

Cisco PGW & MGW

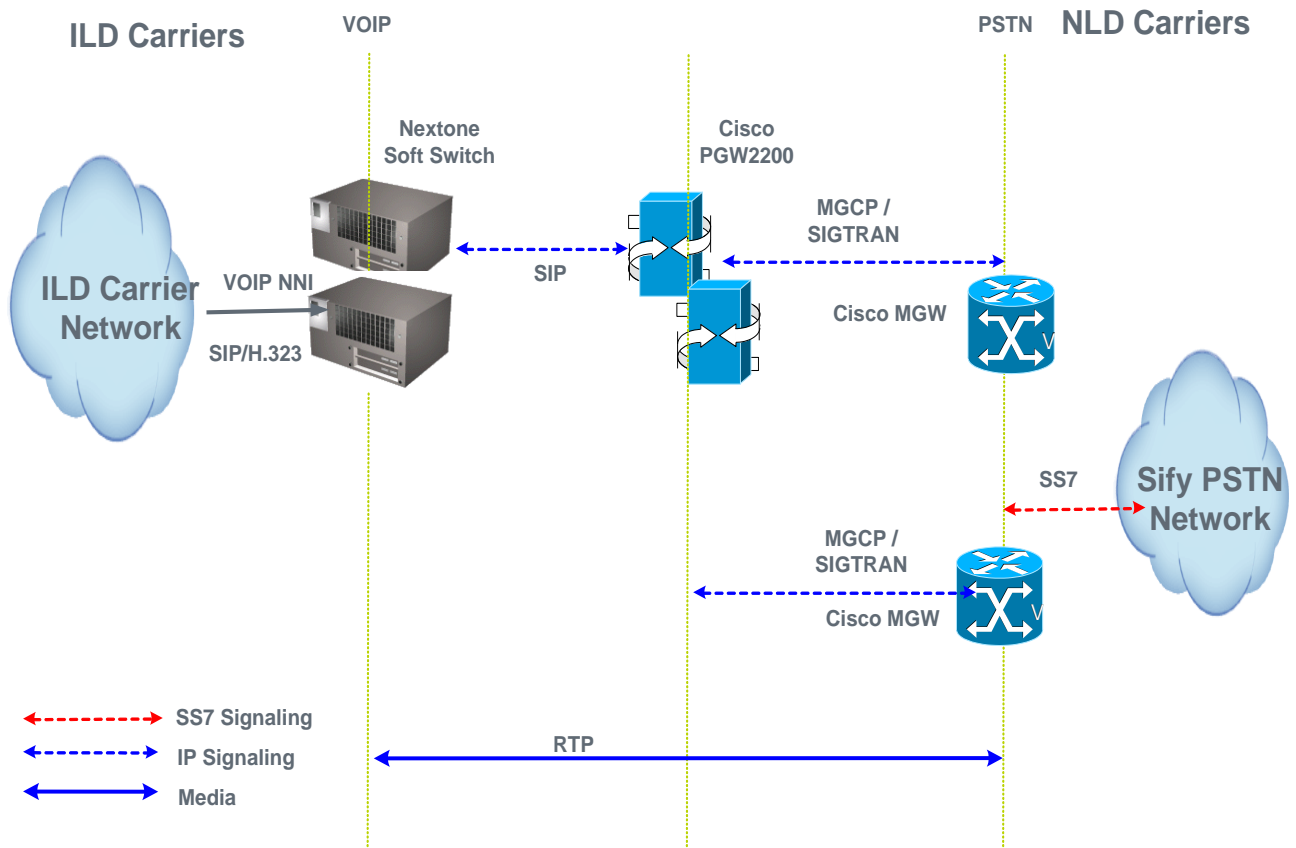
Configuration Guide v1.0



DILIP

Call Control Mode Configuration

SIFY ILD NETWORK With VOIP NNI



Parameter	Description
	<p>Point code can also be in ANSI 8-8-8 format. This is a decimal format where the total point code length of 24 bits is broken up into three sections, where each section is 8 bits long.</p> <p>For example: 142.90.25 → ANSI 8-8-8 format 10001110 - 01011010 - 00011001 → binary</p>
NETIND	<p>The Network Indicator (NI) is part of the header of each SS7 message that is sent between the PGW and PSTN switch. The NI defines certain processing behaviour and must be configured the same on both sides.</p> <p>0 - International 1 - Spare 2 - National 3 - Spare</p>
TYPE	<p>Only relevant for OPCs, and indicates the type of the OPC.</p> <p>Values are: TRUEOPC or CAPOPC.</p> <p>A maximum of six true OPCs are supported SIFY will use an OPC type of TRUEOPC.</p>

