



Finding Available Network Paths Using PathTracer

Cisco PathTracer uses Prime Network's inner logic to show available paths between two network elements. It creates a virtual path, without modifying any real network elements, and shows all devices and components the path flows through, including performance data.

The following topics describe Cisco PathTracer and how to use it:

- [Cisco PathTracer, page 13-1](#)
- [Launching Path Tracer, page 13-2](#)
- [Viewing Path Traces, page 13-12](#)
- [Saving and Opening Cisco PathTracer Map Files, page 13-17](#)
- [Saving Cisco PathTracer Counter Values, page 13-17](#)
- [Rerunning a Path and Comparing Results, page 13-18](#)
- [Viewing Q-in-Q Path Information, page 13-18](#)
- [Viewing L2TP Path Information, page 13-19](#)
- [Using Cisco PathTracer in MPLS Networks, page 13-20](#)

Cisco PathTracer

Cisco PathTracer enables you to launch end-to-end route traces and view related performance information for Layer 1, Layer 2, and Layer 3 traffic. Upon receiving a path's start and endpoint, Cisco PathTracer visually traces the route through the network. For example, in an ATM network environment, Cisco PathTracer identifies all information regarding the connection of a subscriber to a provider, including all ATM PVCs, ATM switching tables, ATM class of service (CoS) definitions, IP-related information, and so on.

You can also use Cisco PathTracer to:

- Trace paths using IPv4, IPv6, or both IPv4 and IPv6 addresses for the source and destination.
- Trace a hypothetical Ethernet frame from a VLAN interface to a specified MAC address.
- Trace a hypothetical Ethernet frame from an Ethernet interface to a specified MAC address within a specific VLAN identifier.

In MPLS and Carrier Ethernet environments, Cisco PathTracer can trace paths across:

- Carrier Supporting Carrier (CSC) configurations—A path trace along a CSC flow follows the path from the customer CE through the customer carrier VPN, across the customer backbone carrier VPN, back to the customer carrier VPN, and to the destination CE.
- VLANs—A path trace across VLANs follows the path based on the forwarding table, which means that the trace follows ports in the Forwarding STP state.
- Q-in-Q—A path trace across Q-in-Q creates a single path trace (if the MAC address is learned) or a multiple-path (multipath) trace if the MAC address is not in the forwarding table. If the VLAN bridge has not learned a given MAC address, the bridge floods the Ethernet frame to the confines of a given VLAN or switching entity and across those ports that allow the given VLAN identifier. A MAC/VLAN path trace can be conducted from a customer edge (CE) VLAN interface across a service provider (SP) VLAN; that is, across Q-in-Q configurations with the CE-VLAN identifier as the inner VLAN identifier and Cisco PathTracer detecting the outer SP-VLAN identifier that encapsulates the CE-VLAN.
- Pseudowires (also known as EoMPLS)—A MAC/VLAN path trace can be conducted from a VLAN interface across a VLAN attachment to a pseudowire.
- VLAN-VPLS-VLAN configurations—A multiple-point MAC/VLAN path trace can be conducted on CE-VLANs across a service provider VPLS transport from a VLAN interface that attaches to the VPLS.

In addition, Cisco PathTracer can trace a path:

- If the destination MAC address is not reachable—If Cisco PathTracer cannot complete a MAC/VLAN path trace to a specified destination MAC address across an MPLS core, VPLS, or H-VPLS, then Cisco PathTracer displays the portion of the path that Cisco PathTracer can trace toward the destination MAC address.
- That contains a simulated Ethernet frame—Cisco PathTracer can trace a simulated Ethernet frame from a VLAN port, across a VLAN (VLAN-based flow domain fragment), VPLS (VPLS-based flow domain fragment), and VLAN, for an end-to-end MAC address trace.

Prime Network derives the various paths on the network from its up-to-date knowledge of the network. After a user selects a source and destination, Cisco PathTracer finds and retrieves the path of a specified service, and displays the path in the Cisco PathTracer window. The retrieved information contains network elements in the path, including all properties at Layer 1, Layer 2, and Layer 3, plus alarm information, counters, and more, all of which is available via Cisco PathTracer.

Launching Path Tracer

Cisco PathTracer can be launched from a bridge, switching entity, Ethernet interface, Ethernet flow point, VLAN interface, ATM VC, DLCI, or IP interface entry point. Ethernet flow points can be starting points whether they are associated with an interface, bridge, or LAG.

The virtual route is found according to the cross connect table of each ATM switch or Frame Relay device. The IP routing and path-finding process is enabled according to the VRF tables of each router, and the Ethernet-simulated path is found according to the various Layer 2 forwarding tables, such as bridges or VSIs.

To view a specific path, you must specify an initial point and a destination, such as an IP or MAC address. If you specify VC or DLCI information, which ends in a router, Cisco PathTracer finds the next hop according to the destination IP address. If you do not specify a destination IP or MAC address, Cisco PathTracer uses the default gateway in the router. Any business tags that are associated with the physical or logical entities are also displayed.

**Note**

A path can also be launched if a business tag attached to an endpoint that can be used as the starting point.

Path Traces and Blocked Ports

The following conditions apply for blocked ports:

- You can launch a path trace from a blocked port. This action is equivalent to launching a path trace from a bridge.
- You can specify a blocked port as a destination.
- If Cisco PathTracer encounters a blocked port in its path to the destination, the path trace stops. Path traces do not traverse blocked ports.

[Table 13-1](#) identifies the available path trace launching points and their locations within the Vision client. Cisco PathTracer is available in each location as a right-click menu option.

Supported Launch Points for Cisco PathTracer

Cisco PathTracer is launched by using right-click menu options. [Table 13-1](#) identifies the launching points for the different types of elements.

Table 13-1 Cisco PathTracer Right-Click Menu Options

Element	Location
Affected Parties	<ul style="list-style-type: none"> • Inventory window • Ticket Properties window (Affected Parties tab)
Bridge	Inventory window
Business tag	The path can be found using a business tag, which is attached to the VPI/VCI, or using an IP interface by entering its key. The path can then be opened from the Find Business Tag dialog box.
Ethernet flow point	<ul style="list-style-type: none"> • Map view or navigation pane • Inventory window
IP interface	<ul style="list-style-type: none"> • Inventory window • Affected entry
Layer 2 MPLS tunnel	Inventory window
MPLS-TE tunnel	Inventory window
MPLS-TP tunnel endpoint	<ul style="list-style-type: none"> • Map view or navigation pane • Inventory window
Port	Inventory window
Pseudowire endpoint	<ul style="list-style-type: none"> • Map view or navigation pane • Inventory window
Site	Map view
Switching entity	Map view

Table 13-1 Cisco PathTracer Right-Click Menu Options (continued)

Element	Location
Virtual connection	Inventory window: <ul style="list-style-type: none"> • Cross Connect window • VC Table window
VLAN	<ul style="list-style-type: none"> • Navigation pane • Map view

Starting a Path Trace

To start a path trace:

Step 1 Start the path trace in one of the following ways:



Note If you select an IP interface as the launch point, the right-click menu displays IPv4 and IPv6 options. These options are enabled or dimmed, depending on whether the IP interface has an IPv4 address, an IPv6 address, or both IPv4 and IPv6 addresses. For an example, see [Figure 13-3](#).

