



Avaya Solution & Interoperability Test Lab

Application Notes of Avaya and Polycom H.323 Video Solution Consisting of Polycom CMA 4000 with Avaya Aura™ Communication Manager – Issue 1.0

Abstract

These Application Notes describe a compliance tested solution comprised of Avaya Aura™ Communication Manager and the Polycom CMA 4000. The solution described in these Application Notes pertains only to H.323 interoperability between Avaya Aura™ Communication Manager and the aforementioned Polycom gatekeeper.

Information in these Application Notes has been obtained through DevConnect compliance testing and additional technical discussions. Testing was conducted via the DevConnect Program at the Avaya Solution and Interoperability Test Lab.

1. Introduction

This Application Notes describes a compliance tested solution comprised of Avaya Aura™ Communication Manager and Polycom CMA 4000 Gatekeeper. Connectivity between Polycom and Avaya devices is via H.323 signaling. This configuration provides basic point-to-point and multipoint Video/Audio calls through Avaya Aura™ Communication Manager and Polycom Gatekeeper.

1.1. Interoperability Compliance Testing

The interoperability compliance testing included basic feature testing.

Feature tests focused on:

- Point to point calls
- Multipoint audio and video calls
- Ad-hoc Conference calls
- Polycom RMX based Conference
- Media shuffling
- Basic Telephony
 - Hold
 - Unhold
 - Mute Audio and Video
 - Unmute Audio and Video
 - Transfer
 - Video start/stop

1.2. Support

Technical support on Polycom can be obtained through the following:

Web: <http://www.polycom.com/support/>

2. Network Topology

The configuration in **Figure 1** was used to compliance test Polycom Video Solution interoperability with Avaya Video Solution where some of the Polycom video endpoints were registered to Communication Manager and the others were registered to the **Polycom CMA**. Various types of video and audio calls were tested across the H.323 trunk. The configuration in **Figure 2** was used to test Polycom Interop Test Configuration with Avaya Aura™ Communication Manager Neighbored Gatekeeper where only the Avaya video endpoints (one-X Communicator and IP Softphone) were registered to Communication Manager and all the Polycom endpoints were registered to the Polycom CMA. Various types of video and audio calls were tested across the H.323 trunk.

