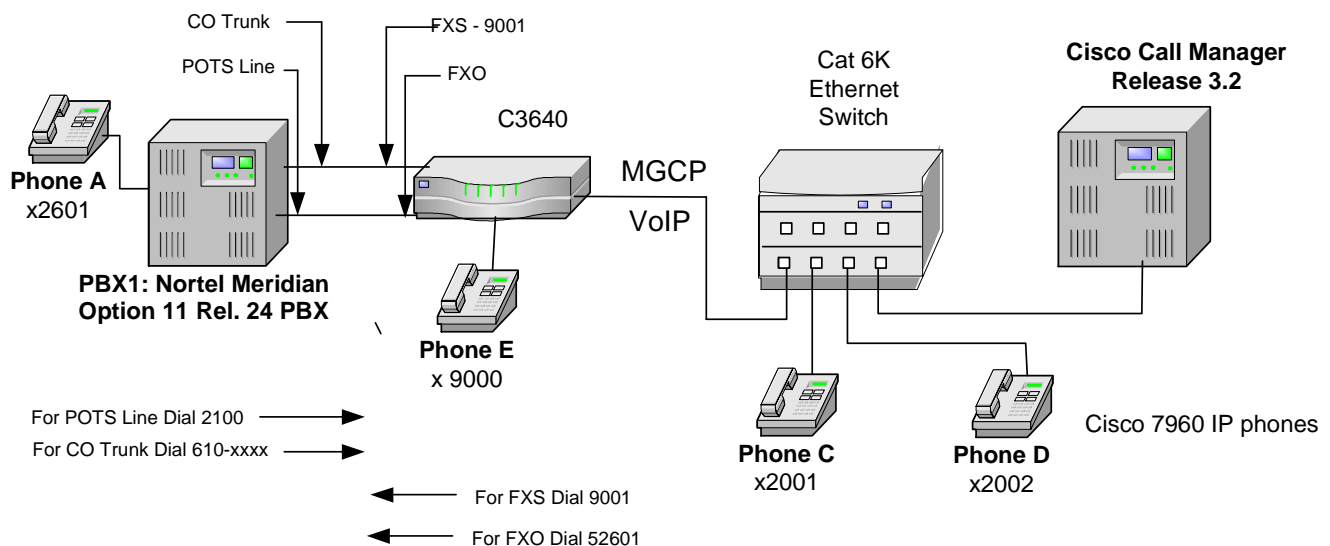# CISCO SYSTEMS

Cisco 3640 Router - PBX Interoperability: Nortel Meridian Option 11 Rel. 24 PBX with Analog FXS and FXO interfaces to an MGCP Gateway

Introduction

- This note describes interoperability of the Nortel Meridian Option 11 PBX with Cisco Call Manager using Cisco C3640 Analog FXS/FXO interfaces as an MGCP Gateway.
- The Network Topology diagram shows the test set-up for end-to-end interoperability between the Cisco Call Manager connected to the PBX via Cisco 3640 analog FXS and FXO voice ports linked as an MGCP gateway.
- Connectivity is achieved first by using the analog FXS loop start voice port on the MGCP gateway to a loop start CO Trunk port on the Nortel Meridian Option 11 PBX. Then by using the analog FXO loop start voice port on the MGCP gateway to a loop start phone line (POTS) port on a Nortel Meridian PBX.
- Loop Start is used because the gateway FXS port does not support Ground Start in MGCP mode and with the gateway FXO configuration the PBX POTS circuit does not support Ground Start.
- The FXO port connected to the PBX POTS line answers the call (goes off-hook) before the dialed phone is answered, which stops the PBX from forwarding a call if the target phone does not answer.

Network Topology

Basic Call Setup End-to-End Configuration

Limitations

- FXS Ground_Start Signaling.

- FXS Ground Start Signaling type is not supported on CCM MGCP Gateway configuration GUI.

- FXO Ground_Start Signaling.
    - FXS Ground Start Signaling type is not supported on a PBX POTS Line.

- FXO Loop_Start Signaling
    - The FXO gateway voice port goes off-hook on the first ring of an incoming seizure, before the targeted phone has answered. This disables the PBX from forwarding the incoming call on a ring-no-answer to voice-mail or other forward target. The PBX Analog extension does not support disconnect supervision which causes trunk hang issues and long ring-no answer times.

System Components

Hardware Requirements

- Cisco C3640 Gateway with analog FXS & FXO Ports
- Cisco Cat6K switch
- Cisco Call Manager 3.2
- Nortel Meridian Option 11 Release 24 PBX.

