



Avaya Solution & Interoperability Test Lab

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

Abstract

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

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, Polycom CMA 4000 Gatekeeper, and Polycom Voice and Video End points. 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 CMA 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
- 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 Neighborhood 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.

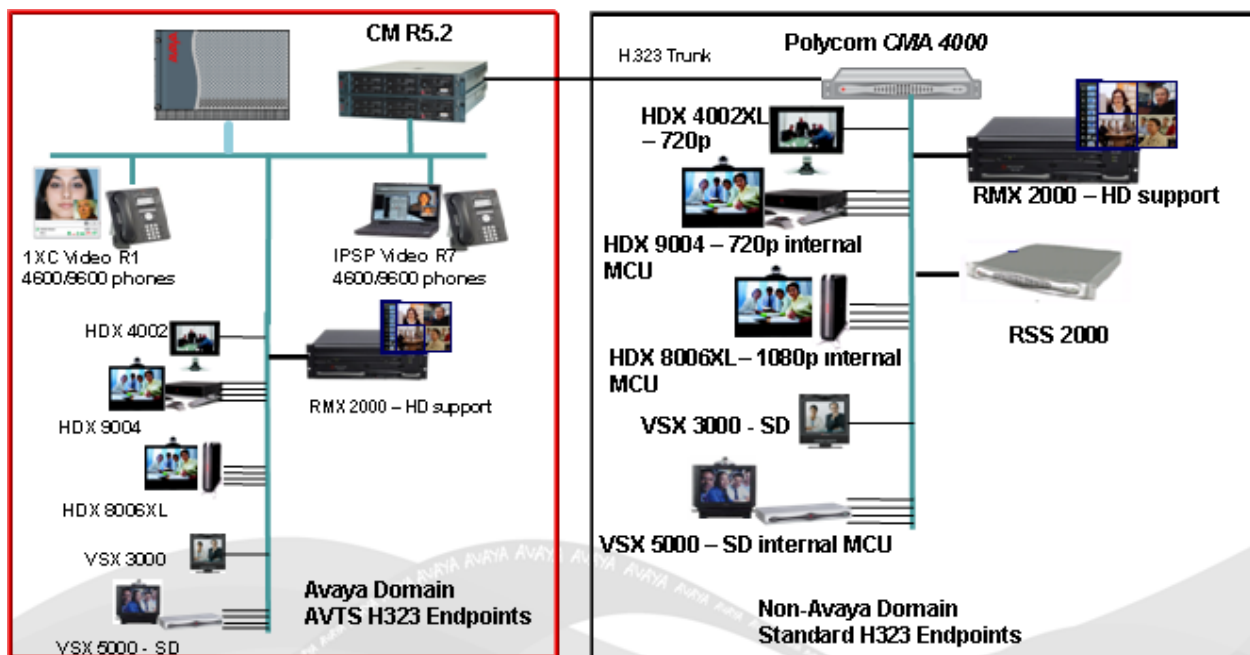


Figure 1: CM Integration & CM Neighbored Gatekeeper

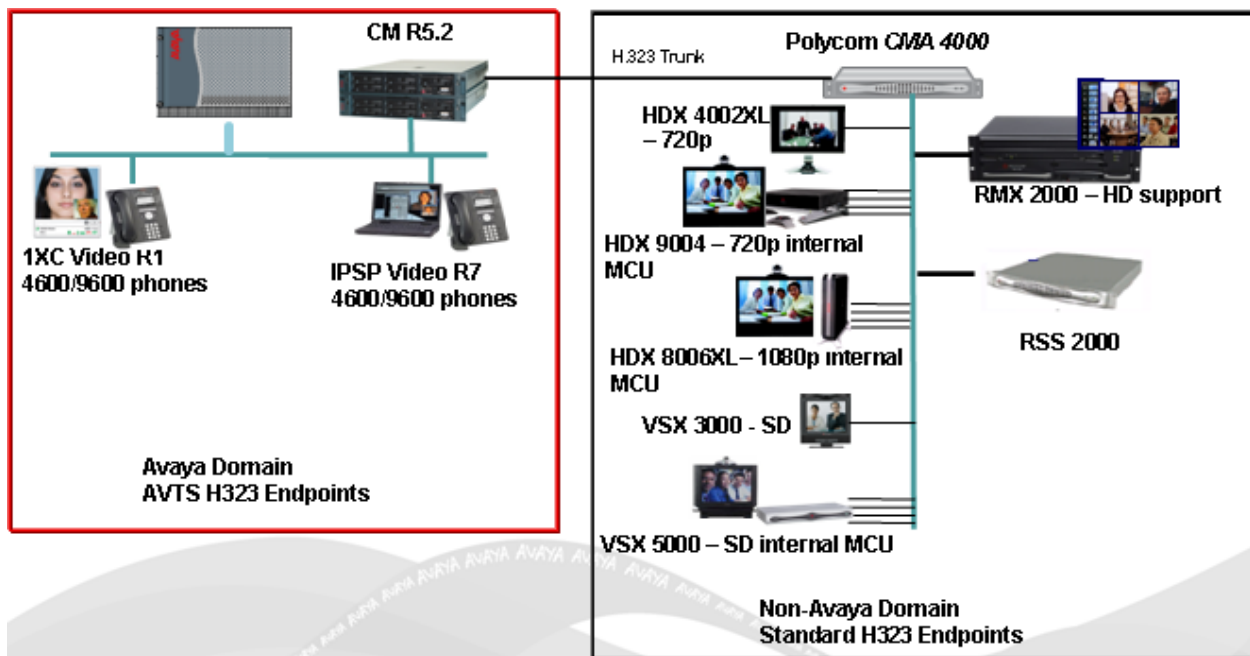


Figure 2 - CM Neighbored Gatekeeper

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
Polycom HDX 4002 (h.323)	2.5.0.5
Polycom HDX 8006 (h.323)	2.5.0.5
Polycom HDX 9004 (h.323)	2.5.0.5
Polycom VSX 3000 (h.323)	9.05.1
Polycom VSX 5000 (h.323)	9.05.1

4. Configure Communication Manager

This section provides the procedures for configuring Avaya Aura™ Communication Manager necessities for video endpoints. The configuration page in this section are accessed using Communication Manager System Access Terminal (SAT). Log in with the proper login credentials. It is assumed that all of the other Communication Manager administration is complete, including but not limited to CM license, Dial Plan, Routing Patterns, AAR Analysis, and Uniform Dial Plan.