Point codes Conversion

<p>Converting from the Decimal form to the Network-Cluster-Member form can be achieved in three simple steps;</p> <p>Step 1: Convert the Decimal point code into Binary</p> <p>7498 (decimal) = 011 - 10101001 - 010 (Binary)</p> <p>Step 2: Split the binary number into three parts, bits 1 to 3, bits 4 to 11 and bits 12 to 14.</p> <p>Bits 1 to 3 relate to the Member, bits 4 to 11 relate to the Cluster and bits 12 to 14 relate to the Network.</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td>(Network)</td> <td>(Cluster)</td> <td>(Member)</td> </tr> <tr> <td>bits 12 to 14</td> <td>bits 4 to 11</td> <td>bits 1 to 3</td> </tr> <tr> <td>011</td> <td>10101001</td> <td>010</td> </tr> </table> <p>Step3: Finally convert the binary parts to decimal values.</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td>Network</td> <td>=</td> <td>011 (binary)</td> <td>=</td> <td>3 (decimal)</td> </tr> <tr> <td>Cluster</td> <td>=</td> <td>01110011 (binary)</td> <td>=</td> <td>169 (decimal)</td> </tr> <tr> <td>Member</td> <td>=</td> <td>010(binary)</td> <td>=</td> <td>2 (decimal)</td> </tr> </table> <p>Hence, Network-Cluster-Member form = 3.169.2</p>	(Network)	(Cluster)	(Member)	bits 12 to 14	bits 4 to 11	bits 1 to 3	011	10101001	010	Network	=	011 (binary)	=	3 (decimal)	Cluster	=	01110011 (binary)	=	169 (decimal)	Member	=	010(binary)	=	2 (decimal)
(Network)	(Cluster)	(Member)																						
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Cluster	=	01110011 (binary)	=	169 (decimal)																				
Member	=	010(binary)	=	2 (decimal)																				

SS7 Linksets

A group of SS7 links is referred to as a linkset, and there can be up to 16 links in a linkset (the limit of 16 is specified in the SS7 standards). The linkset component defines the point code that the linkset is connected to and the **SS7 MTP3 variant** (also known as the protocol family) that is used for message routing/handling and connection testing.

For A-links, which are SS7 links directly connected to an STP, the linkset Adjacent Point Code (APC) is the point code defined for the STP (actually an APC component). If the SS7 links are F-links though, which are SS7 links directly connected to the PSTN switch, the linkset APC field will be populated with the PSTN switch's Destination Point Code (a DPC component). SIFY network uses F Links.

SS7 Linkset for Idea

```
prov-add:lnkset:name="ls-idea-bhopal",desc="Linkset from PGW to ideamobbpl  
SSP",apc="dpc-idea-bhopal",proto="SS7-ITU",type="IP"
```

Parameter	Description
NAME	Arbitrary text name
DESC	Arbitrary text description
APC	The point code of the STP or SSP that the link is connected to. This APC parameter can refer to an APC component or a DPC component defined earlier. If an APC component is used, the link will be classed as an A-link. If a DPC component is used, the link will be classed as an F-link.
PROTO	Identifies the protocol family associated with the link. Possible choices are: SS7-ITU SS7-ANSI SS7-UK SS7-CHINA SS7-NTT
TYPE	Indicates that the transport mechanism for the SS7 link is across the IP network. This should always be "IP".

SS7 Routes

An SS7 route provides the PGW2200 with the information it needs to be able to forward SS7 messages to the correct SS7 Destination Point Code. There can also be multiple paths for SS7 messages to reach their eventual destination, and the SS7 route definition provides a way to create multiple entries in the SS7 routing table to allow load sharing or backup link across the different paths or the creation of redundant paths.

