



# Avaya S8500 PBX Connectivity Using H.323 Trunks to Cisco Unified CallManager Release 4.1(2)

November 2, 2007 Revision 9

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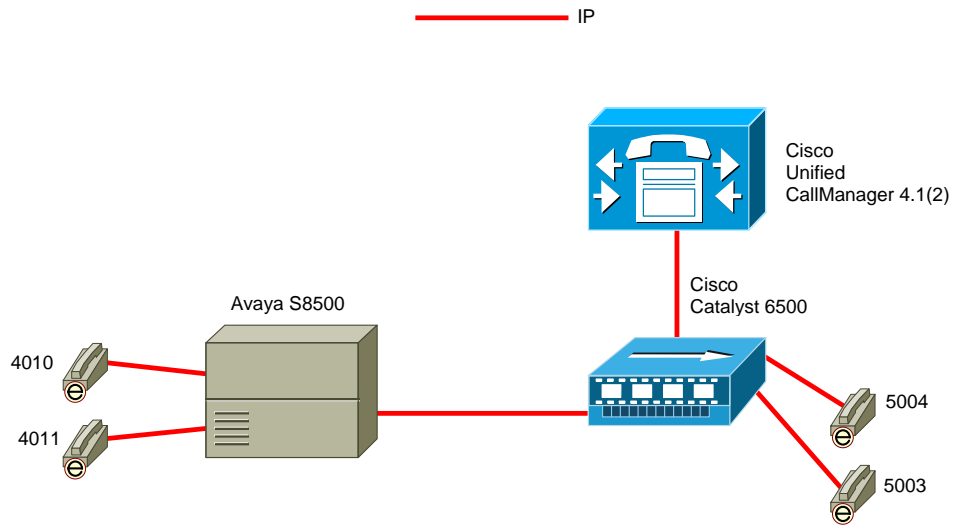
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## Introduction

- This is a lab report performed to ascertain interoperability of Cisco Unified CallManager Release 4.1(2) when connected via H.323 trunk to Avaya S8500 PBX
- The network topology diagram (Figure 1) shows the test setup for end-to-end interoperability with the Cisco Unified CallManager

## Network Topology

Figure 1. Network Topology



## Limitations

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### Call Completion

- Call Completion (Callback on Cisco Unified CallManager; Auto Callback on Avaya PBX) is not supported over H.323 trunks

### End-to-end DTMF signaling

- DTMF tones are not passed over H.323 connections between Avaya and Unified CallManager endpoints unless Avaya Special Application Package SA8507 is enabled on the Avaya S8500 PBX.



#### Call Forward

- Calls forwarded over H.323 trunks are presented to forwarded-to stations as direct call from the original calling party
- Calls from Avaya stations over H.323 trunks to Unified CallManager stations forwarding off-net (e.g. over ISDN PRI trunks connected to PSTN) on ring-no-answer/busy conditions fail to connect. This is due to H.323 protocol incompatibility between Avaya and Cisco (Unified CallManager sends Progress message with Open Logical Channel information; Avaya ignores Progress OLC message). All-calls forwards are connected successfully.

#### MWI

- MWI updates are not passed over H.323 connections between Avaya and Unified CallManager

#### Hardware Requirements

- Cisco Hardware:
  - Cisco Catalyst 6500 switch with 6608 T1/E1 blades
  - Cisco Unified CallManager 4.1(2)
- Avaya S8500 PBX hardware:
  - TN799 C-LAN
  - TN2302 Media Processor

#### Software Requirements

- Avaya CM 2.0
- Cisco Unified CallManager 4.1(2)

#### Features

##### Features Supported

- CLIP-Calling Line (Number) Identification Presentation
- CLIR-Calling Line (Number) Identification Restriction
- CNIP-Calling Name Identification Presentation
- CNIR-Calling Name Identification Restriction
- COLP-Connected Line (Number) Identification Presentation
- COLR- Connected Line (Number) Identification Restriction
- CONP-Connected Name Identification Presentation
- CONR- Connected Name Identification Restriction



- CT-Call Transfer
- End-to-End DTMF signaling (Avaya Special Application package SA8507 required)

#### **Features Not Supported**

- MWI- Message Waiting Indication (lamp ON, lamp OFF)
- Call Completion (Callback; Automatic Callback)
- CFU-Call Forwarding Unconditional
- CFB-Call Forwarding Busy
- CFNR-Call Forwarding No Reply
- Alerting Name

#### **Configuration**

##### **Configuring the Avaya Definity G3 PBXs**

1. Configure the Cisco Unified CallManager as an IP node in the IP node-names form
2. Configure IP Codec Set to be used in the IP Network Region assigned to the Signaling Group used by the trunk group
3. Configure the Signaling Group(s)
4. Configure the Trunk Group(s)
5. Configure ISDN Numbering plan
6. Configure the Uniform Dialing Plan
7. Configure Route Pattern(s)

#### **Configuration Menus and Commands**

This document assumes that the Media Processor and C-LAN cards are already configured and working properly on the Avaya S8500.