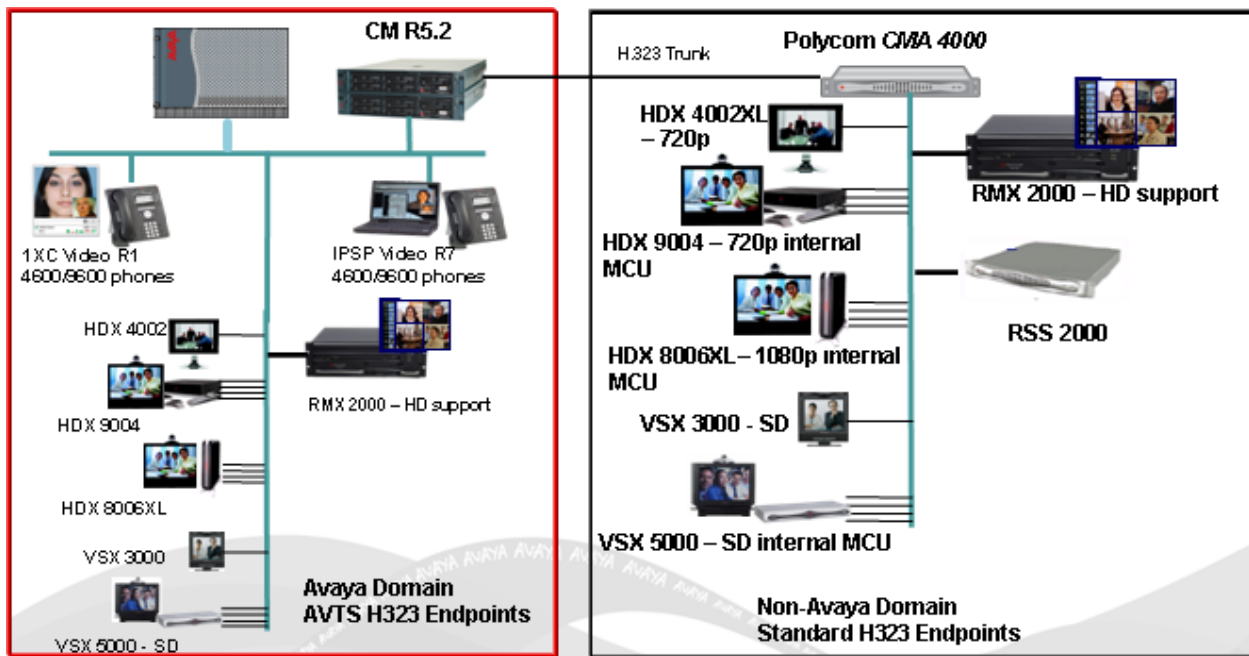


Figure 1: CM Integration & CM Neighbored Gatekeeper

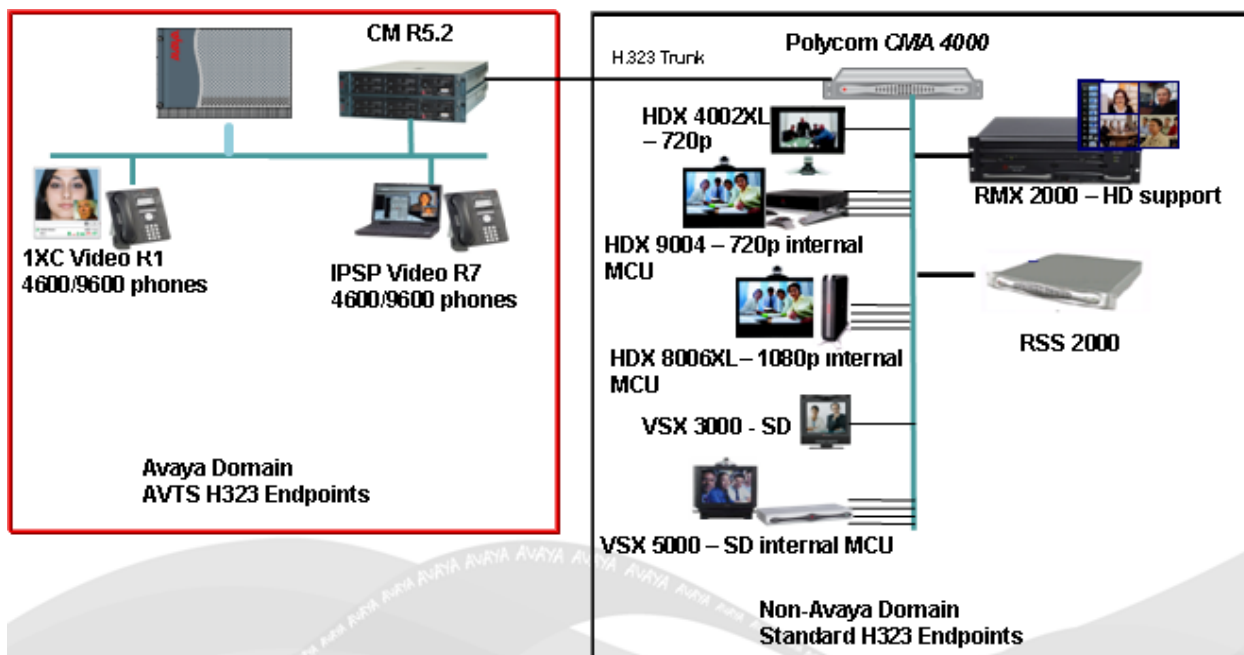


Figure 2 - CM Neighbored Gatekeeper

3. Equipment and Software Validated

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

Equipment	Software
Avaya Aura™ Communication Manager	5.02.0.947.3-17436
Avaya Gateway G650 IPSI CONTROL-LAN Medpro (TN2602AP)	FW044 FW032 FW044
Polycom CMA 4000	4.01.00.ER030

4. Configure the Avaya Aura™ Communication Manager

This section provides the procedures for configuring Avaya Aura™ Communication Manager. The configuration page in this section are accessed using Communication Manager System Access Terminal (SAT). Log in with the appropriate credentials. The procedures include the following areas:

- Verify Communication Manager License
- Administer IP Node Name for Communication Manager
- Administer Dial Plan
- Administer Signaling Group and Trunk Group
- Administer Routing Pattern
- Administer AAR Analysis Table
- Administer Uniform Dial Plan

- Administer Network Region
- Administer Codec Set

4.1. Verify Communication Manager License

Verify that the Communication Manager license has proper permissions for features illustrated in these Application Notes. If not then contact the Avaya sales team or business partner for a proper license file.

For Ad-hoc video conferencing there needs to be some ports available on the system-parameters customer-options form “Maximum Administered Ad-hoc Video Conferencing Ports:”.

change system-parameters customer-options		Page	2 of	11
OPTIONAL FEATURES				
IP PORT CAPACITIES		USED		
	Maximum Administered H.323 Trunks:	8000	211	
	Maximum Concurrently Registered IP Stations:	18000	21	
	Maximum Administered Remote Office Trunks:	0	0	
Maximum Concurrently Registered Remote Office Stations:		0	0	
	Maximum Concurrently Registered IP eCons:	128	0	
Max Concur Registered Unauthenticated H.323 Stations:		12000	0	
	Maximum Video Capable Stations:	12000	12	
	Maximum Video Capable IP Softphones:	12000	27	
	Maximum Administered SIP Trunks:	7000	1619	
	Maximum Administered Ad-hoc Video Conferencing Ports:	8000	80	
	Maximum Number of DS1 Boards with Echo Cancellation:	0	0	
	Maximum TN2501 VAL Boards:	128	1	
	Maximum Media Gateway VAL Sources:	250	0	
	Maximum TN2602 Boards with 80 VoIP Channels:	128	0	
	Maximum TN2602 Boards with 320 VoIP Channels:	128	3	
	Maximum Number of Expanded Meet-me Conference Ports:	300	0	

4.2. Administer IP Node Name for Communication Manager

Enter the **change node-names ip** command and add an entry for the Polycom CMA Gatekeeper as shown in the sample configuration screen below. The actual node name and IP address may vary. Submit these changes.

```
change node-names ip                                     Page 1 of 2
                                     IP NODE NAMES
Name                               IP Address
video8730clan3B                   135.9.88.5
DefaultGW                           135.9.88.245
SQA_CMA4000                       135.9.88.45
medpro                              135.9.88.6
```

4.3. Administer Dial Plan

Enter the **change dialplan analysis** command. Add an entry for local **ext** (extension), **dac** (dial access code), and **fac** (feature access code) as shown in the screen shot below. Submit these changes. 4 is the fac for “Auto Alternate Routing (AAR) Access Code” (see admin on screen capture below), 5xxxx series are the local extensions of the Avaya IP Softphone, One-X Communicator, and Polycom End Points registered to the Communication Manager, and #xxx is the dac for the trunk groups.

```
change dialplan analysis                               Page 1 of 12
                                     DIAL PLAN ANALYSIS TABLE
                                     Location: all          Percent Full: 1
Dialed   Total   Call   Dialed   Total   Call   Dialed   Total   Call
String   Length  Type   String   Length  Type   String   Length  Type
4       1      fac
5       5      ext
7        7        ext
#        4        dac
```

```
change feature-access-codes                           Page 1 of 9
                                     FEATURE ACCESS CODE (FAC)
Abbreviated Dialing List1 Access Code:
Abbreviated Dialing List2 Access Code:
Abbreviated Dialing List3 Access Code:
Abbreviated Dial - Prgm Group List Access Code:
Announcement Access Code: *10
Answer Back Access Code: *11
Attendant Access Code:
Auto Alternate Routing (AAR) Access Code: 4
Auto Route Selection (ARS) - Access Code 1: 9      Access Code 2:
Automatic Callback Activation: *12      Deactivation: *13
Call Forwarding Activation Busy/DA: *14      All: *15      Deactivation: *16
Call Forwarding Enhanced Status:          Act:          Deactivation:
Call Park Access Code: *17
Call Pickup Access Code: *18
CAS Remote Hold/Answer Hold-Unhold Access Code: *69
CDR Account Code Access Code:
Change COR Access Code:
Change Coverage Access Code:
```

