Avaya Solution & Interoperability Test Lab

Configuring Avaya Communication Manager with Cisco VoIP Gateways using H.323 IP Trunks - Issue 1.0

Abstract

These Application Notes describe how to configure an H.323 VoIP trunk between Avaya Communication Manager and Cisco Gateways. The configuration details focus on the IP trunk configured in the Avaya S8500 Media Server, Avaya G650 Media Gateway, and Cisco 3725 Gateway. The configuration can be used for other Avaya Media Servers (S8700, S8300, etc.) and Avaya Media Gateways (G600, G350, G700, MCC1, etc.). The detailed configuration for T1 PRI and Caller ID are not covered in these Application Notes.

1. Introduction

These Application Notes provide the detailed IP trunk configuration between the Avaya S8500 Media Server and the Cisco 3725 Gateway for successful VoIP calls. The configuration details focus on the IP trunk configured in the Avaya S8500 Media Server, Avaya G650 Media Gateway, and Cisco 3725 Gateway. The configuration can be used for other Avaya Media Servers (S8700, S8300, etc.) and Avaya Media Gateways (G600, G350, G700, MCC1, etc.). The T1/PRI configuration on the Cisco 3725 Gateway that connects to the Avaya S8700 Media Server with G700 Media Gateway is also shown.

Figure 1 shows the network diagram used for these Application Notes. In Office A, Avaya S8500 Media Server and Avaya G650 Media Gateway can provide H.323 Gateway functionality. In Office B, Cisco 3725 access router is configured to be an H.323 Gateway. The Cisco 3725 Gateway is connected to the Avaya S8300 Media Server with Avaya G700 Media Gateway via T1/PRI.

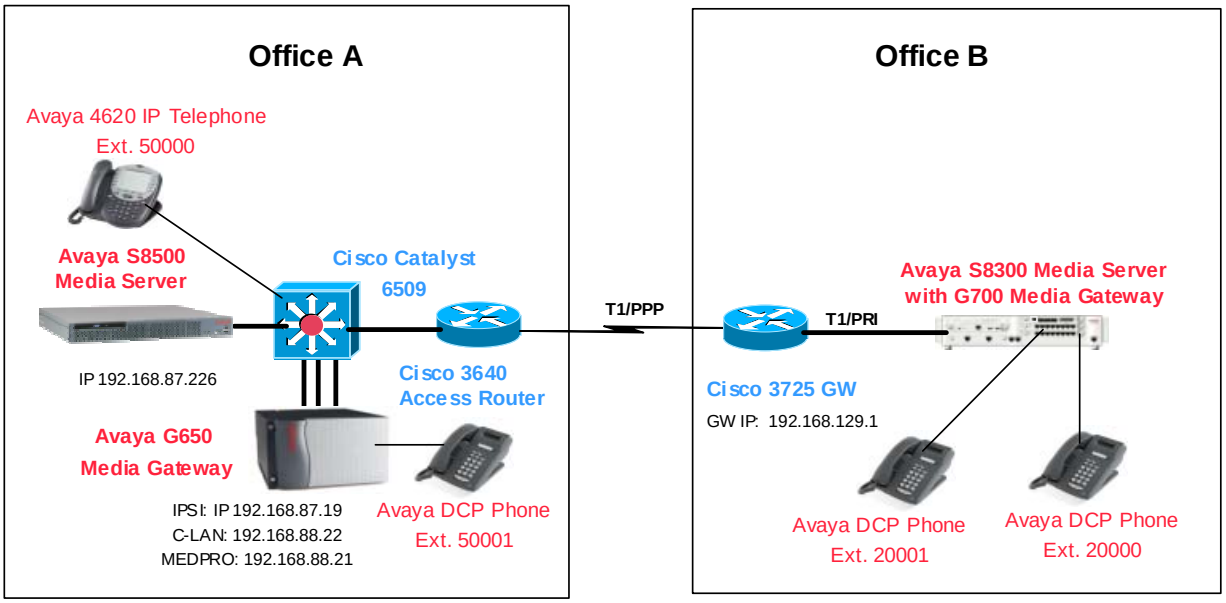

Figure 1: Network Diagram For Avaya S8500 Media Server with Avaya G650 Media Gateway and Cisco 3725 Gateway

2. Equipment and Software Validated

The following equipment and software were used for the sample configuration provided:

Network Component	Software Version
Avaya Communication Manager S8500 Media Server S8300 Media Server	 2.0.1 (221.1) 2.0.1 (221.1)
Avaya G650 Media Gateway IPSI C-LAN MEDPRO	 FW009 FW011 FW072
Avaya G700 Media Gateway	21.22.0
Avaya 4620 IP Telephone	2.0.1
Cisco Gateway (Cisco 3725 MultiService Access Router)	12.2(13)T5 (Enterprise Plus)
Cisco Catalyst 6509	8.2.1
Cisco 3640 MultiService Access Router	12.2(24)

Table 1 - Network Component Software Versions

3. Configuring Avaya Communication Manager

Refer to [1] for detailed configurations for the following sections (not covered in these Application Notes):

- Configuring Avaya S8500 Media Server to control Avaya G650 Media Gateway
- Controlling Intra-office and Inter-Office VoIP behavior on the Avaya S8500 Media Server
- Configuring Avaya S8500 Media Server for Call Routing and Caller ID
- Configuring Avaya S8300 Media Server for T1/PRI with the Cisco 3725 Gateway
- Configuring T1/PRI and Dial Peers on the Cisco 3725 Gateway

This section only covers the configuration for the Avaya S8500 Media Server with the Avaya G650 Media Gateway.

Cisco Gateways only support out-of-band DTMF via a H.245 message. Avaya Communication Manager supports DTMF relay via H245-signal and H245-alphanumeric from Cisco. The Avaya S8500 Media Server must be configured to send out-of-band DTMF via H.245. Use the command **display system-parameters special-applications** to verify that **H245 Support With**

Other Vendors is set to **y**. In addition, **DTMF over IP** must be configured to **out-of-band** on the signaling group forms.

```
display system-parameters special-applications                Page   4 of   4
                            SPECIAL APPLICATIONS

     (SA8481) - Replace Calling Party Number with ASAI ANI? n
               (SA8500) - Expanded UUI Display Information? n
                 (SA8506) - Altura Interoperability (FIPN)? n
                (SA8507) - H245 Support With Other Vendors? y
                (SA8508) - Multiple Emergency Access Codes? n
 (SA8510) - NTT Mapping of ISDN Called-Party Subaddress IE? n
```

Use the command **change node-names ip** to add the Cisco 3725 Gateway into the node-name database. Note that this IP address must be the same IP address configured on the Cisco 3725 Gateway in Section 4. For an incoming call, Avaya Communication Manager will try to match the call to a signaling group based on the remote Gateway's IP address. The call will be denied if there is no match. Therefore, the remote Gateway's IP address must be configured correctly.

Note that the C-LAN of the Avaya G650 Media Gateway functions as an H.323 Gateway. The C-LAN IP address must be used as a target Gateway IP address for remote Gateways.

```
change node-names ip                                          Page   1 of   1
                                  IP NODE NAMES
    Name                 IP Address          Name              IP Address
CLAN                  192.168.88 .22                            .   .   .
GW-3725               192.168.129.1                             .   .   .
MEDPRO                192.168.88 .21                            .   .   .
default               0  .0  .0  .0                            .   .   .
procr                    .   .   .                             .   .   .
                         .   .   .                             .   .   .
```

Use the command **add signaling-group X** (**X** is the signaling group number) to add signaling group. The **Near-End Node Name** and **Far-end Node Name** are configured to the C-LAN and Cisco 3725 Gateway, respectively. The **Near-end Listen Port** and **Far-end Listen Port** must be configured to **1720** ((TCP port 1720 for H.225 call setup) for an IP trunk. **Direct IP-IP Audio Connections** and **IP Audio Hairpinning** must be set to **n** for successful media paths. By disabling Direct IP-IP and IP Audio Hairpinning, the RTP stream for a call between Office A (either digital phone or IP telephone) and Office B is between the MEDPRO on the Avaya G650 Media Gateway and the Cisco 3725 Gateway.

In order to support out-of-band DTMF, the **DTMF over IP** must be configured to **out-of-band**. In order to control which Codec set is used, the **Far-end Network Region** must be configured to a different network region from the IP endpoints in Office A. Note that this signaling group is configured to be associated with channel group 11.

```
change signaling-group 11                                       Page   1 of   5
                              SIGNALING GROUP

 Group Number: 11             Group Type: h.323
                            Remote Office? n          Max number of NCA TSC: 0
                                      SBS? n           Max number of CA TSC: 0
                                                     Trunk Group for NCA TSC:
       Trunk Group for Channel Selection: 11
          Supplementary Service Protocol: a


        Near-end Node Name: CLAN              Far-end Node Name: GW-3725
     Near-end Listen Port: 1720            Far-end Listen Port: 1720
                                      Far-end Network Region: 2
             LRQ Required? n          Calls Share IP Signaling Connection? n
             RRQ Required? n                H245 Control Addr On FACility? n
                                       Bypass If IP Threshold Exceeded? n

             DTMF over IP: out-of-band     Direct IP-IP Audio Connections? n
                                                     IP Audio Hairpinning? n
                                        Interworking Message: PROGress
```

