

# NEC 2400 ICS PBX with CallManager using 3640-E1 MGCP Gateway

**This application note illustrates connectivity for NEC 2400 ICS PBX with CallManager using 3640-E1 MGCP Gateway.**

## Introduction

The network topology diagram presented in [Figure 1](#) illustrates the test set-up for end-to-end interoperability between the Cisco CallManager connected to the PBX via 3640-E1 link as MGCP Gateway.

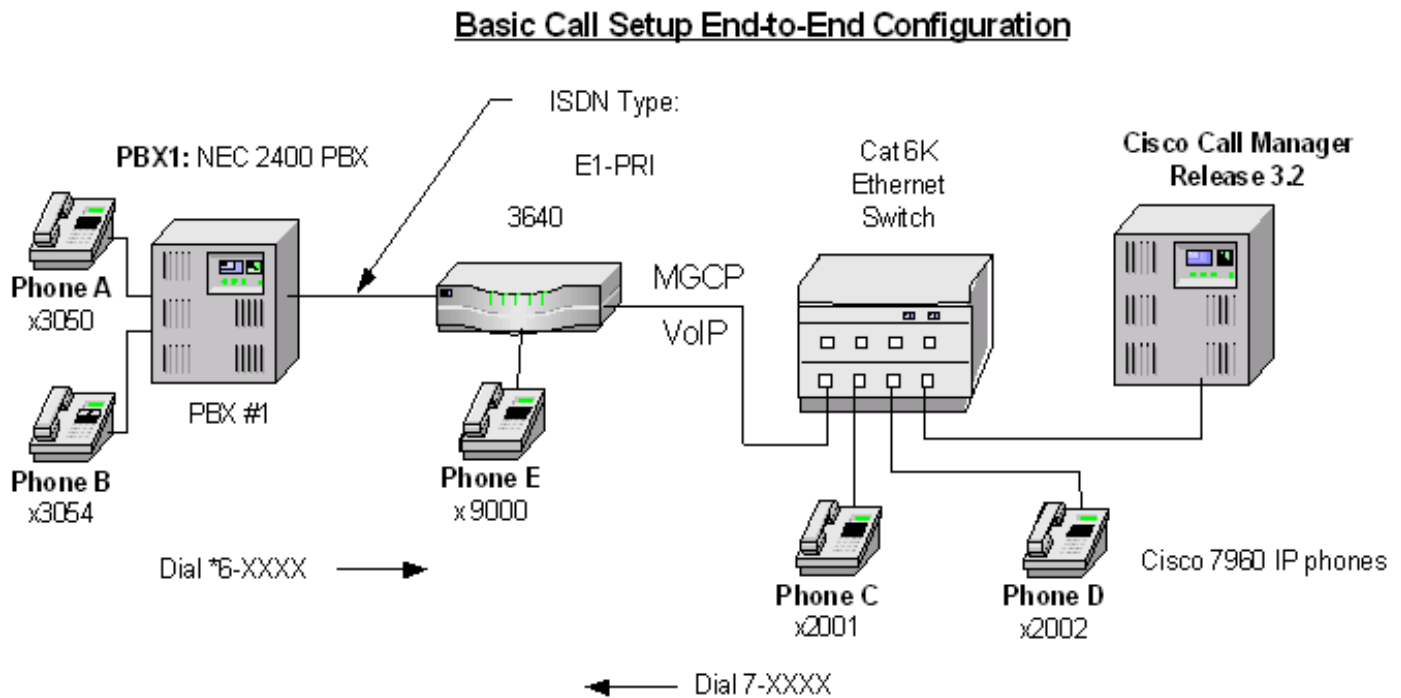
Key test environment parameters:

- Calling Name delivery and presentation features are not supported by the NEC 2400 ICS PBX.
- Calling Number is displayed when calling either direction as expected. The Connected Number is not returned by CallManager nor NEC. This was verified using an ISDN protocol analyzer.
- Connectivity is achieved by using the industry standard ETSI protocol. Though the NEC 2400 ICS can be configured as either NETWORK (Master) or USER (Slave) side, configuration as NETWORK is not recommended. The NEC TAC center will not resolve a case presented with NEC set as the NETWORK side.



## Network Diagram

Figure 1  
Network Test Topology



## Limitations

### Calling Name and Number Feature

1. Calling Name delivery and presentation features are not supported by the NEC 2400 ICS PBX.
2. Returning the Connected Number in the Connect message is not supported by CallManager nor NEC.

## System Components

### Hardware Requirements

#### Cisco Hardware:

- Cisco 3640 Gateway with 2MFT E1 Port
- Cisco Cat6K switch
- Cisco CallManager 3.2

#### NEC 2400 ICS PBX:

- Hardware: PA-30PRTB

### Software Requirements

- Cisco IOS software releases "c3640-js-mz.122-2.XN"

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- PBX Software:VERSION ISSUE DATE
  - J 05.80 00/06/20 Generic
  - F 01.00 96/04/26 Boot ROM
- Cisco CallManager 3.2

## Feature

Key features supported:

- Calling Number

Key features not supported:

- Connected Number
- Calling/Called Name

## Configuration

Configuration tasks consist of:

1. [NEC 2400 ICS Configuration](#)
2. [Route \(ARTD\) Configuration](#)
3. [Cisco ISDN PRI Configuration](#)
4. [Route Pattern Configuration](#)
5. [MGCP \(3640\) Gateway Configuration](#)

## NEC 2400 ICS Configuration

The NEC requires a substantial amount of programming and circuit card switch settings to properly install E1 PRI. It is beyond the scope of this document to provide the entire configuration, therefore the NEC information below is mostly helpful for NEC techs. If further assistance is required, the entire configuration of our lab PBX can be found in EDCS document # EDCS-207455. The EDCS document provides the programs required for E1 ISDN circuit setup, all the switch settings for all cards on our Lab NEC and fairly complete configuration listings (*List Ups*).

