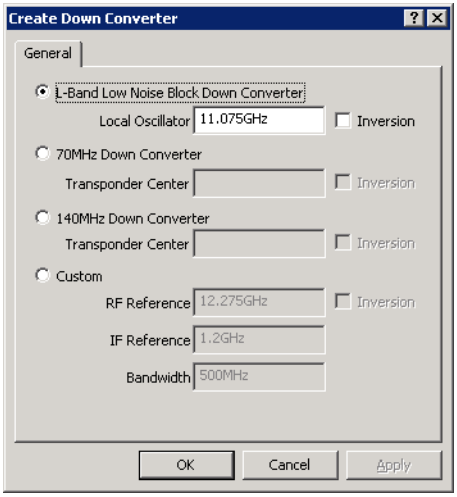


Figure 3-19 Create Down Converter dialog

3. Notice that the newly created Up and Down Converters appear in the Antenna View (figure 3-20).

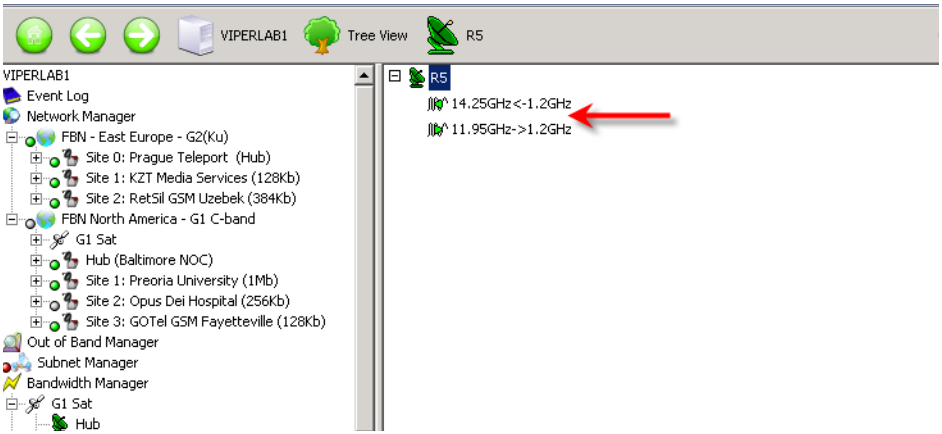


Figure 3-20 Converter Icons on Antenna View

4. Bind node Modulators and Demodulators to the Up and Down Converters:

- Expand the Subnet Manager tree down to the Modulator and Demodulator level for those units that will utilize this Antenna.
- Click on the Antenna icon in the left window panel to display the Converters in the Antenna View in the right window panel.
- Click-hold on each modulator/demodulator device icon in the left panel, drag it to the right panel and drop it onto the desired converter.

The new devices appear under the Converters as shown in figure 3-21.

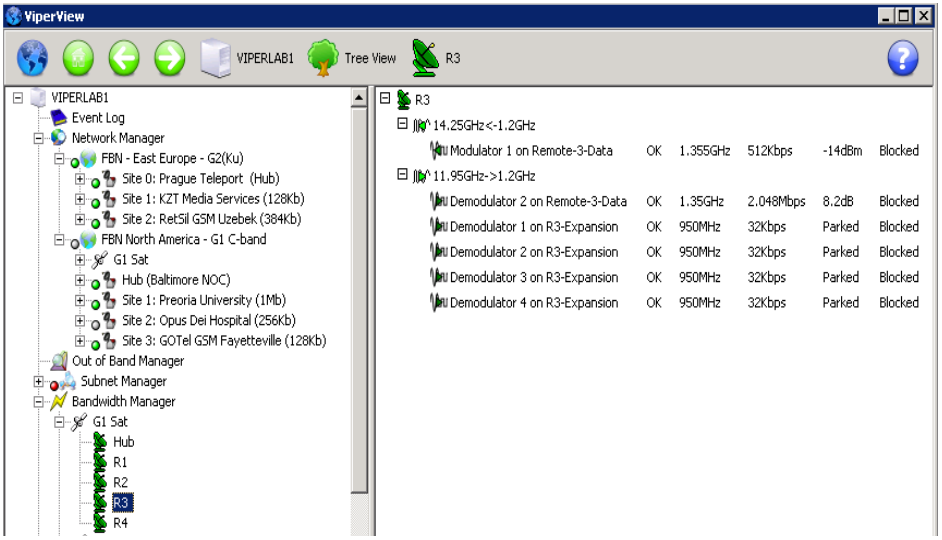


Figure 3-21 New Devices Added to Converters

5. Make the *Expansion Unit* Demodulators available by right-clicking on them in the Antenna View and selecting **Allocatable** from the drop-down menu.

6. Repeat the previous steps for each Antenna.

InBand Manager Configuration

A precursor to configuring InBand management is to set the carrier flags.

Carrier flags provide carrier type information to the system switching function. Each modem device (Modulator and Demodulator) is represented to the switching function as a transmission mode type (None, SCPC, or STDMA). These carrier flags set up the database for a starting point or home state condition. Additionally, there are flags to indicate availability of units for the switching resource manager.

It is important for the operator to set the STDMA flag on the network burst controller(s). The VMS sets the flags for the other network devices automatically.

Right-click on the BC demodulator and select **Properties** from the drop-down menu. The dialog appearance with the correct settings are shown in figure 3-22 (CDM-570/570L) and figure 3-23 (SLM-5650A).

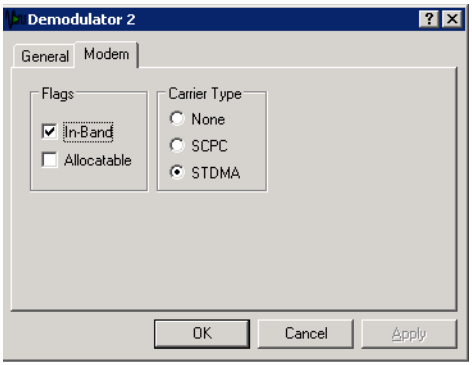


Figure 3-22 BC Carrier Flag Setting, CDM-570/570L

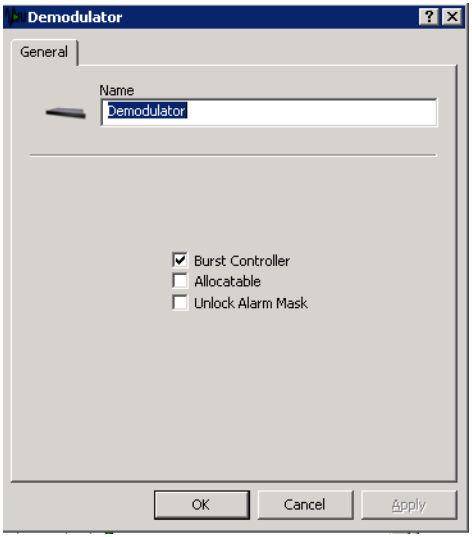


Figure 3-23 BC Carrier Flag Setting, SLM-5650A

1. Enable **InBand Management** on each remote subnet. On nodes which are part of the switched network, right-click on the Subnet icon from the Tree View and select **InBand Management**, as shown in figure 3-24.

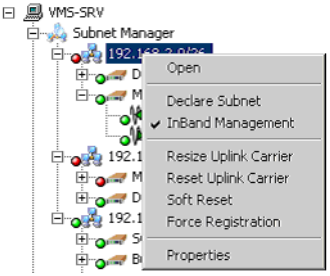


Figure 3-24 InBand Settings for Remotes

2. When **InBand Management** is selected, as shown in figure 3-24, a window will open prompting the operator to select the Modulator for switching from the **Name** list shown in figure 3-25.

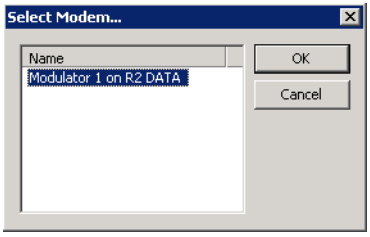


Figure 3-25 Select Switching Modulator

3. Select the remote's modulator, open the Subnet View, as shown in figure 3-26, and refresh the device view to verify that the VMS has picked up the home state.

Tip: If the list is empty, it is likely that the remote is not registered. Ensure that all sites are registered with the VMS before attempting InBand Management. Typically, if the device icon is illuminated (green or red), the modem has registered. To verify that the modem is registered with the managing VMS, secure a connection to the unit through either Telnet or Web interface.

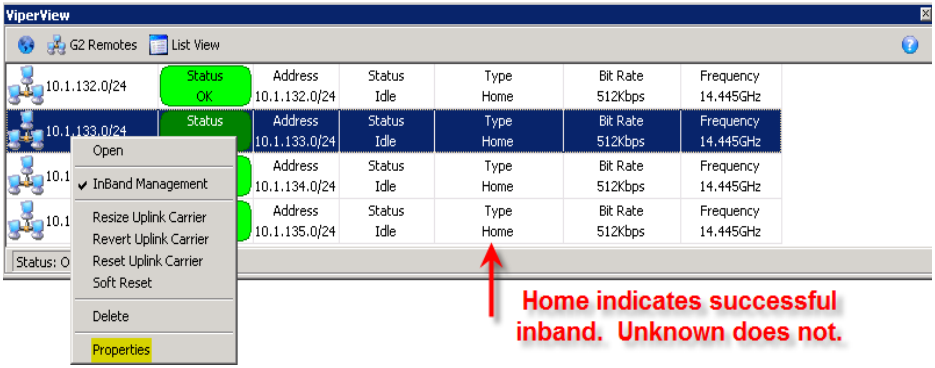


Figure 3-26 InBanding a Remote

4. Right-click on the Subnet and open the **Properties** page.

The **General** tab, which opens first, allows the operator to enter a **Subnet Name**, if desired, and add **External Subnets**. External Subnets are additional networks beyond the local area network of the modem.

If the remote site has a router, and applications you wish to switch on (voice, e.g.) reside on the other side, insert the **Subnet Address** and **Mask** here. See figure 3-27, below.

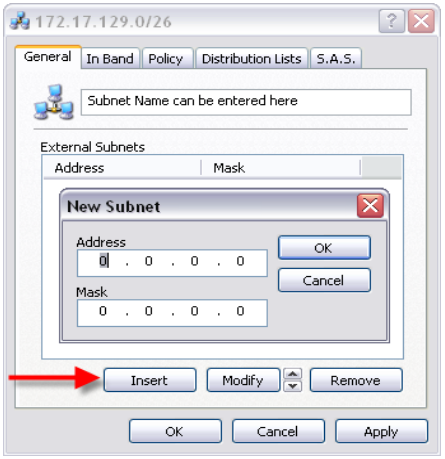


Figure 3-27 Subnet Properties, General tab

5. The **InBand** tab on the Properties page (figure 3-28) displays the **Home State**, the **Remote Modulator**, the **Downlink Modulator** (if selected), and the **Uplink Demodulator**.

If the initial InBand setting failed (did not show the correct Home State in the Subnet view), check to ensure these settings are correct.

This tab can be used to change Home State settings for a remote. Enter the desired settings and revert the uplink carrier. Remember to reset the Home State parameters in the modem and save them after doing this.

Figure 3-28 Subnet Properties, InBand tab

6. The **Policy** tab (figure 3-29) allows the operator to modify policy settings for this remote site that are inherited from the global Policy tab (see the section "InBand Manager" on page 5-18).

Minimum, *Maximum* and *Excess Bit Rates* can be either left at 0 bps, which will cause the InBand to use the global settings, or set to the desired values for local control.

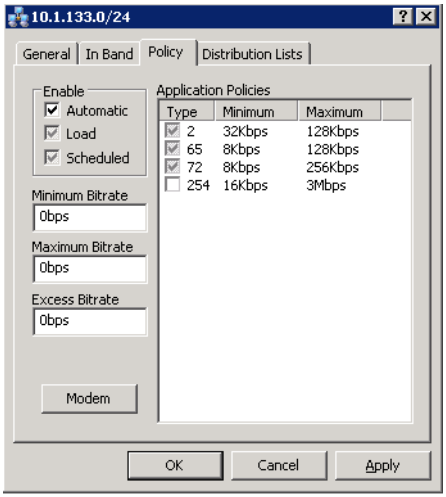


Figure 3-29 Properties Policy Tab

The check boxes have 3 states:

Clear — The policy or switch type is not allowed
Clear with Check — The policy or switch type is controlled locally
Gray with Check — The policy or switch type uses global settings

Application Policy Type numbers have the following convention:

1 — Scheduled Switching and VFS
2 — Voice
3 — Video
4-64 — Reserved for the System
65-253 — User Defined
254 — Uninterruptable Switch (used to ensure that additional applications will not generate a switch, thus preventing video glitches)

7. The **Distribution Lists** tab (figure 3-30) allows the operator to set up a list of sites to be included in a switch under defined circumstances. For example, this feature can be used to tune expansion demodulators at a list of sites to receive a multicast video stream.

To declare a distribution list, right-click on the white area in the tab box, then click on the **Insert** button that appears.

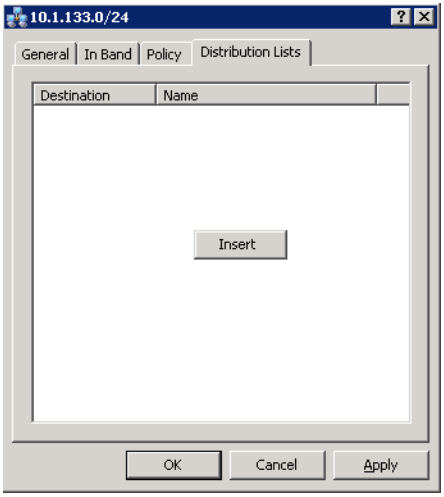


Figure 3-30 Properties Distribution List tab

8. The **Distribution List** dialog (figure 3-31) provides a **Destination** box and a **Name** box, and allows the operator to select **Sites** to add to the list.

If the destination is left as 0.0.0.0 and the network is in *Entry Channel Mode* with switch type *Load*, the effect is to permanently PAMA the links in the list.

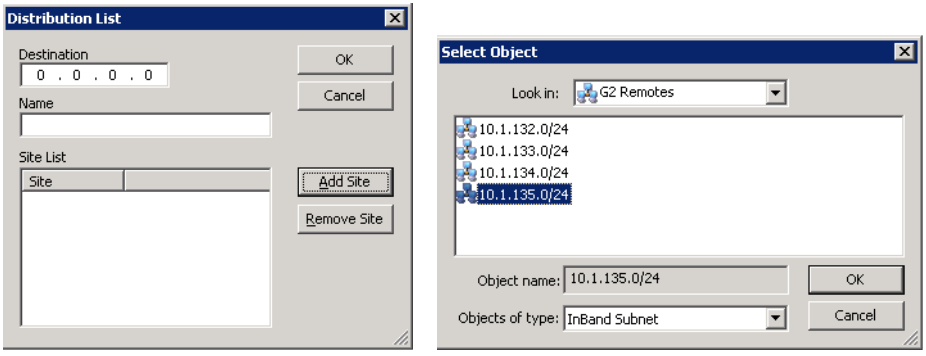


Figure 3-31 Distribution List dialogs

The **Satellite Advanced Switching** (S.A.S.) tab (figure 3-32) is a remote roaming feature that provides advanced switching per remote to any given satellite. The advanced carrier switching from beam-to-beam in roaming applications allows for variable carrier characteristics between satellites per remote, whereby roaming from one satellite to another with different specifications, e.g. Modula-

tion and FEC Rate, can occur. Note, however, that Turbo mode should never be changed.

To configure a roaming remote and different specifications per satellite are required, perform the following steps. Otherwise, proceed to the next section, “Pool Management”.

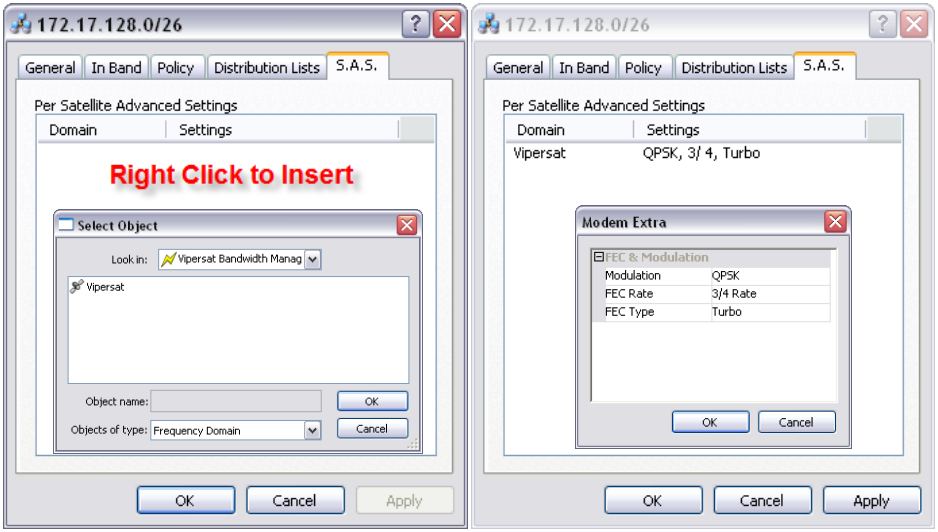


Figure 3-32 S.A.S. tab with SOTM Enabled

9. Right-click in the center of the S.A.S. tab and select **Insert** to open the Select Object dialog.

10. Select the **Vipersat Bandwidth Manager Service** from the list of object names and click **OK**.

11. Select the Satellite and click **OK**, then modify the Modulation and FEC Rate for the switched SCPC characteristics of this satellite service area.

NOTE

Note: When switching between satellites, the Modem Extra values set within the SAS will override the Modem Extra block setting in the Policy tab. The Home State Extra block setting is **not** affected, as it is used for reverting to STDMA mode.

Pool Management

The next step is to set up bandwidth pool(s) in the transponder(s) created earlier. Bandwidth pools are the heart of the switching engine. They are the only portion of the space segment actively controlled by the VMS.

1. Right-click on the satellite in the tree view and select **Open** (figure 3-33).

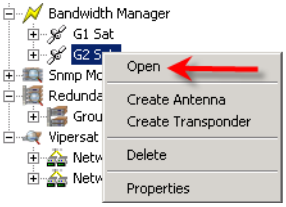


Figure 3-33 Satellite Open menu command

This opens the **Spectrum Analyzer** / **Bandwidth** ViperView window (figure 3-34).

Tip: At this point, the carriers should be visible. If not, double-click in the center of the window. If the carriers still do not appear, there is an error in the frequency settings on either the satellite, the transponder, or the converters.

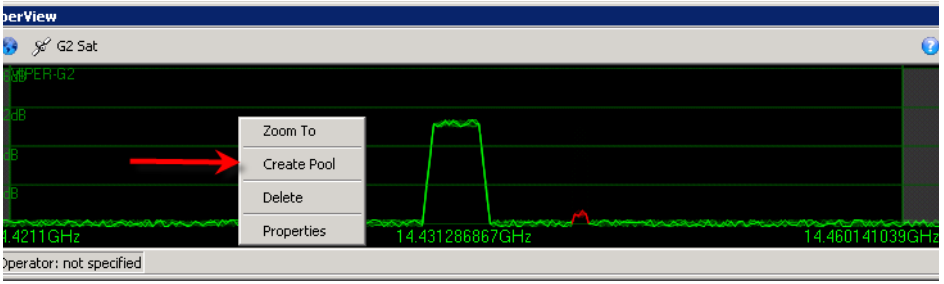


Figure 3-34 Spectrum View

The gray edges in the Spectrum View represent the Guardband. The darker area is the Transponder, and the carriers shown are the TDM Outbound and STDMA carrier for the network associated with the opened satellite.

2. Right-click in the Transponder area and select **Create Pool** from the menu to open the Create Pool dialog shown in figure 3-35, below.

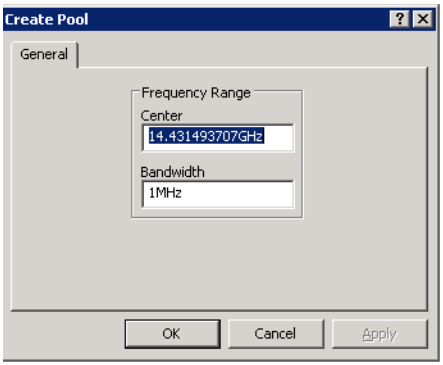


Figure 3-35 Create Pool dialog

3. The **Center Frequency** setting will reflect the Transponder frequency value corresponding to the point where the mouse was clicked to create the pool.

   Correct this setting to the desired value for this pool, and adjust the **Bandwidth** to the correct width.

   Click **OK** and the new pool will appear (figure 3-36).

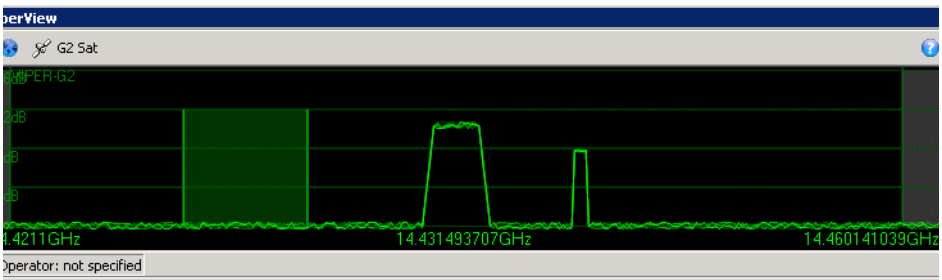


Figure 3-36 New Bandwidth Pool

4. Repeat the previous steps to create additional bandwidth pools.

5. Right-click on the inbanded subnet in the Subnet Manager View and select **Resize Uplink Carrier** from the drop-down menu (figure 3-37).

   The Resize Uplink dialog will open, allowing a **New Bitrate** to be specified. The bit rate shown is equal to the current bit rate; in this case, the STDMA channel rate.

6. Click on **OK** to close the dialog and initiate a switch.

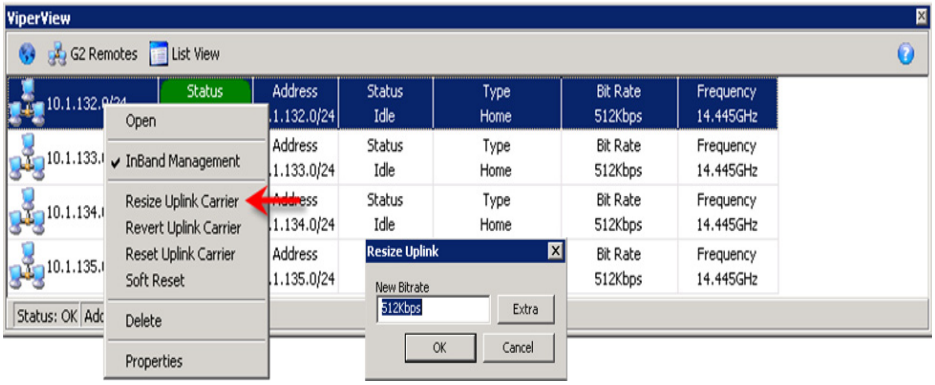


Figure 3-37 Resize Uplink Carrier, Subnet

Returning to the Spectrum View, the blue shaded area represents the slot assigned by the VMS for the switch. Upon receipt of the next PLDM (Path Loss Data Message), a carrier will appear showing the current E_bN_0 and bandwidth (figure 3-38).

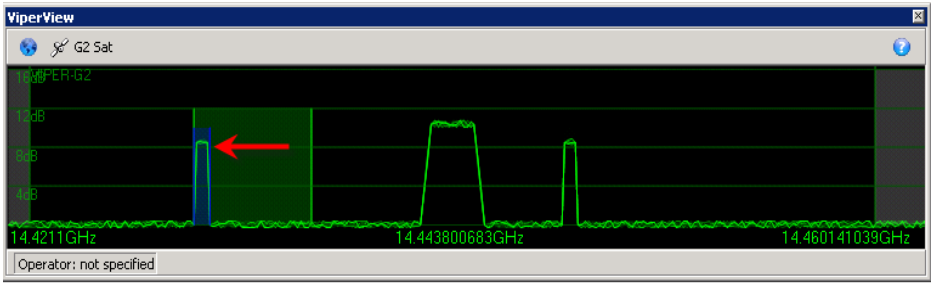


Figure 3-38 Switched Carrier (Spectrum View)

The Subnet View will show the site status as *Switched*, with a type of *Manual*, along with the current Bit Rate and Frequency (figure 3-39).

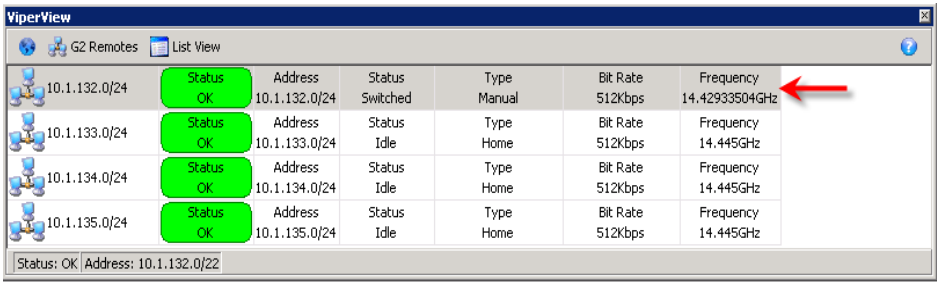


Figure 3-39 Switched Carrier (Subnet View)

7. From the Tree View, click on the Hub antenna under the Bandwidth Manager to display the Hub devices in the right window panel.

From this view, the operator can see the switched demodulator that the VMS selected, the carrier frequency in L-Band, the bit rate, the current E_bN_0, and the subnet/subnet mask (figure 3-40).

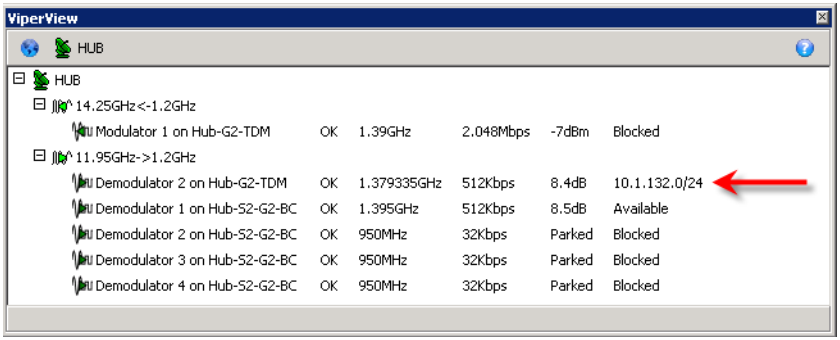


Figure 3-40 Switched Carrier (Hub Antenna View)

NOTE

Note: After reaching this point and all indications are as noted above, the Subnet Manager, the Bandwidth Manager, and the InBand Manager have been configured successfully. All frequencies and conversions are correct. To test the policies, it will be necessary to set up an application such as VoIP.

Network Manager Configuration and ViperGlobe

The Network Manager provides a means of exposing the satellite network(s) to customers via VNO (for network operations) and ViperGlobe (for geographical display). The networks, and their associated elements, that are created in the Network Manager are *virtual*, and can thus be added and removed without affecting the actual networks upon which they are based.

VMS version 3.6 introduces ViperGlobe, an optional global Map View application. The ViperGlobe option greatly enhances Network Manager by providing a geographical global representation of the Vipersat satellite network. ViperGlobe displays the networks that are created under the Network Manager and provides a visual global positioning of the network sites and the carrier links that exist between them. Network alarm status is also visually indicated in the Map View.

The operator can now anchor sites to true geographic locations. In a SOTM (Satellite on the Move) network, moving sites are placed based on GPS infor-

mation received from the antenna ACU. An example of this type of network is depicted in figure 3-41, below.

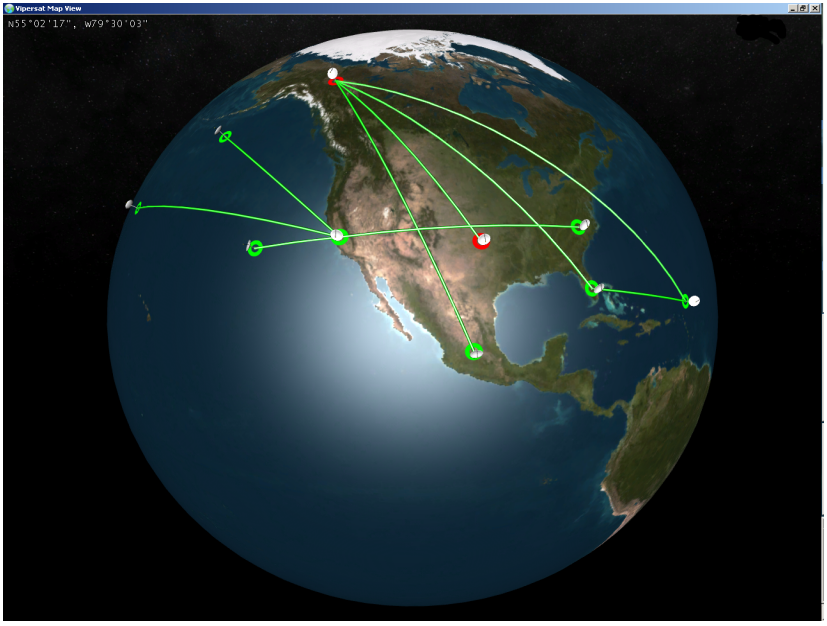


Figure 3-41 Vipersat Network, Global Map View

This section describes the procedure for configuring Network Manager in the VMS, and graphically displaying the network using ViperGlobe.

1. From the Tree View, right-click on the Network Manager icon and select **Create Network** (figure 3-42).

2. In the Network Properties dialog that opens, enter a **Network Name**.

3. Expand the Network Manager to expose the new Network icon.

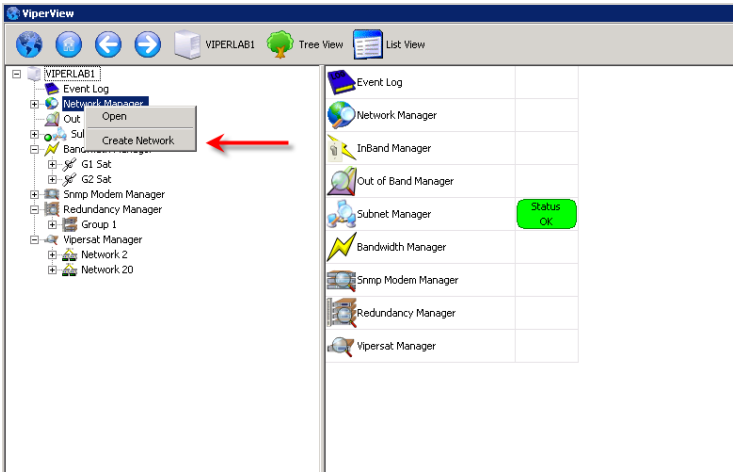


Figure 3-42 Creating the Network

4. Drag and Drop the satellite(s) for this network from the Bandwidth Manager onto the Network icon (figure 3-43).

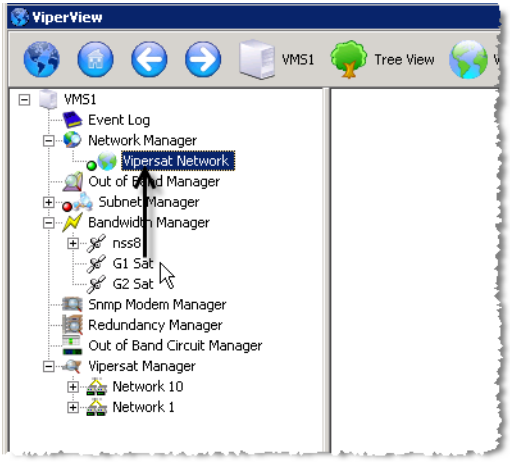


Figure 3-43 Drag and Drop Satellite(s)

NOTE

Note: References to ViperGlobe in the following steps apply to Client machines that have the optional ViperGlobe application installed.

5. Open the **Vipersat Map View** window by one of two methods:

- Double-click on the **Network Map View** icon (Desktop Shortcut).

- From the *Start* menu, select *Programs* then *VMS 3.6* followed by **Vipersat Network Globe**.

A Connect dialog will open, prompting for the **Server Name**. Enter the IP address of the server and click **Connect**.

The Vipersat Map View window will open, displaying the globe (figure 3-44).

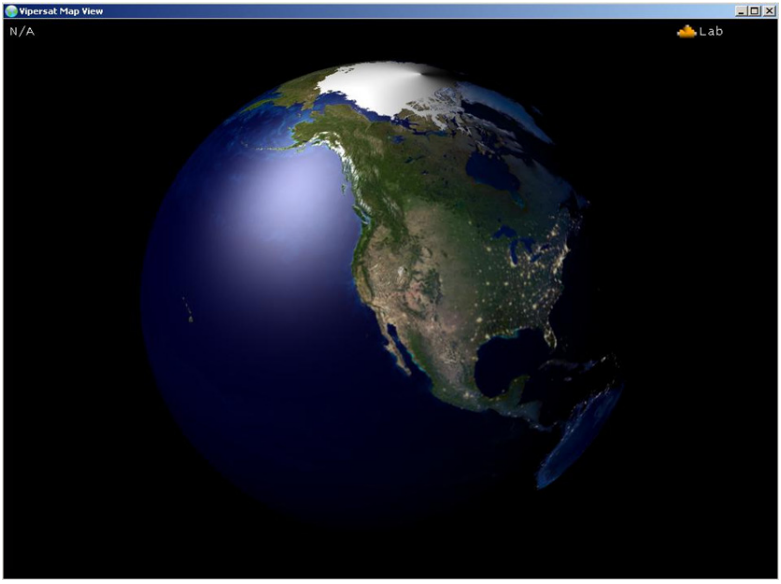


Figure 3-44 Globe View with Network Icon

6. In the upper right corner of the window, the Vipersat network will appear as an orange icon. Click on this icon to highlight it and make the network active.

The next step is to add the sites, typically the Hub site and each of the Remote sites. This can be done by one of two methods (figure 3-45):

- Right-click on the Network icon under Network Manager in the Tree View of the Viperview window and select the **Create Site** command from the drop-down menu.

  This method requires that the site coordinates for latitude and longitude be specified after the site is created.

- Right-click on the desired geographic location on the globe in the Vipersat Map View window and select **Create Site**.

  This method approximates the site coordinates for latitude and longitude based on the point where the mouse click occurs. The coordinates

corresponding to the mouse position appear in the upper left corner of the window as a reference.

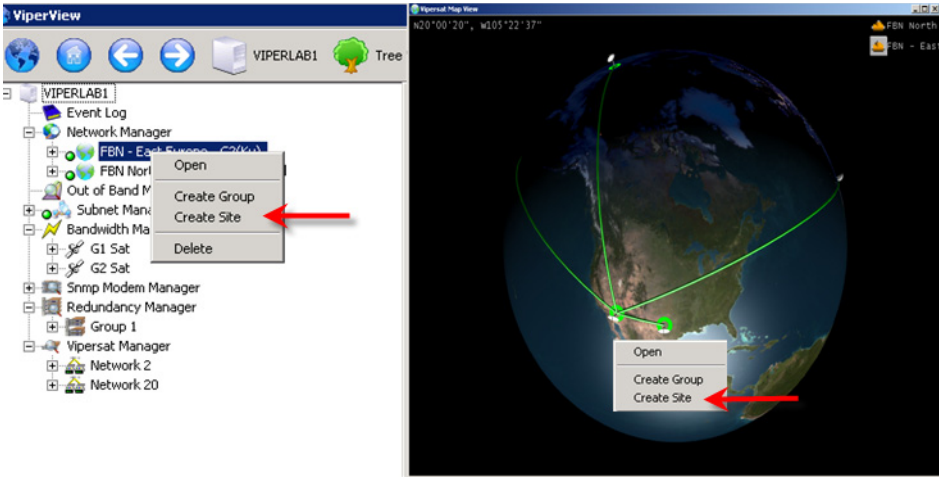


Figure 3-45 Adding Sites, Network Manager and ViperGlobe

7. Execute the Create Site command and enter the **Name** to be used for the site.

In the Tree View, expand the Network to expose the newly created site.

8. Right-click on the Site icon and select **Properties**.

The exact coordinates can be entered in the dialog that opens.

9. After adding a site, drag and drop the associated **Antenna** from the Satellite Tree View onto the Site.

10. Once the Hub site and at least one Remote site have been added and populated with their antennas, a **Carrier Line** should appear between them (figure 3-46), assuming that the sites are up and there is at least one active link.

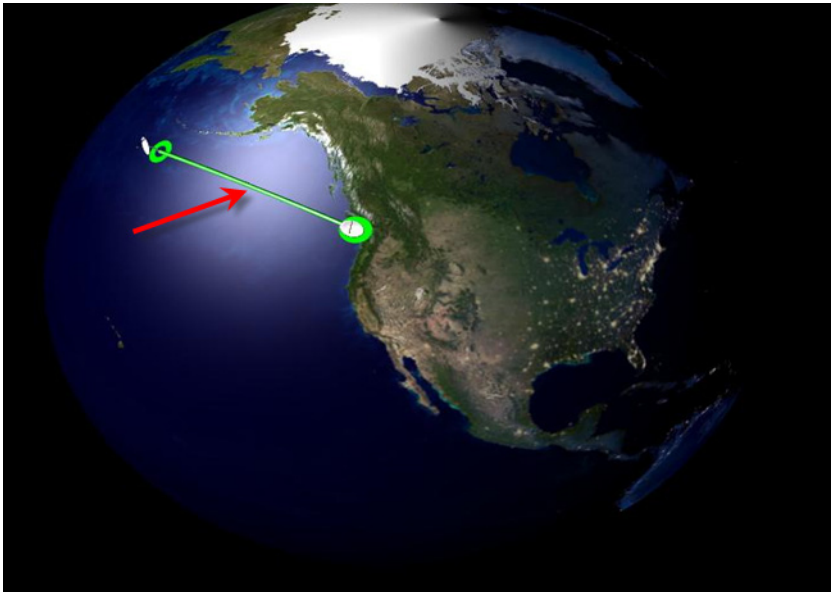


Figure 3-46 Map View with Linked Sites

In order to have the sites on the Map View indicate alarms, it is also necessary to drag and drop the subnet icons associated with each site into the Network Manager.

11. Drag and drop the associated **Subnet** from the Subnet Manager onto the Site.

12. Repeat the above Create Site steps to create all desired sites for the Network.

Multiple Networks can be created under Network Manager by repeating the above procedure. Each of these Networks will appear as a separate network icon in the upper right corner of the map window. When an icon is selected (click to highlight), the associated network element map will be displayed on the globe. All sites created for the same Network will appear together in a single map.

Basic Guaranteed Bandwidth

Basic Guaranteed Bandwidth is a feature that provides the means for assigning a guaranteed minimum bandwidth on a per site basis. This bandwidth allocation is known as the **Committed Information Rate** (CIR). When properly configured, this feature ensures that there will always be sufficient bandwidth available to

switch a terminal to its CIR. Requests for rates above the CIR are granted on a first-come, first-serve, best effort basis. A terminal that does not have an assigned CIR has no guarantee for any bandwidth, and is only granted bandwidth on a purely opportunistic basis.

The Basic Guaranteed Bandwidth / CIR function depends on the pre-allocation of system resources, namely RF spectrum and network hardware devices (demodulators). Overlaying frequency masks are utilized for the pre-allocation of bandwidth, as illustrated in figure 3-47.

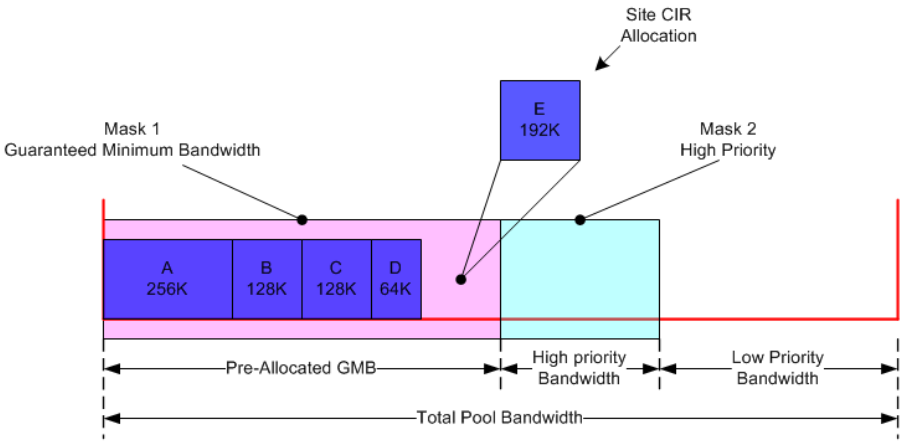


Figure 3-47 Visualization of Basic Guaranteed Bandwidth

Mask 1 designates the frequency spectrum that is reserved for sites with defined CIR bandwidth slots. The slot size is equal to the Minimum Bit Rate value that is defined by the site Policy parameter setting.

Mask 2 designates a separate spectrum allocation dedicated to sites that are selected to operate within this priority frequency segment. Creating this spectrum mask is optional when setting up the Basic Guaranteed Bandwidth feature.

CIR Configuration

The configuration of CIR involves four steps:

- Enabling CIR on the Satellite
- Setting the CIR policies — first the Global, then the Local Subnet
- Enabling CIR on the Remote Antenna(s)
- Defining the Priority Bandwidth allocation (optional)

Enable CIR on the Satellite

Right-click on the Satellite appearance in the Tree View and select **CIR Enabled** from the drop-down menu (figure 3-48).

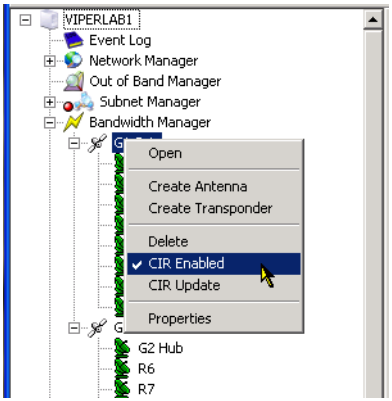


Figure 3-48 CIR Enabled Command

CIR Policy Setting

The CIR assigned to a Remote is equal to the Minimum Bit Rate setting, which is determined by the local Subnet policy setting. Any Remote that has the local policy set to 0 bps (the default) will use the global policy setting as its CIR value. This relationship facilitates the configuration of CIR on a system-wide basis. A local policy, if set *above* 0 bps, will over-ride the global policy, in much the same manner as is used by the VMS to control switching policies.

In the example figures shown below, the global policy Minimum Bit Rate value is set to 256 Kbps. The remote with the subnet 172.16.128.0/27 has a minimum rate of 384 Kbps, which will be its assigned CIR.

To configure the CIR Policy settings, perform the following procedure.

1. Click on the **VMS Server** appearance at the top of the Tree View to display the Service Managers in the right panel of the window.

2. Right-click on the **InBand Manager** and select **Properties** from the drop-down menu. The window shown in figure 3-49 will open.

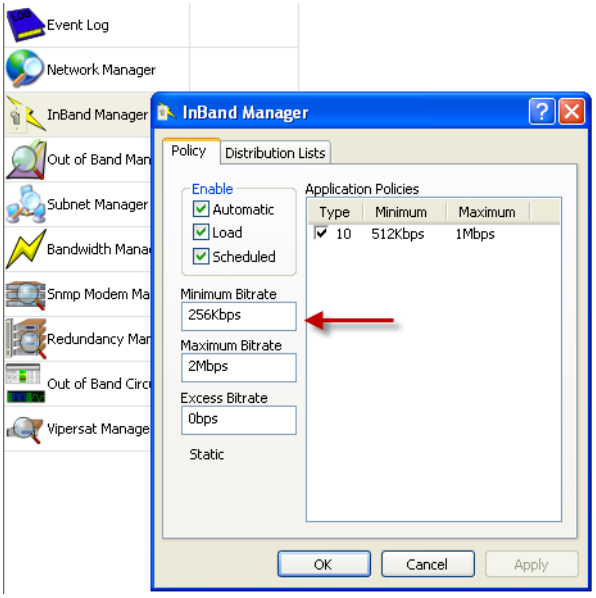


Figure 3-49 Global CIR Setting

The **Minimum Bit Rate** setting on the Policy tab establishes the global CIR value for the Network.

Perform the following steps for all Remotes that will utilize a CIR that is different than the global value.

1. Right-click on the local Subnet appearance for the Remote and select the **Properties** command.

2. Open the **Policy** tab and set the **Minimum Bit Rate** for the Remote (figure 3-50).

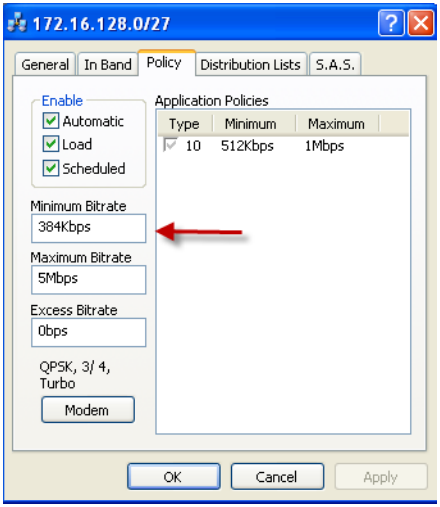


Figure 3-50 Remote CIR Setting

Enable CIR on Remote Antennas

1. Right-click on the Antenna appearance for the desired Remote and enable CIR for either **Normal** or **Priority** bandwidth from the drop-down menu (figure 3-51).

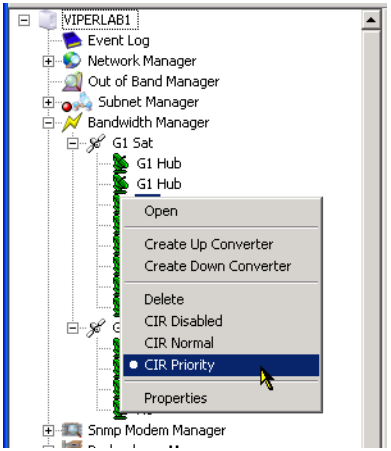


Figure 3-51 CIR Commands, Remote Antenna

Selecting **CIR Normal** will allow this Remote to access the *Low Priority Bandwidth* spectrum (see figure 3-47) when attempting to switch above its CIR.

Selecting **CIR Priority** will grant access to the *High Priority Bandwidth* spectrum for this Remote.

2. Repeat for each Antenna associated with a CIR Remote.

NOTE

Note: An attempt to enable CIR for a remote that results in the available bandwidth (the sum of the Guaranteed, Normal, and Priority bandwidths) exceeding the Total Pool Bandwidth will be denied, and an error message will appear (figure 3-52).

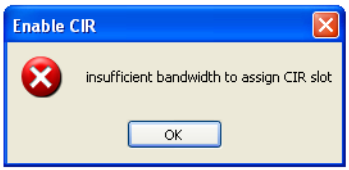


Figure 3-52 Enable CIR Error

Adjust Bandwidth Allocation

1. Right-click on the Satellite and open the **Properties** window.

2. Select the **CIR** tab, as shown in figure 3-53.

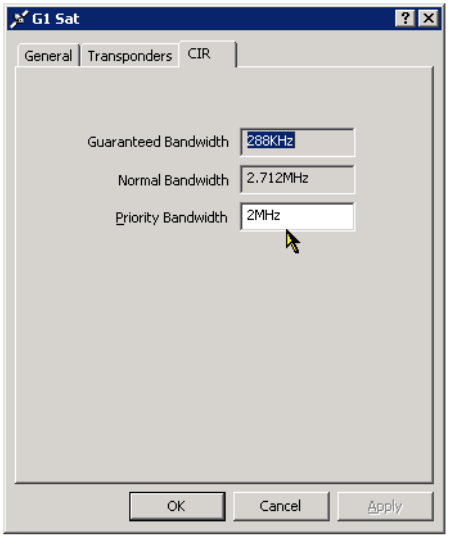


Figure 3-53 Satellite CIR tab

Because the Remote CIR policies have been configured previously, the available bandwidth for **Guaranteed** and **Normal** has been calculated by the VMS and is displayed here.

3. If **Priority Bandwidth** is required, enter the amount and click on the **Apply** button. Note that the Normal Bandwidth will be reduced by this amount.

It will be necessary to perform a **CIR Update** whenever any of the following occur:

- The Bandwidth Pools are changed
- The CIR (Minimum Bandwidth) for a Remote is changed
- A Remote Antenna is added or removed, with or without CIR

NOTE

Note: An Update is not required when changing either a Remote priority or the Priority Bandwidth because the VMS will automatically adjust the available bandwidth.

The CIR Update command is selected from the Satellite drop-down menu (figure 3-48).

N:M Device Redundancy

If device redundancy for hub primary modems is desired, it should be configured at this point. Complete instructions for configuring this feature can be found in Appendix C, "Redundancy".

VMS Redundancy

If VMS server redundancy is desired, it should be configured at this point. Complete instructions for configuring this feature can be found in Appendix C, "Redundancy".

SOTM (Satellite On The Move)

This section applies only to those networks with mobile platforms, such as a maritime environment. VMS 3.6.x incorporates automated features to seamlessly handle configuration changes inherent to a mobile environment. If a platform transitions to a new satellite, the VMS will automatically move the associated antenna, update the Inband Home State, and remove and rewrite the appropriate routes in the old and new TDM outbounds. QOS rules applying to the TDM outbound for the remote site will be moved as well. If the transition involves moving to a different hub, the modems will generate RIPv2 updates to the edge routers providing a path to the Internet.

This process is illustrated below, in figure 3-54. Configuring this feature requires that sites are on-line.