The procedures include the following areas:

- Administer Network Region
- Administer Codec Set

4.1. Administer Codec Set

Use the **change ip-codec-set x** command (where **x** is the chosen IP codec set) to:

- Define the codecs (page 1 of form). The following codecs are recommended:
 - SIREN14-32K (1 fpp, 20 ms)
SIREN14-32K are wideband codecs. Since most Polycom systems are not configured for stereo, it is not recommended to use a stereo SIREN codec as a default.
 - G722-64K (1 fpp, 20 ms)
G722-64K are wideband codecs. These codecs allow wideband with video endpoints that do not support SIREN codecs.
 - G.729A (no silence suppression, 2 fpp, 20 ms)

Polycom systems do not support all variants of G.729 codecs. If you want to use G.729, you must specify G.729A. If you specify G.729, audio problems arise. All variants of G.729 codecs are narrowband codecs.

NOTE:

Wideband codecs should appear before narrowband codecs in the codec set.

- Set **Allow Direct-IP Multimedia** to y (page 2 of form).
- Set **Maximum Call Rate for Direct-IP Multimedia**. This setting is the combined audio and video transmit rate or receive rate for non-priority (normal) video calls. You can use this setting to limit the amount of bandwidth used for normal video calls. For example, if you select 384 Kbits, a maximum of 384 Kbits will be used to transmit *and* to receive audio/video.
- **Maximum Call Rate for Priority Direct-IP Multimedia**. This setting is the combined audio and video transmit rate or receive rate for priority video calls. You can use this setting to limit the amount of bandwidth used for priority video calls. For example, if you select 384 Kbits, a maximum of 384 Kbits will be used to transmit *and* to receive audio/video.
- **Media Encryption** is currently not supported with video so this value needs to be set to **none**.

Repeat the above steps for each IP codec set that will be used for video.

change ip-codec-set 1 Page 1 of 2

IP Codec Set

Codec Set: 1

Audio Codec	Silence Suppression	Frames Per Pkt	Packet Size (ms)
1: SIREN14-32K		1	20
2: G.722-64K		2	20
3: G.711MU	n	2	20
4: G.729A	n	2	20
5:			
6:			
7:			

Media Encryption

1: **none**

2:

3:

It's important to set the correct Maximum Call Rate. Below is an example of how to configure the rates. Contact your Network Administrator for the Maximum Call Rate allowed.

change ip-codec-set 1 Page 2 of 2

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

4.2. Administer Network Region

Use the **change ip-network-region *x*** command (where *x* is the chosen IP network region) to set the following parameters:

- **Intra-region IP-IP Direct Audio** to **yes**.
- **Inter-region IP-IP Direct Audio** to **yes**.
NOTE: Shuffling is recommended. However, you can set shuffling to **no**, and video calls will work properly.
- **Security Profiles 1** to **any-auth** (page 2 of form).
- **Codec set** (page 3 of form) to one of the codec sets you defined in Section 4.1.
- **Video Norm** (page 3 of form) to the amount of bandwidth that you want to allocate for the normal video pool to each IP network region.
- **Video Prio** (page 3 of form) to the amount of bandwidth that you want to allocate for the priority video pool to each IP network region.
- **Video Shr** (page 3 of form). Specify whether the normal video pool can be shared with the audio pool for each link between IP network regions.

Repeat the above steps for each IP network region that will be used for video in this system.

```
change ip-network-region 1                                     Page 1 of 19
                                                                IP NETWORK REGION
Region: 2
Location: 1      Authoritative Domain: dr.avaya.com
Name: video_endpoints
MEDIA PARAMETERS
  Codec Set: 1
  Intra-region IP-IP Direct Audio: yes
  Inter-region IP-IP Direct Audio: yes
  UDP Port Min: 2048
  UDP Port Max: 65535
  IP Audio Hairpinning? y
DIFFSERV/TOS PARAMETERS
  Call Control PHB Value: 46
  Audio PHB Value: 46
  Video PHB Value: 36
  RTCP Reporting Enabled? y
  RTCP MONITOR SERVER PARAMETERS
  Use Default Server Parameters? y
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
  H.323 Link Bounce Recovery? y
  Idle Traffic Interval (sec): 20
  Keep-Alive Interval (sec): 5
  Keep-Alive Count: 5
  RSVP Enabled? n
```

It's important to administer the H.323 SECURITY PROFILES appropriately. Below is an example of how to configure the profiles.

```
change ip-network-region 1                                     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
display ip-network-region 1                                     Page 3 of 19

Source Region: 2      Inter Network Region Connection Management      I      M
                                G      A      e
dst codec direct  WAN-BW-limits  Video      Intervening      Dyn  A  G  a
rgn  set  WAN  Units  Total Norm  Prio Shr Regions      CAC  R  L  s
1    1    y    NoLimit
2    1
3    1    y    NoLimit      n
4
5
6
```

