CHAPTER 18

Monitoring MToP Services

The following topics describe Mobile Transport over Packet (MToP) services and how you can view and manage them:

For more information about MToP, see the *Cisco Active Network Abstraction 3.7.1 Theory of Operations Guide*.

User Roles Required to Work with MToP

Table 18-1 identifies the roles that are required to work with MToP in Cisco ANA NetworkVision. Cisco ANA determines whether you are authorized to perform a task as follows:

- For GUI-based tasks (tasks that do not affect devices), authorization is based on the default permission that is assigned to your user account.
- For device-based tasks (tasks that do affect devices), authorization is based on the default permission that is assigned to your account. That is, whether the device is in one of your assigned scopes and whether you meet the minimum security level for that scope.

For more information on user authorization, see the *Cisco Active Network Abstraction 3.7.1 Administrator Guide*.

Table 18-1 Default Permission/Security Level Required for Viewing MToP Properties

Task	Viewer	Operator	OperatorPlus	Configurator	Administrator
View MToP properties	—	—	—	—	X

Viewing SAToP Pseudowire Type in Logical Inventory

Structure-Agnostic Time Division Multiplexing (TDM) over Packet (SAToP) enables the encapsulation of TDM bit-streams (T1, E1, T3, or E3) as pseudowires over PSNs. As a structure-agnostic protocol, SAToP disregards any structure that might be imposed on the signals and TDM framing is not allowed.

To view the SAToP pseudowire type in logical inventory:

Step 1 In Cisco ANA NetworkVision, right-click the device on which SAToP is configured, then choose **Inventory**.

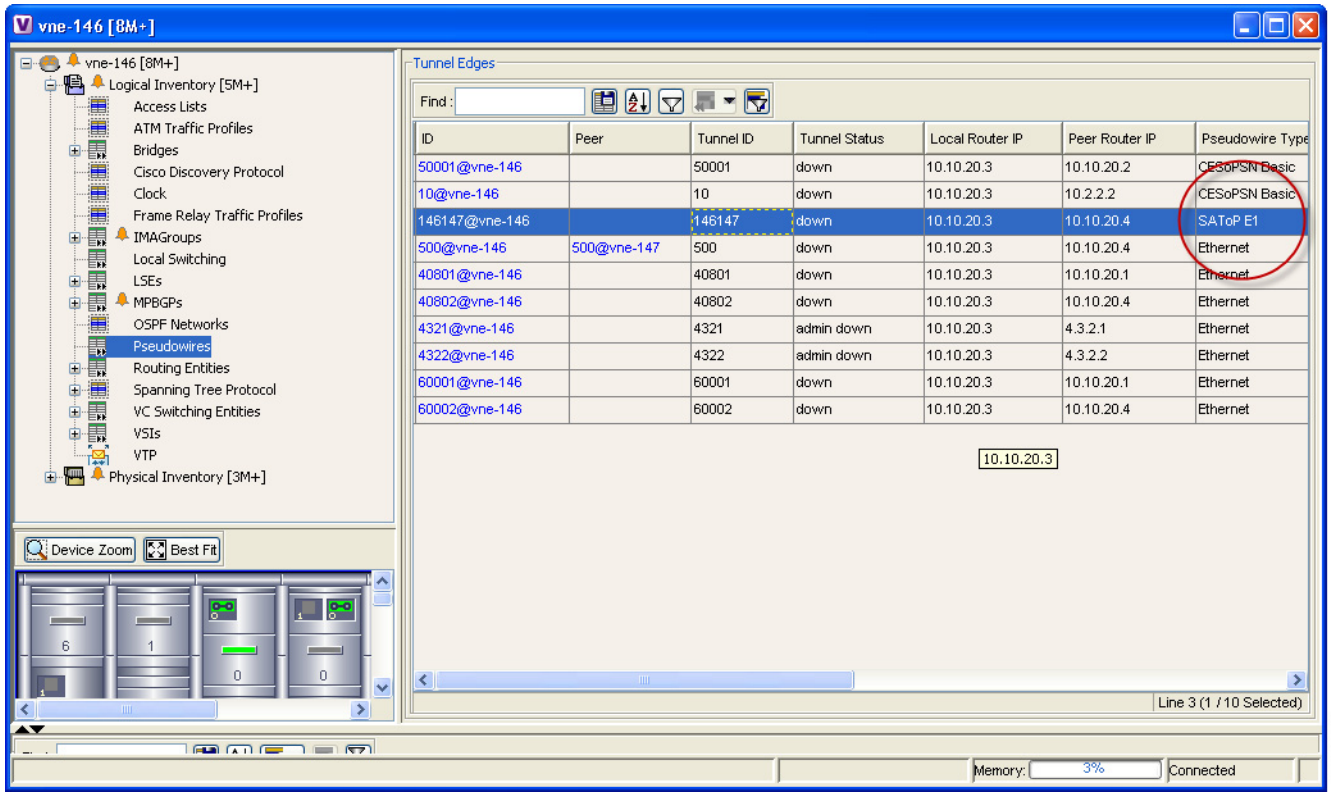
Step 2 In the inventory window, choose **Logical Inventory > Pseudowires**.

Step 3 In the Tunnel Edges table, select the required entry and scroll horizontally until you see the Pseudowire Type column. See Figure 18-1.

Note You can also view this information by right-clicking the entry in the table and choosing **Properties**.

Step 4 To view the physical inventory for the port, click the hypertext port link.

Figure 18-1 SAToP Pseudowire Type in Logical Inventory



Viewing CESoPSN Pseudowire Type in Logical Inventory

Circuit Emulation Services over PSN (CESoPSN) is a method for encapsulating structured (NxDS0) TDM signals as pseudowires over packet-switching networks, complementary to SAToP. By emulating NxDS0 circuits, CESoPSN:

- Saves PSN bandwidth.
- Supports DS0-level grooming and distributed cross-connect applications.

To view TDM properties for Circuit Emulation (CEM) groups in Cisco ANA NetworkVision:

Step 1 In Cisco ANA NetworkVision, right-click the device on which CESoPSN is configured, then choose **Inventory**.

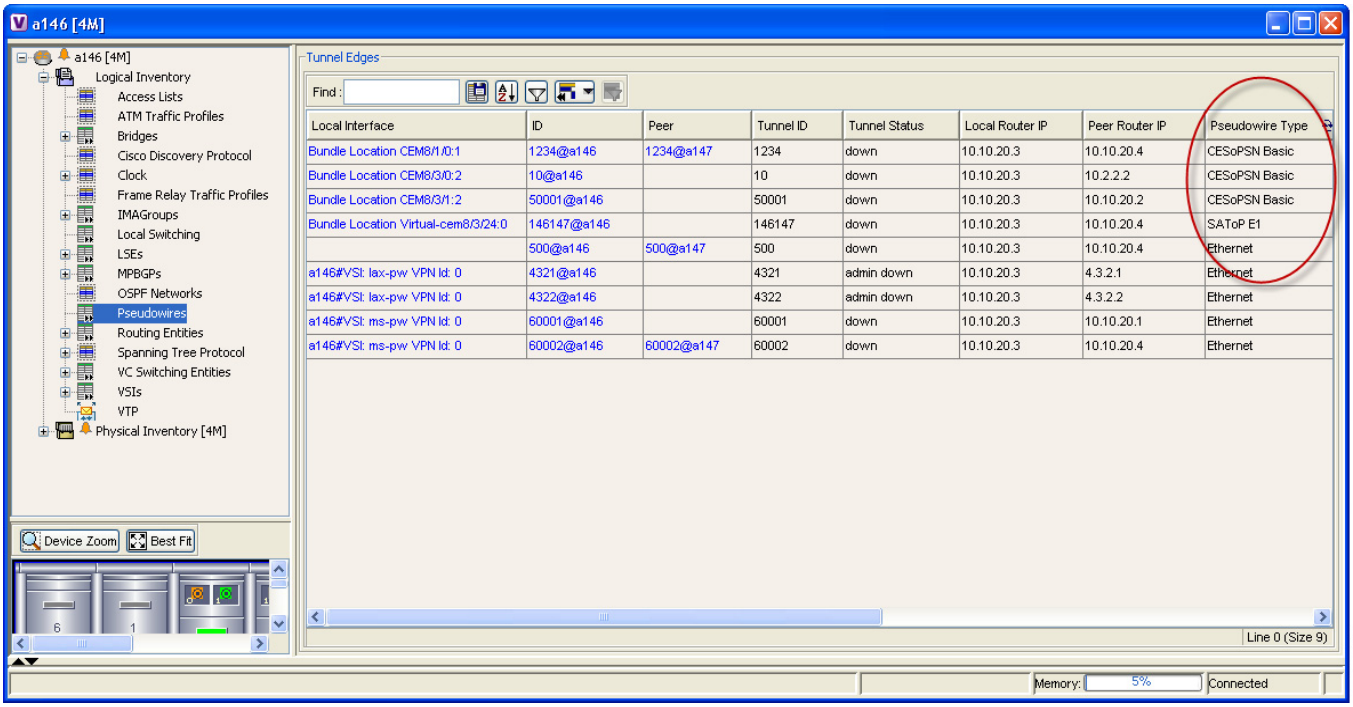
Step 2 In the inventory window, choose **Logical Inventory > Pseudowires**.

Step 3 In the Tunnel Edges table, select the required entry and scroll horizontally until you see the Pseudowire Type column. See Figure 18-2.

Note You can also view this information by right-clicking the entry in the table and choosing **Properties**.

Step 4 To view the physical inventory for the port, click the hypertext port link.

Figure 18-2 CESoPSN Pseudowire Type in Logical Inventory



Viewing ATM Virtual Connection Cross-Connects

ATM networks are based on virtual connections over a high-bandwidth medium. By using cross-connects to interconnect virtual path or virtual channel links, it is possible to build an end-to-end virtual connection.

An ATM cross-connect can be mapped at either of the following levels:

- Virtual path—Cross-connecting two virtual paths maps one Virtual Path Identifier (VPI) on one port to another VPI on the same port or a different port.
- Virtual channel—Cross-connecting at the virtual channel level maps a Virtual Channel Identifier (VCI) of one virtual channel to another VCI on the same virtual path or a different virtual path.

Cross-connect tables translate the VPI and VCI connection identifiers in incoming ATM cells to the VPI and VCI combinations in outgoing ATM cells.

To view ATM cross-connects:

Step 1 In Cisco ANA NetworkVision, right-click the required device, then choose **Inventory**.

Step 2 In the inventory window, choose **Logical Inventory > VC Switching Entities > VC Switching Entity**. The Cross-Connect Table is displayed in the content pane as shown in Figure 18-3.

Step 3 Select an entry and scroll horizontally until you see the required information.

Figure 18-3 ATM Virtual Connection Cross-Connect Properties

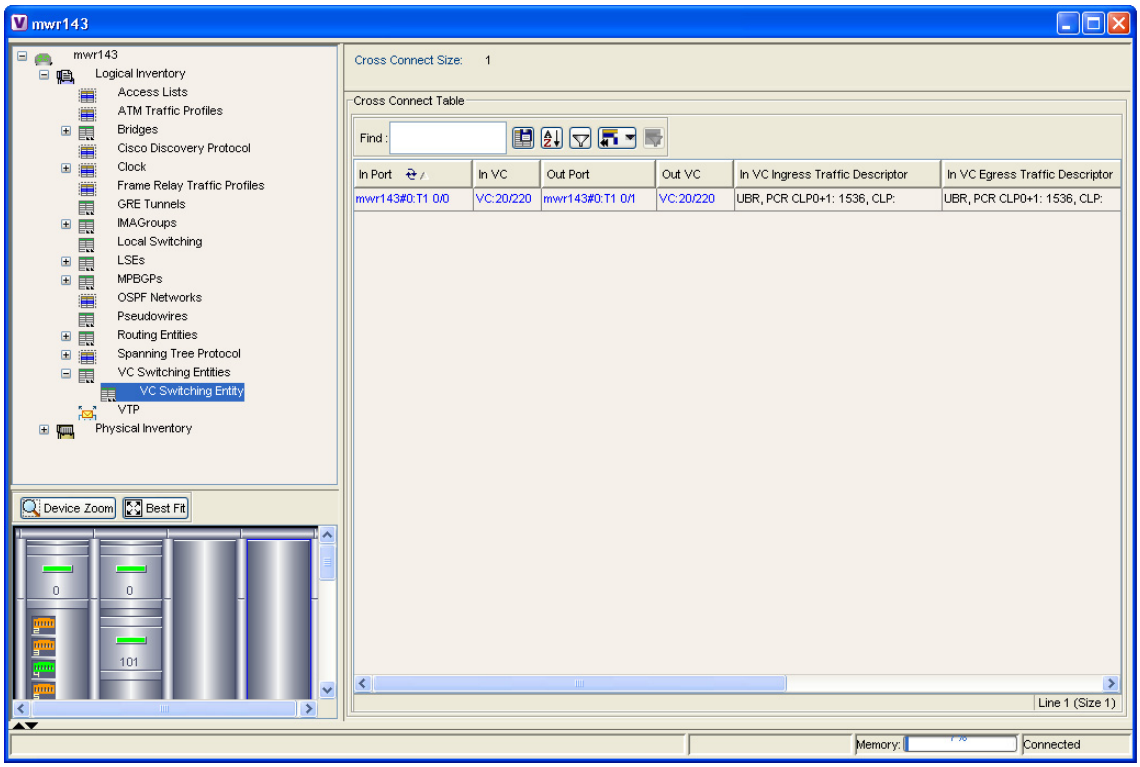


Table 18-2 identifies the properties that are displayed for ATM VC cross-connects.

Table 18-2 ATM Virtual Connection Cross-Connect Properties

Field	Description
In Port	The incoming port for the cross-connect.
In VC	The incoming virtual connection for the cross-connect. You can view additional details about the virtual connection in the following ways: • Click the hyperlinked entry to view the VC table. • Right-click the entry, then choose **Properties** to view information about the incoming and outgoing VCIs, VPI, service category, and traffic descriptors.
Out Port	The outgoing port for the cross-connect.
Out VC	The outgoing virtual connection for the cross-connect. You can view additional details about the virtual connection in the following ways: • Click the hyperlinked entry to view the VC table. • Right-click the entry, then choose **Properties** to view information about the incoming and outgoing VCIs, VPI, service category, and traffic descriptors.
In VC Ingress Traffic Descriptor	ATM traffic parameters and service categories for the incoming traffic on the incoming VC cross-connect. For information on VC traffic descriptors, see Table 18-3.