Launch Point	Steps
VLAN (from map view)	<ol style="list-style-type: none"> 1. Double-click a VLAN to view its entities. 2. Right-click the required item and choose PathTracer > From Here to Destination or PathTracer > Start Here.
VPN (from map view)	<ol style="list-style-type: none"> 1. Double-click the VPN to view its entities. 2. Right-click the site and choose PathTracer > From Here to Destination or PathTracer > Start Here.
Ethernet Flow Point (from map view)	<ol style="list-style-type: none"> 1. Choose Network Inventory > Ethernet Flow Domains. 2. In the Ethernet Flow Domain List Properties window, double-click the required domain. 3. In the Ethernet Flow Domain Properties window, right-click the required element and choose PathTracer > From Here to Destination or PathTracer > Start Here.
NE physical or logical inventory	<ol style="list-style-type: none"> 1. Right-click one of the following: <ul style="list-style-type: none"> – IP interface – MPLS-TP tunnel endpoint – Port – Pseudowire endpoint – VLAN bridge 2. Choose PathTracer > From Here to Destination or PathTracer > Start Here.

- Step 2** If you choose **PathTracer > From Here to Destination**, complete the Path Information dialog box (Figure 13-1).

Figure 13-1 Path Information Dialog Box

- a. In the Path Information dialog box, enter the required information. The contents depend on your launch point.

Field	Description
Destination IP	Specify an IPv4 or IPv6 address.
Destination MAC	MAC address
VLAN ID	Enter the VLAN identifier (For example, VLAN id 1-4094).
Inner VLAN ID	Inner VLAN identifier
Stop trace after	Check this check box to enter a maximum of hops that Cisco PathTracer makes in its attempt to reach the destination

- b. Click **OK**.

Step 3 If you choose **Start Here**, navigate to the destination interface, port, or bridge, right-click it, and choose **End Here**. The Cisco PathTracer window is displayed showing the path or paths that were found.

Step 4 To view additional details regarding the path traces, select one or more paths in the paths pane.

Step 5 In the toolbar, click **Cisco PathTracer**.

- If you select one or more paths in the paths pane, each selected path is displayed in its own window with the Layer 1, Layer 2, Layer 3, and Business Tag tabs.
- If you select nothing in the Paths pane, each path found is displayed in its own window with the Layer 1, Layer 2, Layer 3, and Business Tag tabs.

For more information about the end-to-end path and networking layer details, see [Saving and Opening Cisco PathTracer Map Files](#), page 13-17.

Examples of Launching Cisco PathTracer

The following topics provide examples for launching Cisco PathTracer from different locations in the Vision client:

- Using an Ethernet Flow Point, page 13-6
- Using an IP Interface, page 13-7
- Using a VLAN Bridge, page 13-8
- Using an Ethernet Port, page 13-9
- Using a Pseudowire, page 13-10
- Using an MPLS-TP Tunnel Endpoint, page 13-11

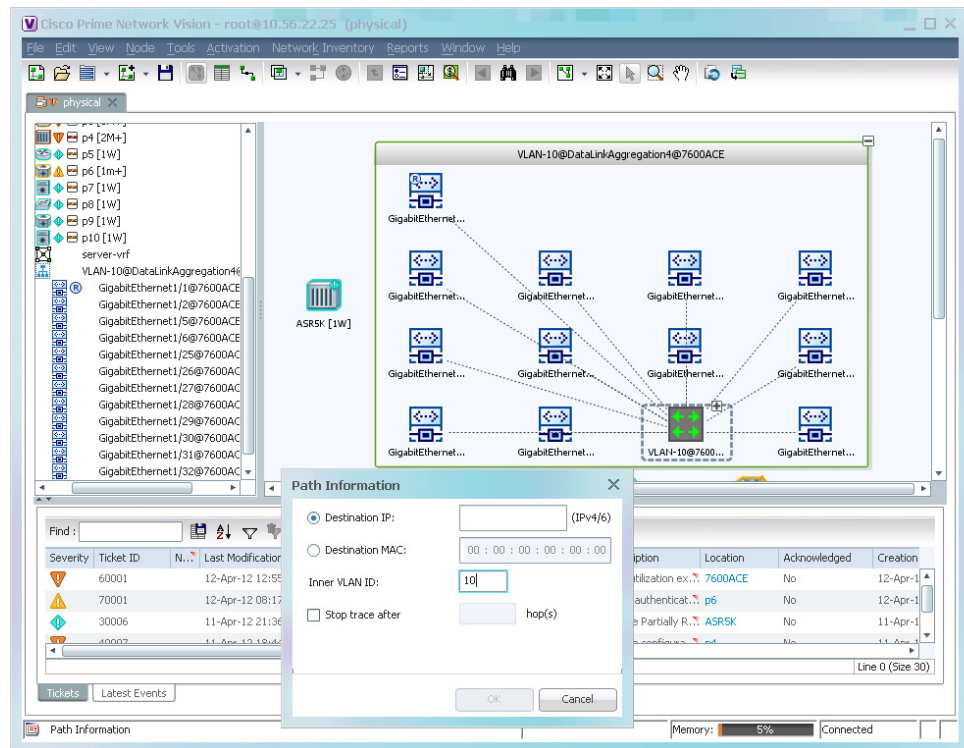
Using an Ethernet Flow Point

A network VLAN is required for you to start a path trace using an Ethernet flow point.

To launch a path trace from an Ethernet flow point:

- Step 1** In the Vision client navigation pane or map pane, expand the required network VLAN.
- Step 2** In the VLAN, right-click the required Ethernet flow point and choose **PathTracer > From Here to Destination**. The Path Information dialog box is displayed as shown in [Figure 13-2](#).

Figure 13-2 Ethernet Flow Point Path Trace Launch Point



- Step 3** Specify the destination.
- Step 4** To limit the number of hops for the path trace, check the *Stop trace after* check box, and enter the maximum number of hops for the path trace.
- Step 5** Click **OK**. The Cisco PathTracer window is displayed with the resulting path trace.

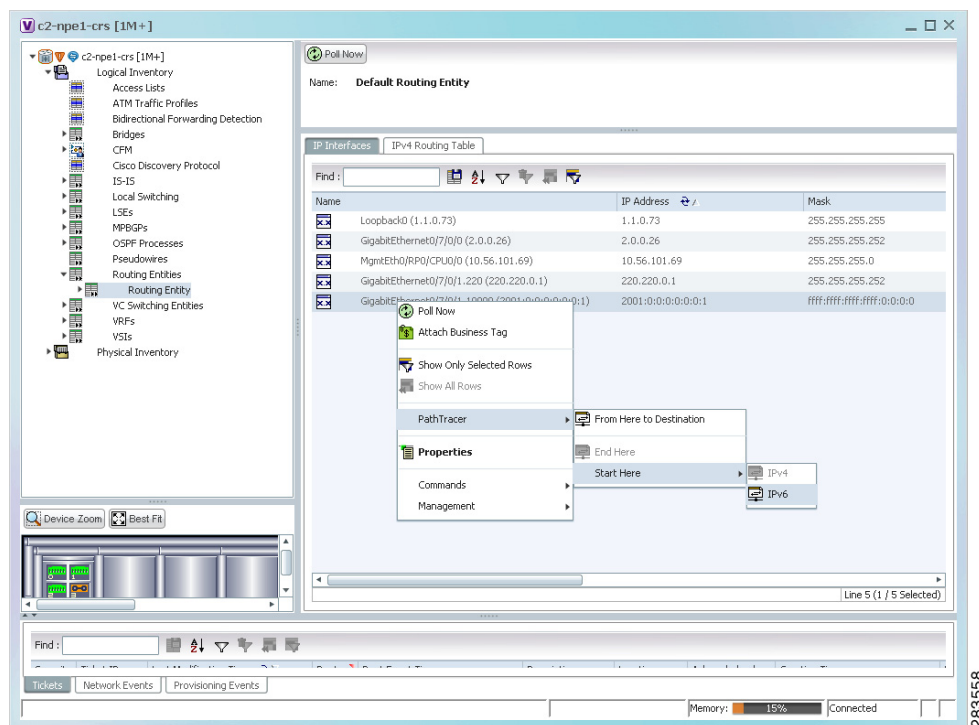
Using an IP Interface

Both IPv4 and IPv6 addresses are supported as valid path trace sources and destinations as illustrated in the following procedure.

