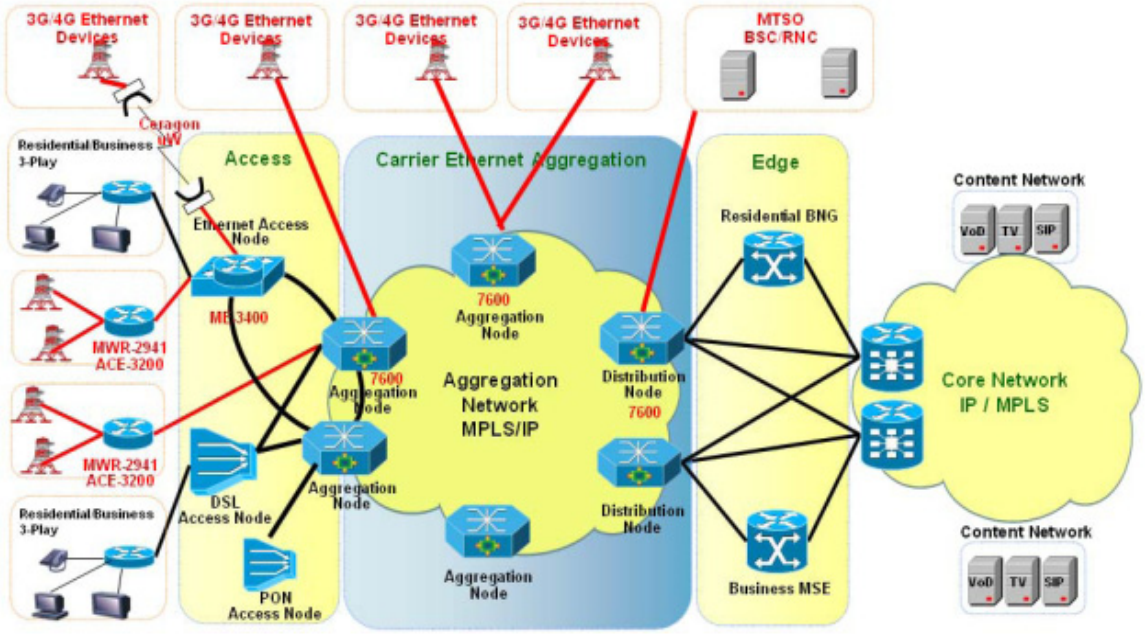
CHAPTER 26

Managing Mobile Transport Over Pseudowire (MToP) Networks

Cisco's Mobile Transport over Pseudowire (MToP) solution builds an MPLS cloud between the distribution nodes (between access and aggregation), and the aggregation nodes on the network edge. The MPLS network is also extended over the point-to-point links from the distribution nodes either via Ethernet, serial, microwave, or a Layer 2 access network. Figure 26-1 provides an example of a Prime Network MToP solution.

Figure 26-1 MToP Network



The following topics describe the Mobile Transport over Packet (MToP) services and properties you can view in the Vision client. If you cannot perform an operation that is described in these topics, you may not have sufficient permissions; see Permissions for Managing MToP, page B-20.

- Viewing SAToP Pseudowire Type in Logical Inventory, page 26-2
- Viewing CESoPSN Pseudowire Type in Logical Inventory, page 26-3

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:

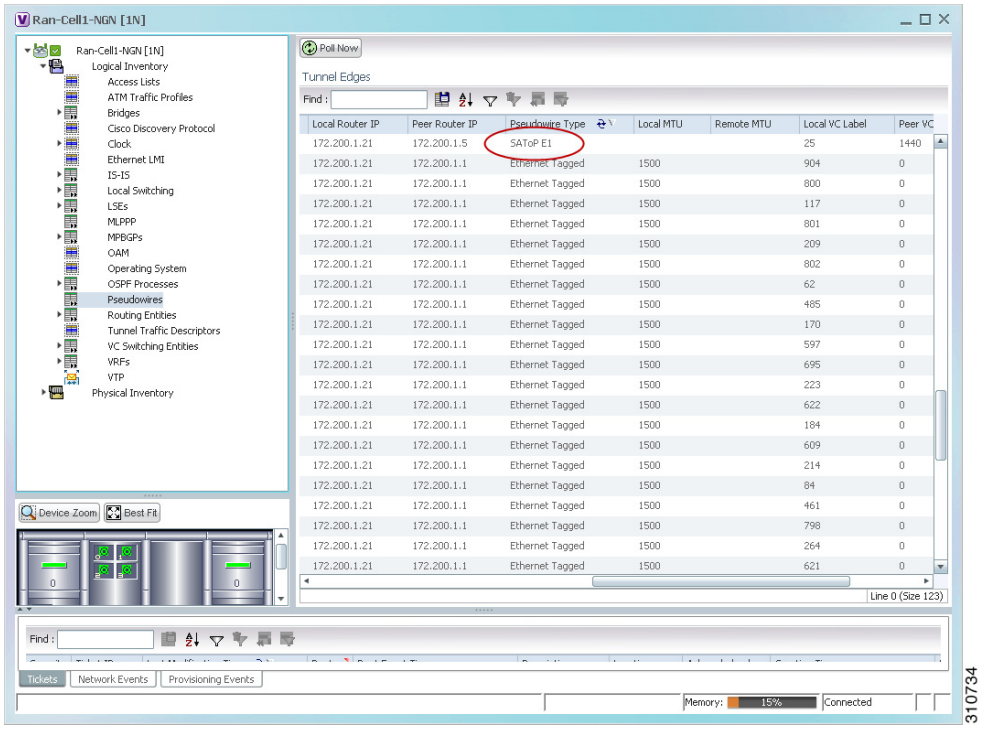
Step 1 In the Vision client, right-click the device on which SAToP is configured, then choose **Inventory**.

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 26-2.

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

Figure 26-2 SAToP Pseudowire Type in Logical Inventory



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

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 the Vision client:

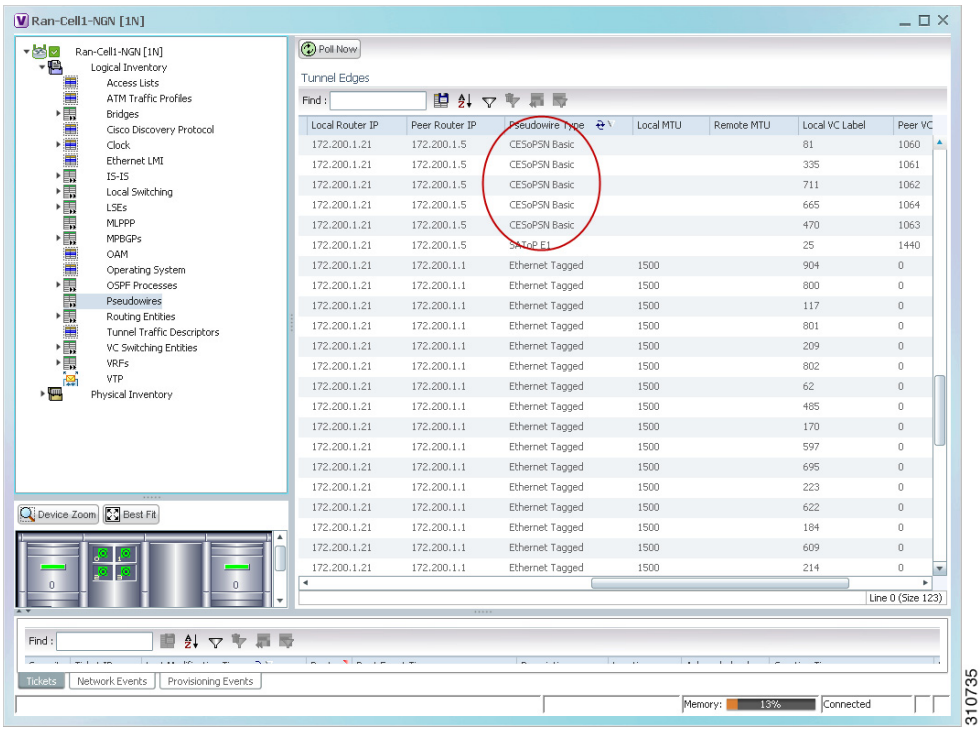
Step 1 In the Vision client, right-click the device on which CESoPSN is configured, then choose **Inventory**.

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 26-3.

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

Figure 26-3 CESoPSN Pseudowire Type in Logical Inventory



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

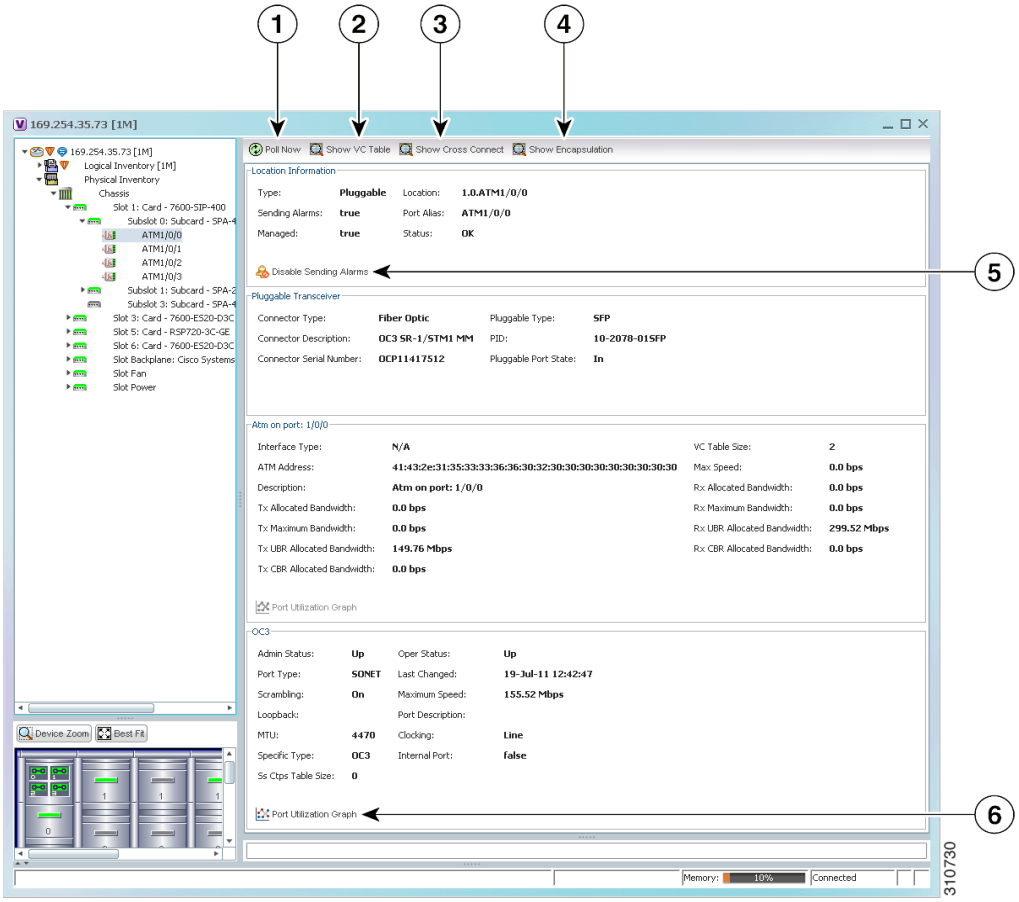
Viewing Virtual Connection Properties

The following topics describe how to view properties related to virtual connections:

- Viewing ATM Virtual Connection Cross-Connects, page 26-6
- Viewing ATM VPI and VCI Properties, page 26-10
- Viewing Encapsulation Information, page 26-11

Buttons for viewing these properties are available at the top of the physical inventory window for the selected interface, as shown in Figure 26-4.

Figure 26-4 ATM-Related Properties Available in Physical Inventory



1	Poll Now button	Polls the VNE for updated status.
2	Show VC Table button	Displays virtual circuit (VC) information for the selected port.. For more information, see Viewing ATM VPI and VCI Properties, page 26-10.
3	Show Cross Connect button	Displays cross-connect information for incoming and outgoing ports. For more information, see Viewing ATM Virtual Connection Cross-Connects, page 26-6.

4	Show Encapsulation button	Displays encapsulation information for incoming and outgoing traffic for the selected item. For more information, see Viewing Encapsulation Information, page 26-11.
5	Disable/Enable Sending Alarms button	Enables you to manage the alarms on a port. For more information, see Viewing Port Status and Properties and Checking Port Utilization, page 8-15.
6	Port Utilization Graph button	Displays the selected port traffic statistics: Rx/Tx Rate and Rx/Tx Rate History. For more information, see Checking a Port's Utilization, page 8-19.
—	Show DLCI Table button (not displayed)	Displays data-link connection identifier (DCLI) information for the selected port.