The switch settings and software references in the EDCS document assume a familiarity with the NEC 2400. It is highly recommended to have a NEC ISDN certified technician setup the NEC portion.

Configure in the following sequence:

1. Install circuit card.
2. Configure all software.

Table 1 Circuit Card Configuration (PA-30PRTB)

Switch	Position	Description	Setting
SW00		Make Busy	Down
SW01	0	All Channel Make Busy	Off
	1	External Loop Back	Off



Table 1 Circuit Card Configuration (PA-30PRTB)

Switch	Position	Description	Setting
	2	Internal Loop Back	Off
	3	Dch Handler Make Busy	Off
<b>SW02 (SENSE - Rotary)</b>		1 = AT&T 2 = Australia 3 = NTT Japan 4 = NEC/ETSI 5 = AT&T 6 = INS A = Q.SIG	4
<b>SW10</b>	Jumper	Off = Coax On = Twisted Pair	On
<b>SW11</b>	Jumper	Off = Coax On = Twisted Pair	On
<b>SW12</b>	Jumper	Off = Coax On = Twisted Pair	On
<b>SW13</b>	1	On = PAD ROM Special Version Off = PAD ROM Standard Version	Off
	2	On = ISDN BUS Not Used Off = ISDN BUS Used	On
	3	Not Used	Off
	4	Not Used	Off
<b>SW14</b>	1	On = CCITT Signaling Off = CEPT Signaling	On
	2	On = Alarm Release: 2sec (Aus) Off = Alarm Release 15 Sec.	On
	3	PAD	On
	4	PAD	On
	5	PAD	On
	6	PAD	On
	7	PAD	On
	8	Fixed Off	Off
<b>SW15</b>	1	Loopback Pattern Off = Loopback inhibited	Off
	2	Loopback Pattern Off = Loopback inhibited	Off



Table 1 Circuit Card Configuration (PA-30PRTB)

Switch	Position	Description	Setting
	3	Loopback Pattern Off = Loopback inhibited	Off
	4	Loopback Pattern Off = Loopback inhibited	Off
	5	TS16 Control: On = Data Through (CCIS/ ISDN) Off = Signaling	On
	6	On = No CRC4 Off = CRC4	Off
	7	Firmware (CCITT/China/ Thailand/Aux)	On
	8	Firmware (CCITT/China/ Thailand/Aux)	On
<b>SW16</b>	1	Fixed Off	Off
	2	Fixed Off	Off
	3	All "1" Supervision On = To be controlled Off = Not to be controlled	Off
	4	On = Dch User Side Off = Dch Network Side	On
	5	On = Dch NegativeLogic Off = Dch Positive Logic	Off
	6	On = Dch Packet Service On Off = Dch Packet Service Off	Off
	7	Fixed Off	Off
	8	Fixed Off	Off



### Route (ARTD) Configuration

Below are the Route settings found in ARTD. Route 12 is the B channel and Route 13 is the D channel. Please refer to EDCS document # EDCS-207455 for complete details for configuration.

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\* ROUTE CLASS DATA LIST \*

CDN FUNCTION	R O U T E N U M B E R				
	11	12	13	14	15
1 OSGS	7	0	0	0	0
2 ONSG	3	2	0	2	2
3 ISGS	7	0	0	0	0
4 INSG	3	2	0	2	2
5 TF	3	3	3	3	3
6 TCL	4	4	4	4	4
7 L/T	1	1	1	1	1
8 RLP	2	2	0	2	0
9 TQ	0	0	0	0	0
10 SMDR	0	1	1	1	1
11 TD	0	0	0	0	0
12 DR	0	0	0	0	0
13 AC	1	1	0	1	0
14 TNT	0	0	0	0	0
15 LSG	5	12	13	12	13
16 SMDR2	0	0	0	0	0
17 H/M	0	0	0	0	0
18 MC	0	0	0	0	0
19 ANI	0	1	1	1	0
20 D	0	0	0	0	0
21 MSB	0	0	0	0	0
22 MSW	0	0	0	0	0
23 TR	0	0	0	0	0
24 OC	0	0	0	0	0
25 R/L	0	0	0	0	0
26 RVSD	0	0	0	0	0
27 TL	0	0	0	0	0
28 ANS	0	1	1	1	1
29 TELP	0	0	0	0	0
30 PAD	0	4	7	4	7
31 OGRL	0	1	1	1	1
32 ICRL	0	1	1	1	1
33 HD	0	0	0	0	0
34 GUARD	0	1	1	1	1
35 WINK	0	0	0	0	0
36 VAD	0	0	0	0	0
37 CLD	0	0	0	0	0



