Cisco Catalyst 6000 Series Gateway-PBX Interoperability: Ericsson MD-110 with T1 PRI NI-2 Signaling

This document describes the interoperability and configuration of a Cisco Catalyst 6000 series voice gateway with an Ericsson MD-110 PBX using PRI NI-2 signaling. It includes the following sections:

- System Components
- Configuration Tasks
- Caveats

System Components

PBX Model	Ericsson MD-110
PBX Release	BC9
Telephony Signaling	T1 PRI NI-2
Voice Gateway	Cisco Catalyst 6608
Gateway Release	5.5(6)a
Call Manager Release	3.1.1
VoX Protocol	MGCP

Configuration Tasks

See the following sections for configuration tasks for this feature:

- Set Up
- Ericsson PBX Configuration
- Call Manager Configuration
- Cisco Catalyst 6608 Gateway Configuration

Set Up

This section includes the following information:

- Connectivity Diagrams
- Set Up Notes

Connectivity Diagrams

Figure 1: Test Configuration

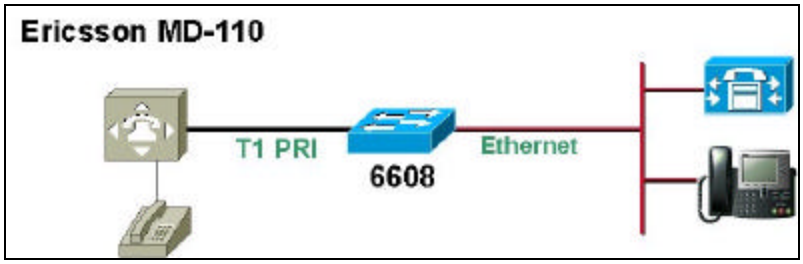


Figure 1 represents the configuration used for testing: an Ericsson MD-110 PBX connected to a Cisco Catalyst 6608 voice gateway via a PRI NI-2 connection.

Set Up Notes

- The Cisco 6608-T1 Gateway with an ISDN protocol type setting of PRI-NI2 supports both protocol sides by selecting “Network/User” in the protocol field when configuring the Gateway via the Cisco CallManager.
- The Ericsson MD-110 PBX supports both “USER” (slave) and “NETWORK” (master) protocol sides by using the **RODAI** command.

Ericsson PBX Configuration

Ericsson PBX Version Information

- Software: Version BC9
- Hardware: TLU77/1

Ericsson PBX Sample Configuration

Configure in the following sequence:

1. **ROCAI** Route Category Initiate
2. **RODAI** Route Data Initiate
3. **ROEQI** Route Equipment Initiate

4. **RODDI** Route External Destination Data Initiate

Route Category Initiate

Setup internal characteristics for the route. Ex. Traffic direction, services, Bearer capabilities.

```
< ROCAP:ROU=20;
ROUTE CATEGORY DATA

ROU SEL          TRM SERV       NODG DIST DISL TRAF     SIG          BCAP

20  711000000000 7   3110000010  0   5    20   03151515 211100000031 111111
```

Route Data Initiate

T1-PRI Route Protocol Characteristics, protocol side “Network”

```
< RODAP:ROU=20;
ROUTE DATA

ROU   TYPE  VARC        VARI        VARO        FILTER

20    SL63  H'00001110  H'00000002  H'00000037  NO

END
```

T1-PRI Route Protocol Characteristics, protocol side “User”

```
< RODAP:ROU=20;
ROUTE DATA

ROU   TYPE  VARC        VARI        VARO        FILTER

20    SL63  H'00001110  H'00000002  H'00000027  NO

END
```

Route Equipment Initiate

T1-PRI trunk lines (B-channels)

```
< ROEDP:ROU=20,TRU=ALL;
ROUTE EQUIPMENT DATA

ROU             TRU             EQU             SQU             INDDAT

20              001-1           001-0-00-00     0-00-3          H'000000000000
20              001-2           001-0-00-01     0-00-3          H'000000000000
20              001-3           001-0-00-02     0-00-3          H'000000000000
20              001-4           001-0-00-03     0-00-3          H'000000000000
20              001-5           001-0-00-04     0-00-3          H'000000000000
20              001-6           001-0-00-05     0-00-3          H'000000000000
20              001-7           001-0-00-06     0-00-3          H'000000000000
20              001-8           001-0-00-07     0-00-3          H'000000000000
20              001-9           001-0-00-08     0-00-3          H'000000000000
20              001-10          001-0-00-09     0-00-3          H'000000000000
20              001-11          001-0-00-10     0-00-3          H'000000000000
20              001-12          001-0-00-11     0-00-3          H'000000000000
20              001-13          001-0-00-12     0-00-3          H'000000000000
20              001-14          001-0-00-13     0-00-3          H'000000000000
20              001-15          001-0-00-14     0-00-3          H'000000000000
20              001-16          001-0-00-15     0-00-3          H'000000000000
20              001-17          001-0-00-16     0-00-3          H'000000000000
20              001-18          001-0-00-17     0-00-3          H'000000000000
20              001-19          001-0-00-18     0-00-3          H'000000000000
```

