CHAPTER 8

X.25 Configuration Commands

Use the commands in this chapter to configure Link Access Procedure Balanced (LAPB), X.25, DDN X.25, and Blacker Front-end Encryption (BFE).

For X.25 and LAPB configuration information and examples, refer to the *Communication Server Configuration Guide*.

access-class

To configure an incoming access class on virtual terminals, use the **access-class** line subcommand.

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

Syntax Description

access-list-number	An integer between 1 and 199 that you select for the access list.

Default

None

Command Mode

Line configuration

Usage Guidelines

The access list number is used for both incoming TCP access and incoming PAD access.

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

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

Example

The following example configures an incoming access class on virtual terminal line 4.

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

Related Command

The dagger (†) indicates that the command is documented in another chapter of this manual.

x29 access-list
access-list
line vty (†)

bfe

Use the **bfe** EXEC command to set the communication server to participate in emergency mode or to end participation in emergency mode when your system is configured for **x25 bfe-emergency decision** and **x25 bfe-decision ask**.

bfe {**enter** | **leave**} *interface-type number*

Syntax Description

enter	Causes the communication server to send a special address translation packet that includes an **enter emergency mode** command to the BFE if the emergency mode window is open. If the BFE is already in emergency mode, this command enables the sending of address translation information.
leave	Disables the sending of address translation information from the communication server to the BFE when the BFE is in emergency mode.
interface-type	The interface name.
number	The interface number.

Command Mode

EXEC

Example

The following example illustrates how to set the communication server to participate in BFE mode:

```
cs# bfe enter interface serial 0
```

Related Commands

encapsulation bfex25
x25 bfe-decision
x25 bfe-emergency

clear x25-vc

Use the **clear x25-vc** privileged EXEC command to clear virtual circuits (VCs). This command without any arguments clears all X.25 virtual circuits at once.

clear x25-vc *interface-type interface-number* [*lcn*]

Syntax Description

interface-type	The interface name.
number	The interface unit number.
lcn	(Optional.) A virtual circuit.

Command Mode

Privileged EXEC

Example

The following example illustrates how to clear all VCs:

```
cs# clear x25-vc
```

Related Command

x25 idle

encapsulation bfex25

Use the **encapsulation bfex25** interface configuration command to configure BFE encapsulation on a communication server attached to a BFE device.

encapsulation bfex25

Syntax Description

This command has no arguments or keywords.

Default

The default serial encapsulation is HDLC. You must choose an X.25 encapsulation method.

Command Mode

Interface configuration

Usage Guidelines

This encapsulation operates to map between Class A IP addresses and the type of X.121 addresses expected by the BFE encryption device.

Example

The following example sets BFE encapsulation on interface serial 0:

```
interface serial 0
encapsulation bfex25
```

Related Command

bfe

encapsulation ddnx25

A communication server using DDN X.25 Standard Service can act as either a DTE or a DCE device. Use the **encapsulation ddnx25** interface configuration command to set DTE DDN X.25 device operation.

encapsulation ddnx25

Syntax Description

This command has no arguments or keywords.

Default

The default serial encapsulation is HDLC. You must choose an X.25 encapsulation method.

Command Mode

Interface configuration

Usage Guidelines

This encapsulation operates to map between IP addresses and the type of X.121 addresses expected by the BFE encryption device.

Example

The following example sets DTE DDN X.25 device operation on interface serial 0:

```
interface serial 0
encapsulation ddnx25
```

encapsulation ddnx25-dce

A communication server using DDN X.25 Standard Service can act as either a DTE or a DCE device. Use the **encapsulation ddnx25-dce** interface configuration command to set DCE DDN X.25 device operation.

encapsulation ddnx25-dce

Syntax Description

This command has no arguments or keywords.

Default

The default serial encapsulation is HDLC. You must choose an X.25 encapsulation method.

Command Mode

Interface configuration

Usage Guidelines

This encapsulation operates to map between IP addresses and the type of X.121 addresses expected by the DDN.

Example

The following example sets DCE DDN X.25 device operation on interface serial 0:

```
interface serial 0
encapsulation ddnx25-dce
```

encapsulation lapb

Use the **encapsulation lapb** interface configuration command to run datagrams over a DTE serial interface using the LAPB encapsulation. One end of the link must be DTE and the other end must be DCE.

encapsulation lapb

Syntax Description

This command has no arguments or keywords.

Default

The default serial encapsulation is HDLC. You must choose an X.25 encapsulation method.

Command Mode

Interface configuration

Example

The following example sets LAPB DTE encapsulation on interface serial 3:

```
interface serial 3
encapsulation lapb
```

Related Command

lapb protocol

encapsulation lapb-dce

Use the **encapsulation lapb-dce** interface configuration command to run datagrams over a DCE serial interface using the LAPB encapsulation. One end of the link must be DTE and the other end must be DCE.

encapsulation lapb-dce

Syntax Description

This command has no arguments or keywords.

Default

The default serial encapsulation is HDLC. You must choose an X.25 encapsulation method.

Command Mode

Interface configuration

Example

The following example sets LAPB DCE encapsulation on interface serial 3:

```
interface serial 3
encapsulation lapb-dce
```

Related Command

lapb protocol

encapsulation multi-lapb

For DTE operation, use the **encapsulation multi-lapb** interface configuration command to enable use of multiple local-area network (LAN) protocols on the same line at the same time.

encapsulation multi-lapb

Syntax Description

This command has no arguments or keywords.

Default

The default serial encapsulation is HDLC. You must choose an X.25 encapsulation method.

Command Mode

Interface configuration

Usage Guidelines

With the **encapsulation multi-lapb** command, you can use multiple protocols such as IP, DECnet, and XNS at the same time. Both ends of the line must use the same encapsulation; one end of the link must be DCE and the other end DTE.

Example

The following example illustrates how to set multiple protocols on a LAPB line for DTE operation:

```
interface serial 0
encapsulation multi-lapb
```

encapsulation multi-lapb-dce

For DCE operation, use the **encapsulation multi-lapb-dce** interface configuration command to enable use of multiple LAN protocols on the same line at the same time.

encapsulation multi-lapb-dce

Syntax Description

This command has no arguments or keywords.

Default

The default serial encapsulation is HDLC. You must choose an X.25 encapsulation method.

Command Mode

Interface configuration

Usage Guidelines

With the **encapsulation multi-lapb-dce** command, you can use multiple protocols such as IP, DECnet, and XNS at the same time. Both ends of the line must use the same encapsulation; one end of the link must be DCE and the other end DTE.

Example

The following example illustrates how to set multiple protocols on a LAPB line for DCE operation:

```
interface serial 0
encapsulation multi-lapb-dce
```

encapsulation x25

A communication server using X.25 Level 3 encapsulation can act as a DTE or DCE protocol device on general X.25 networks. Use the **encapsulation x25** interface configuration command to set X.25 DTE operation.

encapsulation x25

Syntax Description

This command has no arguments or keywords.

