



Wide-Area Networking Commands

access-class (X.25)

To configure an incoming access class on virtual terminals, use the **access-class** (X.25) command in line configuration mode.

access-class *access-list-number* **in**

Syntax Description

<i>access-list-number</i>	An integer that identifies the access list. Range is from 1 to 199.
in	Restricts incoming connections between a particular access server and the addresses in the access list.

Defaults

No incoming access class is defined.

Command Modes

Line configuration

Command History

Release	Modification
10.3	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The access list number is used for both incoming TCP access and incoming packet assembler/disassembler (PAD) access.

In the case of TCP access, the access server uses the IP access list defined with the **access-list** command.

For incoming PAD connections, the same numbered X.29 access list is referenced. If you only want to have access restrictions on one of the protocols, you can create an access list that permits all addresses for the other protocol.

Examples

The following example configures an incoming access class on virtual terminal line 4. For information on the **line vty** command, see the publication *Configuring the Route Processor for the Catalyst 8540 and Using Flash Memory Cards*.

```
line vty 4
 access-class 4 in
```

Related Commands

Command	Description
access-list	Configures the access list mechanism for filtering frames by protocol type or vendor code.
x29 access-list	Limits access to the access server from certain X.25 hosts.

arp

To enable Address Resolution Protocol (ARP) entries for static routing over the Switched Multimegabit Data Service (SMDS) network, use the following variation of the **arp** command in global configuration mode. To disable this capability, use the **no** form of this command.

```
arp ip-address smds-address smds
```

```
no arp ip-address smds-address smds
```

Syntax Description

<i>ip-address</i>	IP address of the remote router.
<i>smds-address</i>	12-digit SMDS address in the dotted notation <i>nnnn.nnnn.nnnn</i> (48 bits long).
smds	Enables ARP for SMDS.

Defaults

Static ARP entries are not created.

Command Modes

Global configuration

Command History

Release	Modification
10.3	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

This command requires a 12-digit (48-bit) dotted-format SMDS address. It does not support 15-digit SMDS addresses.

Examples

The following example creates a static ARP entry that maps the IP address 172.20.173.28 to the SMDS address C141.5797.1313 on interface serial 0:

```
interface serial 0
  arp 172.20.173.28 C141.5797.1313 smds
```

Related Commands

Command	Description
smds enable-arp	Enables dynamic ARP. The multicast address for ARP must be set before this command is issued.
smds static-map	Configures a static map between an individual SMDS address and a higher-level protocol address.

authentication (L2TP)

To enable Challenge Handshake Authentication Protocol (CHAP) style authentication for Layer 2 Tunnel Protocol Version 3 (L2TPv3) tunnels, use the **authentication** command in L2TP class configuration mode. To disable L2TPv3 CHAP-style authentication, use the **no** form of this command.

authentication

no authentication

Syntax Description This command has no arguments or keywords.

Command Default L2TPv3 CHAP-style authentication is disabled.

Command Modes L2TP class configuration

Command History

Release	Modification
12.0(23)S	This command was introduced.
12.3(2)T	This command was integrated into Cisco IOS Release 12.3(2)T.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.2(27)SBC	Support for this command was integrated into Cisco IOS Release 12.2(27)SBC.

Usage Guidelines

Two methods of control channel authentication are available in Cisco IOS Release 12.0(29)S and later releases. The L2TPv3 Control Message Hashing feature (enabled with the **digest** command) introduces a more robust authentication method than the older CHAP-style method of authentication enabled with the **authentication** command. You may choose to enable both methods of authentication to ensure interoperability with peers that support only one of these methods of authentication, but this configuration will yield control of which authentication method is used to the peer PE router. Enabling both methods of authentication should be considered an interim solution to solve backward-compatibility issues during software upgrades.

Table 8 shows a compatibility matrix for the different L2TPv3 authentication methods. PE1 is running a Cisco IOS software release that supports the L2TPv3 Control Message Hashing feature, and the different possible authentication configurations for PE1 are shown in the first column. Each remaining column represents PE2 running software with different available authentication options, and the intersections indicate the different compatible configuration options for PE2. If any PE1/PE2 authentication configuration poses ambiguity on which method of authentication will be used, the winning authentication method is indicated in bold. If both the old and new authentication methods are enabled on PE1 and PE2, both types of authentication will occur.

Table 8 Compatibility Matrix for L2TPv3 Authentication Methods

PE1 Authentication Configuration	PE2 Supporting Old Authentication¹	PE2 Supporting New Authentication²	PE2 Supporting Old and New Authentication³
None	None	None New integrity check	None New integrity check
Old authentication	Old authentication	—	Old authentication Old authentication and new authentication Old authentication and new integrity check
New authentication	—	New authentication	New authentication Old authentication and new authentication
New integrity check	None	None New integrity check	None New integrity check
Old and new authentication	Old authentication	New authentication	Old authentication New authentication Old and new authentication Old authentication and new integrity check
Old authentication and new integrity check	Old authentication	—	Old authentication Old authentication and new authentication Old authentication and new integrity check

1. Any PE software that supports only the old CHAP-like authentication system.
2. Any PE software that supports only the new message digest authentication and integrity checking authentication system, but does not understand the old CHAP-like authentication system. This type of software may be implemented by other vendors based on the latest L2TPv3 draft.
3. Any PE software that supports both the old CHAP-like authentication and the new message digest authentication and integrity checking authentication system, such as Cisco IOS 12.0(29)S or later releases.

Examples

The following example enables CHAP-style authentication for L2TPv3 pseudowires configured using the L2TP class configuration named l2tp class1:

```
Router(config)# l2tp-class l2tp-class1
Router(config-l2tp-class)# authentication
```

Related Commands	Command	Description
	digest	Enables L2TPv3 control channel authentication or integrity checking.
	l2tp-class	Creates a template of L2TP control plane configuration settings that can be inherited by different pseudowire classes and enters L2TP class configuration mode.
	password	Configures the password used by a PE router for CHAP-style L2TPv3 authentication.

auto-route-target

To enable the automatic generation of a route target (RT), use the **auto-route-target** command in L2 VFI configuration mode. To remove the automatically generated RTs, use the **no** form of this command.

auto-route-target

no auto-route-target

Syntax Description This command has no arguments or keywords.

Command Default The VPLS Autodiscovery feature automatically generates an RT, so you do not need to enter this command when you configure the feature.

Command Modes L2 VFI configuration

Command History	Release	Modification
	12.2(33)SRB	This command was introduced.

Usage Guidelines This command works with the **I2 vfi autodiscovery** command, which automatically creates route targets. The **no** version of the command allows you to remove the automatically generated route targets. You cannot enter this command if route targets have not been automatically created yet.

Examples The following example removes automatically generated route targets:

```
no auto-route-target
```

Related Commands	Command	Description
	I2 vfi autodiscovery	Enables the VPLS PE router to automatically discover other PE routers that are part of the same VPLS domain.
	route-target (VPLS)	Specifies an RT for a VPLS VFI.

backup active interface

To activate primary and backup lines on specific X.25 interfaces, use the **backup active interface** command in interface configuration mode. To disable active backup behavior on the X.25 interface, use the **no** form of this command.

backup active interface *X.25-interface number*

no backup active interface *X.25-interface number*

Syntax Description

X.25-interface number X.25 interface type and number, such as serial 1/3.

Defaults

No default behavior or values

Command Modes

Interface configuration

Command History

Release	Modification
12.2(13)T	This command was introduced.

Usage Guidelines

The **backup active interface** command is available only on serial interfaces configured for the X.25 protocol. Use this command to activate dual serial lines (a primary and a backup) to maintain the redundancy and monitoring capability available from the SCC0 and SCC1 links on a Lucent 5ESS switch in a telco data communication network (DCN). The DCN provides telco service providers with communications for network management applications.

This configuration requires that both serial interfaces be on the same Cisco router. Once the **backup active interface** command is configured, the router will bring up leads on the backup X.25 interface, but will ignore Set Asynchronous Balanced Mode (SABM) messages from the Lucent 5ESS switch until the primary interface fails.

