**C H A P T E R** **7**

Provisioning Broadband Aggregators

The Cisco Broadband Access Center software enables you to provision services on broadband aggregators.

Provisioning occurs after you create administrative networks and network devices. See Chapter 6, "Managing Devices" For information about creating administrative networks and network devices.

Table 7-1   Provisioning Broadband Aggregators Topics

If you want to...	Go to the...
Learn about provisioning broadband aggregators	"Overview of Provisioning Broadband Aggregators" section on page 7-2.
Add service profiles and service features to a broadband aggregator	"Organizing and Managing Services" section on page 7-5.
Manage service profiles and service features, including selecting a method of downloading configuration information	"Downloading Service Profiles and Service Features" section on page 7-30.

Overview of Provisioning Broadband Aggregators

From the Network tab, you can provision the Cisco IOS devices that act as broadband aggregators on your network. Before you begin to provision broadband aggregators, you should understand:

- The role or roles that a device plays on a network
- Encapsulation methods on a network
- Service profiles and features
- Virtual templates and configuration templates

The Role or Roles of a Device on the Network

You can configure Cisco broadband aggregators with the roles defined in Table 7-2.

Table 7-2   Roles of Network Devices

Role	Definition
LAC	As a Layer 2 tunneling protocol access concentrator (LAC), the device connects to a broadband access network, often over an ATM cloud. It also connects to an LNS using a LAN or a WAN. A PVC terminates at a LAC; thus, the LAC is an endpoint of the PVC. A LAC authenticates PVCs and domains using a AAA server. The LAC then transmits encapsulated data to the LNS through an L2TP tunnel.
LNS	As a Layer 2 tunneling protocol network server (LNS), the device connects to a LAC using a LAN or a WAN. An LNS authenticates users using a AAA server. It then transmits encapsulated data through an L2TP tunnel to the LAC.
PTA	As a point-to-point protocol (PPP) termination and aggregation device, the router terminates PVCs that it receives from an ATM network and IP packets that it receives from an Ethernet network. **Note** A router can act as both a LAC and a PTA depending on how you configure each of its interfaces.
RBE	In an ATM routed bridge encapsulation (RBE) role, the router provides connectivity to an IP routed network for a remote bridged Ethernet device.

Encapsulation Methods

The encapsulation method for a broadband aggregator depends upon its role in the network:

- If it is a LAC, you can configure one of the following PPP encapsulation types:

  - PPP over ATM (PPPoA)

  - PPP over Ethernet over ATM (PPPoEoA)

  - PPP over Ethernet over Ethernet (PPPoEoE)

  - PPP over Ethernet over VLAN (PPPoEoVLAN)

- If it is a PTA, you can configure the following encapsulation types:

  - All of the PPP encapsulation types also available to a LAC or an LNS

  - Routed bridge encapsulation (RBE)

> **Note** With a PTA using a PPP encapsulation type, authentication occurs at the service provider using a local database or a AAA server. RBE users are not authenticated and, instead, are routed directly to the Internet.

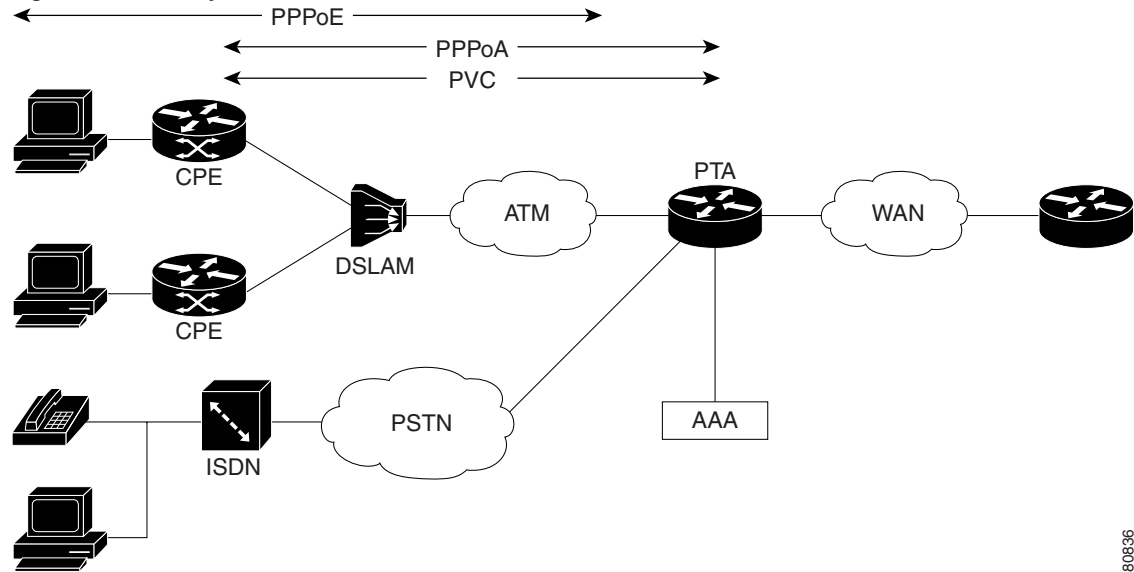Figure 7-1 illustrates encapsulation for a LAC/LNS network.

Figure 7-1   Encapsulation in the LAC/LNS Network Model
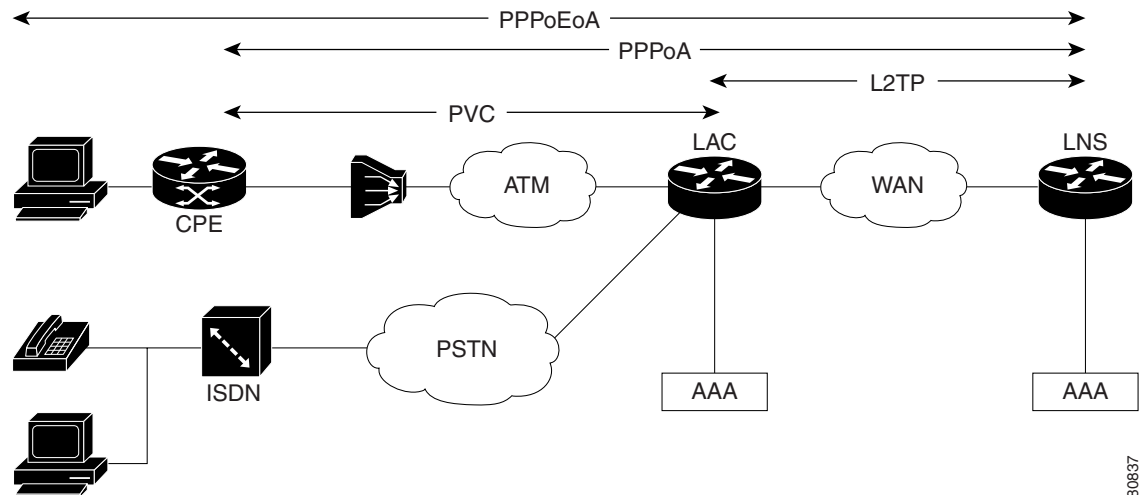
Figure 7-2 illustrates encapsulation for a PTA network.

