Avaya Solution & Interoperability Test Lab

Application Notes for Tandberg, Polycom and Avaya Endpoints with Avaya Communication Manager Utilizing H.323 Signaling - Issue 1.1

Abstract

These Application Notes present the procedures for configuring connectivity between Tandberg, Polycom and Avaya endpoints with Avaya Communication Manager via H.323 signaling.

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

These Application Notes present the procedures for configuring connectivity between Tandberg, Polycom and Avaya endpoints with Avaya Communication Manager via H.323 signaling.

Figure 1 illustrates the sample configuration utilized for this compliance tested solution. Avaya Communication Manager was comprised of a pair of Avaya S8710 Servers and an Avaya G650 Media Gateway. Avaya Communication Manager provided authentication, registration and feature server functionality for the video enabled endpoints via H.323 signaling, as well as audio only connectivity for all endpoints in this compliance tested solution. For example, any endpoint associated with Avaya Communication Manager, including the video enabled endpoints can, at a minimum, have audio only call connectivity. All video codec functionality is dependent on the hardware, e.g., video codec, installed on the endpoint. Note that although Avaya Communication Manager does not provide video codec support, Avaya Communication Manager is involved in the signaling for video calls. In this way, Avaya Communication Manager can be administered to provide Call Admission Control (CAC) regarding the bandwidth required for video.

The Tandberg Centric 1700 MXP operates both as a multi-point control unit and PC display, enabling seamless and real-time face-to-face collaboration at the desktop.

- Multi-point control unit for conferencing up to 4 video and 3 audio endpoints
- H.235 and IEEE 802.1x authentication
- Video compliant with the H.264 standard

Tandberg Centric 150 MXP provides communication for the individual workspace by allowing end users to place video and voice calls.

- Up to 512 kbps IP
- H.235 Authentication
- Video compliant with the H.264 standard

The Polycom VSX 3000 operates both as a multi-point control unit and PC display, enabling seamless and real-time face-to-face collaboration at the desktop.

- Multi-point control unit for conferencing up to 4 video enabled endpoints
- Video compliant with the H.264 standard

To account for the SIP telephones in this sample configuration, Avaya SIP Enablement Services was utilized as a SIP registration server only.

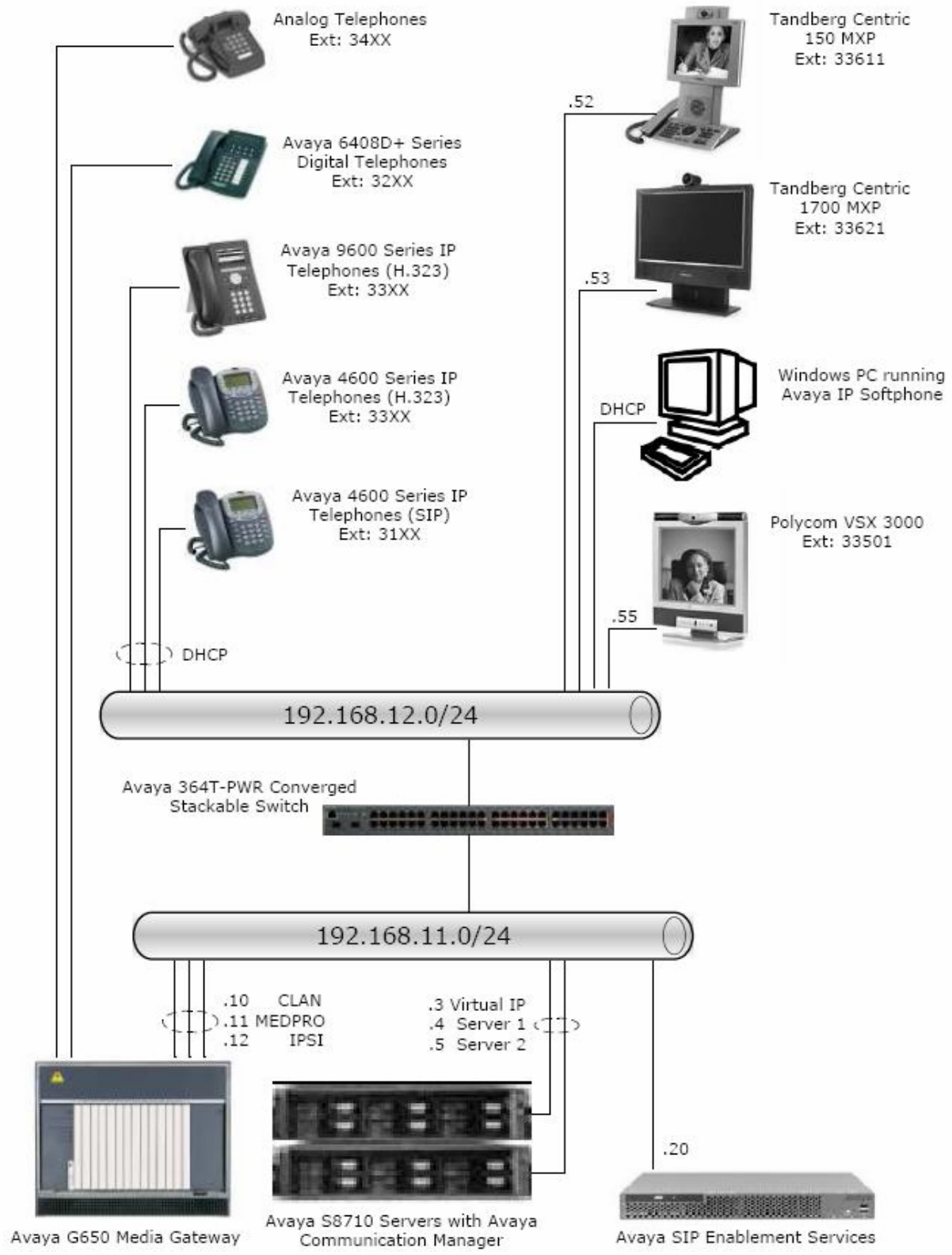


Figure 1: Sample Configuration

2. Equipment Validated

Table 1 list the equipment and software/firmware versions that were used for this sample configuration.

