



SMDS Commands

Use the commands in this chapter to configure the Switched Multimegabit Data Service (SMDS), a wide-area networking service offered by some Regional Bell Operating Companies (RBOCs) and MCI.

For SMDS configuration information and examples, refer to the “Configuring SMDS” chapter in the *Wide-Area Networking Configuration Guide*.

arp

Use the following variation of the **arp** global configuration command to enable Address Resolution Protocol (ARP) entries for static routing over the SMDS network. Use the **no** form of this command to disable this capability.

```
arp ip-address smds-address smds  
no arp ip-address smds-address smds
```

Syntax Description

<i>ip-address</i>	IP address of the remote router.
<i>smds-address</i>	12-digit SMDS address in the dotted notation <i>nnnn.nnnn.nnnn</i> (48 bits long).
smds	Enables ARP for SMDS.

Default

Disabled

Command Mode

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.3.

This command requires a 12-digit (48-bit) dotted-format SMDS address. It does not support 15-digit SMDS addresses.

Example

The following example creates a static ARP entry that maps the IP address 172.20.173.28 to the SMDS address C141.5797.1313 on interface serial 0:

```
interface serial 0  
  arp 172.20.173.28 C141.5797.1313 smds
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

```
smds enable-arp  
smds static-map
```

encapsulation smds

Use the **encapsulation smds** interface configuration command to enable SMDS service on the desired interface.

encapsulation smds

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

The interface to which this command applies must be a serial interface. All subsequent SMDS configuration commands apply only to an interface with encapsulation SMDS.

Note The maximum packet size allowed in the SMDS specifications (TA-772) is 9188. This is larger than the packet size used by servers with most media. The Cisco default maximum transmission unit (MTU) size is 1500 bytes to be consistent with Ethernet. However, on the High Speed Serial Interface (HSSI), the default MTU size is 4470 bytes. If a larger MTU is used, the **mtu** command must be entered before the **encapsulation smds** command.



Caution The Cisco MCI card has buffer limitations that prevent setting the MTU size higher than 2048, and the HSSI card has buffer limitations that prevent setting the MTU size higher than 4500. Configuring higher settings can cause inconsistencies and performance problems.

Example

The following example shows how to configure the SMDS service on serial interface 0:

```
interface serial 0
 encapsulation smds
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

mtu

interface serial multipoint

To define a logical subinterface on a serial interface to support multiple logical IP subnetworks over SMDs, use the **interface serial multipoint** interface configuration command.

interface serial *interface.subinterface* **multipoint**

Syntax Description

<i>interface</i>	Interface number.
<i>subinterface</i>	Number for this subinterface; values in the range 0 to 255.

Default

This command has no default values.

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Use this command only for routers that need knowledge of multiple IP networks. Other routers can be configured with information only about their own networks.

Example

The following example configures serial interface 2 with multipoint logical subinterface 1:

```
interface serial 2.1 multipoint
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

ip address
smds address
smds enable-arp
smds multicast

show arp

Use the **show arp** privileged EXEC command to display the entries in the ARP table.

show arp

Syntax Description

This command has no arguments or keywords.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Sample Display

The following is sample output from the **show arp** command:

```
Router# show arp

Protocol    Address          Age (min)    Hardware Addr    Type    Interface
-----
Internet    172.20.42.112   120         0000.a710.4baf   ARPA    Ethernet3
AppleTalk   4028.5          29          0000.0c01.0e56   SNAP    Ethernet2
Internet    172.20.42.114   105         0000.a710.859b   ARPA    Ethernet3
AppleTalk   4028.9          -           0000.0c02.a03c   SNAP    Ethernet2
Internet    172.20.42.121   42          0000.a710.68cd   ARPA    Ethernet3
Internet    172.20.36.9     -           0000.3080.6fd4   SNAP    TokenRing0
AppleTalk   4036.9          -           0000.3080.6fd4   SNAP    TokenRing0
Internet    172.20.33.9     -           c222.2222.2222   SMDS    Serial0
```

Table 20 describes significant fields shown in the first line of output in the display.

Table 20 Show ARP Field Descriptions

Field	Description
Protocol	Type of network address this entry includes.
Address	Network address that is mapped to the media access control (MAC) address in this entry.
Age (min)	Interval (in minutes) since this entry was entered in the table, rather than the interval since the entry was last used. (The timeout value is 4 hours.)
Hardware Addr	MAC address mapped to the network address in this entry.

Table 20 Show ARP Field Descriptions (Continued)

Field	Description
Type	Encapsulation type used for the network address in this entry. Possible values include <ul style="list-style-type: none">• ARPA• SNAP• ETLK (EtherTalk)• SMDS
Interface	Interface associated with this network address.

show smds addresses

Use the **show smds addresses** privileged EXEC command to display the individual addresses and the interface they are associated with.

show smds addresses

Syntax Description

This command has no arguments or keywords.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Sample Display

The following is sample output from the **show smds addresses** command:

```
Router# show smds addresses

SMDS address - Serial0  c141.5555.1212.FFFF
```

Table 21 describes the fields shown in the display.

Table 21 Show SMDS Addresses Field Descriptions

Field	Description
Serial0	Interface to which this SMDS address has been assigned.
c141.5555.1212	SMDS address that has been assigned to the interface.

show smds map

To display all SMDS addresses that are mapped to higher-level protocol addresses, use the **show smds map** privileged EXEC command.

show smds map

Syntax Description

This command has no arguments or keywords.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Sample Display

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

