
# Managing AVMs and VNEs

**About this chapter:**

This chapter describes defining and managing AVMs and VNEs.

**Creating AVMs**, describes how to define an AVM for a Cisco ANA Unit Server.

**AVM Status**, describes the status of AVMs when they are created and loaded.

**Viewing and Editing an AVM's Properties**, describes how to view and edit an AVM's properties.

**Deleting an AVM**, describes how to delete AVMs.

**Starting and Stopping AVMs**, describes how to stop and start AVMs, and the respective changes in AVM status.

**Moving AVMs**, describes how to manage AVM before you move them, and their status after a move.

**Finding an AVM/VNE**, describes how to locate Cisco ANA AVMs and VNEs among all Cisco ANA Servers.

**VNEs Overview**, provides an overview of assigning VNE IP addresses, the VNE relationship to an AVM, and how to add a VNE to an AVM.

**Defining VNEs**, describes how to open the New VNE dialog box and provides a description of property options you may define in each tab.

**Viewing and Editing a VNE's Properties**, describes how to view and edit the properties of a VNE.

**Deleting a VNE**, describes how to delete a VNE from an AVM.

**Changing the VNE's State**, describes how to start or stop a VNE or move a VNE to maintenance mode.

**Moving Multiple and Single VNEs**, describes how to move VNEs between AVMs.

## Creating AVMs

Cisco ANA Manage enables the user to define AVMs for Cisco ANA Unit Servers. Every AVM (Autonomous Virtual Machine) in the Cisco ANA Fabric is by default managed by the watchdog protocol. Cisco ANA Manage enables the administrator to define AVMs for Cisco ANA Units and enable or disable the watchdog protocol on the AVM.

In order to define an AVM:

- The Cisco ANA Unit must be installed.
- The Cisco ANA Unit must be connected to the transport network.

- The default AVMs, namely, AVM 0 (the switch AVM), AVM 99 (the management AVM) and AVM 100 (the trap management AVM) must be running.

**Note** For more information on the status of AVMs, for example, status **Up** when the AVM is running, see the AVM Status section.

- The new AVM must have a unique ID within the Cisco ANA Unit.

**Note** There are certain AVM ID numbers that are reserved, namely, AVM 0-100 and these cannot be used. In addition, there may be other reserved AVM ID numbers. The user will be unable to enter a reserved number.

To create an AVM:

**Step 1** Select the *ANA Servers* branch in the Cisco ANA Manage window's *Tree* pane. The *ANA Servers* branch is displayed.

**Step 2** Expand the *ANA Servers* branch and select the required *ANA Servers Entity* sub-branch.

**Step 3** Right-click on the required Cisco ANA Unit to display the menu and select **New AVM** or in the toolbar click **New AVM** or from the *File* menu select **New AVM**. The New AVM dialog box is displayed.

The following fields are displayed in the New AVM dialog box:

- **ANA Unit—**The IP address of the selected Cisco ANA Unit.

**Note** The Cisco ANA Unit does not have to be **Up** to create a new AVM.

- **ID—**The name of the AVM as defined in Cisco ANA Manage, and unique to the Cisco ANA Unit, for example, AVM 18.

**Note** The AVM numbers 0-100 are reserved and cannot be used. The user will be unable to enter a reserved number. A message is displayed in the New AVM dialog box advising the user that the number is reserved.

- **Key—**The key is a string that uniquely identifies an AVM in the system (across all Cisco ANA Units) thus enabling a transparent failover scenario in the system. If the user does not enter a key the default key is used, namely, "ID + timestamp".
- **Allocated Memory—**The maximum memory allocated to the AVM.

The following checkboxes are displayed in the New AVM dialog box:

- **Activate on creation—**Select this option to load the AVM into the bootstrap of the Cisco ANA Unit. This changes the administrative status of the AVM to **Up** and ensures that the AVM is loaded on subsequent restarts of the Cisco ANA Unit. By default this option is unchecked and the newly created AVM has an administrative status of **Down**.
- **Enable AVM Protection—**By default this option is selected enabling the watchdog protocol on the AVM when high availability is enabled. For more information, refer to the *Cisco Active Network Abstraction High Availability User's Guide*.

**Note** It is highly recommended that the user does not disable this option if high availability is enabled.
If this option is selected or unchecked when the AVM is up then you will need to restart the AVM in order for this change to take affect.

**Step 4** Define the properties of the AVM.

**Step 5** Click **OK**. The new AVM is added to the selected Cisco ANA Unit, is displayed in the *Workspace*, and is activated.

Creating the new AVM results in Cisco ANA providing the registry information of the new AVM in the specified Cisco ANA Unit, and the AVM can now host VNEs. For more information, see the Defining VNEs section.

# AVM Status

The status of AVMs (and VNEs) is affected by Admin and Oper mode. Admin mode is the administrative instructions that are sent to the AVM. Oper mode is the actual status of the AVM, for example, Up. For more information about Admin and Oper modes, see the Admin and Oper Mode AVM Status section.

When moving an AVM (file), its status, for example, Up or Down, has a bearing on whether the file is reloaded (Up) or not (Down). For more information about moving AVMs, see the Moving AVMs section. For more information about starting and stopping AVMs, see the Starting and Stopping AVMs section.

An AVM can have only one of the following statuses at a time:

- **Up—**The file (process) is reachable and was loaded and started. When a **Start** (command) option is issued, and no problems are encountered, such as an overloaded server, the AVM is running (has been loaded and started), and its status is **Up**.
- **Down—**The file (process) is reachable and was stopped. When a **Stop** (command) option is issued, Cisco ANA issues instructions to shutdown all of the processes. When all of the processes have been stopped, the status of the AVM is **Down**.
- **Starting Up—**When a **Start** or upload (command) option is issued, and for example, the Server cannot execute it due to the fact that it is busy or overloaded, the status of the AVM is **Starting Up**.
- **Shutting Down—**When a **Stop** (command) option is issued, and while the command is being executed (some processes may still be running), the status of the AVM is **Shutting Down**.

## Admin and Oper Mode AVM Status

The AVM status table describes the status of an AVM depending on the Admin and Oper modes, as displayed in the **Status** column of the AVMs table. The Admin mode is the administrative instructions that are sent to the VNE. The Oper mode is the actual status of the VNE, for example, Up.