Examples

The following partial example shows how to configure a primary and backup X.25 interface for dual serial line management of the Lucent 5ESS switch in a DCN:

```
interface serial 1/0
  description SCC0
  backup active interface serial 1/1
  encapsulation x25 dce
  x25 address 66666666
  x25 ltc 8
  x25 ips 256
  x25 ops 256
  clockrate 9600
!
interface serial 1/1
  description SCC1
  encapsulation x25 dce
  x25 address 66666666
```

```
x25 ltc 8
x25 ips 256
x25 ops 256
clockrate 9600
.
.
.
```

Related Commands

Command	Description
debug backup	Monitors the transitions of an interface going down and then back up.
show backup	Displays interface backup status.

backup delay (L2VPN local switching)

To specify how long a backup pseudowire virtual circuit (VC) should wait before resuming operation after the primary pseudowire VC goes down, use the **backup delay** command in interface configuration mode or xconnect configuration mode.

backup delay *enable-delay* { *disable-delay* | **never** }

Syntax Description

<i>enable-delay</i>	Number of seconds that elapse after the primary pseudowire VC goes down before the Cisco IOS software activates the secondary pseudowire VC. The range is 0 to 180. The default is 0.
<i>disable-delay</i>	Number of seconds that elapse after the primary pseudowire VC comes up before the Cisco IOS software deactivates the secondary pseudowire VC. The range is 0 to 180. The default is 0.
never	The secondary pseudowire VC will not fall back to the primary pseudowire VC if the primary pseudowire VC becomes available again unless the secondary pseudowire VC fails.

Command Default

If a failover occurs, the xconnect redundancy algorithm will immediately switch over or fall back to the backup or primary member in the redundancy group.

Command Modes

Interface configuration
Xconnect configuration

Command History

Release	Modification
12.0(31)S	This command was introduced.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.4(11)T	This command was integrated into Cisco IOS Release 12.4(11)T.
12.2(33)SRB	This command was integrated into Cisco IOS Release 12.2(33)SRB.
12.2(33)SXI	This command was integrated into Cisco IOS Release 12.2(33)SXI.

Examples

The following example shows a Multiprotocol Label Switching (MPLS) xconnect with one redundant peer. Once a switchover to the secondary VC occurs, there will be no fallback to the primary VC unless the secondary VC fails.

```
Router(config)# pseudowire-class mpls
Router(config-pw-class)# encapsulation mpls

Router(config)# connect frpw1 serial0/1 50 l2transport
Router(config-if)# xconnect 10.0.0.1 50 pw-class mpls
Router(config-if-xconn)# backup peer 10.0.0.2 50
Router(config-if-xconn)# backup delay 0 never
```

The following example shows an MPLS xconnect with one redundant peer. The switchover will not begin unless the Layer 2 Tunnel Protocol (L2TP) pseudowire has been down for 3 seconds. After a switchover to the secondary VC occurs, there will be no fallback to the primary until the primary VC has been reestablished and is up for 10 seconds.

```
Router(config)# pseudowire-class mpls
Router(config-pw-class)# encapsulation mpls

Router(config)# connect frpwl serial10/1 50 l2transport
Router(config-if)# xconnect 10.0.0.1 50 pw-class mpls
Router(config-if-xconn)# backup peer 10.0.0.2 50
Router(config-if-xconn)# backup delay 3 10
```

Related Commands

Command	Description
backup peer	Configures a redundant peer for a pseudowire VC.

backup peer

To specify a redundant peer for a pseudowire virtual circuit (VC), use the **backup peer** command in interface configuration mode or xconnect configuration mode. To remove the redundant peer, use the **no** form of this command.

backup peer *peer-router-ip-addr vcid* [**pw-class** *pw-class-name*] [**priority** *value*]

no backup peer *peer-router-ip-addr vcid*

Syntax Description

<i>peer-router-ip-addr</i>	IP address of the remote peer.
<i>vcid</i>	The 32-bit identifier of the VC between the routers at each end of the layer control channel.
pw-class	(Optional) Pseudowire type. If not specified, the pseudowire type is inherited from the parent xconnect.
<i>pw-class-name</i>	(Optional) Name of the pseudowire you created when you established the pseudowire class.
priority <i>value</i>	(Optional) Priority of the backup pseudowire in instances where multiple backup pseudowires exist. The default is 1. The range is 1 through 10.

Command Default

No redundant peer is established.

Command Modes

Interface configuration (config-if)
Xconnect configuration (config-if-xconn)

Command History

Release	Modification
12.0(31)S	This command was introduced.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.4(11)T	This command was integrated into Cisco IOS Release 12.4(11)T.
12.2(33)SRB	This command was integrated into Cisco IOS Release 12.2(33)SRB.
12.2(33)SXI	This command was integrated into Cisco IOS Release 12.2(33)SXI.
Cisco IOS XE Release 2.4	This command was modified. The ability to add up to three backup pseudowires was added. The priority keyword was added to assign priority to the backup pseudowires.

Usage Guidelines

The combination of the *peer-router-ip-addr* and *vcid* arguments must be unique on the router.

In Cisco IOS XE Release 2.3, only one backup pseudowire is supported. In Cisco IOS XE Release 2.4 and later releases, up to three backup pseudowires are supported.

Examples

The following example shows a Multiprotocol Label Switching (MPLS) xconnect with one redundant peer:

```
Router(config)# pseudowire-class mpls
Router(config-pw-class)# encapsulation mpls

Router(config)# interface serial10/0
Router(config-if)# xconnect 10.0.0.1 100 pw-class mpls
Router(config-if-xconn)# backup peer 10.0.0.2 200
```

The following example shows a local-switched connection between ATM and Frame Relay using Ethernet interworking. The Frame Relay circuit is backed up by an MPLS pseudowire.

```
Router(config)# pseudowire-class mpls
Router(config-pw-class)# encapsulation mpls
Router(config-pw-class)# interworking ethernet

Router(config)# connect atm-fr atm1/0 100/100 s2/0 100 interworking ethernet
Router(config-if)# backup peer 10.0.0.2 100 pw-class mpls
```

The following example shows a pseudowire with two backup pseudowires:

```
interface ATM4/0.1 point-to-point
 pvc 0/100 l2transport
  encapsulation aal5snap
  xconnect 10.1.1.1 100 pw-class mpls
  backup peer 10.1.1.1 101
  backup peer 10.10.1.1 110 priority 2
  backup peer 10.20.1.1 111 priority 9
```

Related Commands

Command	Description
backup delay	Specifies how long the backup pseudowire VC should wait before resuming operation after the primary pseudowire VC goes down.

bfe

This command is no longer supported.

bridge-domain

To enable RFC 1483 ATM bridging or RFC 1490 Frame Relay bridging to map a bridged VLAN to an ATM permanent virtual circuit (PVC) or Frame Relay data-link connection identifier (DLCI), use the **bridge-domain** command in Frame Relay DLCI configuration, interface configuration, interface ATM VC configuration, or PVC range configuration mode. To disable bridging, use the **no** form of this command.

```
bridge-domain vlan-id [access | dot1q [tag] | dot1q-tunnel] [broadcast] [ignore-bpdu-pid]
[pvst-tlv CE-vlan] [increment] [lan-fcs] [split-horizon]
```

```
no bridge-domain vlan-id
```