4.4. Administer Signaling Group and Trunk Group

Prior to configuring a H.323 trunk group for communication with Polycom CMA Gatekeeper, an h.323 signaling group must be configured. Enter the **add signaling-group 33** command and add an entry for Polycom CMA Gatekeeper as shown below. Submit these changes. **NOTE:** The field “Trunk Group for Channel Selection: ” can’t be populated with any number (33 in this case) until the trunk group on the next step is administered. Don’t forget to come back to the signaling-group form and populate this field with the appropriate trunk group.

```
add signaling-group 33                                     Page 1 of 5
                                                         SIGNALING GROUP
Group Number: 33           Group Type: h.323
Remote Office? n           Max number of NCA TSC: 0
SBS? n                     Max number of CA TSC: 0
IP Video? y               Priority Video? n       Trunk Group for NCA TSC:
Trunk Group for Channel Selection: 33
TSC Supplementary Service Protocol: a
T303 Timer(sec): 10
H.245 DTMF Signal Tone Duration(msec):
Near-end Node Name: video8730clan3B   Far-end Node Name: SQA_CMA4000
Near-end Listen Port: 1719           Far-end Listen Port: 1719
Far-end Network Region: 2
LRQ Required? y               Calls Share IP Signaling Connection? n
RRQ Required? n
Media Encryption? n           Bypass If IP Threshold Exceeded? n
H.235 Annex H Required? n
DTMF over IP: out-of-band   Direct IP-IP Audio Connections? y
Link Loss Delay Timer(sec): 90   IP Audio Hairpinning? n
Enable Layer 3 Test? n       Interworking Message: PROGRESS
H.323 Station Outgoing Direct Media? n   DCP/Analog Bearer Capability: 3.1kHz
```

Enter the **add trunk-group 33** command and add an entry for the Polycom CMA Gatekeeper as shown in the sample configuration. Submit these changes.

```
add trunk-group 33                                     Page 1 of 21
                                                         TRUNK GROUP
Group Number: 33           Group Type: isdn           CDR Reports: y
Group Name: H.323 TG to CMA 4000   COR: 1           TN: 1           TAC: #033
Direction: two-way         Outgoing Display? y       Carrier Medium: H.323
Dial Access? y               Busy Threshold: 255   Night Service:
Queue Length: 0
Service Type: tie           Auth Code? n
Member Assignment Method: auto
Signaling Group: 33
Number of Members: 10
```

4.5. Administer Routing Pattern

Enter the **change route-pattern 33** command and add an entry for Polycom CMA Gatekeeper as shown in the sample configuration section. Submit these changes.

```

change route-pattern 33                                     Page 1 of 3
                Pattern Number: 4   Pattern Name: Polycom CMA4000
                SCCAN? n   Secure SIP? n
  Grp FRL NPA Pfx Hop Toll No.  Inserted          DCS/ IXC
  No   Mrk Lmt List Del  Digits          QSIG
                Dgts          Intw
1: 33  0
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 PARM  No. Numbering LAR
  0 1 2 M 4 W      Request          Dgts Format
                Subaddress
1: y y y y y n  n          rest          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

```

4.6. Administer AAR Analysis Table

Enter the **change aar analysis 0** command and add an entry for Polycom CMA Gatekeeper as shown in the sample configuration below. Submit these changes.

```

change aar analysis 0                                     Page 1 of 2
                AAR DIGIT ANALYSIS TABLE
                Location: all          Percent Full: 1

  Dialed      Total      Route      Call      Node      ANI
  String      Min  Max  Pattern  Type      Num      Reqd
  2           7   7   999     aar       n        n
  3           7   7   999     aar       n        n
  4           5   5   33      aar       n        n
  5           7   7   999     aar       n        n
  6           7   7   999     aar       n        n
  7           7   7   999     aar       n        n
  81       5  5  33    lev0    n

```


4.7. Administer Uniform Dial Plan

Enter the **change uniform-dialplan 0** command and add an entry for Polycom CMA Gatekeeper as shown in the sample configuration below. Submit these changes.

```
change uniform-dialplan 0                               Page 1 of 2
                UNIFORM DIAL PLAN TABLE
                                                    Percent Full: 0

Matching      Len Del      Insert      Node
Pattern       Len Del      Digits      Net Conv Num
81          5 0      aar n
```

