



CHAPTER 7

Provisioning Regular PE-CE Links

This chapter describes how to configure MPLS VPN PE-CE links in the IP Solution Center (ISC) provisioning process. It contains the following major sections:

- [MPLS VPN PE-CE Link Overview, page 7-1](#)
- [Creating MPLS VPN PE-CE Service Policies, page 7-3](#)
- [Creating MPLS VPN PE-CE Service Requests, page 7-8](#)

MPLS VPN PE-CE Link Overview

To provision an MPLS VPN service in ISC, you must first create an MPLS VPN Service Policy. In ISC, a Service Policy is a set of default configurations for creating and deploying a service request.

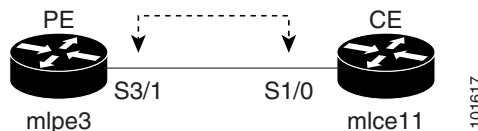
ISC supports two MPLS VPN Service Policy Types: Regular PE-CE and MVRFCE PE-CE. The following scenarios focus on the Regular PE-CE Policy Type.

The Regular PE-CE Policy Type is a normal PE to CE link between two devices. This Policy Type has two options:

- CE Present *enabled* (One PE with one CE; two devices)
- CE Present *disabled* (PE Only with no CE; one device)

[Figure 7-1](#) shows an example of a normal PE to CE link between two devices.

Figure 7-1 PE to CE link with CE Present



In a PE to CE link with CE Present enabled, interfaces S3/1 and S1/0 are configured as an MPLS VPN link in the service request process.

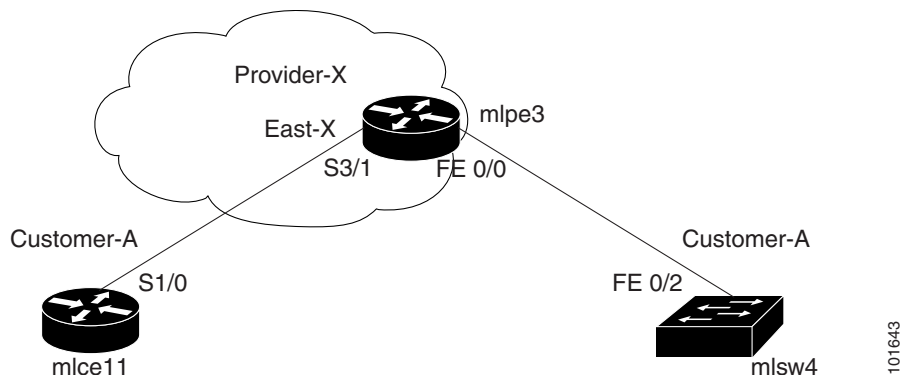
[Figure 7-2](#) shows an example of a PE Only link with no CE.

Figure 7-2 PE to CE link with No CE

In a PE to CE link with CE Present disabled, interface FE0/0 is configured as an MPLS VPN link in the service request process.

Network Topology

Figure 7-3 shows an overview of the network topology in which the MPLS VPN PE-CE links are created.

Figure 7-3 Network Topology for MPLS VPN PE-CE Scenarios.

The network topology in Figure 7-3 illustrates the lab environment of a service provider (Provider-X) and one customer (Cust-A). There is one Region (East-X) and one PE (mlpe3.cisco.com). Each customer device (one CE and one CLE) represents a Site (mlce11-Site and mlsw4-Site).

