

Configuring SMDS

The Switched Multimegabit Data Service (SMDS) is a wide-area networking service offered by some Regional Bell Operating Companies (RBOCs) and by MCI. This chapter describes the configuration tasks for the SMDS packet-switched software. For a complete description of the commands mentioned in this chapter, refer to the “SMDS Commands” chapter in the *Router Products Command Reference* publication. For historical background and a technical overview of SMDS, see the *Internetworking Technology Overview* publication.

Cisco’s Implementation of SMDS

Cisco’s implementation of the SMDS protocol is based on cell relay technology as defined in the Bellcore Technical advisories, which are based on the IEEE 802.6 standard. We provide an interface to an SMDS network using DS-1 or DS-3 high-speed transmission facilities. Connection to the network is made through a device called an SDSU—an SMDS Channel Service Unit/Digital Service Unit (CSU/DSU) developed jointly by Cisco Systems and Kentrox. The SDSU attaches to a Cisco router through an RS-449 connection. On the other side, the SDSU terminates the line.

Cisco’s implementation of SMDS supports the IP, DECnet, AppleTalk, XNS, Novell IPX, Banyan VINES, and OSI internetworking protocols, and transparent bridging.

Cisco’s implementation of SMDS also supports SMDS encapsulation over an Asynchronous Transfer Mode (ATM) interface. For more information and for configuration tasks, see the “Configuring ATM” chapter of this publication.

IP routing is fully dynamic; that is, the routing tables are determined and updated dynamically. Routing of the other supported protocols requires that you establish a static routing table of SMDS neighbors in a user group. Once this is set up, all interconnected routers provide dynamic routing.

Note When configuring IP routing over SMDS, you may need to make adjustments to accommodate split horizon effects. Refer to the “Configuring IP Routing Protocols” chapter in this manual for details about how our routers handle possible split horizon conflicts. By default, split horizon is disabled for SMDS networks.

Cisco’s SMDS implementation includes multiple logical IP subnet (MultiLIS) support as defined by RFC 1209. This RFC describes routing IP over an SMDS cloud where each connection is considered a host on one specific private network and points to cases where traffic must transit from network to network.

Cisco's implementation of SMDS also provides the Data Exchange Interface (DXI) Version 3.2 with heartbeat. The heartbeat mechanism periodically generates a heartbeat poll frame.

When a multicast address is not available to a destination, *pseudobroadcasting* can be enabled to broadcast packets to those destinations using a unicast address.

SMDS Addresses

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.

Our software expects the addresses to be entered in E.164 format, which is 64 bits (15-digit addressing). 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 when broadcasting 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.

An example of an E.164 address follows:

```
C14155561313FFFF
```

Note Previous versions of our software supported 48-bit SMDS addresses. If, when using the current version of the software, you write the configuration to NVRAM, the full 64-bit SMDS address is written. Previous versions of the software will no longer be able to read the new SMDS configuration from NVRAM. However, the current version of the software can read previous versions of the configuration in NVRAM.

The addresses can be entered with periods in a manner similar to Ethernet-style notation, or simply as a string of digits.

The following is an example of an individual address entered in Ethernet-style notation:

```
C141.5555.1212.FFFF
```

The following is an example of a group address:

```
E180.0999.9999.FFFF
```

For additional technical references about SMDS, see the "References and Recommended Readings" appendix in the *Router Products Command Reference* publication.

SMDS Hardware Requirements

You need the following hardware, equipment, and special software to configure SMDS:

- A CSC-MCI or CSC-SCI serial interface controller card, or HSSI interface (chassis-based systems), or the serial port on an IGS router

To operate on CSC-SCI or CSC-MCI cards, SMDS requires that the appropriate microcode version be installed. Version numbers are 1.2 (or later) for CSC-SCI and 1.7 (or later) for CSC-MCI.

- RS-449 or V.35 applique (chassis-based systems) or RS-449 transition cable (IGS)
- The SDSU device
- The packet-switched software option with the system software

Figure 10-1 illustrates the connections between the different components.