Figure 7-2   Encapsulation in the PTA Network Model

Service Profiles and Service Features

Once you determine the role that a device plays on your network and what encapsulation method it supports, you identify the service profiles and service features with which to provision it. Table 7-3 defines what a service profile is and what a service feature is.

Table 7-3   Service Profile and Service Feature Definitions

Term	Definition
Service Profile	A service profile represents at a high-level the tasks that a router performs. In all but one case, a profile name combines the role name and, where applicable, its associated encapsulation method; for example LACPPPoEoA, PTAPPPoEoVLAN, LNS, and RBE are all profile names. The exception to this naming convention is the Policy profile.
Service Feature	Each service profile contains a set of service features. These represent specific configurations that you might want to apply to a network device. Examples of service features include Basic, RADIUS, IP pool, PVC range, and VLAN range.

Virtual Templates and Configuration Templates

BAC supports two types of templates:

- Cisco IOS virtual templates—A virtual template is a logical entity that you configure on routers and dynamically apply to virtual access interfaces. A virtual template provides generic configuration on an as-needed basis to a virtual interface. For more information, see Cisco IOS documentation.

- BAC configuration templates—A configuration template contains the Cisco IOS commands, attributes, and variables that define a service feature. A configuration template defines variables and merges variables with data to generate commands that you download to a router. You can use the default configuration templates supplied with BAC, or you can define your own templates. Use the Show Template action button to view the template. For information about customizing BAC templates, see Chapter 10, "Customizing Broadband Access Center."

Note   In the Web UI, BAC displays default values for many attributes that it derives from the configuration templates.

Organizing and Managing Services

Routers perform single or multiple roles in a broadband aggregation network, depending on the services with which you configure them. Organizing and managing services involves the following procedures.

1. Adding a service profile.
2. Adding the Basic service feature to the service profile.
3. Optionally, adding additional service features to the service profile.
4. Repeating 1 through 3 for each role that a router performs.

A service profile describes the role and the encapsulation type of a broadband aggregator. A service feature is comparable to a Cisco IOS configlet, which consists only of the commands necessary to modify the router's current configuration to enable a particular service.

About Service Profiles

Selecting a service profile determines the service features that you can configure on a router. Table 7-4 summarizes the service features available with each service profile:

Table 7-4   Service Profiles and Associated Service Features

If You Select This Profile...	You Can Configure These Features...
LACPPPoA	Basic Radius Radius Group Virtual Template PVC RangeoA Single PVCoA L2TP
LACPPPoEoA	Basic Radius Radius Group VPDN PVC Range Single PVC L2TP
LACPPPoEoE	Basic Radius Radius Group EnablePPPoE VPDN L2TP
LACPPPoEoVLAN	Basic Radius Radius Group VPDN VLAN Range Single VLAN L2TP
LNS	Basic Radius Radius Group IP Pool DHCP Virtual Template L2TP NAT (not supported on Cisco 10000 series routers)
PTAPPPoA	Basic Radius Radius Group IP Pool DHCP Virtual Template PVC RangeoA Single PVCoA NAT (not supported on Cisco 10000 series routers)

Table 7-4   Service Profiles and Associated Service Features (continued)

If You Select This Profile...	You Can Configure These Features...
PTAPPPoEoA	Basic Radius Radius Group IP Pool DHCP VPDN PVC Range Single PVC NAT (not supported on Cisco 10000 series routers)
PTAPPPoEoE	Basic Radius Radius Group IP Pool DHCP EnablePPPoE VPDN NAT (not supported on Cisco 10000 series routers)
PTAPPPoEoVLAN	Basic Radius Radius Group IP Pool DHCP VPDN VLAN Range Single VLAN NAT (not supported on Cisco 10000 series routers)
Policy	Policy Route Map
RBE	Basic PVC Range Single PVC NAT (not supported on Cisco 10000 series routers)

About Service Features

The service features that you download to a router become part of its running configuration. Table 7-5 provides an overview of all the service features.

> **Note** You can customize any BAC service feature using Template Manager. For more information, see Chapter 10, "Customizing Broadband Access Center."

Table 7-5   Service Features Overview

Service Feature	Purpose
Basic	Defines basic configuration parameters, for example, the type of authentication that the device uses. **Note** You must set up Basic service before you can set up the other services.
RADIUS	Sets authentication and authorization ports and the shared secret key.
RADIUS Group	Enables round-robin use of local RADIUS servers.
IP Pool	Defines the local pool of IP addresses available to the router.
DHCP	In broadband aggregation, downloads the IP address of the DHCP server to the router.
Virtual Template	Provides the configuration characteristics of the virtual access interface, such as its IP address, address type, and uplink interface. Virtual templates are available only with LACPPPoA and PTAPPPoA profiles.
PVC Range	Provisions a range of PVCs on an ATM subinterface. You can group a number of PVCs on a multipoint ATM subinterface and simplify their configurations. **Note** If you select either the LACPPPoA or the PTAPPPoA profile, the service feature is PVCRangeoA.
Single PVC	Provisions a single PVC on an ATM or RBE subinterface. **Note** If you select either the LACPPPoA or the PTAPPPoA profile, the service feature is SinglePVCoA.
L2TP	Specifies the LAC and LNS using the Layer 2 tunnel, including the local name of each device, the passwords for each device, and the tunnel password.
EnablePPPoE	Sets the subscriber-facing subinterface when you implement the LACPPPoE and PTAPPPoE profiles.
VPDN	Enables virtual private dialup networking (VPDN) on a router.
VLAN Range	Provisions multiple Ethernet Virtual LAN subinterfaces.
Single VLAN	Provisions a single Ethernet Virtual LAN subinterface.
NAT	Configures network address translation where private IP address space is implemented.

To Add a Service Profile

To add a service profile, follow these steps:

Step 1   Log in to BAC.

