



CHAPTER 26

Provisioning Multi-VRFCE PE-CE Links

This chapter describes how to configure MPLS VPN Multi-VRFCE PE-CE links in the Prime Fulfillment provisioning process.

MPLS VPN MVRFCE PE-CE Link Overview

This section contains the following sections:

- [Network Topology, page 26-2](#)
- [Prerequisite Tasks, page 26-2](#)

To provision an MPLS VPN service in Prime Fulfillment, you must first create an MPLS VPN Service Policy. In Prime Fulfillment, a Service Policy is a set of default configurations for creating and deploying a service request. Prime Fulfillment supports two MPLS VPN Service Policy Types: Regular PE-CE and MVRFCE PE-CE. The following scenarios focus on the MVRFCE PE-CE Policy Type. An MVRFCE PE-CE Policy Type is a PE to CE link with three devices:

- PE
- Multi-VRF CE
- CE

This Policy Type has two options:

- CE Present *enabled* (One PE with one MVRFCE and one CE; three devices)
- CE Present *disabled* (One PE with one MVRFCE; two devices)

[Figure 26-1](#) shows an example of an MVRFCE PE-CE link with three devices.

Figure 26-1 MVRFCE PE-CE Link



In an MVRFCE PE-CE link with CE Present enabled, interfaces FE 0/0, E 0/1, E 0/2 and FE 0/1 are configured as an MPLS VPN link in the service request process.

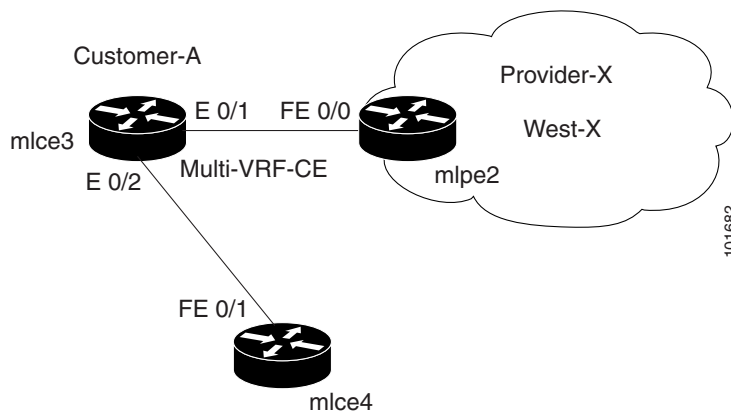
[Figure 26-2](#) shows an example of a PE to MVRFCE link with no CE.

Figure 26-2 MVRFCE PE-CE Link with No CE

In an MVRFCE PE-CE link with CE Present disabled, interfaces FE 0/0, E 0/1, and E 0/2 are configured as an MPLS VPN link in the service request process.

Network Topology

Figure 26-3 shows an overview of the network topology in which the MPLS VPN MVRFCE PE-CE links are created.

Figure 26-3 Network Topology for MPLS VPN MVRFCE PE-CE Scenarios

The network topology in Figure 26-3 illustrates the lab environment of a service provider (Provider-X) and one customer (Cust-A). There is one Region (West-X) and one PE (mlpe2.cisco.com). Each customer device (one MVRFCE and one CE) represents a Site (mlce3-Site and mlce4-Site).

Prerequisite Tasks

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

- Step 1** Set up a Customer with a Site (see [Chapter 21, “Creating Customers, Sites, and CPEs”](#)).
- Step 2** Setup a Provider with a Region (see [Chapter 21, “Creating a Provider”](#)).
- Step 3** Import, create, or discover Devices (see [Chapter 21, “Creating Devices”](#)).
- Step 4** Create CPE and PE (see [Chapter 21, “Creating CPEs”](#)).
- Step 5** Collect Configurations (see [Chapter 21, “Collecting Configurations”](#)).
- Step 6** Create Resource Pools (see [Chapter 21, “Creating Resource Pools”](#)).
- Step 7** Create CE routing communities (CERC) (see [Chapter 21, “Creating Route Target\(s\)”](#)).