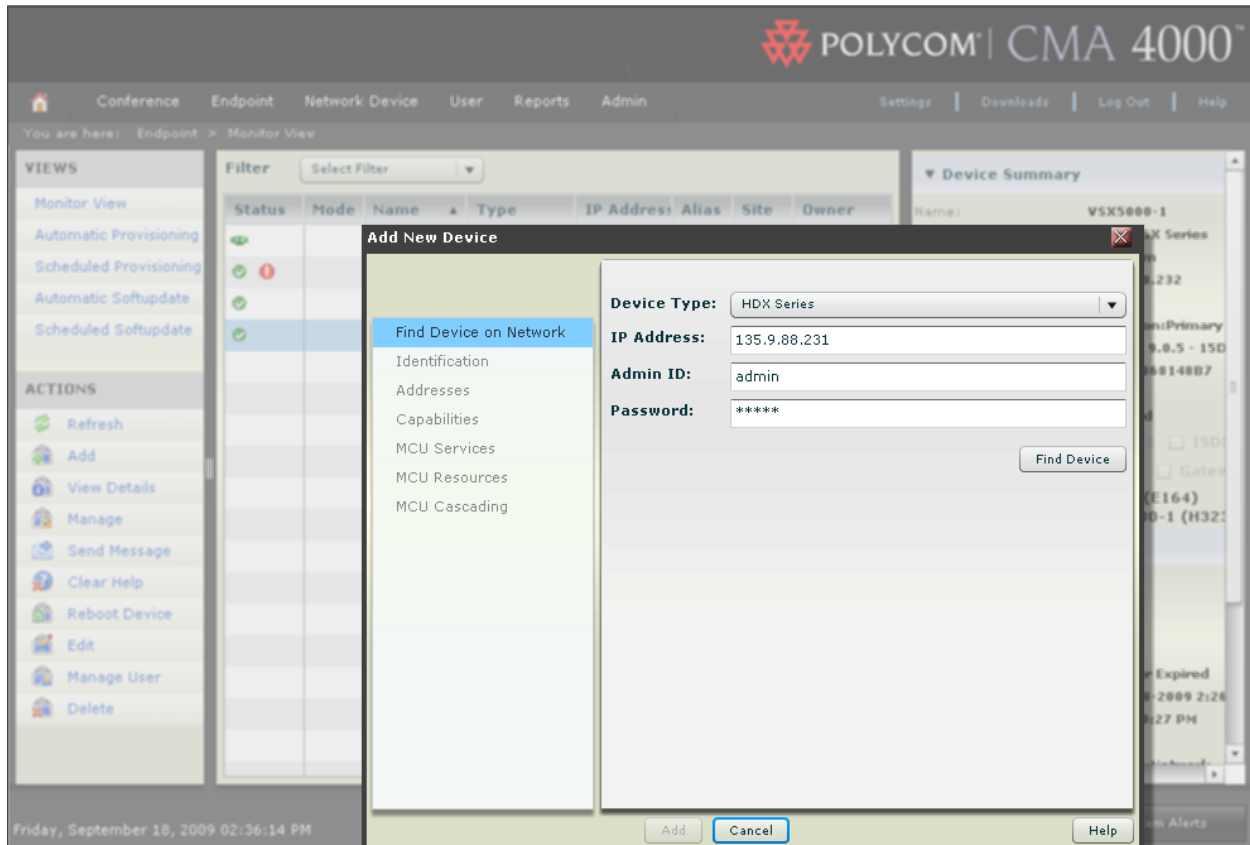
5. Configure Endpoints with Polycom CMA 4000 Gatekeeper

This section discusses the configuration of video endpoints with Polycom CMA Gatekeeper. Is it assumed that the basic configuration of the CMA including Neighboring Gatekeepers, Dial Rules, Sites, and Site-links are already in place.

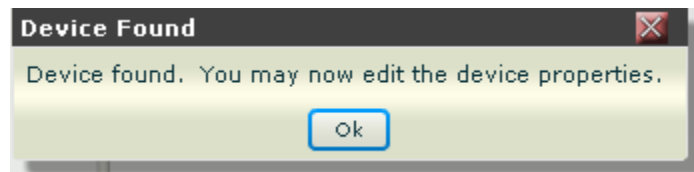
5.1. Endpoints

These are Polycom video endpoints registered to the Polycom CMA. As such they will be recognized only by the Polycom CMA and not by the Communication Manager as valid endpoints.

Click **Endpoint** tab and then **Monitor View**. Select **Add** to add a new endpoint to the table. Enter a **Device Type** from the drop down menu, **IP Address** of the device, the **Admin ID**, and the **Password**. Click **Find Device**.



If the device was successfully found, you will see the following message displayed:



Select the **Identification** option from the Add New Device list. This is the data that was sent by the Polycom Endpoint that was found. Fill in a **Description** if necessary (see below).

Add New Device

Find Device on Network

Identification

Addresses

Capabilities

MCU Services

MCU Resources

MCU Cascading

Device Type: HDX Series

IP Address: 135.9.88.231

System Name: HDX8000-1

Description:

Site: My Region:Primary Site

Serial Number: 880919100AC4CG

Software Version: Release - 2.5.0.5-3548

HTTP URL: http://135.9.88.231/

HTTP Port: 80

Add Cancel Help

Select the **Address** option from the Add New Device list. The values displayed below are all values that were automatically setup when the Device (Polycom Endpoint) was found with the exception of the E164 Type and Value. It's necessary to enter an Alias Value for the Alias Type of E164, which is the extension that the endpoint will be assigned. In the example below the extension (E164) of this endpoint is 50081. Add additional details to this form as necessary.