SS7 route to Idea

```
prov-add:SS7ROUTE:NAME="ss7r-idea-bhopal",DESC="SS7 Route  
Ideamobhyd",OPC="opc",DPC=" dpc-idea-bhopal ",LNKSET=" ls-idea-bhopal ",PRI=1
```

Parameter	Description
NAME	Arbitrary text name
DESC	Arbitrary text description
OPC	Originating point code

Parameter	Description
DPC	Destination point code
LNKSET	Name of the linkset that can carry the SS7 messages from OPC to DPC.
PRI	Priority of the route. An equal priority between two routes to the same destination allows load sharing across linksets. A different priority between routes creates a primary linkset with one or more backup linksets that could take over if the primary one becomes unavailable.

SS7 Paths

The SS7PATH component specifies the SS7 signalling protocol ISUP variant that will be used for communication between a particular OPC and DPC pair. The chosen signalling service to be used for a destination switch is defined using the name of the appropriate MDL file on the PGW2200 that contains the required SS7 protocol variant information.

There are a large number of SS7 variants supported by the PGW2200. The list of the MDO files that will be used by SIFY initially was covered in a previous section (SIFY SS7 Interconnect Data). The Q.761_India variant will be used for SIFY SS7 connectivity.

SS7 path for IDEA

```
prov-add:ss7path:name=" ss7p-idea-bhopal",desc="ISUP Variant for
Ideamobbpl",MDO="Q761_INDIA",custgrpId="0000",opc="opc",dpc=" dpc-idea-
bhopal",side="network"
```

Parameter	Description
NAME	Arbitrary text name used to uniquely identify the component
DESC	Text description
MDO	Identifies the SS7 protocol variant (ISUP) to be used for this destination
CUSTGRPID	Unique identifier for a number analysis file (if required). SIFY will use the default of 0000 since no number analysis is being done by the PGW2200
SIDE	This is used for ISDN backhaul configuration only. Always set to "network".
DPC	Destination Point Code for this signalling service
OPC	Originating Point Code for this signalling service

IP Route

This IP Route component is used to reach any particular POP subnet. These IP Routes will be used further in the sessionset and c7lnk component.

IP routes

```
prov-add:iproute:name=" iprte-bp11",desc="IP route to reach bhopal from First
gateway",dest="210.210.75.64",netmask="255.255.255.248",nexthop="
IP_NextHop1",ipaddr="IP_Addr1",pri=1
```

prov-add:iproute:name=" iprte-bpl12",desc="IP route to reach bhopal from Second gateway",dest="210.210.75.64",netmask="255.255.255.248",nexthop="IP_NextHop2",ipaddr="IP_Addr2",pri=2

Parameter	Description
NAME	Arbitrary text name used to uniquely identify the component
DESC	Text description
DEST	Destination subnet
NETMASK	IP routing subnet mask.
NEXTHOP	Nexthop ip address to reach the destination subnet. It will use nexthop vales already defined in the XECfgParm.dat file.
IPADDR1	Local IP address of the PGW2200. This is configured with the IP address defined in the XECfgParm.dat file using the variable name IP_Addr1.
IPADDR2	Second IP address of the PGW2200. This is configured with the IP address defined in the XECfgParm.dat file using the variable name IP_Addr2.
PRI	Priority of the IP Route

SLT Backhaul Session Set

The SLT backhaul session communication link between the PGW2200 and the SLT carries the SS7 signalling messages across the IP network. The PGW2200 provisioning must match the IOS configuration entered on the SLT.

