



# ATM PVC Range and Routed Bridge Encapsulation Subinterface Grouping

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## History for the ATM PVC Range and Routed Bridge Encapsulation Subinterface Grouping Feature

Release	Modification
12.1(5)T	This feature was introduced.
12.2(28)SB	This feature was integrated into Cisco IOS Release 12.2(28)SB.

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# Feature Overview

In a digital subscriber line (DSL) environment, many applications require the configuration of a large number of ATM permanent virtual circuits (PVCs). The ATM PVC Range and Routed Bridge Encapsulation Subinterface Grouping feature enables you to group a number of PVCs together into a PVC *range* in order to configure them all at once.

For applications that use multipoint subinterfaces, such as PPP over Ethernet and PPP over ATM, the PVC range is on a single multipoint subinterface. For applications that use point-to-point subinterfaces, such as routed bridge encapsulation (RBE), a point-to-point subinterface is created for each PVC in the range.

A PVC range is defined by two VPI–VCI pairs. The two virtual path identifiers (VPIs) define a VPI range, and the two virtual channel identifiers (VCIs) define a VCI range. The number of PVCs in the PVC range equals the number of VPIs in the VPI range multiplied by the number of VCIs in the VCI range.

Once the PVC range is defined, you can configure the range by using the existing interface-ATM-VC configuration commands that are also supported in PVC range configuration mode. The **shutdown** PVC range command can be used to deactivate the range without deleting the configuration.

The ATM PVC Range and Routed Bridge Encapsulation Subinterface Grouping feature also introduces the **pvc-in-range** command, which allows you to explicitly configure an individual PVC within the defined range of PVCs on a multipoint subinterface. The **shutdown** PVC-in-range command allows you to deactivate an individual PVC within a range.

**Note**

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You cannot explicitly configure the individual point-to-point subinterfaces created by the PVC range on a point-to-point subinterface. All of the point-to-point subinterfaces in the range share the same configuration as the subinterface on which the PVC range is configured.

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## Benefits

**Saving Time**

Configuring a range of PVCs is faster than configuring each PVC individually.

**Saving NVRAM**

A range of PVCs takes up less NVRAM on network service routers than a large number of individually configured PVCs.

**Speeding Boot-Up**

The parser can parse one configuration command instead of many, thus speeding boot-up time.

## Restrictions

You cannot explicitly configure the individual point-to-point subinterfaces created by the PVC range on a point-to-point subinterface. All of the point-to-point subinterfaces in the range share the same configuration as the subinterface on which the PVC range is configured.

## Configuration Tasks

See the following sections for configuration tasks for the ATM PVC Range and Routed Bridge Encapsulation Subinterface Grouping feature. Each task in the list is identified as optional or required.

- [Configuring an ATM PVC Range, page 3](#) (Required)
- [Deactivating a PVC Range, page 3](#) (Optional)
- [Configuring an Individual PVC Within a PVC Range, page 4](#) (Optional)
- [Deactivating an Individual PVC Within a PVC Range, page 4](#) (Optional)
- [Verifying an ATM PVC Range, page 4](#) (Optional)

### Configuring an ATM PVC Range

To configure an ATM PVC range, use following commands beginning in global configuration mode:

	Command	Purpose
Step 1	Router(config)# <b>interface atm</b> <i>slot/port.subinterface-number</i> { <b>point-to-point</b>   <b>multipoint</b> }	Configures an ATM subinterface.
Step 2	Router(config-subif)# <b>range</b> [ <i>range-name</i> ] <b>pvc</b> <i>start-vpi/start-vci end-vpi/end-vci</i>	Defines a range of PVCs and enables PVC range configuration mode.
Step 3	Router(config-if-atm-range)# <b>exit</b>	Exits PVC range configuration mode.

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

$$\text{number of PVCs} = (\text{end-vpi} - \text{start-vpi} + 1) \times (\text{end-vci} - \text{start-vci} + 1).$$

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.



#### Note

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

### Deactivating a PVC Range

To deactivate a PVC range, use the following command in PVC range configuration mode:

Command	Purpose
Router(config-if-atm-range)# <b>shutdown</b>	Deactivates a PVC range.

## Configuring an Individual PVC Within a PVC Range

To configure an individual PVC within a PVC range on a multipoint subinterface, use the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	Router(config)# <b>interface atm</b> <i>slot/port.subinterface-number multipoint</i>	Configures an ATM interface.
Step 2	Router(config-subif)# <b>range</b> [ <i>range-name</i> ] <b>pvc</b> <i>start-vpi/start-vci end-vpi/end-vci</i>	Defines a range of PVCs and enables PVC range configuration mode.
Step 3	Router(config-if-atm-range)# <b>pvc-in-range</b> [ <i>pvc-name</i> ] <i>[vpi/vci]</i>	Defines an individual PVC within a PVC range, and enables PVC-in-range configuration mode.
Step 4	Router(cfg-if-atm-range-pvc)# <b>exit</b>	Exits PVC-in-range configuration mode.

## Deactivating an Individual PVC Within a PVC Range

To deactivate an individual PVC within a range, use the following command in PVC-in-range configuration mode:

Command	Purpose
Router(cfg-if-atm-range-pvc)# <b>shutdown</b>	Deactivates an individual PVC within a range.

## Verifying an ATM PVC Range

To verify ATM PVC range configuration, use the following EXEC command:

Command	Purpose
Router# <b>show atm pvc</b> [ <i>vpi/vci</i>   <i>name</i>   <b>interface atm</b> <i>interface-number</i> ]	Displays ATM PVCs and traffic information.