Add New Device

Find Device on Network

Identification

Addresses

Capabilities

MCU Services

MCU Resources

MCU Cascading

Device Type:

HDX Series

IP Address:

135.9.88.231

DNS Name:

HDX8000-1

Aliases:

Alias Type:

E164

Alias Value:

Add

Type	Value	
E164	50081	Delete
H323 ID	HDX8000-1	Delete

ISDN Video Number:

Country Code:

Select

City/Area Code:

Local Phone Number:

Add

Cancel

Help

Select the **Capabilities** option from the Add New Device list. The values displayed below are all default values that were automatically setup when the Device (Polycom Endpoint) was found. Select the additional items to this form as necessary. Click **Add**. Repeat this **Section 4.5 Endpoints** to add additional Polycom Endpoints.

Add New Device

Find Device on Network
Identification
Addresses
Capabilities
MCU Services
MCU Resources
MCU Cascading

Device Type: HDX Series

IP Address: 135.9.88.231

Supported Protocols: ☒ IP(H.323) ☐ ISDN(H.320)

Capabilities Enabled: ☐ MCU ☐ Gateway

Available to Schedule: ☒

Monitoring Level: ☒ Standard ☐ VIP

Add Cancel Help

6. Configure Video Endpoints on Communication Manager

6.1. Configure Polycom VSX/HDX Series Video Conferencing Systems on Communication Manager

Use this procedure to configure Polycom VSX/HDX video conferencing systems. When setting up these systems, you will need to know the following information:

- Maximum number of VSX/HDX systems on your network
- PIN for each VSX/HDX system. The PIN can consist of a maximum of eight numeric characters and is defined by the System Administrator. The PIN must be the same number as is defined on the station form **Security Code**.
- The key code that combines the Avaya option with any other Polycom options.
- Whether the VSX/HDX system has the multipoint option. If so, you must combine the Polycom Software License for this capability with the "Avaya Option" Polycom Software License to create a single Key Code to input into the unit.
- IP address of the voice system.
- IP codec sets you want to use.
- IP network regions you want to use.

Perform the following steps to configure Polycom systems on Communication Manager:

1. Use the **display system-parameters customer-options** command to verify the **Maximum Video Capable Stations** (page 2 of form). This number is provided by the RFA license file. The **Maximum Video Capable Stations** was determined using the following criteria.
 - Each single-point VSX/HDX system is considered to be one station.
 - Each VSX multipoint system can be **three** to **six** stations.
 - Each HDX system can be three stations for multipoint plus 4 and seven for multipoint plus 8 multipoint licensed options for the HDX9004. The HDX9002 only has multipoint plus 4 as an option.
2. Use the **change cos** command to set **Priority Ip Video** (page 2 of form) for the appropriate COS levels.
3. Use the **add station** command to add a station for the Polycom system. Set the following parameters:
 - **Type** to **H.323**.
 - **Security Code** to the "pin" you will administer for the VSX or HDX system.
 - **IP Video** to **y**.
 - If you want this station to be able to make priority video calls, make sure you select a COS level that has **Priority Ip Video** enabled.
 - On page 2 of the form, set **Direct IP-IP Audio Connections** to **y** and set **IP Audio Hairpinning** to **y**.

NOTE: You can create an alias for VSX/HDX stations.

IP PORT CAPACITIES	USED
Maximum Administered H.323 Trunks:	12000 211
Maximum Concurrently Registered IP Stations:	18000 28
Maximum Administered Remote Office Trunks:	0 0
Maximum Concurrently Registered Remote Office Stations:	0 0
Maximum Concurrently Registered IP eCons:	414 0
Max Concur Registered Unauthenticated H.323 Stations:	18000 0
Maximum Video Capable Stations:	18000 12
Maximum Video Capable IP Softphones:	18000 27
Maximum Administered SIP Trunks:	7000 1619
Maximum Administered Ad-hoc Video Conferencing Ports:	12000 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

(NOTE: You must logoff & login to effect the permission changes.)

	CLASS OF SERVICE															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
VIP Caller	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Masking CPN/Name Override	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Call Forwarding Enhanced	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
Priority Ip Video	n	y	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Ad-hoc Video Conferencing	y	y	y	n	n	n	n	n	n	n	n	n	n	n	n	n

STATION		
Extension: 50081	Lock Messages? n	BCC: M
Type: H.323	Security Code: 123456	TN: 1
Port: S01767	Coverage Path 1:	COR: 1
Name: HDX8000	Coverage Path 2:	COS: 2
	Hunt-to Station:	Tests? y
STATION OPTIONS		
Loss Group: 19	Time of Day Lock Table:	
	Message Waiting Indicator: none	
	Authentication Required? y	
Survivable COR: internal		
Survivable Trunk Dest? y		
DTMF over IP: in-band		
	IP Video? y	

add station 50081		Page 2 of 4
FEATURE OPTIONS		STATION
LWC Reception: spe		
LWC Activation? y		Coverage Msg Retrieval? y
LWC Log External Calls? n		
CDR Privacy? n		Data Restriction? n
Redirect Notification? y		Call Waiting Indication: y
Per Button Ring Control? n		Att. Call Waiting Indication: y
Bridged Call Alerting? n		
Switchhook Flash? y		
H.320 Conversion? n	Per Station CPN - Send Calling Number?	
MWI Served User Type:		
AUDIX Name:		Coverage After Forwarding? s
		Multimedia Early Answer? n
		Direct IP-IP Audio Connections? y
Emergency Location Ext: 50081		IP Audio Hairpinning? y

If the VSX/HDX system has the multipoint option, perform the following steps:

1. Use the **add station** command to add a second station for the Polycom system.
2. Set **Type** to **H.323**.
3. Set **Security Code** to the “pin” you will administer for the VSX/HDX. Make sure the security code is the same as the previous station. All the stations configured for a single VSX or HDX system must have the same security code.
4. Set **IP Video** to **y**.
5. On page 2 of the form, set **Direct IP-IP Audio Connections** to **y**.
6. Set **IP Audio Hairpinning** to **y**.
7. If you want this station to be able to make priority video calls, make sure you select a COS level that has **Priority Ip Video** enabled.
8. Repeat Steps 1 through 7 to create the third consecutive station. For VSX systems, you can have up to six stations.
9. Use the **change station xx** command (where **xx** is the first station you added for the Polycom system) to set **Hunt-to Station** to the second station you added for the Polycom system.
10. Use the **change station xx** command (where **xx** is the second station you added for the Polycom system) to set **Hunt-to Station** to the third station you added for the Polycom system.
11. Use the **change station xx** command (where **xx** is the third station you added for the Polycom system) to set **Hunt-to Station** to the first station you added for the Polycom system. All stations must be in a circular hunt. If you added more than three stations for the Polycom system, use the **change station xx** command to set **Hunt-to Station** for each station.

add station 50081		Page 1 of 4
STATION		
Extension: 50081	Lock Messages? n	BCC: M
Type: H.323	Security Code: 123456	TN: 1
Port: S01767	Coverage Path 1:	COR: 1
Name: HDX8000	Coverage Path 2:	COS: 2
	Hunt-to Station: 50082	Tests? y
STATION OPTIONS		
Loss Group: 19	Time of Day Lock Table:	
	Message Waiting Indicator: none	
	Authentication Required? y	
Survivable COR: internal		
Survivable Trunk Dest? y		
DTMF over IP: in-band		
	IP Video? y	



add station 50082		Page 1 of 4
STATION		
Extension: 50082	Lock Messages? n	BCC: M
Type: H.323	Security Code: 123456	TN: 1
Port: S01767	Coverage Path 1:	COR: 1
Name: HDX8000	Coverage Path 2:	COS: 2
	Hunt-to Station: 50083	Tests? y
STATION OPTIONS		
Loss Group: 19	Time of Day Lock Table:	
	Message Waiting Indicator: none	
	Authentication Required? y	
Survivable COR: internal		
Survivable Trunk Dest? y		
DTMF over IP: in-band		
	IP Video? y	

add station 50083		Page 1 of 4
STATION		
Extension: 50083	Lock Messages? n	BCC: M
Type: H.323	Security Code: 123456	TN: 1
Port: S01767	Coverage Path 1:	COR: 1
Name: HDX8000	Coverage Path 2:	COS: 2
	Hunt-to Station: 50081	Tests? y
STATION OPTIONS		
Loss Group: 19	Time of Day Lock Table:	
	Message Waiting Indicator: none	
	Authentication Required? y	
Survivable COR: internal		
Survivable Trunk Dest? y		
DTMF over IP: in-band		
	IP Video? y	

Perform the following steps to configure VSX/HDX Polycom Systems registered to Communication Manager Gatekeeper:

1. Install the Polycom system and connect it to your network.
2. Upgrade the Polycom system software (if necessary).
3. Using a web browser, access the Polycom home page for the unit, and select **Admin Settings>Network>IP Network**.
4. Select the **Enable IP H.323** check box.
5. Select the **Display H.323 Extension** check box.
6. In the **H.323 Extension (E.164)** box, enter the first station extension number you specified for this system on the Communication Manager system.
7. From the **Use Gatekeeper** box, select **Specify with PIN**.
8. In the **Gatekeeper IP Address** box, enter the IP address of the CLAN or Processor Ethernet (procr) followed by: 1719 (to specify the correct port to use).
9. In the **Authentication PIN** box, enter the security code you entered when administering the station on Communication Manager.
10. In the **Number** box in the Gateway area, enter the H.323 extension you specified.
11. Select the **Enabled PVEC** check box.
12. In the **Type of Service** box in the **Quality of Service** area, select the appropriate setting. Both **IP Precedence** and **DiffServ** are supported. Contact your Network Administrator for this information.
13. In the **Type of Service Value** boxes (**Video**, **Audio**, and **Control**), enter the QoS values for the IP Network Region settings in which the VSX/HDX station belongs.
14. Select the **Dynamic Bandwidth** check box.
15. From the **Maximum Transmit Bandwidth** box, select the setting that matches the Maximum Call Rate for Direct-IP Multimedia setting you specified for the Communication Manager system.
16. From the **Maximum Receive Bandwidth** box, select the setting that matches the Maximum Call Rate for Direct-IP Multimedia setting you specified for the Communication Manager system.
17. Complete the **Firewall** section as necessary.
18. When finished, click the **Update** button at the top (see **Figure 3** below).

Repeat above Steps for each Polycom system.

Place a Call
Admin Settings
Diagnostics
Utilities
Home

Configure the system so that users can place and receive calls using IP on your LAN or WAN.