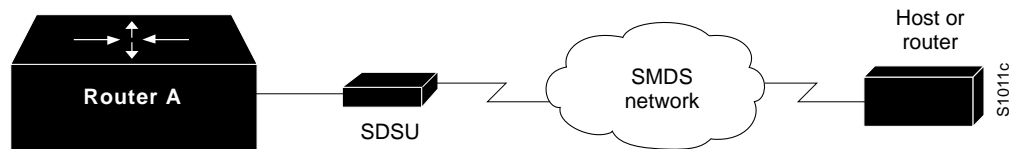


Figure 10-1 Typical SMDS Configuration

SMDS Configuration Task List

Before you can begin the configuration tasks, you must have already obtained your SMDS addresses from your service provider. You need two types of addresses:

- The group address for broadcasts
- The SMDS hardware (individual) address for each router that will interface directly into the SMDS network (that is, customer premises equipment).

There are basic steps that you must perform to enable SMDS. In addition, you can customize SMDS for your particular network needs and monitor SMDS connections. Perform the tasks in the following sections:

- Enable SMDS on the Interface
- Customize Your SMDS Network
- Monitor the SMDS Connection

See the examples at the end of this chapter for ideas of how to configure SMDS on your network.

Enable SMDS on the Interface

You must perform the tasks in the following sections to enable SMDS:

- Set SMDS Encapsulation
- Specify the SMDS Address
- Establish Address Mapping
- Map a Multicast Address to an SMDS Address
- Enable ARP
- Enable Broadcast ARP Messages

Set SMDS Encapsulation

To set SMDS encapsulation at the interface level, perform the following task in interface configuration mode:

Task	Command
Enable SMDS on the interface.	encapsulation smds

For examples of enabling SMDS encapsulation, see any of the examples in the section “SMDS Configuration Examples” later in this chapter.

Specify the SMDS Address

To specify the SMDS individual address for a particular interface, perform the following task in interface configuration mode:

Task	Command
Enter an individual address provided by the SMDS service provider.	smds address <i>smds-address</i>

For examples of specifying the SMDS address, see any of the examples in the section “SMDS Configuration Examples” later in this chapter.

Establish Address Mapping

Routing tables are configured dynamically when IP and CLNS routing are configured. For any other protocol, you must configure a static map between an individual SMDS address and a higher-level protocol address. To establish address mapping, perform the following task in interface configuration mode:

Task	Command
Define static entries for those routers that are SMDS remote peers.	smds static-map <i>protocol-type protocol-address smds-address</i> [broadcast]

The supported protocols and the keywords to enable them are as follows. Note that bridging is not a protocol, but the **bridge** keyword is valid for establishing address mapping.

- AppleTalk—**appletalk**
- Banyan VINES—**vines**
- Bridging—**bridge**
- DECnet—**decnet**
- IP—**ip**
- ISO CLNS—**clns**
- Novell IPX—**ipx**
- XNS—**xns**

For examples of establishing address mapping, see any of the examples in the section “SMDS Configuration Examples” later in this chapter.

Map a Multicast Address to an SMDS Address

You can map an SMDS group address to a broadcast or multicast address used by a higher-level protocol. If you map an SMDS group address to a broadcast or multicast address used by higher-level protocol, the **broadcast** keyword does not need to be specified in the **smds static-map** command, and the router will not need to replicate each broadcast address.

To map an SMDS group address to a multicast address, perform the following task in interface configuration mode:

Task	Command
Map an SMDS group address to a multicast address used by a higher-level protocol.	smds multicast <i>protocol-type smds-address</i>

The protocols supported and the keywords to enable them are as follows. Note that bridging is not a protocol, but the **bridge** keyword is valid for providing a map to a multicast address.

