Preparing for Broadband Access Aggregation

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Before you begin to perform the tasks required to accomplish broadband access aggregation, there are several preparatory tasks that you can perform at your option to enable you to complete the aggregation task with more efficiency. This module presents three of those preparation tasks: configuring permanent virtual circuits (PVCs), configuring a virtual template interface, and configuring enhancements for broadband scalability.

In a digital subscriber line (DSL) environment, many applications require the configuration of a large number of PVCs. Configuring PVCs before you start broadband aggregation can save you time because configuring a range of PVCs is faster than configuring PVCs individually.

A virtual template interface saves time because all PPP parameters are managed within the virtual template configuration. Any configurations made in the virtual template are automatically propagated to the individual virtual access interfaces.

Using the enhancement for broadband scalability reduces the amount of memory that is used per terminated PPP session by creating virtual access subinterfaces. Determining if virtual access subinterfaces are available on your system and preconfiguring these enhancements can speed your aggregation process and improve system performance.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the "Feature Information for Preparing for Broadband Access Aggregation" section on page 18.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Contents

Prerequisites for Preparing for Broadband Access Aggregation

Before configuring broadband access aggregation, you will need to know the information that is presented in the "Understanding Broadband Access Aggregation" module.

Additional information can be found in these documents:

- Configuring a PVC range—For detailed information about configuring individual ATM PVCs, see "Configuring PVCs" in the *Cisco IOS Wide-Area Networking Configuration Guide*.
- Creating a virtual template—For detailed information see the "Configuring Virtual Template Interfaces" chapter in the *Cisco IOS Dial Technologies Configuration Guide*.

Restrictions for Preparing for Broadband Access Aggregation

Broadband scalability is not intended to improve the scalability of the following:

- Scaling for dial-out
- Scaling for PPP callback
- Scaling virtual profiles
- Scaling Multilink PPP (MLP)
- Various PPP (PPPoX) applications that terminate PPP on physical interfaces

Information About Preparing for Broadband Access Aggregation

To prepare for broadband access aggregation, you should understand the following concepts:

Virtual-Access Interfaces

A virtual-template interface is used to provide the configuration for dynamically created virtual-access interfaces. It is created by users and can be saved in NVRAM.

Once the virtual-template interface is created, it can be configured in the same way as a serial interface.

Virtual-template interfaces can be created and applied by various applications such as virtual profiles, virtual private dialup networks (VPDN), PPP over ATM, protocol translation, and Multichassis Multilink PPP (MMP).

All PPP parameters are managed within the virtual-template configuration. Configuration changes made to the virtual template are automatically propagated to the individual virtual access interfaces. Multiple virtual-access interfaces can originate from a single virtual template; therefore, multiple PVCs can use a single virtual template.

Cisco IOS software supports up to 200 virtual-template configurations. If greater numbers of tailored configurations are required, an authentication, authorization, and accounting (AAA) server may be employed. Refer to the "Configuring Per-User Configuration" chapter in the *Cisco IOS Dial Technologies Configuration Guide* for additional information on configuring an AAA server.

If the parameters of the virtual template are not explicitly defined before the ATM PVC is configured, the PPP interface is brought up using default values from the virtual template. Some parameters (such as an IP address) take effect only if specified before the PPP interface comes up. Therefore, it is recommended that you explicitly create and configure the virtual template before configuring the ATM PVC to ensure that such parameters take effect. Alternatively, if parameters are specified after the ATM PVC has been configured, use the **shutdown** command followed by the **no shutdown** command on the ATM subinterface to restart the interface; this restart will cause the newly configured parameters (such as an IP address) to take effect.

Network addresses for the PPP-over-ATM connections are not configured on the main ATM interface or subinterface. Instead, they are configured on the appropriate virtual template or obtained via AAA.

The virtual templates support all standard PPP configuration commands; however, not all configurations are supported by the PPP-over-ATM virtual access interfaces. These restrictions are enforced at the time the virtual-template configuration is applied (cloned) to the virtual-access interface.

Autosense for ATM PVCs

The PPPoA/PPPoE Autosense for ATM PVCs feature enables a router to distinguish between incoming PPP over ATM (PPPoA) and PPP over Ethernet (PPPoE) over ATM sessions and to create virtual access based on demand for both PPP types.

Note The PPPoA/PPPoE Autosense for ATM PVCs feature is supported on SNAP-encapsulated ATM PVCs only. It is not supported on MUX-encapsulated PVCs.