Step 2   Click the **Network** tab. The system displays the Administrative Network Management page in the main window.

Step 3   In the Object Selector, select the network where the device is located.

Step 4   In the subtask bar, click **Device Management**. The system displays the Device Management page in the main window.

Step 5   On the Device Management page, select the device to which you want to add a service profile.

Step 6   Click **Add Service**. The system displays the Service Profile Selection page.

Step 7   Select the service that you want to add; for example, select PTAPPPoEoA.

Step 8   Click **Next**. The system displays the Service Feature Selection page.

Step 9   Begin to add service features. At a minimum, you must add Basic service. For more information, see "Setting Up Basic Service" section on page 7-9.

The next sections of this chapter provided detailed procedures for adding each of the service features.

Setting Up Basic Service

Set up Basic service to define the basic configuration of a router.

About Basic Service

When you add Basic service, you define the fields listed in Table 7-6.

Table 7-6   Basic Service Fields

Field	Description
Authentication Type	A drop-down list box that enables you to choose whether authentication is through a local server or a RADIUS server.
CNOTE	A check box that indicates whether a Cisco Notification Engine server is available.
CNOTE IP Address	The IP address for the Cisco Notification Engine server.
Interface Selector	Enables you to select the interface from which to send Syslog messages.

To Create Basic Service

To create Basic service, complete the procedure described in "To Add a Service Profile" section on page 7-8 and then follow these steps:

Step 1   On the Service Feature Selection page, select Basic and click **Next**. The system displays the Service Feature Data page.

Step 2   In the Service Feature Data page, enter the Basic service information, as defined in Table 7-6.

Step 3   Optionally, click **Download Method** to select a method of download the running configuration. The system displays the Subscriber Provisioning - Device Configuration Download dialog box. For more information, see "Downloading Service Profiles and Service Features" section on page 7-30.

Step 4   If desired, click one of the following action buttons:

- **Reset Values**—Restores the default values.
- **Config Preview**—Displays the configuration that BAC generates based on what you have entered.
- **Show XML**—Displays the user interface components corresponding to the template variables for the service feature data that you have entered.
- **Show Template**—Displays the provisioning template.

Step 5   Click **Next** to download the configuration. The system displays the Configuration Download Status box.

Step 6   Click **Finish**.

Setting Up RADIUS Service

Set up RADIUS service to identify the AAA server that you want to use for authentication and authorization.

About RADIUS Service

When you add RADIUS service, you define the fields listed in Table 7-7.

Table 7-7   RADIUS Service Fields

Field	Description
Radius IP Address	The IP address for the interface of the RADIUS server that you want to use for AAA functions.
Radius Authentication Port	The port on the interface of the RADIUS server that you want to use for authentication.
Radius Account Port	The port on the interface of the RADIUS server that you want to use for accounting.
Radius Key	The shared secret key of the RADIUS server. This key much match the shared secret key of the router.

To Create RADIUS Service

To create RADIUS service, follow these steps:

Step 1   On the Service Feature Selection page, select Radius and click **Next**. The system displays the Service Feature Data page.

Step 2   If necessary, in the Select a Service Feature drop-down list box, select RADIUS. The system displays the Device Provisioning–Service Feature Data page in the content area of the main window.

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> **Note**   You need to select RADIUS from the drop-down list, if you selected RADIUS along with one or more other service features on the Service Feature Selection page.

Step 3   Click **Add**. The system displays the Device Provisioning–Service Feature Data dialog box.

Step 4   In the Device Provisioning–Service Feature Data dialog box, enter the RADIUS service information, as defined in Table 7-7.

Step 5   When you are done, click **OK**. The system redisplays the Service Feature Data page.

Step 6   Click **Download Method** to select a method of download the running configuration. The system displays the Subscriber Provisioning - Device Configuration Download dialog box. For more information see "Downloading Service Profiles and Service Features" section on page 7-30.

Step 7   Click **Next** to begin downloading the configuration. The system displays the Configuration Download Status box.

Step 8   Click **Finish**.

Setting Up RADIUS Group Service

Set up RADIUS group service to enable round-robin use of multiple, local AAA servers.

About RADIUS Groups

When you add RADIUS Group service, you define the fields listed in Table 7-8.

Table 7-8   RADIUS Group Service Fields

field	Description
Radius Group	The name of the RADIUS group.
Radius IP Address List	The IP addresses of the RADIUS servers in the group. Separate IP addresses with a comma (,). For example: `172.29.145.28,172.29.145.29`
Dead Time	The length of time during which transaction requests skip an unavailable RADIUS server, up to a maximum of 1440 minutes (24 hours).

Note   You must set up RADIUS service before you set up RADIUS Group service.

To Create RADIUS Group

To create RADIUS Group service, follow these steps:

Step 1   On the Service Feature Selection page, select Radius Group and click **Next**. The system displays the Service Feature Data page.

Step 2   If necessary, in the Select a Service Feature drop-down list box, select Radius Group. The system displays the Device Provisioning–Service Feature Data in the content area of the main window.

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Note   If you selected RADIUS Group along with one or more other service features on the Service
Feature Selection page, you need to select Radius Group in the Select a Service Feature
drop-down list box.

Step 3   Click **Add**. The system displays the Device Provisioning–Service Feature Data dialog box, which is
superimposed over the main window.

Step 4   In the Device Provisioning–Service Feature Data dialog box, enter the RADIUS Group service
information, as defined in Table 7-7.

Step 5   When you are done, click **OK**. The system redisplays the Service Feature Data page.

Step 6   Click **Next** to begin downloading the configuration. The system displays the Configuration Download
Status box.

Step 7   Click **Finish**.

Setting Up IP Pool Service

Set up IP Pool service to define the pool of local IP addresses available to the router.

About IP Pools

When you add IP Pool service, you define the fields listed in Table 7-9.

Table 7-9   IP Pool Service Field

field	Description
Pool Name	The name of the IP address pool.
IP From	The starting address of the IP Pool.
IP To	The ending address of the IP Pool.

To Create IP Pool Service

To create IP Pool service, follow these steps:

Step 1   On the Service Feature Selection page, select IP Pool and click **Next**. The system displays the Service
Feature Data page.

Step 2   If necessary, in the Select a Service Feature drop-down list box, select IP Pool. The system displays the
Device Provisioning–Service Feature Data in the content area of the main window.

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Note   If you selected IP Pool along with one or more other service features on the Service Feature Selection
page, you need to select IP Pool in the Select a Service Feature drop-down list box.