*Table 6-1 AVM Status*

| Status | Admin Mode | Oper Mode |
|---|---|---|
| Up | Up | Up |
| Shutting Down | Down | Up |
| Down | Down | Down |
| Starting Up | Up | Down |

# Viewing and Editing an AVM's Properties

Cisco ANA Manage enables the user to view and edit the properties of an AVM, for example, the key and the allocated memory.

To view and edit an AVM's properties:

**Step 1** Select the *ANA Servers* branch in the Cisco ANA Manage window's *Tree* pane. The *ANA Servers* branch is displayed.

**Step 2** Expand the *ANA Servers* branch and select the required *AVM* sub-branch in the *Tree* pane.

**Step 3** Right-click to display the shortcut menu and select **Properties**, or from *File* menu, select **Properties** or in the toolbar click **Properties**.

The AVM Properties dialog box is displayed with the details of the selected AVM, including, the IP address/key of the Cisco ANA Unit.

The following field is displayed in the AVM Properties dialog box:

- **Status—**The status of the AVM, namely, Up, Down or Unreachable. For more information, see the Admin and Oper Mode AVM Status section.

**Step 4** Edit the details of the AVM, as required.

**Note** For more information on the other fields displayed in the AVM Properties dialog box, see the Creating AVMs section.

**Step 5** Click **OK**. The AVM's new properties are displayed in the *Workspace*.

# Deleting an AVM

The user can remove an AVM. If the AVM is running it will be stopped before removal. This procedure deletes the registry information of the AVM in the specified Cisco ANA Unit. If there are VNEs running in the AVM then an error message will be displayed and the user will be unable to delete the AVM.

**Warning** **You must remove all of the VNEs before removing their hosting AVM.**

For more information, see the Deleting a VNE section.

**Note** Reserved AVMs 0-100 cannot be deleted.

To delete an AVM:

**Step 1** Select the *ANA Servers* branch in the Cisco ANA Manage window's *Tree* pane. The *ANA Servers* branch is displayed.

**Step 2** Expand the *ANA Servers* branch and select the required *AVM* sub-branch in the *Tree* pane.

**Step 3** Right-click to display the menu and select **Delete**. A warning message is displayed.

**Step 4** Click **Yes**. A confirmation message is displayed.

**Step 5** Click **OK**. The selected AVM is deleted from the selected Cisco ANA Unit.

**Note** Multiple rows can be selected using the standard Microsoft® Windows selection keys.

# Starting and Stopping AVMs

Cisco ANA Manage enables the user to start or stop an AVM.

**Note** Stopping the AVM process stops all of the VNEs in the AVM. You should be aware that any change in status of the AVMs, may take some time to be applied. For example, during execution of the **Stop** command it may take several minutes before the status changes from **Shutting Down** to **Down**.

To start or stop an AVM:

**Step 1** Select the *ANA Servers* branch in the Cisco ANA Manage window's *Tree* pane. The *ANA Servers* branch is displayed.

**Step 2** Expand the *ANA Servers* branch and select the required *AVM* sub-branch.

**Step 3** Right-click to display the shortcut menu and select **Actions | Start** or **Actions | Stop** or in the toolbar click **Start** or **Stop**.

The AVM is started or stopped and the appropriate status is displayed as follows:

- When an AVM is started a **Starting Up** status is displayed in the *Workspace*.
- When the AVM has started an **Up** status is displayed in the *Workspace*.
- When the AVM is stopped a **Shutting Down** status is displayed in the *Workspace*.
- When the AVM has stopped the **Down** state is displayed in the *Workspace*.

**Note** When the AVM status is displayed as **Down**, the status remains **Down** and no-reload will take place.

# Moving AVMs

Cisco ANA Manage enables the administrator to move an entire AVM between Cisco ANA Units.

**Note** Reserved AVMs 0-100 cannot be moved.

Cisco ANA Manage automatically checks the status of the AVM/VNE before it is moved. This information is maintained in the memory.

If the AVM is **Up** it is stopped and then it is moved to the target Cisco ANA Unit. After the move is completed, the AVM is reloaded according to its status prior to the move, namely, the status of the AVM as it was before the move is maintained. For example, if it was **Up** before the move it will remain **Up**, if it was **Down** it will remain **Down**.

To move an AVM:

**Step 1** Select the *ANA Servers* branch in the Cisco ANA Manage window. The *ANA Servers* branch is displayed.

**Step 2** Expand the *ANA Servers* branch and select the required *AVM* sub-branch.

**Step 3** Right-click to display the menu and select **Move AVM**. The Move to dialog box is displayed.

The Move To dialog box displays a tree-and-branch representation of the selected Cisco ANA Server and its Units, excluding the Cisco ANA Unit in which the AVM is currently located. The highest level of the tree displays the Cisco ANA Server. The branches can be expanded and collapsed in order to display and hide information.

**Step 4** Browse to and select the Cisco ANA Unit (branch) where you want to move the AVM(s).

**Step 5** Click **OK**. The AVM(s) is moved and now appears beneath the selected Cisco ANA Unit.

For information about moving VNEs, see the Moving Multiple and Single VNEs section.

# Finding an AVM/VNE

A single search in Cisco ANA Manage can locate Cisco ANA AVMs and VNEs among all Cisco ANA Servers according to specifically defined search criteria.

To find an AVM/VNE:

**Step 1** In the Cisco ANA Manage window *Tree* pane, select the *ANA Unit* sub-branch or any sub-branch. The selected sub-branch is displayed.

**Step 2** In the toolbar, click **Find**. The Find dialog box is displayed.

The **Find** field enables the user to enter specific search criteria in order to find the required AVM/VNE. For example, the user can search for an AVM using the ID number or search for a VNE using an IP address.

The **Types** dropdown list enables the user to specify whether the user is searching for an AVM/VNE by selecting an option from the list. When an option is selected from the list, then the **Property** area is enabled, displaying the properties for the selected option. For example, if AVM is selected from the **Types** dropdown list, then the AVM's properties are displayed in the **Property** area and the user can select a specific property according to which the user wants to conduct the search.

The **Up** and **Down** radio buttons enable the user to search up and down (you can also use the F3 key).

The following buttons are displayed in the Find dialog box:

- **Find—**Searches for the AVM/VNE from the selected point in the *Tree* pane, either up or down.
- **Cancel—**Cancels the search and clears the Find dialog box.