## Configuration Examples

This section provides the following configuration examples:

- [ATM PVC Range on a Multipoint Subinterface Example, page 4](#)
- [RBE Subinterface Grouping by PVC Range Example, page 5](#)
- [Individual PVC Within a PVC Range Configuration Example, page 5](#)

### 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.”

```

router(config)# interface atm 6/0.110 multipoint
router(config-subif)# range range-pppoa-1 pvc 100 4/199
router(config-if-atm-range)# class-range classA
router(config-if-atm-range)#ubr 1000
router(config-if-atm-range)# encapsulation aal5snap
router(config-if-atm-range)# protocol ppp virtual-template 2

```

## RBE Subinterface Grouping by PVC Range 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.

```

Router(config)# interface atm 6/0.200 point-to-point
Router(config-subif)# ip unnumbered loopback 1
Router(config-subif)# atm route-bridged ip
Router(config-subif)# range range1 pvc 1/200 1/299
Router(config-if-atm-range)# end

```

## Individual PVC Within a PVC Range Configuration Example

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

```

router(config)# interface atm 6/0.110 multipoint
router(config-subif)# range range1 pvc 100 4/199
router(config-if-atm-range)# class-range classA
router(config-if-atm-range)# pvc-in-range pvc1 3/104
router(cfg-if-atm-range-pvc)# shutdown

```

## Additional References

The following sections provide references related to ATM PVC Range and Routed Bridge Encapsulation Subinterface Grouping.

## Related Documents

Related Topic	Document Title
Configuring ATM	“Configuring ATM” chapter in the <i>Cisco IOS Wide-Area Networking Configuration Guide</i> , Release 12.2

## Standards

Standard	Title
None	—

## MIBs

MIB	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: <a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a>

## RFCs

RFC	Title
None	—

## Technical Assistance

Description	Link
The Cisco Technical Support & Documentation 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.	<a href="http://www.cisco.com/techsupport">http://www.cisco.com/techsupport</a>

## Command Reference

This section documents modified commands only.

- [class-range](#)
- [oam-range](#)
- [pvc-in-range](#)
- [range pvc](#)
- [shutdown \(PVC-in-range\)](#)
- [shutdown \(PVC range\)](#)

# class-range

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

**class-range** *class-name*

**no class-range** *class-name*

## Syntax Description

<i>class-name</i>	Name of the VC class.
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## 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.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.

## 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
```

■ class-range

Related Commands	Command	Description
	<b>shutdown (PVC-in-range)</b>	Deactivates an individual PVC within a PVC range.
	<b>shutdown (PVC range)</b>	Deactivates an ATM PVC range.

## 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** command in PVC range configuration mode. 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.
	<i>frequency</i>	(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.
	12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.

**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**

```
oam-range manage 11  
oam retry 8 9 10
```

**Related Commands**

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

## pvc-in-range

To configure an individual permanent virtual circuit (PVC) within a PVC range, use the **pvc-in-range** command in PVC range configuration mode. 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

<i>pvc-name</i>	(Optional) Name given to the PVC. The PVC name can have a maximum of 15 characters.
<i>vpi</i>	(Optional) ATM network virtual path identifier (VPI) for this PVC. In the absence of the “/” and a <i>vpi</i> value, the <i>vpi</i> value defaults to 0. The <i>vpi</i> value ranges from 0 to 255.
<i>vci</i>	(Optional) ATM network virtual channel identifier (VCI) for this PVC. The <i>vci</i> 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.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.

### 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
<b>range pvc</b>	Defines a range of ATM PVCs.

## range pvc

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

```
range [range-name] pvc start-vpil/start-vci end-vpil/end-vci
```

```
no range [range-name] pvc
```

### Syntax Description

<i>range-name</i>	(Optional) Name of the range. The range name can be a maximum of 15 characters.
<i>start-vpil</i>	Beginning value for a range of virtual path identifiers (VPIs). In the absence of the “f” and a <i>vpi</i> value, the <i>vpi</i> value defaults to 0. The <i>vpi</i> value ranges from 0 to 255.
<i>start-vcil</i>	Beginning value for a range of virtual channel identifiers (VCIs). The <i>vci</i> value ranges from 32 to 65535.
<i>end-vpil</i>	End value for a range of virtual path identifiers (VPIs). In the absence of an <i>end-vpi</i> value, the <i>end-vpi</i> value defaults to the <i>start-vpi</i> value. The <i>vpi</i> value ranges from 0 to 255.
<i>end-vci</i>	End value for a range of virtual channel identifiers (VCIs). The <i>vci</i> 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.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.

### 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:

$$\text{number of PVCs} = (\text{end-vpi} - \text{start-vpi} + 1) \times (\text{end-vci} - \text{start-vci} + 1).$$

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
<b>pvc-in-range</b>	Configures an individual PVC within a PVC range.

# shutdown (PVC-in-range)

To deactivate an individual permanent virtual circuit (PVC) within a PVC range, use the **shutdown** command in PVC-in-range configuration mode. 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.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.

## 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
<b>pvc-in-range</b>	Configures an individual PVC within a PVC range.
<b>shutdown (PVC range)</b>	Deactivates a PVC range.

## shutdown (PVC range)

To deactivate a permanent virtual circuit (PVC) range, use the **shutdown** command in PVC range configuration mode. 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.
	12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.

**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
	<b>range pvc</b>	Defines a range of ATM PVCs.
	<b>show pppatm summary</b>	Deactivates an individual PVC within a PVC range.

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