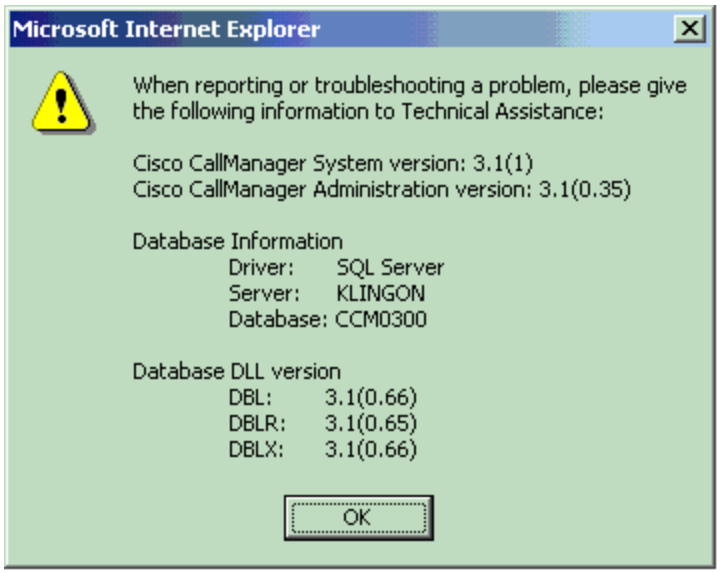
```
20              001-20          001-0-00-19     0-00-3          H'000000000000
20              001-21          001-0-00-20     0-00-3          H'000000000000
20              001-22          001-0-00-21     0-00-3          H'000000000000
20              001-23          001-0-00-22     0-00-3          H'000000000000

END
```

Route External Destination Data Initiate

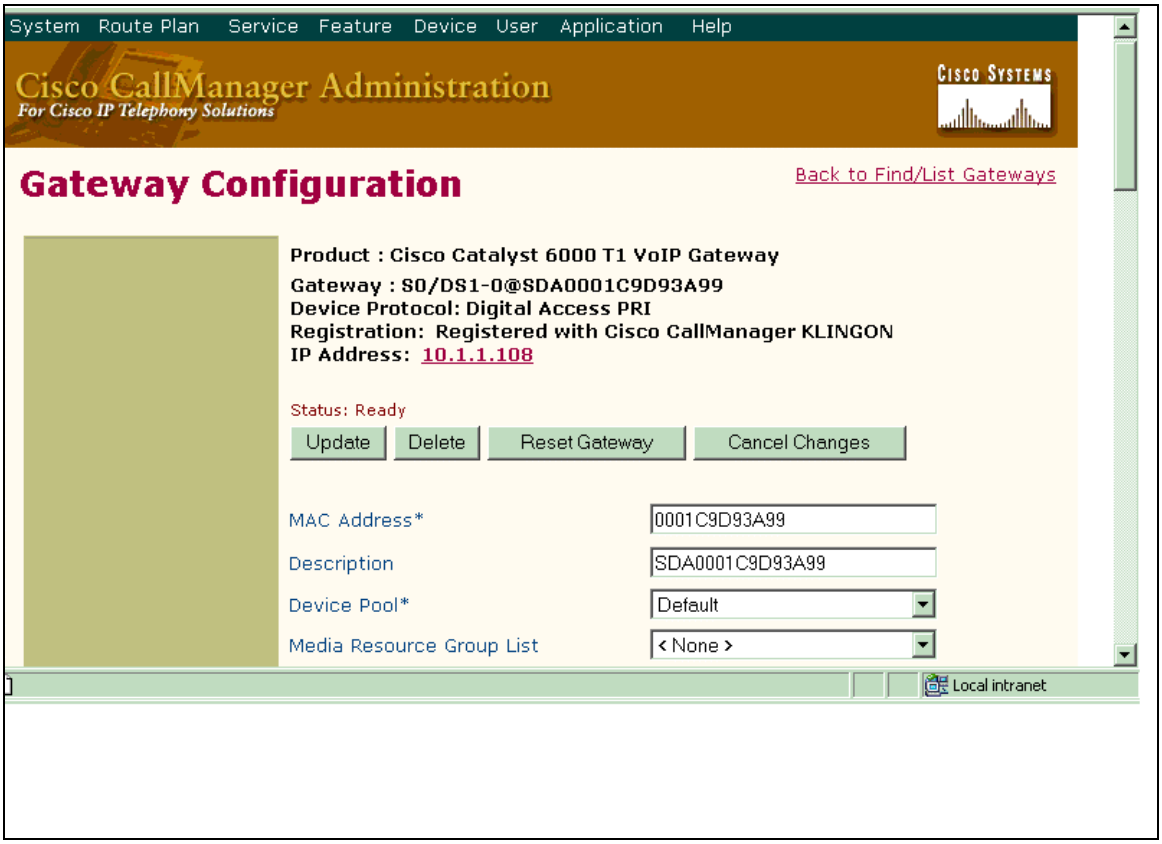
```
Route and Access Code for the trunk Information- Note PRI uses Route 20

< RODDP:DEST=ALL;
EXTERNAL DESTINATION ROUTE DATA

DEST  DRN ROU CHO CUST ADC                TRC SRT NUMACK PRE

2         20          100500000000025000 0   1   0
30        1           100500000000025000 0   3   0
31        2           100500000000025000 0   3   0
32        3           100500000000025000 0   3   0
33        4           100500000000025000 0   3   0
34        5           100500000000025000 0   3   0
35        6           000500000000025000 0   3   0
36        7           000500000000025000 0   3   0
37        8           000500000000025000 0   3   0
39        21          100500000000025000 0   3   0
40        11          100500000000025000 0   3   0
41        12          000500000000025000 0   3   0
42        13          000500000000025000 0   3   0

END
```

