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x25 accept-reverse

To configure the Cisco IOS software to accept all reverse-charge calls, use the **x25 accept-reverse**command in interface or X.25 profile configuration mode. To disable this facility, use the **no** form of this command.

x25 accept-reverse

no x25 accept-reverse

Syntax Description

This command has no arguments or keywords.

Command Default

Disabled

Command Modes

Interface configuration X.25 profile 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

This command causes the interface to accept reverse-charge calls by default. You can also configure this behavior for each peer with the **x25 map** interface configuration command.

Examples

The following example sets acceptance of reverse-charge calls:

```
interface serial 0
 x25 accept-reverse
```

Related Commands

Command	Description
x25 map	Sets up the LAN protocols-to-remote host mapping.

x25 address

To set the X.121 address of a particular network interface, use the **x25 address** command in interface or X.25 profile configuration mode.

x25 address *x121-address*

Syntax Description

x121-address	Variable-length X.121 address. It is assigned by the X.25 network service provider.

Command Default

Defense Data Network (DDN) and Blacker Front End (BFE) encapsulations have a default interface address generated from the interface IP address. For proper DDN or BFE operation, this generated X.121 address must not be changed. Standard X.25 encapsulations do not have a default.

Command Modes

Interface configuration

X.25 profile 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

When you are connecting to a public data network (PDN), the PDN administrator will assign the X.121 address to be used. Other applications (for example, a private X.25 service), may assign arbitrary X.121 addresses as required by the network and service design. X.25 interfaces that engage in X.25 switching only do not need to assign an X.121 address.

Examples

The following example sets the X.121 address for the interface:

```
interface serial 0
 encapsulation x25
 x25 address 00000123005
```

The address must match that assigned by the X.25 network service provider.

x25 address (line)

To assign an X.121 address to a TTY line, use the **x25 address** command in line configuration mode. To remove the assigned address, use the **no** form of this command.

x25 address *x121-address*

no x25 address *x121-address*

Syntax Description

x121-address	X.121 address. The address must be a numerical string no longer than 20 digits.

Command Default

No X.121 address is defined.

Command Modes

Line configuration

Command History

Release	Modification
12.3(11)YN	This command was introduced.
12.4(4)T	This command was integrated into Cisco IOS Release 12.4(4)T.

Usage Guidelines

Each X.121 address can be associated with only one line.

This command cannot configure VTY lines.

Examples

The following example assigns the X.121 address of 12345 to the TTY line:

```
x25 address 12345
```

Related Commands

Command	Description
x25 address	Sets the X.121 address of a particular network interface.

x25 alias

To configure an interface alias address that will allow this interface to accept calls with other destination addresses, use the **x25 alias** command in interface or X.25 profile configuration mode.

x25 alias {*destination-pattern*| *x121-address-pattern*} [**cud** *cud-pattern*]

Syntax Description

destination-pattern	Regular expression used to match against the destination address of a received call.
x121-address-pattern	Alias X.121 address for the interface, allowing it to act as destination host for calls having different destination address.
cud *cud-pattern*	(Optional) Call user data (CUD) pattern, a regular expression of ASCII text. The CUD field might be present in a call packet. The first few bytes (commonly 4 bytes long) identify a protocol; the specified pattern is applied to any user data after the protocol identification.

Command Default

No alias is configured.

Command Modes

Interface configuration X.25 profile configuration

Command History

Release	Modification
11.2	This command was introduced. It replaces the functionality that was provided by the **alias** keyword of the **x25 route** command.
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

Encapsulation, packet assembler/disassembler (PAD), and Qualified Logical Link Control (QLLC) calls are normally accepted when the destination address is that of the interface (or the zero-length address). Those calls will also be accepted when the destination address matches a configured alias.

Examples

An X.25 call may be addressed to the receiving interface; calls addressed to the receiving interface are eligible for acceptance as a datagram encapsulation, PAD or QLLC connection, and may not be routed. In the following example, serial interface 0 is configured with a native address of 0000123 and a destination alias for any address that starts with 1111123. That is, serial interface 0 can accept its own calls and calls for any destination that starts with 1111123.

```
interface serial 0
 encapsulation x25
 x25 address 0000123
 x25 alias ^1111123.*
```

x25 bfe-decision

Note Effective with Cisco IOS Release 12.2, the **x25 bfe-decision**command is not available in Cisco IOS Software.

To specify how a router configured for **x25 bfe-emergency decision** will participate in emergency mode, use the **x25 bfe-decision** command in interface configuration mode.

x25 bfe-decision {**no**| **yes**| **ask**}

Syntax Description

no	Prevents the router from participating in emergency mode and from sending address translation information to the BFE device.
yes	Allows the router to participate in emergency mode and to send address translation information to the BFE when the BFE enters emergency mode. This information is obtained from the table created by the **x25 remote-red** command.
ask	Configures the Cisco IOS software to prompt you to enter the **bfe** EXEC command.

Command Default

The router does not participate in emergency mode.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
10.0	This command was introduced.
12.2	This command became unsupported.

Examples

The following example configures serial interface 0 to require an EXEC command from you before it participates in emergency mode. The host IP address is 21.0.0.12, and the address of the remote BFE unit is 21.0.0.1. When the BFE enters emergency mode, the Cisco IOS software prompts you for the **bfe enter** EXEC command to direct the router to participate in emergency mode.

```
interface serial 0
 x25 bfe-emergency decision
```

```
x25 remote-red 21.0.0.12 remote-black 21.0.0.1
x25 bfe-decision ask
```

Related Commands

Command	Description
bfe	Allows the router to participate in emergency mode or to end participation in emergency mode when the interface is configured using the **x25 bfe-emergency decision** and **x25 bfe-decision ask** commands.
x25 bfe-emergency	Configures the circumstances under which the router participates in emergency mode.
x25 remote-red	Sets up the table that lists the BFE nodes (host or gateways) to which the router will send packets.

x25 bfe-emergency

Note Effective with Cisco IOS Release 12.2, the **x25 bfe-emergency**command is not available in Cisco IOS Software.

To configure the circumstances under which the router participates in emergency mode, use the **x25 bfe-emergency** command in interface configuration mode.

x25 bfe-emergency {**never**| **always**| **decision**}

Syntax Description

never	Prevents the router from sending address translation information to the Blacker Front End (BFE). If it does not receive address translation information, the BFE cannot open a new connection for which it does not know the address.
always	Allows the router to pass address translations to the BFE when it enters emergency mode and an address translation table has been created.
decision	Directs the router to wait until it receives a diagnostic packet from the BFE device indicating that the emergency mode window is open. The window is only open when a condition exists that allows the BFE to enter emergency mode. When the diagnostic packet is received, the participation in emergency mode depends on how the router is configured with the **x25 bfe-decision**command.

Command Default

No address translation information is sent to the BFE.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
10.0	This command was introduced.
12.2	This command became unsupported.

Examples

The following example configures serial interface 0 to require an EXEC command from you before it participates in emergency mode. The host IP address is 21.0.0.12, and the address of the remote BFE unit is 21.0.0.1. When the BFE enters emergency mode, the Cisco IOS software prompts you for the **bfe enter**EXEC command to direct the router to participate in emergency mode.

```
interface serial 0
 x25 bfe-emergency decision
 x25 remote-red 21.0.0.12 remote-black 21.0.0.1
 x25 bfe-decision ask
```

Related Commands

Command	Description
bfe	Allows the router to participate in emergency mode or to end participation in emergency mode when the interface is configured using the **x25 bfe-emergency decision** and **x25 bfe-decision ask** commands.
x25 bfe-decision	Specifies how a router configured for X.25 BFE emergency decision will participate in emergency mode.

x25 call-record

To enable a record to be made of outgoing, incoming, and switched calls on the router, use the **x25 call-record**command in global configuration mode. To disable such record-making, use the **no** form of this command.

x25 call-record

no x25 call-record

Syntax Description

This command has no arguments or keywords.

Command Default

No call record is generated.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.4(15)T	This command was introduced.

Usage Guidelines

Cisco recommends that you configure the router to use Syslog Facility to send the generated call records automatically to a remote syslog server for immediate storage and subsequent retrieval. You'll find instructions on how to do that in the *X.25 Call Record* document.

Examples

```
The following example enables generation of records about calls arriving, leaving, or being
 switched at the router:
x25 call-record
```

Following are two records generated by one such call, which arrived on an intermediate router's serial interface and departed through XOT, being routed over a hunt group:

Examples

```
Jun  7 10:42:00.131: %X25-5-CALL_RECORD:
Start=10:41:54.187 UTC Wed Jun 7 2006, End=10:42:00.131 UTC Wed Jun 7 2006,  Host=R3845-86-34,
 Client=Switch,
Call-direction=incoming,  Calling-addr=33030,  Called-addr=3500,
Interface=Serial0/3/1,  Logical-channel=1024,
Facilities=win-in 2, win-out 2, pkt-in 128, pkt-out 128 tput-in 0, tput-out 0, fast-select
 no, reverse-charging no,
Bytes sent/rcvd=52/55, Packets sent/rcvd=3/3,
Clear cause=0, Diag code=0
```

Examples

```
Jun  7 10:42:00.131: %X25-5-CALL_RECORD:
Start=10:41:54.187 UTC Wed Jun 7 2006, End=10:42:00.131 UTC Wed Jun 7 2006,  Host=R3845-86-34,
 Client=Switch, Huntgroup=HG4,
```

```
Call-direction=outgoing,  Calling-addr=33030,  Called-addr=3500,
Interface=XOT (local: 10.2.86.34:23686 remote: 10.2.86.35:1998),  Logical-channel=1,
Facilities=win-in 2, win-out 2, pkt-in 128, pkt-out 128 tput-in 0, tput-out 0, fast-select
 no, reverse-charging no,
Bytes sent/rcvd=55/52, Packets sent/rcvd=3/3,
Clear cause=0, Diag code=0
```

Related Commands

Command	Description
logging host	Enables logging to a remote syslog server.

x25 default

To set a default protocol that Cisco IOS software will assume applies to incoming calls with unknown or missing protocol identifier in the call user data (CUD), use the **x25 default** command in interface configuration mode or X.25 profile configuration mode. To remove the default protocol specified, use the **no**form of this command.

x25 default *protocol*

no x25 default *protocol*

Syntax Description

protocol	Specifies the protocol to assume; may be **ip** or **pad**.