4.8. Administer Network Region

Enter the **change ip-network-region 2** command and add entries as shown in sample configuration below. Submit these changes.

```
change ip-network-region 2                             Page 1 of 19
                IP NETWORK REGION

Region: 2
Location: 1      Authoritative Domain: dr.avaya.com
Name: video_endpoints
MEDIA PARAMETERS      Intra-region IP-IP Direct Audio: yes
Codec Set: 1        Inter-region IP-IP Direct Audio: yes
  UDP Port Min: 2048      IP Audio Hairpinning? y
  UDP Port Max: 65535
DIFFSERV/TOS PARAMETERS      RTCP Reporting Enabled? y
  Call Control PHB Value: 46      RTCP MONITOR SERVER PARAMETERS
  Audio PHB Value: 46            Use Default Server Parameters? y
  Video PHB Value: 36
802.1P/Q PARAMETERS
  Call Control 802.1p Priority: 7
  Audio 802.1p Priority: 0
  Video 802.1p Priority: 5      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
```

```

change ip-network-region 2                                     Page 2 of 19
                    IP NETWORK REGION

INTER-GATEWAY ALTERNATE ROUTING / DIAL PLAN TRANSPARENCY
Incoming LDN Extension:
Conversion To Full Public Number - Delete:      Insert:
Maximum Number of Trunks to Use for IGAR:
Dial Plan Transparency in Survivable Mode? n

BACKUP SERVERS (IN PRIORITY ORDER)      H.323 SECURITY PROFILES
1                                         1   any-auth
2                                         2
3                                         3
4                                         4
5
6                                         Allow SIP URI Conversion? y

TCP SIGNALING LINK ESTABLISHMENT FOR AVAYA H.323 ENDPOINTS
Near End Establishes TCP Signaling Socket? y
Near End TCP Port Min: 61440
Near End TCP Port Max: 61444

```

4.9. Administer Codec Set

Enter the **change ip-codec-set 1** command and add entries as shown in sample configuration below in bold. Submit these changes.

```

change 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: SIREN14-32K          1          20
2: G.722-64K           2          20
3: G.711MU             n          20
4: G.729A              n          20
5:
6:
7:

Media Encryption
1: none
2:
3:

```

IP Codec Set

Allow Direct-IP Multimedia? y

Maximum Call Rate for Direct-IP Multimedia: **1920**:Kbits

Maximum Call Rate for Priority Direct-IP Multimedia: **1920**:Kbits

	Mode	Redundancy
FAX	relay	0
Modem	off	0
TDD/TTY	US	3
Clear-channel	n	0

5. Configure the Polycom CMA 4000 Gatekeeper

This section discusses the configuration of Polycom CMA Gatekeeper when it is integrated with Communication Manager.

Refer to the **Polycom® CMA™ System Getting Started Guide** that comes with the unit for configuring the Polycom CMA for the first time and run the First-time Setup Wizard.

- Neighboring Gatekeeper
- Dial Rules
- Site Configuration
- Site-Links
- Endpoints

5.1. Neighboring Gatekeepers

Open a web browser, enter <http://x.x.x.x> for the URL, where x.x.x.x is the IP address of the Polycom CMA Gatekeeper. Login with appropriate credentials. Click on the **Admin** tab, **Gatekeeper Settings** and then **Neighboring Gatekeepers**. Select the **Add** button to add a new entry to the table. Enter the **Name**, **Description**, **Gatekeeper IP Address**, **Port**, and **Gatekeeper Identifier** as shown in the sample configuration and click on **Save**.

The screenshot displays the Polycom CMA 4000 web interface. The top navigation bar includes 'Conference', 'Endpoint', 'Network Device', 'User', 'Reports', 'Admin', 'Settings', 'Downloads', 'Log Out', and 'Help'. The breadcrumb trail shows 'You are here: Admin > Gatekeeper Settings > Neighboring Gatekeepers'. A 'NAVIGATION' sidebar on the left lists 'Primary Gatekeeper', 'Alternate Gatekeeper', and 'Neighboring Gatekeeper'. Below it, an 'ACTIONS' sidebar contains 'Add', 'Edit', and 'Delete' buttons. The main content area features a table with columns 'Name' and 'Description'. An 'Add Neighbor' dialog box is open, containing the following fields: 'Name' (video8730clan3B), 'Description' (CM Gatekeeper - CLAN 01B12), 'Gatekeeper IP Address' (135.9.88.5), 'Port' (1719), and 'Gatekeeper Identifier' (video8730clan3B). 'Save' and 'Cancel' buttons are at the bottom of the dialog. The bottom status bar shows 'Friday, September 18, 2009 10:48:32 AM' and 'System Alerts'. A 'Count: 1' indicator is visible in the bottom right of the table area.