- AppleTalk—**appletalk**
- AppleTalk ARP address—**arp**
- Banyan VINES—**vines**
- Bridging—**bridge**
- DECnet—**decnet**
- DECnet multicast address for all Level 1 routers—**decnet_router-L1**
- DECnet multicast address for all Level 2 routers—**decnet_router-L2**
- DECnet multicast address for all end systems—**decnet_node**
- IP—**ip**
- ISO CLNS—**clns**
- Multicast address for all CLNS intermediate systems—**clns_is**
- Multicast address for all CLNS end systems—**clns_es**
- Novell IPX—**ipx**
- XNS—**xns**

For examples of mapping to a multicast address, see any of the examples in the section “SMDS Configuration Examples” later in this chapter.

Enable ARP

When you enable the Address Resolution Protocol (ARP), you can choose to enable either a dynamic ARP cache or one built statically. To enable ARP, perform one of the following tasks in interface configuration mode:

Task	Command
Enable ARP and dynamic routing.	smds enable-arp
Enable ARP and a static routing table	arp ip-address smds-address smds

An SMDS network can be thought of in much the same way as an X.25 cloud. The premises equipment (in this case our router) represents the edge of the cloud. The service provider enables communication across the cloud. However, proper configuration is needed for communication to occur. This configuration will differ between protocol families.

One major difference between protocol families is dynamic versus static routing among the routers (called remote peers) on the periphery of the cloud. For IP, routing across the SMDS cloud is fully dynamic. No action on the user's part is needed to map higher-level protocol addresses to SMDS addresses. Both IP and ARP can be configured and a dynamic ARP routing table enabled. See the section "Configure Specific Protocols" later in this chapter for more information.

Enable Broadcast ARP Messages

When an ARP server is present in the network, you can enable broadcast ARP messages that are sent to all ARP SMDS addresses or to all IP SMDS multicast addresses when ARP addresses are not present. To enable broadcast ARP messages, perform the following task in interface configuration mode:

Task	Command
Enable broadcast ARP messages.	smds multicast arp <i>smds-address</i> [<i>ip-address mask</i>]

For an example of how to enable broadcast ARP messages, see the section "Typical Multiprotocol Configuration Example" later in this chapter.

Customize Your SMDS Network

Perform the tasks in the following sections, as appropriate, for your network:

- Configure Specific Protocols
- Enable Transparent Bridging
- Configure SMDS Subinterfaces for Multiple Logical IP Subnetworks
- Reenable the Data Exchange Interface Version 3.2 with Heartbeat Support
- Configure Pseudobroadcasting
- Enable IP Fast Switching

Configure Specific Protocols

Some protocol families are dynamically routed. For IP and CLNS, routing is fully dynamic, and no action on your part is needed to map higher-level protocol addresses to SMDS addresses. But for the other supported protocols, you must make a static entry for each router to communicate with all other peer routers. The static entries only need to be made for those routers that are SMDS remote peers. Nothing additional needs to be done to assure communication with other nodes behind the peer routers.

For an example of how to configure specific protocols, see the section "Typical Multiprotocol Configuration Example" later in this chapter.

Table 10-1 lists protocol families and the multicasts that are needed.

Table 10-1 Protocol Families and Types of Multicasts Needed

Protocol Family	Multicasts Needed
IP	IP
DECnet	DECNET, DECNET_NODE, DECNET_ROUTER-L1, DECNET_ROUTER-L2
CLNS	CLNS, CLNS_ES, CLNS_IS
Novell IPX	IPX
XNS	XNS
AppleTalk	APPLETALK, AARP
Banyan VINES	VINES

ARP and IP

For both IP and ARP, the multicast address must be configured and ARP must be enabled. ARP multicast is required for only ARP servers; the IP multicast is used for ARPs and routing updates.

DECnet

Static maps must be configured for DECnet. In addition, a separate **smds multicast** command is needed for DECNET, DECNET_NODE, DECNET_ROUTER-L1, and DECNET_ROUTER-L2.

