



CHAPTER 31

Provisioning Multiple Devices

This chapter describes how to configure multiple devices, Layer 2 (L2) “switches” and Layer 3 (L3) “routers,” using the Prime Fulfillment provisioning process. It contains the following sections:

- [NPC Ring Topology, page 31-1](#)
- [Ethernet-To-The-Home \(ETTH\), page 31-5](#)

NPC Ring Topology

This section describes how to create a Ring Topology, connect the CE starting and PE-POP ending points, and configure the Named Physical Circuits (NPC) from end to end, using the Prime Fulfillment provisioning process.

This section contains the following sections:

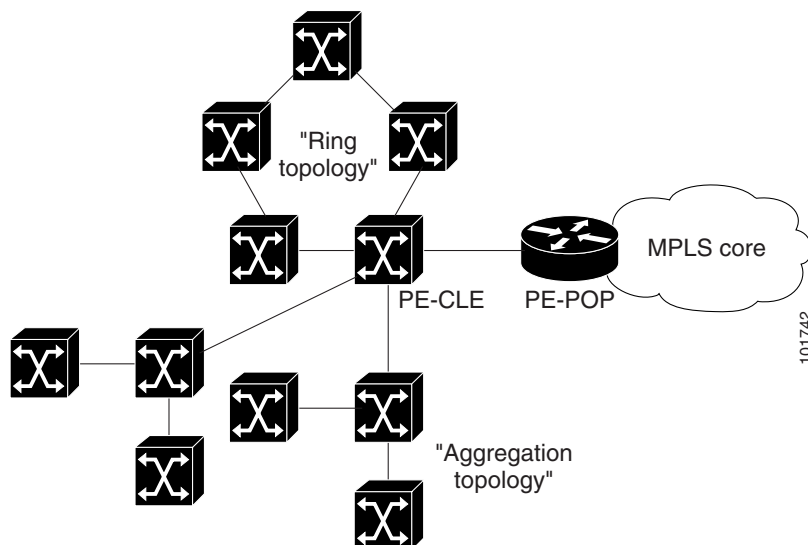
- [Ring Topology Overview, page 31-1](#)
- [Creating Ring of Three PE-CLEs, page 31-2](#)
- [Configuring NPC Ring Topology, page 31-4](#)

Ring Topology Overview

Service providers are now looking to offer L2 and L3 services that must integrate with a common MPLS infrastructure. Prime Fulfillment supports two basic L2 topologies to access L3 MPLS networks:

- Ring Topology
- Aggregation Topology (“Hub and Spoke”)

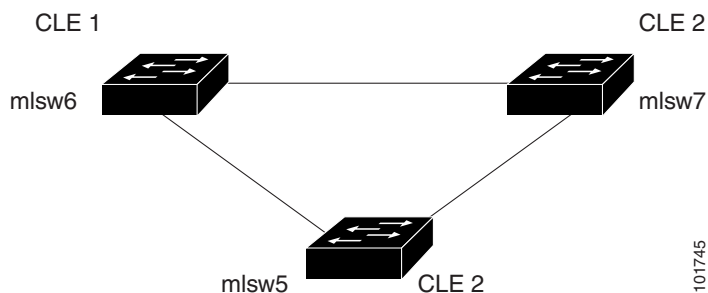
[Figure 31-1](#) shows an example of these two basic L2 access topologies.

Figure 31-1 L2 Access Topologies

Creating Ring of Three PE-CLEs

In its simplest form, the Ring Topology is a tripartite structure that comprises at least three PE- CLE. A PE-POP and a Multi-VRF CE can also be part of a Ring.

Figure 31-2 shows an example ring of three Catalyst 3550 switches: mls w5, mls w6, and mls w7.

Figure 31-2 A Ring of Three PE-CLE

To create a ring of three PE-CLEs, perform the following steps.

-
- Step 1** Choose **Inventory > Logical Inventory > Physical Rings**.
The Physical Rings window appears.
 - Step 2** Click **Create** to continue.
The Create Ring window appears.
 - Step 3** Click **Select source device** in the first cell.
The Show Devices window appears, as shown in Figure 31-3.