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. For information about viewing VPI and VCI properties, see Viewing ATM VPI and VCI Properties, page 26-10.

To view ATM virtual connection cross-connects:

Step 1 In the Vision client, right-click the required device, then choose **Inventory**.

Step 2 Open the VC Cross Connect table in either of the following ways:

- 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 26-5.
- In the **Inventory** window:

  a. Choose **Physical Inventory > Chassis >** *Slot* **>** *Subslot* **>** *Port*.

  b. Click the **Show Cross Connect** button.

  The VC Cross Connections window is displayed and contains the same information as the Cross-Connect Table in logical inventory.

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

Figure 26-5 ATM Virtual Connection Cross-Connect Properties

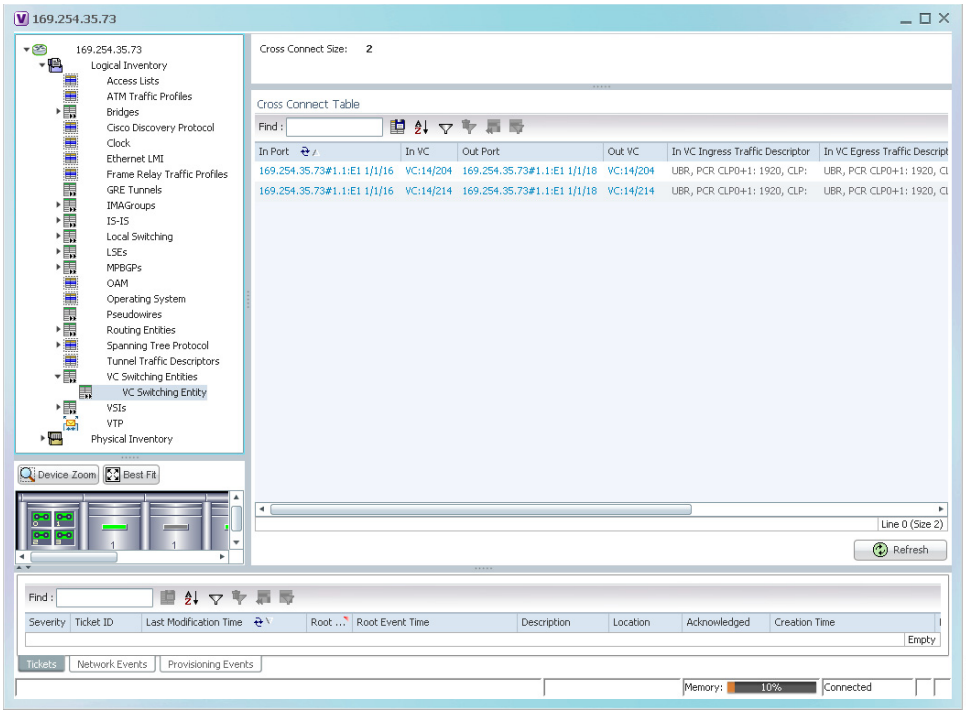


Table 26-1 identifies the properties that are displayed for ATM VC cross-connects.

Table 26-1 ATM Virtual Connection Cross-Connect Properties

Field	Description
In Port	Incoming port for the cross-connect.
In VC	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	Outgoing port for the cross-connect.
Out VC	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 26-2.
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 26-2.
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 26-2.
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 26-2.

Table 26-2 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.
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 ATM VPI and VCI Properties

If you know the interface or link configured for virtual connection cross-connects, you can view ATM VPI and VCI properties from the physical inventory window or from the link properties window.

To view ATM VPI and VCI properties, open the VC Table window in either of the following ways:

- To open the VC Table window from physical inventory:
  a. In the map view, double-click the element configured for virtual connection cross-connects.
  b. In the **Inventory** window, choose **Physical Inventory > Chassis >** *Slot* **>** *Subslot* **>** *Port*.
  c. Click **Show VC Table**.
- To view the VC Table window from the link properties window:
  a. In the map or links view, right-click the required ATM link and choose **Properties**.
  b. In the link properties window, click **Calculate VCs**.
  c. After the screen refreshes, click either **Show Configured** or **Show Misconfigured** to view the virtual connection cross-connects.

The VC Table window is displayed, as shown in Figure 26-6.

Figure 26-6 VC Table

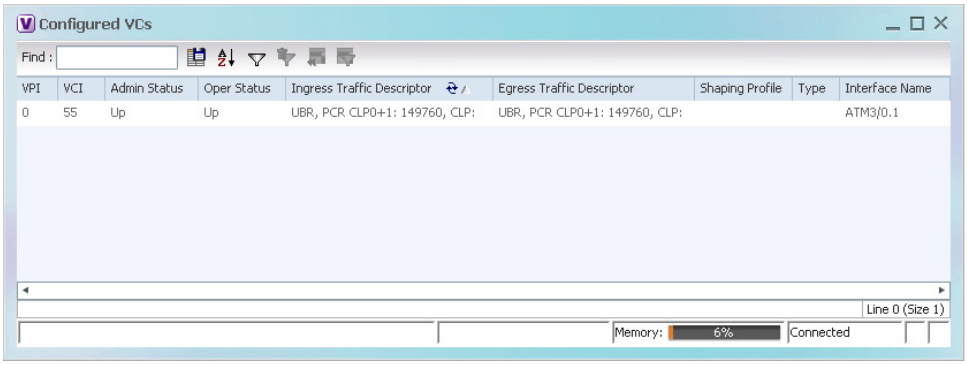


Table 26-3 describes the information displayed in the VC Table window.

Table 26-3 VC Table Properties

Field	Description
VPI	Virtual Path Identifier for the selected port.
VCI	Virtual Channel Identifier for the selected port.
Admin Status	Administrative state of the connection: Up, Down, or Unknown.
Oper Status	Operational state of the connection: Up, Down, or Unknown.
Ingress Traffic Descriptor	Traffic parameters and service categories for the incoming traffic. For information on VC traffic descriptors, see Table 26-2.
Egress Traffic Descriptor	Traffic parameters and service categories for the outgoing traffic. For information on VC traffic descriptors, see Table 26-2.
Shaping Profile	Traffic shape profile used for the virtual connection.
Type	ATM traffic descriptor type for the virtual connection.
Interface Name	Interface name, such as ATM1/1/16.

Viewing Encapsulation Information

To view virtual connection encapsulation information:

Step 1 In the Vision client, double-click the element configured for virtual connection encapsulation.

Step 2 In the **Inventory** window, choose **Physical Inventory > Chassis >** *Slot* **>** *Subslot* **>** *Port*.

Step 3 Click the **Show Encapsulation** button.

The VC Encapsulation window is displayed as shown in Figure 26-7.

Figure 26-7 VC Encapsulation Properties

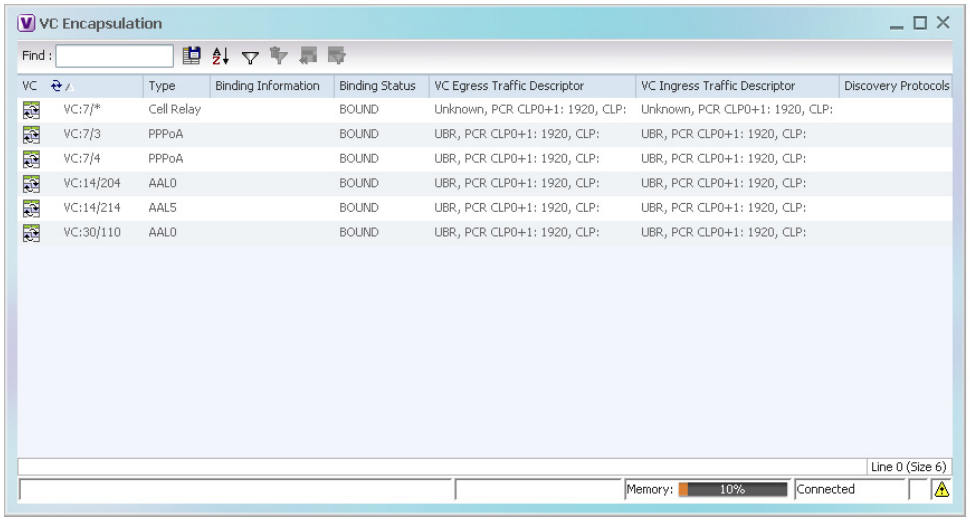


Table 26-4 describes the information displayed in the VC Encapsulation window.

Table 26-4 VC Encapsulation Properties

Field	Description
VC	Virtual connection identifier, such as VC:7/4.
Type	Type of encapsulation, such as Point-to-Point Protocol (PPP) over ATM (PPPoA) or ATM adaption layer Type 5 (AAL5).
Binding Information	Information tied to the virtual connection, such as a username.
Binding Status	Binding state: Bound or Unbound.
VC Egress Traffic Descriptor	Traffic parameters and service categories for the outgoing traffic. For information on VC traffic descriptors, see Table 26-2.
VC Ingress Traffic Descriptor	Traffic parameters and service categories for the incoming traffic. For information on VC traffic descriptors, see Table 26-2.
Discovery Protocols	Discovery protocol used for the VC.

Viewing IMA Group Properties

To view IMA group properties:

Step 1 In the Vision client, double-click the required device.

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 26-8.

Figure 26-8 IMA Group Properties

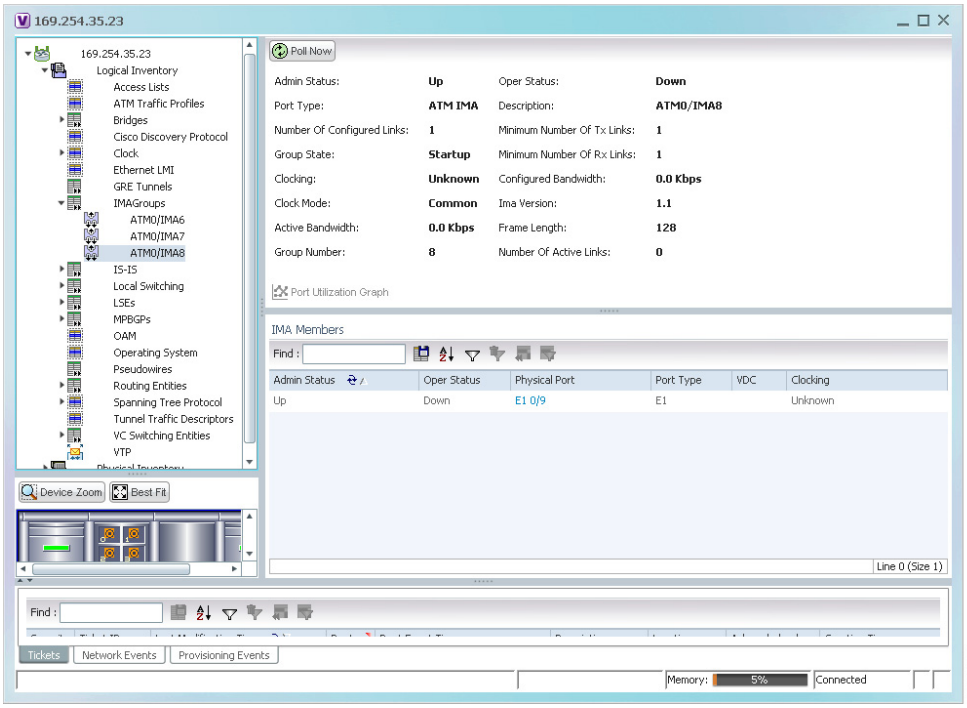


Table 26-5 describes the information displayed for the IMA group.

Table 26-5 IMA Group Properties

Field	Description
Active Bandwidth	Active bandwidth of the IMA group.
Admin Status	Administrative status of the IMA group.
Clock Mode	Clock mode the IMA group is using: • Common—Common transmit clocking (CTC). • Independent—Independent transmit clocking (ITC).
Configured Bandwidth	Total bandwidth of the IMA group, which is the sum of all individual links in the group.
Description	IMA group interface name.

Table 26-5 IMA Group Properties (continued)

Field	Description
Frame Length	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	IMA group number.
Group State	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 identifier, 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	IMA version configured, either 1.0 or 1.1.
Minimum Number of Rx Links	Minimum number of Rx links needed for the IMA group to be operational.
Minimum Number of Tx Links	Minimum number of Tx links needed for the IMA group to be operational.
Number of Active Links	Number of DS1 (E1 or T1) links that are active in the group.
Number of Configured Links	Number of DS1 (E1 or T1) links that are configured in the IMA group.
Oper Status	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 26-6 describes the information displayed in the IMA Members table.

