

PGW 2200 Nailed Solution for CGB and CGU

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Introduction

This document provides a summary on how to work with the SS7 circuit supervision messages for Circuit Group Block (CGB) (message) and Circuit Group Unblock (CGU) (message) on the Cisco PGW 2200 Softswitch in Nailed solution.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Cisco Media Gateway Controller Release 7 Documentation
- Cisco Media Gateway Controller Software Release 9 Documentation
- ITU Q.764 through Q.767

Components Used

The information in this document is based on the Cisco PGW 2200.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Conventions

Refer to Cisco Technical Tips Conventions for more information on document conventions.

CGB/CGU Messages in a Nailed Solution

This document explains how CGB and CGU messages work in a Nailed solution. The PGW 2200 [Nailed] and network access server (NAS) communicate via a signaling protocol based on National ISDN-2 (NI2),

with custom enhancements.

Before you start, the main difference between a Switched and Nailed PGW solution are:

- **PGW 2200 Nailed solution** Between the PGW and NAS, an NI2+ protocol runs with Group Service Message handling
- **PGW 2200 Switched solution** Between the PGW and the gateway, the Media Gateway Control Protocol (MGCP) runs with RSIP message handling.

CGBA2 Property Information

The Circuit Group Block Acknowledge 2 (CGBA2) property is only applicable to ISUP SigPath. Since there is no validation of property, it is possible to assign it on all other types of SigPath. However, it has no impact on them. The property can only contain values 0 or 1 (the default is 0).

If the property is set to 1 on the ISUP SigPath, the PGW 2200 sends individual circuit supervision messages instead of group circuit supervision messages to indicate the range of circuits affected by the action in the message.

If the property was set to 0 on the ISUP SigPath, the PGW 2200 sends group circuit supervision messages instead of individual circuit supervision messages to indicate the range of circuits affected by the action in the message.

If a user assigns any other value to the property, it assumes a value of 1. A detailed description can be found in the Cisco MGC Software Release 9.3(2) Featurettes and Enhancements, MML Command Reference Guide.

Use the MML command **PROV-ADD:sigsvccprop:name= "SS7path name",CGBA2= "0|1"** to change the value.

CDR Information

MAINT Type TAG 4032 has values 1, 2, and 3 for Block, Unblock, and Reset respectively. For further information, refer to the Billing Interfaces documentation.

Whenever a CGB, CGU, or Circuit Group Reset (GRS) has to be written, it is done in TAG 4032 with 1 for CGB, 2 for CGU and 3 for GRS. It also writes the Circuit Identification Code (CIC) (TAG 4018) on which the message was sent.

Troubleshoot CCB and CGBA Information

These are the configuration settings from the gateway configuration:

```
!  
controller E1 1/1/0  
framing NO-CRC4  
pri-group timeslots 1-31 nfas_d primary nfas_int 0 nfas_group 1  
!
```

The performance of a shutdown of this information results in this output:

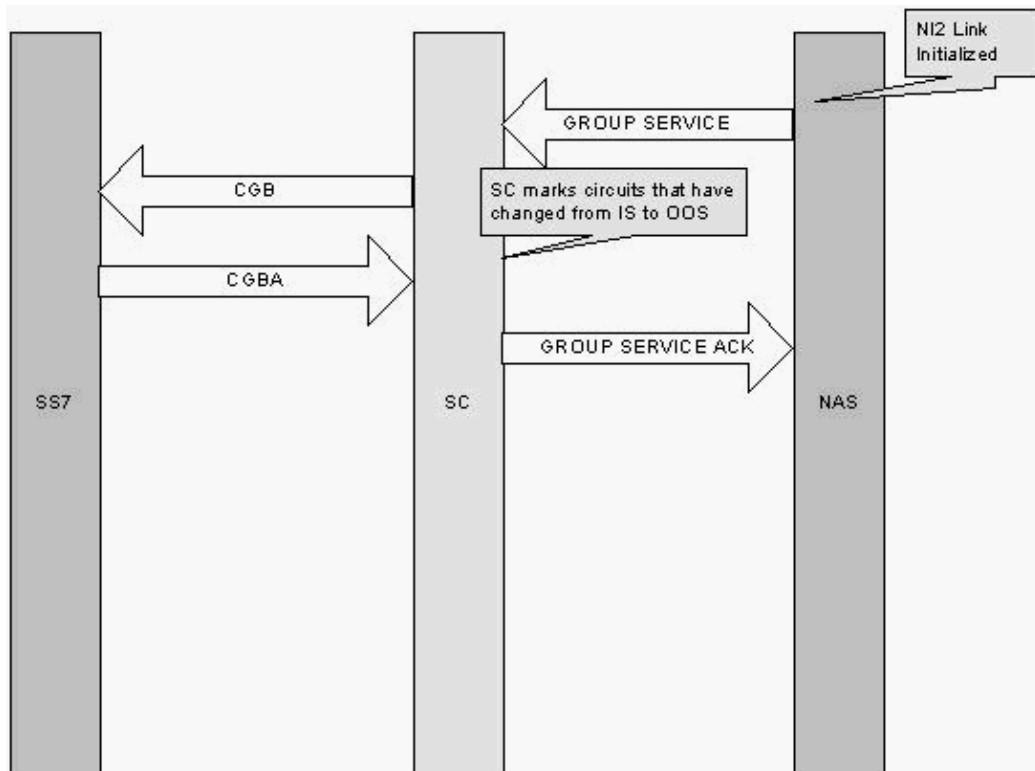
```
v5800-2-sc(config)#controller E1 1/0/0  
v5800-2-sc(config-controller)#shutdown  
v5800-2-sc(config-controller)#
```

This information displays when you view the **debug** output on the gateway and run the **debug isdn standard** command.

```
Oct 17 11:01:44.795: ISDN Sel/0/0:15 SC EVENT:
isdn_pri_tl_state_change: setting State to 0
Oct 17 11:01:44: %CONTROLLER-5-UPDOWN: Controller E1 1/0/0,
changed state to administratively down
Oct 17 11:01:44.795: ISDN Sel/0/0:15 SC BACKHAUL: srl_send_l3_pak:
    source_id = Q.931, dest_id = Q.921, prim = DL_DATA_REQ
    priv_len = 4 int_id = 0x65B73580 datasize = 28
Oct 17 11:01:44.795: ISDN Sel/0/0:15 SC BACKHAUL:
data = 0x65B7358000000300024004AC00010005
Oct 17 11:01:44.795:      4302000006660500000000000
Oct 17 11:01:44.799: ISDN Sel/0/0:15 SC Q931: TX -> GROUP SERVICE pd = 67
                        callref = 0x0000
                        Interface Service i = 0x0000000000
Oct 17 11:01:44.799: ISDN Sel/0/0:15 SC RLM: process_tdial_message:
Received Msg from SC 4 bytes : 0x0001014A
Oct 17 11:01:44.819: ISDN Sel/0/0:15 SC RLM: process_tdial_message:
Received Msg from SC 16 bytes : 0x0201464A430280000B66050000000000
Oct 17 11:01:44.819: ISDN Sel/0/0:15 SC Q931: RX <- GROUP SERVICE ACK pd = 67
                        callref = 0x8000
                        Interface Service i = 0x0000000000
Oct 17 11:01:44.819: ISDN Sel/0/0:15 SC BACKHAUL: srl_send_l2_pak:
source_id = Q.921, dest_id = Q.931, prim = DL_DATA_IND
    priv_len = 4 int_id = 0x65B73580 datasize = 28
Oct 17 11:01:44.819: ISDN Sel/0/0:15 SC BACKHAUL:
data = 0x65B7358000000000000241049000016200
Oct 17 11:01:44.819:      430280000B660500000000000
Oct 17 11:01:44.819: ISDN Sel/0/0:15 SC BACKHAUL: L3IF_rx_L2_pak:
received data 0x430280000B660500000000000
Oct 17 11:01:44.819: ISDN Sel/0/0:15 SC RLM: process_sc_group_msg:
Received msg 11 from SC
Oct 17 11:01:49: %SYS-5-CONFIG_I: Configured from console by vty0 (144.254.9.64)
```

This graphic represents this call flow information:

1. Both the PGW and the gateway assume the initial service state of each bearer is In-Service.
2. On the gateway, the **shutdown** command is executed on the controller.
3. A Group Service message with Interface Service i information is sent to the PGW.
4. The PGW sends a CGB out to the PSTN.
5. The PSTN responds to each CGB message with a CGBA message.
6. The PGW responds with a Group Service Ack for each Group Service message received.