- Step 8** Define a MPLS VPN (see [Chapter 21, “Creating an MPLS VPN”](#)).
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Defining VPN for MVRFCE PE-CE Links

During service deployment, Prime Fulfillment 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 Prime Fulfillment. The first element in a VPN definition is the name of the VPN.

To create a VPN Name, perform the following steps.

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- Step 1** Choose **Inventory > Logical Inventory > VPNs**.
The VPNs window appears.
- Step 2** Click **Create** to create a VPN.
The Create New VPN window appears.
- Step 3** Edit the following attributes:
- **Name:** 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.
 - **Customer:** Click **Select**.
The Select Customer window appears.
- Step 4** Choose a Customer and click **Select**.
- Step 5** Click **Save**.
-



Note Independent VRF association is not supported for MVRFCE-based policies and service requests.

Creating MPLS VPN MVRFCE PE-CE Service Policies

This section contains the following sections:

- [Creating MVRFCE PE-CE Service Policies, page 26-3](#)
- [Creating PE-NoCE Service Policies, page 26-6](#)

Creating MVRFCE PE-CE Service Policies

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

**Note**

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

- Step 1** Choose **Service Design > Policies > MPLS**. The MPLS Policy Editor - Policy Type window appears, as shown in [Figure 26-4](#).

Figure 26-4 *MPLS - Policy Type Information*



- Step 2** 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. (**MVRFCE: PE-CE**)
 - **CE Present:** Check to set CE as present.

- Step 3** Click **Next**.

The MPLS Policy Editor - PE Interface window appears, as shown in [Figure 26-5](#).

Figure 26-5 *The MPLS Policy Editor - PE Interface*



- Step 4** Click **Next**.
The MPLS Policy Editor - Interface window appears.
- Step 5** Edit all applicable attributes.
- Step 6** Click **Next**.
The MPLS Policy Editor - IP Address Scheme window appears for **PE-MVRFCE**.
- Step 7** Edit all applicable attributes.
- Step 8** Click **Next**.
- Step 9** Another set of MPLS Policy Editor - IP Address Scheme windows appear for **MVRFCE-CE**.
- Step 10** Edit all applicable attributes, as above.
- Step 11** Click **Next**.
The MPLS Policy Editor - Routing Information window appears for **PE-MVRFCE**.



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

- Step 12** Click **Next** to accept the defaults.

The MPLS Policy Editor - Routing Information window appears for **MVRFCE-CE**.

Step 13 Click **Next** to accept the defaults.

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

Step 14 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 [Chapter 49, “Using Templates and Data Files with Policies and Service Requests”](#) 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 15 If you did not enable templates, click **Finish** in the MPLS Policy Editor – VRF and VPN window.

The Policies window reappears showing that the MPLS VPN MVRFCE PE-CE Service Policy is complete.

Creating PE-NoCE Service Policies

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

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

The MPLS Policy Editor - Policy Type window appears.

Step 2 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 3 Click **Next**.

The MPLS Policy Editor - Interface window appears.

Step 4 Click **Next** to accept the defaults.

The MPLS Policy Editor - Interface window appears for **MVRFCE-CE Facing Information**.

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

The MPLS Policy Editor - IP Address Scheme window appears for **PE-MVRFCE-CE Interface Address/Mask**.

- a. Edit the attributes as indicated:

- b. **IP Numbering Scheme:** Choose **IP Numbered** Scheme.
- c. **Automatically Assign IP Address:** To have Prime Fulfillment automatically assign IP Addresses, check the check box.
- d. **IP Address Pool:** Choose the IP Address Pool.

Step 6 Click **Next**.

The MPLS Policy Editor - IP Address Scheme window appears for **MVRFCE-CE Interface Address/Mask**.

- a. Edit the attributes as indicated:
- b. **IP Numbering Scheme:** Choose **IP Numbered** Scheme.
- c. **Automatically Assign IP Address:** To have Prime Fulfillment automatically assign IP Addresses, check the check box.
- d. **IP Address Pool:** Choose the IP Address Pool.

Step 7 Click **Next**.

The MPLS Policy Editor - Routing Information window appears for **PE-MVRFCE Routing Information**.