Virtual Access Interface Precloning

Precloning virtual-access interfaces for PPPoA at the NAS enables the virtual-access interface to be allocated at system start. This functionality significantly reduces the load on the system during call setup. When precloning is used, the virtual-access interface is attached to the session upon receipt of the first session-initiation packet from the client. The virtual-access interface is detached upon termination of the PPP session.

Configuration Enhancements for Broadband Scalability

The Configuration Enhancements for Broadband Scalability feature reduces the amount of memory that is used per terminated PPP session by creating virtual-access subinterfaces. Depending on the configuration of the source virtual template, virtual-access subinterfaces may be available. This feature also introduces a command to determine if a virtual template is compatible with virtual access subinterfaces.

Virtual Access Subinterfaces

The **virtual-template** command supports existing features, functions, and configurations. By default, the **virtual-template subinterface** command is enabled.

The virtual template manager will determine if the set of options configured on the virtual template are all supported on a subinterface. Virtual-access subinterfaces will be created for all virtual templates that support subinterfaces. If the user has entered any commands that are not supported on a subinterface, a full virtual access interface will be created and cloned for all PPP sessions using that virtual template. If the **virtual-template subinterface** command is disabled, full virtual-access interfaces will always be created.

Different applications can use the same virtual template even if one application is subinterface-capable and another is not. The virtual-template manager will be notified whether the application supports virtual-access subinterfaces and creates the appropriate resource.

The **ppp multilink** and **ppp callback accept** commands will not necessarily prevent subinterfaces from being created. Often, these commands are present in a virtual-template configuration, but PPP does not negotiate them. If neither of these features is negotiated, virtual-access subinterfaces will be created. If one or both of these features is negotiated, subinterfaces will not be created. The router will automatically determine if subinterfaces will be created depending on how PPP is negotiated on a case-by-case basis.

Virtual Template Compatibility with Subinterfaces

The **test virtual-template subinterface** privileged EXEC command determines whether a virtual template can support the creation of a virtual-access subinterface. If the virtual template contains commands that prevent the creation of subinterfaces, the **test virtual-template subinterface** command identifies and displays these commands.

If the creation of virtual-access subinterfaces is disabled by the **no virtual-template subinterface** command, the **test virtual-template subinterface** command produces no output.

The **debug vtemplate subinterface** command displays debug messages that are generated if you enter configuration commands on the virtual template that are not valid on a subinterface. These messages are generated only if the **debug vtemplate subinterface** command is enabled, the **virtual-template subinterface command** is enabled, and a virtual template is configured that can support the creation of subinterfaces. If the creation of virtual-access subinterfaces is disabled by the **no virtual-template** subinterface command, the **debug vtemplate subinterface** command produces no output.

Benefits of Using Broadband Scalability Features

Using broadband scalability reduces the amount of memory that is used per terminated PPP session by creating virtual-access subinterfaces. These virtual-access subinterfaces, along with improvements that are transparent to the user, speed up the cloning process.

How to Prepare for Broadband Access Aggregation

This section contains the following procedures:

Configuring PVCs

In a digital subscriber line (DSL) environment, many applications require the configuration of a large number of ATM PVCs.

Perform the following tasks to configure PVCs:

Benefits of Configuring a PVC Range

A PVC range saves time because configuring a range of PVCs is faster than configuring a number of PVCs individually.

Using a PVC range saves nonvolatile random access memory (NVRAM) because a range of PVCs takes up less NVRAM on network service routers than a large number of individually configured PVCs.

Using a PVC range speeds boot-up time because the command parser is able to parse one configuration command instead of many.

Configuring an ATM PVC or PVC Range

Perform the following task to configure an ATM PVC or PVC range.

SUMMARY STEPS

1. **enable**

2. **configure terminal**

3. **interface atm** *slot*/*port.subinterface-number* [**point-to-point | multipoint**]

   or

   interface atm *number.subinterface-number* [**point-to-point | multipoint**]