CLNS

Multicasts must be configured for CLNS_ES and CLNS_IS. No static maps are necessary. ESHs, ISHs, and Router hello packets are sent to the multicast address, and neighbor entries are created automatically.

XNS and IPX

For XNS and IPX, the multicast address must be configured.

For IPX, RIP routing packets, SAP packets, NetBIOS Name Lookups, directed broadcasts, and traffic to the helper addresses (if that helper address is a broadcast address) will be sent to the SMDS IPX multicast address.

For XNS, only RIP, directed broadcasts, and helper traffic will be sent to the XNS multicast address.

For XNS and Novell configurations, a static map entry must be made for each remote peer.

AppleTalk

The SMDS cloud must be treated by all AppleTalk routers connected to it as either extended or nonextended. The network types cannot be mixed on the same SMDS cloud. Instead, all AppleTalk routers on an SMDS cloud must agree about the network type: extended or nonextended.

If any router in the SMDS cloud uses Cisco IOS Release 10.3(3) (or earlier), use a nonextended AppleTalk configuration for the SMDS cloud. To use nonextended AppleTalk, use the **appletalk address** command and configure static maps.

If all routers in the SMDS cloud use Cisco IOS Release 10.3(4) (or later), you can use extended AppleTalk to support dynamic AARP for SMDS addresses. To use extended AppleTalk, use the **appletalk cable-range** command.

For information on the **appletalk address** and **appletalk cable-range** commands, refer to the *Router Products Command Reference*.

For an example of how to configure AppleTalk, see the section “AppleTalk Configuration Examples” later in this chapter.

Banyan VINES

For Banyan VINES, the multicast address must be configured. Also note that VINES only works with static maps.

Enable Transparent Bridging

You can enable transparent bridging of packets across an SMDS network. The first step is to assign the interface to the bridge group using the **bridge-group** command. To enable transparent bridging, perform the following task in interface configuration mode:

Task	Command
Configure bridging across SMDS.	smds multicast bridge <i>smds-address</i>

See the “Configuring Transparent Bridging” chapter for more information about bridge groups and the **bridge-group** command.

Configure SMDS Subinterfaces for Multiple Logical IP Subnetworks

Multiple logical IP subnets (MultiLIS) are supported as defined by RFC 1209. This RFC describes routing IP over an SMDS cloud where each connection is considered a host on one specific private network and describes cases where traffic must transit from network to network.

The MultiLIS solution allows a single SMDS interface to be treated as multiple logical IP subnets and to support routing of packets from one network to the next without using intervening routers. When MultiLIS is enabled, the router performs routing between the subnets using IP addresses on an SMDS interface. Each supported subnet has an IP address, a unicast SMDS E.164 address, and a multicast SMDS E.164 address configured on the SMDS interface. Broadcast packets are duplicated and transmitted to all IP networks on the specified SMDS interface and use the associated multicast SMDS address for the network.

Only routers that require knowledge of multiple IP networks need to be configured with multipoint subinterfaces that correspond to different networks.

To configure a router to have multipoint subinterfaces for multiple logical IP subnets, perform the following tasks in interface configuration mode:

Task	Command
Step 1 Define a logical subinterface for each IP network.	interface serial <i>interface.subinterface</i> multipoint interface serial <i>slot/port.subinterface</i> multipoint (For Cisco 7000 series routers)
Step 2 Configure the subinterface as an IP network.	ip address <i>ip-address mask</i>
Step 3 Assign a unicast SMDS E.164 address to the subinterface.	smds address <i>smds-address</i>
Step 4 Assign a multicast SMDS E.164 address for each protocol supported on the subinterface.	smds multicast <i>protocol smds-address</i>
Step 5 Enable ARP on the subinterface, if required by the protocol.	smds enable-arp

For an example of how to configure MultiLIS, see the “Configuring MultiLIS over SMDS Example” section later in this chapter.

