



CHAPTER 22

Independent VRF Management

This chapter describes independent VRF management, which provides a means to create, deploy and manage VRF objects independent of MPLS VPN links and service requests. Deployed VRF objects can also be used with MPLS VPN links.

Overview

In the traditional VRF (VPN routing and forwarding) model available in previous releases of Prime Fulfillment, the operator first creates a VPN object and then associates it to an MPLS VPN link. The necessary VRF information is generated and deployed at the time the MPLS VPN link is provisioned. The VRF information is removed only when the last link associated with the VRF is decommissioned. However, in certain cases, it might be desirable to have the VRF information provisioned independent of the physical link. Prime Fulfillment now supports this scenario through the independent VRF management feature described in this chapter. This lets you create, modify, and delete VRF objects independently of MPLS VPN links. This provides several advantages:

- VRF information and templates can be directly deployed on a PE device without being associated with an interface.
- VRF information can exist without links pointing to it.
- A VRF object can be modified, even if it is associated with links.
- Route targets (RTs) can be added and removed without causing outages.

Managing VRFs independently of physical links involves the following tasks, which are covered in detail in the rest of this chapter:

- Creating, modifying, and deleting VRF objects.
- Creating, modifying, deploying, decommissioning, and deleting a new type of service request, called a VRF service request.
- Using deployed VRF objects with MPLS VPN links via service policies and service requests.
- Migrating traditional MPLS VPN service requests to the independent VRF model.



Note

The traditional Prime Fulfillment VRF model is still supported for backward compatibility. The choice of which VRF model to use is available during MPLS VPN link creation. This is described in subsequent sections of this chapter.

**Note**

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

Multicast Support for IPv6 on IOS XR Devices

For IOS XR PE devices running release 3.7.0 or later, Prime Fulfillment allows multicast to be enabled during the creation of the VRF object. When creating a VRF object, you can enable multicast for IPv4, IPv6, or both. You can enter IPv6 addresses as static Rendezvous Point (RP) addresses if IPv6 multicast is enabled during the creation of a VRF object.

You can also modify an existing VRF object to enable multicast for IPv4, IPv6, or both. When IPv4 multicast is enabled, all deployed service requests containing IPv4 links of the same VPN or VRF are moved into Requested state.

In addition, you can specify within the MPLS service request whether you want to enable multicast for IPv4, IPv6, or both on a given MPLS link.

When IPv6 multicast is enabled, all deployed service requests containing IPv6 links of the same VPN or VRF are moved into Requested state. If IPv4 is previously configured and only IPv6 multicast is enabled in a VPN, only the service requests with IPv6 links are moved into Requested state.

You can modify an existing VRF object and add IPv6 static RP addresses when IPv6 multicast is enabled. Any service requests already in Deployed state are then moved to the Requested state.

You can create a service policy or an MPLS VPN link in the service request with IPv6 Numbered or IPv4+IPv6 Numbered as the IP addressing scheme and a multicast VRF with multicast enabled.

Working with VRF Objects

This section describes how to create, modify, and delete VRF objects. Subsequent sections in this chapter cover how the VRF objects are used in service requests.

Creating a New VRF Object

Creating a VRF object is similar to creating a VPN. However, there are some extra attributes involved, such as Import RT List and Export RT List. After the VRF object is created, you will later provision it using a VRF service request, as covered in later sections of this chapter.

To create a VRF object, perform the following steps.

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- Step 1** Choose **Inventory > Logical Inventory > VRFs**.
 - Step 2** From the VRF Management window, click **Create**.

The Create New VRF window appears, as shown in [Figure 22-1](#).

Figure 22-1 Create VRF Window

Step 3 **Name:** Enter the name of the VRF object.

This is a simple text field. Enter any name of your choice. It is recommended not to use special characters (' ` " < > () [] { } / \ & ^ ! ? ~ * % = , . + |), as this may cause misconfiguration of the VRF name for certain devices.

This name will be directly deployed on the PE device. All the validations applicable for a VPN name while creating a VPN object in Prime Fulfillment are applicable for a VRF name. This attribute is required.

Step 4 Provider: To choose the provider associated with this VRF:

a. Click **Select**.

The Select Provider dialog box appears.

b. From the list of providers, choose the appropriate provider, then click **Select**.

Step 5 Description: Enter a description of the VRF, if desired.

No validation is done on the description entered.

Step 6 Route Target(s): To select a Route Target for this VRF:

a. Click **Select**.

The Select CE Routing Communities dialog box appears.

b. From the list, choose the appropriate Route Target, then click **Select**. Only one Route Target is allowed per VRF.

Step 7 Import RT List: Enter one or more Route Targets (RTs) to be imported in the VRF.

For multiple RTs, use a comma (,) separated list. An example RT list is 100:120,100:130,100:140.