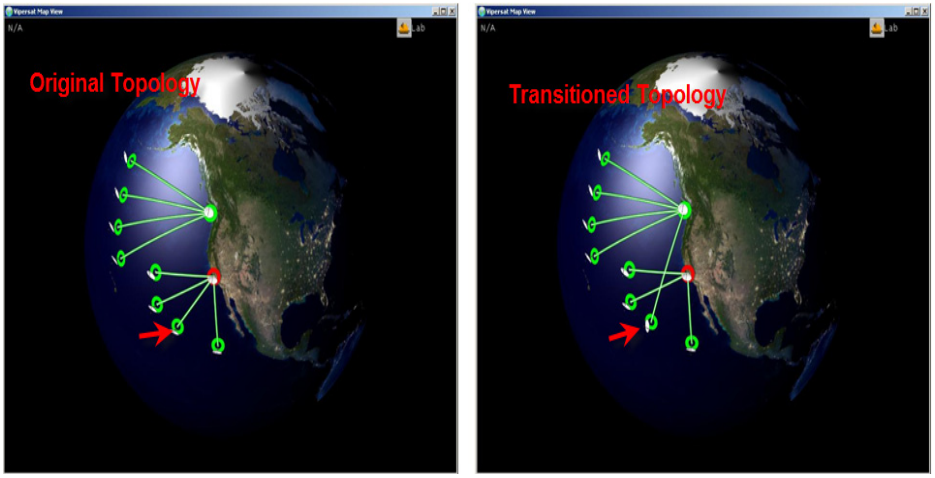


Figure 3-54 SOTM Transitioned Site

1. Open the Vipersat Map View and highlight the Network icon to make the network active.

2. Right-click on a mobile Remote site and open the **Properties** window (figure 3-55).

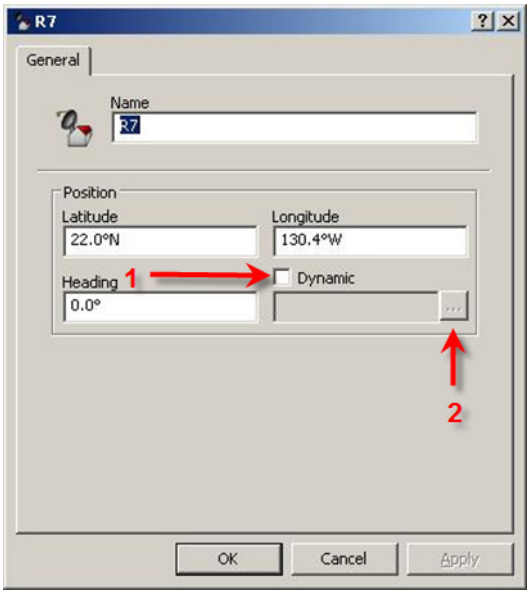


Figure 3-55 Enable Dynamic Function for SOTM Remote

3. Check the **Dynamic** box and select the browse button beneath it. This will open a dialog box in which the subnet should appear (figure 3-56).

Note that, if the subnet icon was not copied into the Network Manager site as described in *Network Manager Configuration*, this box will be empty.

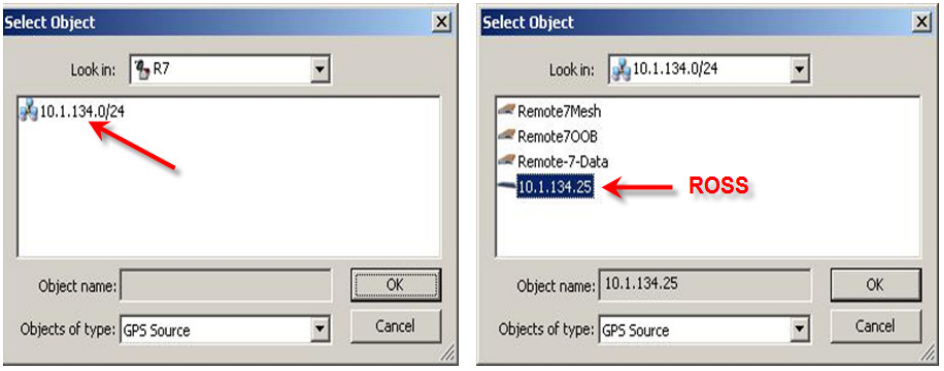


Figure 3-56 Selecting ROSS Unit for SOTM

4. Select the **Subnet** and click **OK**. This will open up a dialog showing the subnet components.

5. Select the **ROSS** unit and click **OK**.

At this point, the Remote site icon will snap to a location on the globe based on the GPS reading that the ROSS is receiving from the antenna.

6. Repeat the above procedure for all mobile remote sites.

The next step will be to set up the VMS to push the routes to the TDM outbounds. This step is necessary if there is more than one satellite–or satellite beam–being used in the network, or if multiple TDM outbounds are being used and the mobile sites will transition between them.

It will no longer be necessary to put static routes in the TDM modems. If any static routes exist, either telnet/console into the box(es) or use the Parameter Editor from the VMS and delete them. The only routes left in the TDM outbounds should be the Default Gateway to the edge router and any non-mobile remotes in the network (if desired, these routes can also be entered as *dynamic* VMS routes).

7. Right-click on the Hub modem unit that represents the first TDM outbound and select the **Properties** page.

8. Click **Routes**. The Routes window will open (figure 3-57).

Right-click in the window and select **Insert**.

A new route is added to the Route List. The operator can then edit the route settings, including the *Network* address, the *Mask*, the *Gateway*, and the *Interface* (next hop). For remotes, select **Satellite**.

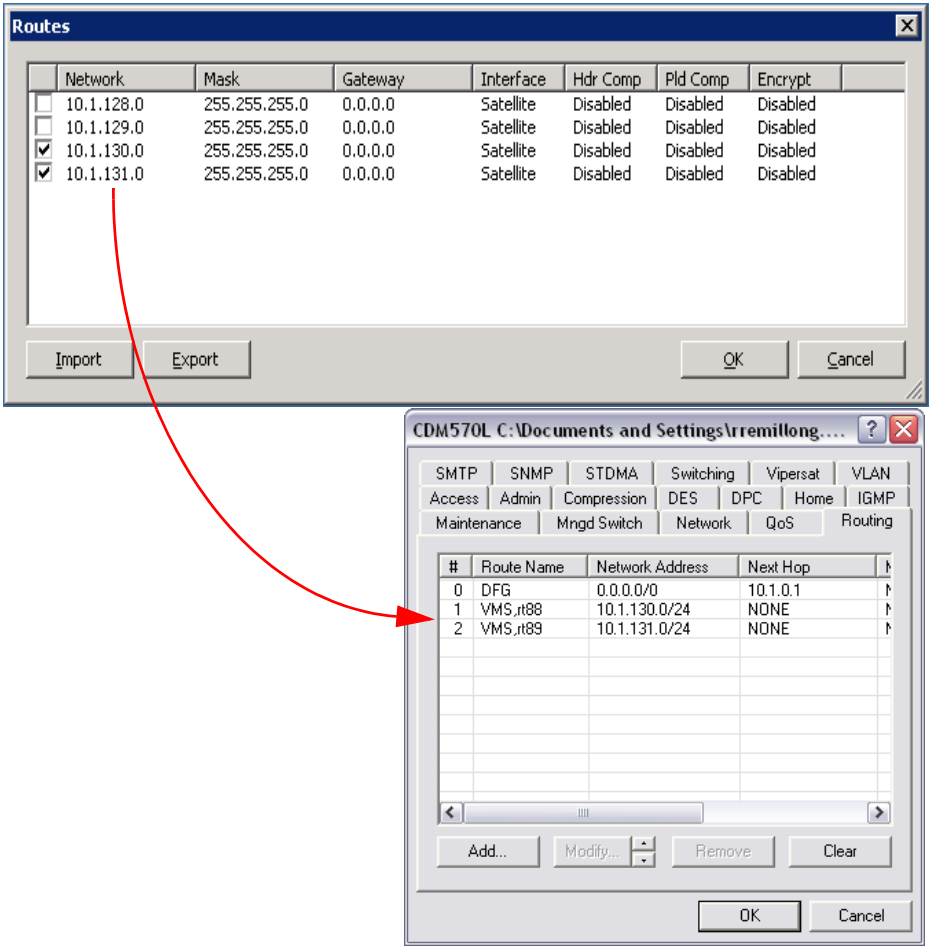


Figure 3-57 Dynamic Routing Entry, CDM-570/570L

9. Push the new route to the modem with a **Force Registration**. The modem will generate a RIPv2 update to the router identified as its default gateway.

This can be verified by right-clicking on the modem, selecting **Configure**, then opening the **Routing** tab as shown in the figure.

10. Repeat this route procedure for each TDM outbound modem.

If Quality of Service rules apply, configure them now. Typically, QOS rules in the TDM will be configured for Min/Max priority. This gives each remote a CIR (min rule) in the TDM outbound and a burstable rate (max rule). Since the number of rules per modem is limited to 32, these rules should be moved to the

currently active TDM outbound. Configure QOS rules for the remotes that use this modem as their “home” TDM.

11. Right-click on the Hub unit with the first TDM outbound and open the **Properties** page.

12. Enable QOS Management by checking the box, then click on the **Rules** button (figure 3-58).

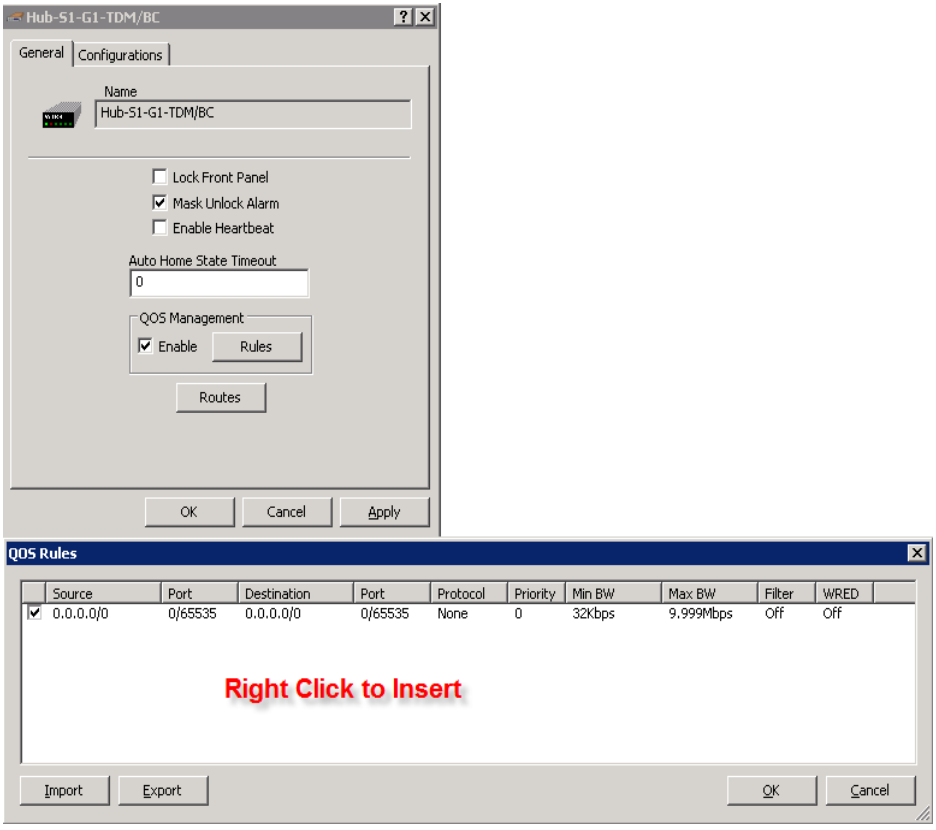


Figure 3-58 QOS Rules Configuration, CDM-570/570L

13. Right-click in the QOS Rules window to **Insert** a rule, then edit the rule settings that will apply to the remote.

When the remote transitions to a new TDM outbound, these rules will transition with it.

This concludes the VMS Network Configuration.

CHAPTER

4

CONFIGURING NETWORK MODEMS

General

This section describes using VMS to configure Vipersat network modems. Configuration of modem parameter files is accomplished using the Parameter Editor. The Parameter Editor, as used from the VMS, performs the same functions as the Parameter Editor accessed via Vipersat's VLoad utility. The uses of the Parameter Editor in VMS and VLoad differ, however, in the way the edited parameters are stored and applied.

For example, once a modem/router parameter has been changed by the VMS, clicking the OK button on the edit screen causes the change to be implemented immediately in the modem. The same change made using VLoad will not be implemented in the modem until the modified parameter file is uploaded or "put" to the subject modem/router.

The parameter modifications may also be made directly to the modem using either a console, Telnet, or HTTP connection. Refer to the modem's documentation for details on configuring modem equipment using one of these methods.

The settings of any network modem/router can be configured or modified using the VMS. Right-clicking on a device icon will display a drop-down menu showing the options that can be exercised for the device (figure 4-1).

The following describes the actions for each item/command on the drop-down menu.

Note: Many of the parameters interact with each other. Before making a change to a parameter, carefully read the instructions and note any interaction with other parameters.

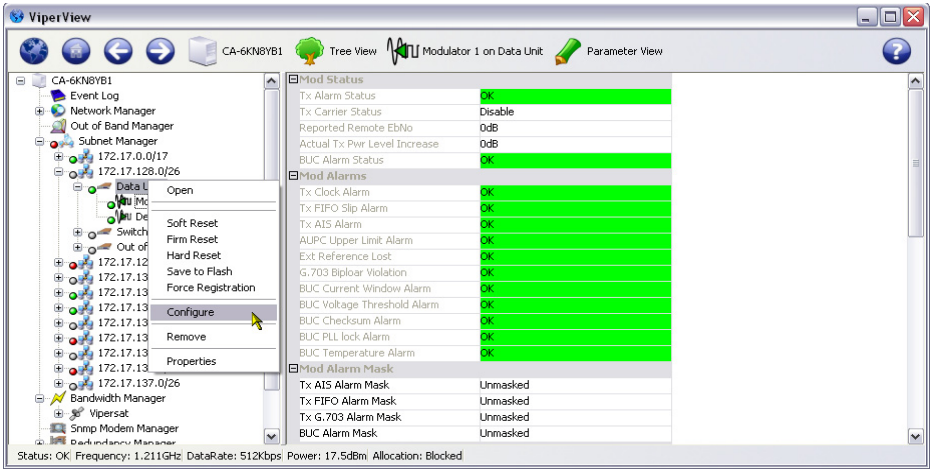


Figure 4-1 Modem Equipment Drop-Down Menu, ViperView

- **Open –** This item causes the selected modem/router to pop open a separate window displaying the device parameters for the unit.
- **Soft Reset –** This command causes the selected modem/router to perform a refresh of all latched alarms, clearing all internal table entries.
- **Firm Reset –** This command overwrites active memory in the modem/router with the contents of the unit's flash memory and executes it.
- **Hard Reset –** This command causes the modem/router to do a complete process reset. Performing a hard reset is similar to power cycling the unit.
- **Save to Flash –** This item will save all volatile configurations to the modem/router's flash memory. Anytime an operator makes a change to communication and operating parameters, it is necessary to save the changed information/configuration.

NOTE

Note: Save to Flash saves information in the selected modem/router, not in the VMS database.

- **Force Registration –** A modem/router is normally automatically registered on the network as part of the initial setup process. If this process fails, this command will force a registration attempt.
- **Configure –** This item will open the Parameter Editor, allowing configuration changes to the unit.
- **Remove –** This command deletes the device container from the VMS configuration database, removing it from selected view.
- **Properties –** This command allows access to the **General** and **Configuration** tabs for the selected unit.

Hardware Configuration

Refer to the user documentation for each modem/router in the satellite network for details on the physical installation of the device. The hardware documentation also has detailed information on using either the unit's front panel controls or a Telnet connection and the command line interface for directly configuring the target modem/router.

Configuring a Network Modem

A modem/router, when controlled by the VMS as part of a communications network, has its performance automatically controlled as VMS monitors the modem/router's role and performance in the network. VMS then commands the modem to modify its configuration, as needed, to optimize network performance.

In addition, the modem portion of each modem/router in a network can be controlled manually. Using the CDM-570/570L as an example, the listing in table 4-1 is typical of the information available in a modem/router's user documentation.

Each modem/router will have its own unique user interface and connection methods. Check the modem's documentation for details.

Note: Not all modem functions may be controlled by the VMS. Refer to the device's user documentation for instructions for using functions not available through the VMS.

Table 4-1 CDM-570/570L Modem/Router Manual Connection Options

User Interface	Connection	Modem Functions	CDM-570L Functions	Related Manual Chapters
Front Panel	Local - Keypad	ALL	IP Address/Subnet Mask only	Chapter 6
Serial Remote Control	Local - Serial RS-232 Remote Control Port	ALL	IP Address/Subnet Mask only	Chapter 14
Serial Command	Line Interface (CLI) Local - Serial RS-232 via Console Port	ALL	ALL	Chapter 17
Telnet	Local or Remote - Ethernet via 10/100 BaseT Traffic interface	ALL	ALL	Chapter 17
Web Server	Local or Remote - Ethernet via 10/100 BaseT Traffic interface	ALL	ALL	Chapter 18
SNMP	Local or Remote - Ethernet via 10/100 BaseT Traffic interface	ALL	ALL	Chapter 19

CHAPTER

5

VMS SERVICES

General

This section covers using the various Services that make up the VMS, a satellite network management system with an intuitive, user-friendly, graphical user interface which displays:

- Continuously updated network health and status information
- Multiple networks managed from a single server
- Centralized network configurations
- Organized network layouts
- Automated equipment detection
- Large network management with intuitive drag-and-drop bandwidth management and configuration.

The following sections describe the system services which, working together, form VMS.

ViperView—Monitor and Control

ViperView and the VMS Services function to monitor and control network operations as well as to provide an interface for the administrator/operator to manage and perform modifications to the network.

Caution: In a redundant VMS configuration, when any changes are made to the VMS database, a **Synchronize** command should be executed (available by right-clicking on the Servers icon, as shown in figure 5-1). This step is required to ensure that any changes made to the Active server are also made to the Standby server(s).

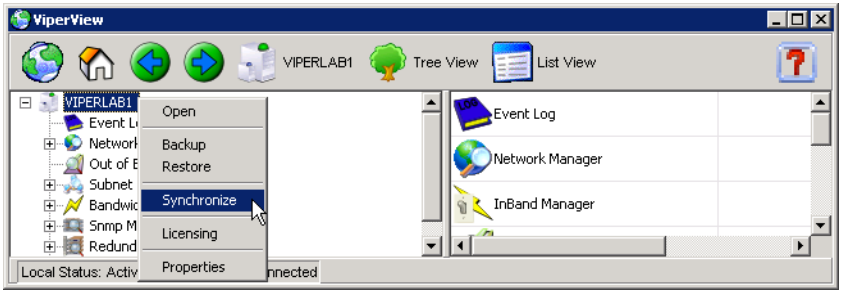


Figure 5-1 Synchronize Command

Multiple Views

VMS supports opening multiple ViperView window views, as shown on the sample screen in figure 5-2, allowing the operator to monitor several network services at once. These window views can be sized and positioned as desired.

Each of the ViperView child windows are constantly updated by the VMS, giving the operator real-time views of the current status of the network.

To open a child window, right-click on the Service or device appearance in the Tree View and select the **Open** command.

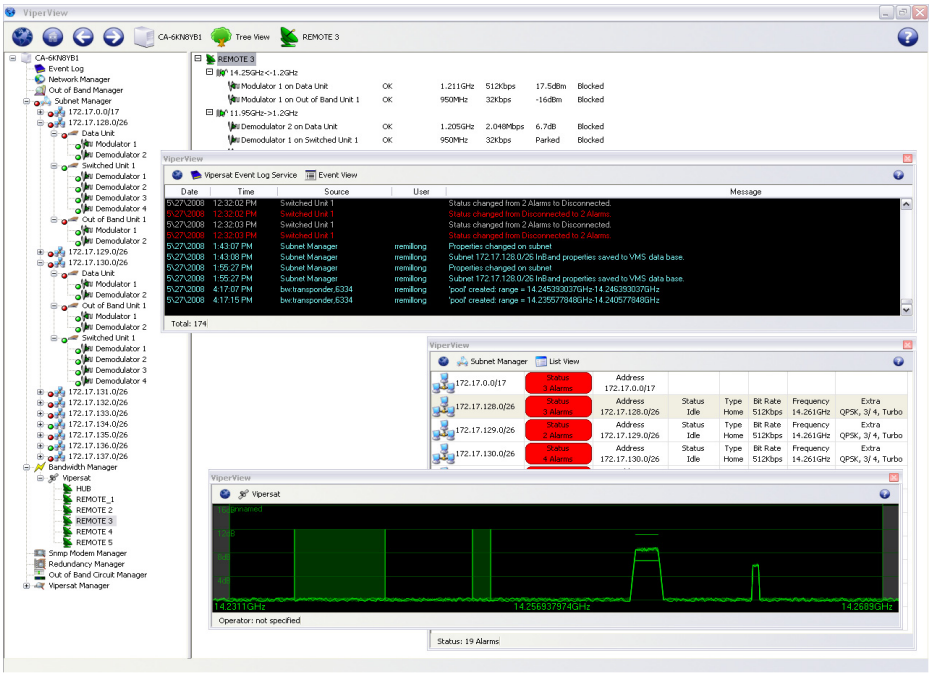


Figure 5-2 ViperView, Multiple Window Views

For example, the **Subnet Manager View** shown in figure 5-3 can be opened to display the current switch status, bit-rate, and RF frequency of all network remotes.

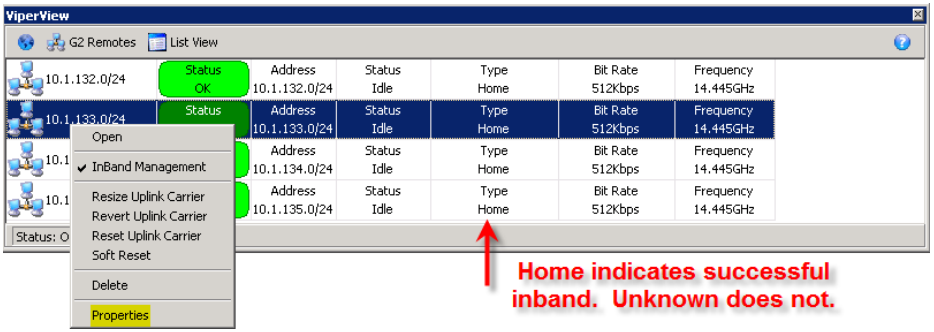


Figure 5-3 Subnet Manager View

Similarly, the **Antenna View** displays the current status of a site's Modulators and Demodulators, as shown for the Hub site in figure 5-4.

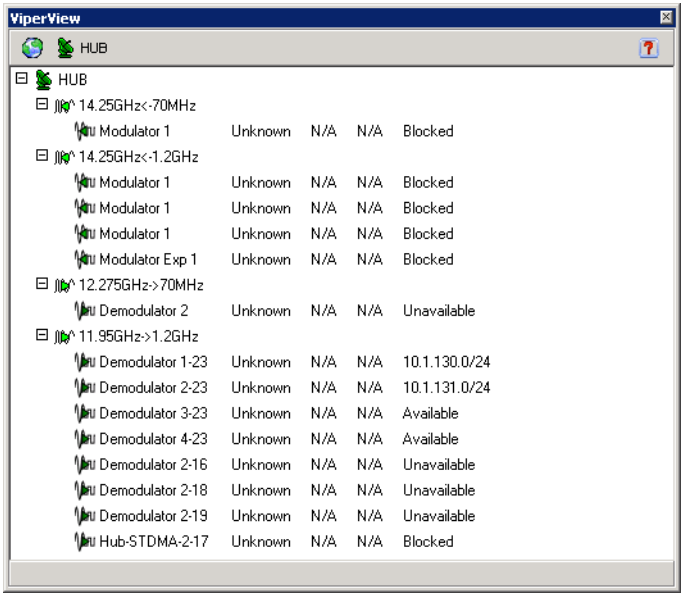


Figure 5-4 Antenna View

NOTE **Note:** The Antenna View shows L-Band frequencies.

Use the Event Log to stay current on recent network activity, as shown in the **Event View** window shown in figure 5-5.

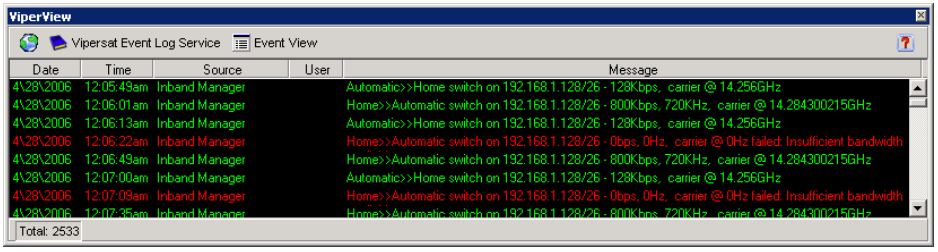


Figure 5-5 Event View

The Event View lists the details of network configuration changes, alarms, and switch events.

The **Spectrum View** displays a simulated spectrum analyzer, shown in figure 5-6, letting the operator monitor carriers and pools. The Spectrum View reports E_bN_o, space segment usage, and pool slots assigned by the VMS.

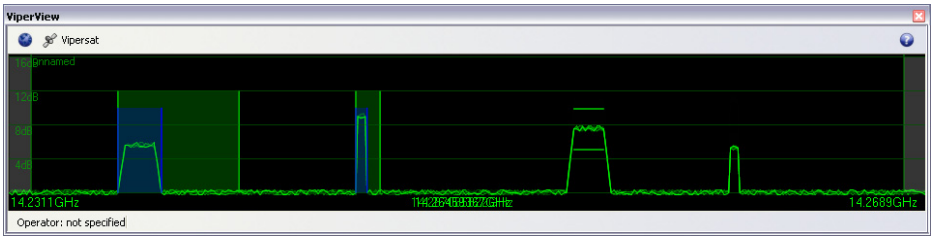


Figure 5-6 Spectrum View

The **Parameter View**, shown in figure 5-7, constantly supplies the operator with updated information for a selected unit.

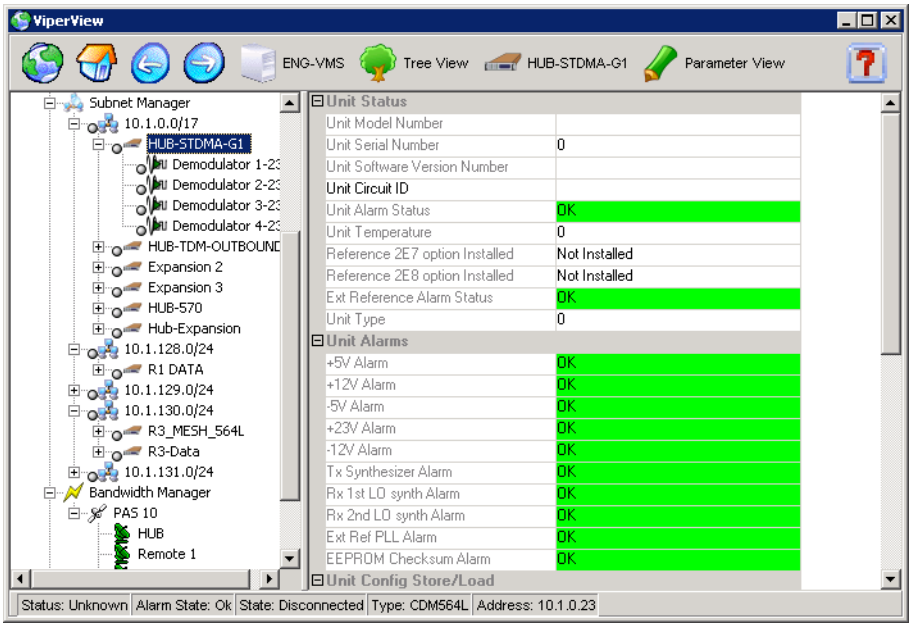


Figure 5-7 Parameter View

The **Parameter View** of a selected unit includes:

- Unit Status
- Unit Alarms
- Unit Config Store/Load
- Unit Events Log
- Unit Statistics Log
- Unit Reference

- Unit Ethernet

Right-clicking on a unit icon in the tree view displays the drop-down menu shown in figure 5-8. Use the commands from this menu to:

- **Open** a separate window for the unit's operating parameters
- Perform **Soft, Firm** and **Hard Resets**
- **Save to Flash**
- **Force Registration**
- **Remove**
- Manipulate router parameters with the **Configure** and **Properties** commands.

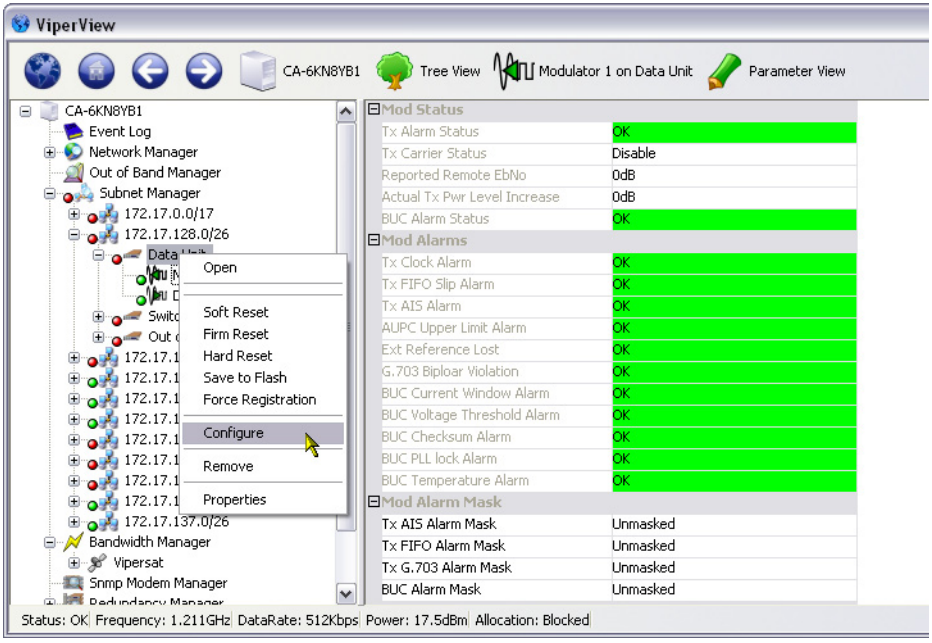


Figure 5-8 Unit Command Menu

Error Detection

Using the **ViperView** screen, you can quickly see which sites in the network are showing an error condition and which have all of the equipment and software operating normally.

Green is used, as shown in figure 5-9, to show which sites, links, and equipment which are operating normally. Red, on both the map and for entries in the menu tree to the left of the map, indicates that there is an alarm condition. Gray indicates that no status multicast (PLDM) being received.

Tip: The red error condition indicator indicates that at least one of the devices in a site is reporting an alarm condition for a link.

At this point, no details are shown, but you can very quickly expand the display so you can scan the entire network and determine the condition of each of the network's components.

At the main screen level, you have a number of choices to examine and remedy the error conditions. The tools available are easily reached from the display.

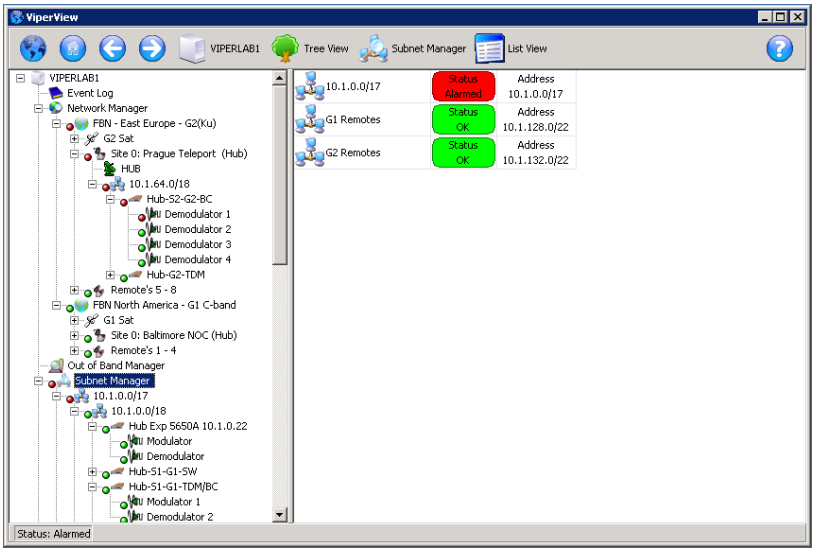


Figure 5-9 ViperView, Subnet Manager

Right-clicking on a point in the network (using either Network Manager or Subnet Manager) displays a drop-down menu which is specific to the selected point in the network. From this menu, the operator can perform any of the actions available on the list and instantly modify the parameters of that network element.

An example is shown in figure 5-10 for a data unit Modulator.

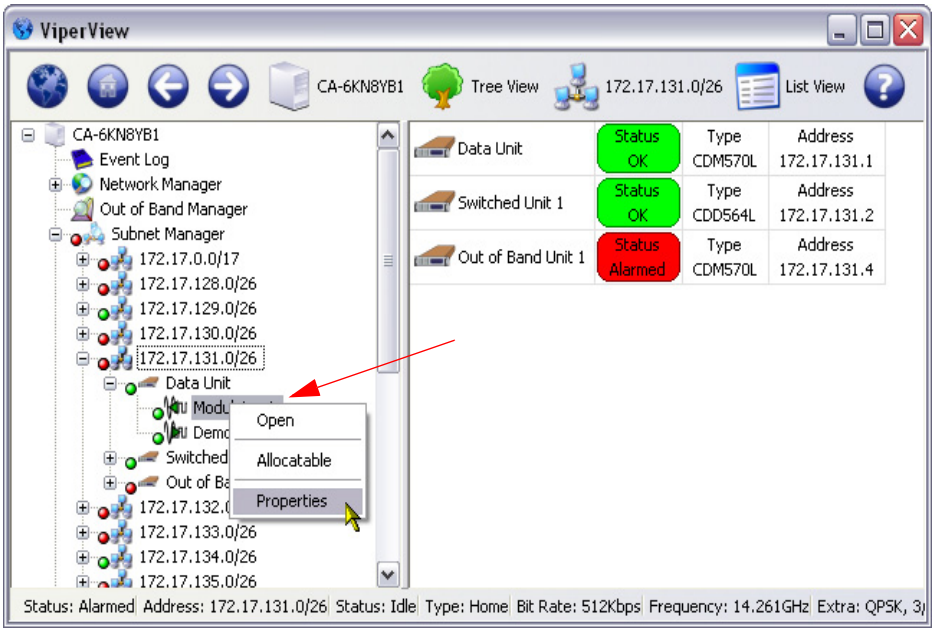
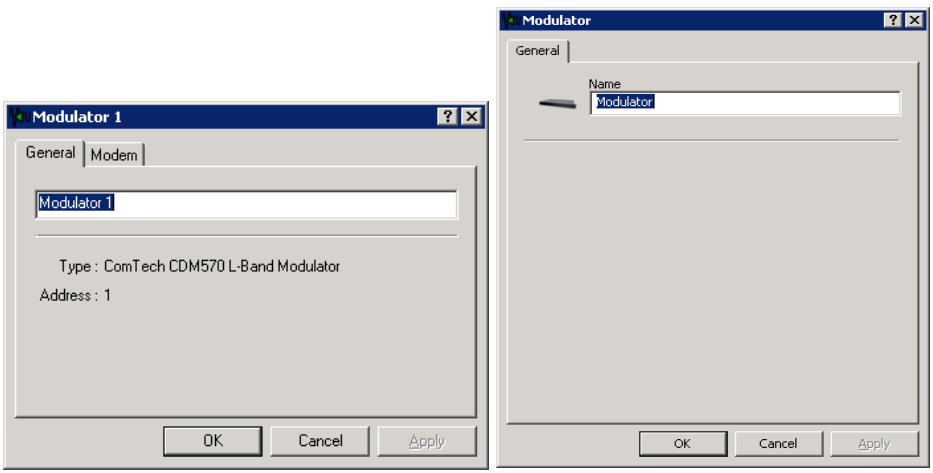


Figure 5-10 Drop-down menu

Right-clicking on the Modulator and selecting **Properties** opens the tabbed dialog shown in figure 5-11.



CDM-570/570L **SLM-5650A**

Figure 5-11 Modulator Properities dialog

The **General** tab displays the current name assigned to the modulator and allows renaming, if required.

Clicking the **Modem** tab (*CDM only*) displays the dialog shown in figure 5-12. This tab allows setting the **Flags** and the **Carrier Type** for the device.

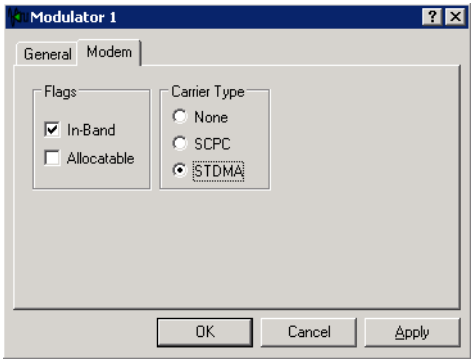


Figure 5-12 Modem tab, CDM modulator and Demodulator only

These same settings also appear in the Demodulator Properties window for both the CDM-570/570L and CDD-56X.

Event Log

The VMS **Event Log** displays a history of events occurring in the system and network. Anytime that there is a change in the current setting, status, resources, and configurations, the system ouputs an event message displaying information about the event. The displayed information is part of a complete database file of recorded network activity used for notifying the operator of possible errors or failures.

With the use of this information, the system administrator can quickly locate, identify, repair, or replace the network element that is associated with the error/failure.

Selecting the **Event Log** icon (directly below the Server icon) from the left panel of the ViperView window (figure 5-9) will display the Event Log view in the right panel. Alternatively, right-clicking on the icon allows the Event Log to be opened in a seperate ViperView child window (figure 5-13).

The Log lists all activity reported to the server. This is a useful tool when determining the functioning of the network. Each event listed is categorized by the date, time, source, and user. A message describing the activity which created the event is also provided.

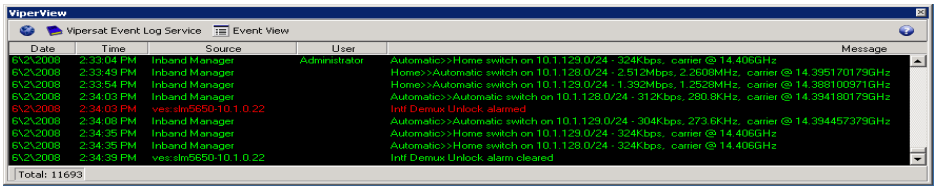


Figure 5-13 Event Log View

Each log entry is displayed using the standard VMS color scheme:

- **Green** – the logged item was completed successfully
- **Red** – The logged item failed and caused an alarm
- **Grey** – The unit was not available
- **White** – Items which do not have a status associated with them
- **Yellow** – Command
- **Blue** – Configuration change
- **Purple** – Corrupted entry

Clicking on the **Event View** icon on the Object Bar, as shown in figure 5-13, displays a drop-down menu with five commands:

- Clear
- Twelve Hour
- Filters...
- Export...
- Refresh

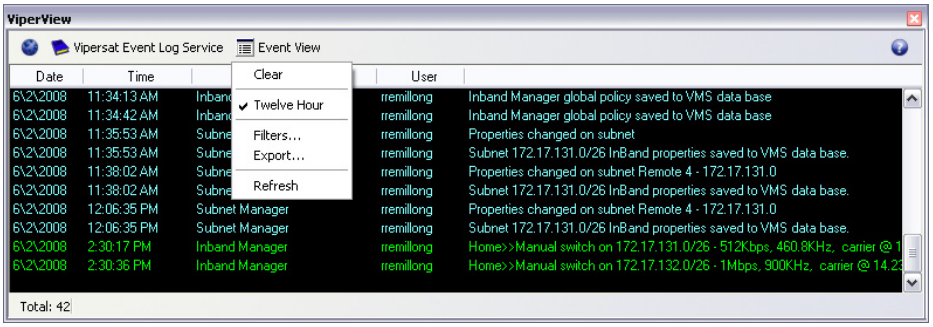


Figure 5-14 Event View Menu

Clear

Selecting **Clear** from the menu deletes all previously recorded events from the log.

Twelve Hour

Selecting the **Twelve Hour** clock setting will toggle between 12 or 24 hour event time stamping.

Filters...

Selecting the **Filters...** command from the menu opens the **Event Log View** dialog shown in figure 5-15. Here, the log entries appearance can be tailored to display either a particular type of event and/or a specified date range.

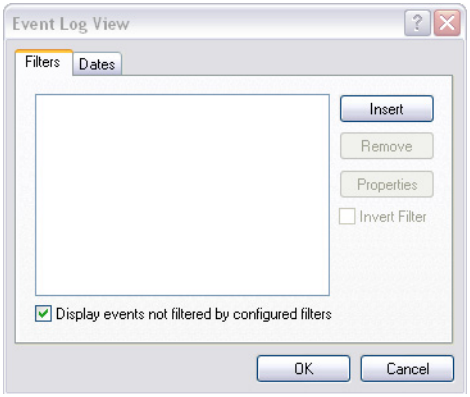


Figure 5-15 Event Log View, Filters tab

Filters Tab

Clicking the **Insert** button opens the **Insert Object Wizard** dialog, shown in figure 5-16, for selecting an event filter. From the list in the **Name** box, select the filter for the type of event to be displayed in the log.

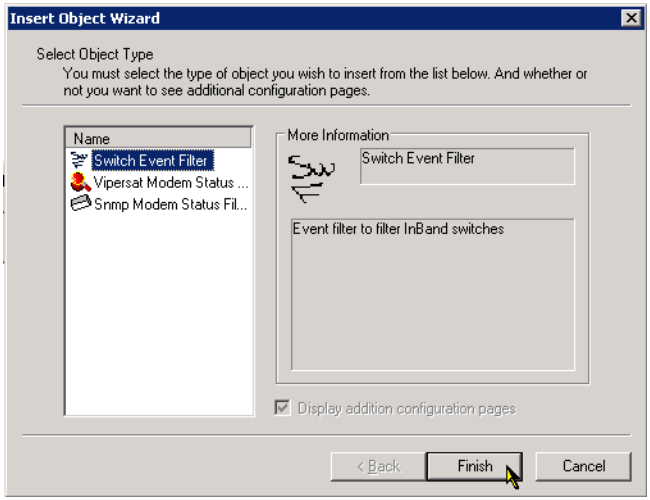


Figure 5-16 Event Log Filter Selection

Note: Currently, there is a set of predefined filters available for the Event Log. As additional filters become available, they can be added to the VMS program through an installer utility.

Clicking the **Finish** button adds the selected object type to the **Event Log View** Filters tab. Multiple filters can be inserted.

The *Display events not filtered by configured filters* check box provides an override to the filter list, allowing all events to be displayed in the log view.

Dates Tab

Similarly, the **Dates** tab can be selected for specifying the date and time to start and stop viewing events, as shown in figure 5-17.

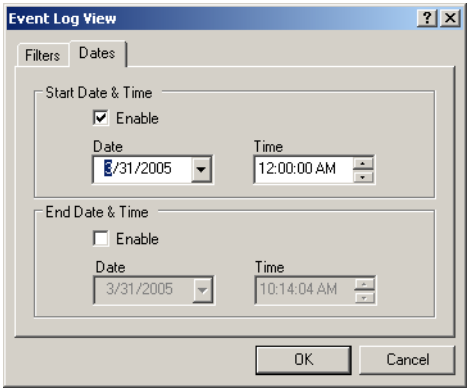


Figure 5-17 Event Log Dates tab

The parameters entered on the **Filters** and **Dates** tabs work together to provide customized Event Views of network activity.

NOTE

Note: A billing translation program is available in the VMS for processing the event log to extract billing information. This program, described in Appendix H, "VMS Billing Log Translator (VBLT)", filters entries in the event log into a format which can be used for billing purposes.

Export

Selecting the **Export** command will open a windows file **Save As** dialog, prompting the operator to enter a file name and location to save the event log. The file is exported as an *Extensible Markup Language* (XML) file, which is a simple and very flexible text format for import into most database applications.

Refresh

Selecting the **Refresh** command will update the log with any pending events waiting in the event thread.

Alarm Masks

Alarm masks are a VMS tool that is used to limit false alarms generated by normal system operations.

Viewing/Setting Alarm Masks

Demodulators that are typically being locked and unlocked, such as switched demodulators/burst controllers, should have the Unlock Alarm masked. The setting of other alarm masks will depend on usage and whether or not a BUC is installed.

Alarms masks are viewed and set for the modem in the device view, as shown in figure 5-18 and figure 5-19.

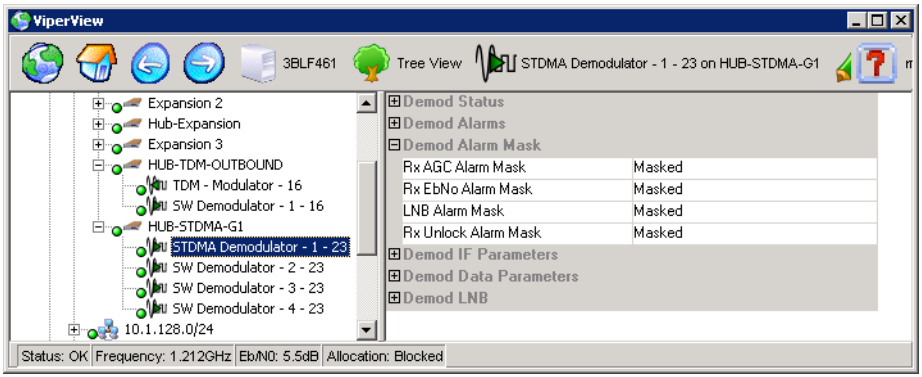


Figure 5-18 Demodulator Alarm Masks

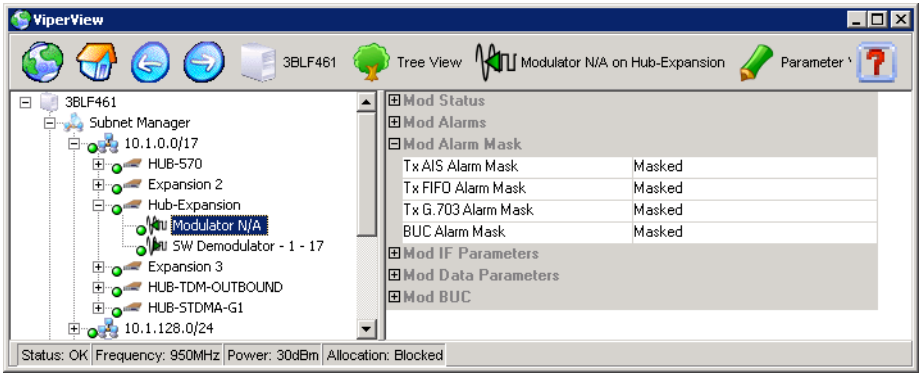


Figure 5-19 Modulator Alarm Masks

To mask/unmask alarms for a device, select the device in the left panel tree view, then select an alarm from the Alarm Mask list in the right panel. Use the pull-down menu to select either **Unmasked** or **Masked**.

The alarm mask settings shown in table 5-2 are for a typical VMS network.

Table 5-2 Alarm Masking in a Typical Network

Device Type	Demodulator Lock Status	Demodulator Level Alarm	Demodulator Auto Gain Ctrl
TDM/ Burst Cont.	X	X	X
Remote			
Hub Expansion	X	X	X
Remote Expansion	X	X	X

Unlock Alarm Masks

InBand modem device **Mask Unlock Alarm** flags mask and set park states every time the modem registers with the VMS. These flags simplify and reduce the device item-by-item settings, making them persistent during active state. These flag settings are typically set on modems that are switched expansion units or hub burst demodulators. If these devices are not masked, the unit will generate many unwanted alarms in the system during normal operations.

Hub burst demodulators, when masked, only shutdown their link status alarms that are typically part of the carrier lock/unlock, leaving all other internal alarms unmasked.

The hub and remote expansion demodulator carrier alarm mask is cleared each time it is switched to receive a return carrier from a remote. This unmasking of alarms remains until the demodulator is returned to a parked state (unlock), where it is re-masked to prevent unwanted network alarms.

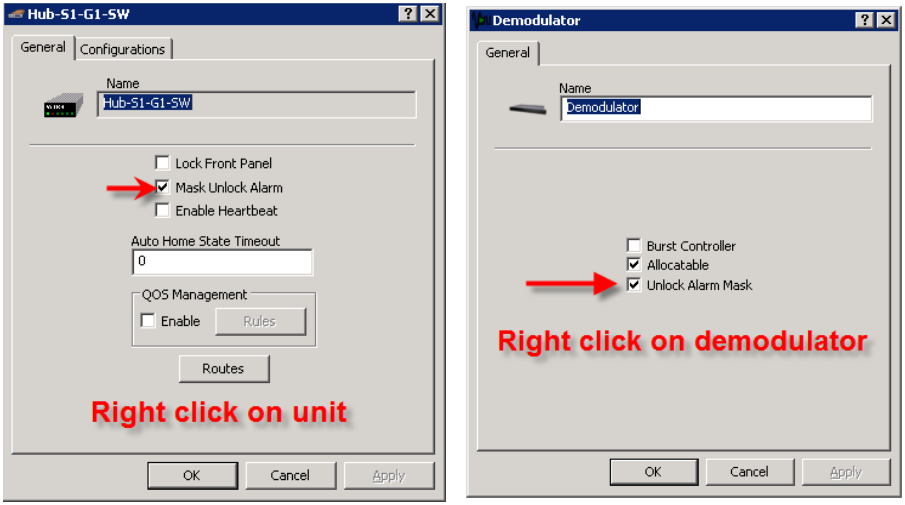
If the modem is rebooted, the alarm masks are cleared until the next VMS registration.

Note: It is not necessary to mask the SLM-5650A hub burst demodulator. If the alarm mask is set for this device type, the front panel carrier lock LED's WILL NOT illuminate.

The Unlock Alarm mask for a device is set from the **Properties** dialog.

For a CDM-570/570L or a CDD-56X, open the Properties window for the unit, as shown in figure 5-20.

For an SLM-5650A, open the Properties window for the demodulator.



CDM-570/570L, CDD-56X **SLM-5650A**

Figure 5-20 Mask Unlock Alarm Flag

VMS Service Managers

When VMS is started on the server and ViperView is opened on the client workstation, the Server View, shown in figure 5-21, displays the installed VMS Services. Included in this display are the Network Manager, the InBand Manager, the Out-of-Band Manager, the Subnet Manager, the Bandwidth Manager (replaces the Upstream Manager in previous versions), the SNMP Modem Manager, the Redundancy Manager, the Out-of-Band Circuit Manager, and the Vipersat Manager.