Backhaul Sessionset

prov-add:sessionset:name=" ss-slt-bhopal-1-1",extnode=" as5400-bhopal",iproute1="iprouteh1",iproute2="iprouteh2",ipaddr1="IP_Addr1",ipaddr2="IP_Addr2",port=7000,peerport=7000,peeraddr1="221.135.182.90",peeraddr2="221.135.182.90",type="BSMV0"

Parameter	Description
NAME	Arbitrary text name used to uniquely identify the component
EXTNODE	The external node type that this session will be connected to.
IPADDR1	Local IP address of the PGW2200. This is configured with the IP address defined in the XECfgParm.dat file using the variable name IP_Addr1.
IPADDR2	Second IP address of the PGW2200. This is configured with the IP address defined in the XECfgParm.dat file using the variable name IP_Addr2.
PEERADDR1	The IP address of the SLT.
PORT	Local port to be used by the PGW2200 for the session link to the SLT.
PEERPORT	Remote port that will be used by the SLT for receiving traffic from the PGW2200. This parameter is not used if the *.stPort parameter in the XECfgParm.dat file is configured with a value.
PEERADDR2	The second IP address of the SLT.
IPROUTE1	First IP route to reach a particular MGW subnet
IPROUTE2	Second IP route to reach a particular MGW subnet

Parameter	Description
TYPE	Set to "BSMV0" for standalone SLTs.

SS7 Signalling Links

The C7IPLNK component identifies the SS7 signalling links coming from a particular physical port on the SLT. It uses the previously defined SESSIONSET component to provide the IP layer configuration, and then identifies the link coming from a particular TIMESLOT in the SLT by assigning a Signalling Link Code (SLC) to it. Note that the timeslot refers not to the channel within the E1 that the signalling is coming in on, but rather is the physical port on the SLT that the E1 trunk carrying the signalling link is connected. The C7IPLNK configuration also makes the link a part of a linkset at the same time.

C7IP link to Idea

prov-add:c7iplnk:name=" c7ip-idea-bhopal ",DESC="C7Iplink from Ideamobbpl",lnkset=" ls-idea-bhopal ",slc=0,timeslot=0,pri=1,sessionset=" ss-slt-bhopal-1-1"

Parameter	Description
NAME	Arbitrary text name
DESC	Arbitrary text description
LNKSET	The name of the linkset (previously defined) that this link will be a part of.
SLC	The Signalling Link Code uniquely identifies this link within the group of links that are part of the same linkset. The SLC provisioned in the PGW needs to match the SLC defined on the STP or SSP.
PRI	The Priority of the link within the linkset. If multiple links within the linkset share the same priority, then the PGW2200 will load share messages across them. If the Priorities of the links are different, then the PGW2200 treats the highest priority link as the active link, and the rest as backup links, ready to take over message transfer if the active link fails.
TIMESLOT	This identifies the physical E1 port on the SLT that the SS7 signalling link coming from the STP or SSP is connected to. The values for TIMESLOT range from 0 to 3, depending on the SLT port. <div style="text-align: center;"> </div>

Gateway Signalling Protocol

The gateway signalling protocol MGCP is specified using the MGCPPATH component. Although the protocol is always the same for every gateway, a MGCPPATH component still needs to be configured specifically for each gateway.

MGCPPATH for IDEA

prov-add: mgcppath:NAME="mgcppath-bhopal",DESC="MGCPPATH signaling service to Ideamobbpl",EXTNODE=" as5400-bhopal"

Parameter	Description
NAME	Arbitrary text name
DESC	Arbitrary text description
EXTNODE	The External Node name defined earlier for this gateway

MGCPPATH Properties

prov-add:sigsvccprop:NAME="mgcppath-bhopal",mgcpDomainNameRemote="S7/DS1-0/1@INBHOPAL-MGW-I"

Parameter	Description
NAME	MGCP path name
MGCPPDOMAINNAMEREMOTE	Will have remote endpoint value from the MGW E1
EXTNODE	The External Node name defined earlier for this gateway

Ex. S7/DS1-0/1 – E1 7/0 1st channel. S7/DS1-X/Y@hostname—Where x denotes the E1 number and y denotes DS0 number. Hostname denotes hostname of the MGW.

Gateway IPlinks

The objective of the IPlinks is to insulate the MGCP call control layers from the indeterminate nature of network behavior typically associated with IP-based networks. The MGCP can maintain several virtual links between the PGW2200 and the remote gateway and it will continuously monitor the state of each link to determine the best path for the outgoing call control messages. The MGCP communications links between the gateway and the PGW2200 are used for sending call control traffic, system status updates, and messages regarding management of the links themselves.

