



## CHAPTER 4

# Managing RAN Backhaul Services

---

This chapter describes how to use Prime Fulfillment to manage radio access network (RAN) backhaul services in Prime Fulfillment. It contains the following sections:

- [Overview of RAN Backhaul Services, page 4-1](#)
- [Prerequisites, page 4-3](#)
- [Working with CEM TDM Services, page 4-3](#)
- [Working with ATM Services, page 4-18](#)
- [Sample Configlets for RAN Backhaul Services, page 4-33](#)

## Overview of RAN Backhaul Services

Radio access network (RAN) transport manages the backhaul traffic (both voice and data) from the cell site base transceiver stations (BTSs) to aggregation nodes and to base station controllers (BSCs), between BSCs, and between the BSC and an associated mobile switching center (MSC). [Figure 4-1](#) shows an example RAN backhaul topology.

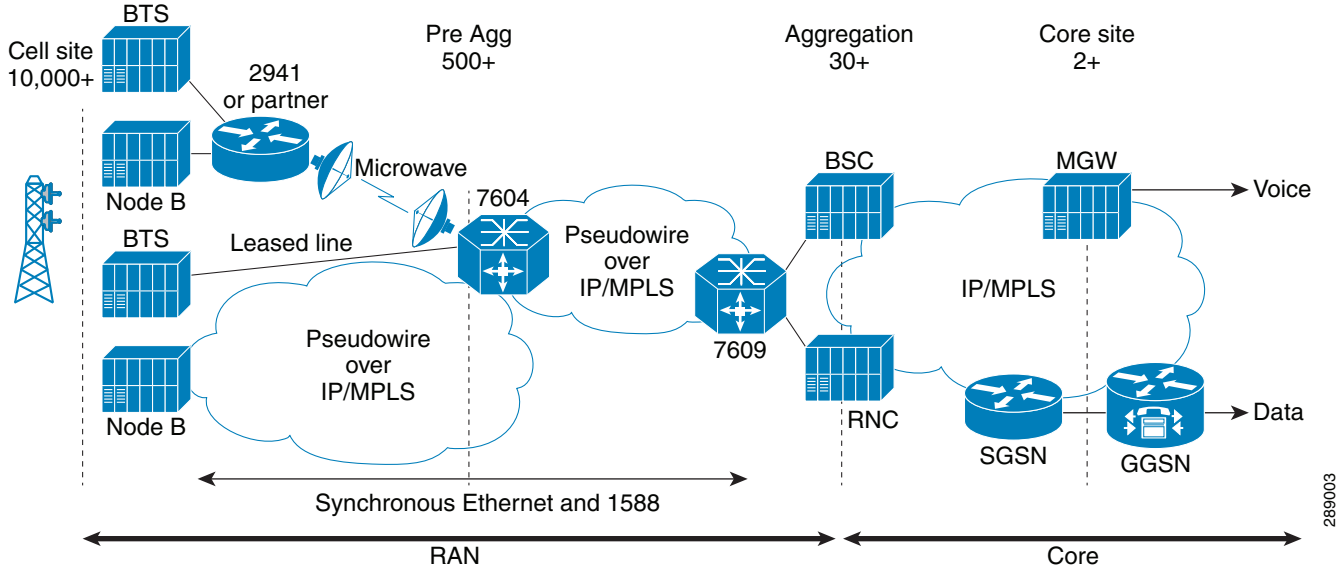
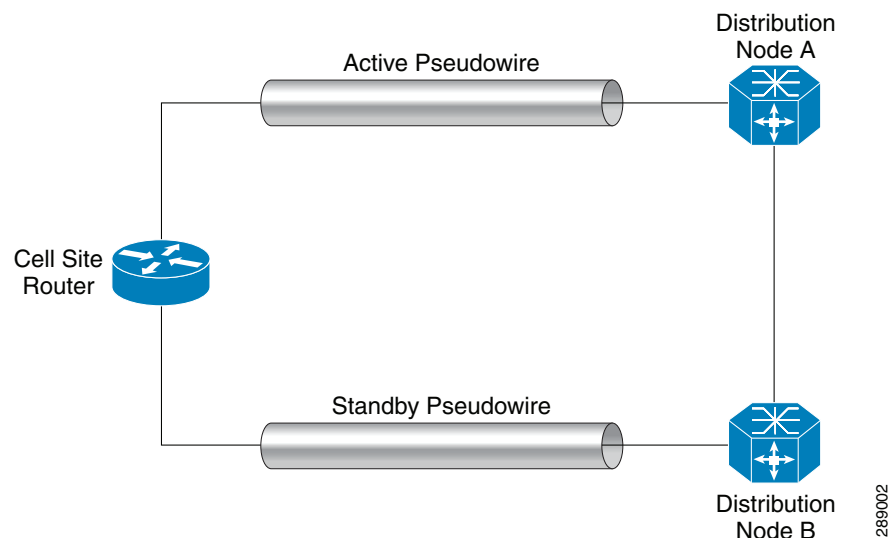
**Figure 4-1 Example RAN Backhaul Topology**

Figure 4-2 is an abstracted topology view that is used in this chapter when discussing how to configure RAN backhaul services in the Prime Fulfillment GUI.

**Figure 4-2 Abstracted RAN Backhaul Topology**

Prime Fulfillment uses Internet Protocol (IP) to transport backhaul traffic in RANs. You use Ethernet Virtual Circuit (EVC) policies and service requests in Prime Fulfillment to provision the following services to support RAN backhaul traffic management:

- Circuit Emulation Time Delay Multiple Access (CEM TDM)
- Pseudowire provisioning of Asynchronous Transfer Mode (ATM)

In addition, the EVC service requests use CEM and pseudowire class objects to bundle common attributes for reuse on every node where the service is provisioned.

The basic workflow for configuring and managing RAN backhaul services in Prime Fulfillment, involves the following tasks:

1. Verify prerequisites and preform necessary setup tasks.
2. Create CEM and/or pseudowire classes to be used in RAN backhaul policies and service requests.
3. Create the CEM TDM or ATM policy.
4. Create template(s) for use in the CEM TDM or ATM service request.
5. Create the CEM TDM or ATM service request.
6. Deploy the service request to the device(s) on the network.

The chapter is organized into two sections, one for CEM TDM services and one for ATM services. The above workflow tasks are documented in each of these sections.

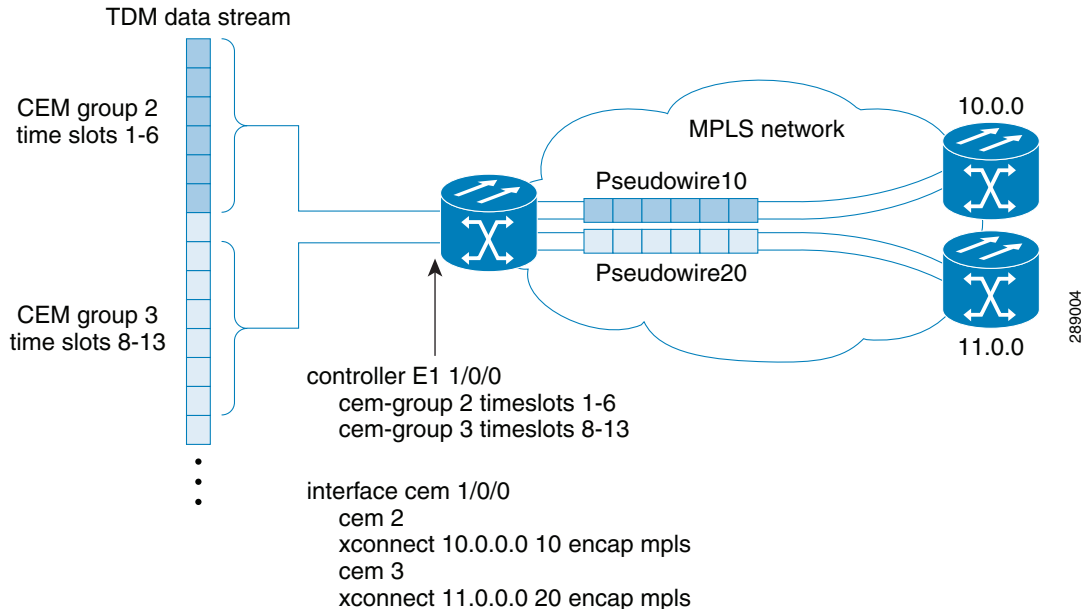
## Prerequisites

This section covers prerequisites and limitations you should be aware of before configuring RAN backhaul services in Prime Fulfillment.

To create CEM TDM policies and service requests, you must first define the service-related elements Prime Fulfillment, such as target devices and network links. Normally, you create these elements once. For some coverage of these tasks, see [Setting Up the Prime Fulfillment Services, page 3-5](#). Also see other chapters of this guide for how to perform basic infrastructure set up and discovery tasks. The information in this chapter assumes you have already performed these preliminary tasks.

## Working with CEM TDM Services

Circuit emulation is configured on a circuit emulation over packet (CEoP) shared port adaptor (SPA) to encapsulate time-division multiplexing (TDM) data in MPLS packets. It then sends the data over a CEM pseudowire to the remote provider edge (PE) router. An example topology is shown in [Figure 4-3](#).

**Figure 4-3 Example Circuit Emulation (CEM) Topology**

Note the following points about this example:

- A TDM circuit is connected to port 0 on an SPA installed in slot 1, subslot 0 (E1 controller 1/0/0).
- Two pseudowires (PW10 and PW20) are configured to carry TDM data across the MPLS network.
- Two CEM groups (2 and 3) are configured for the data in the TDM time slots.
  - Time slots 1 through 6 are sent over pseudowire 10 to the remote PE router at 10.0.0.0.
  - Time slots 8 through 13 are sent to PE router 11.0.0.0 over pseudowire 20.