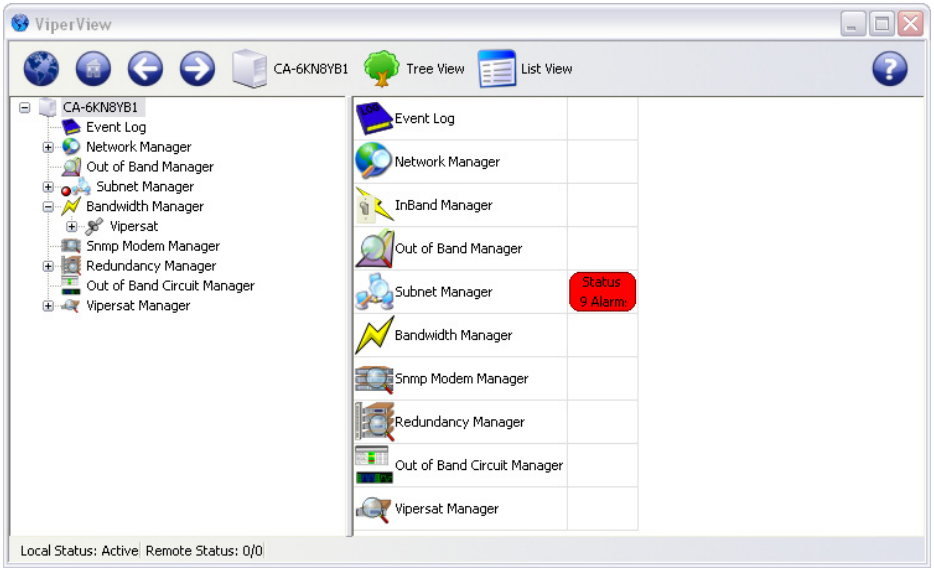


Figure 5-21 Server View

Vipersat Manager

The Network View under the Vipersat Manager displays all of the units sharing the same network number, as shown in figure 5-22.

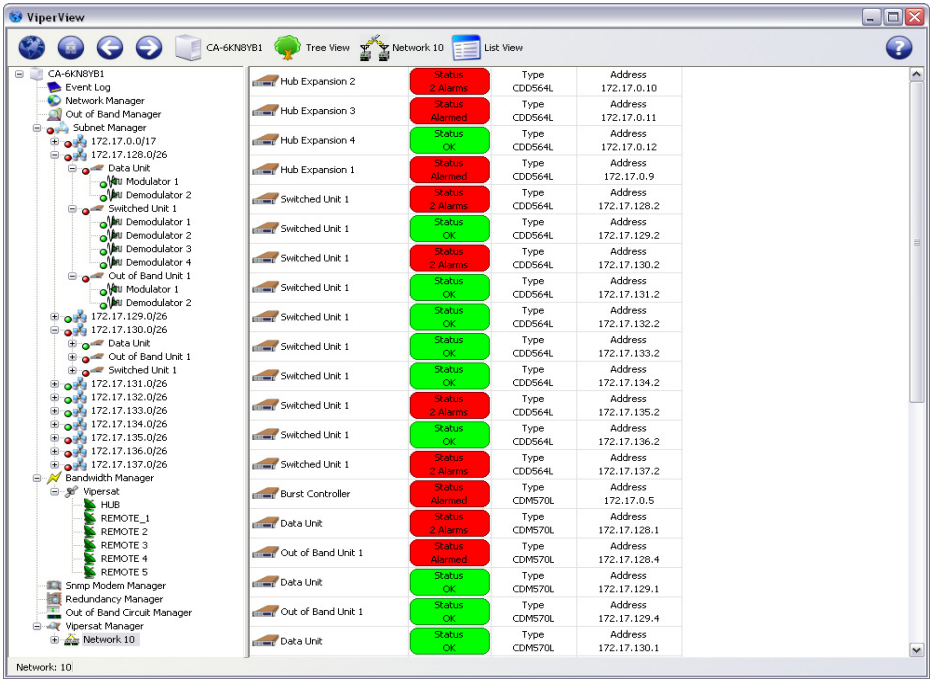


Figure 5-22 Vipersat Manager Network View

The health status of each unit in the Network View is indicated by the unit's status color and the supporting text.

InBand Manager

Right-clicking on the **InBand Manager** icon displays the Properties command, shown in figure 5-23.

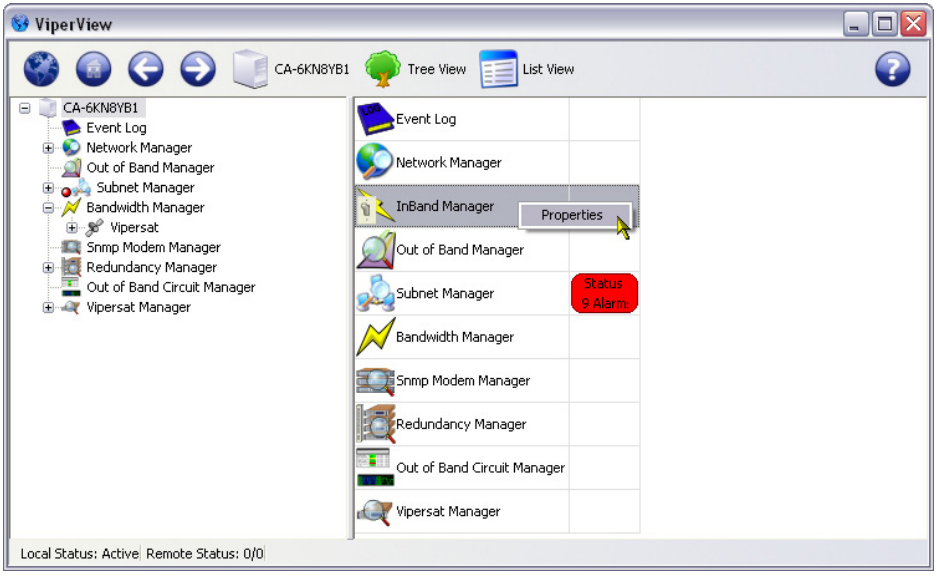


Figure 5-23 InBand Manager Properties Command

Selecting the **Properties** command displays the **InBand Manager** window shown in figure 5-24.

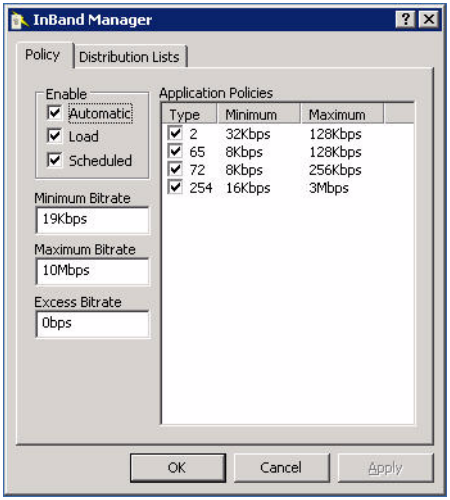


Figure 5-24 InBand Manager, Policy tab

Policy Tab

From the InBand Manager **Policy** tab you can set the global policies under which switching will occur in the Vipersat network. These policy settings are set globally for all networks and are propagated down to all remotes in the system. Independently each remote's policy will inherent the global policies, but the operator may choose the break the inherent settings and configure each site independently.

The check boxes at the top of the tab allow you to enable or disable the following functions:

- Automatic Switching
- Load Switching
- Scheduled Switching (Using VCS)

Bitrate Limits

In the **Bit Rate Limits** box you can set the **Minimum**, **Maximum**, and **Excess** bit rate limits for the network. These values are used to determine the load switching bit rate trigger points.

Minimum - This is the minimum bit rate value for all circuits on the site.

Maximum - This is the maximum bit rate value for all circuits on the site.

Excess - This value is added to application switched circuits to accommodate momentary excess data flow.

Application Policies

Application Policies are created here at the global system level, but can be either modified or disabled at the site level (Subnet Manager) to accommodate specific site requirements. In the **Application Policies** box you can **Insert**, **Modify**, and **Remove** policies for individual circuit types, then either select or de-select these policies once entered.

Right-clicking in the blank area of the Application Policies box displays a drop-down menu for Inserting a policy. Right-clicking on an existing policy displays a choice to Insert a new policy or Remove the existing policy. A policy can be modified by double-clicking on the policy to enter the edit mode which allows the Type, Minimum bitrate, and Maximum bitrate parameters to be changed.

Choosing **Insert** displays the **Application Policy** dialog shown in figure 5-25.

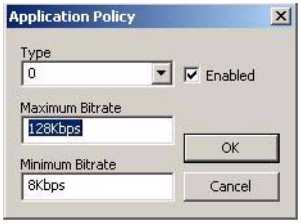


Figure 5-25 Application Policy dialog

Using this dialog, you can establish policy parameters for Type and Bitrate (Maximum and Minimum).

Type

Enter the type of circuit here. Application Policy Type numbers have the following convention:

1 — Scheduled Switching and VFS (Vipersat File Streamer)
2 — Voice
3 — Video
4-64 — Reserved for the System
65-253 — User Defined
254 — Uninterruptable Switch (used to ensure that additional applications will not generate a switch, thus preventing video glitches)

Caution: Do not assign circuit types within the Vipersat reserved range as you may cause conflicts if a future VMS release uses that circuit type as a pre-assigned value.

Maximum Bitrate

The **Maximum Bitrate** affects all circuits of the selected type for the site. This parameter is the rate that any single session of a policy type can not exceed. Once this bit rate is reached, no additional automatic switch requests (ASRs) will be accepted by the VMS.

Minimum Bitrate

The **Minimum Bitrate** affects all circuits of the selected type for the site. This is an absolute minimum value that no selected-type transmission bit rate can be less than.

An **Enabled** check box is provided for specifying whether or not this policy is enabled.

Once an application policy is created, clicking on the **OK** button will display the Policy tab with the new policy appearance, as shown in figure 5-26.

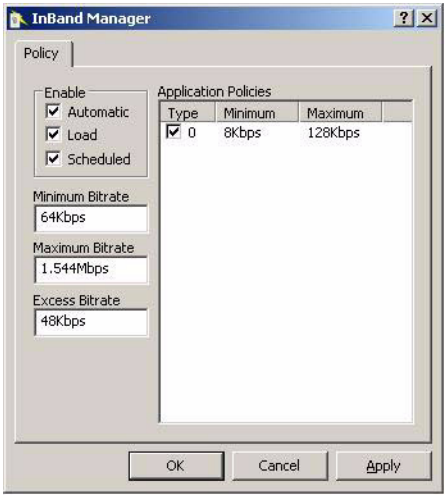


Figure 5-26 Revised Policy Tab

Application policies can be modified by directly clicking on them and editing the parameters. To remove a policy, right-click on the policy and select **Remove** from the pull-down menu. A confirmation is required to execute this command.

Figure 5-27 Remove Application Policy dialog

Distribution Lists Tab

Distribution Lists are used to define multiple target subnets for point-to-multi-point distribution on an inband service connection whenever an upstream switch to a specific destination IP address occurs, such as to a multicast address.

Distribution lists are created here at the global system level, but can also be created, modified, or disabled at the site level (Subnet Manager) to accommodate specific site requirements.

In the Distribution Lists box you can **Insert**, **Modify**, and **Remove** lists for individual subnets, then either select or de-select these lists once entered through the use of the check boxes.

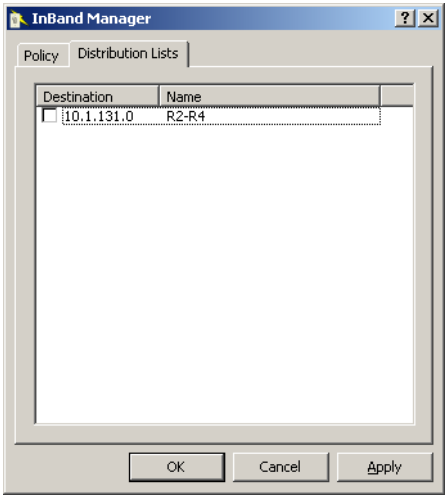


Figure 5-28 InBand Manager, Distribution Lists tab

1. Right-click in the blank area of the Distribution Lists box to display the **Insert** command for inserting a new list.

Right-click on an existing list to display a choice to **Insert** a new list, **Modify** the existing list, or **Remove** the existing list.

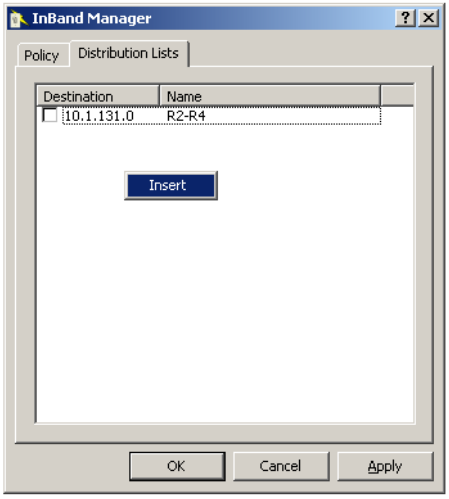


Figure 5-29 Distribution Lists, Insert Command

2. Choose **Insert** to open the **Distribution List** window shown in figure 5-30.

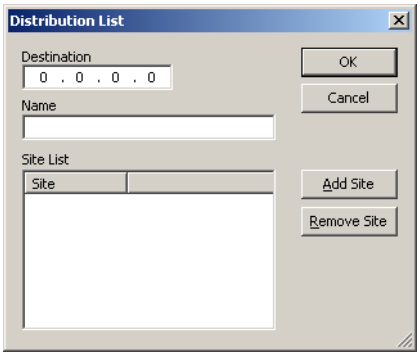


Figure 5-30 Distribution List Window

3. Enter the desired **Destination** IP address.

Typically, this will be a unique multicast address for a specific remote or remotes utilizing the same application. Note, however, that the destination address does not have to be a *valid* IP address; it can be a non-valid IP address that is used exclusively for a distribution list, for example.

4. Enter the **Name** for identifying this distribution list.

5. Click on the **Add Site** button. A search dialog will open, allowing the desired subnet(s) to be selected from the VMS network.

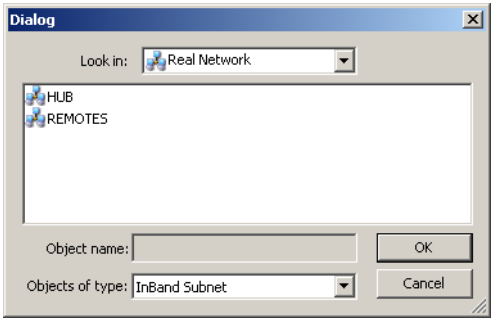


Figure 5-31 Add Site Dialog, Search Network

6. Double-click on the appropriate network element to navigate the network tree until the desired subnet address appears, as shown in figure 5-32. Select the subnet and click OK to add this site to the list.

NOTE

Note: Only one selection at a time can be added to the list.

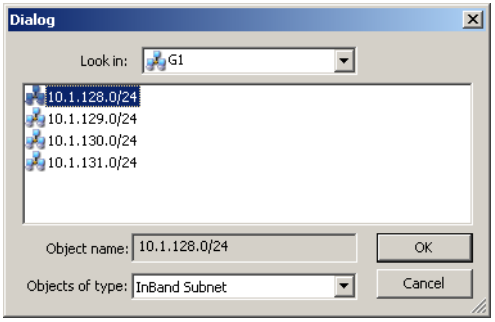


Figure 5-32 Add Site Dialog, Select Subnet

7. Repeat this process until all of the desired subnets have been added to the list.

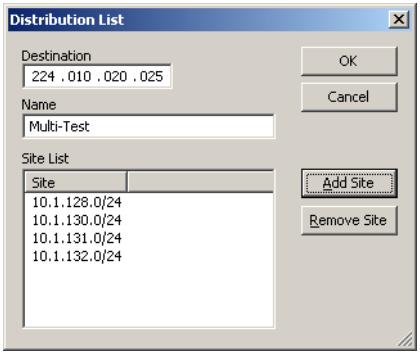


Figure 5-33 Distribution List Window, Configured

8. Click on the **OK** button to insert this list in the Distribution Lists tab.

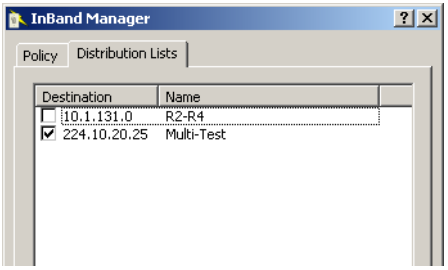


Figure 5-34 Distribution List Created

9. The new list can be enabled or disabled by clicking in the check box.

InBand management allows Application Policies and Distribution Lists to be selected on a remote site-level basis and allows the system operator to enable and disable mesh and upstream switching or use policies/lists for selected remotes that differ from the global policies/lists. These site-level policies and lists are established using the Subnet Manager.

Subnet Manager

The Subnet Manager provides a tree view from which the operator can drill down to investigate alarms. Device management can easily be performed from this view as it displays significant device parameters on the right side of the screen shown figure 5-37.

Clicking on the **Subnet Manager** icon in either the right or left column of ViperView displays a view of all subnets, the status of the switching modulator, the type of switch, if any, and the current transmitting bit rate and frequency.

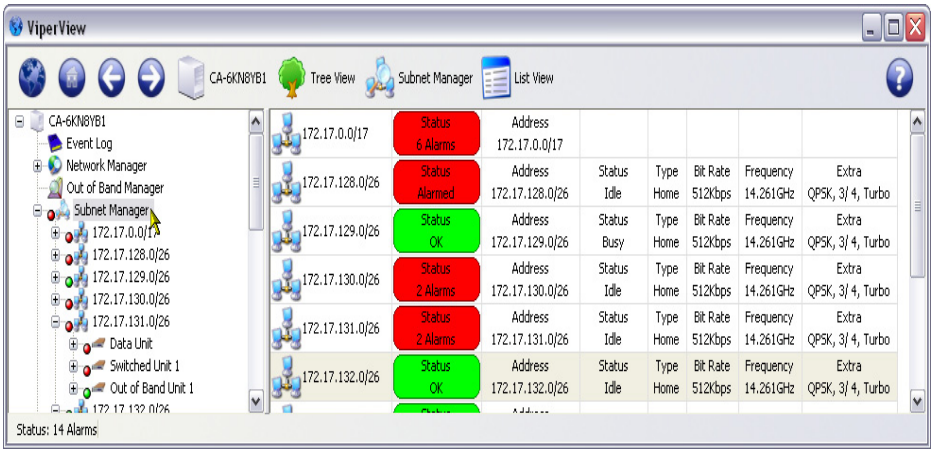


Figure 5-35 Subnet Manager

Tip: You can create a separate window, shown in figure 5-36, to display the information in the right panel of Viperview by right-clicking the icon, then selecting **Open** from the drop-down menu. This window can then be placed anywhere on your desktop and will continue to display its contents after you move on to other tasks.

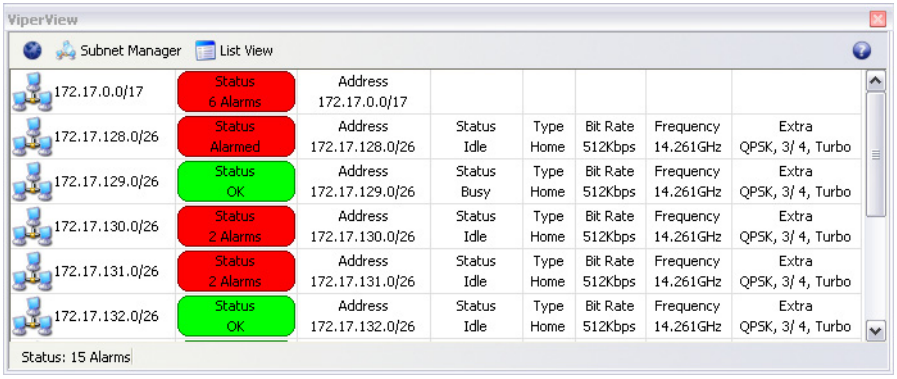


Figure 5-36 Separate window

NOTE

Note: The same information is displayed in both the right-panel display in figure 5-35 and the separate window display shown in figure 5-36. Both of these displays are continually updated by VMS as new data is received from the network.

Clicking on an individual subnet displays all of the units associated with the subnet with their **Status**, **Alarm State**, current device **State**, unit **Type** and IP **Address** information displayed as shown in figure 5-37.

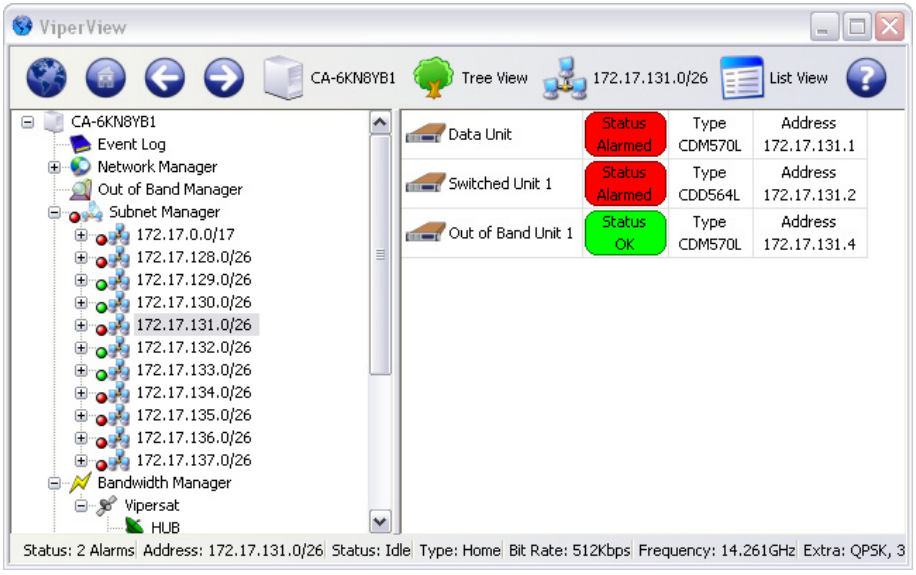


Figure 5-37 Subnet Manager

Subnet Manager Configuration

Right clicking on an individual subnet displays a drop-down menu, as shown in figure 5-38, allowing the operator to:

- Open
- Soft Reset
- InBand Management
- Resize Uplink Carrier
- Revert Uplink Carrier
- Reset Uplink Carrier
- Delete
- Properties

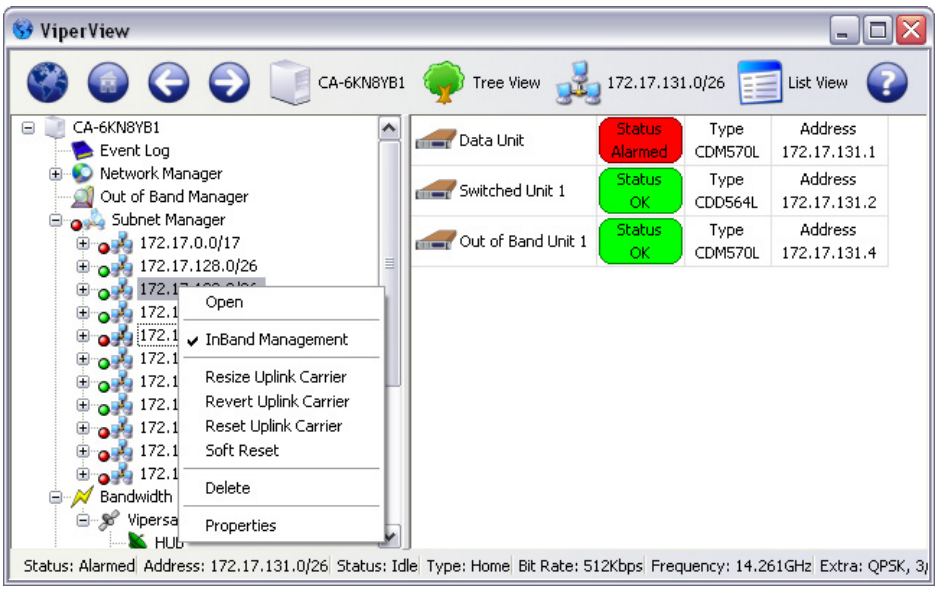


Figure 5-38 Subnet Manager configuration

Open

Clicking the **Open** command creates an independent window with the data shown in the right portion of the screen in figure 5-38. The independent window appears as shown figure 5-39

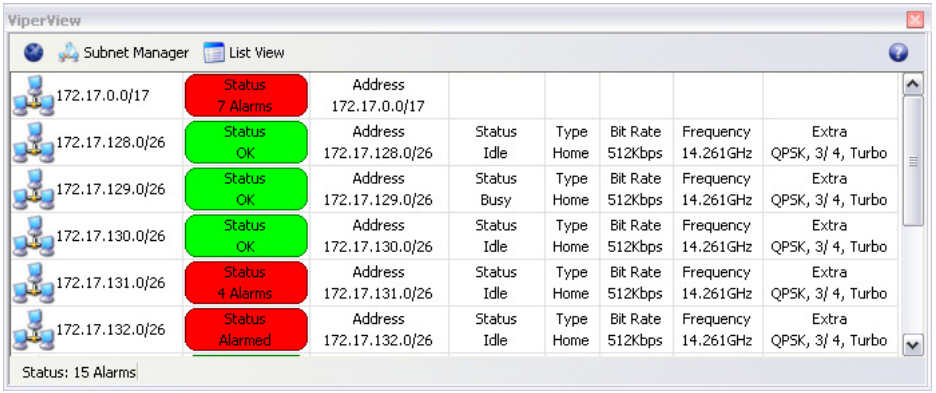


Figure 5-39 Subnet Mananger open command window

The independent window can be placed anywhere on the screen and is constantly updated by VMS as new information is received from the network.

InBand Management

Selecting the **InBand Management** command shown in figure 5-38 brings up the **Select Modem** dialog shown in figure 5-40. Selecting a modulator from the **Name** list and then clicking the **OK** button sets the Home State for the subnet to the current values assigned to the selected modulator.

Choose the modulator on the modem that is to be the designated switching modulator for the subnet.

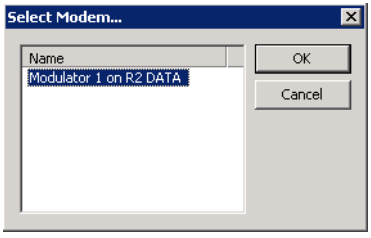


Figure 5-40 Select modem dialog

If the drop-down menu in figure 5-38 was checked indicating that InBand Management was enabled, clicking the **Inband Management** checked InBand Management command brings up the **Disable In-Band Extension** warning shown in figure 5-41.

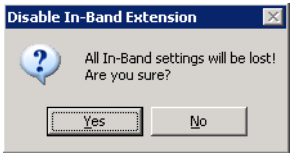


Figure 5-41 Disable in-band extension warning

Clicking the **Yes** button will disable in-band extension and you will lose the home state and policy settings set when In-Band Extensions were enabled.

Soft Reset

Selecting the **Soft Reset** command from the drop-down menu causes an immediate soft reset of the selected unit.

Resize Uplink Carrier

Selecting the **Resize Uplink Carrier** command from the drop-down menu in figure 5-38 displays the dialog shown in figure 5-42. You can enter a new bit rate value for the uplink in the **New Bitrate** window when manually switching to SCPC mode.

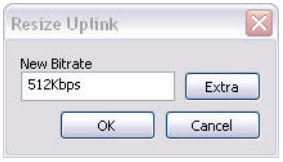


Figure 5-42 Resize uplink dialog

Clicking the **Extra** button brings up the dialog shown in figure 5-43. The items listed in the Modem Extra listing will vary depending on the modem types.

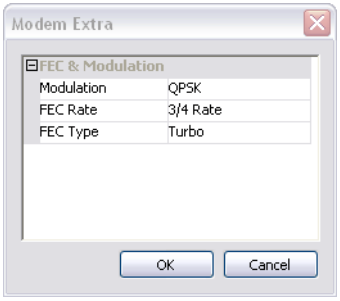


Figure 5-43 Uplink Modem Extra dialog

Using this dialog you can change the FEC and Modulation characteristics of the uplink SCPC carrier when manually switched.

Revert Uplink Carrier

The **Revert Uplink Carrier** command returns the remote modem to its home state settings. This command is appropriate to use when SCPC transmission is no longer required, switching back to STDMA mode, or communications with the remote have been lost and it is *unknown* whether or not the modem is still transmitting. Unlike the Reset command (see below), the bandwidth slot is retained in case the modem communications are restored.

Selecting the Revert Uplink Carrier command from the drop-down menu in figure 5-38 will display the **Revert Uplink** confirmation dialog shown in figure 5-44. Clicking the **Yes** button will cause the selected unit to revert to its home state.

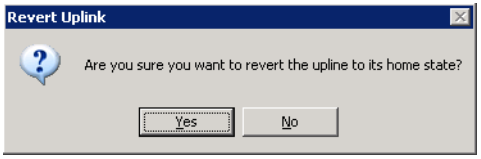


Figure 5-44 Revert uplink carrier dialog

Reset Uplink Carrier

As with the Revert command (see above), the **Reset Uplink Carrier** command returns the remote modem to its home state settings. However, this command is appropriate to use when communications with the remote have been lost and it is *known* that the modem is not transmitting so as to prevent the occurrence of an interfering carrier. The bandwidth slot is freed for use by another network device.

Because of the possibility of an interfering carrier being created if the remote is still transmitting, selecting the Reset Uplink Carrier command shown in figure 5-38 displays the **Reset Uplink** warning shown in figure 5-45.

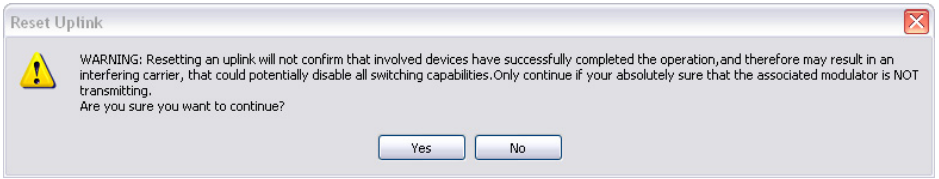


Figure 5-45 Reset uplink warning

Caution: Read the Reset Uplink warning carefully, as performing this operation on a unknown transmitting unit may cause carrier interference on operating network. It is safe to reset resources for a remote if it is known that the remote is not transmitting, powered down or faulty.

Delete

Click the **Delete** command will delete the subnet from the network,

Properties

The Subnet Properties page tabs are described below.

General Tab

The **General** tab allows the operator to view or change the name of the subnet. Subnets declared are listed in the **External Subnets** list.

Note: External subnets apply when an application or ToS switch originates past a router at the remote.

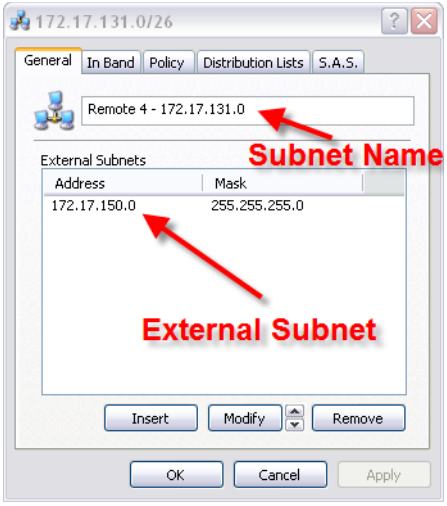


Figure 5-46 Properties general tab

- **Insert** - Clicking the **Insert** button brings up the New Subnet dialog shown in figure 5-47. Enter the IP address and subnet mask for the new subnet in the **Address** and **Mask** dialog boxes.

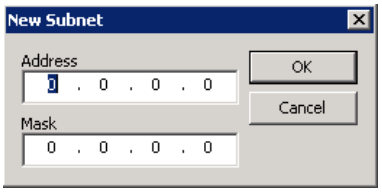


Figure 5-47 New subnet dialog

- **Modify** - Selecting an existing subnet from the **External Subnet** listing then clicking the **Modify** button brings up the **New Subnet** dialog displayed in figure 5-47. The existing subnet IP address and subnet mask will be displayed. Make the modifications required in this dialog then click the **OK** button to make the changes.
- **Remove** - Selecting an existing subnet from the **External Subnet** listing then clicking the **Remove** button deletes the sunbet from the list.

In Band tab

The I**n Band** tab **Home State** box, shown in figure 5-48, shows the switching modulator device's home state:

- Frequency
- Bitrate
- Power

You can enter new values, as required, for each of these parameters in the dialog box associated with the parameter.

Figure 5-48 In Band Tab, Subnet Properties

Clicking on the **Extra** tab displays the Modem Extra dialog shown in figure 5-49, allowing the operator to set the type of Modulation, FEC Rate, and Code Type for the unit's home state.

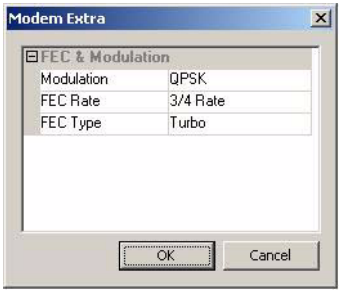


Figure 5-49 Modem Extra dialog

These settings can be modified by clicking on the desired parameter and choosing a new setting from the pull-down menu that appears.

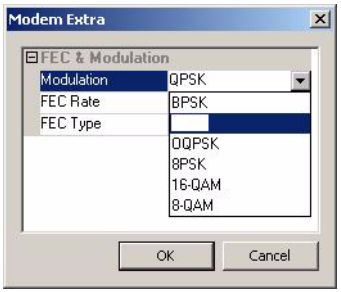


Figure 5-50 Modify, Modem Extra

NOTE

Note: During initial unit registration the set information in the modem is propagated to the VMS database which fills in the Home State values.

The **In Band** tab also identifies the switching **Modulator** (the remote data modulator) for the subnet, **Downlink Modulator** is the hub forwarding (outbound) TDM modulator to remote (used for Roaming applications) and the **Uplink Demodulator** is the Home State hub demodulator (typically is the STDMA demodulator). These associated devices set the known states for recovering remote data units.

Clicking the **Select** button brings up the **Select Modem** dialog shown in figure 5-51.

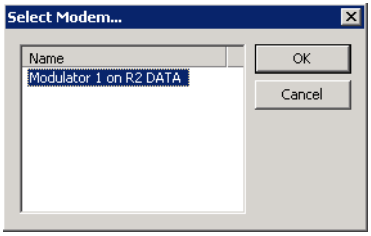


Figure 5-51 Select Modem dialog

NOTE

Note: If the demodulator field is blank either the burst controller or remote flags are incorrect or the remote is not registered.

Clicking the **Select** button in the **Uplink Demodulator** box displays the **Select Demodulator** dialog shown in figure 5-52.

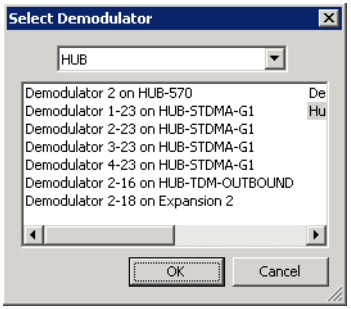


Figure 5-52 Select demodulator dialog.

Using this dialog you can select a different demodulator for the subnet to replace the existing demodulator. Clicking the **OK** button will change the selection.

NOTE

Note: Home State Demodulators are associated and linked by transmission settings, frequency, data rate, modulation and FEC rate. If changing system selected unit to another will require manual tuning and realignment of remote unit configurations.

Policy tab

The check boxes at the top of the **Policy** tab shown in figure 5-53 default to the InBand Manager settings, but can be locally enabled or disabled as follows:

- If the boxes are greyed and checked, global policies are in use.
- If the boxes are white and unchecked the feature is disabled.
- If the boxes are white and checked local policies are in use.

These policy states for each switching mode can be selected by clicking on the boxes until the desired policy state for that switching mode is displayed.

In the **Bitrate Limits** box, values for **Minimum**, **Maximum** and **Excess Bandwidth** can be defined based on a particular remote's link budget and requirements.

The application policies displayed in the **Application Policies** box are created using the **Insert** command. Refer to the section "Application Policies" on page 5-20 for more detailed information on setting policies.

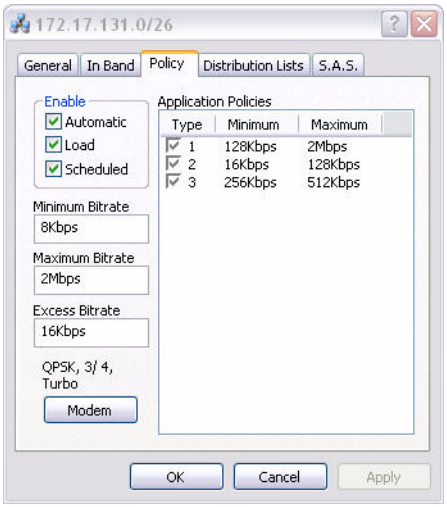


Figure 5-53 Policy Tab, Subnet

Selecting an existing application policy, as shown in figure 5-53, and then clicking directly on one of the parameters allows you to modify the policy for the selected policy type. However, an existing policy cannot be removed from the Subnet site level; an application policy can only be removed from the InBand Manager global level.

Advanced modem settings for a switch type can be configured by clicking on the **Modem** button and modifying the Modem Extra parameters. These settings temporarily override the home state settings, and only apply when this switch occurs.

If the Modem button is inactive (greyed-out), it will be necessary to return to the In Band tab and open the Select Modem dialog (figure 5-51), then select the desired modem. The Modem button in the Policy tab will now be active.

Distribution Lists Tab

Distribution Lists are used to define the target subnets for point-to-multipoint distribution on an inband service connection whenever an upstream switch to a specific destination IP address occurs, such as to a multicast address.

Distribution lists are created at the global system level (InBand Manager), but can be either modified or disabled here at the site level to accommodate specific site requirements.

Opening the Distribution Lists tab for a subnet will display the global lists that were created using InBand Manager, as shown in figure 5-54.

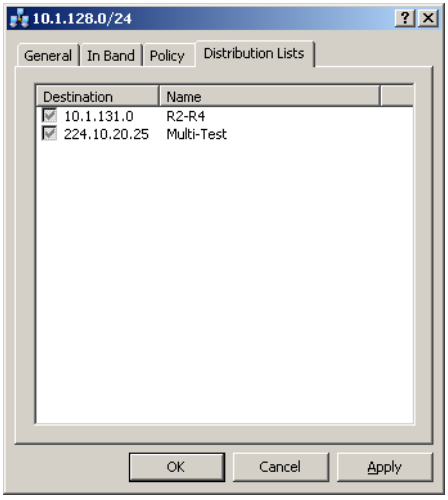


Figure 5-54 Distribution Lists Tab, Subnet

The enable/disable check boxes for the existing lists are greyed and checked, indicating that global settings are in effect. At the subnet level, these lists can be altered by clicking on the box until the desired state for that list is displayed:

- Click once to uncheck (disable) the list for this subnet.
- Click twice to check white box for list to be modified for this subnet.

The figure below shows that the second distribution list has been altered to allow its modification for this site.

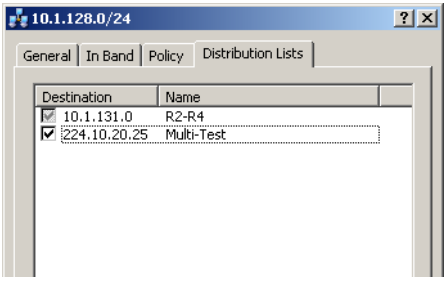


Figure 5-55 Distribution List Enabled for Site Modification

Right-clicking on an existing list displays a choice to either **Insert** a new list, **Modify** this list, or **Remove** this list.

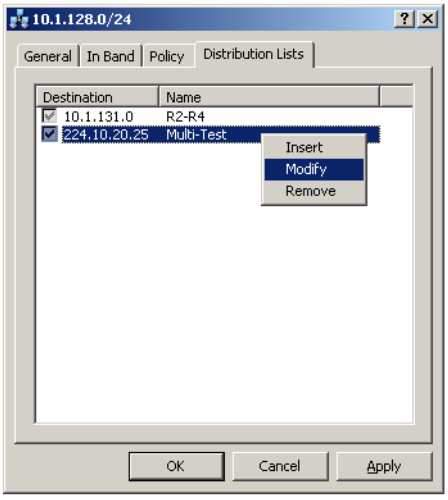


Figure 5-56 Modify Site List

In this example, the Modify command is selected, opening the **Distribution List** window shown in figure 5-57.

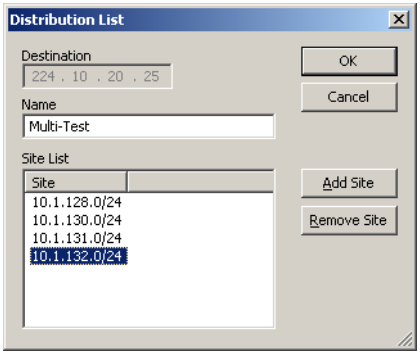


Figure 5-57 Distribution List Window, Site Modification

Here, the list can be modified by adding and/or removing sites from the list. To add a site, click on the **Add Site** button and follow the procedure outlined in section “Distribution Lists Tab” on page 5-22. To remove a site, select the desired site and click on the **Remove Site** button.

Once all modifications for the list have been completed, click on the **OK** button to save the changes.

ViperView

When VMS ViperView starts, the top view displays the installed services as shown in figure 5-58. Each of these services is discussed in the following sections.

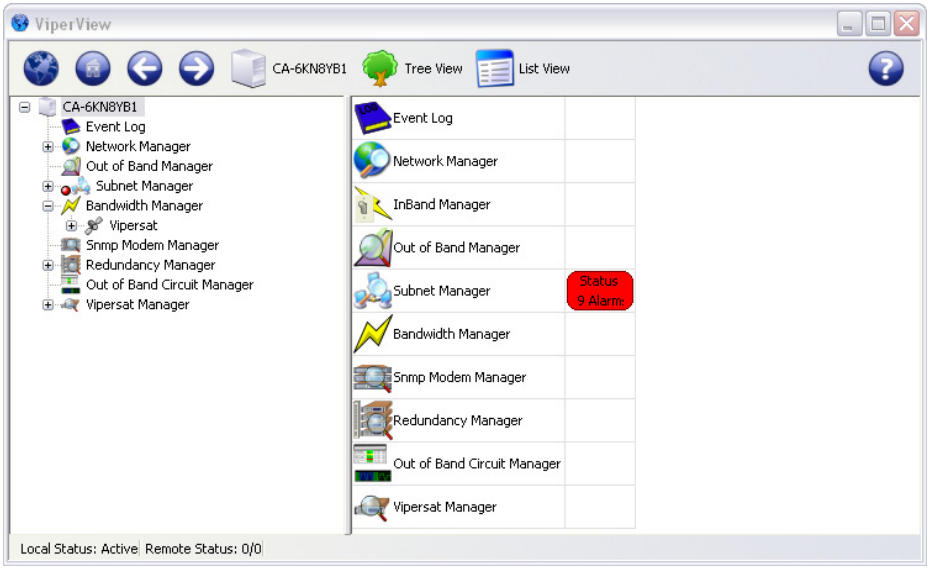


Figure 5-58 ViperView top view

- Vipersat Manager
- Subnet Manager
- SNPM Modem Manager
- Bandwidth Manager
- InBand Manager
- Network Manager.

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CHAPTER

6

OUT-OF-BAND UNITS

General

This chapter describes integrating out-of-band units into a VMS-controlled satellite network.

Controlling Non-IP Modems

Before VMS can communicate with a non-IP capable modem, the modem must have an IP-addressable unit, such as the Comtech CiM-25/600 or CiM-25/600L attached and assigned a valid IP address using procedures described in the appropriate product documentation, and described in the following procedure.

Modems such as the CDM-700, SLM-5650 or CDM-570 have a built-in Ethernet interface and do not require an external CiM unit. Refer to these unit's documentation for the procedure for assigning a valid IP address to the unit.

Note: Check the unit's documentation for specific, detailed procedures.

Once a valid IP address has been assigned to target CiM-25, install the CiM-25 on its companion CDM-600L. The modem must then be declared in VMS using the following procedure.

1. Connect the target CiM-25 unit to your workstation and assign a valid IP address for the network where the CiM-25 and its companion CDM-600L are to be installed

2. Reconnect the CiM-25 to its companion CDM-600L, then connect the ethernet LAN and apply power as required.

NOTE

Note: The CiM-25 must be plugged into an operating modem (except during setup) in order for it to operate reliably. A CiM-25 operating disconnected from a modem will exhibit erratic ethernet communications. Refer to the CiM-25 manual for additional information.

SNMP Manager

The SNMP Modem Manager is the controlling service for all out-of-band modems. Right clicking on the manager icon opens a list which allows you to open the manager, declare modems, Save the entries and view the properties page. The properties page is shown below in figure 6-2.

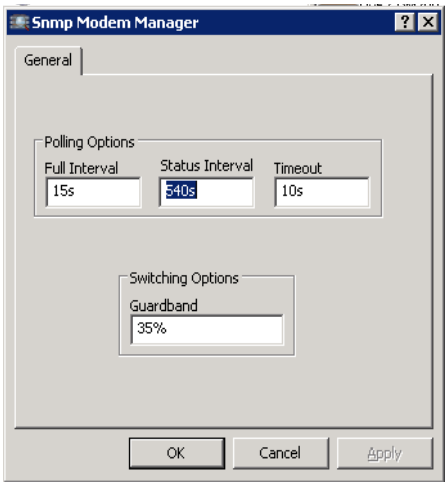

Figure 6-1 SNMP Modem Manager

There are 4 settable parameters in the SNMP Modem Manager properties. They include the full interval poll, the status interval poll, the timeout and the allocation factor for carriers referred to as the guardband. They are described below.

- Full Interval:

The time in seconds, when connected to the device that a full poll will occur for all parameters.

- Status Interval:

The time in seconds between polls for unit status to detect alarm states.

- Timeout:

The time in seconds it will take before VMS times out on a command. Since 3 retries will be made before failing the timeout is actually the time listed multiplied by 3.

- Guardband

The percent of allocation applied to carriers when switched by VMS. The default is 35% allowing for an allocation factor of 1.35.

NOTE

Note: Currently this carrier guardband setting for OOB is separate from the inband setting under the Vipersat Manager and **must be** set to the same value.

The following procedure demonstrates using the SNMP Manager using a CDM-600L as an example.

1. From ViperView, right-click on the SNMP Manager to display the drop-down menu shown in figure 6-2.

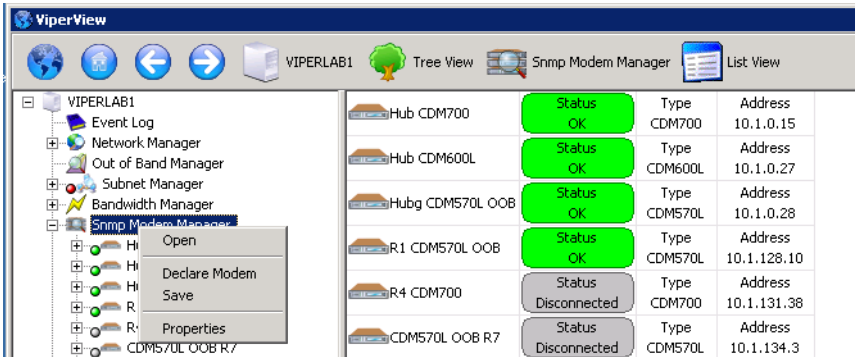

Figure 6-2 Declaring a CDM-600L

2. Select the **Declare Modem** command from the drop-down menu to display the **New SNMP Modem** dialog shown in figure 6-3.

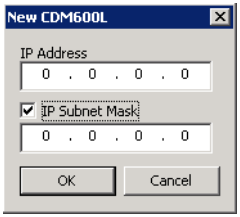

Figure 6-3 CDM-600L IP address dialog

3. From the **Unit Type** drop-down menu select the modem type to be declared. In this example the CDM600L modem is selected.

4. Enter the assigned IP address in the **IP Address** dialog box shown in figure 6-4.

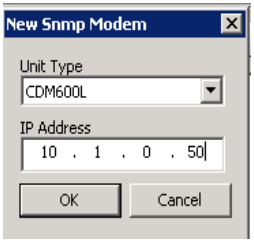

Figure 6-4 New SNMP modem dialog

5. The unit will now appear listed in the SNMP Modem Manager. Right click on the added unit and select **Properties** from the drop down menu to display the **General** tab shown in figure 6-5.

a. Assign a name to the CDM-600L in the top dialog box for reference.

b. The **IP Address** box is a read-only display of the IP address of the target CDM-600L. Add the Subnet Mask in the provided dialog

c. Insure the SNMP settings are correct. For a CDM600 the Read and Write communicties are **admin1234**. For all other devices the Read community is **Public** and the write community is **Private.**

d. If the CDM-600L is connected to a BUC, LNC or other device, select the **Enable Radio Devices** check-box to have this configuration recognized by VMS.

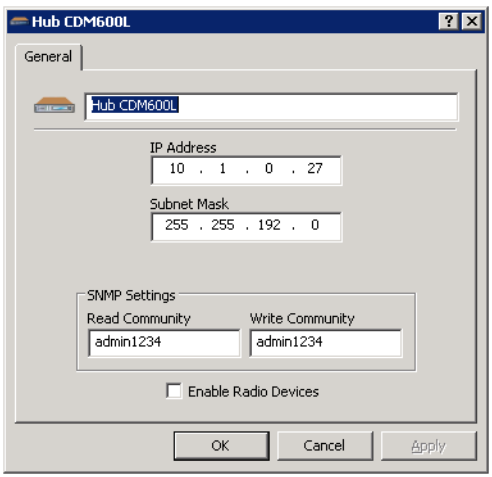

Figure 6-5 CDM-600L properties screen

Once a CDM-600L and its companion CiM-25 are configured and are connected to the network, the CDM-600L will appear in the SNMP Manager Manager as shown in figure 6-6.