**Note**

The Show Devices drop-down window in [Figure 31-3](#) should show *CLE* rather than *PE*. This is a known application error. You cannot initiate this process with a PE-POP or a CE. You must begin with a PE-CLE.

Figure 31-3 **Show Devices**



Step 4 To search for a specific CLE, enter the *source device* in the **matching** dialog-box and click **Find**.

Step 5 Choose the CLE and click **Select**.

The Create Ring window appears, as shown in [Figure 31-4](#).

Figure 31-4 **Create Ring**



Step 6 Continue from left to right and from top to bottom to fill the table with the appropriate Device and Interface information, which would be based on a network diagram from your own environment.

**Note**

If you had used the network diagram in [Figure 31-6](#) to populate the Create Ring table, it would contain the above information at the end of this process.

Step 7 Click **Save** to save your ring in the Repository.

The NPC Rings window appears, as shown in [Figure 31-5](#)

Figure 31-5 **NPC Rings**

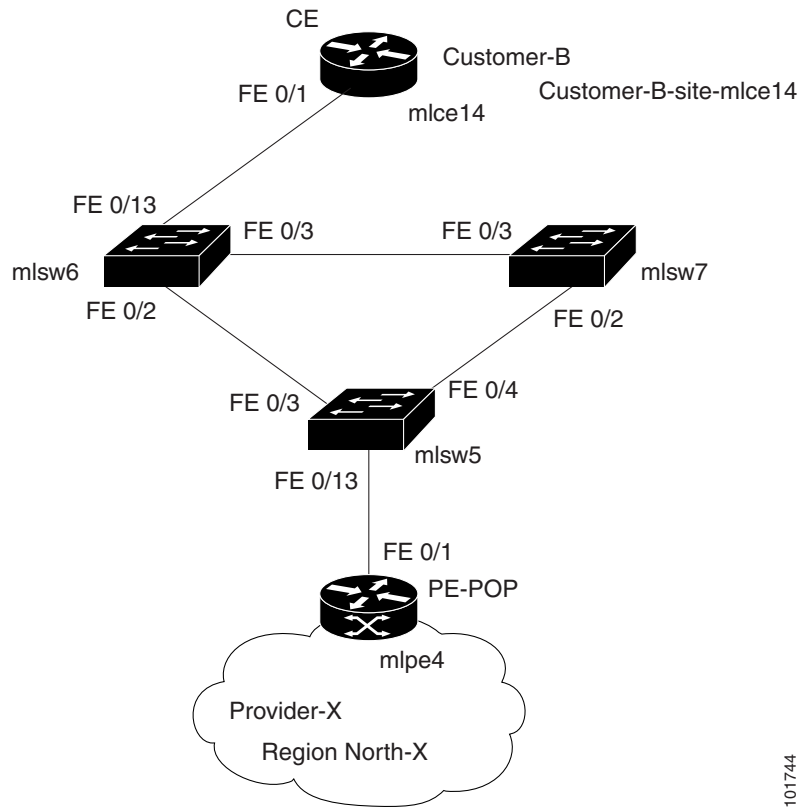


Proceed to [Configuring NPC Ring Topology, page 31-4](#).

Configuring NPC Ring Topology

Figure 31-6 shows an example of the Ring Topology (three CLE) inserted between a CE (**mlce14**) and a PE-POP (**mlpe4**).

Figure 31-6 The Ring Topology



To configure end-to-end connectivity (CE > Ring (PE-CLE) > PE), perform the following steps.

- Step 1** Choose **Inventory > Logical Inventory > Named Physical Circuits**.
The Named Physical Circuits window appears.
- Step 2** Click **Create**.
The Create Named Physical Circuit window appears.
- Step 3** Click **Add Device**.
The Select Devices window appears.
- Step 4** Choose the CE and then click **Select**.
The Create Named Physical Circuit window appears.
- Step 5** Click **Add Device**.
The Select Devices window appears.
- Step 6** Choose the PE and then click **Select**.