38 FA 0 0 0 0 0

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\* ROUTE CLASS DATA LIST \*

CDN FUNCTION	R O U T E N U M B E R				
	11	12	13	14	15
39 BC	0	0	0	0	0
40 TCM	0	0	0	0	0
41 TDMQ	0	0	0	0	0
42 TRSC	0	0	0	0	0
43 BT	0	1	0	1	1
44 PRV	0	0	0	0	0
45 A/D	0	1	1	1	1
46 CW	0	0	0	0	0
47 TPQ	0	0	0	0	0
48 BL	0	0	0	0	0
49 TRKS	0	1	1	0	0
50 DPLY	0	1	1	1	1
51 ACD	0	0	0	0	0
52 2W/4W	1	0	0	0	0
53 FAAT	0	0	0	0	0
54 GW	0	0	0	0	0
55 TCMA	0	0	0	0	0
56 SMDR3	0	0	0	0	0
57 HDT	0	0	0	0	0
58 CD	0	0	0	0	0
59 CCH	0	0	0	0	0
60 TC/EC	0	0	0	0	0
61 IRE	0	0	0	0	0
62 SCR	0	0	0	0	0
63 LYER1	0	1	1	1	1
64 NET	0	1	0	0	0
65 INT	0	4	4	4	4
66 DC	0	4	4	4	4
67 HKS	0	0	0	0	0
68 SCF	0	0	0	0	0
69 SMDR4	0	0	0	0	0



## Cisco ISDN PRI Configuration

Cisco CallManager 3.2 Administration - Gateway Configuration - Microsoft Internet Explorer

Address: B-ABC2283D6185?Action=Update&Type=55&MGCP={664EEA32-8D58-4A50-99B7-98D6C028ADA6}

### Gateway Configuration

[Back to MGCP Configuration](#)  
[Back to Find/List Gateways](#)

Product : Cisco 364X  
Gateway : S1/DS1-0@MGCP\_3640  
Device Protocol: Digital Access PRI  
Registration: Registered with Cisco CallManager 10.1.1.2  
IP Address: 10.1.1.200

Status: Ready

End-Point Name*	<input type="text" value="S1/DS1-0@MGCP_3640"/>
Description	<input type="text" value="S1/DS1-0@MGCP_3640"/>
Device Pool*	<input type="text" value="Default"/>
Media Resource Group List	<input type="text" value="&lt; None &gt;"/>
Network Hold Audio Source	<input type="text" value="&lt; None &gt;"/>
User Hold Audio Source	<input type="text" value="&lt; None &gt;"/>
Calling Search Space	<input type="text" value="&lt; None &gt;"/>
Location	<input type="text" value="&lt; None &gt;"/>
Load Information	<input type="text" value=""/>
Channel Selection Order*	<input type="text" value="Bottom Up"/>
Protocol Side*	<input type="text" value="User"/>
Caller ID DN	<input type="text" value=""/>
Calling Party Selection*	<input type="text" value="Originator"/>
Channel IE Type*	<input type="text" value="Use Number when 1B"/>
MCDN Channel Number Extension Bit Set to Zero**	<input type="checkbox"/>
Interface Identifier Present**	<input type="checkbox"/>
Interface Identifier Value**	<input type="text" value="0"/>

Done Local intranet





Cisco CallManager 3.2 Administration - Gateway Configuration - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address [B-ABC2283D6105}6Action=Update&Type=55&MGCP={664EEA32-8D58-4450-99B7-90D6DC28AD46}](#) Go Links

Display IE Delivery	<input checked="" type="checkbox"/>
Redirecting Number IE Delivery - Outbound	<input checked="" type="checkbox"/>
Redirecting Number IE Delivery - Inbound	<input checked="" type="checkbox"/>
Delay for first restart (1/8 sec ticks)	<input type="text" value="32"/>
Delay between restarts (1/8 sec ticks)	<input type="text" value="4"/>
Num Digits*	<input type="text" value="23"/>
Sig Digits	<input checked="" type="checkbox"/>
Prefix DN	<input type="text"/>
Presentation Bit*	<input type="text" value="Allowed"/>
Called party IE number type unknown*	<input type="text" value="Cisco CallManager"/>
Calling party IE number type unknown*	<input type="text" value="Cisco CallManager"/>
Called Numbering Plan*	<input type="text" value="Cisco CallManager"/>
Calling Numbering Plan*	<input type="text" value="Cisco CallManager"/>
PRI Protocol Type*	<input type="text" value="PRI EURO"/>
Inhibit restarts at PRI initialization	<input checked="" type="checkbox"/>
Enable status poll	<input type="checkbox"/>
Number of digits to strip*	<input type="text" value="0"/>
Network Locale	<input type="text" value="&lt; None &gt;"/>
Setup non-ISDN Progress Indicator IE Enable****	<input type="checkbox"/>

**Product Specific Configuration** ⓘ

Line Coding*	<input type="text" value="HDB3"/>
Framing*	<input type="text" value="CRC4"/>
Clock*	<input type="text" value="External"/>

Done Local intranet



## Route Pattern Configuration

System Route Plan Service Feature Device User Application Help

**Cisco CallManager Administration**  
For Cisco IP Telephony Solutions

**Route Pattern Configuration**

[Add a New Route Pattern](#)  
[Back to Find/List Route Patterns](#)

**Route Pattern: 7.XXXX**  
Status: Ready  
Note: Any update to this route pattern automatically resets the associated gateway/route list

**Pattern Definition**

Route Pattern\*   
Partition   
Numbering Plan\*   
Route Filter   
Gateway/Route List\*  (Edit)  
Route Option  Route this pattern  Block this pattern  
 Provide Outside Dial Tone  Urgent Priority

**Calling Party Transformations**

Use Calling Party's External Phone Number Mask  
Calling Party Transform Mask   
Prefix Digits (Outgoing Calls)

**Called Party Transformations**

Discard Digits   
Called Party Transform Mask   
Prefix Digits (Outgoing Calls)

\* indicates required item.

