



# CHAPTER 19

## Monitoring MPLS Services

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The following topics describe how to view and manage aspects of Multiprotocol Label Switching (MPLS) services using Cisco Prime Network Vision (Prime Network Vision), including the MPLS service view, business configuration, and maps. The topics also describe the device inventory specific to MPLS VPNs, including routing entities, label switched entities (LSEs), BGP neighbors, Multiprotocol BGP (MP-BGP), VRF instances, pseudowires, and TE tunnels. Topics include:

- [User Roles Required to Work with MPLS Networks, page 19-1](#)
- [Working with MPLS-TP Tunnels, page 19-4](#)
- [Viewing VPNs, page 19-18](#)
- [Managing VPNs, page 19-21](#)
- [Working with VPN Overlays, page 19-24](#)
- [Monitoring MPLS Services, page 19-26](#)
- [Configuring VRF, page 19-53](#)
- [Configuring IP Interface, page 19-54](#)
- [Configuring MPLS-TP, page 19-54](#)
- [Configuring MPLS-TE, page 19-57](#)
- [Configuring MPLS, page 19-57](#)
- [Configuring RSVP, page 19-58](#)
- [Configuring BGP, page 19-59](#)
- [Configuring VRRP, page 19-60](#)
- [Configuring Bundle Ethernet, page 19-61](#)

## User Roles Required to Work with MPLS Networks

This topic identifies the roles that are required to work with MPLS networks. Prime Network determines whether you are authorized to perform a task as follows:

- For GUI-based tasks (tasks that do not affect elements), authorization is based on the default permission that is assigned to your user account.
- For element-based tasks (tasks that do affect elements), authorization is based on the default permission that is assigned to your account. That is, whether the element 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 Prime Network 3.10 Administrator Guide*.

The following tables identify the tasks that you can perform:

- [Table 19-1](#) identifies the tasks that you can perform if a selected element is **not in** one of your assigned scopes.
- [Table 19-2](#) identifies the tasks that you can perform if a selected element is **in** one of your assigned scopes.

By default, users with the Administrator role have access to all managed elements. To change the Administrator user scope, see the topic on device scopes in the *Cisco Prime Network 3.10 Administrator Guide*.

**Table 19-1** Default Permission/Security Level Required for Working with MPLS Networks - Element Not in User's Scope

Task	Viewer	Operator	OperatorPlus	Configurator	Administrator
<b>Working with Elements</b>					
Add tunnels to VPNs	—	X	X	X	X
Add VPNs to a map	—	—	X	X	X
Create VPNs	—	—	X	X	X
Move virtual routers between VPNs	—	X	X	X	X
Remove tunnels from VPNs	X	X	X	X	X
Remove VPNs from a map	—	—	X	X	X
<b>Viewing Element Properties</b>					
View 6RD properties	—	—	—	—	X
View BFD properties	—	—	—	—	X
View cross-VRF routing entries	—	—	—	—	X
View LSE properties	—	—	—	—	X
View MP-BGP information	—	—	—	—	X
View MPLS TE tunnel information	—	—	—	—	X
View MPLS-TP information	—	—	—	—	X
View port configurations	—	—	—	—	X
View pseudowire end-to-end emulation tunnels	—	—	—	—	X
View rate limit information	—	—	—	—	X
View the ARP table	—	—	—	—	X
View the NDP table	—	—	—	—	X
View VPN properties	X	X	X	X	X
View VPNs	X	X	X	X	X
View VRF egress and ingress adjacents	—	—	—	—	X
View VRF properties	—	—	—	—	X
<b>Working with Overlays</b>					
Add VPN overlays	X	X	X	X	X

**Table 19-1** *Default Permission/Security Level Required for Working with MPLS Networks - Element Not in User's Scope (continued)*

Task	Viewer	Operator	OperatorPlus	Configurator	Administrator
Display or hide VPN overlays	X	X	X	X	X
Remove VPN overlays	X	X	X	X	X

**Table 19-2** *Default Permission/Security Level Required for Working with MPLS Networks - Element in User's Scope*

Task	Viewer	Operator	OperatorPlus	Configurator	Administrator
<b>VPNs and VRFs</b>					
Add tunnels to VPNs	—	X	X	X	X
Add VPNs to a map	—	—	X	X	X
Create VPNs	—	—	X	X	X
Display VRF egress and ingress adjacents	—	—	—	—	X
Move virtual routers between VPNs	—	X	X	X	X
Remove tunnels from VPNs	X	X	X	X	X
Remove VPNs from a map	—	—	X	X	X
View VPN properties	X	X	X	X	X
View VPNs	X	X	X	X	X
View VRF properties	—	—	—	—	X
<b>VPN Overlays</b>					
Add VPN overlays	X	X	X	X	X
Display or hide VPN overlays	X	X	X	X	X
Remove VPN overlays	X	X	X	X	X
<b>Routing Entities</b>					
View the ARP table	X	X	X	X	X
View the NDP table	X	X	X	X	X
View rate limit information	X	X	X	X	X
<b>Other</b>					
View 6RD properties	X	X	X	X	X
View BFD properties	X	X	X	X	X
View cross-VRF routing entries	X	X	X	X	X
View LSE properties	X	X	X	X	X
View MP-BGP information	X	X	X	X	X
View MPLS TE tunnel information	X	X	X	X	X
View MPLS-TP information	X	X	X	X	X

**Table 19-2** *Default Permission/Security Level Required for Working with MPLS Networks - Element in User's Scope (continued)*

Task	Viewer	Operator	OperatorPlus	Configurator	Administrator
View port configurations	X	X	X	X	X
View pseudowire end-to-end emulation tunnels	X	X	X	X	X

## Working with MPLS-TP Tunnels

MPLS-Transport Profile (MPLS-TP) is considered to be the next generation transport for those using SONET/SDH TDM technologies as they migrate to packet-switching technology. Although still under definition by the IETF, MPLS-TP provides:

- Predetermined and long-lived connections.
- Emphasis on manageability and deterministic behavior.
- Fast fault detection and recovery.
- Inband OAM.

MPLS-TP features include:

- Manually provisioned MPLS-TP LSPs.
- Reserved bandwidth for static MPLS-TP LSPs.
- One-to-one path protection for MPLS-TP LSPs.
- Working/Protected LSP switchover.
- Continuity Check (CC), Proactive Continuity Verification (CV), and Remote Defect Indication (RDI) based on BFD.
- New fault OAM functions resulting from the MPLS-TP standardization effort.

Prime Network automatically discovers network MPLS-TP tunnels from end to end, including LSPs, tunnel endpoints, and bandwidth. Network LSPs contain LSP endpoints and midpoints and are identified as working or protected.

Prime Network links the MPLS-TP tunnel components appropriately, provides a visual representation in Prime Network Vision maps, and displays the properties in logical inventory.

Prime Network employs warm start technology when rebooting. That is, when rebooting, Prime Network compares existing MPLS-TP tunnel information to topology changes that occur while Prime Network is down and updates MPLS-TP tunnel accordingly when Prime Network returns to operation.

The following options are available for working with MPLS-TP tunnels in Prime Network Vision:

- [Adding an MPLS-TP Tunnel, page 19-5](#)
- [Viewing MPLS-TP Tunnel Properties, page 19-7](#)
- [Viewing LSPs Configured on an Ethernet Link, page 19-11](#)
- [Viewing LSP Endpoint Redundancy Service Properties, page 19-13](#)
- [Applying an MPLS-TP Tunnel Overlay, page 19-16](#)
- Viewing MPLS-TP BFD session properties—See [Viewing BFD Session Properties, page 19-47](#).

## Adding an MPLS-TP Tunnel

Prime Network Vision automatically discovers MPLS-TP tunnels, endpoints, and midpoints and enables you to add MPLS-TP tunnels to maps.

To add an MPLS-TP tunnel to a map:

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**Step 1** In Prime Network Vision, display the map to which you want to add the MPLS-TP tunnel.

**Step 2** Do either of the following:

- From the File menu, choose **Add to Map > MPLS-TP Tunnel**.
- In the main toolbar, click **Add to Map**, then choose **Add to Map > MPLS-TP Tunnel**.

The Add MPLS-TP Tunnel dialog box is displayed.

**Step 3** Do either of the following:

- Choose a search category, enter a search string, then click **Go** to narrow search results to a range of MPLS-TP tunnels or a specific MPLS-TP tunnel. Search categories include:
  - Description
  - Name
  - System Name
- Choose **Show All** to display all the MPLS-TP tunnels.

**Step 4** Select the MPLS-TP tunnel that you want to add to the map.

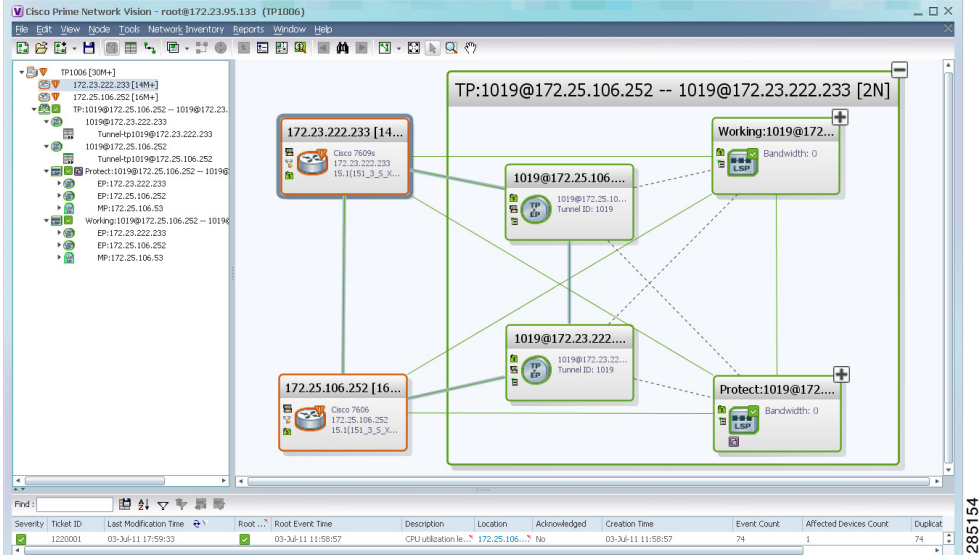
**Step 5** Click **OK**.

The MPLS-TP tunnel is added to the map and to the navigation pane.

In [Figure 19-1](#):

- The devices are on the left side of the map, and the MPLS-TP tunnel is displayed in a thumbnail on the right.
- The devices are connected to each other and to the MPLS-TP tunnel via tunnels.
- Physical links connect the devices to the Working and Protected LSPs.
- A redundancy service badge is displayed next to the Protected LSP in the navigation and map panes.
- In the thumbnail:
  - The tunnel endpoints are connected to each other via a tunnel.
  - A physical link connects the Working and Protected LSPs.
  - Business links connect the Working and Protected LSPs to each endpoint.

Figure 19-1 MPLS-TP Tunnel in Prime Network Vision Map

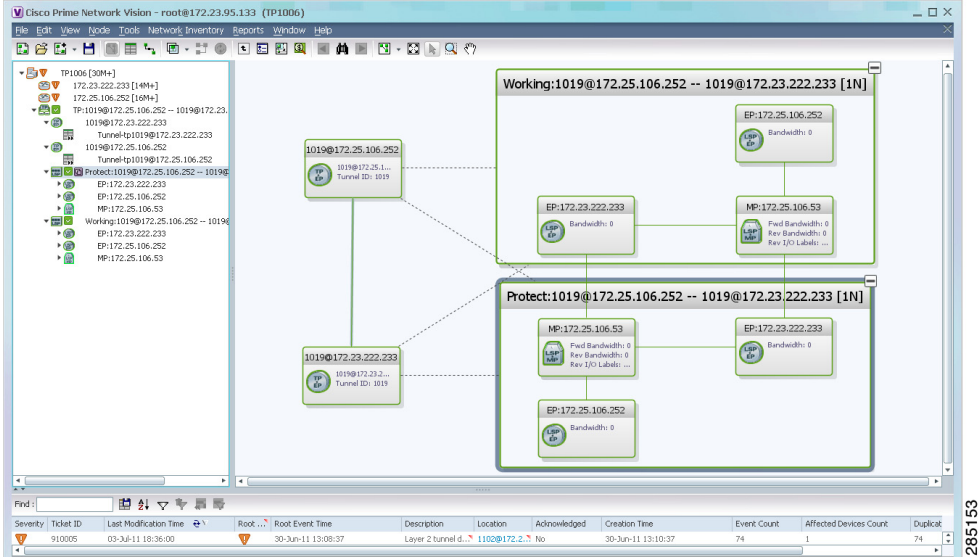


If an LSP is in lockout state, it is displayed with the lock badge (🔒).

By expanding all aggregations in the MPLS-TP tunnel (see Figure 19-2), you can see components and links in the MPLS-TP tunnel, including:

- MPLS-TP tunnel endpoints
- LSP endpoints
- LSP midpoints

Figure 19-2 MPLS-TP Tunnel Expanded



If an LSP is configured for redundancy service, a redundancy service badge is applied to the secondary (backup) LSP in the navigation and map panes in the navigation and map panes.

For more information about LSP redundancy service, see [Viewing LSP Endpoint Redundancy Service Properties](#), page 19-13.

## Viewing MPLS-TP Tunnel Properties

Prime Network Vision discovers and displays MPLS-TP attributes in the MPLS-TP branch in logical inventory as described in this topic.

Additional information about MPLS-TP tunnel properties are available in the following branches:

- Routing Entities—See [Viewing Routing Entities](#), page 19-31.
- LSEs—See [Viewing Label Switched Entity Properties](#), page 19-39.
- Pseudowires— See [Viewing Pseudowire End-to-End Emulation Tunnels](#), page 19-50.

To view MPLS-TP tunnel properties:

- Step 1** Right-click the required device in Prime Network Vision and choose **Inventory**.
- Step 2** In the logical inventory window, choose **Logical Inventory > MPLS-TP > MPLS-TP Global**. The routing information is displayed as shown in [Figure 19-3](#).

**Figure 19-3** MPLS-TP Tunnel Properties in Logical Inventory

ID	Tunnel Id	Admin Status	Oper Status	Bandwidth (kbps)	Description	Tunnel Name
Tunnel-tp40@c1-npe1-76	40	Up	Up	0		
Tunnel-tp50@c1-npe1-76	50	Up	Up	0		

[Table 19-3](#) describes the information that is available for MPLS-TP tunnels. The information that is displayed depends on the configuration.

**Table 19-3 MPLS-TP Tunnel Properties in Logical Inventory**

Field	Description
Global ID	Globally unique Attachment Interface Identifier (AII) for MPLS-TP derived from the Autonomous System Number (ASN) of the system hosting the PEs.
Router ID	MPLS-TP source node identifier for this element in the form of an IPv4 address.
Protection Mode	Whether the transmitting endpoint is in revertive or nonrevertive mode: <ul style="list-style-type: none"> <li>Revertive—If the protection mode is revertive and a failed path is restored, the traffic automatically returns, or reverts, to the original path.</li> <li>Nonrevertive—If the protection mode is nonrevertive and a failed path is restored, the traffic does not return to the original path. That is, the traffic does not revert to the original path.</li> </ul>
Redundancy Mode	Level of redundancy for the MPLS-TP tunnel: 1:1, 1+1, or 1:N.
<b>MPLS-TP Tunnel Endpoints Tab</b>	
ID	Tunnel endpoint identifier as a Tunnel-tp interface on the selected network element.
Tunnel ID	Unique tunnel identifier.
Admin Status	Administrative status of the tunnel: Up or Down.
Oper Status	Operational status of the tunnel: Up or Down.
Bandwidth (kbps)	Configured bandwidth (in Kb/s) for the tunnel.
Description	Tunnel description.
<b>TP Enabled Links Tab</b>	
Link ID	Identifier assigned to the MPLS-TP interface.
Interface	Hyperlink to the interface in physical inventory.
Next Hop	IP address of the next hop in the path.
<b>LSP End Points Tab</b>	
LSP ID	LSP identifier, derived from both endpoint identifiers and using the format <i>src-node-ID::src-tunnel-number::dest-node-ID::dest-tunnel-number</i> where: <ul style="list-style-type: none"> <li><i>src-node-ID</i> represents the identifier of the node originating the signal exchange.</li> <li><i>src-tunnel-number</i> represents source tunnel identifier.</li> <li><i>dest-node-ID</i> represents the identifier of the target node.</li> <li><i>dest-tunnel-number</i> represents the destination tunnel identifier.</li> </ul>
LSP Type	Indicates whether the LSP is active (Working) or backup (Protect).
In Label	Incoming label identifier.
Out Label	Outgoing label identifier.
Out Interface	Outgoing interface hyperlinked to the relevant entry in physical inventory.
Bandwidth (kbps)	Bandwidth specification in Kb/s.
Role (Oper Status)	Role of the LSP endpoint (Active or Standby) with the operational status (UP or DOWN).