Table 18-2 ATM Virtual Connection Cross-Connect Properties (continued)

Field	Description
In VC Egress Traffic Descriptor	ATM traffic parameters and service categories for the outgoing traffic on the incoming VC cross-connect. For information on VC traffic descriptors, see Table 18-3.
Out VC Egress Traffic Descriptor	ATM traffic parameters and service categories for the outgoing traffic on the outgoing VC cross-connect. For information on VC traffic descriptors, see Table 18-3.
Out VC Ingress Traffic Descriptor	ATM traffic parameters and service categories for the incoming traffic on the outgoing VC cross-connect. For information on VC traffic descriptors, see Table 18-3.
Sending Alarms	Indicates whether the cross-connect is sending alarms: True or False.

Table 18-3 Virtual Connection Traffic Descriptors

Value	Description
ABR	Available bit rate (ABR) supports nonreal-time applications that tolerate high cell delay, and can adapt cell rates according to changing network resource availability to prevent cell loss.
CBR	Constant bit rate (CBR) supports real-time applications that request a static amount of bandwidth that is continuously available for the duration of the connection.
CDVT	Cell Delay Variation Tolerance (CDVT) specifies an acceptable deviation in cell times for a PVC that is transmitting above the PCR. For a given cell interarrival time expected by the ATM switch, CDVT allows for some variance in the transmission rate.
CLP	Cell loss priority (CLP) indicates the likelihood of a cell being dropped to ease network congestion.
MBS	Maximum Burst Size (MBS) specifies the number of cells that the edge device can transmit up to the PCR for a limited period of time without penalty for violation of the traffic contract.
MCR	Minimum Cell Rate (MCR) specifies the cell rate (cells per second) at which the edge device is always allowed to transmit.
PCR	Peak Cell Rate (PCR) specifies the cell rate (cells per second) that the edge device cannot exceed.
PDR CLP0+1: 1536	Packet delivery ratio (PDR) for all cells (both CLP1 and CLP0 cells) on the circuit.
SCR	Sustainable Cell Rate (SCR) specifies the upper boundary for the average rate at which the edge device can transmit cells without loss.
UBR	Unspecified Bit Rate (UBR) supports nonreal-time applications that tolerate both high cell delay and cell loss on the network.
UBR+	Unspecified bit rate plus (UBR+) supports nonreal-time applications that tolerate both high cell delay and cell loss on the network, but request a minimum guaranteed cell rate.

Table 18-3 Virtual Connection Traffic Descriptors (continued)

Value	Description
nrt-VBR	Nonreal-time variable bit rate (nrt-VBR) supports nonreal-time applications with bursty transmission characteristics that tolerate high cell delay, but require low cell loss.
rt-VBR	rt-VBR—Real-time variable bit rate (rt-VBR) supports real-time applications that have bursty transmission characteristics.

Viewing IMA Group Properties

To view IMA group properties:

Step 1 In Cisco ANA NetworkVision, right-click the required device, then choose **Inventory**.

Step 2 In the inventory window, choose **Logical Inventory > IMA Groups >** *group*. IMA group properties and the IMA Members table are displayed in the content pane as shown in Figure 18-4.

Figure 18-4 IMA Group Properties

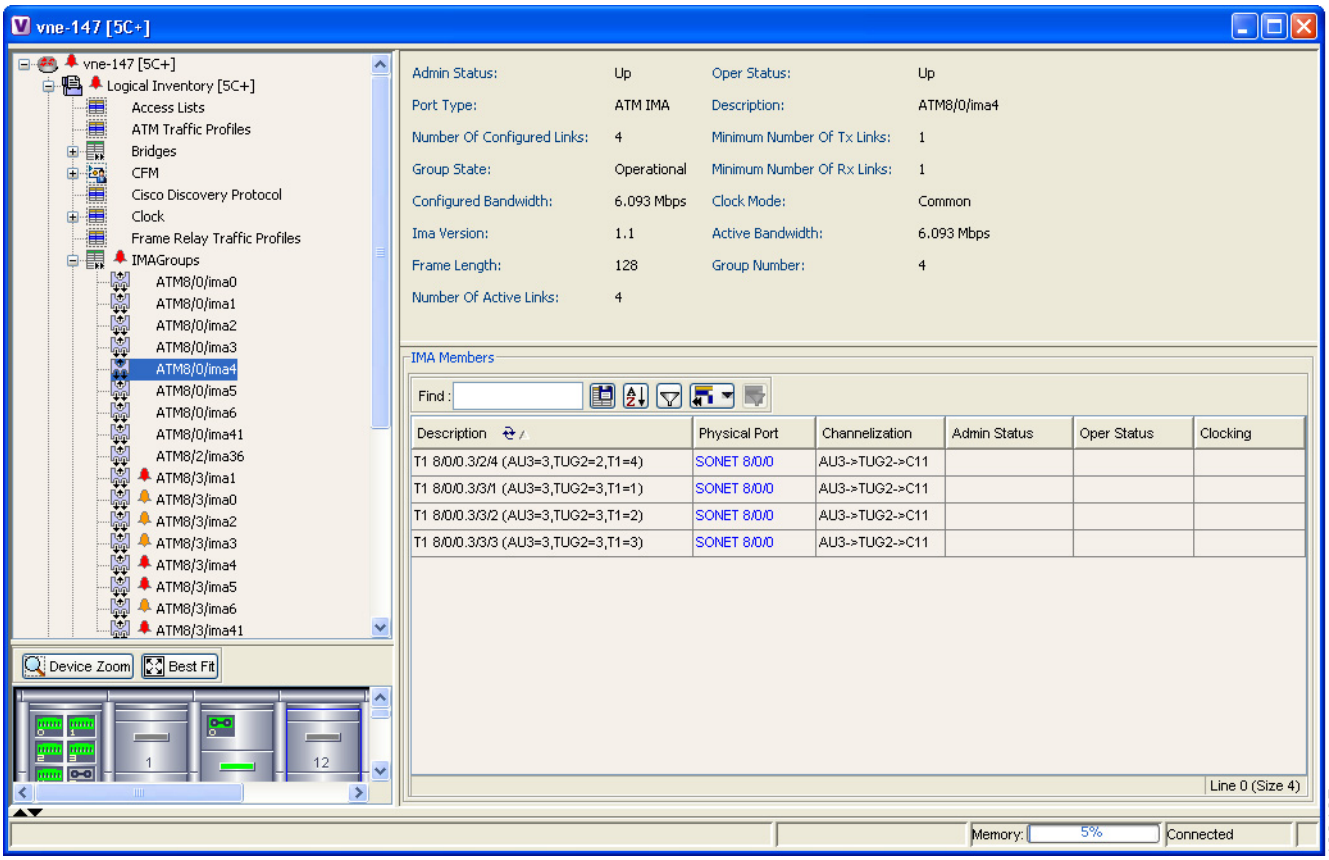


Table 18-4 describes the information displayed for the IMA group.

Table 18-4 IMA Group Properties

Field	Description
Active Bandwidth	The active bandwidth of the IMA group.
Admin Status	The administrative status of the IMA group.
Clock Mode	The clock mode the IMA group is using: • Common—Common transmit clocking (CTC). • Independent—Independent transmit clocking (ITC).
Configured Bandwidth	The total bandwidth of the IMA group, which is the sum of all individual links in the group.
Description	The IMA group interface name.
Frame Length	The length of the IMA group transmit frames, in the number of cells: 32, 64, 128, or 256. A small frame length causes more overhead but loses less data if a problem occurs. We recommend a frame length of 128 cells.
Group Number	The IMA group number.
Group State	The IMA group status, in the order of usual appearance: • Startup—The near end is waiting to receive indication that the far end is in Startup. The IMA group moves to the Startup-Ack state when it can communicate with the far end and has recorded IMA ID, group symmetry, and other IMA group parameters. • Startup ACK—Both sides of the link are enabled. • Config Aborted—The far end has unacceptable configuration parameters, such as an unsupported IMA frame size, an incompatible group symmetry, or an unsupported IMA version. • Insufficient Links—The near end has accepted the far end group parameters, but the far end does not have sufficient links to move into the Operational state. • Operational—The group is not inhibited and has sufficient links in both directions. The IMA interface can receive ATM layer cells and pass them from the IMA sublayer to the ATM layer. • Blocked—The group is blocked, even though sufficient links are active in both directions.
IMA Version	The IMA version configured, either 1.0 or 1.1.
Minimum Number of Rx Links	The minimum number of Rx links needed for the IMA group to be operational.
Minimum Number of Tx Links	The minimum number of Tx links needed for the IMA group to be operational.
Number of Active Links	The number of DS1 (E1 or T1) links that are active in the group.
Number of Configured Links	The number of DS1 (E1 or T1) links that are configured in the IMA group.

Table 18-4 IMA Group Properties (continued)

Field	Description
Oper Status	The operational state of the IMA group interface: • Dormant—The interface is dormant. • Down—The interface is down. • Not Present—An interface component is missing. • Testing—The interface is in test mode. • Unknown—The interface has an unknown operational status. • Up—The interface is up.
Port Type	Type of port, such as ATM IMA.

Table 18-5 describes the information displayed in the IMA Members table.

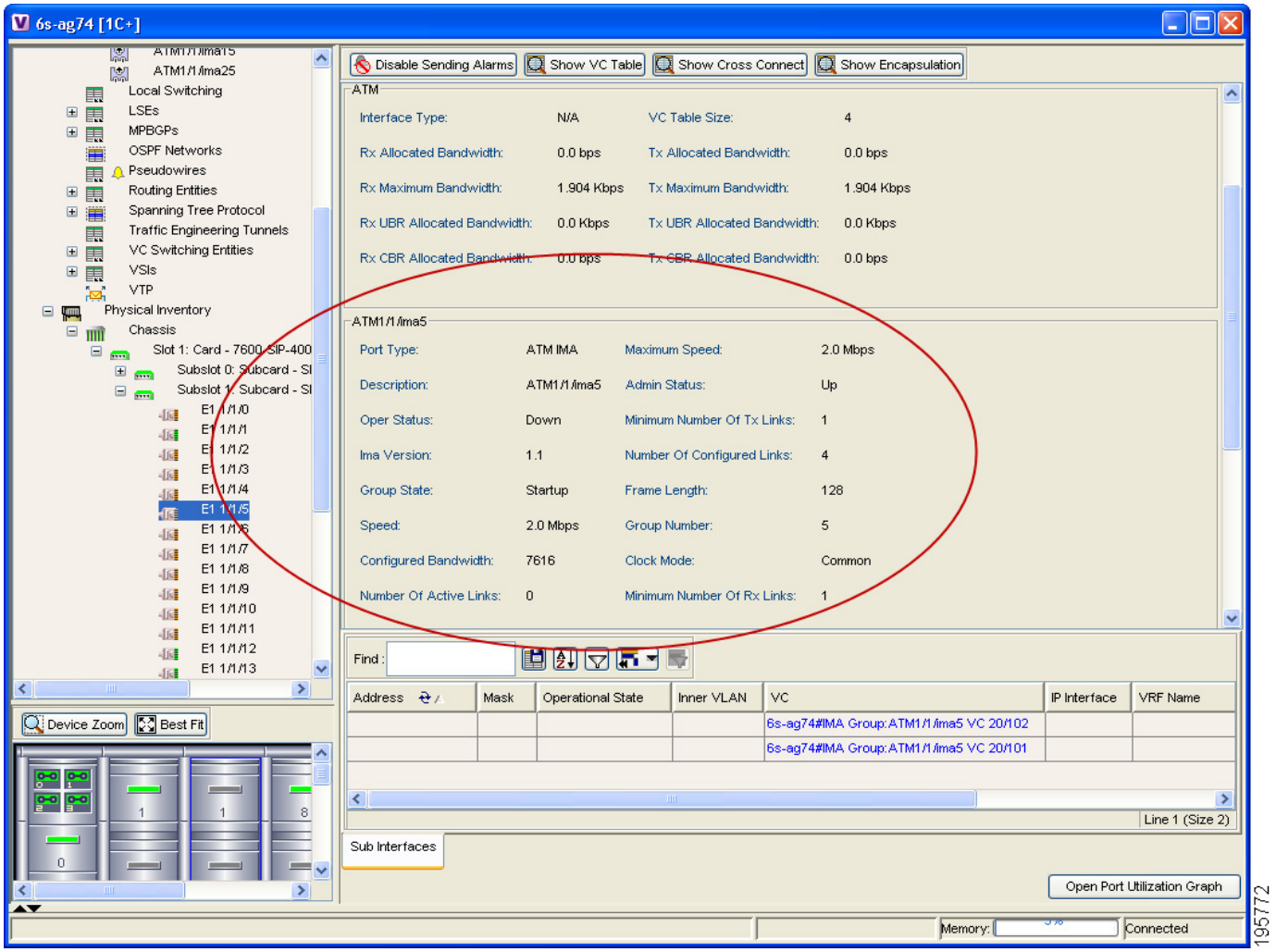
Table 18-5 IMA Members Table

Column	Description
Admin Status	The administrative status of the IMA member.
Channelization	The channelization that occurs through the path, such as STS1-> VTG-> VT15. Information is displayed in this field only if the T1 or E1 path was channelized. If the line was not channelized, this field is not displayed. For example, if the IMA group is configured on a T1 or E1 card, this field is not displayed.
Clocking	The source of the clocking mechanism: Internal or Line.
Description	The type of channelization, such as Synchronous Transport Signal 1 (STS-1) or Synchronous Transport Module level 1 (STM-1).
Oper Status	The operational state of the IMA member:
Physical Port	Hyperlinked entry to the port in physical inventory.
Port Type	The type of port, such as E1 or T1.

Step 3 In the IMA Members table, click a hyperlinked port entry to view the port properties in physical inventory. See Figure 18-5.

The information that is displayed for the port in physical inventory depends on the type of connection, such as SONET or ATM.