4. **pvc** [*name*] *vpi*/*vci*

   or

   range [*range-name*] **pvc** s*tart-vpi*/*start-vci end-vpi*/*end-vci*

5. **exit**

6. **show atm pvc** [*vpi/vci* | **name** | **interface atm** *interface-number*]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** Router> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** Router# configure terminal	Enters global configuration mode.
Step 3	**interface atm** *slot***/***port.subinterface-number* [**point-to-point** | **multipoint**] or **interface atm** *number.subinterface-number* [**point-to-point** | **multipoint**] **Example:** Router(config)# interface atm 6/0.200 point-to-point or Router(config)# interface atm 1/0/0.4 multipoint	Specifies the ATM point-to-point or multipoint subinterface using the appropriate format of the **interface atm** command.[1]
Step 4	**pvc** [*name*] *vpi***/***vci* or **range** [*range-name*] **pvc** *start-vpi***/***start-vci* *end-vpi*/*end-vci* **Example:** Router(config-subif)# pvc cisco 0/5 or Router(config-subif)# range range1 pvc 1/200 1/299	Configures the PVC or a range of PVCs.
Step 5	exit **Example:** Router(config-subif)# exit	(Optional) Exits the configuration session and returns to privileged EXEC mode.
Step 6	**show atm pvc** [*vpi/vci* | **name** | **interface atm** *interface-number*] **Example:** Router(config)# show atm pvc 0/5	Displays all ATM permanent virtual connections (PVCs) and traffic information.

1. To determine the correct form of the **interface atm** command, consult your ATM network module, port adapter, or router documentation.

Example

The following is sample output from the **show atm pvc** command with the vpi/vci argument specified:

```
Router# show atm pvc 0/41
ATM2/0: VCD: 3, VPI: 0, VCI: 41
UBR, PeakRate: 155000
AAL5-LLC/SNAP, etype:0x0, Flags: 0xC20, VCmode: 0x0
OAM frequency: 0 second(s), OAM retry frequency: 1 second(s), OAM retry frequency: 1
second(s)
OAM up retry count: 3, OAM down retry count: 5
OAM Loopback status: OAM Disabled
OAM VC state: Not Managed
ILMI VC state: Not Managed
InARP frequency: 15 minutes(s)
InPkts: 31759, OutPkts: 26497, InBytes: 2356434, OutBytes: 1589743
InPRoc: 15785, OutPRoc: 26472, Broadcasts: 0
InFast: 20, OutFast: 20, InAS: 15954, OutAS: 6
OAM cells received: 0
F5 InEndloop: 0, F5 InSegloop: 0, F5 InAIS: 0, F5 InRDI: 0
F4 InEndloop: 0, F4 InSegloop: 0, F4 InAIS: 0, F4 InRDI: 0
OAM cells sent: 0
F5 OutEndloop: 0, F5 OutSegloop: 0, F5 OutRDI: 0
F4 OutEndloop: 0, F4 OutSegloop: 0, F4 OutRDI: 0
OAM cell drops: 0
Status: UP
PPPOE enabled.
```

Configuring an Individual PVC Within a PVC Range

Perform this task to configure an individual PVC within a range.

SUMMARY STEPS

1. **enable**

2. **configure terminal**

3. **interface atm** *number* [**point-to-point** | **multipoint**]

4. **range** [*range-name*] **pvc** *start-vpi/start-vci end-vpi/end-vci*

5. **pvc-in-range** *[pvc-name] [[vpi/]vci]*

6. **end**

7. **show atm pvc** [*vpi/vci* | **name** | **interface atm** *interface-number*]

8. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** Router> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** Router# configure terminal	Enters global configuration mode.
Step 3	**interface atm** *number* [**point-to-point** | **multipoint**] **Example:** Router(config)# interface atm 5/0.1 multipoint	Specifies an ATM interface or subinterface and enters interface configuration mode.
Step 4	**range** [**range-name**] **pvc** *start-vpi*/*start-vci* *end-vpi*/*end-vci* **Example:** Router(config-if)# range range-one pvc 1/100 4/199	Defines a range of PVCs and enables PVC range configuration mode.
Step 5	**pvc-in-range** [*pvc-name*] [[*vpi*/]*vci*] **Example:** Router(config-if-atm-range)# pvc-in-range pvc1 3/104	Defines an individual PVC within a PVC range and enables PVC-in-range configuration mode.
Step 6	end **Example:** Router(config-if-atm-range-pvc)# end	Ends the PVC range configuration mode.
Step 7	show atm pvc [*vpi*/*vci* | name | interface atm *interface-number*] **Example:** Router(config-if)# show atm pvc pvc1 3/104	Displays the PVC information.
Step 8	**exit** **Example:** Router(config-if)# exit	Exits interface configuration mode and returns to privileged EXEC mode.