Step 3   In the Device Provisioning–Service Feature Data dialog box, enter the IP Pool information, as defined
in Table 7-9.

Step 4   Click **Add**. The system displays the Device Provisioning–Service Feature Data dialog box, which is superimposed over the main window.

Step 5   Click **Next** to begin downloading the configuration. The system displays the Configuration Download Status box.

Step 6   Click **Finish**.

Setting Up DHCP Service

Set up DHCP service to define the IP address of the DHCP server you use for IP address assignment.

About DHCP Service

When you add DHCP service, you define the field listed in Table 7-10.

Table 7-10   DHCP Service Fields

Field	Description
DHCP Server IP	The IP address of the DHCP server that you want to use for dynamic address assignment.

To Create DHCP Service

To create DHCP service, follow these steps:

Step 1   On the Service Feature Selection page, select DHCP and click **Next**. The system displays the Service Feature Data page.

Step 2   If necessary, in the Select a Service Feature drop-down list box, select DHCP. The system displays the Device Provisioning–Service Feature Data in the content area of the main window.

Note   If you selected DHCP along with one or more other service features on the Service Feature Selection page, you need to select DHCP in the Select a Service Feature drop-down list box.

Step 3   Click **Add**. The system displays the Device Provisioning–Service Feature Data dialog box, which is superimposed over the main window.

Step 4   In the Device Provisioning–Service Feature Data dialog box, enter the DHCP service information, as defined in Table 7-7.

Step 5   When you are done, click **OK**.

Step 6   Click **Next** to begin downloading the configuration. The system displays the Configuration Download Status box.

Step 7   Click **Finish**.

Setting Up Virtual Template Service

Set up Virtual Template service to provide generic configuration on an as-needed basis to a virtual interface on a router. Virtual Template service is available only in LACPPPoA and PTAPPPoA environments.

About Virtual Templates

When you add Virtual Template service, you define the fields listed in Table 7-11.

Table 7-11   Virtual Template Fields

Field	Description
Virtual Template Number	The number of the virtual template that you want to apply to the virtual access interface.
IP Address Type	The IP address type that you want to use. Possible values are Unnumbered or Other. If you select Unnumbered, you are opting to usethe network or subnet address of a local LAN interface as the network or subnetwork address of the router for a point-to-point serial link.
Uplink Interface Selector	The point of connection to the network of the virtual access interface.
Virtual Template IP Address	The IP address contained in the virtual template that is applied to the virtual access interface.
Virtual Template IP Subnetmask	The subnet mask contained in the virtual template that is applied to the virtual access interface.
IP Allocation Type	The type of IP address assignment that the router uses. The possible values are Local, DHCP, and none. If the value is Local, you are opting to use the local IP address pool. If the value is DHCP, you are opting to use a DHCP server to dynamically assign addresses. The option None is available only in a LAC environment and indicates that you do not want to use an IP address. BAC displays this property only if you select an LNS profile or a LAC profile.
IP Pool	The local pool to use for IP address assignment. You can select a local pool, only if you selected Local as the value for IP Allocation Type.
Authentication Type	The PPP authentication type that you want to use. The default value is *chap pap*, which implement both methods of PPP authentication.

To Create Virtual Template Service

To create Virtual Template service, follow these steps:

Step 1   On the Service Feature Selection page, select Virtual Template and click **Next**. The system displays the Service Feature Data page.

Step 2   If necessary, in the Select a Service Feature drop-down list box, select Virtual Template. The system displays the Device Provisioning–Service Feature Data in the content area of the main window.

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> **Note**   If you selected Virtual Template, along with one or more other service features on the Service Feature Selection page, you need to select Virtual Template in the Select a Service Feature drop-down list box.

Step 3   Click **Add**. The system displays the Device Provisioning–Service Feature Data dialog box, which is superimposed over the main window.

Step 4   In the Device Provisioning–Service Feature Data dialog box, enter the Virtual Template service information, as defined in Table 7-11.

Step 5   When you are done, click **OK**. The system redisplays the Service Feature Data window.

Step 6   Click **Next** to begin downloading the configuration. The system displays the Configuration Download Status box.

Step 7   Click **Finish**.

Setting Up PVC Range Service

Set up PVC Range service to provision a range of PVCs on an ATM subinterface. You can group a number of PVCs on a multipoint ATM subinterface and simplify their configurations.

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> **Note**   In LACPPPoA and PTAPPPoA environments, this service is called PVCRangeoA.

About PVC Range Service

When you add PVC Range service for LAC and PTA service profiles, you define the fields listed in Table 7-12.

Table 7-12   LAC and PTA PVC Range Service Fields

Field	Description
Range Name	The name assigned to a group of PVCs configured as a range on a multipoint ATM subinterface.
Range	The starting and ending pairs of virtual path identifier/virtual channel identifier. The two VPIs define a VPI range, and the two VCIs define a VCI range.
QoS Type	The quality of service (QoS) type for this PVC range. The possible values are: • ubr—unspecified bit rate • abr—available bit rate • cbr—committed bit rate • vbr-nrt—variable bit rate non-real time • vbr-rt—variable bit rate real time
QoS Rate	The transmission rate associated with the QoS type.

Table 7-12   LAC and PTA PVC Range Service Fields (continued)

Field	Description
Encap Type	The ATM encapsulation type for this PVC range. The value is either MUX or SNAP. **Note** BAC displays this field only in LACPPPoA and PTAPPPoA environments.
Virtual Template Number	The virtual template number for this PVC range. **Note** BAC displays this field only in LACPPPoA and PTAPPPoA environments.
Subscriber-facing Interface Selector	The subscriber facing interface on the broadband aggregator that this PVC range uses.
Subinterface	The multipoint ATM subinterface on which this PVC range is configured.

Note   For more detailed information about configuring PVC ranges, see the Cisco IOS documentation which describes ATM PVC range and Routed Bridge Encapsulation subinterface grouping.

When you add PVC Range service for an RBE service profile, you define the properties in listed in Table 7-13.

Table 7-13   RBE PVC Range Service Fields

Field	Description
Subscriber-facing Interface Selector	The subscriber facing module on the broadband aggregator that this PVC range uses. This field is required.
ATM Subinterface Number	The ATM subinterface on which this PVC range is configured.
Range Name	The name assigned to a group of PVCs configured as a range on a multipoint ATM subinterface.
Unnumbered Interface Selector	The point of connection to the network. This field is required.
DHCP Service IP Address	The IP address of the DHCP server.
PVC Range	The starting and ending pairs of virtual path identifier (VPI)/virtual channel identifier. The two VPIs define a VPI range, and the two VCIs define a VCI range.
QoS Type	The quality of service (QoS) type for this PVC range. The possible values are: • ubr—unspecified bit rate • abr—available bit rate • cbr—committed bit rate • vbr-nrt—variable bit rate non-real time • vbr-rt—variable bit rate real time
QoS Rate	The transmission rate associated with the QoS type.