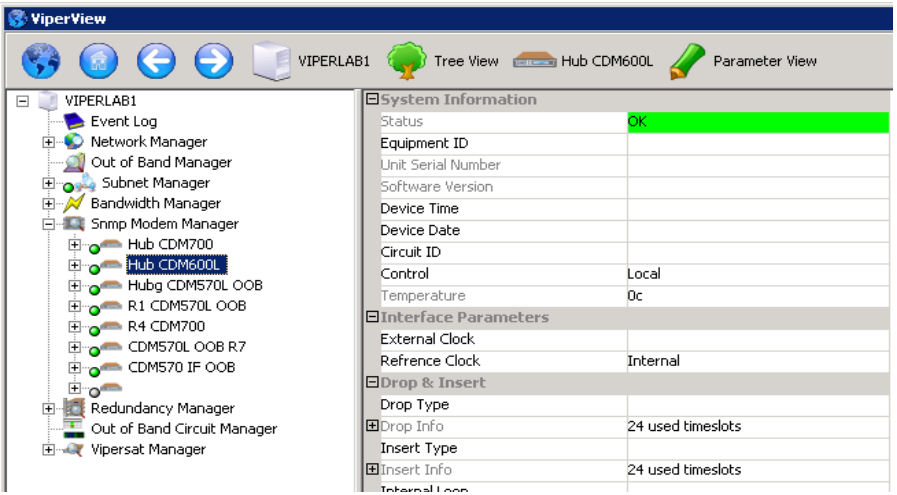

Figure 6-6 SNMP Modem Manager

Parameter View

The **Parameter View** display shown in figure 6-7, displays unit information and options available for the unit selected in the SNMP Modem Manager. The following discussion shows the type of information available, but you should refer to each unit's documentation for detailed information on setting or changing any of the parameters listed here.

The options available on the drop-down menu shown in figure 6-7 are:

- **Apply** - Clicking the **Apply** command writes any changes made to the unit's configuration in the **Parameter View** to the unit's active memory. If you want the changes to be permanent, you must save the changes to the unit's flash memory.
- **Revert** - If you make a change and want to revert to the previous setting, clicking the **Revert** command will revert the setting back to its original configuration.

NOTE

Note: If you have marked the changed parameter by clicking the **Dirty Selected** command, the **Revert** command will not function.

- **Refresh** - Clicking the **Refresh** command will read the current state of all parameters from the unit and display them in the Parameter View display.
- **Dirty Selected** - If you have made a change, selecting the changed item and then clicking the Dirty Selected command marks the item as changed and it will be changed in the unit's active memory.

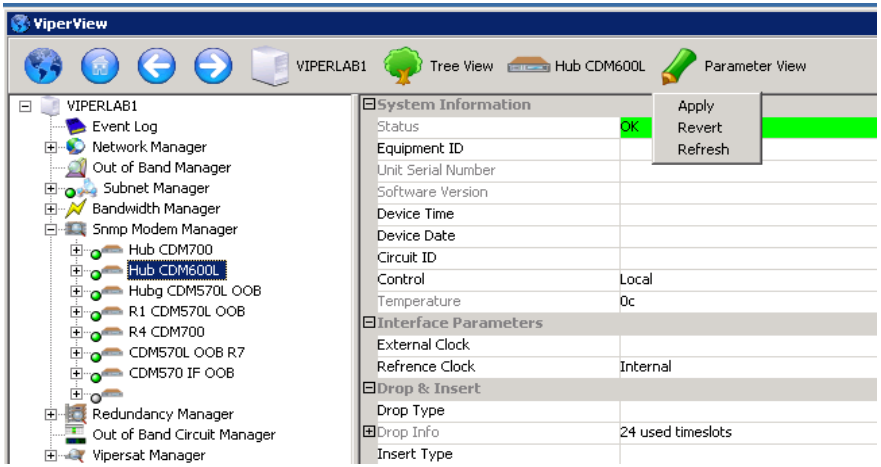

Figure 6-7 Parameter View

Before continuing with this process, you should click the **Refresh** button on the drop-down menu shown in. This will ensure that you have the most current information available for the unit before continuing.

The information available in the **Parameter View** contains both information you can edit and information which is hard-coded in the unit which cannot be changed.

This can be useful for out-of-band units allowing you to modify their configuration using the VMS.

Configuring the RF Chain

The following procedure shows how to configure the SNMP Modem's RF chain and enable it for switching.

1. Expand the modem icon to show the Modulator and Demodulator. Select the appropriate antenna and expand the up and down converters as shown in figure 6-8 below:

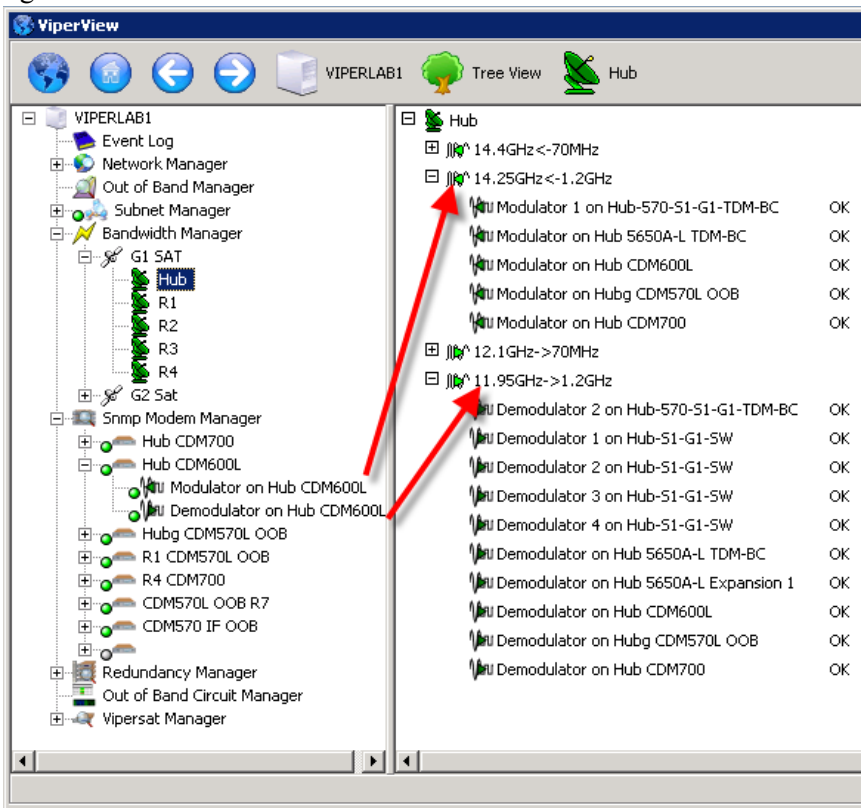

Figure 6-8 Configuring the RF Chain

2. Drag and drop the modulator on to the up converter and the demodulator to the down converter.

3. Right click on the antenna, click the properties page and select the Out of Band tab as shown in figure 6-9 below:

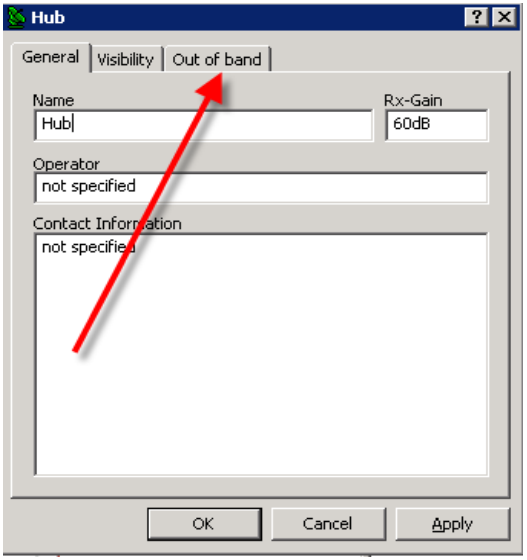

Figure 6-9 Out of Band Antenna Tab

4. Highlight the Modulator for the new SNMP modem and click Enable as shown in figure 6-10 below:

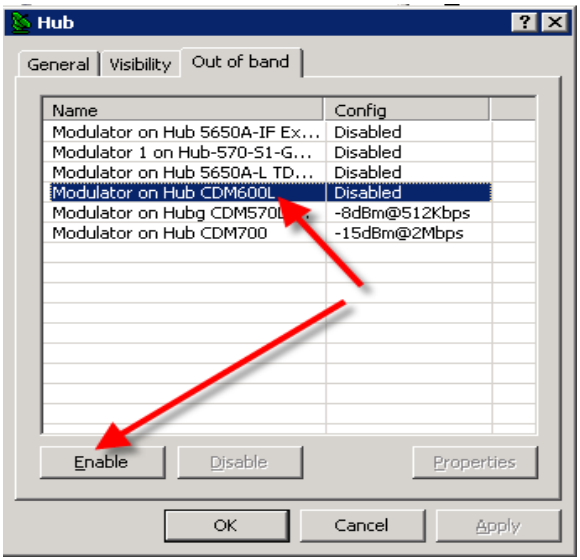

Figure 6-10 Selecting the Out of Band Modem

5. A dialog box will open prompting for a bit rate and power. VMS uses this to calculate correct power settings for any bit rate the out of band link will

switch to. Set them to a combination that will give an appropriate level. The dialog box is shown in figure 6-11. These two values set the base levels from which all SCPC switched modifications are referenced for this unit.

Example, if the set power of -28dBm was calibrated to represent a satellite link of 10dB E_b/N_o and the VMS modified (switched) the carrier bit rate from 256k to 512k the modulators power would change from -28dBm to -25dBm respectively.

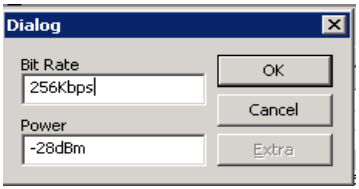

Figure 6-11 Out of Band Dialog Box

Switching SNMP Out of Band Modems

Overview

SNMP controlled modems are defined as Out-of-Band in the VMS. This means the traffic interface for these modems is not part of the IP infrastructure the Vipersat Network belongs to.

SNMP modems use either a serial traffic interface such as V.35 or G.703, a bridged GiGE interface (in the case of the CDM700s) or an IP interface which is isolated from the local area network native to the Vipersat Network (in the case of OOB CDM570 modems in managed switch mode).

VMS communicates with SNMP modems at remote sites through a TDM/ STDMA Vipersat overlay. A sample of this topology is shown below in figure 6-12

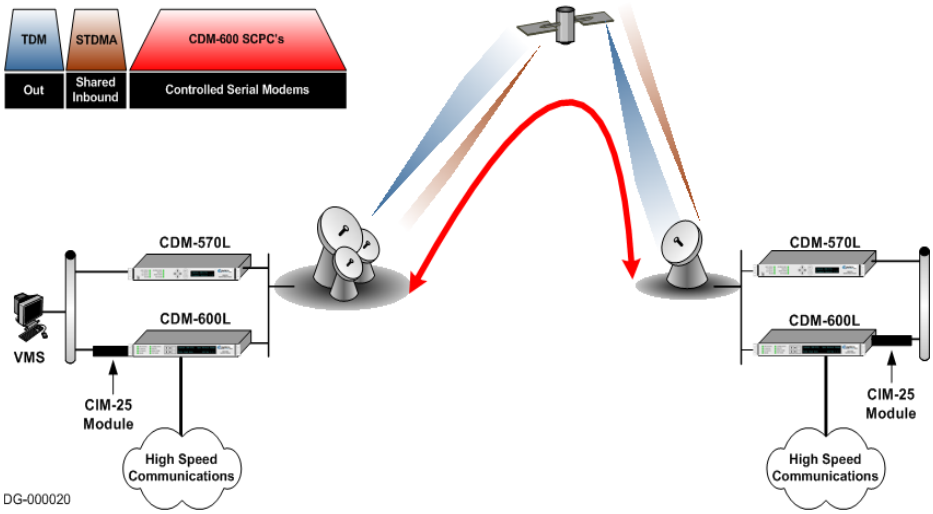

Figure 6-12 Sample Overlay Network

Out of Band Circuit Manager (OBCM)

One of the methods available for switching out of band modems is the OBCM. Using the OBCM the operator can create channels with fixed modems and channel rates. These channels can currently be manually switched as will be illustrated below. In a future version of VMS this capability will be automated. SNMP traps will be passed by the SNMP modem manager to the Out-of-Band Manager to establish the predefined circuits.

Configuring the OBCM

If the steps above for configuring the RF chain have been completed the following procedure can be used to configure the OBCM. This also assumes that each of the OOB units have been correctly declared and associated with there proper antenna components.

1. Open the Out of Band Circuit Manager by left clicking on the icon in the tree view as illustrated in figure 6-13.

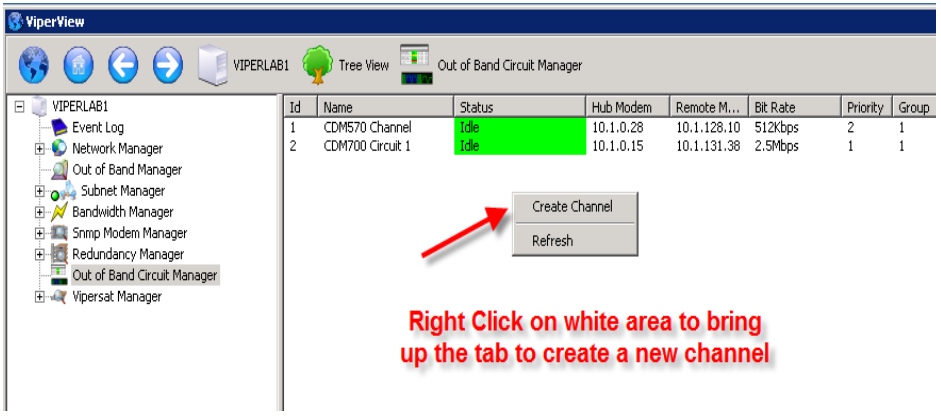

Figure 6-13 Out of Band Circuit Manager

2. Select “Create Channel” to open up the dialog below.

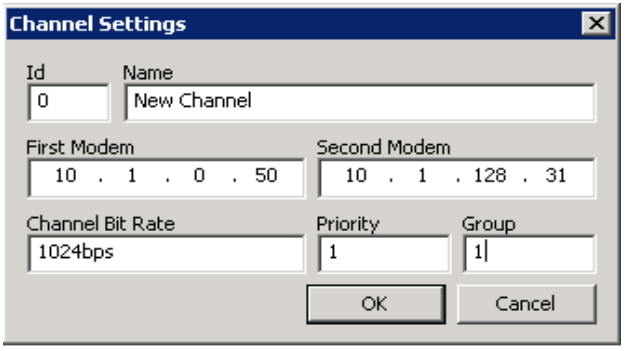

Figure 6-14 Channel Configuration

3. The following parameters must be set:

- A channel ID. This must be unique within the system
- A channel name

- IP address of the first modem
- IP address of the second modem
- A channel bit rate
- The channel priority (will be used in future release)
- The Group number (used in conjunction with the channel priority.

4. Once the channel is configured it will be possible to manually switch it. Right click on the channel and select “Setup” from the drop down menu. This menu also allows the operator to revert an active channel, to edit the channel parameters and to delete the channel. figure 6-15 illustrates this.

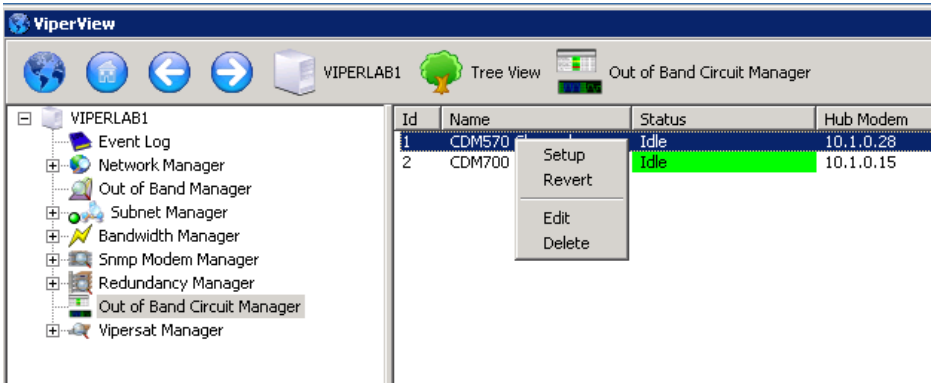

Figure 6-15 Setting up an OBVM Circuit

5. Once the channel sets up the channel will show an active status.

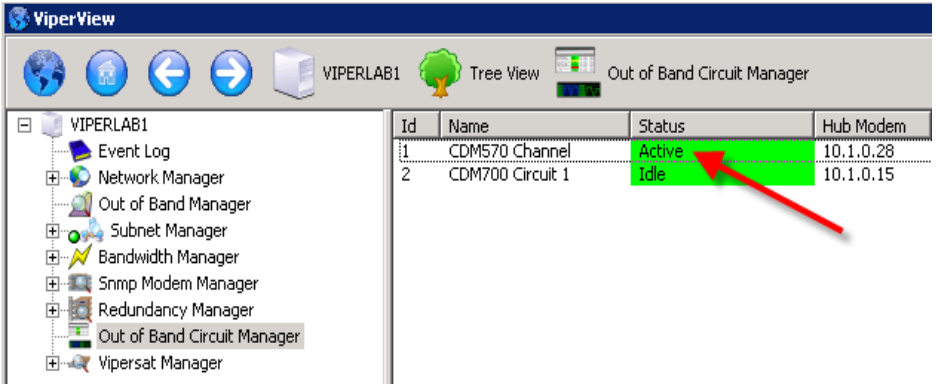

Figure 6-16

6. While the circuit is active the switched modems will appear in the Out-of-Band Manager display. If, for some reason, communications is lost with the

remote modem right clicking on the hub modem will allow the operator to free up the bandwidth resources by selecting Reset. Unless you are certain the remote modem is no longer transmitting do not free up its resources as it will then act as a foreign carrier in the network.

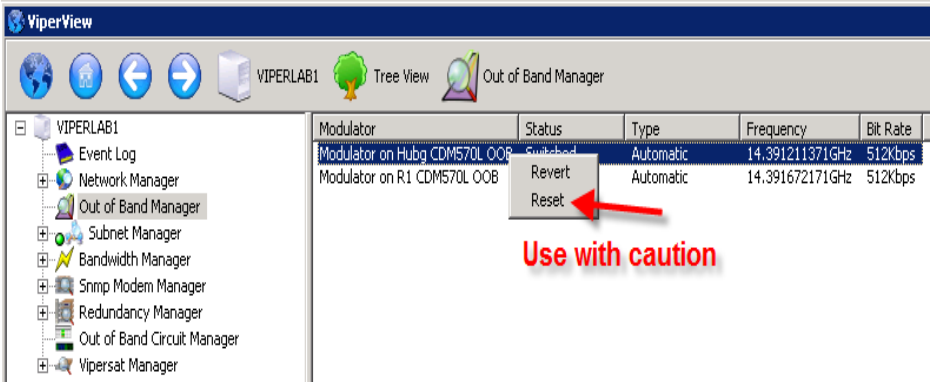

Figure 6-17

7. If you attempt to do an OBCM switch and it fails it is most probably a mis-configuration of the out of band modems (check the antennas to insure they are enabled), insufficient bandwidth or other errors in the RF chain.

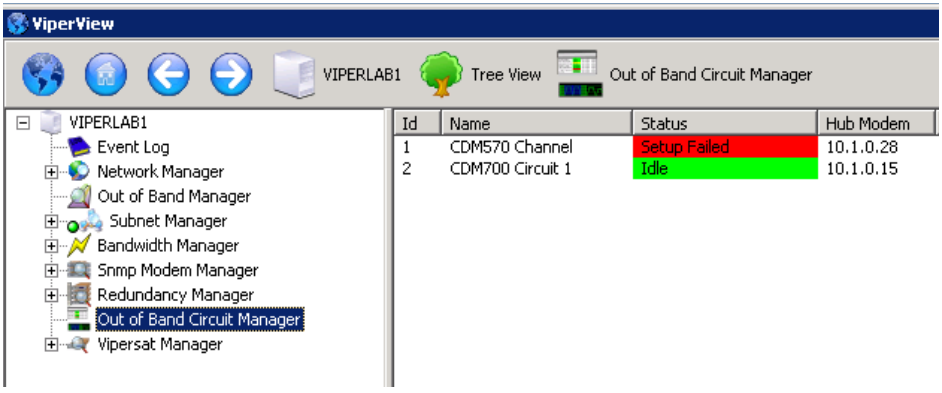

Figure 6-18

Vipersat Circuit Scheduler

Another way of switching SNMP Out-of-Band modems is with the Vipersat Circuit Scheduler. If you have purchased this option see the manual for instructions on scheduling Out of Band switches.

You will still need to follow the instructions above through Configuring the RF chain for the VCS to work.

APPENDIX

VMS CROSS BANDING

The VMS has the capability to accommodate applications involving satellite cross strapping and cross banding. The VMS is able to recognize, manage, and control satellite circuits which utilize more than one frequency. The typical satellite bands currently in use include:

- C-Band
  - Downlink 3.7 to 4.2GHz
  - Uplink 5.9 to 6.4GHz
  - 24 36MHz transponders
- Ku Band
  - Downlink 11.7 to 12.2 GHz
  - Uplink 14.0 to 14.5 GHz (FSS)
  - 24 36MHz or 12 72MHz transponders
- Ka Band
  - Downlink 17.7 – 21.2GHz
  - Uplink 27.5 – 31.0GHz

The VMS cross banding function allows VMS to manage and control the following satellite circuit configurations:

- Two remote terminals are in different antenna footprints on the same satellite where, for example, one antenna serves C-band users while another antenna serves Ku band users.

- The satellite has mapped the transponder from one antenna to a transponder on another antenna.
- The satellite serves as an RF inter-band relay which is also referred to as cross strapping

In the example shown in figure A-1 the C-band and Ku-band transponders 20 through 24 are cross banded.

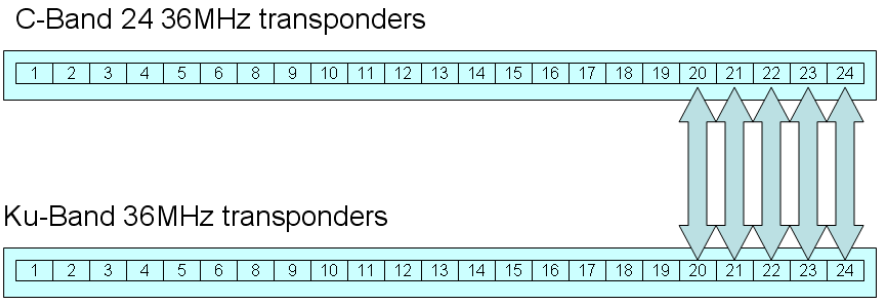

Figure A-1 Cross Banded Transponders, C-band & Ku-band

Vipersat Cross Banding Solution

Figure A-2 illustrates a schematic representation of a cross banded satellite network.

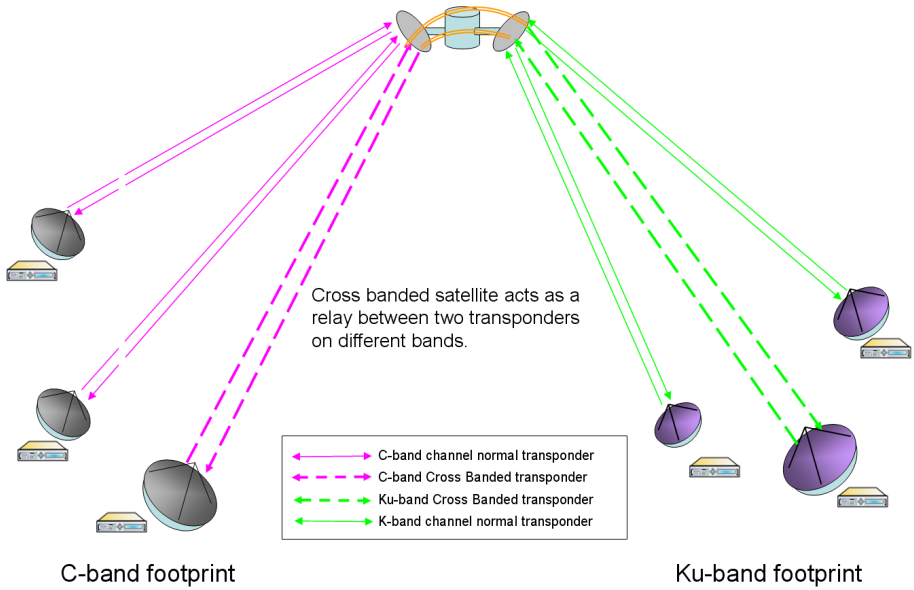

Figure A-2 A Cross Banded Satellite Network

The VMS does the following to allow a cross banded satellite network to be included in its management and control functions:

- VMS adds a translation override frequency to the transponder object which is used in place of the satellite's normal translation frequency
- The VMS bandwidth allocation logic then:
  - Selects demodulators first
  - Builds a collection of frequency limits based on available transponders
  - Selects modulators based on their intersecting limits

NOTE

Note: The VMS cross band function has no effect on non-cross banded configurations, and supports multiple transponders.

Figure A-3 shows a cross banded network configuration.

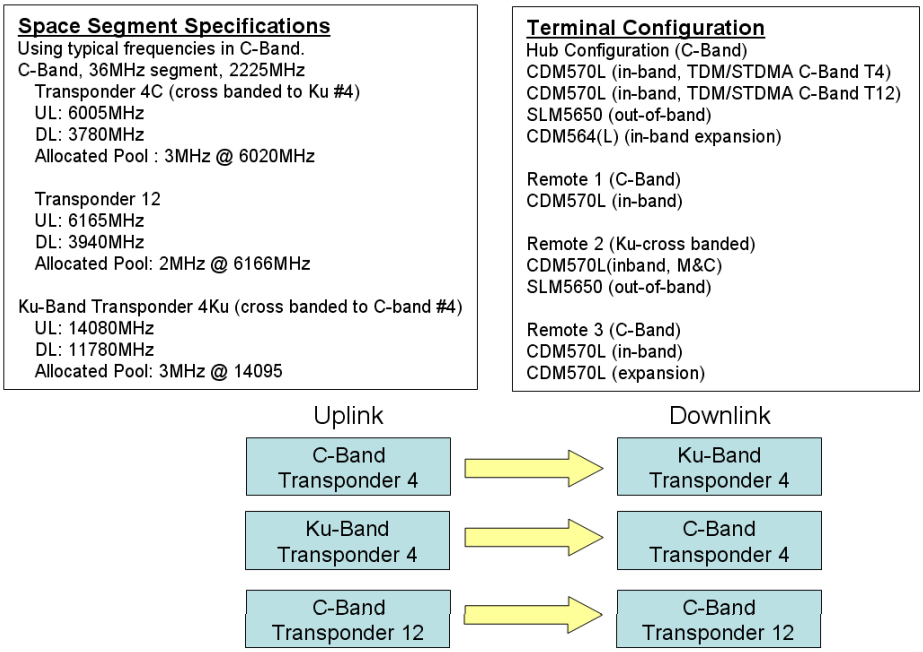

Figure A-3 VMS Cross Banded Network Configuration

In response to the network configuration shown in figure A-3 the VMS would:

1. Create Satellite - Set center frequency to 6.1375GHz and translation frequency to 2.225GHz

2. Create Transponder 4C (cross banded to Ku) - 6.005GHz, 36MHz

3. Perform a Translation Override = (6.005 – 11.78) = -5.775GHz

4. Create Pool, 3MHz at 6.020GHz

5. Create Transponder 12C - 6.165GHz, 36MHz

6. Create Pool 4, 2MHz at 6.166GHz

7. Create Transponder 4Ku - 14.155GHz, 36MHz

8. Perform a Translation Override = (14.08 – 3.78) = 10.30GHz

9. Create Pool 4, 3MHz at 14.170GHz

Figure A-4 illustrates the results of the VMS solution for managing and controlling the cross banded network described above.

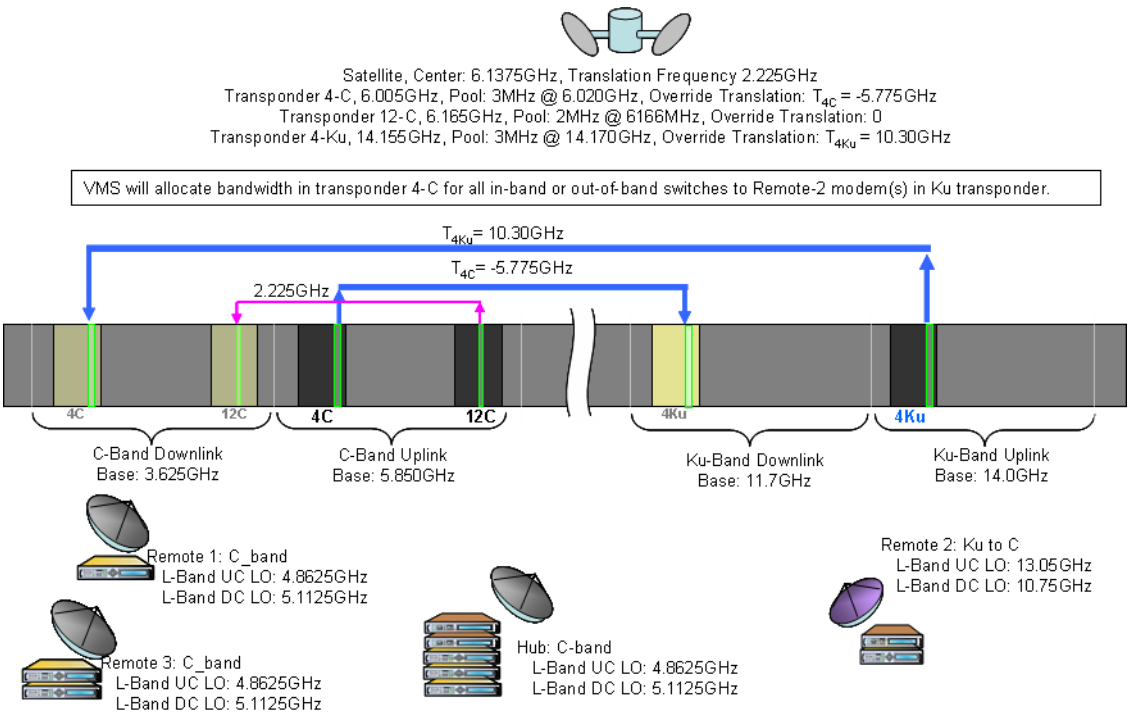

Figure A-4 VMS Cross Banded Network Solution

The VMS calculated Translation Override Frequency (TOF) is an integer value in Hertz that represents frequency offset of the cross banded transponders, mapping the modulator frequency to the demodulator frequency. When the TOF is set to a non-zero value, this value overrides the default satellite translation value and is calculated with respect to the Downlink (Rx) frequency.

The TOF value is positive if the cross banded downlink transponder frequency is lower than the Tx transponder band. The TOF value is negative if the cross banded downlink transponder frequency is higher than the Tx transponder band. Note that the VMS always subtracts the translation frequencies.

The figures below show the Create Transponder dialog for setting up VMS cross banding values. In this example, the cross banding is between C-band and Ku-band.

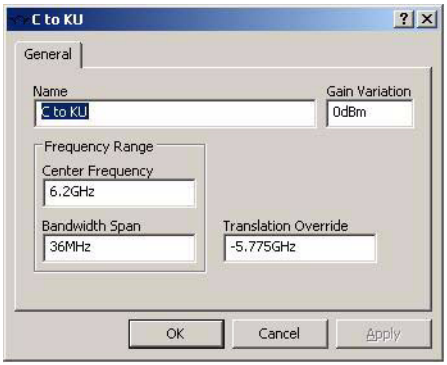

Figure A-5 Transponder dialog, C to Ku

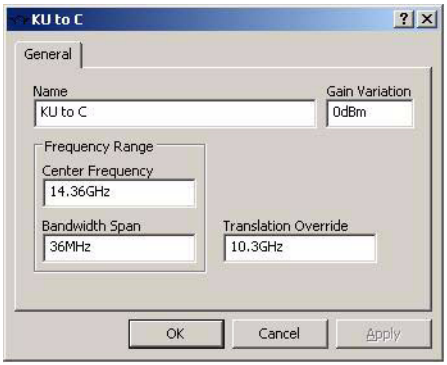

Figure A-6 Transponder dialog, Ku to C

To create a new transponder, right-click on the Satellite icon and choose **Create Transponder** from the pull-down menu that appears. On existing networks, right-click in the black portion of the satellite spectrum view, choose **Properties**, and the transponder window will open displaying the current settings. Alternatively, edits can be performed by displaying the antenna and transponder list.

In some instances, transponders may have different translation frequencies than others on the same band, thus requiring a translation override frequency configuration even without it being a cross banding or cross strapping application.

APPENDIX

B

ANTENNA VISIBILITY

General

Antenna Visibility is a powerful tool in the VMS that allows an operator to control the spectrum used by the VMS switching engine. Simply stated, it allows the operator on a site by site basis to block portions of the satellite or transponder bandwidth from being used by the bandwidth manager, even if a defined bandwidth pool exists within the blocked portion.

Antenna visibility can be used in a variety of ways. However, great care must be taken when implementing this powerful tool in a Vipersat satellite network, or unexpected results will occur.

Warning: Do Not use antenna visibility without a thorough understanding of the mechanics involved. It is highly recommended that an operator complete the Vipersat Advanced VMS training course that includes coverage of Antenna Visibility prior to configuring a live network with this feature.

Using Antenna Visibility

Antenna Visibility is accessed by right-clicking on the desired satellite antenna and selecting Properties. The antenna properties window will open. Click on the **Visibility** tab to display the antenna visibility window. The figure below shows the antenna visibility flag as defaulted by the VMS. The default values ensure that the entire spectrum is available so that there are no limitations in effect when this feature is not used.

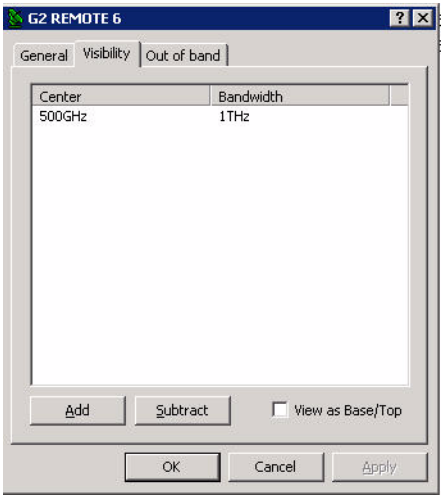

Figure B-1 Antenna Properties, Visibility Tab

An antenna with these settings is essentially clear for all satellite bands. Under most conditions, it is advisable to leave the visibility settings at the default values. Should a network application call for the use of antenna visibility, start by configuring the desired transmit and receive frequencies for the antenna to be able to use, as illustrated below using standard Ku Band.

Note: The VMS is not limited to any particular frequency band.

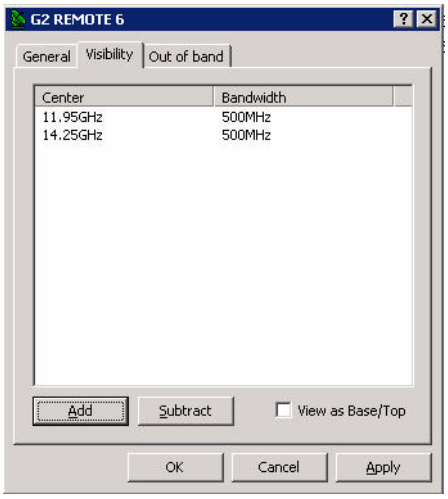

Figure B-2 Ku-band Visibility Ranges, Center/Bandwidth

The frequencies can be viewed, as above, with a center frequency and bandwidth, or as shown below with frequency ranges. Clicking in the **View as Base/Top** box will toggle between these two views.

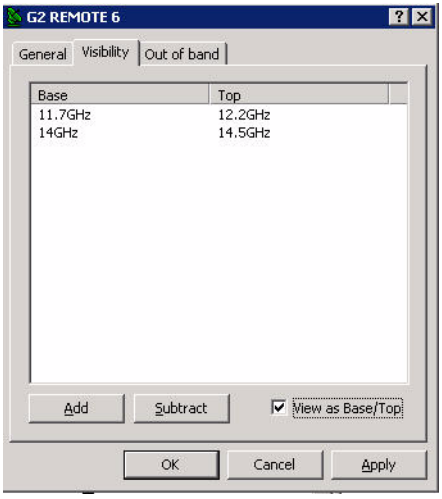

Figure B-3 Ku-band Visibility Ranges, Base/Top

The **Add** and **Subtract** buttons are used to modify the visibility by either adding or subtracting frequency ranges to/from the antenna. Clicking on either one of these buttons opens a **Frequency Range** dialog for specifying the new visibility range. Note that the appearance of this dialog reflects the appearance of the visi-

bility tab, showing either a center frequency with bandwidth, or a base frequency and top frequency. This appearance can be toggled using the **View as Base/Top** check box.

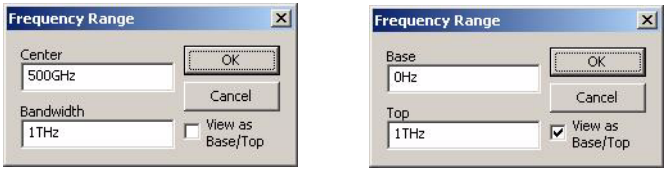

Figure B-4 Frequency Range dialogs

Enter the range of bandwidth to be added or subtracted and select **OK**.

Subtracting a frequency range from within visible bandwidth creates a visibility block, or mask, for that portion of the spectrum. To remove an existing visibility block and restore visibility for that bandwidth, select the two adjacent ranges and click **Add**. This will display the range of bandwidth blocked, as shown in the figure below. By selecting **OK**, the range will be added and the two ranges will become merged into one continuous range.

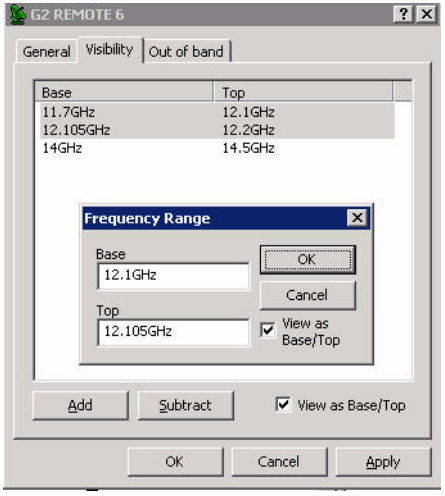

Figure B-5 Merging Visibility Ranges

Example — Blocking Spectrum Affected by Local Ground Frequency Interference

In the example shown here, Antenna Visibility is used to block off a portion of a bandwidth pool at a given remote site due to ground interference on the lower part of the transponder spectrum.

In this case, assume there is ground interference on the lower end of the transponder that overlaps into the bandwidth pool, as illustrated in the figure below.

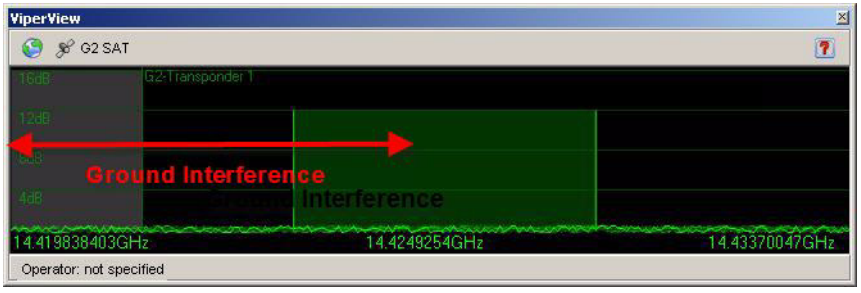

Figure B-6 VMS Bandwidth Pool with Ground Interference

Note: The satellite spectrum view provided by the VMS, as shown here, displays the transmit (uplink) carriers from the Hub and the remote sites. The corresponding receive (downlink) carriers are determined by the frequency offsets but are not visible.

This interference at the remote site may not affect the transmission path, but could prevent reception in the lower portion of the pool. With no antenna visibility block, the VMS would perform a switch with this remote, resulting in the carriers being placed as shown below. This places the corresponding receive carrier within the ground interference frequency range, and could cause a disruption in communications.

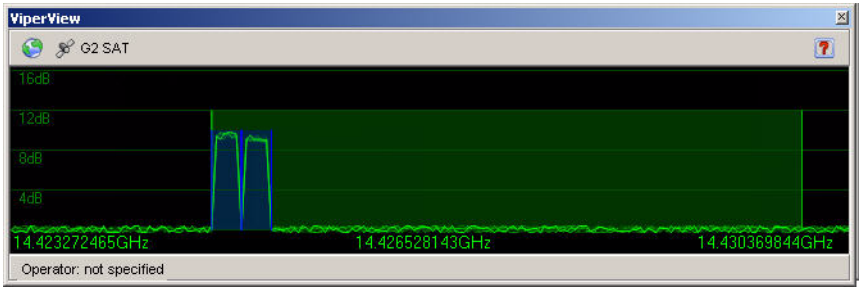

Figure B-7 Transmit Carriers, No Visibility Block

Using the visibility Subtract function, a new block for this area of interference can be created for the remote antenna, as shown in the figure below.

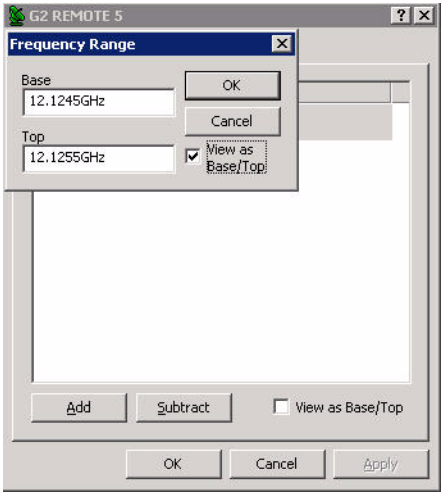

Figure B-8 Visibility Subtract dialog

The revised visibility map now shows a visibility block between 12.1245GHz and 12.1255GHz which represents the bottom 1MHz portion of the pool experiencing ground interference.

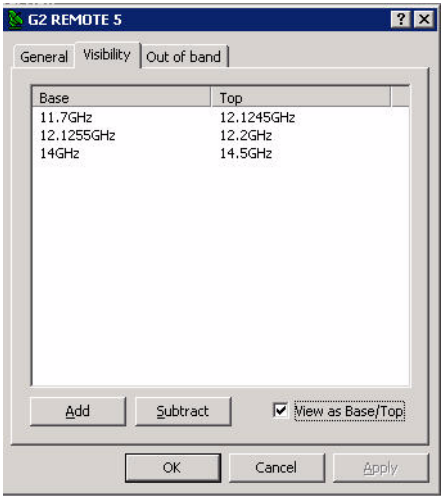

Figure B-9 Visibility Ranges with Blocks

This configuration results in the VMS switching as shown below. The receive carrier for the remote is now outside of the area of interference.

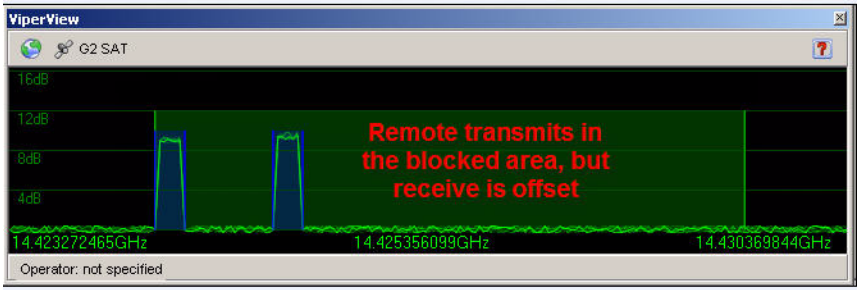

Figure B-10 Transmit Carriers Repositioned, Visibility Block

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APPENDIX

C

REDUNDANCY

General

This appendix describes the optional redundancy services that protect critical Vipersat network equipment. The two main services offered are **VMS Redundancy** and **Hub Modem Redundancy**.

VMS Redundancy provides for N:1 redundant VMS server(s) (standby) co-located at the Hub alongside the active VMS server. This configuration provides for the automatic switch-over to a standby server in the event of a failure of the active server.

Hub Modem Redundancy provides for the operation of N:M multiple primary and multiple secondary modems installed at the Hub. If a protected device fails, its output is automatically removed from the satellite network. A replacement device, loaded with the failed device's configuration, is booted into service and its output is switched into the satellite network, replacing that of the failed device.

VMS Redundancy

Description

VMS redundancy (protection) increases the system availability of a Vipersat-enabled network by protecting the network from a VMS server failure. In the current release, N:1 redundancy is a monitored hot-standby configuration with N+1 VMS servers running in parallel.

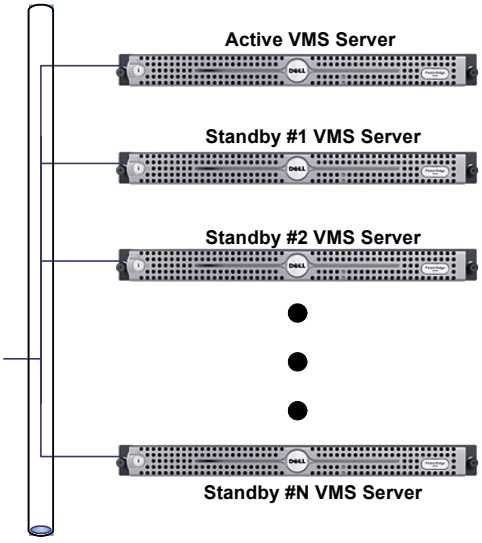

Figure C-1 Active and Standby VMS Servers, N:1 Redundancy

Each server can switch between two mutually exclusive modes of **active** or **standby**. The active/standby hierarchy is specified through the assignment of a priority level attribute. In the event that the active server fails, the backup server with the highest priority is hot-switched to assume control of the satellite network, replacing the failed server.

Note: The redundant VMS protection feature can only be activated with a valid license in the server(s) USB Crypto-Box key.

Redundant Hot-Standby

In a redundant configuration, the VMS servers run in parallel. The VMS database on the standby server(s) is continuously maintained, in real-time, as a mirror image of the VMS database running on the active server.

Note: It is recommended that all servers be co-located at the same site and be connected to the same Ethernet LAN. The monitoring workstation should also be co-located. This is to eliminate reliability issues that may be associated with the terrestrial data-link communications between a geographically remote server and NOC units. A data-link failure may result in contention of automatic switch-over control and interruption of restoral processing.

Protection Switch-over

If the active server fails, the VMS protected by N:1 redundancy immediately switches to a standby server. The VMS running on the standby server picks up and executes the ongoing network management tasks until the failure in the active VMS server is resolved by human intervention.

Both the active and standby servers operate in a query-peer mode to determine which server is to be the active VMS server in the network.

If, for example, the active VMS server fails causing a protection switch, a standby VMS server assumes control of the network. While the standby server is actively managing the live network, a previously active server that is being restarted cannot assume the active server role without first checking for the presence of an active VMS server already managing the network. The process for initiating and managing the transitions between active to standby modes is described below.

Active to Standby Switch

This transition occurs whenever:

- An automatic switch-over is triggered by the failure detection mechanism due to active VMS failure, or
- A manual switch-over is invoked from the active console by, for example, taking down the active server for maintenance.

A switch-over from the currently active server back to the server with higher priority (once recovered) is NOT automatic. An operator must manually perform the switch at the active server's console.

When a server with a higher priority is restarted, the VMS on the server detects an active peer on the network (a previous standby server) and automatically enters standby mode, and remains in standby mode until either an operator manually switches the server back to active mode, or a failure occurs causing an automatic switch-over.

For instructions on performing a manual switch-over, refer to the section "Manual Switching" on page C-12.

Active Server Role

The active VMS server has the following specific privileges that differ from a standby server:

- There can be only **one** (1) VMS server actively managing the network.
- The active server is considered the default VMS server for configuration and network topology purposes.
- The active server's database is considered the master copy. The standby server(s) receives a copy of the master database from the active server as a part of its start-up process and automatic synchronization.
- The first VMS server to come on-line assumes the active mode provided that all redundant servers are online and no other server is operating in active mode.
- The active server is the only unit that may initiate a manual protection switch-over (a transition from active-to-standby mode or standby-to-active mode). This is a two-step event controlled by the operator/administrator: the Active server is first *Deactivated*, then a Standby server is *Activated*.

Standby Server Role

A VMS standby server has the following specific functions that differ from the active VMS server:

- Upon startup, a standby VMS enters a query-peer mode where it attempts to discover a peer VMS in active mode. The VMS enters a standby mode when an active VMS is discovered.
- A standby VMS server's default mode is standby. It can only enter active as a result of a protection switch, either automatic or manual.

Automatic VMS Activation

An Auto Activate function is available to resolve any activation conflicts in the event that all servers go offline temporarily. Once the servers return to online status, the server that was the last active will automatically reactivate and assume the active role.

Server Synchronization

Server synchronization is always executed by/from the active VMS server, and is performed to ensure that all standby servers receive any necessary updates due to changes in the master database that resides in the active server. Two types of server synchronization occur with a redundant VMS configuration, automatic and manual.

Automatic Synchronization

As the name implies, automatic synchronization occurs automatically by the active VMS and is performed whenever any changes occur that are associated with automatic system functions, such as automatic switching, device redundancy, etc. The active server maintains a memory cache that holds the updates until they can be pushed out to the standby servers by an automatic synchronization that occurs during the VMS heartbeat. The updates are tagged onto the heartbeat message that is sent by the active server to the standby servers.

Manual Synchronization

Manual synchronization, also referred to as “full synchronization”, must be performed by administrator/user command for any changes not related to automatic VMS functions, such as whenever any database configuration changes are made to the server. Should a standby server be restarted, when it rejoins the redundancy group, the sequence of updates is lost and a manual synchronization is required to ensure that the standby receives the most current database from the active server.