Figure 18-5 ATM IMA Port in Physical Inventory



Viewing TDM Properties

TDM is a mechanism for combining two or more slower-speed data streams into a single high-speed communication channel. In this model, data from multiple sources is broken into segments that are transmitted in a defined sequence. Each incoming data stream is allocated a timeslot of a fixed length, and the data from each stream is transmitted in turn. For example, data from data stream 1 is transmitted during timeslot 1, data from data stream 2 is transmitted during timeslot 2, and so on. After each incoming stream has transmitted data, the cycle begins again with data stream 1. The transmission order is maintained so that the input streams can be reassembled at the destination.

MToP encapsulates TDM streams for delivery over packet-switching networks (PSNs) using the following methods:

- SAToP—A method for encapsulating TDM bit-streams (T1, E1, T3, or E3) as pseudowires over PSNs.
- CESoPSN—A method for encapsulating structured (NxDS0) TDM signals as pseudowires over PSNs.

For T1 or E1 entries, the TDM properties presented in Table 18-6 are displayed in physical inventory in addition to the existing T1 or E1 properties.

Table 18-6 TDM-Specific Properties for DS1 (T1 or E1) in Physical Interfaces

Field	Description
International Bit	Indicates whether or not the international bit is used by the controller: • 0—The international bit is not used. • 1—The international bit is used. This property applies only to E1.
National Bits	Indicates whether or not the national reserve bits (sa4, sa5, sa6, sa7, and sa8) are used by the controller: • 0—The national reserve bits are not used. • 1—The national reserve bits are used. This property applies only to E1.
Line Code	The line encoding method for the DS1 link: • For E1, the options are Alternate Mark Inversion (AMI) and high-density bipolar of order 3 (HDB3). • For T1, the options are AMI and bipolar with 8 zero substitution (B8ZS).
Cable Length	For T1 ports in short-haul mode, the length of the cable in feet.

Viewing Channelization Properties

Beginning with version 3.7, Cisco ANA supports the channelization of SONET/SDH and T3 lines. When a line is channelized, it is logically divided into smaller bandwidth channels called paths. These paths (referred to as high order paths or HOPs) can, in turn, contain low order paths, or LOPs. The sum of the bandwidth on all paths cannot exceed the line bandwidth.

The following topics describe how to view channelization properties for SONET/SDH and T3 lines:

- Viewing SONET/SDH Channelization Properties, page 18-12
- Viewing T3 DS1 and DS3 Channelization Properties, page 18-15

Viewing SONET/SDH Channelization Properties

SONET and SDH use the same concepts for channelization, but the terminology differs. Table 18-7 describes the equivalent terms for SONET and SDH channelization. The information displayed in Cisco ANA NetworkVision reflects whether SONET or SDH is configured on the interface.

Table 18-7 SONET and SDH Channelization Terminology

Concept	SONET Term	SDH Term
Frame	Synchronous Transport Signal level N (STS-N)	Synchronous Transport Module level N (STM-N)
HOP channel	STS-1	Administrative Unit (AU-*n*)
Lower-order channels	Virtual Tributary (VT)	Tributary Unit Group (TUG)
LOP payloads	DS1, DS3, or E1	

To view SONET/SDH channelization properties:

Step 1 In Cisco ANA NetworkVision, right-click the required device, then choose **Inventory**.

Step 2 Choose **Physical Inventory > Chassis >** *slot* **>** *subslot* **>** *SONET/SDH-interface*. The properties for SONET/SDH and OC-3 are displayed in the content pane. See Figure 18-6.

Figure 18-6 SONET/SDH Interface in Physical Inventory

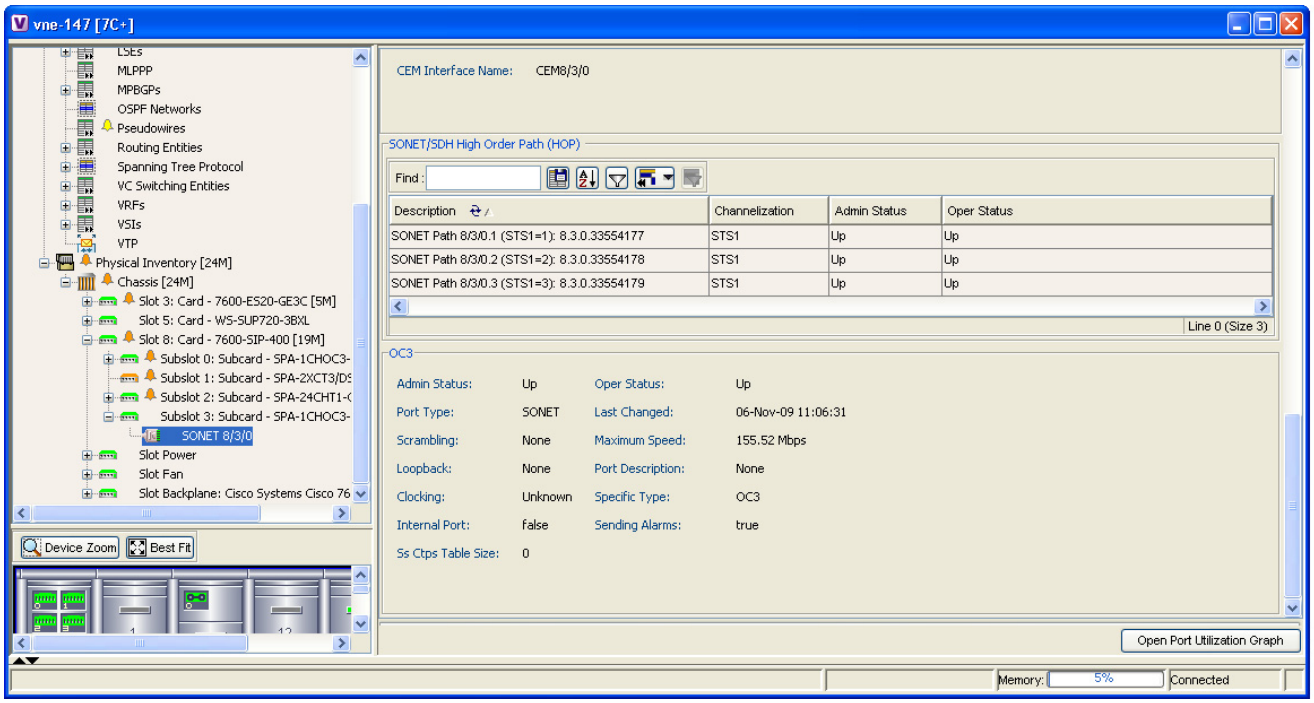


Table 18-8 describes the information that is displayed for SONET/SDH and OC3 in the content pane.

Table 18-8 SONET/SDH and OC3 Properties

Field	Description
SONET/SDH High Order Path (HOP) Area	
Description	The SONET/SDH path description including the interface and high order path. Double-click an entry to view additional details about the path.
Channelization	The type of channelization, such as STS-1 or STM-1.
Admin Status	The administrative status of the HOP.
Oper Status	The operational status of the HOP.
OC3 Area	
Admin Status	The administrative status of the OC-3 line.
Oper Status	The operational status of the OC-3 line.
Port Type	The type of port.
Last Changed	The date and time of the last status change of the line.
Scrambling	Identifies any scrambling that has been applied to the SONET payload.
Maximum Speed	The maximum bandwidth for the line.
Loopback	The loopback setting configured on the line.
Port Description	The description of the port defined by the user.
Clocking	The clocking configured on the line.
Specific Type	The specific type of line; in this case, OC3.
Internal Port	Whether or not the line includes an internal port: True or False.
Sending Alarms	Whether or not the line is sending alarms: True or False.
Ss Ctps Table Size	The size of the SONET/SDH Connection Termination Point (CTP) table.

Step 3 To view additional information about a channelized path, double-click the required entry in the Description column. The SONET/SDH High Order Path Properties window is displayed as shown in Figure 18-7.

Figure 18-7 SONET/SDH High Order Path Properties Window

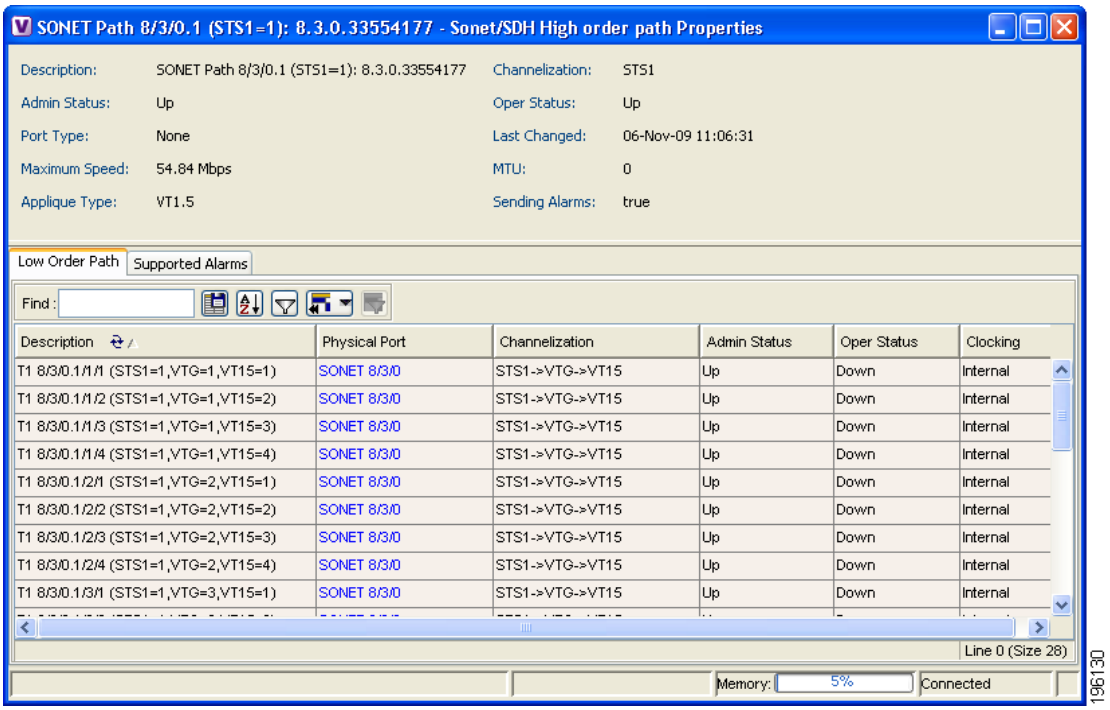


Table 18-9 describes the information displayed in SONET/SDH High Order Path Properties window.

Table 18-9 SONET/SDH High Order Path Properties

Field	Description
Description	The SONET/SDH path description including the interface and high order path. Double-click an entry to view additional details about the path.
Channelization	The type of channelization, such as Synchronous Transport Signal 1 (STS-1) or Synchronous Transport Module level 1 (STM-1).
Admin Status	The administrative status of the HOP.
Oper Status	The operational status of the HOP.
Port Type	The type of port.
Last Changed	The date and time of the last status change of the path.
Maximum Speed	The maximum bandwidth for the line.
MTU	The MTU for the path.
Applique Type	A sub-STS-1 facility applied to this path. In this example, the facility applied is Virtual Tributary 1.5 (VT1.5).
Sending Alarms	Whether or not the path is sending alarms: True or False.
Low Order Path Tab	
Description	A description of the low order path down to the T1 level, including the channel types (such as STS-1, VTG, or VT) and channel allocated.
Physical Port	Hyperlinked entry to the port in physical inventory.

Table 18-9 SONET/SDH High Order Path Properties (continued)

Field	Description
Channelization	The channelization that occurs through the path, such as STS1-> VTG-> VT15.
Admin Status	The administrative status of the path.
Oper Status	The operational status of the path.
Clocking	The source of the clocking mechanism: Internal or Line.
Supported Alarms Tab	
Name	The supported alarm.
Enable	Whether the alarm is enabled or disabled.

Viewing T3 DS1 and DS3 Channelization Properties

To view T3 DS1 and DS3 channelization properties:

Step 1 In Cisco ANA NetworkVision, right-click the required device, then choose **Inventory**.

Step 2 Choose **Physical Inventory > Chassis >** *slot* **>** *subslot* **>** *T3-interface*.

Figure 18-8 shows DS1 channelization properties for T3 in physical inventory, and Figure 18-9 shows DS3 channelization properties for T3 in physical inventory.