To Create PVC Range Service

To create PVC Range service, follow these steps:

Step 1   On the Service Feature Selection page, select PVC Range and click **Next**. The system displays the Service Feature Data page.

Step 2   If necessary, in the Select a Service Feature drop-down list box, select PVC Range. The system displays the Device Provisioning–Service Feature Data in the content area of the main window.

> **Note**   If you selected PVC Range along with one or more other service features on the Service Feature Selection page, you need to select PVC Range in the Select a Service Feature drop-down list box.

Step 3   Click **Add**. The system displays the Device Provisioning–Service Feature Data dialog box, which is superimposed over the main window.

Step 4   In the Device Provisioning–Service Feature Data dialog box, enter the PVC service data. If you are adding PVC range service to a LAC or PTA profile, see Table 7-12. If you are adding PVC range service to an RBE profile, see Table 7-13.

Step 5   When you are done, click **OK**. The system redisplays the Service Feature Data window.

Step 6   Click **Next** to begin downloading the configuration. The system displays the Configuration Download Status box.

Step 7   Click **Finish**.

Setting Up Single PVC Service

Set up Single PVC service to provision single PVCs on ATM and RBE subinterface.

> **Note**   In LACPPPoA and PTAPPPoA environments, this service is called SinglePVCoA.

About Single PVC Service

When you add Single PVC service for LAC and PTA service profiles, you define the fields listed in Table 7-14.

Table 7-14   LAC and PTA Single PVC Service Fields

Field	Description
VPI	The virtual path identifier for the PVC.
VCI	The virtual channel identifier for the PVC.

Table 7-14   LAC and PTA Single PVC Service Fields (continued)

Field	Description
QoS Type	The quality of service (QoS) type for this PVC range. The possible values are: • ubr—unspecified bit rate • abr—available bit rate • cbr—committed bit rate • vbr-nrt—variable bit rate non-real time • vbr-rt—variable bit rate real time
QoS Rate	The transmission rate associated with the QoS type.
Encap Type	The ATM encapsulation type for this PVC range. The value is either MUX or SNAP.
Virtual Template Number	The virtual template number for this PVC range.
Subscriber-facing Interface Selector	The subscriber facing module on the broadband aggregator that this PVC range uses.
ATM Subinterface	The ATM subinterface on which this PVC range is configured.

When you add PVC Range service for an RBE service profile, you define the fields in listed in Table 7-15.

Table 7-15   RBE Single PVC Service Fields

Property	Description
Uplink Interface Selector	The point of connection to the network.
DHCP Service IP Address	The IP address of the DHCP server.
VPI	The virtual path identifier for the PVC.
VCI	The virtual channel identifier for the PVC.
QoS Type	The quality of service (QoS) type for this PVC range. The possible values are: • ubr—unspecified bit rate • abr—available bit rate • cbr—committed bit rate • vbr-nrt—variable bit rate non-real time • vbr-rt—variable bit rate real time
QoS Rate	The transmission rate associated with the QoS type.
Subscriber-facing Interface Selector	The subscriber facing module on the broadband aggregator that this PVC range uses.
ATM Subinterface Number	The ATM subinterface on which this PVC range is configured.

To Create Single PVC Service

To create Single PVC service, follow these steps:

Step 1   On the Service Feature Selection page, select Single PVC and click **Next**. The system displays the Service Feature Data page.

Step 2   If necessary, in the Select a Service Feature drop-down list box, select Single PVC. The system displays the Device Provisioning–Service Feature Data in the content area of the main window.

> **Note**   If you selected Single PVC along with one or more other service features on the Service Feature Selection page, you need to select Single PVC in the Select a Service Feature drop-down list box.

Step 3   Click **Add**. The system displays the Device Provisioning–Service Feature Data dialog box, which is superimposed over the main window.

Step 4   In the Device Provisioning–Service Feature Data dialog box, enter the PVC service information. To create Single PVC service for a LAC or PTA profile, see Table 7-14. To create PVC service for an RBE profile, see Table 7-15.

Step 5   When you are done, click **OK**. The system redisplays the Service Feature Data window.

Step 6   Click **Next** to begin downloading the configuration. The system displays the Configuration Download Status box.

Step 7   Click **Finish**. The system redisplays the Device Management page.

Setting Up L2TP Service

Set up L2TP service to specifies the LAC and LNS that use a specified the Layer 2 tunnel. The properties differ depending on which profile you select.

About L2TP Service to a LAC

When you select one of the LAC profiles, you define the L2TP fields listed in Table 7-16.

Table 7-16   L2TP Service Fields for a LAC Profile

Property	Description
LAC Local Name	The name that the LAC uses during tunnel authentication. If you do not enter the local name, the hostname of the router is used instead. The LAC and the LNS authenticate each other before attempting any sessions within a tunnel.
LAC Password	The password that the LAC uses during tunnel authentication.

Table 7-16   L2TP Service Fields for a LAC Profile (continued)

Property	Description
LNS Local Name	The name that the LNS uses during tunnel authentication. If you do not enter the local name, the hostname of the router is used instead. The LNS and the LAC authenticate each other before attempting any sessions within a tunnel.
LNS Password	The password that the LNS uses during tunnel authentication.
VPDN Group Name	The name of the virtual private dialup network group using the L2TP service to establish a tunnel.
VPDN Domain Name List	The list of the domains that can be used to select a tunnel. This list is based on the domain names associated with a service provider.
LNS IP Address List	The list of IP addresses for LNS servers that a LAC can use to establish a tunnel. You set this property and value only if you are working with a LAC profile. Separate multiple IP addresses with a comma (,). For example: `172.29.145.58,172.29.145.59`
L2TP Password Type	The type of password associated with the tunnel, either L2TP or OTHER.
Tunnel Password	The tunnel password.

To Create L2TP Service to a LAC

To create L2TP service to a LAC, make sure that you have selected one of the LAC service profiles. Then, follow these steps:

Step 1   On the Service Feature Selection page, select L2TP and click **Next**. The system displays the Service Feature Data page.

Step 2   If necessary, in the Select a Service Feature drop-down list box, select L2TP. The system displays the Device Provisioning–Service Feature Data in the content area of the main window.