Step 8 Export RT List: Enter one or more Route Targets (RTs) to be exported from the VRF.

For multiple RTs, use a comma (,) separated list.

Step 9 Import Route Map: Enter the name of a route map defined on the device.

Prime Fulfillment will validate this name while provisioning the VRF. If the route map is not defined, Prime Fulfillment will generate an error.

Step 10 Export Route Map: Enter the name of a route map defined on the device.

Prime Fulfillment will validate this name while provisioning the VRF. If the route map is not defined, Prime Fulfillment will generate an error.

Step 11 Maximum Routes: Specify the maximum number of routes that can be imported into the VRF.

This is an integer value from 1 to 4294967295 for IOS devices and from 32 to 2000000 for IOS XR devices.

Step 12 Threshold: Specify the threshold value, which defines a percentage, which, if exceeded, generates a warning message.

This is an integer value from 1 to 100. This attribute is mandatory for IOS devices and optional for IOS XR devices. Validations for specific device type will be done during service request creation.

Step 13 RD Format: To specify the format of the RD (route distinguisher) format, choose a format type from the drop-down list.

- RD_AS—Specify RD in AS (autonomous system) format. This is the default selection.
- RD_IPADDR—Specify RD in IP address format. This is supported for IOS and IOS XR PE devices.

The RD format chosen determines the how the RD should be set in the next step.

Step 14 RD: Specify a RD (route distinguisher) manually (according to the format chosen in the previous step), or check the **Autopick RD** check box to have Prime Fulfillment automatically choose an RD from the Route Distinguisher pool (if one has been set up).

Usage notes:

- This attribute is required.

- Checking the Autopick RD check box disables the RD text entry field.
- If the Autopick RD check box is checked in conjunction with the RD_IPADDR format, then the VPN ID for the RD will automatically selected from the RD pool of the respective provider and appended to the label *IP* to form the RD. Example: IP:1245. (This value appears when the VRF object is saved and then edited.) You choose the actual IP address when the service request is created, as the IP address (that is, the loopback IPv4 address) might differ for different PEs.
- If the Autopick RD check box is checked in conjunction with the RD_AS format, then Prime Fulfillment picks the value from the Route Distinguisher pool and assigns it to this particular VRF object.
- If Autopick RD is not checked, you must specify the RD manually in the provided text field using one of the following formats (as specified in the RD Format attribute):
 - The RD value for the RD_AS format must be *as_number:number*, where *as_number* is an AS number (2-byte value) and *number* is a 4-byte integer value. The AS number can be in the range 1 through 65,535. Example: 100:1254.
 - The RD value for RD_IPADDR must be *ip_address:number*, where *ip_address* is an IPv4 address and *number* is a 4-byte integer value. The number can be in the range 1 through 65,535 only. Example: 10.23.6.5:1245.
- If the RD value is entered manually in IP address format, the operator is responsible for the deployment of the VRF across different PEs.
- RD format validation is performed based on the RD format set in the RD Format attribute.
- No check is done to verify the association with the PE, other than validating the new RD format.
- Prime Fulfillment allows the modification of an existing VRF object with the new RD format only if the VRF object is not deployed.
- The following Prime Fulfillment template variables support RD Format:
 - RD_FORMAT
 - RD_IPADDRESS

Step 15 OSPF Domain ID: Enter an OSPF domain ID in decimal format.

Usage notes:

- Enter the value in decimal format. The Hex value: field is a non-editable text field that displays the equivalent hex value. The hex value is what actually gets displayed on the device.
- You can modify the OSPF domain ID at any time. If you attempt to modify the OSPF domain ID for a VRF that is associated with a deployed MPLS service request and has the Use VRF/VPN Domain ID attribute enabled, those service requests are moved to the **Requested** state. Prime Fulfillment provides a list of the service requests using this VRF object, so that you can deploy them.
- The OSPF Domain ID property has no effect on the VRF service request, and no configuration related to OSPF Domain ID gets deployed with VRF service request.
- OSPF domain ID is supported only on IOS XR devices. In the case of IOS devices, Prime Fulfillment ignores the this attribute if you use a VRF object with an OSPF domain ID specified.
- The OSPF domain ID attribute uniquely identifies the OSPF domain from which a route is redistributed. This domain ID should be unique per customer. For IOS devices, because IOS allows only one VRF per process, the default behavior is that the OSPF process ID is considered as the OSPF domain ID. IOS XR supports multiple VRFs per process. Therefore, for IOS XR devices, you need to explicitly configure a unique OSPF domain ID for each VRF. You can configure one VRF per OSPF process, but it is not a scalable solution.

- For additional information, see the discussion of the OSPF Domain ID attribute in [OSPF Protocol Chosen, page 24-24](#).