Prerequisite Tasks

Before you can create a Service Policy in ISC, you must complete the following Service Inventory tasks:

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- Step 1** Set up a Customer with a Site (see [Creating Customers, Sites, and CPEs](#), page 2-7).
 - Step 2** Setup a Provider with a Region (see [Creating Providers, Regions, and PEs](#), page 2-9).
 - Step 3** Import, create, or discover Devices (see [Creating Devices](#), page 2-2).
 - Step 4** Create CPE and PE (see [Creating CPEs](#), page 2-8).
 - Step 5** Collect Configurations (see [Collecting Configurations](#), page 2-4).
 - Step 6** Create Resource Pools (see [Creating Resource Pools](#), page 2-15).
 - Step 7** Create CE routing communities (CERC) (see [Creating CE Routing Communities](#), page 2-32).
 - Step 8** Define a MPLS VPN (see [Creating an MPLS VPN](#), page 2-22).
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Defining a VPN for the PE-CE Link

During service deployment, ISC generates the Cisco IOS commands to configure the logical VPN relationships. At the beginning of the provisioning process, before creating a Service Policy, a VPN must be defined within ISC.

To define a VPN, perform the following steps.

-
- Step 1** Choose **Service Inventory > Inventory and Connection Manager > VPNs**.
The VPN window appears.
- Step 2** Click **Create** to create a VPN. The Create VPN window appears.
- Step 3** In the Name field, enter the VPN name.
It is recommended not to use special characters (' ` " < > () [] { } / \ & ^ ! ? ~ * % = , . + |) in the VPN name, as this may cause misconfiguration of the VRF name for certain devices, if the VPN name is used to autogenerate a VRF name.
- Step 4** In the Customer field, click **Select**.
The Select Customer window appears.
- Step 5** Check to choose a Customer and click **Select**.
The VPNs window reappears where the new VPN Name is associated with a Customer in this new VPN definition.
- Step 6** Click **Save**.
-

Creating MPLS VPN PE-CE Service Policies

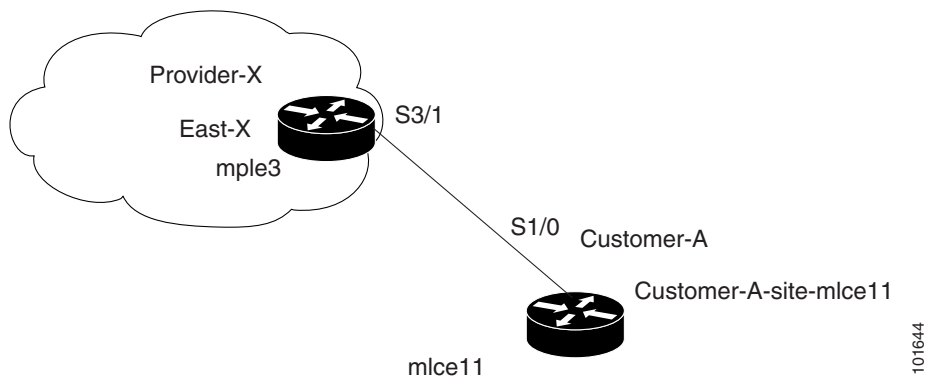
This section contains the following sections:

- [PE-CE Service Policy Overview, page 7-3](#)
- [Creating a PE-CE Service Policy, page 7-4](#)
- [Creating a PE-NoCE Service Policy, page 7-6](#)

PE-CE Service Policy Overview

[Figure 7-4](#) shows an example of the PE-CE link that is defined in the PE-CE Service Policy scenario.

Figure 7-4 PE-CE Topology



Creating a PE-CE Service Policy

To create a PE-CE service policy, perform the following steps.

- Step 1** Choose **Service Design > Policies**.
The Policies window appears.
- Step 2** From the **Create** drop-down list, choose **MPLS Policy**.
The MPLS Policy Editor - Policy Type window appears, as shown in [Figure 7-5](#).

Figure 7-5 MPLS Policy Editor - Policy Type

Attribute	Value
Policy Name *	mpls-pe-ce
Policy Owner:	<input checked="" type="radio"/> Customer <input type="radio"/> Provider <input type="radio"/> Global Policy
Customer *	Select
Policy Type:	<input checked="" type="radio"/> Regular: PE-CE <input type="radio"/> MVRFCPE: PE-CE
CE Present:	<input checked="" type="checkbox"/>

Note: * - Required Field

- Step 3** Edit the following attributes:
 - **Policy Name:** Enter the policy name.
 - **Policy Owner:** Choose the Policy Owner.
 - **Customer:**
 - Click **Select** to specify a Customer.
 - The Customer for MPLS Policy window appears.

