

show x25 context

To display operating configuration status details of an X.25 link, use the **show x25 context** command in EXEC mode.

```
show x25 context [xot | interface serial number [dcli number] | cmns-interface-type number [mac mac-address]]
```

Syntax Description		
xot	(Optional)	Displays information specific to X.25 over TCP (XOT) contexts.
interface serial <i>number</i>	(Optional)	Specific serial interface.
dcli <i>number</i>	(Optional)	Specific data-link connection identifier (DLCI) link.
<i>cmns-interface-type number</i>	(Optional)	Local Connection Mode Network Service (CMNS) interface type and number. CMNS interface types are Ethernet, Token Ring, and FDDI. The interface numbering scheme depends on the router interface hardware.
mac <i>mac-address</i>	(Optional)	Hardware address of the CMNS interface.

Command Modes	
	EXEC

Command History	Release	Modification
	12.0(3)T	This command was introduced.
	12.1(5)T	This command was modified to display information about X.25 failover.
	12.2(8)T	The xot keyword was added to display information specific to XOT contexts.

Examples

XOT Example

The following is sample output from the **show x25 context** command with the **xot** keyword:

```
Router# show x25 context xot

XOT Access-group 2
PROFILE mod128 station DXE/DTE, address 2222, state R1, modulo 128, timer 0
  Defaults: idle VC timeout 0
    input/output window sizes 80/80, packet sizes 256/256
  Timers: T20 180, T21 200, T22 180, T23 180
  RESTARTs 0/0 CALLs 5+0/7+0/0+0 DIAGs 0/0
XOT Access-group 3
station DXE/DTE, address <none>, state R1, modulo 8, timer 0
  Defaults: idle VC timeout 0
    input/output window sizes 2/2, packet sizes 128/128
  Timers: T20 180, T21 200, T22 180, T23 180
  RESTARTs 0/0 CALLs 21+0/50+0/0+0 DIAGs 0/0
```

Serial Interface Example

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

```
Router# show x25 context interface serial 1
```

```

Serial1 DLCI 20
PROFILE DCE, address <none>, state R1, modulo 8, timer 0
  Defaults: idle VC timeout 0
    input/output window sizes 2/2, packet sizes 128/128
  Timers: T10 60, T11 180, T12 60, T13 60
  Channels: Incoming-only none, Two-way 1-1024, Outgoing-only none
  RESTARTS 1/0 CALLS 0+0/0+0/0+0 DIAGS 0/0
LAPB DCE, state CONNECT, modulo 8, k 7, N1 12056, N2 20
  T1 3000, T2 0, interface outage (partial T3) 0, T4 0
  VS 7, VR 6, tx NR 6, Remote VR 7, Retransmissions 0
  Queues: U/S frames 0, I frames 0, unack. 0, reTx 0
  IFRAMES 111/118 RNRs 0/0 REJs 0/0 SABM/Es 14/1 FRMRs 0/0 DISCs 0/0

```

X.25 Failover Example

The following is sample output from the **show x25 context** command when the X.25 Failover feature is configured. The “Fail-over delay” field appears when the primary interface has gone down and come back up again. The number of seconds indicates the time remaining until the secondary interface will reset.

```
Router# show x25 context
```

```

Serial1 DLCI 33
PROFILE dx/DCE, address 3032, state R1, modulo 8, timer 0
  Defaults: idle VC timeout 0
    input/output window sizes 2/2, packet sizes 128/128
  Timers: T20 180, T21 200, T22 180, T23 180
  Channels: Incoming-only none, Two-way 1-4095, Outgoing-only none
  RESTARTS 12/0 CALLS 5+4/0+0/0+0 DIAGS 0/0
  Fail-over delay: 16 seconds remaining on Dialer0
LAPB dx/DCE, state CONNECT, modulo 8, k 7, N1 12056, N2 20
  T1 3000, T2 0, interface outage (partial T3) 0, T4 0
  VS 1, VR 1, tx NR 1, Remote VR 1, Retransmissions 0
  Queues: U/S frames 0, I frames 0, unack. 0, reTx 0
  IFRAMES 97/88 RNRs 0/0 REJs 0/0 SABM/Es 55490/12 FRMRs 186/0 DISCs

```

Table 51 describes significant fields shown in the displays.

Table 51 *show x25 context Field Descriptions*

Field	Description
XOT Access-group	Number of the XOT access group.
PROFILE	X.25 profile associated with the XOT access group.
address	Address to which the interface is connected.
state	State of the interface. Possible values are as follows: R1— normal ready state R2—DTE ¹ restarting state R3—DCE ² restarting state If the state is R2 or R3, the interface is awaiting acknowledgment of a Restart packet.
modulo	Modulo packet sequence numbering scheme.
timer	Interface timer value (zero unless the interface state is R2 or R3).
Defaults: idle VC timeout	Inactivity time before clearing the virtual circuit.

Table 51 *show x25 context Field Descriptions (continued)*

Field	Description
input/output window sizes	Default window sizes (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 router.
packet sizes	Default maximum packet sizes (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 router.
Timers	Values of the X.25 timers are as follows: T10 through T13 for a DCE device T20 through T23 for a DTE device
Channels	Virtual circuit ranges for this interface.
RESTARTs	Restart packet statistics for the interface using the format Sent/Received.
CALLs	(number of successful calls sent + calls failed)/(calls received + calls failed)/(calls forwarded + calls failed). Calls forwarded are counted as calls sent.
DIAGs	Number of diagnostic messages sent and received.
Fail-over delay	Number of seconds remaining until secondary interface resets.

1. DTE = data terminal equipment
2. DCE = data communications equipment

Related Commands

Command	Description
show x25 profile	Displays information about configured X.25 profiles.
show x25 vc	Displays information about active X.25 virtual circuits.
x25 profile	Configures an X.25 profile without allocating any hardware-specific information.

show x25 cug

To display information about all closed user groups (CUGs) or specific CUGs (defined by the local or network CUG number), use the **show x25 cug** command in EXEC mode.

```
show x25 cug {local-cug [number] | network-cug [number]}
```

Syntax Description	local-cug	Displays CUGs by locally significant CUG identifier.
	<i>number</i>	(Optional) Local CUG number (0 to 9999). If you do not specify a CUG number, information for all CUGs will be displayed.
	network-cug	Displays CUGs by network-translated CUG identifier.
	<i>number</i>	(Optional) Network CUG number (0 to 9999). If you do not specify a CUG number, information for all CUGs will be displayed.

Command Modes	EXEC
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Command History	Release	Modification
	12.0(7)T	This command was introduced.
	12.1(5)T	This command was modified to show information about CUG selection facility suppression.
	12.2(13)T	This command was modified to display information about all or specific CUGs configured on terminal lines.

Usage Guidelines	You must designate either the local CUG or the network CUG by the choice of keyword. Within that designation you can view all CUGs or a specific CUG defined by its local or network CUG identifier.
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Examples	<p>CUG Selection Facility Suppress Option Example</p> <p>The following is sample output for the show x25 cug command when CUG selection facility is suppressed for all CUGs on serial interface 1/2 and for the preferential CUG on the X.25 profile named "cug".</p>
----------	---

```
Router# show x25 cug local-cug

X.25 Serial1/2, 2 CUGs subscribed with no public access
  CUG selection facility suppressed for all CUGs
    local-cug 100 <-> network-cug 10
    local-cug 1 <-> network-cug 11
PROFILE cug, 2 CUGs subscribed with incoming public access
  CUG selection facility suppressed for preferential CUG
    local-cug 0 <-> network-cug 0 , preferential
    local-cug 100 <-> network-cug 100
    local-cug 200 <-> network-cug 200
```