Equipment	Version
Avaya S8710 Servers	Avaya Communication Manager 4.0 (R014x.00.1.731.2)
Avaya G650 Media Gateway: • Avaya TN2312BP (IPSI) • Avaya TN799DP (C-LAN) • Avaya TN2302AP (MEDPRO)	 HW12 FW040 HW01 FW024 HW20 FW117
Avaya SIP Enablement Services	SES 4.0 (04.0-04.0.033.6)
Avaya C364T-PWR Converged Stackable Switch	4.5.14
Avaya 4600 Series IP Telephones	2.8 (H.323)
Avaya 4600 Series IP Telephones	2.2.2 (SIP)
Avaya 9600 Series IP Telephones	1.5 (H.323)
Avaya IP Softphone	6.0.0.25
Avaya 6408D+ Digital Telephones	--
Analog Telephones	--
Polycom VSX 3000	8.5.3
Tandberg Centric 150 MXP	L5.0
Tandberg Centric 1700 MXP	F6.1

Table 1: Equipment and Software Versions

3. Avaya Communication Manager Configuration

This section describes the configuration for enabling Avaya Communication Manager to interoperate with the video enabled endpoints in this sample configuration.

Avaya Communication Manager was administered from the System Access Terminal (SAT). In these Application Notes the SAT screens are shown with a gray shaded background. In some instances, the information from the original screen has been edited or annotated for brevity or clarity in presentation. For example, entries and/or fields in the SAT screens that were either modified or were required for these Application Notes are displayed with boldface type. Refer to [**1**] and [**2**] for additional information regarding the administration of Avaya Communication Manager.

3.1. Verify Licensing

The following steps verify licensing on Avaya Communication Manager that is required to support the configuration described in these Application Notes. If a required feature is not enabled or there is insufficient capacity, contact an authorized Avaya account representative to make the appropriate changes.

Step	Description
3.1.1	Issue the command "**display system-parameters customer-options**" and proceed to page 2. Verify that there is sufficient licensing for the following: • The **Maximum Video Capable H.323 Stations** field must be greater than or equal to the number of H.323 video enabled stations in the network. In this sample configuration, the Tandberg and Polycom endpoints are video capable stations. o The Tandberg Centric 1700 MXP is administered as four H.323 video enabled stations. o The Polycom VSX 3000 is administered as three H.323 video enabled stations. o The Tandberg Centric 150 MXP is administered as two H.323 video enabled stations. Note that the Tandberg Centric 150 MXP is administered as two H.323 video enabled stations to support multiple calling lines (see **Step 3.5.2**). Since the Tandberg Centric 1700 MXP does not support multiple call appearances, this is a work around to emulate a station with multiple call appearances. The Tandberg Centric 1700 MXP may be administered as a single H.323 video enabled station. • The **Maximum Video Capable IP Softphones** field must be greater than or equal to the number of Avaya IP Softphones enabled with video capabilities in the network.

```
display system-parameters customer-options                    Page   2 of  10

                                OPTIONAL FEATURES

IP PORT CAPACITIES                                            USED
                     Maximum Administered H.323 Trunks: 800   20
           Maximum Concurrently Registered IP Stations: 100   11
             Maximum Administered Remote Office Trunks: 0     0
Maximum Concurrently Registered Remote Office Stations: 0     0
              Maximum Concurrently Registered IP eCons: 0     0
  Max Concur Registered Unauthenticated H.323 Stations: 100   0
                  Maximum Video Capable H.323 Stations: 100   16
                   Maximum Video Capable IP Softphones: 100   5
                       Maximum Administered SIP Trunks: 800   225

   Maximum Number of DS1 Boards with Echo Cancellation: 0     0
                            Maximum TN2501 VAL Boards: 10    0
                     Maximum Media Gateway VAL Sources: 0     0
           Maximum TN2602 Boards with 80 VoIP Channels: 128   0
          Maximum TN2602 Boards with 320 VoIP Channels: 128   0
   Maximum Number of Expanded Meet-me Conference Ports: 0     0

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

3.2. Configure Connectivity

This section describes the steps for configuring connectivity between the Tandberg, Polycom and Avaya endpoints in this sample configuration with Avaya Communication Manager.

Step	Description
3.2.1	Issue the command "**change ip-codec-set <n>**", where **n** is the number of an available codec set. Add entries for audio codecs that are supported by the endpoints in a network. • The Tandberg endpoints support **G.711MU** and **G.722.1-32K**. • The Polycom VSX 3000 supports **SIREN14-48K**, **G.711MU**, **G.722.1-32K** and **G.729A**.

```
change ip-codec-set 2                                         Page   1 of   2

                         IP Codec Set

    Codec Set: 2

    Audio         Silence      Frames   Packet
    Codec         Suppression  Per Pkt  Size(ms)
 1: SIREN14-48K                  1        20
 2: G.722.1-32K                  1        20
 3: G.729A             n         2        20
 4: G.711MU            n         2        20
 5:
 6:
 7:
```

Step	Description
3.2.2	Proceed to Page 2 and enable direct IP multimedia. The **Maximum Call Rate for Direct-IP Multimedia** field is the combined audio and video transmit/receive rate for a call. This field is utilized to limit the bandwidth used for calls within an IP network region. For these Application Notes, the field was set well above the expected call rate.

```
change ip-codec-set 2                                         Page   2 of   2

                         IP Codec Set

                              Allow Direct-IP Multimedia? y
               Maximum Call Rate for Direct-IP Multimedia: 5120:Kbits
     Maximum Call Rate for Priority Direct-IP Multimedia:  384:Kbits

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

Step	Description
3.2.3	Issue the command "**change ip-network-region <n>**", where **n** is the number of an available IP network region and provision an IP network region for the Tandberg and Polycom endpoints. Administer settings as displayed: • Enter the number of the IP codec set provisioned in **Step 3.2.1** in the **Codec Set** field. • Use default settings for remaining fields. ***Note**: It is not required that a second IP network region be created. By default, any IP endpoint associated with Avaya Communication Manager will correlate with IP network region 1. For this sample configuration, a second IP network region was created to allow for the following:* • *A distinct setting for the **Authoritative Domain** field.* • *An IP codec set to account for the video enabled endpoints in this sample configuration (see **Step 3.2.1**).* • *A unique setting for the **H.323 SECURITY PROFILES** field (see **Step 3.2.4**).* • *The option of restricting the bandwidth over the Wide Area Network (WAN) interface between IP network regions for video calls (see **Step 3.2.5**).*

```
change ip-network-region 100                                  Page   1 of  19

                                IP NETWORK REGION
  Region: 100
Location:         Authoritative Domain: avaya.com
    Name: H.323 Video
MEDIA PARAMETERS                Intra-region IP-IP Direct Audio: yes
      Codec Set: 2              Inter-region IP-IP Direct Audio: yes
   UDP Port Min: 2048                     IP Audio Hairpinning? n
   UDP Port Max: 3329
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: 26
802.1P/Q PARAMETERS
 Call Control 802.1p Priority: 6
        Audio 802.1p Priority: 6
        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
```