Command Default

No default protocol is specified.

Command Modes

Interface configuration

X.25 profile 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

This command specifies the protocol assumed by the Cisco IOS software for incoming calls with unknown or missing protocol identifier in the call user data (CUD). If you do not use the **x25 default** interface configuration command, the software clears any incoming calls with unrecognized CUD.

Examples

The following example establishes IP as the default protocol for X.25 calls:

```
interface serial 0
 x25 default ip
```

Related Commands

Command	Description
x25 map	Sets up the LAN protocols-to-remote host mapping.

x25 facility

To force facilities on a per-call basis for calls originated by the router (switched calls are not affected), use the **x25 facility**command in interface or X.25 profile configuration mode. To disable a facility, use the **no** form of this command.

x25 facility *option*

no x25 facility *option*

Syntax Description

option	Set of user facilities options. See the table below for a list of supported facilities and their values.

Command Default

No facility is sent.

Command Modes

Interface configuration X.25 profile 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

The table below lists the set of **x25 facility** command user facilities options.

Table 1: x25 facility User Facilities Options

User Facilities Option	Description
cug *number*	Specifies a closed user group (CUG) number; CUGs numbered from 1 to 9999 are allowed. CUGs can be used by a public data network (PDN) to create a virtual private network within the larger network and to restrict access.

User Facilities Option	Description
packetsize *in-size out-size*	Proposes input maximum packet size *(in-size*) and output maximum packet size (*out-size*) for flow control parameter negotiation.Both values must be one of the following values: 16, 32, 64, 128, 256, 512, 1024, 2048, or 4096.
windowsize *in-size out-size*	Proposes the packet count for input windows (*in-size*) and output windows (*out-size*) for flow control parameter negotiation. Both values must be in the range 1 to 127 and must not be greater than or equal to the value set for the **x25 modulo** command.
reverse	Specifies reverses charging on all calls originated by the interface.
throughput *in out*	Sets the requested throughput class negotiation values for input (*in*) and output (*out*) throughput across the network. Values for *in* and *out* are in bits per second (bps) and range from 75 to 64000 bps.
transit-delay *value*	Specifies a network transit delay to request for the duration of outgoing calls for networks that support transit delay. The transit delay value can be between 0 and 65534 milliseconds.
roa *name*	Specifies the name defined by the **x25 roa** command for a list of transit Recognized Operation Agencies (ROAs) to use in outgoing Call Request packets.

Examples

The following example specifies a transit delay value in an X.25 configuration:

```
interface serial 0
 x25 facility transit-delay 24000
```

The following example sets an ROA name and then sends the list via the X.25 user facilities:

```
x25 roa green_list 23 35 36
interface serial 0
 x25 facility roa green_list
```

Related Commands

Command	Description
x25 suppress-called-address	Omits the destination address in outgoing calls.

x25 fail-over

To configure a secondary interface and set the number of seconds for which a primary interface must be up before the secondary interface resets, use the **x25 fail-over** command in the appropriate configuration mode. To prevent the secondary interface from resetting, use the **no** form of this command.

x25 fail-over *seconds* **interface** *type number* [*dlci*| *mac-address*]

no x25 fail-over *seconds* **interface** *type number* [*dlci*| *mac-address*]

Syntax Description

seconds	Number of seconds for which the primary interface must be up before the secondary interface resets.
interface	Secondary interface.
type	Interface type.
number	Interface number.
dlci	(Optional) DLCI number.
mac-address	(Optional) MAC address.

Command Default

No default behavior or values

Command Modes

Interface configuration X.25 profile configuration

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

The **x25 fail-over** command can be configured on a primary X.25 interface or an X.25 profile only.

Examples

In the following example, X.25 failover is configured on a network that is also configured for Annex G. If data-link connection identifier (DLCI) 13 or DLCI 14 on serial interface 1/0 goes down, dialer interface 1

will serve as the secondary interface. After DLCI 13 or 14 comes back up and remains up for 20 seconds, dialer interface 1 will reset, sending all calls back to the primary interface.

```
interface serial1/0
 encapsulation frame-relay
 frame-relay interface-dlci 13
 x25-profile frame1
  exit
 frame-relay interface-dlci 14
 x25-profile frame1 dte
  exit
!
interface dialer1
 encapsulation x25
 exit
x25 route ^1234 interface serial1/0 dlci 13
x25 route ^1234 interface serial1/0 dlci 14
x25 route ^1234 interface dialer1
!
x25 profile frame1
 x25 fail-over 20 interface dialer1
  exit
!
```

Related Commands

Command	Description
show x25 context	Displays information about X.25 links.
x25 profile	Configures an X.25 profile without specifying any hardware-specific information.

x25 hic

To set the highest incoming-only virtual circuit (VC) number, use the **x25 hic** interface configuration command.

x25 hic *circuit-number*

Syntax Description

circuit-number	VC number from 1 to 4095, or 0 if there is no incoming-only VC range.

Command Default

0

Command Modes

Interface configuration X.25 profile 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

This command is applicable only if you have the X.25 switch configured for an incoming-only VC range. *Incoming* is from the perspective of the X.25 data terminal equipment (DTE). If you do not want any outgoing calls from your DTE, configure both ends to disable the two-way range (set the values of **x25 ltc** and **x25 htc** to 0) and configure an incoming-only range. Any incoming-only range must come before (that is, must be numerically less than) any two-way range. Any two-way range must come before any outgoing-only range.

Examples

The following example sets a valid incoming-only VC range of 1 to 5:

```
interface serial 0
 x25 lic 1
 x25 hic 5
```

Related Commands

Command	Description
x25 lic	Sets the lowest incoming-only VC number.

x25 hoc

To set the highest outgoing-only virtual circuit (VC) number, use the **x25 hoc** interface configuration command.

x25 hoc *circuit-number*

Syntax Description

circuit-number	VC number from 1 to 4095, or 0 if there is no incoming-only VC range.

Command Default

0

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

This command is applicable only if you have the X.25 switch configured for an outgoing-only VC range. *Outgoing* is from the perspective of the X.25 data terminal equipment (DTE). If you do not want any incoming calls on your DTE, disable the two-way range (set the values of **x25 ltc** and **x25 htc** to 0) and configure an outgoing-only range. Any outgoing-only range must come after (that is, be numerically greater than) any other range.

Examples

The following example sets a valid outgoing-only VC range of 2000 to 2005:

```
interface serial 0
 x25 loc 2000
 x25 hoc 2005
```

Related Commands

Command	Description
x25 loc	Sets the lowest outgoing-only VC number.

x25 hold-queue

To set the maximum number of packets to hold until a virtual circuit (VC) is able to send, use the **x25 hold-queue** command in interface configuration mode. To remove this command from the configuration file and restore the default value, use the **no** form of this command without an argument.

x25 hold-queue packets

no x25 hold-queue [*packets*]

Syntax Description

packets	Number of packets. A hold queue value of 0 allows an unlimited number of packets in the hold queue.

Command Default

10 packets

Command Modes

Interface configuration X.25 profile 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

If you set the queue-size argument to 0 when using the **no x25 hold-queue** command, there will be no hold queue limit. While this setting will prevent drops until the router runs out of memory, it is only rarely appropriate. A VC hold queue value is determined when it is created; changing this parameter will not affect the hold queue limits of the existing virtual circuits.

Examples

The following example sets the X.25 hold queue to hold 25 packets:

```
interface serial 0
 x25 hold-queue 25
```

Related Commands

Command	Description
ip mtu	Sets the MTU size of IP packets sent on an interface.

Command	Description
x25 ips	Sets the interface default maximum input packet size to match that of the network.
x25 ops	Sets the interface default maximum output packet size to match that of the network.

x25 hold-vc-timer

To start the timer that prevents additional calls to a destination for a given period of time (thus preventing overruns on some X.25 switches caused by Call Request packets), use the **x25 hold-vc-timer** command in interface configuration mode. To restore the default value for the timer, use the **no** form of this command.

x25 hold-vc-timer *minutes*

no x25 hold-vc-timer

Syntax Description

minutes	Number of minutes that calls to a previously failed destination will be prevented. Incoming calls are still accepted.

Command Default

0 minutes

Command Modes

Interface configuration X.25 profile 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

Only Call Requests that the router originates are held down; routed X.25 Call Requests are not affected by this parameter.

Upon receiving a Clear Request for an outstanding Call Request, the X.25 support code immediately tries another Call Request if it has more traffic to send, and this action might cause overrun problems.

Examples

The following example sets this timer to 3 minutes:

```
interface serial 0
 x25 hold-vc-timer 3
```

x25 host

To define a static host name-to-address mapping, use the **x25 host** command in global configuration mode. To remove the host name, use the **no**form of thecommand.

x25 host *name x121-address* [**cud** *call-user-data*]

no x25 host *name*

Syntax Description

name	Host name.
x121-address	The X.121 address.
cud *call-user-data*	(Optional) Sets the Call User Data (CUD) field in the X.25 Call Request packet.

Command Default

No static host name-to-address mapping is defined.

Command Modes

Global 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

This command permits you to map an X.121 address to an easily recognizable name. You can later use this host name instead of the X.121 address when you issue the **translate** command for X.25.

Examples

The following example specifies a static address mapping:

```
x25 host Willard 4085551212
```

The following example removes a static address mapping:

```
no x25 host Willard
```

The following example specifies static address mapping from the X.121 address 12345678 to the host name "ocean". It then uses the name "ocean" in the **translate** command in place of the X.121 address when translating from the X.25 host to the PPP host with address 10.0.0.2.

```
x25 host ocean 12345678
translate x25 ocean ppp 10.0.0.2 routing
```

Related Commands

Command	Description
translate x25	Translates a request to another outgoing protocol connection type when that X.25 connection request to a particular destination address is received.

x25 htc

To set the highest two-way virtual circuit (VC) number, use the **x25 htc** command in interface configuration mode or X.25 profile configuration mode.

x25 htc *circuit-number*

Syntax Description

circuit-number	VC number from 1 to 4095, or 0 if there is no two-way VC range.

