X.25 and LAPB Commands

This chapter describes the function and displays the syntax of each X.25 and LAPB command. For more information about defaults and usage guidelines, see the corresponding chapter of the *Router Products Command Reference* publication.

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

To allow the router to participate in emergency mode or to end participation in emergency mode when the interface is configured for **x25 bfe-emergency decision** and **x25 bfe-decision** ask, use the **bfe** EXEC command.

enter Causes the router 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 router to the BFE when the

BFE is in emergency mode.

type Interface type.

number Interface unit number.

clear x25-vc type number [lcn]

To clear switched virtual circuits (SVCs) and to reset permanent virtual circuits (PVCs), use the **clear x25-vc** privileged EXEC command. To clear *all* X.25 virtual circuits at once by restarting the packet layer service, use this command without an *lcn* argument.

type Interface type

number Interface unit number

Router Products Command Summary

[no] cmns enable

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

encapsulation lapb [dte | dce] [multi | protocol]

To exchange datagrams over a serial interface using LAPB encapsulation, use the **encapsulation lapb** interface configuration command.

dte (Optional) Specifies operation as a DTE. This is the

default LAPB mode.

dce (Optional) Specifies operation as a DCE.

multi (Optional) Specifies use of multiple local-area

network (LAN) protocols to be carried on the LAPB

line.

protocol (Optional) A single protocol to be carried on the

LAPB line. A single protocol can be one of the following: **apollo**, **appletalk**, **clns** (ISO CLNS), **decnet**, **ip**, **ipx** (Novell IPX), **vines**, and **xns**. IP is

the default protocol.

encapsulation x25 [dte | dce] [[ddn | bfe] | [ietf]]

To specify an interface's operation as an X.25 device, use the **encapsulation x25** interface configuration command.

dte (Optional) Specifies operation as a DTE. This is the

default X.25 mode.

dce (Optional) Specifies operation as a DCE.

ddn (Optional) Specifies DDN encapsulation on a router

using DDN X.25 standard service

bfe (Optional) Specifies BFE encapsulation on a router

attached to a BFE device.

ietf (Optional) Specifies that the interface's datagram

encapsulation should default to use of the IETF standard method, as defined by RFC 1356.

[no] ip tcp header-compression [passive]

To implement TCP header compression that complies with the IETF RFC 1144 standard, use the **ip tcp header-compression** interface configuration command. To disable this feature, user the **no ip tcp header-compression** command.

passive (Optional) Outgoing packets are compressed only if

incoming TCP packets on the virtual circuit for a TCP header compression map are compressed. When the **passive** option is not set, all compressible traffic intended for the TCP header compression

address map is compressed.

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

To define the number of frames that can be held while LAPB is unable to send, use the **lapb hold-queue** interface configuration command. To remove this command from the configuration file and return to the default value, use the **no lapb hold-queue** command without an argument.

size Defines the number of frames. A hold queue limit of 0 allows an unlimited number of frames in the hold

queue. This argument is optional in the **no** form of

the command.

The default is 10 frames for LAPB encapsulation; X25 encapsulation may not set this parameter because proper operation requires that LAPB send

all requested frames.

Router Products Command Summary

lapb interface-outage milliseconds

To specify a period during which a link will remain connected, even if a brief hardware outage occurs, use the **lapb interface-outage** interface configuration command.

milliseconds

Number of milliseconds a hardware outage can last without having the protocol disconnect the service. The default is 0 milliseconds, which disables this feature.

lapb k window-size

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

window-size

Frame count. It can be a value from 1 to the modulo size minus 1. The default is 7 frames.

lapb modulo modulus

To specify the LAPB operating modulo as the basic (modulo 8) or extended (modulo 128) protocol modulo, use the **lapb modulo** interface configuration command.

modulus

Either 8 or 128. The value 8 specifies LAPB's basic mode; the value 128 specifies LAPB's extended mode. The default is 8.