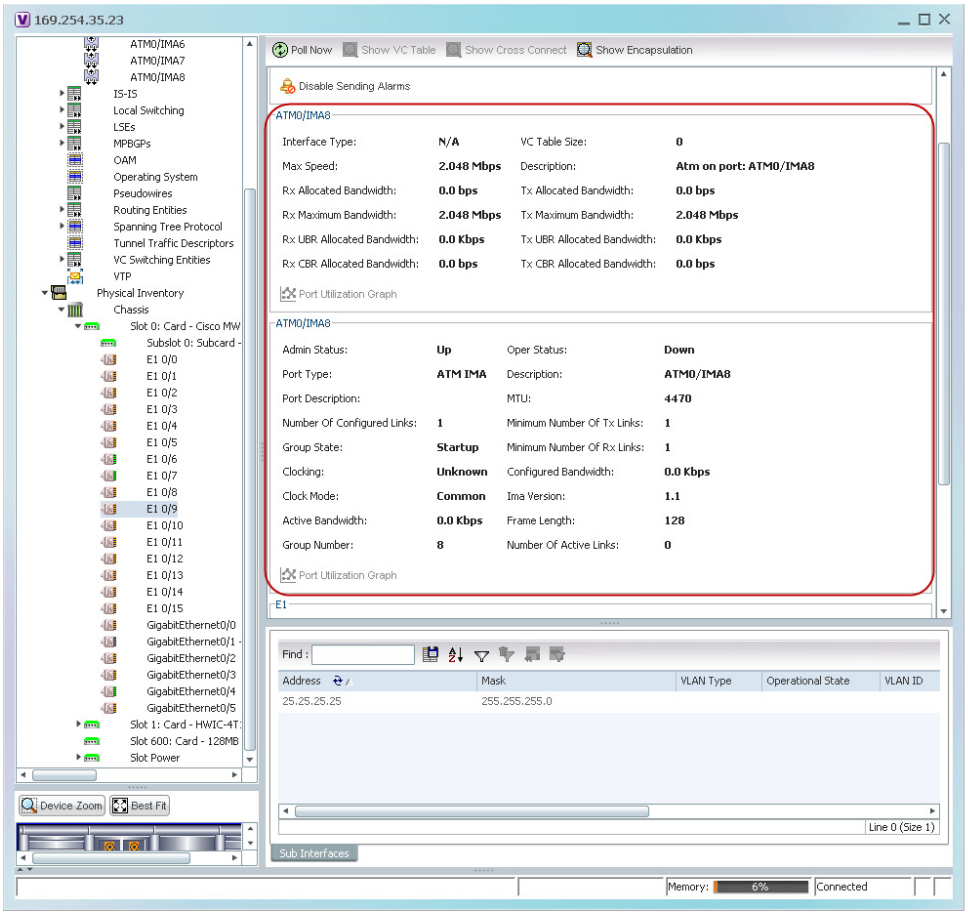
Table 26-6 IMA Members Table

Column	Description
Admin Status	Administrative status of the IMA member.
Channelization	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	Source of the clocking mechanism: Internal or Line.
Description	Type of channelization, such as Synchronous Transport Signal 1 (STS-1) or Synchronous Transport Module level 1 (STM-1).
Oper Status	Operational state of the IMA member:
Physical Port	Hyperlinked entry to the port in physical inventory.
Port Type	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 26-9.

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

Figure 26-9 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 divided 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 26-7 are displayed in physical inventory in addition to the existing T1 or E1 properties.

Table 26-7 TDM-Specific Properties for DS1 (T1 or E1) in Physical Interfaces

Field	Description
International Bit	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	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	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

Prime Network supports the channelization of SONET/SDH and T3 5.0. 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.

For SONET show and configuration commands, see Configuring SONET, page 26-53.

The following topics describe how to view channelization properties for SONET/SDH and T3 5.0:

- Viewing SONET/SDH Channelization Properties, page 26-18
- Viewing T3 DS1 and DS3 Channelization Properties, page 26-21

Viewing SONET/SDH Channelization Properties

SONET and SDH use the same concepts for channelization, but the terminology differs. Table 26-8 describes the equivalent terms for SONET and SDH channelization. The information displayed in the Vision client reflects whether SONET or SDH is configured on the interface.

Table 26-8 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 the Vision client, 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 26-10.

Figure 26-10 SONET/SDH Interface in Physical Inventory

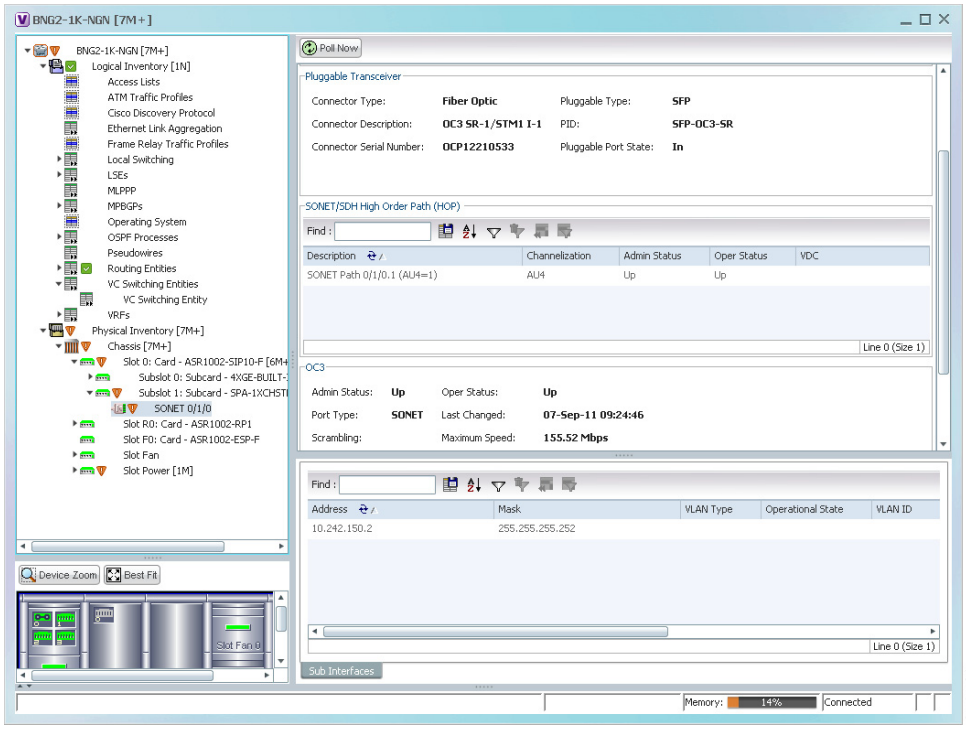


Table 26-9 describes the information that is displayed for SONET/SDH and OC3 in the content pane.

Table 26-9 SONET/SDH and OC3 Properties

Field	Description
SONET/SDH High Order Path (HOP) Area	
Description	SONET/SDH path description including the interface and high order path. Double-click an entry to view additional details about the path.
Channelization	Type of channelization, such as STS-1 or STM-1.
Admin Status	Administrative status of the HOP.
Oper Status	Operational status of the HOP.
OC3 Area	
Admin Status	Administrative status of the OC-3 line.
Oper Status	Operational status of the OC-3 line.
Port Type	Type of port.
Last Changed	Date and time of the last status change of the line.
Scrambling	Any scrambling that has been applied to the SONET payload.
Maximum Speed	Maximum bandwidth for the line.
Loopback	Loopback setting configured on the line.
Port Description	Description of the port defined by the user.
Clocking	Clocking configured on the line.
Specific Type	Specific type of line; in this case, OC3.
Internal Port	Whether or not the line includes an internal port: True or False.
Ss Ctps Table Size	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 26-11.

Figure 26-11 SONET/SDH High Order Path Properties Window

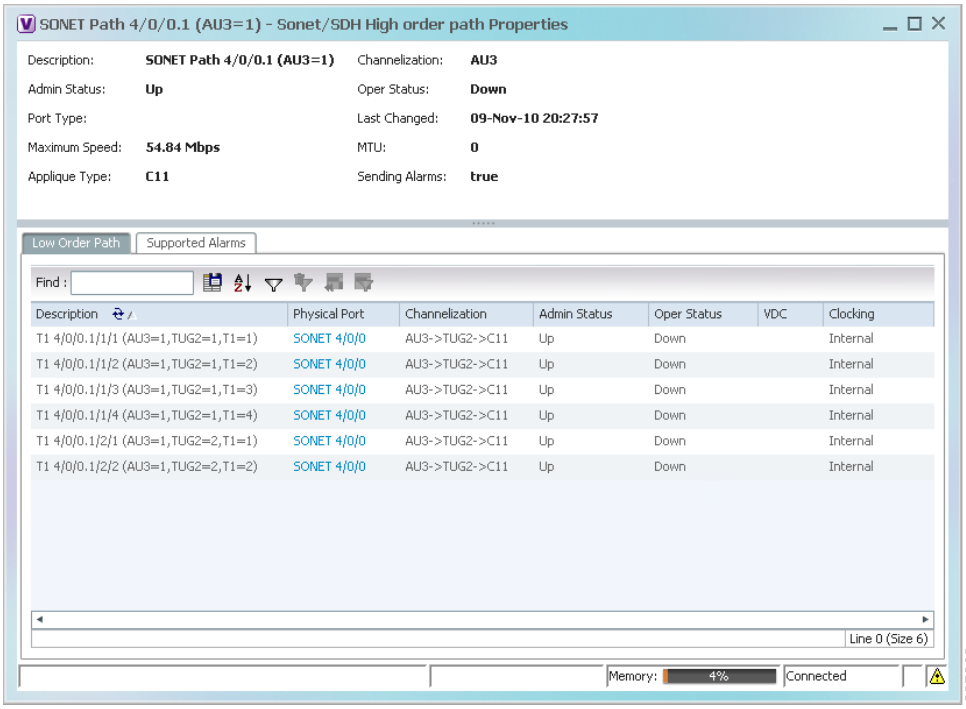


Table 26-10 describes the information displayed in SONET/SDH High Order Path Properties window.

Table 26-10 SONET/SDH High Order Path Properties

Field	Description
Description	SONET/SDH path description including the interface and high order path. Double-click an entry to view additional details about the path.
Channelization	Type of channelization, such as Synchronous Transport Signal 1 (STS-1) or Synchronous Transport Module level 1 (STM-1).
Admin Status	Administrative status of the HOP.
Oper Status	Operational status of the HOP.
Port Type	Type of port.
Last Changed	Date and time of the last status change of the path.
Maximum Speed	Maximum bandwidth for the line.
MTU	MTU for the path.
Applique Type	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	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 26-10 SONET/SDH High Order Path Properties (continued)

Field	Description
Channelization	Channelization that occurs through the path, such as STS1-> VTG-> VT15.
Admin Status	Administrative status of the path.
Oper Status	Operational status of the path.
Clocking	Source of the clocking mechanism: Internal or Line.
Supported Alarms Tab	
Name	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 the Vision client, right-click the required device, then choose **Inventory**.

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

Figure 26-12 shows DS1 channelization properties for T3 in physical inventory.

Figure 26-12 T3 DS1 Channelization Properties in Physical Inventory

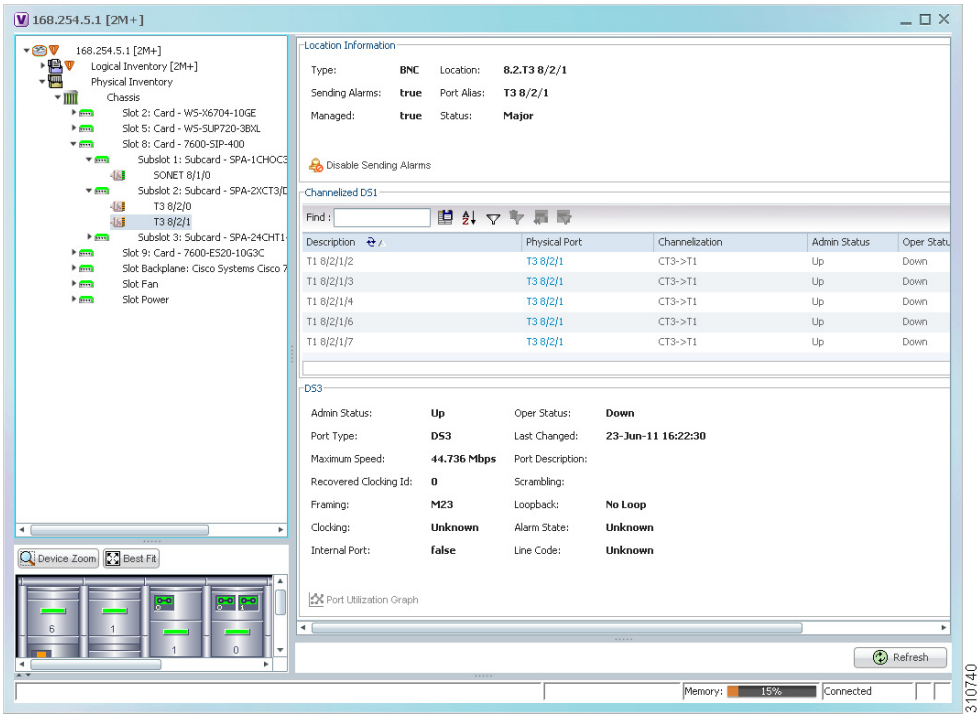


Table 26-11 describes the information that is displayed for Channelized DS1 and DS3 in the content pane.