Syntax Description	
<i>vlan-id</i>	The number of the VLAN to be used in this bridging configuration. The valid range is from 2 to 4094.
access	(Optional) Enables bridging access mode, in which the bridged connection does not transmit or act upon bridge protocol data unit (BPDU) packets.
dot1q	(Optional) Enables Institute of Electrical and Electronic Engineers (IEEE) 802.1Q tagging to preserve the class of service (CoS) information from the Ethernet frames across the ATM network. If this keyword is not specified, the ingress side assumes a CoS value of 0 for quality of service (QoS) purposes.
<i>tag</i>	(Optional—ATM PVCs only) Specifies the 802.1Q value in the range 1 to 4095. You can specify up to 32 bridge-domain command entries using dot1q tag for a single PVC. The highest tag value in a group of bridge-domain commands must be greater than the first tag entered (but no more than 32 greater).
dot1q-tunnel	(Optional) Enables IEEE 802.1Q tunneling mode, so that service providers can use a single VLAN to support customers who have multiple VLANs, while preserving customer VLAN IDs and segregating traffic in different customer VLANs.
broadcast	(Optional) Enables bridging broadcast mode on this PVC. This option is not supported for multipoint bridging. Support for this option was removed in Cisco IOS Release 12.2(18)SXF2 and Cisco IOS Release 12.2(33)SRA.
ignore-bpdu-pid	(Optional for ATM interfaces only) Ignores BPDU protocol identifiers (PIDs) and treats all BPDU packets as data packets to allow interoperability with ATM customer premises equipment (CPE) devices that do not distinguish BPDU packets from data packets.
pvst-tlv	(Optional) When the router or switch is transmitting, translates Per-VLAN Spanning Tree Plus (PVST+) BPDUs into IEEE BPDUs. When the router or switch is receiving, translates IEEE BPDUs into PVST+ BPDUs.
<i>CE-vlan</i>	Customer-edge VLAN in the Shared Spanning Tree Protocol (SSTP) tag-length-value (TLV) to be inserted in an IEEE BPDU to a PVST+ BPDU conversion.
increment	(PVC range configuration mode only) (Optional) Increments the bridge domain number for each PVC in the range.

lan-fcs	(Optional) Specifies that the VLAN bridging should preserve the Ethernet LAN frame checksum (FCS) of the Ethernet frames across the ATM network. Note This option applies only to routers using a FlexWAN module. Support for this option was removed in Cisco IOS Release 12.2(18)SXF2 and Cisco IOS Release 12.2(33)SRA.
split-horizon	(Optional) Enables RFC 1483 split horizon mode to globally prevent bridging between PVCs in the same VLAN.

Defaults

Bridging is disabled.

Command Modes

Frame Relay DLCI configuration
 Interface configuration—Only the **dot1q** and **dot1q-tunnel** keywords are supported in interface configuration mode.
 Interface ATM VC configuration
 PVC range configuration

Command History

Release	Modification
12.1(13)E	This command was introduced as the bridge-vlan command for the 2-port OC-12 ATM WAN Optical Services Modules (OSMs) on Cisco 7600 series routers and Catalyst 6500 series switches.
12.1(12c)E	This command was integrated into Cisco IOS Release 12.1(12c)E.
12.1(14)E1	This command was integrated into Cisco IOS Release 12.1(14)E1. The dot1q-tunnel keyword was added.
12.2(14)SX	This command was integrated into Cisco IOS Release 12.2(14)SX. The dot1q-tunnel keyword is not supported in this release.
12.1(19)E	The split-horizon keyword was added.
12.2(18)S	This command was integrated into Cisco IOS Release 12.2(18)S. The dot1q-tunnel and split-horizon keywords are supported in this release.
12.2(17a)SX	Support was added for the dot1q-tunnel keyword in Cisco IOS Release 12.2(17a)SX.
12.2(18)SXE	This command was renamed from bridge-vlan to bridge-domain . The access , broadcast , ignore-bpdu-pid , and increment keywords were added.
12.2(18)SXF2	Support for the lan-fcs and broadcast keywords was removed. The ignore-bpdu-pid and pvst-tlv keywords were added.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

RFC 1483 bridging on ATM interfaces supports the point-to-point bridging of Layer 2 packet data units (PDUs) over Ethernet networks. RFC 1490 Frame Relay bridging on Packet over SONET (POS) or serial interfaces that are configured for Frame Relay encapsulation provides bridging of Frame Relay packets over Ethernet networks.

The Cisco 7600 router can transmit BPDUs with a PID of either 0x00-0E or 0x00-07. When the router connects to a device that is fully compliant with RFC 1483 Appendix B, in which the IEEE BPDUs are sent and received by the other device using a PID of 0x00-0E, you must not use the **ignore-bpdu-pid** keyword.

If you do not enter the **ignore-bpdu-pid** keyword, the PVC between the devices operates in compliance with RFC 1483 Appendix B. This is referred to as *strict mode*. Entering the **ignore-bpdu-pid** keyword creates *loose mode*. Both modes are described as follows:

- Without the **ignore-bpdu-pid** keyword, in strict mode, IEEE BPDUs are sent out using a PID of 0x00-0E, which complies with RFC 1483.
- With the **ignore-bpdu-pid** keyword, in loose mode, IEEE BPDUs are sent out using a PID of 0x00-07, which is normally reserved for RFC 1483 data.

Cisco-proprietary PVST+ BPDUs are always sent out on data frames using a PID of 0x00-07, regardless of whether you enter the **ignore-bpdu-pid** keyword.

Use the **ignore-bpdu-pid** keyword when connecting to devices such as ATM digital subscriber line (DSL) modems that send PVST (or 802.1D) BPDUs with a PID of 0x00-07.

The **pvst-tlv** keyword enables BPDU translation when the router interoperates with devices that understand only PVST or IEEE Spanning Tree Protocol. Because the Catalyst 6500 series switch ATM modules support PVST+ only, you must use the **pvst-tlv** keyword when connecting to a Catalyst 5000 family switch that understands only PVST on its ATM modules, or when connecting with other Cisco IOS routers that understand IEEE format only.

When the router or switch is transmitting, the **pvst-tlv** keyword translates PVST+ BPDUs into IEEE BPDUs.

When the router or switch is receiving, the **pvst-tlv** keyword translates IEEE BPDUs into PVST+ BPDUs.

**Note**

The **bridge-domain** and **bre-connect** commands are mutually exclusive. You cannot use both commands on the same PVC for concurrent RFC 1483 and BRE bridging.

To preserve class of service (CoS) information across the ATM network, use the **dot1q** option. This configuration uses IEEE 802.1Q tagging to preserve the VLAN ID and packet headers as they are transported across the ATM network.

To enable service providers to use a single VLAN to support customers that have multiple VLANs, while preserving customer VLAN IDs and segregating traffic in different customer VLANs, use the **dot1q-tunnel** option on the service provider router. Then use the **dot1q** option on the customer routers.

**Note**

The **access**, **dot1q**, and **dot1q-tunnel** options are mutually exclusive. If you do not specify any of these options, the connection operates in “raw” bridging access mode, which is similar to access, except that the connection does act on and transmit BPDU packets.

RFC 1483 bridging is supported on AAL5-MUX and AAL5-LLC Subnetwork Access Protocol (SNAP) encapsulated PVCs. RFC-1483 bridged PVCs must terminate on the ATM interface, and the bridged traffic must be forwarded over an Ethernet interface, unless the **split-horizon** option is used, which allows bridging of traffic across bridged PVCs.

**Note**

RFC 1483 bridging is not supported for switched virtual circuits (SVCs). It also cannot be configured for PVCs on the main interface.

In interface configuration mode, only the **dot1q** and **dot1q-tunnel** keyword options are supported.

Examples

The following example shows a PVC being configured for IEEE 802.1Q VLAN bridging using a VLAN ID of 99:

```
Router# configure terminal
Router(config)# interface ATM6/2
Router(config-if)# pvc 2/101
Router(config-if-atm-vc)# bridge-domain 99 dot1q
Router(config-if-atm-vc)# end
```

The following example shows how to enable BPDU translation when a Catalyst 6500 series switch is connected to a device that understands only IEEE BPDUs in an RFC 1483-compliant topology:

```
Router(config-if-atm-vc)# bridge-domain 100 pvst-tlv 150
```

The **ignore-bpdu-pid** keyword is not used because the device operates in an RFC 1483-compliant topology for IEEE BPDUs.