General Settings
System Settings
Home Screen Settings
Sites
Security
Password Settings
Location
Date and Time
Security
Password Settings
Location
Date and Time
Security
Password Settings
Location
Date and Time
Security
Password Settings
Location
Date and Time
Security
Password Settings
Location
Date and Time
Security
Password Settings
Location
Date and Time
Serial Port
Options
Software Update
Network
IP Network
Telephony
Call Preference
Network: Dialing
Call Speeds
Monitors
Cameras
Audio Settings
LAN Properties
Global Services
Tools

Update

IP Network

H.323 Settings

Enable IP H.323: ☒
Display H.323 Extension: ☒
H.323 Name: HDX8000
H.323 Extension (E.164): 60081
Use Gatekeeper: Specify with PIN
Gatekeeper IP Address: 135.9.88.5:1719
Alternate Gatekeepers: 135.9.88.5
Change PIN: ☒
Authentication PIN:
Confirm PIN:

Gateway

Country Code: 1
Area Code:
Number: 60081
Gateway Number Type: Number + Extension
Dial Prefix:

SIP Settings

Enable SIP: ☐

Quality of Service

Type of Service: DiffServ
Type of Service Value:
Video: 36
Audio: 46
Control: 0
Maximum Transmission Unit Size: Default 1260 bytes
Enable PVEC: ☒
Enable RSVP: ☒
Dynamic Bandwidth: ☒
Maximum Transmit Bandwidth: 1920 Kbps
Maximum Receive Bandwidth: 1920 Kbps

Firewall



Fixed Ports: ☐
TCP Ports: 3230 to 3243
UDP Ports: 3230 to 3285
Enable H.460 Firewall Traversal: ☐
NAT Configuration: Off

Figure 3. Example of a Polycom HDX8000 registered to Communication Manager

Perform the following steps to configure VSX/HDX Polycom Systems registered to Polycom CMA Gatekeeper:

1. Install the Polycom system and connect it to your network.
2. Upgrade the Polycom system software (if necessary).
3. Using a web browser, access the Polycom home page for the unit, and select **Admin Settings>Network>IP Network**.
4. Select the **Enable IP H.323** check box.
5. Select the **Display H.323 Extension** check box.
6. In the **H.323 Extension (E.164)** box, enter the first station number you specified for this system on the Polycom CMA Gatekeeper.
7. From the **Use Gatekeeper** box, select **Specify**.
8. In the **Gatekeeper IP Address** box, enter the IP address of the Polycom CMA Gatekeeper followed by: 1719 (to specify the correct port to use).
9. In the **Number** box in the Gateway area, enter the H.323 extension you specified.
10. Select the **Enabled PVEC** check box.
11. In the **Type of Service** box in the **Quality of Service** area, select the appropriate setting. Both **IP Precedence** and **DiffServ** are supported. Contact your Network Administrator for this information.
12. In the **Type of Service Value** boxes (**Video**, **Audio**, and **Control**), enter the QoS values necessary. Contact your Network Administrator for this information.
13. Select the **Dynamic Bandwidth** check box.
14. From the **Maximum Transmit Bandwidth** box, select the appropriate setting. Contact your Network Administrator for this information.
15. From the **Maximum Receive Bandwidth** box, select the appropriate setting. Contact your Network Administrator for this information.
16. Complete the **Firewall** section as necessary.
17. When finished, click the **Update** button at the top (see **Figure 4** below).

Repeat above Steps for each Polycom system.

Place a Call
Admin Settings
Diagnostics
Utilities
Home

Configure the system so that users can place and receive calls using IP on your LAN or WAN.

General Settings
System Settings
Home Screen Settings
Sites
Security
Password Settings
Location
Date and Time
Serial Port
Password Settings
Location
Date and Time
Serial Port
Password Settings
Location
Date and Time
Serial Port
Password Settings
Location
Date and Time
Serial Port
Options
Software Update
Network
IP Network
Telephony
Call Preference
Network Dialing
Call Speeds
Monitors
Cameras
Audio Settings
LAN Properties
Global Services
Tools

IP Network

Update

H.323 Settings

Enable IP H.323:	<input checked="" type="checkbox"/>
Display H.323 Extension:	<input checked="" type="checkbox"/>
H.323 Name:	HDX8000
H.323 Extension (E.164):	81002
Use Gatekeeper:	Specify
Gatekeeper IP Address:	135.9.88.45:1719
Use PathNavigator for Multipoint Calls:	Always

Gateway

Country Code:	1
Area Code:	
Number:	81002
Gateway Number Type:	Number + Extension

SIP Settings

Enable SIP:	<input type="checkbox"/>
-------------	--------------------------

Quality of Service

Type of Service:	DiffServ
Type of Service Value:	
Video:	36
Audio:	46
Control:	0
Maximum Transmission Unit Size:	Default 1260 bytes
Enable PVEC:	<input checked="" type="checkbox"/>
Enable RSVP:	<input checked="" type="checkbox"/>
Dynamic Bandwidth:	<input checked="" type="checkbox"/>
Maximum Transmit Bandwidth:	1920 Kbps
Maximum Receive Bandwidth:	1920 Kbps

Firewall

Fixed Ports:	<input type="checkbox"/>
TCP Ports:	3230 to 3243
UDP Ports:	3230 to 3285
Enable H.460 Firewall Traversal:	<input type="checkbox"/>
NAT Configuration:	Off

Figure 4. Example of a Polycom HDX8000 registered to Polycom CMA Gatekeeper

7. General Test Approach and Test Results

The testing was successfully concluded and it was not necessary to correct equipment deficiencies or failures.