Reenable the Data Exchange Interface Version 3.2 with Heartbeat Support

By default, SMDS provides the Data Exchange Interface (DXI) Version 3.2 heartbeat process as specified in the SIG-TS-001/1991 standard. If you find you must reenable the DXI heartbeat, perform the following task in interface configuration mode:

Task	Command
Configure DXI 3.2.	smds dxi

The DXI mechanism encapsulates SMDS packets in a DXI frame before they are transmitted. The heartbeat mechanism automatically generates a heartbeat poll frame every 10 seconds. The Interim Local Management Interface (ILMI) is not supported. See the *Router Products Command Reference* publication for more information about DXI 3.2.

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

Configure Pseudobroadcasting

Some hosts do not support multicast E.164 addresses. This is a problem in IP where frequent broadcast packets are sent, because routing updates are generally broadcast. IP and ARP depend on the use of multicast addresses to determine a route to a destination IP address. A mechanism was needed to artificially support the use of broadcast where multicast E.164 addresses do not exist; the result is that a multicast address is not available to a destination, pseudobroadcasting can be enabled to broadcast packets to those destinations using a unicast address.

To configure pseudobroadcasting, perform the following task in interface configuration mode:

Task	Command
Configure pseudobroadcasting.	smds static-map ip <i>ip-address</i> <i>smds-address</i> broadcast

For an example of how to configure pseudobroadcasting, see the section “Example of Configuring Pseudobroadcasting” later in this chapter.

Enable IP Fast Switching

SMDS fast switching of IP packets provides faster packet transfer on serial links with speeds above 56 Kbps. Use fast switching if you use high-speed, packet-switched, datagram-based WAN technologies such as Frame Relay offered by service providers.

By default, SMDS fast switching is enabled.

To reenabling fast switching, perform the following tasks.

Task	Command
Step 1 Define the type and unit number of the interface, and enter interface configuration mode.	interface <i>type unit</i> ¹
Step 2 Set SMDS encapsulation.	encapsulation smds
Step 3 Enable the interface for fast switching.	ip route-cache ²

1. This command is documented in the “Interface Commands” chapter in the *Router Products Command Reference* publication.

2. This command is documented in the “IP Commands” chapter in the *Router Products Command Reference* publication.

Monitor the SMDS Connection

To monitor the SMDS connection, perform one or more of the following tasks in EXEC mode:

Task	Command
Monitor ARP activity.	show arp
Display the individual addresses and the interface with which they are associated.	show smds addresses
Display all SMDS addresses that are mapped to higher-level protocol addresses.	show smds map
Display packet traffic activity.	show smds traffic

SMDS Configuration Examples

The following section provides typical configuration file examples you can use as models for your network configurations:

- Typical Multiprotocol Configuration Example
- Configuration with a Remote Peer on the Same Network Example
- AppleTalk Configuration Examples
- Configuring MultiLIS over SMDS Example
- Configuring Pseudobroadcasting Example

Typical Multiprotocol Configuration Example

The following example is a typical interface configured for IP, DECnet, ISO CLNS, Novell IPX, XNS, and AppleTalk. DECnet needs to be configured globally and at the interface level.

```
interface serial 4
ip address 1.1.1.2 255.0.0.0
decnet cost 4
appletalk address 92.1
appletalk zone smds
clns router igrp FOO
ipx net 1a
xns net 17
encapsulation SMDS
! SMDS configuration follows
smds address c120.1580.4721
smds static-map APPLETALK 92.2 c120.1580.4592.FFFF
smds static-map APPLETALK 92.3 c120.1580.4593.FFFF
smds static-map APPLETALK 92.4 c120.1580.4594.FFFF
smds static-map NOVELL 1a.0c00.0102.23ca c120.1580.4792.FFFF
smds static-map XNS 17.0c00.0102.23ca c120.1580.4792.FFFF
smds static-map NOVELL 1a.0c00.0102.23dd c120.1580.4728.FFFF
smds static-map XNS 17.0c00.0102.23aa c120.1580.4727.FFFF
smds multicast NOVELL e180.0999.9999.FFFF
smds multicast XNS e180.0999.9999.FFFF
smds multicast ARP e180.0999.9999.FFFF
smds multicast IP e180.0999.9999.FFFF
smds multicast APPLETALK e180.0999.9999.FFFF
smds multicast AARP e180.0999.9999.FFFF
smds multicast CLNS_IS e180.0999.9990.FFFF
smds multicast CLNS_ES e180.0999.9990.FFFF
smds multicast DECNET_ROUTER e180.0999.9992.FFFF
smds multicast DECNET_NODE e180.0999.9992.FFFF
smds multicast DECNET e180.0999.9992.FFFF
smds enable-arp
```