Table 26-11 Channelized DS1 and DS3 Properties

Field	Description
Channelized DS1 Table	
Description	Path description including the physical interface and the channel number. Double-click an entry to view additional details about the path.
Physical Port	Physical port for the channelized line.
Channelization	Type of channelization, such as channelized T3 (CT3) to T1.
Admin Status	Administrative status of the channelized line.
Oper Status	Operational status of the channelized line.
VDC	For devices with multiple virtual contexts, the context associated with the channelized line.
Clocking	Clocking configured on the line: Internal or Line.

Table 26-11 Channelized DS1 and DS3 Properties (continued)

Field	Description
DS3 Area	
Admin Status	Administrative status of the DS3 line.
Oper Status	Operational status of the DS3 line.
Port Type	Type of port.
Last Changed	Date and time of the last status change of the line.
Maximum Speed	Maximum bandwidth for the line.
Port Description	Description of the port configured on the interface.
Recovered Clocking ID	Recovered clock identifier, if known.
Scrambling	Any scrambling that has been applied to the SONET payload.
Framing	Type of framing applied to the line.
Loopback	Loopback setting configured on the line.
Clocking	Clocking configured on the line: Internal or Line.
Alarm State	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.
Line Code	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 26-13 shows the information that is displayed in the Channelized DS1 PDH Properties window.

Figure 26-13 Channelized DS1 PDH Properties Window

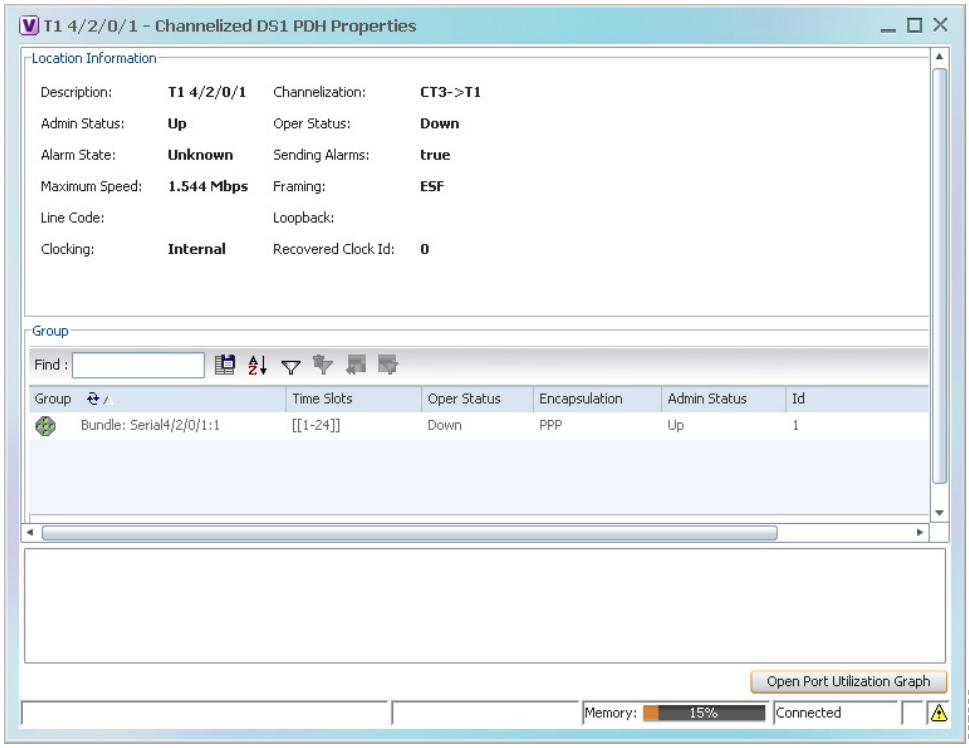


Table 26-12 describes the information that is displayed in the Channelized DS1 PDH Properties window.

Table 26-12 Channelized DS1 PDH Properties Window

Field	Description
Location Area	
Description	Path description including the physical interface and the channel number.
Channelization	Type of channelization used on the line, such as CT3-> T1.
Admin Status	Administrative status of the channelized line.
Oper Status	Operational status of the channelized line.
Alarm State	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.

Table 26-12 Channelized DS1 PDH Properties Window (continued)

Field	Description
Sending Alarms	Whether or not the line is sending alarms: True or False.
Maximum Speed	Maximum bandwidth for the line.
Framing	Type of framing applied to the line.
Line Code	Line coding applied to the line.
Loopback	Loopback setting configured on the line.
Clocking	Clocking configured on the line: Internal or Line.
Recovered Clock ID	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	Name of the DS0 bundle.
Time Slots	Range of timeslots (DS0 channels) allotted to the group.
Oper Status	Operational status of the group.
Encapsulation	Type of encapsulation used, such as High-Level Data Link Control (HDLC).
Admin Status	Administrative status of the group.
ID	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 the Vision client, right-click the required device, then choose **Inventory**.

Step 2 In the **Inventory** window, choose **Logical Inventory > MLPPP**. See Figure 26-14.

Figure 26-14 MLPPP Properties in Logical Inventory

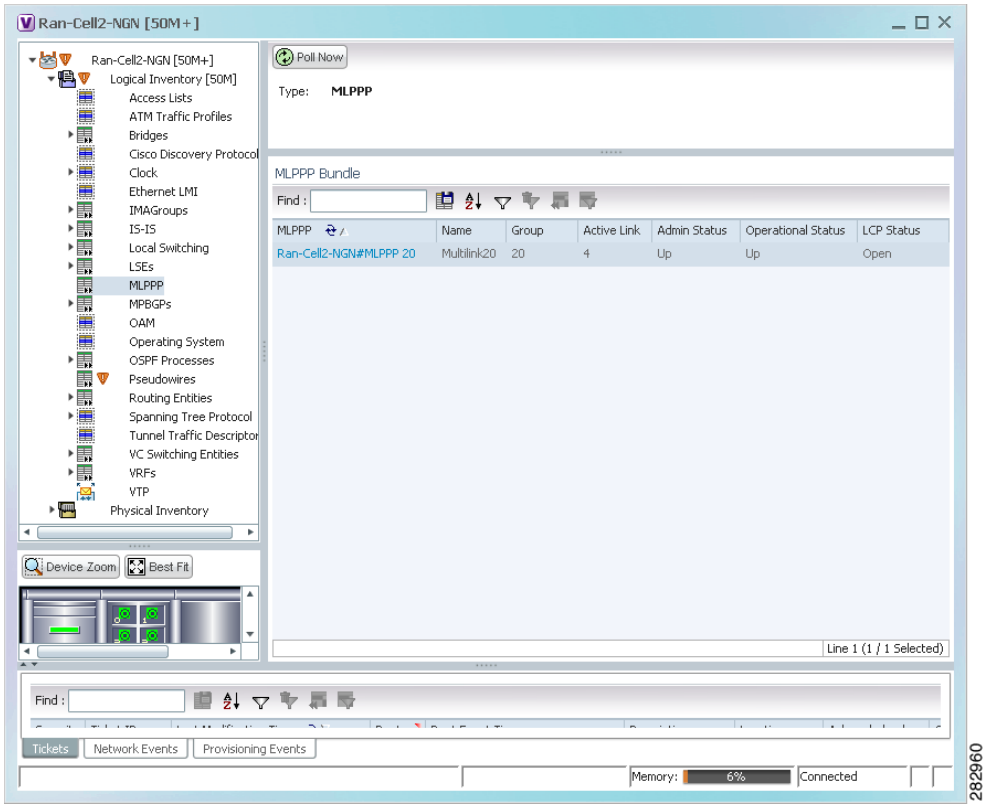


Table 26-13 describes the information that is displayed for MLPPP.

Table 26-13 MLPPP Properties

Field	Description
Type	Type of properties; in this case, MLPPP.
MLPPP Bundle Table	
MLPPP	MLPPP bundle name, hyperlinked to the MLPPP Properties window.
Name	MLPPP interface name.
Group	MLPPP group to which the bundle belongs.
Active Link	Number of active interfaces participating in MLPPP.
Admin Status	Administrative status of the MLPPP bundle: Up or Down.
Operational Status	Administrative status of the MLPPP bundle: Up or Down.
LCP Status	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.

Table 26-14 describes the information that is displayed in the MLPPP Properties window.

Table 26-14 MLPPP Bundle and Member Properties

Field	Description
MLPPP	MLPPP bundle name, hyperlinked to MLPPP in logical inventory.
Name	MLPPP interface name.
Group	Group to which the MLPPP bundle belongs.
Active Link	Number of active interfaces participating in MLPPP.
Admin Status	Administrative status of the MLPPP bundle: Up or Down.
Operational Status	Operational status of the MLPPP bundle: Up or Down.
LCP Status	Link Control Protocol (LCP) status of the MLPPP bundle: Closed, Open, Started, or Unknown.
Minimum Configured Link	Minimum number of configured links for an MLPPP bundle.
Maximum Configured Link	Maximum number of configured links for an MLPPP bundle.
Bandwidth	Bandwidth allocated to the MLPPP bundle.
MTU	Size of the Maximum Transmission Unit (MTU), from 1 to 2147483647 bytes.
Keepalive	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 26-14 MLPPP Bundle and Member Properties (continued)

Field	Description
Fragment Disable	Whether fragmentation is enabled or disabled: True or False.
Fragment Delay	Maximum size, in units of time, for packet fragments on an MLPPP bundle. Values range from 1 to 999.
Fragment Maximum	Maximum number of MLPPP bundle fragments.
Keepalive Retry	Number of times that the device sends keepalive packets without response before closing the MLPPP bundle protocol. Values range from 2 to 254.
Load Threshold	Minimum load threshold for the MLPPP bundle. If the traffic load falls below the threshold, the link is removed.

Table 26-14 MLPPP Bundle and Member Properties (continued)

Field	Description
MLPPP Members Table	
ID	MLPPP bundle member identifier, hyperlinked to the interface in physical inventory.
Type	No value is displayed in this field.
Binding Information	Binding information to which the interface is associated. The value is null.
Binding Status	No value is displayed in this field.
Discovery Protocols	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.

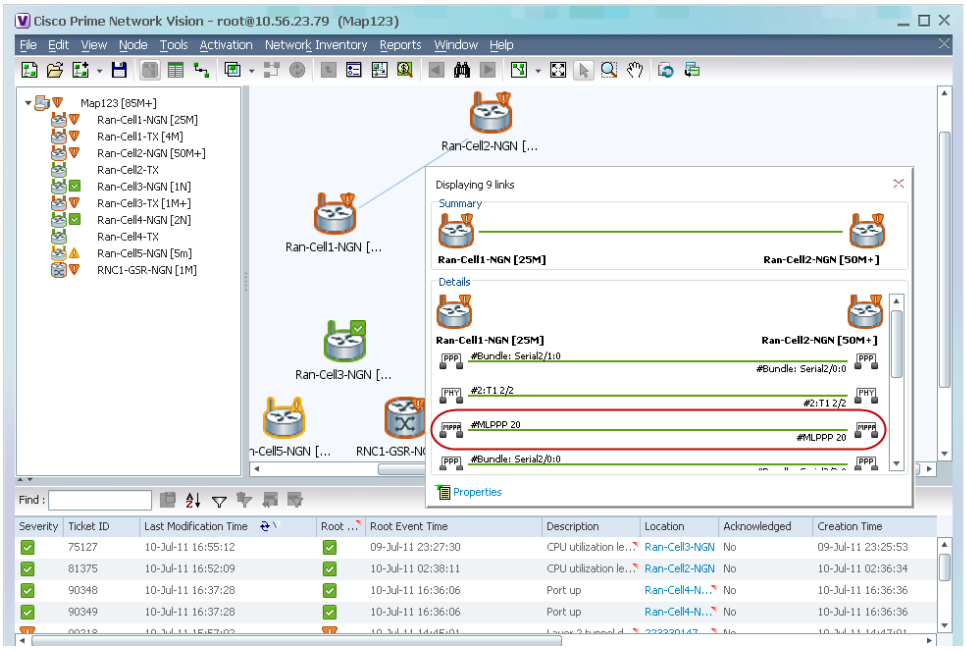
Viewing MLPPP Link Properties

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

To view MLPPP link properties:

Step 1 In the Vision client map view, select a link connected to two MLPPP devices and open the link quick view window as shown in Figure 26-15.