> **Note**   If you selected L2TP along with one or more other service features on the Service Feature Selection page, you need to select L2TP in the Select a Service Feature drop-down list box.

Step 3   Click **Add**. The system displays the Device Provisioning–Service Feature Data dialog box, which is superimposed over the main window

Step 4   In the Device Provisioning–Service Feature Data dialog box, enter the L2TP service information, as defined in Table 7-16.

Step 5   When you are done, click **OK**. The system redisplays the Service Feature Data window.

Step 6   Click **Next** to begin downloading the configuration. The system displays the Configuration Download Status box.

Step 7   Click **Finish**.

About L2TP Service to an LNS

When you select the LNS service profile, you define the L2TP fields listed in Table 7-17.

Table 7-17   L2TP Service Fields for the LNS Profile

Property	Description
LNS Local Name	The name that the LNS uses during tunnel authentication. If you do not enter the local name, the hostname of the router is used instead. The LNS and the LAC authenticate each other before attempting any sessions within a tunnel.
LNS Password	The password that the LNS uses during tunnel authentication.
LAC Local Name	The name that the LAC uses during tunnel authentication. If you do not enter the local name, the hostname of the router is used instead. The LAC and the LNS authenticate each other before attempting any sessions within a tunnel.
LAC Password	The password that the LAC uses during tunnel authentication.
VPDN Group Name	The name of the virtual private dialup network group using the L2TP service to establish a tunnel.
Virtual Template Number	The number of the virtual template that configures a virtual access interface on the LNS. This field appears if the profile you selected is for an LNS.
LAC Hostname	The hostname of the LAC. The LNS uses this value to authenticate a LAC if the LAC Local Name property is not set.
L2TP Password Type	The type of password associated with the tunnel, either L2TP or OTHER.
Tunnel Password	The tunnel password.

To Create L2TP Service to an LNS

To create L2TP service to an LNS, make sure that you have selected one of the LNS service profiles. Then, follow these steps:

Step 1   On the Service Feature Selection page, select L2TP and click **Next**. The system displays the Service Feature Data page.

Step 2   If necessary, in the Select a Service Feature drop-down list box, select L2TP. The system displays the Device Provisioning–Service Feature Data in the content area of the main window.

Note   If you selected L2TP along with one or more other service features on the Service Feature Selection page, you need to select L2TP in the Select a Service Feature drop-down list box.

Step 3   Click **Add**. The system displays the Device Provisioning–Service Feature Data dialog box, which is superimposed over the main window.

Step 4   In the Device Provisioning–Service Feature Data dialog box, enter the L2TP service information, as described in Table 7-17.

Step 5   When you are done, click **OK**. The system redisplays the Service Feature Data window.

Step 6   Click **Next** to begin downloading the configuration. The system displays the Configuration Download Status box.

Step 7   Click **Finish**.

Setting Up Enable PPPoE Service

Set up Enable PPPoE service so that you can enable or disable PPPoE on an ethernet interface.

About Enable PPPoE Service

When you add EnablePPPoE service, you define the field listed in Table 7-18.

Table 7-18   Enable PPPoE Service Field

Field	Description
Subscriber-facing Interface Selector	The subscriber-facing interface on the broadband aggregator that you want to enable.

To Create Enable PPPoE Service

To create Enable PPPoE service, follow these steps:

Step 1   On the Service Feature Selection page, select EnablePPPoE and click **Next**. The system displays the Service Feature Data page.

Step 2   If necessary, in the Select a Service Feature drop-down list box, select EnablePPPoE. The system displays the Device Provisioning–Service Feature Data in the content area of the main window.

> **Note**   If you selected EnablePPPoE along with one or more other service features on the Service Feature Selection page, you need to select EnablePPPoE in the Select a Service Feature drop-down list box.

Step 3   Click **Add**. The system displays the Device Provisioning–Service Feature Data dialog box, which is superimposed over the main window.

Step 4   In the Device Provisioning–Service Feature Data dialog box, do the following:

a.   In the Subscriber-facing Interface Selector field, enter the value for the subscriber-facing module that this PVC uses; or, to browse for the interface, click **Select**. The system displays the Popup Selection window.

b.   Select the interface, expanding the interface hierarchy as needed, and click **Select**. The system redisplays the Device Provisioning–Service Feature Data dialog box.

Step 5   When you are done, click **OK**. The system redisplays the Service Feature Data page.

Step 6   Click **Next** to begin downloading the configuration. The system displays the Configuration Download Status box.

Step 7   Click **Finish**. The system redisplays the Device Management page.

Setting Up VPDN Service

Set up VPDN service to enables virtual private dialup networking on a router.

About VPDN Service

When you create VPDN service, you define the fields listed in Table 7-19.

Table 7-19   VPDN Service Fields

Field	Description
PPPoE Limit	The method used to limit VPDN sessions. The possible values are: • max-sessions • per-mac • per-vc • per-vlan
Limit Parameters	The maximum number sessions that this VPDN service supports. Enter a value in this field, if you selected max-sessions as the value for Limit Type.
Unnumbered Interface Selector	The point of connection to the network of the VPDN.
IP Allocation Type	The type of IP address assignment that the router uses. The possible values are Local, DHCP, and none. If the value is Local, you are opting to use the local IP address pool. If the value is DHCP, you are opting to use a DHCP server to dynamically assign addresses.
IP Pool	The IP Pool that the router uses for IP address assignment. Enter a value in this field, if you selected local as the value for DHCP Type.
Authentication Type	The PPP authentication type that you want to use. The default value is *chap pap,* which implements both methods of PPP authentication. You can use chap or pap alone.
MTU	The size of the maximum transmission unit that this VPDN supports.

To Create VPDN Service

To create VPDN service, follow these steps:

Step 1   On the Service Feature Selection page, select VPDN and click **Next**. The system displays the Service Feature Data page.

Step 2   If necessary, in the Select a Service Feature drop-down list box, select VPDN. The system displays the Device Provisioning–Service Feature Data in the content area of the main window.

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> **Note**   If you selected VPDN along with one or more other service features on the Service Feature Selection page, you need to select VPDN in the Select a Service Feature drop-down list box.

Step 3   Click **Add**. The system displays the Device Provisioning–Service Feature Data dialog box, which is superimposed over the main window.

Step 4   In the Device Provisioning–Service Feature Data dialog box, enter the VPDN service information, as defined in Table 7-19.

Step 5   When you are done, click **OK**. The system redisplays the Service Feature Data window.