- Step 1** In logical inventory, right-click the required IP interface (**Logical Inventory > Routing Entities > Routing Entity > ip-interface**).

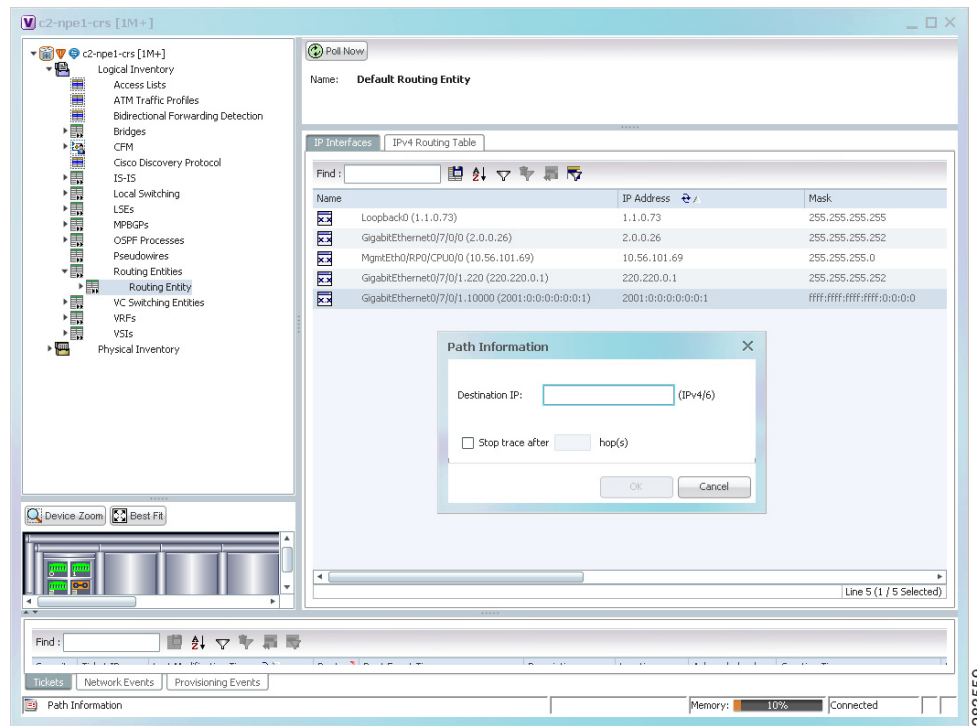
The right-click menu displays IPv4 and IPv6 options. These options are enabled or dimmed, depending on whether the IP interface has an IPv4 address, an IPv6 address, or both IPv4 and IPv6 addresses. See [Figure 13-3](#).

Figure 13-3 IP Interface Path Trace Launch Point - Right-Click Menu



- Step 2** Choose **PathTracer > From Here to Destination**. The Path Information dialog box is displayed as shown in [Figure 13-4](#).

Figure 13-4 IP Interface Path Trace Launch Point - Path Information Dialog Box



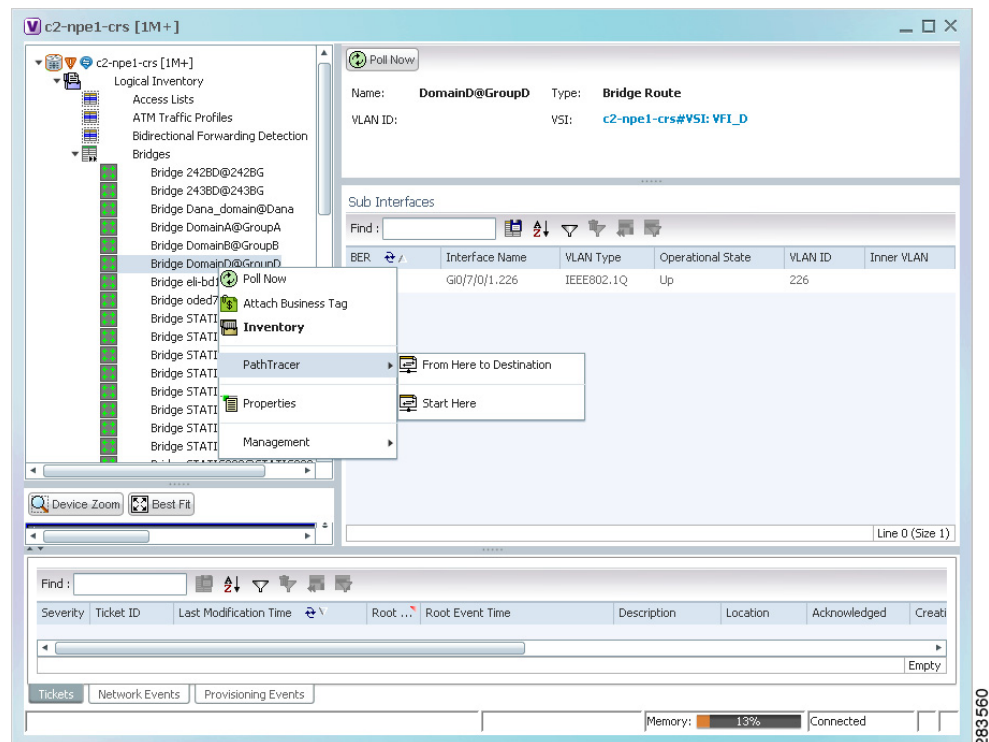
- Step 3** In the Destination IP field, enter the IPv4 or IPv6 address.
- Step 4** To limit the number of hops for the path trace, check the *Stop trace after* check box, and enter the maximum number of hops for the path trace.
- Step 5** Click **OK**.

Using a VLAN Bridge

You can launch path traces from VLAN bridges. Additionally, MAC addresses in the VLAN bridge forwarding table can be path trace destinations.

- Step 1** In logical inventory, right-click the required bridge (**Logical Inventory > Bridges > bridge**) and choose one of the following options as shown in Figure 13-5:
- **PathTracer > From Here to Destination**
 - **PathTracer > Start Here**

Figure 13-5 VLAN Bridge Path Trace Launch Point



- Step 2** If you choose **From Here to Destination** in [Step 1](#), the Path Information dialog box is displayed. Specify the required destination.
- Step 3** If you choose **Start Here**, navigate to the destination, right-click it, and choose **End Here**. Destination options include:
- IP interface—**Logical Inventory > Routing Entities > Routing Entity > IP-interface**
 - Bridge—**Logical Inventory > Bridges > bridge**
 - MAC address—**Logical Inventory > Bridges > bridge > Bridge Table > MAC-address**
 - Ethernet port—**Physical Inventory > chassis > slot > port**