Default

The default serial encapsulation is HDLC. You must choose an X.25 encapsulation method.

Command Mode

Interface configuration

Example

The following example sets X.25 DTE operation on interface serial 0:

```
interface serial 0
encapsulation x25
```

encapsulation x25-dce

A communication server using X.25 Level 3 encapsulation can act as a DTE or DCE device on general X.25 networks. Use the **encapsulation x25-dce** interface configuration command to set X.25 DCE operation.

encapsulation x25-dce

Syntax Description

This command has no arguments or keywords.

Default

The default serial encapsulation is HDLC. You must choose an X.25 encapsulation method.

Command Mode

Interface configuration

Example

The following example sets X.25 DCE operation on interface serial 0:

```
interface serial 0
encapsulation x25-dce
```

lapb hold-queue

Use the **lapb hold-queue** interface configuration command to define the number of packets to be held until they can be sent over the LAPB connection. Use the **no lapb hold-queue** command without an argument to remove this command from the configuration file and return to the default value.

lapb hold-queue *queue-size*
no lapb hold-queue [*queue-size*]

Syntax Description

queue-size	Defines the number of packets. A hold queue limit of 0 allows an unlimited number of packets in the hold queue. This argument is optional in the **no** form of the command.

Default

12 packets

Command Mode

Interface configuration

Example

The following example illustrates how to set the X.25 hold queue to hold 25 packets:

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

lapb k

Use the **lapb k** interface configuration command to specify the maximum permissible number of outstanding frames, called the window size.

lapb k *window-size*

Syntax Description

window-size	A packet count from 1 to 7.

Default

7 packets

Command Mode

Interface configuration

Example

The following example changes the LAPB window size (the K parameter) to three packets:

```
interface serial 0
lapb k 3
```

lapb n1

Use the **lapb n1** interface configuration command to specify the maximum number of bits a frame can hold (the LAPB N1 parameter).

lapb n1 *bits*

Syntax Description

bits	Number of bits from 1088 through 32,840; it must be a multiple of eight.

Default

12056 bits (1500 bytes)

Command Mode

Interface configuration

Usage Guidelines

It is not necessary to set N1 to an exact value to support a particular X.25 data packet size, although both ends of a connection should have the same N1 value. The N1 parameter serves to avoid processing of any huge frames that result from a "jabbering" interface, an unlikely event.

The Cisco N1 default value corresponds to the hardware interface buffer size. Any changes to this value must allow for an X.25 data packet and LAPB frame overhead.The software supports an X.25 data packet with a maximum packet size plus 3 or 4 bytes of overhead for modulo 8 or 128 operation, respectively, and LAPB frame overhead of 2 bytes of header for modulo 8 operation plus 2 bytes of CRC.

In addition, the various standards bodies specify that N1 be given in bits rather than bytes. While some equipment can be configured using bytes or by automatically adjusting for some of the overhead information present, Cisco devices are configured using the true value of N1.

Table 1-1 specifies the *minimum* N1 values needed to support a given X.25 data packet. Note that N1 cannot be set to a value less than what is required to support an X.25 data packet size of 128 bytes under modulo 128 operation. This is because all X.25 implementations must be able to support 128-byte data packets.

Table 1-1 Minimum LAPB N1 Values

Maximum Data in X.25 Packet	Minimum N1 value for X.25 Modulo 8	Minimum N1 Value for X.25 Modulo 8
128	1088	1088
256	2104	2112
512	4152	4160
1024	8240	8256
2048	16440	16448
4096	32824	32832

Configuring N1 to be less than 2104 will generate a warning message that X.25 might have problems because some nondata packets can use up to 259 bytes.

The N1 parameter cannot be set to a value larger than the default without first increasing the hardware maximum transmission unit (MTU) size.

The X.25 software will accept default packet sizes and CALLs that specify maximum packet sizes greater than what the LAPB layer will support, but will negotiate the CALLs placed on the interface to the largest value that can be supported. For switched CALLs, the packet size negotiation takes place end-to-end through the Cisco communication server so the CALL will not have a maximum packet size that exceeds the capability of either of the two interfaces involved.

Example

The following example sets the N1 bits to 9600:

```
interface serial 0
lapb n1 9600
```

lapb n2

Use the **lapb n2** interface configuration command to specify the maximum number of times a data frame can be transmitted (the LAPB N2 parameter).

lapb n2 *tries*

Syntax Description

tries	Retransmission count from 1 through 255

Default

20 retransmissions

Command Mode

Interface configuration

Example

The following example sets the N2 retries to 50:

```
interface serial 0
lapb n2 50
```

lapb protocol

Use the **lapb protocol** interface configuration command to configure a protocol on the LAPB line.

lapb protocol *protocol*

Syntax Description

protocol	Protocol choice: **ip** and **ipx** (Novell IPX)

Default

IP

Command Mode

Interface configuration

Example

The following example sets IP as the protocol on the LAPB line:

```
interface serial 1
lapb protocol ip
```

Related Commands

encapsulation lapb
encapsulation lapb-dce

lapb t1

Use the **lapb t1** interface configuration command to set the limit retransmission timer period (the LAPB T1 parameter).

lapb t1 *milliseconds*

Syntax Description

milliseconds	Number of milliseconds from 1 through 64,000

Default

3000 milliseconds

Command Mode

Interface configuration

Usage Guidelines

The retransmission timer determines how long a transmitted frame can remain unacknowledged before the LAPB software polls for an acknowledgment.

To determine an optimal value for the retransmission timer, use the privileged EXEC command **ping** to measure the round-trip time of a maximum-sized frame on the link. Multiply this time by a safety factor that takes into account the speed of the link, the link quality, and the distance. A typical safety factor is 1.5. Choosing a larger safety factor can result in slower data transfer if the line is noisy. However, this disadvantage is minor compared to the excessive retransmissions and effective bandwidth reduction caused by a timer setting that is too small.

Example

The following example sets the T1 retransmission timer to 20,000 milliseconds:

```
interface serial 0
lapb t1 20000
```

show interfaces serial

Use the **show interfaces serial** EXEC command to display information about a serial interface.

show interfaces serial *number*

Syntax Description

number Specifies the interface port number.