**Step 3** Enter the search criteria in the **Find** field.

**Step 4** From the **Types** dropdown list select AVM/VNE (optional).

**Step 5** From the **Property** area select a specific property (optional).

**Step 6** Select a direction, namely, **Up** or **Down**.

**Step 7** Click **Find**. The AVM/VNE matching the search criteria is highlighted in Cisco ANA Manage.

**Note** Click **F3** to view the next AVM/VNE matching the search criteria.

# VNEs Overview

A Virtual Network Element (VNE) is designated by its leading IP address and corresponds to a single Network Element (NE). Typically a Network Element has only one IP address that is used for management. For such devices the leading IP address is the single IP address configured for this device.

In cases where a NE has multiple IP addresses, the operator must choose one of these IP addresses to be used as a leading IP address. The leading IP address serves as an identifier of the VNE that corresponds to the NE and is displayed wherever the IP address of the Network Element is required.

**Note** Two VNEs cannot monitor the same Network Element.

Cisco ANA Manage enables the user to create VNEs (replicas of devices), for example, by entering the IP address, SNMP and polling rate information and so on. This is called **Element Management**.

After Cisco ANA Manage installs and runs the process, samples the device and collects the data a VNE (**Managed Element)** is created. The VNE includes tables and physical inventory, and this **Managed Element** can be accessed using Cisco NetworkVision.

## VNE Status

The status of VNEs is affected by Admin and Oper mode. Admin mode is the administrative instructions that are sent to the VNE. Oper mode is the actual status of the VNE, for example, Up. For more information about Admin and Oper modes, see the Admin and Oper Mode VNE Status section.

When moving a VNE, its status, for example, Up or Down, has a bearing on whether the VNE is reloaded (Up) or not (Down). For more information about moving VNEs, see Moving Multiple and Single VNEs. For more information about starting and stopping VNEs, see the Changing the VNE's State section.

A VNE can have only one of the following statuses at a time:

- **Up—**The VNE (process) is reachable and was loaded and started. When a **Start** (command) option is issued, and no problems are encountered, such as an overloaded server, the VNE is running (has been loaded and started), and its status is **Up**.
- **Down—**The VNE (process) is reachable and was stopped. When a **Stop** (command) option is issued, Cisco ANA issues instructions to shutdown all of the processes. When all of the processes have been stopped, the status of the VNE is **Down**.
- **Unreachable—**The VNE cannot be managed by Cisco ANA and its status is defined as Unreachable. When an option (command) is issued that cannot be executed by Cisco ANA, the status of the VNE is **Unreachable**.
- **Starting Up—**When a **Start** or upload (command) option is issued, and for example, the Server cannot execute it due to the fact that it is busy or overloaded, the status of the VNE is **Starting Up**.
- **Shutting Down—**When a **Stop** (command) option is issued, and while the command is being executed (some processes may still be running), the status of the VNE is **Shutting Down**.

In addition to the statuses described, the VNE can be placed in maintenance mode, for example, a VNE's status can be **Up** and in maintenance mode. NEs often undergo maintenance operations and planned outages. The Cisco ANA platform supports such maintenance operations without affecting the overall functionality of the active network.

While in maintenance mode (temporary state) a VNE:

- Does not change state on its own, unless the user explicitly (manually) switches the VNE back to active state.
- Never polls the device.
- Is capable of sending alarms, but it does not poll the device and therefore service alarms are not supposed to be sent, except for those that are negotiated between adjacent ports, for example, a "link down" alarm is still sent. Syslogs and traps are sent and the flows are active.
- Maintains any existing links.
- Does not fail on verification requests.

For more information about maintenance mode, see the Changing the VNE's State section.

# Admin and Oper Mode VNE Status

The VNE status table describes the status of a VNE depending on the Admin and Oper modes, as displayed in the **Status** column of the VNEs table. The Admin mode is the administrative instructions that are sent to the VNE. The Oper mode is the actual status of the VNE, for example, Up.

***Table 6-2 VNE Status***

| Status | Admin Mode | Oper Mode |
|---|---|---|
| Up | Up | Up |
| Shutting Down | Down | Up |
| Down | Down | Down |
| Starting Up | Up | Down |
| Unreachable | Up | Unreachable |

For example, if the user starts the VNE, the Admin status is **Up** but the Oper status is **Down** and has not started yet (because the Server is busy), the status is **Starting Up**. If the VNE is **Up** and running and the user stops the VNE, the Admin status is **Down** but the process is not terminated immediately, the status is **Shutting Down**.

# Defining VNEs

The user adds and defines a new VNE for the system using Cisco ANA Manage; this VNE corresponds to a Network Element (NE) and should only be added to the system once. As the VNE loads, Cisco ANA starts investigating the NE and automatically builds a live model of it, including its physical and logical inventory, its configuration, and its status.

When adding a new VNE, Cisco ANA creates the registry information of the new VNE in the Cisco ANA Unit. The newly created VNE has an administrative status of Down and uses the default community strings and polling rates. The VNE inherits these properties from the configuration record that corresponds to the device type.

A VNE must be loaded into the bootstrap of the Cisco ANA Unit before it starts monitoring its underlying NE. This changes the administrative status of the VNE to Up, and ensures that the VNE is loaded on subsequent restarts of the Cisco ANA Unit. Loading the VNE also starts the VNE immediately. For more information on the status of VNEs, see the Admin and Oper Mode VNE Status section.

Before adding a new VNE using Cisco ANA Manage, the user must first determine to which Cisco ANA Unit and AVM, the new VNE should be added.

The user can define and manage SNMP, Telnet/SHH, ICMP, and polling information for the appropriate VNEs in the New VNE dialog box.

**Note** A new VNE cannot be added to the reserved AVMs 0-100.

The user can create VNEs that perform reachability testing only through ICMP. This can be done by creating the VNE and selecting the type **ICMP** and then defining the details in the **ICMP** tab. For more information about the ICMP tab, see the ICMP Tab section.

For information on defining VNE properties in the respective VNE tabs, refer to the following sub-sections:

- General properties, see the General Tab section.
- SNMP properties, see the SNMP Tab section.
- Telnet/SSH properties, see the Telnet / SSH Tab section.
- ICMP properties, see the ICMP Tab section.
- Polling properties, see the Polling Tab section.