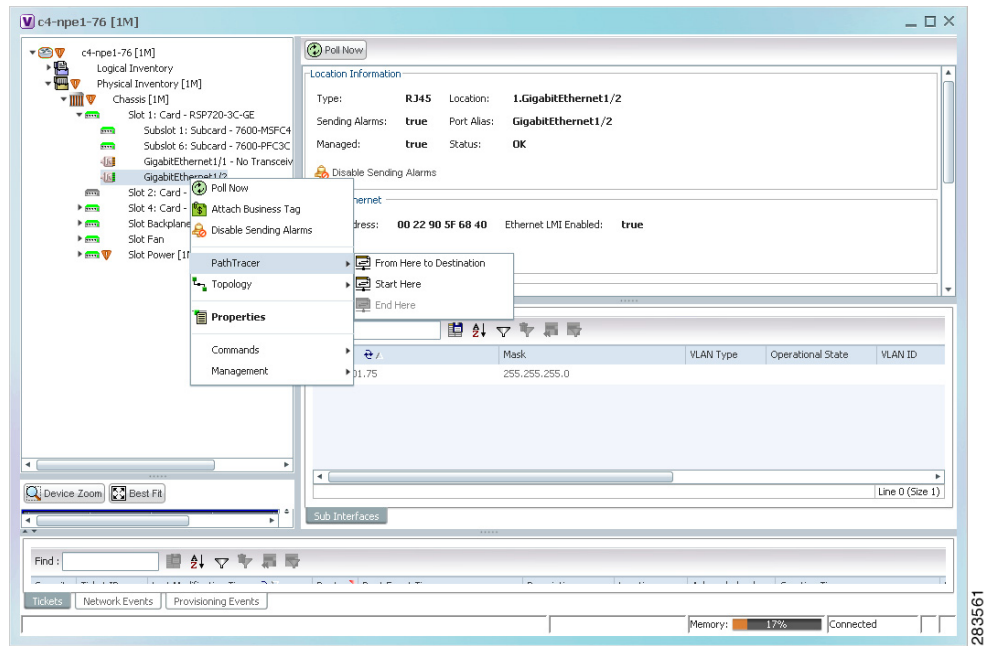
When a destination is selected, the system extracts the relevant IP address from this point and uses it as the destination.

Using an Ethernet Port

To launch a path trace from an Ethernet port:

- Step 1** In physical inventory, right-click the required port (**Physical Inventory > Chassis > slot > subslot > port**) and choose one of the following options as shown in [Figure 13-6](#):
- **PathTracer > From Here to Destination**
 - **PathTracer > Start Here**

Figure 13-6 Ethernet Port Path Trace Launch Point



Step 2 Depending on your choice in [Step 1](#), specify the required destination information or select the path trace endpoint.

The Cisco PathTracer window appears, displaying the resulting path trace.

Using a Pseudowire

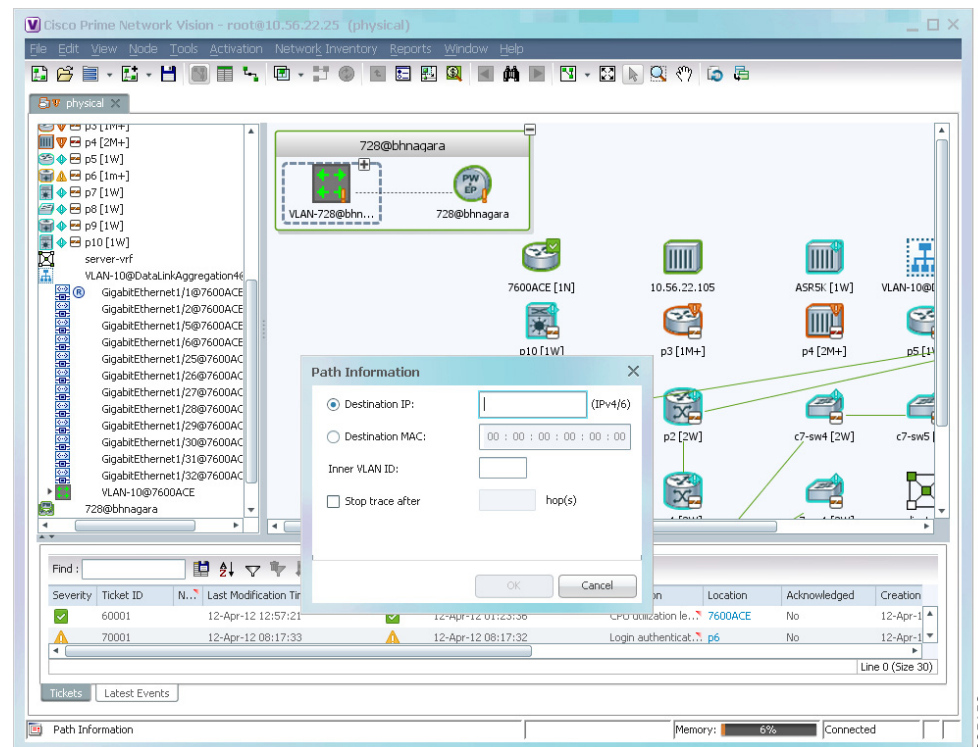
To launch a path trace from a network pseudowire endpoint:

Step 1 In the navigation pane or map pane, expand the required network pseudowire.

Step 2 Right-click the required pseudowire endpoint and choose **PathTracer > From Here to Destination**.

The Path Information dialog box is displayed as shown in [Figure 13-7](#).

Figure 13-7 Path Information Dialog Box for a Network Pseudowire



- Step 3** Specify the destination.
- Step 4** To limit the number of hops for the path trace, check the *Stop trace after* check box, and enter the maximum number of hops for the path trace.

The Cisco PathTracer window appears, displaying the resulting path trace.

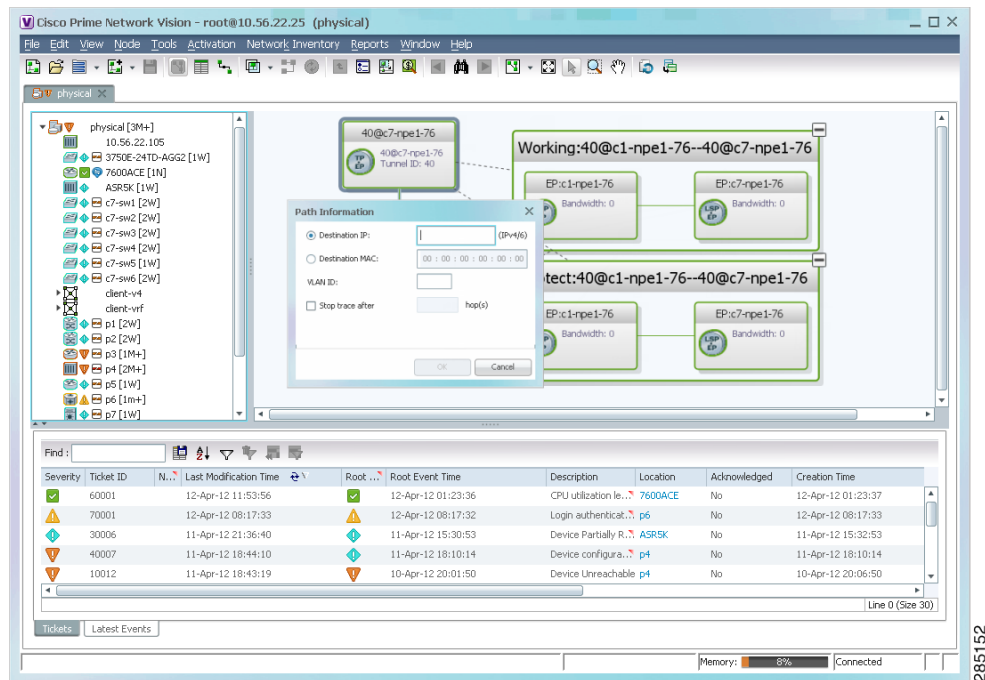
Using an MPLS-TP Tunnel Endpoint

To launch a path trace from an MPLS-TP tunnel endpoint:

- Step 1** In the navigation pane or map pane, expand the required MPLS-TP tunnel.
- Step 2** Right-click the required MPLS-TP tunnel endpoint and choose **PathTracer > From Here to Destination**.