8. Verification

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

Use **Status Station** command to verify the status of the station. The following screen captures display the status of station 50090. The Service State is in-service/off-hook meaning that this user is active on a call. The following four screen captures are an example of the status of a Polycom video endpoint active on a call.

```
status station 50090                                     Page 1 of 8
                                     GENERAL STATUS
Administered Type: H.323                               Service State: in-service/off-hook
Connected Type: N/A                                     TCP Signal Status: connected
Extension: 50090
Port: S01762                                           Parameter Download: not-applicable
Call Parked? no                                       SAC Activated? no
Ring Cut Off Act? no
Active Coverage Option: 1                             one-X Server Status: N/A
EC500 Status: N/A                                     Off-PBX Service State: N/A
Message Waiting:
Connected Ports: T01844
Limit Incoming Calls? no
User Cntrl Restr: none
Group Cntrl Restr: none
                                     HOSPITALITY STATUS
Awaken at:
User DND: not activated
Group DND: not activated
Room Status: non-guest room
```

The **Switch-End** IP address is the IP address of the CLAN or Processor Ethernet that this endpoint is registered to. The **Set End** is the IP address of this endpoint.

```
status station 50090                                     Page 4 of 8
                                     CALL CONTROL SIGNALING
Port: S01762      Switch-End IP Signaling Loc: 01B1217  H.245 Port: 01B1217
IP Address                                     Port Node Name      Rgn
Switch-End: 135.9.88.5                       1720 sqa8730clan3B  1
Set End: 135.9.88.233                       1720                      1
H.245 Near: 135.9.88.5                       13118
H.245 Set: 135.9.88.233                      H.245 Set:33369
```


Below is an example of a Polycom HDX8000 device (81002) registered to the CMA and active on a call. Under the Status column there are various symbols that represent different things including active on a call (connected plug symbol) and registered (check mark). On the right hand side of the CMA screen capture below is the Device Summary which gives information pertaining to the device registered to the CMA, the Device Status which in this case shows the endpoint is registered by displaying a green up arrow, and the Call Info in this case displays the Far Site Name and Number which is the CLAN IP address located at the Neighboring CM Gatekeeper.

The screenshot shows the Polycom CMA 4000 interface. The main table lists devices with columns: Status, Mode, Name, Type, IP Address, Alias, Site, and Owner. The first row is highlighted in blue and contains a green plug icon in the Status column, indicating the device is active on a call. Red arrows point to this icon and the 'Type' column header. Another red arrow points to the 'Device Status' section on the right, which shows a green up arrow indicating the endpoint is registered.

Status	Mode	Name	Type	IP Address	Alias	Site	Owner
		HDX8000-2	HDX Series	135.9.88.227	81002	My Region	SIL Room
		MLVSX 3K	V and VSX Series	135.122.26.229	46599	My Region	
		VSX3000-2	V and VSX Series	135.9.88.225	81001	My Region	SIL Room
		VSX5000-1	V and VSX Series	135.9.88.232	81003	My Region	SIL Room

Device Summary:

- Name: HDX8000-2
- Type: HDX Series
- Owner: SIL Room
- IP Address: 135.9.88.227
- ISDN Video Number:
- Site: My Region: Primary Site
- Software Version: Release - 2.5.0.5-3548
- Serial Number:
- Available to Schedule: Yes
- Monitoring Level: Standard
- Supported Protocols: ☒ H.323 ☐ ISDN
- Capabilities Enabled: ☐ MCU ☐ Gateway
- Alias (type): 81002 (E164) HDX8000-2 (H323ID)

Device Status:

- Gatekeeper Registration:
- GDS Registration:
- Presence Registration:
- Device Managed: No
- GK Registration Timeout: Never Expired
- Last GK Registration: 11-18-2009 10:10:53 AM
- Device Local Time:
- ISDN Line Status:
- ISDN Assignment Type: From Network
- Device ISDN Type:

Call Info:

- Call Type:
- Video Protocol:
- Video Format:
- Audio Protocol:
- Far Site Name: 135.9.88.5:1720
- Far Site Number: 135.9.88.5
- Cause Code:
- Encryption:

Here is an example of an endpoint that is administered on the CMA but not registered.

The screenshot shows the Polycom CMA 4000 interface. The top navigation bar includes links for Conference, Endpoint, Network Device, User, Reports, Admin, Settings, Downloads, Log Out, and Help. The breadcrumb trail indicates the current location is 'Endpoint > Monitor View'.

On the left, there are two sections: 'VIEWS' with links for Monitor View, Automatic Provisioning, Scheduled Provisioning, Automatic Softupdate, and Scheduled Softupdate; and 'ACTIONS' with links for Refresh, Add, View Details, Manage, Send Message, Clear Help, Reboot Device, Edit, and Delete.

The main area contains a table with columns: Status, Mode, Name, Type, IP Address, Alias, Site, and Owner. The table lists three endpoints:

Status	Mode	Name	Type	IP Address	Alias	Site	Owner
✓		HDX8000-2	HDX Series	135.9.88.227	81002	My Region	SIL Room
✓		MLVSX 3K	V and VSX Series	135.122.26.229	46599	My Region	SIL Room
✓		VSX3000-2	V and VSX Series	135.9.88.225	81001	My Region	SIL Room
✓		VSX5000-1	V and VSX Series	135.9.88.232	81003	My Region	SIL Room

A red arrow points from the text 'Endpoint is not registered. Gatekeeper Registration has a red arrow pointing downward.' to a red downward arrow in the 'Gatekeeper Registration' status column of the table.

On the right, the 'Device Summary' section provides details for the selected endpoint (MLVSX 3K):

- Name: MLVSX 3K
- Type: V and VSX Series
- Owner: My Region:Primary Site
- IP Address: 135.122.26.229
- ISDN Video Number: 1 720 36753
- Software Version: HF 9.0.5.1.01-103 - 04Aug2009 09:2
- Serial Number: 82061705EC81N1
- Available to Schedule: Yes
- Monitoring Level: Standard
- Supported Protocols: ☒ H.323 ☒ ISDN
- Capabilities Enabled: ☐ MCU ☐ Gateway
- Alias (type): 46599 (E164) VSX MINI Lab 12 (H323ID)

