



# 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

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

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Figure 1: Test Configuration

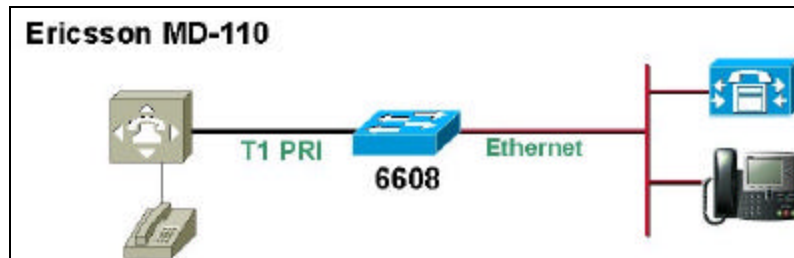


Figure 1 represents the configuration used for testing: an Ericsson MD-110 PBX connected to a Cisco Catalyst 6608 voice gateway via a PRI NI-2 connection.

### Set Up Notes

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- 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

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- Software: Version BC9
- Hardware: TLU77/1

### Ericsson PBX Sample Configuration

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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'0000000000000
20          001-21          001-0-00-20      0-00-3          H'0000000000000
20          001-22          001-0-00-21      0-00-3          H'0000000000000
20          001-23          001-0-00-22      0-00-3          H'0000000000000
```

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
```

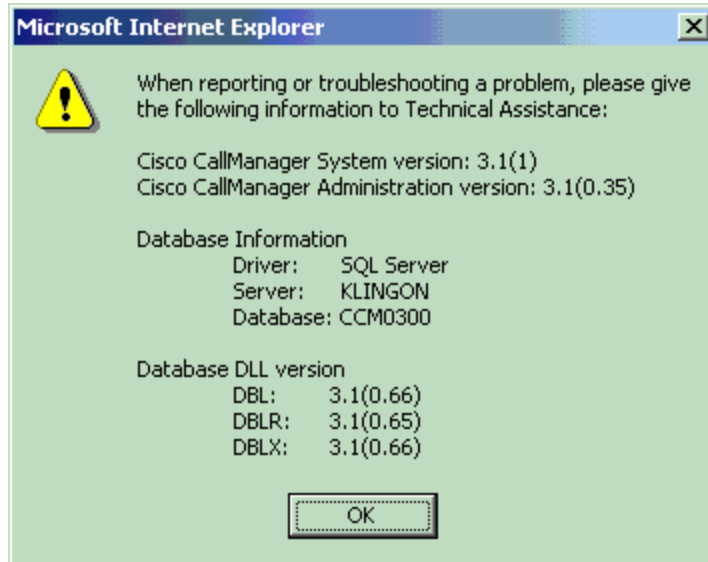
DEST	DRN	ROU	CHO	CUST	ADC	TRC	SRT	NUMACK	PRE
2		20			1005000000000025000	0	1	0	
30		1			1005000000000025000	0	3	0	
31		2			1005000000000025000	0	3	0	
32		3			1005000000000025000	0	3	0	
33		4			1005000000000025000	0	3	0	
34		5			1005000000000025000	0	3	0	
35		6			0005000000000025000	0	3	0	
36		7			0005000000000025000	0	3	0	
37		8			0005000000000025000	0	3	0	
39		21			1005000000000025000	0	3	0	
40		11			1005000000000025000	0	3	0	
41		12			0005000000000025000	0	3	0	
42		13			0005000000000025000	0	3	0	