Done Local intranet



## MGCP (3640) Gateway Configuration

Cisco CallManager 3.2 Administration - MGCP Configuration - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address [http://llngon/CCMAdmin/mgcpconfig.asp?MGCP=\(664EE432-8D58-4450-9987-98D60D28AD46\)](http://llngon/CCMAdmin/mgcpconfig.asp?MGCP=(664EE432-8D58-4450-9987-98D60D28AD46)) Go Links

### MGCP Configuration [Back to Find/List Gateways](#)

Product: Cisco 364X  
MGCP : MGCP\_3640

Status: Ready

MGCP Domain Name\*

Description

Cisco CallManager Group\*

Installed Voice Interface Cards		Endpoint Identifiers	
Module in Slot 0	< None >		
Module in Slot 1	NM-HDV		
	Sub-Unit 0	VVIC-2MFT-E1	(1/0)  (1/1)
Module in Slot 2	NM-2V		
	Sub-Unit 0	VIC-2FXS	(2/0/0)  (2/0/1)
	Sub-Unit 1	VIC-2FXO	(2/1/0)  (2/1/1)
Module in Slot 3	NM-HDV		
	Sub-Unit 0	VVIC-2MFT-T1	(3/0)  (3/1)

#### Product Specific Configuration

Global ISDN Switch Type

Switchback Timing\*

Switchback uptime-delay (min)

Switchback schedule (hh:mm)

\* indicates required item

Local intranet



## Appendix A

### CallManager Software Release



### NEC Software release:

```
DISS      02/05/10 16:06      CISCO TEST FACILITY
MM
VERSION   ISSUE      DATE
  J       05.80     00/06/20  Generic
MM
VERSION   ISSUE      DATE
  F_      01.00     96/04/26  Boot ROM

DISS      END    02/05/10 16:07
```



## CallManager Components Release

The screenshot shows the Cisco CallManager Administration web interface in Microsoft Internet Explorer. The browser address bar shows the URL: <http://Ningon/CCMAdmin/componentversions.asp?pkid={FDF4BD79-9364-494C-9E9E-C163B4335ED4}>. The page title is "Cisco CallManager Administration For Cisco IP Telephony Solutions". The main heading is "Cisco CallManager Component Versions" with a sub-link "Latest Installed Version Out Of Sync".

On the left, a "Servers" tree shows "10.1.1.2" selected. The main content area displays "Component Versions for 10.1.1.2:" with a "Page 1" dropdown. Below this is a table of components:

Component	Version	Installation ID
ace.dll	5.1.12.0	3.2(0.150)
aced.dll	5.1.12.0	3.2(0.150)
astisapi.dll	3.2.0.5	3.2(0.150)
aupair.exe	3.2.1.2	3.2(0.150)
aupairps.dll	3.2.1.85	3.2(0.150)
avvidcustomerdirectoryconfigurationplugin.exe	2.11.15.0	3.2(0.150)
bootp.exe	2.0.2.2	3.2(0.150)
ccm.exe	3.2.1.0	3.2(0.150)
ccmparfmon.dll	3.2.1.0	3.2(0.150)
ccntest.exe	3.2.1.0	3.2(0.150)
cdpintf.dll	3.2.0.0	3.2(0.150)
Cisco CallManager Administration	3.1(0.5)	CCM3.2(0.150)
Cisco CallManager Serviceability	3.1(0.2)	CCM3.2(0.150)
Cisco CallManager Trace Filter Extension	3.1(0.1)	CCM3.2(0.150)
ciscojtapclient.exe	2.1.13.0	3.2(0.150)
ciscomessaginginterface.exe	3.1.0.6	3.2(0.150)
ciscosysfilemgr.exe	1.0.0.1	3.2(0.150)
ciscotraceviewer.exe	1.0.0.1	3.2(0.150)