Step	Description
3.2.4	Proceed to Page 2 and enable H.323 endpoints to register with Avaya Communication Manager using any of the H.323 authentication methods supported by Avaya Communication Manager.

```
change ip-network-region 100                                  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
```

Step	Description
3.2.5	Proceed to Page 3 and enable inter-region connectivity between IP network regions 100 and 1 by entering the number of the IP codec set provisioned in **Step 3.2.1** in the **codec set** field. By default, the C-LAN and all Avaya IP endpoints are assigned to IP network region 1. For this sample configuration, the Tandberg and Polycom endpoints are assigned to IP network region 100 (see **Step 3.2.6**). ***Note**: The default value for the **Units** field allows unlimited bandwidth allocation for calls between IP network regions. This has significance for video, as a video call may have high bandwidth requirements. If the goal is to preserve bandwidth over the WAN, enter appropriate settings under **WAN-BW-limits**.*

```
change ip-network-region 100                                  Page   3 of  19

                    Inter Network Region Connection Management

 src dst codec direct   WAN-BW-limits   Video                            Dyn
 rgn rgn  set   WAN  Units    Total Norm  Prio Shr Intervening-regions  CAC IGAR
 100 1    2     y    NoLimit                                             n
 100 2
 100 3
 100 4
 100 5
 100 6
 100 7
 100 8
 100 9
 100 10
 100 11
 100 12
 100 13
 100 14
 100 15
```

3.2.6	Issue the command "**change ip-network-map**" and administer settings to assign a range of IP addresses to an IP network region as displayed. For this sample configuration, the Tandberg and Polycom endpoints are assigned static IP addresses that are in this range. Therefore, the Tandberg and Polycom endpoints are assigned to the IP network region provisioned in **Steps 3.2.3 - 3.2.5.**

```
change ip-network-map                                          Page   1 of  32

                        IP ADDRESS MAPPING

                                                                 Emergency
                                          Subnet                 Location
 From IP Address  (To IP Address   or Mask)  Region    VLAN     Extension
 192.168.12 .50   192.168.12 .59              100      n
```

3.3. Configure an H.323 Station to Support Avaya IP Softphone

This section describes the steps for configuring an H.323 station on Avaya Communication Manager to support Avaya IP Softphone.

Step	Description
3.3.1	Issue the command "**change station <n>**", where **n** is the extension of an existing station and administer settings to enable video for this station as displayed. Repeat this step for each Avaya H.323 station that is required to support Avaya IP Softphone and video. ***Note**: These Application Notes include an Avaya IP Softphone that is associated with this station. Refer to [**3**] for administering Avaya IP Softphone*.

```
change station 33005                                          Page   1 of   5

                                    STATION

Extension: 33005                       Lock Messages? n               BCC: 0
     Type: 9620                        Security Code: 123456           TN: 1
     Port: S00021                    Coverage Path 1:                 COR: 1
     Name: H.323 33005 Video         Coverage Path 2:                 COS: 1
                                     Hunt-to Station:
STATION OPTIONS
                                          Time of Day Lock Table:
             Loss Group: 19          Personalized Ringing Pattern: 1
                                               Message Lamp Ext: 33005
           Speakerphone: 2-way              Mute Button Enabled? y
        Display Language: english
 Survivable GK Node Name:
          Survivable COR: internal             Media Complex Ext:
   Survivable Trunk Dest? y                         IP SoftPhone? y

                                              IP Video Softphone? y


                                         Customizable Labels? y
```

3.4. Configure H.323 Stations to Support the Tandberg Centric 1700 MXP

This section describes the steps for configuring H.323 stations on Avaya Communication Manager to support the Tandberg Centric 1700 MXP. Each Tandberg Centric 1700 MXP requires the administration of four stations in Avaya Communication Manager. Repeat the steps in this section for each Tandberg Centric 1700 MXP in the network.

Step	Description
3.4.1	Issue the command "**add station <n>**", where **n** is the extension of an available station and administer settings as displayed.
	add station 33621 Page 1 of 4 STATION Extension: 33621 Lock Messages? n BCC: 0 **Type: H.323** **Security Code: 123456** TN: 1 Port: IP Coverage Path 1: COR: 1 **Name: Tandberg1700** Coverage Path 2: COS: 1 Hunt-to Station: Tests? y STATION OPTIONS Time of Day Lock Table: Loss Group: 19 Message Waiting Indicator: none Authentication Required? y Survivable COR: internal Survivable Trunk Dest? y DTMF over IP: in-band **IP Video? y**
3.4.2	Repeat **Step 3.4.1** to add the "second" station for the Tandberg Centric 1700 MXP. For this sample configuration, extension 33622 was used.
3.4.3	Repeat **Step 3.4.1** to add the "third" station for the Tandberg Centric 1700 MXP. For this sample configuration, extension 33623 was used.
3.4.4	Repeat **Step 3.4.1** to add the "fourth" station for the Tandberg Centric 1700 MXP. For this sample configuration, extension 33624 was used.

Step	Description
3.4.5	Issue the command "**change station <n>**", where **n** is the extension of the "first" station configured for the Tandberg Centric 1700 MXP and administer settings as displayed. Set the **Hunt-to Station** field to the extension of the "second" station configured for the Tandberg Centric 1700 MXP.

```
change station 33621                                          Page   1 of   4

                                    STATION

Extension: 33621                       Lock Messages? n               BCC: 0
     Type: H.323                       Security Code: 123456           TN: 1
     Port: IP                        Coverage Path 1:                 COR: 1
     Name: Tandberg1700              Coverage Path 2:                 COS: 1
                                     Hunt-to Station: 33622         Tests? y
STATION OPTIONS
                                        Time of Day Lock Table:
              Loss Group: 19          Message Waiting Indicator: none

                                      Authentication Required? y


          Survivable COR: internal
   Survivable Trunk Dest? y
            DTMF over IP: in-band
                                                          IP Video? y
```

3.4.6	Repeat **Step 3.4.5** to administer the "second" station configured for the Tandberg Centric 1700 MXP. Set Hunt-to Station field to the extension of the "third" station configured for the Tandberg Centric 1700 MXP.
3.4.7	Repeat **Step 3.4.5** to administer the "third" station configured for the Tandberg Centric 1700 MXP. Set Hunt-to Station field to the extension of the "fourth" station configured for the Tandberg Centric 1700 MXP.
3.4.8	Repeat **Step 3.4.5** to administer the "fourth" station configured for the Tandberg Centric 1700 MXP. Set Hunt-to Station field to the extension of the "first" station configured for the Tandberg Centric 1700 MXP.