For details on viewing and editing VNE properties, see the Viewing and Editing a VNE's Properties section.

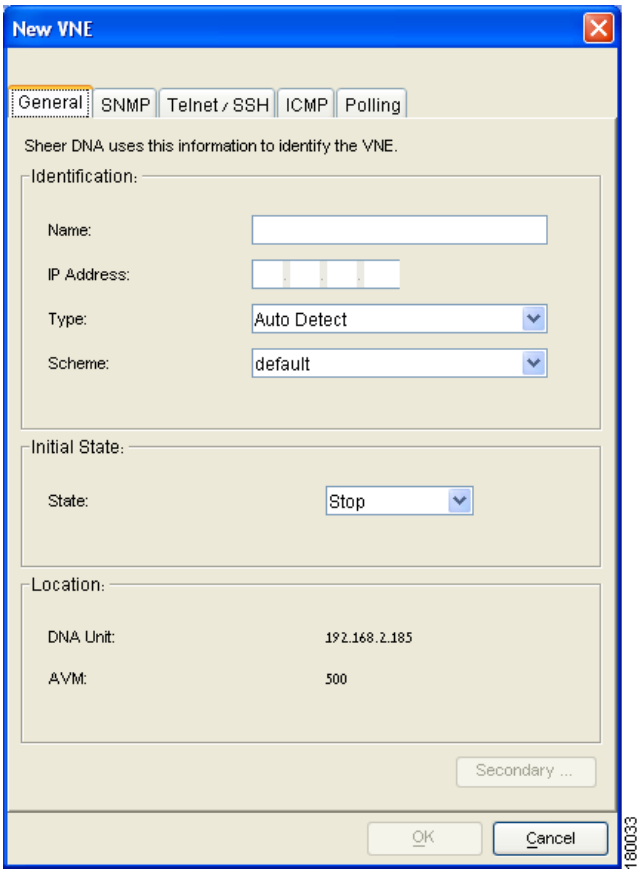
To define the properties of a new VNE:

**Step 1** Select the *ANA Servers* branch in the Cisco ANA Manage window's *Tree* pane. The *ANA Servers* branch is displayed.

**Step 2** Expand the *ANA Unit* branch and select the required *AVM* sub-branch in the *Tree* pane.

**Step 3** Right-click in the *Tree* pane to display the shortcut menu and select **New VNE**, or from *File* menu select **New VNE** or in the toolbar, click **New VNE**. The New VNE dialog box is displayed.

***Figure 6-1 New VNE Dialog Box***




The New VNE dialog box contains the following tabs:

- **General** tab, see the General Tab section, enables the user to manage VNE information in the connected Cisco ANA (Mandatory Name and IP fields).
- **SNMP** tab, see the SNMP Tab section, enables the user to support polling and accessing devices using SNMPv1, SNMPv2c and SNMPv3.
- **Telnet / SSH** tab, see the Telnet / SSH Tab section, enables the user to choose Telnet or SSH for device access and configure the login sequence.
- **ICMP** tab, see the ICMP Tab section, enable the user to verify that devices are reachable by sending repetitive ICMP request packets, and testing reachability by defining the polling rate.
- **Polling** tab, see the Polling Tab section, enables the user to associate a VNE in the Cisco ANA with a polling group or define an instance.

**Note** The **OK** button in the New VNE dialog box is enabled only when the user has typed in the VNE name and IP address in the *General* tab (**Mandatory Fields**).

# General Tab

The **General** tab enables the user to manage VNE information in the connected Cisco ANA.

The following VNE identification fields are displayed in the **Identification** area:

- **VNE Name—**The name of the VNE that is used as a unique key throughout the system (Cisco ANANetworkVision, Cisco ANA Manage, Cisco ANA EventVision).

  **Note** This name is also used for VNE manipulation commands.

- **IP Address—**The IP address of the device.
- **Type—**Select the VNE Type from the dropdown list:
  - **Auto Detect—**Automatically detects the device type and loads the relevant VNE.

    **Note** SNMP cannot be disabled if the **AutoDetect** option is selected (see the SNMP Tab section).

  - **Generic SNMP**—Loads a generic VNE. For more information about defining a generic VNE, see the Defining a Generic SNMP VNE section.
  - **Cloud—**Loads an unmanaged network segment. Specific cloud configuration is provided on a per project basis.
  - **ICMP—**The VNE uses this ICMP-based reachability test to validate communication with the managed device by continuously sending ICMP packets.

    **Note** When this option is selected the **ICMP** tab is enabled (the **SNMP**, **Telnet / SSH** and **Polling** tabs are disabled).

- **Scheme—**Defines the VNE modeling components investigated during the discovery process. This enables the administrator to define different behavior for some devices, for example, for some devices poll only with SNMP and for other devices also poll with Telnet. Soft properties and activation scripts are also attached to a specific scheme. By default, the VNE inherits the VNE Scheme from the **Default** scheme. Select the VNE Scheme from the dropdown list. Where more than one scheme exists in the network, the VNE loads the selected scheme.

The following VNE state fields are displayed in the **Initial State** area:

- **State—**The initial state of the VNE, namely, Start, Stop or Maintenance. By default, this option is set to **Stop**.
  - **Stop—**The VNE is not loaded.
  - **Start—**The VNE is loaded and starts collecting data.
  - **Maintenance—**The VNE is started and moved to maintenance mode. For more information, see the VNE Status section.