- Check to choose a Customer and click **Select**.
 - **Policy Type:** Choose the Policy Type. (**Regular PE-CE**)
- Step 4** **CE Present:** Check to set CE as present.
- Step 5** Click **Next**.

The MPLS Policy Editor - Interface window appears, as shown in [Figure 7-6](#).

Figure 7-6 The MPLS Policy Editor - Interface

Attribute	Value	Editable
Reset All Attribute Editable Flags:		<input checked="" type="checkbox"/>
PE Information		
Interface Type:	ANY <input type="button" value="v"/>	
Interface Format:	<input type="text"/>	
Interface Description:	<input type="text"/>	<input checked="" type="checkbox"/>
Shutdown Interface:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Auto-Pick VLAN ID:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Use SVI:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Link Speed:	None <input type="button" value="v"/>	<input checked="" type="checkbox"/>
Link Duplex:	None <input type="button" value="v"/>	<input checked="" type="checkbox"/>
ETTH Support:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Standard UNI Port:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
UNI Security Information		
Disable CDP:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Filter BPDU:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Use Existing ACL Name:	<input type="checkbox"/>	
UNI MAC Addresses:	<input type="button" value="Edit"/>	<input checked="" type="checkbox"/>
UNI Port Security:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Maximum MAC Address:	<input type="text"/> (1 - 5120)	<input checked="" type="checkbox"/>
Aging (in minutes):	<input type="text"/> (0 - 1440)	<input checked="" type="checkbox"/>
Violation Action:	PROTECT <input type="button" value="v"/>	<input checked="" type="checkbox"/>
Secure MAC Addresses:	<input type="button" value="Edit"/>	<input checked="" type="checkbox"/>
CE Information		
Interface Type:	ANY <input type="button" value="v"/>	
Interface Format:	<input type="text"/>	
Interface Description:	<input type="text"/>	<input checked="" type="checkbox"/>

- Step 6** Click **Next** to accept the defaults.

The MPLS Policy Editor - IP Address Scheme window appears.



Note Make sure the Editable check boxes are checked, so you can edit these attributes in the service request process.

- Step 7** Edit all applicable attributes.



Note If you check **Automatically Assign IP Address**, the screen refreshes and adds a fourth attribute: **IP Address Pool**.

Step 8 Click **Next**.

The MPLS Policy Editor - Routing Information window appears.

Step 9 Click **Next** to accept the defaults.

The MPLS Policy Editor - VRF and VPN Membership window appears.



Note For information about protocol types, see [Specifying the Routing Protocol for a Service](#), page 5-11.



Note If you want to set the VRF and VPN attributes via a previously defined VRF object, check the **Use VRF Object** check box. For more information on this feature, see [Chapter 3, “Independent VRF Management.”](#) That chapter describes how to use independent VRF objects in MPLS VPN service policies and service requests.

Step 10 To enable template association for the policy, click the **Next** button in MPLS Policy Editor - VRF and VPN Membership window.

The Template Association window appears. In this window, you can enable template support and, optionally, associate templates and data files with the policy. For instructions about associating templates with policies and how to use the features in this window, see [Appendix B, “Working with Templates and Data Files.”](#) For additional information about using templates in ISC, also see the *Cisco IP Solution Center Infrastructure Reference, 5.1*. When you have completed setting up templates and data files for the policy per the instructions in the appendix, click **Finish** in the Template Association window to close it.

The Policies window appears.

Step 11 If you did not enable templates, click **Finish** in the MPLS Policy Editor – VRF and VPN window.

The Policies window reappears.

The MPLS VPN PE-CE Service Policy is complete.

Creating a PE-NoCE Service Policy

To create a PE-NoCE service policy, perform the following steps.

Step 1 Choose **Service Design > Policies**.

The Policies window appears.