Local CUG Example

The following sample output from the **show x25 cug local-cug** command displays information about all local CUGs on configured on the router.

```
Router# show x25 cug local-cug

X.25 Serial1/1, 3 CUGs subscribed with no public access
  local-cug 99 <-> network-cug 9999, no-incoming, preferential
  local-cug 100 <-> network-cug 1000
  local-cug 101 <-> network-cug 1001
PROFILE cugs, 2 CUGs subscribed with with incoming public access
  local-cug 1 <-> network-cug 10, no-outgoing
  local-cug 2 <-> network-cug 20, no-incoming, preferential
Line: 129 aux 0 , 1 CUGs subscribed with outgoing public access
  local-cug 1 <-> network-cug 10
Line: 130 vty 0 , 4 CUGs subscribed with incoming and outgoing public access
  local-cug 1 <-> network-cug 10
  local-cug 50 <-> network-cug 5, preferential
  local-cug 60 <-> network-cug 6, no-incoming
  local-cug 70 <-> network-cug 7, no-outgoing
Line: 131 vty 1 , 1 CUGs subscribed with no public access
  local-cug 1 <-> network-cug 10
```

Network CUG Example

The following is sample output from the **show x25 cug network-cug** command specifically for network number 10 showing that local CUG 1 is associated with it.

```
Router# show x25 cug network-cug 10

X.25 Serial1/2, 5 CUGs subscribed with no public access
  network-cug 10 <-> local-cug 1
PROFILE cugs, 2 CUGs subscribed with no public access
  network-cug 10 <-> local-cug 1 , no-outgoing
Line: 129 aux 0 , 1 CUGs subscribed with no public access
  network-cug 10 <-> local-cug 1
Line: 130 vty 0 , 4 CUGs subscribed with incoming and outgoing public access
  network-cug 10 <-> local-cug 1
Line: 131 vty 1 , 1 CUGs subscribed with no public access
  network-cug 10 <-> local-cug 1
```

[Table 52](#) describes the significant fields shown in the displays.

Table 52 *show x25 cug Field Descriptions*

Field	Description
X.25 Serial...	DCE interface with X.25 CUG service subscription.
PROFILE	X.25 profile with X.25 CUG service subscription.
Line	Terminal line with X.25 CUG service subscription.
local-cug	Local CUG details.
network-cug	Network CUG details.
preferential	Identifies which CUG, if any, is preferred. A single CUG listed for an interface is assumed to be preferred.

Related Commands

Command	Description
x25 subscribe cug-service	Enables and controls standard CUG behavior on an X.25 DCE interface.
x25 subscribe local-cug	Configures a DCE X.25 interface for a specific CUG subscription.

show x25 hunt-group

To display hunt groups and view detailed interface statistics and distribution methods, use the **show x25 hunt-group** command in EXEC mode.

show x25 hunt-group [*name*]

Syntax Description	<i>name</i> (Optional) Displays the specific hunt group named.
---------------------------	--

Command Modes	EXEC
----------------------	------

Command History	Release	Modification
	12.0(3)T	This command was introduced.
	12.0(5)T	The command output status field was modified to include “unoperational” as a type of interface status.

Usage Guidelines Use the **clear counters** or the **clear x25** commands in EXEC mode to clear the count of VCs in use in the “status” field and the number of bytes of data transmitted and received in the “traffic” field. Since the “uses” field is a hunt-group-specific counter, it will not be cleared using the **clear counters** or **clear x25** commands. The “uses” field is only cleared at boot time or when the hunt group is defined.

Examples The following is sample output from the **show x25 hunt-group** command:

```
Router# show x25 hunt-group

  ID      Type      Target                               uses    status    traffic(out/in)
=====
HG1      rotary   Serial1                             2       next      1158/1691
                Serial2                             2       next      1328/2146
                xot 172.17.125.54                    2       last_used 137/3154
                xot 172.17.125.34                    1       next      137/3154

HG2      vc-count  Serial2                             4       5 VCs     6921/1364
                Serial3                             2       1 VC      70/1259
```

[Table 53](#) describes significant fields shown in the display.

Table 53 *show x25 hunt-group Field Descriptions*

Field	Description
ID	Hunt group name.
Type	Method of load balancing (rotary or vc-count).
Target	Range of interfaces that a call within the hunt group can go to.

Table 53 *show x25 hunt-group Field Descriptions (continued)*

Field	Description
uses	Total number of call attempts (failed plus successful) made to the interface.
status	State of interface at that moment. The status of an interface may be one of the following: <ul style="list-style-type: none"> • next—Interface will be used next for rotary distribution method. • last used—Interface was just used for rotary distribution method. • unavailable—Interface is shutdown. • full—All logical channels on the interface are in use. • # VC—(vc-count only) Number of VCs currently in use on the interface. • unoper—All VCs on the interface are unoperational.
traffic (out/in)	Number of data bytes transmitted through the interface.

Related Commands

Command	Description
clear x25	Restarts an X.25 or CMNS service, clears an SVC, or resets a PVC.
x25 hunt-group	Creates and maintains a hunt group.

show x25 interface

To display information about virtual circuits (VCs) that use an X.25 interface and, optionally, about a specified virtual circuit, use the **show x25 interface EXEC** command.

show x25 interface [*serial number* | *cmns-interface mac mac-address*]

Syntax Description	serial number	(Optional) Keyword serial and number of the serial interface used for X.25.
	<i>cmns-interface mac mac-address</i>	(Optional) Local CMNS interface type and number, plus the MAC address of the remote device. CMNS interface types are Ethernet, Token Ring, or FDDI. The interface numbering scheme depends on the router interface hardware.

Command Modes	EXEC
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Command History	Release	Modification
	11.2	This command was introduced.

Examples

The following **show x25 interface** sample output displays X.25 information about VCs on serial interface 0:

```
Router# show x25 interface serial 0

SVC 1, State: D1, Interface: Serial0
  Started 00:13:52, last input 00:00:05, output never
  Connects 3334 <-> ip 3.3.3.4
  Call PID ietf, Data PID none
  Window size input: 7, output: 7
  Packet size input: 512, output: 512
  PS: 0 PR: 6 ACK: 1 Remote PR: 0 RCNT: 5 RNR: no
  P/D state timeouts: 0 timer (secs): 0
  data bytes 0/2508 packets 0/54 Resets 0/0 RNRs 0/0 REJs 0/0 INTs 0/0
SVC 32, State: D1, Interface: Serial0.11
  Started 00:16:53, last input 00:00:37, output 00:00:28
  Connects 3334 <-> clns
  Call PID cisco, Data PID none
  Window size input: 7, output: 7
  Packet size input: 512, output: 512
  PS: 5 PR: 4 ACK: 4 Remote PR: 4 RCNT: 0 RNR: no
  P/D state timeouts: 0 timer (secs): 0
  data bytes 378/360 packets 21/20 Resets 0/0 RNRs 0/0 REJs 0/0 INTs 0/0
```

show x25 map

To display information about configured address maps, use the **show x25 map** command in privileged EXEC mode.

show x25 map

Syntax Description This command has no arguments or keywords.

Command Modes Privileged EXEC

Command History	Release	Modification
	10.0	This command was introduced.
	12.2(8)T	This command was modified to display record boundary preservation information for address maps.

Usage Guidelines The **show x25 map** command displays information about the following:

- Configured maps (defined by the **x25 map** command)
- Maps implicitly defined by encapsulation permanent virtual circuits (PVCs) (defined by the encapsulating version of the **x25 pvc** command)
- Dynamic maps (from the X.25 Defense Data Network [DDN] or Blacker Front End [BFE] operations)

Examples

Record Boundary Preservation Examples

The following is sample output of the **show x25 map** command for a router that is configured with record boundary preservation (RBP) using the **x25 pvc rbp remote** command:

```
Router# show x25 map

Serial1/0:-> rbp, destination host 10.0.0.33 port 9999
PVC, 1 VC:1/P
```

The following is sample output of the **show x25 map** command for a router that is configured with RBP using the **x25 map rbp remote** command:

```
Router# show x25 map

Serial3/0:12132 -> rbp, destination host 10.0.0.32 port 9999
permanent, 1 VC:1024
```

The following is sample output of the **show x25 map** command for a router that is configured with RBP using the **x25 pvc rbp local** command:

```
Router# show x25 map

Serial3/0:<- rbp, listening at port 9999
PVC, 1 VC:2/P
```

The following is sample output of the **show x25 map** command for a router that is configured with RBP using the **x25 map rbp local** command:

```
Router# show x25 map

Serial1/0:12131 <- rbp, listening at port 9999
    permanent, 1 VC:1
```

Table 54 describes significant fields shown in the display.