**Table 19-3 MPLS-TP Tunnel Properties in Logical Inventory (continued)**

Field	Description
<b>LSP Mid Points Tab</b>	
LSP ID	LSP identifier, derived from both endpoint identifiers and using the format <i>src-node-ID::src-tunnel-number::dest-node-ID::dest-tunnel-number</i> where: <ul style="list-style-type: none"> <li>• <i>src-node-ID</i> represents the identifier of the node originating the signal exchange.</li> <li>• <i>src-tunnel-number</i> represents source tunnel identifier.</li> <li>• <i>dest-node-ID</i> represents the identifier of the target node.</li> <li>• <i>dest-tunnel-number</i> represents the destination tunnel identifier.</li> </ul>
LSP Type	Indicates whether the LSP is active (Working) or backup (Protect).
Forward In Label	Incoming label identifier in the forward direction (source to destination).
Forward Out Label	Label selected by the next hop device in the forward direction.
Reverse In Label	Incoming label identifier in the reverse direction (destination to source).
Reverse Out Label	Label selected by the next hop device in the reverse direction.
Forward Out Interface	Outgoing interface in the forward direction, hyperlinked to its entry in physical inventory.
Forward Bandwidth (kbps)	Bandwidth specification in Kb/s for the forward direction.
Reverse Out Link ID	Link identifier assigned to the outgoing interface in the reverse direction.
Reverse Out Interface	Outgoing interface in the reverse direction, hyperlinked to its entry in physical inventory.
Reverse Bandwidth	Bandwidth specification in Kb/s for the reverse direction.
Internal ID	Identifier associated with the parent entity of the link. Using an internal identifier ensures that individual LSP links do not participate in multiple network LSPs.

**Step 3** To view additional MPLS-TP tunnel endpoint properties, double-click the required entry in the MPLS-TP Tunnel Endpoints table.

The MPLS-TP Tunnel Properties window is displayed as shown in [Figure 19-4](#).

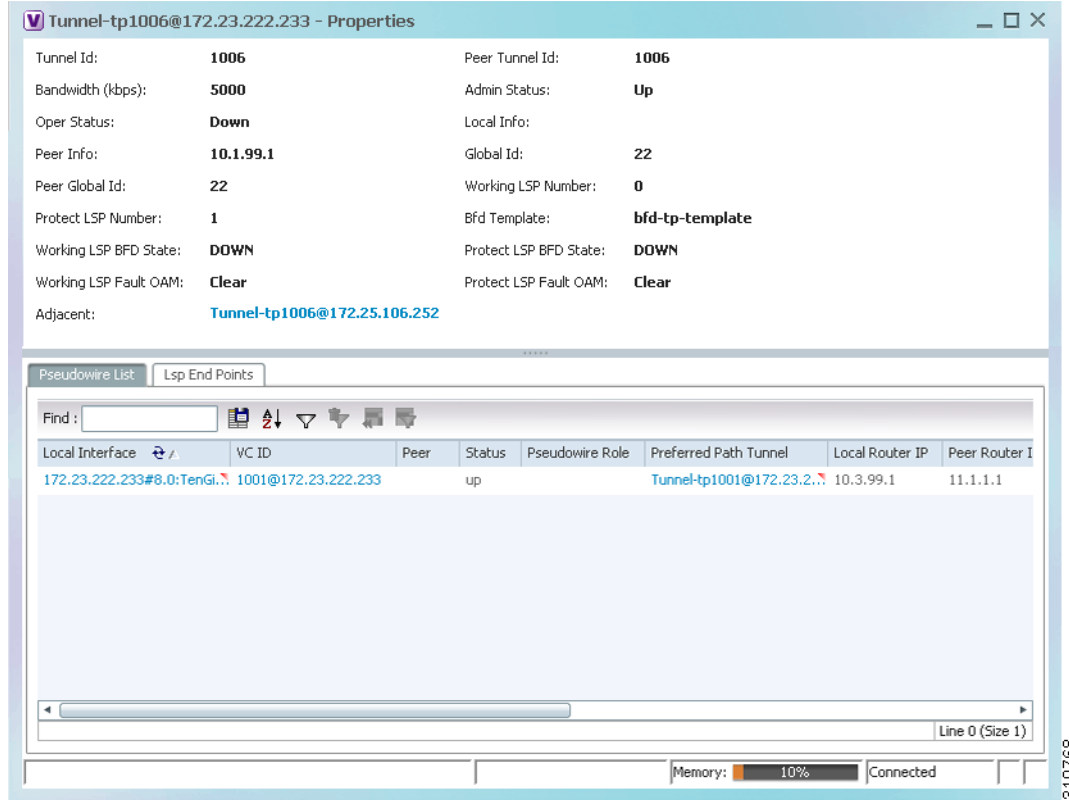
**Figure 19-4** MPLS-TP Tunnel Properties Window

Table 19-4 describes the information available in the top portion of the MPLS-TP Tunnel Properties window. For information about the tabs that are displayed, see Table 19-3.

**Table 19-4** MPLS-TP Tunnel Properties Window

Field	Description
Tunnel ID	Unique tunnel identifier.
Peer Tunnel ID	Unique identifier of peer tunnel.
Bandwidth (kbps)	Configured bandwidth (in Kb/s) for the tunnel.
Admin Status	Administrative status of the tunnel: Up or Down.
Oper Status	Operational status of the tunnel: Up or Down.
Local Info	MPLS-TP source node identifier for this element in the form of an IPv4 address.
Peer Info	MPLS-TP peer node identifier in the form of an IPv4 address.
Global ID	Globally unique Attachment Interface Identifier (AII) for MPLS-TP derived from the Autonomous System Number (ASN) of the system hosting the PEs.
Peer Global ID	Globally unique AII for the peer.
Working LSP Number	Number assigned to the working LSP. By default, the working LSP number is 0 and the protected LSP number is 1.

**Table 19-4** *MPLS-TP Tunnel Properties Window (continued)*

Field	Description
Protect LSP Number	Number assigned to the protected LSP. By default, the working LSP number is 0 and the protected LSP number is 1.
BFD Template	BFD template associated with this MPLS-TP tunnel.
Working LSP BFD State	Configured state of the working LSP BFD template: Up or Down.
Protect LSP BFD State	Configured state of the protected LSP BFD template: Up or Down.
Working LSP Fault OAM	Indicates that a fault has been detected on the working LSP.
Protect LSP Fault OAM	Indicates that a fault has been detected on the protected LSP.
Tunnel Name	Tunnel name.
Adjacent	Hyperlink to the adjacent endpoint in logical inventory.

## Viewing LSPs Configured on an Ethernet Link

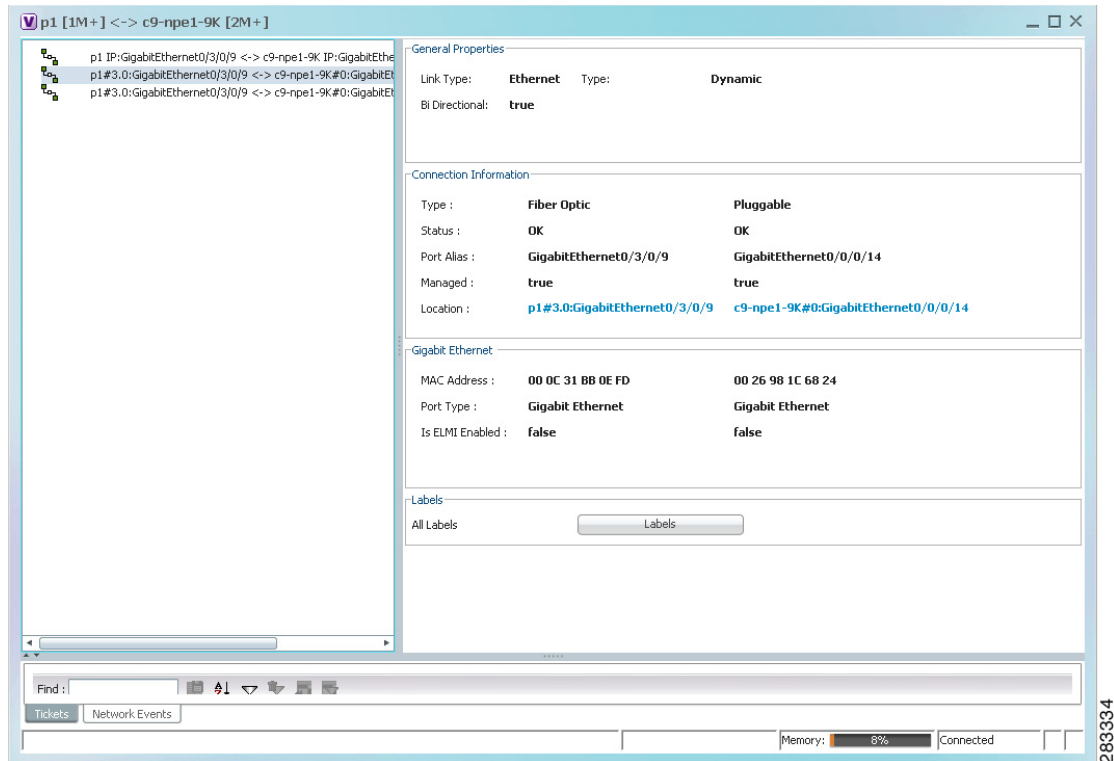
A single Ethernet link can support a number of LSPs. Prime Network Vision enables you to view all LSPs on a single Ethernet link and to identify the source and destination labels.

To view LSPs configured on an Ethernet link:

- 
- Step 1** In the map view, right-click the required link and choose **Properties**.
  - Step 2** In the link properties window, choose the required Ethernet link.

The link properties window refreshes and displays the Labels button as shown in [Figure 19-5](#).

Figure 19-5 Link Properties Window with All Labels Button

**Step 3** Click **Labels**.

The All Labels window is displayed as shown in Figure 19-6 with the LSP sources and destinations.

Figure 19-6 All Labels Table

Object ID	In Label	Out Label
172.25.106.252#LSP Id: 111::10.1.99.1...	114	111
172.25.106.252#LSP Id: 111::10.1.99.1...	118	115
172.25.106.252#LSP Id: 111::10.1.99.1...	124	121
172.25.106.252#LSP Id: 111::10.1.99.1...	134	131
172.25.106.252#LSP Id: 111::10.1.99.1...	138	135
172.25.106.252#LSP Id: 111::10.1.99.1...	148	145
172.25.106.252#LSP Id: 111::10.1.99.1...	154	151
172.25.106.252#LSP Id: 111::10.1.99.1...	158	155
172.25.106.252#LSP Id: 111::10.1.99.1...	164	161
172.25.106.252#LSP Id: 111::10.1.99.1...	168	165
172.25.106.252#LSP Id: 111::10.1.99.1...	174	171
172.25.106.252#LSP Id: 111::10.1.99.1...	294	291
172.25.106.252#LSP Id: 111::10.1.99.1...	298	295
172.25.106.252#LSP Id: 111::10.1.99.1...	304	301
172.25.106.252#LSP Id: 111::10.1.99.1...	308	305
172.25.106.252#LSP Id: 111::10.1.99.1...	324	321
172.25.106.252#LSP Id: 111::10.1.99.1...	328	325
172.25.106.252#LSP Id: 111::10.1.99.1...	524	521

Object ID	In Label	Out Label
172.25.106.53#LSP Id: 111::10.1.99.1...	111	112
172.25.106.53#LSP Id: 111::10.1.99.1...	111	112
172.25.106.53#LSP Id: 111::10.1.99.1...	111	112
172.25.106.53#LSP Id: 111::10.1.99.1...	111	112
172.25.106.53#LSP Id: 111::10.1.99.1...	115	116
172.25.106.53#LSP Id: 111::10.1.99.1...	121	322
172.25.106.53#LSP Id: 111::10.1.99.1...	121	122
172.25.106.53#LSP Id: 111::10.1.99.1...	141	142
172.25.106.53#LSP Id: 111::10.1.99.1...	145	146
172.25.106.53#LSP Id: 111::10.1.99.1...	151	152
172.25.106.53#LSP Id: 111::10.1.99.1...	161	162
172.25.106.53#LSP Id: 111::10.1.99.1...	165	166
172.25.106.53#LSP Id: 111::10.1.99.1...	171	172
172.25.106.53#LSP Id: 111::10.1.99.1...	191	192
172.25.106.53#LSP Id: 111::10.1.99.1...	291	292
172.25.106.53#LSP Id: 111::10.1.99.1...	295	296
172.25.106.53#LSP Id: 111::10.1.99.1...	325	326
172.25.106.53#LSP Id: 111::10.1.99.1...	521	522
172.25.106.53#LSP Id: 111::0.0.0.0:2...	901	902

- Step 4** To identify a specific path, click an outgoing label in the Source table. The corresponding in label is selected in the Destination table.

## Viewing LSP Endpoint Redundancy Service Properties

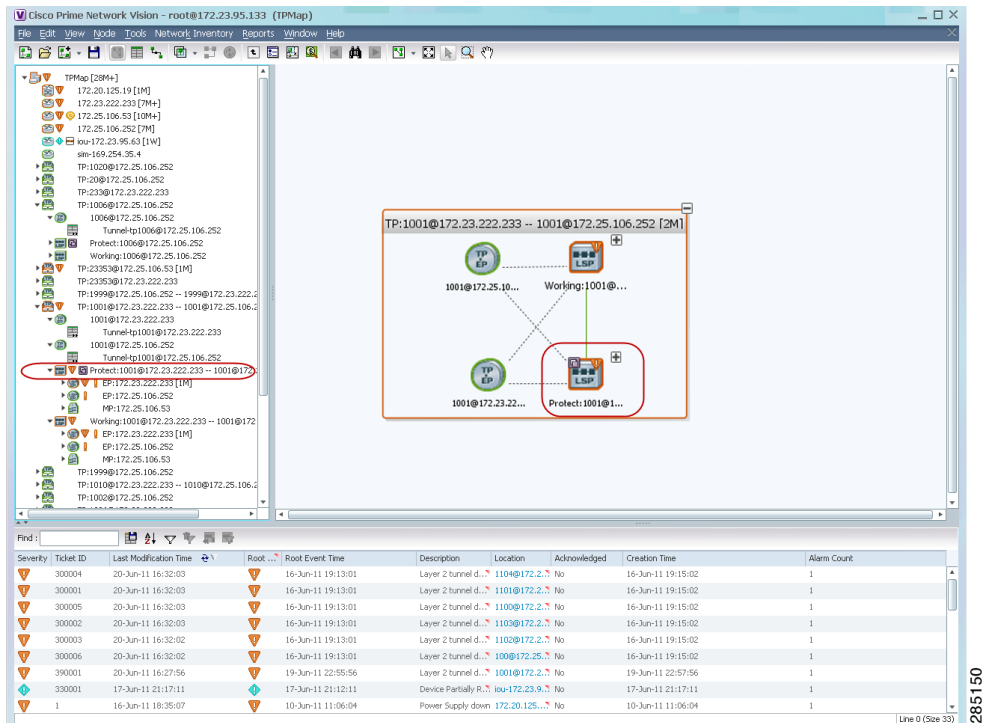
If an LSP endpoint in an MPLS-TP tunnel is configured for redundancy service, a redundancy service badge is applied to the secondary (backup) LSP endpoint in the navigation and map panes in Prime Network Vision. Additional redundancy service details are provided in the LSP endpoint properties window and the inventory window for the element on which the MPLS-TP tunnel is configured.