Configuring a Virtual Template

Before configuring the ATM PVC for PPP over ATM, you typically create and configure a virtual template. Use the following commands to create and configure a virtual template.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface virtual-template** *number*
4. **encapsulation ppp**
5. **ip unnumbered ethernet** *number*
6. **ppp authentication chap**
7. **no ip route-cache**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface virtual-template** *number* **Example:** `Router(config)# interface virtual-template 1`	Creates a virtual template, and enters interface configuration mode.
Step 4	**encapsulation ppp** **Example:** `Router(config-if)# encapsulation ppp`	Enables PPP encapsulation on the virtual template.
Step 5	**ip unnumbered ethernet** *number* **Example:** `Router(config-if)# ip unnumbered ethernet 1`	(Optional) Enables IP without assigning a specific IP address on the LAN.

	Command or Action	Purpose
Step 6	**ppp authentication chap** **Example:** Router(config-if)# ppp authentication chap	(Optional) Enables CHAP authentication.
Step 7	**no ip route-cache** **Example:** Router(config-if)# no ip route-cache	(Optional) Disables IP route-caching.

Other optional configuration commands can be added to the virtual template configuration. For example, you can enable the PPP authentication on the virtual template using the **ppp authentication chap** command. Refer to the "Configuring Virtual Template Interfaces" chapter in the *Cisco IOS Dial Technologies Configuration Guide* for additional information about configuring the virtual template.

Precloning Virtual-Access Interfaces

Precloning virtual-access interfaces at the NAS reduces the load on the system during call setup. Use the following procedure to preclone a virtual-access interface.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **virtual-template** *template-number* **pre-clone** *number*
4. **show vtemplate**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** Router> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** Router# configure terminal	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**virtual-template** *template-number* **pre-clone** *number* **Example:** Router(config)# virtual-template 1 pre-clone 250	Specifies the number of virtual-access interfaces to be created and cloned from a specific virtual access template.
Step 4	**show vtemplate** **Example:** Router(config-if)# show vtemplate	Displays the state of virtual-access interface precloning.

Example

In the following sample output, precloning is enabled for Virtual-Template 1, 250 virtual-access interfaces have been precloned, and 249 virtual-access interfaces are available for new PPPoA and PPPoE sessions. Only one virtual-access interface is in use, and no virtual-access interfaces were cloned during call setup.

```
Router# show vtemplate

Virtual-Template 1, pre-cloning is on
 Pre-clone limit: 250, current number: 249
 Active vaccess number: 1

Generic free vaccess number: 0
```

Configuring Enhancements for Broadband Scalability

To configure enhancement for broadband scalability, you will perform the following tasks:

- Verifying Virtual-Template Compatibility with Virtual-Access Subinterfaces, page 11
- Disabling Virtual-Access Subinterfaces, page 12

Verifying Virtual-Template Compatibility with Virtual-Access Subinterfaces

Perform the following task to test a virtual template to determine if it is compatible with the creation of virtual access subinterfaces.

SUMMARY STEPS

1. **enable**
2. **test virtual-template template subinterface**

DETAILED STEPS

	Command or Action	Purpose

Step 1	`enable`
	
	Example:
	`Router> enable`
		Enables privileged EXEC mode.
		
		• Enter your password if prompted.

Step 2	`test virtual-template` *template* `subinterface`
	
	Example:
	`Router# test virtual-template virtual-template1`
	`subinterface`
		Tests the specified virtual template to determine if it is compatible with the creation of virtual access subinterfaces.

Example

The output generated by the **test virtual-template subinterface** command describes the compatibility of the virtual template with the creation of subinterfaces.

This example shows output indicating that the virtual template is not compatible. This output also includes a list of the commands, which are configured on the virtual template, that cause the incompatibility.

```
Router# test virtual-template virtual-template1 subinterface

Subinterfaces cannot be created using
Virtual-Template1

Interface commands:
traffic-shape rate 50000 8000 8000 1000
```

Disabling Virtual-Access Subinterfaces

When a virtual template is not compatible with the creation of subinterfaces, use the following task to configure a router to always create full virtual-access interfaces instead of virtual-access subinterfaces.

Note The **virtual-template subinterface** command is enabled by default and does not appear in the running configuration.

SUMMARY STEPS

1. **enable**

2. **configure terminal**

3. **no virtual-template subinterfaces**

DETAILED STEPS

	Command or Action	Purpose

Step 1	`enable`
	
	Example:
	`Router> enable`
		Enables privileged EXEC mode.
		
		• Enter your password if prompted.

Step 2	`configure terminal`
	
	Example:
	`Router# configure terminal`
		Enters global configuration mode.

Step 3	`no virtual-template subinterface`
	
	Example:
	`Router(config)# no virtual-template subinterface`
		Disables the creation of virtual-access subinterfaces.
		