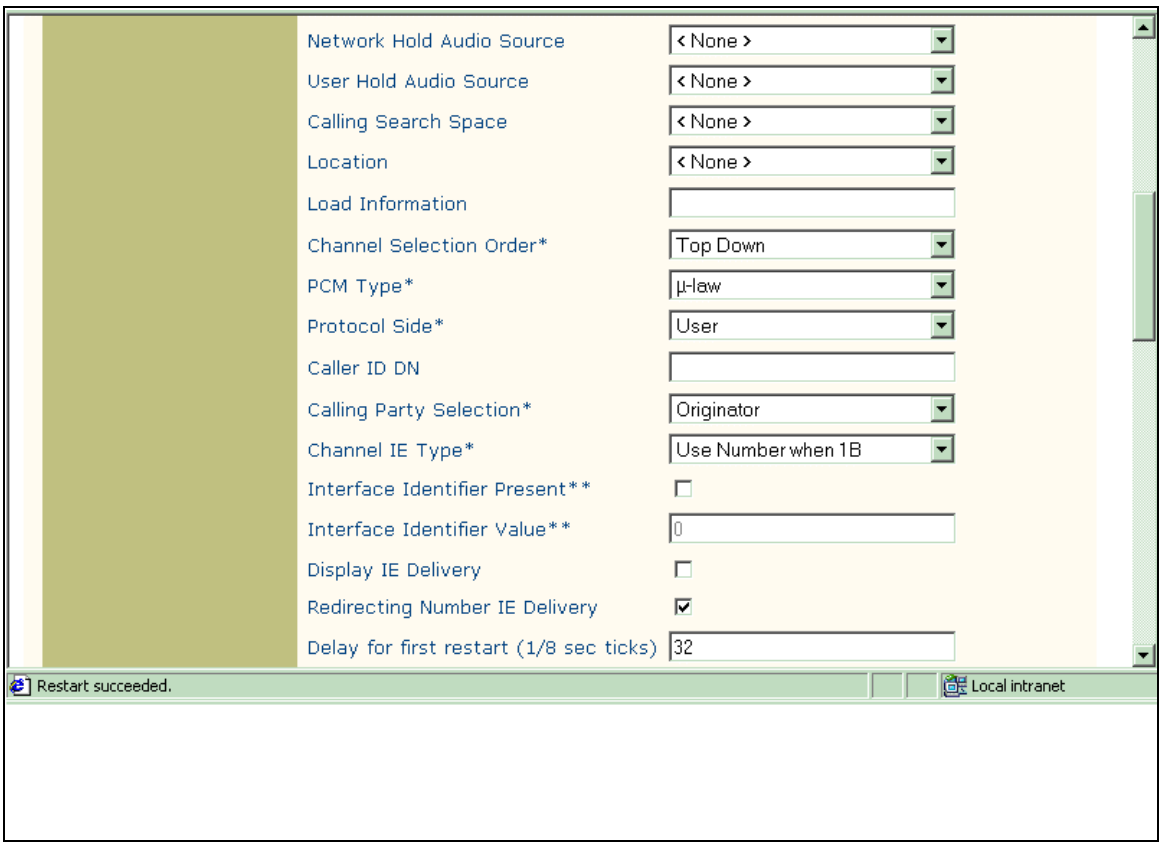
Call Manager Configuration

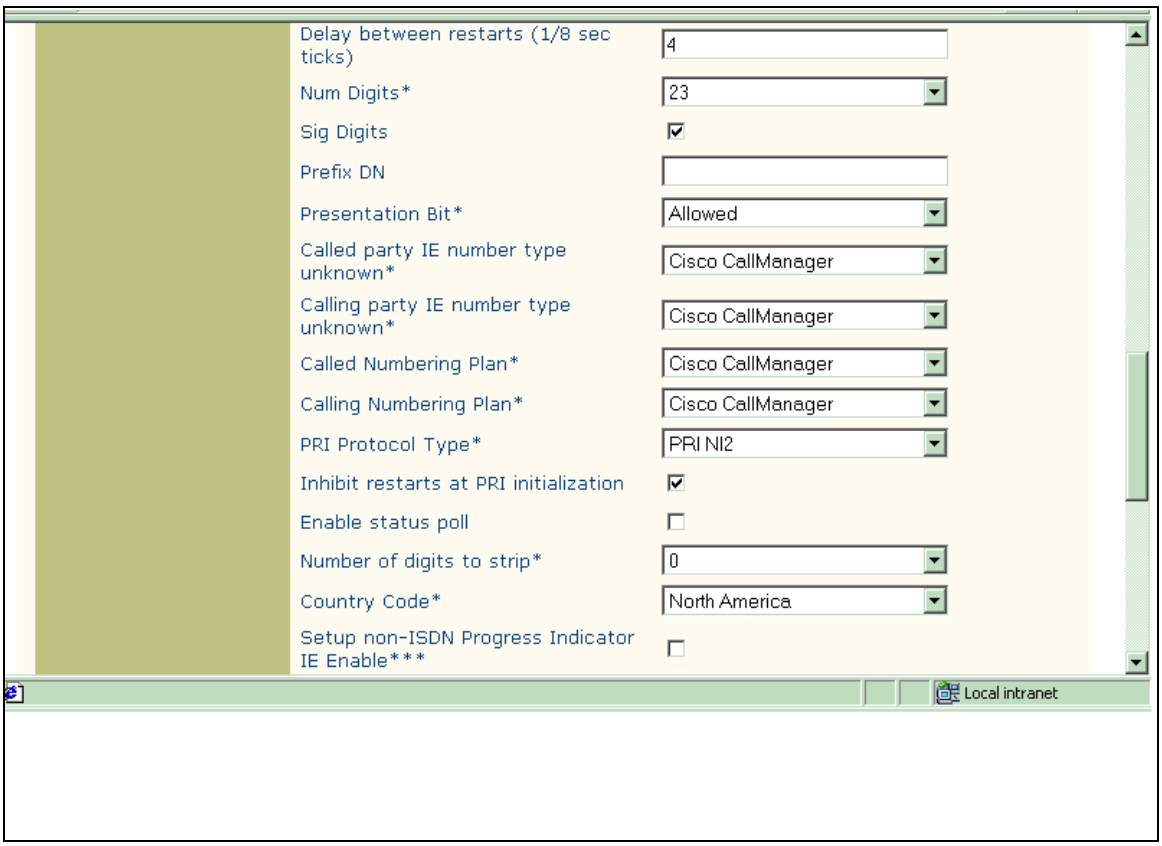
Call Manager Version Information

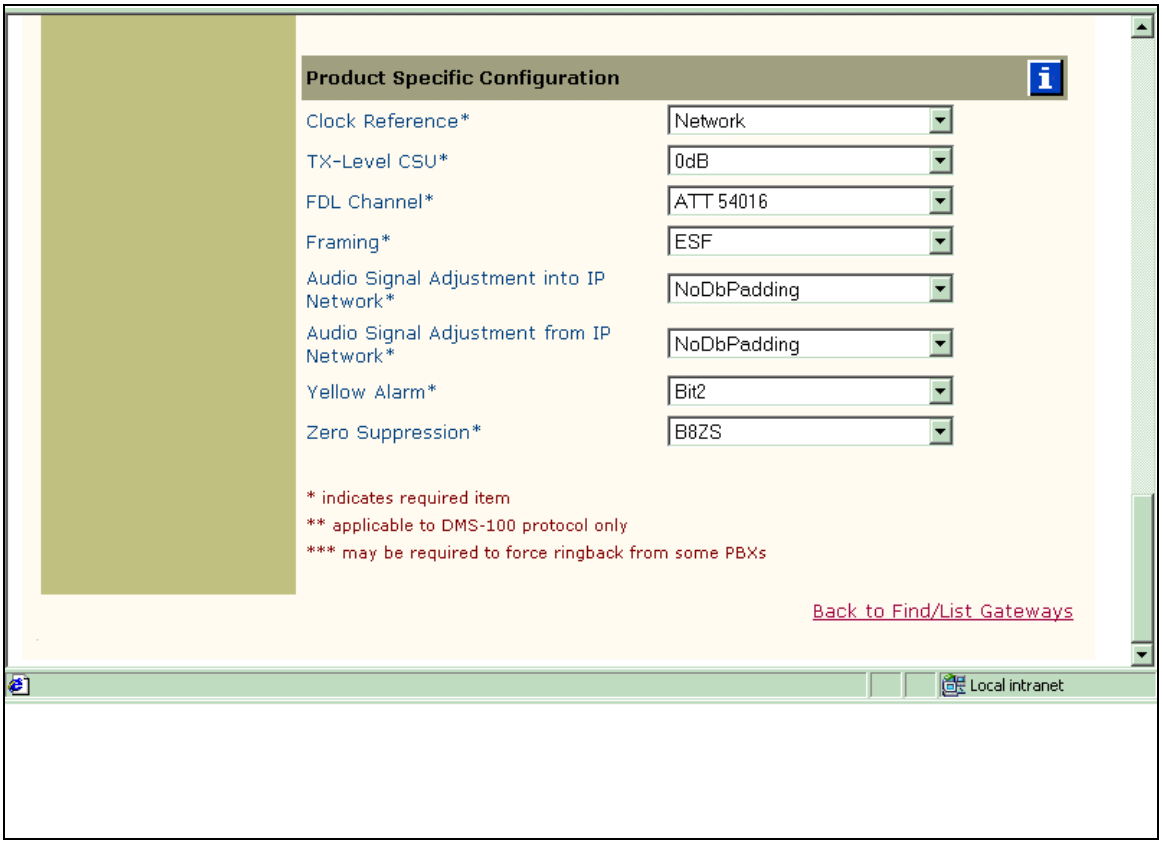


Cisco Catalyst 6608 Gateway Configuration

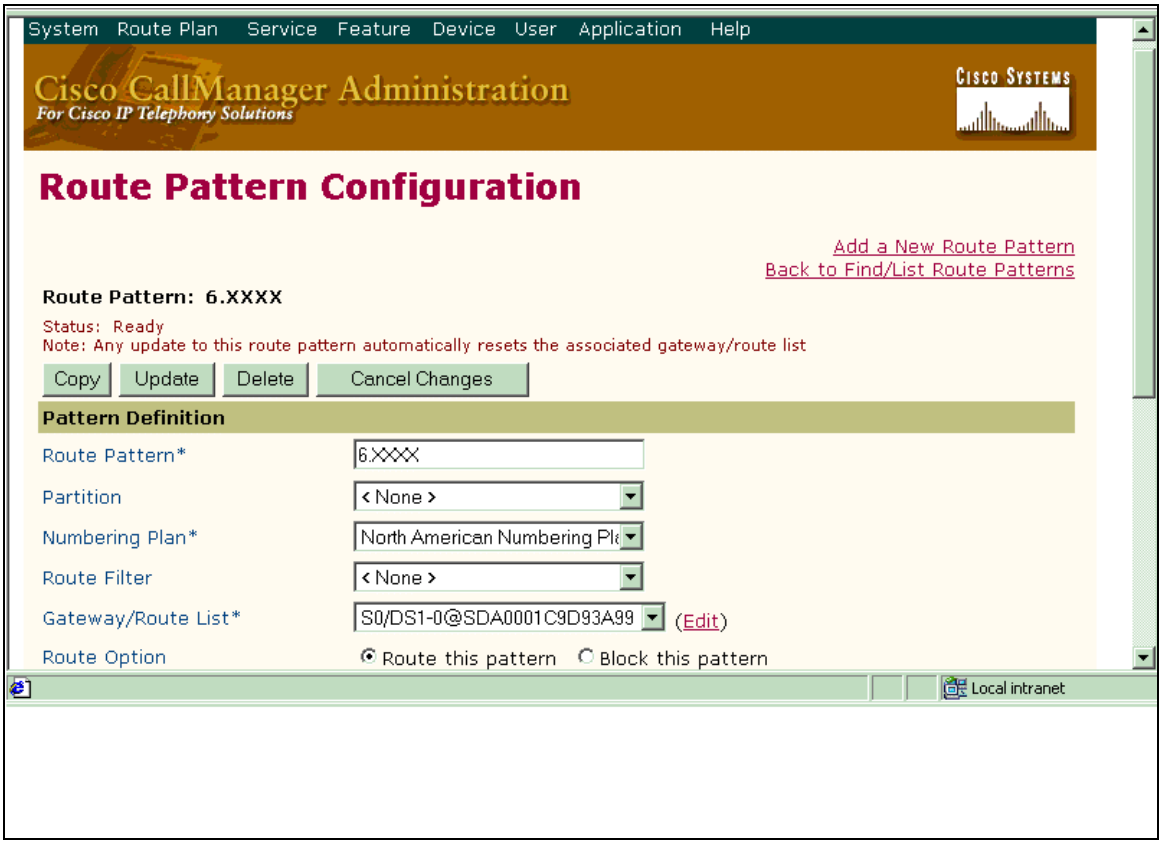


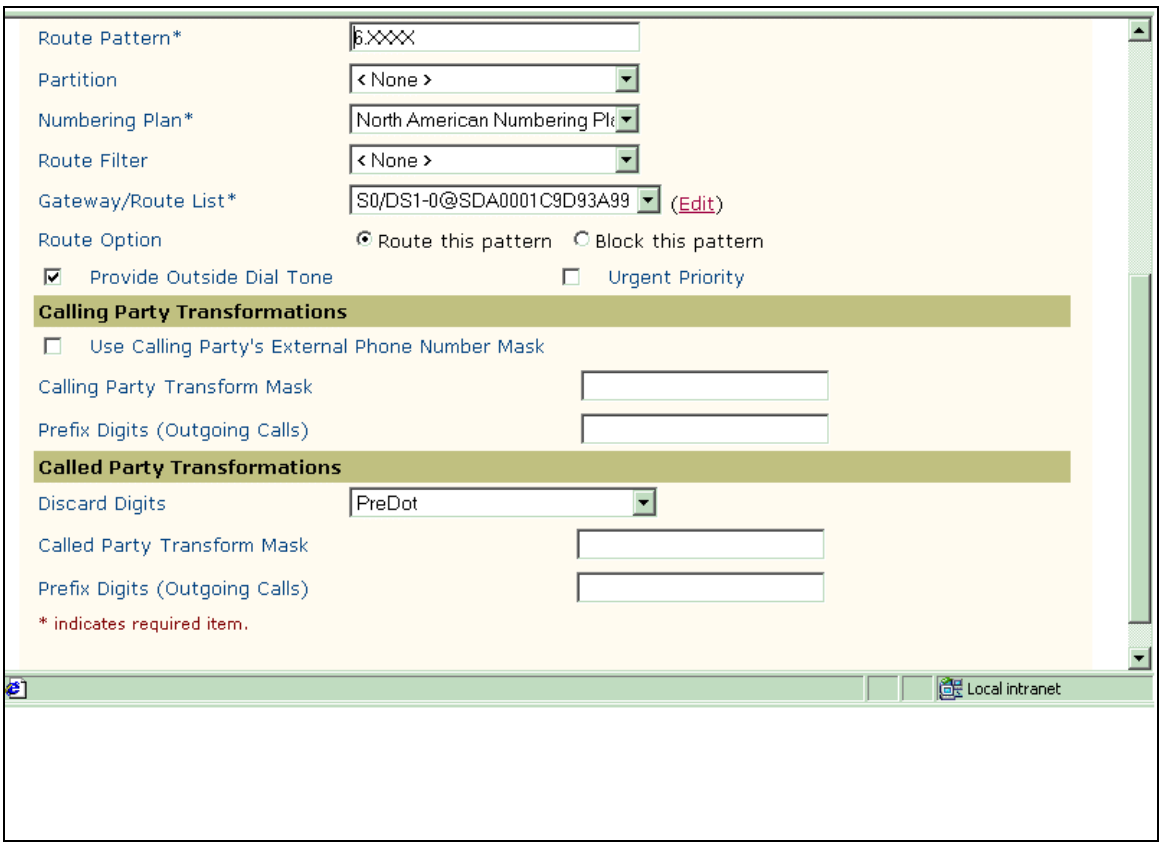

Network Hold Audio Source
< None >
User Hold Audio Source
< None >
Calling Search Space
< None >
Location
< None >
Load Information
Channel Selection Order*
Top Down