The following transport mechanisms are supported:

- SAToP PWE3—Structure Agnostic TDM over Packet / Pseudowire Edge-to-Edge
- CESoPSN PWE3—Circuit Emulation Service over Packet Switched Network / Pseudowire Edge-to-Edge

This rest of this section covers all of the tasks you need to perform to implement and manage CEM TDM services to support RAN backhaul in Prime Fulfillment. It contains the following subsections:

- [Working with CEM Classes, page 4-4](#)
- [Creating a CEM TDM Policy, page 4-7](#)
- [Using Template Variables in CEM TDM Services, page 4-10](#)
- [Managing CEM TDM Service Requests, page 4-11](#)

## Working with CEM Classes

A CEM class object is used to configure CEM interface parameters so that they can be applied to a group of CEM interfaces. The CEM class can then be selected for use in a CEM TDM policy or service request. The CEM class object is used to configure the **cem class** command and its associated configuration settings on the devices configured by the service.

**Note**

CEM TDM policies and service requests can also use pseudowire classes. Information about creating and managing pseudowire classes is covered in another section of this guide. For more information, see [Creating and Modifying Pseudowire Classes, page 3-14](#).

This section covers the following topics:

- [Creating a CEM Class Object, page 4-5](#)
- [Editing a CEM Class Object, page 4-5](#)
- [Deleting a CEM Class Object, page 4-6](#)
- [Sample Configlets for CEM Classes, page 4-6](#)

## Creating a CEM Class Object

Perform the following steps to create a CEM class.

- 
- Step 1** From the top-level menu in the Prime Fulfillment GUI, choose **Inventory > Logical Inventory > CEM class**.
- The CEM Class window appears.
- Step 2** Click **Create**.
- The Create CEM Class window appears.
- Step 3** Enter appropriate values into the fields of the window as follows:
- **Name**—Name for the CEM class object. This field is mandatory.
  - **Description**—A description for the CEM class. This is optional.
  - **Dejitter Buffer**—The size of the dejitter buffer used for network jitter in CEM configuration mode. The range is 1 to 500 milliseconds. This value is optional.
  - **Payload Size**—The payload size used in CEM configuration mode. The range is 32 to 1312 bytes. This value is optional.
  - **Idle Pattern**—The pattern of data used to replace the content of each lost CESoPSN data packet. The range is from 0x00 to 0xFF, in hexadecimal. The default pattern is 0xFF.
- Step 4** Click **Save** to create the CEM class.
- If the create operation is successful, a confirmation message appears, and the CEM Class window reappears showing the new CEM class in the Class Name column.
- 

## Editing a CEM Class Object

Perform the following steps to edit a CEM class.

- 
- Step 1** From the top-level menu in the Prime Fulfillment GUI, choose **Inventory > Logical Inventory > CEM class**.
- The CEM Class window appears showing any CEM classes already created in Prime Fulfillment.
- Step 2** Check the check box for the CEM class you would like to edit.

- Step 3** Click the **Edit** button in the lower right of the window.  
The Edit CEM Class window appears.
- Step 4** Make changes to the attribute values as desired.
- Step 5** Click the **Save** button to save the changes.  
If the edit is successful, a confirmation message is given, and the CEM Class window reappears.
- 

Usage notes for editing CEM class objects:

- The name of a CEM class cannot be changed after it has been created. Therefore, the Name field cannot be modified when editing a CEM class. All other fields are editable.
- When you edit a CEM class that is being used by a service request, that particular service request is subsumed. When multiple service requests use the edited CEM class, all of service requests are subsumed. “Subsumed” means that the service request goes to the Requested state and is ready for deployment.
- When any of the attributes are changed in a CEM class that is associated with one or more CEM TDM service requests, then all of the associated or affected service requests will be subsumed. A window appears in the GUI that shows the list of affected service requests. From the list of service requests, you can perform either of the following actions:
  - Click on the **Save** button to save the service request for a later deployment.
  - Click on the **Save and Deploy** button to save the service request. The service request goes to Requested state and is ready for deployment.

## Deleting a CEM Class Object

Perform the following steps to delete a CEM class.

- 
- Step 1** From the top-level menu in the Prime Fulfillment GUI, choose **Inventory > Logical Inventory > CEM class**.  
The CEM Class window appears showing any CEM classes already created in Prime Fulfillment.
- Step 2** Check the check box for the CEM class you would like to delete.
- Step 3** Click the **Delete** button in the lower right of the window.  
A Confirm Delete window appears.
- Step 4** Click the **Delete** button to confirm the deletion.  
If the delete operation is successful, a confirmation message appears, and the CEM Class window reappears with the deleted CEM class removed from the Class Name column.
- 

Usage notes for deleting CEM class objects:

- CEM classes in use with CEM TDM policies or service requests cannot be deleted.

## Sample Configlets for CEM Classes

The following is a sample configlet generated to create a CEM class:

```

class cem ranCemClass
  payload-size 512
  dejitter-buffer 10
  idle-pattern 0x55
  !

```

The following is a sample configlet showing how a CEM class is included in a configuration:

```

interface cem 0/0
  no ip address
  cem 0
    cem class mycemclass
    xconnect 10.10.10.10 200 encapsulation mpls
  !
!

```

## Creating a CEM TDM Policy

This section describes how to create a CEM TDM policy.

You must define a CEM TDM policy before you can provision a service. A policy can be shared by one or more service requests that have similar service requirements. A policy is a template of most of the parameters needed to define a the service request. After you define the policy, it can be used by all the service requests that share a common set of characteristics. You create a new CEM TDM policy whenever you create a new type of service or a service with different parameters.

You can also associate Prime Fulfillment templates and data files with a policy. See [Using Templates with Policies, page 9-21](#) for more about using templates and data files in policies.

It is also possible to create user-defined attributes within a policy (and service requests based on the policy). For background information on how to use the additional information feature, see [Appendix H, “Adding Additional Information to Services.”](#)

To start defining a CEM TDM policy, perform the following steps.

---

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

The Policy Manager window appears.

**Step 2** Click **Create**.

The Policy Editor window appears.

**Step 3** Choose **EVC** from the Policy Type drop-down list.

The Policy Editor window appears.

**Step 4** Enter a **Policy Name** for the EVC policy.

**Step 5** Choose the **Policy Owner** for the EVC policy.

There are three types of EVC policy ownership:

- Customer ownership
- Provider ownership
- Global ownership—Any service operator can make use of this policy.

This ownership has relevance when the Prime Fulfillment Role-Based Access Control (RBAC) comes into play. For example, an EVC policy that is customer-owned can only be seen by operators who are allowed to work on this customer-owned policy. Similarly, operators who are allowed to work on a provider's network can view, use, and deploy a particular provider-owned policy.

- Step 6** Click **Select** to choose the owner of the EVC policy.
- The policy owner was established when you created customers or providers during Prime Fulfillment setup. If the ownership is global, the Select function does not appear.
- Step 7** Choose the **Circuit-Emulation-TDM** as the **Policy Type**.
- Step 8** Click **Next**.
- The Policy Editor window appears.
- Step 9** Continue with the steps contained in the next section, [Setting the Service Options, page 4-8](#).
- 

## Setting the Service Options

To set the service options for the CEM TDM policy, perform the following steps.



### Note

The MPLS Core Connectivity attributes set to PSEUDOWIRE by default and cannot be changed.

---

- Step 1** Choose one of the **TDM CEM Service Options** from the drop-down list.
- The choices are:
- **SAToP\_UNFRAMED**—Structure-agnostic TDM over packet. This mode used to encapsulate T1 or E1 unstructured (unchannelized) services over packet-switched networks. In SAToP mode, bytes are sent out as they arrive on the TDM line. Bytes do not have to be aligned with any framing. In this mode, the interface is considered as a continuous framed bit stream. All signaling is carried transparently as a part of a bit stream.
  - **CESoPN\_TIMESLOT**—Circuit emulation services over packet-switched network. This mode is used to encapsulate T1 or E1 structured (channelized) services over PSN. CESoPN identifies framing and sends only payload, which can be channelized T1s within DS3, and DS0s within T1. DS0s can be bundled into the same packet.
- Step 2** Choose the **CEM Container Type** from the drop-down list.
- The choices are:
- **T1**—T-1 digital circuit. Transmits voice/data over the PSTN network at 1.544 Mbps using the DS-1 (Digital Signalling level 1) signaling format.
  - **E1**—E-1 digital circuit. Transmits 30 64Kbps digital channels (DS0) for voice or data calls, plus a 64Kbps channel for signaling, and a 64Kbps channel for framing and maintenance.
- Step 3** Click **Next**.
- The Policy Editor window appears.
- Step 4** Continue with the steps contained in the next section, [Setting the Service Attributes, page 4-8](#).
- 

## Setting the Service Attributes

To set the service attributes for the CEM TDM policy, perform the following steps.



- 
- Step 1** Check the **Enable PseudoWire Redundancy** check box to enable pseudowire redundancy (alternative termination device) under certain conditions.
- See [Appendix E, “Terminating an Access Ring on Two N-PEs”](#) and, specifically, the section [Using N-PE Redundancy in FlexUNI/EVC Service Requests, page E-3](#), for notes on how this option can be used.
- Step 2** Check the **AutoPick VC ID** check box to have Prime Fulfillment autopick the VC ID during service request creation.
- If this check box is unchecked, the operator will be prompted to specify a VC ID during service request creation.
- Usage notes:
- When AutoPick VC ID is checked, Prime Fulfillment allocates a VC ID for pseudowires from the Prime Fulfillment-managed VC ID resource pool.
- Step 3** Click **Next**.
- The Policy Editor window appears.
- Step 4** Continue with the steps contained in the next section, [Using Pseudowire and CEM Classes, page 4-9](#).
- 

## Using Pseudowire and CEM Classes

To specify a pseudowire or CEM class to be used by the CEM TDM policy, perform the following steps.