Command Mode

EXEC

Sample Displays

The following is sample output from the **show interfaces serial** command for a serial interface using LAPB encapsulation:

```
cs# show interfaces serial 1

LAPB state is SABMSENT, T1 3000, N1 12056, N2 20, K7,
VS 0, VR 0, RCNT 0, Remote VR 0, Retransmissions 2
IFRAMEs 0/0 RNRs 0/0 REJs 0/0 SABMs 3/0 FRMRs 0/0 DISCs 0/0
LAPB state is DISCONNECT, T1 3000, N1 12000, N2 20, K7, TH 3000
Window is closed
IFRAMEs 12/28 RNRs 0/1 REJs 13/1 SABMs 1/13 FRMRs 3/0 DISCs 0/11
```

Table 1-2 shows the fields relevant to all LAPB connections.

Table 1-2 Show Interfaces Serial Field Descriptions When LAPB is Enabled

Parameter	Description
LAPB state is	State of the LAPB protocol.
T1 3000, N1 12056, ...	Current parameter settings.
VS	Modulo 8 frame number to give to the next outgoing I-frame.
VR	Modulo 8 frame number to give to the next I frame expected to be received.
RCNT	Number of received I-frames that have not yet been acknowledged.
Remote VR	Number of the next I-frame the remote expects to receive.
Retransmissions	Count of I-frames that have been retransmitted.
Window is closed	No more frames can be transmitted until some outstanding frames have been acknowledged.
IFRAMEs	Count of Information frames in the form of sent/received.
RNRs	Count of Receiver Not Ready frames in the form of sent/received.
REJs	Count of Reject frames in the form of sent/received.

Parameter	Description
SABMs	Count of Set Asynchronous Balanced Mode commands in the form of sent/received.
FRMRs	Count of Frame Reject frames in the form of sent/received.
DISCs	Count of Disconnect commands in the form of sent/received.

The following is sample output from the **show interfaces** command for a serial X.25 interface:

```
cs# show interfaces serial 1

X25 address 000000010100, state R1, modulo 8, idle 0, timer 0, nvc 1
  Window size: input 2, output 2, Packet size: input 128, output 128
  Timers: T20 180, T21 200, T22 180, T23 180, TH 0
  (configuration on RESTART: modulo 8,
  Window size: input 2 output 2, Packet size: input 128, output 128
  Channels: Incoming-only none, Two-way 5-1024, Outgoing-only none)
  RESTARTs 3/2 CALLs 1000+2/1294+190/0+0/ DIAGs 0/0
```

The stability of the X.25 protocol requires that some parameters not be changed without a RESTART of the protocol. Any change to these parameters will be held until a RESTART is sent or received. If any of these parameters will change, the configuration on RESTART information will be output as well as the values that are currently in effect.

Table 1-3 describes significant fields shown in the display.

Table 1-3 Show Interfaces X25 Field Descriptions

Field	Description
X25 address 000000010100	Calling address used in the Call Request packet.
state R1	State of the interface. Possible values include: • R1 is the normal ready state • R2 is the DCE not-ready state • R3 is the DTE not-ready state If the state is R2 or R3, the device is awaiting acknowledgment for a Restart packet.
modulo 8	Modulo value; determines the packet sequence numbering scheme used.
idle 0	Number of minutes the communication server waits before closing idle virtual circuits.
timer 0	Value of the interface timer, which is zero unless the interface state is R2 or R3.
nvc 1	Maximum number of simultaneous virtual circuits permitted to and from a single host for a particular protocol.
Window size: input 2, output 2	Default window size (in packets) for the interface. The **x25 facility** interface configuration command can be used to override these default values for the switched virtual circuits originated by the communication server.
Packet size: input 128, output 128	Default packet size (in bytes) for the interface. The **x25 facility** interface configuration command can be used to override these default values for the switched virtual circuits originated by the communication server.

Field	Description
Timers: T20 180, T21 200, T22 180, T23 180, TH 0	Values of the Request packet timers: • T10 through T13 for a DCE device • T20 through T23 for a DTE device
Channels: Incoming-only none Two-way 5-1024 Outgoing-only none	Displays the channel sequence range for this interface.
RESTARTs 3/2	Shows RESTART packet statistics for the interface using the format Sent/Received.
CALLs 1000+2/1294+190/0+0	Shows CALL packet statistics for the interface using these formats: • Successful+Failed / • Sent+Failed sent / • Received+Failed received
DIAGs 0/0	Shows DIAG packet statistics for the interface using the format Forwarded+Failed forwarded.

show x25 map

Use the **show x25 map** EXEC command to display information about configured virtual circuits.

show x25 map

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Sample Display

The following is sample output from the **show x25 map** command:

```
cs# show x25 map

Serial0: IP 131.108.170.1 1311001 PERMANENT BROADCAST, 2 LCN: 3 4*
```

The display shows that three virtual circuits have been configured for the communication server, two for the Serial0 interface, and one for the Serial1 interface.

Table 1-4 describes significant fields shown in the first line of output in the display.

Table 1-4 Show X.25 Map Field Descriptions

Field	Description
Serial0	Interface for which this X.25 virtual circuit has been configured.
IP	Type of higher-level address that has been configured for this virtual circuit using the **x25 map** command.
131.108.170.1	Higher-level address that has been configured for this virtual circuit.
1311001	X.121 address that has been configured for this virtual circuit.
PERMANENT	Address-mapping type that has been configured for the interface in this entry. Possible values include: • CONSTRUCTED—Derived using the DDN address conversion scheme. • PERMANENT—Address was entered using the **x25 map** interface configuration command. • TEMPORARY—Address mapping was not entered using a configuration command, but was dynamically created instead.
BROADCAST	If broadcasts are enabled for an address mapping, the word BROADCAST also appears on the output line.
2 LCN:	If the number of logical circuit numbers (LCNs) is greater than zero, the line of output also includes the LCN numbers.
3 4	Indicates the LCNs, if one or more exists.
*	Marks the current LCN.

show x25 remote-red

Use the **show x25 remote-red** EXEC command to display the one-to-one mapping of the host IP addresses and the remote BFE device's IP addresses.

show x25 remote-red

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Sample Display

The following is sample output from the **show x25 remote-red** command:

```
cs# show x25 remote-red
Entry       REMOTE-RED     REMOTE-BLACK   INTERFACE
1           21.0.0.3       21.0.0.7       serial3
2           21.0.0.10      21.0.0.6       serial1
3           21.0.0.24      21.0.0.8       serial3
```

Table 1-5 describes significant fields shown in the display.

Table 1-5 Show X.25 Remote-Red Display Field Description

Field	Description
Entry	Address mapping entry.
REMOTE-RED	Host IP address.
REMOTE-BLACK	IP address of the remote BFE device.
INTERFACE	Name of interface through which communication with the remote BFE device will take place.

show x25 vc

Use the **show x25 vc** EXEC command to display active X.25 virtual circuit parameters and statistics. To examine a particular virtual circuit, add an LCN argument to the **show x25 vc** command.

show x25 vc [*lcn*]

Syntax Description

lcn	(Optional.) Logical channel number (LCN), from 1 to 4095.