PCM Type*
µ-law
Protocol Side*
User
Caller ID DN
Calling Party Selection*
Originator
Channel IE Type*
Use Number when 1B
Interface Identifier Present**
Interface Identifier Value**
0
Display IE Delivery
Redirecting Number IE Delivery
Delay for first restart (1/8 sec ticks)
32
Restart succeeded.
Local intranet


Delay between restarts (1/8 sec ticks)
4
Num Digits*
23
Sig Digits
Prefix DN
Presentation Bit*
Allowed
Called party IE number type unknown*
Cisco CallManager
Calling party IE number type unknown*
Cisco CallManager
Called Numbering Plan*
Cisco CallManager
Calling Numbering Plan*
Cisco CallManager
PRI Protocol Type*
PRI NI2
Inhibit restarts at PRI initialization
Enable status poll
Number of digits to strip*
0
Country Code*
North America
Setup non-ISDN Progress Indicator IE Enable***
Local intranet


Product Specific Configuration
Clock Reference*
Network
TX-Level CSU*
0dB
FDL Channel*
ATT 54016
Framing*
ESF
Audio Signal Adjustment into IP Network*
NoDbPadding
Audio Signal Adjustment from IP Network*
NoDbPadding
Yellow Alarm*
Bit2
Zero Suppression*
B8ZS
* indicates required item
** applicable to DMS-100 protocol only
*** may be required to force ringback from some PBXs
Back to Find/List Gateways
Local intranet

Route Pattern Configuration





Cisco Catalyst 6608 Gateway Configuration

The following is the configuration of the Cisco Catalyst 6608 voice gateway connected to the Ericsson MD-110 PBX T1 PRI NI-2 interface.