Step 6   Click **Next** to begin downloading the configuration. The system displays the Configuration Download Status box.

Step 7   Click **Finish**.

Setting Up VLAN Range Service

Set up VLAN range service to provision multiple Ethernet virtual LAN subinterfaces.

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> **Note**   If you try download VLAN Range service to a device using HTTP, the Cisco IOS software generates an error message. Download VLAN Range service using Telnet, instead.

About VLAN Range Service

When you add VLAN Range service, you define the fields listed in Table 7-20.

Table 7-20   VLAN Range Service Fields

Field	Description
Subscriber-facing Interface Selector	The subscriber-facing interface on the broadband aggregator that this VLAN range uses. You specify the card-type, interface, slot, and port; for example: `GigabitEthernet5/0/0`
Subinterface Start	The number of the Fast Ethernet/Gigabit Ethernet subinterface that starts the VLAN range.

Table 7-20   VLAN Range Service Fields (continued)

Field	Description
Subinterface End	The number of the Fast Ethernet/Gigabit Ethernet subinterface that ends the VLAN range.
Encap Type	The encapsulation type; for VLAN ranges, specify the following type: `dot1q`
VLAN ID	The number assigned to the VLAN that you are configuring.
Max Number of PPPoE Sessions	The maximum number of PPPoE sessions on this VLAN range.

Note   If you attempt to download a VLAN range using either Telnet, Cisco IOS reports an error. The other download methods operate properly.

To Create VLAN Range Service

To create VLAN Range service, follow these steps:

Step 1   On the Service Feature Selection page, select VLAN Range and click **Next**. The system displays the Service Feature Data page.

Step 2   If necessary, in the Select a Service Feature drop-down list box, select VLAN. The system displays the Device Provisioning–Service Feature Data in the content area of the main window.

Note   If you selected VLAN Range along with one or more other service features on the Service Feature Selection page, you need to select VLAN Range in the Select a Service Feature drop-down list box.

Step 3   Click **Add**. The system displays the Device Provisioning–Service Feature Data dialog box, which is superimposed over the main window.

Step 4   In the Device Provisioning–Service Feature Data dialog box, enter the VLAN Range service information, as defined in Table 7-20.

Step 5   When you are done, click **OK**. The system redisplays the Service Feature Data window.

Step 6   Click **Next** to begin downloading the configuration. The system displays the Configuration Download Status box.

Step 7   Click **Finish**.

Setting Up Single VLAN Service

Set up Single VLAN service to enable provisioning a single Ethernet virtual LAN subinterface.

About Single VLAN Service

When you add Single VLAN service, you define the fields listed in Table 7-21.

Table 7-21   Single VLAN Service Fields

Field	Description
VLAN ID	The number for the VLAN that are configuring.
Encap Type	The encapsulation type for this VLAN; specify the following: `dot1q`
Subscriber-facing Interface Selector	The subscriber-facing interface on the broadband aggregator that this VLAN uses. You specify the card-type, interface, slot, and port; for example: `GigabitEthernet5/0/0`
Subinterface Number	The number of the Fast Ethernet/Gigabit Ethernet subinterface on which this VLAN is configured.
Max Number of PPPoE Sessions	The maximum number of PPPoE sessions on this VLAN.

To Create Single VLAN Service

To create Single VLAN service, follow these steps:

Step 1   On the Service Feature Selection page, select Single VLAN and click **Next**. The system displays the Service Feature Data page.

Step 2   If necessary, in the Select a Service Feature drop-down list box, select Single VLAN. The system displays the Device Provisioning–Service Feature Data in the content area of the main window.

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> **Note**   If you selected Single VLAN along with one or more other service features on the Service Feature Selection page, you need to select Single VLAN in the Select a Service Feature drop-down list box.

Step 3   Click **Add**. The system displays the Device Provisioning–Service Feature Data dialog box, which is superimposed over the main window.

Step 4   In the Device Provisioning–Service Feature Data dialog box, enter the Single VLAN service information, as defined in Table 7-21.

Step 5   When you are done, click **OK**. The system redisplays the Service Feature Data window.

Step 6   Click **Next** to begin downloading the configuration. The system displays the Configuration Download Status box.

Step 7   Click **Finish**.

Setting up Network Address Translation Service

Set up Network Address Translation (NAT) service to enable NAT if you have implemented private IP address space.

About Network Address Translation Service

When you add NAT service, you define the fields listed in Table 7-22.

Table 7-22   Network Address Translation Service Field

Field	Description
Pool Name	The name of the private address pool for which you want NAT service.
Start IP	The starting IP address in the pool.
End IP	The ending IP address in the pool.
Netmask	The subnet mask for the private address pool.
Access List	The number of the access control list that filters traffic on the ingress interface.
Ingress Interface Selector	The interface on the router which receives subscriber traffic.
Egress Interface Selector	The interface on the router which transmits subscriber traffic to the network.

To Create Network Address Translation Service

To create NAT service, follow these steps:

Step 1   On the Service Feature Selection page, select NAT and click **Next**. The system displays the Service Feature Data page.

Step 2   In the Select a Service Feature drop-down list box, select NAT. The system displays the Service Feature Data Page.

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Note   If you selected NAT along with one or more other service features on the Service Feature Selection page, you need to select NAT in the Select a Service Feature drop-down list box.

Step 3   Click **Add**. The system displays the Device Provisioning–Service Feature Data dialog box, which is superimposed over the main window.

Step 4 In the Device Provisioning–Service Feature Data dialog box, enter the NAT service information, as defined in Table 7-22.

Step 5 When you are done, click **OK**. The system redisplays the Service Feature Data page.

Step 6 Click **Next** to begin downloading the configuration. The system displays the Configuration Download Status box.

Step 7 Click **Finish**.

Setting Up Policy Service

BAC enables you to apply QoS policy maps to a router through Policy service. Policy maps define QoS actions and rules. You create them as network resources using the Network Services tab. For more information, see Chapter 5, "Managing Network Services."

About Policy Service

When you add Policy service, you define the fields listed in Table 7-23.

Table 7-23   Policy Service Fields

Field	Description
Policy Map Name	The name of the policy map that you want to apply to a router.
Description	An optional text block.

To Create Policy Service

To create Policy service, follow these steps:

Step 1 From the Service Profile Selection page, select Policy and click **Next**. The system displays the Service Feature Selection page in the content area of the main window.

Step 2 On the Service Feature Selection page, check Policy and click **Next**. The system displays the Service Feature Data page.