## Cisco 3640 Router Configuration

```
MGCP_3640#sh ver
Cisco Internetwork Operating System Software
IOS (tm) 3600 Software (C3640-JS-M), Experimental Version 12.2(20020124:013600)
[accheung-v122_xn_throttle.build 101]
Copyright (c) 1986-2002 by cisco Systems, Inc.
Compiled Wed 23-Jan-02 17:57 by accheung
Image text-base: 0x60008948, data-base: 0x61608000

ROM: System Bootstrap, Version 11.1(19)AA, EARLY DEPLOYMENT RELEASE SOFTWARE (fc1)

MGCP_3640 uptime is 1 hour, 40 minutes
System returned to ROM by power-on
System image file is "flash:c3640-js-mz"

cisco 3640 (R4700) processor (revision 0x00) with 58368K/7168K bytes of memory.
Processor board ID 10620494
R4700 CPU at 100Mhz, Implementation 33, Rev 1.0
Channelized E1, Version 1.0.
Bridging software.
X.25 software, Version 3.0.0.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
TN3270 Emulation software.
Primary Rate ISDN software, Version 1.1.
2 Ethernet/IEEE 802.3 interface(s)
55 Serial network interface(s)
2 Channelized E1/PRI port(s)
2 Channelized T1/PRI port(s)
2 Voice FXO interface(s)
2 Voice FXS interface(s)
DRAM configuration is 64 bits wide with parity disabled.
125K bytes of non-volatile configuration memory.
16384K bytes of processor board System flash (Read/Write)
16384K bytes of processor board PCMCIA Slot0 flash (Read/Write)

Configuration register is 0x2102
```

```
MGCP_3640#sh diag
Slot 0:
Combo 2E, 2W Port adapter, 4 ports
Port adapter is analyzed
Port adapter insertion time unknown
EEPROM contents at hardware discovery:
Hardware revision 1.2          Board revision B0
Serial number      7687836    Part number      800-01171-04
Test history      0x0        RMA number      00-00-00
EEPROM format version 1
EEPROM contents (hex):
  0x20: 01 1E 01 02 00 75 4E 9C 50 04 93 04 00 00 00 00
  0x30: 58 00 00 00 98 02 28 17 FF FF FF FF FF FF FF FF

Slot 1:
```



High Density Voice Port adapter  
Port adapter is analyzed  
Port adapter insertion time unknown  
EEPROM contents at hardware discovery:  
Hardware Revision : 1.1  
Top Assy. Part Number : 800-03567-01  
Board Revision : F1  
Deviation Number : 0-0  
Fab Version : 02  
PCB Serial Number : JAB05080M1S  
RMA Test History : 00  
RMA Number : 0-0-0-0  
RMA History : 00

EEPROM format version 4  
EEPROM contents (hex):  
0x00: 04 FF 40 00 CC 41 01 01 C0 46 03 20 00 0D EF 01  
0x10: 42 46 31 80 00 00 00 02 02 C1 8B 4A 41 42 30  
0x20: 35 30 38 30 4D 31 53 03 00 81 00 00 00 04 00  
0x30: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF  
0x40: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF  
0x50: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF  
0x60: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF  
0x70: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

WIC Slot 0:  
E1 (2 Port) Multi-Flex Trunk WAN Daughter Card  
Hardware revision 1.0 Board revision B0  
Serial number 18779824 Part number 800-04479-01  
Test history 0x0 RMA number 00-00-00  
Connector type PCI  
EEPROM format version 1  
EEPROM contents (hex):  
0x20: 01 23 01 00 01 1E 8E B0 50 11 7F 01 00 00 00 00  
0x30: 58 00 00 00 00 02 25 00 FF FF FF FF FF FF FF FF

HDV firmware: Compiled Fri 23-Mar-01 00:20 by miriyala  
HDV memory size 524280 heap free 175065

Slot 2:  
4 PORT Voice PM for MARS Port adapter  
Port adapter is analyzed  
Port adapter insertion time unknown  
EEPROM contents at hardware discovery:  
Hardware revision 1.1 Board revision C0  
Serial number 10689987 Part number 800-02491-02  
Test history 0x0 RMA number 00-00-00  
EEPROM format version 1  
EEPROM contents (hex):  
0x20: 01 65 01 01 00 A3 1D C3 50 09 BB 02 00 00 00 00  
0x30: 60 00 00 00 98 11 22 17 FF FF FF FF FF FF FF FF

