

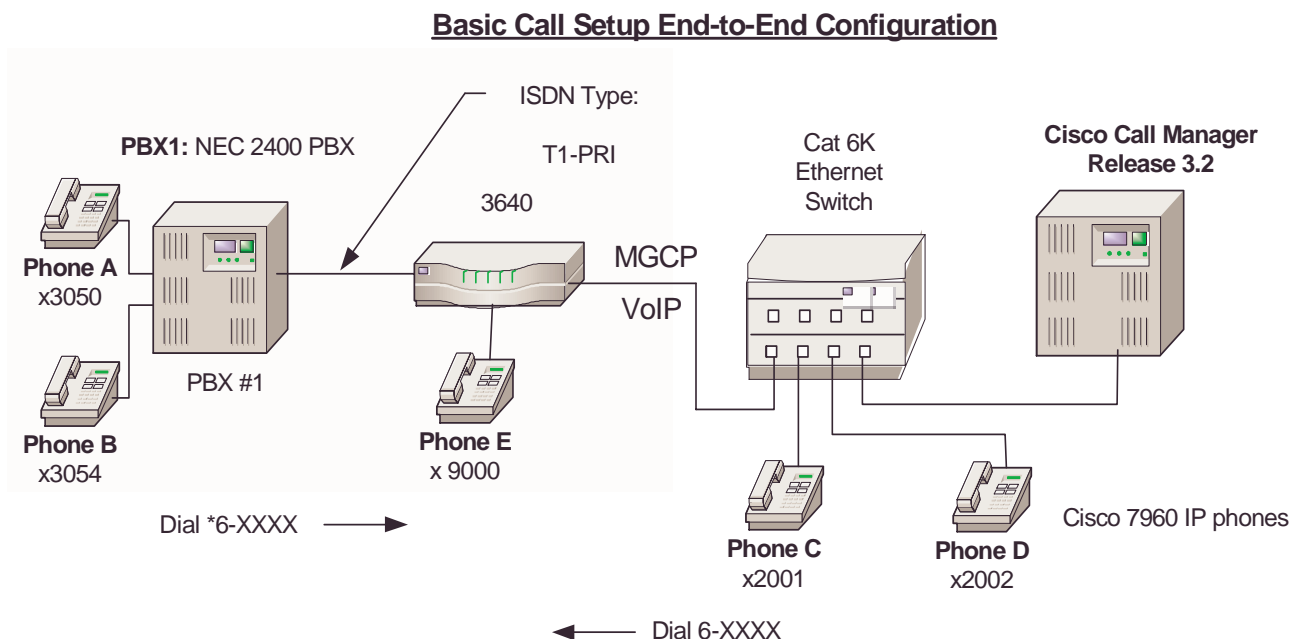
Cisco 3640 Router - PBX Interoperability: NEC 2400 ICS PBX with CallManager using T1 to an MGCP Gateway

Introduction

- This note describes the interoperability of the NEC 2400 ICS PBX, Cisco CallManager, and a Cisco 3640 router. Connectivity is achieved by using the industry standard NI2 protocol. The signaling in the MGCP gateway is T1 PRI.
- The network topology diagram shows the end-to-end interoperability.

Network Topology

Figure 1. Network Topology



Limitations

- 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 in either direction as expected. The connected number is not displayed by CallManager or the NEC PBX. This was verified using an ISDN protocol analyzer.
- Though the NEC 2400 ICS PBX can be configured as either “network side” (master) or “user side” (slave), configuration as “network” is not recommended. The NEC TAC center will not resolve a case presented with the NEC PBX configured as “network side.”



System Components

Hardware Requirements

- Cisco 3640 Gateway with 2MFT T1 Port
- Cisco Cat6K switch
- NEC 2400 ICS PBX, PA-24PRTB

Software Requirements

- IOS software release “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 Release 3.2

Configuration

Configuring the NEC 2400 ICS

The NEC PBX 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. It is highly recommended to have a NEC ISDN certified technician setup the NEC portion. Refer to the NEC 2400 PBX documentation for complete configuration information.

Step 1. Install circuit card (PA-24PRTB) and set the switches.