Table 54 *show x25 map Field Descriptions for Maps That Use Record Boundary Preservation*

Field	Description
Serial1/0	Interface on which this map is configured.
12131	(For SVCs only) X.121 address of the remote host. If any call user data is configured, it will appear in this field also.
-> rbp	Indicates an outgoing TCP session that is configured to use RBP.
<- rbp	Indicates an incoming TCP session that is configured to use RBP.
destination host 10.0.0.32 port 9999	IP address and port number of the destination host for an outgoing TCP session.
listening at port 9999	Port number on which the router is listening for a TCP connection request for incoming TCP sessions.
permanent	Indicates that the address map was explicitly configured using the x25 map rbp local or x25 rbp remote command.
PVC	Indicates that the address map was created when a PVC was configured using the x25 pvc rbp local or x25 pvc rbp remote command.
1 VC:1	Number of circuits associated with the map, followed by a list of circuit numbers. /P indicates a PVC.

Typical X.25 Maps Example

The following is sample output from the **show x25 map** for five maps that were configured with the **x25 map** command:

```
Router# show x25 map

Serial0: X.121 1311001 <--> ip 172.20.170.1
    PERMANENT, BROADCAST, 2 VCS: 3 4
Serial0: X.121 1311005 <--> appletalk 128.1
    PERMANENT
Serial1: X.121 2194441 cud hello <--> pad
    PERMANENT, window size 5 5, accept-reverse, idle 5
Serial1: X.121 1311005 <--> bridge
    PERMANENT, BROADCAST
Serial2: X.121 001003 <--> apollo 1.3,
    appletalk 1.3,
    ip 172.20.1.3,
    decnet 1.3,
    novell 1.0000.0c04.35df,
    vines 00000001:0003,
    xns 1.0000.0c04.35df,
    clns
    PERMANENT, NVC 8, 1 VC: 1024
```

The display shows that five maps have been configured for a router: two for serial interface 0, two for serial interface 1, and one for the serial interface 2 (which maps eight protocols to the host).

Table 55 describes significant fields shown in the display.

Table 55 *show x25 map Field Descriptions for Typical X.25 Maps*

Field	Description
Serial0	Interface on which this map is configured.
X.121 1311001	X.121 address of the mapped encapsulation host.
ip 172.20.170.1	Type and address of the higher-level protocols mapped to the remote host. Bridge maps do not have a higher-level address; all bridge datagrams are sent to the mapped X.121 address. Connectionless Network Service (CLNS) maps refer to a configured neighbor as identified by the X.121 address.
PERMANENT	Address-mapping type that has been configured for the interface in this entry. Possible values include the following: <ul style="list-style-type: none"> • CONSTRUCTED—Derived with the DDN or BFE address conversion scheme. • PERMANENT—Map was entered with the x25 map interface configuration command. • PVC—Map was configured with the x25 pvc interface command.
BROADCAST	If any options are configured for an address mapping, they are listed; the example shows a map that is configured to forward datagram broadcasts to the mapped host.
2 VCs:	If the map has any active virtual circuits, they are identified.
3 4	Identifies the circuit number of the active virtual circuits. Note that a single protocol virtual circuit can be associated with a multiprotocol map.

show x25 profile

To view details of X.25 profiles on your router, use the **show x25 profile** command in EXEC mode.

show x25 profile [*name*]

Syntax Description	<i>name</i>	(Optional) Name of X.25 profile.
Command Modes	EXEC	
Command History	Release	Modification
	12.0(3)T	This command was introduced.
	12.2(8)T	This command was modified to display the XOT access groups associated with an X.25 profile.

Usage Guidelines When the X.25 profile name is not specified, the output shows all configured profiles for a given interface.

Examples The following sample output from the **show x25 profile** command displays details about the X.25 profile called "XOT-DEFAULT":

```
Router# show x25 profile XOT-DEFAULT

X.25 profile name: XOT-DEFAULT
In use by:
  Access-group 2
  Access-group 10
PROFILE dxe/DTE, address 12345, state R/Inactive, modulo 128, timer 0
Defaults: idle VC timeout 0
input/output window sizes 20/20, packet sizes 256/256
Timers: T20 180, T21 200, T22 180, T23 180
Channels: Incoming-only none, Two-way 1-4095, Outgoing-only none
```

The following sample output from the **show x25 profile** command displays all profiles configured on the same interface:

```
Router# show x25 profile

X.25 profile name:NetworkNodeA
Number of references:2
In use by:
  Annex G:Serial1 DLCI 20
  Annex G:Serial1 DLCI 30
PROFILE DCE, address <none>, state R/Inactive, modulo 128, timer 0
Defaults:idle VC timeout 5
  input/output window sizes 2/2, packet sizes 128/128
Timers:T10 60, T11 180, T12 60, T13 60
Channels:Incoming-only none, Two-way 1-128, Outgoing-only none
LAPB DCE, modulo 8, k 7, N1 default, N2 20
  T1 3000, T2 0, interface outage (partial T3) 0, T4 0
```

```

X.25 profile name:NetworkNodeB
Number of references:1
In use by:
  Annex G:Serial1 DLCI 40
PROFILE DTE, address 1111, state R/Inactive, modulo 8, timer 0
Defaults:idle VC timeout 0
  input/output window sizes 2/2, packet sizes 128/128
Timers:T20 180, T21 200, T22 180, T23 180
Channels:Incoming-only none, Two-way 1-1024, Outgoing-only none
LAPB DTE, modulo 8, k 7, N1 default, N2 20
  T1 3000, T2 0, interface outage (partial T3) 0, T4 0

```

Table 56 describes significant fields shown in the display.

Table 56 *show x25 profile Field Descriptions*

Field	Description
Number of references	Number of X.25 connections using this profile.
In use by	Shows the interface, XOT access group, and X.25 service using this profile.
address	Address to which interface is connected.
state	State of the interface. Possible values are as follows: R1—normal ready state R2—DTE ¹ restarting state R3—DCE ² restarting state If the state is R2 or R3, the interface is awaiting acknowledgment of a Restart packet.
modulo	Value that determines the packet sequence numbering scheme used.
timer	Interface timer value (zero unless the interface state is R2 or R3).
Defaults: idle VC timeout	Inactivity time before clearing the virtual circuit.
input/output window sizes	Default window sizes (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 router.
packet sizes	Default maximum packet sizes (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 router.
Timers	Values of the X.25 timers are as follows: T10 through T13 for a DCE device T20 through T23 for a DTE device
Channels:	Virtual circuit ranges for this interface.

1. DTE = data terminal equipment
2. DCE = data communications equipment

show x25 profile**Related Commands**

Command	Description
show x25 context	Displays details of an Annex G DLCI link.
show x25 vc	Displays information about active X.25 virtual circuits.
x25 profile	Configures an X.25 profile without allocating any hardware-specific information.

show x25 remote-red

This command is no longer supported.

show x25 route

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

show x25 route

Syntax Description This command has no arguments or keywords.

Command Modes EXEC

Command History	Release	Modification
	10.0	This command was introduced.
	12.0(5)T	The dns keyword was added.

Examples The following example shows output from the **show x25 route** command:

```
Router# show x25 route
```

```
# Match          Substitute          Route To
1 dest ^1311001$      Serial0, 0 uses
2 dest ^1311002$      xot 172.20.170.10
3 dest 444            xot dns \0
4 dest 555            xot dns \0
```

[Table 57](#) describes significant fields shown in the display.

Table 57 *show x25 route Field Descriptions*

Field	Description
#	Number identifying the entry in the X.25 routing table.
Match	The match criteria and patterns associated with this entry.
Route To	Destination to which the router will forward a call; X.25 destinations identify an interface; CMNS destinations identify an interface and host MAC address; XOT destinations either identify up to six IP addresses (#2), or the x25 route pattern for retrieving up to six IP addresses from the DNS (#3 and #4).

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

show x25 services

To display information pertaining to the X.25 services, use the **show x25 services** EXEC command.

show x25 services

Syntax Description This command has no arguments or keywords.

Command Modes EXEC

Command History	Release	Modification
	11.2	This command was introduced.

Usage Guidelines This command is the default form of the **show x25** command.