Software Requirements

- Cisco IOS Software Release
- • IOS software releases "c3640-js-mz.122-2.XN".
- • PBX Software Option 11 Release 24
- • Cisco Call Manager 3.2
- PBX Software Release
- Cisco CallManager Release

Configuration

Configuring the Nortel Meridian Option 11 Rel. 24 PBX

```
  CO Trunk Configuration
 >ld 20
PT0000
MARP NOT ACTIVATED

REQ: prtTYPE: tnbTN   10 01DATE PAGE DES
TN   010 0 00 01
TYPE COT
CDEN 8D
CUST 0
XTRK XUT
TIMP 600
BIMP 3COM
TRK  ANLG
NCOS 0
RTMB 10 2
ATDN 2601
SIGL LOP
SUPN NO
AST  NO
IAPG 0
CLS  UNR DTN CND WTA LPR APN THFD
     P10 NTC LOL
TKID
DATE 19 MAY 2002
```

```
NACT ****
>
OVL000
>ld 21PT1000

REQ: prtTYPE: rdbCUST 0ROUT 10
TYPE RDB
CUST 00
DMOD
ROUT 10
DES   ANALOG_LOOP_COT
TKTP COT
PRIV NO
SAT  NO
RCLS EXT
DTRK NO
ISDN NO
PTYP ACO
AUTO YES
ICOG IAO
RANX NO
SRCH LIN
TRMB YES
STEP
ACOD 610
CPP  NO
TARG 01
CLEN 1
BILN NO
OABS
TIMR ICF 512
     OGF 512
     EOD 13952
     DSI 34944
     NRD 10112
     DDL 70
     ODT 4096
     RGV 640
     FLH 510
     GRD 896
     SFB 3
     CRD 512
     TFD 0
     LEXT 100
SST  3 0
NEDC ETH
FEDC ORG
CPDC NO
SPCT IMM
HOLD 02 02 40
SEIZ 02 02
RGFL 02 02
RVSD 08 31
ILLR 02 02
DRNG NO
CDR  NO
MUS  NO
MR   NO
MANO NO
EQAR NO
OHQ  NO
OHQT 00
TTBL 0
OHTD NO
PLEV 2
MCTS NO
ALRM NO
ART  0
SGRP 0
```

```
PAGE 002

AACR NO

REQ: ****
>
OVL000
>




   ld 10
PBX000
MARP NOT ACTIVATED

MEM AVAIL: (U/P): 1275886    USED U P: 104457 94216    TOT: 1474559
DISK RECS AVAIL: 478
TNS     AVAIL:    73    USED:   127    TOT:   200
ACD AGENTS AVAIL:   300    USED:     0   TOT:   300
ANALOGUE TELEPHONES AVAIL:  2498    USED:     2   TOT:  2500
AST     AVAIL:  100    USED:     0    TOT:   100
WIRELESS TELEPHONES AVAIL:  2500    USED:     0   TOT:  2500

REQ: prt
TYPE: 500
MARP NOT ACTIVATED

TN    02
CDEN CUST TEN DATE PAGE DES
DES   TEST1
TN    002 0 00 00
TYPE 500
CDEN 4D
CUST 0
WRLS NO
DN    2100 0     MARP
      CPND
        NAME Nortel 500Phone 1
        XPLN 27
        DISPLAY_FMT FIRST,LAST
AST  NO
IAPG 0
HUNT
TGAR 0
LDN  NO
NCOS 0
SGRP 0
RNPG 0
XLST
SCI  0
CLS  CTD DTN FBD XFD WTA THFD FND HTD ONS
     LPR XRD CWD SWD MWD RMMD SMWD LPD XHD CCSD LND TVD
     CFTD SFD MRD C6D CNID CLBD AUTU
     ICDD CDMD LLCN EHTD MCTD
     GPUD DPUD CFXD ARHD OVDD AGTD CLTD LDTD ASCD
     MBXD CPFA CPTA DDGA NAMA
     MCRD
     EXR0 SHL ABDD CFHD DNDY DNO3
     CWND USMD USRD BNRD RTDD RBDD RBHD FAXD CNUD CNAD PGND FTTC
PLEV 02
AACS NO
MLWU_LANG 0
DATE  5 SEP 2000
```

```
DES  TEST2
TN   002 0 00 01
TYPE 500
CDEN 4D
CUST 0
WRLS NO
DN   2101 0     MARP
     CPND
        NAME Nortel 500Phone 2
        XPLN 27
        DISPLAY_FMT FIRST,LAST
AST  NO
IAPG 0
HUNT
TGAR 0
LDN  NO
NCOS 0
SGRP 0
RNPG 0
XLST
SCI  0
CLS  CTD DTN FBD XFD WTA THFD FND HTD ONS
     LPR XRD CWD SWD MWD RMMD SMWD LPD XHD CCSD LND TVD
     CFTD SFD MRD C6D CNID CLBD AUTU
     ICDD CDMD LLCN EHTD MCTD
     GPUD DPUD CFXD ARHD OVDD AGTD CLTD LDTD ASCD
     MBXD CPFA CPTA DDGA NAMA
     MCRD
     EXR0 SHL ABDD CFHD DNDY DNO3
     CWND USMD USRD BNRD RTDD RBDD RBHD FAXD CNUD CNAD PGND FTTC
PLEV 02
AACS NO
MLWU_LANG 0
DATE  5 SEP 2000


NACT
```