- 
- Step 1** Check the **Use PseudoWireClass** check box to enable the selection of a pseudowire class.
- This attribute is unchecked by default.
- Usage notes:
- The pseudowire class name is used for provisioning **pw-class** commands on IOS XR devices. See [Creating and Modifying Pseudowire Classes, page 3-14](#) for additional information on pseudowire class support.
  - If **Use PseudoWireClass** is checked, an additional attribute, **PseudoWireClass**, appears in the GUI. Click the **Select** button to choose a pseudowire class previously created in Prime Fulfillment.
  - Use PseudoWireClass is applicable only for IOS devices.
- Step 2** Check the **Use CEM Class** check box to enable the selection of a CEM class.
- This attribute is unchecked by default.
- Usage notes:
- The CEM class is used for provisioning **cem class ranCemClass** commands on IOS devices. See [Working with CEM Classes, page 4-4](#) for additional information on CEM class support.
  - If **Use CEM Class** is checked, an additional attribute, **CEM Class**, appears in the GUI. Click the **Select** button to choose a CEM class that was previously created in Prime Fulfillment.
  - Use CEM Class is only applicable for IOS devices.
- Step 3** Click **Next**.
- The Policy Editor window appears.

- Step 4** Continue with the steps contained in the next section, [Adding User-Defined Fields into the CEM TDM Policy Workflow, page 4-10](#).
- 

## Adding User-Defined Fields into the CEM TDM Policy Workflow

The Additional Information window allows you to create user-defined attributes within the policy (and service requests based on the policy). For information on how to use the additional information feature, see [Appendix H, “Adding Additional Information to Services.”](#)

Continue with the steps contained in the next section, [Enabling Template Association, page 4-10](#).

## Enabling Template Association

The Prime Fulfillment template feature gives you a means to download free-format CLIs to a device. If you enable templates, you can create templates and data files to download commands that are not currently supported by Prime Fulfillment.



### Note

Template variable support is available for CEM TDM services. An example template and data file is available containing the CEM-related variables. See the next section [Using Template Variables in CEM TDM Services, page 4-10](#), for how to access and use this template.

---

- Step 1** To enable template association for the policy, click the **Next** button in the Interface Attribute window (before clicking **Finish**).
- 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 [Using Templates with Policies, page 9-21](#).
- Step 2** When you have completed setting up templates and data files for the policy, click **Finish** in the Template Association window to close it and return to the Policy Editor window.
- Step 3** To save the CEM TDM policy, click **Finish**.
- 

To create a service request based on an CDM TEM policy, see [Managing CEM TDM Service Requests, page 4-11](#).

## Using Template Variables in CEM TDM Services

This section describes how to access and use the example CEM template in Prime Fulfillment.

To create a data file for the example CEM template, perform the following steps.

---

- Step 1** In the Prime Fulfillment GUI, choose **Service Design > Templates > Template Manager**.  
The Template Manager window appears.
- Step 2** In the **Templates** window, click on the root folder to expand it.  
A list of subfolders appears, with the Examples folder on top.

- Step 3** Click the Examples folder to expand it.
- Several sample templates are visible, including the CEM template.
- Step 4** Click on the CEM folder to choose it.
- The CEM template shows in the Template window, along with a pre-loaded CEMProvisioning data file in the Data File Name column of the table.
- Step 5** Either click the **Edit** button to edit the CEMProvisioning data file or else uncheck it and click **Create Data File** to create a new one.
- In either case, the Data File Editor window appears. You can use this file to map the template variables required for provisioning CEM TDM services.
- Step 6** When you have made the desired changes to the templates variables, click **Save** to save the changes.
- Step 7** Click **Close** to close the Data File Editor window.
- 

## Managing CEM TDM Service Requests

This section describes the various tasks of the workflow for managing CEM TDM service requests. It contains the following sections:

- [Creating a CEM TDM Service Request, page 4-11](#)
- [Setting the Service Request Details, page 4-12](#)
- [Selecting Devices, page 4-14](#)
- [Modifying the CEM TDM Service Request, page 4-17](#)
- [Using Templates and Data Files with an CEM TDM Service Request, page 4-17](#)
- [Saving the CEM TDM Service Request, page 4-18](#)

## Creating a CEM TDM Service Request

To begin creating the CEM TDM service request, perform the following steps.

- 
- Step 1** Choose **Operate > Service Requests > Service Request Manager**.
- The Service Request Manager window appears.
- Step 2** Click **Create**.
- The Service Request Editor window appears.
- Step 3** From the Policy drop-down list, choose an CEM TDM policy from the policies previously created (see [Creating a CEM TDM Policy, page 4-7](#)). This will be a policy of type EVC, as noted by (EVC) following the policy name.
- The EVC Service Request editor window appears. This is the first window of the workflow in which you can add and modify attributes for the service request. The new service request inherits all the properties of the chosen policy, such as all the editable and non-editable features and pre-set parameters.
- Step 4** Continue with the steps contained in the next section, [Setting the Service Request Details, page 4-12](#).
-

## Setting the Service Request Details

To set the attributes in the Service Request Details section, perform the following steps.

**Note**

The **Job ID** and **SR ID** fields are read-only. When the service request is being created for the first time, the fields display a value of NEW. When an existing service request is being modified, the values of the fields indicate the respective IDs that the Prime Fulfillment database holds within the editing flow of the service request.

**Note**

The **Policy Name** field is read-only. It displays the name of the policy on which the service request is based. Clicking on the read-only policy name displays a list of all the attribute values set within the policy.

**Step 1** Check the **AutoPick VC ID** check box if you want Prime Fulfillment to choose a VC ID.

If you do not check this check box, you will be prompted to provide the ID in the VC ID field, as covered in the next step.

When AutoPick VC ID is checked, Prime Fulfillment allocates a VC ID for pseudowires from the Prime Fulfillment-managed VC ID resource pool. In this case, the text field for the VC ID option is non-editable.

**Step 2** If AutoPick VC ID was unchecked, enter a VC ID in the **VC ID** field.

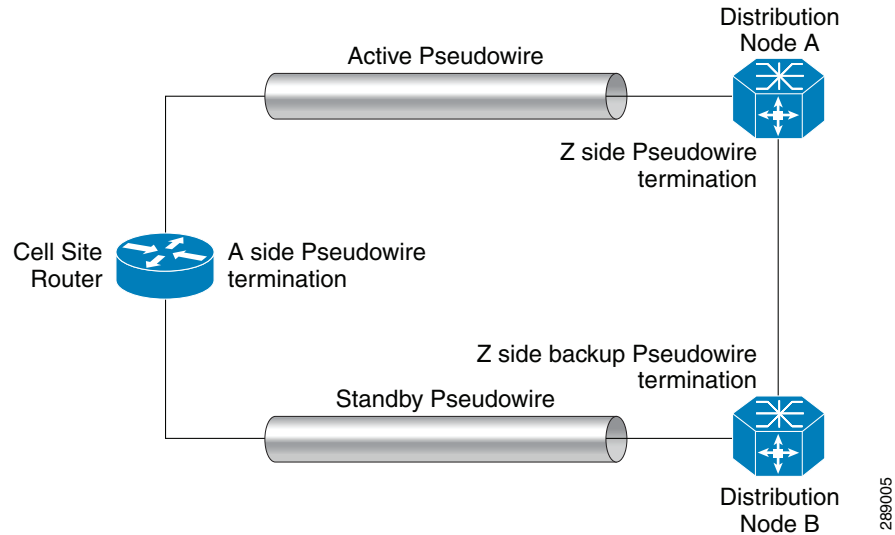
Usage notes:

- The VC ID value must be an integer value corresponding to a VC ID.
- When a VC ID is manually allocated, Prime Fulfillment verifies the VC ID to see if it lies within Prime Fulfillment's VC ID pool. If the VC ID is in the pool but not allocated, the VC ID is allocated to the service request. If the VC ID is in the pool and is already in use, Prime Fulfillment prompts you to allocate a different VC ID. If the VC ID lies outside of the Prime Fulfillment VC ID pool, Prime Fulfillment does not perform any verification about whether or not the VC ID allocated. The operator must ensure the VC ID is available.
- The VC ID can be entered only while creating a service request. If you are editing the service request, the VC ID field is not editable.

**Step 3** Check the **PseudoWire Redundancy** check box to enable pseudowire redundancy (alternative termination device) under certain conditions.

Usage notes:

- When PseudoWire Redundancy is unchecked, pseudowire redundancy is not provisioned in the service request. Therefore, there will be only two devices actively contributing to the service. See [Figure 4-4](#) for an example configuration. One device is the "A" side of the pseudowire and one side is the "Z" side of the pseudowire. In this case, you would not be able to enter a Backup PW VC ID.

**Figure 4-4 Pseudowire Termination Example**

- When PseudoWire Redundancy check box is enabled there will be three devices actively contributing to the service. One device will be on the “A” side of pseudowire, and the other device will be on the “Z” side. In this case, you could configure the “Z” backup pseudowire using the Backup PW VC ID attribute.
- See [Appendix E, “Terminating an Access Ring on Two N-PEs”](#) and, specifically, the section [Using N-PE Redundancy in FlexUNI/EVC Service Requests, page E-3](#), for notes on how this option can be used.

**Step 4** If appropriate for the configuration, enter a VC ID for the backup pseudowire in the **Backup PW VC ID** field.

The backup VC ID behaves the same as the VC ID of the primary pseudowire.

**Step 5** Choose the **CEM Container Type** from the drop-down list.

The choices are:

- **T1**—T-1 digital circuit. Transmits voice/data over the PSTN network at 1.544 Mbps using the DS-1 (Digital Signalling level 1) signaling format
- **E1**—E-1 digital circuit. Transmits 30 64Kbps digital channels (DS0) for voice or data calls, plus a 64Kbps channel for signaling, and a 64Kbps channel for framing and maintenance.

Usage notes:

- If the CEM Container Type is set to T1, the Framing Type attribute dynamically appears in the GUI, which can be set as covered in the next step.

**Step 6** Choose the **Framing Type** from the drop-down list.

The choices are:

- **SDH**—Synchronous Digital Hierarchy.
- **SONET**—Synchronous Optical Networking.

These are related standards for synchronous data transmission over fiber optic networks. Details of these protocols are not covered in this user guide.