Figure 18-8 T3 DS1 Channelization Properties in Physical Inventory

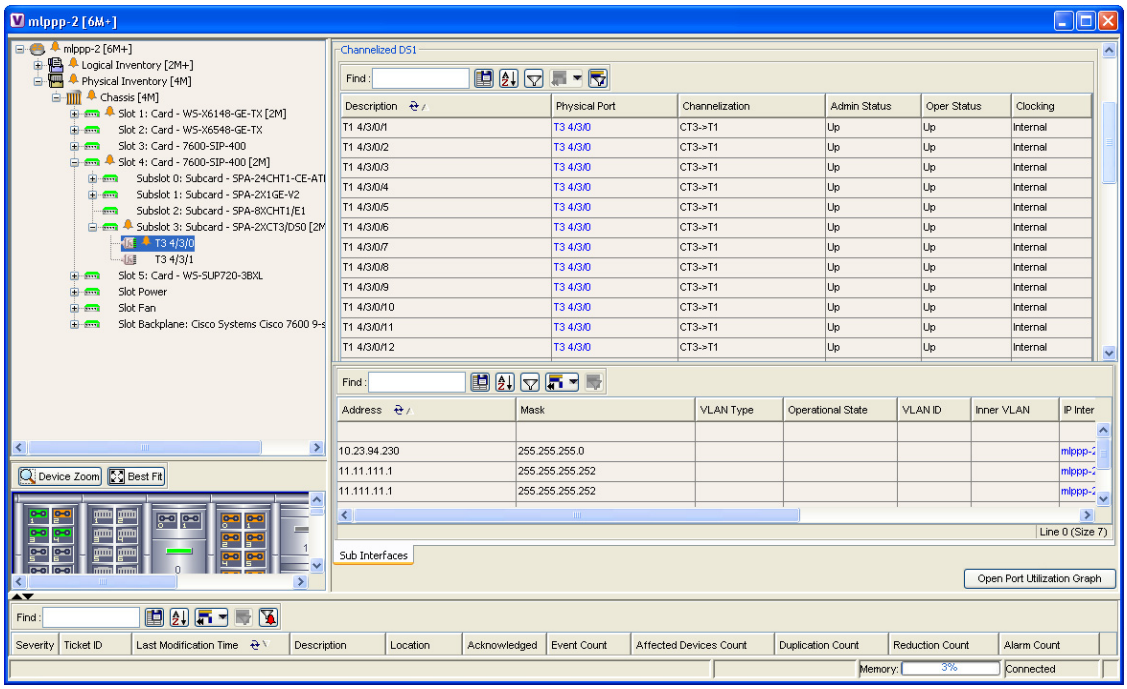


Figure 18-9 T3 DS3 Channelization Properties in Physical Inventory

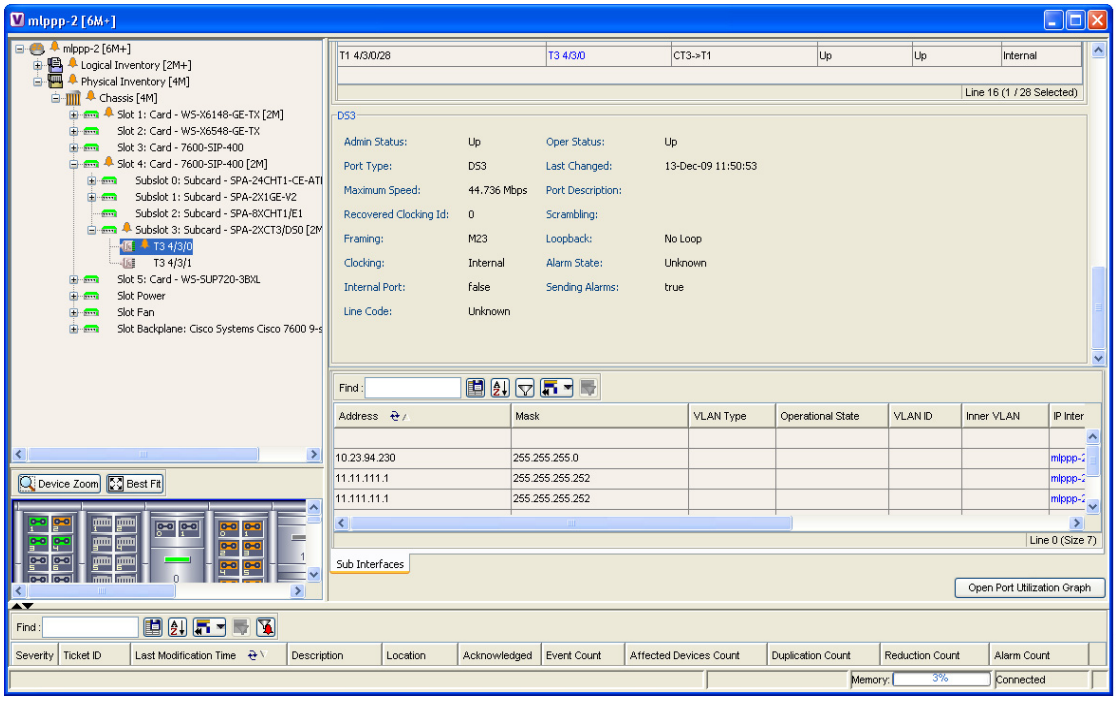


Table 18-10 describes the information that is displayed for Channelized DS1 and DS3 in the content pane.

Table 18-10 Channelized DS1 and DS3 Properties

Field	Description
Channelized DS1 Table	
Description	The path description including the physical interface and the channel number. Double-click an entry to view additional details about the path.
Physical Port	The physical port for the channelized line.
Channelization	The type of channelization, such as channelized T3 (CT3) to T1.
Admin Status	The administrative status of the channelized line.
Oper Status	The operational status of the channelized line.
Clocking	The clocking configured on the line: Internal or Line.
DS3 Area	
Admin Status	The administrative status of the DS3 line.
Oper Status	The operational status of the DS3 line.
Port Type	The type of port.
Last Changed	The date and time of the last status change of the line.
Maximum Speed	The maximum bandwidth for the line.
Port Description	The description of the port configured on the interface.
Recovered Clocking ID	The recovered clock identifier, if known.
Scrambling	Identifies any scrambling that has been applied to the SONET payload.
Framing	The type of framing applied to the line.
Loopback	The loopback setting configured on the line.
Clocking	The clocking configured on the line: Internal or Line.
Alarm State	The alarm state of the DS3 line: • Clear—The alarm state is clear. • AIS—Alarm Indication Signal (AIS). • LOS—Loss of signal (LOS) alarm. • AIS_LOS—AIS loss of signal alarm. • LOF—Loss of frame (LOF) alarm. • AIS_LOF—AIS loss of frame alarm. • LOS_LOF—Loss of signal and loss of frame alarm. • AIS_LOS_LOF—AIS loss of signal and loss of frame alarm. • Unknown—Unknown alarm.
Internal Port	Whether or not the line includes an internal port: True or False.
Sending Alarms	Whether or not the line is sending alarms: True or False.
Line Code	The line coding applied to the line.

Step 3 To view additional information about a DS1channelized path, double-click the required entry in the Channelized DS1 table. Figure 18-10 shows the information that is displayed in the Channelized DS1 PDH Properties window.

Figure 18-10 Channelized DS1 PDH Properties Window

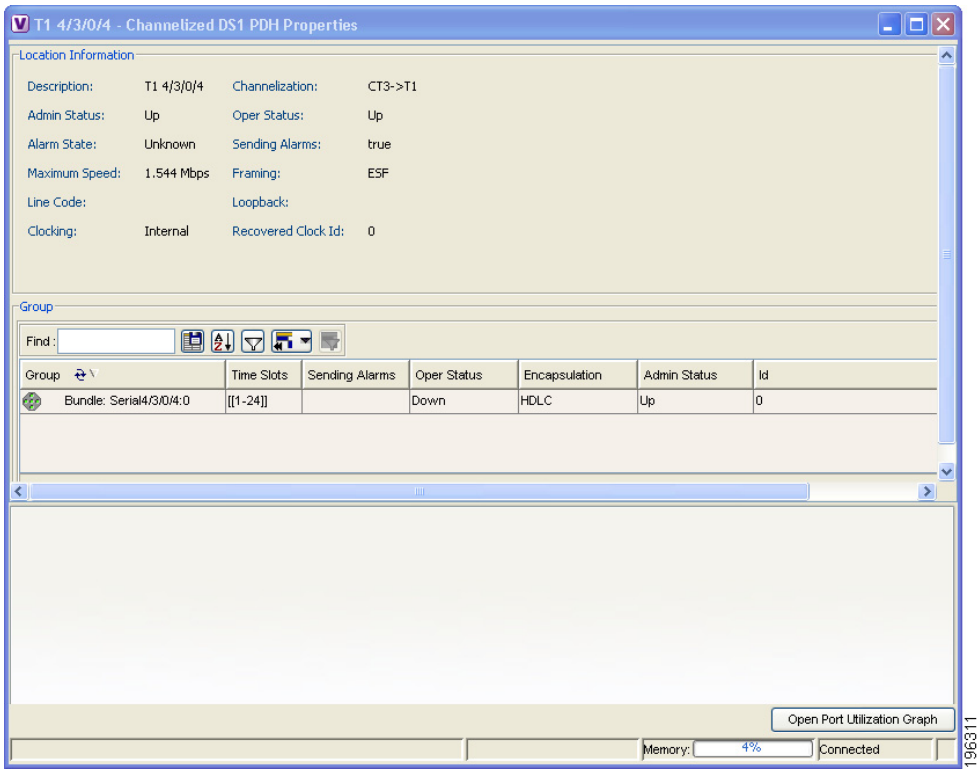


Table 18-11 describes the information that is displayed in the Channelized DS1 PDH Properties window.

Table 18-11 Channelized DS1 PDH Properties Window

Field	Description
Location Area	
Description	The path description including the physical interface and the channel number.
Channelization	The type of channelization used on the line, such as CT3-> T1.
Admin Status	The administrative status of the channelized line.
Oper Status	The operational status of the channelized line.

Table 18-11 Channelized DS1 PDH Properties Window (continued)

Field	Description
Alarm State	The alarm state of the DS1 line: • Clear—The alarm state is clear. • AIS—Alarm Indication Signal (AIS). • LOS—Loss of signal (LOS) alarm. • AIS_LOS—AIS loss of signal alarm. • LOF—Loss of frame (LOF) alarm. • AIS_LOF—AIS loss of frame alarm. • LOS_LOF—Loss of signal and loss of frame alarm. • AIS_LOS_LOF—AIS loss of signal and loss of frame alarm. • Unknown—Unknown alarm.
Sending Alarms	Whether or not the line is sending alarms: True or False.
Maximum Speed	The maximum bandwidth for the line.
Framing	The type of framing applied to the line.
Line Code	The line coding applied to the line.
Loopback	The loopback setting configured on the line.
Clocking	The clocking configured on the line: Internal or Line.
Recovered Clock ID	The recovered clock identifier, if known.
Group Table	
This table appears only if a DS0 bundle is configured on a channelized DS1 line. The properties that are displayed pertain to the DS0 bundle.	
Group	The name of the DS0 bundle.
Time Slots	The range of timeslots (DS0 channels) allotted to the group.
Sending Alarms	Whether or not the group is sending alarms: True or False.
Oper Status	The operational status of the group.
Encapsulation	The type of encapsulation used, such as High-Level Data Link Control (HDLC).
Admin Status	The administrative status of the group.
ID	The DS0 bundle identifier.

Viewing MLPPP Properties

Multilink PPP (MLPPP) is a protocol that connects multiple links between two systems as needed to provide bandwidth when needed. MLPPP packets are fragmented, and the fragments are sent at the same time over multiple point-to-point links to the same remote address. MLPPP provides bandwidth on demand and reduces transmission latency across WAN links.

To view MLPPP properties:

Step 1 In Cisco ANA NetworkVision, right-click the required device, then choose **Inventory**.

Step 2 In the inventory window, choose **Logical Inventory > MLPPP**. See Figure 18-11.

Figure 18-11 MLPPP Properties in Logical Inventory

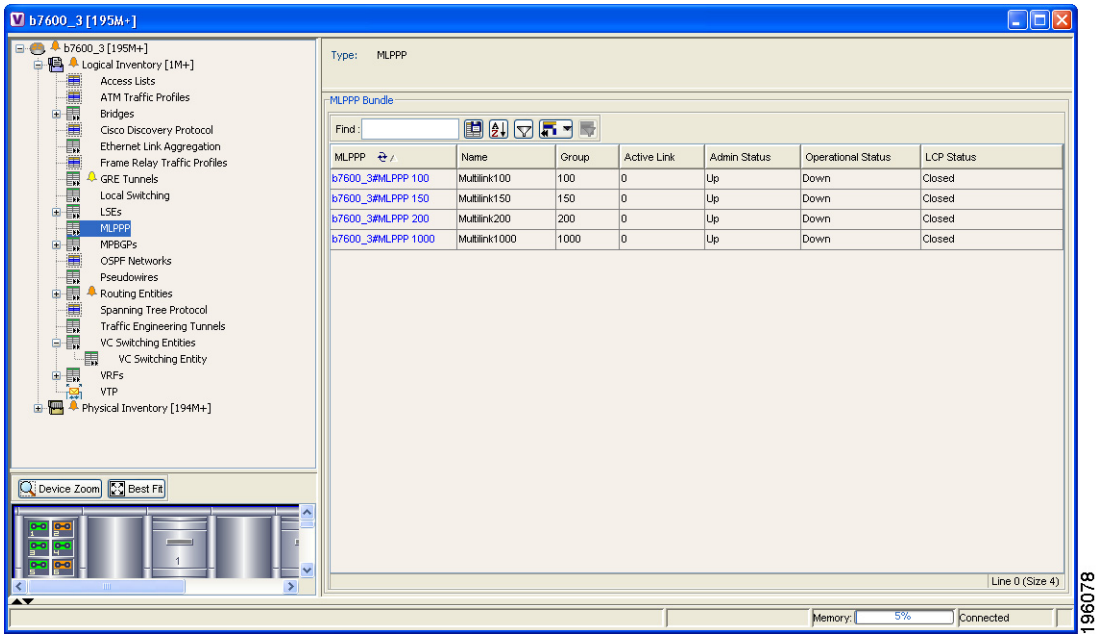


Table 18-12 describes the information that is displayed for MLPPP.

Table 18-12 MLPPP Properties

Field	Description
Type	The type of properties; in this case, MLPPP.
MLPPP Bundle Table	
MLPPP	The MLPPP bundle name, hyperlinked to the MLPPP Properties window.
Name	The MLPPP interface name.
Group	The MLPPP group to which the bundle belongs.
Active Link	The number of active interfaces participating in MLPPP.
Admin Status	The administrative status of the MLPPP bundle: Up or Down.
Operational Status	The administrative status of the MLPPP bundle: Up or Down.
LCP Status	The Link Control Protocol (LCP) status of the MLPPP bundle: Closed, Open, Started, or Unknown.

Step 3 To view properties for individual MLPPP bundles, double-click the hyperlinked entry in the MLPPP Bundle table.

The MLPPP Properties window is displayed as shown in Figure 18-12.