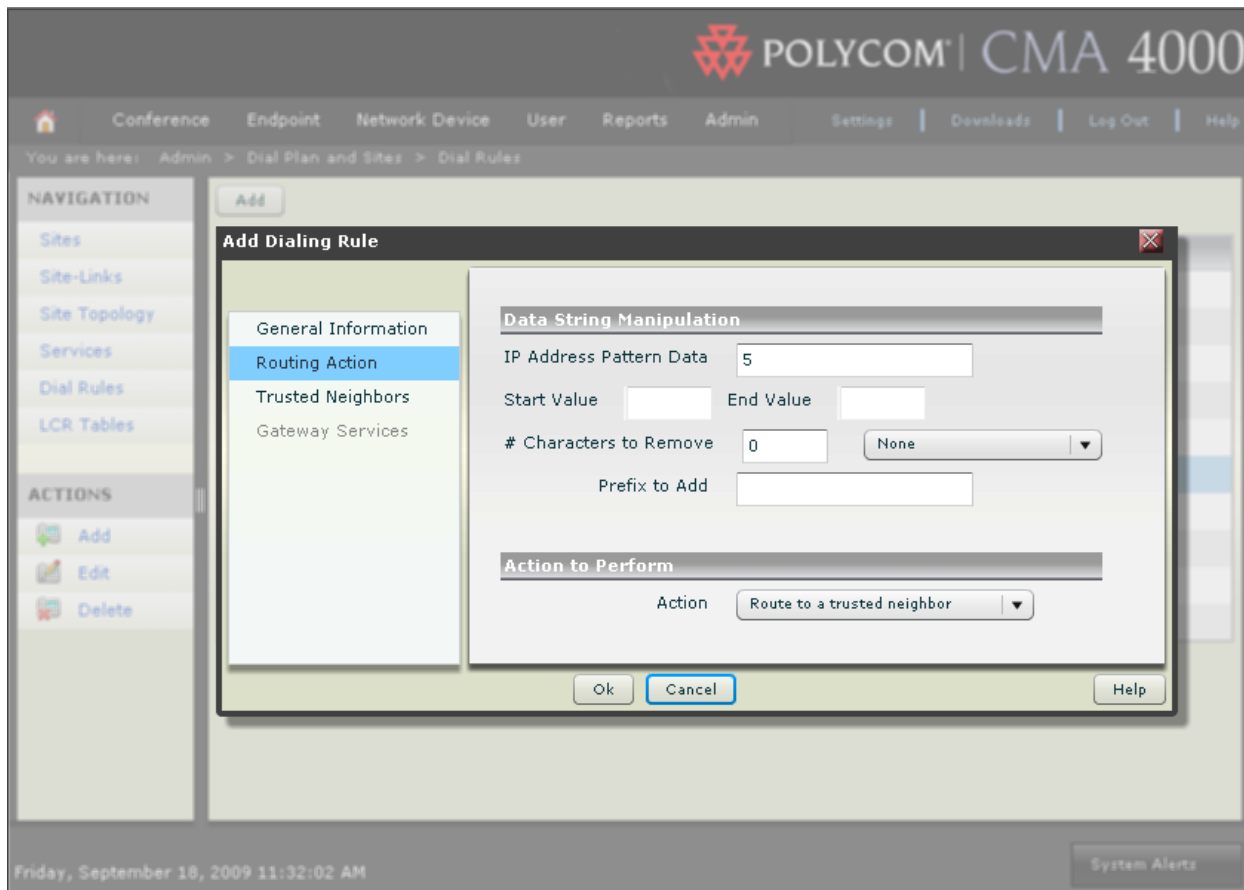
5.2. Dial Rules

Click on the **Admin** tab, **Dial Plan and Sites**, and then **Dial Rules**. Select the **Add** button to add a new entry to the table. Under the **General Information** option, enter the **Name**, **Description**, and **Priority**. Check the **Enabled** box. Select **Prefix** from the **Pattern Type** drop-down field and **All** from the **Applicable Site** drop-down field.

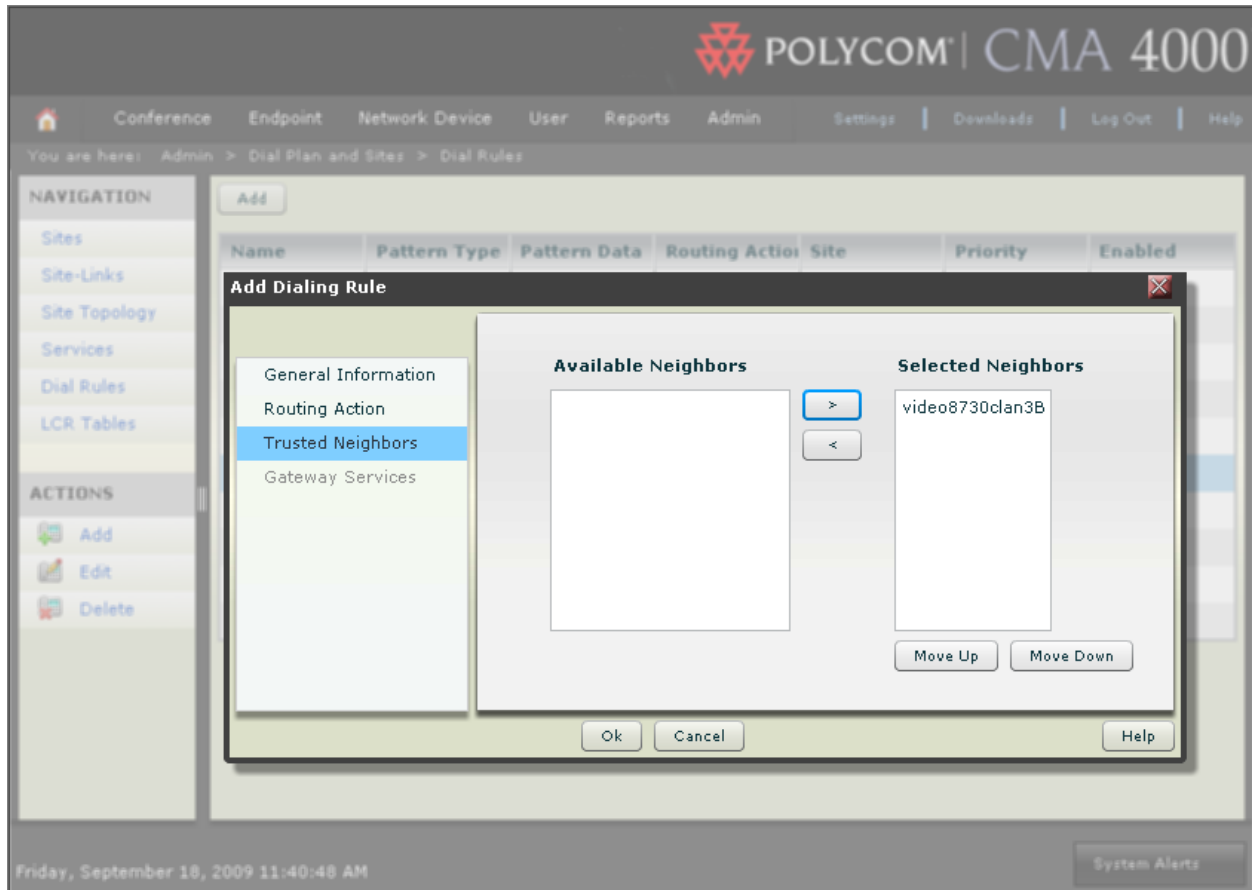
Note: This example below is just one way of how to setup a Dialing Rule, configure as appropriate.

