

NEC 2400 ICS PBX with CallManager using 3640-T1 MGCP Gateway

This application note illustrates connectivity for NEC 2400 ICS PBX with CallManager using 3640-T1 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 Cisco 3640-T1 link as MGCP Gateway.

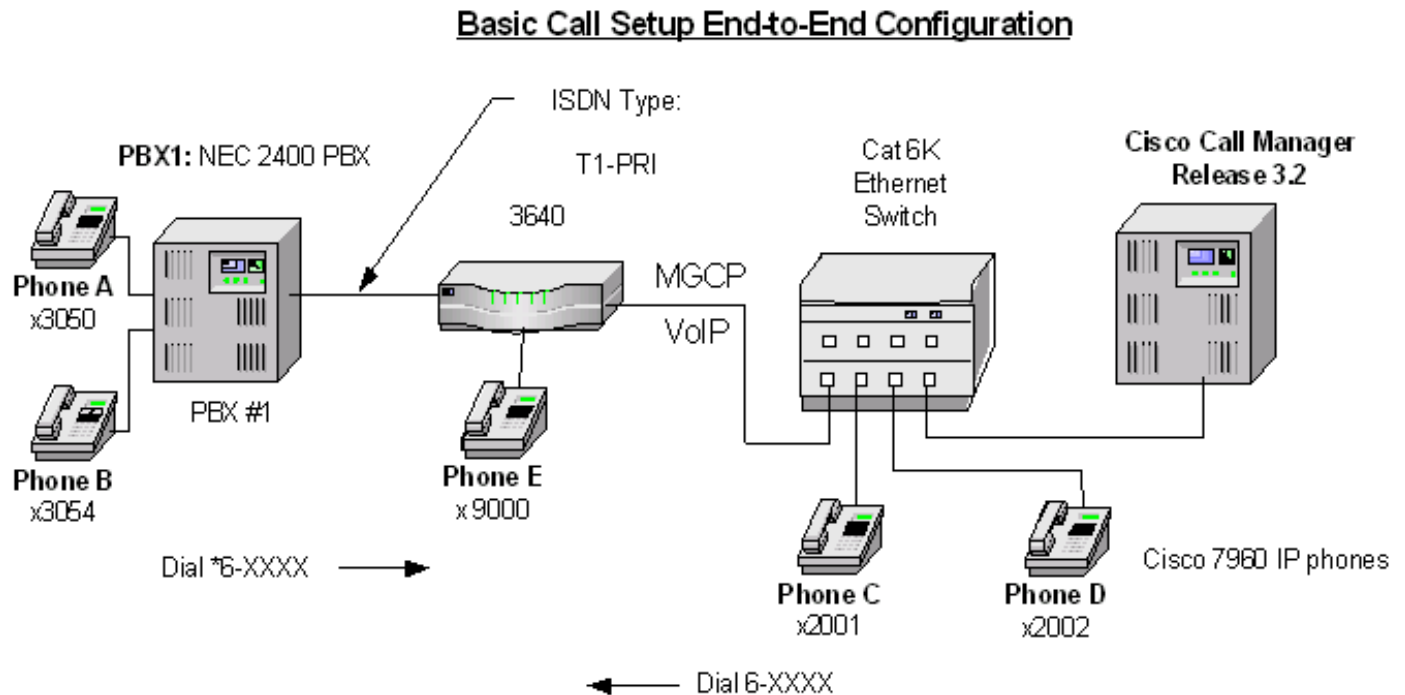
Key test environment parameters:

- Calling Name delivery and presentation features are not supported by the NEC 2400 ICS PBX. Calling Name is supported on the NEC IMX platform using software Release 9 or higher with the NI2 protocol.
- 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 NI2 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 T1 Port
- Cisco Cat6K switch
- Cisco CallManager 3.2

NEC 2400 ICS PBX:

- Hardware: PA-24PRTB



Software Requirements

- Cisco IOS software releases “c3640-js-mz.122-2.XN”
- 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” on page 3](#)
2. [“Route \(ARTD\) Configuration” on page 6](#)
3. [“MGCP \(Cisco 3640\) Gateway Configuration” on page 8](#)
4. [“ISDN PRI Configuration” on page 10](#)
5. [“Route Pattern Configuration” on page 14](#)

NEC 2400 ICS Configuration

The NEC requires a substantial amount of programming and circuit card switch settings to properly install T1 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 T1 ISDN circuit setup, all the switch settings for all cards on our Lab NEC and fairly complete configuration listings (*List Ups*).