Cisco Catalyst 6608 Voice Gateway Version Information

```
Console> (enable) sh version
WS-C6006 Software, Version NmpSW: 5.5(6a)
Copyright (c) 1995-2001 by Cisco Systems
NMP S/W compiled on Feb 23 2001, 10:23:18

System Bootstrap Version: 5.3(1)

Hardware Version: 2.0  Model: WS-C6006  Serial #: TBA04511172

Mod Port Model               Serial #    Versions
--- ---- ------------------- ----------- -------------------------------------
1   2    WS-X6K-SUP1A-2GE    SAD05010NBK Hw : 7.0
                                         Fw : 5.3(1)
                                         Fw1: 5.4(2)
                                         Sw : 5.5(6a)
                                         Sw1: 5.5(6a)
         WS-F6K-PFC          SAD05020221 Hw : 1.1
3   48   WS-X6348-RJ-45      SAD04420N7B Hw : 1.4
                                         Fw : 5.4(2)
```

```
                                          Sw : 5.5(6a)
         WS-F6K-VPWR                      Hw : 1.0
4   24   WS-X6624-FXS        SAD050203M8 Hw : 3.0
                                          Fw : 5.4(2)
                                          Sw : 5.5(6a)
                                          HP : A00203010010; DSP : A003E031 (3.3.
32)
5   8    WS-X6608-T1         SAD04400EM0 Hw : 1.1
                                          Fw : 5.4(2)
                                          Sw : 5.5(6a)
                                          HP1: D00403010017; DSP1: D005E031 (3.3.
32)
                                          HP2: D00403010017; DSP2: D005E031 (3.3.
32)
                                          HP3: D00403010017; DSP3: D005E031 (3.3.
32)
                                          HP4: D00403010017; DSP4: D005E031 (3.3.
32)
                                          HP5: D00403010017; DSP5: D005E031 (3.3.
32)
                                          HP6: D00403010017; DSP6: D005E031 (3.3.
32)
                                          HP7: D00403010017; DSP7: D005E031 (3.3.
32)
                                          HP8: D00403010017; DSP8: D005E031 (3.3.
32)
6   8    WS-X6608-E1         SAD04380DW1 Hw : 1.1
                                          Fw : 5.4(2)
                                          Sw : 5.5(6a)
                                          HP1: D00403010017; DSP1: D005E031 (3.3.
32)
                                          HP2: D00403010017; DSP2: D005E031 (3.3.
32)
                                          HP3: D00403010017; DSP3: D005E031 (3.3.
32)
                                          HP4: D00403010017; DSP4: D005E031 (3.3.
32)
                                          HP5: D00403010017; DSP5: D005E031 (3.3.
32)
                                          HP6: D00403010017; DSP6: D005E031 (3.3.
32)
                                          HP7: D00403010017; DSP7: D005E031 (3.3.
32)
                                          HP8: D00403010017; DSP8: D005E031 (3.3.
32)

       DRAM                     FLASH                    NVRAM
Module Total   Used    Free    Total   Used    Free    Total Used  Free
------ ------- ------- ------- ------- ------- ------- ----- ----- -----
1       65408K  37863K  27545K  16384K  11546K   4838K  512K  198K  314K

Uptime is 83 days, 2 hours, 34 minutes
Console> (enable)
```