Figure 26-15 MLPPP Link in Link Quick View



Step 2 In the link quick view window, click **Properties**.

Step 3 In the link properties window, select the MLPPP link. The link properties are displayed as shown in Figure 26-16.

Figure 26-16 MLPPP Link Properties

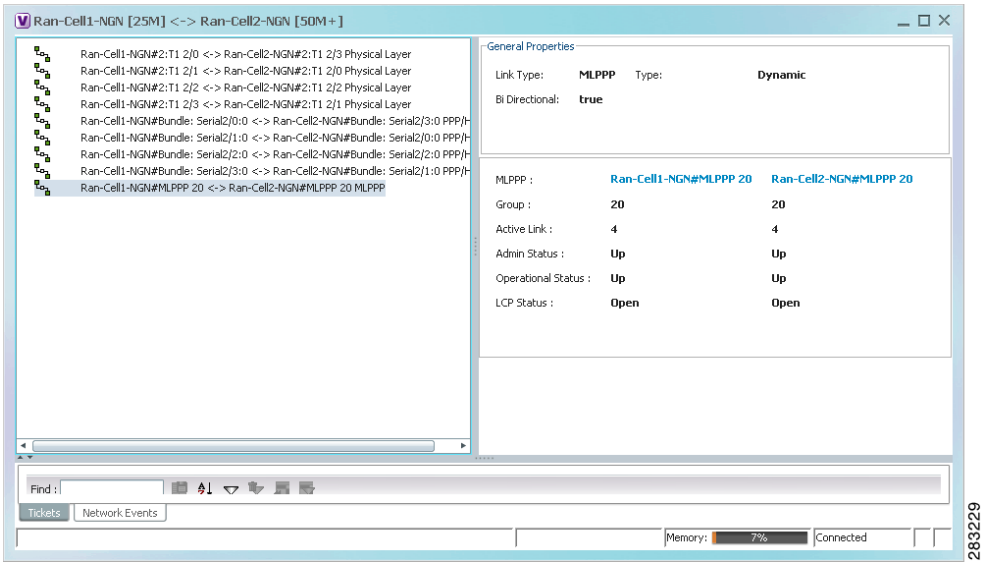


Table 26-15 describes the information that is displayed for the MLPPP link.

Table 26-15 MLPPP Link Properties

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

- Among cell site-facing Cisco 7600 routers and base station controller (BSC) site-facing Cisco 7600 routers.
- 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 the Vision client, 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 26-17.

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

Figure 26-17 MPLS Pseudowire Tunnels over GRE Properties

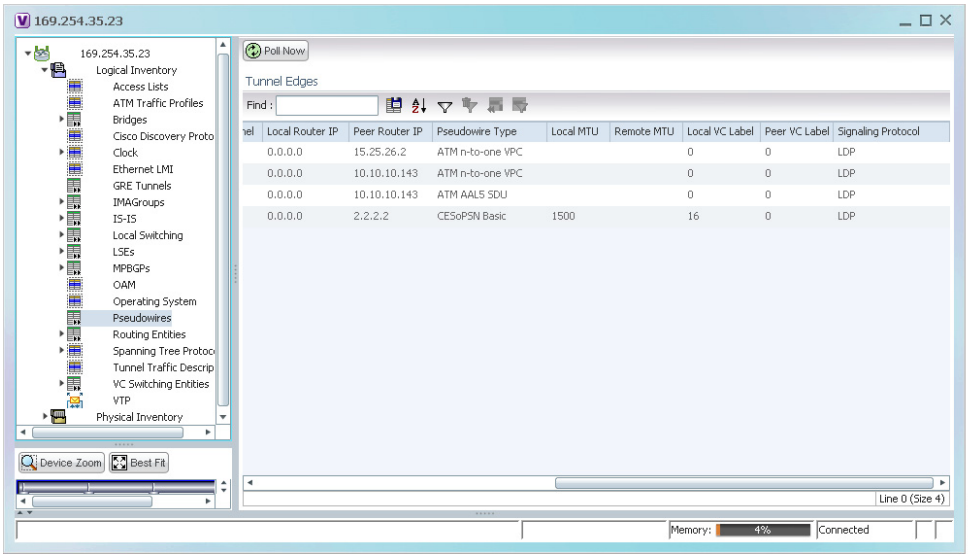


Table 26-16 describes the information included in the Tunnel Edges table specifically for MPLS pseudowire tunnels over GRE.

Table 26-16 MPLS Pseudowire over GRE Properties

Field	Description
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.
Local MTU	Size, in bytes, of the MTU on the local interface.
Remote MTU	Size, in bytes, of the MTU on the remote interface.
Preferred Path Tunnel	Path to be used for MPLS pseudowire traffic. Click the hyperlinked entry to view the tunnel details in logical inventory.

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

Figure 26-18 shows the Tunnel Edges table that is displayed for GRE tunnels.

Figure 26-18 GRE Tunnel Properties in Logical Inventory

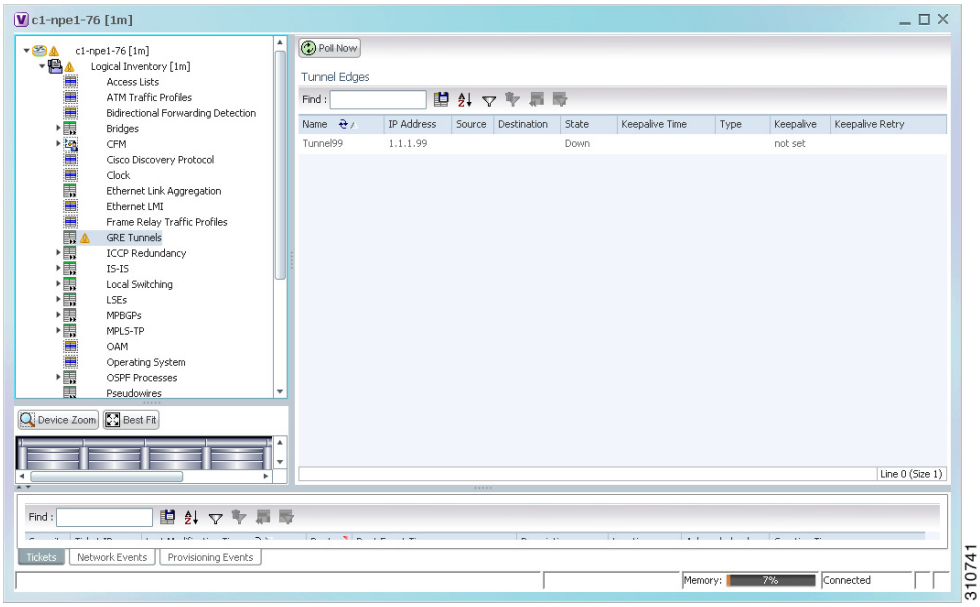


Table 26-17 describes the information that is displayed for GRE tunnels in logical inventory.

Table 26-17 GRE Tunnel Properties in Logical Inventory

Field	Description
Name	Tunnel name.
IP Address	Tunnel IP address.
Source	IP address local to the device.
Destination	IP address of the remote router.
State	State of the tunnel: Up or Down.
Keepalive Time	If keepalive is enabled, the amount of time, in seconds, to wait before sending a keepalive message.
Type	Tunnel type.
Keepalive	Status of the keepalive function: Set, Not Set, or Unknown.
Keepalive Retry	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.

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 Prime Network, *clock service* refers to *network clock service*.

The following topics describe how to use the Vision client to monitor clock service:

- Monitoring Clock Service, page 26-34
- Monitoring PTP Service, page 26-35
- Viewing Pseudowire Clock Recovery Properties, page 26-41
- Viewing SyncE Properties, page 26-45
- Applying a Network Clock Service Overlay, page 26-48
- Viewing CEM and Virtual CEM Properties, page 26-49

Monitoring Clock Service

To monitor clock service:

Step 1 In the Vision client, 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 26-19.

Figure 26-19 Clock Service Properties

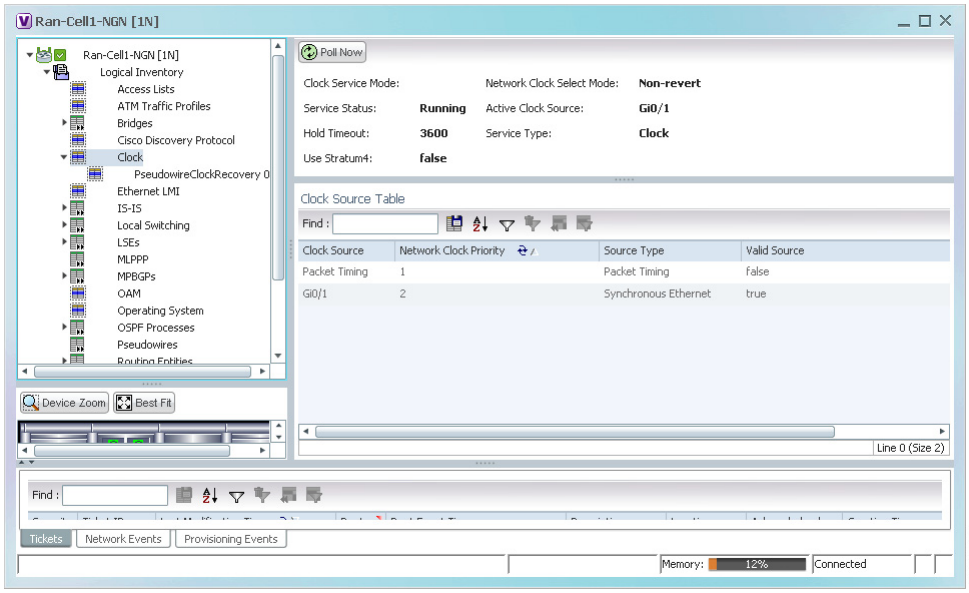


Table 26-18 describes the information displayed for clocking service.

Table 26-18 Clock Service Properties

Field	Description
Clock Service Mode	This field is not populated.
Network Clock Select Mode	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	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.

Table 26-18 Clock Service Properties (continued)

Field	Description
Active Clock Source	Current active clock source used by the device.
Hold Timeout	How long the device waits before reevaluating the network clock entry. Values can be from 0-86400 seconds, Not Set, or infinite.
Service Type	Type of system service, such as Clock or Cisco Discovery Protocol.
Use Stratum4	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	This table is displayed only if there are active clock sources.
Clock Source	Current active clock source used by the device.
Network Clock Priority	Priority of the clock source with 1 being the highest priority.
Source Type	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. For configuring PTP, see Configuring SONET, page 26-53.

To monitor PTP service:

Step 1 In the Vision client, 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 26-20.

Figure 26-20 PTP Service Properties

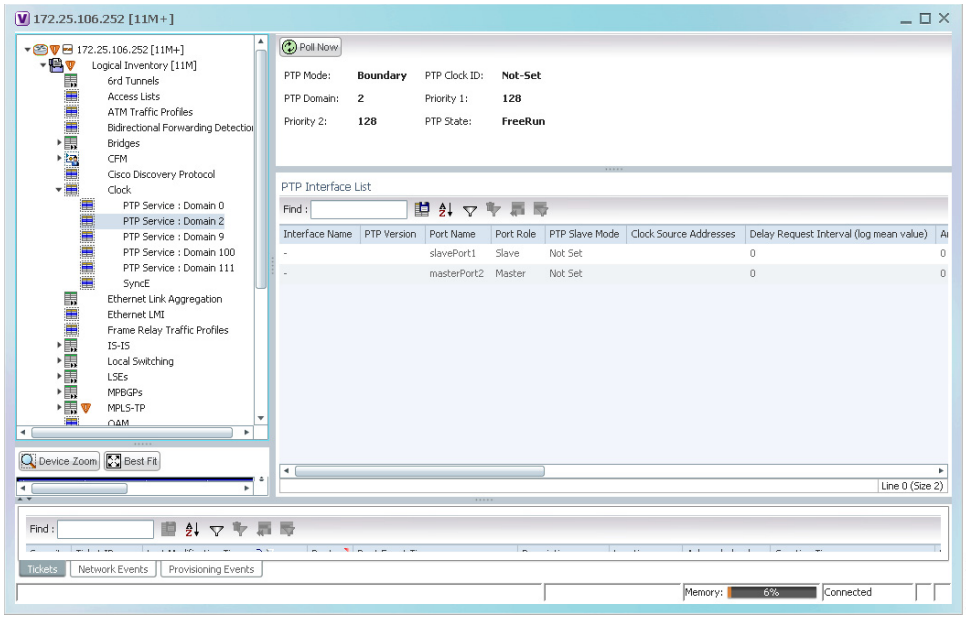


Table 26-19 describes the properties that are displayed for PTP service.