3.5. Configure H.323 Stations to Support the Tandberg Centric 150 MXP

This section describes the steps for configuring an H.323 station on Avaya Communication Manager to support the Tandberg Centric 150 MXP.

Step	Description
3.5.1	Issue the command "**add station <n>**", where **n** is the extension of an available station and administer settings as displayed. Repeat this step for each Tandberg Centric 150 MXP in the network.

```
add station 33611                                          Page   1 of   4

                                    STATION

Extension: 33611                       Lock Messages? n               BCC: 0
     Type: H.323                       Security Code: 123456           TN: 1
     Port: IP                        Coverage Path 1:                 COR: 1
     Name: Tandberg150               Coverage Path 2:                 COS: 1
                                     Hunt-to Station:               Tests? y
STATION OPTIONS
                                         Time of Day Lock Table:
             Loss Group: 19           Message Waiting Indicator: none

                                       Authentication Required? y


         Survivable COR: internal
   Survivable Trunk Dest? y
          DTMF over IP: in-band
                                                          IP Video? y
```

Step	Description
3.5.2	[***Optional***] Repeat **Step 3.5.1** to add the "second" station for the Tandberg Centric 150 MXP. For this sample configuration, extension 33612 was used. This second station is utilized to support a second calling line and is an optional step. Note that the Tandberg Centric 150 MXP supports a maximum of two calling lines. If this step is performed, then **Step 3.5.3** must be performed.
3.5.3	Issue the command "**change station <n>**", where **n** is the extension of the "first" station configured for the Tandberg Centric 150 MXP and administer settings as displayed. Set the **Hunt-to Station** field to the extension of the "second" station configured for the Tandberg Centric 150 MXP. ***Note**: Since there are only two stations used to support the Tandberg Centric 150 MXP, it is sufficient to only administer hunting from the first station to the second station. It is not necessary to then administer the second station to hunt back to the first station. If more than two stations are used, it is necessary to complete the "loop" and administer the last station to hunt to the first station, as administered for the Tandberg Centric 1700 MXP*.

```
change station 33611                                          Page   1 of   4

                                    STATION

Extension: 33611                       Lock Messages? n               BCC: 0
     Type: H.323                       Security Code: 123456           TN: 1
     Port: IP                        Coverage Path 1:                 COR: 1
     Name: Tandberg150               Coverage Path 2:                 COS: 1
                                     Hunt-to Station: 33612          Tests? y
STATION OPTIONS
                                        Time of Day Lock Table:
             Loss Group: 19           Message Waiting Indicator: none

                                      Authentication Required? y


         Survivable COR: internal
   Survivable Trunk Dest? y
          DTMF over IP: in-band
                                                          IP Video? y
```

3.6. Configure H.323 Stations to Support the Polycom VSX 3000

This section describes the steps for configuring H.323 stations on Avaya Communication Manager to support the Polycom VSX 3000. Each Polycom VSX 3000 requires the administration of three stations in Avaya Communication Manager. Repeat the steps in this section for each Polycom VSX 3000 in the network.

Step	Description
3.6.1	Issue the command "**add station <n>**", where **n** is the extension of an available station and administer settings as displayed.

```
add station 33501                                          Page   1 of   4

                                    STATION

Extension: 33501                       Lock Messages? n              BCC: 0
     Type: H.323                       Security Code: 123456          TN: 1
     Port: IP                        Coverage Path 1:                COR: 1
     Name: VSX 3000                   Coverage Path 2:               COS: 1
                                     Hunt-to Station:              Tests? y
STATION OPTIONS
                                        Time of Day Lock Table:
             Loss Group: 19           Message Waiting Indicator: none

                                      Authentication Required? y


          Survivable COR: internal
   Survivable Trunk Dest? y
            DTMF over IP: in-band
                                                          IP Video? y
```

3.6.2	Repeat **Step 3.6.1** to add the "second" station for the Polycom VSX 3000. For this sample configuration, extension 33502 was used.
3.6.3	Repeat **Step 3.6.1** to add the "third" station for the Polycom VSX 3000. For this sample configuration, extension 33503 was used.

Step	Description
3.6.4	Issue the command "**change station <n>**", where **n** is the extension of the "first" station configured for the Polycom VSX 3000 and administer settings as displayed. Set the **Hunt-to Station** field to the extension of the "second" station configured for the Polycom VSX 3000.
	change station 33501 Page 1 of 4 STATION Extension: 33501 Lock Messages? n BCC: 0 Type: H.323 Security Code: 123456 TN: 1 Port: IP Coverage Path 1: COR: 1 Name: VSX 3000 Coverage Path 2: COS: 1 **Hunt-to Station: 33502** Tests? y STATION OPTIONS Time of Day Lock Table: Loss Group: 19 Message Waiting Indicator: none Authentication Required? y Survivable COR: internal Survivable Trunk Dest? y DTMF over IP: in-band IP Video? y
3.6.5	Repeat **Step 3.6.5** to administer the "second" station configured for the Polycom VSX 3000. Set Hunt-to Station field to the extension of the "third" station configured for the Polycom VSX 3000.
3.6.6	Repeat **Step 3.6.5** to administer the "third" station configured for the Polycom VSX 3000. Set Hunt-to Station field to the extension of the "first" station configured for the Polycom VSX 3000.

4. Tandberg Configuration

This section describes the steps for configuring the Tandberg endpoints. The configuration of the Tandberg endpoints may be administered via Control Panel Menus or the Command Line Interface (CLI). It should be noted that the Tandberg endpoints do not support DHCP Option 242, see **Section 6.2.1** for details. Therefore, the information for the H.323 gatekeeper must be input via the Control Panel Menus, or the CLI. For these Application Notes, DHCP was disabled and information regarding IP addressing was entered statically via the Control Panel Menus. Static IP addressing also simplified the assignment of the Tandberg endpoints to the correct IP network region administered on Avaya Communication. Refer to [**4**] and [**5**] for additional information regarding the administration of the Tandberg endpoints.