Step 16 **Enable IPv4 Multicast** or **Enable IPv6 Multicast**: Check one or both of these check boxes to enable multicast VRF.

The multicast attributes below this check box are enabled for use. For details on how to set the multicast attributes, see [Creating an IP Multicast VPN, page 21-21](#).



Note This attribute is not supported for use with MVRFCPE policies and service requests.



Note Enable IPv6 Multicast is not supported on IOS and IOS 6VPE devices.



Note Route Target is mandatory if multicast is enabled.



Note For the MDT MTU attribute: The range for IOS devices is from 576 to 18010. The range for IOS XR devices is from 1401 to 65535. Validations for specific device type will be done during service request creation.

Step 17 When you are satisfied with the settings for this VRF object, click **Save**.

Prime Fulfillment creates a new VRF object based the attributes selected. The new VRF is listed in the VRF Name column of the window.

Copying a VRF Object

You can use an existing VRF object as the basis for a new one. You do this by copying a VRF object, renaming the copy, and (optionally) modifying its attributes.

To copy an existing VRF object, perform the following steps.

Step 1 Choose **Inventory > Logical Inventory > VRFs**.

The VRF Management window appears.



Note The example assumes that a VRF object has already been created. See [Creating a New VRF Object, page 22-2](#) for information on how to create a VRF object.

Step 2 Select an existing VRF object (for example, VRF_1) by checking the check box for the VRF object.

When you select a VRF object, the Edit, Copy, and Delete buttons become active.

Step 3 To copy the VRF object, click the **Copy** button.

The attribute fields are populated with values from the VRF object being copied.

Step 4 Provide a name for the new VRF object by changing the name in the **Name** field.

Step 5 Edit other attributes in the Create VRF window as desired.



Note The copy VRF function copies all attributes of the parent except the route distinguisher (RD), Default MDT Address, and Data MDT Subnet. The RD is always set to auto pick (the Autopick RD check box is checked by default). If auto pick is set for the parent VRF, it will be carried to the VRF object created by the copy function.

Step 6 When you are finished with the edits, click the **Save** button.

The VRF Management window appears, with the new VRF object.

Step 7 The VRF object copy operation is complete.

Searching for VRF Objects in the Prime Fulfillment Repository

All VRF objects are stored in the Prime Fulfillment repository. You can display these by accessing the VRF Management window at **Inventory > Logical Inventory > VRF** in the Prime Fulfillment GUI. You can search for VRF objects using the **Show VRF with** drop-down list together with the **matching** field. The **Show VRF with** drop-down list enables you to display VRF objects by searching for these attributes:

- VRF Name
- Provider
- Route Distinguisher
- Route Target



Note The search is case insensitive, and wildcard (*) searches are supported.

Modifying Non-Deployed VRF Objects

VRF objects can be modified individually (single VRF edit) or in batch mode (multi-VRF edit). This section covers the basic steps for modifying VRF objects which have not yet been deployed via a VRF service request or associated with MPLS VPN links. There are some special considerations when modifying VRFs which have been deployed, as described in [Modifying Deployed VRF Objects, page 22-9](#).

Single-VRF Edit Mode

To edit one VRF object, perform the following steps.

Step 1 Choose **Inventory > Logical Inventory > VRF** to list the VRF objects in the Prime Fulfillment repository.

The VRFs window appears.

Step 2 Select the VRF you want to edit and click the **Edit** button.

Step 3 Update any attributes you want to edit.

Step 4 Click **Save** to save the edits.

Multi-VRF Edit Mode

The multi-VRF edit feature allows you to modify common attributes on more than one VRF. For example, multi-VRF edit is useful for adding and/or removing route targets on multiple VRFs.

To edit multiple VRF objects simultaneously, perform the following steps.

Step 1 Choose **Inventory > Logical Inventory > VRFs** to list the VRF objects in the Prime Fulfillment repository.

The VRFs window appears.

Step 2 Select the VRFs you want to edit and click the **Edit** button.

The Edit Multiple VRFs window appears, as shown in [Figure 22-2](#).

Figure 22-2 Edit Multiple VRFs

Edit Multiple VRFs

VRF'S Affecting

VRF Details: vrf1 ,vrf2 ,vrf3 Attributes

Route Attributes

Import Targets		Export Targets	
Add	<input type="text"/>	<input type="text"/>	<input type="text"/>
Remove	<input type="text"/>	<input type="text"/>	<input type="text"/>

Provider: NbiProvider

Route Target(s): Select

Import Route Map:

Export Route Map:

Multicast Attributes

Enable IPv4 Multicast:

Enable IPv6 Multicast:

Data MDT Size: 1

Data MDT Threshold: (1 - 4294967 kilobits/sec)

Default PIM Mode: SPARSE_DENSE_MODE

MDT MTU: (576 - 65535)

Enable PIM SSM:

SSM List Name:

Multicast Route Limit: (1 - 2147483647)

Enable Auto RP Listener:

Save Cancel

Note: * - Required Field

The Edit VRFs window is similar to the Create VRF and Edit VRF windows. However, there is an additional field, **VRF Details**, and the format of the RT import/export fields are laid out differently. Also, some attributes are not available for editing in multi-VRF edit mode.