- The Create Named Physical Circuit window appears.
- Step 7** Click **Insert Ring**.
- The Show NPC Rings window appears.
- Step 8** Choose an NPC Ring and click **Select**.
- The Create a Named Physical Circuit window appears
- Step 9** Choose a device with an available check box and click **Select device**.
- The Select a device from ring window appears.
- Step 10** Choose a PE-CLE and click **Select**.
- The Create Named Physical Circuit window appears.
- Step 11** Choose the incoming and outgoing interfaces for the CE, CLE, and PE until complete.
- Step 12** Choose the remaining device with the darkened check box.
- The Create a Named Physical Circuit window appears.
- Step 13** Click **Save**.
- The Named Physical Interfaces window appears, with the Ring Topology displayed, as shown in [Figure 31-7](#).

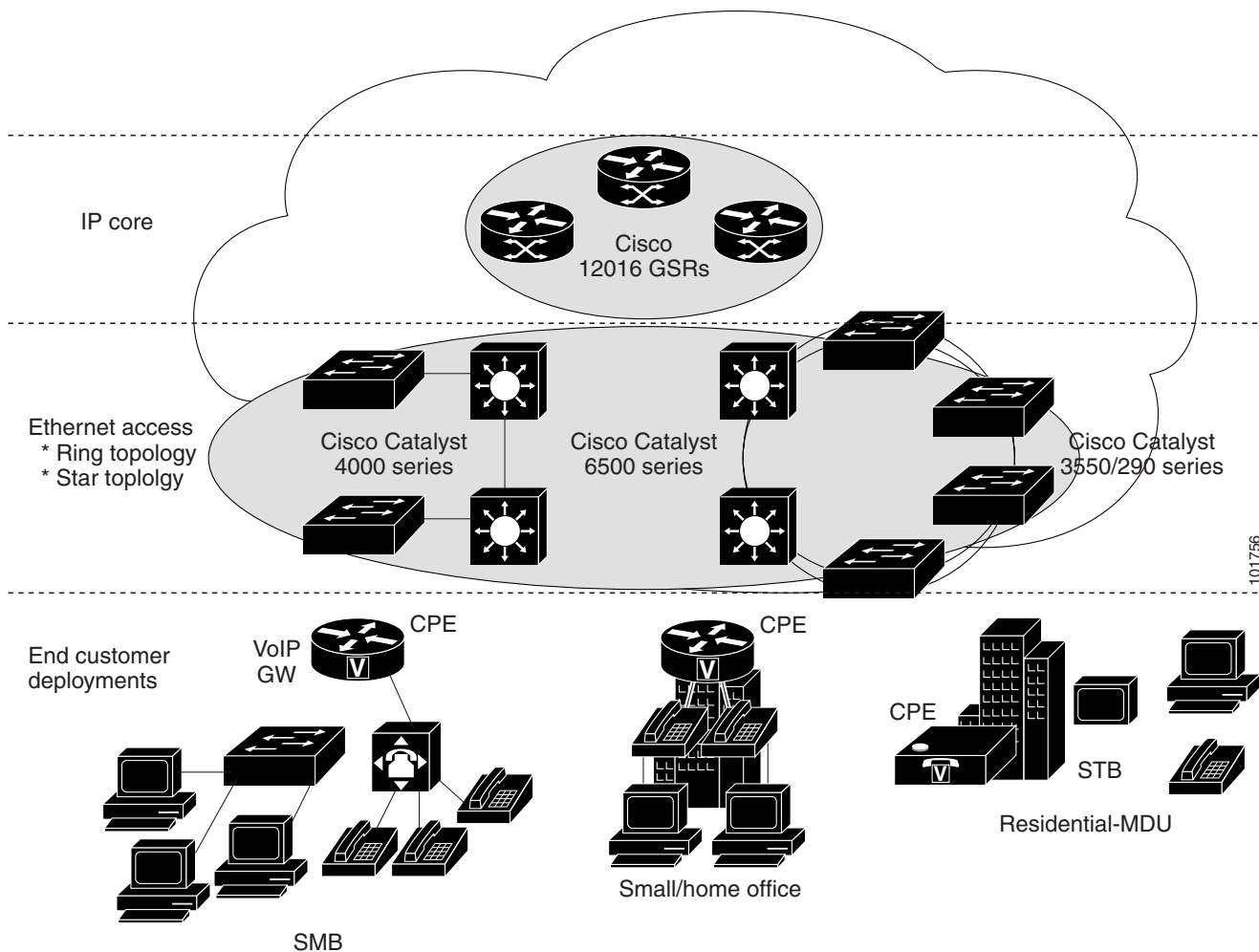
Figure 31-7 **Named Physical Circuits**

Ethernet-To-The-Home (ETTH)

This section describes how to configure Ethernet-To-The-Home (ETTH) using the Prime Fulfillment provisioning process.