4.1. Configure the Tandberg Centric 1700 MXP

This section describes the steps for configuring the Tandberg Centric 1700 MXP.

Figure 2 illustrates the Control Panel Menus, which are accessed using the remote control unit for the Tandberg Centric 1700 MXP. Use the appropriate buttons on the remote control unit to open the Control Panel Menus as displayed to provide static IP address parameters. Reboot to apply the changes.

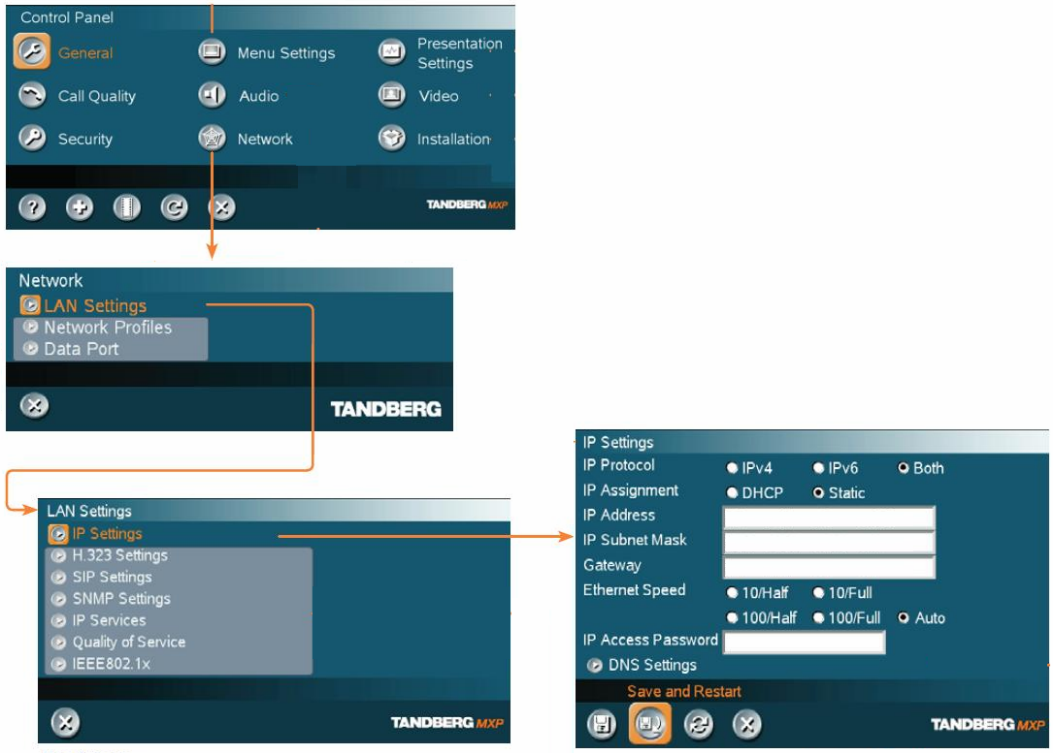


Figure 2: Tandberg Centric 1700 MXP Control Panel Menus

Step	Description
4.1.1	Log in to the Tandberg Centric 1700 MXP via Secure Shell (SSH) with the appropriate credentials. From the CLI, enter commands as displayed. ***Note**: The commands of the type, "**`xConfiguration H323Gatekeeper Avaya`**" must be entered via the CLI. Optionally, the others may be entered via the Control Panel Menus on the Tandberg Centric 1700 MXP.*

	`xConfiguration H323 Mode: On`
	`xConfiguration H323CallSetup Mode: Gatekeeper`
	`xConfiguration H323Prefix: ""`
	`xConfiguration H323Gatekeeper Discovery: Manual`
	`xConfiguration H323Gatekeeper Address: <IP Address of CLAN>`
	`xConfiguration H323Gatekeeper Authentication Mode: Off`
	`xConfiguration H323Gatekeeper Authentication ID: ""`
	`xConfiguration H323Gatekeeper MultipleAlias: Off`
	`xConfiguration H323Gatekeeper Avaya` `Mode: On`
	`xConfiguration H323Gatekeeper Avaya` `AnnexH: On`
	`xConfiguration H323Gatekeeper Avaya` `MultipointCount: 0`
	`xconfiguration H323Gatekeeper Avaya` `Password: <`**`Security Code`** `from` **`Step 3.4.1`**`>`
	`xConfiguration Conference H323Alias E164: <Station` **`Extension`** `from` **`Step 3.4.1`**`>`
	`xConfiguration Conference H323Alias ID: ""`

4.1.2	To apply the administrative changes, enter **boot** form the Tandberg Centric 1700 MXP CLI.

	`boot`
	
	`OK`
	`Boot requested, restarting`

4.2. Configure the Tandberg Centric 150 MXP

This section describes the steps for configuring the Tandberg Centric 150 MXP.

Figure 3 illustrates the keypad on the Tandberg Centric 150 MXP, which is used to access the Control Panel Menus. Press the button as displayed to open the Control Panel Menus. Refer to **Figure 2** for navigating to the appropriate menu to provide static IP address parameters.

Figure 3: Tandberg Centric 150 MXP Keypad

Step	Description
4.2.1	Log in to the Tandberg Centric 150 MXP via Secure Shell (SSH) with the appropriate credentials. From the CLI, enter commands as displayed. ***Note**: The commands of the type, "**`xConfiguration H323Gatekeeper Avaya`**" must be entered via the CLI. Optionally, the others may be entered via the keypad on the Tandberg Centric 150 MXP. In particular, it should be noted that to enable multiple line appearances for the Tandberg Centric 150 MXP, the variable for the **xConfiguration H323Gatekeeper Avaya MultipointCount** is set to **2**.*

	`xConfiguration H323CallSetup Mode: Gatekeeper`
	`xConfiguration H323Gatekeeper Discovery: Manual`
	`xConfiguration H323Gatekeeper Address: <IP Address of CLAN>`
	`xConfiguration H323Gatekeeper Authentication Mode: Off`
	`xConfiguration H323Gatekeeper Authentication ID: ""`
	`xConfiguration H323Gatekeeper MultipleAlias: Off`
	`xConfiguration H323Gatekeeper Avaya` `Mode: On`
	`xConfiguration H323Gatekeeper Avaya` `AnnexH: On`
	`xConfiguration H323Gatekeeper Avaya MultipointCount: 2`
	`xconfiguration H323Gatekeeper Avaya` `Password: <`**`Security Code`** `from` **`Step 3.5.1`**`>`
	`xConfiguration Conference H323Alias E164: <Station` **`Extension`** `from` **`Step 3.5.1`**`>`
	`xConfiguration Conference H323Alias ID: ""`