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

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

The MPLS Policy Editor - Routing Information window appears for **MVRFCE-CE Routing Information**.

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

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

Step 10 Click **Add** to join a VPN. The VPN dialog box appears.

Step 11 Click **Join as Hub**, then click **Done**.

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

Step 12 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 [Chapter 49, “Using Templates and Data Files with Policies and Service Requests”](#) 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 13 If you did not enable templates, click **Finish** in the MPLS Policy Editor – VRF and VPN window.

The Policies window reappears showing that the MPLS VPN MVRFCE PE-NoCE Service Policy is complete.

Creating MPLS VPN MVRFCE PE-CE Service Requests

This section contains the following sections:

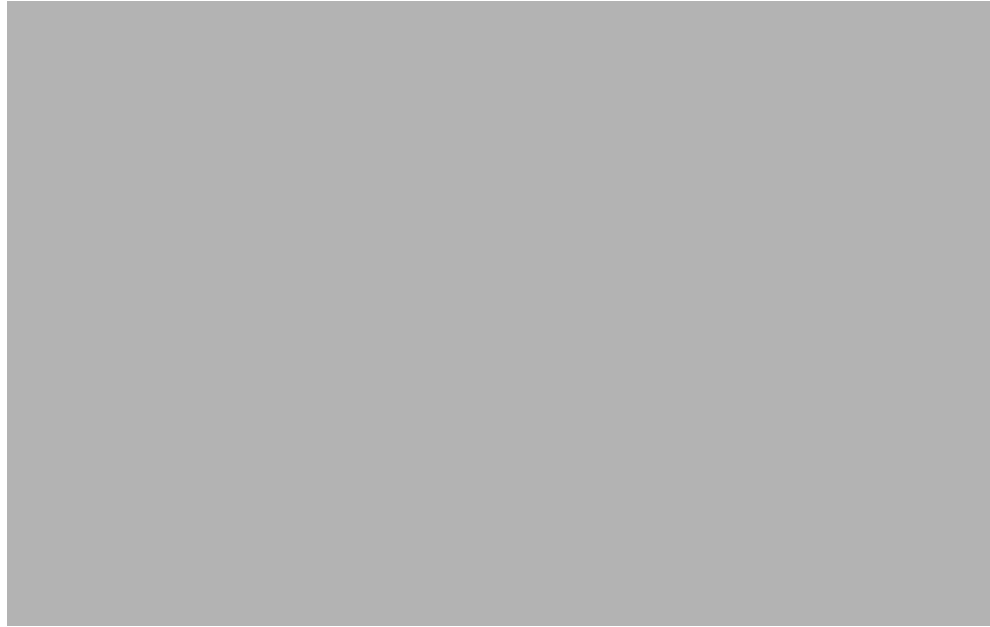
- [Creating MVRFCE PE-CE Service Requests, page 26-8](#)
- [Creating MVRFCE PE-NoCE Service Requests, page 26-12](#)

Creating MVRFCE PE-CE Service Requests

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

-
- | | |
|----------------|--|
| Step 1 | Choose Operate > Service Requests > MPLS . |
| Step 2 | Choose the MPLS Policy (mpls-mvrfce-pe-ce). |
| Step 3 | Click OK .
The MPLS Service Request Editor window appears. |
| Step 4 | Click Add Link .
The MPLS Service Request Editor window appears. |
| Step 5 | Click Select CE .
The CPE for MPLS VPN Link window appears. |
| Step 6 | Choose the CPE Device and click Select .
The MPLS Service Request Editor window appears. |
| Step 7 | Choose the CE Interface from the drop-down list. |
| Step 8 | Click Select MVRFCE .
The MVRFCE for MPLS VPN Link window appears. |
| Step 9 | Choose the MVRFCE and click Select .
The MPLS Service Request Editor window appears. |
| Step 10 | Choose the MVRFCE PE Facing Interface from the drop-down list. |
| Step 11 | Click Add in the Link Attribute cell.
The MPLS Link Attribute Editor - Interface window appears, as shown in Figure 26-6 . |

Figure 26-6 *MPLS Link Attribute Editor - Interface*



PE Information

Step 12 Encapsulation: Choose the PE Encapsulation from the drop-down list. (**DOT1Q**)

Step 13 VLAN ID: Enter the PE VLAN ID.