Figure 18-12 MLPPP Bundle Properties Window

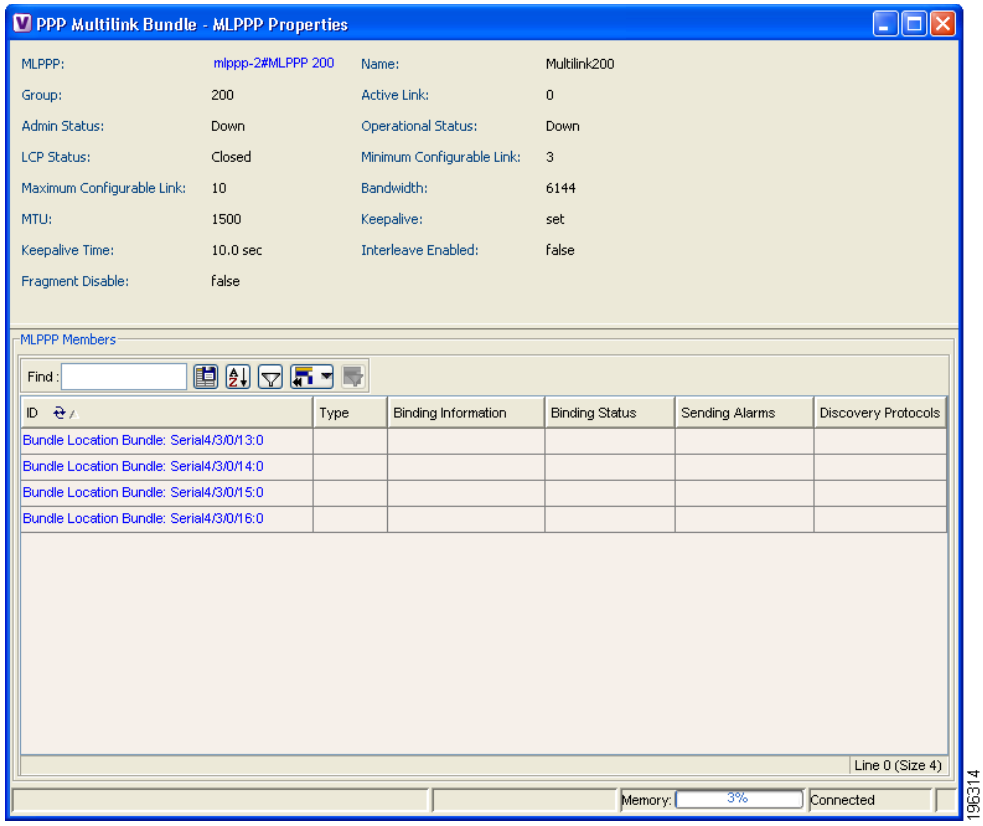


Table 18-13 describes the information that is displayed in the MLPPP Properties window.

Table 18-13 MLPPP Bundle and Member Properties

Field	Description
MLPPP	The MLPPP bundle name, hyperlinked to MLPPP in logical inventory.
Name	The MLPPP interface name.
Group	The MLPPP group to which the bundle belongs.
Active Link	The number of active interfaces participating in MLPPP.
Admin Status	The administrative status of the MLPPP bundle: Up or Down.
Operational Status	The operational status of the MLPPP bundle: Up or Down.
LCP Status	The Link Control Protocol (LCP) status of the MLPPP bundle: Closed, Open, Started, or Unknown.
Bandwidth	The bandwidth allocated to the MLPPP bundle.
MTU	The size of the Maximum Transmission Unit (MTU), from 1 to 2147483647 bytes.
Keepalive	The status of the keepalive function: Set, Not Set, or Unknown.
Keepalive Time	If keepalive is enabled, the amount of time, in seconds, to wait before sending a keepalive message.
Interleave Enabled	Whether or not interleaving of small fragments is enabled.

Table 18-13 MLPPP Bundle and Member Properties (continued)

Field	Description
Fragment Disable	Whether fragmentation is enabled or disabled: True or False.
Fragment Delay	The maximum size, in units of time, for packet fragments on an MLPPP bundle. Values range from 1 to 999.
Fragment Maximum	The maximum number of MLPPP bundle fragments.
Keepalive Retry	The number of times that the device sends keepalive packets without response before closing the MLPPP bundle protocol. Values range from 2 to 254.
Minimum Configured Link	The minimum number of configured links for an MLPPP bundle.
Maximum Configured Link	The maximum number of configured links for an MLPPP bundle.
Load Threshold	The minimum load threshold for the MLPPP bundle. If the traffic load falls below the threshold, the link is removed.
MLPPP Members Table	
ID	The MLPPP bundle member identifier, hyperlinked to the interface in physical inventory.
Type	No value is displayed in this field.
Binding Information	The binding information to which the interface is associated. The value is null.
Binding Status	No value is displayed in this field.
Sending Alarms	Whether or not the interface is sending alarms: True or False.
Discovery Protocols	The discovery protocol used on the interface.

Step 4 To view the interface properties in physical inventory, double-click the required entry in the ID column.

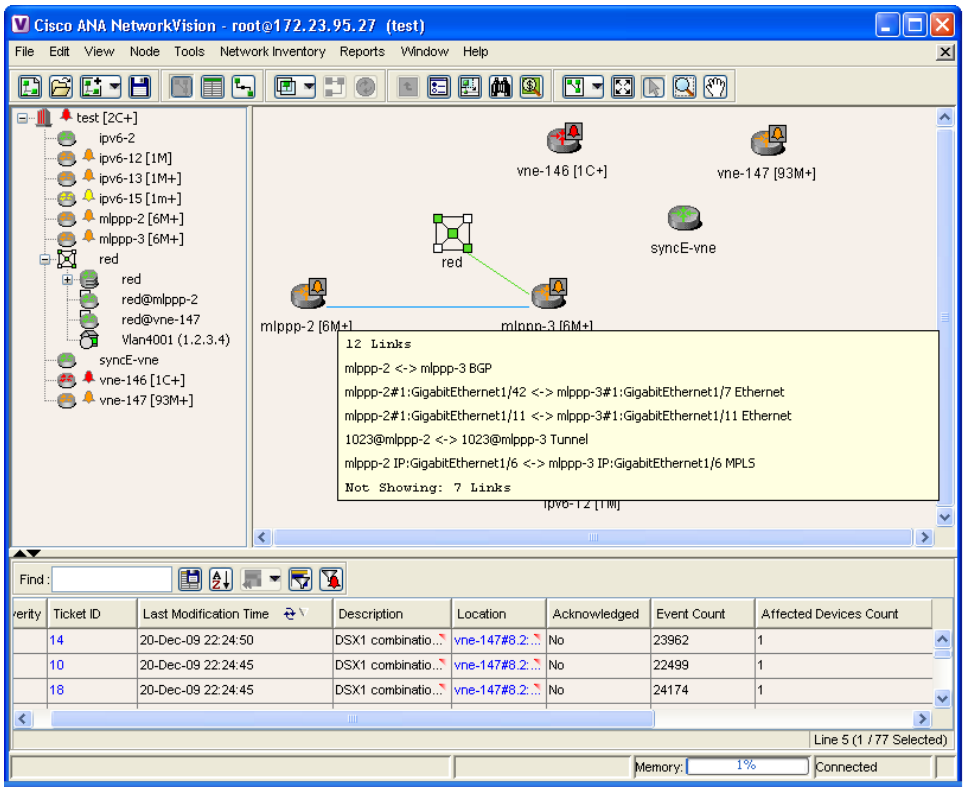
Viewing MLPPP Link Properties

An MLPPP link is a link that connects two MLPPP devices.

To view MLPPP link properties:

Step 1 In the Cisco ANA NetworkVision map view, select a link connected to two MLPPP devices. The link information is displayed as shown in Figure 18-13.

Figure 18-13 MLPPP Link in Cisco ANA NetworkVision



Step 2 To view the MLPPP link properties, right-click the link and then choose **Properties**. The link properties are displayed as shown in Figure 18-14.

Figure 18-14 MLPPP Link Properties

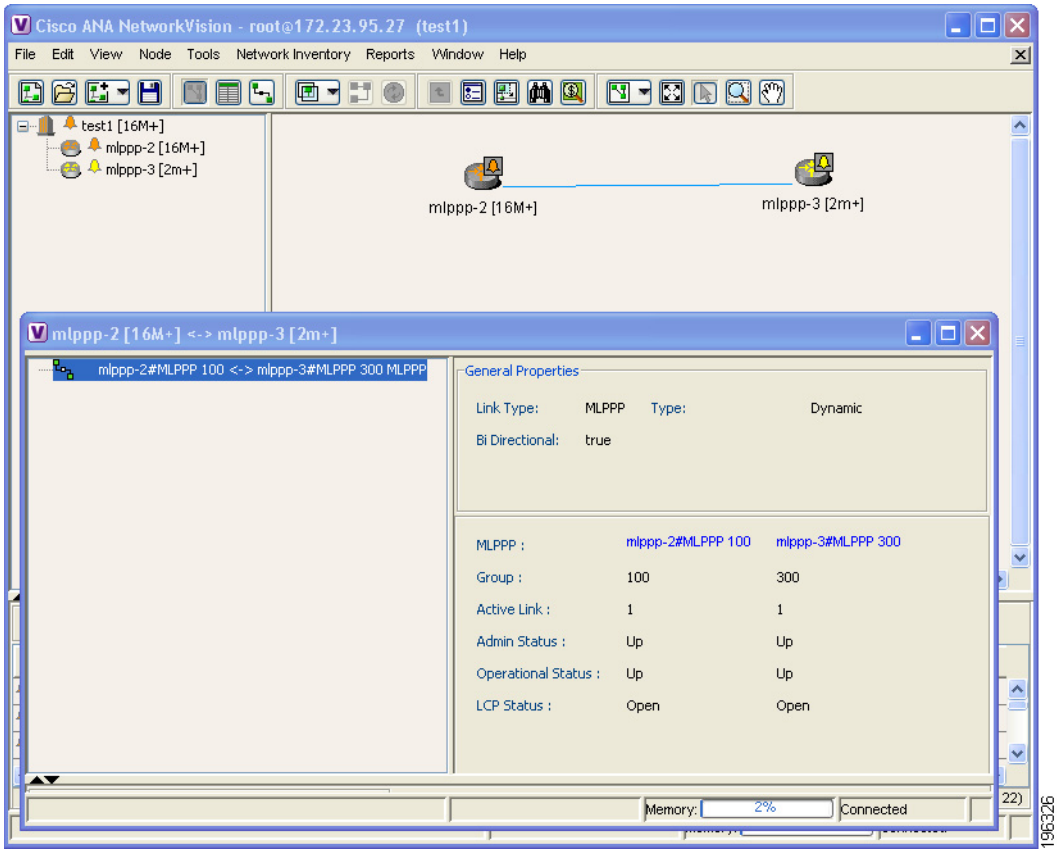


Table 18-14 describes the information that is displayed for the MLPPP link.

Table 18-14 MLPPP Link Properties

Field	Description
General Properties	
Link Type	The link protocol. In this case, MLPPP.
Type	The type of link: Dynamic or Static.
Bi Directional	Whether the link is bidirectional: True or False.
MLPPP Properties	
The properties are displayed for both ends of the MLPPP link.	
MLPPP	The interface configured for MLPPP, hyperlinked to the entry in physical inventory.
Group	The MLPPP group to which the interface belongs.
Active Link	The number of active interfaces participating in the MLPPP link for each device.
Admin Status	The administrative status of the interface: Up or Down.

Table 18-14 MLPPP Link Properties (continued)

Field	Description
Operational Status	The operational status of the interface: Up or Down.
LCP Status	The LCP status of the MLPPP interface: Closed, Open, Started, or Unknown.

Viewing MPLS Pseudowire over GRE Properties

Generic routing encapsulation (GRE) is a tunneling protocol, originated by Cisco Systems and standardized in RFC 2784. GRE encapsulates a variety of network layer packets inside IP tunneling packets, creating a virtual point-to-point link to devices at remote points over an IP network. GRE encapsulates the entire original packet with a standard IP header and GRE header before the IPsec process. GRE can carry multicast and broadcast traffic, making it possible to configure a routing protocol for virtual GRE tunnels.

In RAN backhaul networks, GRE is used to transport cell site traffic across IP networks (nonMPLS). In addition, GRE tunnels can be used to transport TDM traffic (TDMoMPLSoGRE) as part of the connectivity among cell site-facing Cisco 7600 routers and base station controller (BSC) site-facing Cisco 7600 routers, or between a Cisco Mobile Wireless Router (MWR) device and a BSC site-facing Cisco 7600 router.

Using GRE tunnels to transport Any Traffic over MPLS (AToM) enables mobile service providers to deploy AToM pseudowires in a network where MPLS availability is discontinuous; for example, in networks where the pseudowire endpoints are located in MPLS edge routers with a plain IP core network, or where two separate MPLS networks are connected by a transit network with plain IP forwarding.

To view the properties for MPLS pseudowire over GRE:

Step 1 In Cisco ANA NetworkVision, right-click the required device, then choose **Inventory**.

Step 2 In the inventory window, choose **Logical Inventory > Pseudowires**. The Tunnel Edges table is displayed in the content pane as shown in Figure 18-15.

Step 3 Select the required entry and scroll horizontally until you see the required information.

Figure 18-15 MPLS Pseudowire Tunnels over GRE Properties

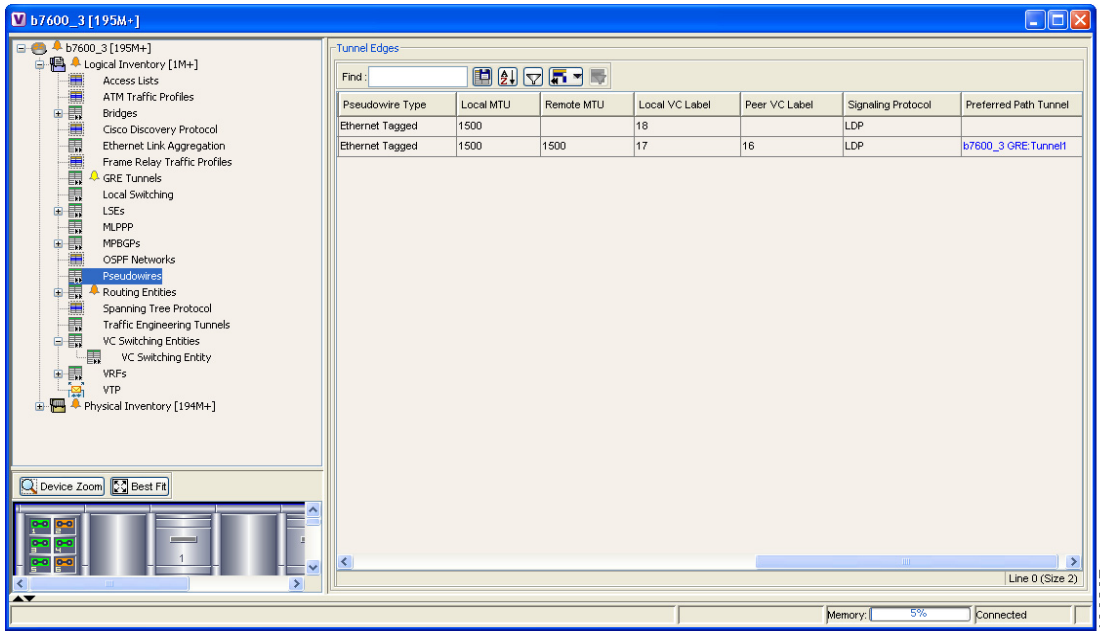


Table 18-15 describes the information included in the Tunnel Edges table specifically for MPLS pseudowire tunnels over GRE.