Step	Description
4.2.2	To apply the administrative changes, enter **boot** form the Tandberg Centric 1700 MXP CLI.
	boot OK Boot requested, restarting

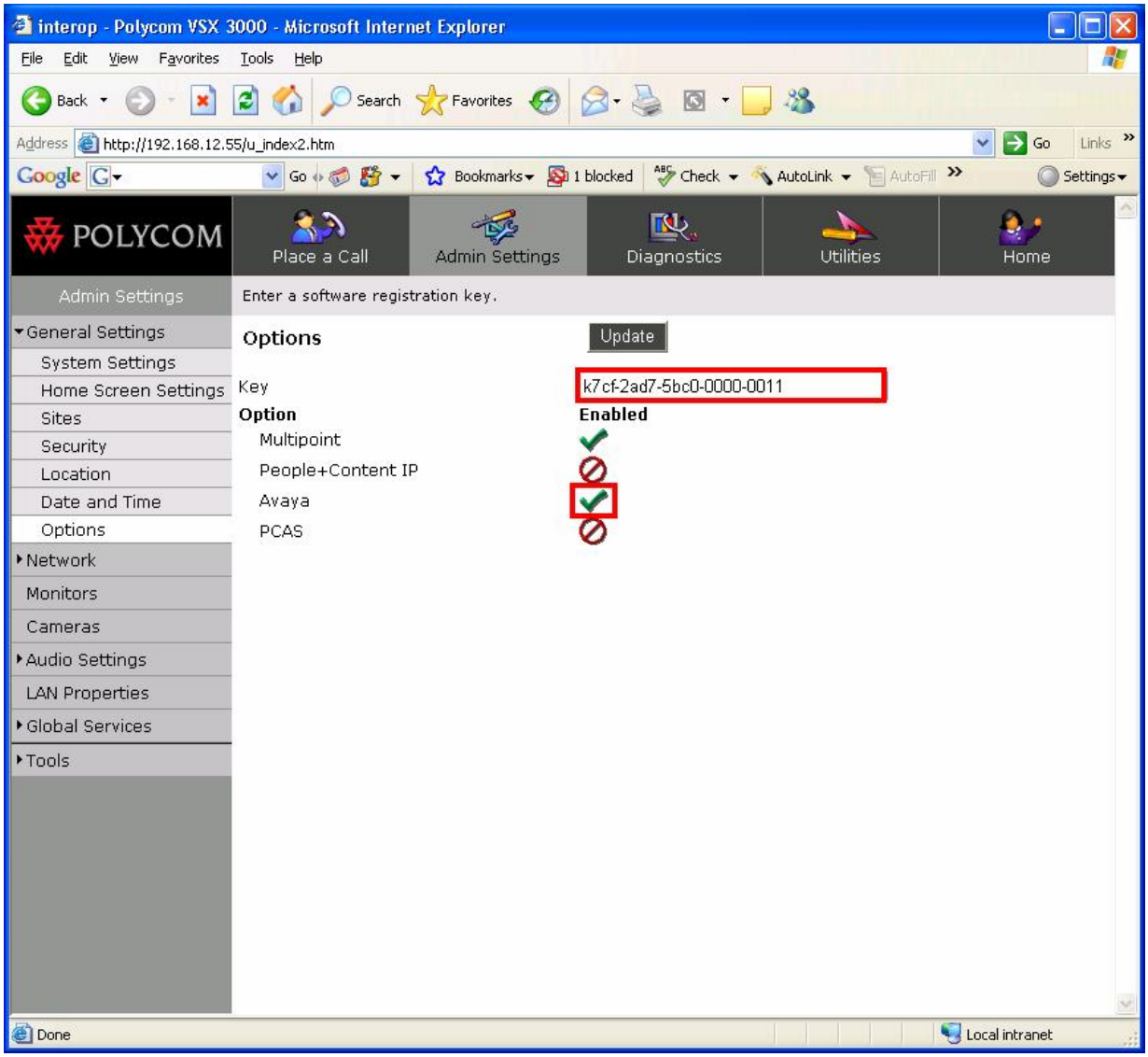
5. Polycom VSX 3000 Configuration

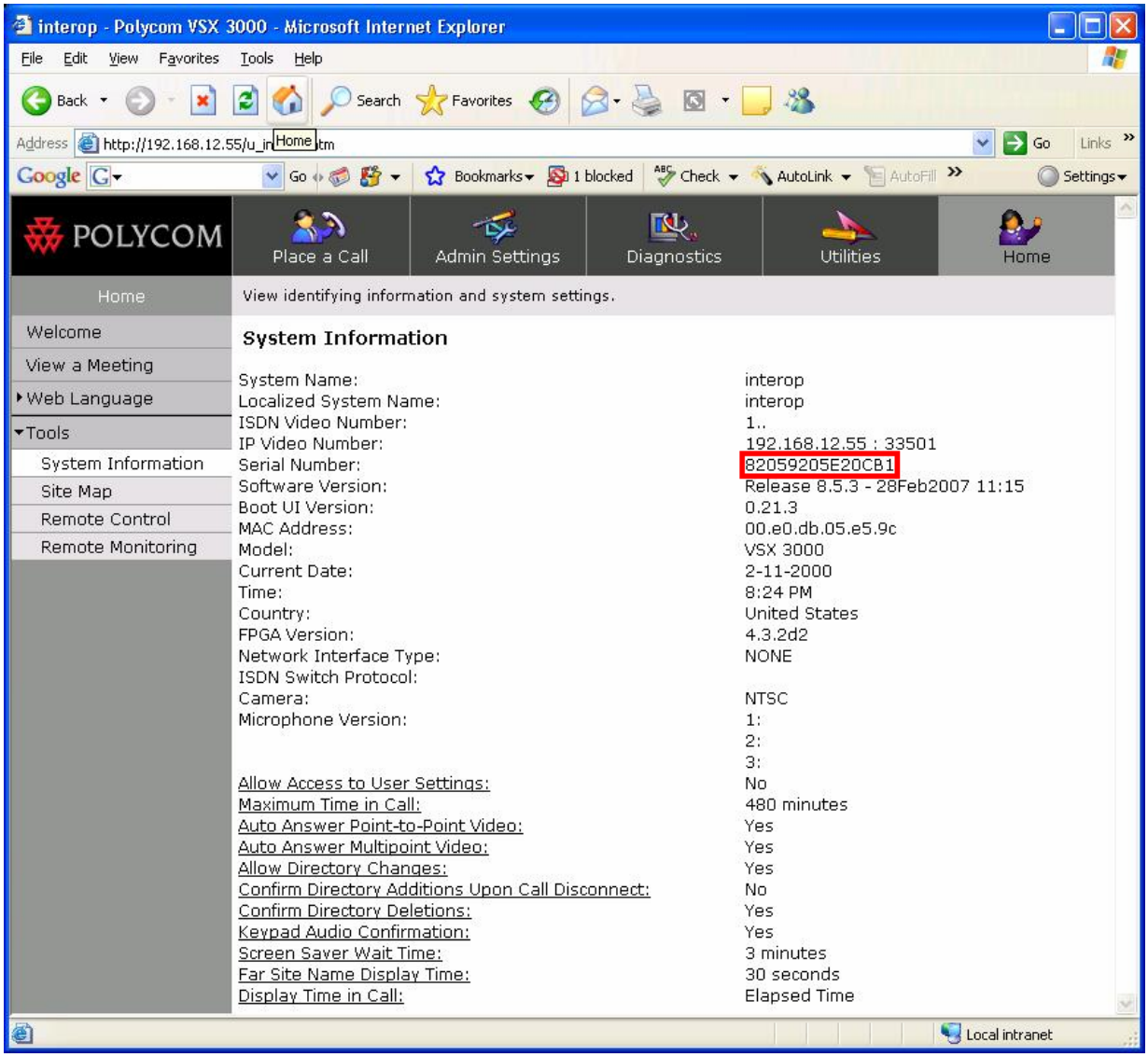
This section describes the steps for configuring the Polycom VSX 3000. The configuration of the Polycom VSX 3000 may be administered via configuration screens accessed by a remote control unit or a web interface. Access the web interface from a web browser by entering **http://<IP address of the Polycom VSX 3000>** into the web browser's Uniform Resource Locator (URL) bar. Note that if Security Mode is enabled on the Polycom VSX 3000, use "https" to access the web interface. It should be noted that the Polycom VSX 3000 does not support DHCP Option 242, see **Section 6.2.1** for details. Therefore, the information for the H.323 gatekeeper must be input via the configuration screens or the web interface. For these Application Notes, DHCP