**Step 7** Check the **Use CEM Class** check box to enable the selection of a CEM class object.

Usage notes:

- The CEM class is editable at the service request level. Therefore the CEM class can be modified from the one set in the policy for the service request. If the CEM class is not changed, the one specified in the policy will be retained for service provisioning.
- The CEM class is used for provisioning **cem class ranCemClass** commands on IOS devices. See [Working with CEM Classes, page 4-4](#) for additional information on CEM class support.
- If **Use CEM Class** is checked, an additional attribute, **CEM Class**, appears in the GUI. Click the **Select** button to choose a CEM class previously created in Prime Fulfillment.
- Use CEM Class is only applicable for IOS devices.

**Step 8** Continue with the steps contained in the next section, [Selecting Devices, page 4-14](#).

## Selecting Devices

The Select Devices section of the EVC Service Request Editor window allows you to set up links to the N-PE. In Prime Fulfillment, devices added for CEM TDM provisioning are considered as N-PE role-based devices. After the device is selected, you choose controllers and set other attributes for the devices.

The configuration example shown in [Figure 4-4](#) is also used in this section.

Perform the following steps.

**Step 1** Click the **Select Device** link to choose the “A” side pseudowire termination point.

The Select PE Device window appears.



### Note

The device types supported at the “A” node include MWR 2941-DC and 760X series devices having appropriate CEoP and SPA line cards.

**Step 2** Choose the appropriate device and click **Save**.

**Step 3** In the Controller column, choose the desired controllers from the drop-down list for the device.

Usage notes:

- The controllers that display in the drop-down list depend on the value of in the CEM Container Type attribute specified above.
- If the CEM Container Type is TI, only T1 controllers are populated in the list. If the container type is E1, only E1 controllers appear in the list.
- If there are no controllers for the given type on the selected device, the drop-down list will be empty.
- Also, if CEM Container Type is TI, the value of the addition Framing Type attribute changes the list of controllers. For example, if the Framing Type is SONET, then SONET controllers are displayed in the controller list. Then selecting a SONET controller from the list and clicking on Edit opens the SONET controller attributes window. If the Framing Type is SDH, then selecting a SONET controller from the list and clicking Edit opens the SDH controller attributes window.

**Step 4** After selecting the controller for the “A” side termination device, click the **Edit** link in the Link Attributes column to set the controller attributes.

The EVC Service Request Editor - Standard UNI Details window appears. This displays a list of either T1/E1 controller attributes,

**Step 5** Set T1/E1 controller attributes for the “A” side terminal device:

- **CEM Group ID**—The CEM Group ID under the controller creates a CEM interface that has the same slot/subslot/port information as the controller. The number it can take depends on the E1 or T1 line. A number from 0 to 23.
- **Clock Source**—INTERNAL or LINE. The default is INTERNAL.
- **Time-Slot Range**—A value from 1 to 31 for T1 controllers, or from 1 to 24 for E1 controllers.



**Note** Note that the Time-Slot Range attribute only appears if the TDM CEM Service Options attribute in the policy was set to CESoPN\_TIMESLOT. It does not appear if the attribute was set to SAToP\_UNFRAMED.

- **Use PseudoWireClass**—Check the check box to associate an existing pseudowire class with the service request. A Select button appears in the GUI, which you can use to choose a pseudowire class. Uncheck the check box to dissociate the pseudowire class from the service request.
- **Use Backup PseudoWireClass**—(This attribute is only available when the Pseudowire Redundancy attribute is checked.) Check the check box to associate an existing pseudowire class as a backup pseudowire class with the service request. A Select button appears in the GUI, which you can use to choose a backup pseudowire class. Uncheck the check box to dissociate the pseudowire class from the service request. The functionality is similar to Pseudowire Class selection in the service request window. The Use Backup PseudowireClass attribute is only applicable for “A” terminals and not for “Z” and “Z - Backup” terminals.

**Step 6** After setting the attributes for the T1/E1 controllers for the “A” terminal device, click **OK**.

The EVC Service Request Editor window reappears.

**Step 7** Select the “Z” and, if applicable, the “Z - Backup” terminal devices and their controllers following the same steps you performed for the “A” terminal device.

SONET controllers are populated in the Controller drop-down list for “Z” and “Z - Backup” terminal devices.

**Step 8** After selecting the controllers for these termination devices, click the **Edit** link in the Link Attributes column to set the controller attributes.

The Standard UNI Details window appears, displaying SONET controller attributes,

**Step 9** Set the SONET controller attributes.

The SONET attributes that display in this window depend on the CEM Container Type, SONET controller framing type, administrative unit group (AUG) mapping, and channelization mode. This is summarized in [Table 4-1](#).

**Table 4-1 CEM Container Type and SONET Controller Attributes**

CEM Container Type	SONET Controller Framing Sequence	AUG Mapping	Channelization Mode
E1	SDH	Au-4	C-12
T1	SDH	Au-3	C-11
T1	SONET	N/A	STS-1

The superset of possible attributes is provided below for reference. What actually appears in the GUI depends on the selections previously made in the GUI.

- **CEM Group ID**—The CEM Group ID under the controller creates a CEM interface that has the same slot/subslot/port information as the controller. The number it can take depends on the E1 or T1 line. A number from 0 to 23.
- **Clock Source**—INTERNAL or LINE. The default is INTERNAL.
- **AUG-Mapping**—Configures administrative unit group (AUG) mapping when SDH framing is selected. au-3 or au-4.
- **Channelization Mode**—Mode used to specify TDM Channelization. c-11, c-12, or sts-1.
- **au3 Number**—A number in the range from 1 to 3. This is used to configure a particular Administrative Unit type 3 (AU-3) of an E1 line that has been mapped to an AU-3.
- **sts-1 Number**—A number user to identify a Synchronous Transport Signal. A number from 1 to 3.
- **sts-1 Mode**—Synchronous Transport Signal. It specifies VT-15 as the STS-1 mode of operation.
- **tug-2 Number**—Tributary Unit group type 2 (TUG-2). A number, or range of numbers, from 1 to 7. To specify a range of TUG-2 numbers use a dash between the values, for example 1-5. An individual TUG-2 can be specified using a comma between values, for example 2,4. The user must set the value in the text box. There is no default value.
- **tug-3 Number**—Tributary Unit group type 3 (TUG-3). A number, or range of numbers, from 1 to 7.
- **VTG Number**—Virtual tributary group carrying a T1. A number, or range of numbers, from 1 to 7.
- **T1 Line Number**—Specifies the T1 number for which service needs to be configured. A number from 1 to 4.
- **E1 Number**—Specifies the E1 number for which a service needs to be configured. A number from 1 to 3.
- **Time Slot**—A number from 1 to 24, or 1 to 31, depending on the container type (E1 or T1)
- **Time-Slot Range**—A number from 1 to 31 for T1 controllers, or from 1 to 24 for E1 controllers.



**Note** Note that the Time-Slot Range attribute only appears if the TDM CEM Service Options attribute in the policy was set to CESoPN\_TIMESLOT. It does not appear if the attribute was set to SAToP\_UNFRAMED.

- **Use PseudoWireClass**—Check the check box to associate an existing pseudowire class with the service request. A Select button appears in the GUI, which you can use to choose a pseudowire class. Uncheck the check box to dissociate the pseudowire class from the service request.

**Step 10** After the SONET controller values are set, click **OK**.

The EVC Service Request Editor window appears.

**Step 11** If desired, use the **Swap Terminals** drop-down list to reorder the devices in relation to the terminals.

The choices are based on the configuration:

- **Swap A - Z**
- **Swap A - Z Backup**
- **Swap Z- Z Backup**

Choose one of the options to perform the swap operation. The devices reorder in the Select Devices column based on the selection.



Usage notes:

- The Swap Terminals button only appears when you first create the service request. If you later edit the service request, the button does not appear and you cannot perform the swap operation at that time.
- The Swap A - Z Backup and Swap Z - Z Backup options are available only when the Pseudowire Redundancy attribute is checked.
- When devices and terminals are swapped, the controllers must be reset in the Controller column.

**Step 12** When you have completed setting the attributes in the EVC Service Request Editor window, click the **Save** button at the bottom of the window to save the settings and create the service request.

If any attributes are missing or incorrectly set, Prime Fulfillment displays a warning. Make any corrections or updates needed (based on the information provided by Prime Fulfillment), and click the **Save** button.

For information on modifying an EVC service request see the section [Modifying the CEM TDM Service Request, page 4-17](#). For additional information about saving an CEM TDM service request, see [Saving the CEM TDM Service Request, page 4-18](#).

---

## Modifying the CEM TDM Service Request

You can modify a CEM TDM service request if you must change or modify the links or other settings of the service request.

To modify a service request, perform the following steps.

---

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

The Service Request Manager window appears, showing service requests available in Prime Fulfillment.

**Step 2** Check a check box for a service request.

**Step 3** Click **Edit**.

EVC Service Request Editor window appears.

**Step 4** Modify any of the attributes, as desired.

**Step 5** To add a template/data file to an attachment circuit, see the section [Using Templates and Data Files with an CEM TDM Service Request, page 4-17](#).

**Step 6** When you are finished editing the CEM TDM service request, click **Save**.

For additional information about saving an CEM TDM service request, see [Saving the CEM TDM Service Request, page 4-18](#).

---

## Using Templates and Data Files with an CEM TDM Service Request

Prime Fulfillment does not support configuration of all the available CLI commands on a device being managed by the application. In order to configure such commands on the devices, you can use Prime Fulfillment Template Manager functionality. Templates can be associated at the policy level on a per-device role basis. Templates can be overridden at service request level, if the policy-level setting permits the operator to do so.

To associate templates and data files in a service request select any link in the Service Request Editor window and click the **Template** button at the bottom of the window.

**Note**

If the template feature has not been enabled in the associated policy then the Template button will not be available for selection.

The SR Template Association window appears. In this window, you can associate templates at a per-device level. The SR Template Association window lists the devices comprising the link, the device roles, and the template(s)/data file(s) associated with the devices. In this case, the template(s)/data file(s) have not yet been set up.