Table 18-15 MPLS Pseudowire over GRE Properties

Field	Description
Local MTU	The size, in bytes, of the MTU on the local interface.
Preferred Path Tunnel	The path to be used for MPLS pseudowire traffic. Click the hyperlinked entry to view the tunnel details in logical inventory.
Pseudowire Type	Type of pseudowire relevant to MToP: • ATM AAL5 SDU—ATM with ATM Adaptation Layer 5 (AAL5) service data units. • ATM n-to-one VCC—ATM with n-to-one virtual channel connection (VCC). • ATM n-to-one VPC—ATM with n-to-one virtual path connection (VPC). • CESoPSN Basic—CESoPSN basic services with CAS. • SAToP E1—SAToP on an E1 interface. For a complete list of pseudowire types, see the *Cisco Active Network Abstraction 3.7.1 Theory of Operations Guide.*
Remote MTU	The size, in bytes, of the MTU on the remote interface.

Step 4 To view GRE Tunnel properties, choose **Logical Inventory > GRE Tunnels**.

Figure 18-16 shows the Tunnel Edges table that is displayed for GRE tunnels.

Figure 18-16 GRE Tunnel Properties in Logical Inventory

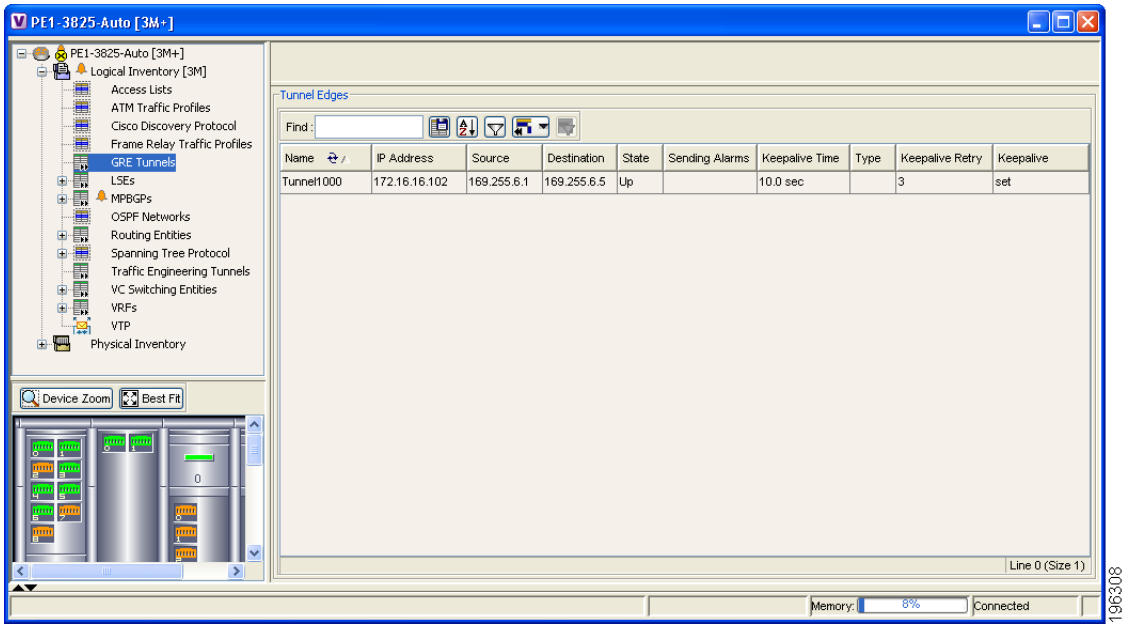


Table 18-16 describes the information that is displayed for GRE tunnels in logical inventory.

Table 18-16 GRE Tunnel Properties in Logical Inventory

Field	Description
Name	The tunnel name.
IP Address	The tunnel IP address.
Source	The IP address local to the device.
Destination	The IP address of the remote router.
State	The state of the tunnel: Up or Down.
Sending Alarms	Whether the tunnel is configured for sending alarms: True or False.
Keepalive Time	If keepalive is enabled, the amount of time, in seconds, to wait before sending a keepalive message.
Type	The tunnel type.
Keepalive Retry	The number times that the device continues to send keepalive packets without response before bringing the tunnel interface protocol down. Values range from 2 to 254, with a default of 3.
Keepalive	The status of the keepalive function: Set, Not Set, or Unknown.

Network Clock Service Overview

Network clock service refers to the means by which a clock signal is generated or derived and distributed through a network and its individual nodes for the purpose of ensuring synchronized network operation. Network clocking is particularly important for mobile service providers to ensure proper transport of cellular traffic from cell sites to Base Station Control (BSC) sites.

Note In Cisco ANA, *clock service* refers to *network clock service*.

Monitoring Clock Service

To monitor clock service:

Step 1 In Cisco ANA NetworkVision, right-click the required device, then choose **Inventory**.

Step 2 In the inventory window, choose **Logical Inventory > Clock**. Clock service information is displayed in the content pane as shown in Figure 18-17.

Figure 18-17 Clock Service Properties

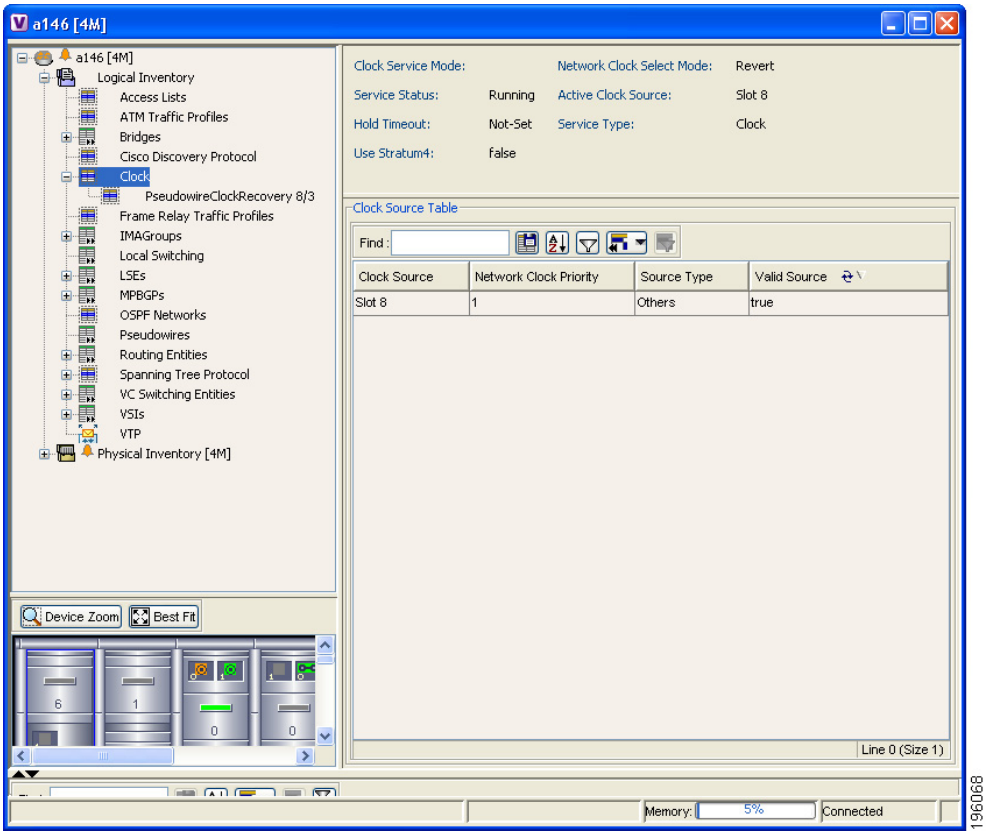


Table 18-17 describes the information displayed for clocking service.

Table 18-17 Clock Service Properties

Field	Description
Clock Service Mode	This field is not populated.
Network Clock Select Mode	The action to take if the master device fails: • Non-revert—Do not use the master device again after it recovers from the failure. • Revert—Use the master device again after it recovers and functions correctly for a specified amount of time. • Unknown—The network clock selection mode is unknown.
Service Status	The status of the system service: • Initializing—The service is starting up. • Down—The service is down. • Reset—The service has been reset. • Running—The service is running. • Other—A status other than those listed.
Active Clock Source	The current active clock source used by the NE.
Hold Timeout	How long the NE waits before reevaluating the network clock entry. Values can be from 0-86400 seconds, Not Set, or infinite.
Service Type	Indicates the type of system service, such as Clock or Cisco Discovery Protocol.
Use Stratum4	The quality of the clock source: • True—Use Stratum 4, the lowest level of clocking quality. • False—(Default) Use Stratum 3, a higher level of clocking quality than Stratum 4.
Clock Source Table	
Clock Source	The current active clock source used by the NE.
Network Clock Priority	The priority of the clock source with 1 being the highest priority.

Table 18-17 Clock Service Properties (continued)

Field	Description
Source Type	The method by which clocking information is provided: • BITS—Timing is supplied by a Building Integrated Timing Supply (BITS) port clock. • E1/T1—Clocking is provided via an E1 or T1 interface. • Packet-Timing—Clocking is provided over a packet-based network. • Synchronous Ethernet—Clocking is provided by Synchronous Ethernet. • Others—Clocking is provided by a source other than the above.
Valid Source	Validity of the clock source: • True—The clock source is valid and operational. • False—The clock source is not valid or is not operational.

Monitoring PTP Service

In networks that employ TDM, periodic synchronization of device clocks is required to ensure that the receiving device knows which channel is which for accurate reassembly of the data stream. The Precision Time Protocol (PTP) standard:

- Specifies a clock synchronization protocol that enables this synchronization.
- Applies to distributed systems that consist of one or more nodes communicating over a network.

Defined by IEEE 1588-2008, PTP Version 2 (PTPv2) allows device synchronization at the nanosecond level.

PTP uses the concept of master and slave devices to achieve precise clock synchronization. Using PTP, the master device periodically starts a message exchange with the slave devices. After noting the times at which the messages are sent and received, each slave device calculates the difference between its system time and the system time of the master device. The slave device then adjusts its clock so that it is synchronized with the master device. When the master device initiates the next message exchange, the slave device again calculates the difference and adjusts its clock. This repetitive synchronization ensures that device clocks are coordinated and that data stream reassembly is accurate.

To monitor PTP service:

Step 1 In Cisco ANA NetworkVision, right-click the required device, then choose **Inventory**.

Step 2 In the inventory window, choose **Logical Inventory > Clock > PTP Service**. The PTP service properties are displayed in the content pane as shown in Figure 18-18.

Figure 18-18 PTP Service Properties

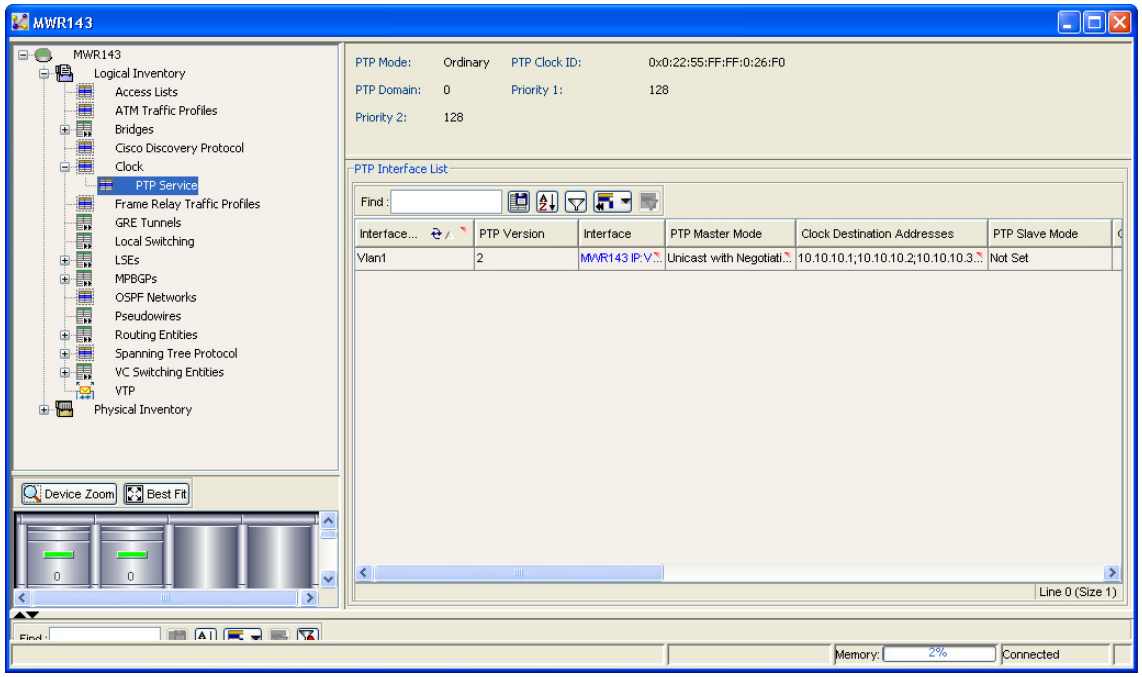


Table 18-18 describes the properties that are displayed for PTP service.

Table 18-18 PTP Service Properties

Field	Description
PTP Mode	The mode of PTP operation: • Boundary—Boundary clock mode. • E2E Transparent—End-to-end transparent clock mode. • Ordinary—Ordinary clock mode. • P2P Transparent—Peer-to-peer transparent clock mode. • Unknown—The clock mode is unknown. **Note** Cisco MWR-2941 routers support Ordinary mode only.
PTP Clock ID	The clock identifier derived from the device interface.
PTP Domain	The number of the domain used for PTP traffic. A single network can contain multiple separate domains.
Priority 1	The first value checked for clock selection. The clock with the lowest priority takes precedence.
Priority 2	If two or more clocks have the same value in the Priority 1 field, the value in this field is used for clock selection.
PTP Interface List Table	
Interface Name	The interface identifier.
PTP Version	The version of PTP used. The default value is 2, indicating PTPv2.

