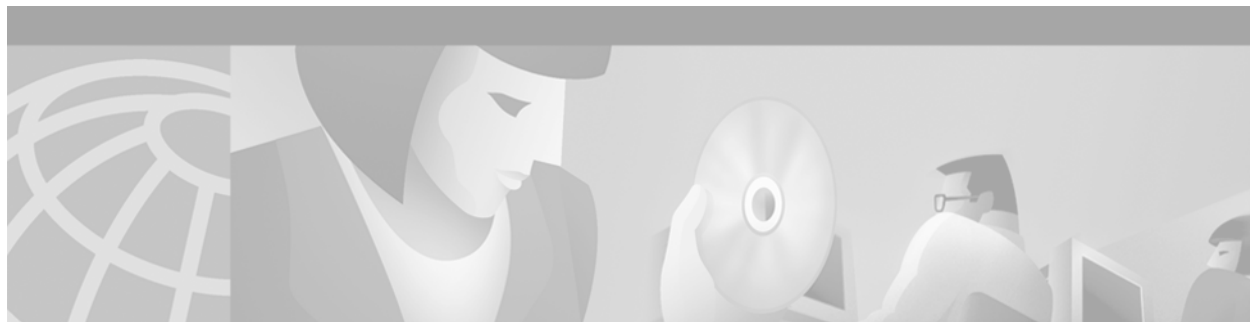




Configuring the Cisco SS7/C7 Dial Access Solution System

This appendix describes how to configure the Cisco network side of the Cisco Signaling System 7 (SS7)/C7 Dial Access Solution System. It includes the following main sections:

- [Cisco SS7/C7 Dial Access Overview](#)
- [RLM Configuration Task List](#)

The Cisco SS7/C7 Dial Access Solution System feature runs on the Cisco access servers and with the following Cisco technologies:

- Cisco Signaling Controller (CSC) on the network access servers
- Continuity Testing (COT)
- ISDN Module

You will need additional information to complete successful configuration of the Cisco SS7/C7 Dial Access Solution System. You can find more information at the following Web site:

<http://www.cisco.com/univercd/cc/td/doc/product/access/sc/r2/>

Additional software configuration information can also be found in the following publications:

- *Cisco AS5300 Universal Access Server Software Configuration Guide*
- *Cisco AS5800 Universal Access Server Installation and Configuration Guide*
- *Cisco SS7/CCS7 Dial Access Solution System Integration Guidelines*
- *Redundant Link Manager (RLM) 12.0(3)T feature module in Cisco.com.*

To identify the hardware platform or software image information associated with a feature, use the Feature Navigator on Cisco.com to search for information about the feature or refer to the software release notes for a specific release. For more information, see the “Identifying Supported Platforms” section in the “Using Cisco IOS Software” chapter.

For a complete description of the commands mentioned in this appendix, refer to the [Cisco IOS Voice, Video, and Fax Command Reference](#), Release 12.2. To locate documentation of other commands that appear in this appendix, use the command reference master index or search online.

Cisco SS7/C7 Dial Access Overview

The Cisco SS7/C7 Dial Access Solution System feature enhances capabilities previously introduced in Cisco IOS software. These capabilities include:

- [Redundant Link Management](#)
- [Continuity Test Subsystem](#)
- [ISDN Module](#)

Support is provided for IP connection to SS7/C7 signaling controller and associated continuity testing. This support allows carrier customers to connect their access servers to the Public Switch Telephone Network (PSTN) directly by using SS7/C7 signaling protocols. The SS7/C7 signaling links terminate on a separate UNIX system called the Signaling Controller (SC2200). The SC2200 maps incoming calls, which are signalled via SS7/C7, to bearers on the access servers. The access servers and SC2200 interact to set up and tear down calls using an extended Q.931 protocol over Q.921 and the User Data gram Protocol (UDP). In this manner, the access servers and SC2200 form a system that emulates an end-office switch in the PSTN.

The Cisco SS7/C7 Dial Access Solution System uses the ISDN Q.931 and Q.921 protocols over an RLM module. RLM makes use of UDP to transfer information from the network access server to the CSC and vice versa. The ISDN module works in conjunction with the RLM.