Figure 2. IP node-names configuration form



```
display node-names ip
IP NODE NAMES
  Name          IP Address
CCM4.1         172.20 .231.254
CCM4.1.2       172.20 .236.2
avayasip1     172.20 .212.254
clan1         172.20 .212.253
clan1serverb  172.20 .213.253
default       0 .0 .0 .0
medpro1       172.20 .212.252
procr         . . .

( 8 of 8 administered node-names were displayed )
Use 'list node-names' command to see all the administered node-names
Use 'change node-names ip xxx' to change a node-name 'xxx' or add a node-name
```

Note: The configuration above shows the Unified CallManager configured as “CCM4.1.2”. The MCS server hosting the CM application has been assigned IP address 172.20.236.2

Figure 3. IP Codec Set configuration

```
display ip-codec-set 1 Page 1 of 2
IP Codec Set
Codec Set: 1
Audio      Silence  Frames  Packet
Codec      Suppression Per Pkt  Size(ms)
1: G.711MU      n        2       20
2: G.729        n        2       20
3: G.723-6.3K  n        1       30
4:
5:
6:
7:
Media Encryption
1: none
2:
3:
```



Figure 4. IP Network Region configuration

```
display ip-network-region 1                                     Page 1 of 19
IP NETWORK REGION
Region: 1
Location: 1           Home Domain: lab.com
Name: CiscoLAB
AUDIO PARAMETERS
Codec Set: 1          Intra-region IP-IP Direct Audio: yes
UDP Port Min: 2048    Inter-region IP-IP Direct Audio: yes
UDP Port Max: 3028    IP Audio Hairpinning? y
                    RTCP Reporting Enabled? y
DIFFSERV/TOS PARAMETERS
Call Control PHB Value: 34    RTCP MONITOR SERVER PARAMETERS
Audio PHB Value: 46          Use Default Server Parameters? y
802.1P/Q PARAMETERS
Call Control 802.1p Priority: 7
Audio 802.1p Priority: 6      AUDIO RESOURCE RESERVATION PARAMETERS
H.323 IP ENDPOINTS
H.323 Link Bounce Recovery? y    RSUP Enabled? n
Idle Traffic Interval (sec): 20
Keep-Alive Interval (sec): 5
Keep-Alive Count: 5
```

Figure 5. Signaling Group configuration

```
display signaling-group 4                                     Page 1 of 5
SIGNALING GROUP
Group Number: 4          Group Type: h.323
Remote Office? n        Max number of NCA TSC: 5
SBS? n                 Max number of CA TSC: 5
Trunk Group for Channel Selection: 4
Supplementary Service Protocol: a
T303 Timer(sec): 10
Near-end Node Name: clan1    Far-end Node Name: CM-POLARIS
Near-end Listen Port: 1720   Far-end Listen Port: 1720
Far-end Network Region: 1
LRQ Required? n           Calls Share IP Signaling Connection? n
RRQ Required? n
Media Encryption? n       Bypass IF IP Threshold Exceeded? n
DTMF over IP: out-of-band   Direct IP-IP Audio Connections? y
IP Audio Hairpinning? y
Interworking Message: PROGRESS
```



Note: when configuring this form, make sure that parameter "Near-end Node Name" contains the node name of the CLAN card to be used for H.323 connectivity. Make sure parameter "Far-end Node Name" contains the node name assigned to the Cisco Unified CallManager server. Also, please note that parameter "DTMF over IP", whenever configured as in-band or inband-G711 does not allow the PBX to send DTMF tones from/to Unified CallManager end devices. In order to pass DTMF over the H.323 trunk, Special Application package SA8507 must be installed on The Avaya S8500 PBX, and parameter "DTMF over IP" must be configured as "out-of-band".

Figure 6. Trunk Group configuration – Page 1

```
display trunk-group 4                                     Page 1 of 22
TRUNK GROUP
Group Number: 4          Group Type: isdn          CDR Reports: y
  Group Name: To CM-Neptune    COR: 1          TN: 1          TAC: 804
  Direction: two-way          Outgoing Display? n    Carrier Medium: IP
  Dial Access? y              Busy Threshold: 5      Night Service:
Queue Length: 0
Service Type: tie          Auth Code? n          TestCall ITC: rest
                          Far End Test Line No:
TestCall BCC: 4
TRUNK PARAMETERS
  Codeset to Send Display: 0    Codeset to Send National IEs: 6
  Max Message Size to Send: 260 Charge Advice: none
  Supplementary Service Protocol: a  Digit Handling (in/out): enbloc/enbloc
  Trunk Hunt: cyclical          QSIG Value-Added? n
  Incoming Calling Number - Delete:  Insert:          Digital Loss Group: 18
  Bit Rate: 1200                Synchronization: async  Format: unk-unk
Disconnect Supervision - In? y  Out? n          Duplex: full
Answer Supervision Timeout: 0
```