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- Step 3** To see details of the VRFs being edited, click the **Attributes** link in the VRF Details row. The VRF Details window appears. This lists the VRFs being edited and displays the following attributes for each VRF:
- Name
 - Provider
 - Route Target
 - Import Route Map
 - Export Route Map
 - Import Route Target
 - Export Route Target
 - MultiCast IPv4
 - MultiCast IPv6
- Step 4** To add or remove import or export route maps, enter the desired values in the provided fields. You can enter more than one RT in each field. For multiple RTs, use a comma (,) separated list.
- Step 5** Update the **Route Target(s)**, **Import Route Map**, **Export Route Map**, and **Multicast Attributes** settings as desired.
-  **Note** The **Provider** attribute cannot be edited in multi-VRF editing mode.
- Step 6** To save the edits, click **Save**.

Modifying Deployed VRF Objects

After a VRF object is deployed on a PE device through a VRF service request (see [Deploying VRF Service Requests, page 22-13](#)), there are some special considerations to be aware of when modifying the VRF object.

- The VRF object might have been associated with multiple links and/or VRF service requests.
- Unlike traditional VPN objects, you can modify a VRF object even if it is referenced by multiple VRF service requests.
- The **VRF Name**, **Provider**, and **RD** attributes cannot be changed after the VRF object is deployed.



Note The **RD** attribute can be modified if the VRF service request is deployed on a PE device running IOS 12.0 (32) SY or greater.

To modify a deployed VRF object, perform the following steps.

- Step 1** When you attempt to modify a deployed VRF object, the Affected Jobs window appears. The window displays the affected VRF service requests associated with the VRF object being modified. The Job ID, SR ID, Link ID, VRF Name, and Description information for each VRF service request are listed.

- Step 2** To display more details about a VRF service request, click the **Job ID** link.
The Service Request Details window appears.
- Step 3** Verify the service request details, if desired.
- Step 4** Perform one of the following actions:
- Click **Save** to save the VRF object and move all of the affected VRF service requests to the **Requested** state.
 - Click **Save and Deploy** to save the VRF object, move all of the affected VRF service requests to the **Requested** state, and schedule an immediate deployment for all of the VRF service requests.
 - Click **Cancel** to cancel the operation and return to the Edit VRFs window.
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Deleting VRF Objects

To delete VRF objects from the Prime Fulfillment repository, perform the following steps.



Note

There are some prerequisite steps you must perform if the VRF object or objects are still in use by a VRF service request, as mentioned in the notes following the procedure.

- Step 1** Choose **Inventory > Logical Inventory > VRF** to list the VRF objects in the Prime Fulfillment repository.
The VRFs window appears.
- Step 2** Select the VRFs you want to delete and click the **Delete** button.
- Step 3** Click **Delete** to confirm.
- If the VRF objects are not in use, the selected VRF objects are deleted.
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Deleting VRF Objects Associated with VRF Service Requests

A VRF object cannot be deleted if it is still associated with any VRF service request. If you attempt to do so, you receive a Delete VRF Failed message in the Status window. In this case you must first decommission, deploy, and purge all of the related VRF service requests before you can delete the VRFs object. Use the information provided in the error message to identify the VRF services requests and links related to the VRF object you are attempting to delete.

Working with VRF Service Requests

Saved VRF objects are deployed on a Provider Edge (PE) device through a special type of service request called a VRF service request.

Overview of VRF Service Requests

The VRF service request allows the VRF object to be configured on a router without having to select a physical interface. Each VRF service request consists of one or more links. Each link consists of the following elements:

- One VRF object
- One PE object
- One template (optional)

In addition, VRF service requests are associated to a customer.

**Note**

An important difference between regular MPLS service requests and VRF service requests is that there is no service policy required for a VRF service request. As a result, the VRF service request is not associated with a service policy.

The VRF service request states follow the normal Prime Fulfillment service request state transitions, as described in the [Chapter 25, “Service Enhancements”](#).

Defining VRF Service Requests

To define a VRF service request, perform the following steps.

Step 1 Choose **Operate > Service Requests > VRF** to access the VRF Service Requests window.

The VRF Service Request Editor window appears.



Note If necessary, click the **Add Link** button to create a row for setting the link information.