Command Default

1024 for X.25 network service interfaces; 4095 for CMNS network service interfaces.

Command Modes

Interface configuration X.25 profile 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

This command is applicable if the X.25 switch is configured for a two-way VC range. Any two-way VC range must come after (that is, be numerically larger than) any incoming-only range, and must come before any outgoing-only range.

Examples

The following example sets a valid two-way VC range of 5 to 25:

```
interface serial 0
 x25 ltc 5
 x25 htc 25
```

Related Commands

Command	Description
cmns enable	Enables the CMNS on a nonserial interface.
x25 ltc	Sets the lowest two-way VC number.

x25 hunt-group

To create and maintain a hunt group, use the **x25 hunt-group**command in global configuration mode. To delete this hunt group, use the **no** form of this command.

x25 hunt-group *name* {**rotary**| **vc-count**}

no x25 hunt-group *name*

Syntax Description

name	Name you assign to the particular hunt group.
rotary	Each call steps to the next interface.
vc-count	Each call is placed on the interface with most available logical channels.

Command Default

No X.25 hunt group is created.

Command Modes

Global configuration

Command History

Release	Modification
12.0(3)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

Only one load-balancing distribution method can be selected for a hunt group, although one interface can participate in one or more hunt groups.

The rotary distribution method sends every call to the next available interface regardless of line speed and the number of available VCs on that interface.

The vc-count distribution method sends calls to the interface with the largest number of available logical channels. This method ensures a good load balance when you have lines of equal speed. If the line speeds are unequal, the vc-count method will favor the line with the higher speed. In cases where interfaces have the same line speed, the call is sent to the interface that is defined earliest in the hunt group.

To distribute calls equally among interfaces regardless of line speed, configure each interface with the same number of VCs.

With the vc-count distribution method, if a hunt group does not contain an operational interface, the call will be forwarded to the next route if one was specified. If a session is terminated on an interface within the hunt group, that interface now has more available VCs and it will be chosen next.

Examples

Examples

In the following example, the vc-count distribution method is used on a hunt group that contains two serial interfaces that have different numbers of VCs. Assuming no sessions are being terminated at this time, the first 450 calls will be sent to Serial1, and subsequent calls will alternate between Serial0 and Serial1 until the interfaces are full.

```
interface serial0
  description 56k link supporting 50 virtual circuits
  x25 htc 50
!
interface serial1
  description T1 line supporting 500 virtual circuits
  x25 htc 500
!
x25 hunt-group hg-vc vc-count
  interface serial0
  interface serial1
!
```

Examples

The following example shows the creation of hunt group “HG1” with serial interfaces 1 and 2 and two specific XOT target IP addresses (172.17.125.54 and 172.17.125.34). Hunt group "HG1" is configured to use rotary distribution method. The example also shows the creation of hunt group “HG2” with serial interfaces 0 and 3. Hunt group "HG2" will use vc-count distribution method.

```
x25 hunt-group HG1 rotary
 interface serial 1
 interface serial 2
 xot 172.17.125.54
 xot 172.17.125.34
 exit
x25 hunt-group HG2 vc-count
 interface serial 0
 interface serial 3
```

Related Commands

Command	Description
show x25 hunt-group	Displays X.25 hunt groups, detailed interface statistics, and distribution methods.

x25 idle

To define the period of inactivity after which the router can clear a switched virtual circuit (SVC), use the **x25 idle** command in interface configuration mode.

x25 idle *minutes* [*seconds*]

Syntax Description

minutes	Idle period in minutes. Accepted range for the *minutes* argument is from 0 to 255 minutes. The default is 0 minutes, which keeps an SVC open indefinitely.
seconds	(Optional) Idle period in seconds. Adds granularity to the idle period of X.25 encapsulation virtual circuits (VCs) only. Accepted range is from 1 to 59 seconds. **Note** Set the *minutes* argument to 0, if the desired idle period on the X.25 encapsulation VC is fewer than 60 seconds, then enter a value for the optional *seconds*argument. The *seconds* argument will be ignored for other types of X.25 VCs such as packet assembler/disassembler (PAD) and protocol translation VCs.

Command Default

0 minutes (the SVC is kept open indefinitely)

Command Modes

Interface configuration X.25 profile configuration

Command History

Release	Modification
10.0	This command was introduced.
12.4(6)T	This command was enhanced with the *seconds* argument, for finer granularity in setting the idle period for X.25 encapsulation VCs.
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

Calls originated and terminated by the router are cleared; packet assembler/disassembler and switched virtual circuits are not affected. To clear one or all virtual circuits at once, use the **clear x25**privileged EXEC command. Use the **show interfaces** and **show x25 vc** privileged EXEC commands to display the configured timeout values.

Examples

The following example sets a 5-minute wait period before an idle circuit is cleared:

```
interface serial 2
 x25 idle 5
```

The following example clears an X.25 encapsulation VC after the VC remains idle for 1 minute and 10 seconds:

```
interface Serial0/0
 description connects to tester s1/0
 ip address 10.132.0.8 255.255.255.0
 encapsulation x25
 x25 address 2xx8xx
 x25 idle 1 10
 x25 map ip 10.132.0.9 2xx9xx
 clock rate 64000
end
```

The **x25 idle 0 30** command would change this configuration to clear the X.25 encapsulation VC after the VC remains idle for 30 seconds. See the description for the **x25 map** command for information on setting the idle timer using that command.

Related Commands

Command	Description
clear x25	Restarts an X.25 or CMNS service, clears an SVC, or resets a PVC.
show interfaces	Displays statistics for all interfaces configured on the router or access server.
show x25 vc	Displays information about active SVCs and PVCs.
x25 map	Sets up the LAN protocols-to-remote-host mapping.

x25 ip-precedence

To enable the Cisco IOS software to use the IP precedence value when it opens a new virtual circuit (VC), use the **x25 ip-precedence** command in interface configuration mode. To cause the Cisco IOS software to ignore the precedence value when opening VCs, use the **no** form of this command.

x25 ip-precedence

no x25 ip-precedence

Syntax Description

This command has no arguments or keywords.

Command Default

The router opens one VC for all types of service.

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

This feature is useful only for Defense Data Network (DDN) or Blacker Front End (BFE) encapsulations because only these methods have an IP precedence facility defined to allow the source and destination devices to both use the VC for traffic of the given IP priority.

Verify that your host does not send nonstandard data in the IP type of service (TOS) field because it can cause multiple wasteful virtual circuits to be created.

Four VCs may be opened based on IP precedence to encapsulate routine, priority, immediate, and all higher precedences.

The **x25 map nvc** limit or the default **x25 nvc** limit still applies.

Examples

The following example allows new IP encapsulation VCs based on the IP precedence:

```
interface serial 3
 x25 ip-precedence
```

x25 ips

To set the interface default maximum input packet size to match that of the network, use the **x25 ips** interface configuration command.

x25 ips *bytes*

Syntax Description

bytes	Byte count. It can be one of the following values: 16, 32, 64, 128, 256, 512, 1024, 2048, or 4096.

Command Default

128 bytes

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

X.25 network connections have a default maximum input packet size set by the network administrator. Larger packet sizes require less overhead processing. To send a packet larger than the X.25 packet size over an X.25 virtual circuit, the Cisco IOS software must break the packet into two or more X.25 packets with the more data bit (M-bit) set. The receiving device collects all packets with the M-bit set and reassembles the original packet.

Note Set the **x25 ips** and **x25 ops** commands to the same value unless your network supports asymmetric input and output packet sizes.

Examples

The following example sets the default maximum packet sizes to 512:

```
interface serial 1
 x25 ips 512
 x25 ops 512
```

Related Commands

Command	Description
x25 facility	Forces facilities on a per-call basis for calls originated by the router (switched calls are not affected).
x25 ops	Sets the interface default maximum output packet size to match that of the network.

x25 lic

To set the lowest incoming-only virtual circuit (VC) number, use the **x25 lic** interface configuration command.

x25 lic *circuit-number*

Syntax Description

circuit-number	VC number from 1 to 4095, or 0 if there is no incoming-only VC range.

Command Default

0

Command Modes

Interface configuration X.25 profile 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

This command is applicable only if you have the X.25 switch configured for an incoming-only VC range. *Incoming* is from the perspective of the X.25 DTE device. If you do not want any outgoing calls on your DTE device, disable the two-way range (set the values of **x25 ltc** and **x25 htc** to 0).

The following example sets a valid incoming-only VC range of 1 to 5, and sets the lowest two-way VC number:

```
interface serial 0
 x25 lic 1
 x25 hic 5
 x25 ltc 6
```

Related Commands

Command	Description
x25 hic	Sets the highest incoming-only VC number.

x25 linkrestart

To force X.25 Level 3 (packet level) to restart when Level 2 (Link Access Procedure, Balanced [LAPB], the link level) resets, use the **x25 linkrestart** command in interface configuration mode. To disable this function, use the **no** form of this command.

x25 linkrestart

no x25 linkrestart

Syntax Description

This command has no arguments or keywords.

Command Default

Forcing packet-level restarts is the default and is necessary for networks that expect this behavior.

Command Modes

Interface configuration X.25 profile 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.

Examples

The following example disables the link-level restart:

```
interface serial 3
 no x25 linkrestart
```

x25 loc

To set the lowest outgoing-only virtual circuit (VC) number, use the **x25 loc** interface configuration command.

x25 loc *circuit-number*

Syntax Description

circuit-number	VC number from 1 to 4095, or 0 if there is no outgoing-only VC range.

Command Default

0

Command Modes

Interface configuration X.25 profile 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

This command is applicable only if you have the X.25 switch configured for an outgoing-only VC range. *Outgoing* is from the perspective of the X.25 DTE device. If you do not want any incoming calls from your DTE device, configure the values of **x25 loc** and **x25 hoc** and set the values of **x25 ltc** and **x25 htc** to 0.