Step 2 From the **Create** drop-down list, choose **MPLS Policy**.

The MPLS Policy Editor - Policy Type window appears, as shown in [Figure 7-7](#).

Figure 7-7 MPLS Policy Editor - Policy Type

MPLS Policy Editor - Policy Type

Attribute	Value
Policy Name *	mpls-pe-noce
Policy Owner:	<input checked="" type="radio"/> Customer <input type="radio"/> Provider <input type="radio"/> Global Policy
Customer *	CUST-A <input type="button" value="Select"/>
Policy Type:	<input checked="" type="radio"/> Regular: PE-CE <input type="radio"/> MVRFCPE: PE-CE
CE Present:	<input type="checkbox"/>

Note: * - Required Field

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- Step 3** Edit the following attributes:
- **Policy Name:** Enter the policy name.
 - **Policy Owner:** Choose the Policy Owner.
 - **Customer:**
 - Click **Select** to specify a Customer.
 - The Customer for MPLS Policy window appears.
 - Choose a Customer and click **Select**.
 - **Policy Type:** Choose the Policy Type. (**Regular PE-CE**)
 - **CE Present:** Do *not* check to set CE as **not** present (**NoCE**).

- Step 4** Click **Next**.

The MPLS Policy Editor - Interface window appears.

- Step 5** Click **Next** to accept the defaults.

The MPLS Policy Editor - IP Address Scheme window appears.



Note Make sure the Editable check boxes are checked, so you can edit these attributes in the service request process.

The field values displayed in this dialog box reflect the values specified in the service policy associated with this service.

For details on the IP address scheme fields, see [Specifying the IP Address Scheme, page 5-8](#).

- Step 6** Edit all applicable attributes.



Note If you check **Automatically Assign IP Address**, the screen refreshes and adds a fourth attribute: **IP Address Pool**.

- Step 7** Click **Next**.

The MPLS Policy Editor - Routing Information window appears.

Step 8 Click **Next** to accept the defaults.

The MPLS Policy Editor - VRF and VPN Membership window appears.



Note For information about protocol types, see [Specifying the Routing Protocol for a Service](#), page 5-11.



Note If you want to set the VRF and VPN attributes via a previously defined VRF object, check the **Use VRF Object** check box. For more information on this feature, see [Chapter 3, “Independent VRF Management.”](#) That chapter describes how to use independent VRF objects in MPLS VPN service policies and service requests.

Step 9 To enable template association for the policy, click the **Next** button in MPLS Policy Editor - VRF and VPN Membership window.

The Template Association window appears. In this window, you can enable template support and, optionally, associate templates and data files with the policy. For instructions about associating templates with policies and how to use the features in this window, see [Appendix B, “Working with Templates and Data Files.”](#) For additional information about using templates in ISC, also see the [Cisco IP Solution Center Infrastructure Reference, 5.1](#). When you have completed setting up templates and data files for the policy per the instructions in the appendix, click **Finish** in the Template Association window to close it.

The Policies window appears.

Step 10 If you did not enable templates, click **Finish** in the MPLS Policy Editor – VRF and VPN window.

The Policies window reappears.

The MPLS VPN PE-NoCE Service Policy is complete.

Creating MPLS VPN PE-CE Service Requests

This section contains the following sections:

- [Creating PE-CE Service Requests](#), page 7-8
- [Creating PE-NoCE Service Requests](#), page 7-12

Creating PE-CE Service Requests

To create a PE-CE service request, perform the following steps.

Step 1 Choose **Service Inventory > Inventory and Connection Manager > Service Requests**.

The Service Requests window appears.

Step 2 From the **Create** drop-down list, choose **MPLS VPN**.

The Select MPLS Policy window appears.

Step 3 Choose an MPLS PE-CE type policy.

Step 4 Click **OK**.

The MPLS Service Request Editor window appears.

Step 5 Click **Add Link**.

The MPLS Service Request Editor window appears, as shown in [Figure 7-8](#).