		Note The **virtual-template subinterface** command is enabled by default.

Configuration Examples for Preparing for Broadband Access Aggregation

This section provides the following configuration examples:

ATM PVC Range on a Point-to-Point Subinterface: Example

In the following example, a PVC range called "range1" is created with a total of 100 PVCs in the range. A point-to-point subinterface will be created for each PVC in the range. Routed bridge encapsulation is configured on this range.

```
interface atm 6/0.200 point-to-point
 ip unnumbered loopback 1
 atm route-bridged ip
 range range1 pvc 1/200 1/299
 end
```

ATM PVC Range on a Multipoint Subinterface: Example

In the following example, a PVC range called "range-pppoa-1" is created with a total of 500 PVCs in the range. PVC parameters are configured for the range, including the assignment of a VC class called "classA."

```
interface atm 6/0.110 multipoint
 range range-pppoa-1 pvc 100 4/199
```

```
class-range classA
ubr 1000
encapsulation aal5snap
protocol ppp virtual-template 2
```

Individual PVC Within a PVC Range Configuration: Example

In the following example, "pvc1" within the PVC range called "range1" is deactivated.

```
interface atm 6/0.110 multipoint
 range range1 pvc 100 4/199
 class-range classA
  pvc-in-range pvc1 3/104
 shutdown
```

Virtual-Access Subinterfaces Configuration: Examples

This section provides the following configuration examples:

Virtual-Access Subinterface Configuration: Example

The example that follows shows a virtual template that is compatible with virtual-access subinterfaces.

> **Note** The **virtual-access subinterface** command is enabled by default and does not appear in running configurations. Only the **no virtual-access subinterface** command will appear in running configurations.

```
interface Virtual-Template1
 ip unnumbered Loopback0
 peer default ip address pool pool-1
 ppp authentication chap
 ppp multilink
```

The following example shows a configuration in which the creation of virtual-access subinterfaces has been disabled by the **no virtual-access subinterface** command. When this command is configured, virtual-access interfaces are not registered with the SNMP code on the router. In network environments that do not use SNMP to manage PPP sessions, this saves the memory and CPU processing that would be used to register the virtual-access interfaces with the SNMP code.

```
Current configuration :6003 bytes
!
! Last configuration change at 10:59:02 EDT Thu Sep 19 2004
!
version 12.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
```

```
service internal
service udp-small-servers
service tcp-small-servers
!
hostname ioswan5-lns
!
enable password lab
!
username cisco password 0 cisco
clock timezone EST -5
clock summer-time EDT recurring
aaa new-model
!
!
aaa authentication ppp default local

aaa authorization network default local
aaa session-id common
ip subnet-zero
no ip gratuitous-arps
ip cef
!
!
no ip domain lookup
ip name-server 10.44.11.21
ip name-server 10.44.11.206
!
ip vrf vpn1
rd 10:1
route-target export 10:1
route-target import 10:1
!
vpdn enable
!
vpdn-group 1
accept-dialin
protocol l2tp
virtual-template 1
terminate-from hostname ioswan5-lac
local name tunnel1
l2tp tunnel password 7 01100F175804
!
!

!
no virtual-template subinterface
no virtual-template snmp
virtual-template 1 pre-clone 10
!
!
!
buffers small permanent 20000
buffers middle permanent 7500
!
!
!
interface Loopback1
ip address 10.111.1.1 255.255.255.0
```

Testing a Virtual Template for Compatibility with Subinterfaces: Example

This example shows the process for testing a virtual template to determine if it can support virtual-access subinterfaces. The following command displays the configuration for virtual template 1:

```
Router# show running interface virtual-template 1

Building configuration...
!
interface Virtual-Template1
ip unnumbered Loopback0
peer default ip address pool pool-1
ppp authentication chap
traffic-shape rate 50000 8000 8000 1000
end
```

The **test virtual-template subinterface** command tests virtual template 1 to determine if it can support subinterfaces. The output shows that the **traffic-shape rate** command that is configured on virtual template 1 prevents the virtual template from being able to support subinterfaces.

```
Router# test virtual-template 1 subinterface

Subinterfaces cannot be created using Virtual-Template1
Interface commands:
traffic-shape rate 50000 8000 8000 1000
```

Where to Go Next

To configure broadband access, first select one of the three main configuration tasks:

1. If you want to provide protocol support for PPPoE sessions, refer to the "*Providing Protocol Support for Broadband Access Aggregation of PPPoE Sessions*" module. Then go to 2.

   or

   If you want to provide protocol support for PPP over ATM sessions, refer to the "Providing Protocol support for Broadband Access Aggregation of PPP over ATM Sessions" module. Then go to 2.

   or

   If you want to provide connectivity from a remote bridged ethernet network to a routed network using ATM routed bridge encapsulation, refer to the "Providing Connectivity Using ATM Routed Bridge Encapsulation" module.