During a full synchronization, the active VMS service is temporarily taken down to avoid any changes occurring during the synchronization process. The active server sends the contents of the temp file holding the entire database backup to each standby server via simultaneous unicasts. If, for any reason, there is a failure with this update process, a notification will appear in the windows log.

Server Contention

Server contention is a built-in protection mechanism for redundant VMS operation. A situation may occur where the active server briefly loses network connectivity—a network cable is unintentionally pulled, for example—before communications are restored. The first priority standby will become active due to the lost heartbeat of the former active server. When the former active server returns, it will detect that there is another active server in operation, and will enter the contention state.

When this is sensed by the current active server, it also will enter the contention state. In such a situation, there is no way for the system to determine which server has the most current up-to-date database, and both servers will immediately de-activate to protect the current status of the network. A generated alarm, both visual and audible activated, will appear on each server. In addition, an SNMP trap will be generated.

In this condition, VMS services are still running, but no changes of state can be executed in the network until the condition is cleared. For instructions on clear-

ing server contention, refer to the section “Clearing Server Contention” on page C-12.

Server Status

The VMS Connection Manager provides the status of the VMS and each of the servers in a redundancy group. The Connection Manager, when running, will display its icon in the Windows Task bar at the bottom right of the screen. When the mouse is positioned over this icon, a status pop-up appears displaying information on the VMS and the servers, as shown in figure C-2, below.

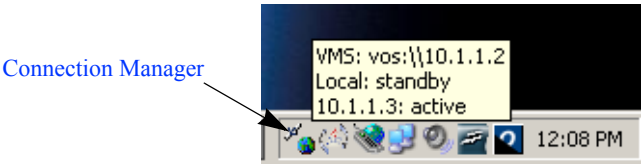

Figure C-2 Server Status Pop-Up

There are four possible server states:

- active
- standby
- contention
- disconnected

If no servers are connected, the status message will read “Vipersat Management System Disconnected”.

The server to which the console is currently connected (the local server) is identified by whatever was entered in the **Connect To** dialog; either its assigned name or its IP address (as appears in the first line of the example shown in figure C-2). The next server status that is displayed is that of the local server, followed by any remote servers listed by their IP address.

Installing & Configuring VMS Server Redundancy

Installation of a redundant VMS server configuration in a VMS controlled network requires the following:

- Two or more dedicated servers and a client workstation.
- The servers and the workstation should be co-located (in the same physical location) and connected to the same Ethernet LAN.
- A dedicated IP address for each VMS server.

- A common domain for the redundant servers and the client workstation. Refer to Appendix D, “Domain Controller and DNS”, in this document for details for establishing the VMS server as a domain server.

Starting a redundant VMS configuration requires bringing up the VMS servers and the workstation using the following procedure:

1. Install VMS on each of the servers following the instruction in Chapter 2, “VMS Installation”.

2. Start the Vipersat Management System service and ViperView.

Select **Vipersat Management System** from Windows Services and **Start** the service, if it is not already running.
Note: It is recommended that this service be configured for **Automatic** Startup.

Click **Connection Manager** on the path:
Start > All Programs > VMS 3.x> Connection Manager

The Connection Manager will prompt for the server to connect to. Select the server that is to be the initial Active server; typically, this is the server with the highest priority setting.

The ViperView window will appear as shown in figure C-3.

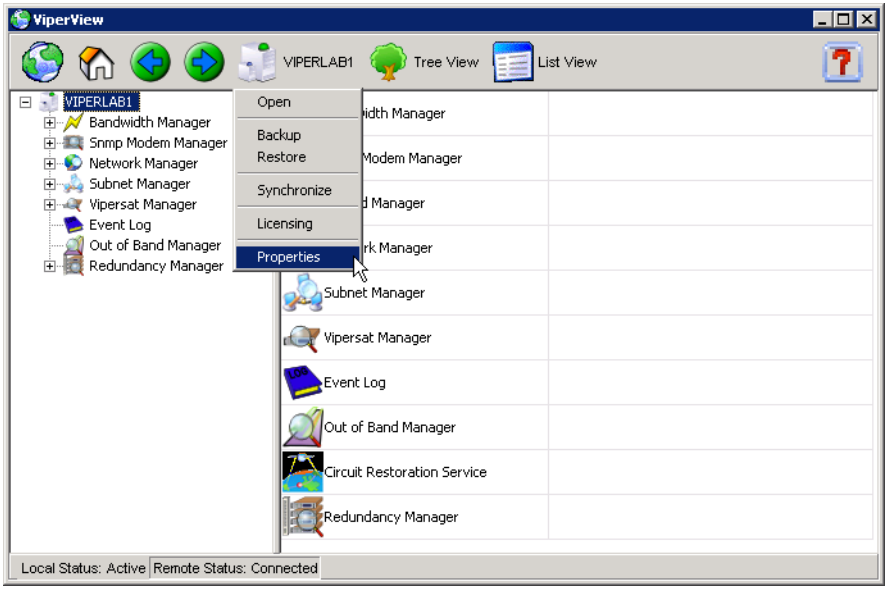

Figure C-3 ViperView, VMS Server Drop-down Menu

3. From the VMS Server drop-down menu, select the **Properties** command to display the VMS Server (VIPERLAB1 in this example) dialog window shown in figure C-4.

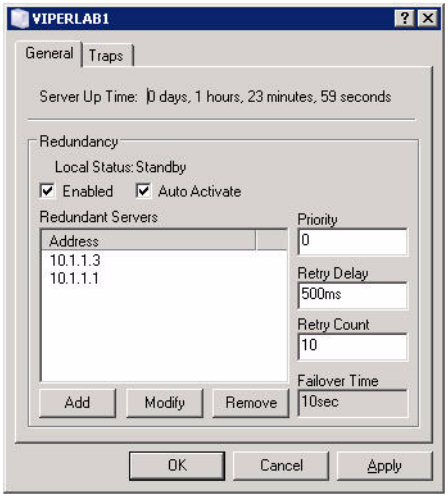

Figure C-4 VMS Server Properties, General Tab

4. Configure the redundancy settings for this server.

The **General** tab provides redundancy information on the server role and local status, and current server redundancy settings which can be edited as required.

Enabled

Clicking in the **Enabled** box selects/de-selects redundancy operation for this server. This setting must be enabled for each server that belongs to a redundancy group.

Auto Activate

Clicking in the **Auto Activate** box selects/de-selects this function. In the event that the redundant servers go offline temporarily, when the servers return to online status:

- with Auto Activate *selected*, the server that was the last active will automatically reactivate and resume the active role.

- with Auto Activate *de-selected*, a server will be activated only by an operator manually issuing an Activate command on one of the servers.

When choosing to use Auto Activate, each VMS server in the redundant group should be configured with the Auto Activate function selected.

Redundant Servers

The **Redundant Servers** box lists, by IP address, the other VMS servers that are in the redundancy group with this server. Each VMS server in the group must own a list that includes all of the other servers in that group.

Use the **Add**, **Modify**, and **Remove** buttons to create and maintain the list.

Priority

The **Priority** setting identifies where this server ranks in the redundant server hierarchy for becoming active during a switch-over. The lower the number entered, the higher the priority.

Set the Priority to a unique number in the range 0 to 31.

Caution: No two servers in a redundancy group should ever be assigned the same priority; each server must have a unique number to prevent contention.

Failover Time

The Redundancy **Failover Time** is set by specifying the values for **Retry Delay** and **Retry Count**. The Failover Time is the amount of time that will pass prior to a switch-over to a Standby server following a failure in communications with the Active server.

The Retry Delay represents how long the system waits before sending another heartbeat request. The Retry Count represents how many heartbeats are missed before the device is determined to be offline. Failover Time is calculated by taking twice the Retry Delay value and multiplying it by the Retry Count value.

Generally, it is recommended to use the following values:

- For networks *with up to 100 nodes* — Retry Delay = 500 ms, Retry Count = 10.
- For networks *with over 100 nodes* — Retry Delay = 500 ms, Retry Count = 20.

5. Configure the SNMP traps for this server. This may be required for relaying server status information/alarms to a primary management system at the NOC, for example.

Click the **Traps** tab, shown in figure C-5, to display the existing SNMP Manager traps. Use the **Insert**, **Modify**, and **Remove** buttons to add new traps and modify or remove existing traps. Refer to Appendix E, "SNMP Traps", for detailed information on the SNMP Manager.

6. When finished, click the **OK** button to save the server properties settings.

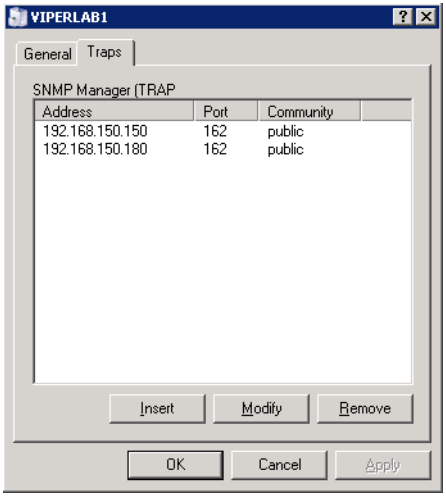

Figure C-5 VMS Server Properties, Traps Tab

7. Repeat steps 2 through 5 for each VMS server in the redundancy group.

8. Place the VMS server with the highest redundancy priority into the *active* state:
Connect the console to the server with the highest priority and select the **Activate** command from the VMS Server drop-down menu.

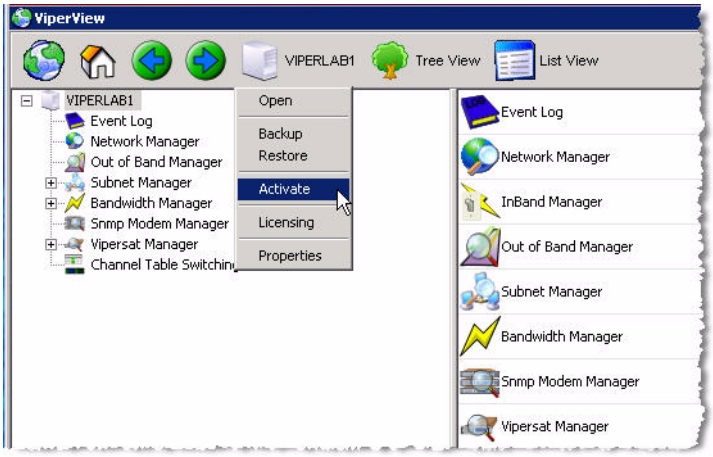

Figure C-6 Activate Command, VMS Server Menu

9. From the *Active* VMS server, select the **Synchronize** command from the Server drop-down menu to force the Standby server(s) to synchronize with the current status of the Active server.

This manual synchronization command must be executed whenever a Standby server is started or comes back into the group, as well as whenever any database changes are made to a unit. A synchronization can only be executed from the Active server.

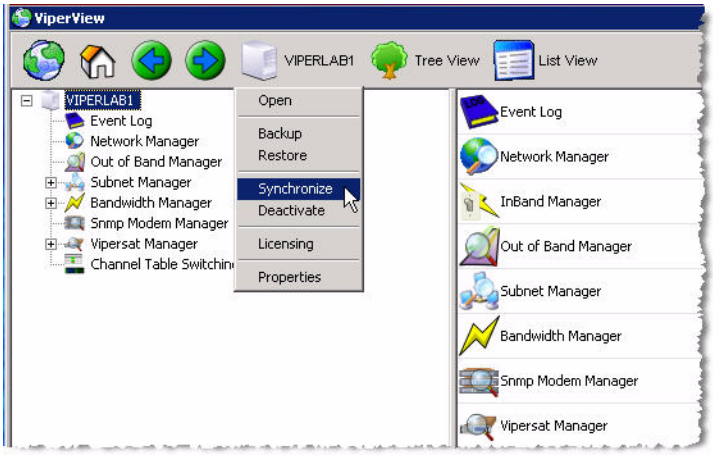

Figure C-7 Synchronize Command, VMS Server Menu

This concludes the procedure for installing and configuring the VMS redundancy servers.

- The next step is to configure the VMS database for the satellite network on the *Active* server. Refer to Chapter 3, “VMS Configuration”, for details on this procedure.
- Once the VMS configuration is completed on the Active server, perform a server synchronization to synch the Standby server database(s) with the Active server database.

Manual Switching

Manual switching can be used to designate a different server to be the active VMS server in the redundancy group.

1. From the currently active server, right-click on the server icon in Viperview to display the pull-down menu and select **Deactivate**.

2. From the standby server that will become the new active server, right-click on the server icon in Viperview and select **Activate**.

3. Verify the new server status using Connection Manager.

Clearing Server Contention

Should contention for active status between two VMS servers occur, use the following procedure to clear the condition.

1. From Viperview, right-click on the server icon and select **Clear Contention** from the pull-down menu that appears.

   A pop-up message will appear on the console indicating that the server will enter standby mode, and that the contention on the other server must also be cleared before this server status can be changed to active.

2. Repeat the previous step for the second server in contention.

3. Determine which server is to be made active (typically, the server with the highest priority) and select the **Activate** command.

   This server will become active and the other server will remain in standby mode.

N:M Hub Modem Redundancy

Description

The N:M Hub Modem Redundancy service provides for the protection of critical VMS network modems operating in Hub mode and enhances overall network reliability.

The N:M redundancy in VMS version 3.x has the following characteristics:

- Protects Vipersat Hub modems from equipment failure
- Is a VMS controlled feature
- Does not require any external switching hardware
- Preserves the satellite network configuration and state information during hardware failure
- Is scalable and flexible to satisfy the unique requirements of each network

N:M redundancy increases reliability by backing up critical primary central hub components with standby backup units. In a traditional 1:1 or 1:N redundancy, switching is handled by combining transmission equipment into logical mechanical switching units. These software/hardware units then interconnect the primary transmission units I/O through a physical mechanical maze of relays and cable jungles. They also become the next point of failure in the reliability hierarchy.

The Vipersat solution relies less on a mechanical backup system architecture, decreasing the single point of failure. The Vipersat software-driven N:M redundant architecture is completely IP packet controlled with the only hardware item being an IP controlled electrical power switch.

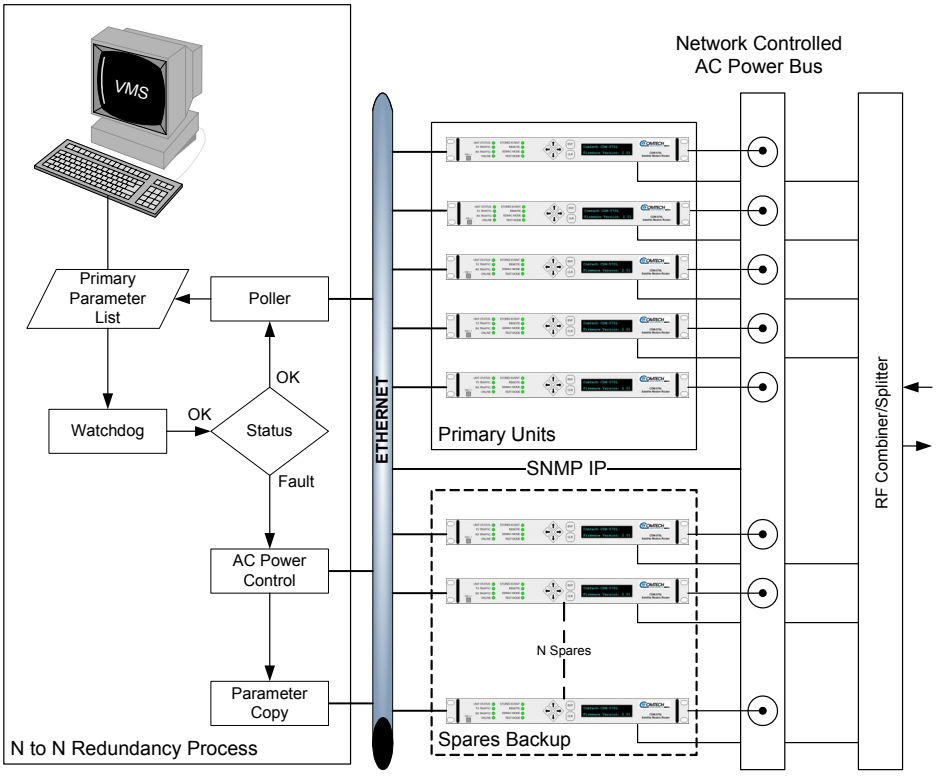

Figure C-8 N:M redundancy logic diagram

The switching control mechanism is completely monitored and controlled by the host master processing VMS as shown in the logic diagram in figure C-8. The VMS parameter backup and restore function is used to copy each primary units configuration database information which are then stored in a lookup list.

The stored primary unit's parameter files are used to put the image of a failed primary unit's parameters into a standby spare unit. The spare units should always be in the parked configuration described in the section "Setting Unit to Parked Configuration Mode" on page C-34, powered on, and listening and responding to the local LAN network.

After the N:M redundancy has been installed, as described in the section "Installing N:M Redundancy" on page C-15, the VMS starts listening for heart-beat messages from each of the primary and backup spare units for health and fault code response as shown in the logic diagram in figure C-8. If any primary unit fails (has an alarm set or misses three consecutive heartbeats) the VMS will invoke the backup procedure by sending a copy of the failed unit's database to the next available standby spare.

The spare unit is selected in order of IP address. If the spare unit fails to respond or process, it is marked as unavailable by VMS and the VMS repeats the process by selecting the next available unit in the list. Also, as part of the copy command, a separate message is sent to the IP remote controlled AC power bus removing power to the primary failed unit, shutting it down. This ensures that there is no possible contention between the failed unit and the spare unit being brought online.

As the spare unit receives the database configuration file it immediately copies the image over the stored offline state parameters and issues a firm rest to reinitialize the newly stored information without rebooting. Once the firm reset completes (approximately 1 second for non-STDMA mode or approximately 5 seconds for a unit operating in STDMA mode) the unit will announce itself by broadcasting an ARP message updating local routing tables.

The failed primary unit is readily identified by its powered down state. Once the cause of failure is identified and repaired, the primary unit can be reinstated and put back online using the procedure in the section “Putting a Failed Unit Back into Service” on page C-33.

Installing N:M Redundancy

The installation of N:M redundancy in a satellite network involves the physical installation, interconnection, and grouping of the primary and secondary modems and the logical grouping of managed units using the VMS Redundancy Manager.

Hub N:M Redundancy Requirements

The following requirements must be met before you can do a successful installation of VMS N:M redundancy.

- N:M Redundancy is only applicable to Hub devices that are not expansion units
- The VMS version must be 3.x or later
- VMS controlled modems must have identical firmware version installed.
- A Server Technology horizontal Sentry™ PowerTower XL IP remote power control is required
- The active device and the backup device must be connected to the same Ethernet LAN
- The active and backup devices must be connected to the same RF output connection

- The VMS, managed power strip, and hub modems must be on the same LAN segment
- All modems must share the same RF infrastructure, such as combiners and splitters

Once devices have been installed in the satellite network as described in the section “Installing N:M Redundancy” on page C-15, a group of identical, active, primary devices functioning in the satellite network under VMS control and another group of N devices, identical to the active devices in a spare device pool are created.

Tip: The logical grouping should correspond to the physical device grouping and their connections to remote managed power controls.

The devices in the primary group are devices which are active in the network. These devices can be performing any function in the network, except expansion units. All of the devices in the backup group are turned on, but have not been configured to perform any network function and are assigned a different IP addresses than the active devices. All devices in both the active and spare groups are connected to the VMS managed power switch as shown in figure C-9.

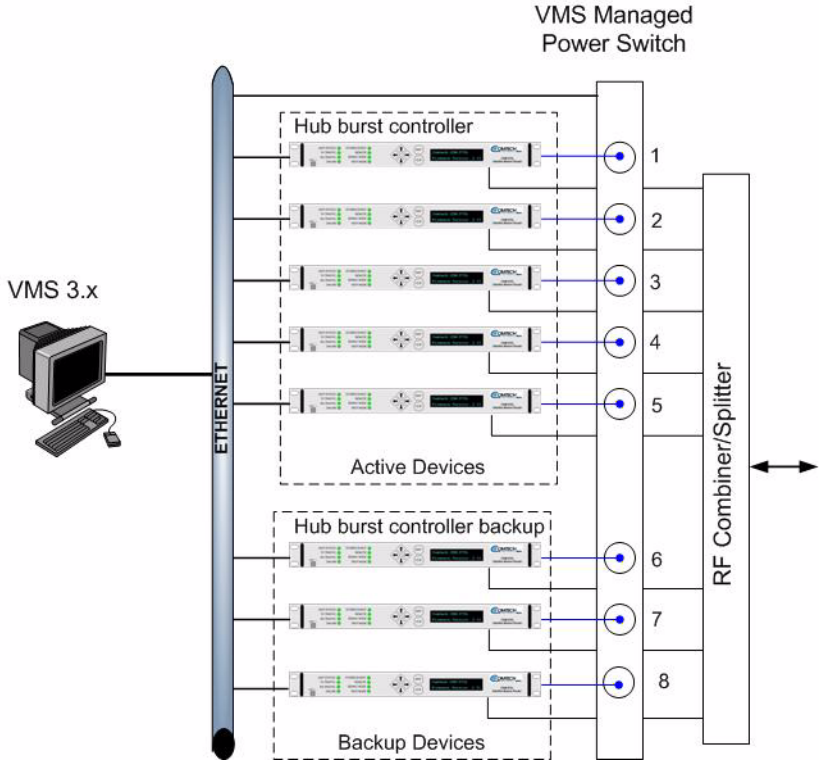

Figure C-9 N:M block diagram

Sample installation

Figure C-10 shows a diagram of a sample installation of an N:M redundant VMS installation. As shown in figure C-10, the units in the primary and secondary groups share a common Ethernet LAN with the IP controlled power switch.

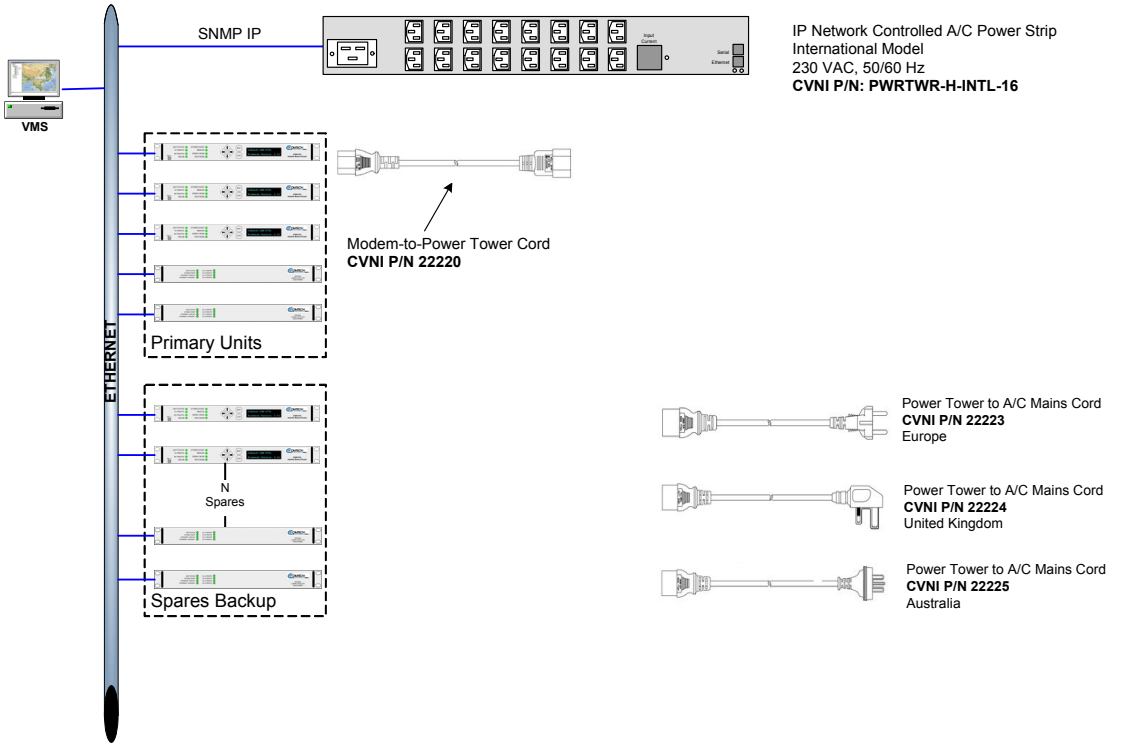

Figure C-10 Typical N:M redundant installation

The URL http://www.servertech.com/support/ProductManuals/ contains the *Power Tower XL/XM Installation and Operation* manuals for the network controlled power strip shown in figure C-10. Refer to these manuals for detailed information on this device.

NOTE

Note: All units in both the primary and secondary group must be identical, with exactly the same hardware configuration and accessories, and have identical firmware revision levels.

Use the following procedure to implement the optional N:M capability in a VMS network.

Setting up N:M redundancy

There are 3 hierarchal objects in N:M Redundancy, as shown in figure C-11. They are:

1. Redundancy Manager

2. Containers

3. Power Strips and Groups

Figure C-11 N:M Redundancy Hierarchy

Expanding the Redundancy Manager icon, shown in figure C-12, shows a typical N:M redundancy installation. Under the Redundancy Manager service icon are the icons for a container named Hub, in this example.

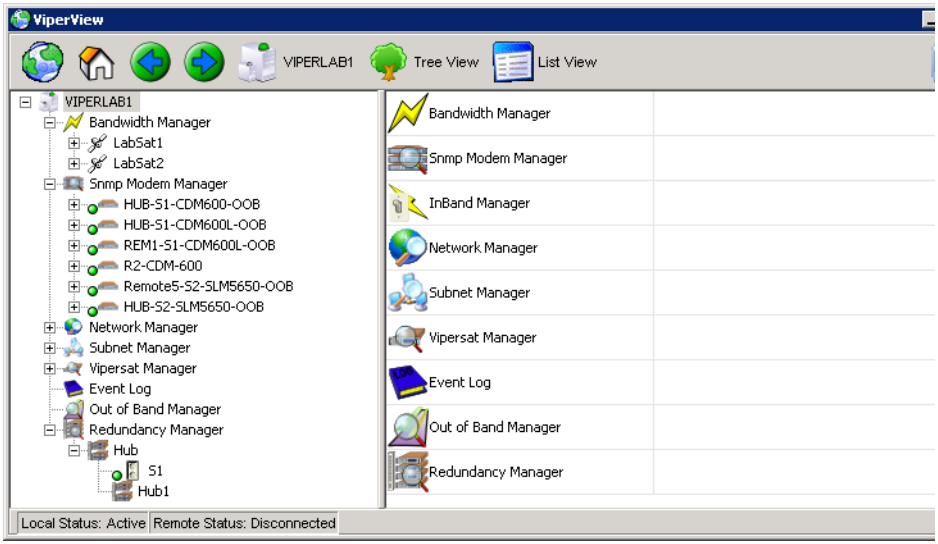

Figure C-12 Redunancy Manager Tree

Expanding the Hub icon shows additional icons such as the remote controllable switch labeled S1 in this example, and a group labeled Hub1.

Redundancy Manager

The Device Redundancy Manager is loaded as a service in ViperView. By right-clicking on it, as shown in figure C-13, the operator can enable device redundancy, create the main container for the site, and backup or restore the redundancy service.

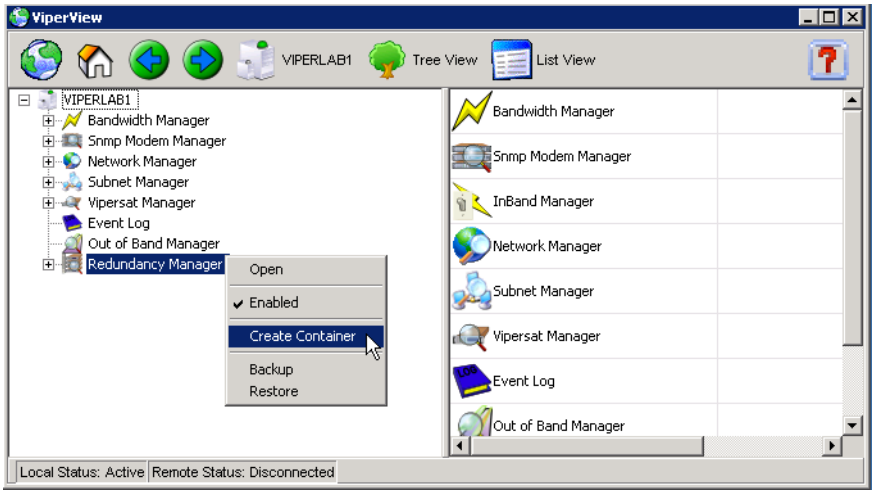

Figure C-13 Redundancy Manager Drop-Down Menu

Create Container

Selecting **Create Container** from the drop-down menu in figure C-13, brings up the **Create New Redundancy Group** dialog shown in figure C-14. Clicking the OK button creates a container with the name assigned in this dialog.

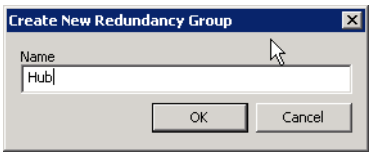

Figure C-14 Create Container dialog

Adding Strips and Groups

This top level container represents the main redundancy group. From it the operator can add Power strips and sub-groups by right clicking on the newly created group icon and selecting from the drop-down menu shown in figure C-15.

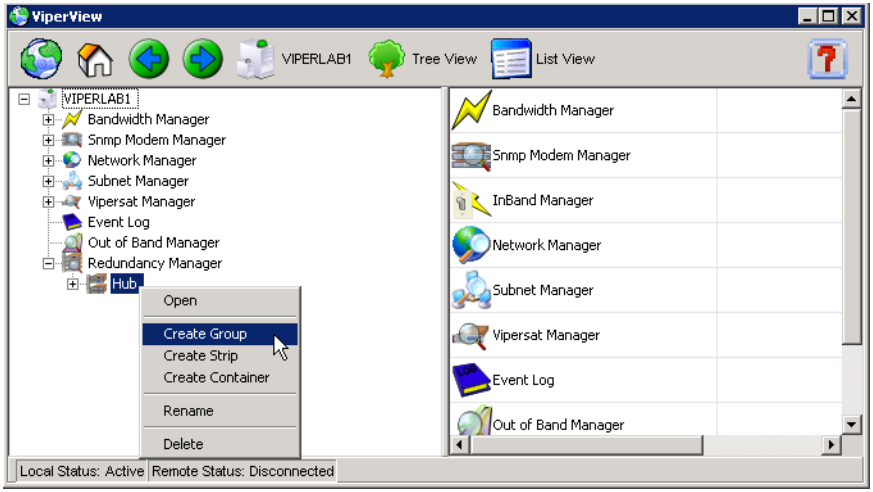

Figure C-15 Group drop-down menu

Once the container is created, right-clicking on its icon brings up the drop-down menu shown in figure C-16.

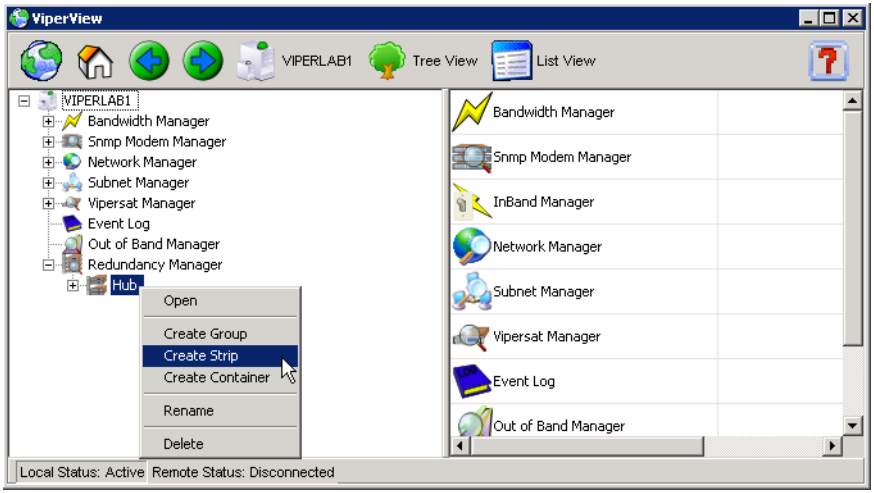

Figure C-16 Group drop-down menu

Power Strips

Selecting **Create Strip** from the drop-down menu shown in figure C-16, displays the New Power Strip dialog shown in figure C-17.

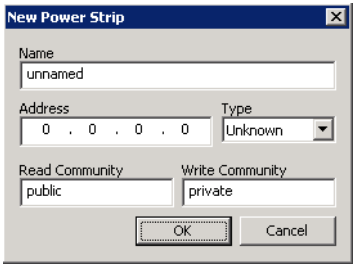

Figure C-17 New power strip dialog

The operator can name the strip (such as reference to a specific rack), enter the IP address, and select the type using the dialog in figure C-17. At this time VMS supports the Sentry 3 and 1 model of APC power strips. Vipersat recommends the Sentry 3. Leave the read and write communities public and private.

It will then be necessary to populate the strip with the primary and backup units. It is very important in this step to insure the association is made with the correct port. Populate the strip by dragging the unit from the subnet manager to the strip port as shown in figure C-18.

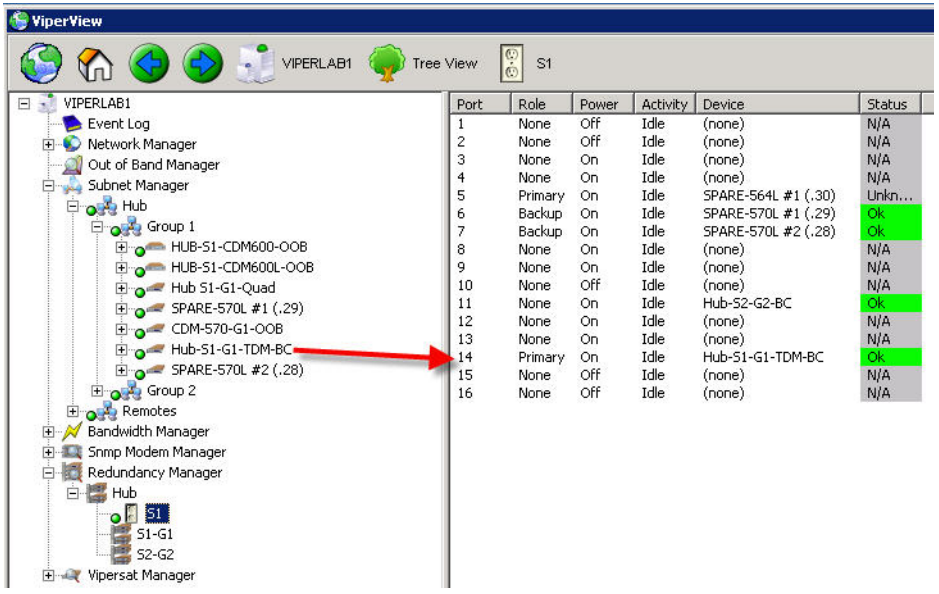

Figure C-18 Drag-and-drop populating power strip

Redundancy Groups

After declaring the strip(s), right-click on the main redundancy group as shown in figure C-16 and select **Create Group** from the drop-down menu. This next group will represent the redundancy group for a given satellite or network.

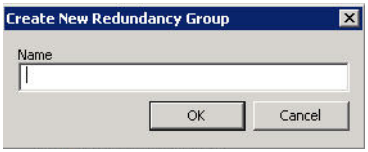

Figure C-19 Create Group dialog

Once the group is created, drag the port to the group sub-container as shown in figure C-20. Group sub-containers can have entries from multiple strips.

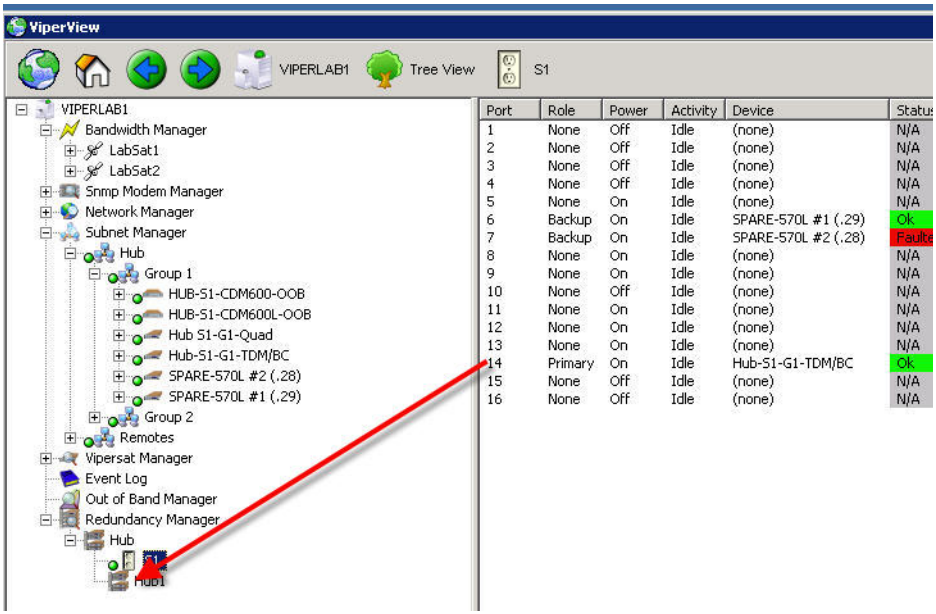

Figure C-20 Dragging port to group sub-container

Enabling Heartbeats

Next, enable heartbeats in the VMS and the devices.

From the Subnet Manager, right-click on the desired device and open the properties page shown in figure C-21. Check the **Enable Heart Beat** box.

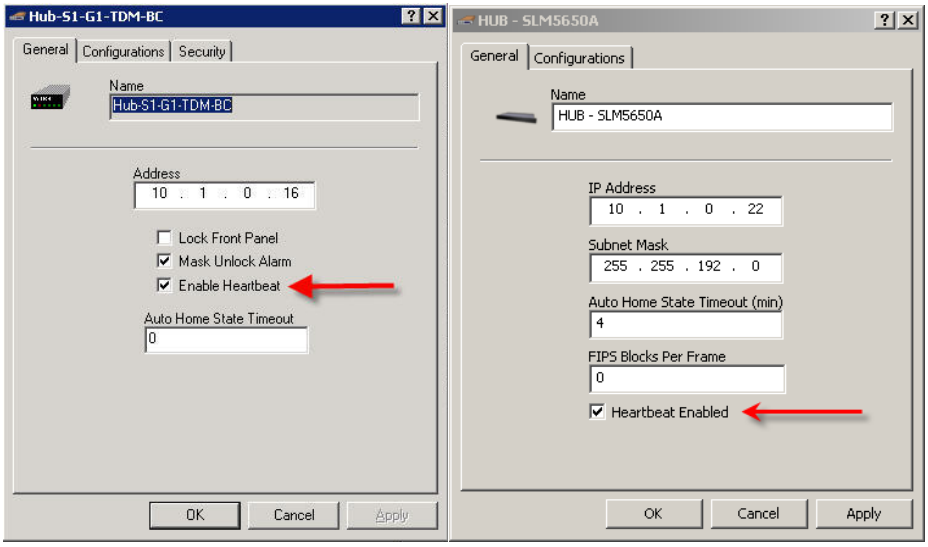

Figure C-21 Enable hearbeat in VMS, left window CDM-570/570L, right window SLM-5650A

Right-click on the device again from the drop-down menu select **Configure**. On the **Features** tab, shown in figure C-22, check the **Primary Heartbeat** box. Click the **OK** button to continue.

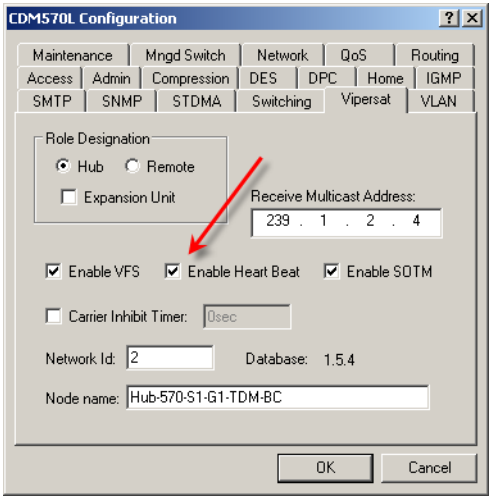

Figure C-22 Enabling heatbeat in CDM-570/570L modem

Force registration on the device. On the next PLDM the Status in the group window should turn green and change to OK.

Hub SLM-5650A Modem

Connect to the hub modem using Web interface, select the Vipersat page as shown on figure C-23 to enable HeartBeat messaging.

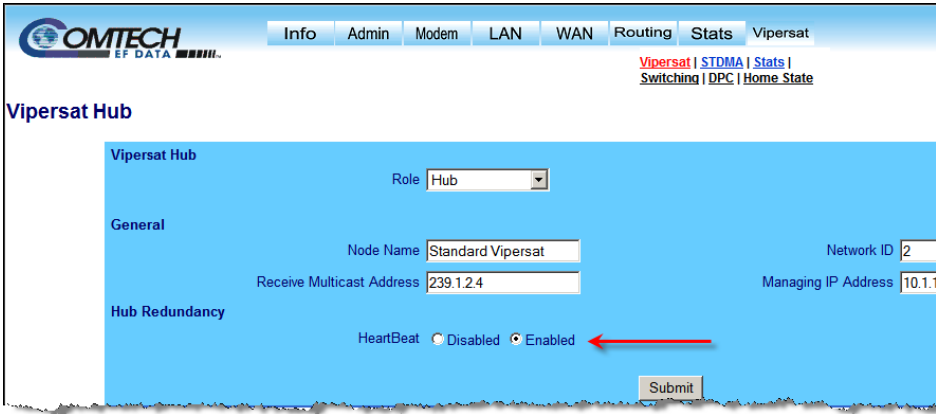

Figure C-23 Enabling HeartBeat in SLM-5650A Hub modem

Roles

Once the group sub-container is populated and heartbeats are enabled, roles can be defined for each of the ports by right-clicking on the device and selecting the appropriate role from the drop-down menu shown in figure C-33.

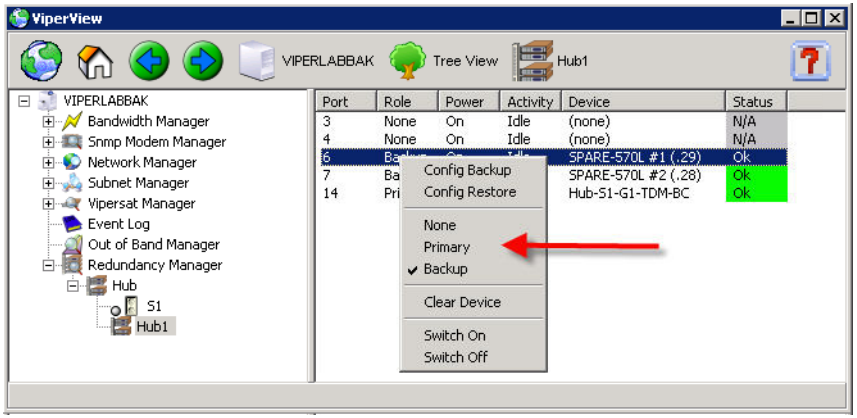

Figure C-24 Role selection

Roles are either **None**, **Primary** or **Backup**. From this drop-down menu shown in figure C-33, the operator can also Backup the device configuration (a very important step after populating the group), restore the device configuration, clear the device from the group or turn the port on or off. Before setting the roles ensure the Status for the device is Ok as shown in figure C-33.

There are four possible status indications:

1. **Ok** – Hearbeats are enabled in both VMS and the device, are being received by VMS and have no fault indications.

2. **Unknown** – Heartbeats are not enabled in VMS. May be enabled or not in the device.

3. **Faulted** – Hearbeats are enabled in VMS but not in the device or heartbeats are being received with a fault indication (non-zero status).

4. **N/A** – The port is not in use.

VMS will select only appropriate units from the list of backups. For example, only CDM570 backups will be used to backup a failed CDM570 even if there are CDD564 units designated as backup units earlier in the list.

Backup Configurations

At this point it is necessary to pull backup configuration files from each of the units. Clicking on the **Config Backup** command on the drop-down menu shown in figure C-25 stores these configuration files in the directory path: *C:\Program Files\Vipersat\VMS\3.0\bin\Device Redundancy.*

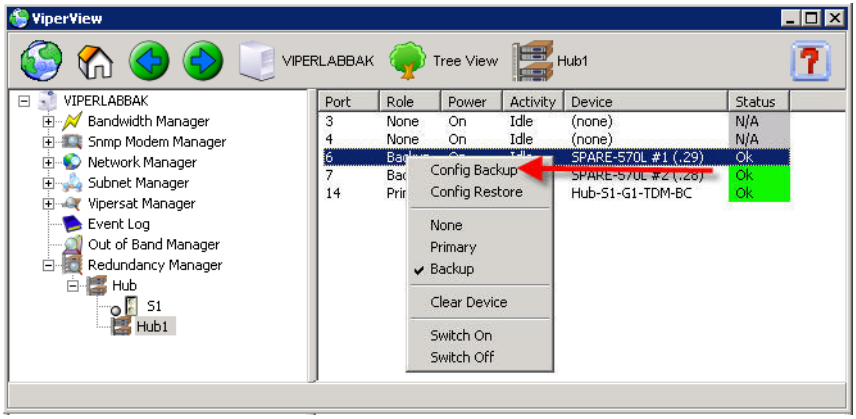

Figure C-25 Configuration backup

System Restoration

Once VMS performs a unit restoration, the backup unit will take on all the characteristics of the original unit that failed, including its IP address. Unless the operator wishes to maintain the original rack profile, the failed unit can either be repaired or replaced and designated as a backup to the unit which is now functioning as the primary.

Should the operator desire to return to the original rack profile the following steps are mandatory and will require a system/segment outage!

Pre-Configuring Backup Files

The files created in the preceding step are used by VMS for automatic redundancy and are not available to the operator for restoring device units to their original role. It will be necessary to create these files so they will be available for this purpose.

Creating Backup Configuration Files

From the Subnet Manager, right-click on the target unit, open the **Properties** page and select the **Configuration** tab shown in figure C-26.

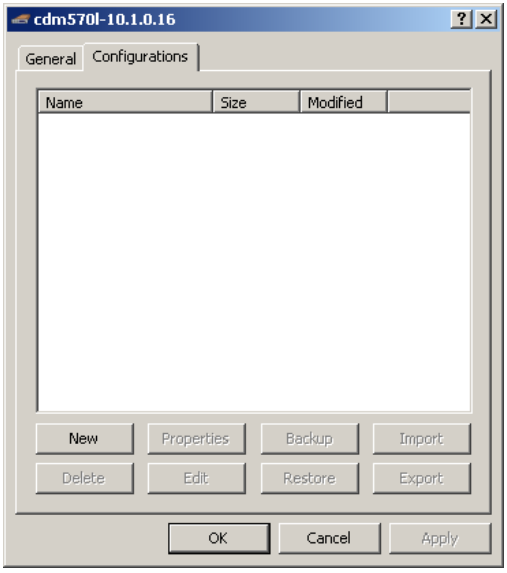

Figure C-26 Configuration tab

Click the **New** button, shown in figure C-27 which will open the **New Configuration** dialog shown in figure C-27.

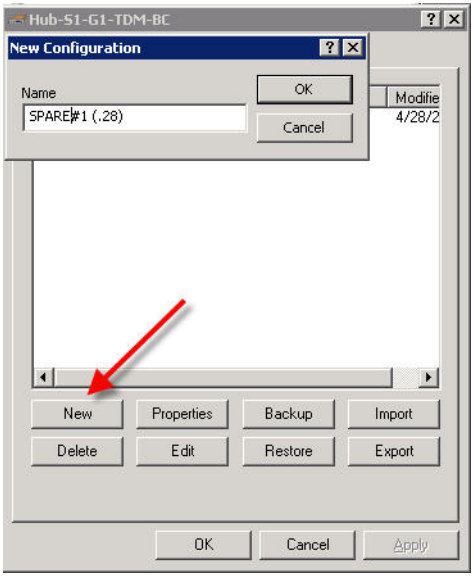

Figure C-27 New configuration dialog

Give the configuration file an appropriate name in the **New Configuration** dialog in figure C-27 and click the **OK** button. Then highlight the file name as shown in figure C-28 and click the **Backup** button.

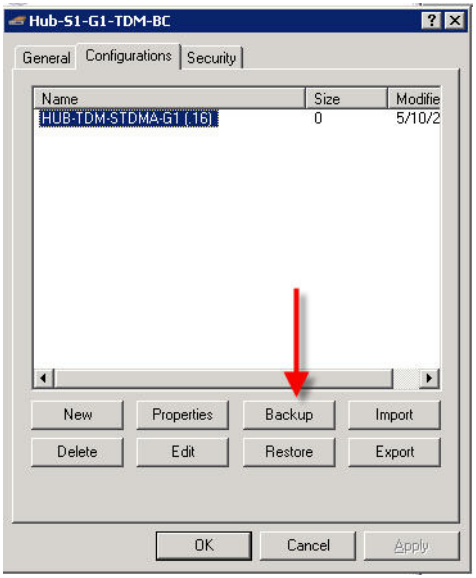

Figure C-28 Creating a backup configuration file.

By default the file will be saved in the location shown in figure C-29.

Figure C-29 Saved file location

Storing Spare Configurations in the Primary Units

Once these backup files have been created, it is necessary to add all possible spare units to the **Configurations** tab for each of the primary units. This is done by creating a new configuration file name, highlighting it, then clicking the **Import** button as shown in figure C-30 and importing the file from the directory shown in figure C-31.