Figure 7-8 MPLS Service Request Editor - Select CE

MPLS Service Request Editor

Job ID: SR ID: SR State:

Policy: MPLSPolicy_PECE

Customer: Customer1

Description : []

Showing 0 of 0 records

#	Link ID	CE	CE Interface	PE	PE Interface	Link Attribute	Logical Link
Rows per page: 10 Go to page: 1 of 1 [Go] []							

[Add Link] [Delete Link] [Save] [Cancel]

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Step 6 Click **Select CE**.

The CPE for MPLS VPN Link window appears.

Step 7 Choose a CPE device and click **Select**.

The MPLS Service Request Editor window appears.

Step 8 Choose a CE Interface from the drop-down list.

The MPLS Service Request Editor window appears.

Step 9 Click **Select PE**.

The PE for MPLS VPN Link window appears.

Step 10 Choose a PE device and click **Select**.

The MPLS Service Request Editor window appears.

Step 11 Choose a PE Interface from the drop-down list.

The MPLS Service Request Editor window appears.

Step 12 Click **Select PE**.

The PE for MPLS VPN Link window reappears.

Step 13 In the Link Attribute cell, click **Add**.

The MPLS Link Attribute Editor - Interface window appears, as shown in [Figure 7-9](#).

Figure 7-9 MPLS Link Attribute Editor - Interface

MPLS Link Attribute Editor - Interface	
Attribute	Value
PE Information	
PE	pe1
Interface Name:	Ethernet4/0. <input type="text"/> (1-4294967295)
Interface Description:	<input type="text"/>
Shutdown Interface:	<input checked="" type="checkbox"/>
Encapsulation:	DOT1Q <input type="text"/>
VLAN ID *:	<input type="text"/> (1-4094)
Auto-Pick VLAN ID:	<input type="checkbox"/>
Second VLAN ID:	<input type="text"/> (1-4094)
Use SVI:	<input type="checkbox"/>
CE Information	
CE	ce3
Interface Name:	Ethernet0/0. <input type="text"/> (1-4294967295)
Interface Description:	<input type="text"/>
Encapsulation:	DOT1Q <input type="text"/>

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PE Information

- Step 14 Interface Name:** Enter a value to identify the interface.
- Step 15 Interface Description:** Optionally, you can enter a description of the PE interface.
- Step 16 Shutdown Interface:** When you check this check box, the PE interface is configured in a shutdown state.
- Step 17 Encapsulation:** Choose the PE Encapsulation from the drop-down list.
The selections available in the drop-down list are determined by the interface type.
- Step 18 VLAN ID:** Enter the VLAN ID. The VLAN ID is shared between the PE and CE, so there is one VLAN ID for both.
- Step 19 Auto-Pick VLAN ID:** Check this check box if you would like ISC to autopick a VLAN ID from the VLAN pool.
If this box is checked, the VLAN ID field is not visible in the GUI.
- Step 20 Second VLAN ID:** The Second VLAN ID is an optional attribute that provides a method to match the Q-in-Q second VLAN tag of incoming frames on the PE interface.
For usage details about this attribute, see [Notes on the VLAN ID and Second VLAN ID Attributes, page 6-10](#).
- Step 21 Use SVI:** Check this box to have ISC terminate VRF on SVI.

CE Information

- Step 22 Interface Name:** Enter a value from to identify the interface.
- Step 23 Interface Description:** Optionally, you can enter a description of the PE interface.
- Step 24 Encapsulation:** Choose the CE Encapsulation from the drop-down list.
The selections available in the drop-down list are determined by the interface type.
- Step 25** Click Next.

The MPLS Link Attribute Editor - IP Address Scheme window appears.

Step 26 Accept the defaults and click **Next**.

The MPLS Link Attribute Editor - Routing Information window appears, as shown in [Figure 7-10](#).