The following example shows how to enable BPDU translation when a Catalyst 5500 ATM module is a device that understands only PVST BPDUs in a non-RFC1483-compliant topology. When a Catalyst 6500 series switch is connected to a Catalyst 5500 ATM module, you must enter both keywords.

```
Router(config-if-atm-vc)# bridge-domain 100 ignore-bpdu-pid pvst-tlv 150
```

To enable BPDU translation for the Layer 2 Protocol Tunneling (L2PT) topologies, use the following command:

```
Router(config-if-atm-vc)# bridge-domain 100 dot1q-tunnel ignore-bpdu-pid pvst-tlv 150
```

The following example shows a range of PVCs being configured, with the bridge domain number being incremented for each PVC in the range:

```
Router(config)# interface atm 8/0.100
Router(config-subif)# range pvc 102/100 102/199
Router(config-if-atm-range)# bridge-domain 102 increment
```

Related Commands

Command	Description
bre-connect	Enables the BRE over a PVC or SVC.
show atm pvc	Displays the configuration of a particular PVC.

bridge-domain (service instance)

To bind the service instance to a bridge domain instance, use the **bridge-domain** command in the service instance mode. To unbind the service instance to a bridge domain instance, use the no form of this command.

```
bridge-domain bridge-id
```

```
no bridge-domain bridge-id
```

Syntax Description

bridge-id The identifier for the bridge domain instance, integer in the range 1 to Platform_Upper_Bound where Platform_Upper_Bound is a platform-specific upper limit.

Command Default

The service instance is not bound to a bridge domain instance.

Command Modes

Service instance

Command History

Release	Modification
12.2(33)SRB	This command was introduced.

Usage Guidelines

This command indicates that the service instance terminates in a bridge-domain that corresponds to the broadcast domain.

Examples

The following example shows how to define a bridge domain:

```
Router(config-if-srv)# bridge domain 12
```

Related Commands

Command	Description
ethernet evc	Defines an EVC and enters the EVC configuration mode.

bump (Frame Relay VC-bundle-member)

To configure the bumping rules for a Frame Relay permanent virtual circuit (PVC) bundle member, use the **bump** command in Frame Relay VC-bundle-member configuration mode. To specify that the PVC bundle member does not accept bumped traffic, use the **no** form of this command.

bump { **explicit** *level* | **implicit** | **traffic** }

no bump traffic

Syntax Description

explicit <i>level</i>	Specifies the precedence, experimental (EXP), or differentiated services code point (DSCP) level to which traffic on a PVC is bumped when the PVC goes down. For PVC bundles that use precedence or EXP mapping, valid values for the <i>level</i> argument are from 0 to 7. For PVC bundles that use DSCP mapping, valid values are from 0 to 63.
implicit	Applies the implicit bumping rule, which is the default, to a single PVC bundle member. The implicit bumping rule is that bumped traffic is to be carried by a PVC that has the lower precedence level.
traffic	Specifies that the PVC accept bumped traffic (the default condition). The no form stipulates that the PVC does not accept bumped traffic.

Defaults

The PVC accepts bumped traffic, and implicit bumping is used.

Command Modes

Frame Relay VC-bundle-member configuration

Command History

Release	Modification
12.2(13)T	This command was introduced.
12.2(16)BX	This command was integrated into Cisco IOS Release 12.2(16)BX.
12.0(26)S	This command was integrated into Cisco IOS Release 12.0(26)S.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.

Usage Guidelines

The **no bump explicit** and **no bump implicit** commands have no effect.

To change the configured bumping rules for a PVC bundle member, override the current configuration with a new **bump** command entry.

To return to the default condition of implicit bumping, use the **bump implicit** command.

The effects of different bumping configurations are as follows:

- **Implicit bumping:** If you configure implicit bumping, bumped traffic is sent to the PVC configured to handle the next-lower service level. When the original PVC that bumped the traffic comes back up, it resumes transmission of the configured service level. When the **bump explicit** command is not configured, the **bump implicit** command takes effect by default; however, the **bump implicit** command does not appear in the **show running-config** and **show startup-config** command outputs.

- **Explicit bumping:** If you configure a PVC with the **bump explicit** command, you can specify the service level to which traffic is bumped when that PVC goes down, and the traffic is directed to a PVC mapped with that level. If the PVC that picks up and carries the traffic goes down, the traffic uses the bumping rules for that PVC. You can specify only one service level for bumping.
- **Permit bumping:** The PVC accepts bumped traffic by default. If the PVC has been previously configured to reject bumped traffic, you must use the **bump traffic** command to return the PVC to its default condition.
- **Reject bumping:** To configure a discrete PVC to reject bumped traffic when traffic is directed to it, use the **no bump traffic** command.

**Note**

When no alternative PVC can be found to handle bumped traffic, even when there are no packets of that traffic type present, the bundle brings itself down. No messages are displayed unless the **debug frame-relay vc-bundle** command is enabled or the interface-level command **logging event frame-relay vc-bundle status** is enabled. When default (implicit) bumping is used for all PVCs, the PVC that is handling the lowest service level can be configured to bump explicitly to a PVC handling a higher service level.

The following examples show the alerts that appear during configuration. They describe configuration problems that might prevent the bundle from coming up or might cause the bundle to go down unexpectedly:

- The following example shows an alert that appears when the **bump explicit** command is configured:


```
%DLCI 300 could end up bumping traffic to itself
```

It warns that PVC 300 may be configured to bump to a PVC that will in turn bump back to PVC 300, in which case the bundle will go down.
- The following example shows an alert that appears when a PVC that is explicitly bumped to is configured with the **no bump traffic** command:


```
%DLCI 306 is configured for bumping traffic to level 7
```
- The following example shows an alert that appears when the service levels handled by a PVC are changed, which leaves other PVCs explicitly configured to bump to levels that are no longer being handled by that PVC:


```
%DLCI(s) configured for explicitly bumping traffic to DLCI 300
```
- The following example shows an alert that appears when a PVC is configured to explicitly bump to a level that is not yet handled by any PVCs:


```
%Presently no member is configured for level 3
```
- The following example shows an alert that appears when you attempt to explicitly configure bumping to a PVC that is already configured with the **no bump traffic** command:


```
%DLCI configured for level 0 does not accept bumping
```

Examples

The following example configures PVC 101 in the Frame Relay PVC bundle named bundle1 with explicit bumping to the PVC bundle member having a precedence level of 7. PVC 101 is also configured to prohibit traffic from other PVCs from being bumped to it:

```
frame-relay vc-bundle bundle1
 match precedence
 pvc 101
 precedence 5
 no bump traffic
 bump explicit 7
```

Related Commands

Command	Description
class	Associates a map class with a specified DLCI.
dscp (Frame Relay VC-bundle-member)	Specifies the DSCP value or values for a specific Frame Relay PVC bundle member.
exp	Configures MPLS EXP levels for a Frame Relay PVC bundle member.
precedence (Frame Relay VC-bundle-member)	Configures the precedence levels for a Frame Relay PVC bundle member.
protect (Frame Relay VC-bundle-member)	Configures a Frame Relay PVC bundle member with protected group or protected PVC status.
pvc (Frame Relay VC-bundle)	Creates a PVC and PVC bundle member and enters Frame Relay VC-bundle-member configuration mode.

cell-packing

To enable ATM over Multiprotocol Label Switching (MPLS) or Layer 2 Tunneling Protocol Version 3 (L2TPv3) to pack multiple ATM cells into each MPLS or L2TPv3 packet, use the **cell-packing** command in the appropriate configuration mode. To disable cell packing, use the **no** form of this command.

cell-packing [*cells*] [**mcpt-timer** *timer*]

no cell-packing

Syntax Description

<i>cells</i>	(Optional) The number of cells to be packed into an MPLS or L2TPv3 packet. The range is from 2 to the maximum transmission unit (MTU) of the interface divided by 52. The default number of ATM cells to be packed is the MTU of the interface divided by 52. If the number of cells packed by the peer provider edge router exceeds this limit, the packet is dropped.
mcpt-timer <i>timer</i>	(Optional) Specifies which timer to use. Valid values are 1, 2, or 3. The default value is 1.

Command Default

Cell packing is disabled.