```
Router# show smds map

Serial0: ARP maps to e180.0999.9999.FFFF multicast
Serial0: IP maps to e180.0999.9999.FFFF 172.16.42.112 255.255.255.0 multicast
Serial0: XNS 1006.AA00.0400.0C55 maps to c141.5688.1212.FFFF static [broadcast]
Serial0: IPX 1ABC.000.0c00.d8db maps to c111.1111.1111.1111 -- dynamic, TTL: 4 min
```

Table 22 describes the fields shown in the output.

Table 22 Show SMDS Map Field Descriptions

Field	Description
Serial0	Name of interface on which SMDS has been enabled.
ARP maps to	Higher-level protocol address that maps to this particular SMDS address.
e180.0999.9999.FFFF	SMDS address. Includes all SMDS addresses entered with either the smds static-map command (static) or smds multicast command (multicast).
172.16.42.112	IP address.
255.255.255.0	Subnet mask for the IP address.
static/dynamic	The address was obtained from a static map or dynamic map.
TTL	Time to live.

show smds traffic

To display statistics about SMDS packets the router has received, use the **show smds traffic** privileged EXEC command.

show smds traffic

Syntax Description

This command has no arguments or keywords.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Sample Display

The following is sample output from the **show smds traffic** command:

```
Router# show smds traffic

624363 Input packets
759695 Output packets
2 DXI heartbeat sent
0 DXI heartbeat received
0 DXI DSU polls received
0 DXI DSU polls sent
0 DXI invalid test frames
0 Bad BA size errors
0 Bad Header extension errors
65 Invalid address errors
1 Bad tag errors
```

Table 23 describes the fields shown in the output.

Table 23 Show SMDS Traffic Field Descriptions

Field	Description
0 Input packets	Number of input packets.
0 Output packets	Number of output packets.
0 DXI heartbeat sent	Number of Data Exchange Interface (DXI) heartbeat polls transmitted.
0 DXI heartbeat received	Number of DXI heartbeat polls received.
0 DXI DSU polls sent	Number of DXI Data Service Unit (DSU) polls sent.
0 DXI DSU polls received	Number of DXI DSU polls received.
0 DXI invalid test frames	Number of invalid test frames seen.
0 Bad BA size errors	Number of packets that have a size less than 32 bytes or greater than 9188 bytes.
0 DXI Header extension errors	Number of extended SMDS Interface Protocol (SIP) Layer 3 header errors.

Table 23 Show SMDS Traffic Field Descriptions (Continued)

Field	Description
0 DXI Invalid address errors	Number of address errors.
0 Bad tag errors	Status indicating the number of errors that occur when there is a mismatch between the Tag value in the header and the BeTag value in the trailer of an SMDS frame. This usually indicates that there is a misconfiguration (that is, a DXI is connected to a non-DXI) or that the SMDS data service unit (SDSU) is scrambling the Layer 2 protocol data units (PDUs).

smds address

To specify the 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

<i>smds-address</i>	Individual address provided by the SMDS service provider. This address is protocol independent.
---------------------	--

Default

No address is specified.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

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.

Example

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.

Default

Enabled

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

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** command.

The Interim Local Management Interface (ILMI) is not supported.

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 media access control (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.

Fast switching of DXI frames is also supported.

Example

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

You can use the master indexes or search online to find documentation of related commands.

keepalive

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. Once ARP has been enabled, use the **no** form of this command to disable the interface.

smds enable-arp
no smds enable-arp

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Example

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

You can use the master indexes or search online to find documentation of related commands.

arp

smds glean

To enable dynamic address mapping for IPX over 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.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1.

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.

Example

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 SMDS E.164 address to a higher-level protocol, use the **smds multicast** interface configuration command. To remove an assigned multicast address, use the **no** form of this command with the appropriate address.

```
smds multicast protocol smds-address
no smds multicast protocol smds-address
```

Syntax Description

<i>protocol</i>	Protocol type. See Table 24 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.

Default

No mapping is defined.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

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

Table 24 lists the high-level protocols supported by the **smds multicast** command.

Table 24 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
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

Table 24 SMDS Multicast Supported Protocols (Continued)

Keyword	Protocol
ip	Internet Protocol (IP)
ipx	Novell IPX
vines	Banyan VINES
xns	Xerox Network Systems (XNS)

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.

Example

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 SMDS address to a multicast address, use the **smds multicast arp** interface configuration command. Use the **no** form of this command to disable this feature.

```
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.

Default

No mapping is defined.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

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.

Example

The following example configures broadcast ARP messages:

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

Related Commands

You can use the master indexes or search online to find documentation of related commands.

smds multicast ip

smds multicast bridge

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

```
smds multicast bridge smds-address  
no smds multicast bridge smds-address
```

Syntax Description

smds-address SMDS multicast address in E.164 format.

Default

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

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

To allow transparent bridging of packets across serial and 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 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.

Example

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

You can use the master indexes or search online to find documentation of related commands.

bridge-group

smds multicast ip

To map an SMDS group address to a secondary IP address, use the **smds multicast ip** interface configuration command. Use the **no** form of this command to remove the address map.

```
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 Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

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.

Example

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

You can use the master indexes or search online to find documentation of related commands.

smds multicast arp

smds static-map

To configure a static map between an individual SMDS address and a higher-level protocol address, use the **smds static-map** interface configuration command. Use the **no** form of this command with the appropriate arguments to remove the map.

```
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 , ipx , vines , or xns .
<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.

Default

No mapping is defined.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

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
```