The Path Information dialog box is displayed as shown in [Figure 13-8](#).

Figure 13-8 MPLS-TP Tunnel Endpoint Path Trace Launch



Step 3 Specify the destination.

Step 4 To limit the number of hops for the path trace, check the *Stop trace after* check box, and enter the maximum number of hops for the path trace.

The Cisco PathTracer window appears, displaying the resulting path trace.

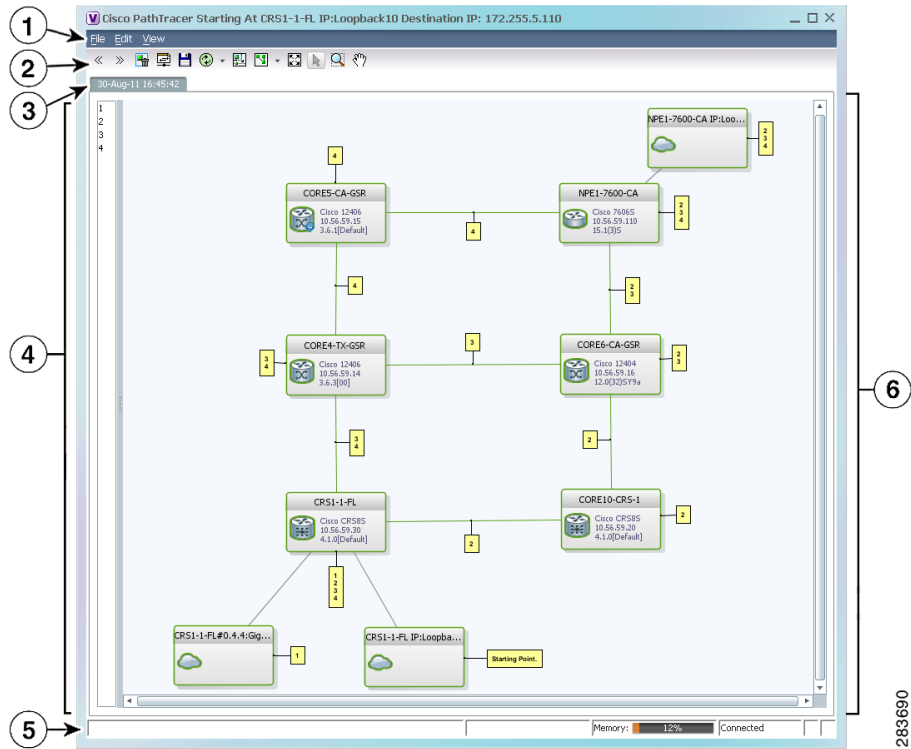
Viewing Path Traces

The Cisco PathTracer window displays all discovered paths for the specified source and destination of the path trace, including the devices and physical links. From the window you can:

- View multiple paths for a selected source and destination either sequentially or simultaneously.
- View individual paths with networking layer details.
- Save a map with multiple paths to a file.
- Run Cisco PathTracer again, using the same trace or with a different limit number of hops.

Figure 13-9 shows an example of the Cisco PathTracer window with a multiple-path trace.

Figure 13-9 Cisco PathTracer Window - Multiple-Path Trace



Window Area	Description
1	Menu bar
2	Toolbar Cisco PathTracer Toolbar, page 13-16
3	Trace tab Displays the discovered path with a tab that displays the date and time when Prime Network started the path tracing process (snapshot time). New runs are represented in new tabs. To use a saved path in the same window, the source and destination must be the same.
4	Paths pane Lists all the paths discovered in the path trace (one path for each source and destination pair, identified by a number). If you launch a path trace with a specific hop count, the paths pane displays First <i>n</i> Hops where <i>n</i> is the number of hops specified. You can choose different paths in the path pane or by using the toolbar icons. Click Clear Path Selection to de-select a path.
5	Status bar
6	Path trace pane Displays the devices, links, and topological paths in path trace. All links and nodes are labeled with their relevant path numbers. The starting point is labeled with a Starting Point callout. All other edge points are displayed as clouds. The same coloring conventions that are used for links in the Prime Network content pane are used to display links in the Cisco PathTracer path trace pane. (See Links, page A-11.)

Click **PathTracer** from the toolbar to display the following information:

- Each NE's relevant parameters for each interface on all layers along the path; for each layer, an indication of a mismatch between the parameters of the interfaces on both sides of a link; and traffic statistics along the path.
- Status and traffic information for all links along the path.
- View In and Out port properties.

If you select multiple paths, a separate window is opened for each path. [Figure 13-10](#) shows an example of the Cisco PathTracer details window.

Figure 13-10 Cisco PathTracer Details Window

The screenshot shows the Cisco PathTracer interface. At the top, a network diagram displays four nodes: c4-upe6, c4-upe3, c4-upe2, and an Edge Point. A path is highlighted in green, connecting c4-upe6 to c4-upe3, then c4-upe3 to c4-upe2, and finally c4-upe2 to the Edge Point. Below the diagram is a table of Layer 1 properties for each interface. The table has columns for VNE, Slot, Port, and various statistics. A toolbar at the bottom shows 'Layer 1' selected, and a status bar indicates 'Memory: 11%' and 'Connected'.













Layer 1 Properties	VNE: c4-upe6 Slot: 0 Port: GigabitEthernet0/1	VNE: c4-upe3 Slot: 1 Port: GigabitEthernet1/4	VNE: c4-upe3 Slot: 1 Port: GigabitEthernet1/2	VNE: c4-upe2 Slot: 1 Port: GigabitEthernet1/5
Port Type	Ethernet CSMA/CD	Ethernet CSMA/CD	Ethernet CSMA/CD	Ethernet CSMA/CD
Admin Status	Up	Up	Up	Up
Oper Status	Up	Up	Up	Up
Media Type	UTP	Fiber Optic	Fiber Optic	Fiber Optic
Traffic <- Rate	1.336 Kbps	1.25 Kbps	543.0 bps	546.0 bps
Traffic -> Rate	6.069 Kbps	5.075 Kbps	563.0 bps	683.0 bps
Traffic <- Counters	625172135 octets	4151136124 octets	2352239963 octets	2352240282 octets
Traffic -> Counters	4057415740 octets	2772181371 octets	2063373774 octets	2063374396 octets
Discarded Counters	0 octets	0 octets	0 octets	0 octets
Dropped Counters	0 octets	0 octets	0 octets	0 octets
Discarded Rate	0.0 bps	0.0 bps	0.0 bps	0.0 bps
Dropped Rate	0.0 bps	0.0 bps	0.0 bps	0.0 bps
Internal Port	false	false	false	false
Max Speed	1000.0 Mbps	1000.0 Mbps	1000.0 Mbps	1000.0 Mbps