Table 26-19 PTP Service Properties

Field	Description
PTP Mode	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	Clock identifier derived from the device interface.
PTP Domain	Number of the domain used for PTP traffic. A single network can contain multiple separate domains.
Priority 1	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.
Port State	Clock state according to the PTP engine: • Freerun—The slave clock is not locked to a master clock. • Holdover—The slave device is locked to a master device, but communication with the master is lost or the timestamps in the PTP packet are incorrect. • Acquiring—The slave device is receiving packets from a master and is trying to acquire a clock. • Freq locked—The slave device is locked to the master device with respect to frequency, but is not aligned with respect to phase. • Phase aligned—The slave device is locked to the master device with respect to both frequency and phase. PTP clock status syslog support—As part of the syslog support, Prime Network started supporting PTP clock status syslog besides the PTP inventory information. While receiving the syslog, Prime Network queries the device, and receives the PTP state information and updates in the respective PTP service. The service alarm supported for the PTP status information is PTP port clock state change alarm. Theses service alarms and the syslogs are correlated under the PTP service as clock service. For more information on PTP clock status update service alarm, refer Cisco Prime Network Supported Service Alarms.
PTP Interface List Table	
Interface Name	Interface identifier.
PTP Version	Version of PTP used. The default value is 2, indicating PTPv2.
Port Name	Name of the PTP port clock.
Port Role	PTP role of the clock: Master or Slave.

Table 26-19 PTP Service Properties (continued)

Field	Description
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	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.
Announce Interval (log mean value)	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	Number of PTP announcement intervals before the session times out. Values are 2-10.

Table 26-19 PTP Service Properties (continued)

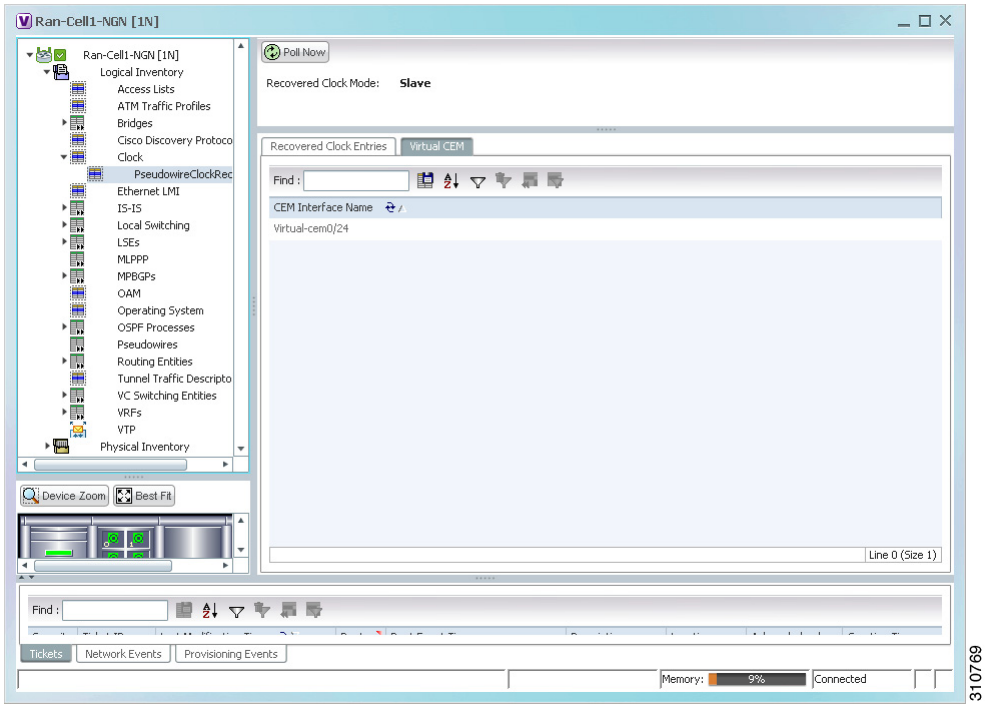
Field	Description
Sync Interval (log mean value)	Interval for sending PTP synchronization messages: • 4—1 packet every 16 seconds. • 3—1 packet every 8 seconds. • 2—1 packet every 4 seconds. • 1—1 packet every 2 seconds. • 0—1 packet every second. • -1—1 packet every 1/2 second, or 2 packets per second. • -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)	Maximum clock offset value, in nanoseconds, before PTP attempts to resynchronize.
Interface	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	IP addresses of the clock destinations. This field contains IP addresses only when Master mode is enabled.
Domain	Clocking domain.

Viewing Pseudowire Clock Recovery Properties

To view pseudowire clock recovery properties:

Step 1 Choose **Logical Inventory > Clock > Pseudowire Clock Recovery**. The Vision client displays the Virtual CEM information by default. See Figure 26-21.

Figure 26-21 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 26-20.

Table 26-20 Virtual CEM Group Properties

Field	Description
CEM Interface Name	CEM interface name.
CEM Group Table	
CEM Group	Name of the virtual CEM group.
Framing	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	Name of the pseudowire configured on the CEM interface, hyperlinked to the pseudowire properties in logical inventory.
Oper Status	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	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 26-21 describes the information displayed in the CEM Group Properties window.

Table 26-21 CEM Group Properties

Field	Description
Oper Status	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	Eight-bit hexadecimal number that is transmitted on a T1 or E1 line when missing packets are detected on the pseudowire (PW) circuit.
Type	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	Associated card and slot for the virtual CEM, using the virtual CEM port 24; for example virtual-cem/8/3/24:0.
Dejitter	Size of the dejitter buffer in milliseconds (ms). The range is 4 to 500 ms with a default of 4 ms.
RTP Hdr Compression	Whether RTP header compression is enabled or disabled.
RTP Enabled	Whether RTP compression is enabled or disabled.
Admin Status	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	DS0 bundle CEM group identifier.
Payload Size	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 26-22.

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

Figure 26-22 Pseudowire Clock Recovery - Recovered Clock Entries Tab

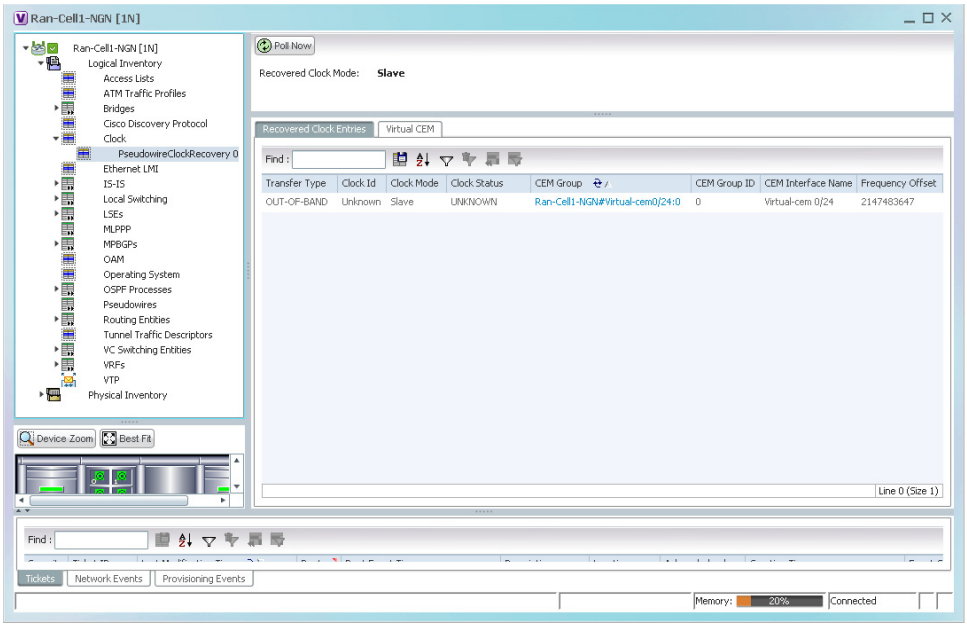


Table 26-22 describes the information displayed for pseudowire clock recovery.

Table 26-22 Pseudowire Clock Recovery Properties

Field	Description
Recovered Clock Source	Interface (slot/subslot) in which clock recovery occurred. Click the hyperlinked entry to view its properties in physical inventory.
Recovered Clock Mode	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.
Virtual CEM Tab	
CEM Interface Name	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.

Table 26-22 Pseudowire Clock Recovery Properties (continued)

Field	Description
Clock ID	Clock identifier, if known.
Clock Mode	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	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	CEM group associated with the clock.
CEM Group ID	Identifier of the CEM group associated with the clock.
CEM Interface Name	Virtual CEM interface associated with the clock.
Frequency Offset	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.

For configuring SyncE, see Configuring Clock, page 26-55. To view SyncE properties, choose **Logical Inventory > Clock > SyncE**. (See Figure 26-23.)

Figure 26-23 SyncE Properties in Logical Inventory

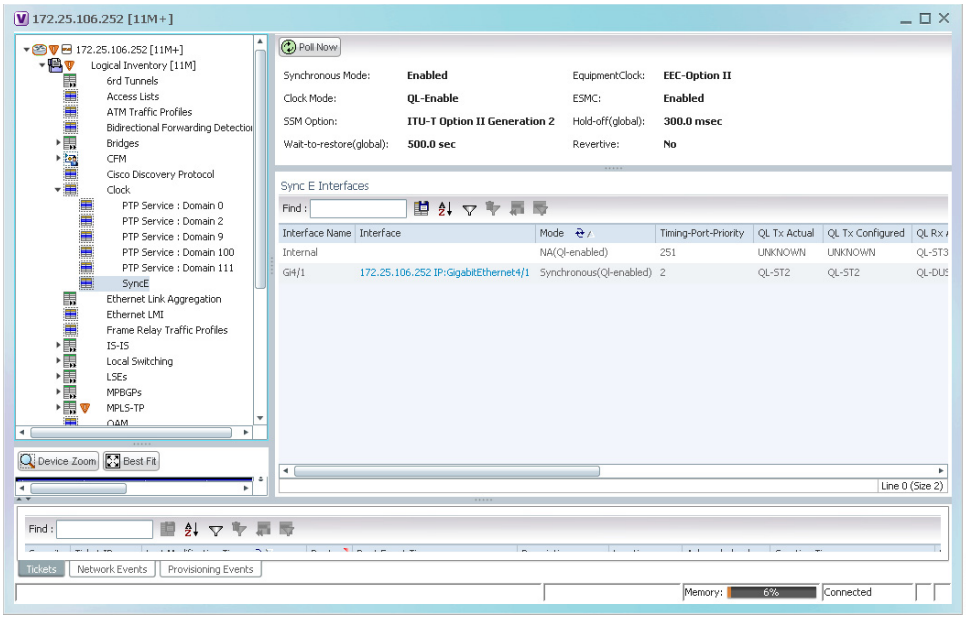


Table 26-23 describes the information that is displayed for SyncE.

Table 26-23 SyncE Properties

Field	Description
Synchronous Mode	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	Ethernet Synchronization Message Channel (ESMC) status: Enabled or Disabled.
SSM Option	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)	Length of time (in milliseconds) to wait before issuing a protection response to a failure event.
Wait-to-restore (global)	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 26-23 SyncE Properties (continued)

Field	Description
SyncE Interfaces Table	
Interface Name	Name of the Gigabit or 10 Gigabit interface associated with SyncE. If SyncE is not associated with a Gigabit or 10 Gigabit interface, this field contains *Internal*.
Interface	Hyperlinked entry to the interface routing information in the Routing Entity Controller window. For more information, see Viewing Routing Entities, page 17-32. This field does not apply for Internal interfaces.
Mode	Whether the interface is enabled or disabled for the QL function: QL-Enabled or QL-Disabled.
Timing Port Priority	Value used for selecting a SyncE interface for clocking if more than one interface is configured. Values are from 1 to 250, with 1 being the highest priority.
QL Tx Actual	Actual type of outgoing quality level information, depending on the globally configured SSM option: • ITU-T Option I—Available values are QL-PRC, QL-SSU-A, QL-SSU-B, QL-SEC, and QL-DNU. • ITU-T Option II Generation 1—Available values are QL-PRS, QL-STU, QL-ST2, QL-SMC, QL-ST4, and QL-DUS. • ITU-T Option II Generation 2—Available values are QL-PRS, QL-STU, QL-ST2, QL-TNC, QL-ST3, QL-SMC, QL-ST4, and QL-DUS.
QL Tx Configured	Configured type of outgoing quality level information, depending on the globally configured SSM option. See QL Tx Actual for the available values.
QL Rx Actual	Actual type of incoming quality level information, depending on the globally configured SSM option. See QL Tx Actual for the available values.
QL Rx Configured	Configured type of incoming quality level information, depending on the globally configured SSM option. See QL Tx Actual for the available values.
Hold-Off Timer (msecs)	Length of time (in milliseconds) to wait after a clock source goes down before removing the source.
Wait-to-Restore (secs)	Length of time (in seconds) to wait after a failure is fixed before the interface returns to its original state.