Figure 7. Trunk Group configuration – Page 2



```
display trunk-group 4                                     Page 2 of 22
TRUNK FEATURES
  ACA Assignment? n           Measured: none       Wideband Support? n
                             Internal Alert? n         Maintenance Tests? y
                             Data Restriction? n       NCA-TSC Trunk Member: 2
                             Send Name: y             Send Calling Number: y
  Used for DCS? n
  Suppress # Outpulsing? n   Format: unknown
  Outgoing Channel ID Encoding: preferred   UUI IE Treatment: service-provider
                                           Replace Restricted Numbers? n
                                           Replace Unavailable Numbers? n
                                           Send Connected Number: y
                                           Modify Tandem Calling Number? n
  Send UUI IE? y
  Send UCID? n
  Send Codeset 6/7 LAI IE? y

SBS? n Network (Japan) Needs Connect Before Disconnect? n
```

Figure 8. Trunk Group configuration – Page 6

```
display trunk-group 4                                     Page 6 of 22
TRUNK GROUP
Administered Members (min/max): 1/2
Total Administered Members: 2
GROUP MEMBER ASSIGNMENTS
  Port   Code Sfx Name   Night   Sig Grp
  1: T00007
  2: T00008
  3:
  4:
  5:
  6:
  7:
  8:
  9:
  10:
  11:
  12:
  13:
  14:
  15:
```

Note: When assigning trunk group members, simply type “ip” in the “port” parameter field, and enter the proper signaling group number. The PBX will automatically assign the next available ip trunk port.



Figure 9. ISDN Numbering plan configuration

```
display public-unknown-numbering Page 1 of 8
NUMBERING - PUBLIC/UNKNOWN FORMAT
Total
Ext  Ext  Trk  CPN  Total
Len  Code  Grp(s)  Prefix  CPN  Ext  Ext  Trk  CPN  Total
          CPN  Len  Len  Code  Grp(s)  Prefix  Len
4  2          4
4  4          4
4  5    4    4
```

Note: Since the trunk group used is configured to use ISDN – Unknown Numbering, configuration form “ISDN Public-Unknown-Numbering” is used. If trunk groups are configured to use Private numbering, configuration form “ISDN Private-Numbering” needs to be used.

Figure 10. Uniform Dialing Plan Configuration





```
display route-pattern 4                                     Page 1 of 3
Pattern Number: 4   Pattern Name:
                    Secure SIP? n
  Grp FRL NPA Pfx Hop Toll No.  Inserted          DCS/  IXC
  No   Mrk Lmt List Del  Digits          QSIG
  1: 4   0          3          Intw
  2:
  3:
  4:
  5:
  6:
                                     n  user
                                     n  user
                                     n  user
                                     n  user
                                     n  user
                                     n  user

  BCC VALUE  TSC CA-TSC  ITC BCIE Service/Feature BAND  No. Numbering LAR
  0 1 2 3 4 W   Request
  1: y y y y y n y  as-needed bothunr          unk-unk  none
  2: y y y y y n n          rest          none
  3: y y y y y n n          rest          none
  4: y y y y y n n          rest          none
  5: y y y y y n n          rest          none
  6: y y y y y n n          rest          none
```



## Configuring Cisco Unified CallManager

6608 H.323 Gateway Configuration

# Gateway Configuration

[Back to Find/List Gateways](#)  
[Dependency Records](#)

**Product : H.323 Gateway**  
**Gateway : 172.20.212.253**  
**Device Protocol: H.225**  
**Registration: Unknown**  
**IP Address: 172.20.212.253**

Status: Ready

Update

Delete

Reset Gateway

### Device Information

Device Name*	<input type="text" value="172.20.212.253"/>
Description	<input type="text" value="S8500"/>
Device Pool*	<input type="text" value="Default"/>
Call Classification*	<input type="text" value="OnNet"/>
Media Resource Group List	<input type="text" value="MRGL_CM_Neptune"/>
Location	<input type="text" value="&lt; None &gt;"/>
AAR Group	<input type="text" value="&lt; None &gt;"/>
Signaling Port*	<input type="text" value="1720"/>

- Media Termination Point Required
- Retry Video Call as Audio
- Wait for Far End H.245 Terminal Capability Set

Note: In the Device Name field, enter the IP address of the C-LAN card used in the Avaya S8500. Also, make sure that parameter "Wait for Far End H.245 Terminal Capability Set" is enabled, or calls will not complete.