For further instructions on how to associate templates and data files with a service request, see [Using Templates with Service Requests, page 9-24](#).

## Saving the CEM TDM Service Request

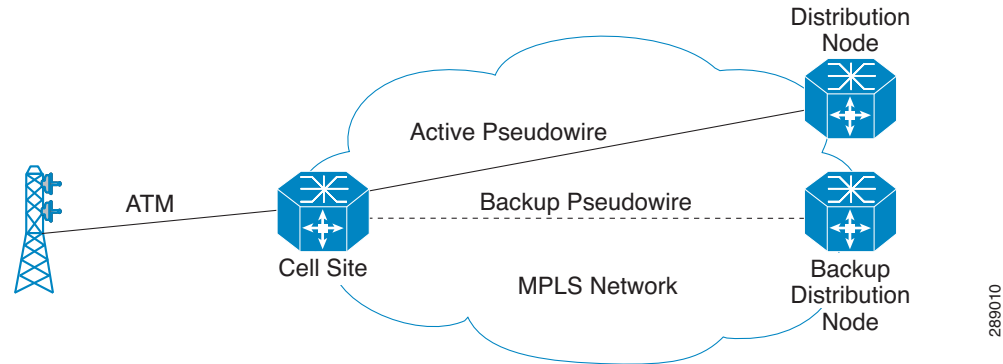
To save an CEM TDM service request, perform the following steps.

- 
- Step 1** When you have finished setting the attributes for the service request, click **Save** to create the service request.
- If the service request is successfully created, the Service Request Manager window appears. The newly created CEM TDM service request is added with the state of REQUESTED.
- If, however, the service request creation fails for some reason (for example, a value chosen is out of bounds), you are warned with an error message. In such a case, you should correct the error and save the service request again.
- Step 2** If you are ready to deploy the CEM TDM service request, see [Deploying Service Requests, page 8-10](#).
- 

For sample configlets for CEM TDM services, see the section [Sample Configlets for RAN Backhaul Services, page 4-33](#).

## Working with ATM Services

RAN backhaul services can be configured on an inverse multiplexing for ATM (ATM/IMA) virtual channel connection (VCC) or permanent virtual path (PVP) circuit. Data is sent over an ATM pseudowire to the remote provider edge (PE) router. When creating pseudowire with an ATM endpoint, you can select IMA interfaces under which to create the permanent virtual circuit (PVC). Also, you can create a controller, which allows you to create the corresponding IMA interface. An example topology is shown in [Figure 4-5](#).

**Figure 4-5 Example ATM Topology**

The following transport mechanisms are supported:

- ATM IMA VCC PWE3—ATM Inverse Multiplexing for ATM / Virtual Channel Connection / Pseudowire Edge-to-Edge.
- ATM IMA PVP PWE3—ATM Inverse Multiplexing for ATM / Permanent Virtual Path / Pseudowire Edge-to-Edge.

This section covers the various tasks in the workflow for managing ATM services to support RAN backhaul in Prime Fulfillment. It contains the following subsections:

- [Working with Pseudowire Classes, page 4-19](#)
- [Creating an ATM Policy, page 4-19](#)
- [Using Template Variables in ATM Services, page 4-22](#)
- [Creating an ATM/IMA Interface Using Templates, page 4-23](#)
- [Managing an ATM Service Request, page 4-26](#)

## Working with Pseudowire Classes

A pseudowire class is used to configure various attributes related in a class object. The pseudowire class supports configuration of the encapsulation, transport mode, fallback options, and selection of a traffic engineering tunnel down which the pseudowire can be directed. The pseudowire class is later used in ATM policies and/or service requests.



**Note**

Information about creating and managing pseudowire classes is covered in another section of this guide. See [Creating and Modifying Pseudowire Classes, page 3-14](#).

## Creating an ATM Policy

This section describes how to create an ATM policy.

You must define an ATM policy before you can provision a service. A policy can be shared by one or more service requests that have similar service requirements. A policy is a template of most of the parameters needed to define a the service request. After you define the policy, it can be used by all the service requests that share a common set of characteristics. You create a new ATM policy whenever you create a new type of service or a service with different parameters.

You can also associate Prime Fulfillment templates and data files with a policy. See [Using Templates with Policies, page 9-21](#), for more about using templates and data files in policies.

It is also possible to create user-defined attributes within a policy (and service requests based on the policy). For background information on how to use the additional information feature, see [Appendix H, “Adding Additional Information to Services.”](#)

To start defining an ATM policy, perform the following steps.

---

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

The Policy Manager window appears.

**Step 2** Click **Create**.

The Policy Editor window appears.

**Step 3** Choose **EVC** from the Policy Type drop-down list.

The Policy Editor window appears.

**Step 4** Enter a **Policy Name** for the EVC policy.

**Step 5** Choose the **Policy Owner** for the EVC policy.

There are three types of EVC policy ownership:

- Customer ownership
- Provider ownership
- Global ownership—Any service operator can make use of this policy.

This ownership has relevance when the Prime Fulfillment Role-Based Access Control (RBAC) comes into play. For example, an EVC policy that is customer-owned can only be seen by operators who are allowed to work on this customer-owned policy. Similarly, operators who are allowed to work on a provider’s network can view, use, and deploy a particular provider-owned policy.

**Step 6** Click **Select** to choose the owner of the EVC policy.

The policy owner was established when you created customers or providers during Prime Fulfillment setup. If the ownership is global, the Select function does not appear.

**Step 7** Choose the **ATM** as the **Policy Type**.

**Step 8** Click **Next**.

The Create New EVC Policy window appears.

**Step 9** Continue with the steps contained in the next section, [Setting the ATM Interface Attributes, page 4-20](#).

---

## Setting the ATM Interface Attributes

This section describes how to set the ATM Interface attributes for the ATM policy.

To set the ATM interface attributes, perform the following steps.

---

**Step 1** Choose the **Transport Mode** from the drop-down list.

The choices are:

- **VP**—Virtual path mode. This is the default.
- **VC**—Virtual circuit mode. If this option is chosen, an ATM Encapsulation attribute appears in the GUI with a default value of AAL0. The ATM Encapsulation cannot be changed.

**Step 2** Click **Next**.

The Policy Editor window appears, displaying the Service Attributes section.

**Step 3** Continue with the steps contained in the next section, [Setting the Service Attributes, page 4-21](#).

---

## Setting the Service Attributes

To set the service attributes, perform the following steps.

---

**Step 1** Check the **Enable PseudoWire Redundancy** check box to enable pseudowire redundancy (alternative termination device) under certain conditions.

**Step 2** Check the **AutoPick VC ID** check box to have Prime Fulfillment autopick the VC ID during service request creation.

If this check box is unchecked, the operator will be prompted to specify a VC ID during service request creation.

Usage notes:

- When AutoPick VC ID is checked, Prime Fulfillment allocates a VC ID for pseudowires from the Prime Fulfillment-managed VC ID resource pool.

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

The Policy Editor window appears, displaying the Pseudowire section.

**Step 4** Continue with the steps contained in the next section, [Using Pseudowire Classes, page 4-21](#).

---

## Using Pseudowire Classes

To specify a pseudowire class to be used by the ATM policy, perform the following steps.

---

**Step 1** Check the **Use PseudoWireClass** check box to enable the selection of a pseudowire class.

This attribute is unchecked by default.

Usage notes:

- The pseudowire class name is used for provisioning **pw-class** commands on IOS devices. See [Creating and Modifying Pseudowire Classes, page 3-14](#) for additional information on pseudowire class support for IOS XR devices.
- If **Use PseudoWireClass** is checked, an additional attribute, **PseudoWireClass**, appears in the GUI. Click the **Edit** button to choose a pseudowire class previously created in Prime Fulfillment.
- Use PseudoWireClass is only applicable for IOS devices.

**Step 2** Click **Next**.

The Policy Editor window appears.

- Step 3** Continue with the steps contained in the next section, [Adding User-Defined Fields into the ATM Policy Workflow, page 4-22](#).
- 

## Adding User-Defined Fields into the ATM Policy Workflow

The Additional Information window allows you to create user-defined attributes within the policy (and service requests based on the policy). For information on how to use the additional information feature, see [Appendix H, “Adding Additional Information to Services”](#).

Continue with the steps contained in the next section, [Enabling Template Association, page 4-22](#).

## Enabling Template Association

The Prime Fulfillment template feature gives you a means to download free-format CLIs to a device. If you enable templates, you can create templates and data files to download commands that are not currently supported by Prime Fulfillment.



### Note

Template variable support is available for ATM policies and services. An example template and data file is available containing the ATM-related variables. See the section [Using Template Variables in ATM Services, page 4-22](#), for how to access and use this template.

---

- Step 1** To enable template association for the policy, click the **Next** button in the Policy Editor window (before clicking **Finish**).
- The Policy Editor window appears, displaying the Template Information section. 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 [Using Templates with Policies, page 9-21](#).
- Step 2** When you have completed setting up templates and data files for the policy, click **Finish** in the Template Information window to close it and return to the Policy Editor window.
- Step 3** To save the ATM policy, click **Finish**.
- 

To create a service request based on an ATM policy, see [Managing an ATM Service Request, page 4-26](#).

## Using Template Variables in ATM Services

This section describes how to access and use the example ATM template in Prime Fulfillment.

To create a data file for the example ATM template, perform the following steps.

- Step 1** In the Prime Fulfillment GUI, choose **Service Design > Templates > Template Manager**.  
The Template Manager window appears.
- Step 2** In the **Templates** window, click on the root folder to expand it.  
A list of subfolders appears, with the Examples folder on top.