Command Modes

Interface configuration
L2transport VC configuration—for ATM VC
L2transport VP configuration—for ATM VP
VC class configuration

Command History

Release	Modification
12.0(25)S	This command was introduced.
12.0(29)S	Support for L2TPv3 sessions was added.
12.0(30)S	This command was updated to enable cell packing as part of a virtual circuit (VC) class.
12.0(31)S	This command was integrated into Cisco IOS Release 12.0(31)S.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.4(11)T	This command was integrated into Cisco IOS Release 12.4(11)T.
12.2(33)SRB	This command was integrated into Cisco IOS Release 12.2(33)SRB.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.

Usage Guidelines

The **cell-packing** command is available only if you configure the ATM VC or virtual path (VP) with ATM adaptation layer 0 (AAL0) encapsulation. If you specify ATM adaptation layer 5 (AAL5) encapsulation, the command is not valid.

Only cells from the same VC or VP can be packed into one MPLS or L2TPv3 packet. Cells from different connections cannot be concatenated into the same packet.

When you change, enable, or disable the cell-packing attributes, the ATM VC or VP and the MPLS or L2TPv3 emulated VC are reestablished.

If a provider edge (PE) router does not support cell packing, the PE routers sends only one cell per MPLS or L2TPv3 packet.

The number of packed cells need not match between the PE routers. The two PE routers agree on the lower of the two values. For example, if PE1 is allowed to pack 10 cells per MPLS or L2TPv3 packet and PE2 is allowed to pack 20 cells per MPLS or L2TPv3 packet, the two PE routers would agree to send no more than 10 cells per packet.

If the number of cells packed by the peer PE router exceeds the limit, the packet is dropped.

If you issue the **cell-packing** command without first specifying the **atm mcpt-timers** command, you get the following error:

```
Please set mcpt values first
```

Examples

The following example shows cell packing enabled on an interface set up for VP mode. The **cell-packing** command specifies that ten ATM cells be packed into each MPLS packet. The command also specifies that the second maximum cell-packing timeout (MCPT) timer be used.

```
Router> enable
Router# configure terminal
Router(config)# interface atm1/0
Router(config-if)# atm mcpt-timers 1000 800 500
Router(config-if)# atm pvp 100 l2transport
Router(config-if-atm-l2trans-pvp)# xconnect 10.0.0.1 234 encapsulation mpls
Router(config-if-atm-l2trans-pvp)# cell-packing 10 mcpt-timer 2
```

The following example configures ATM cell relay over MPLS with cell packing in VC class configuration mode. The VC class is then applied to an interface.

```
Router> enable
Router# configure terminal
Router(config)# vc-class atm cellpacking
Router(config-vc-class)# encapsulation aal0
Router(config-vc-class)# cell-packing 10 mcpt-timer 1
Router(config-vc-class)# exit
Router(config)# interface atm1/0
Router(config-if)# atm mcpt-timers 100 200 250
Router(config-if)# class-int cellpacking
Router(config-if)# pvc 1/200 l2transport
Router(config-if-atm-l2trans-pvc)# xconnect 10.13.13.13 100 encapsulation mpls
```

The following example configures ATM AAL5 over L2TPv3 in VC class configuration mode. The VC class is then applied to an interface.

```
Router(config)# vc-class atm aal5class
Router(config-vc-class)# encapsulation aal5
!
Router(config)# interface atm1/0
Router(config-if)# class-int aal5class
Router(config-if)# pvc 1/200 l2transport
Router(config-if-atm-l2trans-pvc)# xconnect 10.13.13.13 100 encapsulation l2tpv3
```

Related Commands

Command	Description
atm mcpt-timers	Creates cell-packing timers, which specify how long the PE router can wait for cells to be packed into an MPLS or L2TPv3 packet.
debug atm cell-packing	Displays ATM cell relay cell packing debugging information.
show atm cell-packing	Displays information about the VCs and VPs that have ATM cell packing enabled.

class

To associate a map class with a specified data-link connection identifier (DLCI), use the **class** command in Frame Relay DLCI configuration mode or Frame Relay VC-bundle-member configuration mode. To remove the association between the DLCI and the map class, use the **no** form of this command.

class *name*

no class *name*

Syntax Description

<i>name</i>	Name of the map class to associate with the specified DLCI.
-------------	---

Defaults

No map class is defined.

Command Modes

Frame Relay DLCI configuration
Frame Relay VC-bundle-member configuration

Command History

Release	Modification
11.2	This command was introduced.
12.2(13)T	This command was made available in Frame Relay VC-bundle-member configuration mode.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Use this command with DLCIs that were created using the **frame-relay interface-dlci** command and with DLCIs that were created as permanent virtual circuit (PVC) bundle members within a specified Frame Relay PVC bundle. The PVC bundle is created using the **frame-relay vc-bundle** command. The Frame Relay PVC bundle member DLCIs are then created by using the **pvc** command in Frame Relay VC-bundle configuration mode.

A map class applied to the interface is applied to all PVC members in a PVC bundle. A class applied to an individual PVC bundle member supersedes the class applied at the interface level.

The map class is created by using the **map-class frame-relay** command in global configuration mode.

Examples

The following example shows how to define a map class named slow-vcs and apply it to DLCI 100:

```
interface serial 0.1 point-to-point
  frame-relay interface-dlci 100
  class slow-vcs
```

```
map-class frame-relay slow-vcs
  frame-relay cir out 9600
```

The following example shows how to apply a map class to a DLCI for which a **frame-relay map** statement exists. The **frame-relay interface-dlci** command must also be used.

```
interface serial 0.2 point-to-multipoint
  frame-relay map ip 172.16.13.2 100
  frame-relay interface-dlci 100
  class slow-vcs
```

```
map-class frame-relay slow_vcs
  frame-relay traffic-rate 56000 128000
  frame-relay idle-timer 30
```

The following example creates a Frame Relay map class named class1 and shows how to assign it to PVC 300 in a Frame Relay PVC bundle named MP-3-static:

```
map-class frame-relay class1
interface serial 1/4
  frame-relay map ip 10.2.2.2 vc-bundle MP-3-static
  frame-relay vc-bundle MP-3-static
  pvc 300
  class HI
```

Related Commands

Command	Description
frame-relay interface-dlci	Assigns a DLCI to a specified Frame Relay subinterface on the router or access server.
frame-relay map	Defines mapping between a destination protocol address and the DLCI used to connect to the destination address.
frame-relay vc-bundle	Creates a Frame Relay PVC bundle and enters Frame Relay VC-bundle configuration mode.
map-class frame-relay	Creates a map class for which unique QoS values can be assigned.
pvc (frame-relay vc-bundle)	Creates a PVC and PVC bundle member and enters Frame Relay VC-bundle-member configuration mode.

class (map-list)

To associate a map class with a protocol-and-address combination, use the **class** command in map-list configuration mode.

```
protocol protocol-address class map-class [broadcast] [trigger] [ietf]
```

Syntax Description

<i>protocol</i>	Supported protocol, bridging, or logical link control keywords: appletalk , bridging , clns , decnet , dls , ip , ipx , llc2 , and rsrb .
<i>protocol-address</i>	Protocol address. The bridge and clns keywords do not use protocol addresses.
<i>map-class</i>	Name of the map class from which to derive quality of service (QoS) information.
broadcast	(Optional) Allows broadcasts on this switched virtual circuit (SVC).
trigger	(Optional) Enables a broadcast packet to trigger an SVC. If an SVC that uses this map class already exists, the SVC will carry the broadcast. This keyword can be configured only if broadcast is also configured.
ietf	(Optional) Specifies RFC 1490 encapsulation. The default is Cisco encapsulation.

Defaults

No protocol, protocol address, and map class are defined. If the **ietf** keyword is not specified, the default is Cisco encapsulation. If the **broadcast** keyword is not specified, no broadcasts are sent.

Command Modes

Map-list configuration

Command History

Release	Modification
11.2	This command was introduced.
12.2(13)T	The vines and xns arguments were removed because Banyan VINES and Xerox Network Systems are no longer available in the Cisco IOS software.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

This command is used for Frame Relay SVCs; the parameters within the map class are used to negotiate for network resources. The class is associated with a static map that is configured under a map list.