was disabled and information regarding IP addressing was entered statically via the configuration screens. Static IP addressing also simplified the assignment of the Polycom VSX 3000 to the correct IP network region administered on Avaya Communication. Refer to [**6**] for additional information regarding the configuration presented in this section.

5.1. Verify Licensing

The following steps verify licensing on the Polycom VSX 3000 that is required to support the configuration described in these Application Notes. If a required feature is not enabled, contact an authorized Avaya or Polycom account representative to make the appropriate changes. The configuration presented in this section was administered via the web interface.

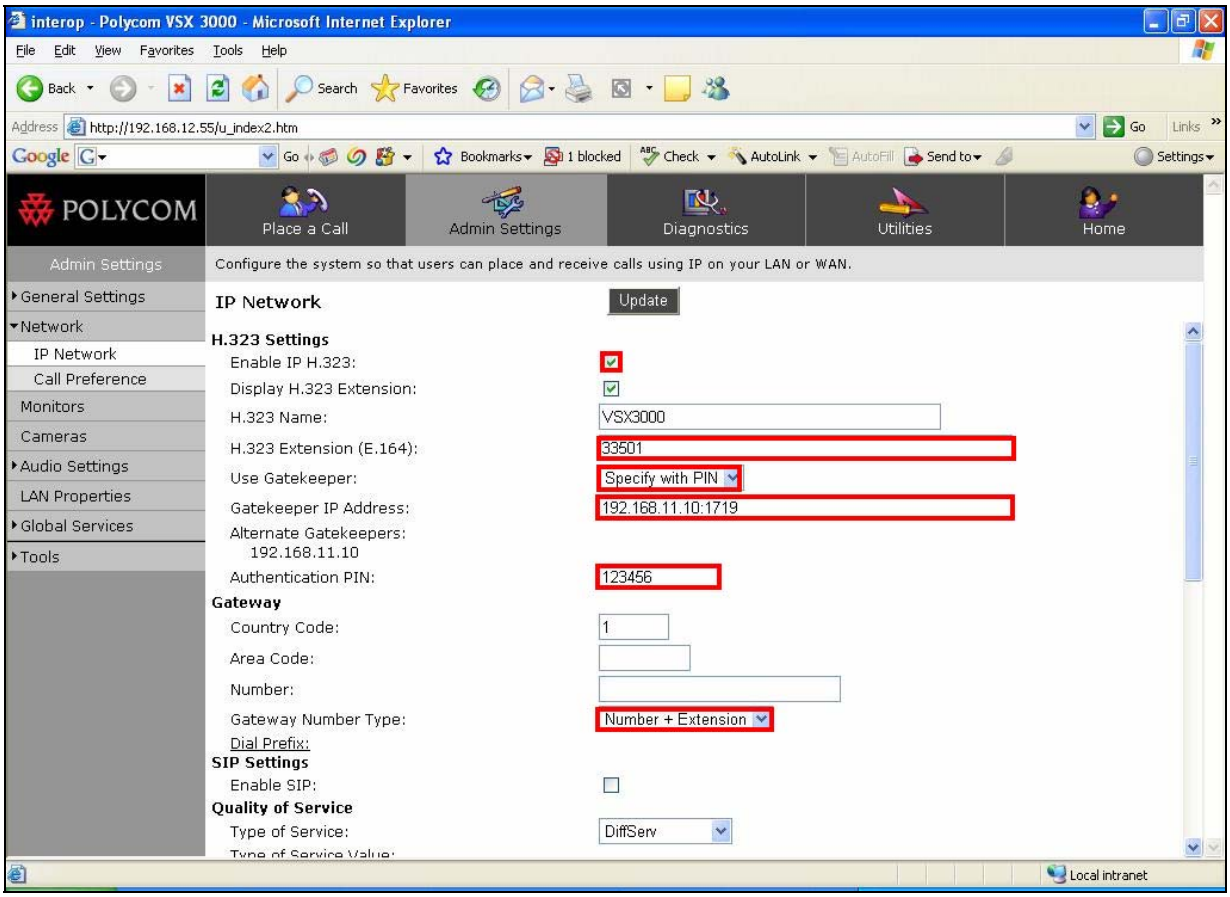
Step	Description
5.1.1	From the **Admin Settings** tab, navigate to **General Settings** ➔ **Options** and verify that there is a ✔ for the Avaya option. If not, proceed to **Step 5.1.2**, otherwise, skip to **Section 5.2**.