WIC Slot 0:  
FXS Voice daughter card (2 port)  
Hardware revision 1.1 Board revision C0  
Serial number 11291019 Part number 800-02493-01  
Test history 0x0 RMA number 00-00-00  
Connector type Wan Module



```
EEPROM format version 1
EEPROM contents (hex):
  0x20: 01 0E 01 01 00 AC 49 8B 50 09 BD 01 00 00 00 00
  0x30: 60 00 00 00 99 01 05 01 FF FF FF FF FF FF FF FF
```

```
WIC Slot 1:
FXO Voice daughter card (2 port)
Hardware revision 1.1      Board revision C0
Serial number      8421533  Part number      800-02495-01
Test history       0x0      RMA number       00-00-00
Connector type     Wan Module
EEPROM format version 1
EEPROM contents (hex):
  0x20: 01 0D 01 01 00 80 80 9D 50 09 BF 01 00 00 00 00
  0x30: 60 00 00 00 98 06 02 01 FF FF FF FF FF FF FF FF
```

```
Slot 3:
High Density Voice Port adapter
Port adapter is analyzed
Port adapter insertion time unknown
EEPROM contents at hardware discovery:
  Hardware Revision      : 1.0
  Top Assy. Part Number  : 800-03567-01
  Board Revision        : A0
  Deviation Number      : 0-0
  Fab Version           : 02
  PCB Serial Number     : JAB03350B9K
  RMA Test History      : 00
  RMA Number            : 0-0-0-0
  RMA History           : 00
EEPROM format version 4
EEPROM contents (hex):
  0x00: 04 FF 40 00 CC 41 01 00 C0 46 03 20 00 0D EF 01
  0x10: 42 41 30 80 00 00 00 02 02 C1 8B 4A 41 42 30
  0x20: 33 33 35 30 42 39 4B 03 00 81 00 00 00 04 00
  0x30: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
  0x40: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
  0x50: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
  0x60: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
  0x70: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
```

```
WIC Slot 0:
T1 (2 Port) Multi-Flex Trunk (Drop&Insert) WAN Daughter Card
Hardware revision 1.0      Board revision A0
  Serial number      19621702  Part number      800-04614-02
Test history       0x0      RMA number       00-00-00
Connector type     PCI
EEPROM format version 1
EEPROM contents (hex):
  0x20: 01 24 01 00 01 2B 67 46 50 12 06 02 00 00 00 00
  0x30: 50 00 00 00 00 05 20 00 FF FF FF FF FF FF FF FF
```

```
HDV firmware: Compiled Fri 23-Mar-01 00:20 by miriyala
HDV memory size 524280 heap free 175065
```

```
MGCP_3640#sh controller e1
E1 1/0 is up.
```





```
Applique type is Channelized E1 - balanced
No alarms detected.
alarm-trigger is not set
Version info Firmware: 20010315, FPGA: 15
Framing is CRC4, Line Code is HDB3, Clock Source is Line.
Data in current interval (11 seconds elapsed):
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
E1 1/1 is down.
Applique type is Channelized E1 - balanced
Far End Block Errors Detected
Receiver has loss of signal.
alarm-trigger is not set
Version info Firmware: 20010315, FPGA: 15
Framing is CRC4, Line Code is HDB3, Clock Source is Line.
Data in current interval (12 seconds elapsed):
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 12 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 12 Unavail Secs
```

```
MGCP_3640# sh conf
Using 2266 out of 129016 bytes
!
version 12.2
no parser cache
no service single-slot-reload-enable
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
no service dhcp
!
hostname MGCP_3640
!
logging rate-limit console 10 except errors
!
!
!
voice-card 1
!
voice-card 3
!
ip subnet-zero
!
!
!
no ip dhcp-client network-discovery
mgcp
mgcp call-agent 10.1.1.2 2427 service-type mgcp version 0.1
mgcp dtmf-relay voip codec all mode out-of-band
mgcp rtp unreachable timeout 1000 action notify
mgcp modem passthrough voip mode cisco
mgcp sdp simple
mgcp package-capability rtp-package
mgcp package-capability sst-package
no mgcp timer receive-rtcp
```



```
no mgcp explicit hookstate
isdn switch-type primary-ni
call rsvp-sync
!
!
!
!
!
ccm-manager mgcp
ccm-manager music-on-hold
ccm-manager config server 10.1.1.2
ccm-manager config
!
!
controller E1 1/0
  pri-group timeslots 1-31 service mgcp
!
controller E1 1/1
!
controller T1 3/0
  framing esf
  linecode b8zs
  pri-group timeslots 1-24 service mgcp
!
controller T1 3/1
  framing sf
  linecode ami
!
!
!
interface Ethernet0/0
  ip address 10.1.1.200 255.255.255.0
  no ip mroute-cache
  half-duplex
!
interface Ethernet0/1
  ip address 171.69.231.23 255.255.255.0
  no ip mroute-cache
  half-duplex
!
interface Serial1/0:15
  no ip address
  no logging event link-status
  isdn switch-type primary-net5
  isdn incoming-voice voice
  isdn T310 4000
  isdn bind-13 ccm-manager
  no cdp enable
!
interface Serial3/0:23
  no ip address
  no logging event link-status
  isdn switch-type primary-ni
  isdn protocol-emulate network
  isdn incoming-voice voice
  isdn T306 30000
  isdn T310 40000
```



```
isdn bind-13 ccm-manager
no cdp enable
!
ip classless
no ip http server
!
!
!
snmp-server manager
!
voice-port 1/0:15
!
voice-port 2/0/0
!
voice-port 2/0/1
!
voice-port 2/1/0
!
voice-port 2/1/1
!
voice-port 3/0:23
!
dial-peer cor custom
!
!
!
dial-peer voice 1 pots
  application mgcp
!
dial-peer voice 3 pots
  application mgcpapp
  port 2/0/1
!
dial-peer voice 2 pots
  application mgcpapp
  port 2/0/0
!
dial-peer voice 999200 pots
  application mgcpapp
  port 2/0/0
!
dial-peer voice 9991015 pots
  application mgcpapp
  port 1/0:15
!
dial-peer voice 9993023 pots
  application mgcpapp
  port 3/0:23
!
!
line con 0
line aux 0
line vty 0 4
  login
!
!
```



```
end

MGCP_3640#sh run
Building configuration...

Current configuration : 2266 bytes
!
version 12.2
no parser cache
no service single-slot-reload-enable
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
no service dhcp
!
hostname MGCP_3640
!
logging rate-limit console 10 except errors
!
!
!
voice-card 1
!
voice-card 3
!
ip subnet-zero
!
!
!
no ip dhcp-client network-discovery
mgcp
mgcp call-agent 10.1.1.2 2427 service-type mgcp version 0.1
mgcp dtmf-relay voip codec all mode out-of-band
mgcp rtp unreachable timeout 1000 action notify
mgcp modem passthrough voip mode cisco
mgcp sdp simple
mgcp package-capability rtp-package
mgcp package-capability sst-package
no mgcp timer receive-rtcp
no mgcp explicit hookstate
isdn switch-type primary-ni
call rsvp-sync
!
!
!
!
!
ccm-manager mgcp
ccm-manager music-on-hold
ccm-manager config server 10.1.1.2
ccm-manager config
!
!
controller E1 1/0
  pri-group timeslots 1-31 service mgcp
!
controller E1 1/1
```



```
!  
controller T1 3/0  
  framing esf  
  linecode b8zs  
  pri-group timeslots 1-24 service mgcp  
!  
controller T1 3/1  
  framing sf  
  linecode ami  
!  
!  
!  
interface Ethernet0/0  
  ip address 10.1.1.200 255.255.255.0  
  no ip mroute-cache  
  half-duplex  
!  
interface Ethernet0/1  
  ip address 171.69.231.23 255.255.255.0  
  no ip mroute-cache  
  half-duplex  
!  
interface Serial1/0:15  
  no ip address  
  no logging event link-status  
  isdn switch-type primary-net5  
  isdn incoming-voice voice  
  isdn T310 4000  
  isdn bind-13 ccm-manager  
  no cdp enable  
!  
interface Serial3/0:23  
  no ip address  
  no logging event link-status  
  isdn switch-type primary-ni  
  isdn protocol-emulate network  
  isdn incoming-voice voice  
  isdn T306 30000  
  isdn T310 40000  
  isdn bind-13 ccm-manager  
  no cdp enable  
!  
ip classless  
no ip http server  
!  
!  
!  
!  
snmp-server manager  
!  
voice-port 1/0:15  
!  
voice-port 2/0/0  
!  
voice-port 2/0/1  
!  
voice-port 2/1/0
```

