Nortel CS1000 Succession 4.0 with Cisco Unified Border Element for SIP-to-SIP Calls

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Introduction

• This is an application note for connectivity of Nortel CS1000 Succession 4.0 with Cisco Unified Border Element via SIP (10/100baseT).

• The network topology diagram (Figure 1) shows the test setup for end-to-end interoperability with the Cisco Unified Border Element (CUBE) connected to the IP PBX via SIP (10/100baseT). Connectivity is achieved by using the SIP protocol.

• This Application Note uses the c3845 IOS-voice-gateway, however other Cisco voice gateways are also an option to use since CUBE implementation does not depend on the platform. Here is a list of Cisco Products capable of CUBE functionality:

  Cisco 2800 Series Integrated Services Routers
  Cisco 3800 Series Integrated Services Routers
  Cisco AS5350XM Universal Gateway
  Cisco AS5400XM Universal Gateway
Network Topology

Figure 1. Network Topology or Test Setup

Limitations

- Connected Name is not presented at originating Phone. Nortel does not include Final destination NAME in the SIP ringing status, or in the OK status.
- Basic Call using G.726 codec is not supported on Nortel PBX
- Call Transfer Name and Number updates do not occur
- Call Forward Name and Number updates do not occur
- DTMF tones are not played across established call. Nortel PBX utilizes SIP “INFO” messages to signal DTMF tones, Cisco IOS does not support SIP INFO message as of version 124-7.9.PH4a.
- A fax call is supported using only codec G.711 (A or u-law).

System Components

Hardware Requirements

Cisco equipment

- Cisco 3845 (Cisco 3800 family routers)
- Cisco Catalyst 6500

Avaya equipment

- Nortel Communication System 1000 (which includes Call Server, Signaling Server and Media gateway)
Software Requirements

- PBX Software: Nortel Succession 4.0 Release

Features

Features Supported

- Basic call using G711u and A law, G729 and G723 codecs
- Call Transfer blind and Call Transfer supervised
- Call Conference
- Call on-hold
- Call Forward No Reply, Busy and All
- FAX integrity (only using G.711)

Features Not Supported

- Connected Name
- DTMF
Configuration

Configuration Sequence and Tasks

Configuration Menus and Commands

Nortel Configuration

Call Server Setup Using SSC Card Console:
1. LD 17 – Configure the IP D-channel (signaling channel) between the Call Server and the Signaling Server
2. LD 97 – Configure the Super-loop for the Virtual Trunks
3. LD 14 – Configure the SIP Virtual Trunks to the Signaling Server
4. LD 14 – Configure the Virtual Gateway Trunks
5. LD 16 – Configure the SIP route
6. LD 86 – Configure the Route List Block for the Virtual Trunk route
7. LD 87 – Configure CDP steering codes
8. Configure Digital Stations (Phones)

Signaling Server Setup Using the Nortel Element Manager:
9. Configure the Zones
10. Configure a new IP Telephony Node summary
11. Configure the Node section
12. Configure the VGW and IP phone codec profile section
13. Configure the Quality of Service (QoS) section
14. Configure LAN Configuration section
15. Configure the SIP GW Setting section
16. Configure the Card section for the MC-32 VGMC card section
17. Configure the Signaling Server section

NRS (Network Routing Server):
18. Configure the System Wide Settings
19. Configure the NRS Server Settings
20. Configure a Service Domain
21. Configure a L1 Domain (UDP)
22. Configure a L0 Domain (CDP)
23. Configure a SIP gateway
24. Configure the Routing Entries

Call Server Setup Using SSC Card Console:
1. LD 17 – Configure the IP D-channel (signaling channel) between the Call Server and the Signaling Server

>ld 22
PT2000
REQ  prt
TYPE adan dch 3
ADAN   DCH 3
CTYP   DCP
DES    IP_Trunk_DCH
USR    ISLD
2. LD 97 – Configure the Super-loop for the Virtual Trunks

>ld 97
SCSYS000
MEM AVAIL: (U/P): 2718718 USED U P: 327039 50818 TOT: 3096575
DISK RECS AVAIL: 1152
REQ prt
TYPE supl
SUPL