MVRFCE PE Facing Information

Step 14 Encapsulation: Choose the PE Encapsulation from the drop-down list. (**DOT1Q**)

Step 15 Click Next.

The MPLS Link Attribute Editor - Interface window appears, as shown in [Figure 26-7](#).

Figure 26-7 *MPLS Link Attribute Editor - Interface*



MVRFCE CE Information

Step 16 Encapsulation: Choose the PE Encapsulation from the drop-down list. (**DOT1Q**)

Step 17 VLAN ID: Enter the PE VLAN ID.

MVRFCE PE-Facing Information

Step 18 Encapsulation: Choose the PE Encapsulation from the drop-down list. (**DOT1Q**)

Step 19 Click **Next**.

The MPLS Link Attribute Editor - IP Address Scheme window appears for **PE-MVRF-CE interface address/mask**.

Step 20 Accept the defaults and click **Next**.

The MPLS Link Attribute Editor - IP Address Scheme window appears for **MVRFCE-CE interface address/mask**.

Step 21 Accept the defaults and click **Next**.

The MPLS Link Attribute Editor - Routing Information window reappears for **PE-MVRF-CE routing information**.



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

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

The MPLS Link Attribute Editor - Routing Information window reappears for **MVRFCE-CE routing information**.

Step 23 Accept the defaults and click **Next**.

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



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 24 Click **Add** to join a VPN.

The Select CERCs window appears.

Step 25 Choose a Customer from the drop-down list.

Step 26 Choose a VPN from the drop-down list.

Step 27 Check to choose a VPN from the list.

Step 28 Click **Join As Hub** or **Join As Spoke**.

Step 29 Click **Done**.

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

Step 30 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 34, 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 [Chapter 49, “Using Templates and Data Files with Policies and Service Requests”](#)

Step 31 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.

The MPLS Service Request Editor window reappears, as shown in [Figure 26-8](#).

Figure 26-8 *MPLS Service Request Editor*



Step 32 Enter the service request description (**mpls-mvrfce-pe-ce**) and click **Save**.

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

Creating MVRFCE PE-NoCE Service Requests

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

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

Step 2 Choose the MPLS Policy (**mpls-mvrfce-pe-noce**).

Step 3 Click **OK**.

The MPLS Service Request Editor window appears.

Step 4 Click **Add Link**.

The MPLS Service Request Editor window appears.

Step 5 Click **Select MVRFCE**.

The CPE for MPLS VPN Link window appears.

Step 6 Choose a MVRFCE and click **Select**.

The MPLS Service Request Editor window appears.

Figure 26-9 *MPLS Service Request Editor - MVRFCE CE Facing Interface*

Step 7 Choose the **MVRFCE CE Facing Interface** from the drop-down list.

Step 8 Click **Add** in the Link Attribute cell.

The MPLS Link Attribute Editor - Interface window appears, as shown in [Figure 26-10](#).

Figure 26-10 *MPLS Link Attribute Editor - Interface*



PE Information

Step 9 **Encapsulation:** Choose the PE Encapsulation from the drop-down list. (DOT1Q)

Step 10 **VLAN ID:** Enter the PE VLAN ID.

MVRFCE PE Facing Information

Step 11 **Encapsulation:** Choose the PE Encapsulation from the drop-down list. (DOT1Q))

Step 12 Click Next.

The MPLS Link Attribute Editor - Interface window appears, as shown in [Figure 26-11](#).

Figure 26-11 *MPLS Link Attribute Editor - Interface*



MVRFCE CE Information

Step 13 **Encapsulation:** Choose the PE Encapsulation from the drop-down list. (DOT1Q)

Step 14 **VLAN ID:** Enter the PE VLAN ID.

MVRFCE PE Facing Information

Step 15 Encapsulation: Choose the PE Encapsulation from the drop-down list. (**DOT1Q**)

Step 16 Click **Next**.