lapb n1 bits

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

bits

Number of bits from 1088 through 32840; it must be a multiple of eight. N1 defaults to the largest value available for the interface.

lapb n2 tries

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

tries

Transmission count. It can be a value from 1 through 255. The default is 20 transmissions.

lapb protocol protocol

To configure the protocol carried on the LAPB line, use the **lapb protocol** interface configuration command.

protocol

Protocol, entered by keyword. It can be one of the following: **ip**, **xns**, **decnet**, **appletalk**, **vines**, **clns** (ISO CLNS), **ipx** (Novell IPX), and **apollo**. The default is IP.

lapb t1 milliseconds

To set the retransmission timer period (the LAPB T1 parameter), use the **lapb t1** interface configuration command.

milliseconds

Time in milliseconds. It can be a value from 1 through 64000. The default is 3000 milliseconds.

lapb t4 seconds

To set the T4 idle timer, after which the router sends out a Poll packet to determine whether the link has suffered an unsignaled failure, use the **lapb t4** interface configuration command.

seconds

Number of seconds between reception of the last frame and the transmission of the outgoing Poll. The default value is 0 seconds, which disables the T4 timer feature.

show cmns [type number]

To display X.25 Level 3 parameters for LAN interfaces (such as Ethernet or Token Ring) and other information pertaining to CMNS traffic activity, use the **show cmns** EXEC command.

type (Optional) Interface type

number (Optional) Interface unit number

show interfaces serial number

To display information about a serial interface, use the **show interfaces serial** EXEC command.

number Specifies the interface port number.

show llc2

To display active LLC2 connections, use the **show llc2** privileged EXEC command.

show x25 map

To display information about configured address maps, use the $show\ x25$ map EXEC command.

show x25 remote-red

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

show x25 route

To display the X.25 routing table, use the **show x25 route** EXEC command.

show x25 vc [lcn]

To display information about active switched virtual circuits (SVCs) and permanent virtual circuits (PVCs), use the **show x25 vc** EXEC command. To examine a particular virtual circuit, add an LCN argument to the **show x25 vc** command.

lcn (Optional) Logical channel number (LCN)

[no] x25 accept-reverse

To configure the router to accept all reverse charge calls, use the **x25** accept-reverse interface configuration command. To disable this facility, use the **no x25 accept-reverse** command.

x25 address x.121-address

To set the X.121 address of a particular network interface, use the **x25** address interface configuration command.

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

x25 bfe-decision {no | yes | ask}

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

no Prevents the router from participating in emergency mode and from sending address

translation information to the BFE device. This

is the default.

yes Allows the router to participate in emergency

mode and to send address translation

information to the BFE when the BFE enters emergency mode. The router obtains this information from the table created by the **x25**

remote-red command.

Router Products Command Summary

ask

Configures the router to prompt the console operator to enter the **bfe** EXEC command.

x25 bfe-emergency {never | always | decision}

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

never	Prevents the rout	ter from sending addres	S
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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. This is the default.

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 is to enter emergency mode. When the diagnostic packet is received, the router's participation in emergency mode depends on how it is configured using the

x25 bfe-decision command.

[no] x25 default protocol

To set a default protocol, use the **x25 default** interface configuration command. To remove the default protocol specified, use the **no x25 default** command.

protocol Specifies the protocol to assume; may be ip or

pad.

[no] x25 facility facility-keyword value

To force facilities on a per-call basis for calls originated by the router (switched calls are not affected), use the **x25 facility** interface configuration command. To disable a facility, use the **no x25 facility** command.

facility-keyword User facility.

value Facility value; see this command in the Router

Products Command Reference publication for a table of supported facilities and their values.

x25 hic *circuit-number*

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

circuit-number Virtual circuit number from 1 through 4095, or

0 if there is no incoming-only virtual circuit

range. The default is 0.

x25 hoc circuit-number

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

circuit-number Virtual circuit number from 1 through 4095, or

0 if there is no outgoing-only virtual circuit

range. The default is 0.

x25 hold-queue packets [no] x25 hold-queue [packets]

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

packets Number of packets. A hold queue value of 0

allows an unlimited number of packets in the hold queue. The default is 10 packets.