END

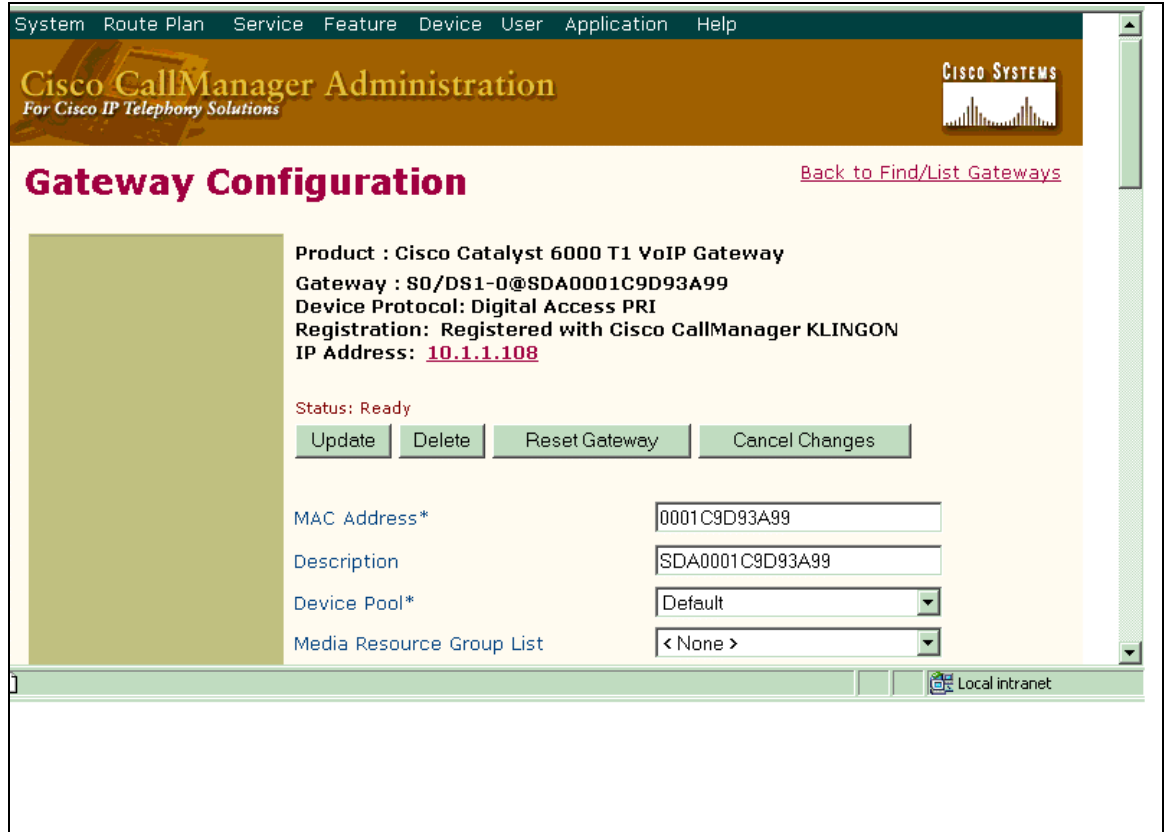
## Call Manager Configuration

### Call Manager Version Information

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## Cisco Catalyst 6608 Gateway Configuration



The screenshot shows the Cisco CallManager Administration interface for Gateway Configuration. The top navigation bar includes System, Route Plan, Service, Feature, Device, User, Application, and Help. The page title is "Gateway Configuration" with a link to "Back to Find/List Gateways". The configuration details are as follows:

Product :	Cisco Catalyst 6000 T1 VoIP Gateway
Gateway :	S0/DS1-0@SDA0001C9D93A99
Device Protocol:	Digital Access PRI
Registration:	Registered with Cisco CallManager KLINGON
IP Address:	<a href="#">10.1.1.108</a>

Status: Ready

Update Delete Reset Gateway Cancel Changes

MAC Address*	0001C9D93A99
Description	SDA0001C9D93A99
Device Pool*	Default
Media Resource Group List	< None >

Local intranet

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**	<input type="checkbox"/>
Interface Identifier Value**	0
Display IE Delivery	<input type="checkbox"/>
Redirecting Number IE Delivery	<input checked="" type="checkbox"/>
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	<input checked="" type="checkbox"/>
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	<input checked="" type="checkbox"/>
Enable status poll	<input type="checkbox"/>
Number of digits to strip*	0
Country Code*	North America
Setup non-ISDN Progress Indicator IE Enable***	<input type="checkbox"/>

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

The screenshot shows the Cisco CallManager Administration web interface. At the top, there is a navigation menu with links for System, Route Plan, Service, Feature, Device, User, Application, and Help. Below the menu is a header banner with the text "Cisco CallManager Administration For Cisco IP Telephony Solutions" and the Cisco Systems logo. The main heading is "Route Pattern Configuration".

On the right side, there are two links: "Add a New Route Pattern" and "Back to Find/List Route Patterns".

The configuration details for the route pattern "6.XXXX" are as follows:

- Route Pattern:** 6.XXXX
- Status:** Ready
- Note:** Any update to this route pattern automatically resets the associated gateway/route list
- Buttons:** Copy, Update, Delete, Cancel Changes
- Pattern Definition:**
  - Route Pattern\*:** 6.XXXX
  - Partition:** < None >
  - Numbering Plan\*:** North American Numbering Plan
  - Route Filter:** < None >
  - Gateway/Route List\*:** S0/DS1-0@SDA0001C9D93A99 (Edit)
  - Route Option:**  Route this pattern  Block this pattern

The browser's address bar shows "Local intranet".

Route Pattern*	6XXXX
Partition	< None >
Numbering Plan*	North American Numbering Pl
Route Filter	< None >
Gateway/Route List*	S0/DS1-0@SDA0001C9D93A99 (Edit)
Route Option	<input checked="" type="radio"/> Route this pattern <input type="radio"/> Block this pattern
	<input checked="" type="checkbox"/> Provide Outside Dial Tone <input type="checkbox"/> Urgent Priority
<b>Calling Party Transformations</b>	
	<input type="checkbox"/> Use Calling Party's External Phone Number Mask
Calling Party Transform Mask	
Prefix Digits (Outgoing Calls)	
<b>Called Party Transformations</b>	
Discard Digits	PreDot
Called Party Transform Mask	
Prefix Digits (Outgoing Calls)	
* indicates required item.	

## 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)
3	48	WS-F6K-PFC	SAD05020221	Hw : 1.1
		WS-X6348-RJ-45	SAD04420N7B	Hw : 1.4 Fw : 5.4(2)

```

Sw : 5.5(6a)
4 24 WS-F6K-VPWR SAD050203M8 Hw : 1.0
WS-X6624-FXS 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)

```

Module	DRAM			FLASH			NVRAM		
	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          SADO5010NBK
3          SADO4420N7B
4          SADO50203M8
5          SADO4400EM0
6          SADO4380DW1
    
```

```

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        SADO5020221  1.1
3    Inline Power Module  WS-F6K-VPWR
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”.