SUPL SUPT SLOT XPEC0 XPEC1

000  STD  LEFT 01 0 1
004  STD  LEFT 02 0 1
008  STD  LEFT 03 0 1
012  STD  LEFT 04 0 1
016  STD  LEFT 05 0 1
032  STD  LEFT 06 0 1
036  STD  LEFT 07 0 1
040  STD  LEFT 08 0 1
044  STD  LEFT 10 0 3
048  STD  LEFT 09 0 3
064  STD  LEFT 11 0 3
068  STD  LEFT 12 0 3
072  STD  LEFT 13 0 3
096  VIRTUAL CARDS 61 - 64 81 - 84
128  STD  LEFT 32 0 1  33 2 3
132  STD  LEFT 34 0 1  35 2 3
136  STD  LEFT 36 0 1  37 2 3
140  STD  LEFT 38 0 1  39 2 3
144  STD  LEFT 40 0 1  41 2 3
148  STD  LEFT 42 0 1  43 2 3
152  STD  LEFT 44 0 1  45 2 3
156  STD  LEFT 46 0 1  47 2 3
3. LD 14 – Configure the SIP Virtual Trunks to the Signaling Server (One trunk = one line connection)

```plaintext
>ld 20

PT0000
REQ: prt
TYPE: tn
TN 62 0 0 0 = SIP Virtual trunk to Signaling Server

DATE
PAGE
DES

DES SIP_IP_VTRK
TN 062 0 00 00 VIRTUAL
TYPE IPTI
CDEN 8D
CUST 0
XTRK VTRK
ZONE 000
LDOP BOP
TIMP 600
BIMP 600
AUTO_BIMP NO
TRK ANLG
NCOS 0
RTMB 10 1
CHID 1
TGAR 1
STRI/STRO IMM IMM
SUPN YES
AST NO
IAPG 0
CLS CTD DTN WTA LPR APN THFD
P10 NTC MID
TKID
AACR NO
DATE 25 FEB 2005

NACT
```
4. LD 14 – Configure the Virtual Gateway Trunks (upto 32 trunks per MC-32)

```
>ld 20

PT0000
REQ: prt
TYPE: tnb
TN  3
CDEN
CUST
DATE
PAGE
DES

DES  192.168.21.2
TN   003 0 00 00
TYPE VGW
CUST 0
XTRK MC32
ZONE 000

DES  192.168.21.2
TN   003 0 00 01
TYPE VGW
CUST 0
XTRK MC32
ZONE 000
```

5. LD 16 – Configure the SIP route

```
>ld 21
PT1000

REQ: prt
TYPE: rdb
CUST 0
ROUT 10

TYPE RDB
CUST 00
DMOD
ROUT 10
DES SIP_TIE
TKTP TIE
NPID_TBL_NUM   0
```
ESN  NO
CNVT NO
SAT  NO
RCLS EXT
VTRK YES
ZONE 000
PCID SIP
CRID YES
NODE 102
DTRK NO
ISDN YES
  MODE ISLD
  DCH  3
  IFC  SL1
  PNI  00001
  NCNA YES
  NCRD YES
  TRO  NO
  FALT NO
  CTYP UKWN
  INAC NO
  ISAR NO
  DAPC NO
PTYP ATT
AUTO NO
DNIS NO
DCDR NO
ICOG IAO
SRCH LIN
TRMB YES
STEP
ACOD 710
TCPP NO
TARG 01
CLEN 1
BILN NO
OABS
INST
ANTK
SIGO STD
STYP SDAT
ICIS YES
TIMR ICF  512
  OGF  512
  EOD  13952
  DSI  34944
  NRD  10112
  DDL  70
  ODT  4096
  RGV  640
  GRD  896
  SFB  3
NBS  2048
NBL  4096

IEPB  5

PAGE 002

TFD  0
VSS  0
VGD  6
SST  5 0
NEDC ORG
FEDC ORG
CPDC NO
DLTN NO
HOLD  02 02 40
SEIZ 02 02
SVFL 02 02
DRNG NO
CDR NO
VRAT NO
MUS NO
MANO NO
OHQ NO
OHQT 00
CBQ NO
AUTH NO
TTBL 0
ATAN NO
OHTD NO
PLEV 2
ALRM NO
AT 0
SGRP 0
AACR NO

REQ:

6. LD 86 – Configure the Route List Block for the Virtual Trunk route

>ld 86
ESN000

MEM AVAIL: (U/P): 2718718   USED U P: 327039 50818   TOT: 3096575
DISK RECS AVAIL: 1152
REQ  prt
CUST 0
FEAT rlb
RLI  10

RLI  10
7. LD 87 – Configure CDP steering codes

>ld 87
ESN000

MEM AVAIL: (U/P): 2718718    USED U P: 327039 50818    TOT: 3096575
DISK RECS AVAIL: 1152
REQ

Note: Dialing plan

Note: SIP Route list used for DSC dialed numbers
8. LD 11 – Configure Digital Stations (Phones)

>`ld 11
>SL1000

MEM AVAIL: (U/P): 2718718  USED U P: 327039 50818  TOT: 3096575
DISK RECS AVAIL: 1152
DIGITAL TELEPHONES AVAIL: 0 USED: 8 TOT: 8
IP USERS AVAIL: 2 USED: 6 TOT: 8
BASIC IP USERS AVAIL: 7 USED: 1 TOT: 8
ACD AGENTS AVAIL: 10 USED: 0 TOT: 10
PCA AVAIL: 0 USED: 0 TOT: 0
AST AVAIL: 1 USED: 0 TOT: 1
TNS AVAIL: 2296 USED: 204 TOT: 2500
DATA PORTS AVAIL: 2500 USED: 0 TOT: 2500

REQ: prt
TYPE: 2616

TN 1 06
DATE
PAGE
DES

DES CS102
TN 001 0 00 06
TYPE 2616
CDEN 8D
CUST 0
AOM 0
FDN 2332
TGAR 1
LDN NO
NCOS 0
NGRP 0
RNPG 0
SCI 0
SSU
Xlst
CLS  CTD FBA WT ALPR MTD FNA HTA ADD HFD
   MWA LMPN RMMD SMWD AAD IMD XHD IRD NID OLD VCE DRG1
   POD DSX VMD CMSD SLKD CSCD SWD LND CNDA
   CFSD SFD MRD DDV CNID CDCA MSID DAPA BFED RCBD
   ICDD CDMD LLCN MCTD CLBD AUTU
   GPUD DPUD DNDA CFSA ARHD CLTD ASCD
   CFPA CPTA ABDD CFHD FICD NAID BUZZ AGRD MOAD AHD
   DDGA NAMA
   DRDD EXR0
   USRD ULAD RTDD RBDD RBHD PGND FLXD FTTC DNDY DNO3 MCBN CDMR
CPND_LANG ENG
RCO  0
EFD  2332
HUNT 2332
EHT  2332
LHK  0
PLEV 02
CSDN
AST
IAPG 0
AACS NO
ITNA NO
DGRP
MLWU_LANG 0
DNDR 0
KEY  00 SCR 5332 0  MARP
   CPND
      NAME ATHENA_5332
      XPLN 13
      DISPLAY_FMT FIRST,LAST
01
02
03 CFW 4  2332
04 AO6
05 TRN
06
07
08
09
10
11
12
13
14
15 RGA
DATE 16 MAR 2006
REQ PRT
TYPE:
TYPE 2616
TN  107
DATE
PAGE
DES

DES  CS102
TN  001 0 00 07
TYPE 2616
CDEN 8D
CUST 0
AOM 0
FDN  2332
TGAR 1
LDN  NO
NCOS 0
SGRP 0
RNPG 0
SCI 0
SSU
XLST

CLS  CTD FBA WTA LPR MTD FNA HTA ADD HFD
   MWA LMPN RMMD SMWD AAD IMD XHD IRD NID OLD VCE DRG1
   POD DSX VMD CMSD SLKD CCSD SWD LND CNDN
   CFTA SFD MRD DDV CNID CDCA MSID DAPA BFED RCBM
   ICDD CDMD LLCN MCTD CLBD AUTU
   GPUD DPUD DNDA CFXA ARHD CLTD ASCD
   CPF A CT A ABDD CFHD FICD NAID BUZZ AGRD MOAD AHD
   DGD A NAMA
   DRDD EXR0
   USRD ULAD RTDD RBDD RBHD PGND FLXD FTTC DNDY DNO3 MCBN CDMR
CPND_LANG ENG
RCO 0
EFD 2332
HUNT 2332
EHT  2332
LHK 0
PLEV 02
CSDN
AST
IAPG 0
AACS NO
ITNA NO
DGRP
MLWU_LANG 0
DNDR 0
KEY 00 SCR 5333 0  MARP
CPND
   NAME ATHENA_5333
   XPLN 13
DISPLAY_FMT FIRST-LAST
01
02
03 CFW 4 2333
04 AO6
05 TRN
06
07
08
09
10
11
12
13
14
15 RGA
DATE 14 MAR 2006