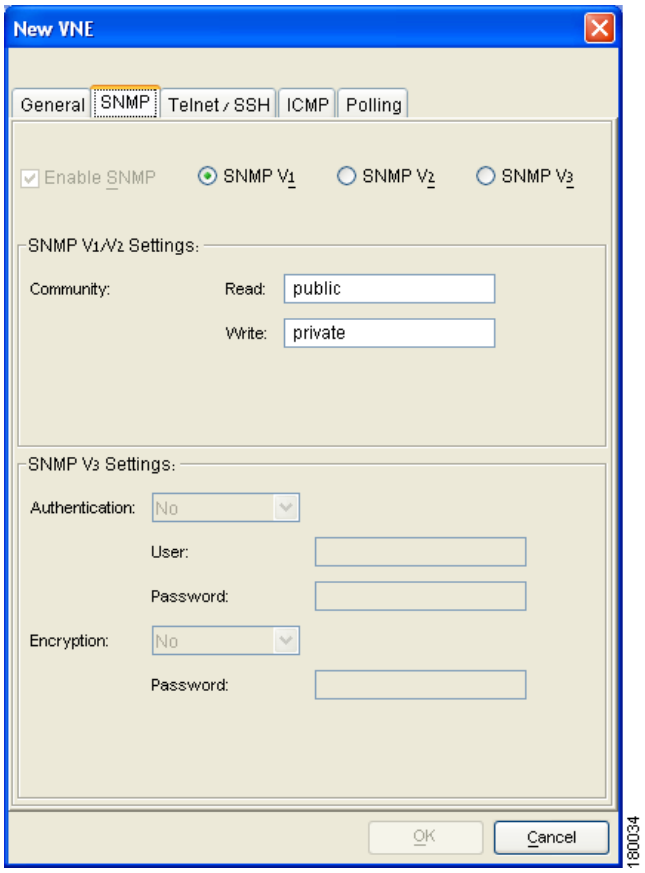
The following fields are displayed in the **Location** area of the **General** tab:

- **ANA Unit—**The IP address of the Cisco ANA Unit that hosts the VNE's AVM.
- **AVM—**The AVM on the Cisco ANA Unit that hosts the VNE.

# SNMP Tab

The **SNMP** tab enables the user to support polling and accessing devices using SNMPv1, SNMPv2 and SNMPv3. Selecting the **SNMP** tab displays the following dialog box:

***Figure 6-2 SNMP Tab***




The following checkbox and radio buttons are displayed in the **SNMP** tab of the New VNE dialog box:

- **Enable SNMP—**Check this option to enable the SNMP communication protocol so that the user can work with it.

**Note** A VNE can be **SNMP** enabled or disabled at any time, however, when the **Auto Detect** option is selected in the **General** tab, it cannot be disabled. (For more information, see the General Tab section).

- **SNMP V1—**Select SNMP version 1.
- **SNMP V2—**Select SNMP version 2.
- **SNMP V3—**Select SNMP version 3.

**Note** The **SNMP V3 Settings** area is only enabled when **SNMP Version 3** is selected.

The following fields are displayed in the **SNMP V1/V2 Settings** area:

- **Read—**The SNMP Read Community status, namely, Public or Private, as defined by the user.
- **Write—**The SNMP Write Community status, namely, Public or Private, as defined by the user.

**Note** The **SNMP V3 Settings** area is only enabled when **SNMP V3** is selected.

The following fields are displayed in the **SNMP V3 Settings** area:

- **Authentication—**Select one of the following:
  - **No—**No authentication is required.
  - md5
  - sha

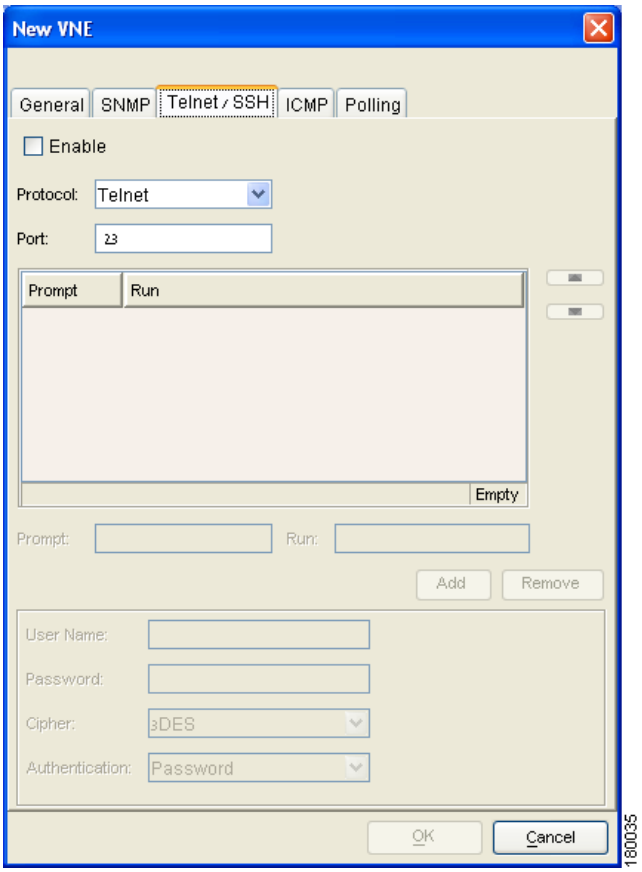
  If MD5 or SHA is selected, enter the required information in the following fields:
  - User
  - Password
- **Encryption—**Select one of the following:
  - **No**—No encryption is required.
  - DES

  If **DES** is selected, enter the required information in the following field:
  - Password

# Telnet / SSH Tab

The **Telnet / SSH** tab enables the user to define the Telnet command sequence and support SSH for device access (reachability) and investigation. Selecting the **Telnet / SSH** tab displays the following tabbed dialog box:

***Figure 6-3 Telnet/SSH Tab***




The following checkbox is displayed in the **Telnet / SSH** tab of the New VNE dialog box:

- **Enable—**Check this option to enable the Telnet/SSH1 communication protocol to be used by the VNE to investigate the reachability of the device by activating the **Prompt** and **Run** fields, and the **Add**/**Remove** command buttons.

**Note** A VNE can be **Telnet / SSH** enabled or disabled at any time.

The following fields are displayed in the **Telnet / SSH** tab of the New VNE dialog box:

- **Protocol—**A dropdown list of the available protocols, namely:
  - **Telnet—**By default this option is set to **Telnet**. When **Telnet** is selected the **Port** field automatically displays **23**.
  - **SSH1—**When **SSH1** is selected the **Port** field automatically displays **22**. In addition, the SSH information fields are enabled in the tabbed dialog box.

- **Port—**When **Telnet** is selected this field automatically displays **23**. When **SSH1** is selected this field automatically displays **22**. The user can edit the port number displayed.
- **Prompt—**The expected Telnet/SSH string. This information is displayed in the table (in the relevant column) after clicking **Add**.
- **Run—**The Telnet/SSH string to be sent to the device when the expected prompt is detected. This information is displayed in the table (in the relevant column) after clicking **Add**.