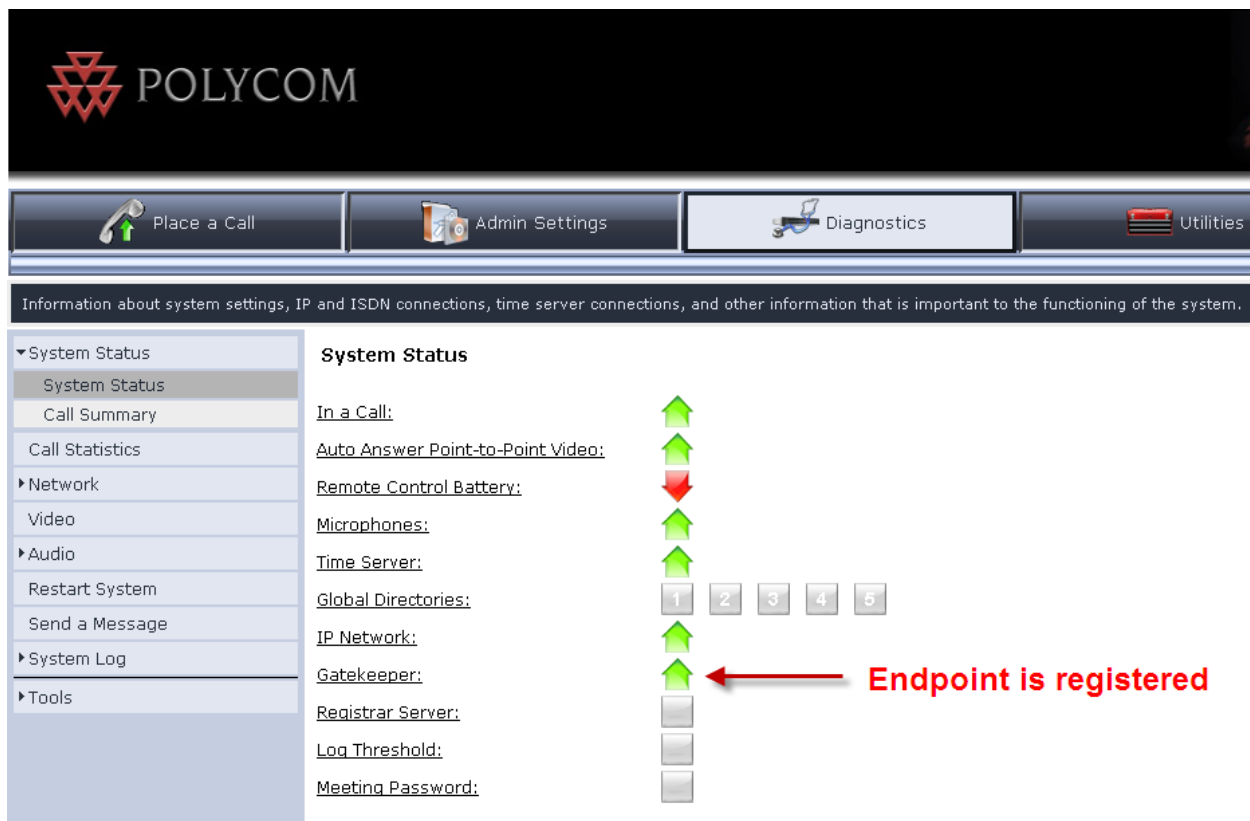
The 'Device Status' section shows the following information:

- Gatekeeper Registration:
- GDS Registration:
- Presence Registration:
- Device Managed: Yes
- GK Registration Timeout: Never Expired
- Last GK Registration: 09-11-2009 2:44:22 PM
- Device Local Time: 11:58:17 AM
- ISDN Line Status:
- ISDN Assignment Type: Endpoint
- Device ISDN Type: ISDN_QUAD_BRI

Below the status section are expandable sections for Call Info, Device Alerts, Provisioning Details, and Softupdate Details.

8.2. Verify Status of Polycom Endpoint

Log in to the Polycom endpoint's web interface and select the **Diagnostics** tab and then from the left column select **System Status**. This is an example of the Polycom video endpoint's web interface showing that it's registered with the Gatekeeper. Notice the green upward arrow next to Gatekeeper. If the endpoint was not registered a red arrow pointing downward would be displayed instead of the green upward arrow.



To see the status of an active Polycom endpoint from its web interface select the **Place a Call** tab. Under **Please enter a number and press Call** you will notice that the number **50090** was dialed in this example. All of the information that pertains to this call is displayed under **Calls Connected**.

Place a video call. Enter a number, or choose an entry from the Directory or Recent Calls list.

Place a Call

Please enter a number and press Call.

50090

Extension: Meeting Password:

Calls Connected:

	Transmit	Receive
Call Speed:	1920 K	1920 K
Video Protocol:	H.264	H.264
Video Annex:	---	---
Video Format:	720p	720p
Audio Protocol:	Siren14	Siren14
Total Packets Lost:	0	0
% Packet Loss:	00.0 %	00.0 %
Call Encryption:	Disabled	
Call Type:	H.323	
Audio Rate:	32 K	32 K
Video Rate:	1888 K	1888 K
Video Rate Used:	1731 K	1882 K
Video Frame Rate:	30.0	30.0
Video Packets Lost:	0	0
Video Jitter:	2 ms	2 ms
Audio Packets Lost:	0	0
Audio Jitter:	0 ms	0 ms
Video FEC Errors:	0	
Far Site Name:	HDX4000-1	
Far Site System:	Lucent_Tech./Avaya Multivantage/R015x.02.1.016.1	
Far Site Number:	50090	

9. Conclusion

The H.323 Video interoperability among Communication Manager Gatekeeper, Polycom CMA 4000 Gatekeeper, VSX 3000, VSX5000, HDX 4002, HDX 8006, and HDX9005 Endpoints has been tested and passed.

10. Additional References

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

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

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