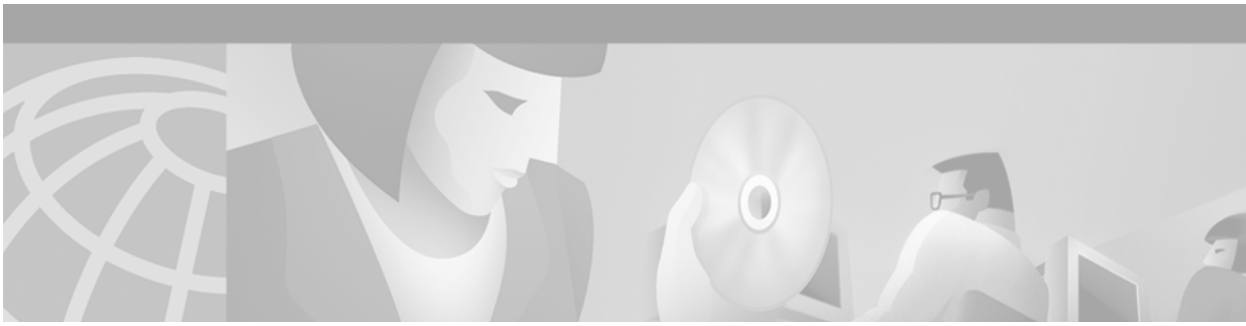

Broadband Access: PPP and Routed Bridge Encapsulation Commands

Use the commands described in this chapter to configure broadband access using PPP and routed bridge encapsulation.

For information about configuring broadband access using PPP and routed bridge encapsulation, refer to the chapter "Configuring Broadband Access: PPP and Routed Bridge Encapsulation" in the *Cisco IOS Wide-Area Networking Configuration Guide.*

atm route-bridge

To configure an interface to use the ATM routed bridge encapsulation, use the **atm route-bridge** interface configuration command.

atm route-bridge *protocol*

Syntax Description

protocol	Protocol to be route-bridged. IP is the only protocol that can be route-bridged using ATM routed bridge encapsulation.

Defaults

ATM routed bridge encapsulation is not configured.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(5)DC	This command was introduced.
12.1(2)T	This command was integrated in Cisco IOS Release 12.1(2)T.

Examples

The following example configures ATM routed bridge encapsulation on an interface:

```
interface atm 4/0.100 point-to-point
 ip address 172.16.5.9 255.255.255.0
 pvc 0/32
 atm route-bridge ip
```

class-range

To assign a virtual circuit (VC) class to an ATM permanent virtual circuit (PVC) range, use the **class-range** PVC range configuration command. To remove the VC class, use the **no** form of this command.

class-range *class-name*

no class-range *class-name*

Syntax Description

class-name	Name of the VC class.

Defaults

No VC class is assigned to the PVC range.

Command Modes

PVC range configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.

Usage Guidelines

When you create a VC class for an ATM PVC range, you can use the following commands to define your parameters: **abr**, **broadcast**, **cbr**, **encapsulation aal5**, **ilmi manage**, **inarp**, **oam-pvc**, **oam retry**, **protocol**, **ubr**, **ubr+**, **vbr-nrt**, and **vbr-rt**.

Parameters that are configured for a PVC range through discrete commands entered in PVC range configuration mode supersede VC class parameters assigned to an ATM PVC range using the **class-range** command.

Examples

In the following example, a class called “classA” is created and then applied to an ATM PVC range called “range-pppoa-1”:

```
! The following commands create the class classA:
vc-class atm classA
 ubr 10000
 encapsulation aal5snap

! The following commands apply classA to an ATM PVC range:
interface atm 6/0.110 multipoint
 range range-pppoa-1 pvc 0/102 0/199
  class-range classA
```