When you run the **debug isdn q931** command, you can also capture the SS7 message that is sent out using the **PTC-MC /snooper** or **SS7 analyzer**.

Q.764 explains Section – 2.8.2.2 Circuit group blocking and unblocking messages. In ITU, in the CGB message (seen in this output) the **hardware_failure_oriented block** can only be cleared by **hardware_failure_oriented unblock**. In ANSI, hardware-block can be cleared by any type of CGU message (Linked to CIRCUIT GRP SUPERVISION of the CGB message). Refer to Cisco bug ID CSCuk45906 (registered customers only) for additional information. This bug ID discusses when the PGW sends the wrong indication in CGB when GRS is enabled.

Note: For a Switched solution, always send maintenance block CGB/CGU. No hardware failure type is sent.

```

*****
* 03 SNOOPER INFO: Snooper is listening on interface "hme0"... *
*****
11:38:40.792151 1-005-1[02089] 1-015-1[02169]
ITU ISUP. -> CGB (18) CIC=00001
  SLS=01 Pr:0 Ni:Ntl
*****  DETAIL *****
CIC                                1
MESSAGE TYPE                       0x18 CGB - Circuit_Group_Blocking
CIRCUIT GRP SUPERVISION MT IND 0x15
  LENGTH:                           0x01 FIXED DATA 0x01
  CIRCUIT GRP SUPERVISION MT IND 1 hardware_failure_oriented
INDEX TO VARIABLE PART             0x01
  RANGE                               30
  LENGTH:                             0x04 STATUS 0xFF 0xFF 0xFF 0x7F
CIC      state                       255
1        1 blocking
2        1 blocking
3        1 blocking
4        1 blocking
5        1 blocking
6        1 blocking
7        1 blocking
8        1 blocking
  
```

```

CIC      state          255
9        1 blocking
10       1 blocking
11       1 blocking
12       1 blocking
13       1 blocking
14       1 blocking
15       1 blocking
16       1 blocking
CIC      state          255
17       1 blocking
18       1 blocking
19       1 blocking
20       1 blocking
21       1 blocking
22       1 blocking
23       1 blocking
24       1 blocking
CIC      state          127
25       1 blocking
26       1 blocking
27       1 blocking
28       1 blocking
29       1 blocking
30       1 blocking
31       1 blocking
32       0 no blocking
*****                               END_OF_MSG                               *****

```

```

11:38:40.819013 1-015-1[02169] 1-005-1[02089]
ITU ISUP. -> CGBA(1a) CIC=00001
SLS=01 Pr:0 Ni:Ntl

```

```

*****                               DETAIL                               *****
CIC      1
MESSAGE TYPE          0x1A CGBA - Circuit_Group_Blocking_Ack
CIRCUIT GRP SUPERVISION MT IND 0x15
LENGTH:              0x01 FIXED DATA 0x01
CIRCUIT GRP SUPERVISION MT IND 1 hardware_failure_oriented
INDEX TO VARIABLE PART 0x01
RANGE                30
LENGTH:              0x04 STATUS 0xFF 0xFF 0xFF 0x7F
CIC      state          255
1        1 blocking acknowledgment
2        1 blocking acknowledgment
3        1 blocking acknowledgment
4        1 blocking acknowledgment
5        1 blocking acknowledgment
6        1 blocking acknowledgment
7        1 blocking acknowledgment
8        1 blocking acknowledgment
CIC      state          255
9        1 blocking acknowledgment
10       1 blocking acknowledgment
11       1 blocking acknowledgment
12       1 blocking acknowledgment
13       1 blocking acknowledgment
14       1 blocking acknowledgment
15       1 blocking acknowledgment
16       1 blocking acknowledgment
CIC      state          255
17       1 blocking acknowledgment
18       1 blocking acknowledgment
19       1 blocking acknowledgment
20       1 blocking acknowledgment