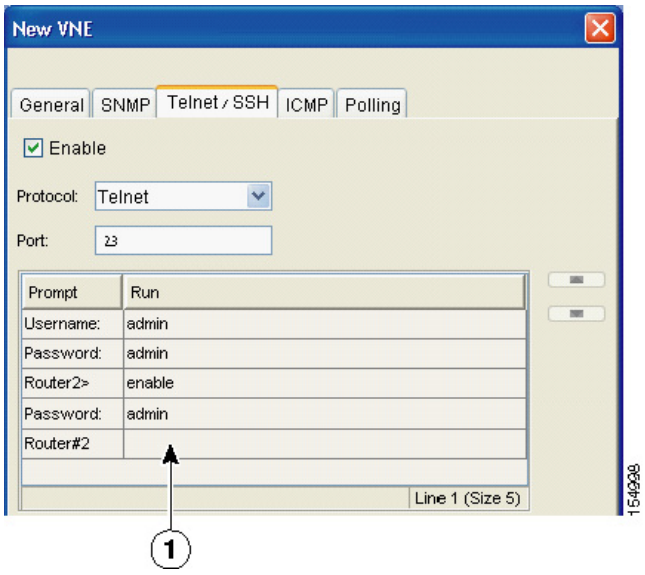
The following buttons are displayed in the **Telnet / SSH** tab of the New VNE dialog box:

- **Add—**Adds the **Prompt** and the **Run** fields to the list in the table.
- **Remove—**Removes the selected row from the list in the table.

Use the **Up** and **Down** arrows to change the order of the commands in the list.

**Note** The Telnet sequence (the order of the commands) must end with a line that includes only the prompt field.

***Figure 6-4 Telnet Sequence Ending with Prompt Field***



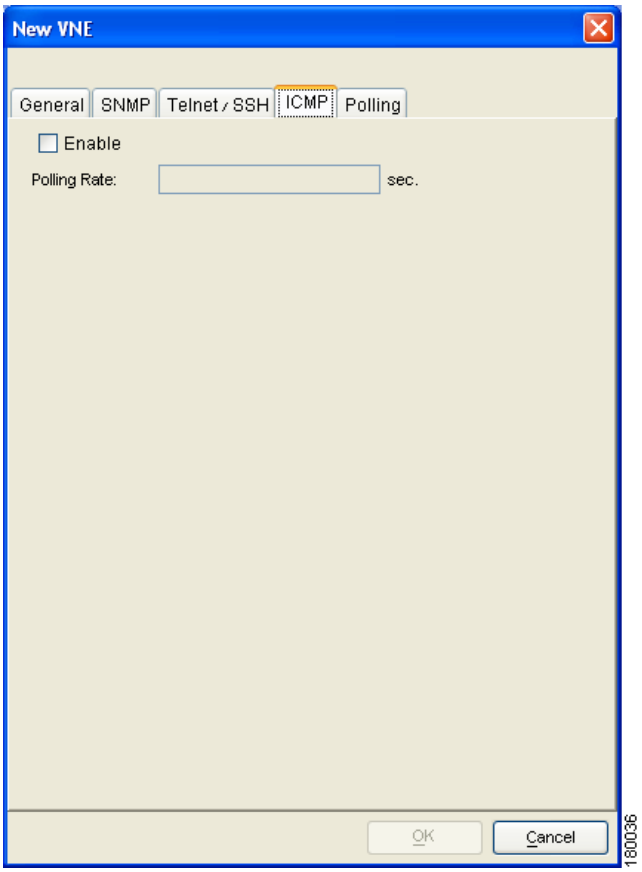

If the SSH1 protocol is selected, enter the required information/properties in the following fields:

- User Name
- Password
- **Cipher—**Cisco ANA supports polling devices using the SSH protocol, which defines a set of ciphers, namely, encryption algorithms, that may be used to encrypt data. This field provides a dropdown list of the available cipher options, namely, 3**DES** (default), **DES** and **Blowfish**.
- **Authentication—**Displays the option **Password**.

# ICMP Tab

The **ICMP** tab enables repetitive sending of packets to a device to verify that the device is reachable. The user can define the polling rate (in seconds) for the VNE. Selecting the **ICMP** tab displays the **ICMP** tab in the New VNE dialog box.

***Figure 6-5 ICMP Tab***




The following checkbox is displayed in the **ICMP** tab of the New VNE dialog box:

- **Enable—**Check this option to enable the use of the ICMP communication protocol to verify that the device is reachable.

**Note** The **ICMP** enable option can be enabled or disabled at any time. If this option is enabled, the user must type in a polling rate (in seconds).

# Polling Tab

When customizing polling rates, special consideration should be given to the following:

- Fast polling rates (30 sec) provide high data accuracy
- Fast change tracking (VC table, profile changes) and accurate flows

vs.

- Constant polling generating high NE CPU utilization, high network traffic, polling overlaps, and starvation for scheduled polling
- Slow polling rates (30 min) will affect data accuracy
- Slow change tracking, stuck flows, invalid information

vs.