Related Commands

Command	Description
abr	Selects ABR QoS and configures the output peak cell rate and output minimum guaranteed cell rate for an ATM PVC.
broadcast	Configures broadcast packet duplication and transmission for an ATM PVC.
cbr	Configures the CBR for the ATM CES for an ATM PVC.
class-vc	Assigns a VC class to an ATM PVC.
encapsulation aal5	Configures the AAL and encapsulation type for an ATM PVC.
ilmi manage	Enables ILMI management on an ATM PVC.
inarp	Configures the Inverse ARP time period for an ATM PVC.
oam-pvc	Enables end-to-end F5 OAM loopback cell generation and OAM management for an ATM PVC.
oam retry	Configures parameters related to OAM management for an ATM PVC.
protocol (ATM)	Configures a protocol for an ATM PVC. A PVC within a PVC range supports only the protocols that do not require static map configuration.
shutdown (PVC-in-range)	Deactivates an individual PVC within a PVC range.
shutdown (PVC range)	Deactivates an ATM PVC range.
ubr	Configures an UBR QoS and specifies the output PCR for an ATM PVC range.
ubr+	Configures an UBR QoS and specifies the output PCR and output minimum guaranteed cell rate for an ATM PVC range.
vbr-nrt	Configures the VBR-NRT QoS and specifies output PCR, output sustainable cell rate, and output maximum burst cell size for an ATM PVC range.
vbr-rt	Configures the real-time VBR for an ATM PVC range.

max bandwidth

To specify the total amount of outgoing bandwidth available to SVCs in the current configuration, use the **max bandwidth** interface-ATM-VC configuration command. To remove the current bandwidth setting, use the **no** form of this command.

max bandwidth *kbps*

no max bandwidth *kbps*

Syntax Description

kbps	Total amount of outgoing bandwidth in kilobits per second available to all SVCs in the current configuration.

Defaults

No default behavior or values.

Command Modes

Interface-ATM-VC configuration

Command History

Release	Modification
12.1(3)T	This command was introduced.

Usage Guidelines

Only the guaranteed cell rate of an SVC is counted toward the maximum bandwidth.

Examples

In following example, an SVC called “anna” on ATM interface 2/0/0 is configured using the **max bandwidth** command to allow a maximum of 50 Mbps of bandwidth to be used by all of the SVCs in this configuration:

```
interface ATM 2/0/0
 svc anna
  encapsulation aal5auto
  protocol ppp virtual-template 1
  max bandwidth 50000
```

Related Commands

Command	Description
max vc	Specifies the maximum number of SVCs that can be established using the current configuration.

max vc

To specify the maximum number of switched virtual circuits (SVCs) that can be established using the current configuration, use the **max vc** interface-ATM-VC configuration command. To restore the maximum number of SVCs to the default setting, use the **no** form of this command.

max vc *number*

no max vc *number*

Syntax Description

number	Maximum number of SVCs to be established using the current SVC configuration.

Defaults

4096 SVCs

Command Modes

Interface-ATM-VC configuration

Command History

Release	Modification
12.1(3)T	This command was introduced.

Examples

In following example, an SVC called “anna” on ATM interface 2/0/0 is configured using the **max vc** command to allow a maximum of 100 SVCs to be established using this configuration:

```
interface ATM 2/0/0
 svc anna
  encapsulation aal5auto
  protocol ppp virtual-template 1
  max vc 100
```

Related Commands

Command	Description
max bandwidth	Specifies the maximum amount of bandwidth available to all SVCs in the current configuration.
svc	Creates an ATM SVC.

oam-range

To enable end-to-end F5 Operation, Administration, and Maintenance (OAM) loopback cell generation and OAM management for an ATM permanent virtual circuit (PVC) range, use the **oam-range** PVC range configuration command. To disable generation of OAM loopback cells and OAM management, use the **no** form of this command.

oam-range [**manage**] [*frequency*]

no oam-range [**manage**] [*frequency*]

Syntax Description

manage	(Optional) Enables OAM management.
frequency	(Optional) Time delay (0 to 600 seconds) between transmissions of OAM loopback cells.

Defaults

10 seconds

Command Modes

PVC range configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.

Usage Guidelines

If OAM management is enabled, further control of OAM management is configured using the **oam retry** command.

If the **oam-range** command is not explicitly configured for an ATM PVC range, the range inherits the following default configuration (listed in order of precedence):

- Configuration of the **oam-range** command in a VC class assigned to the range.
- Configuration of the **oam-range** command in a VC class assigned to the ATM subinterface for the range.
- Configuration of the **oam-range** command in a VC class assigned to the ATM main interface for the range.
- Global default: End-to-end F5 OAM loopback cell generation and OAM management are disabled, but if OAM cells are received, they are looped back. The default value for the *frequency* argument is 10 seconds.