To view LSP endpoint redundancy service properties:

- Step 1** To determine if an LSP endpoint on an MPLS-TP tunnel is configured for redundancy service, expand the required MPLS-TP tunnel in the navigation or map pane.

If the LSP endpoint is configured for redundancy service, the redundancy service badge is displayed in the navigation and map panes as shown in [Figure 19-7](#).

Figure 19-7 LSP Endpoint with Redundancy Service Badge



**Step 2** To view properties for the LSP endpoint, navigate to and right-click the required endpoint in the map or navigation pane, and choose **Properties**.

The LSP endpoint properties window is displayed as shown in Figure 19-8.

Figure 19-8 LSP Endpoint Properties Window

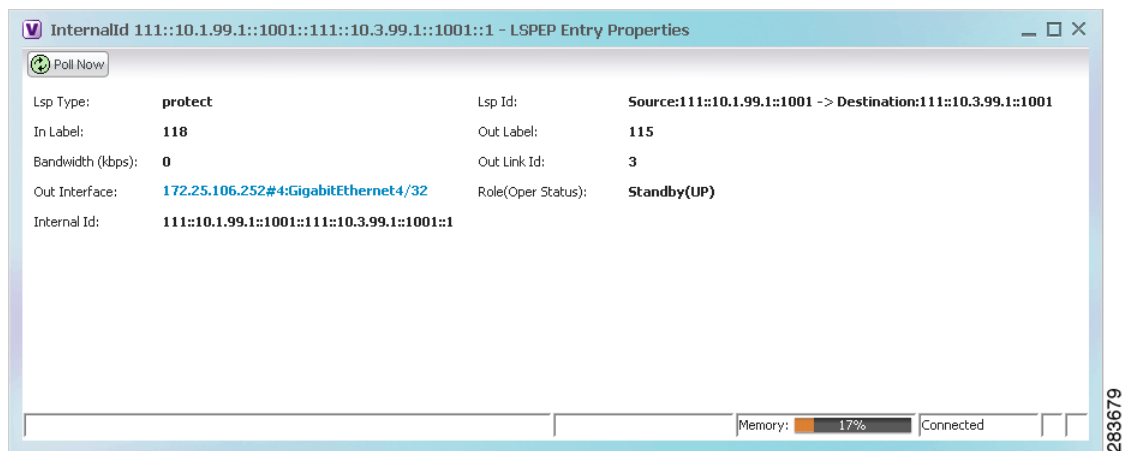


Table 19-5 describes the information displayed in the LSP Endpoint Properties window.

**Table 19-5 LSP Endpoint Properties Window**

Field	Description
LSP Type	Indicates whether the LSP is active (Working) or backup (Protected).
LSP ID	LSP identifier, derived from both endpoint identifiers and using the format <i>src-node-ID::src-tunnel-number::dest-node-ID::dest-tunnel-number</i> where: <ul style="list-style-type: none"> <li><i>src-node-ID</i> represents the identifier of the node originating the signal exchange.</li> <li><i>src-tunnel-number</i> represents source tunnel identifier.</li> <li><i>dest-node-ID</i> represents the identifier of the target node.</li> <li><i>dest-tunnel-number</i> represents the destination tunnel identifier.</li> </ul>
In Label	Incoming label identifier.
Out Label	Outgoing label identifier.
Bandwidth (kbps)	Bandwidth specification in Kb/s.
Out Link ID	Link identifier assigned to the outgoing interface.
Out Interface	Outgoing interface hyperlinked to the relevant entry in physical inventory.
Role (Oper Status)	Role of the LSP endpoint (Active or Standby) with the operational status (UP or DOWN)

**Step 3** To view LSP endpoint redundancy status in inventory, double-click the element on which the MPLS-TP tunnel is configured.

**Step 4** Choose **Logical Inventory > MPLS-TP > MPLS-TP Global > LSP End Points**.

**Step 5** The LSP End Points tab contains the following information related to LSP redundancy service (see [Figure 19-9](#)):

- Whether the LSP endpoint is Working or Protected.
- The LSP endpoint role, either Active or Standby.
- The operational status of the LSP endpoint, either Up or Down.

Figure 19-9 LSP End Points Tab in Logical Inventory

The screenshot shows the Cisco Prime Network Vision interface for a device with IP 172.25.106.53. The main window displays the 'LSP End Points' tab. The table below shows the LSP endpoints:

Lsp Id	Lsp Type	In Label	Out Label	Out Interface	Bandwidth (kbps)	Role(Oper Status)	Internal Id
Source:22:10.2.99.1:23353 -> Destina...	working	5441	5144	172.25.106.53#2:TenGigabitEthernet2/1	0	Active(DOWN)	22:10.2.99.1:23353:122...
Source:22:1.1.1.1:14 -> Destination:2...	working	144	5014	172.25.106.53#2:TenGigabitEthernet2/1	0	Active(DOWN)	22:1.1.1.1:14:22:4.4...
Source:22:10.2.99.1:23353 -> Destina...	protect	5389	5983	172.25.106.53#2:TenGigabitEthernet2/2	0	Standby(DOWN)	22:10.2.99.1:23353:122...

Below the table, an event log shows a 'LSP down' event for the 'protect' LSP:

Severity	Ticket ID	Last Modification Time	Root ...	Root Event Time	Description	Location	Acknowledged	Creation Time	Event Count	Affected Devices Count
Warning	290002	16-Jun-11 17:50:19		16-Jun-11 17:49:19	LSP down	172.25.106...	No	16-Jun-11 17:50:19	1	1

## Applying an MPLS-TP Tunnel Overlay

You can select and display an overlay of a specific MPLS-TP tunnel on top of the devices displayed in a map view. The overlay is a snapshot of the network that visualizes the flows between the sites and tunnel peers. When an MPLS-TP tunnel is selected in the map, the following elements are highlighted in the map:

- Elements on which TP endpoints and LSPs are configured.
- Links that carry TP traffic.

All elements and links that are not part of the MPLS-TP tunnel are dimmed.

To apply an MPLS-TP tunnel overlay:

- Step 1** In Prime Network Vision, display the network map on which you want to apply an overlay.
- Step 2** From the main toolbar, click **Choose Overlay Type** and choose **MPLS-TP tunnel**. The Select MPLS-TP tunnel 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 MPLS-TP tunnels or a specific MPLS-TP tunnel. Search categories include:
    - Description
    - Name
    - System Name



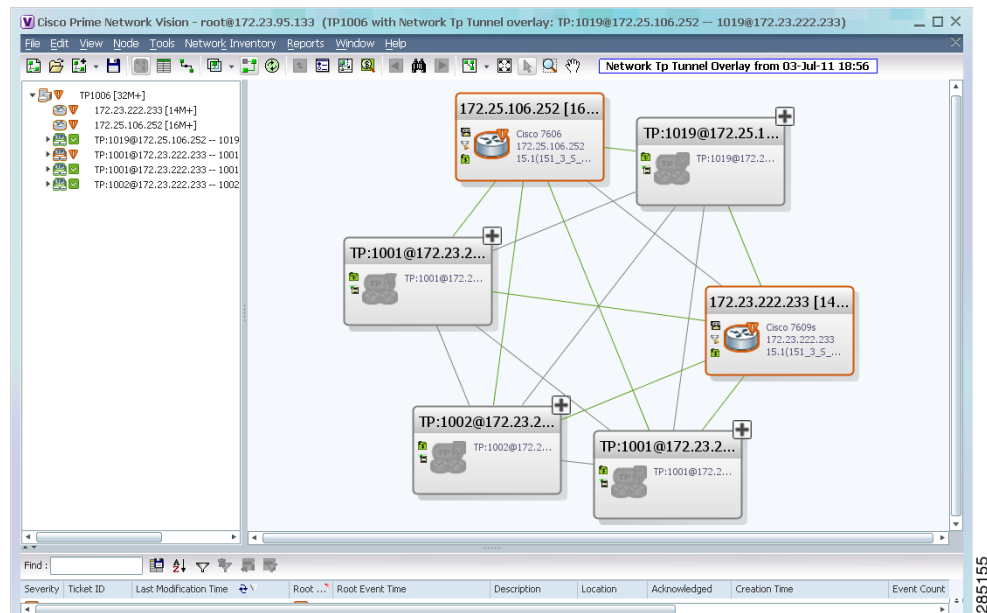
The search condition is “contains.” Search strings are case-insensitive. For example, if you choose the Name category and enter “net,” Prime Network Vision displays MPLS-TP tunnels that have “net” in their names whether net appears at the beginning of the name, the middle, or at the end: for example, Ethernet.

- Choose **Show All** to display all MPLS-TP tunnels.

**Step 4** Select the MPLS-TP tunnel overlay you want to apply to the map.

The elements and links used by the selected MPLS-TP tunnel are highlighted in the network map, and the MPLS-TP tunnel name is displayed in the window title bar as shown in [Figure 19-10](#).

**Figure 19-10** MPLS-TP Tunnel Overlay



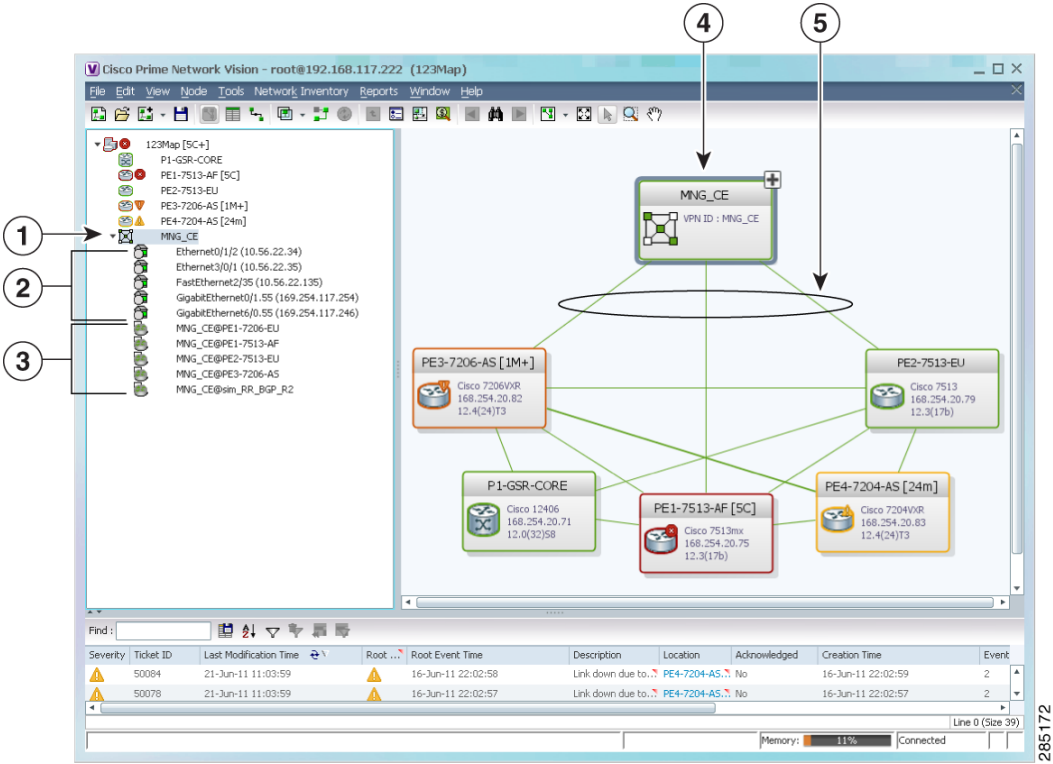
**Note**

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 VPNs

Figure 19-11 shows a VPN displayed in the Prime Network Vision map view. In this example, the VPN is selected in the navigation pane, so the VPN details, such as virtual routers and IP interfaces, are not shown in the map view.

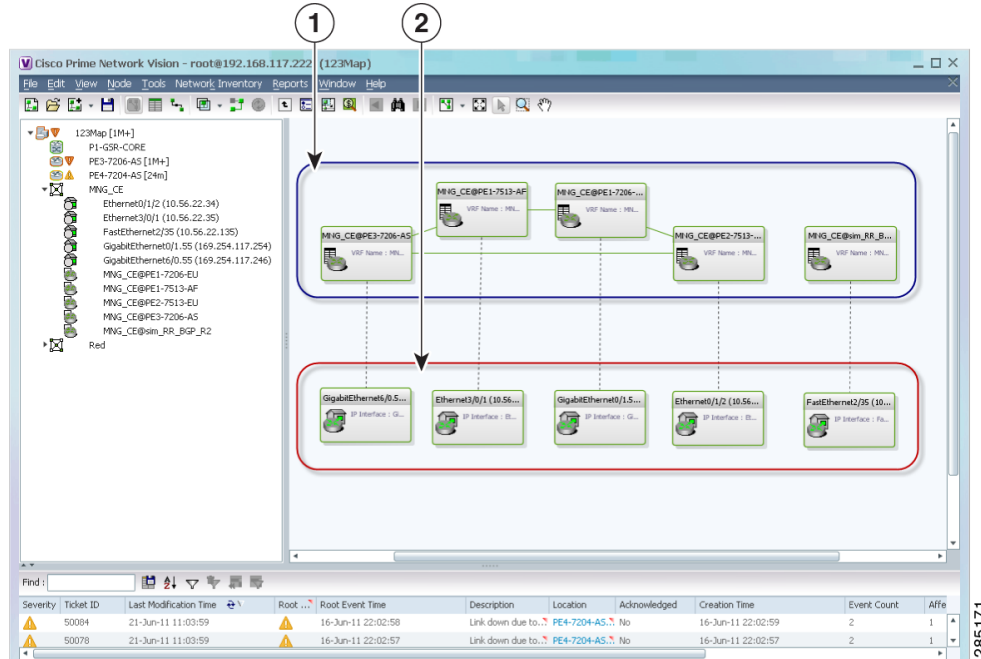
Figure 19-11 VPN in Prime Network Vision Map View



1	VPN in the navigation tree	4	VPN in the map view
2	Sites	5	VPN links
3	Virtual routers		

Figure 19-12 shows a VPN with details, including virtual routers and sites, in the Prime Network Vision map view.

Figure 19-12 VPN in Prime Network Vision Map View with VRFs and Sites







1	Virtual routers
2	Sites

The Prime Network Vision navigation pane displays the VPN business elements in a tree-and-branch representation. Each business element is represented by an icon in a color that reflects the highest alarm severity. The icon might also have a management state badge or alarm. For more information about icon severity colors and badges, see [Prime Network Vision Status Indicators](#), page 2-16.

Table 19-6 shows the VPN icons in the Prime Network Vision map view.

**Table 19-6** VPN Icons in Prime Network Vision Map View

Icon	Description
	Root (map name) or aggregation
	VPN
	Virtual router
	Site

The highest level of the navigation pane displays the root or map name. The branches display the VPN and aggregated business elements as well as their names. The Layer 3 VPN sub-branch displays the virtual routers and sites contained in the VPN along with the names of the business elements. In addition, CE devices can be displayed in the Layer 2 and Layer 3 VPN sub-branches. If you select an aggregated business element in the navigation pane, the map view displays the business elements contained within the aggregated business element.

The Prime Network Vision map view displays the VPN business elements and aggregated business elements loaded in the map view, along with the names of the business elements. In addition, the map view displays the VPN topology (between the virtual routers in the VPNs) and the topology and associations between other business elements. After you select the root in the navigation pane, the map view displays all the VPNs.

Prime Network Vision presents tickets related to the map in the ticket area, which allows you to view and manage the VPN tickets.