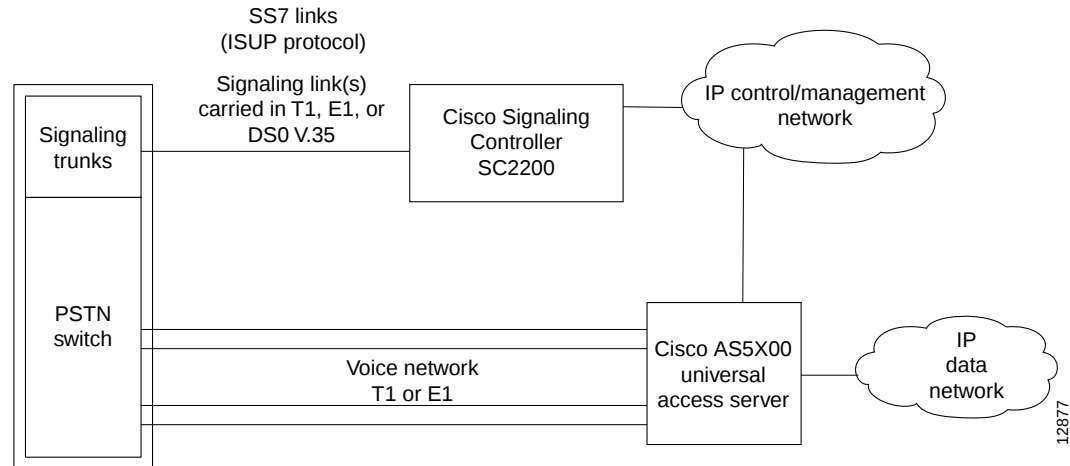
Redundant Link Management

The goal of RLM is to primarily provide virtual link management over multiple IP networks so that the Q.931 signaling protocol and other proprietary protocols can be transported on top of multiple redundant links between the CSC and the network access server. RLM opens, maintains, and closes multiple links, manages buffers of queued signaling messages, and monitors whether links are active for link failover and signaling controller failover. The user can create more than one IP connection between the CSC and the network access server.

The client or server side must support the RLM protocol, which manages those redundant links between the server and client and handles the link and server failover mechanism.

We recommend that all access servers use at least two IP interfaces to connect to the primary and alternative IP interfaces of the CSC. Otherwise, the control traffic will be impacted by the data traffic by sharing the same interface for both types of traffic; see to [Figure 137](#).

The RLM goes beyond Q.921, because it allows for future use of different upper layers, and more importantly, it allows for multiple, redundant paths to be treated as one path by upper layers.

Figure 137 Release 2 Architecture

The protocol stack is listed in [Figure 138](#).

Figure 138 RLM Protocol Stack

Extended Q.931
Q.921
UDP
IP

Extended Q.931 provides call control and maintenance functions. The Q.931 implementation is based on the Cisco National ISDN (NI) switch type with custom enhancements. The signaling controller appears as one or more signaling points in an SS7 network, and performs interworking between the various SS7 protocols in use worldwide to the extended NI protocol used between the Cisco SC2200 and network access server.

Q.921 is used to encapsulate the Q.931 messages. It guarantees the in-sequence transmission of Extended Q.931 messages and provides for retransmission. UDP provides for the connectionless transfer of signaling messages across the subnetworks (LAN or WAN), connecting the access servers to the signaling controller.

Continuity Test Subsystem

To detect failures of DS0 channels, the SS7 network will at times request a COT of a channel before establishing a call. ITU-based networks use only the loopback method for continuity test. However, ANSI-based network usage varies. Some use only the loopback method, and others use both tone and loopback methods. For the SS7 system, the current Cisco IOS Release supports only the loopback method.

Continuity test requests are received over an SS7 signaling path and processed within the Signaling Access Server (SAS). The SAS requests that the network access server put the particular bearer in external loopback mode (loopback incoming receive to outgoing transmit) or to insert a transponder in the incoming circuit. The continuity test lasts until a COT message is received.

The COT subsystem supports continuity testing, which is required by the SS7 network to conduct loopback and tone check testing on the path before a circuit is established. COT will detect any failure of DS0 channels. It is required for North American SS7 compliance. You must have installed MICA technologies 2.6.1.0 portware, which supports the COT feature.

ISDN Module

The ISDN module ensures that the ISDN protocol stack functions properly while the D-channel information (Q.931 and Q.921 frames) is transported over possibly multiple IP networks via UDP, across links managed by the RLM.

Do not use this feature or other SS7 dial access solutions if you are using a PRI interface. The RLM group should have already been configured.