Table 18-18 PTP Service Properties (continued)

Field	Description
Interface	The physical interface identifier, hyperlinked to the routing information for the interface.
PTP Master Mode	For an interface defined as a master device, the mode used for PTP clocking: • Not Set—The master mode is not used. • Multicast—The interface uses multicast mode for PTP clocking. • Unicast—The interface uses unicast mode for PTP clocking. This mode allows a single destination. • Unicast with Negotiation—The interface uses unicast mode with negotiation for PTP clocking. This mode allows up to 128 destinations.
Clock Destination Addresses	The IP addresses of the clock destinations. This field contains IP addresses only when Master mode is enabled.
PTP Slave Mode	For an interface defined as a slave device, the mode used for PTP clocking: • Not Set—The slave mode is not used. • Multicast—The interface uses multicast mode for PTP clocking. • Unicast—The interface uses unicast mode for PTP clocking. • Unicast with Negotiation—The interface uses unicast mode with negotiation for PTP clocking.
Clock Source Addresses	The IP addresses of the clock source.
Delay Request Interval (log mean value)	When the interface is in PTP master mode, the interval specified to member devices for delay request messages. The intervals use base 2 values, as follows: • 4—1 packet every 16 seconds. • 3—1 packet every 8 seconds. • 2—1 packet every 4 seconds. • 1—1 packet every 2 seconds. • 0—1 packet every second. • -1—1 packet every 1/2 second, or 2 packets per second. • -2—1 packet every 1/4 second, or 4 packets per second. • -3—1 packet every 1/8 second, or 8 packets per second. • -4—1 packet every 1/16 seconds, or 16 packets per second. • -5—1 packet every 1/32 seconds, or 32 packets per second. • -6—1 packet every 1/64 seconds, or 64 packets per second.

Table 18-18 PTP Service Properties (continued)

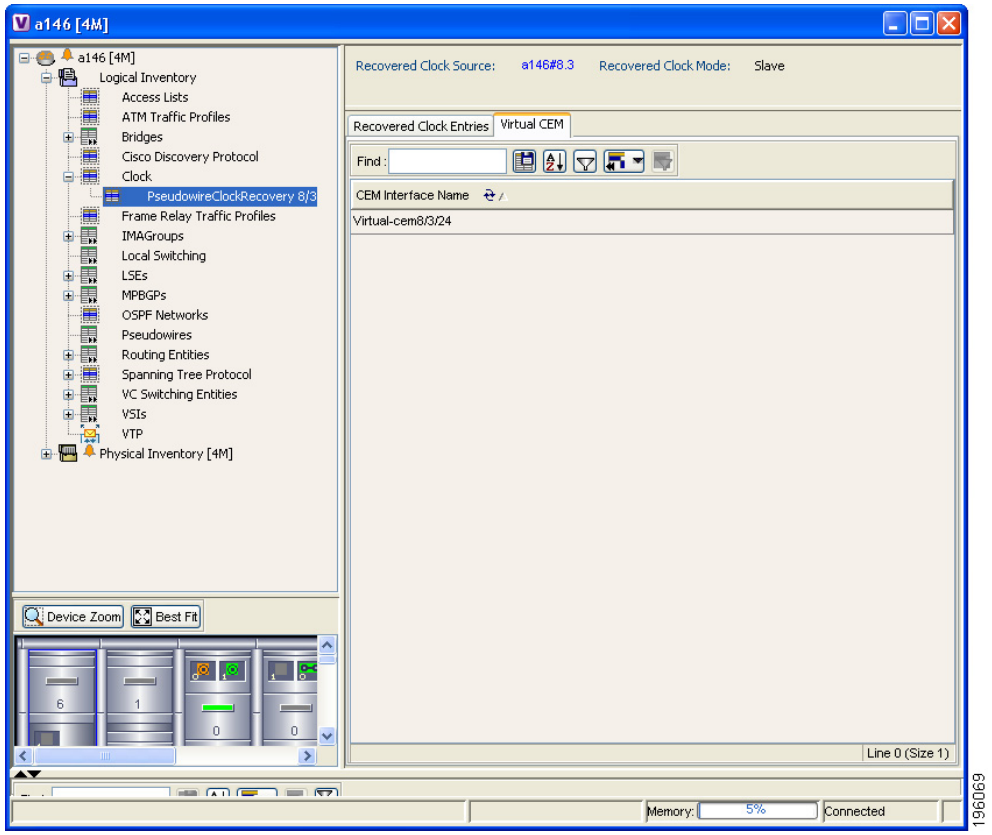
Field	Description
Announce Interval (log mean value)	The interval value for PTP announcement packets: • 4—1 packet every 16 seconds. • 3—1 packet every 8 seconds. • 2—1 packet every 4 seconds. • 1—1 packet every 2 seconds. • 0—1 packet every second. • -1—1 packet every 1/2 second, or 2 packets per second. • -2—1 packet every 1/4 second, or 4 packets per second. • -3—1 packet every 1/8 second, or 8 packets per second. • -4—1 packet every 1/16 seconds, or 16 packets per second. • -5—1 packet every 1/32 seconds, or 32 packets per second. • -6—1 packet every 1/64 seconds, or 64 packets per second.
Announce Timeout	The number of PTP announcement intervals before the session times out. Values are 2-10.
Sync Interval (log mean value)	The interval for sending PTP synchronization messages: • 4—1 packet every 16 seconds. • 3—1 packet every 8 seconds. • 2—1 packet every 4 seconds. • 1—1 packet every 2 seconds. • 0—1 packet every second. • -1—1 packet every 1/2 second, or 2 packets per second. • -2—1 packet every 1/4 second, or 4 packets per second. • -3—1 packet every 1/8 second, or 8 packets per second. • -4—1 packet every 1/16 seconds, or 16 packets per second. • -5—1 packet every 1/32 seconds, or 32 packets per second. • -6—1 packet every 1/64 seconds, or 64 packets per second.
Sync Limit (nanoseconds)	The maximum clock offset value, in nanoseconds, before PTP attempts to resynchronize.

Viewing Pseudowire Clock Recovery Properties

To view Pseudowire Clock Recovery properties:

Step 1 Choose **Logical Inventory > Clock > Pseudowire Clock Recovery**. Cisco ANA NetworkVision displays the Virtual CEM tab by default. See Figure 18-19.

Figure 18-19 Pseudowire Clock Recovery - Virtual CEM Tab



Step 2 To view more information about a virtual CEM, right-click the virtual CEM, then choose **Properties**. The Virtual CEM Properties window is displayed.

The information that is displayed in the Virtual CEM Properties window depends on whether or not the virtual CEM belongs to a group:

- If a CEM group is not configured on the virtual CEM, the Virtual CEM Properties window contains only the CEM interface name.
- If a CEM group is configured on the virtual CEM, the Virtual CEM Properties window contains the information described in Table 18-19.

Table 18-19 Virtual CEM Group Properties

Field	Description
CEM Interface Name	The CEM interface name.
CEM Group Table	
CEM Group	Name of the virtual CEM group.
Framing	The framing mode used for the CEM channel: • Framed—Specifies the channels used for the controller, such as Channels: (1-8), (10-14). The channels that are available depend on the type of controller: T1, E1, T3, or E3. • Unframed—Indicates that a single CEM channel is used for all T1/E1 timeslots. SAToP uses the unframed mode.
Pseudowire	The name of the pseudowire configured on the CEM interface, hyperlinked to the pseudowire properties in logical inventory.
Oper Status	The operational status of the CEM interface: • Dormant—The interface is dormant. • Down—The interface is down. • Not Present—An interface component is missing. • Testing—The interface is in test mode. • Unknown—The interface has an unknown operational status. • Up—The interface is up.
Admin Status	The administrative status of the CEM interface: • Down—The CEM interface is administratively down. • Testing—The administrator is testing the CEM interface. • Unknown—The administrative status is unknown. • Up—The CEM interface is administratively up.

Step 3 To view additional CEM group properties, double-click the required CEM group.

Table 18-20 describes the information displayed in the CEM Group Properties window.

Table 18-20 CEM Group Properties

Field	Description
Oper Status	The operational status of the CEM interface: • Dormant—The interface is dormant. • Down—The interface is down. • Not Present—An interface component is missing. • Testing—The interface is in test mode. • Unknown—The interface has an unknown operational status. • Up—The interface is up.
Idle Pattern	The 8-bit hexadecimal number that is transmitted on a T1 or E1 line when missing packets are detected on the pseudowire (PW) circuit.
Type	The type of CEM group. This is always DS0 Bundle.
Idle CAS Pattern	When CAS is used, the 8-bit hexadecimal signal that is sent when the CEM interface is identified as idle.
Bundle Location	The associated card and slot for the virtual CEM, using the virtual CEM port 24; for example virtual-cem/8/3/24:0.
Dejitter	The size of the dejitter buffer in milliseconds (ms). The range is 4 to 500 ms with a default of 4 ms.
RTP Hdr Compression	Indicates whether RTP header compression is enabled or disabled.
RTP Enabled	Indicates whether RTP compression is enabled or disabled.
Admin Status	The administrative status of the CEM interface: • Down—The CEM interface is administratively down. • Testing—The administrator is testing the CEM interface. • Unknown—The administrative status is unknown. • Up—The CEM interface is administratively up.
ID	The DS0 bundle CEM group identifier.
Payload Size	The size of the payload for packets on the CEM interface. The range is 32 to 1312 bytes.

Step 4 To view recovered clock entries, click the Recovered Clock Entries tab. See Figure 18-20.

If no recovered clock entries exist, this tab is not displayed.

Figure 18-20 Pseudowire Clock Recovery - Recovered Clock Entries Tab

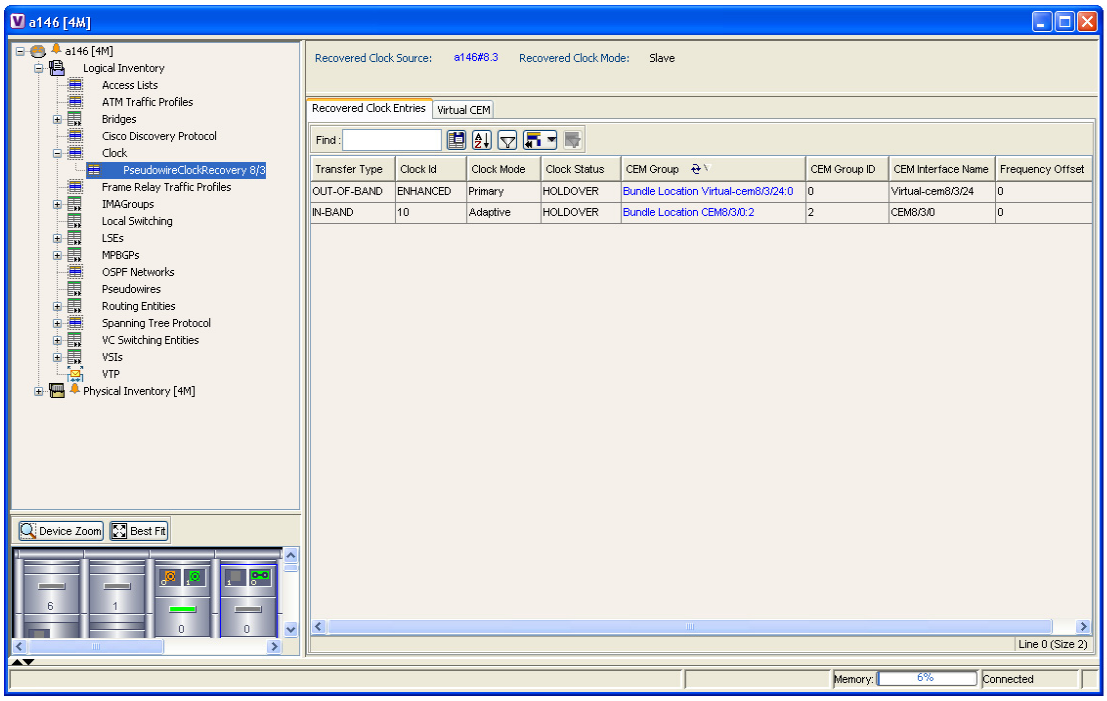


Table 18-21 describes the information displayed for pseudowire clock recovery.

Table 18-21 Pseudowire Clock Recovery Properties

Field	Description
Recovered Clock Source	The interface (slot/subslot) in which clock recovery occurred. Click the hyperlinked entry to view its properties in physical inventory.
Recovered Clock Mode	Identifies the recovered clock mode: • Adaptive—The devices do not have a common clock source. The recovered clock is derived from packet arrival. • Differential—The edge devices have a common clock source, and the recovered clock is derived from timing information in packets and the related difference from the common clock. • Synchronous—A GPS or BITS clock source externally synchronizes both end devices. This method is extremely accurate, but is rarely available for all network devices. For more information about clock recovery methods, see the *Cisco Active Network Abstraction 3.7.1 Theory of Operations Guide*.

Table 18-21 Pseudowire Clock Recovery Properties (continued)

Field	Description
Virtual CEM Tab	
CEM Interface Name	The virtual CEM interface associated with the clock.
Recovered Clock Entries Tab	
This tab appears if recovered entries exist.	
Transfer Type	• In-band—The clocking information is sent over the same pseudowire as the bearer traffic. • Out-of-band—The clocking information is sent over a dedicated pseudowire between the sending and receiving SPAs.
Clock ID	The clock identifier, if known.
Clock Mode	The clock mode of the recovered clock: • Adaptive—The recovered clock was obtained using ACR. • Primary—The recovered clock was obtained from a clock with the highest priority. • Secondary—The recovered clock was obtained from a clock with a lower priority than the primary clock.
Clock Status	The status of the clock: • Acquiring—The clock is obtaining clocking information. • Acquired—The clock has obtained the required clocking information. • Holdover—The current primary clock is invalid and a holdover timer has started to check whether or not the clock becomes valid within the specified holdover time.
CEM Group	The CEM group associated with the clock.
CEM Group ID	The ID of the CEM group associated with the clock.
CEM Interface Name	The virtual CEM interface associated with the clock.
Frequency Offset	The offset to the clock frequency, in Hz.