## Viewing Additional VPN Properties

Prime Network Vision allows you to select any element in the navigation pane or map view and view additional underlying properties. To view additional properties for an object, either double-click it or right-click it and choose **Properties**. Table 19-7 shows the additional properties available for VPN entities.

**Table 19-7** Displaying Additional VPN Properties

Object	Option	For Additional Information
VPN	<ul style="list-style-type: none"> <li>Double-click a VPN to view the participating VRFs, sites, and network elements in the navigation pane and map view.</li> <li>Right-click a VPN and choose <b>Properties</b> to view the VPN Properties window.</li> </ul>	<a href="#">Viewing VPN Properties, page 19-26</a>
VRF	Double-click a VRF to view the VRF properties window.	<a href="#">Viewing VRF Properties, page 19-27</a>

**Table 19-7** *Displaying Additional VPN Properties (continued)*

Object	Option	For Additional Information
Site	Double-click a site to view the IP Interface Properties window	<a href="#">Viewing Site Properties, page 19-27</a>
Link	Double-click a link to view the link properties window. The properties that are depend on the link type.	<a href="#">Chapter 6, “Working with Links”</a>

## Managing VPNs

The following topics describe:

- [Creating a VPN, page 19-21](#)
- [Adding a VPN to a Map, page 19-22](#)
- [Removing a VPN from a Map, page 19-23](#)
- [Moving a Virtual Router Between VPNs, page 19-23](#)

## Creating a VPN

You can change business configurations by manually creating VPNs. The VPNs that are manually created do not contain virtual routers and sites.

To create a VPN:

---

**Step 1** In the Prime Network Vision navigation pane, select the map root.

**Step 2** From the File menu, choose **Add to Map > VPN > New**.

**Step 3** In the Create VPN dialog box, enter the following:

- Name—A unique name for the new VPN.




---

**Note** VPN business element names are case sensitive.

---

- Icon—To use a custom icon for the VPN, click the button next to the Icon field and navigate to the icon file.




---

**Note** If a path is not specified to an icon, the default VPN icon is used (for more information about icons, see [Table 19-6 on page 19-20](#)).

---

- Description—(Optional) An additional VPN description.

**Step 4** Click **OK**.

The new VPN is added to the VPN list in the Add VPN dialog box.

---

For more information about loading the newly created VPN in the service view map, see [Adding a VPN to a Map, page 19-22](#).

## Adding a VPN to a Map

You can add a VPN to a map view if the VPN was previously created by a user or discovered by Prime Network Vision and are not currently displayed in the map.

**Note**

---

Adding a VPN affects other users if they are working with the same map.

---

To add an existing VPN to a map:

---

**Step 1** In Prime Network Vision, display the map to which you want to add the VPN.

**Step 2** Do either of the following:

- From the File menu, choose **Add to Map > VPN > Existing**.
- In the main toolbar, click **Add to Map**, then choose **Add to Map > VPN > Existing**.

The Add VPN dialog box is displayed.

**Step 3** Do either of the following:

- Choose a search category, enter a search string, then click **Go** to narrow search results to a range of VPNs or a specific VPN. Search categories include:
  - Description
  - Name
- Choose **Show All** to display all the VPNs.

The search condition is “contains.” Search strings are case-insensitive. For example, if you choose the Name category and enter “net,” Prime Network Vision displays VPNs that have “net” in their names whether at the beginning of the name, the middle, or the end.

**Step 4** Select the VPN that you want to add to the map.

**Tip**

---

Press **Shift** or **Ctrl** to choose multiple adjoining or nonadjoining VPNs.

---

**Step 5** Click **OK**.

The VPN is displayed in the navigation pane and the selected map or subnetwork in the Prime Network Vision window content pane. In addition, any tickets are displayed in the ticket area.

---

## Removing a VPN from a Map

You can remove one or more VPNs from the current active map. This change does not affect other maps. Removing a VPN from a map does not remove it from the Prime Network Vision database. The VPN will appear in the Add VPN dialog box, so you can add it back to the map at any time.

When removing VPNs from maps, keep the following in mind:

- Removing a VPN affects other users if they are working with the same map view.
- This option does not change the business configuration or database.
- You cannot remove virtual routers or sites from the map without removing the VPN.

To remove a VPN, in the Prime Network Vision pane or map view, right-click the VPN and choose **Remove from Map**.

The VPN is removed from the map view along with all VPN elements, such as connected CE devices. Remote VPNs (extranets) are not removed.

**Note**

If the routing information changes after an overlay is applied, the changes do not appear in the current overlay. Click **Refresh Overlay** to update the routing information.

## Moving a Virtual Router Between VPNs

You can move a virtual router (including its sites) from one VPN to another after you create a VPN and add it to the service view map.

**Note**

Moving a virtual router moves all of its sites as well.

To move a virtual router:

- Step 1** In the Prime Network Vision navigation pane or map, right-click the virtual router and choose **Edit > Move selected**.
- Step 2** Right-click the required VPN in the navigation pane or map to where you want to move the virtual router and choose **Edit > Move here**.

**Caution**

Moving a virtual router from one VPN to another affects all users who have the virtual router loaded in their service view map.

The virtual router and its sites are displayed under the selected VPN in the navigation pane and in the map.

# Working with VPN Overlays

The following topics describe:

- [Applying VPN Overlays, page 19-24](#)
- [Managing a VPN Overlay Display in the Map View, page 19-25](#)
- [Displaying VPN Callouts in a VPN Overlay, page 19-25](#)

## Applying VPN Overlays

You can select and display an overlay of a specific VPN on top of the devices displayed in a map view. The overlay is a snapshot of the network that visualizes the flows between the sites and tunnel peers. When one network VPN is selected in the network map, the PE routers, MPLS routers, and physical links that carry the LSP used by the VPN are highlighted in the network map. All the devices and links that are not part of the VPN are dimmed.

The VPN 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 VPN overlay:

- 
- Step 1** In Prime Network Vision, display the network map on which you want to apply an overlay.
- Step 2** From the main toolbar, click **Choose Overlay Type** and choose **VPN**.  
The Select VPN 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 VPNs or a specific VPN. 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,” Prime Network Vision displays VPNs that have “net” in their names whether net appears at the beginning of the name, the middle, or at the end: for example, Ethernet.
  - Choose **Show All** to display all the VPNs.
- Step 4** Select the VPN overlay that you want to apply to the map.  
The PE routers, MPLS routers, and physical links used by the selected VPN are highlighted in the network map. The VPN name is displayed in the title of the window.
- 

**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.

---



## Managing a VPN Overlay Display in the Map View

After a VPN overlay is applied to a map, you can manage its display by using the overlay tools in the main toolbar:

- To display the overlay, click **Show Overlay** on the main toolbar.
- To hide an active overlay, click **Hide Overlay** on the main toolbar.



**Note** The Show Overlay button is a toggle. When clicked, the overlay is displayed. When clicked again, the overlay is hidden.

- To remove the VPN overlay, choose **Show Overlay Type > None**.

## Displaying VPN Callouts in a VPN Overlay

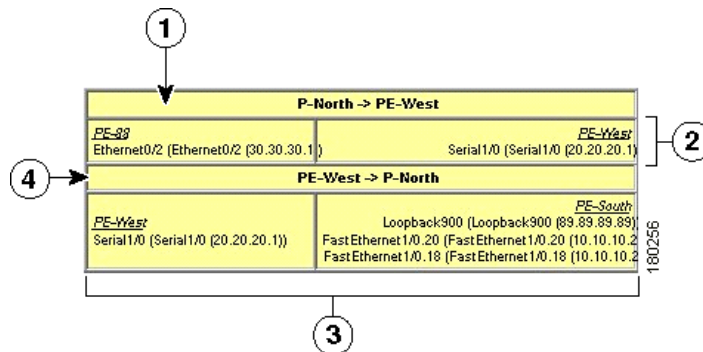
You can display or hide the callouts for VPN links displayed in a VPN overlay to show the details of the sites that are interlinked through the selected links. The callouts (see [Figure 19-13](#)) enable you to view the VPN traffic links for a specific link (either bidirectional or unidirectional).



**Note**

The link must be displayed in the VPN overlay and not dimmed for you to display the link callouts.

**Figure 19-13** Callouts Window



<b>1</b>	Link details and direction. In this example, the link is from P-North to PE-West.	<b>3</b>	Details of sites using the link and interlinks. In this example, the site PE-West is linked to all sites on PE-South.
<b>2</b>	Details of the sites using the link and interlinks. In this example, the site PE-88 is linked to site PE-West.	<b>4</b>	Link details and the direction. In this example, the link is from PE-West to P-North.

To display or hide the callouts:

- 
- Step 1** In the Prime Network Vision window, display the map view with the VPN overlay.
- Step 2** Right-click the required link in the map view and choose **Show Callouts**.
- Step 3** To hide the callouts, right-click the link in the map view that is displaying the callouts and choose **Hide Callouts**.
- 

## Monitoring MPLS Services

The following topics provide details for viewing MPLS services and technologies:

- [Viewing VPN Properties, page 19-26](#)
- [Viewing Site Properties, page 19-27](#)
- [Viewing VRF Properties, page 19-27](#)
- [Viewing VRF Egress and Ingress Adjacents, page 19-31](#)
- [Viewing Routing Entities, page 19-31](#)
- [Viewing Label Switched Entity Properties, page 19-39](#)
- [Viewing MP-BGP Information, page 19-45](#)
- [Viewing BFD Session Properties, page 19-47](#)
- [Viewing Cross-VRF Routing Entries, page 19-49](#)
- [Viewing Pseudowire End-to-End Emulation Tunnels, page 19-50](#)
- [Viewing MPLS TE Tunnel Information, page 19-52](#)

## Viewing VPN Properties

To view the properties of a VPN:

- 
- Step 1** In the Prime Network Vision navigation pane or map view, do either of the following:
- If the VPN icon is of the largest size, click the **Properties** button.
  - Right-click the VPN and choose **Properties**.

The VPN Properties window displays the following information:

- Name—Name of the VPN.
- ID—Unique identifier assigned to the VPN.

- Step 2** Click **Close** to close the VPN Properties dialog box.
-

## Viewing Site Properties

Prime Network Vision enables you to view site properties, including the interfaces that are configured on the PE device. The displayed properties reflect the configuration that Prime Network Vision automatically discovered for the device.

To view site properties, in the Prime Network Vision navigation pane or map view, right-click the required site and choose **Properties**.

[Table 19-8](#) describes the information that is displayed in the Router IP Interface Properties window:

**Table 19-8 Router IP Interface Properties Window for Sites**

Field	Description
Name	Name of the site, such as FastEthernet4/1.252.
State	Interface state, either Up or Down.
IP Address	IP address of the interface.
Mask	Network mask.
Interface Description	Description applied to the interface.
Associated Entity	Element and interface associated with the site, hyperlinked to its entry in physical inventory.
<b>Addresses Table</b>	
Subnet	IP address and subnet mask.  <b>Note</b> If the site is an IPv6 VPN over MPLS with IPv6 addresses provisioned, the IPv6 addresses are displayed. For more information, see <a href="#">Viewing IPv6 Information, page 18-2</a> .
Type	Address type, such as Primary, Secondary, or IPv6 Unicast.

## Viewing VRF Properties

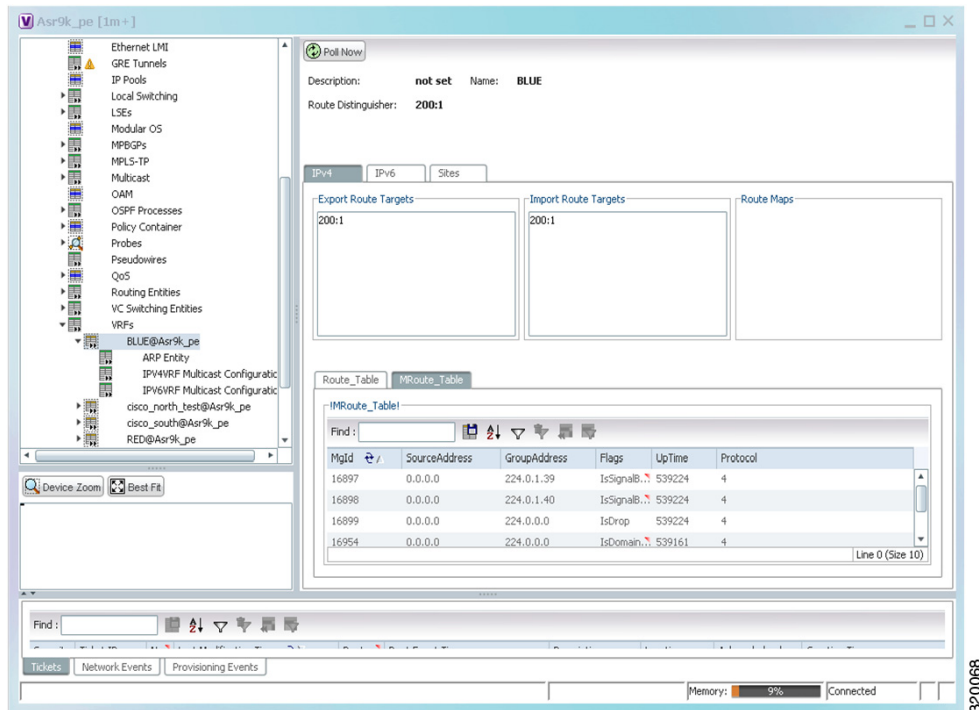
Prime Network Vision enables you to view VRF properties, including the VRF route distinguisher, import and export route targets, and any provisioned sites and VRF routes.

To view VRF properties, do either of the following in map view:

- Double-click the element configured for VRFs.
- Expand the required VPN and double-click the virtual router.

The VRF properties window is displayed as shown in [Figure 19-14](#).

**Figure 19-14** VRF Properties



The VRF Properties window contains the VRF routing table for the device. The table is a collection of routes that are available or reachable to all the destinations or networks in the VRF. The forwarding table also contains MPLS encapsulation information.

[Table 19-9](#) describes the information displayed in the VRF Properties window.



**Note** The VRF Properties window only displays properties and attributes that are provisioned in the VRF. You might not see all the fields and tabs described in [Table 19-9](#).

**Table 19-9** VRF Properties

Field	Description
Route Distinguisher	Route distinguisher configured in the VRF.
Name	VRF name.
Description	Description of the VRF.
<b>IPv4 Tab</b>	
Export Route Targets	IPv4 export route targets contained by the VRF.
Import Route Targets	IPv4 import route targets contained by the VRF.
Route Maps	Route maps for the VRF.

**Table 19-9 VRF Properties (continued)**

Field	Description
<b>IPv6 Tab</b>	
Export Route Targets	IPv6 export route targets contained by the VRF.
Import Route Targets	IPv6 import route targets contained by the VRF.
Route Maps	Route maps for the VRF.
<b>Routing Tables</b>	
Destination	Destination of the specific network.
Prefix Length	Length of the network prefix in bits.
Next Hop	Next routing hop.
Outgoing Interface	Name of the outgoing interface; displayed if the Routing Protocol type is local.
Type	Route type: Direct (local), Indirect, or Static.
Routing Protocol	Routing protocol used to communicate with the other sites and VRFs: BGP or local.
BGP Next Hop	Border Gateway Protocol (BGP) next hop. This is the PE address from which to continue to get to a specific address. This field is empty when the routing entry goes to the CE.
Bottom In Label	Innermost label that is expected when MPLS traffic is received.
Bottom Out Label	Innermost label sent with MPLS traffic.
Outer Label	Outermost or top label in the stack used for MPLS traffic.
<b>MRoute_Table</b>	
Source Address	The source IP address from where the multicast information is sent.
Group Address	The group IP address of the multicast.
Flags	The flag information pertaining to the multicast.
Up Time	The amount of time the interface has been active.
Protocol	The protocol information, which can be 4 or 6.
<b>Sites Tab</b>	
Name	Site name.
IP Address	IP address of the interface.
Mask	Subnet mask.
State	State of the subinterface: Up or Down.
Associated Entity	Element and interface associated with the site, hyperlinked to its entry in physical inventory.
Description	Interface description.
Input Access List	Access list applied to the inbound traffic.
Output Access List	Access list applied to the outbound traffic.