- Step 3** Click the Examples folder to expand it.
- Several sample templates are visible, including the ATM template.
- Step 4** Click on the ATM folder to choose it.
- The ATM template shows in the Template window, along with a pre-loaded ATMDData data file in the Data File Name column of the table.
- Step 5** Either click the **Edit** button to edit the ATMDData data file or else uncheck it and click **Create Data File** to create a new one.
- In either case, the Data File Editor window appears. You can use this file to map the template variables required for provisioning ATM services.
- Step 6** When you have made the desired changes to the templates variables, click **Save** to save the changes.
- Step 7** Click **Close** to close the Data File Editor window.
- 

## Creating an ATM/IMA Interface Using Templates

ATM/IMA interfaces are created in the device that needs to be provisioned. If they have not been previously created on the device manually, they can be created through the Device Console by using templates. Once the ATM/IMA interfaces are created in the device through Device Console, you must perform a Config collection task for the device. After the Config collection, the Prime Fulfillment inventory (repository) is populated with the newly created ATM/IMA interfaces. These interfaces can then be used for ATM service provisioning.

### Creating Template and Data File and Downloading it to a Device.



#### Note

The steps below are presented at a high-level and assume a basic working-knowledge of using templates and data files in Prime Fulfillment. If you require more detailed information on the steps necessary to create templates and data files, see [Chapter 9, “Managing Templates and Data Files.”](#)

Perform the following steps.

- Step 1** Choose **Service Design > Templates > Template Manager**.
- Step 2** In the **Template Manager** tree, click on the Example folder to expand it.
- Step 3** Create an IMA template as shown below and Save
- Step 4** Click on the **Create Template** button to create the IMA template.
- The Template Editor window appears.
- Step 5** Enter the following:
- **Template Name** (required)—For example, “IMA MWR 2941,” or whatever name you choose.
  - **Description** (optional).
  - **Body** (required)—Enter the configuration text, Velocity Template Language (VTL) directives, and variables that you want included. An example is:

```
controller $container $slot/$sub-slot
clock source $option
```

```
ima-group $ima
```

Where:

- **container** is of string type with value either as **E1** or **T1**.
- **slot** and **sub-slot** refer to the respective slot and sub-slot.
- **option** value is of string type with value either **internal** or **line**.
- **ima** value is of interger type with minimum value of 0 and maximum value of 23.

- Step 6** Click **Save** to save the template.
- Step 7** Create an appropriate data file with values mentioned as defined in the previous step.  
Now use the Device Console to select the device and specify the data file as follows.
- Step 8** Choose **Inventory > Device Tools > Device Console**.  
The Choose Operation window appears.
- Step 9** Select **Download Template** and click **Next**.  
The Download Template window appears.
- Step 10** To add devices, click **Add**.
- Step 11** From the resulting Device Selection window, check the check box(es) for each device you want to select.
- Step 12** Click **Select**.  
You return to the Download Template window with the added devices.
- Step 13** Click **Next**.  
The window refreshes, allowing you to add device groups.
- Step 14** Click **Next**.  
The window refreshes, allowing you to choose a template to download.
- Step 15** Click the **Select** button.  
The Add/Remove Template window appears.
- Step 16** Click **Add** to add templates or **Remove** to remove templates.  
When you click **Add** you get a Template Datafile Chooser window with the template choices in the tree. Navigate the folders and subfolders in the tree to find the ATM/IMA template you created previously.
- Step 17** .When you have the template you want, click **OK**.
- Step 18** Select the data file you created previously and click **Accept**.  
You return to the Download Template window, which shows the updated information.
- Step 19** Click **Next**.  
The Template Summary section appears in the window.
- Step 20** Check the check boxes for **Upload Config After Download** and **Retrieve device attributes**.  
Checking these check boxes will perform a Collect Config on the device when the template download is submitted. This causes the device configuration with the template additions to be updated in the Prime Fulfillment inventory/repository.



**Note**

You can also run the Collect as a separate task, as covered in the next section [Adding ATM/IMA Interfaces to the Inventory, page 4-25](#).



- Step 21** Click **Finish** to submit the download.  
You receive a message showing the status.
- Step 22** Click **Done**.
- 

## Adding ATM/IMA Interfaces to the Inventory

You can separately run a Config collection task for a device in order to populate the inventory with the ATM/IMA interfaces previously downloaded via template. This section describes how to connect to the physical device in the network, collect the device information, and populate the repository.

Perform the following steps.

- 
- Step 1** Choose **Operate > Tasks > Task Manager**.

The Choose Operation window appears.

- Step 2** Click **Create**.

- Step 3** Choose **Collect Config**.

The Create Task window appears.



**Tip**

You might want to change the default **Name** and **Description** for this task, so you can more easily identify it in the task log.

---

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

The Collect Config Task window appears.

- Step 5** To choose devices associated to the task, in the Devices panel, click **Select**.

The Select Device window appears.

- Step 6** Check to choose the desired device(s), then click **Select**.

The Collect Config Task window reappears.

- Step 7** To choose device groups associated to the task, in the Groups panel, click **Select**.

A list of available device groups appears.

- Step 8** Check to choose the desired device group(s), then click **Select**.

The Collect Config Task window reappears.

- Step 9** Set schedule and task owner, if applicable.

- Step 10** Click **Submit**.

The Tasks window appears.

- Step 11** Choose your task in the Task Name column, then click **Details** to view more information.
- 

The result of the Collect Config task is that the ATM/IMA interfaces created via the template previously download to the device will be updated in the device configuration in the Prime Fulfillment inventory/repository.

## Managing an ATM Service Request

This section describes the various tasks of the workflow involved in managing ATM service requests to support RAN backhaul services. It contains the following sections:

- [Creating an ATM Service Request, page 4-26](#)
- [Setting the Service Request Details, page 4-26](#)
- [Setting the MCPT Timer Values, page 4-28](#)
- [Selecting Devices, page 4-29](#)
- [Modifying the ATM Service Request, page 4-31](#)
- [Using Templates and Data Files with an ATM Service Request, page 4-31](#)
- [Creating an ATM Service Request, page 4-26](#)

### Creating an ATM Service Request

To begin creating the ATM service request, perform the following steps.

- 
- Step 1** Choose **Operate > Service Requests > Service Request Manager**.  
The Service Request Manager window appears.
- Step 2** Click **Create**.  
The Service Request Editor window appears.
- Step 3** From the Policy drop-down list, choose an ATM policy from the policies previously created (see [Creating an ATM Policy, page 4-19](#)). This will be a policy of type EVC, as noted by (EVC) following the policy name.  
  
The EVC Service Request Editor window appears. This is the first window of the workflow, in which you can add and modify attributes for the service request. The new service request inherits all the properties of the chosen policy, such as all the editable and non-editable features and pre-set parameters.  
  
The attributes in this window describe the pseudowire connectivity between the attachment circuits. The pseudowire connectivity allows you to create a point-to-point connection between two customer sites using X-connect (that is, cross connection).
- Step 4** Continue with the steps contained in the next section, [Setting the Service Request Details, page 4-26](#).
- 

### Setting the Service Request Details

To set the attributes in the Service Request Details section, perform the following steps.

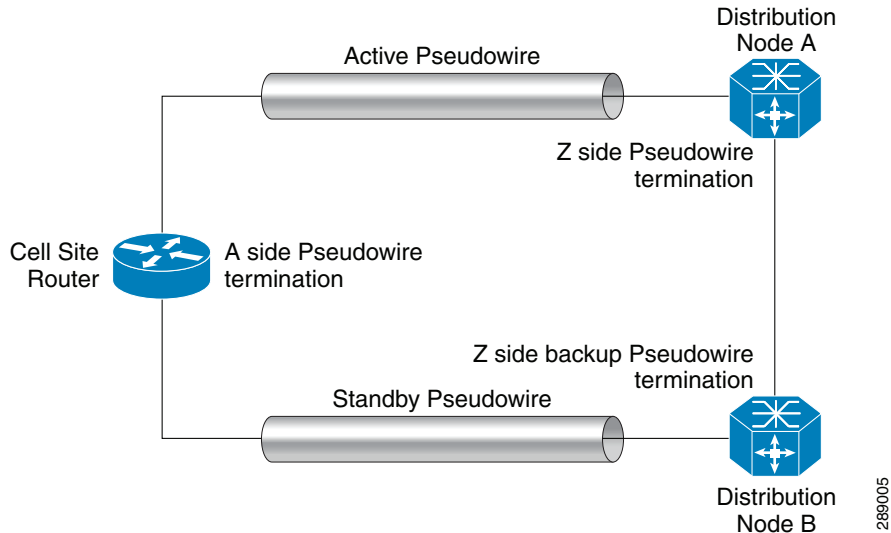
**Note**

The **Job ID** and **SR ID** fields are read-only. When the service request is being created for the first time, the fields display a value of NEW. When an existing service request is being modified, the values of the fields indicate the respective IDs that the Prime Fulfillment database holds within the editing flow of the service request.

**Note**

The **Policy Name** field is read-only. It displays the name of the policy on which the service request is based. Clicking on the read-only policy name displays a list of all the attribute values set within the policy.

- 
- Step 1** Check the **AutoPick VC ID** check box if you want Prime Fulfillment to choose a VC ID.
- If you do not check this check box, you will be prompted to provide the ID in the VC ID field, as covered in the next step.
- When AutoPick VC ID is checked, Prime Fulfillment allocates a VC ID for pseudowires from the Prime Fulfillment-managed VC ID resource pool. In this case, the text field for the VC ID option is non-editable.
- Step 2** If AutoPick VC ID was unchecked, enter a VC ID in the **VC ID** field.
- Usage notes:
- The VC ID value must be an integer value corresponding to a VC ID.
  - When a VC ID is manually allocated, Prime Fulfillment verifies the VC ID to see if it lies within Prime Fulfillment's VC ID pool. If the VC ID is in the pool but not allocated, the VC ID is allocated to the service request. If the VC ID is in the pool and is already in use, Prime Fulfillment prompts you to allocate a different VC ID. If the VC ID lies outside of the Prime Fulfillment VC ID pool, Prime Fulfillment does not perform any verification about whether or not the VC ID allocated. The operator must ensure the VC ID is available.
  - The VC ID can be entered only while creating a service request. If you are editing the service request, the VC ID field is not editable.
- Step 3** Check the **PseudoWire Redundancy** check box to enable pseudowire redundancy (alternative termination device) under certain conditions.
- Usage notes:
- When PseudoWire Redundancy is unchecked, pseudowire redundancy is not provisioned in the service request. Therefore, there will be only two devices actively contributing to the service. See [Figure 4-6](#) for an example configuration. One device is the "A" side of the pseudowire and one side is the "Z" side of the pseudowire. In this case, you would not be able to enter a Backup PW VC ID.