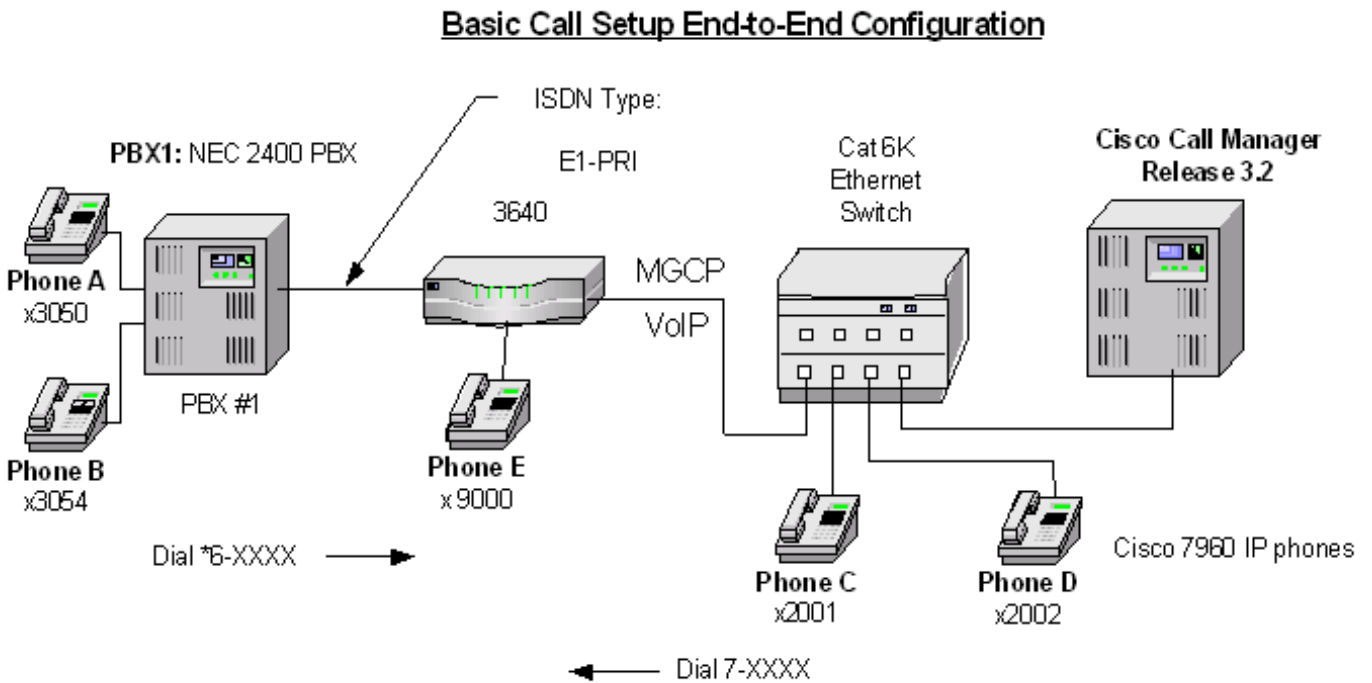


```
!  
voice-port 2/1/1  
!  
voice-port 3/0:23  
!  
dial-peer cor custom  
!  
!  
!  
dial-peer voice 1 pots  
  application mgcp  
!  
dial-peer voice 3 pots  
  application mgcpapp  
  port 2/0/1  
!  
dial-peer voice 2 pots  
  application mgcpapp  
  port 2/0/0  
!  
dial-peer voice 999200 pots  
  application mgcpapp  
  port 2/0/0  
!  
dial-peer voice 9991015 pots  
  application mgcpapp  
  port 1/0:15  
!  
  dial-peer voice 9993023 pots  
  application mgcpapp  
  port 3/0:23  
!  
!  
line con 0  
line aux 0  
line vty 0 4  
  login  
!  
!  
end  
  
MGCP_3640#
```



## Test Configuration

Figure 2  
Test Topology



As shown in the diagram above, a NEC 2400 ICS PBX was connected via an ISDN E1 PRI link to a Cisco 3640 Gateway, which in turn, was connected to an Ethernet switch. The interoperability testing involved Layers 1, 2 and 3 on the ISDN PRI link between a Cisco 3640 and the PBX.