ETTH is part of the Cisco ETTx solution, which contains both ETTH and Ethernet-to-the-Business (ETTB). ETTB is supported in Prime Fulfillment with the L2VPN Metro Ethernet service feature. Unlike ETTB, whose customers are mainly business customers, ETTH is targeted at residential customers.

[Figure 31-8](#) shows an overview of the Cisco ETTx solution.

Figure 31-8 Cisco ETTx Solution

From a provisioning standpoint, the main difference between ETTB and ETTH is the consideration of resource scalability. For example, with ETTB, each business customer is allocated one or more VLAN(s).

With ETTH, it is not practical to assign a unique VLAN to each residential customer. The practical solution is to have all, or a group of residential customers, share the same VLAN and use common technology, such as a private VLAN (PVLAN) or a protected port, to guarantee traffic isolation.

Another difference between ETTB and ETTH is that most of the ETTB customers use an Ethernet trunk port while ETTH customers use an access port. In Prime Fulfillment, the access port is fully supported, with CE present or with no CE.

ETTH needs to support multicast based services, such as video, on a shared media such as a ring. Typically, Internet Group Management Protocol (IGMP) with Multicast VLAN Registration (MVR) would be the technology used to support these services.

Access Domain Management

To provide more flexibility in managing an access domain, you can define a management VLAN. Once defined, the management VLAN is used to construct the list of VLANs allowed on the trunk port for all non-UNI ports.

You can also specify how the VLAN allowed list is constructed in a trunk port for a domain, if the list is not on the device. This feature is implemented for L2VPN DCPL parameter. It is available for Layer 2 access to MPLS VPN as well.

As a part of Layer 2 access management, Prime Fulfillment provides the ability to create MAC access lists by specifying the MAC addresses to be allowed or blocked.

Prime Fulfillment ETTH Implementation

The Prime Fulfillment MPLS VPN implementation of ETTH consists of the following three subfeatures:

- [PVLAN or Protected Port, page 31-7](#)
- [Access Port, page 31-7](#)
- [IGMP with MVR, page 31-7](#)

PVLAN or Protected Port

This feature is used to isolate traffic within a PVLAN. It prevents traffic from flowing between two UNIs.

- PVLAN is only supported on the Catalyst 4500/6500 switches and Cisco 7600 router.
- Protected Port is only supported on the Catalyst 2950/3550 switches.

Access Port

In Prime Fulfillment, the untagged Ethernet default is supported in the CE present and no CE scenarios. You can choose between two encapsulations: DOT1Q and Default.

The Default encapsulation only indicates that the traffic coming in from the CE is untagged. The UNI, which is always a dot1q port, puts a tag on it before transmitting it. UNI has two options to handle this untagged traffic. It functions as an access port or a trunk port. For this reason, the GUI adds one more item for you to choose.

IGMP with MVR

This feature applies to a very specific user service and network topology. It is used for multicast video on a hub and spoke or ring network. However, it is not up to Prime Fulfillment to decide when it is used. Prime Fulfillment only makes it available and the network application running above Prime Fulfillment must invoke it when needed.

Creating an ETTH Policy

To configure a policy to support ETTH, perform the following steps.

-
- | | |
|---------------|---|
| Step 1 | Choose Service Design > Policies > Policy Manager . |
| Step 2 | From the Policy Manager window, choose a Service Policy and click Edit . |

- Step 3** From the Policy Type Information window, click **Next**.
The MPLS Policy Editor - Interface window appears, as shown in [Figure 31-9](#).

Figure 31-9 *MPLS Policy Editor - Interface*



- Step 4** To enable ETTH, check the **ETTH Support** check box.
The ETTH UNI Information check boxes appear between the **ETTH Support** check box and the CE Information, as shown in [Figure 31-10](#).