Step 3 If necessary, in the Select a Service Feature drop-down list box, select Policy. The system displays the Device Provisioning–Service Feature Data page.

Step 4 Click **Add**. The system displays the Device Provisioning–Service Feature dialog box.

Step 5 In the Device Provisioning–Service Feature Data dialog box, enter the Policy service information, as defined in Table 7-23.

Step 6   When you are done, click **OK**. The system redisplays the Service Feature Data page.

Step 7   Click **Next** to begin downloading the configuration. The system displays the Configuration Download Status box.

Step 8   Click **Finish**.

Setting Up Route Map Service

You set up Route Map service to enable policy routing and redistribution of routing information.

About Route Map Service

When you add Route Map service, you define the fields listed in Table 7-23.

Table 7-24   Route Map Service Fields

Field	Description
Name	The name of the route map.
Operation	Permits or denies route map redistribution from one routing protocol to another.
Sequence Number	Indicates the position a new route map is to have in a list of route maps already configured with the same name.
Match Criteria	Specifies conditions under which redistribution is allowed for the current route map.
Access Group	Defines the access list to use to filter network traffic.
Set Criteria	Specifies the particular redistribution actions to perform if the criteria enforced by the match commands are met.
Interface Selector	Enables you to select the interface to which you want to apply the route map.
Precedence	Sets the level of precedence to assign IP network traffic.
Next Hop Address	Provides the IP address of the next hop router.

To Create Route Map Service

To create Route Map service, follow these steps:

Step 1   From the Service Profile Selection page, select Policy and click **Next**. The system displays the Service Feature Selection page in the content area of the main window.

Step 2   On the Service Feature Selection page, check Route Map and click **Next**. The system displays the Service Feature Data page.

Step 3   If necessary, in the Select a Service Feature drop-down list box, select Route Map. The system displays the Device Provisioning–Service Feature Data page.

Step 4   Click **Add**. The system displays the Device Provisioning–Service Feature dialog box.

Step 5   In the Device Provisioning–Service Feature Data dialog box, enter the Route Map service information, as defined in Table 7-24.

Step 6   When you are done, click **OK**. The system redisplays the Service Feature Data page.

Step 7   Click **Next** to begin downloading the configuration. The system displays the Configuration Download Status box.

Step 8   Click **Finish**.

Downloading Service Profiles and Service Features

BAC enables you to select from among several methods of downloading configuration files to your network devices.

About Download Methods

Select a download method from the options listed in Table 7-25.

Table 7-25   Configuration Download Methods

Method	Description
Console	Downloads the configuration using the console port of the router.
Telnet	Downloads the configuration using a Telnet session.
HTTP	Downloads the configuration using the hypertext transfer protocol (HTTP). BAC uses the CNS agent to download files over HTTP.
Deployed	Enables you to continue provisioning without downloading the running configuration.
File	Creates a text file containing the running configuration.

To Choose a Download Method

To choose a download method, follow these steps:

Step 1   Display the Service Feature Data page in the main window.

Step 2   Click **Download Method**. The system displays the Device Provisioning–Device Configuration Download dialog box.

Step 3   Select one of the methods for downloading.

Step 4   In the SSH Type drop-down list box, enable or disable security encryption by selecting one of the following:

- None—To download the information without encryption.

- des—To download the information using the Data Encryption Standard (DES) algorithm.

- 3des—To download the information using the stronger Triple DES (3DES) algorithm.

Step 5 In the Destination drop-down list box, select one of the following:

- Running Config—downloads the configuration information only to the running configuration file on the router.

- Running Config & Copy to Startup—downloads the configuration to the running configuration file and then copies the configuration to the start up configuration file. When you need to restart this router, the configuration is copied from the start up file to the running file.

Step 6 Click **OK**.

Downloading Configuration to Generic Devices

BAC enables you to download text files containing Cisco IOS configuration commands to generic devices. You cannot provision generic devices with services and BAC templates are unavailable for them. You might use a text file to download commands to a device in the following scenarios:

- You want BAC to know about the device, although it plays no role in provisioning.

- You want to maintain a basic configuration start up script that you can quickly download to a device that has failed.

About Generic Device Configuration

When you download configuration commands to a generic device, you set the fields listed in Table 7-26.

Table 7-26   Generic Device Configuration Fields

Field	Description
Download Method	Sets the method you use to download. For more information, see the "About Download Methods" section on page 7-30.
Port Number	Sets the console port number to use when downloading, if you select the console port method. This field is not displayed with the other download options.
Destination	Determines whether this file is downloaded to the running configuration file only of the router, or downloaded to running configuration and then copied to the startup configuration file.

To Download Configuration Commands

To download configuration commands to a generic device, follow these steps:

Step 1 In a text editor, create the configuration file.

Step 2 Log in to BAC and click the **Network** tab. The system displays the Administrative Network Management page in the content area of the main window.

Step 3 In the Object Selector, select the network where the device is located.

Step 4 In the subtask bar, click **Device Management**. The system displays the Device Management page in the main window.

Step 5 On the Device Management page, select the generic device to which you want to download configuration commands.

Step 6 Click **Download Configuration**. The system displays the Device Configuration Selection page in the main window. In the Device Field, it displays the path to the device.

Step 7 Click **Browse** to select the configuration file that you want to download.

Step 8 Click **Next**. The system displays the Device Configuration Download page in the main window.

Step 9 In the Device Configuration Download page, enter the download information as defined in Table 7-26.

Step 10 Click **Next**. The system displays the Device Configuration Status page in the main window.

Step 11 Click **Finish**.

Deleting Service Profiles and Service Features

To delete a service profile or a service feature from a router, follow these steps:

Step 1 Click the **Network** tab. The system displays the Administrative Network Management page in the main window.

Step 2 In the Object Selector, select the network where the device is located.

Step 3 In the subtask bar, click **Device Management**. The system displays the Device Management page in the main window.

Step 4 On the Device Management page, select the device from which you want to delete a service feature.

Step 5 Click **Delete Service**. The system displays the Existing Role Selection page.

Step 6 Under Device Un-Provisioning - Existing Roles, click the icon for the role.

Step 7 Click **Next**. The system displays the Service Feature Selection page.

Step 8 Check the feature or features that you want to delete.

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> **Note**   To remove a service profile from a router, you must delete all service features you have assigned to the profile. Deleting the service features, removes the service profile from the router.

Step 9 Click **Next**. The system displays the Service Feature Data page.

Step 10 From the Select A Service Feature drop-down list box, select the feature that you want to delete.

Step 11 Click **Next**.