Figure 7-10 *MPLS Link Attribute Editor - Routing Information*

MPLS Link Attribute Editor - Ipv4 Routing Information

Attribute	Value
PE-CE Ipv4 Routing Information	
Routing Protocol	STATIC ▾
CsC Support:	<input checked="" type="checkbox"/>
Give Only Default Routes to CE:	<input checked="" type="checkbox"/>
Redistribute Connected (BGP only):	<input checked="" type="checkbox"/>
Default Information Originate (BGP only):	<input type="checkbox"/>
Advertised Routes for CE:	<input type="button" value="Edit"/>
Routes To Reach Other Sites:	<input type="button" value="Edit"/>
Next Hop Option:	USE_OUTGOING_INTF_NAME ▾

Note: * - Required Field

Step 27 Choose a Next Hop Option:

- USE_OUT_GOING_INTF_NAME
- USE_NEXT_HOP_IPADDR



Note If this interface is dual stacked (IPv4 and IPv6), you will be prompted to enter the routing information for both IPv4 and IPv6 independently. The fields in the IPv6 Routing Information window are slightly different from the IPv4 version. For information on setting up the routing information for IPv6, see [Setting Static Routing Protocol Attributes \(for IPv4 and IPv6\)](#), page 6-13.

Step 28 To continue, click **Next**.

The MPLS Link Attribute Editor - VRF and VPN window appears.



Note If you want to set the VRF and VPN attributes via a previously defined VRF object, check the **Use VRF Object** check box. For more information on this feature, see [Chapter 3, “Independent VRF Management.”](#) That chapter describes how to use independent VRF objects in MPLS VPN service policies and service requests.

Step 29 Click **Add** to join a VPN.

The Select CERCs window appears.

Step 30 Choose a Customer from the drop-down list.

Step 31 Choose a VPN from the drop-down list.

Step 32 Check to choose a VPN from the list.

Step 33 Click **Join As Hub** or **Join As Spoke**.

Step 34 Click **Done**.

The MPLS Link Attribute Editor - VRF and VPN window reappears.

Step 35 Click the **Next** button to associate templates or data files to the service request.



Note

This step assumes the policy on which the service request is based has template association enabled. If not, there will be no **Next** button visible in the GUI. In that case, click **Finish** and return to the MPLS Service Request Editor window and proceed with Step 37, below.

The MPLS Link Attribute Editor - Template Association window appears. In this window, you can associate templates and data files with a device by clicking the **Add** button in Template/Data File column for the device. When you click the **Add** button, the Add/Remove Templates window appears. For instructions about associating templates with service requests and how to use the features in this window, see [Appendix B, “Working with Templates and Data Files.”](#)

Step 36 When you have completed setting up templates and data files for any device(s), click **Finish** in the Template Association window to close it and return to the MPLS Service Request Editor window.

You can define multiple links in this service request, following the instructions outlined in previous steps.

Step 37 To save your work, click **Save**.

The MPLS Service Requests window reappears showing that the MPLS VPN PE-CE service request is in the Requested state and ready to deploy.

Creating PE-NoCE Service Requests

To create a PE-NoCE service request, perform the following steps.

Step 1 Choose **Service Inventory > Inventory and Connection Manager > Service Requests**.

The Service Requests window appears.

Step 2 From the **Create** drop-down list, choose **MPLS VPN**.

The Select MPLS Policy window appears.

Step 3 Choose an MPLS PE-NoCE type policy.

Step 4 Click **OK**.

The MPLS Service Request Editor window appears.

Step 5 Click **Add Link**.

The MPLS Service Request Editor window appears, as shown in [Figure 7-11](#).

Figure 7-11 MPLS Service Request Editor - Select CE

- Step 6** Click **Select PE**.
The PE for MPLS VPN Link window appears.
- Step 7** Choose a PE device and click **Select**.
The MPLS Service Request Editor window appears.
- Step 8** Choose the PE Interface from the drop-down list.
The MPLS Service Request Editor window appears.
- Step 9** In the Link Attribute cell, Click **Add**.
The MPLS Link Attribute Editor - Interface window appears, as shown in [Figure 7-12](#).