1	Menu bar	—
2	Toolbar	—
3	Path trace pane	<p>Displays information related to the selected tab (for example, Layer 2). If you choose an element or link in the path trace pane, the related parameters are highlighted in the details pane. By default, the path trace pane includes:</p> <ul style="list-style-type: none"> • Edge points • Elements included in the path trace, including badges • Links included in the path trace <p>Hovering your mouse over an element displays a tooltip that contains the element name, device type, and IP address. Hovering your mouse over the link to the right or left of the element displays the associated incoming or outgoing interface for that element and link.</p>
4	Hide/display path trace pane	—
5	Details pane	<p>Selecting a device or link in the path trace pane automatically highlights the related parameters in the details pane.</p> <p>Displays information about device or link selected in Path trace pane, such as Layer and Business tabs, supported parameters of the selected element in a table, with the ingress and egress ports along the top and the parameters on the left.</p> <p>Colors indicate any inconsistencies between the two connected ports.</p> <p>The information parameters are arranged as follows:</p> <ul style="list-style-type: none"> • Layer <i>n</i> tabs—Provide information about each network element, including ingress and egress port information. The information is either plain data that is extracted from the element or calculated data, such as rates or statistics. This information is displayed in the Layer 1, Layer 2, and Layer 3 tabs, as follows: <ul style="list-style-type: none"> – Layer 1—Displays the Layer 1 information in the selected path and the link parameters, device name, subslot, slot, and port details. – Layer 2—Displays the Layer 2 information in the selected path and the link and connection parameters. For each device, the name and MAC address are displayed, as well as the VPI/VCI in an ATM link or the DLCI in a Frame Relay link. (This tab is active by default.) – Layer 3—Displays the Layer 3 information in the selected path and the link parameters and devicenames. <p>Fields are only displayed if they are populated. For example, if none of the interfaces is configured for MTU, the MTU row is not displayed in the table.</p> <ul style="list-style-type: none"> • Business tab—Provides the name and key of business tags that are attached to the network entities displayed, including ports, devices (physical entities), VCIs, VPIs, DLCIs, contexts (logical entities), or MPLS.
6	Layer and Business tabs	—
7	Status bar	—

Cisco PathTracer Toolbar

Table 13-2 describes the options available in the Cisco PathTracer toolbar.

Table 13-2 Cisco PathTracer Toolbar Options

Button	Function
	Displays the previous path in the path trace pane.
	Displays the next path in the path trace pane.
	Clears the path selection made in the path trace pane.
	Opens the Cisco PathTracer details window. A map is displayed for the selected path, including network element details, links, and property information. For more information, see Saving and Opening Cisco PathTracer Map Files, page 13-17 .
	Saves the current multiple-path trace to an XML file on your local system. For more information, see Saving and Opening Cisco PathTracer Map Files, page 13-17 .
	Offers the following options for running Cisco PathTracer again for the same source and destination: <ul style="list-style-type: none"> Change Hop Count—Enables you to enter a new hop count. Repeat Last Trace—Runs the previous trace with the same settings. Run Full Path Trace—Runs the previous trace without a hop count limit. <p>The new path trace map is displayed in the path trace pane.</p> <p>A new tab with the up-to-date (or refreshed) path map is created for each run, with each tab representing a run and the tab label indicating the snapshot time.</p>
	Opens a window displaying a high level view of the path trace currently displayed in the path trace pane.
	Specifies how the elements are arranged in the path trace pane: circular, hierarchical, orthogonal, or symmetric.
	Fits the entire path trace in the path trace pane.
	Activates the normal selection mode. The button toggles when selected or deselected.
	Activates the zoom selection mode, which enables you to select a specific area in the path to zoom in on by clicking and dragging. The button toggles when selected or deselected.
	Activates the pan mode, which enables you to move around in the path trace by clicking and dragging. The button toggles when selected or deselected.

Saving and Opening Cisco PathTracer Map Files

Prime Network enables you to export multiple-path trace maps that are displayed in the Cisco PathTracer window to an XML file. You can view the data later to assess whether anything has changed.

Saving Cisco PathTracer Map Files

To save Cisco PathTracer map files:

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- Step 1** Open the Cisco PathTracer window as described in [Launching Path Tracer, page 13-2](#).
 - Step 2** Click **Save MultiPath** in the toolbar.
 - Step 3** In the Save dialog box, navigate to the directory where you want to save the file and enter a name for the map file.
 - Step 4** Click **Save**. The map file is saved in the selected directory.
-

Opening Cisco PathTracer Map Files

Prime Network enables you to open saved XML-formatted path-tracing maps.

The following conditions apply when working with multiple-path trace files:

- When you load a multiple-path trace file, Prime Network queries the file (not the network), and loads the persisted information.
- If you load a multiple-path trace file that does not contain the same start and end points, the map is automatically opened in a new Cisco PathTracer window.

To open Cisco PathTracer map files:

-
- Step 1** In the Vision client, choose **File > Load MultiPath** from the main menu. The Open dialog box is displayed.
 - Step 2** Navigate to the directory of the saved file and select the file.
 - Step 3** Click **Open**. The previously saved map is displayed in the Cisco PathTracer window.
-

Saving Cisco PathTracer Counter Values

Prime Network enables you to export, over a period of time, the counter values of the path displayed in the Cisco PathTracer window to a CSV file. The data can then be viewed later, as required.



Note

This topic applies to the Cisco PathTracer details window only.

To save Cisco PathTracer counter values that are generated over a period of time:

-
- Step 1** Open the Cisco PathTracer details window as described in [Launching Path Tracer, page 13-2](#).
 - Step 2** Click **Start Saving to File** in the toolbar.

- Step 3** In the Export Table to File dialog box, navigate to the directory where you want to save the Cisco PathTracer counter values.
- Step 4** In the File name field, enter a name for the file in which to save the counter values.
- Step 5** Click **Save**. Cisco PathTracer starts saving the counter values to the specified file.
- Step 6** To stop exporting counter values to the file, click **Stop Saving to File** in the toolbar. Cisco PathTracer stops exporting the counter values to the file.
-

Rerunning a Path and Comparing Results

If you save a path to a file (see [Saving and Opening Cisco PathTracer Map Files, page 13-17](#)), you can use the file to rerun the same path automatically with the same source and destination. You can also compare the saved path to a newly run path to determine if the path has changed or to assess a problem.

To rerun a saved path:

- Step 1** Load the required map file as described in [Saving and Opening Cisco PathTracer Map Files, page 13-17](#). The Cisco PathTracer window is displayed with the previously saved map file.
- Step 2** Click **Run Again** in the toolbar.
- The path trace runs automatically using the same source and destination as the loaded map file, and a new tab is displayed in the Cisco PathTracer window with the updated map. The tab displays the date and time when the path was rerun.
- Step 3** Compare the previous map to the updated one by switching between the tabs in the Cisco PathTracer window.
-



Note

- If you load a Cisco PathTracer map file that does not contain the same source and destination information as the map that is currently displayed in the window, the map is automatically opened in a new Cisco PathTracer window.
 - If you load a Cisco PathTracer map file that contains the same source and destination information as a map that is currently displayed in the window, the map is loaded in a new tab in the same window.
-

Viewing Q-in-Q Path Information

The Q-in-Q (IEEE 802.1) tagging technology (also known as Dot1q tunneling) allows the nesting of another VLAN tag in a packet, in addition to an existing one. Either VLAN tag is considered an 802.1Q header.

Cisco PathTracer uses the VLAN tags of the Ethernet header and the port configuration to trace the path from one interface to another over the network. Among other things, you can:

- View a Layer 2 path across a LAN domain with all the VLAN tag information.
- For each network element, view the relevant parameters for each interface on all layers along the path.

Q-in-Q and Dot1q information is displayed in the Cisco PathTracer window when a path is traced over Ethernet ports with Dot1q and a Q-in-Q configuration.

As described in [Launching Path Tracer, page 13-2](#), to view a specific path, you must specify an initial start point, such as an IP interface, and then an endpoint, such as a destination IP address.

To trace a Q-in-Q path, you start the path from any:

- Router or switch that is part of the Ethernet domain with Dot1q and Q-in-Q configurations.
- IP destination that can be reached from that point of the network.

After you select the endpoint, the Cisco PathTracer window is displayed. From this window, you can open the Cisco PathTracer details window, with the appropriate Q-in-Q information displayed in the Layer 2 tab.