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

```
Router# show x25 services

X.25 software, Version 3.0.0.
 3 configurations supporting 3 active contexts
 VCs allocated, freed and in use: 7 - 0 = 7
 VCs active and idle: 4, 3
XOT software, Version 2.0.0.
 VCs allocated, freed and in use: 2 - 1 = 1
 connections in-progress: 0 outgoing and 0 incoming
 active VCs: 1, connected to 1 remote hosts
```

Related Commands	Command	Description
	show x25 interface	Displays information about VCs that use an X.25 interface and, optionally, about a specified VC.
	show x25 map	Displays information about configured address maps.
	show x25 route	Displays the X.25 routing table.
	show x25 vc	Displays information about active SVCs and PVCs.

show x25 vc

To display information about active switched virtual circuits (SVCs) and permanent virtual circuits (PVCs), use the **show x25 vc** command in privileged EXEC mode.

show x25 vc [*lcn*]

Syntax Description

lcn (Optional) Logical channel number (LCN).

Command Modes

Privileged EXEC

Command History

Release	Modification
8.3	This command was introduced in a release prior to Release 8.3.
12.2(8)T	This command was modified to display information about record boundary preservation.

Usage Guidelines

To examine a particular virtual circuit number, add an LCN argument to the **show x25 vc** command. This command displays information about virtual circuits (VCs). VCs may be used for a number of purposes, such as the following:

- Encapsulation traffic
- Traffic switched between X.25 services (X.25, Connection-Mode Network Service [CMNS], and X.25 over TCP/IP [XOT])
- PAD traffic
- QLLC traffic

The connectivity information displayed will vary according to the traffic carried by the VC. For multiprotocol circuits, the output varies depending on the number and identity of the protocols mapped to the X.121 address and the encapsulation method selected for the circuit.

Examples

Record Boundary Preservation Example

The following is sample output of the **show x25 vc** command for a PVC configured with record boundary preservation (RBP):

```
Router# show x25 vc

PVC 2, State:D1, Interface:Serial3/0
  Started 00:08:08, last input 00:00:01, output 00:00:01
  recordsize:1500, connected
  local address 10.0.0.1 port 9999; remote address 10.0.0.5 port 11029
  deferred ack:1
  Window size input:2, output:2
  Packet size input:128, output:128
  PS:2 PR:2 ACK:1 Remote PR:2 RCNT:1 RNR:no
  P/D state timeouts:0 timer (secs):0
  data bytes 8000/8000 packets 80/80 Resets 9/0 RNRs 0/0 REJs 0/0 INTs 0/0
```

Table 58 describes the fields shown in the sample output that are typical for virtual circuits.

Table 58 *show x25 vc Field Descriptions*

Field	Description
SVC <i>n</i> or PVC <i>n</i>	Identifies the type of virtual circuit (switched or permanent) and its LCN (also called its “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 International Telecommunication Union Telecommunication Standardization Sector (ITU-T) ¹ X.25 Recommendation for a description of virtual circuit states.
Interface	Interface or subinterface on which the virtual circuit is established.
Started	Time elapsed since the virtual circuit was created.
last input	Time of last input.
output	Time of last output.
Connects...<-->..	Traffic-specific connection information. See Table 60 , Table 61 , Table 62 , and Table 63 for more information.
D-bit permitted	Indicates that the X.25 D-bit (Delivery Confirmation) may be used on this circuit (displayed as needed).
Fast select VC	Indicates that the Fast Select facility was present on the incoming call (displayed as needed).
Reverse charged	Indicates reverse charged virtual circuit (displayed as needed).
Window size	Window sizes for the virtual circuit.
Packet size	Maximum packet sizes for the virtual circuit.
PS	Current send sequence number.
PR	Current receive sequence number.
ACK	Last acknowledged incoming packet.
Remote PR	Last receive sequence 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	This line appears if the router cannot transmit any more packets until the X.25 Layer 3 peer has acknowledged some outstanding packets.
P/D state timeouts	Number of times a supervisory packet (Reset or Clear) has been retransmitted.
Timer	A nonzero time value indicates that a control packet has not been acknowledged yet or that the virtual circuit is being timed for inactivity.
Reassembly	Number of bytes received and held for reassembly. Packets with the M-bit set are reassembled into datagrams for encapsulation virtual circuits; switched X.25 traffic is not reassembled (and is displayed only when values are not zero).
Held Fragments/Packets	Number of X.25 data fragments to transmit to complete an outgoing datagram, and the number of datagram packets waiting for transmission (displayed only when values are not zero).
data bytes <i>m/n</i> packets <i>p/q</i>	Total number of data bytes sent (<i>m</i>), data bytes received (<i>n</i>), data packets sent (<i>p</i>), and data packets received (<i>q</i>) since the circuit was established.

Table 58 *show x25 vc Field Descriptions (continued)*

Field	Description
Resets <i>t/r</i>	Total number of reset packets transmitted/received since the circuit was established.
RNRs <i>t/r</i>	Total number of Receiver Not Ready packets transmitted/received since the circuit was established.
REJs <i>t/r</i>	Total number of Reject packets transmitted/received since the circuit was established.
INTs <i>t/r</i>	Total number of Interrupt packets transmitted/received since the circuit was established.

1. The ITU-T carries out the functions of the former Consultative Committee for International Telegraph and Telephone (CCITT).

[Table 59](#) describes the fields specific to VCs configured with record boundary preservation.

Table 59 *show x25 vc Field Descriptions for VCs That Use Record Boundary Preservation*

Field	Description
recordsize	Maximum record size for the session.
connected	Connection status.
local address; port	IP address and port number of the local end of the TCP session.
remote address; port	IP address and port number of the remote end of the TCP session.
input queue	Number of inbound X.25 data packets not yet processed. This field appears in the display only when the value is not zero.
record buffer	Number of bytes of X.25 data in the current partial record (not including data packets in the input queue). This field appears in the display only when the value is not zero.
deferred ack	Number of X.25 data packets that have been received and processed but not yet acknowledged. This field appears in the display only when the value is not zero.

Encapsulated Traffic Example

The following is sample output of the **show x25 vc** command used on an encapsulated traffic circuit:

```
Router# show x25 vc 1024

SVC 1024, State: D1, Interface: Serial0
Started 0:00:31, last input 0:00:31, output 0:00:31
Connects 170090 <-->
  compressedtcp 172.20.170.90
  ip 172.20.170.90
Call PID multi, Data PID ietf
Reverse charged
Window size input: 2, output: 2
Packet size input: 128, output: 128
PS: 5 PR: 5 ACK: 4 Remote PR: 5 RCNT: 1 RNR: FALSE
Window is closed
P/D state timeouts: 0 Timer (secs): 0
data bytes 505/505 packets 5/5 Resets 0/0 RNRs 0/0 REJs 0/0 INTs 0/0
```

Table 60 describes the connection fields specific to encapsulation traffic.

Table 60 *show x25 vc Encapsulation Traffic Field Descriptions*

Field	Description
170090	The X.121 address of the remote host.
ip 172.20.170.90	The higher-level protocol and address values that are mapped to the virtual circuit.
Call PID	Identifies the method used for protocol identification (PID) in the Call User Data (CUD) field. Because PVCs are not set up using a Call packet, this field is not displayed for encapsulation PVCs. The available methods are as follows: <ul style="list-style-type: none"> cisco—Cisco’s traditional method was used to set up a single protocol virtual circuit. ietf—The IETF’s standard RFC 1356 method was used to set up a single protocol virtual circuit. snap—The IETF’s Subnetwork Access Protocol (SNAP) method for IP encapsulation was used. multi—the IETF’s multiprotocol encapsulation method was used.
Data PID	Identifies the method used for PID when sending datagrams. The available methods are as follows: <ul style="list-style-type: none"> none—The virtual circuit is a single-protocol virtual circuit; no PID is used. ietf—The IETF’s standard RFC 1356 method for identifying the protocol is used. snap—The IETF’s SNAP method for identifying IP datagrams is used.