Examples

The following example sets a valid outgoing-only virtual circuit range of 2000 to 2005:

```
interface serial 0
 x25 loc 2000
 x25 hoc 2005
```

Related Commands

Command	Description
x25 hoc	Sets the highest outgoing-only VC number.

x25 ltc

To set the lowest two-way virtual circuit (VC) number, use the **x25 ltc** interface configuration command.

x25 ltc *circuit-number*

Syntax Description

circuit-number	VC number from 1 to 4095, or 0 if there is no two-way VC range.

Command Default

1

Command Modes

Interface configuration X.25 profile 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

This command is applicable if you have the X.25 switch configured for a two-way virtual circuit range. Any two-way virtual circuit range must come after (that is, be numerically larger than) any incoming-only range, and must come before any outgoing-only range.

Examples

The following example sets a valid two-way virtual circuit range of 5 to 25:

```
interface serial 0
 x25 ltc 5
 x25 htc 25
```

Related Commands

Command	Description
x25 htc	Sets the highest two-way VC number.

x25 map

To set up the LAN protocols-to-remote-host mapping, use the **x25 map** command in interface configuration or X.25 profile configuration mode. To retract a prior mapping, use the **no**form of this command.

x25 map *protocol address*[*protocol2 address2*[...[*protocol9 address9*]]]*x121-address*[*option*]

no x25 map *protocol address x121-address*

Syntax Description

protocol	Protocol type, entered by keyword. Supported protocols are entered by keyword, as listed in the Protocols Supported by X.25 table. As many as nine protocol and address pairs (represented by ellipses in the syntax example) can be specified on one command line.
address	Protocol address.
x121-address	X.121 address of the remote host.
option	(Optional) Additional functionality that can be specified for originated calls. Can be any of the options listed in the x25 map Options table.

Command Default

No LAN protocol-to-remote-host mapping is set up.

Command Modes

Interface configuration X.25 profile configuration

Command History

Release	Modification
10.0	This command was introduced.
12.2(13)T	The **apollo**, **vines**, and **xns** arguments were removed because Apollo Domain, Banyan VINES, and Xerox Network Systems are no longer available in the Cisco IOS software.
12.4(6)T	The **idle** option of this command was enhanced to support seconds granularity in setting the idle period.
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

Because no defined protocol can dynamically determine LAN protocol-to-remote-host mappings, you must enter all the information for each host with which the router may exchange X.25 encapsulation traffic.

Two methods are available to encapsulate traffic: Cisco's long-available encapsulation method and the Internet Engineering Task Force (IETF) standard method defined in RFC 1356; the latter allows hosts to exchange several protocols over a single virtual circuit. Cisco's encapsulation method is the default (for backward compatibility) unless the interface configuration command specifies the **ietf**keyword.

When you configure multiprotocol maps, you can specify a maximum of nine protocol and address pairs in an **x25 map** command. A multiprotocol map can specify a single address for all the supported protocols. However, if IP and TCP header compression are both specified, the same IP address must be given for both protocols.

Encapsulation maps might also specify that traffic between the two hosts should be compressed, thus increasing the effective bandwidth between them at the expense of memory and computation time. Because each compression VC requires memory and computation resources, compression must be used with care and monitored to maintain acceptable resource usage and overall performance.

Bridging is supported only if you are using Cisco's traditional encapsulation method. For correct operation, bridging maps must specify the **broadcast** option. Because most datagram routing protocols rely on broadcasts or multicasts to send routing information to their neighbors, the **broadcast** keyword is needed to run such routing protocols over X.25.

Open Shortest Path First (OSPF) Protocol treats a nonbroadcast, multiaccess network such as X.25 in much the same way as it treats a broadcast network by requiring the selection of a designated router. In earlier releases of the Cisco IOS software, this selection required manual assignment in the OSPF configuration using the **neighbor**router configuration command. When the **x25 map** command is included in the configuration with the broadcast, and the **ip ospf network** command with the **broadcast** keyword is configured, there is no need to configure any neighbors manually. OSPF will run over the X.25 network as a broadcast network. (Refer to the **ip ospf network** interface configuration command for more detail.)

Note The OSPF broadcast mechanism assumes that IP class D addresses are never used for regular traffic over X.25.

You can modify the options of an **x25 map** command by restating the complete set of protocols and addresses specified for the map, followed by the desired options. To delete a map command, you must specify the complete set of protocols and addresses; the options can be omitted when deleting a map.

Once defined, a map's protocols and addresses cannot be changed. This requirement exists because the Cisco IOS software cannot determine whether you want to add to, delete from, or modify an existing map's protocol and address specification, or simply have mistyped the command. To change a map's protocol and address specification, you must delete it and create a new map.

A given protocol-address pair cannot be used in more than one map on the same interface.

The following table lists the protocols supported by X.25.

Table 2: Protocols Supported by X.25

Keyword	Protocol
appletalk	AppleTalk
bridge	Bridging[1]
clns	ISO Connectionless Network Service
compressedtcp	TCP/IP header compression
decnet	DECnet
ip	IP
ipx	Novell IPX
pad	Packet assembler/disassembler (PAD) links[2]
qllc	System Network Architecture (SNA) encapsulation in X.25[3]

1 Bridging traffic is supported only for Cisco's traditional encapsulation method, so a bridge map cannot specify other protocols.
2 PAD maps are used to configure session and protocol translation access, therefore, this protocol is not available for multiprotocol encapsulation.
3 Qualified Logical Link Control (QLLC) is not available for multiprotocol encapsulation.

Note The Connection-Mode Network Service (CMNS) map form is obsolete; its function is replaced by the enhanced **x25 route** command.

The following table lists the map options supported by X.25 when you use the **x25 map** command.

Table 3: x25 map Options

Option	Description
accept-reverse	Causes the Cisco IOS software to accept incoming reverse-charged calls. If this option is not present, the Cisco IOS software clears reverse-charged calls unless the interface accepts all reverse-charged calls.
broadcast	Causes the Cisco IOS software to direct any broadcasts sent through this interface to the specified X.121 address. This option also simplifies the configuration of OSPF; see "Usage Guidelines" for more detail.

Option	Description
cug *group-number*	Specifies a closed user group (CUG) number (from 1 to 9999) for the mapping in an outgoing call.
compress	Specifies that X.25 payload compression be used for mapping the traffic to this host. Each virtual circuit established for compressed traffic uses a significant amount of memory (for a table of learned data patterns) and for computation (for compression and decompression of all data). Cisco recommends that compression be used with careful consideration of its impact on overall performance.
idle *minutes seconds*	Idle period in minutes and, optionally, seconds. Accepted range for the *minutes* argument is from 0 to 255 minutes. The default is 0 minutes, which keeps an SVC open indefinitely. Accepted range for the optional *seconds* argument is from 1 to 59 seconds, and the *seconds* argument is valid only for setting the idle period for X.25 encapsulation VCs. **Note** Set the *minutes* argument to 0, if the desired idle period on the X.25 encapsulation VC is fewer than 60 seconds, then enter a value for the optional *seconds* argument.
method {**cisco** | **ietf** | **snap** | **multi**}	Specifies the encapsulation method. The choices are as follows: • **cisco** --Cisco's proprietary encapsulation; not available if more than one protocol is to be carried. • **ietf** --Default RFC 1356 operation: protocol identification of single-protocol virtual circuits and protocol identification within multiprotocol virtual circuits use the standard encoding, which is compatible with RFC 877. Multiprotocol virtual circuits are used only if needed. • **snap** --RFC 1356 operation where IP is identified with SNAP rather than the standard IETF method (the standard method is compatible with RFC 877). • **multi** --Forces a map that specifies a single protocol to set up a multiprotocol VC when a call is originated; also forces a single-protocol PVC to use multiprotocol data identification methods for all datagrams sent and received.
no-incoming	Uses the map only to originate calls.

Option	Description
no-outgoing	Does not originate calls when using the map.
nudata *string*	Specifies the network user identification in a format determined by the network administrator (as allowed by the standards). This option is provided for connecting to non-Cisco equipment that requires an NUID facility. The string should not exceed 130 characters and must be enclosed in quotation marks (“ ”) if there are any spaces present. This option only works only if the router is configured as an X.25 DTE.
nuid *username password*	Specifies that a network user ID (NUID) facility be sent in the outgoing call with the specified TACACS username and password (in a format defined by Cisco). This option should be used only when connecting to another Cisco router. The combined length of the username and password should not exceed 127 characters. This option works only if the router is configured as an X.25 DTE.
nvc *count*	Sets the maximum number of virtual circuits for this map or host. The default *count* is the **x25 nvc**setting of the interface. A maximum number of eight virtual circuits can be configured for each map. Compressed TCP may use only one virtual circuit.
packetsize *in-size out-size*	Proposes maximum input packet size (*in-size*) and maximum output packet size (*out-size*) for an outgoing call. Both values typically are the same and must be one of the following values: 16, 32, 64, 128, 256, 512, 1024, 2048, or 4096.
passive	Specifies that the X.25 interface should send compressed outgoing TCP datagrams only if they were already compressed when they were received. This option is available only for compressed TCP maps.
reverse	Specifies reverse charging for outgoing calls.
roa *name*	Specifies the name defined by the **x25 roa** command for a list of transit Recognized Operating Agencies (ROAs, formerly called Recognized Private Operating Agencies, or RPOAs) to use in outgoing Call Request packets.

Option	Description
throughput *in out*	Sets the requested throughput class values for input (*in*) and output (*out*) throughput across the network for an outgoing call. Values for *in* and *out* are in bits per second (bps) and range from 75 to 48000 bps.
transit-delay *milliseconds*	Specifies the transit delay value in milliseconds (0 to 65534) for an outgoing call, for networks that support transit delay.
windowsize *in-size out-size*	Proposes the packet count for input window (*in-size*) and output window (*out-size*) for an outgoing call. Both values typically are the same, must be in the range 1 to 127, and must be less than the value set by the **x25 modulo** command.