This window allows you to define the VRF service request by setting up one or more links, each consisting of a VRF object, PE device, and an optional template. You also specify the address scheme for each link. You can also view or, in some cases, set the Route Distinguisher (RD) value. This depends on how the RD format and RD were specified when creating the VRF object. You can deploy any number of links with any combination of PE devices and VRF objects. An important point to note is that no physical interface on the router needs to be selected.

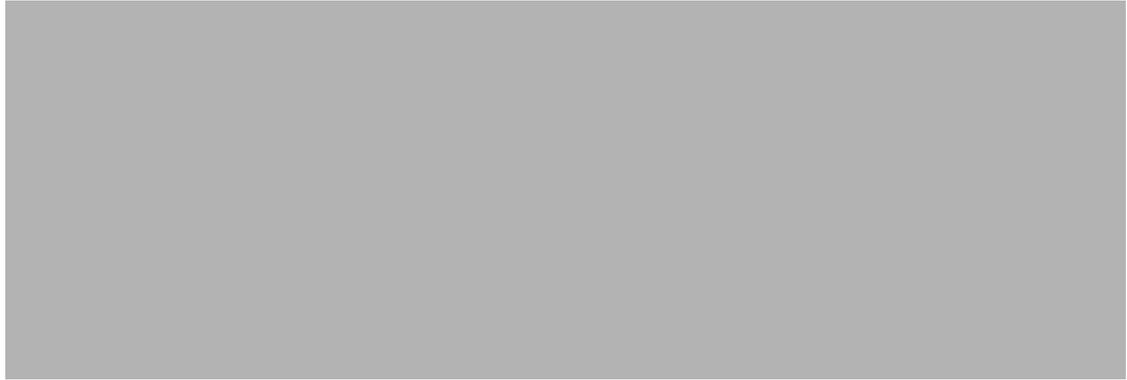
To set up a link, continue with the steps in the procedure, as follows:

Step 2 Set the customer for the VRF service request by clicking on the link beside the Customer attribute.

The Select Customer window appears. Choose the desired customer and click the **Select** button. This attribute is optional.

Step 3 Click the **Select VRF** link to choose a VRF object from the Prime Fulfillment repository.

This brings up the Select Independent VRF window, like the one shown in [Figure 22-3](#).

Figure 22-3 Select Independent VRF Window

Step 4 Choose a VRF object by clicking on a radio button and clicking the **Select** button.

If desired, you can limit the VRF objects displayed by searching by VRF Name, Provider, Route Distinguisher, or Route Target using the **Show VRFs with** and **matching** fields.



Note For steps on how to add VRF objects to the Prime Fulfillment repository, see [Creating a New VRF Object, page 22-2](#).

Step 5 Click the **Select PE** link to choose a PE device for the link.

The Select PE Device window appears.

Step 6 Choose a PE by clicking on a radio button and clicking the **Select** button.

If desired, you can limit the PE devices displayed by using the **Show PEs with** and **matching** fields.

This step specifies the PE device on which to deploy the VRF object selected in Steps 4 and 5.



Note Because the VRF object and the PE device must belong to the same provider, Prime Fulfillment limits the list of PEs displayed to those with the same provider specified in the VRF object chosen for the link.

After the PE is selected, the RD IP Address Value column will display a message or, in some cases, a text field in which to enter an IP address. This is coverage in subsequent steps below.

Step 7 Click the **Add Template** link to choose a template data file to be associated with the link.

The Add/Remove Templates window appears. This is a standard Prime Fulfillment window for selecting a data file and specifying operations such as append and prepend. For information on working with templates in Prime Fulfillment, see [Chapter 49, “Using Templates and Data Files with Policies and Service Requests”](#) For specific information about using the Add/Remove Templates window, see [Chapter 49, “Using Templates and Data Files with Service Requests”](#).

Step 8 Specify the address scheme by choosing the appropriate selection from the **Address Family** drop-down list for the link.

The choices are:

- IPv4
- IPv6
- IPv4 and IPv6

The IPv4 and IPv6 option causes the VRF object to be deployed with both IPv4 and IPv6 configurations.

- Step 9** If appropriate for your configuration, enter an RD IP address in the text field of the RD IP Address Value column. Alternatively, you can click the **Select_Loopback** link to pick a loopback IP address of the PE device used in the service request.