**Table 19-9 VRF Properties (continued)**

Field	Description
Rate Limits	<p>If a rate limit is configured on an IP interface, the limit is shown as an IP interface property. This option is checked when a rate limit is defined on the IP interface, meaning the access list is a rate limit access list. IP interface traffic is measured and includes the average rate, normal burst size, excess burst size, conform action, and exceed action.</p> <p><b>Note</b> Double-clicking a row displays the properties of the IP interface. When a rate limit is configured on the IP interface, the Rate Limits tab is displayed. For more information about rate limits, see <a href="#">Viewing Rate Limit Information, page 19-36</a>.</p> <p><b>Note</b> The Input Access, Output Access, and Rate Limits parameters apply only to Cisco IOS devices.</p>
IP Sec Map Name	IP Security (IPsec) map name.
Site Name	Name of the business element to which the interface is attached.

## Viewing VRF Multicast Configuration details

To view global multicast configuration details for a VRF:

- Step 1** Right-click on the required device and select **Inventory**.
- Step 2** In the Inventory window, choose **Logical Inventory > VRFs > vrf** (where *vrf* is the required VRF) > **IPV4VRF Multicast Configuration** or **IPV6VRF Multicast Configuration**. The route policies configured on the device are displayed in the content pane.

[Table 19-10](#) describes the information that is displayed in the Router IP Interface Properties window:

**Table 19-10 Global Multicast Configuration Details**

Field	Description
VPN ID	The VPN ID configured for the VRF.
RoutePolicy	The name of the multicast route policy.
BgpAD	The BgpAd enabled on the device.
MdtSourceif	The Multicast Distribution Tree (MDT) source interface.
MdtPartitioned	The MDT partitioned permission.
NSF	The non-stop forwarding (NSF) information configured for the VRF.
MdtAddress	The MDT address.
MdtData	The MDT data that can be handled.
Address Family	The address family, which can be IPV4 or IPV6.
RP Address	The rendezvous point (RP) address configured for the VRF.

## Viewing VRF Egress and Ingress Adjacents

Prime Network Vision enables you to view the exporting and importing neighbors by displaying the VRF egress and ingress adjacents. In addition, you can view the connectivity between the VRFs for the route targets and view their properties. For example, if VRF A retrieved route target import X, you can view all VRFs that export X as a route target whether it is in the same or another VPN.

To display the VRF egress and ingress adjacents, you can use either an element configured for VRFs or a virtual router:

- To use an element configured for VRFs:
  - a. Double-click the element configured for VRFs.
  - b. In the inventory window, choose **Logical Inventory > VRFs > vrf** where *vrf* is the required VRF.
  - c. Right-click the required VRF and choose **Show VRF Egress Adjacents** or **Show VRF Ingress Adjacents**.
- To use a virtual router, right-click the required VRF in the navigation pane, and choose **Show VRF Egress Adjacents** or **Show VRF Ingress Adjacents**.

Table 19-11 describes the information displayed in the Adjacents window.

**Table 19-11 VRF Adjacents Properties Window**

Field	Description
Name	VRF name.
Route Distinguisher	Route distinguisher configured in the VRF.
VRF V6 Table	IPv6 route distinguisher if IPv6 is configured.

## Viewing Routing Entities

To view routing entities:

- 
- Step 1** Right-click the required device in Prime Network Vision and choose **Inventory**.
  - Step 2** In the logical inventory window, choose **Logical Inventory > Routing Entities > Routing Entity**.  
The routing information is displayed as shown in [Figure 19-15](#).

Figure 19-15 Routing Entity Table

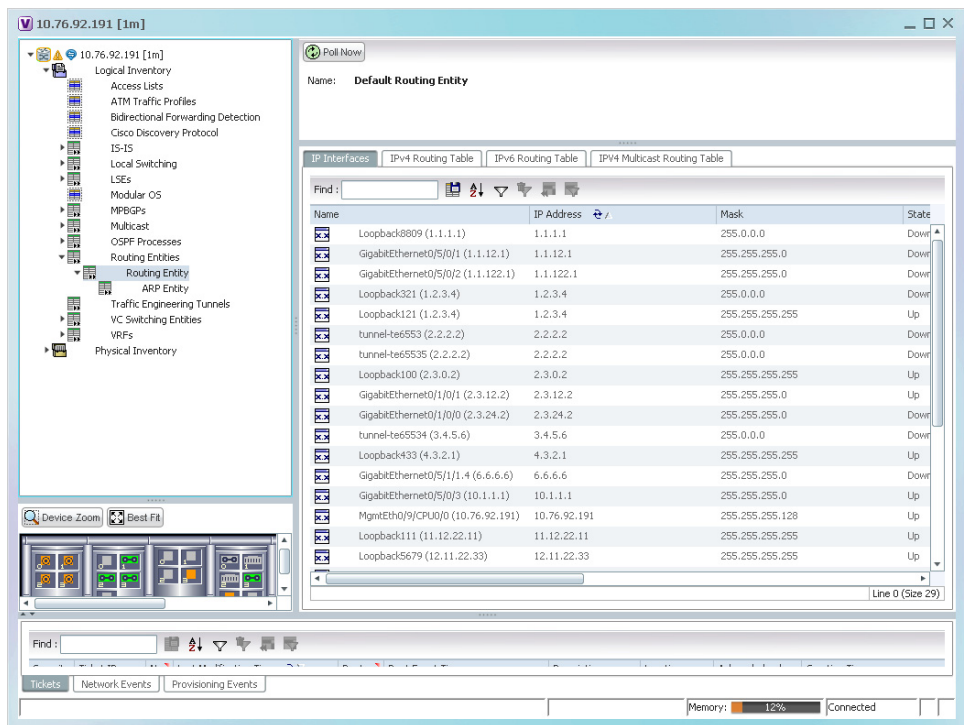


Table 19-12 describes the information that is displayed in the Routing Entity table.

Table 19-12 Routing Entity Table

Field	Description
Name	Name of the routing entity.
<b>IP Interfaces Tab</b>	
Name	Site name.
IP Address	IP address of the interface.
Mask	Network mask.
State	State of the subinterface: Up or Down.
Associated Entity	Interface associated with the routing entity, hyperlinked to its location in physical inventory.
Description	Description of the interface.
Input Access List	If an input access list is assigned to an IP interface, the list is shown as an IP interface property, and a hyperlink highlights the related access list in the Access List table. When an access list is assigned to the inbound traffic on an IP interface, the actions assigned to the packet are performed.



**Table 19-12 Routing Entity Table (continued)**

Field	Description
VRRP Group	<p>If a VRRP group is configured on an IP interface, the information is shown as an IP interface property. This option is checked when a rate limit is defined on the IP interface.</p> <p><b>Note</b> Double-clicking a row displays the properties of the IP interface. When a VRRP group is configured on an IP interface, the VRRP Groups tab is displayed in the IP Interface Properties window. For more information, see <a href="#">Viewing VRRP Information, page 19-37</a>.</p>
Output Access List	<p>If an output access list is assigned to an IP interface, the list is shown as an IP interface property, and a hyperlink highlights the related access list in the Access List table. When an access list is assigned to the outbound traffic on an IP interface, the actions assigned to the packet are performed.</p>
Rate Limits	<p>If a rate limit is configured on an IP interface, the limit is shown as an IP interface property. This option is checked when a rate limit is defined on the IP interface, meaning the access list is a rate limit access list. IP interface traffic is measured and includes the average rate, normal burst size, excess burst size, conform action, and exceed action.</p> <p><b>Note</b> Double-clicking a row displays the properties of the IP interface. When a rate limit is configured on the IP interface, the Rate Limits tab is displayed. For more information, see <a href="#">Viewing Rate Limit Information, page 19-36</a>.</p> <p><b>Note</b> The Input Access, Output Access, and Rate Limits parameters apply only to Cisco IOS devices.</p>
IP Sec Map Name	IP Security (IPsec) crypto map name.
Site Name	Name of the business element to which the interface is attached.
<b>IPv4 and IPv6 Routing Table Tabs</b>	
Destination	Destination of the specific network.
Outgoing If Name	Name of the outgoing interface; displayed if the Routing Protocol type is local.
Type	Routing type: Direct, Indirect, Static, Other, Invalid, or Unknown.
Next Hop	IP address from which to continue to get to a specific address. This field is empty when the routing entry goes to a PE router.
Prefix Length	Length of the network prefix in bits.
Route Protocol Type	Routing protocol used to communicate with other routers.
<b>IPv4 and IPv6 Multicast Routing Tabs</b>	
Source Address	The source IP address from where the multicast information is sent.
Group Address	The group IP address of the multicast.
Flags	The flag information pertaining to the multicast.
Up Time	The amount of time the interface has been active.
Protocol	The protocol information, which can be 4 or 6.

## Viewing the ARP Table

To view the ARP table:

- Step 1** Right-click the required device in Prime Network Vision and choose **Inventory**.
- Step 2** In the logical inventory window, choose **Logical Inventory > Routing Entities > Routing Entity > ARP**.

Table 19-13 describes the information that is displayed in the ARP table.

**Table 19-13 ARP Table**

Field	Description
MAC	Interface MAC address.
Interface	Interface name.
IP Address	Interface IP address.
State	Interface state: <ul style="list-style-type: none"> <li>• Dynamic—The entry was learned by the device according to network traffic.</li> <li>• Static—The entry was learned by a local interface or from a user configuring a static route.</li> <li>• Other—The entry was learned by another method not explicitly defined.</li> <li>• Invalid—In SNMP, this type is used to remove an ARP entry from the table.</li> </ul>

## Viewing the NDP Table

Neighbor Discovery Protocol (NDP) is used with IPv6 to discover other nodes, determine the link layer addresses of other nodes, find available routers, and maintain reachability information about the paths to other active neighbor nodes.

NDP functionality includes:

- Router discovery
- Autoconfiguration of addresses (stateless address autoconfiguration [SLAAC])
- IPv6 address resolution (replaces Address Resolution Protocol [ARP])
- Neighbor reachability (neighbor unreachability detection [NUD])
- Duplicate address detection (DAD)
- Redirection

To view the NDP table:

- Step 1** Right-click the required device in Prime Network Vision and choose **Inventory**.
- Step 2** In the logical inventory window, choose **Logical Inventory > Routing Entities > Routing Entity > ARP Entity**.
- Step 3** Click the **NDP Table** tab.

Figure 19-16 shows an example of the NDP Table tab.

**Figure 19-16 NDP Table in Logical Inventory**

The screenshot shows the Cisco Prime Network Vision interface for device c4-npe1-76. The left pane displays the Logical Inventory tree with various categories like Access Lists, ATM Traffic Profiles, and Routing Entities. The main pane shows the NDP Table tab, which contains a table with the following data:

MAC	Interface	IP Address	State
00 22 90 5F 2C 00	GigabitEthernet1/2	fe80:0:0:222:90ff:fe5f:2c00	Stale
00 22 90 5F 2C 00	GigabitEthernet1/2	2001:db8:c18:1:0:0:0:3	Stale

The interface also includes a search bar, a 'Poll Now' button, and a bottom status bar showing memory usage at 22% and a 'Connected' status.

Table 19-14 describes the information displayed for NDP.

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Table 19-14 NDP Table

Field	Description
MAC	Interface MAC address.
Interface	Interface name.
IP Address	Interface IPv6 address.
Type	<p>Entry type:</p> <ul style="list-style-type: none"> <li>• <b>ICMP (Incomplete)</b>—Address resolution is being performed on the entry. A neighbor solicitation (NS) message has been sent to the solicited-node multicast address of the target, but the corresponding neighbor advertisement (NA) message has not yet been received.</li> <li>• <b>REACH (Reachable)</b>—Positive confirmation was received via an NA that the forward path to the neighbor was functioning properly. While in REACH state, the device takes no special action as packets are sent.</li> <li>• <b>STALE</b>—Too much time has elapsed since the last positive confirmation was received that the forward path was functioning properly. While in STALE state, the device takes no action until a packet is sent.</li> <li>• <b>DELAY</b>—Too much time has elapsed since the last positive confirmation was received that the forward path was functioning properly. If no reachability confirmation is received within a specified amount of time, the device sends an NS message and changes the state to PROBE.</li> <li>• <b>PROBE</b>—A reachability confirmation is actively sought by resending neighbor solicitation messages until a reachability confirmation is received.</li> </ul>

## Viewing Rate Limit Information

To view rate limit information:

- Step 1** Right-click the required element in Prime Network Vision and choose **Inventory**.
- Step 2** In the logical inventory window, choose **Logical Inventory > Routing Entities > Routing Entity**.
- Step 3** In the IP Interfaces tab, double-click the required interface to view the IP interface properties. If a rate limit is configured on the IP interface, the Rate Limits tab is displayed.



**Note** Rate limit information is relevant only for Cisco IOS devices.

Table 19-15 describes the information that is displayed in the Rate Limits tab of the IP Interface Properties dialog box.

**Table 19-15 Rate Limits Information**

Field	Description
Type	Rate limit direction, either Input or Output.
Max Burst	Excess burst size in bytes.
Normal Burst	Normal burst size in bytes.
Bit Per Second	Average rate in bits per second.
Conform Action	Action that can be performed on the packet if it conforms to the specified rate limit (rule), for example, continue, drop, change a bit, or transmit.
Exceed Action	Action that can be performed on the packet if it exceeds the specified rate limit (rule), for example, continue, drop, change a bit, or transmit.
Access List	Hyperlink that highlights the related access list in the Access List table.

## Viewing VRRP Information

Virtual Router Redundancy Protocol (VRRP) is a non-proprietary redundancy protocol that is designed to increase the availability of the static default gateway servicing hosts on the same subnet. This increased reliability is achieved by advertising a *virtual router* (a representation of master and backup routers acting as a group) as a default gateway to the hosts instead of one physical router. Two or more physical routers are then configured to stand for the virtual router, with only one doing the actual routing at any given time. If the current physical router that is routing the data on behalf of the virtual router fails, another physical router automatically replaces it. The physical router that forwards data on behalf of the virtual router is called the master router; physical routers standing by to take over for the master router if needed are called backup routers.

To view VRRP information:

- 
- Step 1** Double-click the required element in Prime Network Vision.
  - Step 2** In logical inventory, choose **Logical Inventory > Routing Entities > Routing Entity**.
  - Step 3** In the IP Interfaces tab, double-click the required interface to view the IP interface properties. If VRRP is configured on the IP interface, the VRRP Groups tab is displayed.

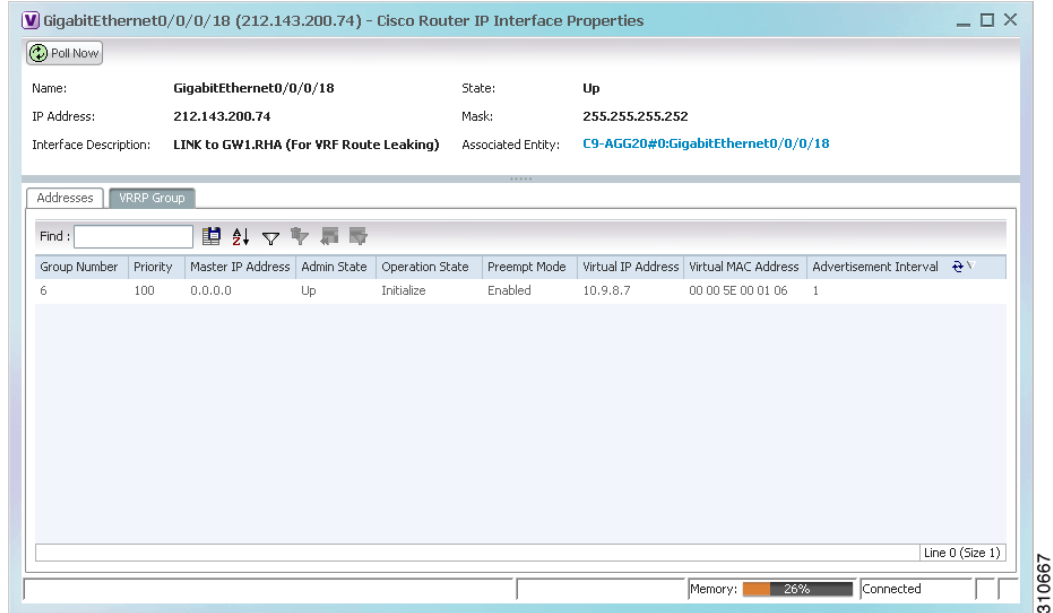
**Figure 19-17 VRRP Properties in IP Interface Properties Window**

Table 19-16 describes the information in the VRRP Groups tab.