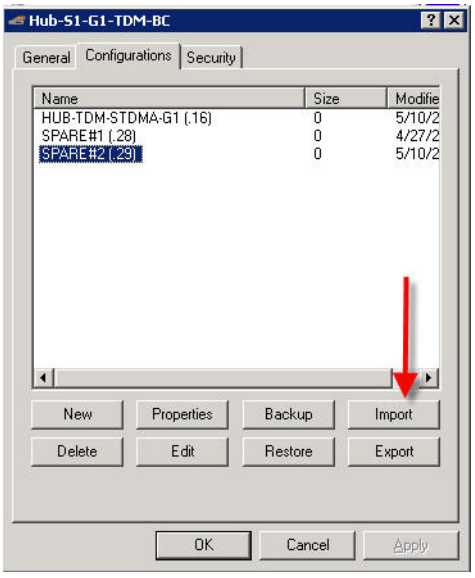

Figure C-30 Importing file

Select the appropriate file from the list:

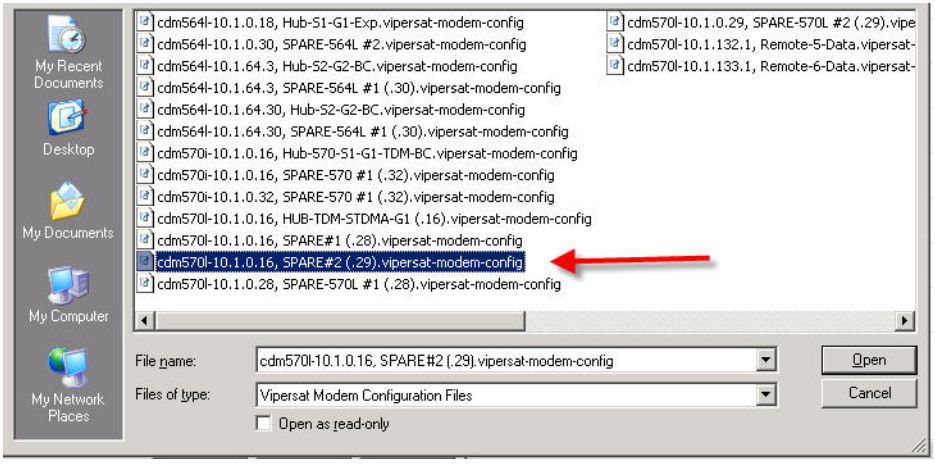

Figure C-31 Selecting file

Preparing the repaired/replacement unit

Pre-configure the repaired/replacement unit with the configuration of the primary unit being replaced. This step should be performed on a separate LAN segment from the satellite network to avoid conflicts. Vipersat strongly recommends using VLOAD to maintain backups of all network units. These backup files can be used for this purpose.

Install the replacement unit in the desired rack location and make all connections. The unit should be powered on, but insure the switch port is powered off.

Restoring the acting primary unit spare configuration

Since the backup unit assumed the identity of the failed primary unit during restoration, it will appear in the Subnet Manager as the original unit. Right-click on the unit and open the Properties page. Go to the Configuration tab and select the appropriate spare configuration imported in the preceding step. Be sure to select the proper configuration to avoid IP address conflicts.

Select Restore to load the configuration.

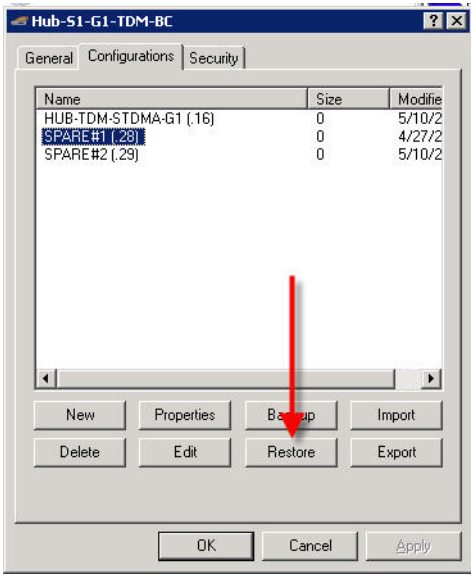

Figure C-32 Restoring configuration

At this point, the network segment controlled by this primary unit will go down. Power up the new primary unit using the drop down menu on the strip, or in the sub-group. If the configuration is correct, the network segment will automatically come back up after the unit reboots.

Cleaning up

Once the network has been restored, it will be necessary to create new configuration backups from the drop-down menus and to reset the system roles. Insure the status is OK. (It may be necessary to reset heartbeat flags)

How N:M Redundancy Works

In the event of failure of any active device, a unit from the spare device pool is configured with the configuration of the failed device, including its IP address, and re-initialized without a hard reset. VMS switches off power to the failed device immediately after detecting failure to ensure the failed device will not conflict with its replacement device when the replacement device is booted into service.

Note: The total elapsed time to detect a failed device, remove power, configure a device from the spare pool with the failed device's configuration, and reboot the replacement device into service in the satellite network is generally less than 5 seconds.

Device failure detection

Each device protected by N:M redundancy in a satellite network transmits a packet, called a heartbeat, at timed intervals whenever N:M redundancy is enabled on the device. During registration, VMS establishes the heartbeat interval for each protected device. The heartbeat packet contains the following information:

- The unit's IP address
- The unit's health/fault status
- The unit's receive and transmit health or fault status

The VMS monitors and analyzes each received heartbeat packet for information for a switch trigger such as:

- No heartbeat is detected for three (3) consecutive one-second intervals.
- The unit transmits a fault status indicating the unit's health, or loss of transmit or receive capability.

The Switch-over Process

The switch-over process involves both the Vipersat Manager and the Redundancy Manager.

Vipersat Manager

Activity in the Vipersat Manager starts when the VMS N:M redundancy capability is enabled, then proceeds as follows:

1. VMS monitors error messages and heartbeat packets from protected units for an event indicating that a redundancy switch is required.

2. When an event is detected that requires a redundancy switch, VMS sends a notification event to the VMS Log service.

3. VMS sends notification to the Redundancy Manager that a switch-over is required.

Redundancy Manager

The Redundancy Manager receives the switch-over request from VMS which starts the following process:

1. The Redundancy Manager checks that the VMS notification is a for a valid switch condition. If the condition is not valid, the Redundancy Manager sends its action to the VMS log service and returns to waiting for the next event notification.

2. If the notification is a valid switch condition, the Redundancy Manager checks to see if there is a backup unit available. If no unit is available, the Redundancy Manager send this information to the VMS Log Service and returns to waiting for the next event notification.

3. If there is a backup unit available, the Redundancy Manager sends a command to the remote managed power control unit to turn off power to the plug used by the failed primary unit.

4. The Redundancy Manager saves (puts) the redundant configuration and base modem parameters to the backup unit.

5. The Redundancy Manager commands a firm reset of the backup unit.

6. After the switch, the backup unit is configured as the original primary unit and joins the network performing the same functions as the failed primary unit.

7. When the unit switch-over is completed, the Redundancy Manager sends the event to the VMS Log service completing the switch-over process.

8. The Redundancy Manager resumes waiting for the next event notification.

Putting a Failed Unit Back into Service

This section describes the process of configuring a VMS controlled modem before connecting it to a VMS network as an N:M redundant backup unit.

Caution: A repaired failed unit will have the same IP address and function as its replacement unit which is currently online. Use the following procedure when returning the unit back into service as a backup. To avoid conflict with the online primary unit and possible loss or degradation of satellite network communications, use the following procedure.

Use the following procedure when putting a VMS controlled modem into service. The unit must have its IP address changed and its configuration modified to backup mode so that it can be connected to the network without conflicting with any ongoing communication or network control functions.

Warning: Do not apply power to the unmodified unit while it is still connected to the network. To do so may cause the network to behave unpredictably and possibly fail. A unit removed from service MUST be set to backup configuration before being placed back into service.

1. Disconnect the Ethernet connection between the unit and the LAN.

2. Remove all RF connections from the VMS controlled modem to the network.

Tip: To test a failed unit and then put it into backup configuration before putting it back into service, ideally it should be removed from the rack and the power cord removed from the unit's rear connector leaving the power cord connected to the remote managed power control unit.

Setting Unit to Parked Configuration Mode

You should configure all units you are installing into an existing VMS network to be in the parked configuration mode to ensure that:

- The unit will be recognized and respond to VMS commands
- The unit will not try to assume an active role in the network until it has been commanded to do so by VMS.

Connect to the unit using the serial console port as described in the unit's documentation available for download at:

http://www.comtechefdata.com/

Note: For the following configuration changes using a SLM-5650A refer to Vipersat version of modem manual. All referenced changes are similar in text descriptive terms.

1. Turn the unit on.

2. On the Administration > Feature Configuration page shown in figure C-33, enter the unit's features and unlock codes.

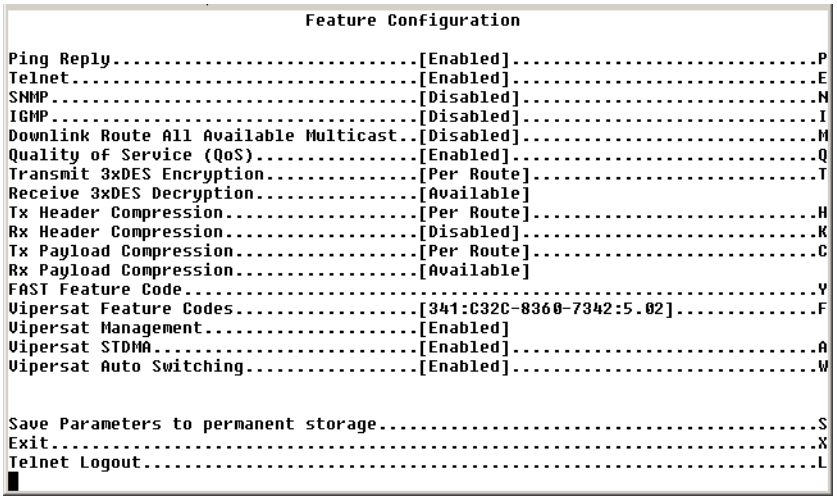

Figure C-33 Feature configuration page, CDM-570/570L

3. Disable STDMA

4. On the **Administration** page shown in figure C-34, set the **Working Mode** to **Router - Vipersat**.

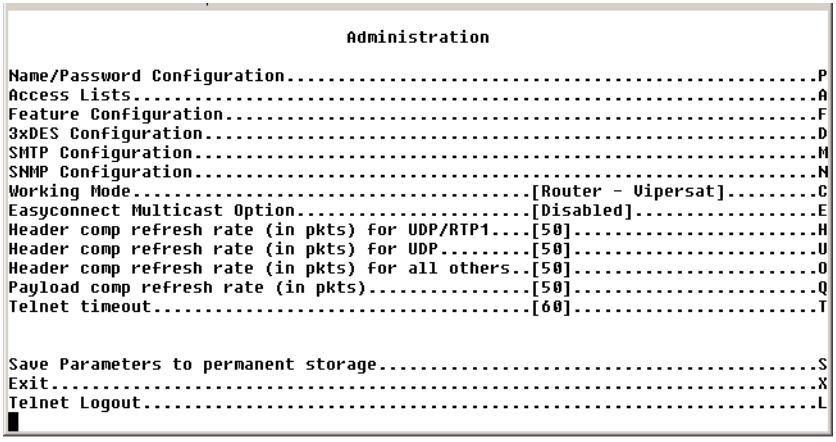

Figure C-34 Administration page, CDM-570/570L

5. Using the Internet Interface page shown in figure C-35, set the unit's IP address to the IP address of the backup unit which replaced it. If you do not use this IP address, make certain that the IP address is on the hub subnet and is not being used by any other active or backup unit.

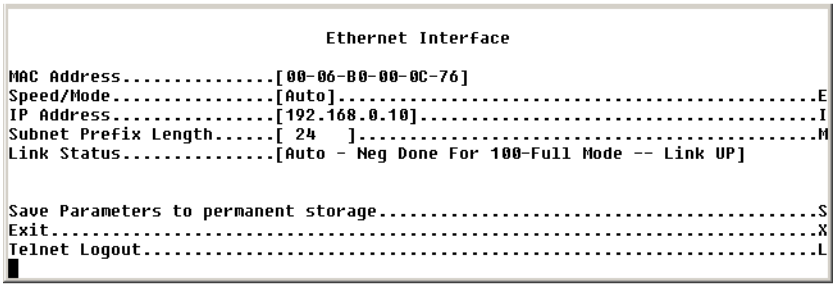

Figure C-35 Ethernet Interface page, CDM-570/570L

6. On the Vipersat Configuration page shown in figure C-36, set the **Unit Role** to **Hub Expansion**.

7. This completes setting the unit to the Passive Configuration mode if it is a CDM-564L. It is possible the unit was being used to supply voltage to a LNB, which is described below.

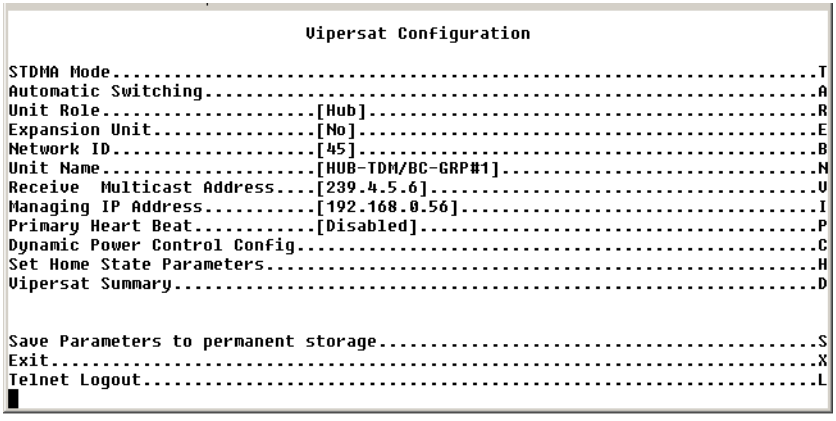

Figure C-36 Vipersat configuration page, CDM-570/570L

8. On the Satellite Modem > Configuration > Configuration > **Tx Configuration** page shown in figure C-37, disable the unit's transmit capability by changing the Tx Carrier to [Off].

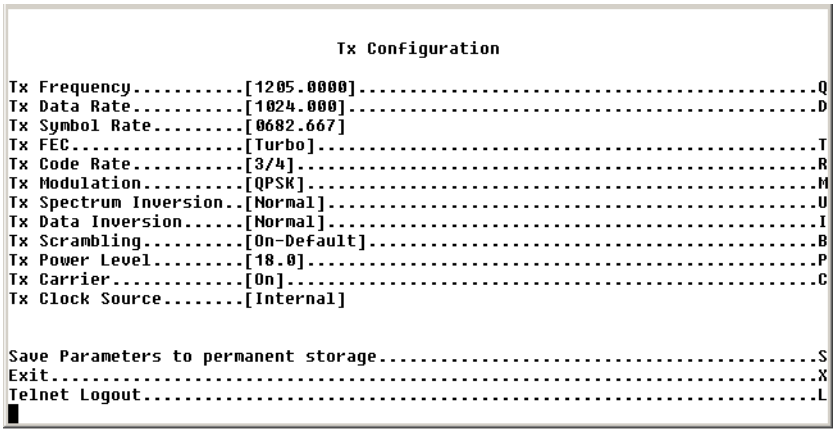

Figure C-37 Transmit configuration page, CDM-570/570L

9. On the Satellite Modem > Configuration > Configuration > Rx Configuration page shown in figure C-38, set the **Rx Frequency** to the low end (50 or 950).

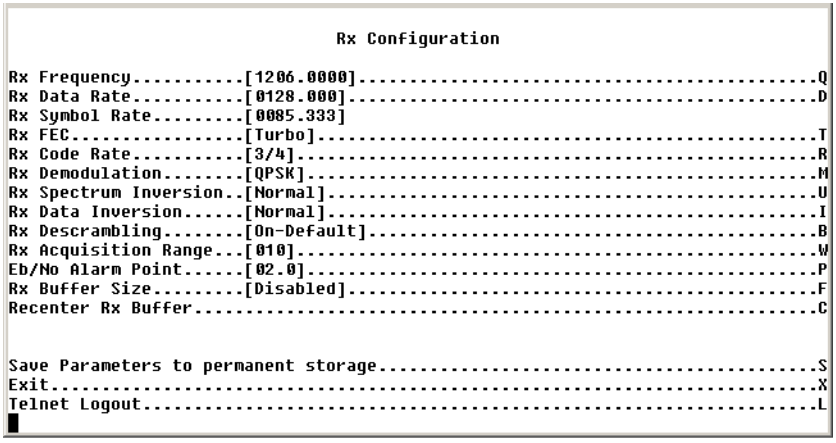

Figure C-38 Set receive frequency to low end, CDM-570/570L

10. Disable the Satellite Modem > Configuration > Configuration > Block Up Converter (BUC) > BUC DC Power as shown in figure C-39.

```
                    Block Up Converter (BUC) Configuration

BUC Address.....................[ 1    ].............................A
BUC RF Output...................[Disabled].........................R
BUC DC Power....................[Disabled].........................W
BUC 10 MHz Reference............[Disabled].........................P
BUC Current Alarm Upper Limit (mA)..[ 3500 ].....................H
BUC Current Alarm Lower Limit (mA)..[ 1000 ].....................C
BUC LO Frequency (MHz)..........[00000-].........................F


Save Parameters to permanent storage.....................................S
Exit.....................................................................X
Telnet Logout............................................................L
```

Figure C-39 BUC configuration, CDM-570/570L

11. Disable the Satellite Modem > Configuration > Configuration > Low Noise Block Converter (LNB) LNB DC Supply Voltage as shown in figure C-40.

```
                  Low Noise Block Converter(LNB) Configuration

LNB DC Supply Voltage...........[Off].....................................P
LNB 10MHz Reference.............[Off   ].....................................R
LNB Current Alarm Upper Limit (mA)..[ 600  ].....................H
LNB Current Alarm Lower Limit (mA)..[ 10   ].....................C
LNB LO Frequency (MHz)..........[00000+].........................F


Save Parameters to permanent storage.....................................S
Exit.....................................................................X
Telnet Logout............................................................L
```

Figure C-40 LNB configuration, CDM-570/570L

12. This completes the process of setting the VMS controlled modem to parked configuration mode and it now ready to be put back into service.

13. If the repaired unit is to be connected to the same plug, it will automatically reinstate the unit as a member of the backup group. VMS identifies the unit by its MAC address so if, for any reason, the failed unit is replaced with another unit, you will have to go to VMS and drag the newly installed unit to the appropriate plug on the power strip to complete its installation.

Caution: Failure to follow the discipline of connecting the repaired unit to the correct plug on the remote controlled power strip will result in the unit not being able to be turned off if it fails while acting as the primary unit, resulting in the possibility of having two active units trying to operate in the same role and consequently crashing the network.

APPENDIX

D

DOMAIN CONTROLLER AND DNS

This appendix describes configuring the VMS server or servers to perform the roles of network domain controller and DNS server for the VMS network. It is especially necessary that these functions be installed if the VMS installation is to be a redundant, fault-resistant installation.

Note: If you are not installing a redundant VMS configuration, use the instructions in this section and the section and ignore the instructions in the section “Configuring a Secondary Domain Controller” on page D-15.

Domain controllers store data and manage user and domain interactions, including user logon processes, authentication, and directory searches. If you plan to use this server to provide the Active Directory directory service to network users and computers, configure this server as a domain controller.

To configure a server as a domain controller, install Active Directory on the server. There are four options available in the Active Directory Installation Wizard. You can create an additional domain controller in an existing domain, a domain controller for a new child domain, a domain controller for a new domain tree, or a domain controller for a new forest.

Setup

Before you begin configuring your server as a domain controller, verify that:

- Make sure that the TCP/IP configuration settings for the server are correct, particularly those used for DNS name resolution.
- If a server is to be configured as the secondary server in a redundant VMS installation, the primary and secondary servers should have an active Ethernet connections between these two servers.

- All existing disk volumes use the NTFS file system. Active Directory requires at least one NTFS volume in which to store the SYSVOL folder and its contents. FAT32 volumes are not secure, and they do not support file and folder compression, disk quotas, file encryption, or individual file permissions.
- Disable any extra Ethernet adapters on the server and ensure that only one gateway is assigned to the server.
- Disable the Windows Firewall.
- Verify that the Security Configuration Wizard is installed and enabled.

This Appendix is divided into two parts. The first part describes configuring a Domain Controller and Domain Name Server (DNS) on a single server which can then be used either as a stand-along VMS server or as the Primary VMS server in a redundant configuration.

The second part of this Appendix, starting with the section “Configuring a Secondary Domain Controller” on page D-15, describes configuring a secondary Domain Controller and Domain Name Server on the Secondary or backup server in a redundant VMS installation.

Configuring a Domain Controller and DNS

Before you begin configuring your server as a domain controller, verify whether or not:

- TCP/IP configuration settings for the server are correct, particularly those used for DNS name resolution. The servers should have active Ethernet connections to each other.
- All existing disk volumes use the NTFS file system. Active Directory requires at least one NTFS volume in which to store the SYSVOL folder and its contents. FAT32 volumes are not secure, and they do not support file and folder compression, disk quotas, file encryption, or individual file permissions.
- Extra Ethernet adapters are disabled
- Ensure only one gateway is assigned to the server.
- Windows Firewall is disabled.
- The Security Configuration Wizard is installed and enabled.

To configure a stand-alone or Primary server as a domain controller, start the Configure Your Server Wizard by doing either of the following:

1. From **Manage Your Server** shown in figure D-1, click Add or remove a role. By default, Manage Your Server starts automatically when you log on. To open Manage Your Server, click Start, click Control Panel, double-click Administrative Tools, and then double-click Manage Your Server.

2. Open the Configure Your Server Wizard by clicking Start > Control Panel > Administrative Tools > Configure Your Server Wizard.

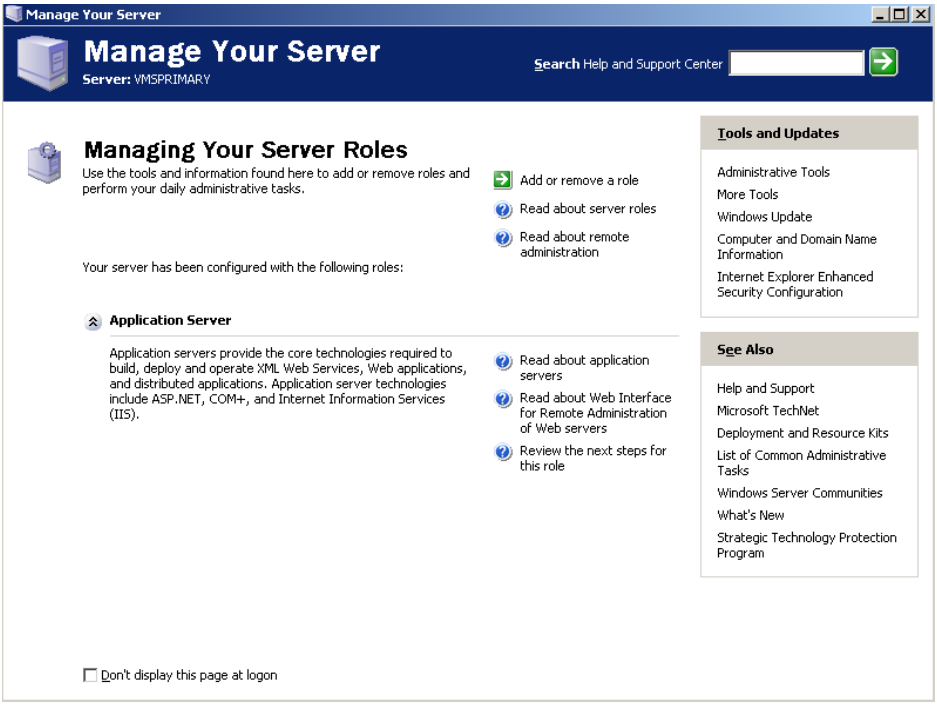

Figure D-1 Manage Your Server dialog

3. Review the **Preliminary Steps** shown in figure D-2 and then click the **Next** button to proceed once you have verified these steps have been completed.

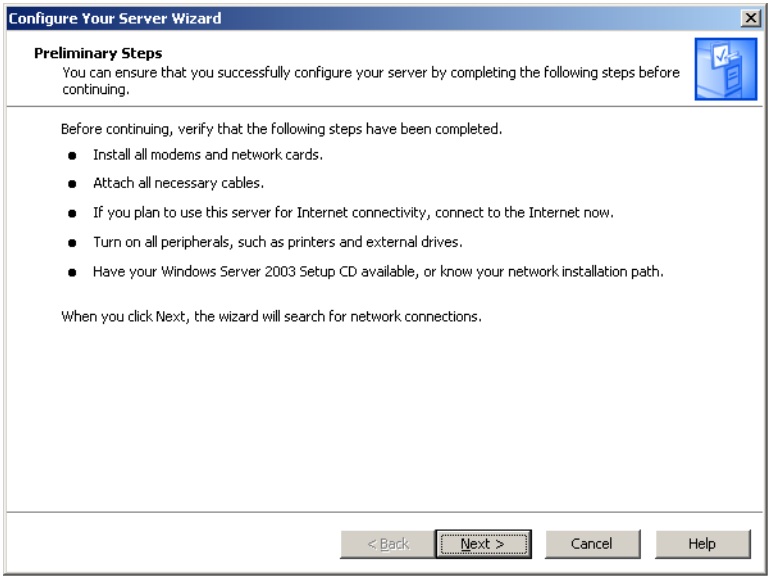

Figure D-2 Preliminary Steps

4. From the **Configuration Options** dialog shown in figure D-3, select the **Custom Configuration** radio button then click **Next** button.

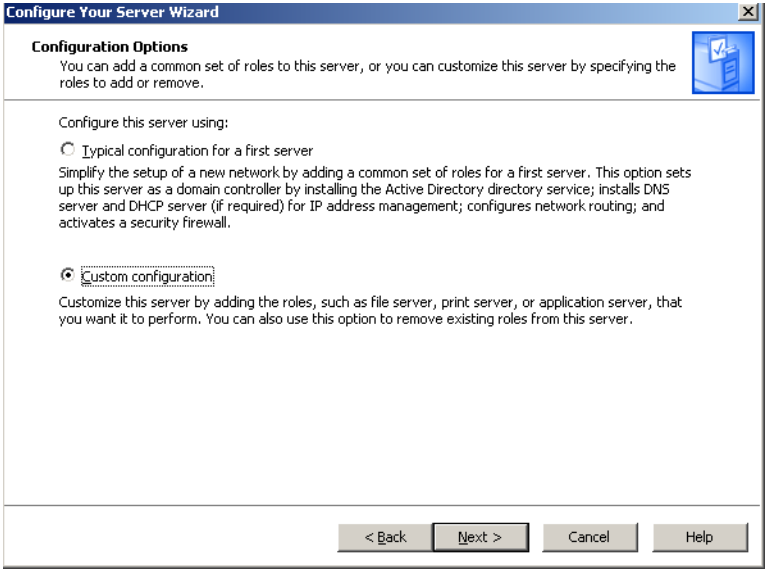

Figure D-3 Configuration Options

5. From the **Server Role** dialog shown in figure D-4, select the **Domain Controller (Active Directory)** item, then click the **Next** button.

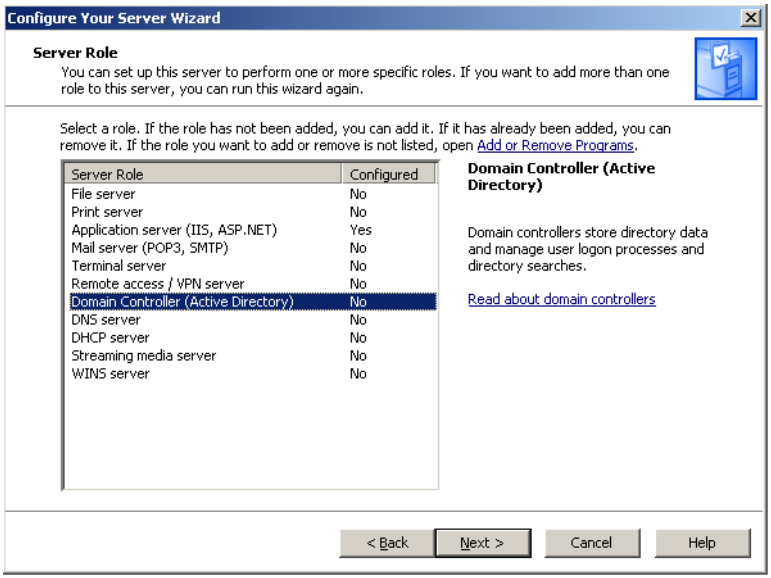

Figure D-4 Server Role dialog

6. Verify your selection displayed in the **Summary of Selections** listing shown in figure D-5, then click the **Next** button to proceed.

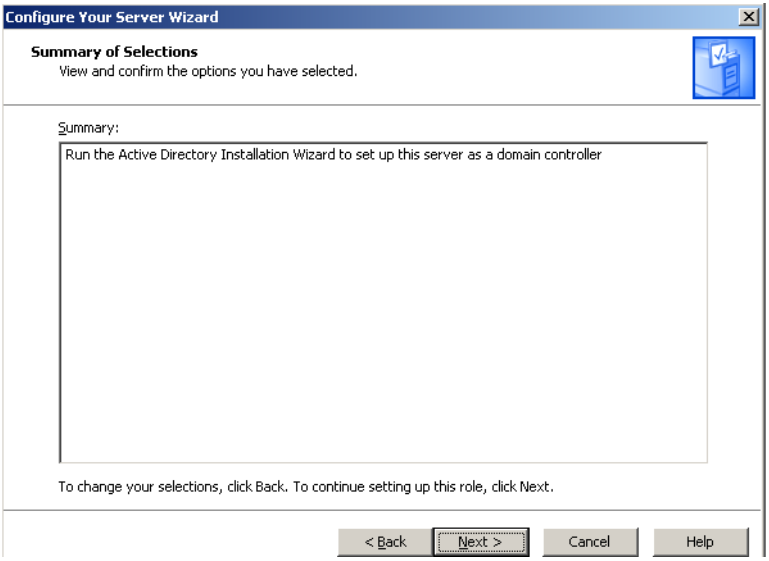

Figure D-5 Summary of Selections dialog

7. From the **Active Directory Installation Wizard** shown in figure D-7, click the **Next** button to begin the installation.

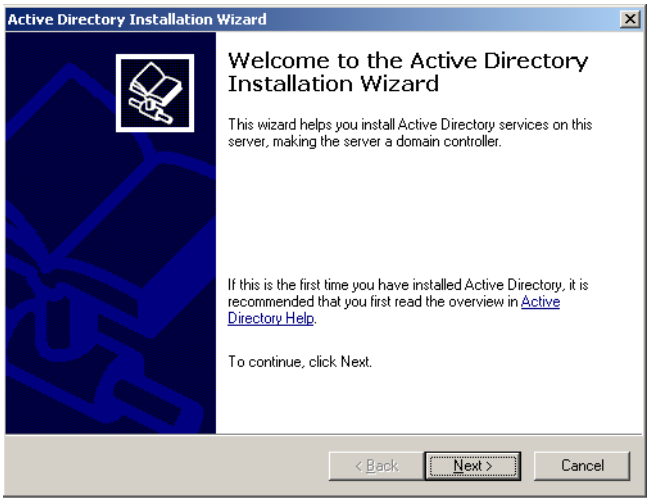

Figure D-6 Active Directory Installation Wizard

8. After reviewing the **Operating System Compatibility** information, shown in figure D-6, click the **Next** button.

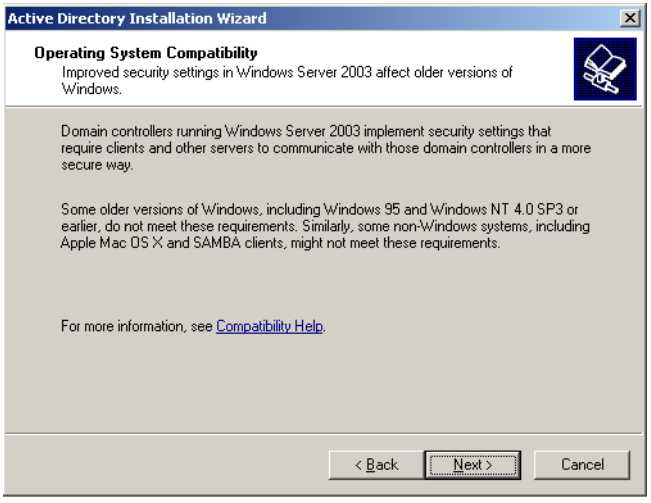

Figure D-7 Active directory installation wizard

9. After reviewing the **Operating System Compatibility** information, click the **Next** button.

10. From the dialog shown in figure D-8, select **Domain controller for a new domain** (default) radio button, and then click the **Next** button.

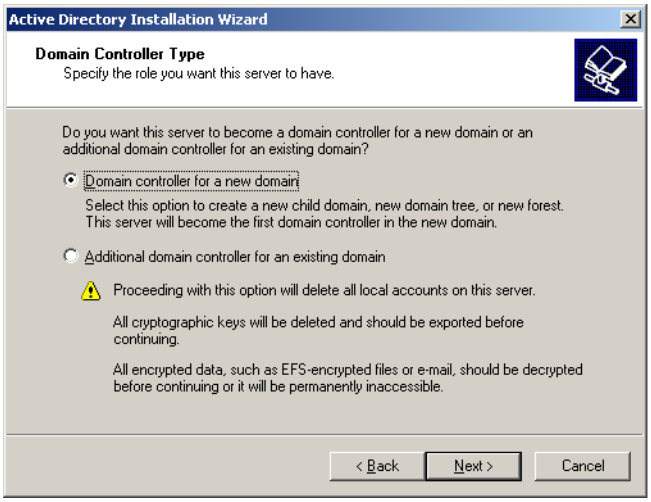

Figure D-8 Domain controller type dialog

11. From the **Create New Domain** dialog shown in figure D-9, select the **Domain in a new forest** (default) radio button, then click the **Next** button.

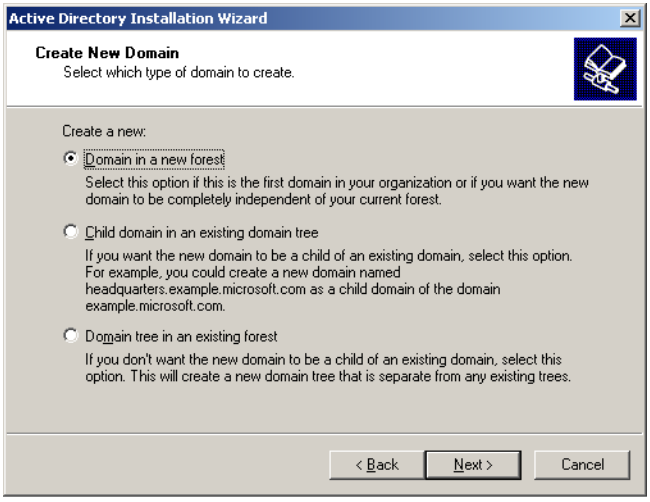

Figure D-9 Create new domain dialog

12. In the **New Domain Name** dialog, enter a fully qualified domain name in the **Full DNS name for the new domain** box. A full DNS name has the structure similar to *AnyName.company.com* as shown in the example in figure D-10. After entering the new domain name, click the **Next** button to proceed.

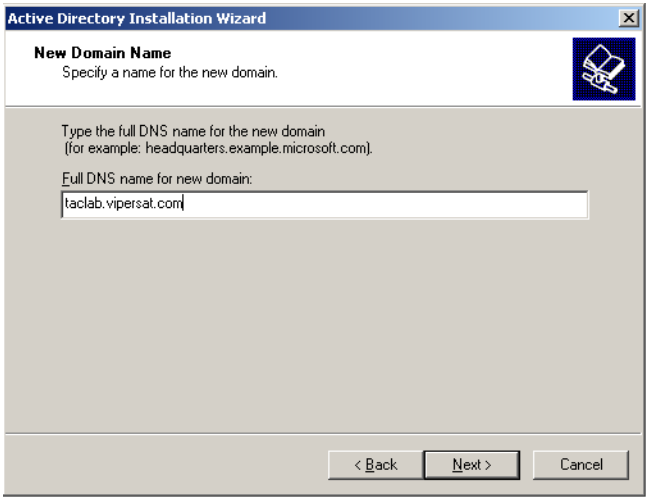

Figure D-10 New domain name dialog

13. In the **NetBIOS Domain Name** dialog shown in figure D-11, enter the NetBIOS name you have assigned to this domain. TACLAB0 is the NetBIOS name used in the example illustrated in figure D-11, but you should assign an appropriate name appropriate to your network. A NetBIOS name gives down-level compatibility.

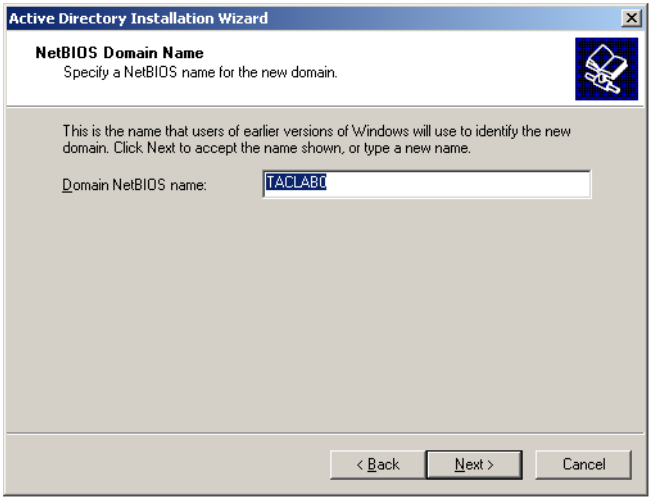

Figure D-11 NetBIOS domain name

14. In the **Database folder** dialogs shown in figure D-12, enter the path C:\Windows\NTDS for these folders. When you have verified these

entries, click the **Next** button to continue. This is the default location for Windows.

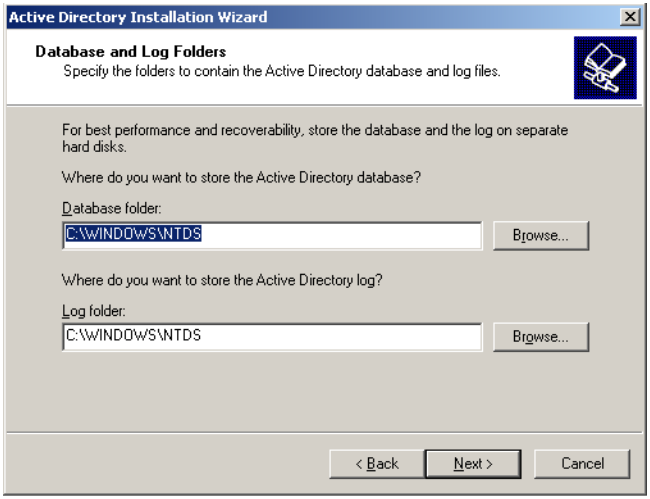

Figure D-12 Database and log folders dialog

15. Use the default folder location, C:\WINDOWS\SYSVOL as shown in figure D-13, for the Shared System Volume. Click the **Next** button to procede.

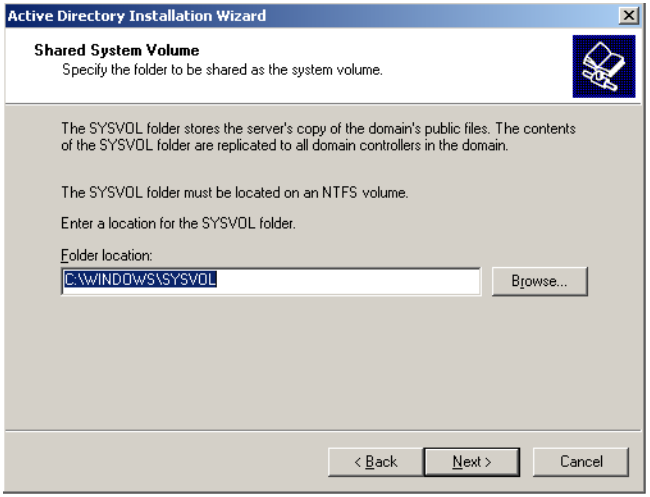

Figure D-13 Shared system volume dialog

16. If the **DNS Registration Diagnostics** screen is as shown in figure D-14, click **Install and configure the DNS server on this computer**. Click **Next**

to continue. The wizard will install and configure DNS support on the server.

NOTE

Note: The screen shown in figure D-14 will be displayed if you are configuring a server which has not had a previous DNS server installation. If you see a different screen at this point, check to make sure that the server has not been a previously configured as a DNS server.

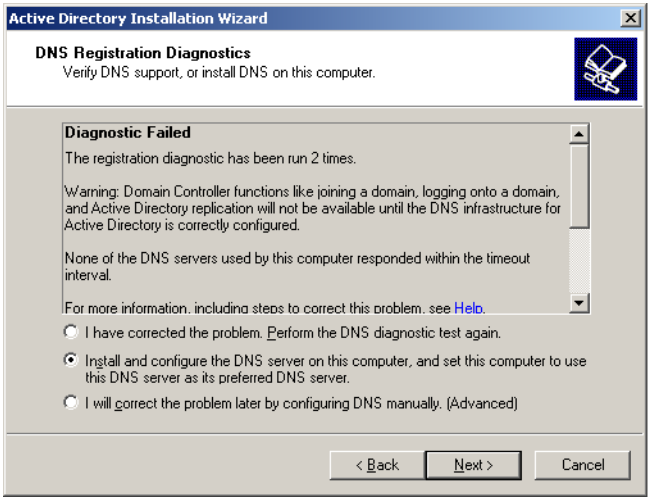

Figure D-14 DNS registration diagnostics screen

17. In the **Permissions** dialog shown in figure D-15, select the **Permissions compatible only with Windows 2000 or Windows Server 2003** (default) radio button, then click the **Next** button.

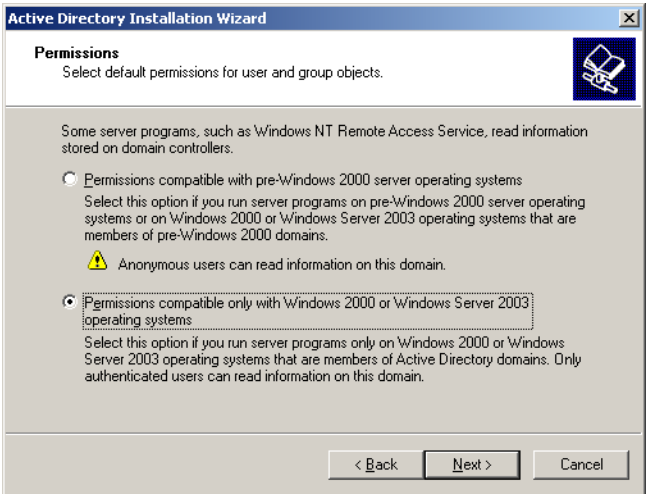

Figure D-15 Permissions dialog

18. In the **Directory Services Restore Mode Administrator Password** dialog shown in figure D-16, enter the password assigned to the Administrator account to be used when the server is started in the Directory Services Restore mode. You should use a complex password with at least 1 alpha and 1 numeric character, such as *V1persat*. When the password has been entered and verified, click the **Next** button to continue.

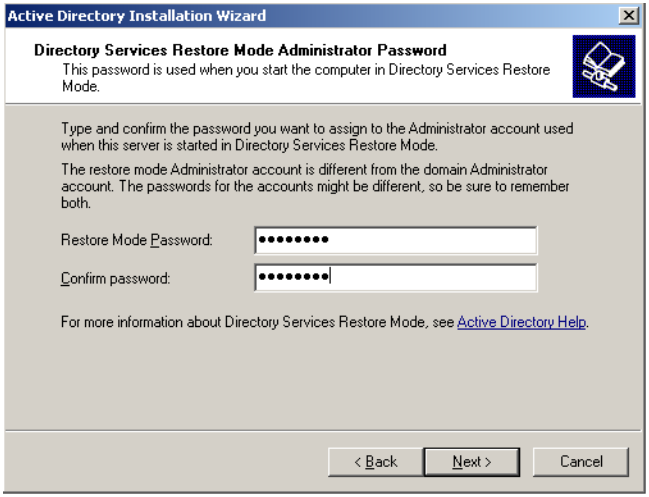

Figure D-16 Administrator password

19. Review the **Summary** screen shown in figure D-17, then click the **Next** button to continue.

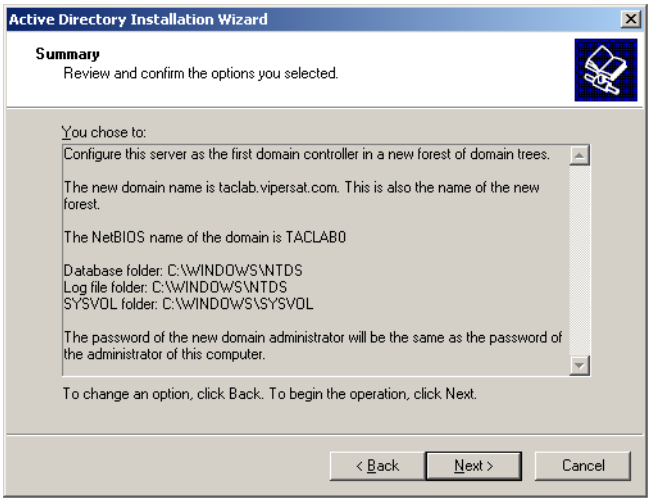

Figure D-17 Summary screen

20. The wizard will begin configuring the Primary domain controller as shown in figure D-18.

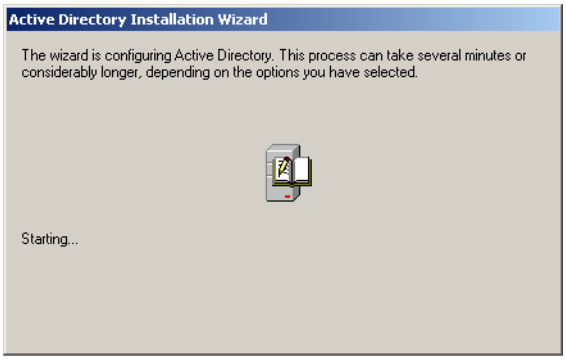

Figure D-18 Configuring primary domain controller

21. When prompted by the screen shown in figure D-19, click the **Finish** button to complete the setup.

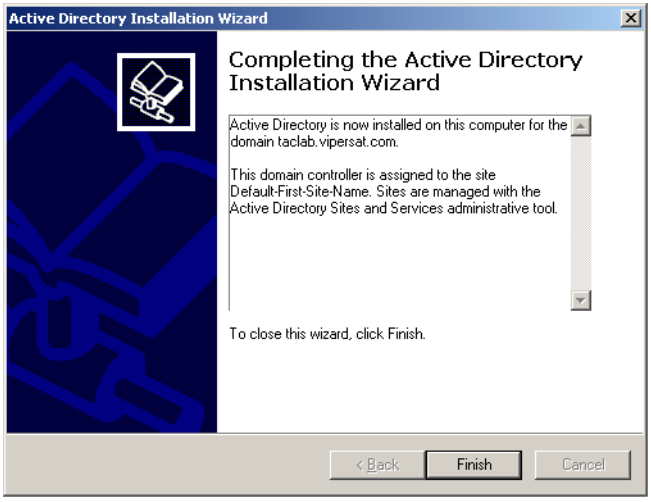

Figure D-19 Complete installation screen

22. Click the **Restart** button shown in Figure D-20 to reboot the server.

Figure D-20 Restart screen

This completes setting the primary server as a domain controller.

Configuring a Secondary Domain Controller

The procedure in the section describes configuring a Domain Controller on the Secondary VMS server in a redundant installation.

The following steps assume that the server is to be configured as the VMS Secondary Domain Controller (SDC) and has had a clean install of Windows 2003 server with service pack-1 and all updates. This procedure also assumes that the server's device drivers have been loaded and are fully functional.

Setup

The following steps make the assumption the server is to be configured as the VMS secondary domain controller (SDC) and assumes:

- There has not been a previous domain controller installation.
- There has been a clean install of Windows 2003 Server with service pack-1 and all updates.
- This procedure also assumes that the server's device drivers have been loaded and are fully functional.

On Local Area contention Properties, select TCP/IP and go to properties = > Make sure the DNS configured is the IP address of the Primary Domain Controller which has had DNS already as described in the section "Configuring a Domain Controller and DNS" on page D-3.

Note: This procedure relies on the secondary server being connected by an Ethernet link to the primary server and that the primary serve domain controller configuration is completed.

To configure a Domain Controller, start the **Configure Your Server Wizard** by doing either of the following:

1. Open the Configure Your Server Wizard by clicking Start > Control Panel > Administrative Tools > Configure Your Server Wizard.

2. From **Manage Your Server** shown in figure D-21, click Add or remove a role. By default, Manage Your Server starts automatically when you log on. To open Manage Your Server, click Start, click Control Panel, double-click Administrative Tools, and then double-click Manage Your Server.

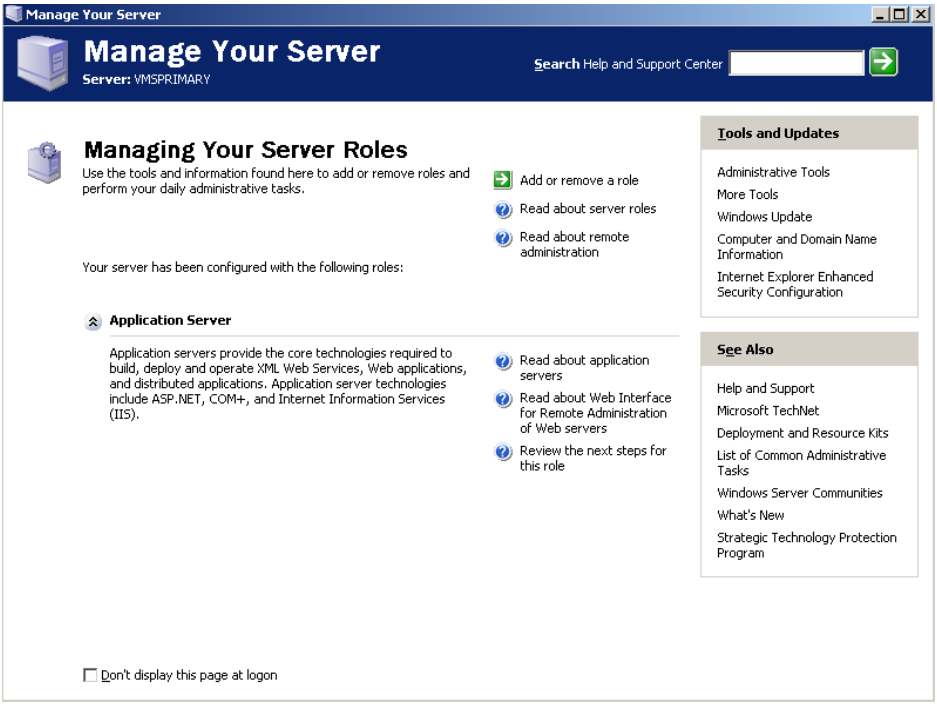

Figure D-21 Manage your server dialog

3. Review the **Preliminary Steps** shown in figure D-22 and then click the **Next** button to proceed once you have verified these steps have been completed.