The MPLS Link Attribute Editor - IP Address Scheme window appears for **PE-MVRF-CE interface address/mask**.

Step 17 Click **Next** to accept the defaults.

The MPLS Link Attribute Editor - IP Address Scheme window appears for **MVRFCE-CE interface address/mask**.

Step 18 Click **Next** to accept the defaults.

The MPLS Link Attribute Editor - Routing Information window reappears for **PE-MVRF-CE routing information**.



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

Step 19 Click **Next** to accept the defaults.

The MPLS Link Attribute Editor - Routing Information window reappears for **MVRFCE-CE routing information**.

Step 20 Click **Next** to accept the defaults.

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



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 21 Click **Add** to join a VPN.

The Select CERCs window appears.

Step 22 Choose a Customer from the drop-down list.

Step 23 Choose a VPN from the drop-down list.

Step 24 Check to choose a VPN from the list.

Step 25 Click **Join As Hub** or **Join As Spoke**.

Step 26 Click **Done**.

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



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 27 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 34, 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 [Chapter 49, “Using Templates and Data Files with Policies and Service Requests”](#)

- Step 28** 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. The MPLS Service Request Editor window reappears, as shown in [Figure 26-12](#).

Figure 26-12 *MPLS Service Request Editor*



- Step 29** Enter the service request description and click **Save**. (`mpls-mvrfce-pe-noce`)

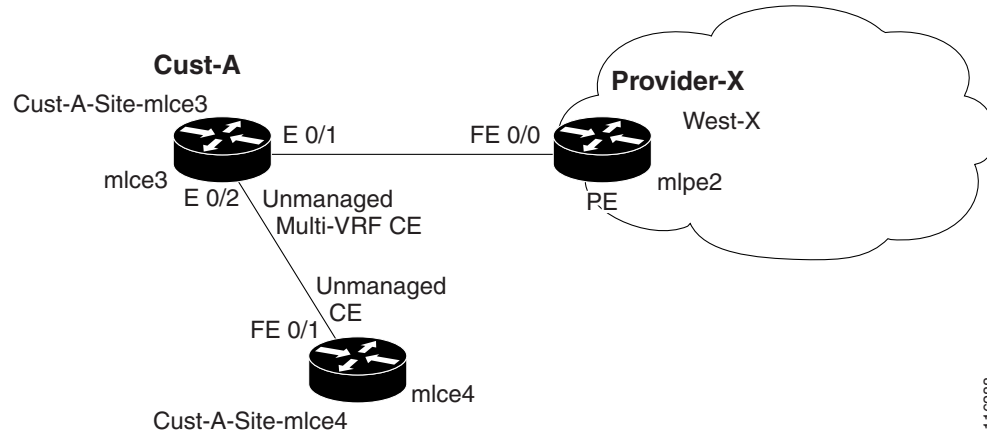
The MPLS Service Requests window reappears showing that the MPLS VPN MVRFCPE PE-NoCE service request is in the Requested state and ready to deploy.

Creating an Unmanaged MVRFCPE

The unmanaged MVRFCPE feature is similar to the unmanaged CE feature in so far as the service provider does not use Prime Fulfillment to upload or download configurations to the CPE. This feature is similar to the managed MVRFCPE feature in so far as Prime Fulfillment creates a link with three devices: a PE, an MVRFCPE, and a CE.

In the unmanaged scenarios, the customer configures the CPE manually. To automate the process of configuring the unmanaged MVRFCPE, the service provider can use Prime Fulfillment to generate the configuration and then send it to the customer for manual implementation.

[Figure 26-13](#) shows an overview of a network topology with MPLS VPN MVRFCPE PE-CE links.

Figure 26-13 Unmanaged MVRFCE PE-CE Network Topology

The network topology in [Figure 26-13](#) shows a service provider (**Provider-X**) and a customer (**Cust-A**). The Provider contains one Region (**West-X**) and one PE (**mlpe2**). The Customer contains an MVRFCE (**mlce3**) and a CE (**mlce4**). Both of these CPEs are unmanaged.