Figure 31-10 *ETTH UNI Information*



- Step 5** To enable Private VLAN or Protected Port, check the **Private VLAN/Protected Port** check box.
- Step 6** To enable IGMP Snooping with MVR, check the **IGMP Snooping with MVR** check box.
Three new UNI Information options appear, as shown in [Figure 31-11](#).

Figure 31-11 ETTH UNI Information Options



Step 7 Choose UNI Information options:

- Mode
 - Compatible—Multicast addresses are statically configured on the device.
 - Dynamic—IGMP snooping is configured on the device.
- Query Time—Determines how often the device is queried for membership.
- Immediate—Removes the interface from the forwarding table immediately, when the session ends.

Step 8 Complete the standard steps and click **Save**.

Creating a Service Request for ETTH

To create a service request for ETTH, perform the following steps.

Step 1 Choose **Operate > Service Requests > Service Request Manager**.

Step 2 From the Service Requests Manager window, choose a Service Request and click **Edit**.

Step 3 From the MPLS Service Request Editor window, click **Edited** from the **Link Attribute** link.

The MPLS Link Attribute Editor - Interface window appears, as shown in [Figure 31-12](#).

Figure 31-12 *MPLS Link Attribute Editor - Interface*

Step 4 Edit the following Link Attribute specific UNI Information:

- Secondary VLAN ID—Enter a VLAN ID for the Private VLAN, which is supported only on the Catalyst 4000 switch.
- Multicast IP Address—See [Step 5](#).
- Multicast VLAN ID—Enter a *VLAN ID* for the Multicast VLAN.

Step 5 Click **Edit**.

The Multicast IP Addresses dialog box appears.

Step 6 Edit the following Link Attribute specific UNI Information:

- Multicast IP Address—Enter an IP Address for the join the multicast group, which allows users to have access to video on demand, for example.
- Counter—Enter a count to determine the number of contiguous IP addresses starting with the Multicast IP Address.

Step 7 Click **OK**.

Step 8 Complete the standard steps for creating a service request, and click **Save**.



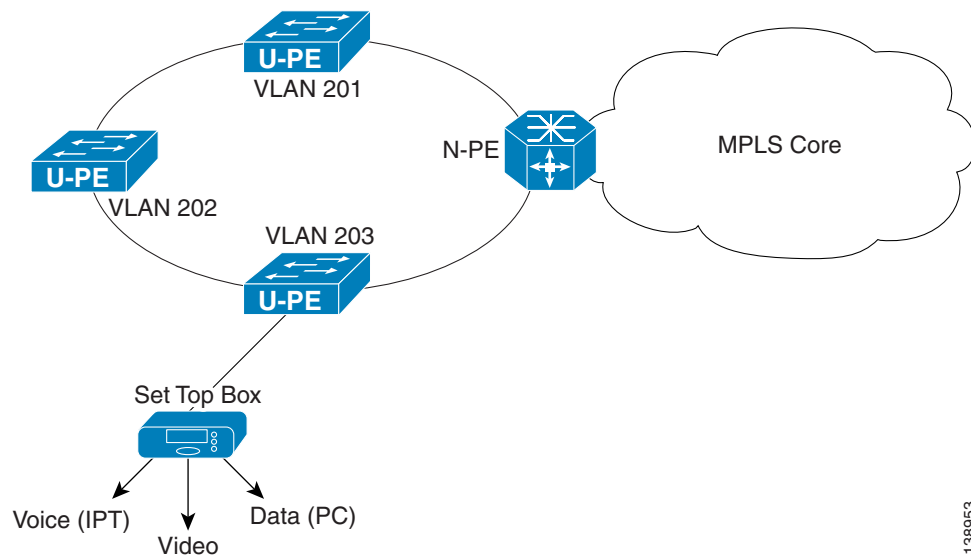
Note For more information on setting the VRF and VPN attributes in MPLS VPN service requests, see [Chapter 25, “Defining VRF and VPN Attributes in an MPLS Service Request”](#).

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

Residential Service

A group of residential customers can share the same VLAN on the same UNI switch with traffic isolation on different UNI interfaces. On an N-PE, a VRF SVI is defined for all the residential services from the same UNI switch, as shown in [Figure 31-13](#).