2. If you are using a RADIUS server for access and accounting, refer to the "Identifying the Physical Subscriber Line for RADIUS Access and Accounting" module. Then go to 3.

3. If you are setting up PPPoE services, you can select the following options:

   – If you want to establish PPPoE session limits for sessions on a specific permanent virtual circuit or VLAN configured on an L2TP access concentrator, refer to the "Establishing PPPoE Session Limits per NAS Port" module.

   – If you want to use service tags to enable a PPPoE server to offer PPPoE clients a selection of service during call setup, refer to the "Offering PPPoE Clients a Selection of Services During Call Setup" module.

   – If you want to control subscriber bandwidth, refer to the "Controlling Subscriber Bandwidth" module.

- If you want to enable an L2TP access concentrator to relay active discovery and service selection functionality for PPPoE over a L2TP control channel to an LNS or tunnel switch, refer to the "Enabling PPPoE Relay Discovery and Service Selection Functionality" module.

- If you want to configure the transfer upstream of the session speed value, refer to the "Configuring Upstream Connections Speed Transfer" module.

- If you want to use Simple Network Management Protocol (SNMP) to monitor PPPoE sessions, refer to the "Monitoring PPPoE Sessions with SNMP" module.

- If you want to identify a physical subscribe line for RADIUS communication with a RADIUS server, refer to the "Identifying a Physical Subscriber Line for RADIUS Access and Accounting" module.

- If you want to configure a Cisco Subscriber Service Switch, refer to the "Configuring Cisco Subscriber Service Switch Policies" module.

Additional References

The following sections provide references related to the "Preparing for Broadband Aggregation" module.

Related Documents

Related Topic	Document Title
Configuring a PVC range	"Configuring PVCs" chapter in the *Cisco IOS Wide-Area Networking Configuration Guide*
Broadband access aggregation concepts	"Understanding Broadband Access Aggregation" *module of the Cisco IOS Broadband Access Aggregation and DSL Configuration Guide*
Broadband access commands: complete command syntax, command mode, command history, defaults, usage guidelines, and examples	"Wide-Area Networking Commands" in the *Cisco IOS Wide-Area Networking Command Reference*, Release 12.3
Creating a virtual template	"Configuring Virtual Template Interfaces" chapter in the *Cisco IOS Dial Technologies Configuration Guide*

Standards

Standards	Title
None	—

MIBs

MIBs	MIBs Link
None	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFCs	Title
None	—

Technical Assistance

Description	Link
The Cisco Technical Support website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/techsupport

Feature Information for Preparing for Broadband Access Aggregation

Table 4 lists the features in this module and provides links to specific configuration information.

Not all commands may be available in your Cisco IOS software release. For details on when support for specific commands was introduced, see the command reference documents.

If you are looking for information on a feature in this technology that is not documented here, see the "Configuring Broadband Access Aggregation Features Roadmap."

Cisco IOS software images are specific to a Cisco IOS software release, a feature set, and a platform. Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at http://www.cisco.com/go/fn. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

Table 4   ***Feature Information for Preparing for Broadband Aggregation***

Feature Name	Software Releases	Feature Configuration Information
Configuration Enhancements for Broadband Scalability	12.2(13)T 12.2(15)B 12.2(33)SRC	This feature reduces the amount of memory that is used per terminated PPP session by creating virtual-access subinterfaces. Depending on the configuration of the source virtual template, virtual-access subinterface may be available. This feature also introduces a command to determine if a virtual template is compatible with virtual-access subinterfaces. The following sections provide information about this feature: • Configuring Enhancements for Broadband Scalability, page 11 • Virtual-Access Subinterfaces Configuration: Examples, page 14
PPPoA/PPPoE Autosense for ATM PVCs	12.2(4)T 12.2(4)T3	This feature enables a router to distinguish between incoming PPP over ATM (PPPoA) and PPP over Ethernet (PPPoE) over ATM sessions and to create virtual access based on demand for both PPP types. The following sections provide information about this feature: • "Autosense for ATM PVCs" section on page 3 • "Precloning Virtual-Access Interfaces" section on page 10

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