```



```
release 9.5(2) – Cisco bug ID
CSCsb27756 ( registered customers
only) [integrated in 9.5(2)P29],
the parameter is automatically
added to the XECfgParm.dat
file during the patch installation.
```

Troubleshoot CGU and CGUA SS7 Messages

This output displays when you issue the **no shutdown** command:

```
v5800-2-sc(config)#controller E1 1/0/0
v5800-2-sc(config-controller)#no shutdown
v5800-2-sc(config-controller)#
```

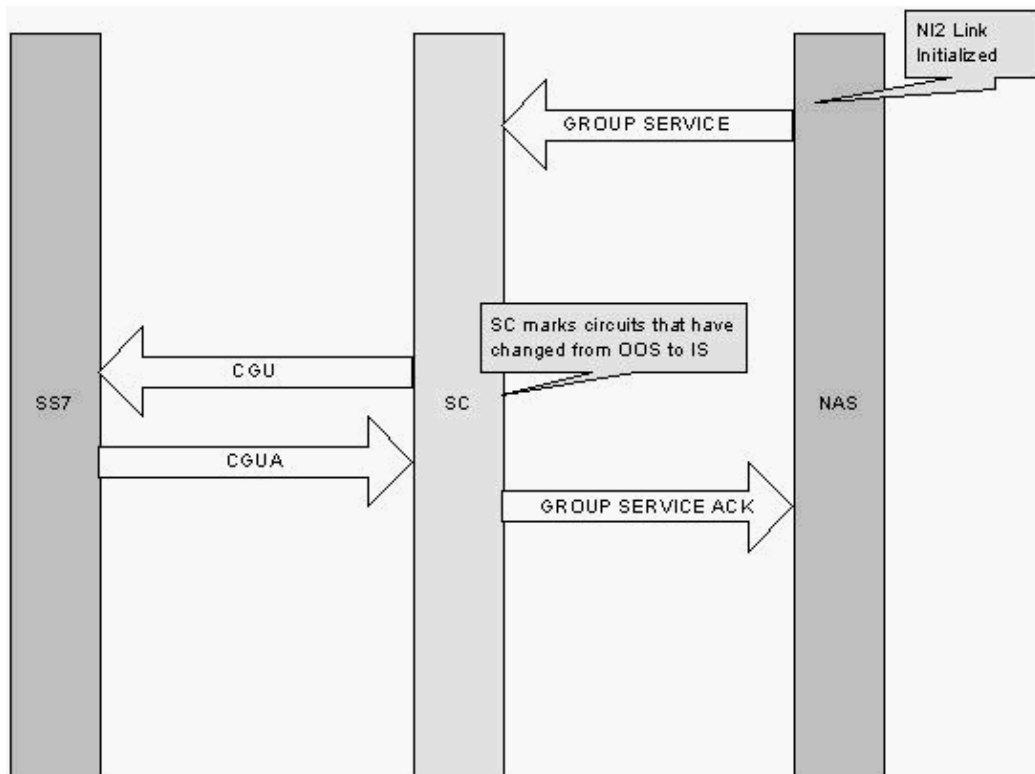
This information displays when you view the **debug** command output on the gateway and issue the **debug isdn standard** command:

```
!
controller E1 1/0/0
 pri-group timeslots 1-31 nfas_d primary nfas_int 0 nfas_group 0
v5800-2-sc(config)#controller e1 1/0/0
v5800-2-sc(config-controller)#no shutdown
v5800-2-sc(config-controller)#
v5800-2-sc(config-controller)#
v5800-2-sc(config-controller)#
Oct 17 11:02:18.762: ISDN Se1/0/0:15 SC RLM: process_tdial_message:
Received Msg from SC 4 bytes : 0x0001014C
Oct 17 11:02:23.614: ISDN Se1/1/0:15 SC RLM: process_tdial_message:
Received Msg from SC 4 bytes : 0x00010129
Oct 17 11:02:28: %CONTROLLER-5-UPDOWN: Controller E1 1/0/0, changed state to up
Oct 17 11:02:28.154: ISDN Se1/0/0:15 SC EVENT: isdn_pri_t1_state_change:
setting State to 4
Oct 17 11:02:28.154: ISDN Se1/0/0:15 SC BACKHAUL: srl_send_l3_pak:
source_id = Q.931, dest_id = Q.921,
prim = DL_DATA_REQ
priv_len = 4 int_id = 0x65B73580 datasize = 28
Oct 17 11:02:28.154: ISDN Se1/0/0:15 SC BACKHAUL:
data = 0x65B73580000003000240043800010300
Oct 17 11:02:28.154: 4302000006660500FFFFFFFFE
Oct 17 11:02:28.154: ISDN Se1/0/0:15 SC Q931: TX -> GROUP SERVICE
pd = 67 callref = 0x0000
Interface Service i = 0x00FFFFFFFFE
Oct 17 11:02:28.158: ISDN Se1/0/0:15 SC RLM: process_tdial_message:
Received Msg from SC 4 bytes : 0x0001014E
Oct 17 11:02:28.170: ISDN Se1/0/0:15 SC RLM: process_tdial_message:
Received Msg from SC 16 bytes : 0x02014A4E430280000B660500FFFFFFFFE
Oct 17 11:02:28.170: ISDN Se1/0/0:15 SC Q931: RX <- GROUP SERVICE ACK
pd = 67 callref = 0x8000 Interface Service i = 0x00FFFFFFFFE
Oct 17 11:02:28.170: ISDN Se1/0/0:15 SC BACKHAUL: srl_send_l2_pak:
source_id = Q.921, dest_id = Q.931,
prim = DL_DATA_IND
priv_len = 4 int_id = 0x65B73580 datasize = 28
Oct 17 11:02:28.170: ISDN Se1/0/0:15 SC BACKHAUL:
data = 0x65B73580000000000024104A800016258
Oct 17 11:02:28.170: 430280000B660500FFFFFFFFE
Oct 17 11:02:28.170: ISDN Se1/0/0:15 SC BACKHAUL: L3IF_rx_L2_pak:
received data 0x430280000B660500FFFFFFFFE
Oct 17 11:02:28.170: ISDN Se1/0/0:15 SC RLM: process_sc_group_msg:
Received msg 11 from SC
```