- Low NE and network utilization, complete polling cycles

**Warning** **Changing polling rates may result in excess traffic and Network Element crashes.**

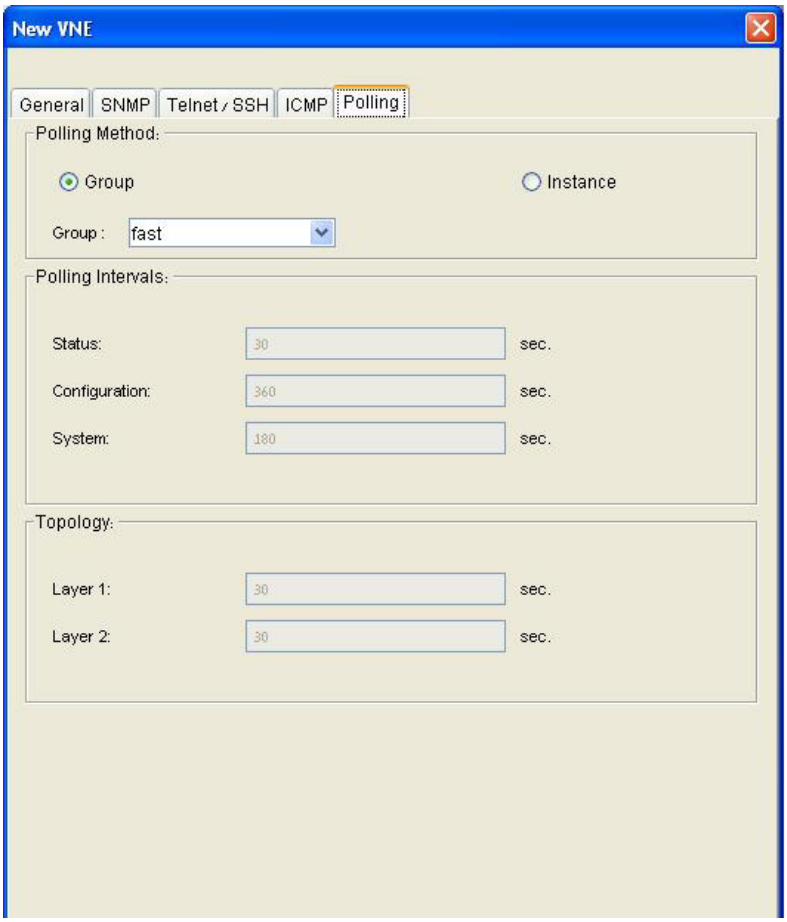
The **Polling** tab enables the administrator to:

- Associate a VNE with a previously created polling group.
- Customize polling intervals for a VNE. Different polling intervals can be defined, namely:
  - **Status—**Typically, would be the most frequently polled information reflecting the current operational state of the element and its components.
  - **Configuration—**Reflects more dynamic element configuration such as forwarding, routing and switching tables.
  - **System—**Reflects element configuration that is less dynamic in nature.
  - **Topology—**Reflects topology connections at different layers.

In addition, a polling interval can be configured for a class of devices, for example, for all Cisco routers.

Selecting the **Polling** tab displays the following dialog box:

***Figure 6-6 Polling Tab***




The following radio buttons are displayed in the **Polling Method** area:

- **Group—**The VNE inherits the polling rates from the polling group selected in the dropdown list. By default, the VNE inherits the polling rates from the **Default** polling group.

  For more information about creating customized polling groups, see the Managing Global Settings section.

  **Note** The **Polling Intervals** and **Topology** areas are disabled when **Group** is selected.

- **Instance—**Enables the user to change the polling rates of any one of the built-in polling intervals currently displayed in the dialog box tab.

  **Note** A polling rate that is not changed inherits its settings from the group specified in the **Group** dropdown list.

  **Note** The **Polling Intervals** and **Topology** areas are enabled when **Instance** is selected.

The following polling interval fields are displayed in the **Polling Intervals** area:

- **Status—**Sets the polling rate for status-related information, such as device status (up/down), port status, admin status and so on. The information is related to the operational and administrative status of the Network Element. The default setting is 60 seconds.
- **Configuration—**Sets the polling rate for configuration-related information, such as VC tables, scrambling and so on. The default setting is 360 seconds.
- **System—**Sets the polling rate for system-related information, such as device name, device location and so on. The default setting is 900 seconds.

The following fields are displayed in the **Topology** area:

- **Layer 1—**Sets the polling rate of the topology process as an interval for the Layer 1 counter. This is an ongoing process. The default setting is 60 seconds.
- **Layer 2—**Sets the polling rate of the topology process as an interval for the Layer 2 counter. This process is available on demand. The default setting is 60 seconds.

# Defining a Generic SNMP VNE

This section describes generic SNMP VNE support. The Generic SNMP VNE is a VNE, that is not related to any vendor and therefore it can represent any vendor (with certain limitations) and provide lightweight management support for network devices.

The Generic VNE provides basic management capabilities for a device with the following technologies:

- IP
- Ethernet Switching
- 802.q

**Note** IP support is restricted to basic IP only. It does not does include modeling of IPsec, MPLS and routing protocols.

The generic SNMP VNE supports the following inventory items:

- Physical Inventory (specific port types only)
- Routing Table
- ARP Table
- Default Bridge
- IP Interfaces

There are two different scenarios that can occur when loading the generic SNMP VNE:

1. The VNE is loaded as a generic SNMP VNE (the user defines the VNE type).

   Cisco ANA Manage enables the user to load a VNE as a generic SNMP VNE. The user does this by simply selecting the **Generic SNMP** option in the **Type** field of the New VNE dialog box. For more information about how to define a generic SNMP VNE, see the Defining VNEs section.

2. The VNE is loaded as a generic SNMP VNE when its type is not supported (the device type is not recognized).

If the device is not found in the "deviceTypes" list, this means that the device is currently unsupported, and the user can load the VNE as:

- An unsupported VNE
- A generic SNMP VNE

Every VNE in "agentdefaults/da" has the entry "load generic agent for unsupported device type", where the user can set the value as "true" or "false" (the default is "false"). If the value is "true", it sets "1.3.999.3" as the property. It looks for this property in "agentdefaults/da/deviceTypes" and finds "sheer/genericda". It then skips the investigation of the device's software versions and builds the VNE (generic SNMP) from the default version.

# Viewing and Editing a VNE's Properties

Cisco ANA Manage enables the user to view and edit the properties of a VNE in a Cisco ANA Unit, for example, the status and Telnet settings. For more information about VNEs, see the Defining VNEs section.

To edit a VNE's properties:

**Step 1** Select the *ANA Servers* branch in the Cisco ANA Manage tabbed dialog box. The *ANA Servers* branch is displayed.

**Step 2** Expand the *ANA Servers* branch and select the required *AVM* sub-branch in the *Tree* pane.

**Step 3** Right-click on the required VNE in the *VNEs Properties* table in the *Workspace* to display the shortcut menu, and select **Properties** or from *File* menu, select **Properties** or in the toolbar click **Properties**. The VNE Properties dialog box is displayed with the details of the selected VNE.