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

To start the hold-vc-timer to prevent 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** interface configuration command. To restore the default value for the timer, use the **no x25 hold-vc-timer** command.

minutes Number of minutes to prevent calls from

going to a previously failed destination. Incoming calls will still be accepted. The

default is 0 minutes.

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

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

name Host name.

x.121-address X.121 address.

cud call-user-data (Optional) Specifies the Call User Data

(CUD) field in the X.25 Call Request

packet.

X.25 and LAPB Commands

x25 htc circuit-number

To set the highest two-way virtual circuit number, use the **x25 htc** interface configuration command.

circuit-number Virtual circuit number from 1 through 4095,

or 0 if there is no two-way virtual circuit range. The default is 1024 for X.25 network service interfaces; 4095 for CMNS network

service interfaces.

x25 idle minutes

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

minutes Idle period in minutes. The default is 0,

which causes the router to keep the SVC

open indefinitely.

[no] x25 ip-precedence

To enable the router to use IP precedence value when it opens a new virtual circuit, use the **x25 ip-precedence** interface configuration command. To cause the precedence value to be ignored when opening virtual circuits, use the **no x25 ip-precedence** command.

x25 ips bytes

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

bytes Byte count. It can be one of the following

values: 16, 32, 64, 128, 256, 512, 1024, 2048, or

4096. The default is 128 bytes.

x25 lic circuit-number

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

circuit-number Virtual circuit number from 1 through 4095, or 0

if there is no incoming-only virtual circuit range.

The default is 0.

[no] x25 linkrestart

To force X.25 Level 3 (packet-level) to restart when Level 2 (LAPB, the link level) resets, use the **x25 linkrestart** interface configuration command. To disable this function, use the **no** form of this command.

x25 loc circuit-number

To set the lowest outgoing-only virtual circuit number, use the $\mathbf{x25}$ loc interface configuration command.

circuit-number Virtual circuit number from 1 through 4095,

or 0 if there is no outgoing-only virtual circuit

range. The default is 0.

x25 ltc circuit-number

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

circuit-number Virtual circuit number from 1 through 4095,

or 0 if there is no two-way virtual circuit

range. The default is 1.

x25 map protocol address [protocol2 address2...protocol9 address9] *x.121-address* [option]

no x25 map protocol address x.121-address

To set up the LAN protocols-to-remote host mapping, use the $\mathbf{x25}$ map interface configuration command. To retract a mapping, use the \mathbf{no} $\mathbf{x25}$ map command with the appropriate network protocol(s) and X.121 address arguments.

protocol Protocol type, entered by keyword. As many as

nine protocol and address pairs can be specified

in one command line. See the supported protocols table for this command in the *Router*

Products Command Reference publication.

address Protocol address.

x.121-address X.121 address of the remote host.

option (Optional) Provides additional functionality or

allows X.25 facilities to be specified for originated calls. See the options table for this command in the *Router Products Command*

Reference publication.

x25 map bridge x.121-address broadcast [option]

To configure IP-to-X.121 address mapping for bridging over X.25, use the **x25 map bridge** interface configuration command.

x.121-address The X.121 address.

broadcast Required keyword for bridging over X.25.

option (Optional) Services that can be added to this

map. See options table for the **x25 map** command in the *Router Products Command*

Reference publication.

[no] x25 map cmns nsap mac-address [**no**] **x25 map cmns** *nsap* [*x.121-address*]

To map NSAP addresses to either MAC-layer addresses or X.121 addresses after enabling CMNS on a nonserial interface, use the x25 map cmns interface configuration command. To retract a mapping, use the no form of this command with the appropriate address arguments.