Figure 7-12 MPLS Link Attribute Editor - Interface

- Step 10** **Interface Name:** Enter a value to identify the interface.
- Step 11** **Interface Description:** Optionally, you can enter a description of the PE interface.
- Step 12** **Shutdown Interface:** When you check this check box, the PE interface is configured in a shutdown state.
- Step 13** **PE Encapsulation:** Choose the PE Encapsulation from the drop-down list.

The selections available in the drop-down list are determined by the interface type. This field is needed for deciding PE/UNI encapsulation.

Step 14 VLAN ID: Enter the VLAN ID. The VLAN ID is shared between the PE and CE, so there is one VLAN ID for both.

Step 15 Auto-Pick VLAN ID: Check this check box if you would like ISC to autopick a VLAN ID from the VLAN pool.

If this box is checked, the VLAN ID field is not visible in the GUI.

Step 16 Second VLAN ID: The Second VLAN ID is an optional attribute that provides a method to match the Q-in-Q second VLAN tag of incoming frames on the PE interface.

For usage details about this attribute, see [Notes on the VLAN ID and Second VLAN ID Attributes, page 6-10](#).

Step 17 Use SVI: Check this box to have ISC terminate VRF on SVI.

Step 18 Standard UNI Port: Check this box to access additional UNI security parameters.

Step 19 Choose the PE Encapsulation from the drop-down list.



Note This field is needed for deciding PE/UNI encapsulation.

Step 20 In the VLAN ID field, enter a valid value, or check **Auto-Pick VLAN ID**.

Step 21 Click **Next**.

The MPLS Link Attribute Editor - IP Address Scheme window appears.

Step 22 Accept the defaults and click **Next**.



Note If this interface is dual stacked (IPv4 and IPv6), you will be prompted to enter the routing information for both IPv4 and IPv6 independently.

The MPLS Link Attribute Editor - Routing Information window appears. In the Hop Option field, you have the following options:

- For a point-to-point interface you have two options:
 - USE_OUT_GOING_INTF_NAME
 - USE_NEXT_HOP_IPADDR
- For a broadcast interface, you have only the USE_NEXT_HOP_IPADDR option.



Note For the USE_NEXT_HOP_IPADDR option, a field appears in which you *must* enter the required IP address.

Step 23 To continue, click **Next**.

The MPLS Link Attribute Editor - VRF and VPN window appears.



Note If you want to set the VRF and VPN attributes via a previously defined VRF object, check the **Use VRF Object** check box. For more information on this feature, see [Chapter 3, “Independent VRF Management.”](#) That chapter describes how to use independent VRF objects in MPLS VPN service policies and service requests.

- Step 24** Click **Add** to join the VPN.
The Join VPN dialog box appears.
- Step 25** Check to choose the VPN.
- Step 26** Click Join as Hub or Join as Spoke.
- Step 27** Click **Done**.
The MPLS Service Request Editor window reappears.
- Step 28** Click the **Next** button to associate templates or data files to the service request.

**Note**

This step assumes the policy on which the service request is based has template association enabled. If not, there will be no **Next** button visible in the GUI. In that case, click **Finish** and return to the MPLS Service Request Editor window and proceed with Step 30, below.

The MPLS Link Attribute Editor - Template Association window appears. In this window, you can associate templates and data files with a device by clicking the **Add** button in Template/Data File column for the device. When you click the **Add** button, the Add/Remove Templates window appears. For instructions about associating templates with service requests and how to use the features in this window, see [Appendix B, “Working with Templates and Data Files.”](#)

- Step 29** When you have completed setting up templates and data files for any device(s), click **Finish** in the Template Association window to close it and return to the MPLS Service Request Editor window.
You can define multiple links in this service request, following the instructions outlined in previous steps.
- Step 30** To save your work, click **Save**.
The MPLS Service Requests window reappears showing that the MPLS VPN PE-NoCE Service Request is in the Requested state and ready to deploy.
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