

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.
<i>type</i>	Interface type.
<i>number</i>	Interface 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.

<i>type</i>	Interface type.
<i>number</i>	Interface number.
<i>lcn</i>	(Optional) Virtual circuit.

[no] cmns enable

To enable Connection-Mode Network Service (CMNS) on a nonserial interface, use the **cmns enable** interface configuration command. Use the **no** form of this 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.
<i>protocol</i>	(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 Blacker Front End device. Available for DTE operation only.
- ietf** (Optional) Specifies that the interface's datagram encapsulation should default to use of the IETF standard method, as defined by RFC 1356.

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: **appletalk**, **apollo**, **clns** (ISO CLNS), **decnet**, **ip**, **ipx** (Novell IPX), **vines**, and **xns**.

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 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.

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show x25 map

To display information about X.25 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 device when it enters emergency mode. The router obtains this information from the BFE device. |
| ask | Configures the router to prompt the console operator to enter the emergency mode window when the router enters emergency mode. |

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 router 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. 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 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 the “X.25 User Facilities” table in the *Router Products Command Reference* publication for 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 to hold 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** form of this 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** form of this 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 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** form of this 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 **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 **x25 map** interface configuration command. To retract a mapping, use the **no 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 “Protocols Supported by X.25” table 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 “X.25 Map Options” table in the *Router Products Command Reference* publication.

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

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

<i>x.121-address</i>	The X.121 address.
broadcast	Required keyword for bridging over X.25.
<i>option</i>	(Optional) Services that can be added to this map. See “X.25 Map Options” table in the <i>Router Products Command Reference</i> 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.

<i>nsap</i>	NSAP address. The NSAP can be either the actual DTE NSAP address or the prefix of the NSAP address. The NSAP prefix is sufficient for a best match to route a call.
<i>mac-address</i>	MAC-level address.
<i>x.121-address</i>	(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.

<i>address</i>	IP address.
<i>x.121-address</i>	X.121 address.
<i>option</i>	(Optional) See the “X.25 Map Options” table in the <i>Router Products Command Reference</i> publication.

x25 modulo *modulus*

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

<i>modulus</i>	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.
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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.

<i>count</i>	Circuit count from 1 to 8. A maximum of eight virtual circuits can be configured for each protocol/host pair 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.
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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 “Protocols Supported by X.25 PVCs” table in the *Router Products Command Reference* publication.

address Protocol address of the host at the other end of the PVC.

x.121-address X.121 address.

option (Optional) Provides additional functionality or allows X.25 parameters to be specified for the PVC. Can be any of the options listed in the “X.25 PVC Options” table 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.

<i>number1</i>	PVC number that will be used on the local interface (as defined by the primary interface command).
interface	Required keyword to specify an interface.
<i>type</i>	Remote interface type.
<i>number</i>	Remote interface number.
pvc	Required keyword to specify a switched PVC.
<i>number2</i>	PVC number that will be used on the remote interface.
<i>option</i>	(Optional) Adds certain features to the mapping specified. See “Switched PVC Options” table in the <i>Router Products Command Reference</i> publication.

x25 pvc number1 tunnel ip-address interface serial string 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.

<i>number1</i>	PVC number of the connecting device.
tunnel	Indicates two PVCs will be connected across a TCP/IP LAN.
<i>address</i>	IP address of the router to which you are connecting.
interface serial	Indicates the interface is serial.
<i>string</i>	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.
<i>number2</i>	Remote PVC number on the target interface.
<i>option</i>	(Optional) Adds certain features for the connection. See the “X.25 PVC Tunnel Options” table in the <i>Router Products Command Reference</i> 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.

<i>host-ip-address</i>	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.
<i>blacker-ip-address</i>	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* [**crud pattern**] **interface**
type number

x25 route [# *position*] *x.121-address* [**crud pattern**] **ip** *address*
[*address2 ... address6*]

no x25 route [# *position*] *x.121-address* [**crud pattern**] **ip** *address*

x25 route [#*position*] *x121-address* [**crud pattern**] **interface** *type number*
[**xot-keepalive-period** *n* | **xot-keepalive-tries** *p*]

x25 route [#*position*] *x121-address* [**crud pattern**] **ip** *ip-address*
[*ip-address2... ip-address6*] [**xot-keepalive period** *p* |
xot-keepalive-tries *p*]

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

[no] **x25 route** [# *position*] *x.121-address* [**substitute-source** *rewrite-pattern*] [**substitute-dest** *rewrite-pattern*] [**cu**d *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** form of this 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 **cu**d keyword. The entire command must be on one line.

<i># position</i>	(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.
<i>x.121-address</i>	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.
cu d <i>pattern</i>	(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.
interface <i>type number</i>	Keyword and destination interface type and unit or port number.
ip <i>address</i>	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.

xot-keepalive-period <i>n</i>	X.25-over-TCP (XOT). Specifies the TCP keepalive period. <i>n</i> is the number of seconds between keepalives. 60 seconds is the default. If specified with the x25 route x121-address interface command, this option controls the keepalive behavior of TCP received calls. If specified with x25 route x121-address ip command, this option controls the keepalive behavior of calls sent to the TCP.
xot-keepalive-tries <i>p</i>	X25-over-TCP (XOT). <i>p</i> specifies the number of times keepalives should be sent before dropping the connection. The default for <i>p</i> is 4. If specified with the x25 route x121-address interface command, this option controls the behavior of TCP received calls. If specified with x25 route x121-address ip command, this option controls the behavior of calls sent to the TCP.
alias <i>type number</i>	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 <i>rewrite-pattern</i>	(Optional) See the “Pattern Rewrite Elements,” “Pattern Matching,” and “Character Matching” tables in the <i>Router Products Command Reference</i> 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 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 **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 **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.