Configuring Cisco CallManager

Cisco CallManager 3.2 Administration - MGCP Configuration - Microsoft Internet Explorer

File   Edit   View   Favorites   Tools   Help

⇐ Back ▾   ⇒ ▾   ⊗   ⟳   ⌂ | ⊕Search   ⊕Favorites   ⊛History | ⊠ ▾   ⊜ | Address ⟨⟩ -4059-A053-C8D87C97DA0F} ▾   ⟩Go   Links »

Cisco CallManager Administration
For Cisco IP Telephony Solutions

CISCO SYSTEMS

MGCP Configuration

Back to Find/List Gateways

Product: Cisco 364X
MGCP : MGCP_3640

Status: Ready

| Update | Delete | Reset Gateway | Cancel Changes |

MGCP Domain Name*	MGCP_3640
Description	MGCP_3640 Gateway
Cisco CallManager Group*	Default ▾

Installed Voice Interface Cards		**Endpoint Identifiers**	
Module in Slot 0	< None > ▾		
Module in Slot 1	NM-HDV ▾		
Sub-Unit 0	VWIC-2MFT-E1 ▾	(1/0) E1PRI	(1/1) ?
Module in Slot 2	NM-2V ▾		
Sub-Unit 0	VIC-2FXS ▾	(2/0/0) POTS	(2/0/1) POTS
Sub-Unit 1	VIC-2FXO ▾	(2/1/0) LS	(2/1/1) LS
Module in Slot 3	NM-HDV ▾		
Sub-Unit 0	VWIC-2MFT-T1 ▾	(3/0) T1PRI	(3/1) ?

Product Specific Configuration		ℹ
Global ISDN Switch Type	NI2 ▾	
Switchback Timing*	Graceful ▾	
Switchback uptime-delay (min)	10	

⟨⟩   ⟨⟩ Local intranet

Cisco CallManager 3.2 Administration - Gateway Configuration - Microsoft Internet Explorer

File   Edit   View   Favorites   Tools   Help

⇐ Back ▾ ⇒ ▾ ⊗ ⟳ ⌂ | 🔍Search ⊡Favorites 🕓History | 📄▾ 🖨 | Address 🔗 53-C8D87C97DA0F}&iPort=1 ▾ 🔗Go | Links »

System   Route Plan   Service   Feature   Device   User   Application   Help

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CISCO SYSTEMS

Gateway Configuration

Back to MGCP Configuration
Back to Find/List Gateways

Slot 2/ Sub-Unit 0
🖥 **2/0/0**   9000
🖥 2/0/1   9001
Slot 2/ Sub-Unit 1
🖥 2/1/0
🖥 2/1/1

Product : Cisco 364X
Gateway : AALN/S2/SU0/0@MGCP_3640
Registration: Registered with Cisco CallManager 10.1.1.2
IP Address: 10.1.1.230

Status: Ready

| Update | Delete | Reset Gateway | Cancel Changes |

Gateway Information

Description	AALN/S2/SU0/0@MGCP_3640
Device Pool*	Default
Calling Search Space	< None >
Media Resource Group List	< None >
Network Hold Audio Source	< None >
User Hold Audio Source	< None >
Location	< None >
Network Locale	United States

Port Information

Prefix DN	
Num Digits*	4
Expected Digits*	4

Done   🖳 Local intranet

FXO Port Configuration

Cisco CallManager 3.2 Administration - Gateway Configuration - Microsoft Internet Explorer

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System   Route Plan   Service   Feature   Device   User   Application   Help