Note: For the NI2+ Group Service Message = "Interface Service i = 0x00FFFFFFE" 00 is linked to the "Interface Number" and FFFFFFFF is linked to Channel status. Operating state values are bitmaps, where the meaning of each bit is 0 = Channel is OUT OF SERVICE and 1 = Channel is IN SERVICE.

This procedure details the call flow information represented in the graphic:

1. Both the PGW and the gateway assume the initial service state of each bearer is Out of Service (OOS).
2. Execute the **no shutdown** command on the gateway.
3. A Group Service message with Interface Service i information is sent to the PGW 2200.
4. The PGW 2200 sends a CGU out to the PSTN.
5. The PSTN responds to each CGU message with a CGUA message.
6. The PGW 2200 responds with a Group Service Ack for each Group Service message received.



```
11:42:48.225329 1-005-1[02089] 1-015-1[02169] ITU ISUP. -> CGU
(19) CIC=00001
```

```
SLS=01
```

```
Pr:0 Ni:NTL
```

```
***** DETAIL *****
```

```

CIC 1
MESSAGE TYPE 0x19 CGU - Circuit_Group_Unblock
CIRCUIT GRP SUPERVISION MT IND 0x15
  LENGTH: 0x01 FIXED DATA 0x01
  CIRCUIT GRP SUPERVISION MT IND 1 hardware_failure_oriented
INDEX TO VARIABLE PART 0x01
  RANGE 30
  LENGTH: 0x04 STATUS 0xFF 0xFF 0xFF 0x7F
CIC state 255
1 1 unblocking
2 1 unblocking
3 1 unblocking
4 1 unblocking
5 1 unblocking
6 1 unblocking
7 1 unblocking
  
```

```

8      1 unblocking
CIC    state                255
9      1 unblocking
10     1 unblocking
11     1 unblocking
12     1 unblocking
13     1 unblocking
14     1 unblocking
15     1 unblocking
16     1 unblocking
CIC    state                255
17     1 unblocking
18     1 unblocking
19     1 unblocking
20     1 unblocking
21     1 unblocking
22     1 unblocking
23     1 unblocking
24     1 unblocking
CIC    state                127
25     1 unblocking
26     1 unblocking
27     1 unblocking
28     1 unblocking
29     1 unblocking
30     1 unblocking
31     1 unblocking
32     0 no unblocking
*****                      END_OF_MSG                      *****