**Figure 4-6 Pseudowire Termination Example**

- When PseudoWire Redundancy check box is enabled there will be three devices actively contributing to the service. One device will be on the “A” side of pseudowire, and the other device will be on the “Z” side. In this case, you could configure the “Z” backup pseudowire using the Backup PW VC ID attribute.
- See [Appendix E, “Terminating an Access Ring on Two N-PEs”](#) and, specifically, the section [Using N-PE Redundancy in FlexUNI/EVC Service Requests, page E-3](#), for notes on how this option can be used.

**Step 4** If appropriate for the configuration, enter a VC ID for the backup pseudowire in the **Backup PW VC ID** field.

The backup VC ID behaves the same as the VC ID of the primary pseudowire.

**Step 5** Continue with the steps contained in the next section, [Setting the MCPT Timer Values, page 4-28](#).

## Setting the MCPT Timer Values

The Setting MCPT Timer Values section of the EVC Service Request Editor window allows you to set the values for Martini cell-packing timers. The MCPT timers can be attached to a permanent virtual circuit (PVC) or permanent virtual path (PVP). If the associated MCPT timer expires before the maximum number of cells that can be packed is reached, then the packet is transmitted with the number of cells that have been packed thus far. The MCPT timers are specified when configuring the link attributes for devices used in the ATM service.

Perform the following steps.

**Step 1** Enter appropriate values for the MCPT timers:

- **MCPT Timer 1**—Set a value between 500 and 10000 microseconds.
- **MCPT Timer 2**—Set a value between 1000 and 10000 microseconds.
- **MCPT Timer 3**—Set a value between 1500 and 10000 microseconds.

- Step 2** Continue with the steps contained in the next section, [Selecting Devices, page 4-29](#).

## Selecting Devices

The Select Devices section of the EVC Service Request Editor window allows you to set up links to the N-PE. In Prime Fulfillment, devices added for circuit emulation provisioning are considered as N-PE role-based devices. After the device is selected, the respective ATM or ATM/IMA interfaces are populated in the Interface drop-down list(s).

The configuration example shown in [Figure 4-6](#) is also used in this section.

Perform the following steps.

- 
- Step 1** Click the **Select Device** link to choose the “A” side pseudowire termination point.  
The Select PE Device window appears.
- Step 2** Choose the appropriate device and click **Save**.
- Step 3** In the Interfaces column, choose the desired interface from the drop-down list for the device.  
Usage notes:
- The interfaces that display in the drop-down list for the “A” side termination point will be ATM or ATM/IMA interfaces.
- Step 4** After selecting the interface for the “A” side termination device, click the **Edit** link in the Link Attributes column to set the interface attributes.  
The ATM UNI Details window appears. This displays a list of interface attributes,
- Step 5** Set interface attributes for the “A” side terminal device.



### Note

The attributes in the window dynamically change depending whether the value of the Transport Mode attribute is set as VP (PVP service) or VC (PVC service). Refer to the appropriate substep below, depending on your configuration.

- If the “A” side termination is a PVP service, set the following attributes displayed in the window:
  - **Transport Mode**—The PVP transport type. In this case, VP appears in the drop-down list.
  - **ATM VPI**—Virtual path identifier. A number between 0 and 255.
  - **Maximum no. of cells to be packed**—The maximum number of cells to be packed into a packet (cell-packing). A number from 2 to 28.
  - **Use MCPT Timer**—The number of MCPT timers to use. 1, 2, or 3.
  - **Use PseudoWireClass**—Check the check box to associate an existing pseudowire class with the service request. A Select button appears in the GUI, which you can use to choose a pseudowire class. Uncheck the check box to dissociate the pseudowire class from the service request.
  - **Use Backup PseudoWireClass**—(This attribute is only available when the Pseudowire Redundancy attribute is checked.) Check the check box to associate an existing pseudowire class as a backup pseudowire class with the service request. A Select button appears in the GUI, which you can use to choose a backup pseudowire class. Uncheck the check box to dissociate

the pseudowire class from the service request. The functionality is similar to Pseudowire Class selection in the service request window. The Use Backup PseudowireClass attribute is only applicable for “A” terminals and not for “Z” and “Z - Backup” terminals.

- b. If the “A” side termination is a PVC service, set the following attributes displayed in the window:
- **Transport Mode**—The PVC transport type. In this case, VC appears in the drop-down list.
  - **Sub-Interface #**—Creates the specified point-to-point sub-interface on the given port on the specified ATM SPA. Range for sub-interface is between 1 and 2147483647.
  - **ATM VPI**—Virtual path identifier. A number between 0 and 255.
  - **ATM VCI**—Virtual circuit identifier. A number between 1 and 65535.
  - **Maximum no. of cells to be packed**—The maximum number of cells to be packed into a packet (cell-packing). A number from 2 to 28.
  - **Use MCPT Timer**—The number of MCPT timers to use. 1, 2, or 3.
  - **Use PseudoWireClass**—Check the check box to associate an existing pseudowire class with the service request. A Select button appears in the GUI, which you can use to choose a pseudowire class. Uncheck the check box to dissociate the pseudowire class from the service request.

**Step 6** After setting the attributes for the interfaces for the “A” terminal device, click **OK**.

The EVC Service Request Editor window reappears.

**Step 7** Select the “Z” and, if applicable, the “Z - Backup” terminal devices and configure their interfaces following the same steps you performed for the “A” terminal device.

Usage notes:

- ATM interfaces are populated in the Interface drop-down list for “Z” and “Z - Backup” terminal devices.
- When the Pseudowire Redundancy check box is checked in the EVC Service Request Editor window (previously in the workflow), you can select and configure a “Z - Backup” node once the link attributes have been set on for the “A” and “Z” terminal devices.
- As in case of the “A” terminal device, the interface attributes for the “Z” and “Z - Backup” terminal devices will depend on the type of ATM service (PVP or PVC).

**Step 8** After selecting the interface for these termination devices, click the **Edit** link in the Link Attributes column to set the interface attributes.

**Step 9** If desired, use the **Swap Terminals** drop-down list to reorder the devices in relation to the terminals.

The choices are based on the configuration:

- **Swap A - Z**
- **Swap A - Z Backup**
- **Swap Z- Z Backup**

Choose one of the options to perform the swap operation. The devices reorder in the Select Devices column based on the selection.

Usage notes:

- The Swap Terminals button only appears when you first create the service request. If you later edit the service request, the button does not appear and you cannot perform the swap operation at that time.
- The Swap A - Z Backup and Swap Z - Z Backup options are available only when the Pseudowire Redundancy attribute is checked.

- When devices and terminals are swapped, the interfaces must be reset in the Interfaces column.

**Step 10** After the interface attributes are set, click **OK**.

The EVC Service Request Editor window appears.

**Step 11** When you have completed setting the attributes in the EVC Service Request Editor window, click the **Save** button at the bottom of the window to save the settings and create the ATM service request.

If any attributes are missing or incorrectly set, Prime Fulfillment displays a warning. Make any corrections or updates needed (based on the information provided by Prime Fulfillment), and click the **Save** button.

For information on modifying an EVC service request see the section [Modifying the ATM Service Request, page 4-31](#). For additional information about saving an ATM service request, see [Saving the ATM Service Request, page 4-32](#).

---

## Modifying the ATM Service Request

You can modify an ATM service request if you must change or modify the links or other settings of the service request.

To modify a service request, perform the following steps.

---

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

The Service Request Manager window appears, showing service requests available in Prime Fulfillment.

**Step 2** Check a check box for a service request.

**Step 3** Click **Edit**.

The EVC Service Request Editor window appears.

**Step 4** Modify any of the attributes, as desired.

**Step 5** To add a template/data file to an attachment circuit, see the section [Using Templates and Data Files with an ATM Service Request, page 4-31](#).

**Step 6** When you are finished editing the ATM service request, click **Save**.

For additional information about saving an ATM service request, see [Saving the ATM Service Request, page 4-32](#).

---

## Using Templates and Data Files with an ATM Service Request

Prime Fulfillment does not support configuration of all the available CLI commands on a device being managed by the application. In order to configure such commands on the devices, you can use Prime Fulfillment Template Manager functionality. Templates can be associated at the policy level on a per-device role basis. Templates can be overridden at service request level, if the policy-level setting permits the operator to do so.

To associate templates and data files in a service request select any link in the Service Request Editor window and click the **Template** button at the bottom of the window.

**Note**

If the template feature has not been enabled in the associated policy then the Template button will not be available for selection.

The SR Template Association window appears. In this window, you can associate templates at a per-device level. The SR Template Association window lists the devices comprising the link, the device roles, and the template(s)/data file(s) associated with the devices. In this case, the template(s)/data file(s) have not yet been set up.

For further instructions on how to associate templates and data files with a service request, see [Using Templates with Service Requests, page 9-24](#).

## Saving the ATM Service Request

To save an ATM service request, perform the following steps.

- 
- Step 1** When you have finished setting the attributes for the service request, click **Save** to create the service request.
- If the service request is successfully created, the Service Request Manager window appears. The newly created ATM service request is added with the state of Requested.
- If, however, the service request creation fails for some reason (for example, a value chosen is out of bounds), you are warned with an error message. In such a case, you should correct the error and save the service request again.
- Step 2** If you are ready to deploy the ATM service request, see [Deploying Service Requests, page 8-10](#).
- 

For sample configlets for ATM services, see the section [Sample Configlets for RAN Backhaul Services, page 4-33](#).