Command Mode

EXEC

Usage Guidelines

For PVCs, the syntax of the third and sometimes fourth lines of **show x25 vc** output varies depending on whether the PVC is in a connected or disconnected state, and whether the connection is locally switched.

If the PVC is locally switched and connected, the syntax for the third line of output follows:

```
Switched PVC to interface name PVC #, connected
```

If the PVC is locally switched and not connected, the syntax for the third line of output follows:

```
Switched PVC to interface name PVC #, not connected, PVC state string
```

Sample Display

The following is sample output from **show x25 vc** command for an SVC that carries encapsulated IP diagrams:

```
cs# show x25 vc

LC1: 1, State: D1, Interface: Serial0
Started 0:55:03, last input 0:54:56, output 0:54:56
Connected to IP [10.4.0.32] <–>000000320400 Precedent: 0
Window size input: 7, output: 7
Packet size input: 1024, output: 1024
PS: 2 PR: 6 Remote PR: 2 RCNT: 1 RNR: FALSE
Window is closed
Retransmits: 0   Timer (secs): 0  Reassembly (bytes): 0
Held Fragments/Packets: 0/0
Bytes 1111/588 Packets 18/22 Resets 0/0 RNRs 0/0 REJs 0/0 INTs 0/0
```

Table 1-6 describes significant fields shown in the output.

Table 1-6 Show X25 VC Field Descriptions

Field	Description
LCI	Virtual circuit number.
State	State of the virtual circuit (which is independent of the states of other virtual circuits); D1 is the normal ready state. (See the CCITT X.25 recommendation for a description of virtual circuit states.)
Interface	Interface used for the virtual circuit.
Started	Time elapsed since the virtual circuit was created.
last input	Time of last input.
output	Time of last output.
Connected to	Network-protocol address, in brackets, and the X.121 address of the machine to which the communication server is locally connected.
Precedent	IP precedence (appears only if you have specified DDN encapsulation).
Window size	Window size for the virtual circuit.
Packet size	Packet size for the virtual circuit.
PS	Current send sequence number.
PR	Current receive sequence number.
Remote	Last PR number received from the other end of the circuit.
RCNT	Count of unacknowledged input packets.
RNR	State of the Receiver Not Ready flag; this field is true if the network sends a receiver-not-ready packet.
Window is closed	Communication server cannot transmit any more frames until the remote node has acknowledged some outstanding packets.
Retransmits	Number of times a supervisory packet (RESET or CLEAR) has been retransmitted.
Timer	A nonzero time value if a packet has not been acknowledged or if virtual circuits are being timed for inactivity.
Reassembly	Number of bytes received for a partial packet (a packet in which the more data bit is set).
Held Fragments/Packets	Number of X.25 packets being held. (In this case, Fragments refers to the X.25 fragmentation of higher-level data packets.)
Bytes	Total number of bytes sent and received. The Packets, Resets, RNRs, REJs, and INTs fields show the total sent and received packet counts of the indicated types. (RNR is Receiver Not Ready, REJ is Reject, and INT is Interrupt.)

x25 accept-reverse

Use the **x25 accept-reverse** interface configuration command to instruct the communication server to accept all reverse charge calls. The **no x25 accept-reverse** command disables this facility.

x25 accept-reverse
no x25 accept-reverse

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command causes the interface to accept reverse charge calls by default. This behavior also can be configured on a per-peer basis using the **x25 map** interface configuration command.

Example

The following example illustrates how to set acceptance of reverse charge calls:

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

Related Command

x25 map

x25 address

Use the **x25 address** interface configuration command to set the X.121 address of a particular network interface.

x25 address *X.121-address*

Syntax Description

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

Default

None

Command Mode

Interface configuration

Example

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

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

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

x25 bfe-decision

Use the **x25 bfe-decision** interface configuration command to direct how a communication server configured for **x25 bfe-emergency decision** will participate in emergency mode.

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

Syntax Description

no Prevents the communication server from participating in emergency mode and from sending address translation information to the BFE device.

yes Allows the communication server to participate in emergency mode and to send address translation information to the BFE when the BFE enters emergency mode. The communication server obtains this information from the table created by the **x25 remote-red** command.

ask Configures the communication server to display an onscreen request to enter the **bfe** EXEC command.

Default

no

Command Mode

Interface configuration

Example

The following example shows how to configure interface serial 0 to require an EXEC command from the administrator 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 communication server will prompt the administrator for EXEC command **bfe enter** to direct the communication server 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

bfe
x25 bfe-emergency
x25 remote-red

x25 bfe-emergency

Use the **x25 bfe-emergency** interface configuration command to configure the circumstances under which the communication server participates in emergency mode.

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

Syntax Description

never	Prevents the communication server from sending address translation information to the 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 communication server to pass address translations to the BFE when it enters emergency mode and an address translation table has been created.
decision	Directs the communication server 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 is to enter emergency mode. When the diagnostic packet is received, the communication server's participation in emergency mode depends on how it is configured using the **x25 bfe-decision** command.

Default

never

Command Mode

Interface configuration

Example

The following example shows how to configure interface serial 0 to require an EXEC command from the administrator 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 communication server will prompt the administrator for EXEC command **bfe enter** to direct the communication server 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

bfe
x25 bfe-decision

x25 default

Use the **x25 default** interface configuration command to set a default protocol. Use the **no x25 default** command to remove the protocol specified.

x25 default *protocol*
no x25 default *protocol*

Syntax Description

protocol	Specifies the protocol; can only be IP, specified by the **ip** keyword.

Default

None

Command Mode

Interface configuration

Usage Guidelines

This command specifies the protocol assumed by the communication server to interpret incoming calls with unknown Call User Data. If you do not use the **x25 default** interface configuration command, the communication server clears any incoming calls with unknown Call User Data.

Example

The following example illustrates how to establish IP as the default protocol for X.25 calls:

```
interface serial 0
x25 default IP
```

Related Command

x25 map

x25 facility

Use the **x25 facility** interface configuration command to override the default facility settings on a per-call basis for calls originated by the communication server. Use the **no x25 facility** command to disable the facility.

x25 facility *facility-keyword value*
no x25 facility *facility-keyword value*

Syntax Description

facility-keyword User facility.; see Table 1-7 for a list of supported facilities and their values.

value Facility value; see Table 1-7 for a list of supported facilities and their values.

Table 1-7 X.25 User Facilities

Option	Description
cug *number*	Specifies a closed user group (CUG) number; 1 to 99 CUGs are allowed. CUGs can be used by a public data network to create a virtual private network within the larger network and to restrict access.
packetsize *in-size out-size*	Specifies input packet size (*in-size*) and output 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*	Specifies 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 the value set for the **x25 modulo** command.
reverse	Specifies reverse 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 70 to 48,000 bps.
t**ransit-delay** *value*	Specifies a network transit delay for the duration of outgoing calls for networks that support transit delay. The transit delay value can be between 0 and 65334 milliseconds.
rpoa *name*	Specifies the name defined by the **x25 rpoa** command for a list of transit Recognized Private Operation Agencies (RPOAs) to use in outgoing Call Request packets.