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



Switch	Position	Description	Settings
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
	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



Switch	Position	Description	Settings
	7	PAD	ON
	8	Idle Code	OFF

Step 2. Configure the route (ARTD). Below are the route settings found in ARTD. Route 7 is the B channel and route 8 is the D channel.

```
[LRTD]                                CISCO TEST FACILITY      02/05/10      PAGE:   3

*  ROUTE CLASS DATA LIST  *

CDN FUNCTION      -----  R O U T E      N U M B E R      -----
                  6          7          8          9          10

 1  OSGS           0          2          2          2          2
 2  ONSG           2          3          3          3          3
 3  ISGS           0          2          2          2          2
 4  INSG           2          3          3          3          3
 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          2          2          2
 9  TQ             0          0          0          0          0
10  SMDR           0          1          1          1          0

11  TD             0          0          0          0          0
12  DR             0          0          0          0          0
13  AC             1          1          1          1          1
14  TNT            0          0          0          0          0
15  LSG           13         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          0          0          0          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          0
29  TELP           0          0          0          0          0
30  PAD            7          4          7          4          7

31  OGRL           0          1          0          1          0
32  ICRL           0          1          0          1          0
33  HD             0          0          0          0          0
34  GUARD          0          1          0          1          0
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

[LRTD]                                CISCO TEST FACILITY      02/05/10      PAGE:   4

*  ROUTE CLASS DATA LIST  *
```



CDN FUNCTION	R O U T E					N U M B E R				
	6	7	8	9	10	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					



Configuring Cisco CallManager

Step 1. Configure the Cisco 3640 router for the MGCP gateway. Use the following screens as a reference.

Cisco CallManager 3.2 Administration - MGCP Configuration - Microsoft Internet Explorer

File Edit View Favorites Tools Help

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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	<input type="text" value="VIC-2FXS"/>	(2/0/0)	(2/0/1)
Sub-Unit 1	<input type="text" value="VIC-2FXO"/>	(2/1/0)	(2/1/1)

Done Local intranet



Cisco CallManager 3.2 Administration - MGCP Configuration - Microsoft Internet Explorer

File Edit View Favorites Tools Help

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Address http://kingon/CCMAdmin/mgcpconfig.asp?MGCP={664EEA32-8D58-4A50-99B7-98D60D28ADA6} 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	VWIC-2MFT-T1	(3/0) T1PRI	(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

[Back to Find/List Gateways](#)

Local intranet



Step 2. Configure ISDN PRI. Use the following screens as a reference.

Cisco CallManager 3.2 Administration - Gateway Configuration - Microsoft Internet Explorer

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Address ASB36-464A-4F1C-810B-B30978BFB72E}&Action=Update&Type=52&MGCP={664EEA32-8D58-4A50-99B7-98D60D28ADA6} Go Links >>

Gateway Configuration

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

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*	S3/DS1-0@MGCP_3640
Description	S3/DS1-0@MGCP_3640
Device Pool*	Default
Media Resource Group List	< None >
Network Hold Audio Source	< None >
User Hold Audio Source	< None >
Calling Search Space	< None >
Location	< None >

Local intranet



Cisco CallManager 3.2 Administration - Gateway Configuration - Microsoft Internet Explorer

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Address [A5B36-464A-4F1C-810B-B30978BFB72E}&Action=Update&Type=52&MGCP={664EEA32-8D58-4A50-99B7-98D60D28ADA6}](#) 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-810B-B30978BFB72E}&Action=Update&Type=52&MGCP={664EEA32-8D58-4A50-99B7-98D60D28ADA6}](#) 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"/>

Local intranet



Cisco CallManager 3.2 Administration - Gateway Configuration - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Reload Home Search Favorites History Print

Address [A5B36-464A-4F1C-810B-B30978BF72E}&Action=Update&Type=52&MGCP={664EEA32-8D58-4A50-99B7-98D60D28ADA6}](#) 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



Step 3. Configure the route pattern. Use the following screens as a reference.

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

File Edit View Favorites Tools Help

Back Forward Stop Search Favorites History

Address http://kingon/CCMAdmin/routepatternconfig.asp?pkid={A4F2014B-A516-482E-82A5-26FFF0723031} Go Links >>

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: 6.XXXX

Status: Ready
Note: Any update to this route pattern automatically resets the associated gateway/route list

Copy Update Delete Cancel Changes

Pattern Definition

Route Pattern*	6.XXXX
Partition	< None >
Numbering Plan*	North American Numbering Pl
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

Done Local intranet



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

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Print

Address <http://kingon/CCMAAdmin/routepatternconfig.asp?pkid={A4F2014B-A516-482E-82A5-26FFF0723031}> Go Links >>

Partition: < None >

Numbering Plan*: North American Numbering Plan

Route Filter: < None >

Gateway/Route List*: S3/DS1-0@MGCP_3640 (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: PreDot

Called Party Transform Mask:

Prefix Digits (Outgoing Calls):

* indicates required item.

Done Local intranet

Configure the Cisco 3640 Router

- The following sample output shows the router configuration for interoperability with the PBX.

```
MGCP_3640# sh running-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 El 1/0
  pri-group timeslots 1-31 service mgcp
!
controller El 1/1
!
controller Tl 3/0
  framing esf
  linecode b8zs
  pri-group timeslots 1-24 service mgcp
!
controller Tl 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
```

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