Examples

In the following example, if IP triggers the call, the SVC is set up with the QoS parameters defined within the class “classip”. However, if AppleTalk triggers the call, the SVC is set up with the QoS parameters defined in the class “classapple”. An SVC triggered by either protocol results in two SVC maps, one for IP and one for AppleTalk.

Two maps are set up because these protocol-and-address combinations are heading for the same destination, as defined by the **dest-addr** keyword and the values following it in the **map-list** command.

```
map-list maplist1 source-addr E164 14085551212 dest-addr E164 15085551212
  ip 131.108.177.100 class classip
  appletalk 1000.2 class classapple
```

In the following example, the **trigger** keyword allows AppleTalk broadcast packets to trigger an SVC:

```
ip 172.21.177.1 class class1 broadcast ietf
appletalk 1000.2 class class1 broadcast trigger ietf
```

Related Commands

Command	Description
map-class frame-relay	Specifies a map class to define QoS values for an SVC.
map-list	Specifies a map group and links it to a local E.164 or X.121 source address and a remote E.164 or X.121 destination address for Frame Relay SVCs.

clear frame-relay-inarp

To clear dynamically created Frame Relay maps, which are created by the use of Inverse Address Resolution Protocol (ARP), use the **clear frame-relay-inarp** command in privileged EXEC mode.

clear frame-relay-inarp

Syntax Description This command has no arguments or keywords.

Command Modes Privileged EXEC

Command History	Release	Modification
	10.0	This command was introduced.
	12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
	12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Examples The following example clears dynamically created Frame Relay maps:

```
clear frame-relay-inarp
```

Related Commands	Command	Description
	frame-relay inverse-arp	Reenables Inverse ARP on a specified interface or subinterface.
	show frame-relay map	Displays the current map entries and information about the connections.

clear l2tun counters

To clear session counters for Layer 2 tunnels, use the **clear l2tun counters** command in privileged EXEC mode.

```
clear l2tun counters [session {ip-addr ip-address | tunnel {id local-id [local-session-id] | remote-name remote-name local-name } | username username | vcid vcid }]
```

Syntax Description		
session		(Optional) Specifies that Layer 2 Tunnel Protocol (L2TP) session counters associated with a particular subset of sessions will be cleared.
ip-addr <i>ip-address</i>		(Optional) Specifies that L2TP session counters for sessions associated with a particular peer IP address will be cleared.
tunnel		(Optional) Specifies that L2TP session counters for sessions associated with a particular tunnel will be cleared.
id <i>local-id</i> [<i>local-session-id</i>]		(Optional) Specifies the tunnel for which L2TP session counters will be cleared using the local tunnel ID, and optionally the local session ID.
remote-name <i>remote-name local-name</i>		(Optional) Specifies the tunnel for which L2TP session counters will be cleared using the remote tunnel name and local tunnel name.
username <i>username</i>		(Optional) Specifies that L2TP session counters for the sessions associated with a particular username will be cleared.
vcid <i>vcid</i>		(Optional) Specifies that L2TP session counters for the sessions associated with a particular virtual circuit ID (VCID) will be cleared.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(28)SB	This command was introduced.

Usage Guidelines Use the **clear l2tun counters** command to clear the counters for all sessions. Use the additional syntax options to clear the counters for only the specified subset of sessions.

Examples The following example clears the session counters for all sessions:

```
Router# clear l2tun counters
```

The following example clears the session counters for only those sessions associated with the peer at IP address 10.1.1.1:

```
Router# clear l2tun counters session ip-addr 10.1.1.1
```

Related Commands

Command	Description
clear l2tun counters tunnel l2tp	Clears global or per-tunnel control message statistics for L2TP tunnels.
show l2tun	Displays general information about Layer 2 tunnels and sessions.
show l2tun counters tunnel l2tp	Displays global or per-tunnel control message statistics for L2TP tunnels, or toggles the recording of per-tunnel statistics for a specific tunnel.
show l2tun session	Displays the current state of Layer 2 sessions and protocol information about L2TP control channels.
show l2tun tunnel	Displays the current state of Layer 2 tunnels and information about configured tunnels, including local and remote L2TP hostnames, aggregate packet counts, and control channel information.

clear l2tun counters tunnel l2tp

To clear global or per-tunnel control message statistics for Layer 2 Tunnel Protocol (L2TP) tunnels, use the **clear l2tun counters tunnel l2tp** command in privileged EXEC mode.

```
clear l2tun counters tunnel l2tp [authentication | id local-id]
```

Syntax Description

authentication	(Optional) Clears the L2TP control channel authentication attribute-value (AV) pair counters.
id local-id	(Optional) Clears the per-tunnel control message counters for the L2TP tunnel with the specified local ID.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(28)SB	This command was introduced.

Usage Guidelines

Use the **clear l2tun counters tunnel l2tp** command to clear the global L2TP control message counters.

Use the **clear l2tun counters tunnel l2tp id local-id** command to clear the per-tunnel L2TP control message counters for the L2TP tunnel with the specified local ID.

Use the **clear l2tun counters tunnel l2tp authentication** command to globally clear only the authentication counters.

Examples

The following example clears the global L2TP control message counters:

```
clear l2tun counters tunnel l2tp
```

The following example clears the per-tunnel L2TP control message counters for the tunnel with the local ID 38360:

```
clear l2tun counters tunnel l2tp id 38360
```

The following example clears the L2TP control channel authentication counters globally:

```
clear l2tun counters tunnel l2tp authentication
```

Related Commands

Command	Description
monitor l2tun counters tunnel l2tp	Enables or disables the collection of per-tunnel control message statistics for L2TP tunnels.
show l2tun counters tunnel l2tp	Displays global or per-tunnel control message statistics for L2TP tunnels.
show l2tun tunnel	Displays the current state of L2TP tunnels and information about configured tunnels.

clear vpdn tunnel pppoe

To clear all PPP over Ethernet (PPPoE) sessions, use the **clear vpdn tunnel pppoe** command in privileged EXEC configuration mode.

clear vpdn tunnel pppoe

Syntax Description This command has no arguments or keywords.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.1(1)T	This command was introduced.
	12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
	12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines Use this command to clear all PPPoE sessions on the device. To clear a specific PPPoE session or set of sessions, use the **clear pppoe** command.

Examples The following example clears all PPPoE sessions on the device:

```
Router# clear vpdn tunnel pppoe
```

Related Commands	Command	Description
	clear pppoe	Clears PPPoE sessions.

clear x25

To restart an X.25 service or Connection-Mode Network Service (CMNS), to clear a switched virtual circuit (SVC), or to reset a permanent virtual circuit (PVC), use the **clear x25** command in privileged EXEC mode.

```
clear x25 {serial number | {ethernet | fastethernet | tokenring | fddi} number mac-address}
         [vc-number] | [dlci-number]
```

Syntax Description		
<i>serial number</i>		Local serial interface being used for X.25 service.
{ ethernet fastethernet tokenring fddi } <i>number mac-address</i>		Local CMNS interface (Ethernet, Fast Ethernet, Token Ring, or FDDI interface) and MAC address of the remote device; this information identifies a CMNS service.
<i>vc-number</i>		(Optional) SVC or PVC number, in the range 1 to 4095. If specified, the SVC is cleared or the PVC is reset. If not specified, the X.25 or CMNS service is restarted.
<i>dlci-number</i>		(Optional) When combined with a serial interface number, it triggers a restart event for an Annex G logical X.25 VC.

Command Modes Privileged EXEC

Command History	Release	Modification
	11.2	This command was introduced.
	12.0(3)T	Annex G restart or clear options were added.
	12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
	12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

This command replaces the **clear x25-vc** command, which first appeared in Cisco IOS Release 8.3. This command is used to disrupt service forcibly on an individual circuit or on all circuits using a specific X.25 service or CMNS service.

If this command is used without the *vc-number* value, a restart event is initiated, which implicitly clears all SVCs and resets all PVCs.

This command allows the option of restarting an Annex G connection per data-link connection identifier (DLCI) number, clearing all X.25 connections, or clearing a specific X.25 logical circuit number on that Annex G link.

