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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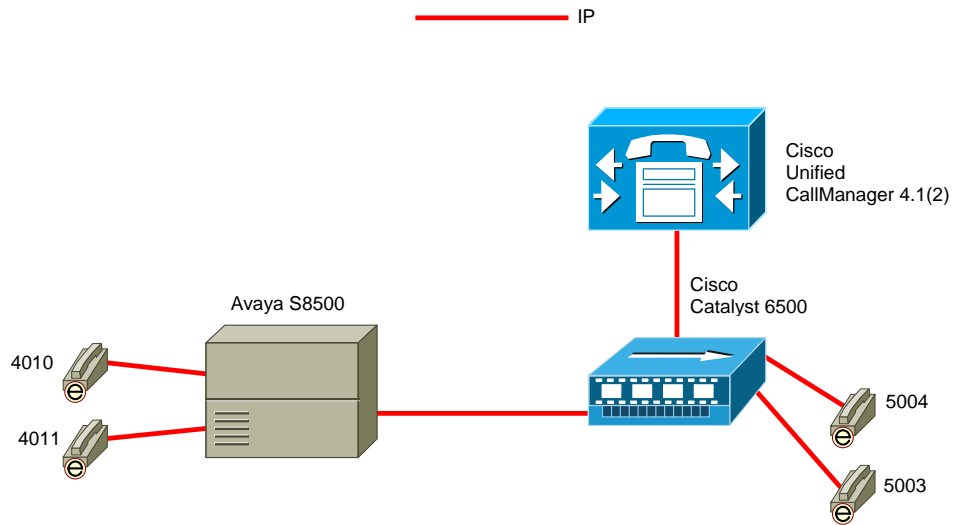
Introduction

- 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

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

                              Intra-region IP-IP Direct Audio: yes
AUDIO PARAMETERS              Inter-region IP-IP Direct Audio: yes
   Codec Set: 1                        IP Audio Hairpinning? y
UDP Port Min: 2048
UDP Port Max: 3028                      RTCP Reporting Enabled? y
                             RTCP MONITOR SERVER PARAMETERS
DIFFSERV/TOS PARAMETERS       Use Default Server Parameters? y
 Call Control PHB Value: 34
       Audio PHB Value: 46
802.1P/Q PARAMETERS
 Call Control 802.1p Priority: 7
       Audio 802.1p Priority: 6    AUDIO RESOURCE RESERVATION PARAMETERS
H.323 IP ENDPOINTS                             RSVP Enabled? n
 H.323 Link Bounce Recovery? y
 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 NCA TSC: 4

        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
                                             Digital Loss Group: 18
Incoming Calling Number - Delete:      Insert:             Format: unk-unk
             Bit Rate: 1200         Synchronization: async    Duplex: full
 Disconnect Supervision - In? y  Out? n
 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
GROUP MEMBER ASSIGNMENTS             Total Administered Members:    2

        Port    Code Sfx Name        Night          Sig Grp
   1: T00007                                         4
   2: T00008                                         4
   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                              Total
Ext Ext  Trk       CPN            CPN Ext Ext  Trk       CPN            CPN
Len Code Grp(s)    Prefix         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 uniform-dialplan 5                              Page  1 of  2
                    UNIFORM DIAL PLAN TABLE
                                            Percent Full: 0

 Matching          Insert          Node   Matching          Insert          Node
 Pattern  Len Del Digits Net Conv Num    Pattern   Len Del Digits Net Conv Num
 5         4   0   225   aar  n                                           n
 6600      4   0   225   aar  n                                           n
                               n                                           n
                               n                                           n
                               n                                           n
                               n                                           n
                               n                                           n
                               n                                           n
                               n                                           n
                               n                                           n
                               n                                           n
                               n                                           n
                               n                                           n
                               n                                           n
```

Note: For this test, the Unified CallManager has ext. 5XXX as its numbering range. AAR is used to route calls to the proper Route Pattern.

This is accomplished by configuring an entry in AAR analysis form, so as to route AAR digits 225 to the proper Route Pattern.

Figure 11. Route Pattern 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
                             Dgts                              Intw
 1: 4     0                  3                                    n   user
 2:                                                               n   user
 3:                                                               n   user
 4:                                                               n   user
 5:                                                               n   user
 6:                                                               n   user

    BCC VALUE   TSC CA-TSC    ITC BCIE Service/Feature BAND  No. Numbering LAR
    0 1 2 3 4 W     Request                                  Dgts Format
                                                        Subaddress
 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
```

Gateway Configuration

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*	172.20.212.253
Description	S8500
Device Pool*	Default
Call Classification*	OnNet
Media Resource Group List	MRGL_CM_Neptune
Location	< None >
AAR Group	< None >
Signaling Port*	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*	False	False
Allow TCP KeepAlives For H323*	True	True
BRQ Enabled*	False	False
Call Present Disconnect Flag*	False	False
H225 Block Setup Destination*	False	False
H225 DB Retry Timer (sec)*	0	0
H225 Device Connect Timer*	0	0
H225 DTMF Duration (msec)*	300	100
H225 TspReq Retry*	2	2
H225 Intercluster Call Throttle Timer*	30	30

![CISCO]

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

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