Cisco CallManager Release 4.01-PBX Interoperability: Nortel Option 11 to a Cisco 3745 with NM-HDV2-T1/E1 Using T1 PRI DMS-100 with MGCP

Introduction
This application note contains the test results of PBX interoperability testing from a PBX via digital trunk (T1/E1 PRI) interfaces under test to a Cisco voice router via NM-HDV2-T1/E1 modules installed in Cisco voice gateway.

This application note is directed toward testing interoperability of the NM-HDV2-T1/E1 Voice Interface Module with a Nortel Meridian as the PBX.

The application note is for Connectivity/Interoperability testing of the selected PBX connected via the NM-HDV2-T1/E1 interface to a C3745. The PBX/Router under test is connected via Ethernet to an Ethernet switch which also has a Cisco CallManager Release 4.01 and IP Phones in the Network Topology. VIC2-2FXS and VIC-4FXS/DID modules were installed into the NM-HDV2-T1/E1 modules to afford connections to phones E and F in figure 1 below.

Network Topology

Basic MGCP Cisco Call Manager Test Configuration
The diagram in Figure 1 is representative of the configuration used for testing.

The diagram shows the test set-up for a Cisco Voice Gateway connected through an Ethernet switch and being controlled via MGCP by a Cisco CallManager Release 4.01.

Figure 1. Network Topology or Test Setup

The above diagram is representative of the configuration used for testing. As shown in the diagram above, a PBX is connected via an interface to a Cisco router, which in turn, is connected to an Ethernet switch which also has the CCM (Cisco call manager) IP Phones and a second Cisco router. The second Cisco router is connected to a second PBX. The interoperability testing involved signaling and audio path configuration on the voice interfaces under test between each Cisco router and it's associated PBX.
Features

Features Supported

Basic Call (ENBLOC)

Basic Call (Overlap)

Calling Name

Calling Number

Called Name

Called Number

Note: It was found that the correct position of jumper J7 on the NM-HDV2-T1/E1 was critical to establish Layer 1 connectivity. Looking into the NM-HDV2-T1/E1 in the direction of insertion into the router, the jumper should be placed to connect the left and middle pins. This was the jumper position for all tests in the report.

Features Not Supported

Called (connected) number is not sent from the voice gateway when calling from the Nortel PBX to the IP phone (ENBLOC Sending or Receiving).

Called (connected) number is not sent from the Nortel PBX when calling from the IP phone via the voice gateway (ENBLOC Sending or Receiving).

Called (connected) number is not forwarded by the voice gateway when calling from the Nortel PBX to the Ericsson phone via the VoIP network (tandem) (ENBLOC Sending or Receiving).

Called name not sent from the Ericsson PBX when calling from the Nortel PBX to the Ericsson phone via the VoIP network (tandem) (ENBLOC Sending or Receiving).

Cisco CallManager Release 4.01 does not support Overlap Receiving with DMS-100. Consequently, no calls involving the Nortel PBX with Overlap Sending or Receiving were made.

For calls between the Nortel extensions and the IP phone extensions, the Connected Number, not Called (Alerting) Number, was sent.

Calling number is not passed to the destination digital phone for calls between phones on the PSTN, via the VoIP network.

Limitations

Basic calls using ENBLOC Sending (called number passed to the original side via phones A to J [router B]) are not sent by the Cisco 3745 router (router A).
Basic calls using ENBLOC Sending (called number passed to the original side via phones J to A [router B]) are not sent by the Nortel PBX.

Basic calls using ENBLOC Sending or basic calls with Overlap Sending or Receiving (connected number passed to the original side via phones C to K or phones K to C [router B]) are sent.

Basic calls using ENBLOC Sending (connected number passed to the original side via phones A to C [router B]) are sent by the Ericsson PBX, but are not forwarded by the Cisco IOS gateway.

Basic calls using ENBLOC Sending (connected number passed to the original side via phones A to C [PBX B]) are not sent by the Ericsson PBX.

Basic calls with Overlap Sending or Receiving (calling number passed to final destination via phones A to J, J to A, A to C, or C to A [PBX A or router A]) are not supported by the Cisco CallManager Release 4.01 for the DMS-100 switch.

Basic calls with Overlap Sending or Receiving (called number passed to the original side via phones A to J, J to A, A to C, or C to A [PBX B or router B]) are not supported by the Cisco CallManager Release 4.01 for the DMS-100 switch.