Examples

The following example maps IP address 172.20.2.5 to X.121 address 000000010300. The **broadcast** keyword directs any broadcasts sent through this interface to the specified X.121 address.

```
interface serial 0
 x25 map ip 172.20.2.5 000000010300 broadcast
```

The following example specifies an ROA name to be used for originating connections:

```
x25 roa green_list 23 35 36
interface serial 0
 x25 map ip 172.20.170.26 10 roa green_list
```

The following example specifies an NUID facility to send on calls originated for the address map:

```
interface serial 0
 x25 map ip 172.20.174.32 2 nudata "Network User ID 35"
```

Strings can be quoted, but quotation marks are not required unless embedded blanks are present.

In the following example, the VC times out 10 seconds after the circuit becomes idle (the setting configured in the **x25 map** command, rather than the **x25 idle** command):

```
interface Serial0/0
 description connects to tester s1/0
 ip address 10.132.0.8 255.255.255.0
 encapsulation x25 dce
 x25 address 2xx8xx
 x25 idle 0 20
 x25 map ip 10.132.0.9 2xx9xx idle 0 10
 clock rate 64000
end
```

The settings for the **x25 map** command have higher precedence over the timeout period configured using the **x25 idle** command.

Related Commands

Command	Description
ip ospf network	Configures the OSPF network type to a type other than the default for a given medium.

Command	Description
show x25 map	Displays information about configured address maps.
x25 facility	Forces facilities on a per-call basis for calls originated by the router.
x25 idle	Defines the period of inactivity after which the router can clear an SVC.
x25 map bridge	Configures an Internet-to-X.121 address mapping for bridging over X.25.
x25 map compressedtcp	Maps compressed TCP traffic to an X.121 address.
x25 map pad	Configures an X.121 address mapping for PAD access over X.25.
x25 route	Creates an entry in the X.25 routing table.
x25 suppress-called-address	Omits the destination address in outgoing calls.

x25 map bridge

To configure an Internet-to-X.121 address mapping for bridging of packets in X.25 frames, use the **x25 map bridge** command in interface configuration mode. To disable the Internet-to-X.121 address mapping, use the **no** form of this command.

x25 map bridge *x121-address* **broadcast** [*option*]

Syntax Description

x121-address	The X.121 address.
broadcast	Required keyword for bridging over X.25.
option	(Optional) Services that can be added to this map (same options as the **x25 map** command). See the table below for more details.

Command Default

No bridging over X.25 is configured.

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

The X.25 bridging software uses the same spanning-tree algorithm as the other bridging functions, but allows packets to be encapsulated in X.25 frames and transmitted across X.25 media. This command specifies IP-to-X.121 address mapping and maintains a table of both the Ethernet and X.121 addresses.

The table below lists **x25 map bridge** options.

Table 4: x25 map bridge Options

Option	Description
accept-reverse	Causes the Cisco IOS software to accept incoming reverse-charged calls. If this option is not present, the Cisco IOS software clears reverse-charged calls unless the interface accepts all reverse-charged calls.
broadcast	Causes the Cisco IOS software to direct any broadcasts sent through this interface to the specified X.121 address. This option also simplifies the configuration of Open Shortest Path First (OSPF) Protocol; see “Usage Guidelines” for more detail.
compress	Specifies that X.25 payload compressi on be used for mapping the traffic to this host. Each virtual circuit established for compressed traffic uses a significant amount of memory (for a table of learned data patterns) and for computation (for compression and decompression of all data). Cisco recommends that compression be used with careful consideration of its impact on overall performance.
cug *group-number*	Specifies a closed user group (CUG) number (from 1 to 9999) for the mapping in an outgoing call.
idle *minutes*	Specifies an idle timeout for calls other than the interface default; 0 minutes disables the idle timeout.

Option	Description
method {**cisco** | **ietf** | **snap** | **multi**}	Specifies the encapsulation method. The choices are as follows: • **cisco** --Cisco's proprietary encapsulation; not available if more than one protocol is to be carried. • **ietf** --Default RFC 1356 operation: protocol identification of single-protocol virtual circuits and protocol identification within multiprotocol virtual circuits use the standard encoding, which is compatible with RFC 877. Multiprotocol virtual circuits are used only if needed. • **snap** --RFC 1356 operation where IP is identified with SNAP rather than the standard Internet Engineering Task Force (IETF) method (the standard method is compatible with RFC 877). • **multi** --Forces a map that specifies a single protocol to set up a multiprotocol virtual circuit when a call is originated; also forces a single-protocol permanent virtual circuit (PVC) to use multiprotocol data identification methods for all datagrams sent and received.
no-incoming	Uses the map only to originate calls.
no-outgoing	Does not originate calls when using the map.
nudata *string*	Specifies the network user identification in a format determined by the network administrator (as allowed by the standards). This option is provided for connecting to non-Cisco equipment that requires an NUID facility. The string should not exceed 130 characters and must be enclosed in quotation marks (" ") if there are any spaces present. This option only works if the router is configured as an X.25 DTE device.
nuid *username password*	Specifies that a network user ID (NUID) facility be sent in the outgoing call with the specified Terminal Access Controller Access Control System (TACACS) username and password (in a format defined by Cisco). This option should be used only when connecting to another Cisco router. The combined length of the username and password should not exceed 127 characters. This option only works if the router is configured as an X.25 DTE.

Option	Description
nvc *count*	Sets the maximum number of virtual circuits for this map or host. The default *count* is the **x25 nvc**setting of the interface. A maximum number of eight virtual circuits can be configured for each map. Compressed TCP may use only 1 virtual circuit.
packetsize *in-size out-size*	Proposes maximum input packet size (*in-size*) and maximum output packet size (*out-size*) for an outgoing call. Both values typically are the same and must be one of the following values: 16, 32, 64, 128, 256, 512, 1024, 2048, or 4096.
passive	Specifies that the X.25 interface should send compressed outgoing TCP datagrams only if they were already compressed when they were received. This option is available only for compressed TCP maps.
reverse	Specifies reverse charging for outgoing calls.
roa *name*	Specifies the name defined by the **x25 roa** command for a list of transit Recognized Operating Agencies (ROAs, formerly called Recognized Private Operating Agencies, or RPOAs) to use in outgoing Call Request packets.
throughput *in out*	Sets the requested throughput class values for input (*in*) and output (*out*) throughput across the network for an outgoing call. Values for *in* and *out* are in bits per second (bps) and range from 75 to 48000 bps.
transit-delay *milliseconds*	Specifies the transit delay value in milliseconds (0 to 65534) for an outgoing call, for networks that support transit delay.
windowsize *in-size out-size*	Proposes the packet count for input window (*in-size*) and output window (*out-size*) for an outgoing call. Both values typically are the same, must be in the range 1 to 127, and must be less than the value set by the **x25 modulo** command.

Examples

The following example configures transparent bridging over X.25 between two Cisco routers using a maximum of six virtual circuits:

```
interface serial 1
 x25 map bridge 000000010300 broadcast nvc 6
```

Related Commands

Command	Description
x25 map	Sets up the LAN protocols-to-remote host mapping.
x25 address	Sets the X.121 address of a particular network interface.

x25 map cmns

The **x25 map cmns** command is replaced by the enhanced **x25 route** command. See the description of the **x25 route** command in this chapter for more information.

x25 map compressedtcp

To map compressed TCP traffic to an X.121 address, use the **x25 map compressedtcp** command in interface configuration mode. To delete a TCP/IP header compression map for the link, use the **no** form of this command.

x25 map compressedtcp *ip-address*[*protocol2 address2*[...[*protocol9 address9*]]]*x121-address*[*option*]

no x25 map compressedtcp *ip-address*[*protocol2 address2*[...[*protocol9 address9*]]]*x121-address*

Syntax Description

ip-address	IP address.
protocol	(Optional) Protocol type, entered by keyword. Supported protocols are entered by keyword, as listed in x25 map. As many as nine protocol and address pairs can be specified in one command line.
address	(Optional) Protocol address.
x121-address	X.121 address.
option	(Optional) The same options as those for the **x25 map** command; see x25 map.

Command Default

No mapping is configured.

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

Cisco supports RFC 1144 TCP/IP header compression (THC) on serial lines using HDLC and X.25 encapsulation. THC encapsulation is only slightly different from other encapsulation traffic, but these differences are worth noting. The implementation of compressed TCP over X.25 uses one virtual circuit to pass the compressed packets. Any IP traffic (including standard TCP) is separate from TCH traffic; it is carried over separate IP encapsulation virtual circuits or identified separately in a multiprotocol virtual circuit.

Note If you specify both **ip** and **compressedtcp**in the same **x25 map compressedtcp** command, they must both specify the same IP address.

The **nvc** map option cannot be used for TCP/IP header compression, because only one virtual circuit can carry compressed TCP/IP header traffic to a given host.

Examples

The following example establishes a map for TCP/IP header compression on serial interface 4:

```
interface serial 4
 ip tcp header-compression
 x25 map compressedtcp 172.20.2.5 000000010300
```

Related Commands

Command	Description
x25 map	Sets up the LAN protocols-to-remote host mapping.

x25 map pad

To configure an X.121 address mapping for packet assembler/disassembler (PAD) access over X.25, use the **x25 map pad**interface configuration command.

x25 map pad *x121-address* [*option*]

Syntax Description

x121-address	X.121 address of the interface.
option	(Optional) Services that can be added to this map--the same options as the **x25 map** command; see x25 map.

Command Default

No specific options are used for PAD access.

Command Modes

Interface configuration

Command History

Release	Modification
10.2	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

Use a PAD map to configure optional X.25 facility use for PAD access. When used with the **x25 pad-access** interface configuration command, the **x25 map pad** command restricts incoming PAD access to those statically mapped hosts.