Usage notes:

- The contents and behavior of the RD IP Address Value field depend on how the RD Format and RD attributes were specified for the VRF object that is being used in the service request, as follows:
 - If the VRF object has RD Format set as RD_IPADDR and Autopick is checked for the RD attribute, then the RD IP Address Value column provides a text field in which to manually enter the RD IP address value. Alternatively, you can pick a loopback IP address of the PE device used in the service request. The RD is formed by appending to this IP address the VPN ID picked from the RD pool of the respective provider. Prime Fulfillment validates the IP address entered. Basic IPv4 addresses are allowed. No network prefixes are permitted.
 - If the VRF object has RD Format set as RD_IPADDR and you manually entered an RD IP address for the RD attribute, then the RD IP Address Value column states “RD IP Address Manual”. You do not enter an IP address in this case.
 - If the VRF object has RD Format set as RD_AS and Autopick was checked for the RD attribute, or a value was entered manually, then the RD IP Address Value column states “RD AS Format”. You do not enter a value in either of these cases.
- After the VRF service request is deployed with the RD using an IP address you entered in the text field, the RD IP Address Value field is disabled and cannot be changed. If the RD IP Address Value needs to be modified, you must decommission, purge, and redeploy the VRF service request.

- Step 10** If you want to set up additional links for the VRF service request, click the **Add Link** button and repeat Steps 4 through 9 for each link.

- Step 11** When you have completed setting up the link(s) for the VRF service request, click **Save** to save the VRF service request.

The Service Requests window appears and you see the VRF service request displayed with Job ID, State, Type and other attributes. The VRF service request is initially in the Requested state.

- Step 12** To deploy a VRF service request, see [Deploying VRF Service Requests, page 22-13](#).

Deploying VRF Service Requests

To deploy a VRF service request, perform the following steps.

- Step 1** In the Service Requests window, choose the VRF service request you want to deploy.

- Step 2** Click the **Deploy** button and choose **Deploy** from the drop-down list.

The Deploy Service Request task window appears.

- Step 3** Set the task parameters as desired and click the **Save** button.

To immediately start the deploy task, keep the defaults and click **Save**. The Service Request window reappears and the VRF service request moves to the Deployed state.

For steps on how to check the status of the deployed VRF service request, see the information in [Chapter 25, “Migrating PE Devices from IOS to IOS XR”](#) and [Chapter 47, “Monitoring Service Requests”](#).

Modifying VRF Service Requests

To add links or modify existing link attributes for a VRF service request, perform the following steps.

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- Step 1** Choose **Operate > Service Requests** to access the Service Requests window.
 - Step 2** Choose the VRF service request in the Service Requests window and click **Edit**.
The VRF Service Request Editor window appears.
 - Step 3** Modify the VRF service request attributes as desired.



Note You can only modify VRF service request links that are not associated with any MPLS VPN links. When you attempt to modify any VRF service request link that is associated with an MPLS VPN link, Prime Fulfillment generates an error while saving the VRF service request.

- Step 4** Click **Save** to save your edits.
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Decommissioning and Deleting VRF Service Requests

VRF service requests are decommissioned and deleted like other Prime Fulfillment service requests.



Note Decommissioning a VRF service request is not allowed if any of the links in the VRF service request with a VRF object referred in MPLS service request exists.

To decommission a VRF service request, perform the following steps.

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- Step 1** Choose **Operate > Service Requests** to access the Service Requests window.
 - Step 2** Choose the VRF service request in the Service Requests window and click the **Decommission** button.
The Confirm Request window appears.
 - Step 3** Click **OK** to confirm.
The Service Request window appears, showing the VRF service request with a DELETE operation type.
 - Step 4** Deploy the service request with the DELETE operation type, to ensure the successful decommission of the service request.
-

Searching for VRF Service Requests by VRF Object Name

To search for and display VRF service requests in the Prime Fulfillment repository by VRF object name, perform the following steps.

-
- Step 1** Choose **Operate > Service Requests > VRF** to access the Service Requests window.
 - Step 2** Choose **VRF Object Name** in the **Show Services with** drop-down list.
 - Step 3** Set the **matching** and **of Type** fields as desired.
To search only VRF service requests, choose **VRF** in the **of Type** field.
 - Step 4** Click **Find** to search for service requests with the associated VRF object name you specified.
-

Viewing the Configlet Generated by a Deployed VRF Service Request

To view the configlet generated by a deployed VRF service request, perform the following steps.

-
- Step 1** Choose **Operate > Service Requests > VRF** to view the available service requests.
 - Step 2** Check the appropriate check box to select the VRF service request for which you want to view the associated configlets.
 - Step 3** Click the **Details** button.
The Service Request Details window appears.
 - Step 4** Click the **Configlets** button.
The Service Request Configlets window appears. This window displays a list of devices for which configlets have been generated.
 - Step 5** To view configlets that were generated for a device, select a device and click the **View Configlet** button.
By default, the latest generated configlet is displayed.



Note If the configlet is deployed on an IOS XR device, you have the option of displaying the configlet in XML or CLI formats or both. For more details on this behavior, see [Chapter 47, “Viewing Configlets on IOS XR Devices”](#).