### Call Routing Information

#### Inbound Calls

Significant Digits*	All
Calling Search Space	< None >
AAR Calling Search Space	< None >
Prefix DN	

- Redirecting Number IE Delivery - Inbound
- Enable Inbound FastStart

#### Outbound Calls

Calling Party Selection*	Originator
Calling Party Presentation*	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
Caller ID DN	

- Display IE Delivery
- Redirecting Number IE Delivery - Outbound
- Enable Outbound FastStart

Codec For Outbound FastStart*	G711 u-law 64K
-------------------------------	----------------

\* indicates required item

Note: Avaya S8500 H.323 trunks support FastStart. Make sure that Inbound and Outbound FastStart are enabled.



## Cisco Unified CallManager H.323-related Service Parameters Configuration

### Clusterwide Parameters (Device - H323)

Parameter Name	Parameter Value	Suggested Value
Accept Unknown TCP Connection*	<input type="text" value="False"/>	False
Allow TCP KeepAlives For H323*	<input type="text" value="True"/>	True
BRQ Enabled*	<input type="text" value="False"/>	False
Call Present Disconnect Flag*	<input type="text" value="False"/>	False
H225 Block Setup Destination*	<input type="text" value="False"/>	False
H225 DB Retry Timer (sec)*	<input type="text" value="0"/>	0
H225 Device Connect Timer*	<input type="text" value="0"/>	0
H225 DTMF Duration (msec)*	<input type="text" value="300"/>	100
H225 TspReq Retry*	<input type="text" value="2"/>	2
H225 Intercluster Call Throttle Timer*	<input type="text" value="30"/>	30



H225 T302 Timer (msec)*	<input type="text" value="15000"/>	15000
H225 T303 Timer (msec)*	<input type="text" value="4000"/>	4000
H225 T304 Timer (msec)*	<input type="text" value="30000"/>	30000
H225 T305 Timer (msec)*	<input type="text" value="30000"/>	30000
H225 T310 Timer (msec)*	<input type="text" value="60000"/>	60000
H225 TCP Timer (sec)*	<input type="text" value="5"/>	5
H245 TCS Timeout*	<input type="text" value="10"/>	10
H323 Calling Party Number Screening Indicator*	<input type="text" value="Calling number screened and passed"/>	Calling number screened and passed
Tone on Connect*	<input type="text" value="False"/>	False
RAS ARQ Timer (sec)*	<input type="text" value="3"/>	3
RAS BRQ Timer (sec)*	<input type="text" value="3"/>	3
RAS DRQ Timer (sec)*	<input type="text" value="3"/>	3
RAS RRQ Timer (sec)*	<input type="text" value="3"/>	3



Ras URQ Timer (sec)*	<input type="text" value="3"/>	3
Retry Count for ARQ*	<input type="text" value="2"/>	2
Retry Count for BRQ*	<input type="text" value="2"/>	2
Retry Count for DRQ*	<input type="text" value="2"/>	2
Retry Count for RRQ*	<input type="text" value="2"/>	2
Retry Count for URQ*	<input type="text" value="1"/>	1
Send Product ID and Version ID*	<input type="text" value="False"/>	False
Send Progress Timer (msec)*	<input type="text" value="3000"/>	3000
Send H225 User Info Message*	<input type="text" value="User Info for Call Progress Tone"/>	User Info for Call Progress Tone
Status Enquiry Poll Timer (msec)*	<input type="text" value="10000"/>	10000
Device Name of GK-controlled Trunk That Will Use Port 1720*	<input type="text" value="None"/>	None
Host Name/IP Address of GK That Will Use RAS UDP Port 1719*	<input type="text" value="None"/>	None
Fail Call If MTP Allocation Fails*	<input type="text" value="False"/>	False



## Acronyms

Acronym	Definitions
ANF-PR	Additional Network Feature Path Replacement
AOC	Advice-of-charge. Information element is sent with the connection setup information for incoming Euro-ISDN connections. The AOC IE is used for call charge calculation.
CCM	Cisco Unified CallManager
CCBS	Call Completion to Busy Subscriber
CCNR	Call Completion on No Reply
CFB	Call Forwarding on Busy
CFNR	Call Forwarding No Reply
CFU	Call Forwarding Unconditional
CLIP	Calling Line (Number) Identification Presentation
CLIR	Calling Line (Number) Identification Restriction
CMM	Communication Media Module (CMM) is a Cisco Catalyst® 6500 Series and Cisco 7600 Series line card that provides flexible and high-density T1/E1 gateways
CNIP	Calling Name Identification Presentation
CNIR	Calling Name Identification Restriction
COLP	Connected Line (Number) Identification Presentation
COLR	Connected Line (Number) Identification Restriction
CONP	Connected Name Identification Presentation
CONR	Connected Name Identification Restriction
CT	Call Transfer
MWI	Message Waiting Indicator
PSTN	Public Switched Telephone Network



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