Locally Switched X.25 Traffic Example

The following is sample output of the **show x25 vc** command used on a virtual circuit carrying locally switched X.25 traffic:

```
Router# show x25 vc

PVC 1, State: D1, Interface: Serial2
  Started 0:01:26, last input never, output never
  PVC <--> Serial1 PVC 1, connected
  Window size input: 2, output: 2
  Packet size input: 128, output: 128
  PS: 0 PR: 0 ACK: 0 Remote PR: 0 RCNT: 0 RNR: FALSE
  P/D state timeouts: 0 Timer (secs): 0
  data bytes 0/0 packets 0/0 Resets 0/0 RNRs 0/0 REJs 0/0 INTs 0/0

SVC 5, State: D1, Interface: Serial2
  Started 0:00:16, last input 0:00:15, output 0:00:15
  Connects 170093 <--> 170090 from Serial1 VC 5
  Window size input: 2, output: 2
  Packet size input: 128, output: 128
  PS: 5 PR: 5 ACK: 4 Remote PR: 5 RCNT: 1 RNR: FALSE
  P/D state timeouts: 0 Timer (secs): 0
  data bytes 505/505 packets 5/5 Resets 0/0 RNRs 0/0 REJs 0/0 INTs 0/0
```

Table 61 describes the connection fields for virtual circuits carrying locally switched X.25 traffic.

Table 61 show x25 vc Local Traffic Field Descriptions

Field	Description
PVC <-->	Indicates a switched connection between two PVCs.
Serial1 PVC 1	Identifies the other half of a local PVC connection.
connected	Identifies connection status for a switched connection between two PVCs. See Table 64 for PVC status messages.
170093	Identifies the Calling (source) Address of the connection. If a Calling Address Extension was encoded in the call facilities, it is also displayed. If the source host is a CMNS host, its MAC address is also displayed.
170090	Identifies the Called (destination) Address of the connection. If a Called Address Extension was encoded in the call facilities, it is also displayed. If the destination host is a CMNS host, its MAC address is also displayed.
from Serial1	Indicates the direction of the call and the connecting interface.
VC 5	Identifies the circuit type and LCN for the connecting interface. VC indicates an SVC, and PVC indicates a PVC. If the connecting host is a CMNS host, its MAC address is also displayed.

X.25 Traffic Locally Switched Between PVCs and SVCs Example

The following is sample output of the **show x25 vc** command used on a virtual circuit carrying locally switched PVC-to-SVC X.25 traffic:

```
Router# show x25 vc

PVC 5, State: D1, Interface: Serial0
  Started 4d21h, last input 00:00:14, output 00:00:14
  Connects 101600 <--> 201700 from Serial2 VC 700
  D-bit permitted
  Window size input: 2, output: 2
  Packet size input: 128, output: 128
  PS: 5 PR: 5 ACK: 4 Remote PR: 5 RCNT: 1 RNR: no
  P/D state timeouts: 0 timer (secs): 0
  data bytes 1000/1000 packets 10/10 Resets 1/0 RNRs 0/0 REJs 0/0 INTs 0/0

SVC 700, State: D1, Interface: Serial2
  Started 00:00:16, last input 00:00:16, output 00:00:16
  Connects 101600 <--> 201700 from Serial0 PVC 5
  Window size input: 2, output: 2
  Packet size input: 128, output: 128
  PS: 5 PR: 5 ACK: 5 Remote PR: 4 RCNT: 0 RNR: no
  P/D state timeouts: 0 timer (secs): 103
  data bytes 500/500 packets 5/5 Resets 0/0 RNRs 0/0 REJs 0/0 INTs 0/0
```

[Table 62](#) describes the connection fields for virtual circuits carrying locally switched X.25 traffic between PVCs and SVCs.

Table 62 *show x25 vc Locally Switched PVC-to-SVC Traffic Field Descriptions*

Field	Description
101600	Identifies the Calling (source) Address of the connection. If a Calling Address Extension was encoded in the call facilities, it is also displayed. If the source host is a CMNS host, its MAC address is also displayed.
201700	Identifies the Called (destination) Address of the connection. If a Called Address Extension was encoded in the call facilities, it is also displayed. If the destination host is a CMNS host, its MAC address is also displayed.
from Serial2	Indicates the direction of the call and the connecting interface.
VC 700	Identifies the circuit type and LCN for the connecting interface. VC indicates an SVC and PVC indicates a PVC. If the remote host is a CMNS host, its MAC address is also displayed.

Remotely Switched X.25 Traffic Example

The following is sample output from the **show x25 vc** command used on a virtual circuit carrying remotely switched X.25 traffic:

```
Router# show x25 vc

PVC 2, State: D1, Interface: Serial2
  Started 0:01:25, last input never, output never
  PVC <--> [172.20.165.92] Serial2/0 PVC 1 connected
  XOT between 172.20.165.95, 1998 and 172.20.165.92, 27801
  Window size input: 2, output: 2
  Packet size input: 128, output: 128
  PS: 0 PR: 0 ACK: 0 Remote PR: 0 RCNT: 0 RNR: FALSE
  P/D state timeouts: 0 Timer (secs): 0 Reassembly (bytes): 0
  Held Fragments/Packets: 0/0
  data bytes 0/0 packets 0/0 Resets 0/0 RNRs 0/0 REJs 0/0 INTs 0/0

SVC 6, State: D1, Interface: Serial2
  Started 0:00:04, last input 0:00:04, output 0:00:04
  Connects 170093 <--> 170090 from
  XOT between 172.20.165.91, 1998 and 172.20.165.92, 27896
  Window size input: 2, output: 2
  Packet size input: 128, output: 128
  PS: 5 PR: 5 ACK: 4 Remote PR: 5 RCNT: 1 RNR: FALSE
  P/D state timeouts: 0 Timer (secs): 0 Reassembly (bytes): 0
  Held Fragments/Packets: 0/0
  data bytes 505/505 packets 5/5 Resets 0/0 RNRs 0/0 REJs 0/0 INTs 0/0
```

[Table 63](#) describes the connection fields for virtual circuits carrying remotely switched X.25 traffic.

Table 63 *show x25 vc Remote X.25 Traffic Field Descriptions*

Field	Description
PVC	Flags PVC information.
[172.20.165.92]	Indicates the IP address of the router remotely connecting the PVC.
Serial 2/0 PVC 1	Identifies the remote interface and PVC number.
connected	Identifies connection status for a switched connection between two PVCs. See Table 64 for PVC status messages.

Table 63 *show x25 vc Remote X.25 Traffic Field Descriptions (continued)*

Field	Description
170093	Identifies the Calling (source) Address of the connection. If a Calling Address Extension was encoded in the call facilities, it is also displayed.
170090	Identifies the Called (destination) Address of the connection. If a Called Address Extension was encoded in the call facilities, it is also displayed.
from	Indicates the direction of the call.
XOT between...	Identifies the IP addresses and port numbers of the X.25-over-TCP (XOT) connection.

Table 64 lists the PVC states that can be reported. These states are also reported by the **debug x25** command in PVC-SETUP packets (for remote PVCs only). Some states apply only to remotely switched PVCs.

Table 64 *X.25 PVC Status Messages*

Status Message	Description
awaiting PVC-SETUP reply	A remote PVC has initiated an XOT TCP connection and is waiting for a reply to the setup message.
can't support flow control values	The window sizes or packet sizes of the PVC cannot be supported by one of its two interfaces.
connected	The PVC is up.
dest. disconnected	The other end has disconnected the PVC.
dest interface is not up	The target interface's X.25 service is down.
dest PVC config mismatch	The targeted PVC is already connected.
mismatched flow control values	The configured flow control values do not match.
no such dest. interface	The remote destination interface was reported to be in error by the remote router.
no such dest. PVC	The targeted PVC does not exist.
non-X.25 dest. interface	The target interface is not configured for X.25.
PVC/TCP connect timed out	A remote PVC XOT TCP connection attempt timed out.
PVC/TCP connection refused	A remote PVC XOT TCP connection was tried and refused.
PVC/TCP routing error	A remote PVC XOT TCP connection routing error was reported.
trying to connect via TCP	A remote PVC XOT TCP connection is established and is in the process of connecting.
waiting to connect	The PVC is waiting to be processed for connecting.

show x25 xot

To display information for all X.25 over TCP (XOT) virtual circuits that match a given criterion, use the **show x25 xot** command in privileged EXEC mode.

```
show x25 xot [local ip-address [port port]] [remote ip-address [port port]] | access-group
[access-group-number]
```

Syntax Description	
local <i>ip-address</i> [port <i>port</i>]	(Optional) Local IP address and optional port number.
remote <i>ip-address</i> [port <i>port</i>]	(Optional) Remote IP address and optional port number.
access-group	(Optional) Displays configuration information about XOT access groups.
<i>access-group-number</i>	(Optional) Displays configuration information about a specific XOT access group.