RLM Configuration Task List

To configure RLM, perform the following tasks:

- [Configuring the Access Server for RLM](#) (Required)
- [Verifying RLM](#) (As Required)
- [Troubleshooting RLM](#) (As Required)

Configuring the Access Server for RLM

To configure the access server interfaces for RLM, use the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	Router(config)# interface Loopback1 Router(config-if)# ip address 10.1.1.1 255.255.255.255	Specifies the IP address of the first interface.
Step 2	Router(config-if)# interface Loopback2 Router(config-if)# ip address 10.1.1.2 255.255.255.255	Specifies the IP address of the second interface.
Step 3	Router(config-if)# rlm group 1 Router(config-rlm-group)#	Specifies the RLM group (network access server) that you want to configure using the rlm group global configuration command.
Step 4	Router(config-rlm-group)# server r1-server Router(config-rlm-group-sc)# link address 10.1.4.1 source Loopback1 weight 4 Router(config-rlm-group-sc)# link address 10.1.4.2 source Loopback2 weight 3	Specifies the device name. Specifies the link addresses and their weighting preferences.
Step 5	Router(config-rlm-group-sc)# server r2-server Router(config-rlm-group-sc)# link address 10.1.5.1 source Loopback1 weight 2 Router(config-rlm-group-sc)# link address 10.1.5.2 source Loopback2 weight 1	Specifies the device name. Specifies the link addresses and their weighting preferences.
Step 6	Router(config-rlm-group-sc)# router eigrp 100 Router(config-router)#	Configures the Enhanced Interior Gateway Routing Protocol (Enhanced IGRP) routing process.

Verifying RLM

To verify RLM, perform the following tasks:

- Enter the **show rlm group status** command and specify the group number:

```
Router# show rlm group 1 status
```

```
RLM Group 1 Status
User/Port: RLM_MGR/3000
Link State: Up          Last Link Status Reported: Up
Next tx TID: 1          Last rx TID: 0
Server Link Group[r1-server]:
  link [10.1.1.1(Loopback1), 10.1.4.1] = socket[active]
  link [10.1.1.2(Loopback2), 10.1.4.2] = socket[standby]
Server Link Group[r2-server]:
  link [10.1.1.1(Loopback1), 10.1.5.1] = socket[opening]
  link [10.1.1.2(Loopback2), 10.1.5.2] = socket[opening]
```



Note The link state must be up and no errors should be reported.



Note

For a description of the output display fields, see the **show rlm group status** command reference page.

- Enter the **show isdn status** command to view layer status information.

```
Router# show isdn status
```

```
Global ISDN Switchtype = primary-ni
ISDN Serial1:23 interface
  dsl 0, interface ISDN Switchtype = primary-ni :Primary D channel of nfas group 0
  Layer 1 Status:
    ACTIVE
  Layer 2 Status:
    TEI = 0, Ces = 1, SAPI = 0, State = MULTIPLE_FRAME_ESTABLISHED
  Layer 3 Status:
    0 Active Layer 3 Call(s)
    Activated dsl 0 CCBs = 0
ISDN Serial2:23 interface
dsl 1, interface ISDN Switchtype = primary-ni :Group member of nfas group 0
  Layer 1 & 2 Status Not Applicable
  Layer 3 Status:
    0 Active Layer 3 Call(s)
    Activated dsl 1 CCBs = 0
    Total Allocated ISDN CCBs = 0
```

Note the following information for serial interface 1:23 (the first half of the output):

- Layer 1 status should be “ACTIVE.”
- Layer 2 status should be “MULTIPLE_FRAME_ESTABLISHED.” (It might take several seconds for Layer 2 status to appear.)
- Layer 3 status should be “0 Active Layer 3 Call(s).”

The second half of the output displays information for serial interface 2:23.

Troubleshooting RLM

If you are having trouble, check for the following:

- Make sure the cable connection is not loose or disconnected if the Layer 1 status is “Deactivated.” This status message indicates a problem at the physical layer.
- There may be a problem with your telco, or the framing and line-code types you entered may not match those of your telco. A Layer 2 error indicates that the access server cannot communicate with the telco; there is a problem at the data link layer.

Cisco SS7/C7 Dial Access Solution System Examples

Configuration of the Cisco SS7/C7 Dial Access Solution System involves configuration of several systems and components in the network not described in this appendix. See the documents noted at the beginning of this appendix for configuration examples.