Default

No facility sent

Command Mode

Interface configuration

Examples

The following example illustrates how to specify a transit delay value in an X.25 configuration:

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

The following example illustrates how to set an RPOA name and then send the list via the X.25 user facilities:

```
x25 rpoa green_list 23 35 36
interface serial 0
x25 facility rpoa green_list
x25 map ip 131.108.170.26 10 rpoa green_list
```

Related Command

x25 rpoa

x25 hic

Use the **x25 hic** interface configuration command to set the highest incoming-only virtual circuit number.

x25 hic *circuit-number*

Syntax Description

circuit-number	Virtual circuit number from 1 through 4095, or 0 if there is no incoming-only virtual circuit range.

Default

0

Command Mode

Interface configuration

Usage Guidelines

This command is applicable only if you have the X.25 switch configured for incoming only. Incoming is from the perspective of the X.25 DTE. If you do not want any outgoing calls from your DCE, configure the lic and hic values and set the ltc and htc values to 0.

Example

The following example illustrates how to set a valid incoming-only virtual circuit range of 1 to 5:

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

Related Command

x25 lic

x25 hoc

Use the **x25 hoc** interface configuration command to set the highest outgoing-only virtual circuit number.

x25 hoc *circuit-number*

Syntax Description

circuit-number	Virtual circuit number from 1 through 4095, or 0 if there is no outgoing-only virtual circuit range.

Default

0

Command Mode

Interface configuration

Usage Guidelines

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

Example

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

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

Related Command

x25 loc

x25 hold-queue

Use the **x25 hold-queue** interface configuration command to modify the maximum number of packets that can be held until a virtual circuit is able to transmit. Use the **no x25 hold-queue** command without an argument to remove this command from the configuration file and restore the default value.

x25 hold-queue *queue-size*
no x25 hold-queue [*queue-size*]

Syntax Description

queue-size	Defines the VC packet hold queue size. A hold queue value of 0 allows an unlimited number of packets in the hold queue. This argument is optional for the **no** form of this command.

Default

10 packets

Command Mode

Interface configuration

Usage Guidelines

If you set the queue-size to 0 when using the **no x25 hold-queue** command, there will be no hold queue limit. An unlimited hold queue might be appropriate if the interface is configured with a maximum transmission unit (MTU) and IP MTU larger than the X.25 input packet size and X.25 output packet size. If you have configured an MTU and IP MTU larger than the these packet sizes, our X.25 software will fragment the encapsulated IP packet into multiple X.25 frames. This fragmentation might cause the X.25 window to close and the hold queue to become full.

Example

The following example illustrates how to set the X.25 hold queue to hold 25 packets:

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

Related Commands

A dagger (†) indicates that the command is documented in another chapter.

ip mtu (†)
x25 ips
x25 ops

x25 hold-vc-timer

Use the **x25 hold-vc-timer** interface configuration command to prevent overruns on some X.25 switches caused by Call Request packets. This command uses the Ignore Destination timer to prevent additional calls to a destination for a given period of time. The **no x25 hold-vc-timer** command restores the default value for the timer.

x25 hold-vc-timer *minutes*
no x25 hold-vc-timer

Syntax Description

minutes	Number of minutes to prevent calls from going to a previously failed destination. Incoming calls still will be accepted.

Default

0

Command Mode

Interface configuration

Usage Guidelines

Only Call Requests that the communication server originates will be 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.

Example

The following example illustrates how to set the Ignore Destination timer to 3 minutes:

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

x25 host

Use the **x25 host** global configuration command to define a static host name-to-address mapping. Use the **no x25 host** command to remove the host name.

x25 host *name X.121-address* [**cud** *call-user-data*]
no x25 host *name*

Syntax Description

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

Default

None

Command Mode

Global configuration

Examples

The following example illustrates how to specify a static address mapping:

```
x25 host Willard 4085551212
```

The following example illustrates how to remove a static address mapping:

```
no x25 host Willard
```

x25 htc

Use the **x25 htc** interface configuration command to set the highest two-way virtual circuit number.

x25 htc *circuit-number*

Syntax Description

circuit-number	Virtual circuit number from 1 through 4095, or 0 if there is no two-way virtual circuit range.

Default

1024 for X.25 network service interfaces

Command Mode

Interface configuration

Usage Guidelines

This command is applicable if you have the X.25 switch configured for two-way.

Example

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

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

Related Command

x25 ltc

x25 idle

The communication server can clear a switched virtual circuit (SVC) after a period of inactivity. Use the **x25 idle** interface configuration command to set this period.

x25 idle *minutes*

Syntax Description

minutes	Number of minutes in the idle period

Default

0 (causes the communication server to keep the SVC open indefinitely)

Command Mode

Interface configuration

Usage Guidelines

Both calls originated and terminated by the communication server are cleared; switched virtual circuits are not cleared. To clear one or all virtual circuits at once, use the privileged EXEC command **clear x25-vc**.

Example

The following example illustrates how to set a 5-minute wait period before an idle circuit is cleared:

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

Related Command

clear x25-vc

x25 ip-precedence

Use the **x25 ip-precedence** interface configuration command to enable the ability to open a new virtual circuit based on the IP Type of Service (TOS) field. The command **no x25 ip-precedence** causes the TOS field to be ignored when opening virtual circuits.

x25 ip-precedence
no x25 ip-precedence

Syntax Description

This command has no arguments or keywords.

Default

The communication servers open one virtual circuit for all types of service.

Command Mode

Interface configuration

Usage Guidelines

There is a problem associated with this feature in that some hosts send nonstandard data in the TOS field, thus causing multiple, wasteful virtual circuits to be created.

Example

The following example illustrates how to allow new virtual circuits based on the TOS field:

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

x25 ips

Use the **x25 ips** interface configuration command to set the interface default maximum input packet size to match those of the network.

x25 ips *bytes*

Syntax Description

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

Default

128 bytes

Command Mode

Interface configuration

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, a communication server must break the packet into two or more X.25 packets with the M-bit ("more data" bit) set. The receiving device collects all packets with the M-bit set and reassembles them.

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

Example

The following example shows how to set the default maximum packet sizes to 512:

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

Related Command

x25 ops

x25 lic

Use the **x25 lic** interface configuration command to set the lowest incoming-only virtual circuit number.

x25 lic *circuit-number*

Syntax Description

circuit-number	Virtual circuit number from 1 through 4095, or 0 if there is no incoming-only virtual circuit range.