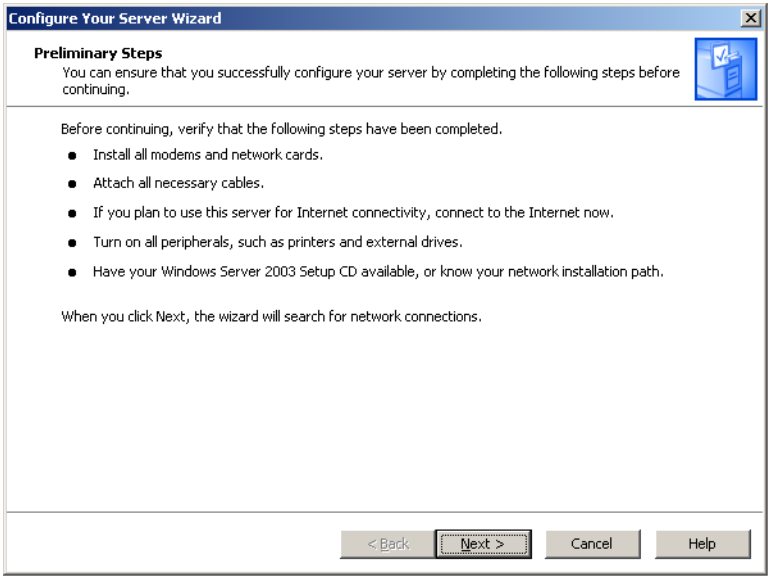

Figure D-22 Preliminary steps

4. The wait screen shown in figure D-23 will be displayed while your network settings are being detected.

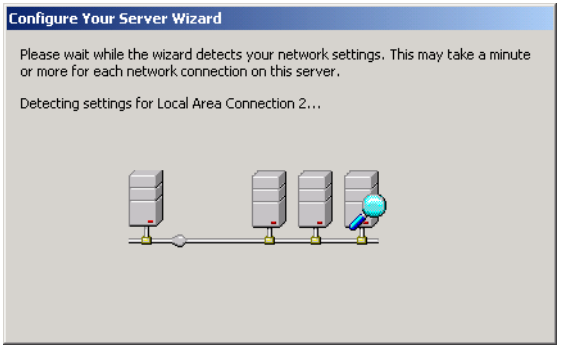

Figure D-23 Network detection wait screen

5. From the **Configuration Options** dialog shown in figure D-24, select the **Custom Configuration** radio button then click **Next** button.

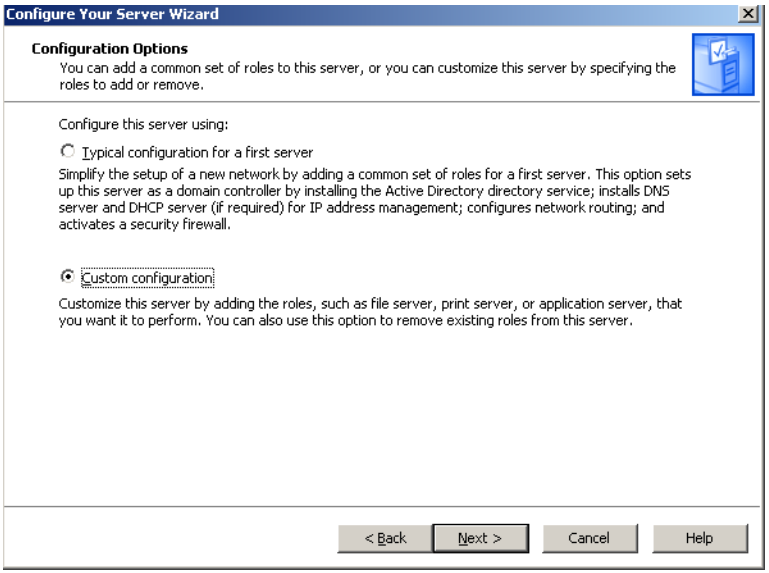

Figure D-24 Configuration options

6. From the **Server Role** dialog shown in figure D-25, select the **Domain Controller (Active Directory)** item, then click the **Next** button.

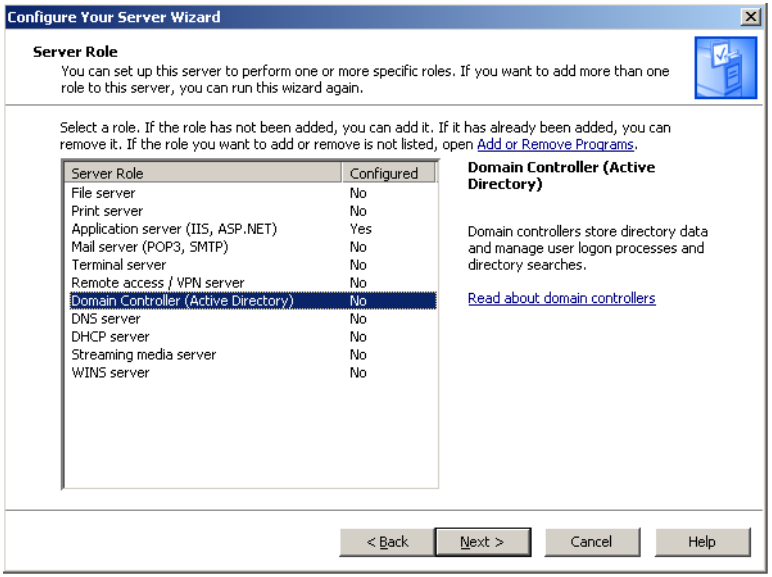

Figure D-25 Server role dialog

7. Verify your selection displayed in the **Summary of Selections** listing shown in figure D-26, then click the **Next** button to proceed.

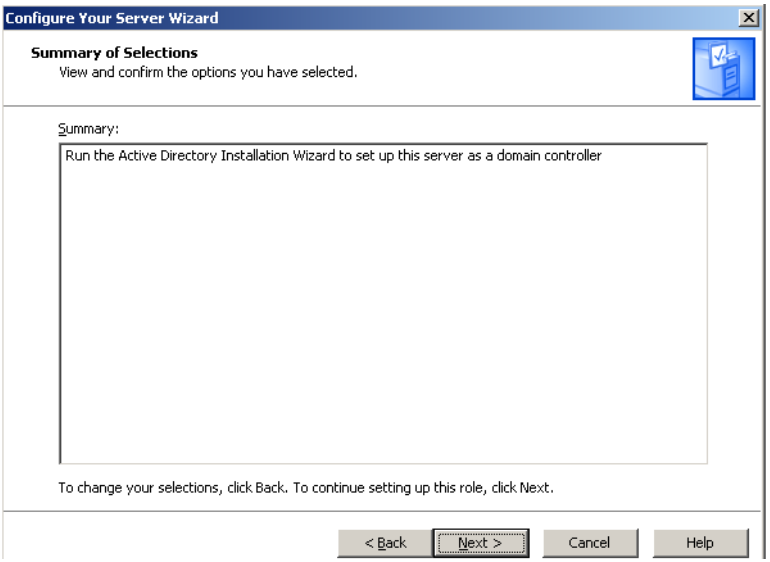

Figure D-26 Summary of selections dialog

8. From the **Active Directory Installation Wizard** shown in figure D-27, click the **Next** button to begin the installation.

Figure D-27 Active directory installation wizard start

9. After reviewing the **Operating System Compatibility** information, shown in figure D-28, click the **Next** button.

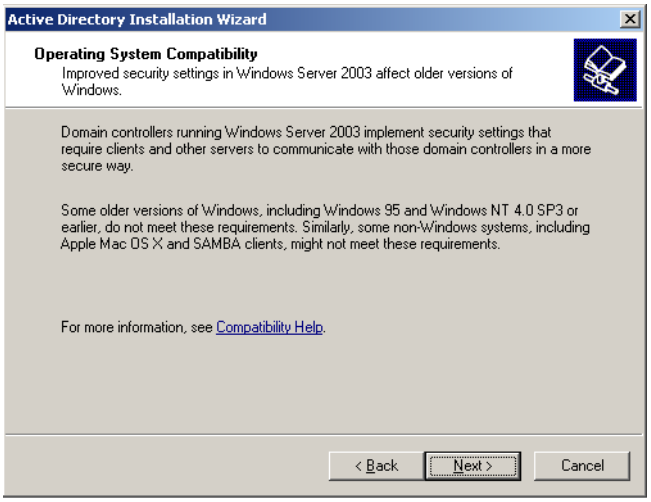

Figure D-28 Active directory installation wizard

10. After reviewing the **Operating System Compatibility** information, click the **Next** button.

11. From the dialog shown in figure D-29, select **Additional Domain controller for an existing domain** radio button, and then click the **Next** button.

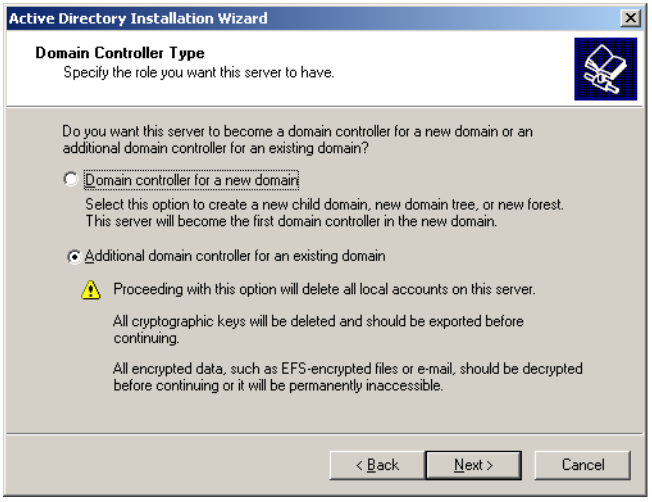

Figure D-29 Domain controller type dialog

12. In the **Network Credentials** dialog shown in figure D-30, enter the username, password and domain to be the administrator account for the domain

created above. When you have completed entering the data, click the Next button to continue.

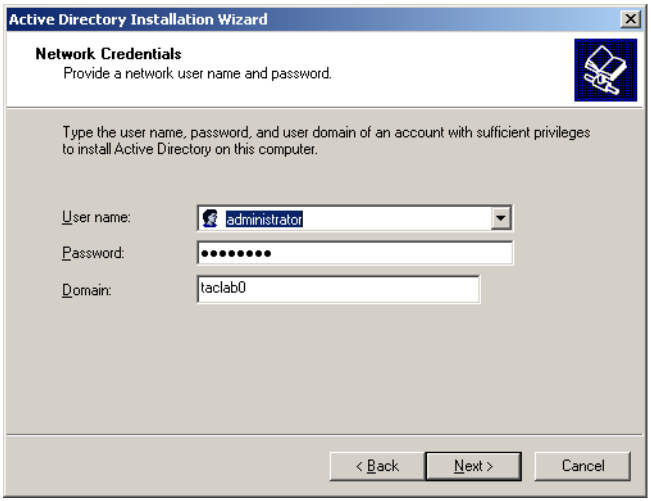

Figure D-30 Network credentials

13. from the **Additional Domain Controller** dialog shown in figure D-31, click the **Browse** button on the **Domain Name** dialog box.

14.

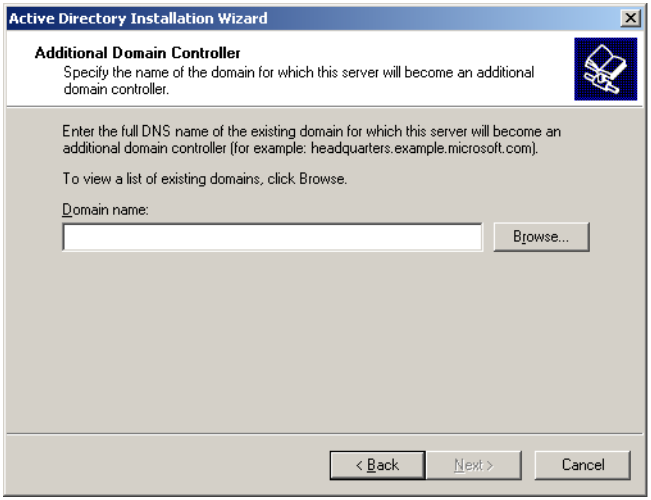

Figure D-31 Additional domain controller

15. Clicking the **Browse** button shown in figure D-31 brings up the **Browse for Domain** list shown in figure D-32. From the list of domains shown in the **Browse for Domain** list, select the Primary VMS server's domain, then click the **OK** button to proceed.

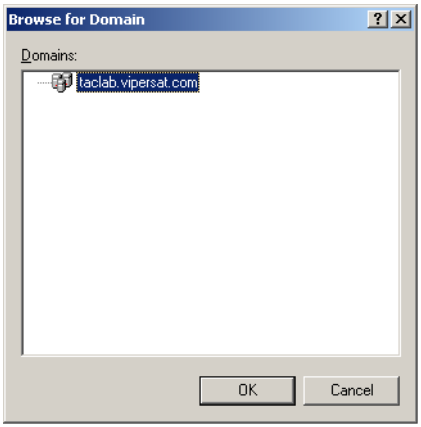

Figure D-32 Browse for domain list

16. The Additional Domain Controller screen shown in figure D-33 will be displayed the selected domain displayed. Click the **Next** button to continue.

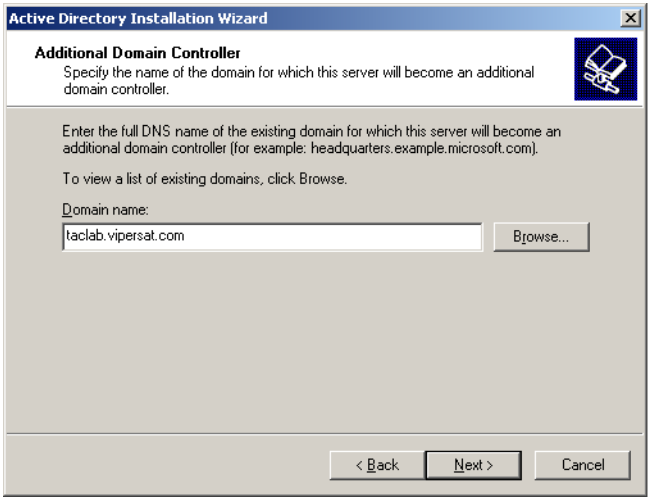

Figure D-33 Additional domain controller with domain name.

17. In the **Directory and Log Folders** dialog shown in figure D-34, enter C:\Windows\NTDS in the **Log Folder** dialog box as shown in figure D-34. This points the log folder to its default location in Microsoft Windows.

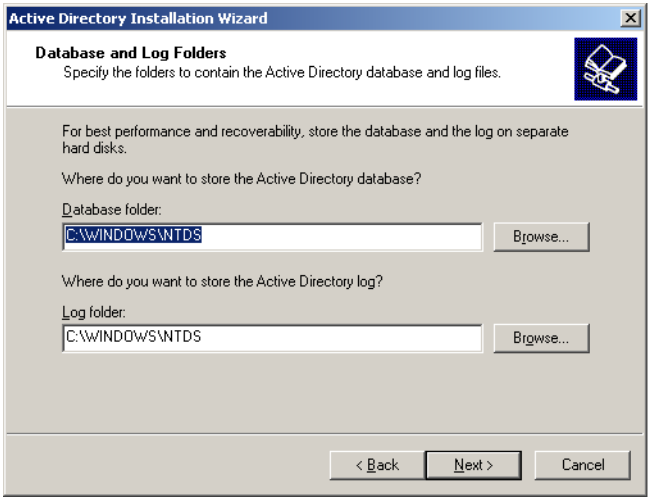

Figure D-34 Directory and log folders dialog

18. Leave the default folder location for the Shared System Volume, as shown in figure D-35, then click the **Next** button to continue.

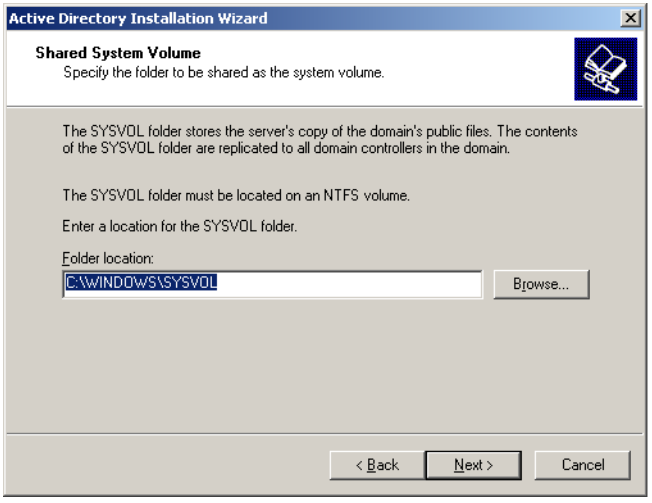

Figure D-35 Shared system volume

19. Type in the password for use by the Administrator account to be used when this server is started Directory Services Restore Mode. Enter the password in the **Restore Mode Password** and **Confirm** password dialog boxes as shown in figure D-36. Click the **Next** button when ready to proceed.

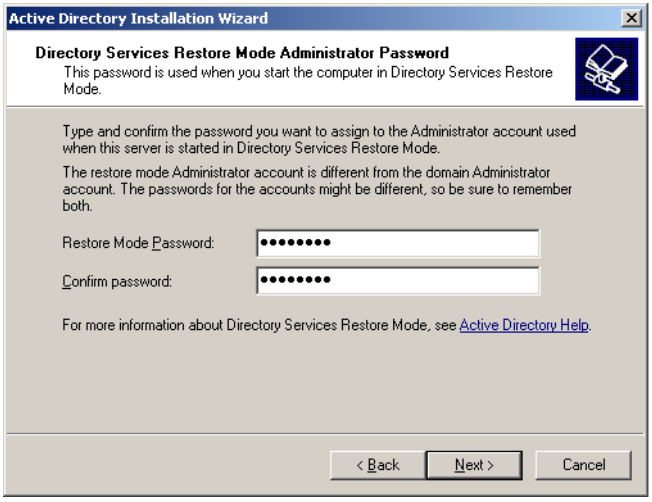

Figure D-36 Directory services restore mode administrative password

20. Review the **Summary** screen shown in figure D-37, then click the **Next** button to proceed.

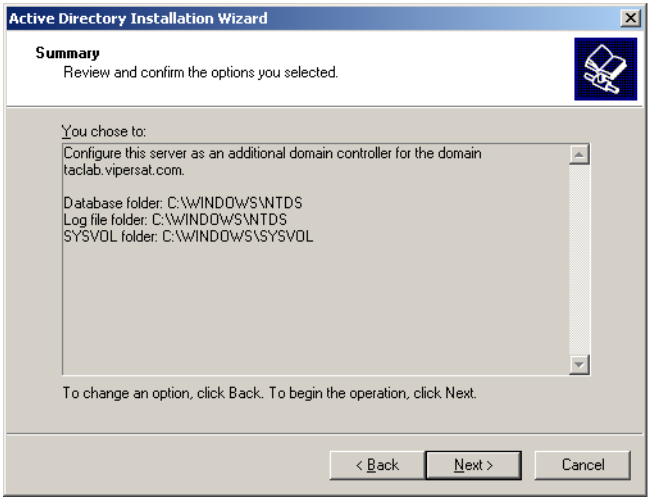

Figure D-37 Summary screen

21. The Active Directory Installation Wizard screen shown in figure D-38 will be displayed while Microsoft Windows configures your server.

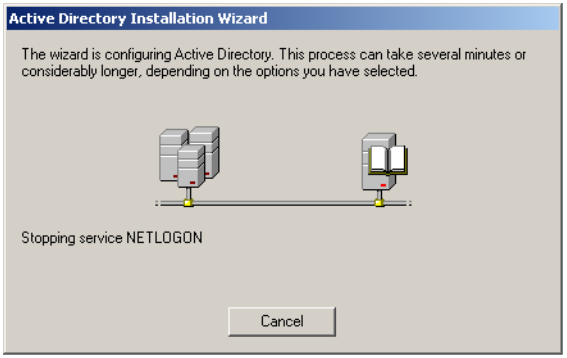

Figure D-38 Active directory installation wizard screen

22. Review the screen shown in figure D-39 is displayed, then click the **Finish** button

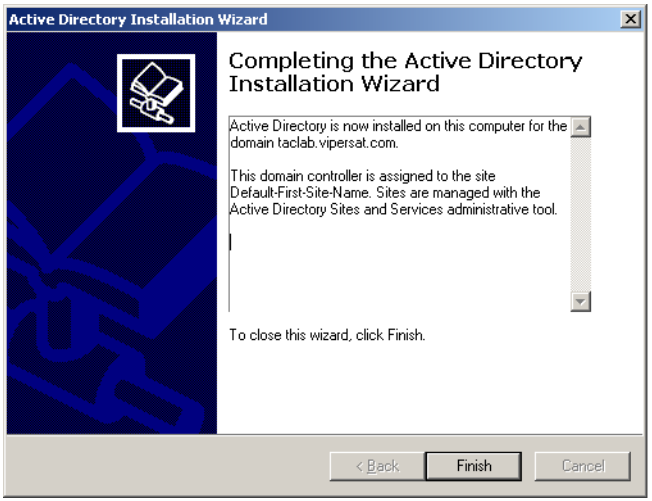

Figure D-39 Domain Controller confirmation screen

23. From the screen shown in figure D-40, click the Restart Now button.

Figure D-40 Restart screen

24. After reboot, Windows displays the confirmation screen shown in figure D-41.

Figure D-41

This completes setting the secondary server as a domain controller.

Installing Secondary DNS Server

This procedure configures the secondary server to prepared take over the DNS function in the network if the primary server fails.

Setup

Before proceeding with setting the server to act as a secondary DNS server be sure that:

- You have successfully completed configuring the server as a Domain Controller
- Have your Server 2003 CD available
- Have Server 2003 Service Pack-1 installed

Use the following procedure to install the DNS server capability on the secondary server.

1. From the **Manage your server** dialog shown in figure D-42, click the **Add or remove a role** option.

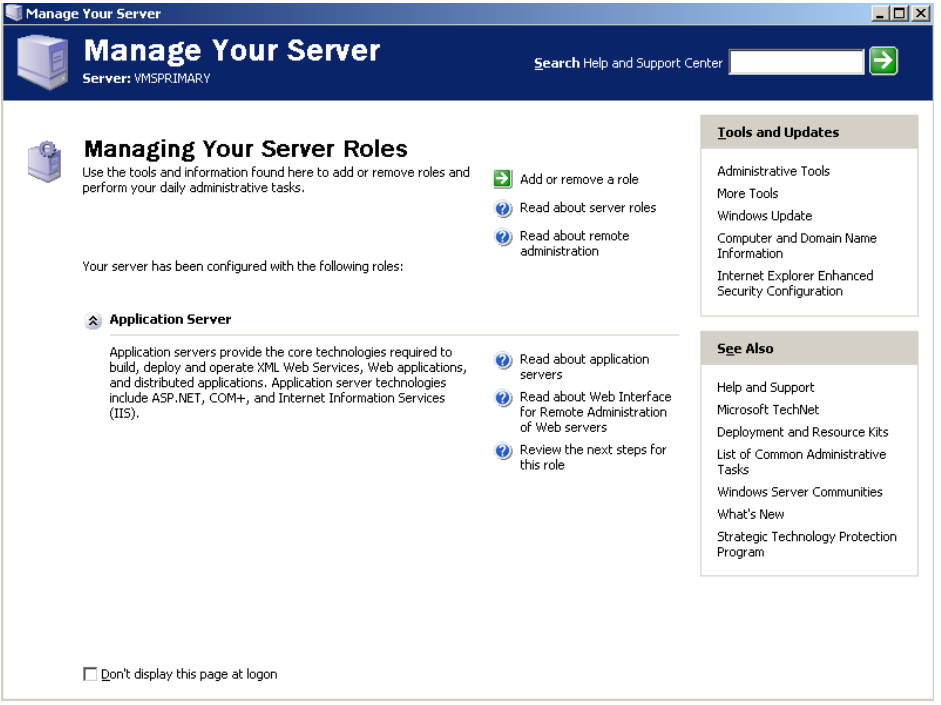

Figure D-42 Manage your server dialog

2. Review the information in the **Preliminary Steps** screen shown in figure D-43 before proceeding and then click then **Next** button to proceed.

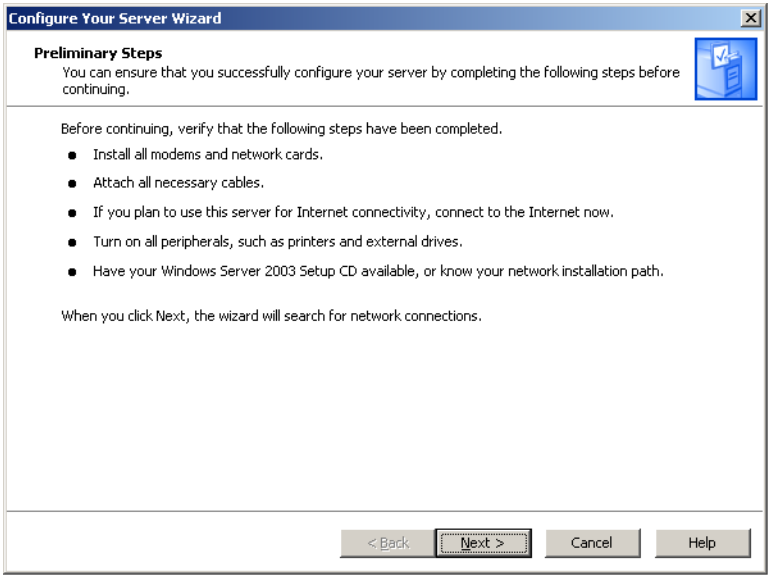

Figure D-43 Preliminary steps screen

3. Highlight DNS server in the table shown in figure D-44 and then click **Next** button.

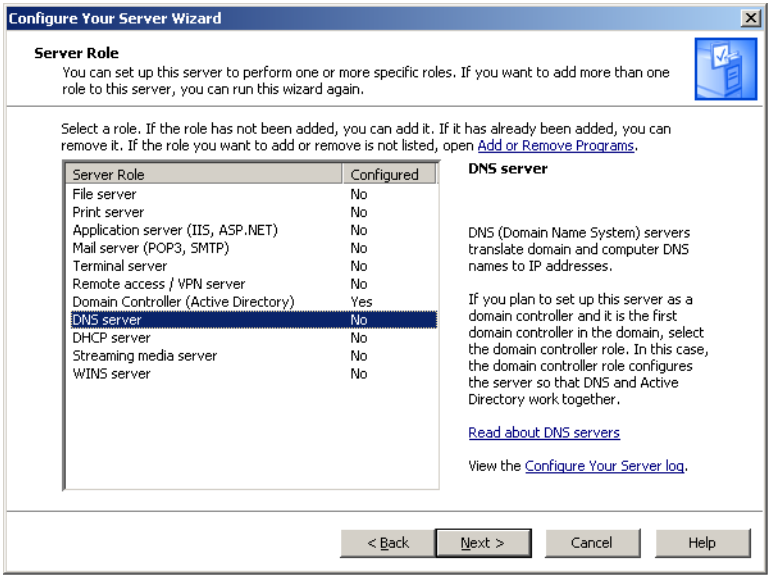

Figure D-44 DNS server role dialog

4. Review options selected as shown in figure D-45 and click the click the **Next** button to proceed.

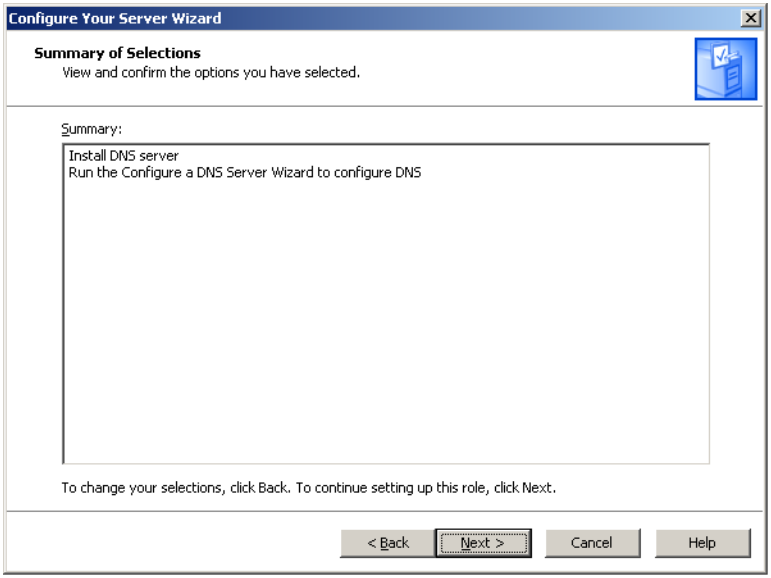

Figure D-45 DNS Selection summary

5. When prompted as shown in figure D-46, insert disc containing Service Pack 1 and click the **OK** button to start the installation process.

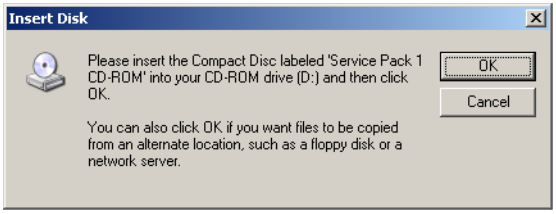

Figure D-46 Insert disk prompt

6. Setup will copy the required files and then proceed with configuring components as shown by progress bar in figure D-47.

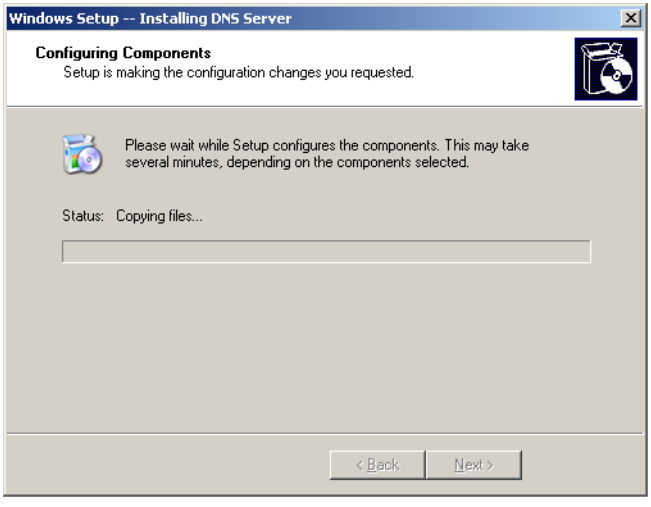

Figure D-47 Configuring components status

7. Click the **DNS Checklists** button shown in figure D-48 to display the checklist. After reviewing the DNS Checklist, click the **Next** button to continue.

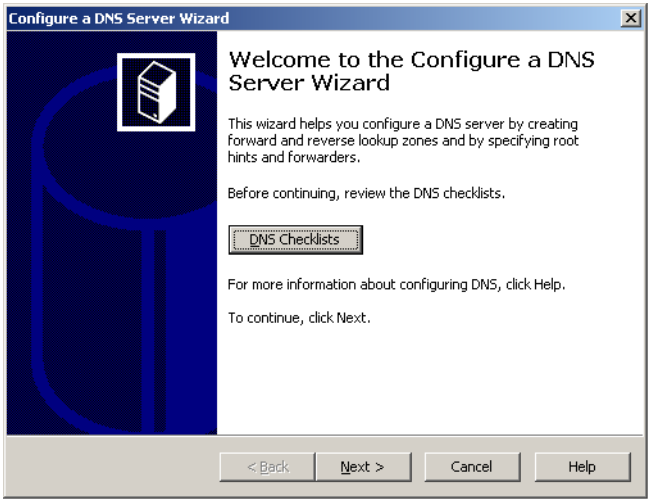

Figure D-48 DNS server wizard welcome screen

8. Select the radio button **Forward Lookup Zone** as shown in **figure D-49**. Click the **Next** button to continue.

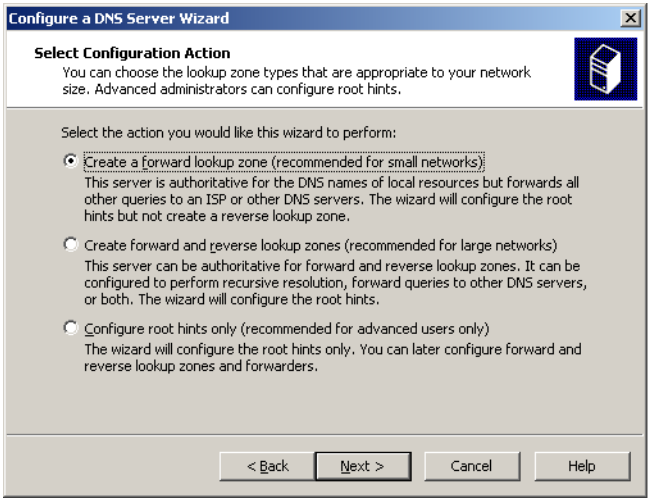

Figure D-49 Select configuration action

9. Select the radio button **This server maintains the zone** as shown in figure D-50. Click the **Next** button to continue.

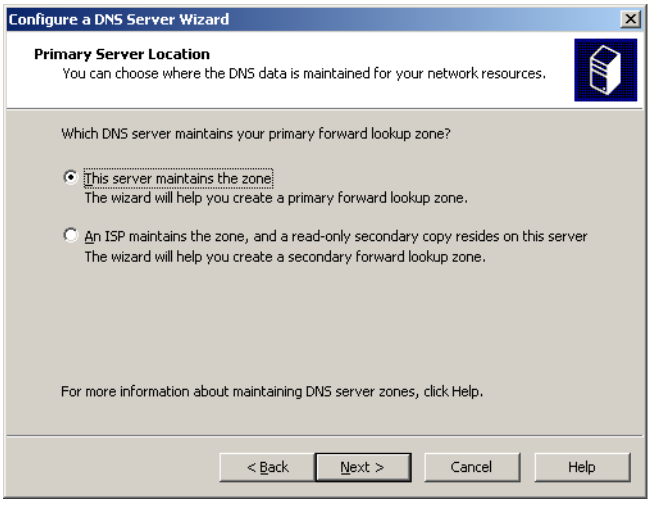

Figure D-50 Primary server location

10. Enter your DNS zone name in the **Zone name** dialog box shown in figure D-51. Click the **Next** button to continue.

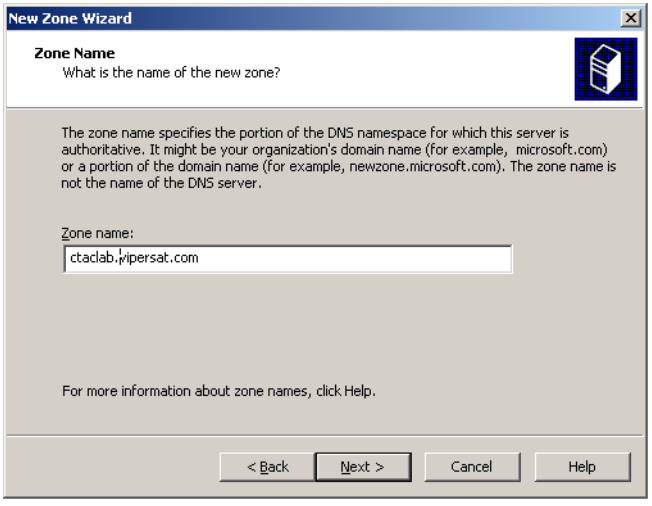

Figure D-51 zone name dialogr

11. Select the **Allow only secure dynamic updates** radio button shown in figure D-52. Click the **Next** button to continue.

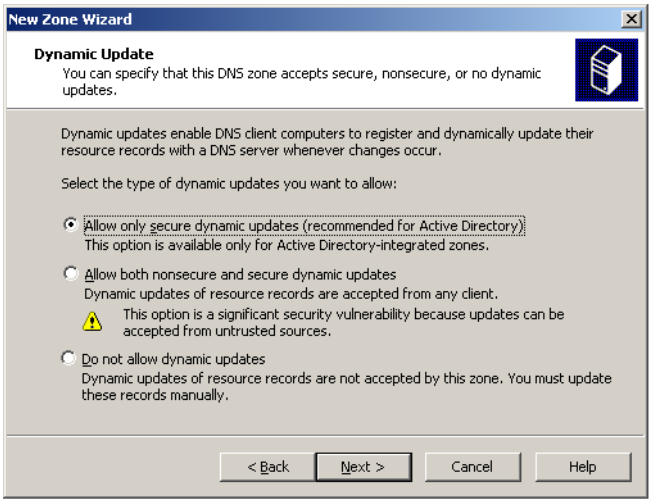

Figure D-52 Dynamic update dialog

12. Review the **Fowarders** dialog shown in figure D-53 and enter the IP address of DNS servers that this server will forward to if it is unable to resolve the request locally. Click the **Next** button when ready to continue.

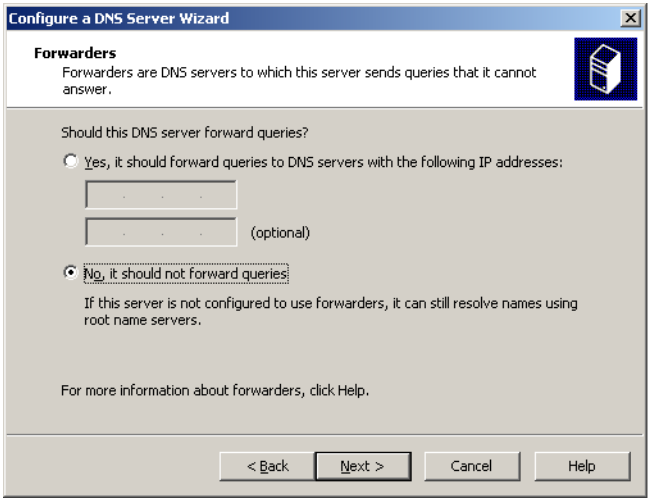

Figure D-53 Forwarders

13. After reviewing the **Completing the Active Directory Installation Wizard** screen shown in figure D-54, click the **Finish** button to continue.

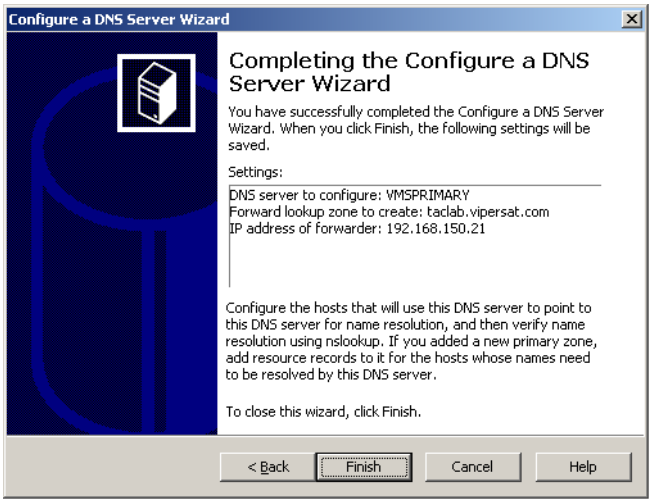

Figure D-54 Completing the configure a DNS server wizard

14. Carefully review the information in figure D-55 then click the **Finish** button.

Figure D-55 Completion screen

15. When the **DNS** error message shown in figure D-56 is displayed, dick the **OK** button.

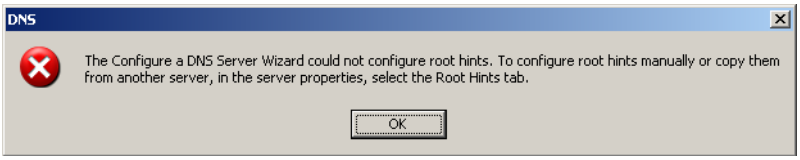

Figure D-56 DNS error message

This completes the installation of the DNS server on the Secondary VMS server in a redundant con figuration.

At this point return to section “Stopping Previous VMS Version (Upgrade)” on page 2-10 of Chapter 2, “VMS Installation” to complete the VMS installation.

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APPENDIX

E

SNMP TRAPS

Introduction

This appendix describes the use of SNMP traps by the Vipersat Management System (VMS). SNMP traps enable the VMS to capture significant network events, then generate an SNMP message reporting the event. In a VMS controlled satellite system, this configuration has several advantages:

- The VMS system, using its existing network monitoring capability, acts as a central collection point for all changes to the satellite network status and provides a single source for SNMP events reported for the satellite network. Individual network devices are not required to generate SNMP traps thereby reducing network overhead bandwidth.
- The VMS collects network changes and status as they occur and as they are reported by the satellite network's modem/routers as part of the normal VMS management and control function.
- Only events defined by the Vipersat MIB are sent as SNMP traps. This reduces the requirement to have each device transmit an SNMP trap as its status changes thereby reducing network overhead bandwidth requirements.

Note: Since VMS only collects and reports SNMP events from the satellite network and it is not the source of the event, you cannot query the VMS for additional information about an SNMP trapped event.

Using SNMP Traps

SNMP (Simple Network Management Protocol) along with the associated Vipersat Management Information Base (MIB), provides trap-directed notification of network changes.

VMS can be responsible for a large number of network parameters as defined in the Vipersat MIB. It is impractical for VMS to poll or request information from each device in a satellite network. Instead of each managed device generating its own SNMP traps, the VMS detects network status changes and when an event defined in the MIB occurs responds with a message called a trap.

After receiving a VMS generated trap, a high-level SNMP monitor can take action based on the trap type, and its parameters.

Using the VMS SNMP traps results in substantial savings of network bandwidth by eliminating the need for polling devices or having each device in the network generate its own SNMP traps. The primary purpose of and SNMP trap is high-order NMS notification.

SNMP Traps Available in VMS

The SNMP trap types available in VMS are:

- **Subnet Alarm Trap** - This trap is sent to the designated destinations whenever a subnet's alarm count or status in Subnet Manager is changed. This trap contains two values: 1) subnetLabel, 2) subnetAlarmCount
- **VMS Server Activated Trap** - This trap is sent to the designated destinations whenever a VMS server is activated (it's services are started). The IP address in the trap variable is the VMS server that has been activated. This trap contains one value: redundancyMode
- **VMS Active Server Failed** - This trap is sent by a VMS server operating in stand-by (non-active) mode whenever it has detected a failure of active server. A vmsServerActivatedTrap will follow when the stand-by is activated. This trap contains one value: redundancyMode
- **Redundant Device Restored Trap** - This trap is sent by VMS whenever the VMS Redundancy Manager has detected a failed device, has shut down the failed device, and has restored the failed unit with another device. This trap has four variables.

Note: SNMP Traps relative to the operation of servers in an N:1 redundant configuration only apply to a network which has the optional N:1 redundant capability available, installed, and configured.

Configuring SNMP Traps

To configure SNMP traps, from ViperView, shown in figure E-1, right click on the server's icon and select the Properties command from the drop-down menu.

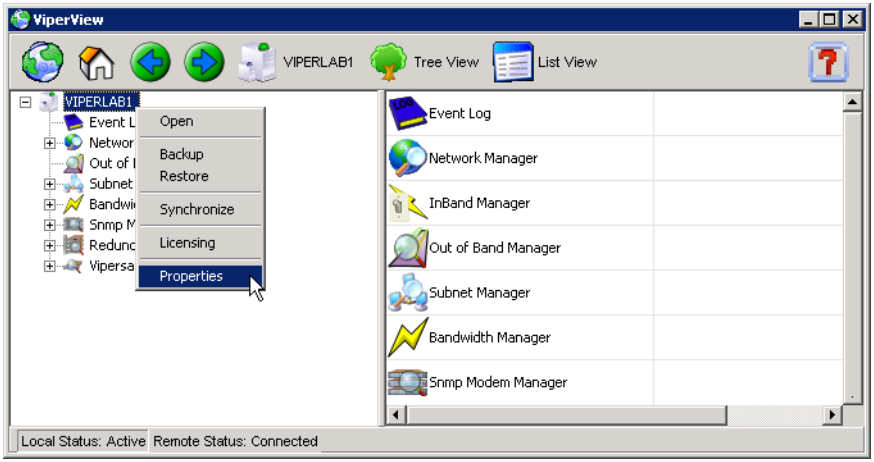


Figure E-1 Server drop-down menu

Clicking the **Traps** tab on the server's properties screen displays the **Traps** dialog shown in figure E-3.

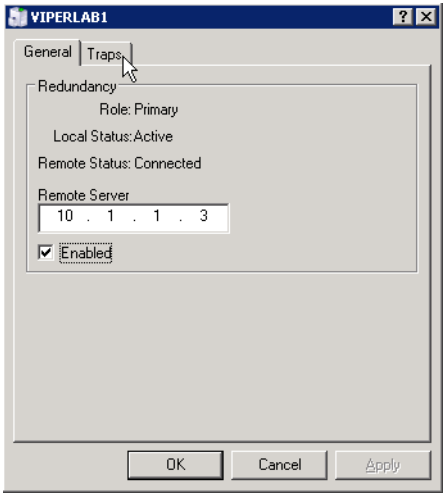


Figure E-2 Properties general tab

Select the **Traps** tab to display the **SNMP Manager TRAP** dialog shown in figure E-3. You can enter the Trap's destination information consisting of:

- IP address of SNMP manager receiving trap
- Port number

- Community String

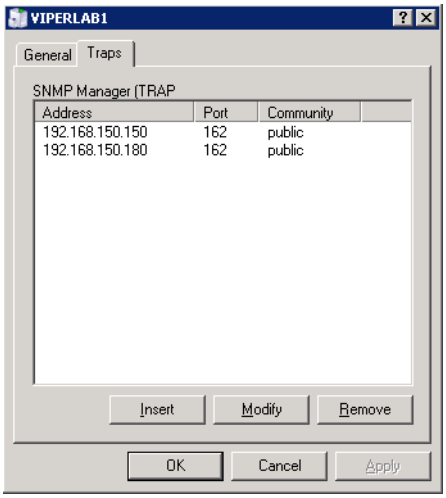


Figure E-3 Server traps tab

Insert

Clicking the **Insert** button displays the **Trap Destination** dialog shown in figure E-4 allowing you to enter the Trap's destination:

- IP Address
- Community String
- Port Number

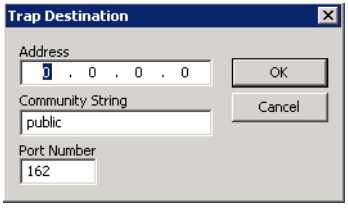


Figure E-4 Trap desitination

Modify

Selecting an existing Trap Destination from the list as shown in figure E-3 then clicking the **Modify** button will display the destination as shown in figure E-4 allowing you to change the Trap's destination as required.

Remove

Selecting a Trap Destination from the list shown in figure E-3 then clicking the **Remove** button will remove the Trap Destination.

Summary

You should keep in mind the following characteristics of an SNMP Trap.

- SNMP is not a “reliable” transport protocol. If the Trap message is lost due to network issues (congestion, noise, delays, etc.), the SNMP protocol will NOT retransmit the lost trap message.
- SNMP (v1&v2) is not a secure protocol. It is not difficult to eavesdrop or spoof messages. Isolating SNMP traffic from end-user channel is recommended.
- VMS will generate a trap message for each destination entered. Entering 10 trap destinations, for example, will generate 10 trap messages for each event.
- Only a VMS server in Active mode will generate trap messages. A redundant VMS server in stand-by mode will not generate or send a trap message until it is switched to Active mode for example the Primary server failure is detected.
- At this time there is no VMS SNMP agent in VMS. An SNMP Manager cannot poll VMS for status or configuration detail information.
- Current trap uses SNMP v1.

APPENDIX

F

AUTOMATIC SWITCHING

General

The basic signal topology in a Vipersat network is TDM (Time Division Multiplex) outbound and Vipersat's proprietary STDMA (Selected Time Division Multiple Access) inbound. The STDMA slots can have their duration and bandwidth allotments varied to tailor bandwidth allocation to meet the bursty traffic load of a typical data network.

When required, a network is switched from STDMA to SCPC. SCPC bandwidth is allocated from a bandwidth pool by VMS to meet QoS or other requirements for the duration of a connection. When the SCPC connection is no longer required, the bandwidth is returned to the pool for use by another client.

This basic structure gives the VMS controlled network its flexible, automated network utilization and optimization capability.

The VMS has the intelligence to interpret the constantly changing statistics gathered by the intelligent modem/routers and uses this data to issue commands back to the Vipersat Modem/Routers effectively managing the Vipersat network operation in real-time, optimizing each user's bandwidth usage to meet their QoS, and cost requirements, within their bandwidth allocation. The result is a stable satellite network connection automatically responding to customer's requirements while continuously monitoring and reacting to changing load, data type, and QoS requirements.

Bandwidth Allocation and Load Switching

Load Switching is the mechanism by which the Vipersat network switches a remote terminal from STDMA to SCPC mode or SCPC-to-SCPC dynamic based on traffic levels at the remote. There are two components of load switching in a Vipersat system: VMS (Vipersat Network Management), MODEM (CDM-570/570L, SLM-5650A). The VMS component receives switch requests from the MODEM based on policy settings and available resources, either grants or denies the request. Within the MODEM component, load switching is managed at either the Hub or the Remote, based on the current mode of operation. When a remote is in STDMA mode, load switching for that remote is managed by the Hub STDMA controller. After a Remote has been switched to SCPC mode it manages its own switching (or Step Up / Step Down) requests.