Examples The following example clears the SVC or resets the PVC specified:

```
clear x25 serial 0 1
```

The following example forces an X.25 restart, which implicitly clears all SVCs and resets all PVCs using the interface:

```
clear x25 serial 0
```

The following example restarts the specified CMNS service (if active), which implicitly clears all SVCs using the service:

```
clear x25 ethernet 0 0001.0002.0003
```

The following example clears the specified DLCI Annex G connection (40) from the specified interface:

```
clear x25 serial 1 40
```

Related Commands

Command	Description
clear xot	Clears an XOT SVC or resets an XOT PVC.
frame-relay interface-dlci	Assigns a DLCI to a specified Frame Relay subinterface on the router or access server.
show x25 context	Displays details of an Annex G DLCI link.
show x25 services	Displays information about X.25 services.
show x25 vc	Displays information about active X.25 virtual circuits.

clear xot

To clear an X.25 over TCP (XOT) switched virtual circuit (SVC) or reset an XOT permanent virtual circuit (PVC), use the **clear xot** command in privileged EXEC mode.

clear xot remote *ip-address port* **local** *ip-address port*

Syntax Description

remote <i>ip-address port</i>	Remote IP address and port number of an XOT connection ID.
local <i>ip-address port</i>	Local IP address and port number of an XOT connection ID.

Command Modes

Privileged EXEC

Command History

Release	Modification
11.2	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Each SVC or PVC supported by the XOT service uses a TCP connection to communicate X.25 packets. A TCP connection is uniquely identified by the data quartet: remote IP address, remote TCP port, local IP address, and local TCP port. This command form is used to forcibly disrupt service on an individual XOT circuit.

XOT connections are sent to TCP port 1998, so XOT connections originated by the router will have that remote port number, and connections received by the router will have that local port number.

Examples

The following command will clear or reset, respectively, the SVC or PVC using the TCP connection identified:

```
clear xot remote 10.1.1.1 1998 local 172.2.2.2 2000
```

Related Commands

Command	Description
show x25 services	Displays information pertaining to the X.25 services.

clp-bit

To set the ATM cell loss priority (CLP) field in the ATM cell header, use the **clp-bit** command in FRF.5 or FRF.8 connect mode. To disable ATM CLP bit mapping, use the **no** form of this command.

clp-bit {0 | 1 | map-de}

no clp-bit {0 | 1 | map-de}

Syntax Description

0	The CLP field in the ATM cell header is always set to 0.
1	The CLP field in the ATM cell header is always set to 1.
map-de	The discard eligible (DE) field in the Frame Relay header is mapped to the CLP field in the ATM cell header.

Defaults

The default is set to **map-de**.

Command Modes

FRF.5 connect configuration
FRF.8 connect configuration

Command History

Release	Modification
12.1(2)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

This command maps from Frame Relay to ATM.

Examples

FRF.5: Example

The following example sets the CLP field in the ATM header to 1 for FRF.5:

```
Router(config)# connect network-1 vc-group network-1 ATM3/0 1/35
Router(config-frf5)# clp-bit 1
```

FRF.8: Example

The following example sets the CLP field in the ATM header to 1 for FRF.8:

```
C3640(config)# connect service-1 Serial11/0 16 ATM3/0 1/32 service-interworking
C3640(config-frf8)# clp-bit 1
```

Related Commands

Command	Description
connect (FRF.5)	Connects a Frame Relay DLCI or VC group to an ATM PVC.
de-bit map-clp	Sets the Frame Relay DE bit field in the Frame Relay cell header.

cmns enable

To enable the Connection-Mode Network Service (CMNS) on a nonserial interface, use the **cmns enable** command in interface configuration mode. To disable this capability, use the **no** form of this command.

cmns enable

no cmns enable

Syntax Description This command has no arguments or keywords.

Defaults Each nonserial interface must be explicitly configured to use CMNS.

Command Modes Interface configuration

Command History	Release	Modification
	10.0	This command was introduced.
	12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
	12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines After this command is processed on the LAN interfaces—Ethernet, Fiber Distributed Data Interface (FDDI), and Token Ring—all the X.25-related interface configuration commands are made available.

Examples The following example enables CMNS on Ethernet interface 0:

```
interface ethernet 0
  cmns enable
```

Related Commands	Command	Description
	x25 route	Creates an entry in the X.25 routing table (to be consulted for forwarding incoming calls and for placing outgoing PAD or protocol translation calls).

connect (Frame Relay)

To define connections between Frame Relay permanent virtual circuits (PVCs), use the **connect** command in global configuration mode. To remove connections, use the **no** form of this command.

```
connect connection-name interface dlc {interface dlc | l2transport}
```

```
no connect connection-name interface dlc {interface dlc | l2transport}
```

Syntax Description

<i>connection-name</i>	A name for this connection.
<i>interface</i>	Interface on which a PVC connection will be defined.
<i>dlc</i>	Data-link connection identifier (DLCI) number of the PVC that will be connected.
l2transport	Specifies that the PVC will not be a locally switched PVC, but will be tunneled over the backbone network.

Defaults

No default behavior or values

Command Modes

Global configuration

Command History

Release	Modification
12.1(2)T	This command was introduced.
12.0(23)S	The l2transport keyword was added.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(15)T	This command was integrated into Cisco IOS Release 12.2(15)T.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

When Frame Relay switching is enabled, the **connect** command creates switched PVCs in Frame Relay networks.

Examples

The following example shows how to define a connection called “frompls1” with DLCI 100 on serial interface 5/0.

```
connect frompls1 Serial5/0 100 l2transport
```

■ connect (Frame Relay)

The following example shows how to enable Frame Relay switching and define a connection called “one” between DLCI 16 on serial interface 0 and DLCI 100 on serial interface 1.

```
frame-relay switching
connect one serial0 16 serial1 100
```

Related Commands

Command	Description
frame-relay switching	Enables PVC switching on a Frame Relay DCE or NNI.
mpls l2transport route	Enables routing of Frame Relay packets over a specified VC.

connect (FRF.5)

To configure an FRF.5 one-to-one or many-to-one connection between two Frame Relay end users over an intermediate ATM network, use the **connect** command in global configuration mode. To remove a connection, use the **no** form of this command.

```
connect connection-name { vc-group group-name | fr-interface fr-dlci } atm-interface atm-vpilvci
network-interworking
```

```
no connect connection-name { vc-group group-name | fr-interface fr-dlci } atm-interface
atm-vpilvci network-interworking
```

Syntax Description

<i>connection-name</i>	Connection name. Enter as a string of 15 characters maximum.
vc-group <i>group-name</i>	VC group name for a many-to-one FRF.5 connection. Enter as a string of 11 characters maximum. (If the vc-group keyword is specified, the interworking type is always network-interworking and does not need to be set as such.)
<i>fr-interface</i>	Frame Relay interface type and number; for example, serial1/0 .
<i>fr-dlci</i>	Frame Relay data-link connection identifier (DLCI) in the range from 16 to 1007.
<i>atm-interface</i>	ATM interface type and number; for example, atm1/0 .
<i>atm-vpilvci</i>	ATM virtual path identifier/virtual channel identifier (VPI/VCI). If a VPI is not specified, the default VPI is 0.
network-interworking	FRF.5 network interworking connection. This keyword is not valid if the vc-group keyword is specified. (If the vc-group keyword is specified, the interworking type is always network-interworking and does not need to be set as such.)

Defaults

No default behavior or values

Command Modes

Global configuration

Command History

Release	Modification
12.1(2)T	This command was introduced.
12.2(8)YN	Enhanced QoS features were added for Cisco 1720, Cisco 1750, Cisco 1751, Cisco 1760, Cisco 2610XM-2651XM, Cisco 3640, Cisco 3640A, and Cisco 3660.
12.3(2)T	This feature was integrated into Cisco IOS Release 12.3(2)T for the following platforms: Cisco 1720, Cisco 1721, Cisco 1750, Cisco 1751, Cisco 1760, Cisco 2610-2651, Cisco 2610XM-2651XM, Cisco 2691, Cisco 3620, Cisco 3640, Cisco 3640A, and Cisco 3660.