Default

0

Command Mode

Interface configuration

Usage Guidelines

This command is applicable only if you have the X.25 switch configured for incoming only. Incoming is from the perspective of the X.25 DTE. If you do not want any outgoing calls from your DCE, configure the lic and hic values and set the ltc and htc values to 0.

Usage Guidelines

This command is applicable if you have the X.25 switch configured for two way virtual circuits.

Example

The following example shows how to set a valid incoming-only virtual circuit range of 1 to 5:

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

Related Command

x25 hic

x25 linkrestart

Use the **x25 linkrestart** interface configuration command to force a packet-level restart when the link level resets. This command restarts X.25 Level 3 when errors occur in Level 2 (LAPB). The **no x25 linkrestart** command disables this function.

x25 linkrestart
no x25 linkrestart

Syntax Description

This command has no arguments or keywords.

Default

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

Command Mode

Interface configuration

Example

The following example illustrates how to disable the link-level restart:

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

x25 loc

Use the **x25 loc** interface configuration command to set the lowest outgoing-only virtual circuit number.

x25 loc *circuit-number*

Syntax Description

circuit-number	Virtual circuit number from 1 through 4095, or 0 if there is no outgoing-only virtual circuit range.

Default

0

Command Mode

Interface configuration

Usage Guidelines

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

Example

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

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

Related Command

x25 hoc

x25 ltc

Use the **x25 ltc** interface configuration command to set the lowest two-way virtual circuit number.

x25 ltc *circuit-number*

Syntax Description

circuit-number	Virtual circuit number from 1 through 4095, or 0 if there is no two-way virtual circuit range.

Default

1

Command Mode

Interface configuration

Usage Guidelines

This command is applicable if you have the X.25 switch configured for two-way.

Example

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

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

Related Command

x25 htc

x25 map

Use the **x25 map** interface configuration command to set up the LAN protocol-to-X.121 address mapping for the host. Because no defined protocol can dynamically determine such mappings, you must enter a mapping for each host with which the communication server will exchange traffic. Use the **no x25 map** command with the appropriate network protocol and X.121 address arguments to retract a network protocol-to-X.121 mapping.

x25 map *protocol-keyword protocol-address X.121-address* [*option1*... [*option*6]]
no x25 map *protocol-keyword protocol-address X.121-address*

Syntax Description

protocol-keyword Selects the protocol type. Supported protocol keywords are listed in Table 1-8.

protocol-address Specifies the protocol address.

X.121-address Specifies the X.121 address. Both addresses specify the network protocol-to-X.121 mapping.

option (Optional.) Provides additional functionality or the X.25 essential user facilities to the mapping specified. Can be any of the options listed in Table 1-9 (six maximum).

Table 1-8 Protocols Supported by X.25

Keyword	Protocol
ip	IP
novell	Novell IPX
compressedtcp	TCP header compression

Table 1-9 X.25 Map Options

Option	Description
reverse	Specifies reverse charging for outgoing calls.
accept-reverse	Causes the communication server to accept incoming reverse-charged calls. If this option is not present, the communication server clears reverse charge calls.
broadcast	Causes the communication server to direct any broadcasts sent through this interface to the specified X.121 address. This optional keyword also simplifies the configuration of OSPF; see “Usage Guidelines” for more detail.
cug *number*	Specifies a closed user group number (from 1 to 99) for the mapping in the outgoing call.
nvc *count*	Sets the number of virtual circuits (VCs) for this map/host. The default *count* is the **x25 nvc** setting of the interface. A maximum number of eight VCs can be configured for each single map/host.
packetsize *in-size out-size*	Specifies 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.

Option	Description
windowsize *in-size out-size*	Specifies the packet count for input windows (*in-size*) and output windows (*out-size*) for the mapping in an outgoing call. 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.
throughput *in out*	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 70 to 48,000 bps.
transit-delay *number*	Specifies the transit delay value in milliseconds (0 to 65334) for the mapping of outgoing calls, for networks that support transit delay.
nuid *username password*	Specifies that a network ID facility be sent in the outgoing call with the specified TACACS username and password (format determined by Cisco). The combined length of the username and password should not exceed 127 characters.
nudata *string*	Specifies the network user identification in a format determined by the network administrator (as per CCITT recommendation). The string should not exceed 130 characters and must be enclosed in quotation marks (" ") if there are any spaces present.
rpoa *name*	Specifies the name defined by the **x25 rpoa** command for a list of transit RPOAs to use in outgoing Call Request packets.

Default

None

Command Mode

Interface configuration

Usage Guidelines

The **broadcast** keyword simplifies the configuration of OSPF for nonbroadcast networks that will use X.25.

OSPF treats a nonbroadcast, multiaccess network such as X.25 much the same way it treats a broadcast network in that it requires selection of a designated communication server. In previous releases, this required manual assignment in the OSPF configuration using the **neighbor interface** communication server configuration command. When the **x25 map** command is included in the configuration with the **broadcast** keyword, there is no need to configure any neighbors manually. OSPF will now automatically run over the Frame Relay network as a broadcast network.

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

Examples

The **broadcast** keyword directs any broadcasts sent through this interface to the specified X.121 address. The following example illustrates how to map IP address 131.08.2.5 to X.121 address 000000010300:

```
interface serial 0
x25 map ip 131.08.2.5 000000010300 broadcast
```

The following example illustrates how to set an RPOA name for use in the connection:

```
x25 rpoa green_list 23 35 36
interface serial 0
x25 facility rpoa green_list
x25 map ip 131.108.170.26 10 rpoa green_list
```

The following example shows how to add a network user identifier (NUI) to the address map:

```
interface serial 0
x25 map IP 131.108.174.32 2 nudata “Network User ID 35”
```

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

Related Commands

x25 map
x25 map compressedtcp

x25 map compressedtcp

Use the **x25 map compressedtcp** interface configuration command to map compressed TCP traffic to X.121 addresses. The **no x25 map compressedtcp** command disables TCP header compression for the link.

x25 map compressedtcp *IP-address X.121-address* [*options*]
no x25 map compressedtcp *IP-address X.121-address*

Syntax Description

IP-address	The IP address.
X.121-address	The X.121 address.
options	(Optional.) The same options as those for the **x25 map** command described in Table 1-9.

Default

None

Command Mode

Interface configuration

Usage Guidelines

The Call User Data of compressed TCP calls is the single byte 0xD8.

TCP header compression is supported over X.25 links. The implementation of compressed TCP over X.25 uses a virtual circuit (VC) to pass the compressed packets. The noncompressed packets use another VC. The NVC map option cannot be used for TCP header compression, as only one VC can carry compressed TCP header traffic to a given host.