Note: 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-24PRTB)

Switch	Position	Description	Settings
MB		Make Busy	Down
LB	0	Internal Loop Back	Off
	1	External Loop Back	Off
	2	Payload Loop Back	Off
	3	Dch Control Block MBR	Off
SENSE (Rotary)		Protocol 0 = CCIS (NEC proprietary) 1 = NI2 3 = INS1500 5 = AT&T (#4 & #5 ESS) 7 = Nortel DMS100/ DMS250 A = Q.SIG	1
SW0	1	ON = Impedance 100 ohms OFF = Impedance 110 ohms	ON
	2	XMT XFMR Ground	OFF
	3	RCV XFMR Ground	OFF
	4	Fixed On	ON
SW1	1	Digital PAD ROM Count Off = 2 ROM chips on board On = 3 ROM chips on board	OFF
	2	Fixed On	ON
	3	ON = 24B OFF = 23B + D	OFF
	4	D-Channel Packet Service	OFF
SW2	1	Equalizer	ON
	2	Equalizer	ON
	3	Equalizer	ON
	4	12/24 Multiframe	ON
	5	AMI/B8ZS	ON
	6	4K Data Link Control	ON



Table 1 Circuit Card Configuration (PA-24PRTB)

Switch	Position	Description	Settings
	7	4K Data Link Control	OFF
	8	Fixed ON	ON
SW3	1	RMT Alarm	OFF
	2	RMT Alarm	OFF
	3	Fixed Off	OFF
	4	All "1" Supervision	OFF
	5	Fixed On	ON
	6	Fixed On	ON
	7	Fixed On	ON
	8	Fixed On	ON
SW4	1	Fixed Off (Protocol Selection)	OFF
	2	ON = User OFF = Network	ON/OFF
	3	Dch Signal Logic	OFF
	4	Dch Speed Selection	ON
	5	Dch Speed Selection	ON
	6	Fixed On	ON
	7	Fixed On	ON
	8	Fixed On	ON
SW5	1	PAD	ON
	2	PAD	ON
	3	PAD	ON
	4	PAD	ON
	5	PAD	ON
	6	PAD	ON
	7	PAD	ON
	8	Idle Code	OFF



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				
	6	7	8	9	10
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	1	0	0
44 PRV	0	0	0	0	0
45 A/D	1	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	1	0	0	0	0
50 DPLY	1	1	0	1	0
51 ACD	0	0	0	0	0
52 2W/4W	0	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	0	0	0	0
64 NET	0	0	0	0	0
65 INT	10	1	1	1	1
66 DC	4	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



MGCP (Cisco 3640) Gateway Configuration

Cisco CallManager 3.2 Administration - MGCP Configuration - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Print

Address <http://kingon/CCMAdmin/mgcpconfig.asp?MGCP={664EEA32-8D58-4A50-99B7-98D60D28ADA6}> Go Links

MGCP Configuration

[Back to Find/List Gateways](#)

Product: Cisco 364X
MGCP : MGCP_3640

Status: Ready

Update Delete Reset Gateway Cancel Changes

MGCP Domain Name*

Description

Cisco CallManager Group*

Installed Voice Interface Cards		Endpoint Identifiers	
Module in Slot 0	< None >		
Module in Slot 1	< None >		
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)

Done Local Intranet



Cisco CallManager 3.2 Administration - MGCP Configuration - Microsoft Internet Explorer

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Address <http://kingon/CCMAdmin/mgcpconfig.asp?MGCP={664EEA32-8D58-4A50-9987-98D60C28ADA6}> Go Links

Module in Slot 1	< None >			
Module in Slot 2	NM-2V			
Sub-Unit 0	VIC-2FXS	(2/0/0) ports	(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	NI2
Switchback Timing*	Graceful
Switchback uptime-delay (min)	10
Switchback schedule (hh:mm)	12:00

* indicates required item

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Local intranet



ISDN PRI Configuration

Cisco CallManager 3.2 Administration - Gateway Configuration - Microsoft Internet Explorer

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Address [ASB36-464A-4F1C-8108-B30978BF872E}&Action=Update&Type=52&MGCP={664EEA32-8D58-4A50-9987-98D60D28ADA6}](#) Go Links