Release	Modification
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Use the **connect** command to connect a group of Frame Relay DLCIs to an ATM permanent virtual circuit (PVC).

To connect to the Frame Relay DLCI that has been configured on the interface, the Frame Relay DLCI must be configured on the interface using the **frame-relay interface-dlci switched** command.

To disconnect the FRF.5 interworking connection, use the **shutdown** command in FRF.5 connect mode.

Examples

The following example shows how to create an FRF.5 one-to-one connection (not using the **vc-group** keyword):

```
Router(config)# interface serial0/0
Router(config-if)# frame-relay interface-dlci 100 switched
Router(config-if)# interface atm1/0
Router(config-if)# pvc 0/32
Router(config-if-atm-vc)# encapsulation aal5mux frame-relay
Router (config-if-atm-vc)# exit
Router (config-if)# exit
Router(config)# connect frf5 serial0/0 100 atm1/0 0/32 network-interworking
Router(config-frf5)# clp-bit 1
Router(config-frf5)# de-bit map-clp
```

The following example shows how to create an FRF.5 many-to-one connection (using the **vc-group** keyword):

```
Router(config)# interface serial1/0
Router(config-if)# frame-relay interface-dlci 100 switched
Router (config-if)# exit
Router(config)# vc-group friends
Router(config-vc-group)# serial1/0 16 16
Router(config-vc-group)# serial1/0 17 17
Router(config-vc-group)# serial1/0 18 18
Router(config-vc-group)# serial1/0 19 19
Router (config-vc-group)# exit
Router(config)# interface atm1/0
Router(config-if)# pvc 0/32
Router (config-if-atm-vc)# encapsulation aal5mux frame-relay
Router (config-if-atm-vc)# exit
Router (config-if)# exit
Router(config)# connect frf5-v vc-group friends atm1/0 0/32
Router(config-frf5)# de-bit map-clp
```

Related Commands

Command	Description
clp-bit	Sets the ATM CLP field in the ATM cell header.
de-bit	Sets the Frame Relay DE bit field in the Frame Relay cell header for FRF.5 and FRF.8 service interworking.

Command	Description
encapsulation aal5	Configures the AAL and encapsulation type for an ATM PVC, SVC, VC class, or VC bundle.
frame-relay interface-dlci switched	Indicates that a Frame Relay DLCI is switched.
pvc	Creates or assigns a name to an ATM PVC, specifies the encapsulation type on an ATM PVC, or enters interface-AMT-VC configuration mode.
vc-group	Assigns multiple Frame Relay DLCIs to a VC group.

connect (FRF.8)

To configure an FRF.8 one-to-one mapping between a Frame Relay data-link connection identifier (DLCI) and an ATM permanent virtual circuit (PVC), use the **connect** command in global configuration mode. To remove a connection, use the **no** form of this command.

connect *connection-name* *FR-interface* *FR-DLCI* *ATM-interface* *ATM-VPI/VCI*
service-interworking

no connect *connection-name* *FR-interface* *FR-DLCI* *ATM-interface* *ATM-VPI/VCI*
service-interworking

Syntax Description

<i>connection-name</i>	Specifies a connection name. Enter as a 15-character maximum string.
<i>FR-interface</i>	Specifies the Frame Relay interface type and number, for example, serial1/0 .
<i>FR-DLCI</i>	Specifies the Frame Relay data-link connection identifier (DLCI) in the range 16 to 1007.
<i>ATM-interface</i>	Specifies the ATM interface type and number, for example atm1/0 .
<i>ATM-VPI/VCI</i>	Specifies the ATM virtual path identifier/virtual channel identifier (VPI/VCI). If a VPI is not specified, the default VPI is 0.
service-interworking	Specifies FRF.8 service interworking.

Defaults

No default behavior or values.

Command Modes

Global configuration

Command History

Release	Modification
12.1(2)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Use the **connect** command to connect a Frame Relay DLCI to an ATM PVC.

To disconnect the FRF.8 interworking connection, use the **shutdown** connect subcommand.

Examples

The following example shows how to create an FRF.8 connection:

```
router(config)# interface serial0
router(config-if)# frame-relay interface-dlci 100 switched
router(config-if)# interface atm1/0
router(config-if)# pvc 0/32
router(config-if-atm-vc)# encapsulation aal5mux fr-atm-srv
router(config)# connect service-1 Serial0 100 ATM1/0 0/32 service-interworking
router(config-frf8)# efci-bit map-fecn
```

Related Commands

Command	Description
clp-bit	Sets the ATM CLP field in the ATM cell header.
de-bit map-clp	Sets the EFCI bit field in the ATM cell header.
encapsulation aal5	Configures the AAL and encapsulation type for an ATM PVC, SVC, or VC class.
pvc	Creates an ATM PVC on a main interface or subinterface; enters interface-ATM-VC configuration mode.

connect (L2VPN local switching)

To create Layer 2 data connections between two ports on the same router, use the **connect** command in global configuration mode. To remove such connections, use the **no** form of this command.

Syntax for 12.0S, 12.2S and 12.4T Releases

```
connect connection-name type number [dldci | pvc | pvp] type number [dldci | pvc | pvp]
[interworking ip | ethernet]
```

```
no connect connection-name type number [dldci | pvc | pvp] type number [dldci | pvc | pvp]
[interworking ip | ethernet]
```

Syntax for Cisco IOS XE Release 2.5 and Later Releases

```
connect connection-name type number type number
```

```
no connect connection-name type number type number
```

Syntax Description	
<i>connection-name</i>	A name for this local switching connection.
<i>type</i>	String that identifies the type of interface used to create a local switching connection; for example, serial or Gigabit Ethernet.
<i>number</i>	Integer that identifies the number of the interface; for example, 0/0/0.1 for a Gigabit Ethernet interface.
<i>dldci</i>	(Optional) The data-link connection identifier (DLCI) assigned to the interface.
<i>pvc</i>	(Optional) The permanent virtual circuit (PVC) assigned to the interface, expressed by its vpi/vci (virtual path and virtual channel identifiers).
<i>pvp</i>	(Optional) The permanent virtual path (PVP) assigned to the interface.
interworking ip ethernet	(Optional) Specifies that this local connection enables different transport types to be switched locally. These keyword options are not necessary for configurations that locally switch the same transport type, such as ATM to ATM, or Frame Relay to Frame Relay. Choices are: <ul style="list-style-type: none"> interworking ip—Causes IP packets to be extracted from the attachment circuit and sent over the pseudowire. Attachment circuit frames that do not contain IPv4 packets are dropped. ethernet—Causes Ethernet frames to be extracted from the attachment circuit and sent over the pseudowire. Ethernet end-to-end transmission is assumed. Attachment circuit frames that do not contain Ethernet frames are dropped. In the case of VLAN, the VLAN tag is removed, leaving a pure Ethernet frame.

Command Default This command is disabled by default.

Command Modes Global configuration

Command History

Release	Modification
12.0(27)S	This command was introduced for local switching.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.0(30)S	This command was integrated into Cisco IOS Release 12.0(30)S.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.4(11)T	This command was integrated into Cisco IOS Release 12.4(11)T.
12.2(33)SRB	This command was integrated into Cisco IOS Release 12.2(33)SRB.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
Cisco IOS XE Release 2.5	This command was integrated into Cisco IOS XE Release 2.5.

Examples

The following example shows an Ethernet interface configured for Ethernet, plus an ATM interface configured for AAL5 Subnetwork Access Protocol (SNAP) encapsulation. The **connect** command allows local switching between these two interfaces and specifies the interworking type as IP mode.

```
Router(config)# interface atm 0/0/0
Router(config-if)# pvc 0/100 12transport
Router(cfg-if-atm-12trans-pvc)# encapsulation aal5snap
```

```
Router(config)# interface fastethernet 6/0/0.1
Router(config-subif)# encapsulation dot1q 100
```

```
Router(config)# connect atm-eth-con atm 0/0/0 0/100 fastethernet 6/0/0.1 interworking ip
```

Related Commands

Command	Description
frame-relay switching	Enables PVC switching on a Frame Relay DCE or NNI.