Table 26-23 SyncE Properties (continued)

Field	Description
ESMC Tx	Whether ESMC is enabled for outgoing QL information on the interface: Enabled, Disabled, or NA (Not Available).
ESMC Rx	Whether ESMC is enabled for incoming QL information on the interface: Enabled, Disabled, or NA (Not Available).
SSM Tx	Whether SSM is enabled for outgoing QL information on the interface: Enabled, Disabled, or NA (Not Available).
SSM Rx	Whether SSM is enabled for incoming QL information on the interface: Enabled, Disabled, or NA (Not Available).

Applying a Network Clock Service Overlay

A service overlay allows you to isolate the parts of a network that are being used by a particular service. This information can then be used for troubleshooting. For example, the overlay can highlight configuration or design problems when bottlenecks occur and all the site interlinks use the same link.

To apply a network clock overlay:

Step 1 In the Vision client, display the network map on which you want to apply an overlay.

Step 2 From the main toolbar, click **Choose Overlay Type** and choose **Network Clock**.

The Select Network Clock Service Overlay dialog box is displayed.

Step 3 Do one of the following:

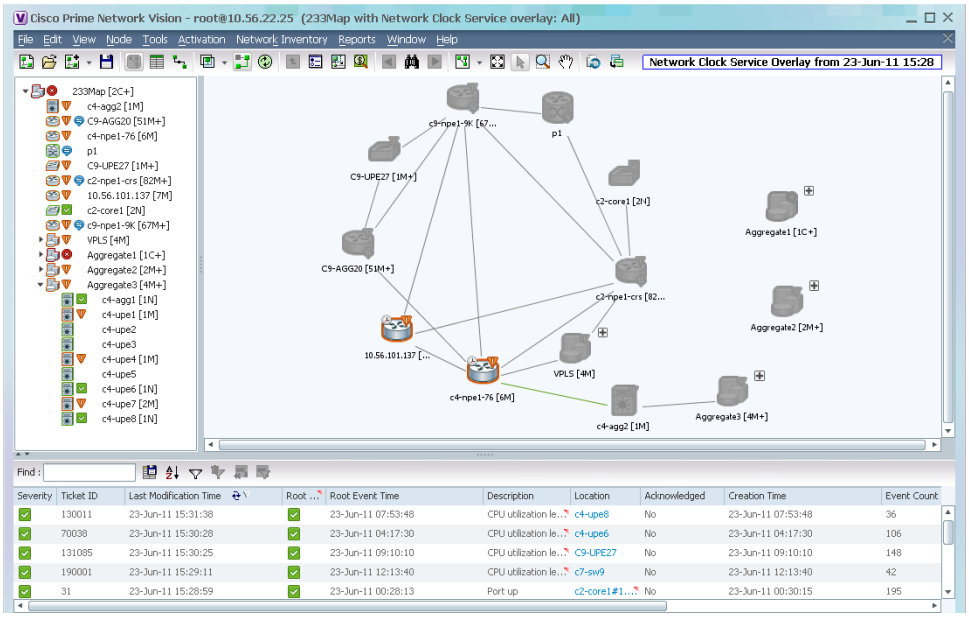
- Choose a search category, enter a search string, then click **Go** to narrow the search results to a range of network clock services or a specific network clock service. Search categories include:
  - Description
  - Name

  The search condition is “contains.” Search strings are case-insensitive. For example, if you choose the Name category and enter “net,” the Vision client displays VPNs “net” and “NET” in the names whether net appears at the beginning, middle, or at the end of the name: for example, Ethernet.
- Choose **Show All** to display all network clock services.

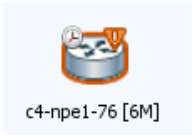
Step 4 Select the network clock service overlay that you want to apply to the map.

The elements and links used by the selected network clock are highlighted in the map, and the overlay name is displayed in the title of the window. (See Figure 26-24.)

Figure 26-24 Network Clock Service Overlay Example



In addition, the elements configured for clocking service display a clock service icon as in the following example:



Note An overlay is a snapshot taken at a specific point in time and does not reflect changes that occur in the service. As a result, the information in an overlay can become stale. To update the overlay, click **Refresh Overlay** in the main toolbar.

Viewing CEM and Virtual CEM Properties

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

- Viewing CEM Interfaces, page 26-50
- Viewing Virtual CEMs, page 26-50
- Viewing CEM Groups, page 26-50

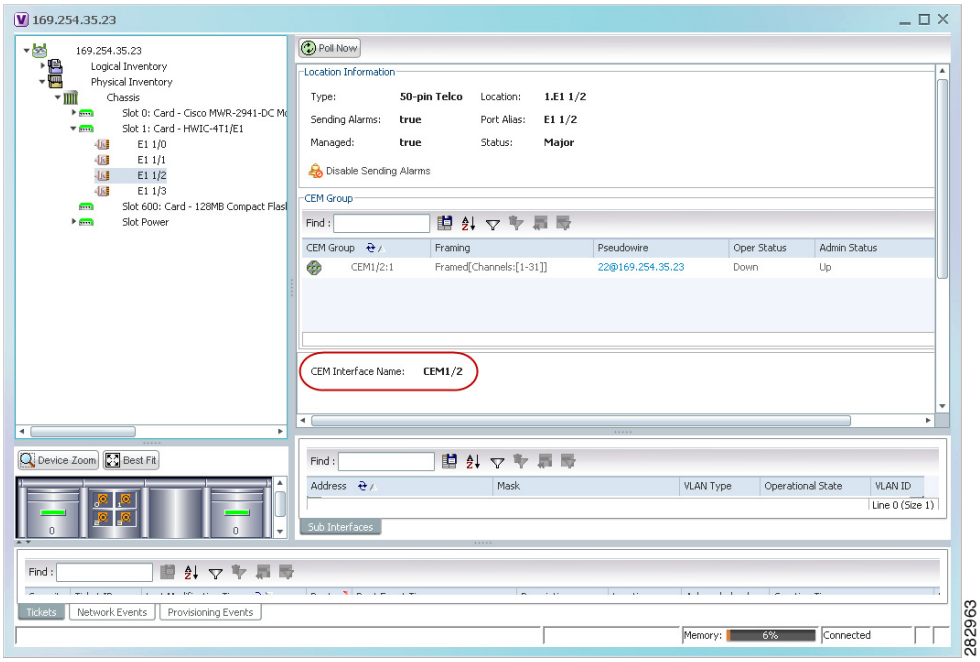
Viewing CEM Interfaces

To view CEM interfaces:

Step 1 In the Vision client, double-click the required device.

Step 2 In the **Inventory** window, choose **Physical Inventory > Chassis >** *slot* **>** *subslot* **>** *interface.* The CEM interface name is displayed in the content pane as shown in Figure 26-25.

Figure 26-25 CEM Interface



Viewing Virtual CEMs

To view virtual CEMs, choose **Logical Inventory > Clock > Pseudowire Clock Recovery**.

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 the Vision client:

- Viewing CEM Groups on Physical Interfaces, page 26-51
- Viewing CEM Groups on Virtual CEM Interfaces, page 26-52

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.

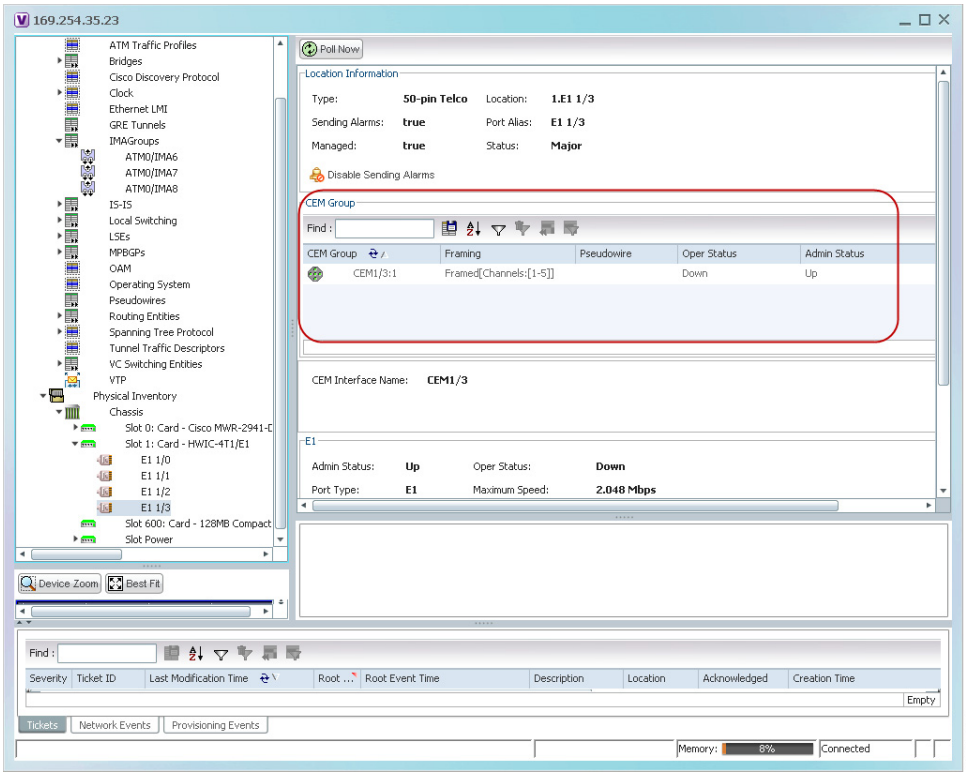
To view CEM groups configured on physical interfaces:

Step 1 In the Vision client, double-click the required device.

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

The CEM group information is displayed in the content pane with other interface properties (Figure 26-26).

Figure 26-26 CEM Group Information

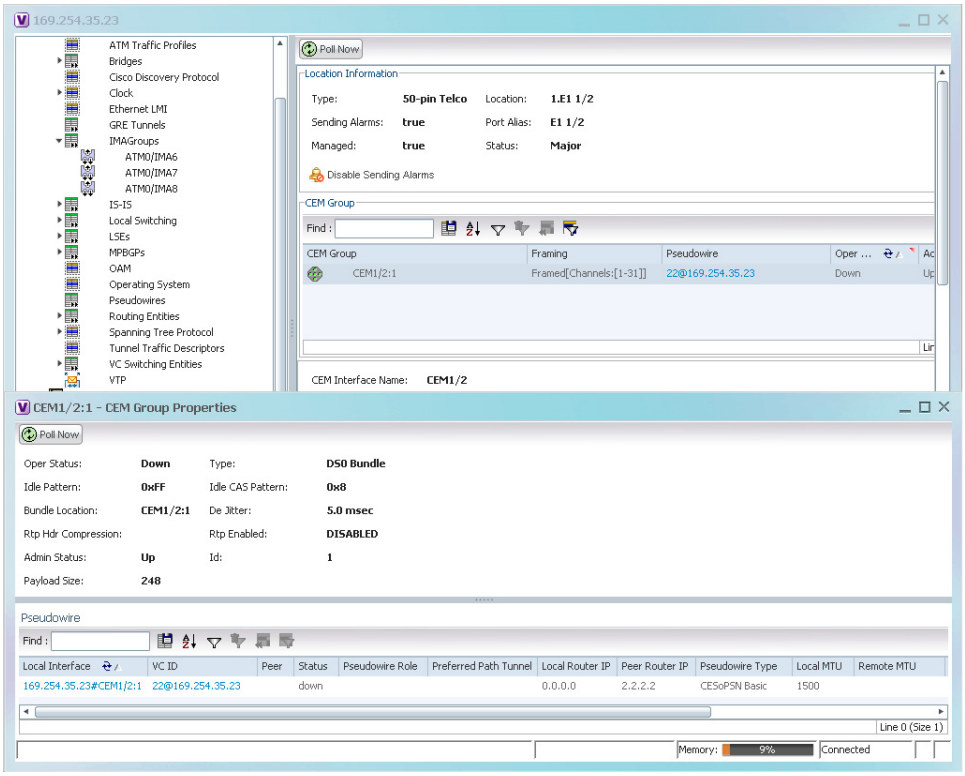


See Table 26-20 for a description of the properties displayed for CEM groups in the content pane.