Use the command **add trunk–group <group number>** to add an IP trunk group. Use the command **display trunk-group** to verify the configuration. The following screen shows the IP trunk group 11 configuration. As a standard IP trunk configuration, **Group Type** is configured to **isdn**, **Carrier Media** to **IP** and **Service Type** to **tie**.

Codeset to Send Display must be set to **0** to avoid any potential problems with the new Cisco IOS version.

```
display trunk-group 11                                          Page   1 of  22
                                TRUNK GROUP

Group Number: 11                   Group Type: isdn          CDR Reports: y
  Group Name: GW-3725                     COR: 1        TN: 1        TAC: 111
   Direction: two-way        Outgoing Display? n         Carrier Medium: IP
 Dial Access? n                Busy Threshold: 255       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
                                                  Digital Loss Group: 18
Calling Number - Delete:     Insert:                Numbering Format:
             Bit Rate: 1200         Synchronization: async    Duplex: full
 Disconnect Supervision - In? y  Out? n
 Answer Supervision Timeout: 0
```

In order to support caller ID on the IP trunk (isdn type), configure **Send Name** and **Send Calling Number** to **y**. In the sample configuration, **Numbering Format** is configured to **unk-pvt**.

```
display trunk-group 11                                        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:
                                    Send Name: y      Send Calling Number: y
            Used for DCS? n
   Suppress # Outpulsing? n    Numbering Format: unk-pvt
 Outgoing Channel ID Encoding: preferred     UUI IE Treatment: service-provider

                                              Replace Restricted Numbers? n
                                             Replace Unavailable Numbers? n
                                                   Send Connected Number: n

             Send UUI IE? y
               Send UCID? n
 Send Codeset 6/7 LAI IE? y
```

IP trunk member port values are initially configured to "ip" in the **Port** field. The system will then assign a **Txxxxx** value to the port as shown below. IP trunk members are virtual ports. In the following screen, four members associated with signaling group 11 are configured. Note that these trunk members are used for both incoming and outgoing calls. When the Avaya S8500 Media Server receives a call from the Cisco 3725 Gateway, the Avaya S8500 Media Server will match the call to this trunk group through signaling group 11.

```
Display trunk-group 11                                        Page   6 of 22
                                  TRUNK GROUP
                                       Administered Members (min/max):   1/4
GROUP MEMBER ASSIGNMENTS                   Total Administered Members:   4

       Port    Code Sfx Name        Night           Sig Grp
  1: T00009                                          11
  2: T00010                                          11
  3: T00011                                          11
  4: T00012                                          11
…
```

4. Configuring Cisco 3725 Gateway

When configuring an IP trunk between the Avaya Communication Manager and the Cisco Gateway, verify that following are configured correctly:

- Use the command **h323-gateway voip bind srcaddr** to configure the IP address (192.168.129.1 in the sample configuration) of the Cisco Gateway so that this IP address included in the H.323 packet is deterministic and consistently indicates the same address for the source.

- As mentioned in Section 3, the Avaya S8500 Media Server must use this IP address for the remote Cisco Gateway in the signaling group configuration.
- The Cisco Gateway must use the C-LAN IP (192.168.88.22 in the sample configuration) in the VoIP dial peer configuration. Do not use the IP address of the Avaya S8500 Media Server.

The following screen is the annotated Cisco 3725 Gateway configuration. The important VoIP related configuration is highlighted in bold.

… **isdn switch-type primary-5ess** ! voice service pots ! voice service voip fax protocol t38 ls-redundancy 0 hs-redundancy 0 fallback cisco ! **voice class codec 1** **codec preference 1 g729br8** **codec preference 2 g711ulaw** **!** **voice class codec 2** **codec preference 1 g711ulaw** **codec preference 2 g729br8** ! ! mta receive maximum-recipients 0 ! controller T1 1/0 shutdown framing esf linecode b8zs no yellow generation no yellow detection ! **controller T1 1/1** **framing esf** **clock source line primary** **linecode b8zs** **pri-group timeslots 1-2,24** no yellow generation no yellow detection ! ! interface FastEthernet0/0 ip address 192.168.103.2 255.255.255.0 duplex auto speed auto ! !	Global configuration for the ISDN Switch type. Voice Codec class configuration T1/PRI Configuration. Use the line clock from the S8300 T1/PRI.