Examples

The following example configures an X.25 interface to restrict incoming PAD access to the single mapped host. This example requires that both incoming and outgoing PAD access use the network user identification (NUID) user authentication.

```
interface serial 1
 x25 pad-access
 x25 map pad 000000010300 nuid johndoe secret
```

Related Commands

Command	Description
x25 map	Sets up the LAN protocols-to-remote host mapping.
x25 pad-access	Causes the PAD software to accept PAD connections only from statically mapped X.25 hosts.

x25 map rbp local

To configure a router to establish X.25 circuits in response to incoming TCP connections on a specified TCP port, and to use record boundary preservation (RBP) to transfer data between the TCP session and the corresponding X.25 circuit, use the **x25 map rbp local**command in interface configuration mode. To delete the map, use the **no**form of this command.

x25 map rbp *x121-address* [**cud** *string*] **local port** *port* [**cug** *group-number*] [**packetsize in-size out-size**] [**recordsize** *size*] **[reverse]** [**roa** *name*] [**throughput** *in out*] [**transit-delay** *milliseconds*] [**windowsize** *in-size out-size*] **q-bit**

no x25 map rbp *x121-address* [**cud** *string*] **local port** *port*

Syntax Description

x121-address	X.121 address of the remote host.
cud *string*	(Optional) Call user data (CUD) to be included in the X.25 call request, as a hexadecimal string.
port *port*	TCP port number on which the router should listen.
cug *group-number*	(Optional) Closed user group (CUG) number (from 1 to 9999) used for the mapping in an outgoing call.
packetsize *in-size out-size*	(Optional) Proposes maximum input packet size (*in-size*) and maximum output packet size (*out-size*). Both values typically are the same and must be one of the following values: 16, 32, 64, 128, 256, 512, 1024, 2048, or 4096.
recordsize *size*	(Optional) Maximum length of a record.
reverse	(Optional) Specifies reverse charging for outgoing calls.
roa *name*	(Optional) Specifies the name defined by the **x25 roa** command for a list of transit Recognized Operating Agencies (ROAs, formerly called Recognized Private Operating Agencies, or RPOAs) to use in outgoing Call Request packets.
throughput *in out*	(Optional) Sets the requested throughput class values for input (*in*) and output (*out*) throughput across the network. Values for *in* and *out* are in bits per second (bps) and range from 75 to 48000 bps.
transit-delay *milliseconds*	(Optional) Transit delay value in milliseconds (0 to 65534) for an outgoing call, for networks that support transit delay.

windowsize *in-size out-size*	(Optional) Inbound and outbound window sizes (the number of packets permitted in each direction before an acknowledgment is required). Both values typically are the same, must be in the range from 1 to 127, and must be less than the value set by the **x25 modulo** command.
q-bit	(Optional) Supports conveyance of Q-bit data packets between X.25 and TCP/IP hosts.

Command Default

No SVC is configured.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(8)T	This command was introduced.
12.4(11)T	The **q-bit** optional keyword was added.

Usage Guidelines

RBP enables X.25 hosts to exchange data with TCP/IP hosts via TCP sessions while maintaining X.25 packet boundaries.

When the **x25 map rbp local**command is configured, the router will listen for a request for a TCP connection to the specified TCP port. When the connection request is accepted, the router will then attempt to place an X.25 call on the interface on which the command was configured, using the X.25 address of the interface as the calling address, the X.121 address specified in the command as the destination address, and the call user data specified in the command. If the call is not successfully completed, the TCP connection will be closed.

The number of connections that may be established to the TCP port is limited only by router resources (such as memory, processor utilization, and available X.25 circuits).

When connections that will be established by the TCP/IP host are configured, the local TCP port number must be unique, with the exception that the same TCP port number may be configured once on each of multiple X.25 interfaces that will not be active simultaneously; this includes the case in which one X.25 interface is configured as a backup interface for another X.25 interface.

No information from the TCP connection is included in the X.25 Call packet sent to the X.25 host.

Examples

In the following example, when the router receives a TCP connection request on port 9999, the host will make an X.25 call to X.121 address 12131 with no call user data.

```
interface Serial1/0
 encapsulation x25 dce
 x25 address 13133
 x25 map rbp 12131 local port 9999
```

Related Commands

Command	Description
show x25 map	Displays information about configured address maps.
show x25 vc	Displays information about active SVCs and PVCs.
x25 map rbp remote	Establishes TCP sessions in response to incoming X.25 calls and uses RBP to transfer data between the X.25 circuit and the corresponding TCP session.
x25 modulo	Sets the window modulus.
x25 pvc rbp local	Accepts an incoming TCP connection and uses RBP to transfer data between the TCP host and an X.25 PVC.
x25 pvc rbp remote	Establishes a TCP session and uses RBP to transfer data between the X.25 host and the TCP session.
x25 roa	Specifies a sequence of packet network carriers.

x25 map rbp remote

To configure a router to establish TCP sessions in response to incoming X.25 calls, and to use record boundary preservation (RBP) to transfer data between the X.25 circuit and the corresponding TCP session, use the **x25 map rbp remote**command in interface configuration mode. To delete the map, use the **no**form of this command.

x25 map rbp *x121-address* [**cud** *string*] **remote host** *ip-address* **port** *port* **[accept-reverse]** [**recordsize** *size*] [**source-interface** *interface*] **q-bit**

no x25 map rbp *x121-address* [**cud** *string*] **remote host port** *port*

Syntax Description

x121-address	X.121 address of the remote host.
cud *string*	(Optional) Call user data (CUD) to be included in the X.25 call request, as a hexadecimal string.
host *ip-address*	Remote IP address for the TCP connection request.
port *port*	Remote TCP port number for the TCP connection request.
accept-reverse	(Optional) Causes the Cisco IOS software to accept incoming reverse-charged calls. If this option is not present, the Cisco IOS software clears reverse-charged calls unless the interface accepts all reverse-charged calls.
recordsize *size*	(Optional) Maximum length of a record.
source-interface *interface*	(Optional) Name of an interface whose IP address will be used as the local IP address for the TCP connection.
q-bit	(Optional) Supports conveyance of Q-bit data packets between X.25 and TCP/IP hosts.

Command Default

No SVC is configured.

Command Modes

Interface configuration

Command History

Release	Modification
12.2(8)T	This command was introduced.

Release	Modification
12.4(11)T	The **q-bit** optional keyword was added.

Usage Guidelines

RBP enables X.25 hosts to exchange data with TCP/IP hosts via TCP sessions while maintaining X.25 packet boundaries.

The router will accept an incoming X.25 call if the source address and call user data in the call request match the values configured in the **x25 map rbp remote** command. If the **cud** parameter is specified in the command, the call user data in the incoming call must match the configured value exactly. If the **cud** parameter is not specified in the command, the call user data must not conflict with any protocol ID recognized by the router, but it is otherwise ignored.

If an incoming call requests reverse charging, and the accept-reverse option is not specified in the matching map, the call will be refused.

If the incoming call is accepted, the router will attempt to open a TCP connection to a configured IP address and TCP port using a dynamically assigned local TCP port number. If the TCP connection cannot be opened, the X.25 call will be cleared.

The number of X.25 calls that may be accepted is limited only by router resources.

No information from the X.25 call packet is provided to the TCP/IP host.

Examples

In the following example, when serial interface 1/0 receives a call from a remote host that has the X.121 address 12132, the router will open a TCP connection to port number 9999 on the TCP/IP host that has the IP address 10.0.0.1.

```
interface Serial1/0
 encapsulation x25 dce
 x25 address 12030
 x25 map rbp 12132 remote host 10.0.0.1 port 9999
```

Related Commands

Command	Description
show x25 map	Displays information about configured address maps.
show x25 vc	Displays information about active SVCs and PVCs.
x25 map rbp local	Establishes X.25 circuits in response to incoming TCP connections on a specified TCP port, and uses RBP to transfer data between the TCP session and the corresponding X.25 circuit.
x25 pvc rbp local	Accepts incoming TCP connections uses RBP to transfer data between the TCP host and an X.25 PVC.
x25 pvc rbp remote	Establishes TCP sessions and uses RBP to transfer data between the X.25 host and the TCP session.

x25 modulo

To set the window modulus, use the **x25 modulo** interface configuration command.

x25 modulo *modulus*

Syntax Description

modulus	Either 8 or 128. The value of the modulo parameter must agree with that of the device on the other end of the X.25 link.

Command Default

8

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

X.25 supports flow control with a sliding window sequence count. The window counter restarts at zero upon reaching the upper limit, which is called the *window modulus*. Modulo 128 operation is also referred to as *extended packet sequence numbering*, which allows larger packet windows.

Examples

The following example sets the window modulus to 128:

```
interface serial 0
 x25 modulo 128
```

Related Commands

Command	Description
x25 facility	Forces facilities on a per-call basis for calls originated by the router (switched calls are not affected).

Command	Description
x25 win	Changes the default incoming window size to match that of the network.
x25 wout	Changes the default outgoing window size to match that of the network.

x25 nvc

To specify the maximum number of virtual circuits (VCs) that a protocol can have open simultaneously to one host, use the **x25 nvc** command in interface configuration mode. To increase throughput across networks, you can establish up to eight virtual circuits to a host and protocol.

x25 nvc *count*

Syntax Description

count	Circuit count from 1 to 8. A maximum of eight virtual circuits can be configured for each protocol-host pair. Protocols that do not tolerate out-of-sequence delivery, such as encapsulated TCP/IP header compression, will use only one virtual circuit despite this value. Permitting more than one VC may help throughput on slow networks.

Command Default

1

Command Modes

Interface configuration X.25 profile 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

When the windows and output queues of all existing connections to a host are full, a new virtual circuit will be opened to the designated circuit count. If a new connection cannot be opened, the data is dropped.

Note The *count* value specified for the **x25 nvc** command affects the default value for the number of VCs. It does not affect the **nvc** option for any **x25 map** commands that are configured.

Examples

The following example sets the default maximum number of VCs that each map can have open simultaneously to 4:

```
interface serial 0
 x25 nvc 4
```

x25 ops

To set the interface default maximum output packet size to match that of the network, use the **x25 ops** interface configuration command.

x25 ops *byteszz*

Syntax Description

bytes	Byte count that is one of the following: 16, 32, 64, 128, 256, 512, 1024, 2048, or 4096.