**System Components**

**Hardware Requirements**

**Platform:**
- Cisco C3745

**Interfaces/Modules:**
- NM-HDV2-2T1/E1 (in 3745)
- VIC2-2FXS (in 3745)

**PBX:**
- Nortel Meridian

**Software Requirements**
- Cisco CallManager Release 4.01
- Nortel Meridian: RELEASE 24, ISSUE 24
- C3745: Cisco IOS Software, 3700 Software (C3745-ADVENTERPRISEK9-M), Version 12.3(7)T, RELEASE SOFTWARE (fc1)

**Configuration**

**Configuration Sequence and Tasks**

**Configuration Menus and Commands**
Configuring the Nortel Option 11 PBX

***************D-CHANNEL CONFIGURATION***************

>LD 22PT2000
MARP NOT ACTIVATED

REQ  PRTTYPE ADAN DCH 3
ADAN     DCH 3
   CTYP MSDL
   CARD 03
   PORT 1
   DES  t1_d100
   USR  PRI
   DCHL 3
   OTBF 32
   PARM RS422 DTE
   DRAT 64KC
   CLOK EXT
   IFC  D100
   SIDE USR
   CNEG 1
   RLS  ID  **
   RCAP ND2
   MBGA NO
   OVLR YES
   DIDD 0
   OVLS YES
   OVLT 0
   T200 3
   T203 10
N200 3
N201 260
K 7

REQ ****

**************************ROUTE DATA BLOCK CONFIGURATION**************************

>LD 21PT1000

REQ: PRTCUST 0ROUT 103
TYPE RDB
CUST 00
DMOD
ROUT 103
DES T1_D100
TKTP TIE
BSN NO
CNVT NO
SAT NO
RCLS EXT
DTRK YES
BRIP NO
DGTP PRI
ISDN YES
MODE PRA
IFC D100
SBN NO
PNI 00000
NCNA YES
NCRD YES
CHTY BCH
CTYP UKWN
INAC NO
ISAR NO
DAPC NO
BCOT 0
DSEL VOD
PTYP PRI
AUTO NO
DNIS NO
DCDR NO
ICOG IAO
SRCH RRB
TRMB YES
STEP
ACOD 703
TCPP NO
PII NO
TARG 01
CLEN 1
BILN NO
OABS
INST
ANTK
SIGO STD
ICIS YES
TIMR ICF 512
OGF 512
EOD 13952
NRD 10112
DDL 70
ODT 4096
RGV 640
GRD 896
SFB 3
NBS 2048
NBL 4096
TFD 0
DRNG NO
CDR NO
MUS NO
OHQ NO
OHQT 00

PAGE 002

CBQ NO
AUTH NO
TTBL 0
PLEV 2
ALRM NO
ART 0
SGRP 0
AACR NO

REQ: ****
TRUNK DATA BLOCK

>LD 20
PT0000
MARP NOT ACTIVATED

REQ: PRTTYPE: TNBTN  3 1DATE PAGE DES
TN 003 01
TYPE TIE
CDEN SD
CUST 0
TRK  PRI
PDCA 1
PCML MU
NCOS 0
RTMB 103 1
B-CHANNEL SIGNALING
TGAR 0
AST  NO
IAPG 0
CLS  UNR DTN CND WTA LPR APN THFD HKD
      P10 VNL
TKID
DATE  9 MAR 2004

NACT ****

**************************COMMON EQUIPMENT CONFIGURATION**************************

>LD 22PT2000
MARP NOT ACTIVATED

REQ  PRTTYPE CX*TYPE CEQU
CEQU
MPED 8D
SUPL  000  004  008  012
      016  032  036  040
      044  048  064  068
      072
XCT  000
CONF  029  030  031  062
      094  095
DLOP  NUM  DCH  FRM  LCMT  YALM  T1TE  TRSH
PRI  003  23  ESF  B8S  FDL  -  00
     004  23  ESF  B8S  FDL  -  00
PRI2  06  07  08  09
DTI2  05
MISP