Gateway Configuration

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Product : Cisco 364X
Gateway : S3/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="S3/DS1-0@MGCP_3640"/>
Description	<input type="text" value="S3/DS1-0@MGCP_3640"/>
Device Pool*	<input type="text" value="Default"/>
Media Resource Group List	<input type="text" value="< None >"/>
Network Hold Audio Source	<input type="text" value="< None >"/>
User Hold Audio Source	<input type="text" value="< None >"/>
Calling Search Space	<input type="text" value="< None >"/>
Location	<input type="text" value="< None >"/>

Local intranet



Cisco CallManager 3.2 Administration - Gateway Configuration - Microsoft Internet Explorer

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Address [ASB06-464A-4F1C-8108-B30978BF872E}&Action=Update&Type=52&MGCP={664EEA32-8D58-4A50-9987-98D60D28ADA6}](#) Go Links

Load Information

Channel Selection Order*	Top Down
Protocol Side*	User
Caller ID DN	
Calling Party Selection*	Originator
Channel IE Type*	Use Number when 1B
MCDN Channel Number Extension Bit Set to Zero**	<input type="checkbox"/>
Interface Identifier Present**	<input type="checkbox"/>
Interface Identifier Value**	0
Display IE Delivery	<input checked="" type="checkbox"/>
Redirecting Number IE Delivery - Outbound	<input checked="" type="checkbox"/>
Redirecting Number IE Delivery - Inbound	<input type="checkbox"/>
Delay for first restart (1/8 sec ticks)	32
Delay between restarts (1/8 sec ticks)	4
Num Digits*	23

Local Intranet



Cisco CallManager 3.2 Administration - Gateway Configuration - Microsoft Internet Explorer

File Edit View Favorites Tools Help

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Address [A5B36-464A-4F1C-8108-B30978BF72E}&Action=Update&Type=52&MGCP={664EEA32-6D58-4A50-9987-98D60D28ADA6}](#) Go Links

Sig Digits	<input checked="" type="checkbox"/>
Prefix DN	<input type="text"/>
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
Send Extra Leading Character In DisplayIE***	<input checked="" type="checkbox"/>
Inhibit restarts at PRI initialization	<input checked="" type="checkbox"/>
Enable status poll	<input type="checkbox"/>
Number of digits to strip*	0
Network Locale	< None >
Setup non-ISDN Progress Indicator IE Enable****	<input type="checkbox"/>

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Cisco CallManager 3.2 Administration - Gateway Configuration - Microsoft Internet Explorer

File Edit View Favorites Tools Help

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Address [A5B36-464A-4F1C-810B-B309798FB72E}&Action=Update&Type=52&MGCP={664EEA32-8D58-4A50-9987-98D60D28ADA6}](#) Go Links

Enable status poll

Number of digits to strip*

Network Locale

Setup non-ISDN Progress Indicator IE Enable****

Product Specific Configuration

Line Coding*

Framing*

Clock*

* indicates required item
** applicable to DMS-100 protocol only
*** applicable to DMS-100 protocol and DMS-250 protocol only
**** may be required to force ringback from some PBXs

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

Local intranet



Route Pattern Configuration

The screenshot shows the Cisco CallManager Administration interface for configuring a route pattern. The browser window title is "Cisco CallManager 3.2 Administration - Route Pattern Configuration - Microsoft Internet Explorer". The address bar shows the URL: `http://kingon/CCMAdmin/routepatternconfig.asp?pkid={A4F20148-A516-482E-82A5-26FFF0723031}`. The page has a navigation menu with items: System, Route Plan, Service, Feature, Device, User, Application, Help. The main header includes the Cisco CallManager Administration logo and the Cisco Systems logo. The title of the page is "Route Pattern Configuration". 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 Plk
Route Filter	< None >
Gateway/Route List*	S3/DS1-0@MGCP_3640 (Edit)
Route Option	<input checked="" type="radio"/> Route this pattern <input type="radio"/> Block this pattern



Cisco CallManager 3.2 Administration - Route Pattern Configuration - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History

Address <http://kingon/CCMAdmin/routepatternconfig.asp?pkid={A4F20148-A516-482E-82A5-26FFF0723031}> Go Links

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



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 title is "Cisco CallManager 3.2 Administration - Cisco CallManager Component Versions - Microsoft Internet Explorer". The address bar shows the URL: <http://lilingon/CCMAdmin/componentversions.asp?pkid={FEF48D79-9364-494C-9E9E-C16304335EB4}>. The page title is "Cisco CallManager Administration For Cisco IP Telephony Solutions". The main heading is "Cisco CallManager Component Versions" with a sub-heading "Latest Installed Version Out Of Sync". The page displays a table of component versions for server 10.1.1.2.