The basic concept for all load switching is that a running average of current utilization is maintained, and when that utilization exceeds a pre-set threshold, a switch is initiated. The data rate for the switch is computed by determining the current bandwidth requirement of the remote and adding some percentage of excess margin. The main difference between switching from STDMA to SCPC and adjusting within SCPC is that in STDMA mode, the current available bandwidth is constantly changing while in SCPC mode it is constant between switches. Furthermore, switches from STDMA to SCPC mode are always caused by the traffic level exceeding the switch threshold. Within SCPC mode, switches can be caused by traffic exceeding an upper threshold or dropping below a lower threshold. However, in both cases the new data rate is based on the actual traffic requirements adjusted up by the margin percentage. Also, based on policies set in the VMS, if a remote requests less than some threshold amount of bandwidth, the remote in put back into STDMA mode.

Note: If the Hub STDMA mode is GIR (Guaranteed Information Rate) 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.

Load switching

The next sections describe the principles behind Load Switching and Rate Adjustment (Step Up / Step Down).

Bandwidth Allocation and Load Switching by the STDMA Controller:

As part of normal STDMA processing, the hub monitors the traffic levels from each of the remotes for which it is allocating bandwidth. This is done using the STDMA ACK management message (Table 1) which is transmitted at the beginning of each burst from the remote. The STDMA ACK contains two metrics that are used by the hub:

1. The number of bytes received for transmission (Queued Bytes) since the last cycle.

2. The number of bytes currently waiting to be transmitted (Bytes In Queue).

These metrics are used by the hub for 3 purposes:

1. Determine the amount of STDMA bandwidth (slot size) to allocate in the next cycle.

2. Provide statistics of the amount of activity at each remote (Average Bytes Received).

3. Determine if a load switch is needed.

Table F-1STDMA ACK Message

Data Type	Size in Bytes	Description	Unit of Measure	Notes:
IP	4	IP address of Remote	N/A	Used by remote to identify itself
Unsigned	4	Queued Bytes	Bytes	Total number of bytes queued since last cycle (includes possible buffer overflow)
Unsigned	4	Bytes in Queue	Bytes	Number of bytes currently queued
Unsigned	1	Group Number	N/A	
Unsigned	1	Dropped Buffers	Packets	Number of packets dropped (due to limited bandwidth)

If there is adequate upstream bandwidth available, the values of these two metrics will be the same. However, if there is not enough bandwidth to satisfy

the traffic requirements of the remote, or if the remote has exceeded the maximum allocation, some data will be held for the next cycle. In this case, the number of Bytes in Queue will start to grow and will exceed the Queued Bytes. (In other words, the Bytes in Queue is the sum of the data not yet transmitted plus the new data received).

If the condition is due to a short burst of data, the backlogged data will eventually be transmitted and the system will return to a sustainable rate. However, if the overload condition is due to long term increased activity, then the backlog condition will continue to grow and eventually trigger an SCPC switch. If the overload condition lasts long enough, buffer capacity will eventually be exceeded and some data may have to be discarded.

Note: This is not necessarily bad, as it is often more effective to discard old data than transmit it after it has become 'stale.'

The "Bytes in Queue" metric is used to determine the STDMA bandwidth allocated (slot size) for the next cycle; the goal being to keep the data backlog to zero. The hub uses this metric to compute the slot size for each remote in the next cycle as follows:

- **Fixed Mode -** All remotes get the same slot regardless of need; in other words, the metric is not used.
- **Dynamic Cycle Mode -** Available bandwidth is allocated to remotes proportionally based on current need. The bandwidth allocation for remotes is calculated by dividing the Bytes in Queue for each remote by the total Bytes in Queue for all remotes to calculate the percentage bandwidth allocation to be given to each remote.
- **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.
- **GIR (Guaranteed Information Rate) Mode -** Initially computed the same as Dynamic Cycle 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 1 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. (In the current design, when the 1 second restriction is exceeded, remotes without a specified GIR are reduced to the global minimum slot size and the remaining bandwidth is distributed amongst remotes that have been assigned a GIR rate. This approach is based on the assumption that remotes that have been assigned a GIR are paying a premium and should benefit from available excess bandwidth when

needed. Note that the GIR allocations are restricted so that the assigned GIR totals cannot exceed available bandwidth. If this restriction is somehow violated, then it will not be possible to properly allocate bandwidth when the network is overloaded.)

- **Entry Channel Mode -** This is the same as Dynamic Cycle, 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 important thing to understand about "Bytes in Queue" is that any data that is not transmitted (i.e. does not fit) in the next slot will be reported again in the next STDMA ACK. Thus the "Bytes in Queue" is not necessarily an accurate measure of the actual traffic being passed through the remote.

The "Queued Bytes" on the other hand, reflects only the data that was received in the last cycle and thus is never duplicated (not including TCP retransmissions). This is the metric that is used for computing average load and initiating a load switch as needed.

Before discussing how load switching is determined, it is necessary to explain the user parameters that control the switch. The menu shown in figure F-1 and figure F-2 shows the entries in the automatic switching menu at the hub that are used to control load switching.

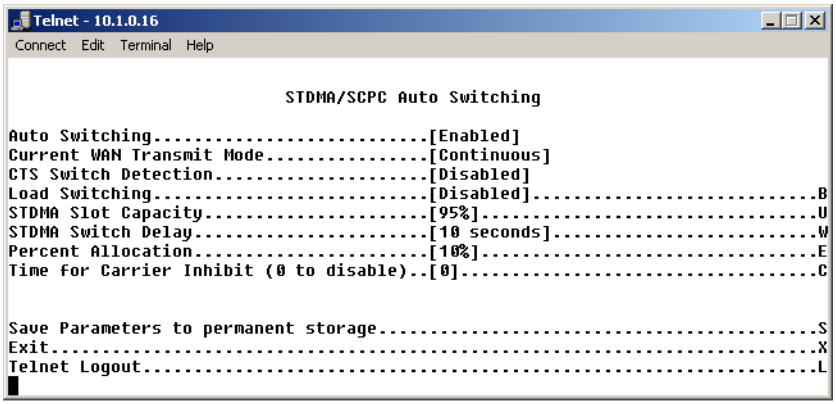


Figure F-1 Hub switching menu, CDM-570/570L

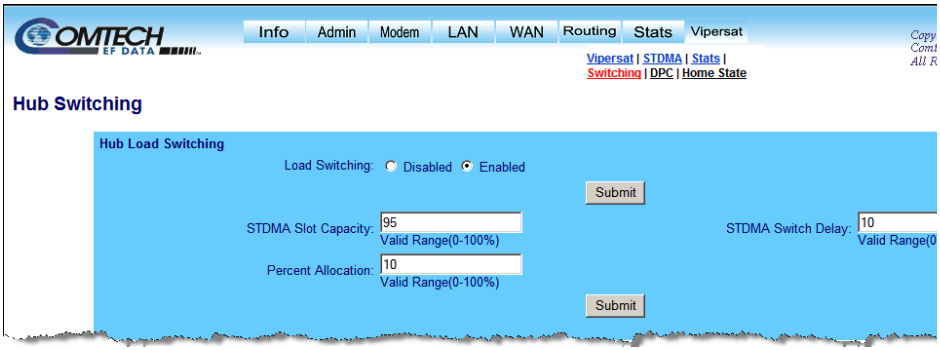


Figure F-2 Hub Load switching menu, SLM-5650A

- **Auto Switching -** This is a Vipersat feature which is enabled in the CDM-570/570L **Features** menu. If Auto Switching is not enabled, Load Switching will be ignored. There is no auto switching enable button in SLM-5650A modem configuration menus, the operator only needs to enable each switching function.
- **Load Switching -** This is a type of Automatic Switching that is based on the amount of traffic at a remote. If this mode is not set, then no remote will be switched based on load.
- **STDMA Slot Capacity -** This is a threshold value. When the amount of outbound traffic at a remote exceeds this percentage of the current STDMA slot capacity, a load switch is initiated. It is important to understand that in most STDMA modes, the amount of bandwidth allocated to a remote varies with need and thus from cycle to cycle. Thus the amount of traffic that constitutes X% will also vary from cycle to cycle.
- **STDMA Switch Delay-** This is a built in latency that forces a remote to maintain an average load over some number of seconds after reaching a switch condition before the switch is actually initiated. This prevents switches due to momentary traffic-bursts.
- **Percent Allocation -** This is an excess amount of bandwidth that is allocated beyond the current traffic rate when the switch to SCPC is made. For example, if the current average traffic at the time of the switch is 60K, and the **Percent Allocation** is 10%, then the allocation will be for 60K + 6K = 66K.

NOTE

Note: Since the hub always allocates bandwidth in 16K blocks the 66K, when rounded up, would actually be 80K in this example.

Load Switching Process

Each time the hub receives an STDMA ACK, it computes the average load for that remote. This average is then compared to the bandwidth currently allocated to the remote.

For example, if a remote gets a 50 ms slot in an upstream that is running at 512000 bps then it can transmit 0.050 * 512000 = 25600 bits = 3200 bytes. If the Queued Bytes was 3000, then for that cycle, the remote was at 3000/3200 = 93.75% of capacity. (If the current cycle time is exactly 1 second, then the effective data rate of the remote is also 25600 bits per second.

However, if the cycle time is only 500 milliseconds, then the effective data rate is actually 25600 /.5 = 51200 bits per second. The effective data rate is important for calculating switch data rates. If the average bandwidth used exceeds the threshold percentage of available bandwidth, then a flag is set indicating a switch is pending. At this point, the statistics are reset and the traffic load is then computed for the time period specified by the switch delay. At the end of this delay, if the threshold is still exceeded, a switch is initiated. The data rate specified for the switch is determined by taking the current load, as indicated by the bytes queued during the delay period, multiplying it by the percent allocation and rounding up to the next 16Kbps.

A key point is that in most of the STDMA modes, the bandwidth allocated to each remote is constantly being adjusted to the needs of the network. As long as the network is running below capacity, most remotes will get the bandwidth they need and a switch will not be required.

Only when a remote requires more bandwidth than is available in STDMA will a switch occur.

Furthermore, in D2 mode, each remote will always appear to be running at near 100% capacity, even when there is actually excess bandwidth available. This is because in D2 mode, the remotes are almost never given more bandwidth than they need. As a result, the algorithm for D2 mode uses a maximum allowed slot size rather than the actual allocated slot size to calculate the effective data rate. This gives a more accurate estimate of the available STDMA bandwidth.

Load Switching by a Remote

Once a remote has been switched to SCPC mode, it checks its bandwidth requirements once per second to see if a change is needed. The menu for controlling the Step Up / Step Down switches are set in the menu shown in figure F-3.

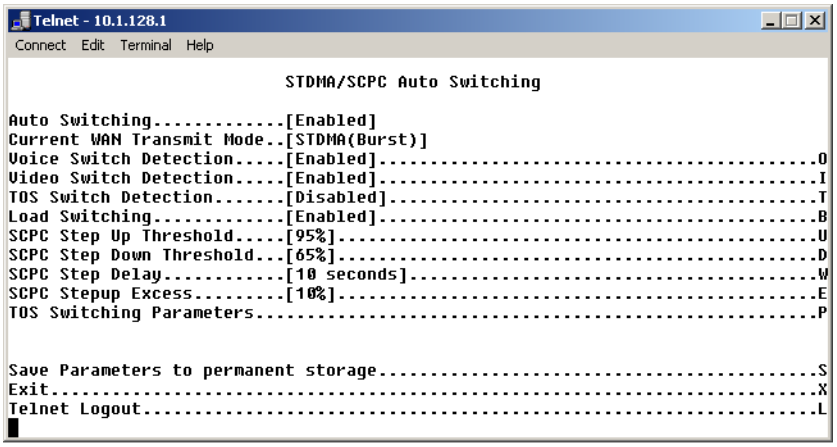


Figure F-3 Switching menu for a remote, CDM-570/570L

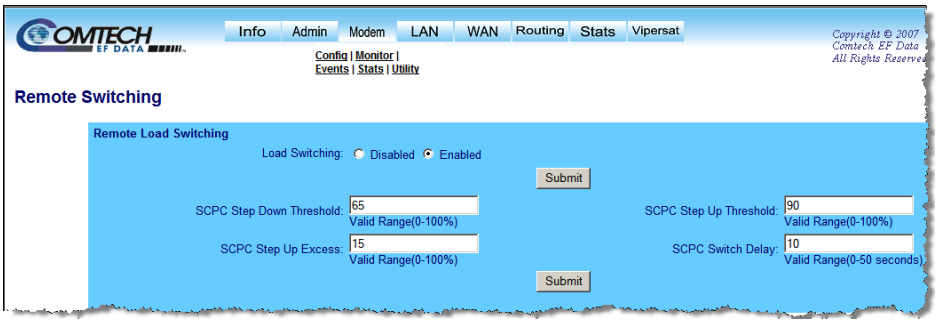


Figure F-4 Load switching menu for remote, SLM-5650A

- **Auto Switching -** Same as Hub
- **SCPC Step Up Threshold -** Same as **STDMA Slot Capacity** at hub.
- **SCPC Step Down Threshold -** Similar to **STDMA Slot Capacity** at hub except **Step Down** is used to trigger a switch if the average load falls below this value
- **SCPC Step Delay -** Same as **STDMA Switch Delay** at hub
- **SCPC Stepup Excess -** Same as **Percent Allocation** at hub. Note that the value applies to both **Step Up** and **Step Down** switches and if computed against the average traffic load at the time the switch is initiated.

Determining Need-for-Change

The following process is used to determine if bandwidth utilization warrants a need-for-change.

The user defines both a Step Up and Step Down threshold in terms of percent utilization, a bandwidth margin value, and a latency or averaging period. Once per second, the CDM router software determines the current percent utilization by dividing the bits transmitted by the current transmit data rate.

If the percent utilization exceeds the step up threshold or is less than the step down threshold for the entire latency period, then an ASR (Automatic Switch Request) is sent to the VMS. The bandwidth requirement for the ASR is computed by taking the average percent utilization over the latency period and multiplying that by the current data rate to determine the actual data rate used over the measured interval. This number is multiplied by the margin value and rounded up to the nearest 8K to determine the requested bandwidth.

Load Switch Example

An automatic load switching example, illustrated in the schematic diagram in figure F-5, illustrates how a network can respond to changes in traffic volume or load conditions. The network's capability and method of response to load changes is determined by the setting and capability of each of the components in the system such as the transmitter power output, the antenna capabilities for each of the sites in the network, and the policies set in VMS.

The elements for determining policies and their interactions are discussed in this section.

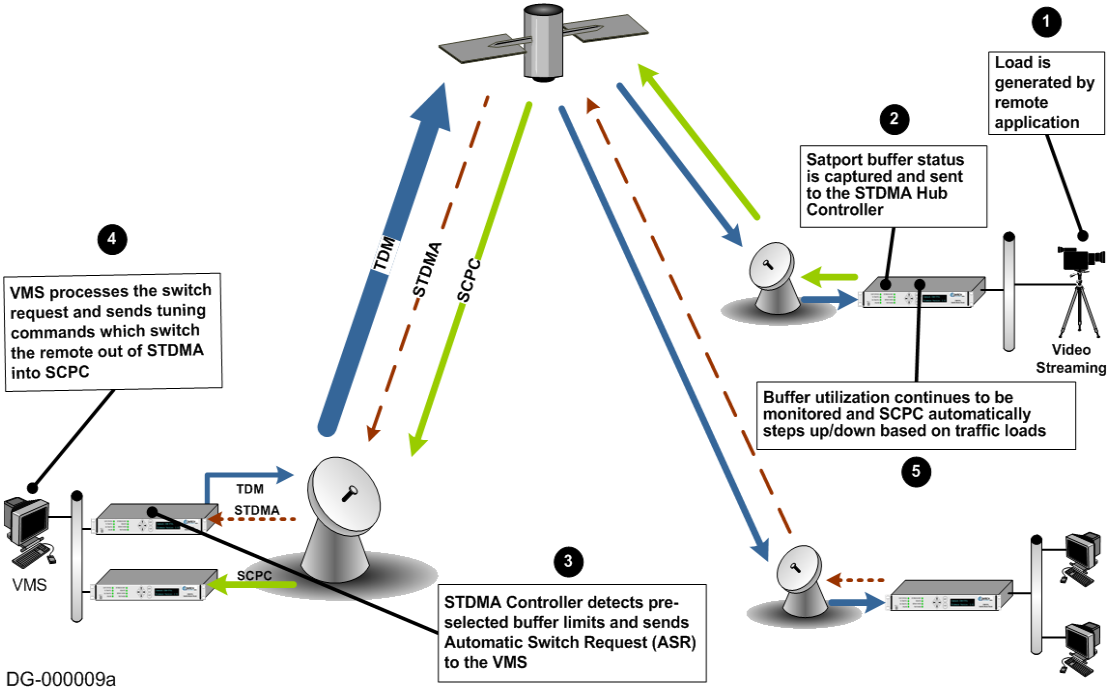


Figure F-5 Example load switching diagram

A load switch is illustrated in figure F-5 are using the following process.

1. A load is generated an application at a remote and the application is a video stream.

2. As an example the data is connected to the remote CDM-570/570L over an ethernet link for transmission to the satellite. While the data-stream transmission is in progress, the Satport buffer status is captured and the CDM-570/570L's buffer status is sent to the STDMA Hub Controller.

3. The STDMA Hub Controller compares the remote CDM-570/570L's pre-selected buffer limits with its buffer status and if the buffer status exceeds the preselected limits the STDMA Hub Controller increases the time-slot allocated to that channel. If this brings the buffer status within established limits no further changes are made.

4. If the buffer status continues to exceed the preselected limits, the STDMA Controller sends an Automatic Switch Request (ASR) to the VMS.

5. The VMS processes the switch request by checking for available resources by:

- Determining if there is a free demodulator.
- Determining the channel space (bandwidth) requirements to accommodate the data flow requested by the STDMA Hub Controller.

6. If the VMS finds available resources it processes the switch request and sends tuning commands which switches the remote CDM-570/570L out of STDMA into SCPC mode.

The ideal condition being looked for is that about 90% utilization of the channel be achieved striving to optimize the use of available bandwidth.

The CDM-570/570L continuously monitors traffic flow volume Whenever a preset upper or lower limit is exceeded, the CDM-570/570L sends a request to VMS to change bandwidth by the amount needed to meet the new requirement. By this process, the bandwidth is continuously optimized in real time, precisely accommodating circuit traffic volume.

The ability to actually accomplish this is limited by the currently available carrier bandwidth, and ultimately the power output and antenna size available at the transmitting remote site.

If the VMS does not have available bandwidth it will ignore the STDMA Hub Controller's request for increased bandwidth. The STDMA Hub Controller will continue to receive buffer status reports from the remote CDM-570/570L indicating that buffer flow is continuing. The STDMA Hub Controller will, in turn, continue to request additional bandwidth from the VMS. If at any time another service drops making bandwidth available, the next time the STDMA Hub Controller requests additional bandwidth the VMS will grant the request.

If the video data stream is completed before the switch in bandwidth is done, the channel is closed, the bandwidth which had been used is made available again to the pool, and no further action is taken.

Reduced data flow in switched mode (SCPC)

In the event the data flow is reduced, for example a streaming file transfer terminates, the SCPC switched demodulator detects the reduced flow and notifies the VMS. The VMS will then send a switch command to reduce the size of the carrier bandwidth to the new calculated bandwidth requirement.

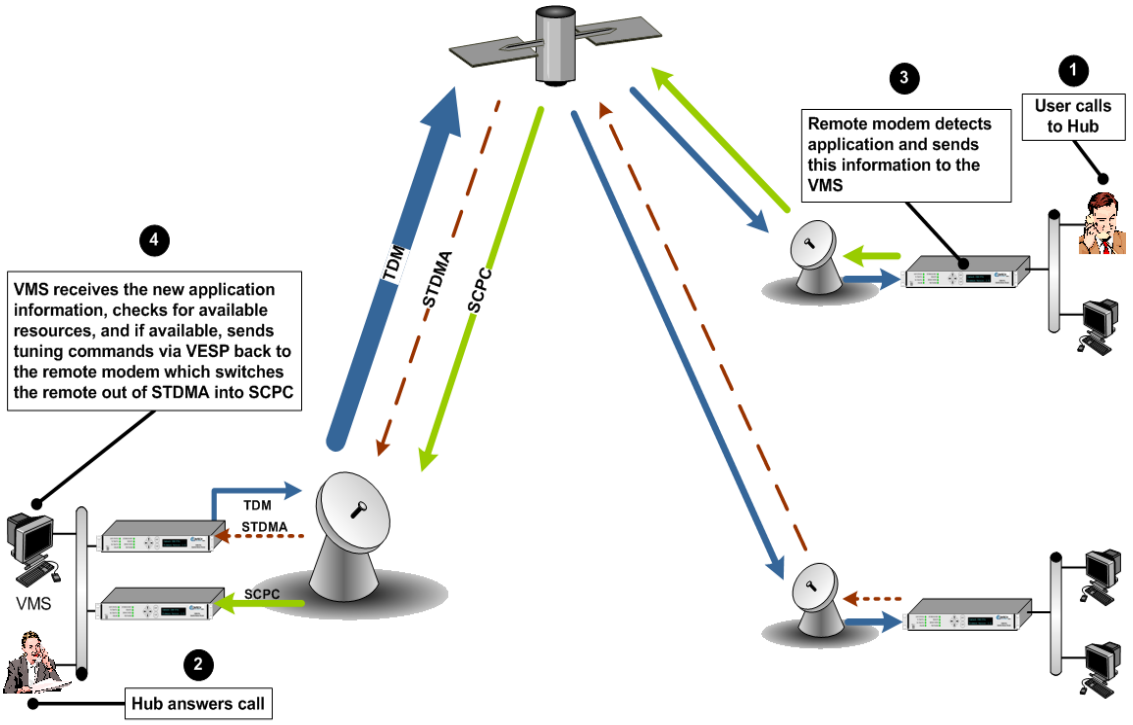
This entire process is automatic following the policies established for the network. The network is dynamically modified changing its configuration to automatically respond to changes to the network's load.

The home threshold is the bit rate set to trigger a return to the home threshold. This function is used when bandwidth has been allocated to meet load requirements, and the load has been either removed or partially removed. Since the channel's new load no longer requires the current bit rate, when the bit rate falls below the preset Home Threshold the channel is switched back to its home condition, STDMA for example.

Note: The load switching example works exactly the same for the SLM-5650A modem.

Application switching

Application switching, diagramed in figure F-6, also is capable of changing bandwidth used, but the change is determined entirely by the type of application being requested ignoring load requirements.



DG-000002a

Figure F-6 Application switching diagram, CDM-570/570L

Note: Application switching is not available for SLM-5650A modems. The following application switching section refers to CDM-570/570L modems.

In a system configured for application switching, the remote site modem/router 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. In the illustration shown in Figure F-6 the signal is a call initiated at the remote site.

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

The modem/router sends a switch request to the VMS requesting a carrier for the application type. Typical applications include:

- Video
- Voice over IP (VoIP)

Each application type will have been assigned a bandwidth allocation when the policy for the remote site is established. The 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 modem/router 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 VMS receives the request to switch, it determines if there is a free demodulator and if 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 modem/router looks at the streaming data flow until it sees a break in the data exceeding 10 seconds. Once a break is detected the modem/router presumes that the application is terminated (or has malfunctioned), drops the carrier, and makes the bandwidth resources available for another service.

Type of Service (ToS) Switching

Type of Service (ToS) switching is used on circuits carrying encrypted traffic where the packets cannot be examined to determine the type of traffic being carried. 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 VMS via Automatic Switch Request (ASR) messages. The VMS switch detector service then applies the required or requested bandwidth using policies which have been pre-configured in the VMS.

Type of Service switching can also be used in non-encrypted networks as well. One advantage is that each packet associated with the application will have ToS set. Therefore, ToS switching is extremely reliable. A drawback is that unless each application can set a different ToS value, resolution is lost.

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 CDM-570/570L. 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.

Using the ToS classification, detection function allows application-based-switching in encrypted networks where the signaling protocols are encrypted or effectively hidden. ToS adds the type of service to the un-encrypted Quality of Service byte (QoS) in the IP header which then can be analyzed to determine the type of service being transmitted. Once the type of service is determined, VMS uses this information to perform switching following the policies established for the detected traffic type.

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

Refer to the Parameter Editor section of the modem manuals for detailed information on enabling and implementing ToS switching on your network.

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

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APPENDIX

G

ENTRY CHANNEL MODE SWITCHING

Entry Channel Mode (ECM)

STDMA entry channel mode provides a method for remotes requiring SCPC access channels to enter/re-enter the network initially or after a power or other site outage. The switch time will be variable based on the burst rate (bps) of the STDMA group, the number of remotes with slots in the group, and where in the burst cycle the remote is when it acknowledges receipt of the burst map.

Initial SCPC rates are settable for each remote in the STDMA group(s). Upon detection of a burst map acknowledgement from a remote the STDMA burst controller will send a switch request to the VMS with the operator specified initial SCPC rate. Upon determining that there is an available demodulator and pool bandwidth the VMS will send a multi-command to remove the remote from the STDMA group, tune it and the switched demodulator to the specified initial bit rate and selected pool frequency. The remote will stay at this initial rate unless an application (such as VTC) or consistent load cause it to request additional bandwidth from the VMS.

Entry channel mode is not driven by the presence or absence of customer traffic. Once in ECM mode, the switched initial data rate becomes the new temporary home state. This temporary home state sets the low limit data load threshold, where the remote will stop sending load switch request commands. Remotes in ECM mode do not require burst maps to maintain SCPC transmission.

Note: Remotes in ECM mode toggle directly from STDMA to SCPC and back. The initial SCPC switch state is used instead of the modem's internal home state for modems operating in ECM mode.

After all remotes are processed into ECM, the Burst Controller drops into sanity mode sending a keep alive map to service remotes which may have their SCPC carrier inhibit flag set. The keep alive message is sent once every two seconds until re-entry is invoked.

Fail Safe Operation

For a detailed description of the features of VMS applications switching, refer to Appendix F, "Automatic Switching". As application switching relates to the ECM mode, it is useful to describe the fail-safe mechanism used for freeing pool bandwidth.

If the VMS loses communications with a switched remote for more than three minutes, it will attempt to return the remote to home state. If the revert-to-home state command succeeds (restoring communications) Entry Channel Mode will cause the remote to switch to its initial SCPC bit rate.

If the revert-to-home state command fails, the VMS will send a command to return the remote and the hub demodulator to the state where they were prior to losing communications, but leave the remote enabled in the STDMA burst controller. This provides the remote with 2 paths to rejoin the network:

1. If the outage was the result of power outage at the site, the remote CDM-570/570L or SLM-5650A will reboot in its home state (STDMA), acknowledge the receipt of the first burst map causing it to rejoin the network through ECM. The VMS will park the demodulator previously in use and free the bandwidth slot.

2. If the outage was due to an extended rain fade or other communications blockage with no loss of power, the remote will rejoin the network via the previously assigned SCPC channel. When VMS receives a PLDM it will send a revert-to-home state command and free the bandwidth slot and burst demodulator. The remote will then rejoin the network through ECM.

Since it is not possible to know which of the above scenarios caused the communications outage the VMS will not free the bandwidth slot except through operator intervention.

Figure G-1 and figure G-2 diagram the time state differences and the process of recovery. Note that the times referenced in the diagrams are approximate.

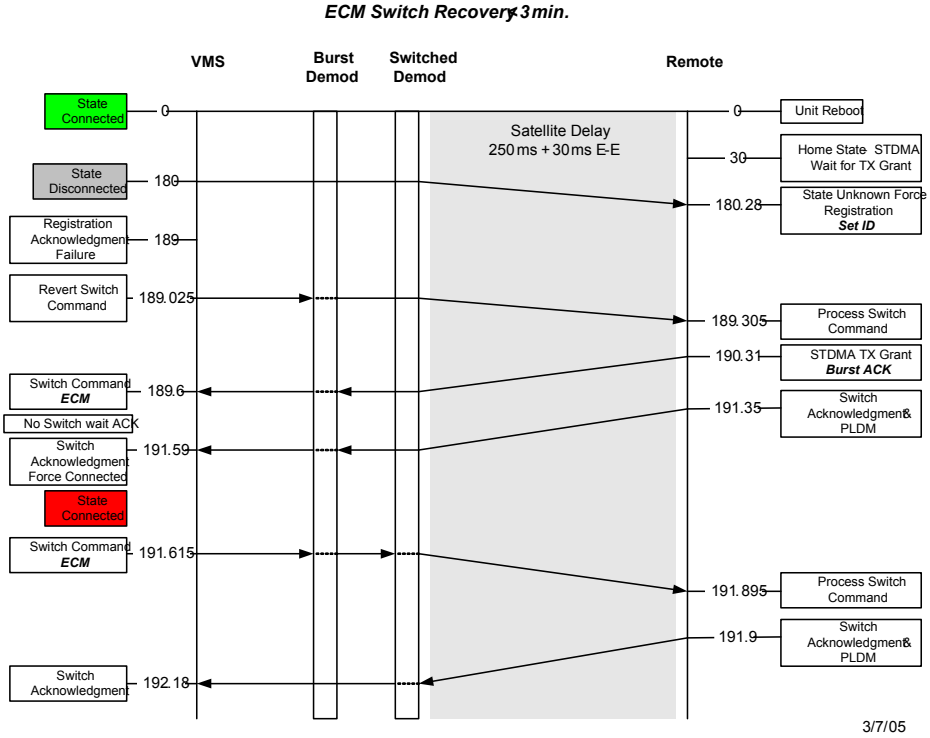

Figure G-1 ECM switch recovery < 3 minutes

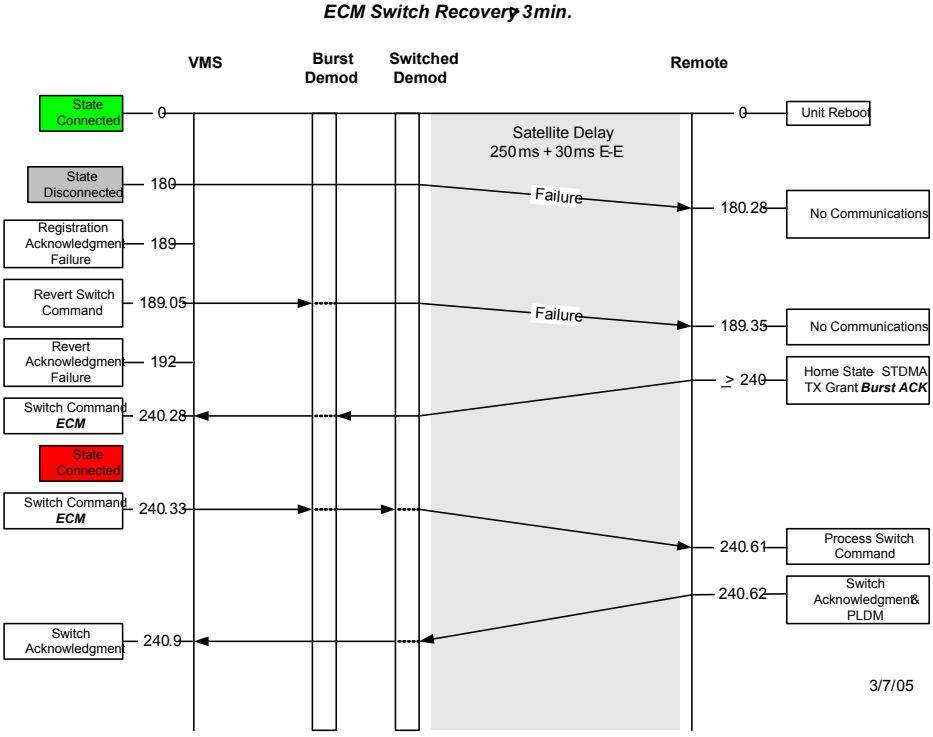

Figure G-2 ECM switch recovery > 3 minutes

Using Entry Channel mode

Entry Channel mode operates slightly differently from other VMS modes due to the STDMA burst controller losing the ability to automatically control once the CDM-570/570L or SLM-5650A is operating SCPC in ECM mode.

The following procedure illustrates this and demonstrates how to change the operation of a modem operating in SCPC ECM mode back to STDMA mode.

Figure G-3 shows the STDMA tab for the CDM-570/570L set up to run in Entry Channel mode. Once a switch has occurred in an ECM enabled VMS controlled modem the unit no longer sends switch requests so VMS does not have a switch request to respond to switch the VMS controlled modem back to STDMA from ECM mode.

The operator will have to manually intervene to switch the VMS controlled modem back to STDMA mode when the VMS controlled modem is no longer required to operate in ECM mode.

Note: Refer to the SLM-5650A modem manual for Entry Channel configuration setup. The text referenced within are similar between modems only the page layouts are different.

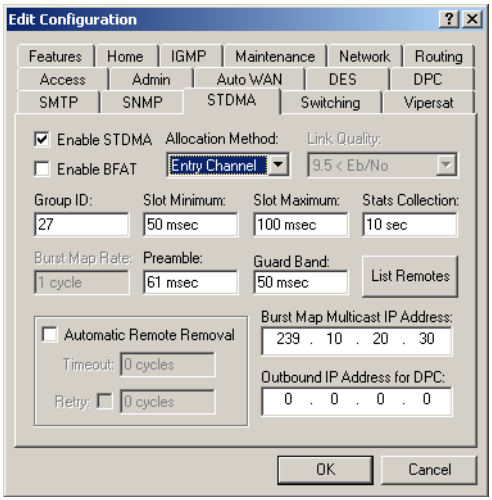

Figure G-3 STDMA tab with ECM mode, CDM-570/570L

Switching an ECM Remote from SCPC to STDMA

Use the following procedure to switch a remote operating in SCPC mode while in the ECM mode.

1. Click the **List Remotes** button on the **STDMA** tab shown in figure G-3 to display the pop-up **STDMA Remote List** shown in figure G-4.

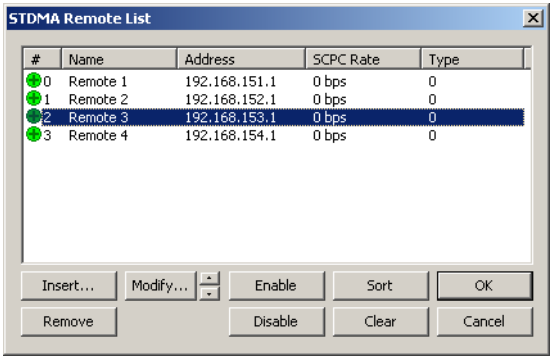

Figure G-4 STDMA remote list tab, CDM-570/570L

2. From the **STDMA Remote List**, select the CDM-570/570L you wish to switch from ECM mode running in SCPC to STDMA mode as shown in figure G-4.

3. Click the **Modify...** button to display the Remote Entry dialog shown in figure G-5. You can use the up and down arrows next to the button to change the selected remote.

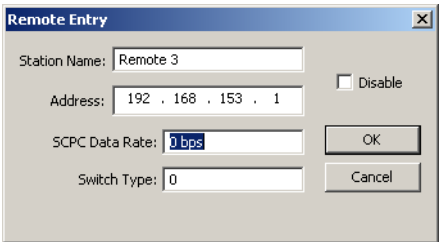

Figure G-5 Remote bandwidth entry, CDM-570/570L

4. To force a switch from ECM SCPC mode to STDMA mode, set the current value in the **SCPC Data Rate** dialog box to 0 (zero) as shown in figure G-5 then click the **OK** button.

NOTE

Note: This switch must be performed manually.

5. In VMS, right click on the remote from the drop-down menu shown in figure G-6 then click on the **Revert Uplink Carrier** command. This causes VMS to send the revert command to the target VMS controlled modem causing it to revert to its STDMA home state.

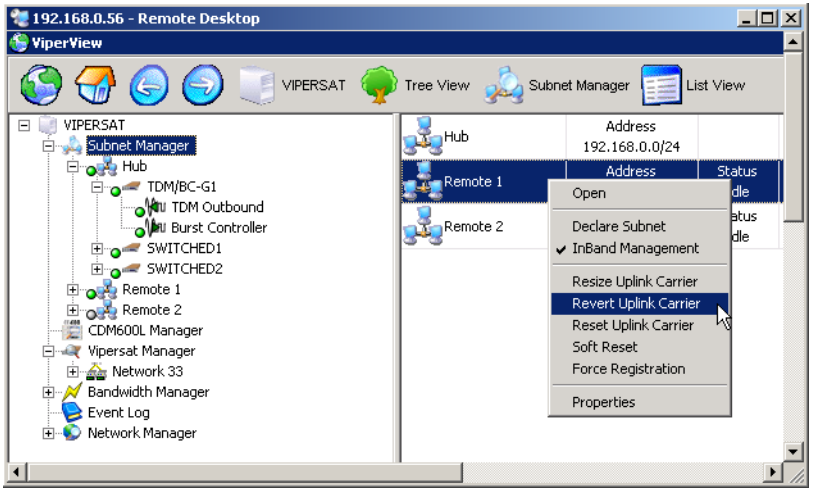

Figure G-6 Revert uplink carrier command, VMS controlled modem

6. This completes resetting the remote VMS controlled modem to operate in the STDMA mode.

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APPENDIX

H

VMS BILLING LOG TRANSLATOR (VBLT)

Description

VBLT is a windows console application that converts switch events, stored in the VMS 3.x event log, into a billing log format. VBLT can be run directly from the command line console, or using VBLT.ui, a graphical user interface frontend, or as a scheduled task using the windows task scheduler.

Note: If you have unique format requirements for your billing information, contact your Vipersat representative for details on having a format conversion program created to meet your needs.

Installation

Copy the two files, VBLT.EXE and VBLT.ui.EXE, into a directory (folder) where the user has valid *write* and *execute* privileges. These applications can be installed on a VMS server, or a remote Viperview client PC. Only users with Viperview privileges should run these applications.

Operation

VBLT can be executed in three modes: (1) console, (2) GUI frontend, or (3) schedule task. Before using VBLT in any mode, it is highly recommended that VMS 3.x service be active.

When specifying a remote VMS server, VBLT should be run from the same user account and PC that is hosting the remote Viperview client. This ensures that the correct security privileges are enabled before executing VBLT.

Consult your VMS or system administrator for more information on accessing a remote VMS server.

Console Mode

VBLT has the following command line options when used in console mode:

-r days - Number of days (24hr period) to retrieve starting from current time. Default is 1 day.

-v server - IP address, UNC, or DNS name of VMS 3.1 server. If this option is not specified, the local VMS server (localhost) is used.

-s session - Sets the starting session ID. Zero (0) is used as default.

-o "path" - Have billing log output to specified file path.

-l - localizes the time stamps to local time zone, default is UTC time.

-q - quiet mode, does not display output to console; used in conjunction with –o option

Examples

In this example, the following command retrieves billing logs for the past two days from the local VMS server. The output is displayed on the console using local time zone.

vblt –r 2 –l

To retrieve billing logs for the past two days and save the results to a file call sample1.log, starting with a session id of 1467, use this command:

vblt –r 2 –s 1467 –o sample1.log

GUI Mode

VBLT.ui provides a Windows user interface to the VBLT application. It also allows the user to specify start/end time & date range for billing log retrieval where as the console mode retrieves logs based on number of days from current time.

To use VBLT.ui, start the VBLT.ui application from the Windows Explorer by double clicking it. Verify that the VBLT.EXE application is in the same directory as VBLT.ui.EXE.

Operation

1. Enter the start date and time in the **Start Date & Time** box shown in figure H-1.

2. Enter the s end date and time in the **End Date & Time** box shown in figure H-1. The end date and time must be greater than the start date and time.

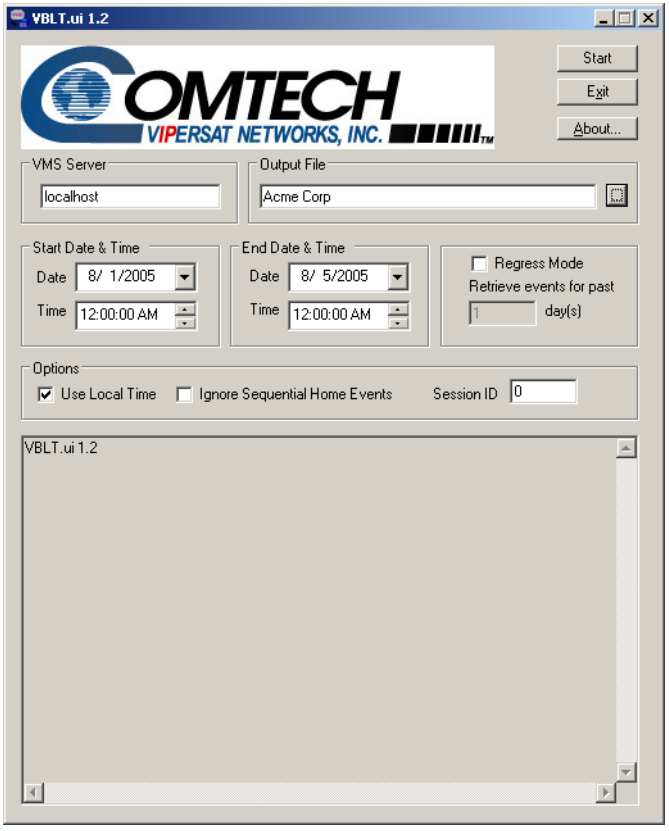

Figure H-1 VLBT graphic user interface

3. Selecting the **Use Local Time** option in the **Options** box determines whether to use local time zone references with respect to start and end time, and the time stamp on the output file. Selecting the **Quiet Mode** option will suppress any output to a VBLT console window.

4. The **VMS Server** entry is optional. Leaving it empty, or entering **localhost** will retrieve the logs from the local VMS server running on the same PC as VBLT. To access a remote VMS server, enter its IP address (i.e. 212.10.0.1), UNC, or hostname. Any security privileges must be configured for remote access and name resolution.

5. An **Output File** must be provided. If the file does not exist, it will be created. If it exists, it will be overwritten.

6. Click the **OK** button to start the retrieval. A dialog box will be displayed to indicate a successful or failed operation. Click **Exit** to quit VBLT.ui.

3.3 Scheduled Task Mode

The billing log retrieval process can be automated by using the Windows Task Scheduler. The Windows Task Scheduler will execute VBLT on a scheduled basis.

To create a scheduled VBLT task, use the Scheduled Task Wizard. Follow the steps below:

1. Open the Windows Task Scheduler, shown in figure H-2, by clicking **Start**, click **All Programs**, point to **Accessories**, point to **System Tools**, and then click **Scheduled Tasks.**

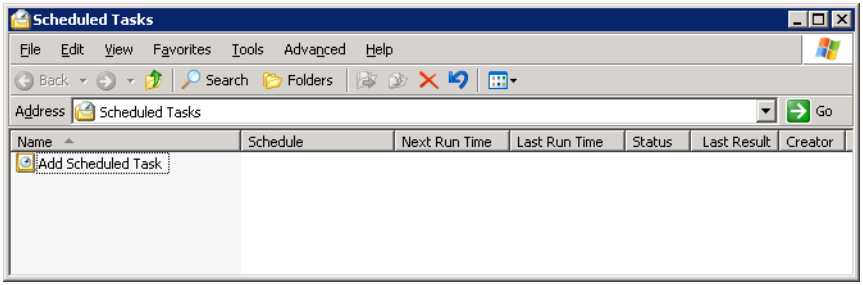

Figure H-2 Scheduled tasks

2. Click on the **Add Scheduled Task** item. This will open the "Scheduled Task Wizard"

3. When prompted to select **Windows program to run**, click the **Browse** button, and select the VBLT.EXE from its install directory.

4. Select a name for the task and scheduled period (Daily, Weekly, Monthly, etc.) from the dialog shown in figure H-3.

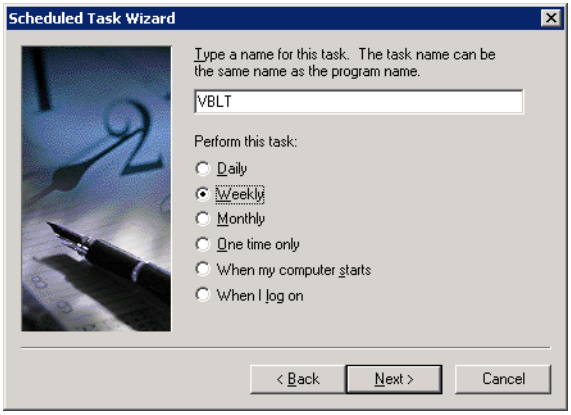

Figure H-3 Scheduled task wizard

5. Set the start time, start date, and recurrence options.

6. Enter your user and name password to confirm the new task entry. This user-name and password should be a valid VMS user.

7. In the last step, check the “Open advanced properties for this task ….” Option, then click Finish.

8. The last step is to add the VLBT command options to the task. In the **Run** text box shown in figure H-4, go to the end of the VBLT.exe and add the desired options. The “-r” and “-o” options should be specified as shown in figure H-4.

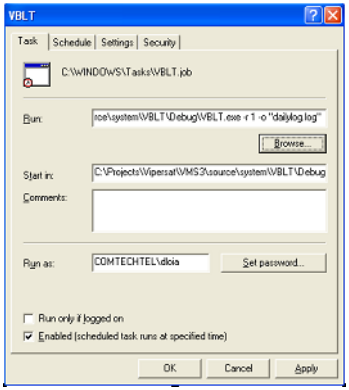

Figure H-4 VLBT task tab

The VLBT application will now be run as a scheduled task by the Windows Task Scheduler.

An alternative method to running a scheduled VBLT task is to create a batch file that calls VBLT with the desired options. A scheduled task is created to run this batch file. This simplifies the maintenance as only the batch file needs to be modified if they are any changes to VBLT options.

Billing Log Format

The billing log format is created from switch events logged by the VMS. The billing log consists of eight (8) comma separated value fields as follows:

1. **Satellite Name** - name of satellite, as shown in VMS, that contains the subnet which generated the switch event.

2. **Antenna Name** - name of Antenna, as shown in VMS, associated with the Subnet which generated the switch event.

3. **Date** - logged date of switch event in “dd/mm/yyyy” format

4. **Time** - logged time of switch event in “hh:mm:ss.mss” format

5. **Session ID** - increasing counter that changes anytime a subnet switches back to its HOME state. This is an unsigned 32 bit counter.

6. **Switch Type** - indicates the type of switch. This value can be “HOME”, “MANUAL”,”AUTOMATIC”,”SCHEDULED”,”UNKNOWN”

7. **Bandwidth** - bandwidth of channel switch in Hertz (Hz)

8. **Bit Rate** - bit rate of channel switch in bits per second (bps)

Billing Log Examples

“Galaxy 10R”, “R1”, 04/04/2005, 19:19:26:717, 996, HOME, 230400Hz, 512000bps
“Galaxy 10R”, “R1”, 04/04/2005, 19:35:08:999, 997, MANUAL, 460800Hz, 512000bps
“Galaxy 10R”, “R1”, 04/04/2005, 19:37:35:979, 997, HOME, 230400Hz, 512000bps
“Galaxy 10R”, “R1”, 04/04/2005, 19:38:21:665, 998, MANUAL, 230400Hz, 256000bps
“Galaxy 10R”, “R1”, 04/04/2005, 20:46:37:210, 998, MANUAL, 115200Hz, 128000bps

APPENDIX

I

GLOSSARY

A

ALC **A**utomatic **L**imit **C**ontrol – A closed loop mechanism controlling the gain stabilization of the HPA's RF output power.

APL **A**synchronous **P**arty **L**ine – A Vipersat term for RS-485 multi-drop bus used for control of indoor equipment. See also SPL.

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 a Vipersat modem and forwarded to the VMS to establish a new satellite link or adjust bandwidth between source and destination IP addresses.

ATM **A**synchronous **T**ransfer **M**ode

B

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.

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. IF is converted to final transmit frequency for satellite communications.

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 modulation technique in which the carrier is phase shifted +/-180 degrees. See also QPSK.

C

C-Band A frequency band commonly used for satellite communications (and sometimes terrestrial microwave). For terrestrial earth stations, the receive frequency band is 3.7–4.2 GHz and the transmit band is 5.925–6.425 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.

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.

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

DNA **D**ynamic **N**ode **A**nnouncement – A process in Vipersat satellite networks whereby remote sites periodically announce their presence to facilitate network setup and monitoring.

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

DRAM **D**ynamic **R**andom **A**ccess **M**emory

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.

DSP **D**igital **S**ignal **P**rocessor – A microprocessor chip optimized for signal processing applications.

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.

FDMA **F**requency **D**ivision **M**ultiple **A**ccess – A technique where multiple users can access a common resource (e.g., satellite) by each being allocated a distinct frequency for operation. See also TDMA.

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.

FIFO **F**irst **I**n **F**irst **O**ut – A simple buffer or queue technique whereby data queued the longest is transmitted first.

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

HDLC **H**igh **L**evel **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 (remote's).

I

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

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).

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 14.0–14.5 GHz. See also C-band.

L

L-Band A frequency band commonly used as an IF for satellite systems using block up/down conversion. Usually 950–1450 MHz.

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. It is similar to LNA.

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

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 all recipients.

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.

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.

OPEX **O**perating **Ex**penditure

OSPF **O**pen **S**hortest **P**ath **F**irst – A common routing algorithm.

P

PLDM **P**ath **L**oss **D**ata **M**ulticast – A message that is sent every sixty seconds and contains information on messages received or lost.

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

QPSK **Q**uaternary **P**hase **S**hift **K**eying – A modulation technique in which the carrier is phase shifted +/- 90 or +/-180 degrees. See also BPSK.

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

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 de-facto Internet standards 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.

RS-485 A common electrical/physical standard issued by the IEEE used for multi-drop serial communications.

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.

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

SPL **S**ynchronous **P**arty **L**ine – An electrically isolated interface between indoor and outdoor equipment used in Vipersat satellite systems. See also APL.

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.

T

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

TDMA — **T**ime **D**ivision **M**ultiple **A**ccess – A multiple access technique where users contend for access to a common channel on a time-shared basis. See also FDMA and STDMA.

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.

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.

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.

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

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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INDEX

T

V

W