Examples

The following example enables end-to-end F5 OAM loopback cell transmission and OAM management on an ATM PVC range called “range1” with a transmission frequency of 11 seconds:

```
interface atm 6/0.1
 range range1 pvc 7/101 7/103
  oam-range manage 11
  oam retry 8 9 10
```

Related Commands

Command	Description
ilmi manage	Enables ILMI management on an ATM PVC.
oam-pvc	Enables end-to-end F5 OAM loopback cell generation and OAM management for an ATM PVC or VC class.
oam retry	Configures parameters related to OAM management for ATM PVC, SVC, or VC class.

pppoe enable

To enable PPP over Ethernet (PPPoE) sessions on an Ethernet interface, use the **pppoe enable** interface configuration command. To disable PPPoE, use the **no** form of this command.

pppoe enable

no pppoe enable

Syntax Description

This command has no arguments or keywords.

Defaults

PPPoE is disabled by default.

Command Modes

Interface configuration

Command History

Release	Modification
12.1(2)T	This command was introduced.
12.1(5)T	This command was modified to enable PPPoE on IEEE 802.1Q encapsulated virtual LAN (VLAN) interfaces.

Examples

PPPoE on an 802.1Q VLAN Subinterface Example

The following example shows how to enable PPPoE on an 802.1Q VLAN subinterface:

```
interface FastEthernet0/0.10
 encapsulation dot1Q 10
 pppoe enable
```

PPPoE on an Ethernet Interface Example

The following example enables PPPoE sessions on Ethernet interface 1/0:

```
interface ethernet1/0
 pppoe enable
```

Related Commands

Command	Description
debug vpdn pppoe-data	Displays data packets of PPPoE sessions.
debug vpdn pppoe-error	Displays PPPoE protocol errors that prevent a session from being established or errors that cause an established session to be closed.
debug vpdn pppoe-events	Displays PPPoE protocol messages about events that are part of normal session establishment or shutdown.
pppoe limit per-mac	Specifies the maximum number of PPPoE sessions to be sourced from a MAC address.
pppoe limit per-vlan	Specifies the maximum number of PPPoE sessions under each VLAN.

pppoe limit per-mac

To specify the maximum number of PPPoE sessions to be sourced from a MAC address, use the **pppoe limit per-mac** command in VPDN configuration mode.

pppoe limit per-mac *number*

Syntax Description

number	Maximum number of PPPoE sessions that can be sourced from a MAC address.

Defaults

100 sessions

Command Modes

VPDN configuration

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

The following example sets a limit of 10 sessions to be sourced from a MAC address:

```
pppoe limit per-mac 10
```

Related Commands

Command	Description
pppoe limit per-vc	Specifies the maximum number of PPPoE sessions to be established over a VC.
pppoe limit per-vlan	Specifies the maximum number of PPPoE sessions under each VLAN.

pppoe limit per-vc

To specify the maximum number of PPPoE sessions to be established over a VC, use the **pppoe limit per-vc** command in VPDN configuration mode.

pppoe limit per-vc *number*

Syntax Description

number	Maximum number of PPPoE sessions that can be established over an ATM PVC.

Defaults

100 sessions

Command Modes

VPDN configuration

Command History

Release	Modification
12.1(1)T	This command was introduced.

Examples

The following example sets a limit of 10 sessions to be established over a VC:

```
pppoe limit per-vc 10
```

Related Commands

Command	Description
pppoe limit per-mac	Specifies the maximum number of PPPoE sessions to be sourced from a MAC address.
pppoe limit per-vlan	Specifies the maximum number of PPPoE sessions under each VLAN.

pppoe limit per-vlan

To specify the maximum number of PPP over Ethernet (PPPoE) sessions permitted under each virtual LAN (VLAN), use the **pppoe limit per-vlan** VPDN configuration command. To remove this specification, use the **no** form of this command.

pppoe limit per-vlan *number*

no pppoe limit per-vlan

Syntax Description

number	Maximum number of PPP over Ethernet sessions permitted under each VLAN.

Defaults

100 PPPoE sessions per VLAN

Command Modes

VPDN configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.

Usage Guidelines

If the **pppoe max-session** command is configured on a VLAN, that command will take precedence over the **pppoe limit per-vlan** command. The **pppoe limit per-vlan** command applies to all VLANs on which the **pppoe max-session** command has not been configured.

The **pppoe limit per-vlan** command must be configured after the accept dial-in VPDN group has been configured using the **accept-dialin** VPDN configuration command.