NSAP address. The NSAP can be either the nsap

actual DTE NSAP address or the prefix of the NSAP address. The NSAP prefix is sufficient

for a best match to route a call.

mac-address MAC-level address.

x.121-address (Optional) X.121 address.

x25 map compressedtcp address x.121-address [option] no x25 map compressedtcp address x.121-address

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

IP address. address x.121-address

option (Optional) See the options table for the x25

X.121 address.

map command in the Router Products Command Reference publication.

x25 modulo modulus

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

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. The default

is 8.

x25 nvc count

To specify the maximum number of switched virtual circuits (SVCs) that a protocol can have open simultaneously to one host, use the **x25 nvc** interface configuration command.

count

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

x25 ops bytes

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

bytes

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

x25 pvc circuit protocol address [protocol2 address2...protocol9 address9] x.121-address [option]
no x25 pvc circuit protocol address

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

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. As many

as nine protocol and address pairs can be specified in one command line. See the supported protocols table for this command in the *Router Products Command Reference*

publication.

address Protocol 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. See the PVC options table for this command in the *Router Products Command Reference*

publication.

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

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

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 unit 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. See this command in the *Router Products Command Reference* publication for a table of switched PVC

options.

x25 pvc pvc-number1 **tunnel** ip-address **interface serial** string **pvc** pvc-number2 [option]

To connect two permanent virtual circuits (PVCs) across a TCP/IP LAN, use the tunnel version of the **x25 pvc** interface configuration command.

number1 PVC number of the connecting device.

tunnel Indicates two PVCs will be connected across

a TCP/IP LAN.

address IP address of the router 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 Cisco 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. See the PVC tunnel options table for this command in the *Router Products*

Command Reference publication.

x25 remote-red host-ip-address remote-black blacker-ip-address

To set up the table that lists the Blacker Front End (BFE) nodes (host or gateways) to which the router will send packets, use the **x25 remote-red** interface configuration command.

host-ip-address IP address of the host or a router 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.

[no] x25 route [# position] x.121-address [cud pattern] interface type number

x25 route [# position] x.121-address [cud pattern] ip address [address2 ... address6]
no x25 route [# position] x.121-address [cud pattern] ip address

[no] x25 route [# position] x.121-address [cud pattern] alias type number

[no] x25 route [# position] x.121-address [substitute-source rewrite-pattern] [substitute-dest rewrite-pattern] [cud pattern] interface type number

To create an entry in the X.25 routing table, use the **x25 route** global configuration command. To remove an entry from the table, enter the **no x25 route** command with the appropriate arguments and keywords.

Note For typographical reasons, the last command is shown on three lines. When using the optional keywords in this variation of the **x25 route** command, the **substitute-source** keyword must precede the **substitute-dest** keyword, and both must precede the **cud** keyword. The entire command must be on one line.

# position	(Optional) A pound sign (#) followed by a number to designate a positional parameter at which to insert the new entry. If no <i>position</i> parameter is given, the entry is appended to the end of the routing table.
x.121-address	Called X.121 address pattern. This argument can be either an actual X.121 destination address or a regular expression such as 1111*, representing a group of X.121 addresses.
cud pattern	(Optional) Call User Data pattern, which is specified as a printable ASCII string. The Call User Data field may be present in a call

packet and is commonly 4 bytes long.

X.25 and LAPB Commands

interface type number

Keyword and destination interface type and unit or port number.

ip address

Keyword and IP address of the network interface or DTE for connections routed through a LAN. Optionally, up to five alternate IP addresses can be listed and each in turn will be tried in the event that the first destination fails.

alias type number

Keyword and interface type and unit or port number of the interface alias. Encapsulation calls are normally accepted when the destination address is that of the interface (or the zero-length X.121 address). Aliases allow the specified interface to accept calls with other destination addresses.

substitute-source rewrite-pattern

(Optional) See the pattern rewrite elements, pattern matching, and character matching tables for this command in the *Router Products Command Reference* publication.