REQ  ****

**************************DIGITAL STATION PHONE CONFIGURATION**************************

>LD 11SL1000
MARP NOT ACTIVATED

MEM AVAIL:  (U/P): 1334514  USED U P: 109213  30832  TOT: 1474559

DISK RECS AVAIL: 479

TNS  AVAIL:   76  USED:   124  TOT:  200

ACD AGENTS AVAIL:   300  USED:    0  TOT:   300

AST  AVAIL:   100  USED:    0  TOT:   100

DIGITAL TELEPHONES AVAIL:  2497  USED:    3  TOT:  2500

REQ:  PRTTYPE:  2616DES  TEST1

TN  001  0 00  04
TYPE  2616
CDEN  8D
CUST  0
AOM  0
FDN
TGAR  0
LDN  NO
NCOS  0
SGRP 0
RNPG 0
SCI 0
SSU
LNRS 16
XLST
CLS  CTD FBD WTA LPR MTD FND HTD ADD HFA
MWD LMPN RMMD SMWD AAD IMD XHD IRD NID OLD VCE DRG1
POD DSX VMD CMSD CCSD SWD LNA CNDA
CFTD SFD MDR DDV CNID CDCA MSID DAPA BFED RCBD
ICDD CDMD LLCN MCTD CLBD AUTU
GPUD DPUD DNDA CFXA ARHD CLTD ASCD
CPFA CPTA ABDD CFHD FICD NAID BUZZ AHD
DDGA NAMA
DRDD EXR0
USMD USRD ULAD RTDD RBDD RBHD PGND FLXD FTTC DNDY DNO3
CPND_LANG  ENG
HUNT
PLEV 02
AST
IAPG 0
AACS NO
ITNA NO
DGRP
MLWU_LANG 0
DNDR 0
KEY 00 SCR 2603 0 MARP
CPND
NAME PHONE A
XPLN 27
DISPLAY_FMT FIRST, LAST
01 SCR 2610 0
02
03 CFW 12 7103999
04 AO6
05 TRN
06 DSP
07
08 ADL 16
09 ADL 16
10 ADL 16
11 ADL 16
12 ADL 16
13 ADL 16
14 ADL 16
15

DATE 13 MAR 2004

NACT
Configuring Cisco CallManager Release 4.01

Route Patterns

Screenshot for Cisco CallManager Release 4.01 Route Patterns (Overview).
Screenshot for Cisco CallManager Release 4.01 Route Patterns (Pattern 7.XXXX to Nortel PBX).

<table>
<thead>
<tr>
<th>Pattern Definition</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Route Pattern/Hunt Pilot*</td>
<td><strong>7.XXXX</strong></td>
</tr>
<tr>
<td>Partition</td>
<td>&lt;None&gt;</td>
</tr>
<tr>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>Numbering Plan*</td>
<td>North American Numbering Plan</td>
</tr>
<tr>
<td>Route Filter</td>
<td>&lt;None&gt;</td>
</tr>
<tr>
<td>MLPP Precedence</td>
<td>Default</td>
</tr>
<tr>
<td>Gateway or Route/Hunt List*</td>
<td>54/DS1:9@A:3745 (Edit)</td>
</tr>
<tr>
<td>Route Option</td>
<td>a Route this pattern</td>
</tr>
<tr>
<td></td>
<td>Block this pattern — Not Selected —</td>
</tr>
</tbody>
</table>

**Provide Outside Dial Tone** | ☐ | **Allow Overlap Sending** | ☐ | **Urgent Priority** | ☐ |

**Calling Party Transformations**
- Use Calling Party’s External Phone Number Mask | ☐ |
- Calling Party Transform Mask |  |
- Prefix Digits (Outgoing Calls) |  |
- Calling Line ID Presentation | Default |
- Calling Name Presentation | Default |

**Connected Party Transformations**
- Connected Line ID Presentation | Default |
- Connected Name Presentation | Default |

**Called Party Transformations**
- Discard Digits | Pre@111/10D->2D |
- Called Party Transform Mask |  |
- Prefix Digits (Outgoing Calls) |  |

**ISDN/Network-Specific Facilities Information Element**
- Carrier Identification Code |  |
- Network Service Protocol | — Not Selected — |

**Network Service**
- Service Parameter Name | <NotExist> |
- Service Parameter Value |  |

* Indicates required item.
Cisco CallManager Release 4.01 Configuration for Cisco 3745

Screenshot for Cisco CallManager Release 4.01 – Cisco 3745 Gateway Configuration.

### Gateway Configuration

**Product:** Cisco 3745  
**Gateway:** A-3745

**Status:** Ready

- **Domain Name:** A-3745  
- **Description:** A-3745  
- **Cisco CallManager Group:** Default

#### Installed Voice Interface Cards

<table>
<thead>
<tr>
<th>Mainboard Slot</th>
<th>Module in Slot 1</th>
<th>Module in Slot 2</th>
<th>Module in Slot 3</th>
<th>Module in Slot 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;None&quot;</td>
<td>&quot;None&quot;</td>
<td>&quot;None&quot;</td>
<td>&quot;None&quot;</td>
<td>&quot;NM-HDI-2VE&quot;</td>
</tr>
</tbody>
</table>

#### Endpoint Identifiers

- **Subunit 0:** VIC2-2FXS, Port 0, Begin 4/0/2002, 10:30 am
- **Subunit 1:** VIC2-MFT-T1, Port 0, Begin 4/0/2002, 10:30 am

#### Product Specific Configuration

- **Global ISDN Switch Type:** 4ESS
- **Switchback Timing:** Graceful
- **Switchback uptime-delay (min):** 10
- **Switchback schedule (hh:mm):** 16:00
Screenshot for Cisco CallManager Release 4.01 – Cisco 3745 PRI Trunk Configuration.