**Table 19-16 VRRP Group Properties**

Field	Description
Group Number	Number of the VRRP group associated with the interface.
Priority	Value that determines the role each VRRP router plays and what happens if the master virtual router fails. Values are 1 through 254, with lower numbers having priority over higher numbers.
Master IP Address	IP address of the VRRP group, taken from the physical Ethernet address of the master virtual router.
Admin State	Administrative status of the VRRP group: Up or Down.
Operation State	State of the VRRP group: Master or Backup.
Preempt Mode	Whether or not the router is to take over as the master virtual router for a VRRP group if it has a higher priority than the current master virtual router: Enabled or Disabled.
Virtual IP Address	IP address of the virtual router.
Virtual MAC Address	MAC address of the virtual router.
Advertisement Interval	Amount of time (in seconds) between successive advertisements by the master virtual router.

## Viewing Label Switched Entity Properties

Logical inventory can display any or all of the following tabs for label switched entities, depending on the configuration:

- **Label Switching Table**—Describes the MPLS label switching entries used for traversing MPLS core networks.
- **LDP Neighbors**—Details all MPLS interface peers that use the Label Distribution Protocol (LDP). LDP enables neighboring provider (P) or PE routers acting as label switch routers (LSRs) in an MPLS-aware network to exchange label prefix binding information, which is required to forwarding traffic. The LSRs discover potential peers in the network with which they can establish LDP sessions in order to negotiate and exchange the labels (addresses) to be used for forwarding packets.

Two LDP peer discovery types are supported:

- **Basic discovery**—Used to discover directly connected LDP LSRs. An LSR sends hello messages to the all-routers-on-this-subnet multicast address, on interfaces for which LDP has been configured.
- **Extended discovery**—Used between indirectly connected LDP LSRs. An LSR sends targeted hello messages to specific IP addresses. Targeted sessions are configured because the routers are not physically connected, and broadcasting would not reach the peers. The IP addresses of both peers are required for extended discovery.

If two LSRs are connected with two separate interfaces, two LDP discoveries are performed.

- **MPLS Interfaces**—Contains information on MPLS interfaces and whether traffic engineering tunnels are configured on an interface.
- **MPLS Label Range**—Identifies whether MPLS uses static or dynamic routing, and the label range.
- **Traffic Engineering LSPs**—Describes the MPLS traffic engineering Label Switched Paths (LSPs) provisioned on the switch entity. MPLS traffic engineering LSP, an extension to MPLS TE, provides flexibility when configuring LSP attributes for MPLS TE tunnels.
- **VRF Table**—Describes MPLS paths that terminate locally at a VRF.

To view information for label switched entities:

- 
- Step 1** Double-click the required device in Prime Network Vision.
- Step 2** In the logical inventory window, choose **Logical Inventory > LSEs > Label Switching**. [Table 19-17](#) describes the information that is displayed for label switched entities.

**Table 19-17 Label Switching Properties in Logical Inventory**

Field	Description
Local LDP ID	Local Label Distribution Protocol (LDP) identifier.
LDP Process State	State of the LDP process, such as Running, Down, or Unknown.
<b>MPLS Interfaces</b>	
ID	Identifier for MPLS interface, as a combination of IP address and interface name.
Distribution Protocol Type	Distribution protocol used: Null, LDP, TDP (Tag Distribution Protocol), RSVP, or TDP and LDP.

**Table 19-17 Label Switching Properties in Logical Inventory (continued)**

Field	Description
MPLS TE Properties	Whether or not traffic engineering (TE) properties are configured on the interface: <ul style="list-style-type: none"> <li>• Checked—MPLS TE properties are configured on the interface.</li> <li>• Unchecked—MPLS TE properties are not configured on the interface.</li> </ul>
Discovery Protocols	Discovery protocols used on the interface.
<b>Label Switching Table</b>	
Incoming Label	Incoming MPLS label identifier.
Action	Type of switching action: Null, Pop, Swap, Aggregate, Untagged, or Act. If an action is defined as Pop, an outgoing label is not required. If an action is defined as Untagged, an outgoing label is not present.
Outgoing Label	Outgoing label.
Out Interface	Name of the outgoing interface, displayed as a hyperlink to the port subinterface in physical inventory.
IP Destination	Destination IP address.
Destination Mask	Subnet mask of the destination.
Next Hop	IP address of the next hop in the path. The IP address is used for resolving the MAC address of the next MPLS interface that you want to reach.
<b>VRF Table</b>	
Incoming Label	Incoming VRF label identifier.
Action	Type of switching action: Null, Pop, Swap, Aggregate, Untagged, or Act.
VRF	VRF name, hyperlinked to its location in logical inventory.
IP Destination	Destination IP address.
Destination Mask	Subnet mask of the destination.
Next Hop	IP address of the next hop in the path. The IP address is used for resolving the MAC address of the next MPLS interface that you want to reach.
Out Interface	Name of the outgoing interface, displayed as a hyperlink to the port subinterface in physical inventory.
<b>Traffic Engineering LSPs</b>	
LSP Name	Label switched path (LSP) name.
LSP Type	Segment type: Head, Midpoint, or Tail.
Source Address	Source IP address.
Destination Address	Destination IP address.
In Label	Incoming label, if not a head segment.
In Interface	Incoming interface, if not a head segment.
Out Interface	Outgoing interface, if not a tail segment.



**Table 19-17 Label Switching Properties in Logical Inventory (continued)**

Field	Description
Out Label	Outgoing label, if not a tail segment.
Average Bandwidth (Kbps)	Current bandwidth (in Kb/s) used to automatically allocate the tunnel's bandwidth.
LSP ID	LSP identifier.
Burst (Kbps)	Tunnel bandwidth burst rate, in Kb/s.
Peak (Kbps)	Tunnel bandwidth peak rate, in Kb/s.
FRR TE Tunnel	Fast Reroute (FRR) TE tunnel name, hyperlinked to the routing entity in logical inventory.
FRR TE Tunnel State	State of the FRR TE tunnel: <ul style="list-style-type: none"> <li>Active—A failure exists in the primary tunnel and the backup is in use.</li> <li>Not Configured—The primary tunnel has no designated backup tunnel.</li> <li>Ready—The primary tunnel is in working condition.</li> </ul>
<b>MPLS Label Range</b>	
MPLS Label Type	Type of MPLS label: Dynamic or Static.
Minimum Label Value	Lowest acceptable MPLS label in the range.
Maximum Label Value	Highest acceptable MPLS label in the range.
<b>LDP Neighbors</b>	
LDP ID	Identifier of the LDP peer.
Transport IP Address	IP address advertised by the peer in the hello message or the hello source address.
Session State	Current state of the session: Transient, Initialized, Open Rec, Open Sent, or Operational.
Protocol Type	Protocol used by the peer to establish the session: LDP, TDP, or Unknown.
Label Distribution Method	Method of label distribution: Downstream, Downstream On Demand, Downstream Unsolicited, or Unknown.
Session Keepalive Interval	Length of time (in milliseconds) between keepalive messages.
Session Hold Time	The amount of time (in milliseconds) that an LDP session can be maintained with an LDP peer, without receiving LDP traffic or an LDP keepalive message from the peer.
Discovery Sources	Whether the peer has one or more discovery sources: <ul style="list-style-type: none"> <li>Checked—Has one or more discovery sources.</li> <li>Unchecked—Has no discovery sources.</li> </ul> <p><b>Note</b> To see the discovery sources in the LDP Neighbor Properties window, double-click the row of the peer in the table.</p>

**Step 3** Double-click an entry in any of the tables to view additional properties for that entry.

**Table 19-18** Additional Properties Available from Label Switching in Logical Inventory

Double-click an entry in this tab...	To display this window...
Label Switching Table	Label Switching Properties
LDP Neighbors	LDP Peer Properties
MPLS Interfaces	MPLS Link Information - MPLS Properties
MPLS Label Range	MPLS Label Range Properties
Traffic Engineering LSPs	Tunnel Properties
VRF Table	MPLS Aggregate Entry Properties

## Multicast Label Switching

Multicast Label Distribution protocol (mLDP) provides extensions to the Label Distribution Protocol (LDP) for the setup of point-to-multipoint (P2MP) and multipoint-to-multipoint (MP2MP) Label Switched Paths (LSPs) in MultiProtocol Label Switching (MPLS) networks. A P2MP LSP allows traffic from a single root (or ingress) node to be delivered to a number of leaf (or egress) nodes.

A MP2MP LSP allows traffic from multiple ingress nodes to be delivered to multiple egress nodes. Only a single copy of the packet will be sent on any link traversed by a multipoint LSP. Container is the holder of MPLS mLDP databases and neighbors instances for Multicast.

### Viewing MLDP Database Information

To view the MLDP database information:

- 
- Step 1** Double-click the required device in Prime Network Vision.
  - Step 2** In the logical inventory window, choose **Logical Inventory > LSEs > Label Switching > Multicast Label Switching > Databases**. The database information is displayed in the **MLDP Databases** content pane.
  - Step 3** Select a database from the content pane, right-click and choose the **Properties** option. The **MLDP Database Properties** dialog box is displayed. You can click on the tabs to view more details.

[Table 19-19](#) describes the information that is displayed for **MLDP Database Properties** dialog box.

**Table 19-19 MLDP Database Properties Dialog Box**

Field	Description
LSM ID	The unique ID assigned to a LSP.
Tunnel Type	The tunnel type.
FEC Root	The root IP address of the MDT.
Opaque Value	The stream information that uniquely identifies the tree to the root. To receive label switched multicast packets, the Egress Provider Edge (PE) indicates to the upstream router (the next hop closest to the root) which label it uses for the multicast source by applying the label mapping message.
Is Root	Indicates whether Forwarding Equivalence Class (FEC) is the root.
<b>Downstream Clients Tab</b>	
Egress Interface Name	The egress interface name.
Associated Entity	The entity associated with the LSP. Click this link to view the associated entity details.
Uptime	The amount of time from when the interface is active.
Table ID	The unique Table ID of the label through which the packet was received.
Ingress State	The status of the ingress interface, which can be <b>Enabled</b> or <b>Disabled</b> .
PPMP State	The status of the Point-to-Point Multipoint, which can be <b>Enabled</b> or <b>Disabled</b> .
Local Label	The label used to identify the label stack of the route within the local VPN network.

### Viewing the MLDP Neighbors Information

To view information of MLDP neighbors:

- Step 1** Double-click the required device in Prime Network Vision.
- Step 2** In the logical inventory window, choose **Logical Inventory > LSEs > Label Switching > Multicast Label Switching > MLDP Neighbors**. The MLDP peer information is displayed in the **MLDP Peers** content pane.
- Step 3** Select a peer id from the content pane, right-click and choose the **Properties** option. The **Peer ID Properties** dialog box is displayed.

[Table 19-20](#) describes the information that is displayed for **Peer ID Properties** dialog box.

**Table 19-20 Peer ID Properties Dialog Box**

Field	Description
Peer ID	The IP address of the MLDP peer.
Capabilities	The capabilities supported by the LDP LSR.
MLDP GR	Indicates whether graceful restart is enabled for the LDP.  <b>Note</b> LDP graceful restart provides a control plane mechanism to ensure high availability and allows detection and recovery from failure conditions while preserving Non Stop Forwarding (NSF) services.
Path Count	The number of LSP's configured.
Uptime	The amount of time from when the peer id is working.
<b>Peer Paths tab</b>	
IP Address	The IP address of the MLDP peer.
Interface Name	The interface name.
Associated Entity	The link to the associated entity, which when clicked will highlight the associated <b>Default routing entity</b> record under the <b>Routing Entity</b> node.
Protocol	The protocol type used for communication.
<b>Peer Adjacent List</b>	
IP Address	The IP address of the MLDP peer.
Interface Name	The interface name.
Associated Entity	The link to the associated entity, which when clicked will highlight the associated <b>Default routing entity</b> record under the <b>Routing Entity</b> node.

## Viewing MP-BGP Information

The MP-BGP branch displays information about a router's BGP neighbors and cross-connect VRFs.


**Note**

If there are multiple MP-BGP links between two devices, Prime Network displays each link in the content pane map view.

To view MP-BGP information:

- Step 1** Right-click the required device in Prime Network Vision and choose **Inventory**.
- Step 2** In the logical inventory window, choose **Logical Inventory > MPBGPs > MPBGP**.

[Table 19-21](#) describes the information that is displayed for MP-BGP.

**Table 19-21 MP-BGP Information in Logical Inventory**

Field	Description
Local AS	Identifier of the autonomous system (AS) to which the router belongs.
BGP Identifier	BGP identifier, represented as an IP address.
<b>Cross VRFs Tab</b>	
VRF Name	Name of the VRF.
Cross VRF Routing Entries	Group of cross VRFs that share a single destination.
<b>BGP Neighbors Tab</b>	
Peer AS	Identifier of the AS to which the remote peer belongs.
Peer State	State of the remote peer: Active, Connect, Established, Open Confirm, Open Sent, or Null.
Peer Address	Remote peer IP address.
AFI	Address family identifier: IPv4, IPv6, L2VPN, VPNv4, or VPNv6.
AF Peer State	Address family peer state: Established or Idle.
Peer BGP ID	Identifier of the remote peer, represented as an IP address.
Local BGP ID	Local peer IP address.
VRF Name	Remote peer VRF name.
BGP Neighbor Type	Neighbor type: Null, Client, or Non Client.
Hold Time (secs)	Established hold time in seconds.
Keepalive (secs)	Established keepalive time in seconds.
BGP Neighbor Entry	BGP neighbor IP address.

## Viewing 6rd Tunnel Properties

IPv6 rapid deployment (6rd) is a mechanism that allows stateless tunneling of IPv6 over IPv4. From Prime Network Vision 3.8, 6rd is supported on the following devices:

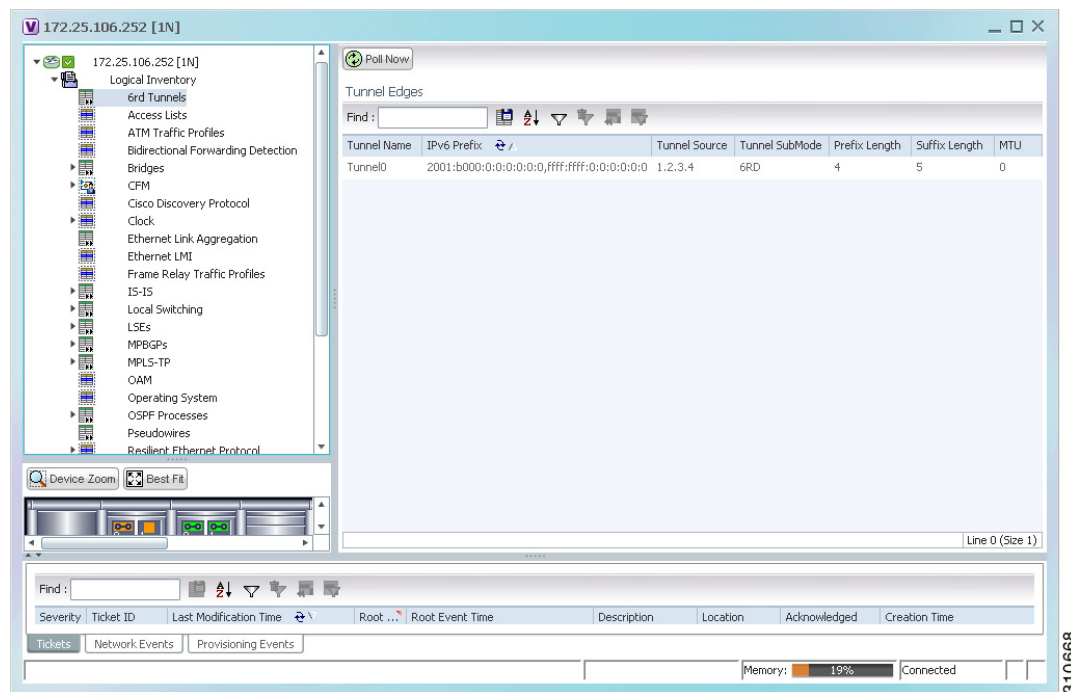
- Cisco 7600 series devices
- Cisco ASR 1000 series devices

To view 6rd tunnel properties:

- Step 1** In Prime Network Vision, double-click the required device.
- Step 2** In the inventory window, choose **Logical Inventory > 6rd Tunnels**.