The MGCP packets are transported over separate IP connections, identified by unique ports. On the gateway, the only one port configuration required is for the MGCP traffic. This is configured on the gateway using the 'mcgp port'.

Iplink Configuration

```
prov-add:iplnk:name=" iplink-bhopal-1 ",desc="Iplink to Ideamobbpl",svc=" mgcppath-  
bhopal ",ipaddr="IP_Addr1",port=  
2427,peeraddr="221.135.182.90",peerport=2427,pri=1,iproute=" iprte-bp11 "  
prov-add:iplnk:name=" iplink-bhopal-2",desc="Backup Iplink to  
Ideamobbpl",svc="mgcppath-  
bhopal",ipaddr="IP_Addr2",port=3001,peeraddr="221.135.182.90",peerport=3001,pri=1,  
iproute=" iprte-bp12"
```

Parameter	Description
NAME	Arbitrary text name
DESC	Arbitrary text description
SVC	The gateway signalling service defined in the MGCPPATH component earlier.
IPADDR	The PGW2200 IP address
PORT	The local port on the PGW for sending and receiving the MGCP call control messages.
PEERADDR	The gateway IP address
PEERPORT	The remote port on the gateway for sending and receiving the MGCP call control messages.
IPROUTE1	This parameter is required for ensuring IP connectivity to gateways that are not located on a directly connected subnet.
PRI	The priority of this link. The lower the value for priority, the higher the preference for the PGW to use the link. This should match the configuration for link weights on the gateway.

```
prov-ed:sigsvccprop:name="ss7p-imco",clidefaultallowed="1"
```

Configuring Trunk group Number for the POI

```
prov-add:trnkgrp:name="3074",cli="TGIDEABPL",svc="ss7p-idea-  
bhopal",TYPE="TDM_ISUP",selseq="LIDL"
```

Parameter	Description
NAME	Arbitrary numeric
CLI	Arbitrary text description
SVC	The gateway signalling service defined in the SS7PATH component earlier.
TYPE	Select TDM ISUP signalling on the trnkgrp
SELSEQ	Select sequence of the CICS in the trunkgroup

Configuring Signaling Interface at SLT

Configure E1

1. Telnet into SLT using IP address
2. Start enable mode
 - a. Router> enable
 - i. Enter password
 - b. Router#
3. Start configuration Mode
 - a. Router#conf t
 - b. Router(conf)#
4. Enter controller configuration mode
 - a. Router#controller e1 7/0
 - b. Router(conf-cont)#
5. Configure proper linecode, framing
 - a. Router(conf-cont)#linecode HDB3
 - b. Router(conf-cont)#framing no-crc4
6. Verify E1 configuration
 - a. Router(conf-cont)#exit
 - b. Router(conf)#exit
 - c. Router#sh control e1 7/0
7. Configure bearer channels
 - a. Router(conf-cont)# ds0-group 0 timeslots 1-15,17-31 type none service mgcp

Assign Proper channel for signaling

1. Configure signaling channel
 - a. Router(conf-cont)#channel-group 15 timeslot 16 speed 64
The timeslot value should match with the channel configuration at Switch side.
2. Configure serial interface for SS7 encapsulation
 - b. Router(conf)# interface serial 7/0:15
 - c. Router(conf-if)# encapsulation ss7
 - d. Router(conf)# channel-id 0
 - e. Router(conf)#exit
 - f. Router#

Configure Signaling backhaul at AS5400 Integrated SLT

Configure session manager

1. Telnet into SLT using IP address
 - a. Start enable mode

- b. Router> enable
2. Enter password
 - a. Router#
3. Start configuration Mode
 - a. Router#conf t
 - b. Router(config)#
4. Configure Session Manager
 - a. router(config)# ss7 session 0 address 221.134.182.228 7000 221.135.182.90
7000 session-set 0
 - b. router(config)# ss7 session 1 address 221.134.182.236 7000 221.135.182.90
7000 session-set 0
 - c. router(config)# ss7 session 2 address 221.134.182.229 7000 221.135.182.90
7000 session-set 0
 - d. router(config)# ss7 session 3 address 221.134.182.237 7000 221.135.182.90
7000 session-set 0

Configure proper MTP variant at SLT

1. Configure proper MTP variant
 - a. Router(config)# ss7 mtp2-variant itu 0
 - b. Router(config)# ss7 mtp2-variant itu 1
 - c. Router(config)# ss7 mtp2-variant itu 2
 - d. Router(config)# ss7 mtp2-variant itu 3

MTP variant ITU is required for all signaling channels that will be configured on this SLT, hence the configuration is done for all four.