Viewing SyncE Properties

With Ethernet equipment gradually replacing SONET and SDH equipment in service-provider networks, frequency synchronization is required to provide high-quality clock synchronization over Ethernet ports. Synchronous Ethernet (SyncE), a recently adopted standard, provides the required synchronization at the physical level.

In SyncE, Ethernet links are synchronized by timing their bit clocks from high-quality, stratum-1-traceable clock signals in the same manner as SONET/SDH. Operations messages maintain SyncE links, and ensure a node always derives timing from the most reliable source.

To view SyncE properties, choose **Logical Inventory > Clock > SyncE**. (See Figure 18-21.)

Figure 18-21 SyncE Properties in Logical Inventory

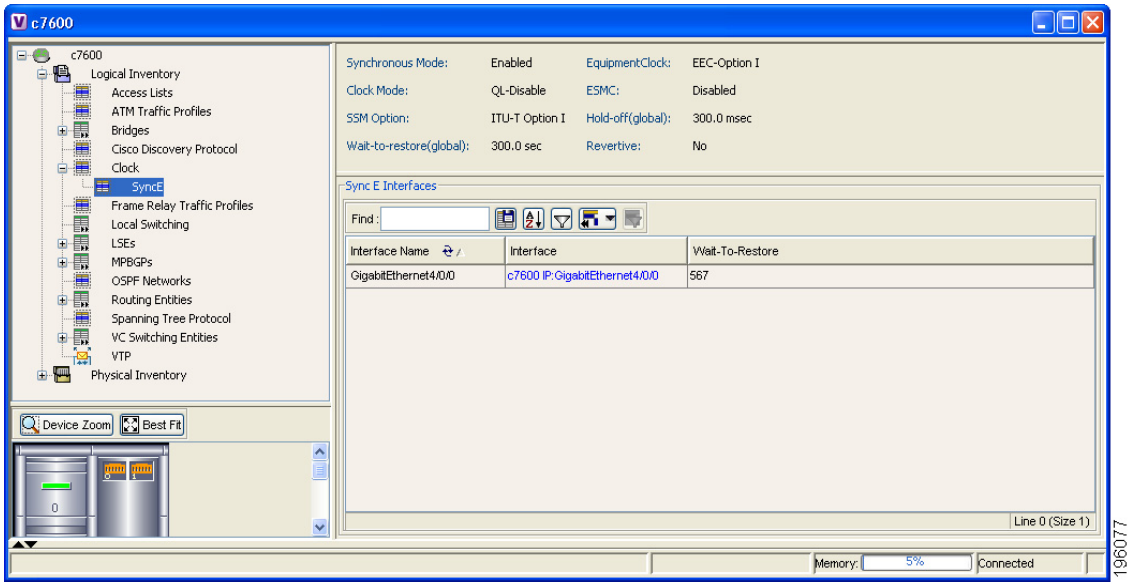


Table 18-22 describes the information that is displayed for SyncE.

Table 18-22 SyncE Properties

Field	Description
Synchronous Mode	The status of the automatic synchronization selection process: Enabled or Disable.
Equipment Clock	Ethernet Equipment Clock (EEC) options: EEC-Option I or EEC-Option II.
Clock Mode	Whether the clock is enabled or disabled for the Quality Level (QL) function: QL-Enabled or QL-Disabled.
ESMC	The Ethernet Synchronization Message Channel (ESMC) status: Enabled or Disabled.
SSM Option	The type of Synchronization Status Message (SSM) option being used: • ITU-T Option I • ITU-T Option II generation 1 • ITU-T Option II generation 2
Hold-off (global)	The length of time (in milliseconds) to wait before issuing a protection response to a failure event.
Wait-to-restore (global)	The length of time (in seconds) to wait after a failure is fixed before the span returns to its original state.
Revertive	Whether the network clock is to use revertive mode: Yes or No.

Table 18-22 SyncE Properties (continued)

Field	Description
SyncE Interfaces Table	
Interface Name	The interface name.
Interface	A hyperlinked entry to the interface routing information in the Routing Entity Controller window. For more information, see Viewing Routing Entities, page 17-22.
Wait-to-Restore	The length of time (in seconds) to wait after a failure is fixed before the interface returns to its original state.

Viewing CEM and Virtual CEM Properties

The following topics describe how to view CEM and virtual CEM properties and interfaces:

- Viewing CEM Interfaces, page 18-40
- Viewing Virtual CEMs, page 18-41
- Viewing CEM Groups, page 18-41

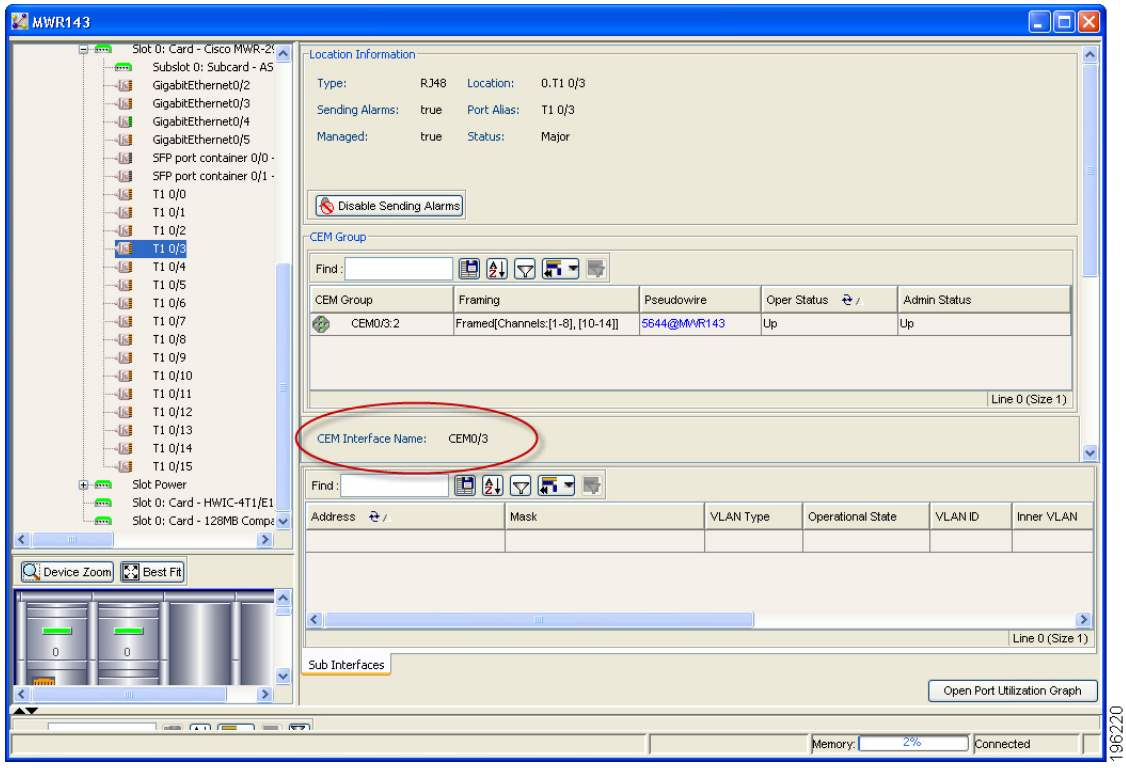
Viewing CEM Interfaces

To view CEM interfaces:

Step 1 In Cisco ANA NetworkVision, right-click the required device, then choose **Inventory**.

Step 2 In the inventory window, choose **Physical Inventory > Chassis >** *slot* **>** *subslot* **>** *interface*. The CEM interface is displayed in the content pane as shown in Figure 18-22.

Figure 18-22 CEM Interface



Viewing Virtual CEMs

To view virtual CEMs, choose **Logical Inventory > Clock > Pseudowire Clock Recovery** (Figure 18-19).

The virtual CEM interfaces are listed in the Virtual CEM tab.

Viewing CEM Groups

CEM groups can be configured on physical or virtual CEM interfaces. The underlying interface determines where you view CEM group properties in Cisco ANA NetworkVision:

- Viewing CEM Groups on Physical Interfaces, page 18-41
- Viewing CEM Groups on Virtual CEM Interfaces, page 18-42

Viewing CEM Groups on Physical Interfaces

When you configure a CEM group on a physical interface, the CEM group properties are displayed in physical inventory for that interface.

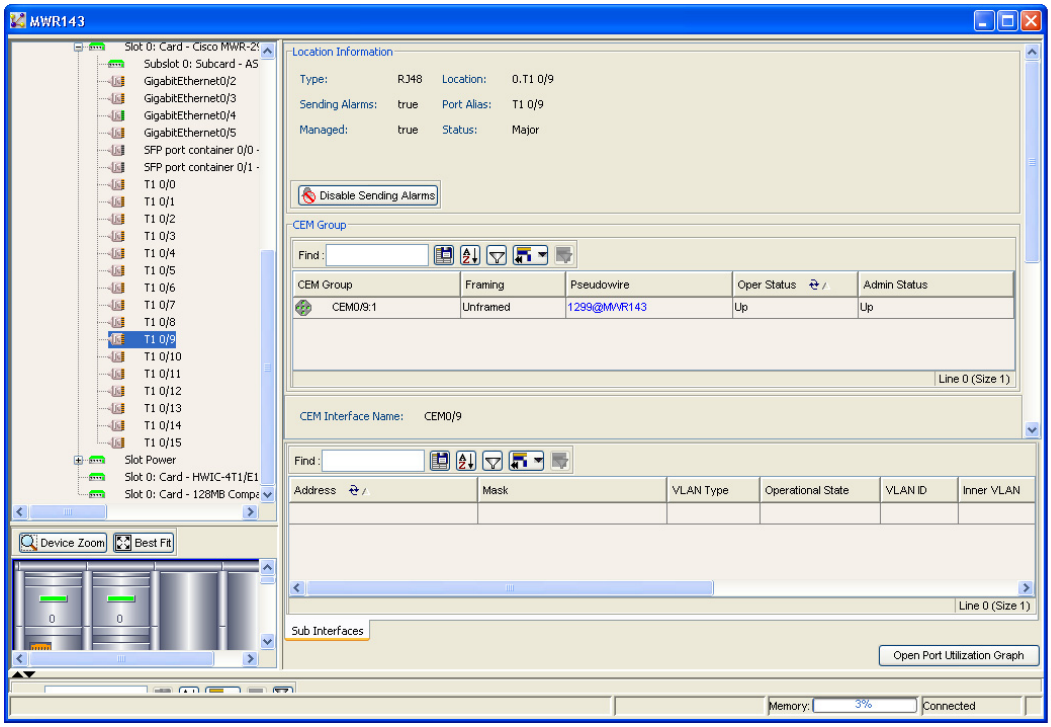
To view CEM groups configured on physical interfaces:

Step 1 In Cisco ANA NetworkVision, right-click the required device, then choose **Inventory**.

Step 2 In the navigation pane, choose **Physical Inventory > Chassis >** *slot* **>** *subslot* **>** *interface.*

The CEM group information is displayed in the content pane with other interface properties (Figure 18-23).

Figure 18-23 CEM Group Information



See Table 18-19 for a description of the properties displayed for CEM groups in the content pane.

Viewing CEM Groups on Virtual CEM Interfaces

When you configure a CEM group on a virtual CEM, the CEM group information is displayed below the virtual CEM in logical inventory.

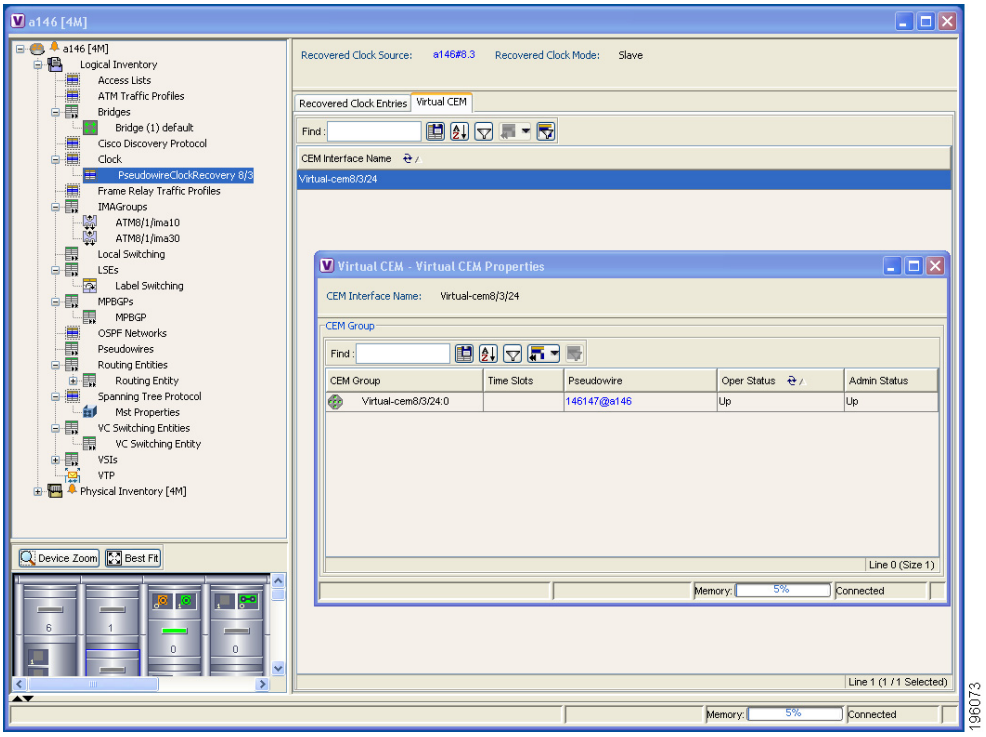
To view CEM groups on virtual CEM interfaces:

Step 1 In Cisco ANA NetworkVision, right-click the required device, then choose **Inventory**.

Step 2 In the inventory window, choose **Logical Inventory > Clock > Pseudowire Clock Recovery**.

Step 3 In the Virtual CEM tab, right-click the CEM interface name and choose **Properties**. The CEM group properties are displayed in a separate window (Figure 18-24). If a pseudowire is configured on the CEM group for out-of-band clocking, the pseudowire VCID is also shown.

Figure 18-24 CEM Group Properties



Step 4 To view additional CEM group properties, double-click the required CEM group.

Table 18-20 describes the information displayed in the CEM Group Properties window.