Command Modes Privileged EXEC

Command History	Release	Modification
	11.2	This command was introduced.
	12.2(8)T	Access group options were added.

Examples The following **show x25 xot** sample output displays information about all XOT virtual circuits:

```
Router# show x25 xot

SVC 11, State: D1, Interface: [10.2.2.2,1998/10.2.2.1,11002]
  Started 00:00:08, last input 00:00:08, output 00:00:08

  Line: 0   con 0   Location: Host: 5678
  111 connected to 5678 PAD <--> XOT 2.2.2.2,1998

  Window size input: 2, output: 2
  Packet size input: 128, output: 128
  PS: 2 PR: 3 ACK: 3 Remote PR: 2 RCNT: 0 RNR: no
  P/D state timeouts: 0 timer (secs): 0
  data bytes 54/18 packets 2/3 Resets 0/0 RNRs 0/0 REJs 0/0 INTs 0/0\
```

The following example shows sample output for the **show x25 xot** command with the **access-group** keyword:

```
Router# show x25 xot access-group
xot access-group 1 using built-in default configuration
xot access-group 10 using x.25 profile ocean
xot access-group 55 using x.25 profile river
```

■ show x25 xot

Related Commands	Command	Description
	show x25 interface	Displays information about VCs that use an X.25 interface and, optionally, about a specified VC.
	show x25 services	Displays information pertaining to the X.25 services.

shutdown (FR-ATM)

To shut down a Frame Relay-ATM Network Interworking (FRF.5) connection or a Frame Relay-ATM Service Interworking (FRF.8) connection, use the **shutdown** command in FRF.5 or FRF.8 connect configuration mode. To disable disconnection, use the **no** form of this command.

shutdown

no shutdown

Syntax Description This command has no arguments or keywords.

Defaults No default behavior or values

Command Modes FRF.5 connect configuration
FRF.8 connect configuration

Command History	Release	Modification
	12.1(2)T	This command was introduced.

Usage Guidelines An FRF.5 or FRF.8 connection must be manually shut down once the interworking connection is created by use of the **shutdown** command.

Examples

FRF.5 Shutdown Example

The following example shows how to shut down an FRF.5 connection:

```
Router(config)# connect network-2 interface serial10/1 16 atm3/0 0/32 network-interworking
.
.
Router(config-frf5)# shutdown
```

FRF.8 Shutdown Example

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

```
Router(config)# connect serial10 100 atm3/0 1/35 service-interworking
.
.
Router(config-frf8)# shutdown
```

Related Commands	Command	Description
	connect (FRF.5)	Connects a Frame Relay DLCI or VC group to an ATM PVC.

shutdown (PVC range)

To deactivate a PVC range, use the **shutdown** command in PVC range configuration mode. To reactivate a PVC range, use the **no** form of this command.

shutdown

no shutdown

Syntax Description This command has no arguments or keywords.

Defaults PVC range is active.

Command Modes PVC range configuration

Command History	Release	Modification
	12.1(5)T	This command was introduced.

Examples In the following example, a PVC range called “range1” is deactivated:

```
interface atm 6/0.110 multipoint
 range range1 pvc 100 4/199
 shutdown
```

Related Commands	Command	Description
	range pvc	Defines a range of ATM PVCs.
	show pppatm summary	Deactivates an individual PVC within a PVC range.

shutdown (PVC-in-range)

To deactivate an individual permanent virtual circuit (PVC) within a PVC range, use the **shutdown** command in PVC-in-range configuration mode. To reactivate an individual PVC within PVC range, use the **no** form of this command.

shutdown

no shutdown

Syntax Description This command has no arguments or keywords.

Defaults The PVC is active.

Command Modes PVC-in-range configuration

Command History	Release	Modification
	12.1(5)T	This command was introduced.

Examples In the following example, “pvc1” within the PVC range called “range1” is deactivated:

```
interface atm 6/0.110 multipoint
 range range1 pvc 100 4/199
  pvc-in-range pvc1 7/104
    shutdown
```

Related Commands	Command	Description
	pvc-in-range	Configures an individual PVC within a PVC range.
	shutdown (PVC range)	Deactivates a PVC range.

smds address

To specify the Switched Multimegabit Data Service (SMDS) individual address for a particular interface, use the **smds address** interface configuration command. To remove the address from the configuration file, use the **no** form of this command.

smds address *smds-address*

no smds address *smds-address*

Syntax Description

smds-address Individual address provided by the SMDS service provider. It is protocol independent.

Defaults

No address is specified.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

All addresses for SMDS service are assigned by the service provider, and can be assigned to individuals and groups.

Addresses are entered in the Cisco SMDS configuration software using an E prefix for *multicast* addresses and a C prefix for *unicast* addresses. Cisco IOS software expects the addresses to be entered in E.164 format, which is 64 bits. The first 4 bits are the address type, and the remaining 60 bits are the address. If the first 4 bits are 1100 (0xC), the address is a unicast SMDS address, which is the address of an individual SMDS host. If the first 4 bits are 1110 (0xE), the address is a multicast SMDS address, which is used to broadcast a packet to multiple end points. The 60 bits of the address are in binary-coded decimal (BCD) format. Each 4 bits of the address field presents a single telephone number digit, allowing for up to 15 digits. At a minimum, you must specify at least 11 digits (44 bits). Unused bits at the end of this field are filled with ones.



Note

If bridging is enabled on any interface, the SMDS address is erased and must be reentered.

Examples

The following example specifies an individual address in Ethernet-style notation:

```
interface serial 0
  smds address c141.5797.1313.FFFF
```

smds dxi

To enable the Data Exchange Interface (DXI) version 3.2 support, use the **smds dxi** interface configuration command. To disable the DXI 3.2 support, use the **no** form of this command.

smds dxi

no smds dxi

Syntax Description This command has no arguments or keywords.

Defaults Enabled

Command Modes Interface configuration

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines Adding this command to the configuration enables the DXI version 3.2 mechanism and encapsulates SMDS packets in a DXI frame before they are transmitted. DXI 3.2 adds an additional 4 bytes to the SMDS packet header to communicate with the SMDS data service unit (SDSU). These bytes specify the frame type. The interface expects all packets to arrive with DXI encapsulation.

The DXI 3.2 support also includes the heartbeat process as specified in the SIG-TS-001/1991 standard, revision 3.2. The heartbeat (active process) is enabled when both DXI and keepalives are enabled on the interface. The echo (passive process) is enabled when DXI is enabled on the interface. The heartbeat mechanism automatically generates a heartbeat poll frame every 10 seconds. This default value can be changed with the **keepalive** (LMI) command.

Fast switching of DXI frames is supported, but Interim Local Management Interface (ILMI) is not.



Note If you are running serial lines back-to-back, disable keepalive on SMDS interfaces. Otherwise, DXI declares the link down.



Note Switching in or out of DXI mode causes the IP cache to be cleared. This clearing process is necessary to remove all cached IP entries for the serial line being used. Stale entries must be removed to allow the new MAC header with or without DXI framing to be installed in the cache. This clearing process is not frequently done and is not considered to be a major performance penalty.

Examples

The following example enables DXI 3.2 on interface HSSI 0:

```
interface hssi 0
 encapsulation smds
 smds dxi
 smds address C120.1111.2222.FFFF
 ip address 172.20.1.30 255.255.255.0
 smds multicast ip E180.0999.9999
 smds enable-arp
```

Related Commands

Command	Description
keepalive (LMI)	Enables the LMI mechanism for serial lines using Frame Relay encapsulation.

smds enable-arp

To enable dynamic Address Resolution Protocol (ARP), use the **smds enable-arp** interface configuration command. The multicast address for ARP must be set before this command is issued. To disable the interface once ARP has been enabled, use the **no** form of this command.

smds enable-arp

no smds enable-arp

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Interface configuration

Command History	Release	Modification
	10.0	This command was introduced.