```

11:42:48.241989 1-015-1[02169] 1-005-1[02089]

ITU ISUP. ->**CGUA(1b) CIC=00001**

SLS=01

Pr:0 Ni:NTL

```

***** DETAIL *****
CIC    1
MESSAGE TYPE          0x1B CGUA - Circuit_Group_Unblock_Ack
CIRCUIT GRP SUPERVISION MT IND 0x15
  LENGTH:              0x01 FIXED DATA 0x01
  CIRCUIT GRP SUPERVISION MT IND 1 hardware_failure_oriented
INDEX TO VARIABLE PART 0x01
  RANGE                30
  LENGTH:              0x04 STATUS 0xFF 0xFF 0xFF 0x7F
CIC    state          255
1      1 unblocking acknowledgment
2      1 unblocking acknowledgment
3      1 unblocking acknowledgment
4      1 unblocking acknowledgment
5      1 unblocking acknowledgment
6      1 unblocking acknowledgment
7      1 unblocking acknowledgment
8      1 unblocking acknowledgment
CIC    state          255
9      1 unblocking acknowledgment
10     1 unblocking acknowledgment
11     1 unblocking acknowledgment
12     1 unblocking acknowledgment
13     1 unblocking acknowledgment
14     1 unblocking acknowledgment
15     1 unblocking acknowledgment
16     1 unblocking acknowledgment
CIC    state          255
17     1 unblocking acknowledgment
18     1 unblocking acknowledgment

```

```

19      1 unblocking acknowledgment
20      1 unblocking acknowledgment
21      1 unblocking acknowledgment
22      1 unblocking acknowledgment
23      1 unblocking acknowledgment
24      1 unblocking acknowledgment
CIC     state          127
25      1 unblocking acknowledgment
26      1 unblocking acknowledgment
27      1 unblocking acknowledgment
28      1 unblocking acknowledgment
29      1 unblocking acknowledgment
30      1 unblocking acknowledgment
31      1 unblocking acknowledgment
32      0 no unblocking acknowledgment
*****
                                END_OF_MSG
*****
*****
                                DETAIL
*****

```

Manually Bring One or More B-Channels Out of Service with IOS Commands

```

v5800-2-sc(config-if)#isdn service b_channel 11 state ?
<0-2> Valid states are 0=Inservice 1=Maint 2=Outofservice
v5800-2-sc(config-if)#isdn service b_channel 11 state 2v5800-2-sc
(config-if)#

```

In this situation, a Group Service message is sent to the Cisco PGW 2200. A Group Service message sent from the Cisco NAS efficiently informs the Cisco PGW 2200 engine of the state of all bearer channels. The Cisco PGW 2200 engine decodes the message, changes the state of each NI-2 bearer channel, and propagates the changes to the SS7 side, from which corresponding block and unblock channel management messages must be sent. On the Cisco IOS NAS, check the status with the **show isdn service** command.

```

Jul 18 13:30:07.462: ISDN Se0:15 SC Q931: TX -> GROUP SERVICE
pd = 67 callref = 0x0000
      Interface Service i = 0x00FFDFFFFE
Jul 18 13:30:07.478: ISDN Se0:15 SC Q931: RX <- GROUP SERVICE ACK
pd = 67 callref = 0x8000
      Interface Service i = 0x00FFDFFFFE
Jul 18 13:30:07.478: ISDN Se0:15 SC Q931: do_statistics: 0x43 message
0x0B not counted
Jul 18 13:30:37.489: ISDN Se0:15 SC Q931: RX <- GROUP SERVICE
pd = 67 callref = 0x0000
      Interface Service i = 0x0000000000
Jul 18 13:30:37.493: ISDN Se0:15 SC Q931: TX -> GROUP SERVICE ACK
pd = 67 callref = 0x8000
      Interface Service i = 0x00FFDFFFFE
Jul 18 13:30:37.493: ISDN Se0:15 SC Q931: do_statistics: 0x43 message
0x0B not counted

```

Check the Cisco PGW 2200 error message in the platform.log file under the /opt/CiscoMGC/var/log directory. More information on the Cisco PGW 2200 error message can be found in the Log Messages documentation.