Command Default

128 bytes

Command Modes

Interface configuration X.25 profile 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

X.25 networks use maximum output packet sizes set by the network administrator. Larger packet sizes are better because smaller packets require more overhead processing. To send a packet larger than the X.25 packet size over an X.25 virtual circuit, the Cisco IOS software must break the packet into two or more X.25 packets with the more data bit (M-bit) set. The receiving device collects all packets with the M-bit set and reassembles the original packet.

Note Set the **x25 ips** and **x25 ops** commands to the same value unless your network supports asymmetry between input and output packets.

Examples

The following example sets the default maximum packet sizes to 512:

```
interface serial 1
 x25 ips 512
 x25 ops 512
```

Related Commands

Command	Description
x25 ips	Sets the interface default maximum input packet size to match that of the network.

x25 pad-access

To cause the packet assembler/disassembler (PAD) software to accept PAD connections only from statically mapped X.25 hosts, use the **x25 pad-access** command in interface configuration mode. To disable checking maps on PAD connections, use the **no** form of this command.

x25 pad-access

no x25 pad-access

Syntax Description

This command has no arguments or keywords.

Command Default

Accept PAD connections from any host.

Command Modes

Interface configuration

Command History

Release	Modification
10.2	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

By default, all PAD connection attempts are processed for session creation or protocol translation, subject to the configuration of those functions. If you use the **x25 pad-access** command, PAD connections are processed only for incoming calls with a source address that matches a statically mapped address configured with the **x25 map pad** interface configuration command. PAD connections are refused for any incoming calls with a source address that has not been statically mapped.

Examples

The following example restricts incoming PAD access on the interface to attempts from the host with the X.121 address 000000010300:

```
interface serial 1
 x25 pad-access
 x25 map pad 000000010300
```

Related Commands

Command	Description
service pad	Enables all PAD commands and connections between PAD devices and access servers.
x25 map pad	Configures an X.121 address mapping for PAD access over X.25.
x29 access-list	Limits access to the access server from certain X.25 hosts.
x29 profile	Creates a PAD profile script for use by the translate command.

x25 profile

To configure an X.25 profile without allocating any hardware specific information, use the **x25 profile**command in global configuration mode. To delete this profile, use the **no** form of this command.

x25 profile *name* {**dce| dte| dxe**}

no x25 profile *name*

Syntax Description

name	X.25 profile name that you assign.
dce	Specifies a data communications equipment (DCE) interface.
dte	Specifies a data terminal equipment (DTE) interface.
dxe	Specifies a data exchange equipment (DXE) interface.

Command Default

A DCE interface is specified.

Command Modes

Global configuration

Command History

Release	Modification
12.0(3)T	This command was introduced.
12.0(7)T	The **x25 subscribe flow-control**command was added to the X.25 profile configuration mode X.25 options.
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

You can enable many X.25 commands in X.25 profile configuration mode. The table below lists the following X.25 commands in X.25 profile configuration mode, which you may use to create your X.25 profile.

Table 5: x25 profile Configuration Mode X.25 Options

Command	Description
x25 accept-reverse	Accepts all reverse charged calls.
x25 address	Sets interface X.121 address.
x25 alias	Defines an alias address pattern.
x25 aodi	Enables AODI (Always On/Direct ISDN) Service.
x25 default	Sets protocol for calls with unknown Call User Data.
x25 facility	Sets explicit facilities for originated calls.
x25 hic	Sets highest incoming channel.
x25 hoc	Sets highest outgoing channel.
x25 hold-queue	Sets limit on packets queued per circuit.
x25 hold-vc-timer	Sets time to prevent calls to a failed destination.
x25 htc	Sets highest two-way channel.
x25 idle	Sets inactivity time before clearing switched virtual circuit (SVC).
x25 lic	Sets lowest incoming channel.
x25 linkrestart	Restarts when Link Access Procedure, Balanced (LAPB) resets.
x25 loc	Sets lowest outgoing channel.
x25 ltc	Sets lowest two-way channel.
x25 map	Maps protocol addresses to X.121 address.
x25 modulo	Sets operating standard.
x25 nonzero-dte-cause	Allows non-zero DTE cause codes.
x25 nvc	Sets maximum virtual circuits (VCs) simultaneously open to one host per protocol.
x25 ops	Sets default maximum output packet size.
x25 subscribe flow-control	Controls flow control parameter negotiation facilities in call setup packets.

Command	Description
x25 suppress-called-address	Omits destination address in outgoing calls.
x25 suppress-calling-address	Omits source address in outgoing calls.
x25 t10	Sets DCE Restart Request retransmission timer.
x25 t11	Sets DCE Call Request retransmission timer.
x25 t12	Sets DCE Reset Request retransmission timer.
x25 t13	Sets DCE Clear Request retransmission timer.
x25 threshold	Sets packet count acknowledgment threshold.
x25 use-source-address	Uses local source address for forwarded calls.
x25 win	Sets default input window (maximum unacknowledged packets).
x25 wout	Sets default output window (maximum unacknowledged packets).

The table below lists LAPB commands in X.25 configuration mode, which you may use to create your X.25 profile.

Table 6: x25 profile lapb Options

Command	Description
interface-outage	Interface outage deadband (partial T3).
k	Maximum number of outstanding frames (window size).
modulo	Set frame numbering modulus.
N2	Maximum number of attempts to transmit a frame.
T1	Retransmission timer.
T2	Explicit acknowledge deferral timer.
T4	Keepalive timer.

Examples

The following example shows the NetworkNodeA profile being set as a DCE interface, and with **x25 htc**, **x25 idle**, **x25 accept-reverse**, and **x25 modulo** commands enabled:

```
Router(config)# x25 profile NetworkNodeA dce
Router(config-x25)# x25 htc 128
Router(config-x25)# x25 idle 5
Router(config-x25)# x25 accept-reverse
Router(config-x25)# x25 modulo 128
```

Related Commands

Command	Description
show x25 profile	Displays information about configured X.25 profiles.

x25 pvc (encapsulation)

To establish an encapsulation permanent virtual circuit (PVC), use the encapsulating version of the **x25 pvc**command in interface configuration mode. To delete the PVC, use the **no** form of this command with the appropriate channel number.

x25 pvc *circuit protocol address*[*protocol2 address2*[...[*protocol9 address9*]]]*x121-address*[*option*]

no x25 pvc *circuit*

Syntax Description

circuit	Virtual-circuit channel number, which must be less than the virtual circuits assigned to the switched virtual circuits (SVCs).
protocol	Protocol type, entered by keyword. Supported protocols are listed in the first table below. As many as nine protocol and address pairs can be specified in one command line.
address	Protocol address of the host at the other end of the PVC.
x121-address	X.121 address.
option	(Optional) Provides additional functionality or allows X.25 parameters to be specified for the PVC.Can be any of the options listed in the second table below.

Command Default

The PVC window and maximum packet sizes default to the interface default values.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
10.0	This command was introduced.
12.2(13)T	The **apollo**, **vines**, and **xns** arguments were removed because Apollo Domain, 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.

Release	Modification
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

PVCs are not supported for ISO Connection-Mode Network Service (CMNS).

You no longer need to specify a datagram protocol-to-address mapping before you can set up a PVC; a map is implied from the PVC configuration. Configurations generated by the router will no longer specify a map for encapsulating PVCs.

When configuring a PVC to carry CLNS traffic, use the X.121 address as the subnetwork point of attachment (SNPA) to associate the PVC with a CLNS neighbor configuration. When configuring a PVC to carry transparent bridge traffic, the X.121 address is required to identify the remote host to the bridging function. Other encapsulation PVCs do not require an X.121 address.

The following table lists supported protocols.

Table 7: Protocols Supported by X.25 PVCs

Keyword	Protocol
appletalk	AppleTalk
bridge	Bridging[4]
clns	OSI Connectionless Network Service
compressedtcp	TCP/IP header compression
decnet	DECnet
ip	IP
ipx	Novell IPX
qllc	SNA encapsulation in X.25[5]

4 Bridging traffic is supported only for Cisco's traditional encapsulation method, so a bridge PVC cannot specify other protocols.
5 QLLC is not available for multiprotocol encapsulation.

The following table lists supported X.25 PVC options.

Table 8: x25 pvc Options

Option	Description
broadcast	Causes the Cisco IOS software to direct any broadcasts sent through this interface to this PVC. This option also simplifies the configuration of OSPF.
method {**cisco** | **ietf** | **snap** | **multi**}	Specifies the encapsulation method. The choices are as follows: • **cisco** --Single protocol encapsulation; not available if more than one protocol is carried. • **ietf** --Default RFC 1356 operation; single-protocol encapsulation unless more than one protocol is carried, and protocol identification when more than one protocol is carried. • **snap** --RFC 1356 operation where IP is identified when more than one protocol is carried using the SNAP encoding. • **multi** --Multiprotocol encapsulation used on the PVC.
packetsize *in-size out-size*	Maximum input packet size (*in-size*) and output packet size (*out-size*) for the PVC. Both values are typically the same and must be one of the following values: 16, 32, 64, 128, 256, 512, 1024, 2048, or 4096.
passive	Specifies that transmitted TCP datagrams will be compressed only if they were received compressed. This option is available only for PVCs carrying compressed TCP/IP header traffic.
windowsize *in-size out-size*	Packet count for input window (*in-size*) and output window (*out-size*) for the PVC. Both values are typically the same, must be in the range 1 to 127, and must be less than the value set for the **x25 modulo** command.

Examples

The following example establishes a PVC on channel 2 to encapsulate VINES and IP with the far host:

```
interface serial 0
 x25 ltc 5
 x25 pvc 2 vines 60002A2D:0001 ip 172.20.170.91 11110001
```

Related Commands

Command	Description
x25 map	Sets up the LAN protocols-to-remote host mapping.

x25 pvc (switched PVC to SVC)

To configure a switched permanent virtual circuit (PVC) to a switched virtual circuit (SVC) for a given interface, use the switched PVC to SVC version of the **x25 pvc** interface configuration command.

x25 pvc *number1* **svc** *x121-address* [*flow-control-options*] [*call-control-options*]

Syntax Description

number1	Logical channel ID of the PVC. Value must be lower than any range of circuit numbers defined for SVCs.
svc	Specifies a SVC type.
x121-address	Destination X.121 address for opening an outbound SVC and source X.121 address for matching an inbound SVC.
flow-control-options	(Optional) Adds certain features to the mapping specified. It can be any of the options listed in the first table below.
call-control-options	(Optional) Adds certain features to the mapping specified. It can be any of the options listed in the second table below.

