

Preparing for Broadband Access Aggregation

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.

- Prerequisites for Preparing for Broadband Access Aggregation, on page 1
- Restrictions for Preparing for Broadband Access Aggregation, on page 2
- Information About Preparing for Broadband Access Aggregation, on page 2
- How to Prepare for Broadband Access Aggregation, on page 3
- Configuration Examples for Preparing for Broadband Access Aggregation, on page 6
- Additional References, on page 8
- Feature Information for Preparing for Broadband Access Aggregation, on page 9

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

- Due to high scaling requirements, only virtual access subinterfaces are supported. Disabling virtual access subinterfaces is not supported.
- Precloning virtual access interfaces is not supported.
- When an interface has large number of subinterfaces disabled, the interface's Remote Access (RA) messages that have a lifetime value of zero are not sent to all its subinterfaces.
- ISDN PPP Termination and Aggregation (PTA) is not supported. For ISDN connections, only a single PPP session per user can be bound and provisioned to a physical B-channel interface. Virtual Access Interface (VAI) is not supported for ISDN.

Information About Preparing for Broadband Access Aggregation

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 (VPDNs), and protocol translation.

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.

Cisco IOS XE software supports up to 4096 virtual template configurations. If greater numbers of tailored configurations are required, an authentication, authorization, and accounting (AAA) server can be used.

If the parameters of the virtual template are not explicitly defined before the interface 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 interface to ensure that such parameters take effect. Alternatively, if parameters are specified after the interface has been configured, use the **shutdown** command followed by the **no shutdown** command on the subinterface to restart the interface; this restart will cause the newly configured parameters (such as an IP address) to take effect.

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; this command cannot be disabled.

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 is created and cloned for all PPP sessions using that virtual template.

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

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.

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 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

Configuring a Virtual Template Interface

Configure a virtual template interface before you configure PPPoE on an Ethernet interface. The virtual template interface is a logical entity that is applied dynamically as needed to an incoming PPP session request. Perform this task to create and configure a virtual template interface:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **Interface virtual-template** *number* [**type** [**ethernet** | **serial** | **tunnel**]]
4. **ip unnumbered ethernet** *number*
5. **mtu** *bytes*

6. **ppp authentication chap**
7. **ppp ipcp ip address required**
8. end

DETAILED STEPS

Procedure

	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* [**type** [**ethernet** | **serial** | **tunnel**]] **Example:** `Router(config)# interface virtual-template 1`	Creates a virtual template interface and enters interface configuration mode.
Step 4	**ip unnumbered ethernet** *number* **Example:** `Router(config-if)# ip unnumbered ethernet 3/1`	Enables IP without assigning a specific IP address on the LAN.
Step 5	**mtu** *bytes* **Example:** `Router(config-if)# mtu bytes`	(Optional) Sets the maximum MTU size for the interface. • Valid range for the MTU size is 1492 or 1500.
Step 6	**ppp authentication chap** **Example:** `Router(config-if)# ppp authentication chap`	Enables PPP authentication on the virtual template interface.
Step 7	**ppp ipcp ip address required** **Example:** `Router(config-if)# ppp ipcp ip address required`	Prevents a PPP session from being set up without a valid address being negotiated. This command is required for legacy dialup and DSL networks.
Step 8	end **Example:**	Exits interface configuration mode.

	Command or Action	Purpose
	`Router(config-if)# end`	

Examples

The following example shows the configuration of a virtual template interface:

```
Router(config)# interface virtual-template 1
Router(config)# ip unnumbered21 Loopback1
Router(config-if)# no peer default ip address
Router(config-if)# ppp authentication chap
Router(config-if)# ppp authorization
Router(config-if)# ppp accounting
```

Configuring Enhancements for Broadband Scalability

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

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

Procedure

	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.

Examples

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
```

Configuration Examples for Preparing for Broadband Access Aggregation

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
```

Additional References

The following sections provide references related to preparing for broadband access aggregation.

Related Documents

Related Topic	Document Title
Broadband access aggregation of PPPoE Sessions	Providing Protocol Support for Broadband Access Aggregation of PPPoE Sessions
Specifying a range for the ppp-max payload tag value	PPP-Max-Payload and IWF PPPoE Tag Support
Additional information about commands used in this document	• *Cisco IOS Broadband Access Aggregation and DSL Command Reference*

Standards

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	--

MIBs

MIBs	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco IOS XE releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFCs	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	--

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/techsupport

Feature Information for Preparing for Broadband Access Aggregation

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

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

Table 1: Feature Information for Preparing for Broadband Aggregation

Feature Name	Software Releases	Feature Configuration Information
Virtual Sub-Interface--Configuration Enhancements for Broadband Scalability	Cisco IOS XE Release 2.1	This feature was introduced on Cisco ASR 1000 Series Routers. 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.