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CISCO SYSTEMS

Gateway Configuration

Back to MGCP Configuration
Back to Find/List Gateways

Slot 2/ Sub-Unit 0
🖳 2/0/0   9000
🖳 2/0/1   9001
Slot 2/ Sub-Unit 1
🖳 2/1/0
🖳 2/1/1

Product : Cisco 364X
Gateway : AALN/S2/SU1/0@MGCP_3640
Registration: Registered with Cisco CallManager 10.1.1.2
IP Address: 10.1.1.230

Status: Ready

[Update]   [Delete]   [Reset Gateway]   [Cancel Changes]

Gateway Information

Description	AALN/S2/SU1/0@MGCP_3640
Device Pool*	Default ▾
Calling Search Space	< None > ▾
Media Resource Group List	< None > ▾
Network Hold Audio Source	< None > ▾
User Hold Audio Source	< None > ▾
Location	< None > ▾
Network Locale	United States ▾

Port Information

Route Pattern Configuration

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

File   Edit   View   Favorites   Tools   Help

⇦ Back ▾   ⇨ ▾   ⊗   🔄   🏠   🔍Search   ⭐Favorites   🕘History   📇▾   🖨   Address 🔧 4-47BE-8491-B0F211090F29} ▾   🔗Go   Links »

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Route Pattern Configuration

Route Pattern: 5.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*	5.XXXX
Partition	< None > ▾
Numbering Plan*	North American Numbering Pla ▾
Route Filter	< None > ▾
Gateway/Route List*	AALN/S2/SU1/0@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)	

🖅 Done   🖥 Local intranet

Cisco C3640 Router Configuration

```
MGCP_3640#show ver
Cisco Internetwork Operating System Software
IOS (tm) 3600 Software (C3640-JS-M), Version 12.2(2)XN, EARLY DEPLOYMENT RELEASE
 SOFTWARE (fc2)
TAC Support: http://www.cisco.com/tac
Copyright (c) 1986-2002 by cisco Systems, Inc.
Compiled Sat 02-Mar-02 17:12 by eaarmas
Image text-base: 0x600089A8, data-base: 0x61668000

ROM:System Bootstrap, Version 11.1(19)AA, EARLY DEPLOYMENT RELEASE SOFTWARE (fc1)
ROM: 3600 Software (C3640-JS-M), Version 12.2(2)XN, EARLY DEPLOYMENT RELEASE SOF
TWARE (fc2)

MGCP_3640 uptime is 10 minutes
System returned to ROM by power-on
System image file is "flash:c3640-js-mz.122-2.XN"

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)
20480K bytes of processor board PCMCIA Slot1 flash (Read/Write)

Configuration register is 0x2102

MGCP_3640#show running
Building configuration...

Current configuration : 2546 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 domain-lookup
!
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
 framing NO-CRC4
 pri-group timeslots 1-31 service mgcp
!
controller E1 1/1
!
controller T1 3/0
 framing esf
 linecode b8zs
 cablelength short 133
 pri-group timeslots 1-24 service mgcp
!
controller T1 3/1
 framing sf
 linecode ami
!
interface Ethernet0/0
 ip address 10.1.1.230 255.255.255.0
 half-duplex
!
interface Ethernet0/1
 no ip address
 shutdown
 half-duplex
!
interface Serial1/0:15
 no ip address
 no logging event link-status
 isdn switch-type primary-net5
 isdn protocol-emulate network
 isdn incoming-voice voice
 isdn bind-l3 ccm-manager
 no cdp enable
!

interface Serial3/0:23
 no ip address
 no logging event link-status
 isdn switch-type primary-dms100
 isdn incoming-voice voice
 isdn bind-l3 ccm-manager
 no cdp enable
!
ip classless
no ip http server
!
snmp-server manager
!
voice-port 2/0/0
!
voice-port 2/0/1
!
voice-port 2/1/0
 timing hookflash-out 50
!
voice-port 2/1/1
 timing hookflash-out 50
```

```
!
dial-peer cor custom
!
dial-peer voice 201 pots
 application mgcpapp
 port 2/0/1
!
dial-peer voice 200 pots
 application mgcpapp
 port 2/0/0
!
dial-peer voice 210 pots
 application mgcpapp
 port 2/1/0
!
dial-peer voice 999200 pots
 application mgcpapp
 port 2/0/0
!
dial-peer voice 999201 pots
 application mgcpapp
 port 2/0/1
!
dial-peer voice 999210 pots
 application mgcpapp
 port 2/1/0
!
dial-peer voice 999211 pots
 application mgcpapp
 port 2/1/1
!
line con 0
line aux 0
line vty 0 4
 login
!
end
```

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