Cisco Catalyst 6608 Voice Gateway Sample Configuration

```
Console> (enable) sh module
Mod Slot Ports Module-Type                Model               Sub Status
--- ---- ----- ------------------------- ------------------- --- --------
1   1    2     1000BaseX Supervisor      WS-X6K-SUP1A-2GE    yes ok
3   3    48    10/100BaseTX Ethernet     WS-X6348-RJ-45      yes ok
4   4    24    FXS                       WS-X6624-FXS        no  ok
5   5    8     T1                        WS-X6608-T1         no  ok
6   6    8     E1                        WS-X6608-E1         no  ok
```

```
Mod Module-Name         Serial-Num
--- ------------------- -----------
1                       SAD05010NBK
3                       SAD04420N7B
4                       SAD050203M8
5                       SAD04400EM0
6                       SAD04380DW1

Mod MAC-Address(es)                         Hw     Fw         Sw
--- ---------------------------------------- ------ ---------- -----------------
1   00-04-c0-f8-42-02 to 00-04-c0-f8-42-03 7.0    5.3(1)     5.5(6a)
    00-04-c0-f8-42-00 to 00-04-c0-f8-42-01
    00-04-9b-f0-78-00 to 00-04-9b-f0-7b-ff
3   00-02-fc-20-5e-50 to 00-02-fc-20-5e-7f 1.4    5.4(2)     5.5(6a)
4   00-03-32-ba-2e-35                      3.0    5.4(2)     5.5(6a)
5   00-01-c9-d9-3a-98 to 00-01-c9-d9-3a-9f 1.1    5.4(2)     5.5(6a)
6   00-01-c9-d8-63-3e to 00-01-c9-d8-63-45 1.1    5.4(2)     5.5(6a)

Mod Sub-Type                Sub-Model           Sub-Serial  Sub-Hw
--- ----------------------- ------------------- ----------- ------
1   L3 Switching Engine     WS-F6K-PFC          SAD05020221 1.1
3   Inline Power Module     WS-F6K-VPWR                     1.0
Console> (enable)
```

```
Console> (enable) sh port 5
Port  Name                Status     Vlan       Duplex Speed Type
----- ------------------- ---------- ---------- ------ ----- ------------
 5/1                      notconnect 1            full 1.544 T1
 5/2                      connected  1            full 1.544 T1
 5/3                      notconnect 1            full 1.544 T1
 5/4                      notconnect 1            full 1.544 T1
 5/5                      notconnect 1            full 1.544 T1
 5/6                      notconnect 1            full 1.544 T1
 5/7                      notconnect 1            full 1.544 T1
 5/8                      notconnect 1            full 1.544 T1

Port     DHCP    MAC-Address       IP-Address      Subnet-Mask
-------- ------- ----------------- --------------- ---------------
 5/1     enable  00-01-c9-d9-3a-98 10.1.1.107      255.255.255.0
 5/2     enable  00-01-c9-d9-3a-99 10.1.1.108      255.255.255.0
 5/3     enable  00-01-c9-d9-3a-9a 10.1.1.109      255.255.255.0
 5/4     enable  00-01-c9-d9-3a-9b 10.1.1.110      255.255.255.0
 5/5     enable  00-01-c9-d9-3a-9c 10.1.1.111      255.255.255.0
 5/6     enable  00-01-c9-d9-3a-9d 10.1.1.112      255.255.255.0
 5/7     enable  00-01-c9-d9-3a-9e 10.1.1.113      255.255.255.0
 5/8     enable  00-01-c9-d9-3a-9f 10.1.1.114      255.255.255.0

Port     Call-Manager(s)   DHCP-Server     TFTP-Server     Gateway
-------- ----------------- --------------- --------------- ---------------
 5/1     10.1.1.2          10.1.1.2        10.1.1.2        10.1.1.7
 5/2     10.1.1.2          10.1.1.2        10.1.1.2        10.1.1.7
 5/3     10.1.1.2          10.1.1.2        10.1.1.2        10.1.1.7
 5/4     10.1.1.2          10.1.1.2        10.1.1.2        10.1.1.7
 5/5     10.1.1.2          10.1.1.2        10.1.1.2        10.1.1.7
 5/6     10.1.1.2          10.1.1.2        10.1.1.2        10.1.1.7
 5/7     10.1.1.2          10.1.1.2        10.1.1.2        10.1.1.7
 5/8     10.1.1.2          10.1.1.2        10.1.1.2        10.1.1.7

Port     DNS-Server(s)     Domain
-------- ----------------- -------------------------------------------------
 5/1     -                 -
 5/2     -                 -
 5/3     -                 -
 5/4     -                 -
 5/5     -                 -
```

```
 5/6     -                  -
 5/7     -                  -
 5/8     -                  -

Port     CallManagerState DSP-Type
-------- ---------------- --------
 5/1     registered       C549
 5/2     registered       C549
 5/3     registered       C549
 5/4     registered       C549
 5/5     registered       C549
 5/6     registered       C549
 5/7     registered       C549
 5/8     registered       C549

Port  NoiseRegen NonLinearProcessing
----- ---------- -------------------
 5/1  enabled    enabled
 5/2  enabled    enabled
 5/3  enabled    enabled
 5/4  enabled    enabled
 5/5  enabled    enabled
 5/6  enabled    enabled
 5/7  enabled    enabled
 5/8  enabled    enabled
Console> (enable)
```

Caveats

- The Ericsson MD-110 PBX user interface is very cryptic. All parameters and options are mapped to position-dependent numeric fields within the various commands listed below. The user must have the correct revision of the Ericsson MD-110 PBX Administration manual to be able to decipher each field position to determine its meaning. Therefore it is advised not to make changes to an MD-110 PBX unless you are experienced in this interface. A single number out of place in a command string can cause unusual behavior on the PBX.

- Calling Name delivery and presentation features are not supported by the Ericsson MD-110 PBX.

- When calling from a Cisco 7960 IP phone to an Ericsson digital phone, Calling/Called Number is displayed on both phones after the call is answered.

- When calling from an Ericsson digital phone to a Cisco 7960 IP phone, the IP phone displays “Connected Number” after the call is answered. The Ericsson phone however does NOT get updated when the call is answered. It displays the word “PRIVATE”.