NACT
Signaling Server Setup Using the Nortel Element Manager:

9. Configure the Zones
10. Configure a new IP Telephony Node summary
11. Configure the Node section

12. Configure the VGW and IP phone codec profile section
13. Configure the QoS section

<table>
<thead>
<tr>
<th>Code</th>
<th>Code Name</th>
<th>Voice payload size (ms/frame)</th>
<th>Voice payload (filter buffer) nominal delay</th>
<th>Voice payload (filter buffer) maximum delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>G711</td>
<td>G711</td>
<td>20</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>G729A</td>
<td>G729A</td>
<td>20</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>G723.1</td>
<td>G723.1</td>
<td>30</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>T38 FAX</td>
<td>T38 FAX</td>
<td>20</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>
14. Configure LAN Configuration section
15. Configure the SIP GW Setting section
16. Configure the Card section for the MC-32 VGMC card section
17. Configure the Signaling Server section
NRS (Network Routing Server):

18. Configure the System Wide Settings
19. Configure the NRS Server Settings

<table>
<thead>
<tr>
<th>System Wide Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB sync interval for alternate database</td>
</tr>
<tr>
<td>SIP registration time to live timer (Seconds)</td>
</tr>
<tr>
<td>H.323 gatekeeper registration time to live timer (Seconds)</td>
</tr>
<tr>
<td>H.323 alias name</td>
</tr>
<tr>
<td>Alternate NRS server is permanent</td>
</tr>
<tr>
<td>Auto backup time (HH:MM)</td>
</tr>
<tr>
<td>Auto backup to FTP site enabled</td>
</tr>
<tr>
<td>Auto backup FTP site IP address</td>
</tr>
<tr>
<td>Auto backup FTP site path</td>
</tr>
<tr>
<td>Auto backup FTP username</td>
</tr>
<tr>
<td>Auto backup FTP password</td>
</tr>
</tbody>
</table>

*Mandatory field indicator*
20. Configure a Service Domain
21. Configure a L1 Domain (UDP)
22. Configure a L0 Domain (CDP)
23. Configure a SIP gateway
24. Configure the Routing Entries
<table>
<thead>
<tr>
<th>#</th>
<th>ID (Click to select)</th>
<th>Support Protocol(s)</th>
<th>Description</th>
<th>First Routing Interface</th>
<th>As Default Route?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>COM1_1</td>
<td>RKS H.323</td>
<td>CCM 4.10</td>
<td>7</td>
<td>D</td>
</tr>
<tr>
<td>2</td>
<td>CME</td>
<td>Net RAS H.323J</td>
<td>CME 3.5 172.20</td>
<td>6</td>
<td>D</td>
</tr>
<tr>
<td>3</td>
<td>CM_JINS</td>
<td>Net RAS H.323J</td>
<td>CME 5.0 172.20</td>
<td>7</td>
<td>D</td>
</tr>
<tr>
<td>4</td>
<td>CM_JAKERS</td>
<td>Net RAS H.323J</td>
<td>CM_JAKERS 172.2</td>
<td>3</td>
<td>D</td>
</tr>
<tr>
<td>5</td>
<td>CM_SATURN</td>
<td>Net RAS H.323J</td>
<td>CCM 5.0 172.20</td>
<td>0</td>
<td>D</td>
</tr>
<tr>
<td>6</td>
<td>Dell_Network</td>
<td>Net RAS H.323J</td>
<td>CST K00101 172</td>
<td>4</td>
<td>D</td>
</tr>
<tr>
<td>7</td>
<td>Dell_Network2</td>
<td>Net RAS H.323J</td>
<td>CST K00102</td>
<td>6</td>
<td>D</td>
</tr>
<tr>
<td>8</td>
<td>Total_CME1</td>
<td>Net RAS H.323J</td>
<td>Total CME 1 172.2</td>
<td>1</td>
<td>D</td>
</tr>
<tr>
<td>9</td>
<td>Total_CME2</td>
<td>Net RAS H.323J</td>
<td>Total CME 2 172.2</td>
<td>1</td>
<td>D</td>
</tr>
<tr>
<td>10</td>
<td>Timel</td>
<td>Net RAS H.323J</td>
<td>Total B IP/PPP91</td>
<td>4</td>
<td>D</td>
</tr>
<tr>
<td>11</td>
<td>c2951</td>
<td>RKS H.323</td>
<td>Cisco 2951 ISR</td>
<td>2</td>
<td>D</td>
</tr>
</tbody>
</table>
Cisco 3845 IOS Configuration