Example

The following example establishes packet compression on interface serial 4:

```
interface serial 4
ip tcp header-compression
x25 map compressedtcp 131.08.2.5 000000010300
```

Related Commands

x25 map

x25 modulo

Use the **x25 modulo** interface configuration command to set the packet numbering modulo.

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.

Default

8

Command Mode

Interface configuration

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*.

Example

The following example illustrates how to set the window modulus to 128:

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

Related Commands

x25 win
x25 wout

x25 nvc

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

x25 nvc *count*

Syntax Description

count	Circuit count from 1 to 8. A maximum of eight VCs can be configured for each protocol/host pair. Protocols that do not tolerate out-of-order delivery, such as encapsulated TCP header compression, will only use one virtual circuit despite this value.

Default

1

Command Mode

Interface configuration

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 **x25 nvc** affects the default value for the number of SVCs. It does not affect the NVC value for any **x25 map** commands that already have been configured.

Example

The following example illustrates how to set the maximum number of switched virtual circuits that can be open simultaneously to 4:

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

x25 ops

Use the **x25 ops** interface configuration command to set the interface default maximum output packet size to match those of the network.

x25 ops *bytes*

Syntax Description

bytes	Byte count in the range of 16 through 1024.

Default

128 bytes

Command Mode

Interface configuration

Usage Guidelines

X.25 networks use maximum input packet sizes set by the network administration. 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, a communication server must break the packet into two or more X.25 packets with the M-bit ("more data" bit) set. The receiving device collects all packets with the M-bit set and reassembles them.

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

Example

The following example shows how to set the default maximum packet sizes to 512:

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

Related Command

x25 ips

x25 pvc (encapsulating)

Use the encapsulating version of the **x25 pvc** interface configuration command to establish an encapsulation permanent virtual circuit (PVC). To delete the PVC, use the **no x25 pvc** command with the appropriate channel number, protocol keyword, and protocol address.

x25 pvc *circuit protocol-keyword protocol-address* [*option*]
no x25 pvc *circuit protocol-keyword protocol-address*

Syntax Description

circuit	Virtual-circuit channel number which must be less than the virtual circuits assigned to the switched virtual circuits (SVCs).
protocol-keyword	Protocol type. Supported protocols are listed in Table 1-10.
protocol-address	Address of the host at the other end of the PVC.
option	(Optional.) PVC's flow control parameters if they differ from the interface defaults. The *option* arguments add certain features to the mapping specified and can be either of the options listed in Table 1-11.

Table 1-10 Protocols Supported by X.25 PVCs

Keyword	Protocol
ip	IP
novell	Novell IPX
compressedtcp	TCP header compression

Table 1-11 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 or equal to the value set for the **x25 modulo** command.

Default

None; the PVC window and maximum packet sizes default to the map values or the interface default values.

Command Mode

Interface configuration

Usage Guidelines

You must specify the required network protocol-to-X.121 address mapping with an **x25 map** command before you can set up a PVC.

Note Map entries with the **broadcast** attribute are particularly likely to get traffic, due to routing protocol traffic. The simplest way to ensure that traffic is not sent while configuring an interface to use a PVC is to shut down the interface while configuring it for PVC support.

Related Command

x25 map

x25 remote-red

Use the **x25 remote-red** interface configuration command to set up the table that lists the BFE nodes (host or gateways) to which the communication server will send packets.

x25 remote-red *host-ip-address* **remote-black** *Blacker-ip-address*

Syntax Description

host-IP-address	IP address of the host or a communication server that the packets are being sent to.
remote-black	Delimits the addresses for the table being built.
Blacker-IP-address	IP address of the remote BFE device in front of the host to which the packet is being sent.

Default

None

Command Mode

Interface configuration

Usage Guidelines

The table that results from this command provides the address translation information the communication server sends to the BFE when it is in emergency mode.

Example

The following example sets up a short table of BFE nodes for interface serial 0:

```
interface serial 0
x25 remote-red 131.108.9.3 remote-black 131.108.9.13
x25 remote-red 192.108.15.1 remote-black 192.108.15.26
```

Related Command

x25 bfe-decision

x25 rpoa

Use the **x25 rpoa** global configuration command to set the packet network carrier. The **no x25 rpoa** command removes the specified name.

x25 rpoa *name number...*
no x25 rpoa *name*

Syntax Description

name	Recognized Private Operating Agency (RPOA), which must be unique with respect to all other RPOA names. It is used in the **x25 facility** and **x25 map** interface configuration commands.
number	Number that is used to describe an RPOA; up to 10 numbers are accepted.

Default

None

Command Mode

Global configuration

Usage Guidelines

This command specifies a list of transit RPOAs to use, referenced by name.

Example

The following example illustrates how to set an RPOA name and then send the list via the X.25 user facilities:

```
x25 rpoa green_list 23 35 36
interface serial 0
x25 facility rpoa green_list
x25 map ip 131.108.170.26 10 rpoa green_list
```

Related Commands

x25 facility
x25 map

x25 suppress-called-address

Use the **x25 suppress-called-address** interface configuration command to omit the called address in outgoing calls. Use the **no x25 suppress-called-address** command to reset this command to the default state.

x25 suppress-called-address
no x25 suppress-called-address

Syntax Description

This command has no arguments or keywords.

Default

The called address is sent by default.

Command Mode

Interface configuration

Usage Guidelines

This command omits the called (destination) X.121 address in Call Request packets and is required for networks that expect only subaddresses in the called address field.

Example

The following example illustrates how to suppress or omit the called address in Call Request packets:

```
interface serial 0
x25 suppress-called-address
```

x25 suppress-calling-address

Use the **x25 suppress-calling-address** interface configuration command to omit the calling address in outgoing calls. Use the **no x25 suppress-calling-address** command to reset this command to the default state.

x25 suppress-calling-address
no x25 suppress-calling-address

Syntax Description

This command has no arguments or keywords.

Default

The calling address is sent by default.

Command Mode

Interface configuration

Usage Guidelines

This command omits the calling (source) X.121 address in Call Request packets and is required for networks that expect only subaddresses in the calling address field.