- Step 6** If applicable, you can display configlets for a device based on the time of creation. Choose the desired time of creation in the Create Time list to display a specific configlet based on the time the configlet was generated for the service request.
 - Step 7** Click **OK** when you are finished viewing the VRF configlet data.
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Using VRFs with MPLS VPN Service Requests and Policies

VRF objects which have been deployed can be used within MPLS VPN service requests and service policies.



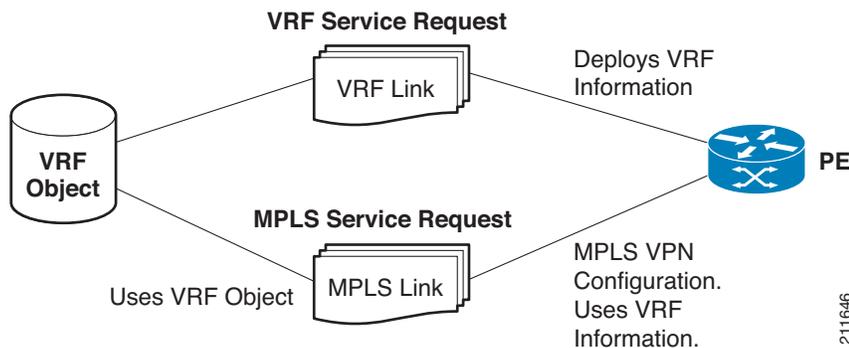
Note

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

Relationship of VRF Object and Service Requests and PE Device

Figure 22-4 shows the relationships between the VRF object, MPLS service request, VRF service request, and the PE device. See this figure to understand concepts discussed in the procedures that follow.

Figure 22-4 VRF Object, VRF Service Request, MPLS VPN Service Request, and PE



Specifying VRF Objects within MPLS VPN Service Requests

VRF objects can be selected during the creation of the MPLS VPN service request at the time when the VRF and VPN attributes are set. At that stage, you can either set the VPN attributes individually (as in previous releases of IP Solution Center) or else use an existing VRF object. In the latter case, the MPLS VPN link “inherits” the VPN and VRF data from the VRF object. The VRF object might be either undeployed or deployed. If the VRF object is not deployed, Prime Fulfillment will deploy it automatically. For additional information about the function of VRF objects with MPLS VPN service requests, see [Notes On Using a VRF Object in an MPLS Service Request, page 22-19](#).

To create an MPLS VPN service request using a VRF object, perform the following steps.

- Step 1** You must create or use an existing MPLS VPN service request and follow the workflow up to the point where you define the VRF and VPN attributes. This is done in the MPLS Link Editor – VRF and VPN window, as shown in [Figure 22-5](#).

Figure 22-5 *MPLS Link Attribute Editor – VRF and VPN Window*



Note If necessary, see the relevant sections of this guide for how to arrive at this window in the MPLS VPN service request workflow.

- Step 2** If you do not want to use a VRF object with this MPLS VPN link, leave **Use VRF Object** unchecked. In this case, set the attributes for the VPN, as normally done with MPLS service requests. These steps are covered in other sections of this guide.
- Step 3** To use a VRF object with the MPLS VPN link, check the **Use VRF Object** check box. All of the standard VPN and VRF attributes, except BGP Multipath Load Sharing, are hidden, and the VRF Object attribute appears.
- Step 4** To select a VRF object, click the **Select** button to the right of the VRF Object attribute. The Select Independent VRF window appears. This Select Independent VRF window lists all of the VRF objects deployed on the PE, along with their RD value, provider and CERC information.
- Step 5** To enable the unique route distinguisher feature, check the **Unique RD** check box.



Note The Unique RD feature is restricted to one MPLS VPN link per MPLS service request. If you select the Unique RD option, it is advised that only one MPLS VPN link is present in that service request.

Be aware of the following use case scenarios when enabling the Unique RD feature:

- If the selected VRF is not deployed on any device, a VRF service request is created for the selected VRF and PE device.
- If the selected VRF is not deployed on the PE device but is deployed on a different PE device, a new VRF object is created (which is a copy of the selected VRF) and a VRF service request is created for the newly created VRF and the PE device.
- If the selected VRF is deployed only on the PE device, then nothing is done. In this case, uniqueness is automatic.
- If the selected VRF is deployed on the PE device and also on some other devices, then a new copy of the VRF object is created with an updated name and a VRF service request is created for the newly created VRF and the PE device.
- It is possible to have two VRFs with the same name but different RDs.

Step 6 Choose the desired VRF Object and click the **Select** button.



Note For information about how the selection of the VRF object is subsequently managed in Prime Fulfillment, see [Notes On Using a VRF Object in an MPLS Service Request, page 22-19](#), following this procedure.

Step 7 Click the **Select** button to confirm the selection of the VRF object and return to the MPLS Link Editor – VRF and VPN window.