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

The CEM Group Properties window is displayed as shown in Figure 26-27.

Figure 26-27 CEM Group Properties Window



See Table 17-29 on page 17-60for the properties displayed in the Pseudowire table in the CEM Group Properties window.

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.

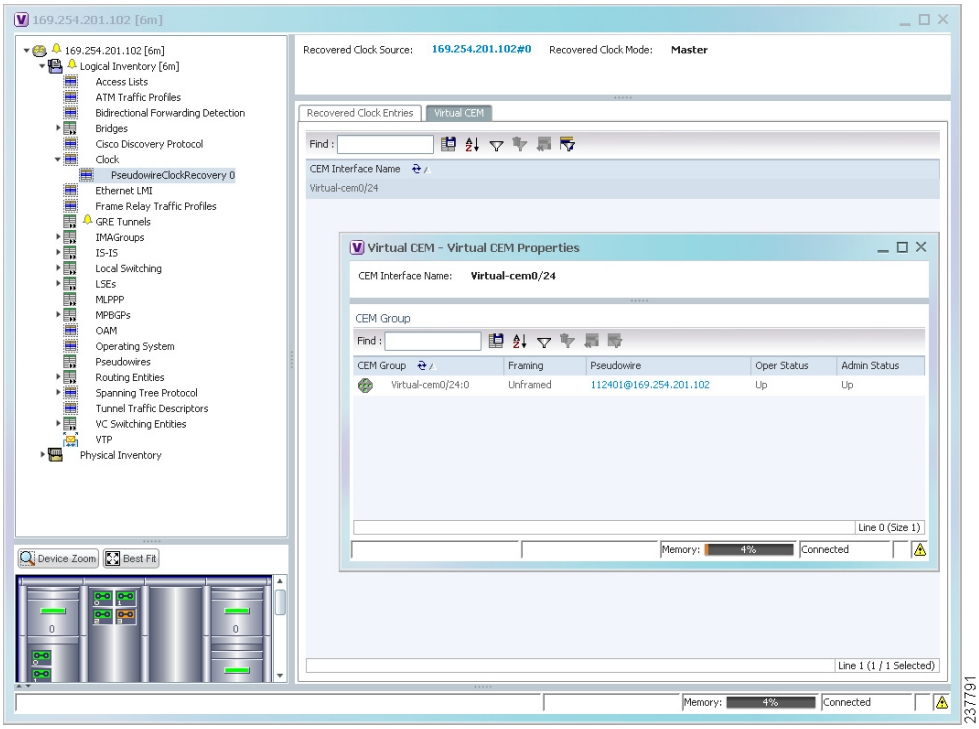
To view CEM groups on virtual CEM interfaces:

Step 1 In the Vision client, 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 26-28). If a pseudowire is configured on the CEM group for out-of-band clocking, the pseudowire VCID is also shown.

Figure 26-28 CEM Group Properties



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

Table 26-21 describes the information displayed in the CEM Group Properties window.

Configuring SONET

The table below lists the SONET commands can be launched from the inventory by right-clicking a SONET port and selecting **Commands > SONET**. Your permissions determine whether you can run these commands (see Permissions for Vision Client NE-Related Operations, page B-4). To find out if a device supports these commands, see the *Cisco Prime Network 5.0 Supported Cisco VNEs*.

Command	Navigation	Description
BER Threshold	*Right-click on SONET port and select* **Commands > SONET > Show**	Performed from command launch point
Controller Data		
TCA Threshold		
SDH Counters	**Clear > SONET**	N/A; performed from command launch point

Command	Navigation	Description
BER Threshold	*Right-click on SONET port and select* **Commands > SONET > Configure**	BER threshold: • sf-ber—Sets the signal failure BER threshold. Value in the range from 3 to 9. The default value is 6 • sd-ber—Sets the signal degrade BER threshold. Value in the range from 3 through 9. The default value is 3 Bit error rate: 3-9, or default. The default for sf-ber is 3, and the default for sd-ber is 9.
Line Counters	*Right-click on SONET port and select* **Commands > SONET > Show > PM**	Line type: farendline, farendline-history, line, or line-history History interval: 1-96; to view all, enter 0
Medium Counters		N/A; performed from command launch point Path type: farendpath, farendpath-history, path, path-history
Path Counters		Channelized path index: 1-48 (for a particular channel) or 0 (for all channels) History interval: 1-96; to view all, enter 0
Section Counters	*Right-click on SONET port and select* **Commands > SONET > Show > PM**	Section type: section or section-history History interval: 1-96; to view all, enter 0
Trace Details		Card location (for example, 0/5/CPU0) **Note** The device must be managed by Prime Network with device admin privileges.

Command	Navigation	Description
Clock Source	*Right-click on SONET port and select* **Commands > SONET > Configure**	Clock source of sent signal on SONET ports: • internal—Controller will clock its sent data using internal clock. • line—Controller will clock its sent data using the clock recovered from the line's receive data stream. • default—Cancels any clock source setting.
TCA Threshold		TCA threshold: • b1-tca—Threshold for B1 BER TCA, between 3-9 (default is 6). • b2-tca—Threshold for B2 BER TCA, between 3-9 (default is 6). Bit error rate: Value from 3-9 (10 to the negative x), or default.

Configuring Clock

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. SyncE and PTP are two widely used clock synchronization protocol used in ethernet based networks.

Clocking configuration commands allows you to configure SyncE and PTP clock configuration on Cisco router. SyncE and PTP clocking configuration is predominantly used in RAN Backhaul (or MToP) network where TDM traffic carried from cell site router to central office via packet switched network.

These commands can be launched from the logical inventory by right-clicking on **Clock** node. Your permissions determine whether you can run these commands (see Permissions for Vision Client NE-Related Operations, page B-4). To find out if a device supports these commands, see the *Cisco Prime Network 5.0 Supported Cisco VNEs*.

Command	Navigation	Description
Create PTP Clock Global	*Right-click* **Clock** *node* **> Commands > Configuration** *or* *Right-click* **Clock** *node* **> Commands > Configuration > PTP**	Identify the clock in the network with the highest priority. The clock with the highest priority is referred to as the master clock. All the other devices on the network synchronize their clocks with the master and are referred to as members. Constantly exchanged timing messages between master and members ensure continued synchronization. The PTP clock port commands are used to modify PTP on individual interfaces.
Modify PTP Clock Global	*Expand* **Clock** *node* **>** *right-click PTP Service* **> Commands > Configuration** *or* *Right-click* **Clock** *node* **> Commands > Configuration > PTP**	
Delete PTP Clock Global	*Expand* **Clock** *node* **>** *right-click PTP Service* **> Commands > Configuration**	
Create PTP Clock Port	*Expand* **Clock** *node* **>** *right-click PTP Service* **> Commands > Configuration**	
Show PTP Clock Global	*Expand* **Clock** *node* **>** *right-click PTP Service* **> Commands > Show**	
Modify PTP Clock Port **Delete PTP Clock Port**	*Expand* **Clock** *node* **>** *select* **PTP** *node* **>** *right-click on the selected PTP interface* **> Commands > Configuration**	
Create PTP Interface **Modify PTP Interface**	**Physical inventory > Chassis > Slot >** *Select an interface* **> Commands > Configuration > PTP**	
Create SyncE Global	*Right-click* **Clock** *node* **> Commands > Configuration**	Configure clock properties at the global level such as hold-off time, wait to restore, force switch, and so on, that helps routers to synchronize to the best available clock source. Configure SyncE at the interface level using the SyncE interface commands.
Modify SyncE Global	*Expand* **Clock** *node* **>** *right-click* **SyncE** **> Commands > Configuration** or *Right-click* **Clock** *node* **> Commands > Configuration**	
Create SyncE Interface **Modify SyncE Interface**	*Expand* **Clock** *node* **>** *right-click* **SyncE** **> Commands > Configuration** or **Physical inventory > Chassis > Slot >** *Select an interface* **> Commands > Configuration > SyncE**	

Command	Navigation	Description
Create ESMC Global **Modify ESMC Global**	*Expand* **Clock** *node* **>** *right-click* **SyncE > Commands > Configuration**	Configure ESMC for synchronous Ethernet (SyncE) clock synchronization on an interface.
Create ESMC Interface **Disable ESMC Interface**	*Expand* **Clock** *node* **>** *select* **SyncE >** *r*ight-click the *SyncE Interface from the content pane* **> Commands > Configuration**	
Modify ESMC Interface		

Configuring TDM and Channelization

The table below lists the supported TDM and channelization commands and how to launch them. Your permissions determine whether you can run these commands (see Permissions for Vision Client NE-Related Operations, page B-4). To find out if a device supports these commands, see the *Cisco Prime Network 5.0 Supported Cisco VNEs*.

Command	Navigation	Description
TDM Commands		
Configure Card Type	*Right-click the device* **> Commands > Configuration**	Configure the card type as SONET/SDH an specify the chassis, slot or the subslot number (for example, for Cisco ASR 9000 series devices). Configure the card type as E1, T1, and specify the location using slot and bay number (for example, for Cisco ASR 901 and Cisco ASR 903 devices).
Modify E1 Controller **Modify T1 Controller**	**Physical Inventory > Chassis > Slot >** *right-click on* **E1 or T1 > Commands > Configuration > E1T1** or **Physical Inventory > Chassis > Slot >** *click on* **SONET >** *double-click on a* **SONET/SDH High Order Path (HOP) >** *right-click* **LOP > Commands > Configuration > E1T1**	Configure E1 and T1 controller as part of the channelization when configuring the low order path (LOP) for the SONET controller (for example, for Cisco ASR 9000 series devices). Configure E1 or T1 controller in either of the following ways while configuring the card type or during the channelization when configuring the low order path (LOP) for the SONET (for example, for Cisco ASR 903 devices). Configure the card type to configure E1 or T1 controller (for example, for Cisco ASR 901 devices).

Command	Navigation	Description
Channelization Commands for SONET/SDH		
Note Channelization commands also include the TDM commands discussed above. Read the description to understand the scenario applicable to your device.		
Configure Framing	**Physical Inventory > Chassis > Slot > Subslot >** *right-click on SONET/SDH-interface* **> Commands > Configuration > SONET**	Configure SDH/SONET framing type using this command.
Configure AUG Mapping		Configuring framing as SDH, configures AU4 by default, but if you want to change the mode of operation as AU3, use the **AUG Mapping** command.
Configure Controller	**Physical Inventory > Chassis > Slot > Subslot >** *right-click on SONET interface* **> Commands > Configuration > SONET**	After configuring SONET/SDH type, configure the controller using additional parameters, like specifying the clock source.
Configure AU3	**Physical Inventory > Chassis > Slot > Subslot >** *click on SONET-interface* **>** right-click the *SONET/SDH HOP* **> Commands > Configuration**	Using these commands, you can configure the parameters for the SDH channelization. When you are configuring the channelized E1/T1 line card for SDH framing, configure AU-3 or AU-4 as the mode of operation. For SDH, both AU-3 and AU-4 AUG mappings are supported.
Delete AU3		
Configure AU4		
Delete AU4		If the AUG mapping is configured to be AU-4, then the following mapping will be used: TUG-3 <--> AU-4 <--> AUG If the mapping is configured to be AU-3, then the following mapping will be used: AU-3 <--> AUG
Configure TUG3 **Delete TUG3**	**Physical Inventory > Chassis > Slot > Subslot >** click on *SONET-interface* **>** *double-click on a* **SONET/SDH High Order Path (HOP) >** *right-click* **LOP > Commands > Configuration**	
Delete STS **Configure STS**	**Physical Inventory > Chassis > Slot > Subslot >** *click on SONET-interface* **>** right-click the *SONET/SDH HOP* **> Commands > Configuration**	Using these commands, you can configure the STS path attributes for the SONET channelization mode.

Configuring Automatic Protection Switching (APS)

APS refers to the mechanism of using a protect interface in the SONET network as the backup for working interface. When the working interface fails, the protect interface quickly assumes its traffic load. The working interfaces and their protect interfaces make up an APS group. SONET APS offers recovery from fiber (external) or equipment (interface and internal) failures at the SONET line layer.

The table below lists the supported APS commands. Your permissions determine whether you can run these commands (see Permissions for Vision Client NE-Related Operations, page B-4). To find out if a device supports these commands, see the *Cisco Prime Network 5.0 Supported Cisco VNEs*.

Command	Navigation	Description
Create APS	*Right-click on the device* > **Commands > Configuration > APS** or **Physical Inventory > Chassis >** *slot* **>** *subslot* **>** *SONET interface* **> Commands > Configuration > APS**	Adds an APS group with a specified number and assign a channel for the APS group. 0 designates a protect channel, and 1 designates a working channel.
Modify APS		