The Layer 2 tab can display the following information specific to Q-in-Q and VLAN port configurations:

- **VLAN Mode**—The work mode for the interface: Unknown, Access, Trunk, or Dot1Q Tunnel. Trunk mode also refers to multiple tagging.
- **Native VLAN ID**—The VLAN identifier that is used to tag untagged traffic received on a trunked interface:
 - If VLAN tagging is enabled, the default native VLAN identifier is 1.
 - If VLAN tagging is disabled, the native VLAN identifier is 0 (zero) or “no VLAN ID.”
- **CE VLAN ID**—The customer edge device VLAN identifier.
- **SP VLAN ID**—The service provider VLAN identifier.

Viewing L2TP Path Information

Cisco PathTracer uses VC ID encapsulation information to trace the path from one tunnel interface to another over the network. The Cisco PathTracer tool enables you to:

- View a path for the defined Layer 2 Tunneling Protocol (L2TP) session across the network.
- For each network element, view the relevant parameters for each interface on all layers along the path.

The Layer 3 tab displays the peer name for L2TP tunnels.

[Table 13-3](#) describes the information that is displayed in the Layer 2 tab for L2TP tunnels.

Table 13-3 Layer 2 Tab Information for L2TP Tunnels

Field	Description
Encapsulation Type	Encapsulation type, such as Point-to-Point Protocol over ATM (PPPoA).
Binding Information	Name of the subscriber.
Binding Status	Binding status: bound or unbound.
Tunnel Session Count	Number of current sessions.

Table 13-3 Layer 2 Tab Information for L2TP Tunnels (continued)

Field	Description
Tunnel Remote ID	Remote tunnel identifier.
Tunnel ID	Local tunnel identifier.
Tunnel Name	Name of the subscriber and the tunnel identifier.
Session ID	Session identifier.
Traffic > L2TPSession Counters	Number of ingress traffic packets passing through the L2TP tunnel.
Traffic < L2TPSessionCounters	Number of egress traffic packets passing through the L2TP tunnel.
Tunnel Ctl Errors	Number of control errors.
Tunnel State	Tunnel state: unknown, idle, connecting, established, or disconnecting.
Session Type	Session type: unknown, LAC, or LNS.
Peer Name	Peer name.
Tunnel Remote IP	Remote IP address of the tunnel.
Last Error Code	Value of the last error code that caused the tunnel disconnection.
Session State	Session state: unknown, idle, connecting, established, or disconnecting.
Remote Session ID	Remote session identifier.

Using Cisco PathTracer in MPLS Networks

You can open and view Cisco PathTracer information between service endpoints, such as an IP interface that is attached to the VRF over an MPLS network. The LSP in the MPLS network is found according to the cross-connect table of each router.



Note

An LSP can be traced and displayed by Cisco PathTracer as part of an end-to-end tracing of a service; for example, when viewing a path between one CE device and another. Cisco PathTracer traces the path that goes over circuits or VLANs in the access networks. It also traces the LSPs between the VRFs going through all intermediate devices such as CE devices, aggregation switches, PE routers, and core routers.

To view a specific path, you must specify an initial starting point, such as an IP interface; specifying a destination IP address is optional. If the traced path (for example, a VC or VLAN) ends in a router, Cisco PathTracer finds the next hop according to the destination IP address. If you select an endpoint, Cisco PathTracer extracts the relevant IP address from this point and uses it as the destination.

The following topics provide more information on using Cisco PathTracer in MPLS networks:

- [Cisco PathTracer MPLS Start and Endpoints, page 13-21](#)
- [Using Cisco PathTracer for CSC Configurations, page 13-22](#)
- [Using Cisco PathTracer for Layer 3 VPNs, page 13-22](#)
- [Using Cisco PathTracer for Layer 2 VPNs, page 13-23](#)
- [Using Cisco PathTracer for MPLS TE Tunnels, page 13-24](#)

Cisco PathTracer MPLS Start and Endpoints

You can open Cisco PathTracer by right-clicking a starting point and entering the required destination IP address. [Table 13-4](#) lists the Cisco PathTracer starting points.

Table 13-4 Cisco PathTracer MPLS Starting Points

Element	Location	Start Options
IP interface	<ul style="list-style-type: none"> Inventory window Affected entity (enabled only if the affected entity has an IP interface) 	<ul style="list-style-type: none"> From Here to Destination Start Here
MPLS-TP tunnel endpoint	<ul style="list-style-type: none"> Navigation or map pane Inventory window 	<ul style="list-style-type: none"> From Here to Destination Start Here
Site	Service view map	<ul style="list-style-type: none"> From Here to Destination To Subnet Destination Start Here
Business tag attached to the VPI/VCI or IP interface	The path can be found using a business tag, which is attached to the VPI/VCI or IP interface by entering its key. It can then be opened from the Find Business Tag window.	From Here to Destination
Layer 2 MPLS Tunnel	Inventory window	From Here to Destination

If you choose the Start Here option, [Table 13-5](#) lists the endpoints that can be selected as path destinations.

Table 13-5 Cisco PathTracer MPLS Endpoints

Element	Location	End Options
IP interface	<ul style="list-style-type: none"> Inventory window Affected entity (enabled only if the affected entity has an IP interface) 	End Here
MPLS-TP tunnel endpoint	Inventory window	End Here
Site	Service view map	End Here

The Cisco PathTracer window is displayed. From this window you can open the Cisco PathTracer details window with the VPN information displayed in the Layer 2 and Layer 3 tabs.



Note

If multiple paths are selected in the paths pane, or if nothing is selected in the paths pane, all available paths are opened automatically, and each is displayed in a separate Cisco PathTracer window.

Using Cisco PathTracer for CSC Configurations

Cisco PathTracer traces a CSC flow from the customer CE through the customer carrier VPN, across the customer backbone carrier VPN, back to the customer carrier VPN, and to the destination CE.

To launch a path trace for a CSC configuration:

- Step 1** In a map, double-click the required CE device.
- Step 2** In the **Inventory** window, choose **Logical Inventory > Routing Entities > Routing Entity**.
- Step 3** In the IP Interfaces table, right-click the required interface and choose **PathTracer > Start Here > IPvn** where *IPvn* represents IPv4 or IPv6.
- Step 4** Navigate to the destination CE device and double-click it.
- Step 5** In the **Inventory** window, choose **Logical Inventory > Routing Entities > Routing Entity**.
- Step 6** In the IP Interfaces table, right-click the required interface and choose **PathTracer > End Here**.
The path trace is displayed in the Cisco PathTracer window.
- Step 7** To view the detailed pane, click Cisco PathTracer in the toolbar.

The Layer 2 tab displays a single outer label and two inner labels for each interface, reflecting the CSC configuration. (See [Figure 13-11](#).)

Figure 13-11 CSC Configuration Path Trace

Layer 2 Properties	VNE: CRS-1-CA Slot: 0.1.2 Port: TenGigE0/1/2/0	VNE: CRS-1-CA Slot: 0.0.0 Port: GigabitEthernet0/0/0/2	VNE: CSC-CE1-7204-CA Slot: 0 Port: GigabitEthernet0/3	VNE: CSC-CE1-7204-CA Slot: 0 Port: GigabitEthernet0/3
MAC Address	00 23 5E 80 DD 8E	00 23 5E 80 DD 2B	00 1B 90 EB 18 19	00 1B 90 EB 18 1A
Interface Type	TenGigabit Ethernet	Gigabit Ethernet	Gigabit Ethernet	Gigabit Ethernet
MPLS Top Label	248	16365	16365	194
MPLS Label Stack	[248,43]	[16365,43]	[16365,43]	[194,43]
Label Distribution Protocol	LDP	N/A	N/A	LDP
Bridge ID				
VLAN Interface Mode				
Native VLAN ID				
VLAN ID		215	215	217
Translated VLAN ID				
VLAN Encapsulation Protocol				
Allowed VLANs				
EFP Match VLAN		dot1q 215	dot1q 215	dot1q 217

Using Cisco PathTracer for Layer 3 VPNs

Cisco PathTracer uses VRF routing and label switching information to trace the path from one VRF interface to another. If you choose a launch point and destination from the right-click menu, you can open the Cisco PathTracer for Layer 3 VPNs. The Cisco PathTracer window shows the VPN topology map. From this window, you can open the Cisco PathTracer details window with the appropriate VPN information displayed in the Layer 2 and Layer 3 tabs.