For more details about the fields displayed in the VNE Properties dialog box, see the Defining VNEs section. In addition to the fields displayed when adding a new VNE, the following fields and buttons are displayed:

- **VNE Status—**The operational status, namely, Up, Down, Shutting Down, Starting Up, or Unreachable. For more information on the status of VNEs, see the VNE Status section.
- **Start—**Click this button to start the VNE if it is has been stopped or is in maintenance mode. For more information, see the Changing the VNE's State section.
- **Stop—**Click this button to stop the VNE if it is running or is in maintenance mode.
- **Maintenance—**Click this button to move the VNE to maintenance mode. If this is done when the VNE has been stopped this has no meaning for the VNE.
- **ANA Unit**—The current Cisco ANA Unit that hosts the VNE.
- **AVM—**The current AVM number, which changes according to the Cisco ANA Unit selected to show one of the available AVMs on that Cisco ANA Unit.

**Step 4** Edit the details of the VNE, as required.

**Step 5** Click **Apply**.

**Step 6** Click **OK**. The VNE's properties are edited accordingly.

# Deleting a VNE

Cisco ANA Manage enables the user to delete a VNE(s) from a Cisco ANA Unit and AVM. This process stops the VNE if it is running and deletes all VNE references from the system and Golden Source. This includes the registry information of the VNE in the specified Cisco ANA Unit. A VNE that has been removed no longer appears in any future system reports.

Since all VNE information is deleted, adding the VNE again requires the user to reinsert all the VNE information.

**Note** A VNE that has static links configured cannot be deleted without first removing all of the static links configured for the VNE. Dynamic links are automatically removed.

To delete a VNE:

**Step 1** Select the *ANA Servers* branch in the Cisco ANA Manage window. The *ANA Servers* branch is displayed.

**Step 2** Expand the *ANA Servers* branch and select the required *AVM* sub-branch in the *Tree* pane.

**Step 3** Right-click on the required VNE in the VNEs *Properties* table in the *Workspace* to display the shortcut menu, and select **Delete**. A warning message is displayed.

**Step 4** Click **Yes**. A confirmation message is displayed.

**Step 5** Click **OK**. The selected VNE is deleted from the AVM and is not displayed in the VNEs *Properties* table.

**Note** Multiple rows can be selected using the standard Microsoft® Windows selection keys.

# Changing the VNE's State

Cisco ANA Manage enables the user to start or stop a VNE or move a VNE to maintenance mode. Starting the VNE adds the VNE to the server bootstrap. Stopping the VNE removes the VNE from the server bootstrap.

During normal operation, NEs often undergo maintenance operations and planned outages (software upgrades, hardware modifications, cold reboots and so on). The Cisco ANA platform supports such maintenance operations without affecting the overall functionality of the active network. Neighboring VNEs do not generate alarms that are related to links to or from the maintained VNE.

While in maintenance state (temporary state) a VNE:

- Does not change state on its own, unless the user explicitly (manually) switches the VNE back to active state.
- Never polls the device.
- Is capable of sending alarms, but it does not poll the device and therefore service alarms are not supposed to be sent, except for those that are negotiated between adjacent ports, for example, a "link down" alarm is still sent. Syslogs and traps are sent and the flows are active.
- Maintains any existing links.
- Does not fail on verification requests.

The VNE blocks all provisioning flows that run through the VNE. A device in maintenance state can be disconnected and/or restarted, and this does not result in link down alarms. Upon restart, the VNE receives only persistent information, and returns to its latest known configuration, the topology links are renewed automatically.

This icon indicates a VNE in maintenance state in Cisco NetworkVision.

To change the VNE's state:

**Step 1** Select the *ANA Servers* branch in the Cisco ANA Manage window. The *ANA Servers* branch is displayed.

**Step 2** Expand the *ANA Servers* branch and select the required *AVM* sub-branch in the *Tree* pane.

**Step 3** Select the required VNE in the in the VNEs *Properties* table in the *Workspace*.

**Step 4** Right-click to display the shortcut menu and select one of the following—

- **Actions** | **Start** or in the toolbar click **Start**.
- **Actions** | **Stop** or in the toolbar click **Stop**.
- **Actions** | **Maintenance** or in the toolbar click **Maintenance**.

**Step 5** The state of the VNE changes based on your selection:

- If the VNE is started a confirmation message is displayed. Click **OK**. An **Up** status will eventually be displayed in the *VNEs Properties* table in the *Workspace*. In the interim, you may see a **Starting Up** status, when, for example, the Server is overloaded, or the VNE is still being loaded.
- If the VNE is stopped a confirmation message is displayed. Click **OK**. A **Down** status will eventually be displayed in the *VNEs Properties* table in the *Workspace*. In the interim, you may see a **Shutting Down** status while various processes are closing down.
- If the VNE is moved to maintenance mode a confirmation message is displayed. Click **OK**. A **Maintenance** status is displayed in the *VNEs Properties* table in the *Workspace*.

# Moving Multiple and Single VNEs

Cisco ANA Manage enables the administrator to move single and/or multiple VNEs between AVMs. The VNEs that are moved are unloaded. The status of the VNEs is maintained after they are reloaded.

**Note** Use standard Microsoft Windows mouse and keyboard techniques for multiple selections in the appropriate Properties table displayed in the *Workspace*.

To move a single VNE or multiple VNEs:

**Step 1** Select the *ANA Servers* branch in the Cisco ANA Manage window. The *ANA Servers* branch is displayed.

**Step 2** Expand the *ANA Servers* branch and select the required *AVM* sub-branch in the *Tree* pane. The VNEs are displayed in the *Workspace*.

**Step 3** Select a VNE or select multiple VNEs using the mouse and/or keyboard, then right-click on the required VNE(s) in the *Tree* pane to display the shortcut menu.

**Step 4** Select **Move VNEs** from the shortcut menu. The Move To dialog box is displayed:

The Move To dialog box displays a tree-and-branch representation of the selected Cisco ANA Server, its Units and AVMs, excluding the AVM in which the VNE is currently located. The highest level of the tree displays the Cisco ANA Server. The branches can be expanded and collapsed in order to display and hide information.

**Step 5** In the Move To dialog box, browse to and select the AVM (branch) where you want to move the VNE(s).

**Step 6** Click **OK**. The VNE is moved to its new location, and now appears beneath the selected AVM (branch) in the *VNEs Properties* table in the *Workspace*.

**Note** The user can view the "moved" VNE by selecting the appropriate AVM in the *Tree* pane of the Cisco ANA Manage window (such as AVM 500-930000) and view the "moved" VNE in the *VNEs Properties* table displayed in the *Workspace*.

**Note** The VNE(s) that is moved is automatically unloaded and reloaded, and its status is maintained.