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)
aupairs.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)
ccmperfmn.dll	3.2.1.0	3.2(0.150)
ctest.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)
ciscojtapiclient.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 t1
T1 3/0 is up.
```



```
Applique type is Channelized T1
Cablelength is long gain36 Odb
No alarms detected.
alarm-trigger is not set
Version info Firmware: 20010315, FPGA: 15
Framing is ESF, Line Code is B8ZS, Clock Source is Line.
Data in current interval (5 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
```

```
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
!
!
```



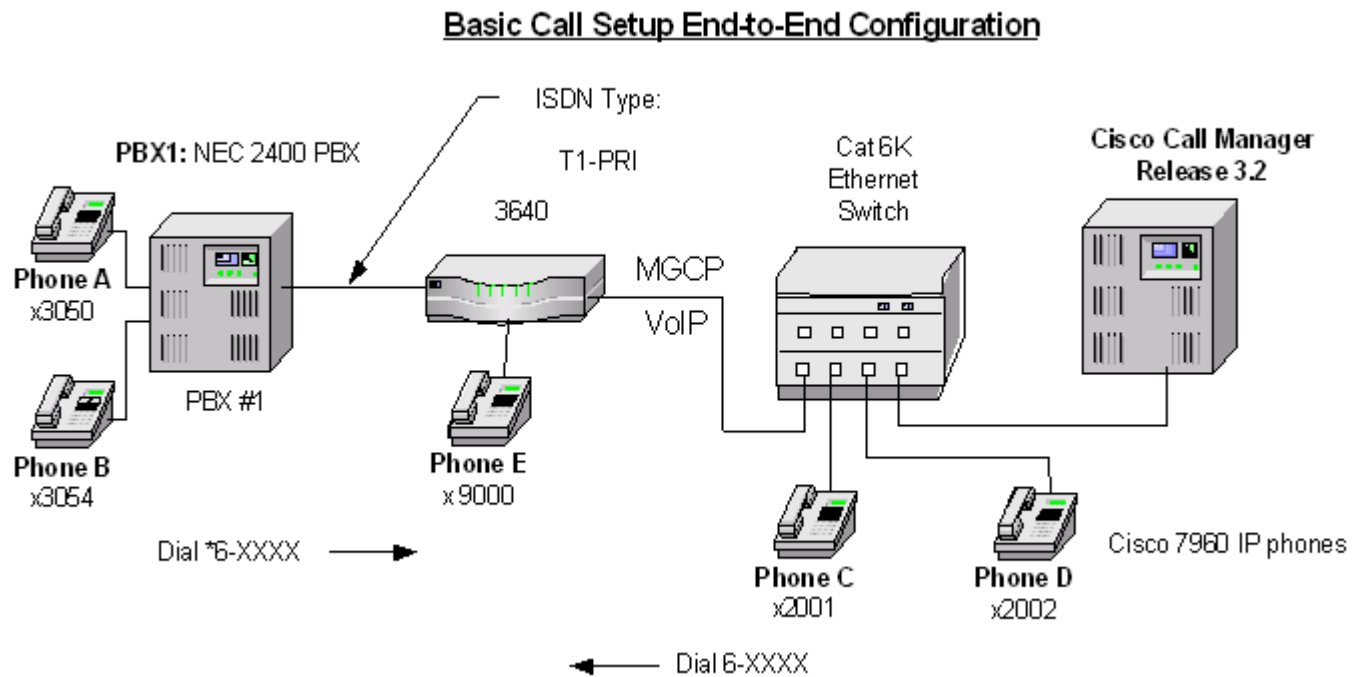
```
!  
dial-peer voice 1 pots  
  application mgcp  
!  
dial-peer voice 3 pots  
  application mgcpapp  
  port 2/0/1  
!  
dial-peer voice 2 pots  
  application mgcpapp  
  port 2/0/0  
!  
dial-peer voice 999200 pots  
  application mgcpapp  
  port 2/0/0  
!  
dial-peer voice 9991015 pots  
  application 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 T1 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 PRI-NI2 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.

Appendix B

Test Results

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

Test Setup

Test configuration:

- PBX1 Configured as N12, emulates User
- Cisco 3640 Gateway configured as PRI-NI2, emulates Network

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
NI2/User	isdn switch-type pri-ni2 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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