Examples The following example enables the dynamic ARP routing table:

```
interface serial 0
 ip address 172.20.1.30 255.255.255.0
 smds multicast IP E180.0999.9999.2222
 smds enable-arp
```

Related Commands	Command	Description
	arp	Enables ARP entries for static routing over the SMDS network.

smds glean

To enable dynamic address mapping for Internet Packet Exchange (IPX) over Switched Multimegabit Data Service (SMDS), use the **smds glean** interface configuration command. To disable dynamic address mapping for IPX over SMDS, use the **no** form of this command.

smds glean *protocol* [*timeout-value*] [**broadcast**]

no smds glean *protocol*

Syntax Description		
	<i>protocol</i>	Protocol type. Only IPX is supported.
	<i>timeout-value</i>	(Optional) Time to live (TTL) value. Value can be from 1 to 65535 minutes. The default is 5 minutes. This value indicates how long a gleaned dynamic map is stored in the SMDS map table.
	broadcast	(Optional) Marks the gleaned protocol address as a candidate for broadcast packets. All broadcast requests are sent to the unicast SMDS address.

Defaults Disabled

Command Modes Interface configuration

Command History	Release	Modification
	11.1	This command was introduced.

Usage Guidelines The **smds glean** command uses incoming packets to dynamically map SMDS addresses to higher-level protocol addresses. Therefore the need for static map configuration for the IPX protocol is optional rather than mandatory. However, any static map configuration overrides the dynamic maps.

If a map is gleaned and it already exists as a dynamic map, the timer for the dynamic map is reset to the default value or the user-specified value.

Examples The following example enables dynamic address mapping for IPX on interface serial 0 and sets the time to live (TTL) to 14 minutes:

```
interface serial 0
 encapsulation smds
 smds address c141.5797.1313.FFFF
 smds multicast ipx e1800.0999.9999.FFFF
 smds glean ipx 14
```

smds multicast

To assign a multicast Switched Multimegabit Data Service (SMDS) E.164 address to a higher-level protocol, use the **smds multicast** command in interface configuration mode. To remove an assigned multicast address, use the **no** form of this command.

smds multicast *protocol smds-address*

no smds multicast *protocol smds-address*

Syntax Description		
	<i>protocol</i>	Protocol type. See Table 65 for a list of supported protocols and their keywords.
	<i>smds-address</i>	SMDS address. Because SMDS does not incorporate broadcast addressing, a group address for a particular protocol must be defined to serve the broadcast function.

Defaults No mapping is defined.

Command Modes Interface configuration

Command History	Release	Modification
	10.0	This command was introduced.
	12.2(13)T	The vines and xns arguments were removed because Banyan VINES and Xerox Network Systems are no longer available in the Cisco IOS software.

Usage Guidelines When configuring DECnet, you must enter all four DEC keywords (**decnet**, **decnet_router-L1**, **decnet_router-L2**, and **decnet_node**) in the configuration.

[Table 65](#) lists the high-level protocols supported by the **smds multicast** command.

Table 65 *smds multicast Supported Protocols*

Keyword	Protocol
aarp	AppleTalk Address Resolution Protocol
appletalk	AppleTalk
arp	Address Resolution Protocol
bridge	Transparent bridging
clns	International Organization for Standardization (ISO) Connectionless Network Service (CLNS)
clns_es	Multicast address for all CLNS end systems
clns_is	Multicast address for all CLNS intermediate systems
decnet	DECnet

Table 65 smds multicast Supported Protocols (continued)

Keyword	Protocol
decnet_node	DECnet multicast address for all end systems
decnet_router-L1	DECnet multicast address for all Level 1 (intra-area) routers
decnet_router-L2	DECnet multicast address for all Level 2 (interarea) routers
ip	Internet Protocol (IP)
ipx	Novell IPX

For IP, the IP NETWORK and MASK fields are no longer required. The Cisco IOS software accepts these arguments, but ignores the values. These were required commands for the previous multiple logical IP subnetworks configuration. The software continues to accept the arguments to allow for backward compatibility, but ignores the contents.

Examples

The following example maps the IP broadcast address to the SMDS group address E180.0999.9999:

```
interface serial 0
  smds multicast IP E180.0999.9999.FFFF
```

smds multicast arp

To map the Switched Multimegabit Data Service (SMDS) address to a multicast address, use the **smds multicast arp** interface configuration command. To disable this feature, use the **no** form of this command.

```
smds multicast arp smds-address [ip-address mask]
```

```
no smds multicast arp smds-address [ip-address mask]
```

Syntax Description		
	<i>smds-address</i>	SMDS address in E.164 format.
	<i>ip-address</i>	(Optional) IP address.
	<i>mask</i>	(Optional) Subnet mask for the IP address.

Defaults No mapping is defined.

Command Modes Interface configuration

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines This command is used only when an Address Resolution Protocol (ARP) server is present on a network. When broadcast ARPs are sent, SMDS first attempts to send the packet to all multicast ARP SMDS addresses. If none exist in the configuration, broadcast ARPs are sent to all multicast IP SMDS multicast addresses. If the optional ARP multicast address is missing, each entered IP multicast command is used for broadcasting.

Examples The following example configures broadcast ARP messages:

```
interface serial 0
  smds multicast arp E180.0999.9999.2222
```

Related Commands	Command	Description
	smds multicast ip	Maps an SMDS group address to a secondary IP address.

smds multicast bridge

To enable spanning-tree updates, use the **smds multicast bridge** interface configuration command. To disable this function, use the **no** form of this command.

smds multicast bridge *smds-address*

no smds multicast bridge *smds-address*

Syntax Description

<i>smds-address</i>	SMDS multicast address in E.164 format.
---------------------	---

Defaults

No multicast SMDS address is defined. Spanning tree updates are disabled for transparent bridging across SMDS networks.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

To allow transparent bridging of packets across serial and High-Speed Serial Interface (HSSI) interfaces in an SMDS network, the SMDS interface must be added to an active bridge group. Also, standard bridging commands are necessary to enable bridging on an SMDS interface.

When the **smds multicast bridge** command is added to the configuration, broadcast packets are encapsulated with the specified SMDS multicast address configured for bridging. Two broadcast Address Resolution Protocol (ARP) packets are sent to the multicast address. One is sent with a standard (SMDS) ARP encapsulation, while the other is sent with the ARP packet encapsulated in an 802.3 MAC header. The native ARP is sent as a regular ARP broadcast.

Cisco's implementation of IEEE 802.6i transparent bridging for SMDS supports 802.3, 802.5, and FDDI frame formats. The router can accept frames with or without frame check sequence (FCS). Fast-switched transparent bridging is the default and is not configurable. If a packet cannot be fast switched, it is process switched.

In Cisco IOS Release 10.2 software (or earlier), bridging over multiple logical IP subnetworks is not supported. Bridging of IP packets in a multiple logical IP subnetworks environment is unpredictable.

Examples

In the following example, all broadcast bridge packets are sent to the configured SMDS multicast address:

```
interface hssi 0
 encapsulation smds
 smds address C120.1111.2222.FFFF
 ip address 172.16.0.0 255.255.255.0
 smds multicast bridge E180.0999.9999.FFFF
 bridge-group 5
```

Related Commands

Command	Description
bridge-group	Assigns each network interface to a bridge group.

smds multicast ip

To map a Switched Multimegabit Data Service (SMDS) group address to a secondary IP address, use the **smds multicast ip** interface configuration command. To remove the address map, use the **no** form of this command.

```
smds multicast ip smds-address [ip-address mask]
```

```
no smds multicast ip smds-address [ip-address mask]
```

Syntax Description

<i>smds-address</i>	SMDS address in E.164 format.
<i>ip-address</i>	(Optional) IP address.
<i>mask</i>	(Optional) Subnet mask for the IP address.

Defaults

The IP address and mask default to the primary address of the interface if they are left out of the configuration.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

This command allows a single SMDS interface to be treated as multiple logical IP subnetworks. If taking advantage of the multiple logical IP subnetworks support in SMDS, you can use more than one multicast address on the SMDS interface (by entering multiple commands). However, each **smds multicast ip** command entry must be associated with a different IP address on the SMDS interface.