Configuration with a Remote Peer on the Same Network Example

The following example illustrates a remote peer on the same SMDS network. DECnet needs to be configured globally and at the interface level.

```

interface serial 0
ip address 1.1.1.1 255.0.0.0
decnet cost 4
appletalk address 92.2
appletalk zone smds
clns router igrp FOO
ipx net 1a
xns net 17
encapsulation SMDS
! SMDS configuration follows
smds address c120.1580.4792
smds static-map APPLETALK 92.1 c120.1580.4721.FFFF
smds static-map APPLETALK 92.3 c120.1580.4593.FFFF
smds static-map APPLETALK 92.4 c120.1580.4594.FFFF
smds static-map NOVELL 1a.0c00.0102.23cb c120.1580.4721.FFFF
smds static-map XNS 17.0c00.0102.23cb c120.1580.4721.FFFF
smds static-map NOVELL 1a.0c00.0102.23dd c120.1580.4728.FFFF
smds static-map XNS 17.0c00.0102.23aa c120.1580.4727.FFFF
smds multicast NOVELL e180.0999.9999.FFFF
smds multicast XNS e180.0999.9999.FFFF
smds multicast IP e180.0999.9999.FFFF
smds multicast APPLETALK e180.0999.9999.FFFF
smds multicast AARP e180.0999.9999.FFFF
smds multicast CLNS_IS e180.0999.9990.FFFF
smds multicast CLNS_ES e180.0999.9990.FFFF
smds multicast DECNET_ROUTER e180.0999.9992.FFFF
smds multicast DECNET_NODE e180.0999.9992.FFFF
smds multicast DECNET e180.0999.9992.FFFF
smds enable-arp

```

AppleTalk Configuration Examples

The following two sections provide basic examples of configuration for a nonextended AppleTalk network and for an extended AppleTalk network.

Nonextended Appletalk Network Example

The following example configures SMDS for a nonextended AppleTalk network. When SMDS is configured for a nonextended AppleTalk network, SMDS static maps are required. Dynamic AppleTalk Address Resolution Protocol (AARP) is not supported on the multicast channel.

```

interface Serial0
ip address 192.168.200.1 255.255.255.0
encapsulation smds
appletalk address 10.1
appletalk zone SMDS
smds address c151.0988.1923
smds static-map ip 192.168.200.2 c151.0988.8770
smds static-map appletalk 10.2 c151.0988.8770
smds multicast APPLETALK e151.0988.2232
smds multicast IP e151.0988.2232
smds multicast ARP e151.0988.2232
smds enable-arp

```

Extended AppleTalk Network Example

If all AppleTalk routers on the SMDS cloud are running Release 10.2(6) or 10.3(3) software or newer, you can use an AppleTalk extended network. This is done using the **appletalk cable-range** interface command.

When SMDS is configured for an extended AppleTalk network, SMDS static maps are not required and not used. Dynamic AARP is supported on the multicast channel.

```

interface Serial0
ip address 192.168.200.1 255.255.255.0
encapsulation smds
appletalk cable-range 10-10
appletalk zone SMDS
smds address c151.0988.1923
smds static-map ip 192.168.200.2 c151.0988.8770
smds multicast APPLETALK e151.0988.2232
smds multicast AARP e151.0988.2232
smds multicast IP e151.0988.2232
smds multicast ARP e151.0988.2232
smds enable-arp
    
```

Configuring MultiLIS over SMDS Example

In the following example, Routers A, B, and C are connected to an SMDS cloud (see Figure 10-2).