Command Default

This command has no default values.

Command Modes

Interface configuration

Command History

Release	Modification
11.2 F	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 PVC window and maximum packet sizes default to the interface default values. The default idle time comes from the interface on which the **x25 pvc** command is configured, not the interface on which the call is sent/received.

PVC circuit numbers must come before (that is, be numerically smaller than) the circuit numbers allocated to any SVC range.

On an outgoing call, the packet size facilities and window size facilities will be included. The call will be cleared if the call accepted packet specifies different values.

On an incoming call, requested values that do not match the configured values will be refused.

The table below lists the flow control options supported by X.25 during PVC to SVC switching.

Table 9: x25 pvc Flow Control Options

Option	Description
packetsize *in-size out-size*	Maximum input packet size (*in-size*) and output packet size (*out-size*) for both the PVC and SVC. Values may differ but must be one of the following: 16, 32, 64, 128, 256, 512, 1024, 2048, or 4096.
windowsize *in-size out-size*	Packet count for input window (*in-size*) and output window (*out-size*) for both the PVC and SVC. Both values may differ but must be in the range 1 to 127 and must be less than the value set for the **x25 modulo** command.

The table below lists the call control options supported by X.25 during PVC to SVC switching.

Table 10: x25 pvc Call Control Options

Option	Description
accept-reverse	Causes the Cisco IOS software to accept incoming reverse-charged calls. If this option is not present, the Cisco IOS software clears reverse-charged calls unless the interface accepts all reverse-charged calls.
idle *minutes*	Idle time-out for the SVC. This option will override the interface's **x25 idle**commandvalue only for this circuit.
no-incoming	Establishes a switched virtual circuit to the specified X.121 address when data is received from the permanent virtual circuit, but does not accept calls from this X.121 address.
no-outgoing	Accepts an incoming call from the specified X.121 address, but does not attempt to place a call when data is received from the permanent virtual circuit. If data is received from the permanent virtual circuit while no call is connected, the PVC will be reset.

Examples

The following example configures PVC to SVC switching between two serial interfaces:

```
x25 routing
interface serial0
 encapsulation x25
 x25 address 201700
 x25 ltc 128
 x25 idle 2
interface serial2
 encapsulation x25 dce
 x25 address 101702
x25 route ^20 interface serial0
x25 route ^10 interface serial2
interface serial0
 x25 pvc 5 svc 101601 packetsize 128 128 windowsize 2 2 no-incoming
 x25 pvc 6 svc 101602 packetsize 128 128 windowsize 2 2 no-outgoing idle 0
 x25 pvc 7 svc 101603 packetsize 128 128 windowsize 2 2
```

Any call with a destination address beginning with 20 will be routed to serial interface 0. Any call with a destination address beginning with 10 will be routed to serial interface 2. (Note that incoming calls will not be routed back to the same interface from which they arrived.)

Traffic received on PVC 5 on serial interface 0 will cause a call to be placed from address 201700 to the X.121 address 101601. The routing table will then forward the call to serial interface 2. If no data is sent or received on the circuit for two minutes, the call will be cleared, as defined by the **x25 idle** command. All incoming calls from 101601 to 201700 will be refused, as defined by the *no-incoming* attribute.

The second **x25 pvc**command configures the circuit to allow incoming calls from 101602 to 201700 to be connected to PVC 6 on serial interface 1. Because idle is set to 0, the call will remain connected until cleared by the remote host or an X.25 restart. Because outgoing calls are not permitted for this connection, if traffic is received on PVC 6 on serial interface 0 before the call is established, the traffic will be discarded and the PVC will be reset.

The last **x25 pvc** command configures the circuit to accept an incoming call from 101603 to 201700 and connects the call to PVC 7 on serial interface 0. If no data is sent or received on the circuit for two minutes, the call will be cleared. If traffic is received on PVC 7 on serial interface 0 before the call is established, a call will be placed to 101503 to 201700.

x25 pvc (switched)

To configure a switched permanent virtual circuit (PVC) for a given interface, use the switched version of the **x25 pvc** interface configuration command.

x25 pvc *number1* **interface** *type number* **pvc** *number2* [*option*]

Syntax Description

number1	PVC number that will be used on the local interface (as defined by the primary interface command).
interface	Required keyword to specify an interface.
type	Remote interface type.
number	Remote interface number.
pvc	Required keyword to specify a switched PVC.
number2	PVC number that will be used on the remote interface.
option	(Optional) Adds certain features to the mapping specified; can be either option listed in the table below.

Command Default

The PVC window and maximum packet sizes default to the interface default values.

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

You can configure X.25 PVCs in the X.25 switching software. As a result, data terminal equipment (DTE) devices that require permanent circuits can be connected to the router acting as an X.25 switch and have a properly functioning connection. X.25 resets will be sent to indicate when the circuit comes up or goes down.

PVC circuit numbers must come before (that is, be numerically smaller than) the circuit numbers allocated to any SVC range.

The table below lists the switched PVC options supported by X.25.

Table 11: x25 pvc Switched PVC Options

Option	Description
packetsize *in-size out-size*	Maximum input packet size (*in-size*) and output packet size (*out-size*) for the PVC. Both values must be one of the following values: 16, 32, 64, 128, 256, 512, 1024, 2048, or 4096.
windowsize *in-size out-size*	Packet count for input window (*in-size*) and output window (*out-size*) for the PVC. Both values should be the same, must be in the range 1 to 127, and must not be greater than the value set for the **x25 modulo** command.

Examples

The following example configures a PVC connected between two serial interfaces on the same router. In this type of interconnection configuration, the alternate interface must be specified along with the PVC number on that interface. To make a working PVC connection, two commands must be specified, each pointing to the other, as this example illustrates.

```
interface serial 0
 encapsulation x25
 x25 ltc 5
 x25 pvc 1 interface serial 1 pvc 1
interface serial 1
 encapsulation x25
 x25 ltc 5
 x25 pvc 1 interface serial 0 pvc 1
```

x25 pvc (XOT)

To connect two permanent virtual circuits (PVCs) across a TCP/IP LAN, use the X.25-over-TCP (XOT) service form of the **x25 pvc** command in interface configuration mode.

x25 pvc *number1* **xot** *address* **interface serial** *string* **pvc** *number2* [*option*]

Syntax Description

number1	PVC number of the connecting device.
xot	Indicates two PVCs will be connected across a TCP/IP LAN using XOT.
address	IP address of the device to which you are connecting.
interface serial	Indicates the interface is serial.
string	Serial interface specification that accepts either a number or a string in model 7000 format (*number*/*number*) to denote the serial interface.
pvc	Indicates a PVC.
number2	Remote PVC number on the target interface.
option	(Optional) Adds certain features for the connection; can be one or more of the options listed in the table below.

Command Default

The PVC window and packet sizes default to the interface default values.

The default for the **xot-keepalive-period** option is 60 seconds.

The default for the **xot-keepalive-tries**option is 4 tries.

Command Modes

Interface 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

Use the PVC tunnel commands to tell the Cisco IOS software what the far end of the PVC is connected to. The incoming and outgoing packet sizes and window sizes must match the remote PVC outgoing and incoming sizes.

It is recommended that the **xot-source** option be used on the remote host so that a consistent IP address is used for the connection.

The table below lists the PVC tunnel options supported by X.25.

Table 12: x25 pvc PVC Tunnel Options

Option	Description
packetsize *in-size out-size*	Maximum input packet size (*in-size*) and output packet size (*out-size*) for the PVC. Both values must be one of the following values: 16, 32, 64, 128, 256, 512, 1024, 2048, or 4096.
windowsize *in-size out-size*	Packet count for input window (*in-size*) and output window (*out-size*) for the PVC. Both values should be the same, must be in the range 1 to 127, and must not be greater than or equal to the value set for the **x25 modulo** command.
xot-keepalive-period *seconds*	Number of seconds between keepalives for XOT connections. The default is 60 seconds.
xot-keepalive-tries *count*	Number of times TCP keepalives should be sent before dropping the connection. The default value is 4 times.
xot-promiscuous	Indicates that the remote IP address should be ignored when matching an incoming XOT connection with the XOT PVC parameters.
xot-source *interface*	Specifies an interface whose IP address should be used as the local IP address of the TCP connection.

Each XOT connection relies on a TCP session to carry traffic. To ensure that these TCP sessions remain connected in the absence of XOT traffic, use the **service tcp-keepalives-in**and **service tcp-keepalives-out**global configuration commands. If TCP keepalives are not enabled, the XOT PVCs might encounter problems if one end of the connection is reloaded. When the reloaded host attempts to establish a new connection, the other host refuses the new connection because it has not been informed that the old session is no longer active. Recovery from this state requires the other host to be informed that its TCP session is no longer viable so that it attempts to reconnect the PVC.

Also, TCP keepalives inform a router when an XOT switched virtual circuit (SVC) session is not active, thus freeing the router's resources.

Examples

The following example enters the parameters for one side of a connection destined for a platform other than the Cisco 7000 series with RSP7000:

```
service tcp-keepalives-in
service tcp-keepalives-out
interface serial 0
 x25 pvc 1 xot 172.20.1.2 interface serial 1 pvc 2
The following example enters the parameters for one side of a connection destined for the
Cisco 7000 series with RSP7000:
service tcp-keepalives-in
service tcp-keepalives-out
interface serial 0
 x25 pvc 1 xot 172.20.1.2 interface serial 1/1 pvc 2
```

Refer to the section "X.25 and LAPB Configuration Examples" in the *Cisco IOS Wide-Area Networking Configuration Guide* for more complete configuration examples.

Related Commands

Command	Description
service tcp-keepalives-in	Generates keepalive packets on idle incoming network connections (initiated by the remote host).
service tcp-keepalives-out	Generates keepalive packets on idle outgoing network connections (initiated by a user).