The screenshot displays the Polycom CMA 4000 web management interface. At the top, the logo and title 'POLYCOM | CMA 4000' are visible. Below the header, a navigation menu includes 'Conference', 'Endpoint', 'Network Device', 'User', 'Reports', 'Admin', 'Settings', 'Downloads', 'Log Out', and 'Help'. The breadcrumb trail indicates the current location: 'You are here: Admin > Dial Plan and Sites > Dial Rules'. On the left, a 'NAVIGATION' sidebar lists 'Sites', 'Site-Links', 'Site Topology', 'Services', 'Dial Rules', and 'LCR Tables'. Below this, an 'ACTIONS' section contains 'Add', 'Edit', and 'Delete' buttons. The main content area shows a table with columns: 'Name', 'Pattern Type', 'Pattern Data', 'Routing Action', 'Site', 'Priority', and 'Enabled'. An 'Add' button is positioned above the table. A modal dialog box titled 'Add Dialing Rule' is open, featuring a left-hand menu with 'General Information', 'Routing Action', 'Trusted Neighbors', and 'Gateway Services'. The 'General Information' tab is selected, showing the following fields: 'Name' (text input: 'CM-5'), 'Description' (text input: 'CM Extensions 5xxxx'), 'Priority' (text input: '10'), 'Enabled' (checkbox: checked), 'Pattern Type' (dropdown menu: 'Prefix'), and 'Applicable Site' (dropdown menu: 'All'). At the bottom of the dialog are 'Ok', 'Cancel', and 'Help' buttons. The footer of the interface shows the date and time: 'Friday, September 18, 2009 11:34:39 AM' and a 'System Alerts' button.

Under the **Routing Action** option, enter the appropriate **IP Address Pattern Data** (e.g., 5) and select **Route to a trusted neighbor** from the **Action to Perform** drop-down field. The **IP Address Pattern Data** is for routing calls, so in this example any number dialed starting with a **5** will route to the trusted neighbor as administered in the **Action to Perform**.



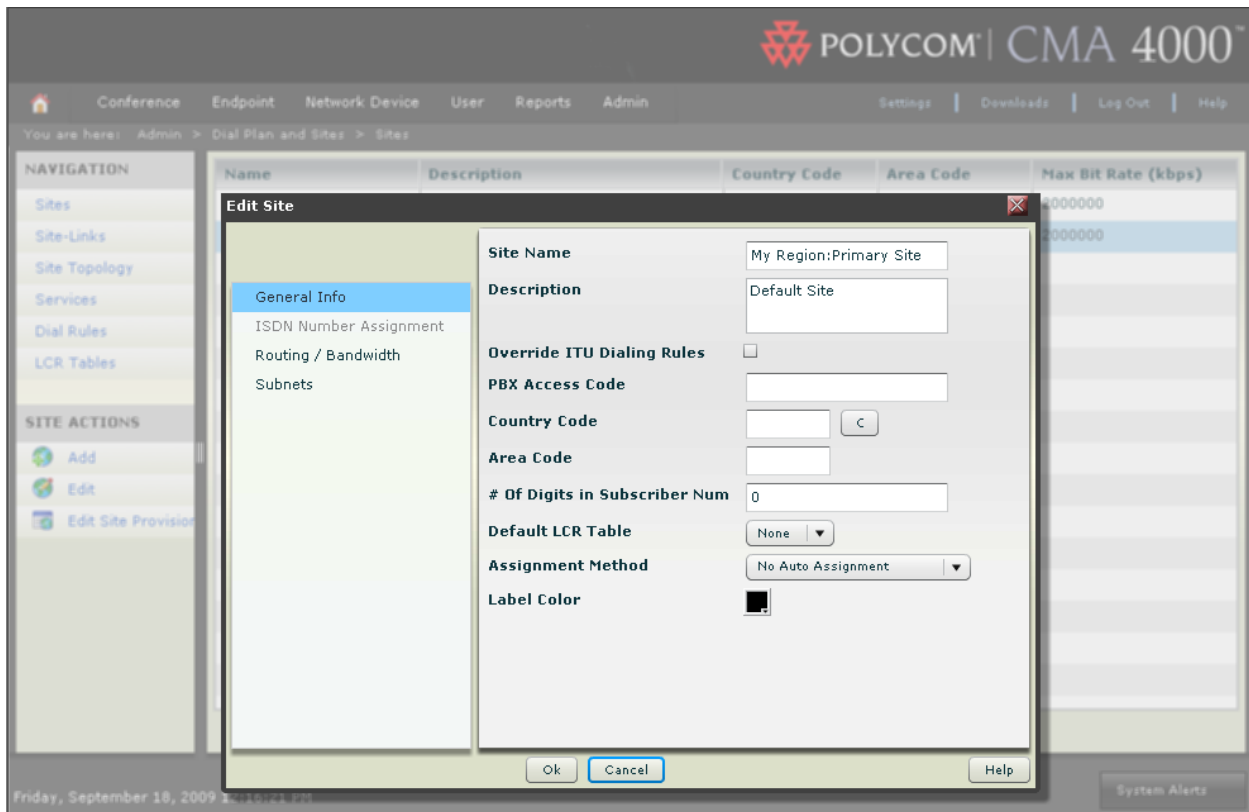
Under the **Trusted Neighbors** option, select the Gatekeeper that was administered earlier and move it over to the **Selected Neighbors** column. Click **Ok**.