For Layer 3 path information, Prime Network uses VRF routing and label switching information to trace the path from one VRF interface to another. Layer 3 path trace information is displayed in the Cisco PathTracer window when the path goes over connections and ends in VRFs.

If a VRF table includes more than one path toward a destination, Cisco PathTracer shows all paths.

To view Layer 3 path information, choose the **Layer 3** tab and choose **Show All** from the View menu. The path information is displayed in the active tab.

The table displays the Layer 3 VPN information on the device that has a VRF. The following Layer 3 properties displayed in the Layer 3 tab relate specifically to VPNs:

- **Name**—The name of the site. For example, ATM4/0.100(10.0.0.1) is a combination of the interface name and IP address used to reach the site. Each site belongs to a particular VPN, so the address must be unique within the VPN.
- **IP Address**—The IP address of the interface.
- **Mask**—The mask of the specific network.
- **State**—The state of the interface (up or down).
- **VRF Name**—The name of the VRF.

Cisco PathTracer does not display or trace EXP bits for Layer 3 VPNs that use policy-based tunnel selection (PBTS).

Using Cisco PathTracer for Layer 2 VPNs

Cisco PathTracer uses VC ID and label switching information to trace the path from one tunnel interface to another over the MPLS network.

Cisco PathTracer also covers end-to-end Layer 2 VPN service paths from one CE router to another. The path goes over circuits (such as a VC) or VLANs in access networks and over LSP between the Layer 2 tunnel edge.

The Cisco PathTracer window shows the VPN topology map for the relevant devices and links. From this window, you can open the Cisco PathTracer details window with the appropriate VPN information displayed in the Layer 2 and Layer 3 tabs.

For Layer 2 path information, Cisco PathTracer uses VC ID, AGI, SAI, TAIL, and label switching information to trace the path from one tunnel interface to another. Layer 2 path trace information is displayed in the Cisco PathTracer window when the path goes over pseudowire tunnels.

To view Layer 2 path information, choose the **Layer 2** tab and then **View > Show All**. The path information is displayed in the active tab.

[Table 13-6](#) describes the Layer 2 properties that can be displayed in the Layer 2 tab specifically for VPNs.

Table 13-6 Cisco PathTracer Layer 2 Properties for VPNs

Field	Description
Top Label	Details of the outer MPLS label.
Label Stack	Details of the inner MPLS label.
MAC Address	MAC address.
Tunnel ID	Tunnel identifier. The identifier and the router IP address of the two tunnel edges identify the pseudowire tunnel.

Table 13-6 Cisco PathTracer Layer 2 Properties for VPNs (continued)

Field	Description
Tunnel Type	Tunnel type: <ul style="list-style-type: none"> • 0—Unknown • 1—PWE3 • 2—TE
Tunnel Status	Operational state of the tunnel: Up or Down.
Tunnel Local VC Label	MPLS label that is used by the router to identify or access the tunnel. It is inserted in the MPLS label stack by the local router.
Tunnel Peer VC Label	MPLS label that is used by the router to identify or access the tunnel. It is inserted in the MPLS label stack by the peer router.
Tunnel Local Router IP	IP address of the tunnel edge, which is used as the MPLS router identifier.
Tunnel Peer Router IP	IP address of the peer tunnel edge, which is used as the MPLS router identifier.
Distribution Protocol Type	Protocol used by MPLS to build the tunnel, such as LDP or TDP.
Peer OID	Tunnel identifier and device name.

Using Cisco PathTracer for MPLS TE Tunnels

Cisco PathTracer uses label switching information to trace the end-to-end path of a TE tunnel path from one PE router to another.

Using MPLS TE technology, Cisco PathTracer enables you to:

- View a path or list of devices.
- View the following information for each network element:
 - The relevant parameters for each interface on all layers along the path.
 - The path for the defined MPLS TE-LSP across the network.

The Cisco PathTracer window is displayed showing the MPLS TE tunnel topology map. From this window, you can open the Cisco PathTracer details window with the appropriate MPLS TE tunnel information displayed in the Layer 2 tab.



Note

Cisco PathTracer does not display or trace EXP bits for Layer 3 VPNs that use PBTS.

Layer 2 and Layer 3 path trace information is displayed in the Cisco PathTracer details window when a path is traced over MPLS TE tunnels. To view Layer 2 path information, choose the **Layer 2** tab and then **View > Show All**. The path information is displayed in the active tab.

Table 13-7 describes the Layer 2 properties that can be displayed in the Layer 2 tab specifically for MPLS TE tunnels.

Table 13-7 Cisco PathTracer Layer 2 Properties for MPLS TE Tunnels

Field	Description
MPLS TE Properties	MPLS TE data set in an MPLS interface, primarily bandwidth allocation levels and signaling protocol.
Tunnel Oper Status	Operational status of the tunnel: Up or Down. If this value is Up, the Tunnel Admin Status must also be Up. See Tunnel Admin Status properties for additional information.
Tunnel Bandwidth Kbps	Configured bandwidth (in Kb/s) for the tunnel.
Tunnel Description	Description of the tunnel.
Tunnel Name	Interface name.
Tunnel Admin Status	Administrative status of the tunnel (Up or Down) with the following caveats: <ul style="list-style-type: none"> If the Tunnel Oper Status value is Up, the Tunnel Admin Status value must also be Up. If the Tunnel Admin Status value is Down, the Tunnel Oper Status value must also be Down.
Tunnel Lockdown	Whether or not the tunnel can be rerouted: <ul style="list-style-type: none"> Enabled—The tunnel cannot be rerouted. Disabled—The tunnel can be rerouted.
Tunnel LSP ID	LSP identifier.
Tunnel Auto Route	Whether or not destinations behind the tunnel are routed through the tunnel: Enabled or disabled.
Tunnel Hold Priority	Tunnel priority after path setup.
Tunnel Setup Priority	Tunnel priority upon path setup.
Tunnel Path Option	Tunnel path option: <ul style="list-style-type: none"> Dynamic—The tunnel is routed along the ordinary routing decisions after taking into account the tunnel constraints such as attributes, priority, and bandwidth. Explicit—The route is explicitly mapped with the included and excluded links.
Tunnel Out Label	TE tunnel MPLS label distinguishing the LSP selection in the adjacent device.
Tunnel Affinity	Tunnel's preferential bits for specific links.
Tunnel Destination Address	IP address of the device in which the tunnel ends.
Tunnel Peak Rate Kbps	Peak flow specification (in Kb/s) for this tunnel.
Tunnel Out Interface	Interface through which the tunnel exits the device.
Tunnel Burst Kbps	Burst flow specification (in Kb/s) for this tunnel.

Table 13-7 Cisco PathTracer Layer 2 Properties for MPLS TE Tunnels (continued)

Field	Description
Tunnel Average Rate Kbps	Tunnel average rate in Kb/s.
Tunnel Affinity Mask	Tunnel affinity bits that should be compared to the link attribute bits.