Step 8 To set up BGP multipath load sharing, check the **BGP Multipath Load Sharing** check box. This activates additional attributes as shown in [Figure 22-6](#).

Figure 22-6 *MPLS Link Attribute Editor – VRF and VPN Window (Multipath Attribute Selected)*



For information on setting these attributes, see [Chapter 24, “BGP Multipath Load Sharing and Maximum Path Configuration”](#).



Note Use the **Force Modify Shared Multipath Attributes** attribute to enable forced modification of the shared VRF attributes used by other links. This field is not persisted.

- Step 9** Click the **Next** button, if you want to associate templates or data files to the service request.
- The 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”](#) When you have completed setting up templates and data files for the service request, click **Finish** in the Template Association window to close it and return to the Service Request Editor window.
- Step 10** If you did not add templates, click **Finish** in the MPLS Link Editor – VRF and VPN window.
- The MPLS Service Request Editor window appears.
- Step 11** Click the **Save** button to complete the creation of the MPLS VPN service request using the VRF object.
- The Service Requests window appears showing that the service request is in the Requested state and ready to deploy.
-

Notes On Using a VRF Object in an MPLS Service Request

Be aware of the following considerations when using VRF objects with MPLS VPN service requests:

- If the selected VRF object is not deployed on the PE device, Prime Fulfillment creates a new VRF service request with the selected VRF object and PE device and deploys it as part of the current MPLS VPN service request deployment process.
- If the VRF object selected in the MPLS VPN service request is not deployed on the PE device but a VRF service request exists in the Requested state or any failed states, Prime Fulfillment will attempt to deploy the VRF service request as part of the MPLS VPN service request.
- When decommissioning an MPLS VPN service request for which VRF service requests were created, Prime Fulfillment will not delete the VRF service requests automatically. The user must decommission and deploy such VRF service requests in order to delete the configuration from the device.
- When VRF configuration is selected, no VRF-related information will be provisioned on the device. The VRF name will be used in all the MPLS VPN configuration commands, such as `ip vrf forwarding` on interface, address family configuration in BGP, OSPF, EIGRP, and so on.

Searching for MPLS VPN Service Requests by VRF Object Name

To search for and display VRF service requests in the Prime Fulfillment repository by VRF object name, perform the following steps.

- Step 1** Choose **Operate > Service Request Manager** to access the Service Requests window.
- Step 2** Choose **VRF** in the **of Type** drop-down list.
- Step 3** Set the **matching** and **of Type** fields as desired.

To search only MPLS VPN service requests, choose **MPLS VPN** in the **of Type** field.

- Step 4** Click the **Find** button to search for MPLS VPN service requests with the associated VRF object name you specified.
-

Specifying VRF Objects within MPLS VPN Service Policies

VRF object selection is supported while defining MPLS VPN policies. This is done during the MPLS VPN policy workflow in the MPLS Policy Editor – VRF and VPN Membership window, as shown in [Figure 22-7](#).

Figure 22-7 *MPLS Policy Editor – VRF and VPN Window*



The procedure for using the VRF Object attribute is similar to what is covered in [Specifying VRF Objects within MPLS VPN Service Requests](#), page 22-16. See that section for details on using these attributes.

If you select a VRF object for the MPLS policy, it will subsequently be used by MPLS VPN service requests that use that policy. As per standard Prime Fulfillment policy usage, you can check the **Editable** check box next to the VRF Object attribute to ensure that service requests based on the policy use the same VRF object specified in the policy.



Note

If you are not using the independent VRF object feature for the policy, then you must set the VRF and VPN attributes available in the MPLS Policy Editor – VRF and VPN Membership window. See [Chapter 24, “Defining VRF and VPN Information”](#), for more information.

Migrating Existing MPLS VPN Service Requests to the VRF Object Model

Prime Fulfillment provides a migration script to migrate traditional MPLS VPN service requests to the independent VRF model. The script takes as input one or more MPLS VPN service request ID numbers and creates appropriate VRF objects and VRF service requests for each service request. The script is located in the \$PRIMEF_HOME/bin directory. The script and its syntax is as follows:

```
runMplsSRMigration srid1 [srid2] [srid3] ...
```

Where *srid1* is the first MPLS VPN service request ID, [*srid2*] is the second service request, and so on.

Prime Fulfillment performs the following tasks for each MPLS VPN service request passed to the script:

- Creates a VRF object based on the VPN and VRF attributes defined for the service request.
- Copies all the VPN properties to the VRF object.
- Creates a VRF service request, with the VRF object and PE selected in the MPLS VPN link.
- Modifies the MPLS VPN link to point to the VRF object.
- Runs a configuration audit on the VRF service request and the MPLS service request to ensure the correctness of the migration.