substitute-dest rewrite-pattern (Optional) Specifies the called X.121 address to replace in locally routed X.25 calls. (For backwards compatibility, the substitute keyword will be accepted as substitute-dest and written to nonvolatile memory in the new format.) The backslash (\) character is treated specially in the argument rewrite-pattern; it indicates that the digit immediately following it selects a portion of the original called address to be inserted in the new called address. The characters \0 are replaced with the entire original address. The characters \1 through \9 are replaced with the strings that matched the first through ninth parenthesized parts of *X.121-pattern*. See the pattern rewrite elements table for this command in the Router Products Command Reference publication.

x25 routing [use-tcp-if-defs] no x25 routing

To enable X.25 switching or tunneling, use the **x25 routing** global configuration command. To disable the forwarding of X.25 calls, use the **no** form of this command.

use-tcp-if-defs (Optional) May be used to modify the

acceptance of calls received over TCP.

x25 rpoa name number no x25 rpoa name

To specify a sequence of packet network carriers, use the **x25 rpoa** global configuration command. To remove the specified name, use the **no** form of this command.

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 A sequence of 1 or more numbers used to

describe an RPOA; up to 10 numbers are

accepted.

[no] x25 suppress-called-address

To omit the destination address in outgoing calls, use the **x25 suppress-called-address** interface configuration command. To reset this command to the default state, use the **no** form of this command.

[no] x25 suppress-calling-address

To omit the source address in outgoing calls, use the **x25 suppress-calling-address** interface configuration command. To reset this command to the default state, use the **no** form of this command.

x25 t10 seconds

To set the value of the Restart Indication retransmission timer (T10) on DCE devices, use the **x25 t10** interface configuration command.

seconds Time in seconds. The default is 60 seconds.

x25 t11 seconds

To set the value of the Incoming Call timer (T11) on DCE devices, use the **x25 t11** interface configuration command.

seconds Time in seconds. The default is 180 seconds.

x25 t12 seconds

To set the value of the Reset Indication retransmission timer (T12) on DCE devices, use the **x25 t12** interface configuration command.

seconds Time in seconds. The default is 60 seconds.

x25 t13 seconds

To set the value of the Clear Indication retransmission timer (T13) on DCE devices, use the **x25 t13** interface configuration command.

seconds Time in seconds. The default is 60 seconds.

x25 t20 seconds

To set the value of the Restart Request retransmission timer (T20) on DTE devices, use the **x25 t20** interface configuration command.

seconds Time in seconds. The default is 180 seconds.

x25 t21 seconds

To set the value of the Call Request timer (T21) on DTE devices, use the **x25 t21** interface configuration command.

seconds Time in seconds. The default is 200 seconds.

x25 t22 seconds

To set the value of the Reset Request retransmission timer (T22) on DTE devices, use the **x25 t22** interface configuration command.

seconds Time in seconds. The default is 180 seconds.

x25 t23 seconds

To set the value of the Clear Request retransmission timer (T23) on DTE devices, use the **x25 t23** interface configuration command.

seconds Time in second. The default is 180 seconds.

x25 th delay-count

To set the data packet acknowledgment threshold, use the $\mathbf{x25}$ th interface configuration command.

delay-count Value between zero and the input window size. A value of 1 sends one Receiver Ready acknowledgment per packet. The default is 0 (which disables the acknowledgment threshold).

[no] x25 use-source-address

To override the X.121 addresses of outgoing calls forwarded over a specific interface, use the **x25 use-source-address** interface configuration command. To prevent updating the source addresses of outgoing calls, use the **no** form of this command.

x25 win packets

To change the default incoming window size to match that of the network, use the $\mathbf{x25}$ win interface configuration command.

packets Packet count that can range from 1 to one less than

the window modulus. The default is 2 packets.

x25 wout packets

To change the default outgoing window size to match that of the network, use the **x25 wout** interface configuration command.

packets Packet count that can range from 1 to the window

modulus. The default is 2 packets.