Figure 31-13 Residential Services



Creating a Policy for Residential Services Over Shared VLAN

A special policy must be created by enabling Shared VLAN. To do this, perform the following steps.

Step 1 Choose **Operate > Service Requests > MPLS**.

The MPLS Policy Editor - Policy Type window appears, as shown in [Figure 31-14](#).

Figure 31-14 *Policy Type*



- Step 2** In the Policy Name field, enter a policy name.
- Step 3** Under Policy Owner, click the **Global Policy** radio button.
- Step 4** Under Policy Type accept **Regular: PE-CE**.
- Step 5** Under CE Present, uncheck the check box, then click **Next**.
- The MPLS Policy Editor - Interface window appears, as shown in [Figure 31-15](#).

Figure 31-15 *Interface Settings*



- Step 6** Check the **Use SVI**: check box, then wait for the window to refresh.
- Step 7** Check the **ETTH Support**: check box, then wait for the window to refresh.
- Step 8** Check the **Standard UNI Port**: check box, then wait for the window to refresh.

- Step 9** Check the **Shared VLAN:** check box, then wait for the window to refresh. Some fields are now grayed-out.



Note Because this policy enables ETTH Support and Shared VLAN, these attributes become unavailable at the link level.

- Step 10** Check the **Private VLAN/Protected Port:** check box, wait for the window to refresh, then click **Next**.

- Step 11** In the IP Address Scheme window, you can continue by clicking **Next**.

- Step 12** In the Routing Information window, you can continue by clicking **Next**.



Note For information about protocol types, see [Chapter 24, “Specifying the Routing Protocol for a Service”](#).

- Step 13** In the VRF and VPN Member window, you can continue by clicking **Next** to associate templates, or else finish creating this policy by clicking **Finish**.



Note For more information on setting the VRF and VPN attributes in MPLS VPN service requests, see [Chapter 25, “Defining VRF and VPN Attributes in an MPLS Service Request”](#).

Creating a Service Request for Residential Services Over Shared VLAN

To create the service request, perform the following steps.

- Step 1** Choose **Service Design > Policies > MPLS Policy Editor - Policy Type**.
- Step 2** Choose the policy you configured for Shared VLAN Residential Services, then click **OK**. The MPLS Service Request Editor window appears.
- Step 3** In the MPLS Service Request Editor window, click **Add Link**, then wait for the window to refresh.
- Step 4** Click the active field **Select U-PE**.
- Step 5** Choose a PE device, then click **Select**.
- Step 6** From the active drop-down list, choose an interface, then wait for the window to refresh.
- Step 7** Under Link Attributes column, click the active **Add** field.

The Interface window appears, as shown in [Figure 31-16](#).



Note Because the policy created for this feature enables ETTH Support and Shared VLAN, these attributes become unavailable at the link level.

Figure 31-16 *Interface Attributes*

Step 8 Enter a valid **VLAN ID** value, then click **Next**. The IP Address Scheme window appears.

Step 9 Enter valid values for each required field, then click **Next**.

Step 10 In the Routing Information widow, check any applicable items, then click **Next**.



Note For information about protocol types, see [Chapter 24, “Specifying the Routing Protocol for a Service”](#).

Step 11 In the VRF and VPN window, for Maximum Route Threshold (required field), accept the default value, or enter a new value.



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 22, “Independent VRF Management.”](#) That chapter describes how to use independent VRF objects in MPLS VPN service policies and service requests.



Note For more information on setting the VRF and VPN attributes in MPLS VPN service requests, see [Chapter 25, “Defining VRF and VPN Attributes in an MPLS Service Request”](#).

Step 12 Under VPN Selection (required), click **Add**.

Step 13 From the CERC window, choose the desired PE VPN Membership, then click **Done**.

Step 14 Back in the VRF and VPN window, click **Finish**.



Note

If the policy on which the service request is based has template association enabled, a **Next** button is visible in the GUI. Click the **Next** button to add templates and data files to the devices defined in the service request. For instructions about associating templates with service requests, see [Chapter 49, “Using Templates and Data Files with Policies and Service Requests”](#)

When you are finished setting the attributes for the service policy, the MPLS Service Request Editor window appears.

Step 15 Click **Save**.

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