Configure IP domain lookup

1. Telnet into Gateway router
2. Start enable mode
3. Enter configuration mode
 - a. Router(config)# no ip domain lookup
 - b. Router(config)# ip host MUMPGW 221.134.182.228 221.134.182.236
221.134.182.229 221.134.182.237

Configure MGCP Parameters

1. Router(config)# mgcp
2. Router(config)#mgcp call-agent MUMPGW 2427 service-type mgcp version 1.0
3. Router(config)#no mgcp timer receive-rtcp
4. Router(config)#mgcp behavior mdcx-sdp ack-with-sdp
5. Router(config)#mgcp profile default
6. Router(config-mgcp-profile)#timeout tsmx 100
7. Router(config-mgcp-profile)#no max1 lookup

Configure Trunks/CICs(Circuit Identification Codes)

Provision Trunks

8. SSH into PGW server
9. Start mml session

mumpgw1 console login: mgcusr

Password:

Last login: Wed Dec 26 11:59:01 on console

Sun Microsystems Inc. SunOS 5.10 Generic January 2005

mumpgw1 mml

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10. Start a new provisioning session, continuing with active configuration

prov-sta::srcver="active",dstver="chnpgwver1",confirm

11. Provision CICs using following command

- a. Mml> prov-
add:switchtrnk:name="100",trnkgrpnum="3074",span="ffff",cic=1,cu="as
5400-bhopal",endpoint="s7/ds1-6/10@inbhopal-mgw-i",spansize=15

Save configuration

1. Save the configuration
 - a. Mml>prov-cpy
 - b. Mml>prov-sync

Verify trunk status

1. To verify that all CICs are configured and are idle, do the following
 - a. Mml>rtrv-tc:all

mumpgw1 mml> rtrv-tc:ss7p-idea-bhopal:

MGC-01 - Media Gateway Controller 2011-03-02 19:41:37.484 IST
M RTRV

```
"ss7p-idea-bhopal:CIC=1,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=2,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=3,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=4,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=5,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=6,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=7,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=8,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=9,PST=IS,CALL=OUT,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=10,PST=IS,CALL=OUT,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=11,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
```

```
"ss7p-idea-bhopal:CIC=12,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=13,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=14,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=15,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=17,PST=IS,CALL=OUT,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=18,PST=IS,CALL=OUT,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=19,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
```

<Press 'SPACE' for next page, 'Enter' for next line or 'q' to quit this output>

```
"ss7p-idea-bhopal:CIC=20,PST=IS,CALL=OUT,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=21,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=22,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=23,PST=IS,CALL=OUT,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=24,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=25,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=26,PST=IS,CALL=OUT,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=27,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=28,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=29,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=30,PST=IS,CALL=OUT,GW_STAT=CXN_IS,BLK=NONE"  
"ss7p-idea-bhopal:CIC=31,PST=IS,CALL=IDLE,GW_STAT=CXN_IS,BLK=NONE"
```

Verify MGCP status

1. Use following command to verify RLM status
 - a. Router# sh mgcp
MGCP Admin State ACTIVE, Oper State ACTIVE - Cause Code NONE

hydmgw1#show ss7 mtp2 state 0

SS7 MTP2 states for channel 0

Protocol version for channel 0 is ITU-T Q.703 (1996) (White Book)

```
MTP2LSC_INSERT      MTP2IAC_IDLE  
MTP2TXC_INSERT      MTP2RC_INSERT  
MTP2SUERM_MONITORING MTP2AERM_IDLE  
MTP2CONGESTION_IDLE
```

Congestion Backhaul = Abate

Remote Processor Outage = FALSE

PCR Enabled = FALSE

Forced Retransmission = FALSE

N2 = 450 octets