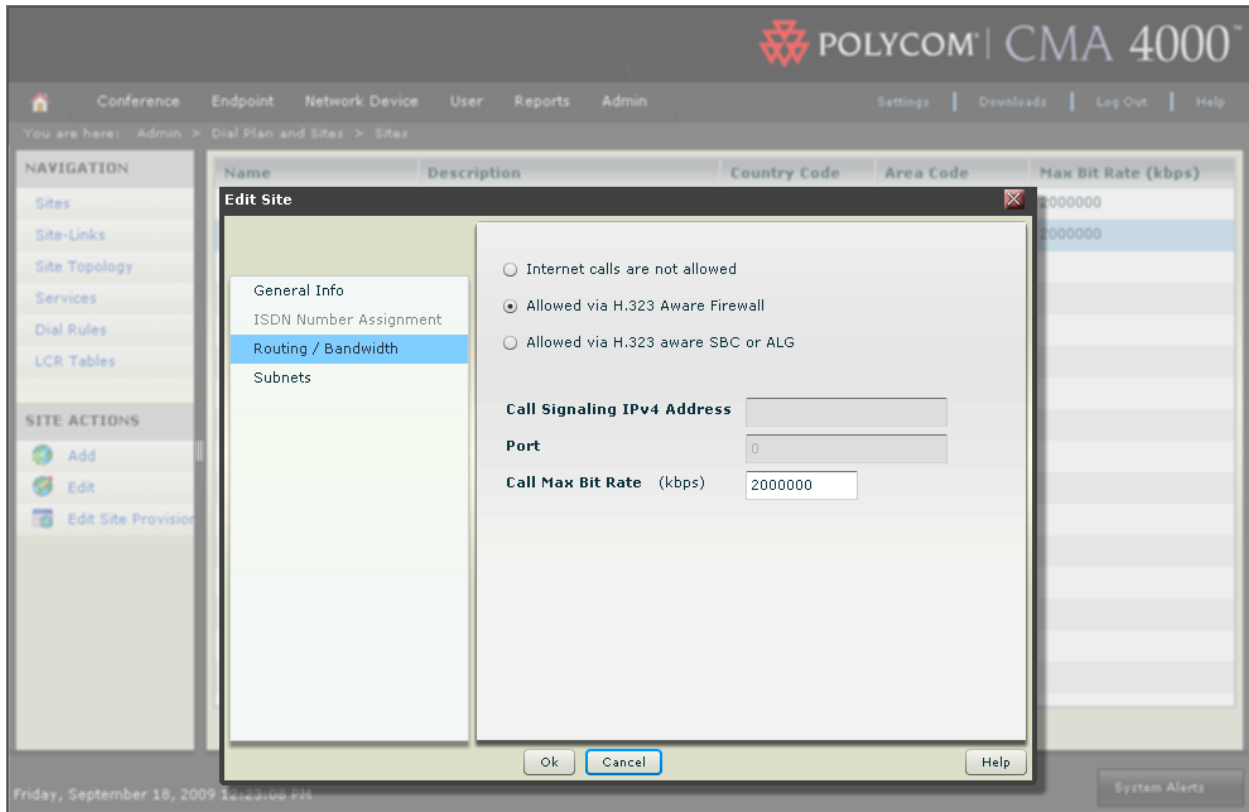
5.3. Site Configuration

Click on the **Admin** tab, **Dial Plan and Sites**, and then **Sites**. Select the **Add** button to add a new entry to the table. Under the **General Info** option enter the **Site Name** and **Description**. Select appropriate values for the **Default LCR Table**, **Assignment Method**, and **Label Color** drop-down field.

Note: This example below is just one way of how to setup a **Site**, configure as appropriate.



Under the **Routing / Bandwidth** option leave all of the default values.



Under the **Subnets** option, type in the **Subnet IP Address/Mask** and click **Add**. This information will be displayed in the Subnet table as seen below. Click on **Ok**.

The screenshot displays the Polycom CMA 4000 web interface. The main navigation menu includes 'Conference', 'Endpoint', 'Network Device', 'User', 'Reports', and 'Admin'. The current page is 'Admin > Dial Plan and Sites > Sites'. The left sidebar shows 'NAVIGATION' options like 'Sites', 'Site-Links', 'Site Topology', 'Services', 'Dial Rules', and 'LCR Tables', along with 'SITE ACTIONS' like 'Add', 'Edit', and 'Edit Site Provision'. The main content area shows a table with columns 'Name', 'Description', 'Country Code', 'Area Code', and 'Max Bit Rate (kbps)'. An 'Edit Site' dialog box is open, showing a 'Subnets' tab. The dialog has an 'Add' button and a text input field for 'Subnet IP Address/Mask'. Below this is a table with the following data:

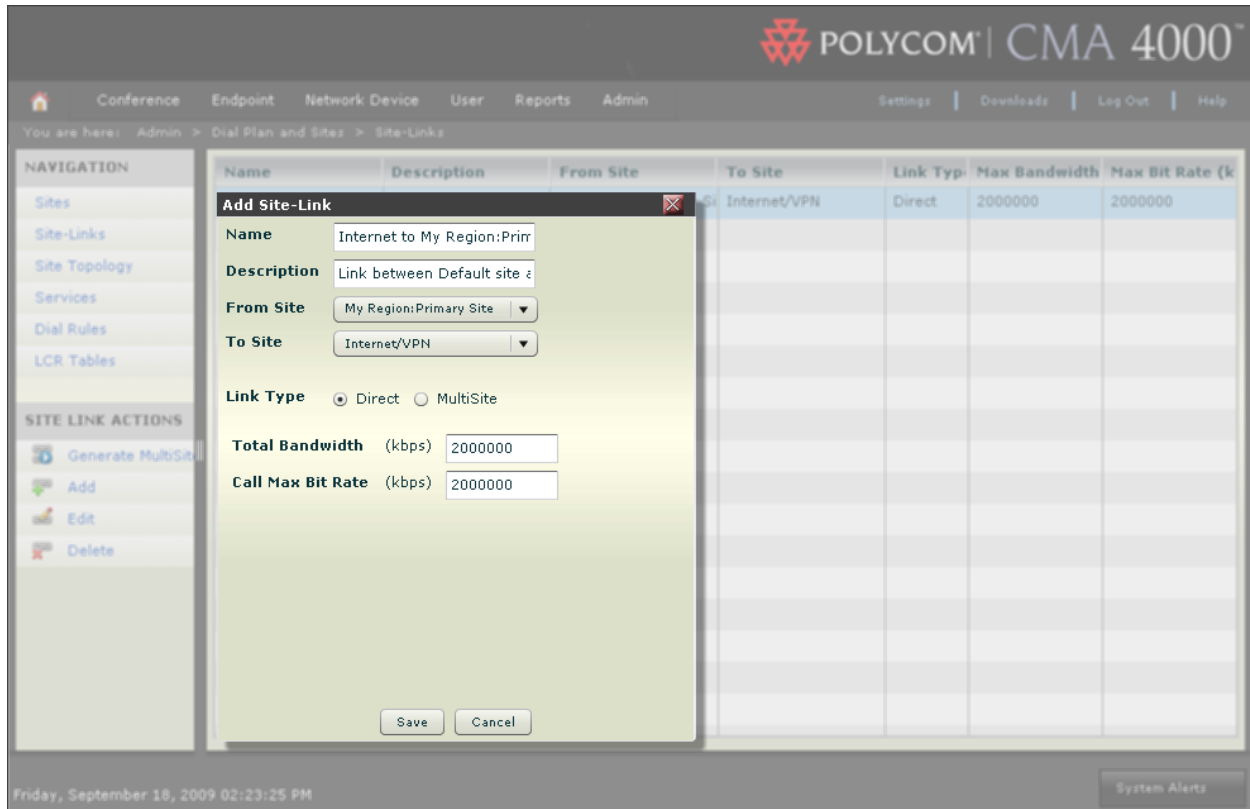
Subnet IP Address/Mask	Action
135.0.0.0/255.0.0.0	Delete

The dialog also has 'Ok', 'Cancel', and 'Help' buttons at the bottom. The background table shows two rows with '2000000' in the 'Max Bit Rate (kbps)' column.

5.4. Site-Links

Click on the **Admin** tab, **Dial Plan and Sites**, and then **Site-Links**. Select **Add** to add a new entry to the table. Enter a **Name** and **Description**. For the **From Site** drop-down list, select the site that was just defined in the previous step. Select a value from the **To Site** drop-down field. Select **Direct** for the **Link Type**. Enter the **Total Bandwidth**, and **Call Max Bit Rate**. Click on **Save**.

Note: This example below is just one way of how to setup a **Site-Link**, configure as appropriate.



The screenshot displays the Polycom CMA 4000 administration interface. The top navigation bar includes 'Conference', 'Endpoint', 'Network Device', 'User', 'Reports', and 'Admin'. The breadcrumb trail indicates the current location: 'Admin > Dial Plan and Sites > Site-Links'. A sidebar on the left provides navigation options like 'Sites', 'Site-Links', 'Site Topology', 'Services', 'Dial Rules', and 'LCR Tables'. The main content area features a table with columns: Name, Description, From Site, To Site, Link Type, Max Bandwidth, and Max Bit Rate (k). An 'Add Site-Link' dialog box is open, showing the following configuration:

- Name:** Internet to My Region:Prim
- Description:** Link between Default site ε
- From Site:** My Region:Primary Site
- To Site:** Internet/VPN
- Link Type:** Direct MultiSite
- Total Bandwidth (kbps):** 2000000
- Call Max Bit Rate (kbps):** 2000000

Buttons for 'Save' and 'Cancel' are visible at the bottom of the dialog box. The status bar at the bottom left shows the date and time: 'Friday, September 18, 2009 02:23:25 PM'. A 'System Alerts' button is located at the bottom right.

6. General Test Approach and Test Results

The testing was successfully concluded with one caveat: The **# Characters to Remove** option in the Dial Rules section (section 5.2) doesn't work. If this option is administered to have a value other than 0 it doesn't actually remove any characters. The workaround is to either setup the call routing so it's not necessary to delete any character or modify Communication Manger's **inc-call-handling-trmt trunk-group** form to remove incoming digits.

7. Verification

This section provides the tests that can be performed to verify proper configuration of Avaya Aura™ Communication Manager and Polycom CMA Gatekeeper.

7.1. Verify Communication Manager

In the test configuration the Communication Manager and Polycom CMA are connected via the trunk group 33 and signaling group 33. In the screen captures below the status of the signaling group and H.323 trunk group shows **in-service**. If the H.323 trunk between the Communication Manager and Polycom CMA is not administered properly then the status would be out-of-service.

```
status signaling-group 33
                        STATUS SIGNALING GROUP

      Group ID: 33                Active NCA-TSC Count: 0
      Group Type: h.323           Active CA-TSC Count: 0
      Signaling Type: facility associated signaling
      Group State: in-service
```

The status of trunk 0033/001 below shows Connected Ports **S01762**. In this example a call is originated by a Polycom endpoint registered to the CMA Gatekeeper making an inbound call to a video endpoint registered to CM via port S01762 over trunk 33.

```
status trunk 33
                        TRUNK GROUP STATUS

Member   Port      Service State      Mtce Connected Ports
                        Busy

0033/001 T01844   in-service/active  no   S01762
0033/002 T01845   in-service/idle   no
0033/003 T01846   in-service/idle   no
0033/004 T01847   in-service/idle   no
0033/005 T01848   in-service/idle   no
```

7.2. Verify Polycom CMA

There is no command or screen to display on the CMA to check the status of the interface between the CMA and Communication Manager. The best way to check the status is through Communication Manager (Section 7.1).

8. Conclusion

The H.323 Video interoperability between Communication Manager Gatekeeper and Polycom CMA 4000 Gatekeeper has been tested and passed.

9. Additional References

Avaya references, available at <http://support.avaya.com>

Polycom references are available at <http://www.polycom.com/support/>

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