Tony_3845#sh run
Building configuration...

Current configuration : 2286 bytes

! version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname tony_3845
!
boot-start-marker
boot system flash:c3845-ipvoice_ivs-mz.124-7.9.P14a
boot-end-marker
!
logging buffered 100000000 debugging
no logging console
enable password cisco
!
no aaa new-model
!
resource policy
!
ip subnet-zero
ip cef
!
!
!
no ip domain lookup
voice-card 0
no dspfarm
!
!
!
voice service voip
allow-connections h323 to h323
allow-connections h323 to sip
allow-connections sip to h323
allow-connections sip to sip
h323
sip
!
!
!
voice class codec 1
codec preference 1 g711ulaw — Note: This is set to G.729 or G.723 to test voice quality and initiate T.38
!
interface GigabitEthernet0/0
  ip address 172.20.8.26 255.255.255.0
duplex auto
  speed auto
  media-type rj45
  negotiation auto

interface GigabitEthernet0/1
  no ip address
  shutdown
duplex auto
  speed auto
  media-type rj45
  negotiation auto
  ip default-gateway 172.20.8.1
  ip classless
  ip route 0.0.0.0 0.0.0.0 172.20.8.1

  ip http server

control-plane

dial-peer voice 3000 voip
  destination-pattern 30..
  voice-class codec 1
  session target ipv4:172.20.213.253
dtmf-relay h245-alphanumeric
  fax-relay ecm disable
  no fax-relay sg3-to-g3
  no vad

dial-peer voice 4150 voip
  destination-pattern 41..
  voice-class codec 1
  session target ipv4:172.20.212.253
dtmf-relay h245-alphanumeric
  fax-relay ecm disable
  no fax-relay sg3-to-g3
  no vad
dial-peer voice 1660 voip
destination-pattern 16..
voice-class codec 1
session target ipv4:172.20.7.252
dtmf-relay h245-alphanumeric
fax-relay ecm disable
no fax-relay sg3-to-g3
no vad
!
dial-peer voice 5330 voip
destination-pattern 5...
signaling forward unconditional
voice-class codec 1
session protocol sipv2
session target ipv4:172.20.217.100
dtmf-relay rtp-nte
no fax-relay sg3-to-g3
fax protocol t38 ls-redundancy 0 hs-redundancy 0 fallback pass-through g711ulaw ➔ Note: must be removed for three party conference feature to work
no vad
supplementary-service pass-through
!
dial-peer voice 2330 voip
destination-pattern 2...
signaling forward unconditional
voice-class codec 1
session protocol sipv2
session target ipv4:172.20.216.100
dtmf-relay rtp-nte
no fax-relay sg3-to-g3
fax protocol t38 ls-redundancy 0 hs-redundancy 0 fallback pass-through g711ulaw ➔ Note: must be removed for three party conference feature to work
no vad
supplementary-service pass-through
!
!
gatekeeper
shutdown
!
!
line con 0
password cisco
stopbits 1
line aux 0
stopbits 1
line vty 0-4
password cisco
login
!
scheduler allocate 20000 1000
!
end

thon_3845#
### Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUBE</td>
<td>Cisco Unified Border Element</td>
</tr>
<tr>
<td>Cisco IOS</td>
<td>Cisco Internetwork Operating System</td>
</tr>
<tr>
<td>SIP</td>
<td>Session Initiation Protocol</td>
</tr>
<tr>
<td>RTP</td>
<td>Real-Time Protocol</td>
</tr>
</tbody>
</table>
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