Broadcasts can be sent on the SMDS interface by means of the multicast address. By sending broadcasts in this manner, the router is not required to replicate broadcasts messages to every remote host.

In addition, the higher-level protocols such as Open Shortest Path First (OSPF) and Intermediate System-to-Intermediate System (IS-IS) can use the multicast capability by sending one update packet or routing packet to the multicast address.

If the optional IP address and mask arguments are not present, the SMDS address and multicast address are associated with the primary IP address of the interface. This association allows the command to be backward compatible with earlier versions of the software.

If an Address Resolution Protocol (ARP) multicast address is missing, each entered IP multicast command is used for broadcasting. The ARP multicast command has the same format as the IP multicast command and is typically used only when an ARP server is present in the network.



Note

All routers at the other end of the SMDS cloud must have the multiple logical IP subnetworks capability enabled. If you allocate a different SMDS subinterface for each logical IP subnetwork on the SMDS interface, you do not have to configure secondary IP addresses.

Examples

The following example configures an interface with two subinterfaces to support two different IP subnets with different multicast addresses to each network:

```
interface serial 2/0
  encapsulation smds
  smds address C120.1111.2222.4444

interface serial 2/0.1 multipoint
  smds addr c111.3333.3333.3333
  ip address 2.2.2.1 255.0.0.0
  smds multicast ip e222.2222.2222.2222
  smds enable-arp

interface serial 2/0.2 multipoint
  smds addr c111.2222.3333.3333.3333
  ip address 2.3.3.3 255.0.0.0
  smds multicast ip E180.0999.9999.FFFF
  smds enable-arp
```

Related Commands

Command	Description
smds multicast arp	Maps the SMDS address to a multicast address.

smds static-map

To configure a static map between an individual Switched Multimegabit Data Service (SMDS) address and a higher-level protocol address, use the **smds static-map** command in interface configuration mode. To remove the map, use the **no** form of this command with the appropriate arguments.

smds static-map *protocol protocol-address smds-address* [**broadcast**]

no smds static-map *protocol protocol-address smds-address* [**broadcast**]

Syntax Description

<i>protocol</i>	Higher-level protocol. It can be one of the following values: appletalk , clns , decnet , ip , or ipx .
<i>protocol-address</i>	Address of the higher-level protocol.
<i>smds-address</i>	SMDS address, to complete the mapping.
broadcast	(Optional) Marks the specified protocol address as a candidate for broadcast packets. All broadcast requests are sent to the unicast SMDS address.

Defaults

No mapping is defined.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.
12.2(13)T	The vines and xns arguments were removed because Banyan VINES and Xerox Network Systems are no longer available in the Cisco IOS software.

Usage Guidelines

The **smds static-map** command provides *pseudobroadcasting* by allowing the use of broadcasts on those hosts that cannot support SMDS multicast addresses.

Examples

The following example illustrates how to enable pseudobroadcasting. The router at address C120.4444.9999 will receive a copy of the broadcast request because the broadcast keyword is specified with the **smds static-map** command. The host at address 172.16.1.15 is incapable of receiving multicast packets. The multicasting is simulated with this feature.

```
interface hssi 0
 encapsulation smds
 smds address C120.1111.2222.FFFF
 ip address 172.16.1.30 255.255.255.0
 smds static-map ip 172.16.1.15 C120.4444.9999.FFFF broadcast
 smds enable-arp
```

The following example illustrates how to enable multicasting. In addition to IP and ARP requests to E100.0999.9999, the router at address C120.4444.9999 will also receive a copy of the multicast request. The host at address 172.16.1.15 is incapable of receiving broadcast packets.

```
interface hssi 0
  encapsulation smds
  smds address C120.1111.2222.FFFF
  ip address 172.16.1.30 255.255.255.0
  smds multicast ip E100.0999.999.FFFF
  smds static-map ip 172.16.1.15 C120.4444.9999.FFFF
  smds enable-arp
```

sscop cc-timer

To change the connection control timer, use the **sscop cc-timer** interface configuration command. To restore the default value, use the **no** form of this command.

sscop cc-timer *seconds*

no sscop cc-timer

Syntax Description	<i>seconds</i> Number of seconds between Begin messages.
---------------------------	--

Defaults	1 second
-----------------	----------

Command Modes	Interface configuration
----------------------	-------------------------

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines	The connection control timer determines the time between transmission of BGN (establishment), END (release), or RS (resynchronization) protocol data units (PDUs) as long as an acknowledgment has not been received.
-------------------------	---

Examples	The following example sets the connection control timer 15 seconds: <pre>sscop cc-timer 15</pre>
-----------------	---

Related Commands	Command	Description
	sscop max-cc	Changes the SSCOP retry count of connection control.

sscop keepalive-timer

To change the keepalive timer, use the **sscop keepalive-timer** interface configuration command. To restore the default value, use the **no** form of this command.

sscop keepalive-timer *seconds*

no sscop keepalive-timer *seconds*

Syntax Description	<i>seconds</i>	Number of seconds the router waits between transmission of POLL PDUs when no sequential data (SD) or SDP PDUs are queued for transmission or are outstanding pending acknowledgments.
---------------------------	----------------	---

Defaults	5 seconds
-----------------	-----------

Command Modes	Interface configuration
----------------------	-------------------------

Command History	Release	Modification
	10.0	This command was introduced.

Examples	The following example sets the keepalive timer to 15 seconds: <pre>sscop keepalive-timer 15</pre>
-----------------	--

sscop max-cc

To change the retry count of connection control, use the **sscop max-cc** interface configuration command. To restore the default value, use the **no** form of this command.

sscop max-cc *retries*

no sscop max-cc

Syntax Description	<i>retries</i>	Number of times that SSCOP will retry to transmit BGN (establishment), END (release), or RS (resynchronization) PDUs as long as an acknowledgment has not been received. Valid range is from 1 to 6000.
---------------------------	----------------	---

Defaults	10 retries
-----------------	------------

Command Modes	Interface configuration
----------------------	-------------------------

Command History	Release	Modification
	10.0	This command was introduced.

Examples The following example sets the retry count of the connection control to 20:

```
sscop max-cc 20
```

Related Commands	Command	Description
	sscop cc-timer	Changes the SSCOP connection control timer.

sscop poll-timer

To change the poll timer, use the **sscop poll-timer** interface configuration command. To restore the default value, use the **no** form of this command.

sscop poll-timer *seconds*

no sscop poll-timer

Syntax Description	<i>seconds</i>	Number of seconds that the router waits between transmission of POLL PDUs.
---------------------------	----------------	--

Defaults	100 seconds
-----------------	-------------

Command Modes	Interface configuration
----------------------	-------------------------

Command History	Release	Modification
	10.0	This command was introduced.

Usage Guidelines	The poll timer controls the maximum time between transmission of POLL PDUs when SD or SDP PDUs are queued for transmission or are outstanding pending acknowledgments.
-------------------------	--

Examples	The following example sets the poll timer to 15 seconds:
-----------------	--

```
sscop poll-timer 15
```

sscop receive-window

To change the receiver window, use the **sscop receive-window** interface configuration command. To restore the default value, use the **no** form of this command.

sscop receive-window *packets*

no sscop receive-window

Syntax Description	<i>packets</i>	Number of packets the interface can receive before it must send an acknowledgment to the ATM switch. Valid range is from 1 to 6000.
---------------------------	----------------	---

Defaults	7 packets
-----------------	-----------

Command Modes	Interface configuration
----------------------	-------------------------

Command History	Release	Modification
	10.0	This command was introduced.

Examples	The following example sets the receiver's window to 10 packets: <pre>sscop rcv-window 10</pre>
-----------------	---

sscop send-window

To change the transmitter window, use the **sscop send-window** interface configuration command. To restore the default value, use the **no** form of this command.

sscop send-window *packets*

no sscop send-window

Syntax Description	<i>packets</i>	Number of packets the interface can send before it must receive an acknowledgment from the ATM switch. Valid range is from 1 to 6000.
---------------------------	----------------	---

Defaults	7 packets
-----------------	-----------

Command Modes	Interface configuration
----------------------	-------------------------

Command History	Release	Modification
	10.0	This command was introduced.

Examples	The following example sets the transmitter's window to 10 packets: <pre>sscop send-window 10</pre>
-----------------	---