Examples

The following example shows a maximum of 200 PPPoE sessions configured for an 802.1Q VLAN subinterface:

```
interface FastEthernet0/0.10
 encapsulation dot1Q 10
 pppoe enable
!
vpdn enable
vpdn-group 1
 accept dialin
  protocol pppoe
  virtual-template 1
 pppoe limit per-vlan 200
```

Related Commands

Command	Description
accept dial-in	Creates an accept dial-in VPDN subgroup.
debug vpdn pppoe-data	Displays data packets of PPPoE sessions.
debug vpdn pppoe-error	Displays PPPoE protocol errors that prevent a session from being established or errors that cause an established session to be closed.
debug vpdn pppoe-events	Displays PPPoE protocol messages about events that are part of normal session establishment or shutdown.
debug vpdn pppoe-packet	Displays each PPPoE protocol packet exchanged.
pppoe enable	Enables PPPoE sessions on an Ethernet interface.
pppoe limit per-mac	Specifies the maximum number of PPPoE sessions to be sourced from a MAC address.
pppoe limit per-vc	Specifies the maximum number of PPPoE sessions to be established over a VC.
pppoe max-session	Specifies the maximum number of PPPoE sessions permitted under a VLAN.

pppoe max-session

To specify the maximum number of PPP over Ethernet (PPPoE) sessions permitted under a virtual LAN (VLAN), use the **pppoe max-session** Ethernet subinterface configuration command. To remove this specification, use the **no** form of this command.

pppoe max-session *number*

no pppoe max-session

Syntax Description

number	Maximum number of PPP over Ethernet sessions permitted under a VLAN.

Defaults

No default behavior or values.

Command Modes

Ethernet subinterface configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.

Usage Guidelines

Use the **pppoe max-session** command to specify the maximum number of PPPoE session under a VLAN. The **pppoe limit per-vlan** global configuration command can also be used to specify the maximum number of PPPoE sessions. If the **pppoe max-session** command and the **pppoe limit per-vlan** command are both configured, the **pppoe max-session** command takes precedence on the VLAN.

Examples

The following example shows a maximum of 200 PPPoE sessions configured for an 802.1Q VLAN subinterface:

```
interface FastEthernet0/0.10
 encapsulation dot1Q 10
 pppoe enable
 pppoe max-session 200
```

Related Commands

Command	Description
debug vpdn pppoe-data	Displays data packets of PPPoE sessions.
debug vpdn pppoe-error	Displays PPPoE protocol errors that prevent a session from being established or errors that cause an established session to be closed.
debug vpdn pppoe-events	Displays PPPoE protocol messages about events that are part of normal session establishment or shutdown.
debug vpdn pppoe-packet	Displays each PPPoE protocol packet exchanged.
pppoe enable	Enables PPPoE sessions on an Ethernet interface.

Command	Description
pppoe limit per-mac	Specifies the maximum number of PPPoE sessions to be sourced from a MAC address.
pppoe limit per-vc	Specifies the maximum number of PPPoE sessions to be established over a VC.
pppoe limit per-vlan	Specifies the maximum number of PPPoE sessions permitted under each VLAN.

pvc-in-range

To configure an individual permanent virtual circuit (PVC) within a PVC range, use the **pvc-in-range** PVC range configuration command. To delete the individual PVC configuration, use the **no** form of this command.

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

no pvc-in-range [*pvc-name*] [*vpi*/*vci*]

Syntax Description

pvc-name	(Optional) Name given to the PVC. The PVC name can have a maximum of 15 characters.
vpi/	(Optional) ATM network virtual path identifier (VPI) for this PVC. In the absence of the "/" and a *vpi* value, the *vpi* value defaults to 0. The *vpi* value ranges from 0 to 255.
vci	(Optional) ATM network virtual channel identifier (VCI) for this PVC. The *vci* value ranges from 32 to 2047.

Defaults

No default behavior or values.

Command Modes

PVC range configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.

Usage Guidelines

The **pvc-in-range** command defines an individual PVC within a PVC range and enables PVC-in-range configuration mode.

Examples

In the following example, a PVC called "pppoa" is deactivated. The PVC "pppoa" is an individual PVC within a configured PVC range.

```
pvc-in-range pppoa 0/130
 shutdown
```

Related Commands

Command	Description
range pvc	Defines a range of ATM PVCs.

range pvc

To define a range of ATM permanent virtual circuits (PVCs), use the **range pvc** subinterface configuration command. To delete the range of ATM PVCs, use the **no** form of this command.