### Layers 2 & 3 (Q.921 and Q.931)

Layer 2 and 3 packet exchanges were monitored using an Acacia Clarinet protocol analyzer, bridged across the PRI link in high impedance mode.

Layer 2 Q.921 packets were monitored to ensure that each PBX/3640 software configuration properly exchanged SABME/UA packets to initialize the ISDN link, and then RR packets were exchanged every 30 seconds.

Layer 3 Q.931 packets were monitored to ensure that the appropriate call setup/teardown packets were exchanged for each configuration, and that the SETUP packets contained the mandatory Information Elements with the necessary details, as well as optional IEs such as Calling Name and Number.

Telephone calls were made end-to-end in both directions through the Cisco 3640 Gateway, and a check was made to ensure that there was an audio path in both directions for each call.

### User/Network Settings

The Cisco 3640 Gateway with ISDN protocol type setting of PRIMARY-NET5 supports both protocol sides by selecting "Network/User" in the protocol side field when configuring the Gateway via Callmanager.



Though the NEC 2400 ICS can be configured as either NETWORK (Master) or USER (Slave) side, configuration as NETWORK is not recommended. The NEC TAC center will not resolve a case presented with NEC set as the NETWORK side.

### Test Results

Testing was performed by Test Engineer(s): Samir Batio and Bob Graves, March 11, 2002

### Test Setup

Test configuration:

- PBX1 configured as ETSI, emulates Network
- Cisco 3640 Gateway configured as primary-net5, emulates User

Note: Configurations show PBX1 as Network with Cisco 3640 as User. Tests were actually performed both ways, but only the PBX-User results are provided because NEC does not officially support Network configuration.

Table 2 Test Setup Switch and Gateway Settings

NEC 2400 ICS Switch-type// Protocol -side Setting	Cisco 3640 ISDN Protocol-type/ Protocol-side Setting
ETSI/User	isdn switch-type primary-net5 isdn protocol-emulate Network

Table 3 Basic Calls: (Enbloc Sending)

Calls Made	Call Comp?	" Calling Number" Passed to Final Destination?	" Calling Name" Passed to Final Destination?	" Called Number" Passed to Orig. Side?	" Called Name" Passed to Orig. Side?	Notes
Phone A to Phone C	Yes	Yes	No	No	No	
Phone C to Phone A	Yes	Yes	No	Yes	No	





Table 4 Basic Calls: (FXS Port)

Calls Made	Call Comp?	" Number" Displayed on the digital phone?	" Name" Displayed on the digital phone?	Notes
Phone E to Phone A	Yes	Yes	No	
Phone A to Phone E	Yes	No	No	
Phone E to Phone C	Yes	Yes	Yes	
Phone C to Phone E	Yes	Yes	Yes	

Table 5 Call Transfers: (Supervised Local Transfers)

Calls Made	Call Comp?	Orig. " Calling Number" displayed on Final Dest. phone?	Orig. " Calling Name" displayed on Final Dest. phone?	" Called Number" display on Orig. phone updated after transfer?	" Called Name" display on Orig. phone updated after transfer?	Notes
Phone C to Phone A Xfr to Phone B	Yes	Yes	No	No	No	
Phone A to Phone C Xfr to Phone D	Yes	Yes	No	No	No	



Table 6 Call Conferencing (Local)

Calls Made	Call Comp?	" Calling Number" passed to remaining conferee when the conferencing phone drops out?	" Calling Name" passed to remaining conferee when the conferencing phone drops out?	" Connected Number" updated on Orig. Caller phone display when a conferee drops out?	" Connected Name" updated on Orig. Caller phone display when a conferee drops out?	Notes
Phone C to Phone A, Phone A conf Phone B	Yes	(A Drops out) Yes	(A Drops out) No	(A Drops out) No	(A Drops out) No	
Phone C to Phone A, Phone C conf Phone D	Yes	(C Drops out) No	(C Drops out) No	(D Drops out) No	(D Drops out) No	
Phone A to Phone C, Phone C conf Phone D	Yes	(C Drops out) No	(C Drops out) No	(C Drops out) No	(C Drops out) No	
Phone A to Phone C, Phone A conf Phone B	Yes	(A Drops out) No	(A Drops out) No	(B Drops out) No	(B Drops out) No	

Table 7 Call Forward (Local)

Calls Made	Call Comp?	Original "Calling Number" passed to Final Dest.?	Original "Calling Name" passed to Final Dest.?	Forwarding "Called Number" passed to Final Dest.?	Forwarding "Called Name" passed to Final Dest.?	Final dest. "Connected Number" updated at orig. side?	Final dest. "Connected Name" updated at orig. side?	Notes
Phone C to Phone A fwd to Phone B	Yes	Yes	No	Yes	No	No	No	
Phone A to Phone C fwd to Phone D	Yes	Yes	No	Yes	No	No	No	



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