<table>
<thead>
<tr>
<th><strong>Outbound Calls</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Calling Line ID Presentation*</td>
<td>Default</td>
</tr>
<tr>
<td>Calling Party Selection**</td>
<td>Originate</td>
</tr>
<tr>
<td>Called party IE number type unknown*</td>
<td>Cisco CallManager</td>
</tr>
<tr>
<td>Calling party IE number type unknown*</td>
<td>Cisco CallManager</td>
</tr>
<tr>
<td>Called Numbering Plan*</td>
<td>Cisco CallManager</td>
</tr>
<tr>
<td>Calling Numbering Plan*</td>
<td>Cisco CallManager</td>
</tr>
<tr>
<td>Number of digits to strip*</td>
<td>0</td>
</tr>
<tr>
<td>Caller ID DN</td>
<td></td>
</tr>
<tr>
<td>SMRI Base Port*</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PRI Protocol Type Specific Information</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Display IE Delivery</td>
</tr>
<tr>
<td>Redirecting Number IE Delivery - Outbound</td>
</tr>
<tr>
<td>Redirecting Number IE Delivery - Inbound</td>
</tr>
<tr>
<td>Send Extra Leading Character in DisplayIE***</td>
</tr>
<tr>
<td>Setup non-ISDN Progress Indicator IE Enable****</td>
</tr>
<tr>
<td>MCDN Channel Number Extension Bit Set to Zero**</td>
</tr>
<tr>
<td>Send Calling Name In Facility IE</td>
</tr>
<tr>
<td>Interface Identifier Present***</td>
</tr>
<tr>
<td>Interface Identifier Value**</td>
</tr>
<tr>
<td>Connected Line ID Presentation (QSIG Inbound Call)*</td>
</tr>
<tr>
<td>Connected PBX Model</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Product Specific Configuration</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Line Coding*</td>
</tr>
<tr>
<td>Framing*</td>
</tr>
<tr>
<td>Clock*</td>
</tr>
<tr>
<td>Input Gain (-6..14 db)*</td>
</tr>
<tr>
<td>Output Attenuation (-6..14 db)*</td>
</tr>
<tr>
<td>Echo Cancellation Enable*</td>
</tr>
<tr>
<td>Echo Cancellation Coverage (ms)*</td>
</tr>
</tbody>
</table>
Configuring the Cisco 3745
A-3745#sho run

Building configuration...

Current configuration : 2425 bytes
!
version 12.3
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname A-3745
!
boot-start-marker
boot-end-marker
!
card type t1 4 1
logging buffered 4096 debugging
!
no network-clock-participate slot 1
no network-clock-participate slot 2
no network-clock-participate slot 3
no network-clock-participate slot 4
no network-clock-participate wic 0
no network-clock-participate wic 1
no network-clock-participate wic 2
no network-clock-participate aim 0
no network-clock-participate aim 1
no aaa new-model
ip subnet-zero
ip cef
!
ip host B9 172.20.43.253
ip audit po max-events 100
no ftp-server write-enable
isdn switch-type primary-4ess
voice-card 4
dspfarm
!
!
ccm-manager mgcp
ccm-manager music-on-hold
ccm-manager config server 172.20.43.253
ccm-manager config
!
!
controller T1 4/0
  framing esf
  linecode b8zs
  pri-group timeslots 1-2,24 service mgcp
!
controller T1 4/1
  framing esf
  linecode b8zs
  ds0-group 1 timeslots 1-12 type e&m-wink-start
!
no crypto isakmp enable
!
!
interface FastEthernet0/0
  ip address 172.20.43.151 255.255.255.0
duplex auto
speed auto
!
interface FastEthernet0/1
  no ip address
  shutdown
duplex auto
speed auto
!
interface Serial4/0:23
  no ip address
  no logging event link-status
  isdn switch-type primary-dms100
  isdn protocol-emulate network
  isdn incoming-voice modem
  isdn incoming-voice voice
  isdn bind-13 ccm-manager
  no cdp enable
!
ip classless
ip route 0.0.0.0 0.0.0.0 FastEthernet0/0
!
ip http server
no ip http secure-server
!

control-plane
!

voice-port 4/0/0
!
voice-port 4/0/1
!
voice-port 4/0:23
voice-port 4/1:1

mgcp
mgcp call-agent 172.20.43.253 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 nse
mgcp package-capability rtp-package
no mgcp package-capability res-package
mgcp package-capability sst-package
no mgcp package-capability fxr-package
no mgcp timer receive-rtcp
mgcp sdp simple
mgcp fax t38 inhibit
mgcp rtp payload-type g726r16 static

mgcp profile default

!

dial-peer voice 999411 pots
  application mgcpapp
  port 4/1:1

!

dial-peer voice 999400 pots
  application mgcpapp
  port 4/0/0

!

dial-peer voice 999401 pots
  application mgcpapp
  port 4/0/1

!
line con 0
line aux 0
line vty 0 4
login
!
!
end

Important Information

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