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

no range [*range-name*] **pvc**

Syntax Description

range-name	(Optional) Name of the range. The range name can be a maximum of 15 characters.
start-vpi/	Beginning value for a range of virtual path identifiers (VPIs). In the absence of the "/" and a *vpi* value, the *vpi* value defaults to 0. The *vpi* value ranges from 0 to 255.
start-vci/	Beginning value for a range of virtual channel identifiers (VCIs). The *vci* value ranges from 32 to 65535.
end-vpi	End value for a range of virtual path identifiers (VPIs). In the absence of an *end-vpi* value, the *end-vpi* value defaults to the *start-vpi* value.The *vpi* value ranges from 0 to 255.
end-vci	End value for a range of virtual channel identifiers (VCIs). The *vci* value ranges from 32 to 65535.

Defaults

An ATM PVC range is not configured.

Command Modes

Subinterface configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.

Usage Guidelines

The **range pvc** command defines a range of PVCs and enables PVC range configuration mode.

The number of PVCs in a range can be calculated using the following formula:

number of PVCs = (*end-vpi* – *start-vpi* + 1) x (*end-vci* – *start-vci* +1).

The *start-vpi* argument may be omitted if it is zero. The *end_vpi* argument may be omitted, but if it is omitted, it is assigned the value of *start-vpi*. The *end-vpi* and *end-vci* arguments are always greater than or equal to *start-vpi* and *start-vci* respectively.

When applied to multipoint subinterfaces, the **range pvc** command creates a range of ATM PVCs. When applied to point-to-point subinterfaces, the **range pvc** command creates range of PVCs and a corresponding range of point-to-point subinterfaces.

For point-to-point subinterfaces, subinterface numbering begins with the subinterface on which the PVC range is configured and increases sequentially through the range.

Examples

ATM PVC Range Example

In the following example, 100 PVCs with VCI values from 100 to 199 for each VPI value from 0 to 4 are created for a PVC range called “range-pppoa-1”. This configuration creates a total of 500 PVCs in the range. PVC parameters are then configured for the range.

```
interface atm 6/0.110 multipoint
 range range-pppoa-1 pvc 100 4/199
  class-range class-pppoa-1
  ubr 1000
  encapsulation aal5snap
  protocol ppp virtual-Template 2
```

Subinterface Grouping by PVC Range for Routed Bridge Encapsulation 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. ATM routed bridge encapsulation is also configured.

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

Related Commands

Command	Description
pvc-in-range	Configures an individual PVC within a PVC range.

show atm svc ppp

To display information about each switched virtual circuit (SVC) configured for PPP over ATM, use the **show atm svc ppp** privileged EXEC command.

show atm svc ppp

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.1(3)T	This command was introduced.

Examples

The following is sample output for the **show atm svc ppp** command:

```
Router# show atm svc ppp

ATM Int.       VCD/Name      VPI   VCI  Type   VCSt  VA  VASt
2/0.1          10             0    60   SVC     UP   1   UP
```

Table 22 describes the fields shown in the displays.

Table 22 show atm svc ppp Field Descriptions

Field	Description
ATM Int.	Interface on which the SVC is configured.
VCD/Name	Virtual circuit descriptor (VCD) or name associated with the SVC.
VPI	Virtual path identifier.
VCI	Virtual channel identifier.
Type	Type of virtual circuit.
VCSt	Virtual circuit state.
VA	Virtual access interface number.
VASt	Virtual access interface state.

shutdown (PVC-in-range)

To deactivate an individual permanent virtual circuit (PVC) within a PVC range, use the **shutdown** PVC-in-range configuration command. To reactivate an individual PVC within PVC range, use the **no** form of this command.

shutdown

no shutdown

Syntax Description

This command has no arguments or keywords.

Defaults

The PVC is active.

Command Modes

PVC-in-range configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.

Examples

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
  pvc-in-range pvc1 7/104
   shutdown
```

Related Commands

Command	Description
pvc-in-range	Configures an individual PVC within a PVC range.
shutdown (PVC range)	Deactivates a PVC range.

shutdown (PVC range)

To deactivate a PVC range, use the **shutdown** PVC range configuration command. To reactivate a PVC range, use the **no** form of this command.

shutdown

no shutdown

Syntax Description

This command has no arguments or keywords.

Defaults

PVC range is active.

Command Modes

PVC range configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.

Examples

In the following example, a PVC range called “range1” is deactivated:

```
interface atm 6/0.110 multipoint
 range range1 pvc 100 4/199
  shutdown
```

Related Commands

Command	Description
range pvc	Defines a range of ATM PVCs.
shutdown (PVC-in-range)	Deactivates an individual PVC within a PVC range.