The 6rd tunnel properties are displayed as shown in [Figure 19-18](#).

**Figure 19-18** 6rd Tunnel Properties in Logical Inventory



[Table 19-22](#) describes the information displayed for 6rd tunnels.

**Table 19-22** 6rd Tunnel Properties in Logical Inventory

Field	Description
Tunnel Name	6rd tunnel name.
IPv6 Prefix	IPv6 prefix used to translate the IPv4 address to an IPv6 address.
Source Address	Tunnel IPv4 source IP address.
Tunnel SubMode	Tunnel type: <ul style="list-style-type: none"> <li>• 6rd—Static IPv6 interface.</li> <li>• 6to4—IPv6 address with the prefix embedding the tunnel source IPv4 address.</li> <li>• Auto-tunnel—IPv4-compatible IPv6 tunnel.</li> <li>• ISATAP—Overlay tunnel using an Intra-Site Automatic Tunnel Addressing Protocol (ISATAP) address.</li> </ul>
Prefix Length	IPv4 prefix length used to derive the delegated IPv6 prefix.
Suffix Length	IPv4 suffix length used to derive the delegated IPv6 prefix.
MTU	Maximum transmission unit (MTU) configured on the 6rd IPv4 tunnel.

## Viewing BFD Session Properties

Bidirectional Forwarding Detection (BFD) is used to detect communication failures between two elements, or endpoints, that are connected by a link, such as a virtual circuit, tunnel, or LSP. BFD establishes sessions between the two endpoints over the link. If more than one link exists, BFD establishes a session for each link.

Prime Network Vision supports BFD with the following protocols: BGP, IPv4 (static), IPv6 (static), IS-IS, LAG (Ether channel), MPLS TE, MPLS-TP, and OSPF.

To view BFD session properties that are configured on an element:

- 
- Step 1** In Prime Network Vision, double-click the required device.
- Step 2** In the inventory window, choose **Logical Inventory > Bidirectional Forwarding Detection**.  
The properties for BFD sessions are displayed as shown in [Figure 19-19](#).

Figure 19-19 BFD Session Properties

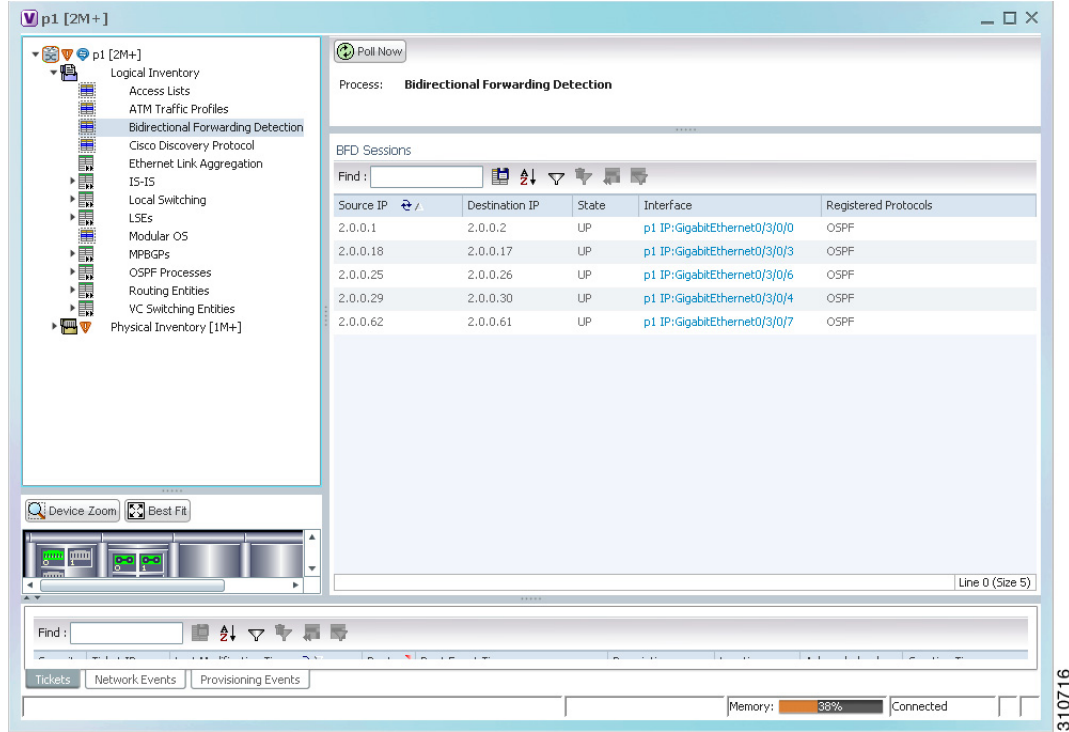


Table 19-23 describes the information displayed for BFD sessions.

Table 19-23 BFD Session Properties

Field	Description
Process	Process name, such as Bidirectional Forwarding Detection.
Process State	Process state, such as Running.
<b>BFD Sessions Table</b>	
Source IP	Source IP address of the session.
Destination IP	Destination IP address of the session.
State	Session state, such as Up or Down.
Interface	Interface used for BFD communications, hyperlinked to the routing entity in logical inventory.
Registered Protocols	Routing protocol being monitored for communication failures, such as BGP or OSPF.



For MPLS-TP BFD sessions, the information in [Table 19-24](#) is displayed.

**Table 19-24 MPLS-TP BFD Session Properties in Logical Inventory**

Field	Description
Process	Process name: Bidirectional Forwarding Detection.
Process State	Process state, such as Running.
<b>MPLS-TP BFD Sessions Table</b>	
Interface	Interface used for BFD communications, hyperlinked to the routing entity in logical inventory.
LSP Type	Type of LSP: Working or Protected.
State	Session state: Up or Down.
Registered Protocols	Routing protocol being monitored for communication failures: MPLS-TP.
Interface Name	

- Step 3** To view additional properties, double-click the required entry in the Sessions table. [Table 19-25](#) describes the information that is displayed in the Session Properties window.

**Table 19-25 Session Properties Window**

Field	Description
Source IP	Source IP address of the session.
Destination IP	Destination IP address of the session.
State	Session state: Up or Down.
Interface	Hyperlink to the routing entity in logical inventory.
Registered Protocols	Routing protocol being monitored for communication failures.
<b>Protocols Table</b>	
Protocol	Protocol used for this session.
Interval	Length of time (in milliseconds) to wait between packets that are sent to the neighbor.
Multiplier	Number of times a packet is missed before the neighbor is declared down.

## Viewing Cross-VRF Routing Entries

Cross-VRF routing entries display routing information learned from the BGP neighbors (BGP knowledge base).

To view properties for cross-VRF routing entries:

- Step 1** Right-click the required device in Prime Network Vision and choose **Inventory**.

**Step 2** In the logical inventory window, choose **Logical Inventory > MPBGPs > MPBGP**.

**Step 3** Click the **Cross VRFs** tab.

**Step 4** Double-click the required entry in the list of cross-VRFs.

The Cross VRF Properties window is displayed, containing the information described in [Table 19-26](#).

**Table 19-26 Cross-VRF Properties Window**

Field	Description
Name	Cross-VRF name.
<b>Cross VRF Routing Entries Table</b>	
Destination	IP address of the destination network.
Prefix	Length of the network prefix in bits.
Next Hop	IP address of the next hop in the path.
Out Going VRF	Outgoing VRF identifier, hyperlinked to its entry in logical inventory.
Out Tag	Outgoing virtual router tag, such as 50 or no tag.
In Tag	Incoming virtual router tag, such as 97 or no tag.

## Viewing Pseudowire End-to-End Emulation Tunnels

The Pseudowires branch in logical inventory displays a list of the Layer 2 tunnel edge properties (per edge), including tunnel status and VC labels.

To view pseudowire properties:

**Step 1** Right-click the required device in Prime Network Vision and choose **Inventory**.

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

The Tunnel Edges table is displayed and contains the information described in [Table 19-27](#).

**Table 19-27 Pseudowires Branch Tunnel Edges Table**

Field	Description
Local Interface	Name of the subinterface or port. Strings, such as Aggregation Group, EFP, VLAN, and VSI, are included in the interface name, and the entry is hyperlinked to the relevant entry in logical or physical inventory: <ul style="list-style-type: none"> <li>• Aggregation groups are linked to Ethernet Link Aggregation in logical inventory.</li> <li>• ATM interfaces are linked to the port in physical inventory and the ATM interface.</li> <li>• ATM VCs are linked to the port in physical inventory and the Port IP Properties table.</li> <li>• CEM groups are linked to the port in physical inventory and the CEM Group table.</li> <li>• EFPs are linked to the port in physical inventory and the EFPs table.</li> <li>• IMA groups are linked to IMA Groups in logical inventory.</li> <li>• Local switching entities are linked to Local Switching Entity in logical inventory.</li> <li>• VLANs are linked to Bridges in logical inventory.</li> <li>• VSIs are linked to the VSI entry in logical inventory.</li> </ul>
VC ID	Tunnel identifier, hyperlinked to the PTP Layer 2 MPLS Tunnel Properties window.
Peer	Details of the selected peer, hyperlinked to the peer pseudowire tunnel in logical inventory.
Status	Operational state of the tunnel: Up or Down.
Pseudowire Role	If the pseudowire is in a redundancy configuration, indicates whether its role is as the primary or secondary pseudowire in the configuration. If the pseudowire is not configured for redundancy, this field is blank.
Preferred Path Tunnel	Path to be used for MPLS pseudowire traffic.
Local Router IP	IP address of this tunnel edge, which is used as the MPLS router identifier.
Peer Router IP	IP address of the peer tunnel edge, which is used as the MPLS router identifier.
Pseudowire Type	Type of pseudowire, such as Ethernet, Ethernet Tagged, CESoPSN Basic, PPP, or SAToP.
Local MTU	Size, in bytes, of the MTU on the local interface.
Remote MTU	Size, in bytes, of the MTU on the remote interface.
Local VC Label	MPLS label that is used by this router to identify or access the tunnel. It is inserted into the MPLS label stack by the local router.
Peer VC Label	MPLS label that is used by this router to identify or access the tunnel. It is inserted into the MPLS label stack by the peer router.
Signaling Protocol	Protocol used by MPLS to build the tunnel, for example, LDP or TDP.

## Viewing MPLS TE Tunnel Information

Prime Network Vision automatically discovers MPLS TE tunnels and enables you to view MPLS TE tunnel information in inventory.

To view MPLS TE tunnel information:

- Step 1** Right-click the required device in Prime Network Vision and choose **Inventory**.
- Step 2** In the logical inventory window, choose **Logical Inventory > Traffic Engineering Tunnels**.

[Table 19-28](#) describes the information that is displayed in the Tunnel Edges table.

**Table 19-28 Tunnel Edges Table**

Field	Description
Name	Name of the TE tunnel; for Cisco devices it is the interface name.
Tunnel Type	Whether the tunnel is Point-to-Point or Point-to-Multipoint.
Tunnel Destination	IP address of the device in which the tunnel ends.
Administrative Status	Administrative state of the tunnel: Up or Down.
Operational Status	Operational state of the tunnel: Up or Down.
Outgoing Label	TE tunnel's MPLS label distinguishing the LSP selection in the next device.
Description	Description of the tunnel.
Outgoing Interface	Interface through which the tunnel exits the device.
Bandwidth (KBps)	Bandwidth specification for this tunnel in Kb/s.
Setup Priority	Tunnel priority upon path setup.
Hold Priority	Tunnel priority after path setup.
Affinity	Tunnel preferential bits for specific links.
Affinity Mask	Tunnel affinity bits that should be compared to the link attribute bits.
Auto Route	Whether or not destinations behind the tunnel are routed through the tunnel: Enabled or disabled.
Lockdown	Whether or not the tunnel can be rerouted: <ul style="list-style-type: none"> <li>Enabled—The tunnel cannot be rerouted.</li> <li>Disabled—The tunnel can be rerouted.</li> </ul>
Path Option	Tunnel path option: <ul style="list-style-type: none"> <li>Dynamic—The tunnel is routed along the ordinary routing decisions after taking into account the tunnel constraints such as attributes, priority, and bandwidth.</li> <li>Explicit—The route is explicitly mapped with the included and excluded links.</li> </ul>
Average Rate (Kbps)	Average bandwidth for this tunnel (in Kb/s).

**Table 19-28 Tunnel Edges Table (continued)**

Field	Description
Burst (Kbps)	Burst flow specification (in Kb/s) for this tunnel.
Peak Rate (Kbps)	Peak flow specification (in Kb/s) for this tunnel.
LSP ID	LSP identifier.
Policy Class	Value of Policy Based Tunnel Selection (PBTS) configured. Values range from 1-7.
FRR	TE Fast Reroute (FRR) status: Enabled or Disabled.
Type	

The Traffic Engineering LSPs tab in the LSEs branch in logical inventory displays TE tunnel LSP information.

For details about the information displayed for TE tunnel LSPs, see [Traffic Engineering LSPs, page 19-40](#).

## Configuring VRF

VRF commands configures routes that are available or reachable to all the destinations or networks in the VRF.

Unless otherwise noted, all of the following commands are launched by right-clicking the **VRF** node and choosing **Commands > Configuration**.

To run these commands, the software on the network element must support the technology. Before executing any commands, you can preview them and view the results. For details on the software versions Prime Network supports for the listed supported network elements, see [Cisco Prime Network 3.10 Supported Cisco VNEs](#).

You might be prompted to enter your device access credentials while executing a command. Once you have entered them, these credentials will be used for every subsequent execution of a command in the same GUI client session. If you want to change the credentials, click **Edit Credentials**. The Edit Credentials button will not be available for SNMP commands or if the command is scheduled for a later time.

Command	Description
<b>Modify VRF</b>	Configures VRF properties, including the VRF route distinguisher, import and export route targets, and any provisioned sites and VRF routes.
<b>Delete VRF</b>	

## Configuring IP Interface

Unless otherwise noted, all of the following commands are launched by right-clicking the **Routing Entities** and choosing **Commands > Configuration**.

To run these commands, the software on the network element must support the technology. Before executing any commands, you can preview them and view the results. For details on the software versions Prime Network supports for the listed supported network elements, see [Cisco Prime Network 3.10 Supported Cisco VNEs](#).

You might be prompted to enter your device access credentials while executing a command. Once you have entered them, these credentials will be used for every subsequent execution of a command in the same GUI client session. If you want to change the credentials, click **Edit Credentials**. The Edit Credentials button will not be available for SNMP commands or if the command is scheduled for a later time.

Command	Description
<b>Create Interface</b>	Configure IP interface as part of the routing entity.
<b>Modify Interface</b>	
<b>Delete Interface</b>	
<b>Configure Secondary IP Address</b>	
<b>Delete Secondary IP Address</b>	

## Configuring MPLS-TP

Use these commands to configure MPLS transport profile (MPLS-TP) on the router.