# Sample Configlets for RAN Backhaul Services

This section provides sample configlets for RAN backhaul service provisioning in Prime Fulfillment. It contains the following subsections:

- [Overview, page 4-33](#)
- [CEM TDM using SAToP PW3, page 4-34](#)
- [CEM TDM using CESoPSN, page 4-36](#)
- [ATM/IMA PVP Service, page 4-38](#)
- [ATM/IMA VCC Service, page 4-40](#)

## Overview

The configlets provided in this section show the CLIs generated by Prime Fulfillment for particular services and features. Each configlet example provides the following information:

- Service
- Feature
- Devices configuration (network role, hardware platform, relationship of the devices and other relevant information)
- Sample configlets for each device in the configuration
- Comments

**Note**

The configlets generated by Prime Fulfillment are only the delta between what needs to be provisioned and what currently exists on the device. This means that if a relevant CLI is already on the device, it does not show up in the associated configlet.

**Note**

The CLIs shown in bold are the most relevant commands.

## CEM TDM using SAToP PW3

### Configuration

- Service: RAN Backhaul.
- Feature: This sections contains sample configlets that would be generated for CEM TDM SAToP PW3 service on a cell site router and two distribution nodes (A and B).
- Device configuration:
  - The cell site router is an MWR 2941-DC router with an IOS image.  
Controller: E1 0/0  
Interface(s): CEM 0/0
  - Distribution node A is a 760X series device with IOS image.  
Contoller: SONET 3/0/0  
Interface(s): CEM 3/0/0
  - Distribution node B is a 760X series device with IOS image.  
Contoller: SONET 3/0/0  
Interface(s): CEM 3/0/0

### Configlets

#### Cell Site Router

```
pseudowire-class c76a3-1
 encapsulation mpls
!
pseudowire-class c76a3-2
 encapsulation mpls
!
controller E1 0/0
 clock source internal
 cem-group 0 unframed
!
interface CEM0/0
 no ip address
 cem 0
 xconnect 10.0.0.1 2090102001 pw-class c76a3-1
 backup peer 10.0.0.4 2090403001 pw-class c76a3-2
```

Distribution Node A	Distribution Node B
<pre> pseudowire-class c76a3-1  encapsulation mpls  preferred-path interface Tunnel211 ! controller SONET 3/0/0  ais-shut  framing sdh  clock source line  aug mapping au-4 !  au-4 1 tug-3 2   mode c-12  tug-2 1 e1 1 description m29a2-3(CEM0/0)   tug-2 1 e1 1 cem-group 100 unframed ! interface CEM3/0/0  no ip address  cem 100   xconnect 10.0.0.1 2090102001 pw-class c76a3-1 sequencing both </pre>	<pre> pseudowire-class c76a3-2  encapsulation mpls  preferred-path interface Tunnel340 ! controller SONET 3/0/0  ais-shut  framing sdh  clock source line  aug mapping au-4 !  au-4 1 tug-3 2   mode c-12  tug-2 1 e1 1 description m29a2-3(CEM0/0)   tug-2 1 e1 1 cem-group 100 unframed   tug-2 1 e1 1 framing unframed ! interface CEM3/0/0  cem 100   xconnect 10.0.0.4 2090403001 pw-class c76a3-2 sequencing both </pre>

**Comments**

- None.

## CEM TDM using CESoPSN

### Configuration

- Service: RAN Backhaul.
- Feature: This sections contains sample configlets that would be generated for CEM TDM CESoPSN service on a cell site router and two distribution nodes (A and B).
- Device configuration:
  - The cell site router is an MWR 2941-DC router with an IOS image.  
Contoller: E1 0/4  
Interface(s): CEM 0/4
  - Distribution node A is a 760X series device with IOS image.  
Contoller: SONET 3/0/0  
Interface(s): CEM 3/0/0
  - Distribution node B is a 760X series device with IOS image.  
Contoller: SONET 3/0/0  
Interface(s): CEM 3/0/0

### Configlets

#### Cell Site Router

```
pseudowire-class c76a3-1
  encapsulation mpls
!
pseudowire-class c76a3-2
  encapsulation mpls
!
controller E1 0/4
  clock source internal
  cem-group 0 timeslots 1-7
!
interface CEM0/4
  cem 0
  xconnect 10.0.0.1 3090102001 pw-class c76a3-1
  backup peer 10.0.0.4 3090403001 pw-class c76a3-2
```

Distribution Node A	Distribution Node B
<pre> pseudowire-class c76a3-1  encapsulation mpls  preferred-path interface Tunnel211 ! controller SONET 3/0/0  ais-shut  framing sdh  clock source line  aug mapping au-4 !  au-4 1 tug-3 2   mode c-12  tug-2 2 e1 2 description m29a2-3(CEM0/4 cem 0)   tug-2 2 e1 2 cem-group 104 timeslots 1-7 ! interface CEM3/0/0  cem 104   xconnect 10.0.0.1 3090102001 pw-class c76a3-1 sequencing both </pre>	<pre> pseudowire-class c76a3-2  encapsulation mpls  preferred-path interface Tunnel340 ! controller SONET 3/0/0  ais-shut  framing sdh  clock source line  aug mapping au-4 !  au-4 1 tug-3 2   mode c-12  tug-2 2 e1 2 description m29a2-3(CEM0/4 cem 0)   tug-2 2 e1 2 cem-group 104 timeslots 1-7 ! interface CEM3/0/0  cem 104   xconnect 10.0.0.4 3090403001 pw-class c76a3-2 sequencing both </pre>

**Comments**

- None.

## ATM/IMA PVP Service

### Configuration

- Service: RAN Backhaul.
- Feature: This sections contains sample configlets that would be generated for ATM PVP service on a cell site router and two distribution nodes.
- Device configuration:
  - The cell site router is an MWR 2941-DC router with an IOS image.  
Contoller(s): E1 0/12, E1 0/13  
Interface(s): ATM0/IMA2
  - Distribution node A is a 760X series device with IOS image.  
Interface(s): ATM 3/1/1
  - Distribution node B is a 760X series device with IOS image.  
Interface(s): ATM 3/1/1

### Configlets

#### Cell Site Router

```
pseudowire-class c76a3-1
 encapsulation mpls
!
pseudowire-class c76a3-2
 encapsulation mpls
!
controller E1 0/12
 framing NO-CRC4
 clock source internal
 ima-group 2 scrambling-payload
!
controller E1 0/13
 framing NO-CRC4
 clock source internal
 ima-group 2 scrambling-payload
!
interface ATM0/IMA2
 no ip address
 ima version 1.0
 ima group-id 2
 atm mcpt-timers 1000 5000 10000
 atm pvp 9 l2transport
 cell-packing 28 mcpt-timer 3
 xconnect 10.0.0.1 4090102003 pw-class c76a3-1
 backup peer 10.0.0.4 4090403003 pw-class c76a3-2
 no atm ilmi-keepalive
```

Distribution Node Z	Distribution Node Z Backup
<pre>pseudowire-class c76a3-1  encapsulation mpls  preferred-path interface Tunnel211 ! interface ATM3/1/1  no ip address  atm mcpt-timers 1000 5000 10000  atm pvp 9 l2transport   cell-packing 28 mcpt-timer 3   xconnect 10.0.0.1 4090102003 pw-class c76a3-1  no atm enable-ilmi-trap</pre>	<pre>pseudowire-class c76a3-2  encapsulation mpls  preferred-path interface Tunnel340 ! interface ATM3/1/1  no ip address  atm mcpt-timers 1000 5000 10000  atm pvp 9 l2transport   cell-packing 28 mcpt-timer 3   xconnect 10.0.0.4 4090403003 pw-class c76a3-2  no atm enable-ilmi-trap</pre>

#### Comments

- None.

## ATM/IMA VCC Service

### Configuration

- Service: RAN Backhaul.
- Feature: This sections contains sample configlets that would be generated for ATM VCC service on a cell site router and two distribution nodes.
- Device configuration:
  - The cell site router is an MWR 2941-DC router with an IOS image.  
 Contoller(s): E1 0/8, E1 0/9  
 Interface(s): ATM0/IMA0, ATM0/ IMA0
  - Distribution node A is a 760X series device with IOS image.  
 Interface(s): ATM 3/1/0
  - Distribution node B is a 760X series device with IOS image.  
 Interface(s): ATM 3/1/0

### Configlets

#### Cell Site Router

```
pseudowire-class c76a3-1
 encapsulation mpls
!
pseudowire-class c76a3-2
 encapsulation mpls
!
controller E1 0/8
 framing NO-CRC4
 clock source internal
 ima-group 0 scrambling-payload
!
controller E1 0/9
 framing NO-CRC4
 clock source internal
 ima-group 0 scrambling-payload
!
interface ATM0/IMA0
 ima version 1.0
 ima group-id 0
 atm mcpt-timers 1000 5000 10000
!
interface ATM0/IMA0.1 point-to-point
 snmp trap link-status
 pvc 9/34 12transport
 cbr 255
 encapsulation aal0
 cell-packing 28 mcpt-timer 3
 xconnect 10.0.0.1 4090102001 pw-class c76a3-1
 backup peer 10.0.0.4 4090403001 pw-class c76a3-2
```



Distribution Node Z	Distribution Node Z Backup
<pre>pseudowire-class c76a3-1  encapsulation mpls  preferred-path interface Tunnel211 ! interface ATM3/1/0  atm mcpt-timers 1000 5000 10000 ! interface ATM3/1/0.9001 point-to-point  description m29a2-3 - ATM0/IMA0  no atm enable-ilmi-trap  pvc 9/34 l2transport   cell-packing 28 mcpt-timer 3   encapsulation aal0   xconnect 10.0.0.1 4090102001 pw-class c76a3-1</pre>	<pre>pseudowire-class c76a3-2  encapsulation mpls  preferred-path interface Tunnel340 ! interface ATM3/1/0  atm mcpt-timers 1000 5000 10000 ! interface ATM3/1/0.9001 point-to-point  description m29a2-3 - ATM0/IMA0  no atm enable-ilmi-trap  pvc 9/34 l2transport   cell-packing 28 mcpt-timer 3   encapsulation aal0   xconnect 10.0.0.4 4090403001 pw-class c76a3-2</pre>

#### Comments

- None.