This is linked to this Cisco PGW 2200 error message in platform.log file.

```

Thu Jul 29 08:41:32:051 2004 GMT | engine (PID 16491) <Error>
CP_ERR_BC_INSV: cmgProtocolAdapter::setChanAsTermLeg: UCID=00000007,
OSigPath=00150001, OTG=*NA*, OSPAN=*NA*, OTS/CIC=11,
TSigPath=00140001, TTG=*NA*, TSPAN=0, TTS/CIC=11,
  Bear channel is not inservice
Thu Jul 29 08:43:59:331 2004 GMT | engine (PID 16491) <Error>

```

```

CP_ERR_MAN_BC_BLK: cmgProtocolAdapter::setChanAsTermLeg: UCID=00000008,
OSigPath=00150001, OTG=*NA*, OSPAN=*NA*, OTS/CIC=11,
TSigPath=00140001, TTG=*NA*, TSPAN=0, TTS/CIC=11,
Bear channel is manual blocked

```

CGB/CGU Processed Conclusion

A CGB/CGU Processed Conclusion indicates that a problem has occurred but is used to inform the craftsperson that the far end switch has blocked a range of CICs.

The PGW 2200 does not send CGB/CGU during the start-up procedure. During start-up, the PGW 2200 sends GRS messages. The messages CGB/CGU are valid and are sent after the start-up procedure was finished. It depends on which SigPath recovered first after AS5xxx (NAS/gateway) reload (see scenario 1 below). For example, in scenario 1, the SS7 patch became IS after NAS, so there was no need to send CGB/CGU.

Scenario 1: No CGB/CGU to PSTN Side

Trigger	CIC state	SS7 SigPath State	NAS SigPath State
Initial Condition	IS	IS	IS
AS5xxx [Gateway – NAS] Reload	OOS	OOS	OOS
NAS recovers	OOS	OOS	IS
SS7 recovers	IS	IS	IS

In scenario 2, once SS7 SigPath becomes IS, the far-end PSTN switch is able to send new calls (IAM message) towards PGW 2200. However, the calls fail because NAS did not become IS. Therefore, the PGW 2200 sends CGB to block (MATE_UNAVAILABLE) the CICs. Once NAS becomes IS, the PGW 2200 unblocks those CICs.

Scenario 2: CGB/CGU to the PSTN Side

Trigger	CIC State	SS7 SigPath State	NAS SigPath State
Initial Condition	IS	IS	IS
AS5xxx [Gateway – NAS] Reload	OOS	OOS	OOS
SS7 recovers	IS, (Mate_UN)	IS	OOS
NAS recovers	IS	IS	IS

Note: For more details about MATE_UNAVAIL, refer to Table 3–7: Circuit Block Types from the Cisco MGC Node Operations documentation.

Note: Other situations where you can run into this behavior are:

- In the AS5xxx (NAS/gateway), the NI2+ Group Service Message indicates that SS7 CIC is not available which includes the SPAN being shutdown.
- The connection between the Cisco PGW 2200 and AS5xxx (NAS/gateway) is down.
- On the Cisco PGW 2200, when you manually set the admin state of NAS sigPath, SPAN, or PRI bearer channel to the lock state, all of them trigger CGB/BLO.

Since SS7 and PRI initialize independent to each other, once cannot guarantee who comes first.

There are more legitimate scenarios where CGB/CGU can be sent after SS7 SigPath becomes IS. For example:

Information	CIC State	SS7 SigPath State	NAS SigPath State
Initial Condition	IS	IS	IS
SS7 DPC was administratively taken down for maintenance	OOS	OOS	IS
NAS was administratively taken down for maintenance	OOS	OOS	OOS
SS7 DPC was brought up	IS,MATE_UN	IS	OOS

Related Information

- [Tech Notes for the PGW 2200](#)
 - [Configuration Examples for the PGW 2200](#)
 - [Voice Technology Support](#)
 - [Voice and IP Communications Product Support](#)
 - [Recommended Reading: Troubleshooting Cisco IP Telephony](#)
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