Router A knows about two IP networks and can communicate with Routers B and C directly. Router B can communicate with Router A directly, and with Router C via Router A. Router C can communicate with Router A directly and with Router B via Router A. Notice that a packet destined to Router B from Router C must make two hops on the cloud through the same interface on Router A. This issue was considered when the MultiLIS proposal was made and deemed not to be a critical one. It is also a nonstandard configuration.

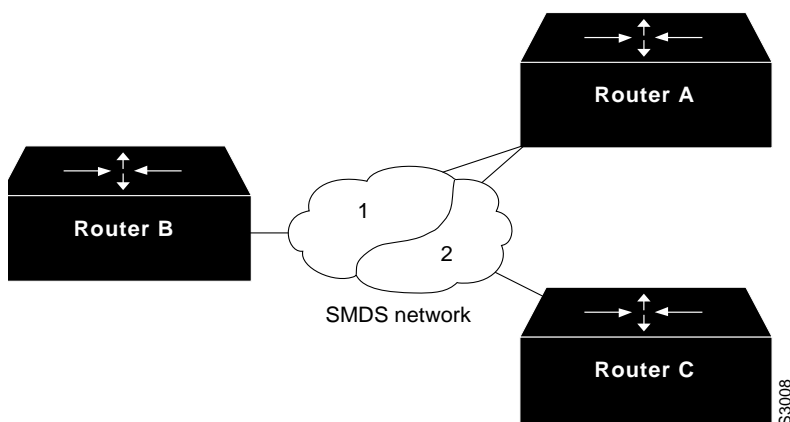


Figure 10-2 Multiple Logical IP Subnet Configuration

The following example shows all routers as Cisco 7000 routers, but they could be other platforms.

Configuration for Router A

```

interface serial 2/0
encapsulation smds
smds address c111.1111.1111.1111
ip address 1.1.1.1 255.0.0.0
smds multicast ip e180.0999.9999
smds enable-arp
!
interface serial 2/0.1 multipoint
smds addr c111.3333.333.3333.3333
ip address 2.2.2.1 255.0.0.0
smds multicast ip e222.2222.2222.2222
smds enable-arp

```

Configuration for Router B

```

interface serial 4/0
encapsulation smds
smds address c111.2222.2222.2222
ip address 1.1.1.3 255.0.0.0
smds multicast ip e180.0999.9999
smds enable-arp

```

Configuration for Router C

```

interface serial 1/0
encapsulation smds
smds address c111.4444.4444.4444
ip address 2.2.2.2 255.0.0.0
smds multicast ip e222.2222.2222.2222
smds enable-arp

```

Configuring Pseudobroadcasting Example

In the following example, an ARP broadcast from Router A is sent to multicast address E180.0999.9999.FFFF to Router B and to unicast address C120.1234.5678.FFFF to Router C. The reply from Router C uses the unicast address C120.1111.2222.FFFF for the return reply if it is the target of the ARP request. IGRP broadcast updates follow the same rules.

Configuration for Router A

```

interface s 0
encapsulation smds
smds address c120.1111.2222.FFFF
ip address 131.108.1.30 255.255.255.0
smds multicast ip e180.0999.9999.FFFF
smds static-map ip 131.108.1.10 c120.1234.5678.FFFF broadcast
smds enable-arp

```

Configuration for Router B

```

interface s 4
smds address c120.9999.8888.FFFF
ip address 131.108.1.20
smds multicast ip e180.0999.9999.FFFF
smds enable-arp

```

Configuration for Router C

```
interface serial 2
smds address c120.1234.5678.FFFF
ip address 131.108.1.10
smds static-map ip 131.108.1.30 c120.1111.2222.FFFF broadcast
smds enable-arp
```