Unless otherwise noted, all of the following commands are launched by right-clicking the appropriate node and selecting **MPLS-TP Global > Commands > Configuration**.

The table below lists the MPLS-TP configuration commands and the MPLS-TP supported network elements.

To run these commands, the software on the network element must support the technology. Before executing any commands, you can preview them and view the results. For details on the software versions Prime Network supports for the listed supported network elements, see [Cisco Prime Network 3.10 Supported Cisco VNEs](#).

You might be prompted to enter your device access credentials while executing a command. Once you have entered them, these credentials will be used for every subsequent execution of a command in the same GUI client session. If you want to change the credentials, click **Edit Credentials**. The Edit Credentials button will not be available for SNMP commands or if the command is scheduled for a later time.

Keep the following in mind:

- LSP Path Lockout can be accessed at both the tunnel level and endpoint level. If you run the command at the tunnel level, you must indicate whether the Lsp is protected or working.
- To run the Global Configuration, BFD Configuration, and Link Configuration commands on the Cisco Carrier Packet Transport (CPT) System, right-click the device in the Prime Network Vision List or Map View, and click **Logical Inventory > CPT Context Container**.

Command	Description	Supported on:
<b>Tunnel Ping</b> <b>Tunnel Trace</b> <b>LSP Ping</b> <b>LSP Trace</b> <b>LSP Lockout</b> <b>LSP Path Lockout</b> <b>LSP Path No Lockout</b>	These actions are performed at the command the launch point.	<ul style="list-style-type: none"> <li>• Cisco 7600 Series Routers</li> <li>• Cisco Carrier Packet Transport (CPT) System</li> <li>• Cisco ASR 9000 Series Aggregation Services Routers</li> <li>• Cisco ASR 903 Series Aggregation Services Routers</li> </ul>
<b>Add Global Configuration</b> <b>Update Global Configuration</b> <b>Remove Global Configuration</b>	Configure Global configuration with Router-id, Global-id, Fault OAM refresh timer value, Wait before restoring timer value.  The remove operation is performed at the command the launch point.	
<b>BFD Global Configuration</b>	BFD minimum interval and multiplier.  <b>Note</b> Only supported on Cisco ASR 9000.	
<b>Add Link Configuration Remove Link Configuration</b>	MPLS-TP link number, Next hop router address. Only the link number is require for the remove operation.	
<b>Add BFD Template Configuration</b> <b>Remove BFD Template Configuration</b>	Template type and name, interval type and value, For compute hold down Check/UnCheck Multiplier, multiplier value.  The remove operation requires a template type and name.	
<b>Show BFD Template</b> <b>Show BFD Template at Tunnel</b>	Show BFD Template requires a template name. The Show BFD Template at Tunnel is performed at the command launch point.	<ul style="list-style-type: none"> <li>• Cisco 7600 Series Routers</li> <li>• Cisco Carrier Packet Transport (CPT) System</li> <li>• Cisco ASR 9000 Series Aggregation Services Routers</li> <li>• Cisco ASR 903 Series Aggregation Services Routers</li> </ul>
<b>Add Label Range Configuration</b> <b>Remove Label Range Configuration</b>	Minimum and maximum values for dynamic and static labels. The remove operation is performed at the command the launch point.  <b>Note</b> Not supported on Cisco IOS.	

## Locking/Unlocking MPLS-TP Tunnels in Bulk

An MPLS-TP network has one or multiple LSPs running between endpoint devices. If you want to shutdown one of the interfaces in the network, the MPLS-TP packet must be diverted through an alternative LSP. This can be achieved by locking the interface.

The MPLS-TP bulk lockout/unlock option in Prime Network allows you to lock or unlock multiple MPLS-TP tunnels on different VNEs at the same time.

Before attempting to lock or unlock a tunnel, ensure that MPLS-TP tunnels have been configured for the link. Also, ensure that you have the appropriate rights (Configurator and above) to lock or unlock a tunnel.

### Locking MPLS-TP Tunnels

To lock MPLS-TP tunnels in bulk:

- 
- Step 1** In the map view, right-click the required link and choose **Properties**.
  - Step 2** In the link properties window, right-click on the required physical link and choose the **Show MPLS-TP tunnels** option. The MPLS-TP tunnels' commands dialog box is displayed, which lists all the tunnels in the selected link.
  - Step 3** In the MPLS-TP tunnels' commands dialog box, choose the tunnels that you want to lock and select the **Lock Out** option in the **Commands** field.
  - Step 4** Click **Execute Now**. You are prompted to confirm the lockout operation.
  - Step 5** Click **Yes** to confirm. A message is displayed confirming that the selected tunnels have been locked. The status of the tunnel is automatically updated as Lockout(UP) after this operation.
- 

### Unlocking MPLS-TP Tunnels

To unlock MPLS-TP tunnels in bulk:

- 
- Step 1** In the map view, right-click the required link and choose **Properties**.
  - Step 2** In the link properties window, right-click on the required physical link and choose the **Show MPLS-TP tunnels** option. The MPLS-TP tunnels' commands dialog box is displayed, which lists all the tunnels in the selected link.
  - Step 3** In the MPLS-TP tunnels' commands dialog box, select the locked tunnels that you want to unlock and select the **Unlock** option in the **Commands** field.
  - Step 4** Click **Execute Now**. You are prompted to confirm the unlock operation.
  - Step 5** Click **Yes** to confirm. A message is displayed confirming that the selected tunnels have been unlocked. The status of the tunnels is automatically updated as Active(UP) after this operation.



**Note** If you attempt to unlock a tunnel that is not locked, a message is displayed indicating that there are no valid tunnels to perform the unlock operation.

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## Configuring MPLS-TE

Use these commands to configure MPLS-TE on the router. The table below lists the MPLS-TE configuration commands and the MPLS-TE supported network elements.

To run these commands, the software on the network element must support the technology. Before executing any commands, you can preview them and view the results. For details on the software versions Prime Network supports for the listed supported network elements, see [Cisco Prime Network 3.10 Supported Cisco VNEs](#).

You might be prompted to enter your device access credentials while executing a command. Once you have entered them, these credentials will be used for every subsequent execution of a command in the same GUI client session. If you want to change the credentials, click **Edit Credentials**. The Edit Credentials button will not be available for SNMP commands or if the command is scheduled for a later time.

Command	Navigation	Description <sup>1</sup>	Supported on
<b>Configure MPLS-TE Global</b>	<b>LSEs &gt; right-click Label Switching &gt; Commands &gt; Configuration &gt;</b>	Configures MPLS at the device level or an interface level. Contains information on MPLS interfaces and whether traffic engineering tunnels are configured.	<ul style="list-style-type: none"> <li>• Cisco ASR 9000 Series Routers</li> <li>• Cisco ASR 901 Series Routers</li> <li>• Cisco ASR 903 Series Routers</li> </ul>
<b>Configure MPLS-TE Interface</b>	<b>Routing Entities &gt; Routing Entity &gt; IP Interfaces tab, right-click the required interface &gt; Commands &gt; Configuration &gt;</b>		Cisco ASR 9000 Series Routers

1. Modify commands can be used to delete specific attributes, whereas the delete commands deletes the complete configuration.

## Configuring MPLS

Multiprotocol label switching (MPLS) is a high-performance packet forwarding technology that integrates the performance and traffic management capabilities of data link layer (Layer 2) switching with the scalability, flexibility, and performance of network layer (Layer 3) routing. Use these commands to enable MPLS protocol on Cisco routers

To run these commands, the software on the network element must support the technology. Before executing any commands, you can preview them and view the results. For details on the software versions Prime Network supports for the listed supported network elements, see [Cisco Prime Network 3.10 Supported Cisco VNEs](#).

You might be prompted to enter your device access credentials while executing a command. Once you have entered them, these credentials will be used for every subsequent execution of a command in the same GUI client session. If you want to change the credentials, click **Edit Credentials**. The Edit Credentials button will not be available for SNMP commands or if the command is scheduled for a later time.

Command	Navigation	Description <sup>1</sup>	Supported on
Configure MPLS Discovery	LSEs > <i>right-click</i> Label Switching > Commands > Configuration >	Configure MPLS LDP discovery parameters to discover core MPLS networks. This also includes specifying the discovery method.	<ul style="list-style-type: none"> <li>• Cisco ASR 9000 Series Routers</li> <li>• Cisco ASR 901 Series Routers</li> <li>• Cisco ASR 903 Series Routers</li> </ul>
Configure MPLS Label Range		Configures MPLS static and dynamic label range.	
Enable MPLS on Interface	LSEs > Label Switching > right-click on a selected ID in the MPLS Interface tab	Enables/disables MPLS protocol on an interface.	
Disable MPLS on Interface	Commands > Configuration >	Contains information on MPLS interfaces and whether traffic engineering tunnels are configured on an interface.	

1. Modify commands can be used to delete specific attributes, whereas the delete commands deletes the complete configuration.

## Configuring RSVP

Use RSVP commands to establish a reserved-bandwidth path between hosts or the end systems to predetermine and ensure Quality of Service (QoS) for their data transmission.

To run the these commands, the software on the network element must support the technology. Before executing any commands, you can preview them and view the results. For details on the software versions Prime Network supports for the listed supported network elements, see [Cisco Prime Network 3.10 Supported Cisco VNEs](#).

You might be prompted to enter your device access credentials while executing a command. Once you have entered them, these credentials will be used for every subsequent execution of a command in the same GUI client session. If you want to change the credentials, click **Edit Credentials**. The Edit Credentials button will not be available for SNMP commands or if the command is scheduled for a later time.

Command	Navigation	Description <sup>1</sup>	Supported on:
Configure RSVP	LSEs > right-click <b>Label Switching &gt; Commands &gt; Configuration &gt;</b>	Configure RSVP on a device or an interface.	<ul style="list-style-type: none"> <li>• Cisco ASR 9000 Series Routers</li> <li>• Cisco ASR 901 Series Routers</li> <li>• Cisco ASR 903 Series Routers</li> </ul>
Delete RSVP			Cisco ASR 9000 Series Routers
Enable RSVP On Interface Disable RSVP On Interface	<b>Routing Entities &gt; Routing Entity&gt; IP Interfaces tab, right-click the required interface &gt; Commands &gt; Configuration</b>		<ul style="list-style-type: none"> <li>• Cisco ASR 9000 Series Routers</li> <li>• Cisco ASR 901 Series Routers</li> <li>• Cisco ASR 903 Series Routers</li> </ul>

1. Modify commands can be used to delete specific attributes, whereas the delete commands deletes the complete configuration.

## Configuring BGP

Multiprotocol BGP is an enhanced BGP that carries routing information for multiple network layer protocols and IP multicast routes. BGP commands configure the routing protocol to communicate with the other sites and VRFs.



### Note

BGP neighbors should be configured as part of BGP routing. At least one neighbor and at least one address family must be configured to enable BGP routing.

The table below lists the commands that will be used to configure BGP Routing Protocol on Cisco Routers.

To run the these commands, the software on the network element must support the technology. Before executing any commands, you can preview them and view the results. For details on the software versions Prime Network supports for the listed supported network elements, see [Cisco Prime Network Supported Cisco VNEs](#).

You might be prompted to enter your device access credentials while executing a command. Once you have entered them, these credentials will be used for every subsequent execution of a command in the same GUI client session. If you want to change the credentials, click **Edit Credentials**. The Edit Credentials button will not be available for SNMP commands or if the command is scheduled for a later time.

Command	Navigation	Description <sup>1</sup>	Supported on
<b>Create BGP Router</b> <b>Modify BGP Router</b> <b>Delete BGP Router</b>	<b>MPBGPs &gt; right-click</b> <b>MPBGP &gt; Commands</b> <b>&gt; Configuration &gt;</b>	Configures BGP routing and establish a BGP routing process with AS number and Router ID	<ul style="list-style-type: none"> <li>• Cisco ASR 5000 Series Mobile-Gateway</li> <li>• Cisco ASR 9000 Series Routers</li> <li>• Cisco ASR 901 Series Routers</li> <li>• Cisco ASR 903 Series Routers</li> </ul>
<b>Create BGP Address Family</b> <b>Modify BGP Address Family</b> <b>Delete BGP Address Family</b>		Enter various address family configuration modes that uses IPv4, IPv6, L2VPN, VPNV4 or VPNV6 address prefixes.	
<b>Create BGP Neighbor</b>		Places the router in neighbor configuration mode for BGP routing and configures the neighbor IP address as a BGP peer.	
<b>Modify BGP Neighbor</b> <b>Delete BGP Neighbor</b>	<b>MPBGP &gt; MPBGP &gt;</b> <i>right-click on the BGP neighbour in the content pane &gt;</i> <b>Commands &gt;</b> <b>Configuration &gt;</b>		

1. Modify commands can be used to delete specific attributes, whereas the delete commands deletes the complete configuration.

## Configuring VRRP

The Virtual Router Redundancy Protocol (VRRP) feature allows for transparent failover at the first-hop IP router, enabling a group of routers to form a single virtual router. VRRP Command will be used to configure VRRP protocol on Cisco router.

These commands configures transparent failover at the first-hop IP router, enabling a group of routers to form a single virtual router.

To run the these commands, the software on the network element must support the technology. Before executing any commands, you can preview them and view the results. For details on the software versions Prime Network supports for the listed supported network elements, see [Cisco Prime Network 3.10 Supported Cisco VNEs](#).

You might be prompted to enter your device access credentials while executing a command. Once you have entered them, these credentials will be used for every subsequent execution of a command in the same GUI client session. If you want to change the credentials, click **Edit Credentials**. The Edit Credentials button will not be available for SNMP commands or if the command is scheduled for a later time.

Command	Navigation	Description <sup>1</sup>	Supported on:
<b>Create VRRP Group</b> <b>Delete VRRP Interface</b>	<b>Routing Entities &gt; Routing Entity &gt; IP Interfaces tab,</b> <i>right-click the required interface &gt;</i> <b>Commands &gt; Configuration</b>	Configure a group of routers to form a single virtual router.  Example is using VRRP group as default router on the client. The LAN clients can be configured with the virtual router as their default gateway thus avoiding single point of failure, which was the case in dynamic discovery protocol.	Cisco ASR 9000 Series Routers
<b>Modify VRRP Group</b> <b>Delete VRRP</b> <b>Show VRRP</b>	<b>Routing Entities &gt; Routing Entity &gt; IP Interfaces tab,</b> <i>double-click on the VRRP configured interface &gt; select</i> <b>VRRP Group tab &gt;</b> <i>right-click on required group.</i>		

1. Modify commands can be used to delete specific attributes, whereas the delete commands deletes the complete configuration.

## Configuring Bundle Ethernet

Configure a bundle of one or more ports to form a single link using bundle ethernet commands.

To run the these commands, the software on the network element must support the technology. Before executing any commands, you can preview them and view the results. For details on the software versions Prime Network supports for the listed supported network elements, see [Cisco Prime Network 3.10 Supported Cisco VNEs](#).

You might be prompted to enter your device access credentials while executing a command. Once you have entered them, these credentials will be used for every subsequent execution of a command in the same GUI client session. If you want to change the credentials, click **Edit Credentials**. The Edit Credentials button will not be available for SNMP commands or if the command is scheduled for a later time.

Command	Navigation	Description <sup>1</sup>	Supported on:
<b>Bundle Ethernet</b>			
<b>Configure Bundle Ethernet</b>	<b>Physical Inventory &gt; Chassis &gt; Slot &gt; Ethernet Port &gt; Commands &gt; Configuration &gt;</b>	Configuring an Ethernet link bundle involves creating a bundle and adding member interfaces to that bundle.	<ul style="list-style-type: none"> <li>• Cisco ASR 9000 Series Routers</li> <li>• Cisco ASR 901 Series Routers</li> <li>• Cisco ASR 903 Series Routers</li> </ul>

1. Modify commands can be used to delete specific attributes, whereas the delete commands deletes the complete configuration.