Example

The following example illustrates how to suppress or omit the calling address in Call Request packets:

```
interface serial 0
x25 suppress-calling-address
```

x25 t10

Use the **x25 t10** interface configuration command to set the limit for the Restart Request retransmission timer (T10) on DCE devices.

x25 t10 *seconds*

Syntax Description

seconds	Amount of time in seconds

Default

60 seconds

Command Mode

Interface configuration

Example

The following example sets the T10 timer to 30 seconds:

```
interface serial 0
x25 t10 30
```

x25 t11

Use the **x25 t11** interface configuration command to set the limit for the Call Request Completion timer (T11) on DCE devices.

x25 t11 *seconds*

Syntax Description

seconds	Amount of time in seconds

Default

180 seconds

Command Mode

Interface configuration

Example

The following example sets the T11 timer to 90 seconds:

```
interface serial 0
x25 t11 90
```

x25 t12

Use the **x25 t12** interface configuration command to set the limit for the Reset Request retransmission timer (T12) on DCE devices.

x25 t12 *seconds*

Syntax Description

seconds	Amount of time in seconds

Default

60 seconds

Command Mode

Interface configuration

Example

The following example sets the T12 timer to 30 seconds:

```
interface serial 0
x25 t12 30
```

x25 t13

Use the **x25 t13** interface configuration command to set the limit for the Clear Request retransmission timer (T13) on DCE devices.

x25 t13 *seconds*

Syntax Description

seconds	Amount of time in seconds

Default

60 seconds

Command Mode

Interface configuration

Example

The following example sets the T13 timer to 30 seconds:

```
interface serial 0
x25 t13 30
```

x25 t20

Use the **x25 t20** interface configuration command to set the limit for the Restart Request retransmission timer (T20) on DTE devices.

x25 t20 *seconds*

Syntax Description

seconds	Amount of time in seconds

Default

180 seconds

Command Mode

Interface configuration

Example

The following example sets the T20 timer to 90 seconds:

```
interface serial 0
x25 t20 90
```

x25 t21

Use the **x25 t21** interface configuration command to set the limit for the Call Request Completion timer (T21) on DTE devices.

x25 t21 *seconds*

Syntax Description

seconds	Amount of time in seconds

Default

200 seconds

Command Mode

Interface configuration

Example

The following example sets the T21 timer to 100 seconds:

```
interface serial 0
x25 t21 100
```

x25 t22

Use the **x25 t22** interface configuration command to set the limit for the Reset Request retransmission timer (T22) on DTE devices.

x25 t22 *seconds*

Syntax Description

seconds	Amount of time in seconds

Default

180 seconds

Command Mode

Interface configuration

Example

The following example sets the T22 timer to 90 seconds:

```
interface serial 0
x25 t22 90
```

x25 t23

Use the **x25 t23** interface configuration command to set the limit for the Clear Request retransmission timer (T23) on DTE devices.

x25 t23 *seconds*

Syntax Description

seconds	Amount of time in seconds

Default

180 seconds

Command Mode

Interface configuration

Example

The following example sets the T23 timer to 90 seconds:

```
interface serial 0
x25 t23 90
```

x25 th

Use the **x25 th** interface configuration command to instruct the communication server to send an acknowledgment packet when it has received a threshold of data packets it has not acknowledged, instead of waiting until its input window is full. This command improves line responsiveness at the expense of bandwidth.

x25 th *delay-count*

Syntax Description

delay-count	Value between zero and the input window size. A value of 1 sends one Receiver Ready acknowledgment per packet at all times.

Default

0 (which disables the delayed acknowledgment strategy)

Command Mode

Interface configuration

Usage Guidelines

The communication server sends acknowledgment packets when the number of input packets reaches the count you specify, providing there are no other packets to send. For example, if you specify a count of 1, the communication server can send an acknowledgment per input packet.

Example

The following example sends five Receiver Ready acknowledgments per packet as an input packet delay:

```
interface serial 1
x25 th 5
```

Related Commands

x25 win
x25 wout

x25 win

Use the **x25 win** interface configuration command to change the default maximum number of unacknowledged incoming packets for the interface.

x25 win *packets*

Syntax Description

packets	Packet count that can range from 1 to one less than the window modulus.

Default

2 packets

Command Mode

Interface configuration

Usage Guidelines

This command determines how many packets the communication server can receive before sending an X.25 acknowledgment. To maintain high bandwidth utilization, assign this limit the largest number that the network allows.

Note Set **x25 win** and **x25 wout** to the same value unless your network supports asymmetry between input and output window sizes.

Example

The following example specifies that five packets must be received before sending an X.25 acknowledgment:

```
interface serial 1
x25 win 5
```

Related Commands

x25 modulo
x25 th
x25 wout

x25 wout

Use the **x25 wout** interface configuration command to change the default maximum number of unacknowledged packets to allow.

x25 wout *packets*

Syntax Description

packets	Packet count that can range from 1 to the window modulus.

Default

2 packets

Command Mode

Interface configuration

Usage Guidelines

This command determines the default number of packets the communication server can send before waiting for an X.25 acknowledgment. To maintain high bandwidth utilization, assign this limit the largest number that the network allows.

Note Set **x25 win** and **x25 wout** to the same value unless your network supports asymmetry between input and output window sizes.

Example

The following example specifies an upper limit of five for the number of outstanding unacknowledged packets for the output window:

```
interface serial 1
x25 wout 5
```

Related Commands

x25 modulo
x25 th
x25 win

x29 access-list

To limit access to the communication server from certain X.25 hosts, use the **x29 access-list** global configuration command. To delete an entire access list, use the **no** form of this command.

x29 access-list *access-list-number* {**deny | permit**} *X.121-address*
no x29 access-list *access-list-number*

Syntax Description

access-list-number	Number of the access list. It can be a value between 1 and 199.
deny	Denies access and clears call requests immediately.
permit	Permits access to the protocol translator.
X.121-address	X.121 address, with or without regular expression pattern-matching characters, with which to compare for access.

Default

None

Command Mode

Global

Usage Guidelines

An access list can contain any number of access list items. The list are processed in the order in which you entered them, with the first match causing the permit or deny condition. If an X.121 address does not match any of the regular expression in the access list, access will be denied.

Access lists take advantage of the message field defined by Recommendation X.29, which describes procedures for exchanging data between two PADs or a PAD and a DTE device.

The UNIX-style regular expression characters allow for pattern matching of characters and character strings in the address. Various pattern-matching constructions are available that will allow many addresses to be matched by a single regular expressions. Refer to the regular expression appendix in this manual for more information.

Example

The following example permits connections to hosts with addresses beginning with the string 31370:

```
x29 access-list 2 permit ^31370
```

x29 profile

To create a PAD profile script for use by the **translate** command, use the **x29 profile** global configuration command.

x29 profile *name parameter***:***value* [*parameter***:***value*]

Syntax Description

name	Name of the PAD profile script.
X.parameter:*value*	X.3 PAD parameter number and value separated by a colon. You can specify multiple parameter-value pairs.

Default

None

Command Mode

Global

Usage Guidelines

When an X.25 connection is established, the communication server acts as if an X.29 SET PARAMETER packet had been sent containing the parameters and values set by the **x29 profile** command and sets the communication server accordingly.

Example

The following profile script turns local edit mode on when the connection is made and establishes local echo and line termination upon receipt of a Return. The name "linemode" is used with the **translate** command to effect use of this script.

```
x29 profile linemode 2:1 3:2 15:1
```

Related Command

translate