interface FastEthernet0/1 **ip address 192.168.129.1 255.255.255.0** duplex auto speed auto **h323-gateway voip bind srcaddr 192.168.129.1** ! interface Serial0/1 ip address 192.16.100.1 255.255.255.0 encapsulation ppp service-module t1 timeslots 1-24 !	Interface FastEthernet 0/1 configuration. Configure the Gateway IP address to 192.168.129.1.
interface Serial1/1:23 no ip address no logging event link-status **isdn switch-type primary-5ess** **isdn incoming-voice voice** **isdn outgoing display-ie** no cdp enable !	ISDN D-Channel configuration Configure ISDN switch type Configure incoming-voice to voice. Display IE for outgoing ISDN to the Avaya S8300 Media Server.
router ospf 1 log-adjacency-changes network 192.16.100.0 0.0.0.255 area 0 network 192.168.129.0 0.0.0.255 area 0 ! ip classless ip http server ! call rsvp-sync ! voice-port 1/1:23 ! ! mgcp profile default ! ! dial-peer cor custom !	
dial-peer voice 3 pots **destination-pattern 2....** ! !	POTS dial Peer configuration For the call to the Avaya S8300 Media Server.
direct-inward-dial	The Cisco 3725 Gateway will use the digits in the Q.931 setup message from the S8300 Media Server to set up VoIP call instead of providing the second dial tone.
port 1/1:23	Route the call to the T1/PRI for the matched destination pattern.
forward-digits all	Forward all the digits to the S8300.

dial-peer voice 10 voip **destination-pattern 5....** **voice-class codec 2** **session target ipv4:192.168.88.22** **dtmf-relay h245-alphanumeric** ! telephony-service admin-username Admin ! …	VoIP dial peer configuration When the Gateway receives the called digits 5xxxx, use this dial peer Codec class 2 is used for Codec negotiation. Configure remote Gateway IP address to the C-LAN of the Avaya G650 Media Gateway Send out-of-band DTMF via H245-alphanumeric

5. Voice Call Flow between the Avaya Communication Manager and Cisco 3725 Gateway

Call flows from ext. 50000 (Avaya Communication Manager) to ext. 20000 (Cisco 3725 Gateway):

- User dials 20000, the Avaya S8500 Media Server will associate the call with signaling group 11 and trunk group 11 based on its dial plan.
- The Avaya S8500 Media Server will set up a VoIP call with the Cisco 3725 Gateway. During the call setup, the Cisco 3725 Gateway will exchange call control messages with the Avaya S8300 Media Server/G700 Media Gateway on the T1/PRI trunk.

Call flows from ext. 20000 (Cisco 3725 Gateway) to ext. 50000 (Avaya Communication Manager):

- User dials 50000, the Avaya S8300 Media Server will route the call to the T1/PRI and send call control messages to the Cisco 3725 Gateway.
- The Cisco 3725 Gateway will map the called number 50000 to dial peer 10 based on its dial plan, and establish the VoIP call with the Avaya S8500 Media Server.
- The Avaya S8500 will map the incoming call to signaling group 11 and trunk group 11, and exchange call control messages with the Cisco 3725 Gateway.

6. Verification Steps

The following are the verification steps:

- Verify that calls can be made between Office A and B.
- Verify that out of band DTMF can be passed between Office A and B.
- Verify that caller ID (calling name and number) can be displayed correctly.

7. Conclusion

As illustrated in these Application Notes, calls can be made on the IP trunk between the Avaya Communication Manager and the Cisco Gateway. DTMF Relay and Caller ID also work well between the Avaya Communication Manager and Cisco Gateways.

8. Reference

Application Notes:

[1] Title: Configuring Avaya Communication Manager With Cisco Gatekeepers and Cisco VoIP Gateways.

9. Glossary

Technical Term	Definition as it pertains to this document
LAN	Local Area Network
WAN	Wide Area Network
IPSI	IP Server Interface
C-LAN	Control-LAN
MEDPRO	Media Processor
SAT	System Access Terminal
Codec	Coder/Decoder
RAS	Registration, Administration and Status

Please e-mail any questions or comments pertaining to these Application Notes along with the full title name and filename, located in the lower right corner, directly to the Avaya Solution & Interoperability Test Lab at interoplabnotes@list.avaya.com