Step	Description
5.1.2	From the **Home** tab, navigate to **Tools** ➔ **System information** and note the **Serial Number**. Provide this serial number to an authorized Avaya or Polycom account representative. The representative will generate a **Key** that is entered in the **Options** column as displayed in **Step 5.1.1**. ***Note**: The **Serial Number** and **Key** fields displayed in **Section 5.1** are not actual values. They have been modified to illustrate licensing required for the Polycom VSX 3000 to support the configuration described in these Application Notes.* 

5.2. Configure the Polycom VSX 3000

This section describes the steps for configuring the Polycom VSX 3000. The configuration presented in this section was administered via the web interface.

Step	Description
5.2.1	From the **Admin Settings** tab, navigate to **Network ➔ IP Network** and administer settings as displayed. The settings highlighted were associated with configuration administered on Avaya Communication Manager in **Section 3**. ***Note**: If required, the Polycom VSX 3000 will automatically prompt for a reboot to apply the administrative changes.* 

6. Interoperability Compliance Testing

6.1. General Test Approach

The general test approach was to verify audio/video calls between the Avaya, Tandberg and Polycom endpoints. Serviceability and performance testing was also performed to assess the reliability of the joint solution. The main objectives were to verify the following:

- Tandberg and Polycom endpoints successfully register with Avaya Communication Manager using secure Annex H Authentication
- Point-to-point video calls are successfully completed between:
  - Tandberg endpoints
  - Tandberg endpoints and Avaya IP Softphone
  - Tandberg endpoints and the Polycom VSX 3000
- Point-to-point voice-only calls are successfully completed between:
  - Tandberg endpoints and Avaya H.323, SIP, Analog and Digital telephones
- A multi-point video call is successfully established on the Tandberg Centric 1700 MXP with three other video enabled endpoints (Tandberg videoconference endpoint, Avaya IP Softphone with Video and the Polycom VSX 3000) and one Avaya telephone
- Call conferencing for both video and audio only endpoints, provided by the Tandberg and Polycom multi-point control units
- Call control features provided by Avaya Communication Manager:
  - Call transfer from an audio only endpoint to a video enabled endpoint and back to an audio only endpoint
  - Call transfer from Avaya IP Softphone to an audio only endpoint and back to a video enabled endpoint
  - Call hold/resume initiated from Avaya IP Softphone
- Codecs:
  - Audio: G.711MU, G.729A, SIREN14-48K, G.722.1-32K
  - Video: H.263, H.264
- Voice and video quality, verified subjectively using endpoints participating in a conference
- DTMF origination/termination as defined by RFC 2833
- Serviceability testing, including failures such as cable pulls, hardware and software resets

6.2. Test Results

All test cases, as defined by the general test approach, passed.

6.2.1. Observations

The following observations were noted during testing:

- The Tandberg and Polycom endpoints do not support DHCP Option 242. This option is required in a network if there are Avaya 9600 Series Telephones present and DHCP is utilized. The work around is to statically configure the H.323 gatekeeper on the Tandberg and Polycom endpoints.

- A call to a Tandberg endpoint that is rejected by the Tandberg endpoint is not cleared properly with respect to the calling party. The calling party continues to hear ringing following the call reject invoked by the Tandberg endpoint.
- A call to a Tandberg endpoint that is set to Do Not Disturb is not handled properly with respect to the calling party. The calling party hears ringing, while the Tandberg endpoint remains in the idle state.
- The Tandberg endpoints do not support call transfer when configured for H.323.
- When the Polycom VSX 3000 is in a call with a video enabled endpoint and adds an audio only endpoint to the call, there is no audio between the video enabled endpoint and the audio only endpoint. However, both endpoints have two way audio with the Polycom VSX 3000.

7. Verification Steps

The following steps were used to verify the administrative steps presented in these Application Notes and are applicable for similar configurations in the field.

Step	Description
7.1.1	Verify endpoints register with Avaya Communication Manager. Note the following: • The Avaya endpoints associated with **33005** are registered to IP network region **1**. • The three endpoints provisioned for the Polycom VSX 3000: **33501**, **33502** and **33503** are registered to IP network region **100**. • The two endpoints provisioned for the Tandberg Centric 150 MXP: **33611** and **33612** are registered to IP network region **100**. • The four endpoints provisioned for the Tandberg Centric 1700 MXP: **33621**, **33622**, **33623** and **33624** are registered to IP network region **100**.

```
list registered-ip-stations                                          Page   1

                            REGISTERED IP STATIONS

Station Ext/  Set     Product    Prod  Station         Net Gatekeeper     TCP
 Orig Port    Type    ID         Rel   IP Address      Rgn IP Address     Skt
33005         9620    IP_Phone   1.500 192.168.12.111  1   192.168.11.10   y
33005         9620    IP_Soft    5.242 192.168.12.114  1   192.168.11.10   y
33501         H.323   VSX 3000   0.  0 192.168.12.55   100 192.168.11.10   n
33502         H.323   VSX 3000   0.  0 192.168.12.55   100 192.168.11.10   n
33503         H.323   VSX 3000   0.  0 192.168.12.55   100 192.168.11.10   n
33611         H.323   Tandberg   0.  0 192.168.12.52   100 192.168.11.10   n
33612         H.323   Tandberg   0.  0 192.168.12.52   100 192.168.11.10   n
33621         H.323   Tandberg   0.  0 192.168.12.53   100 192.168.11.10   n
33622         H.323   Tandberg   0.  0 192.168.12.53   100 192.168.11.10   n
33623         H.323   Tandberg   0.  0 192.168.12.53   100 192.168.11.10   n
33624         H.323   Tandberg   0.  0 192.168.12.53   100 192.168.11.10   n
```

Step	Description
7.1.2	Verify the endpoints administered in these Application Notes can originate/terminate audio/video calls. The following scenario will provide a basis for verifying the administration presented in these Application Notes. • Place a call from the Tandberg Centric 150 MXP to the Polycom VSX 3000. • If the call completes, obtain status on the call from Avaya Communication Manager by issuing the command "**status station <n>**", where **n** is the extension of the Tandberg Centric 150 MXP. Note the items as displayed with boldface type.

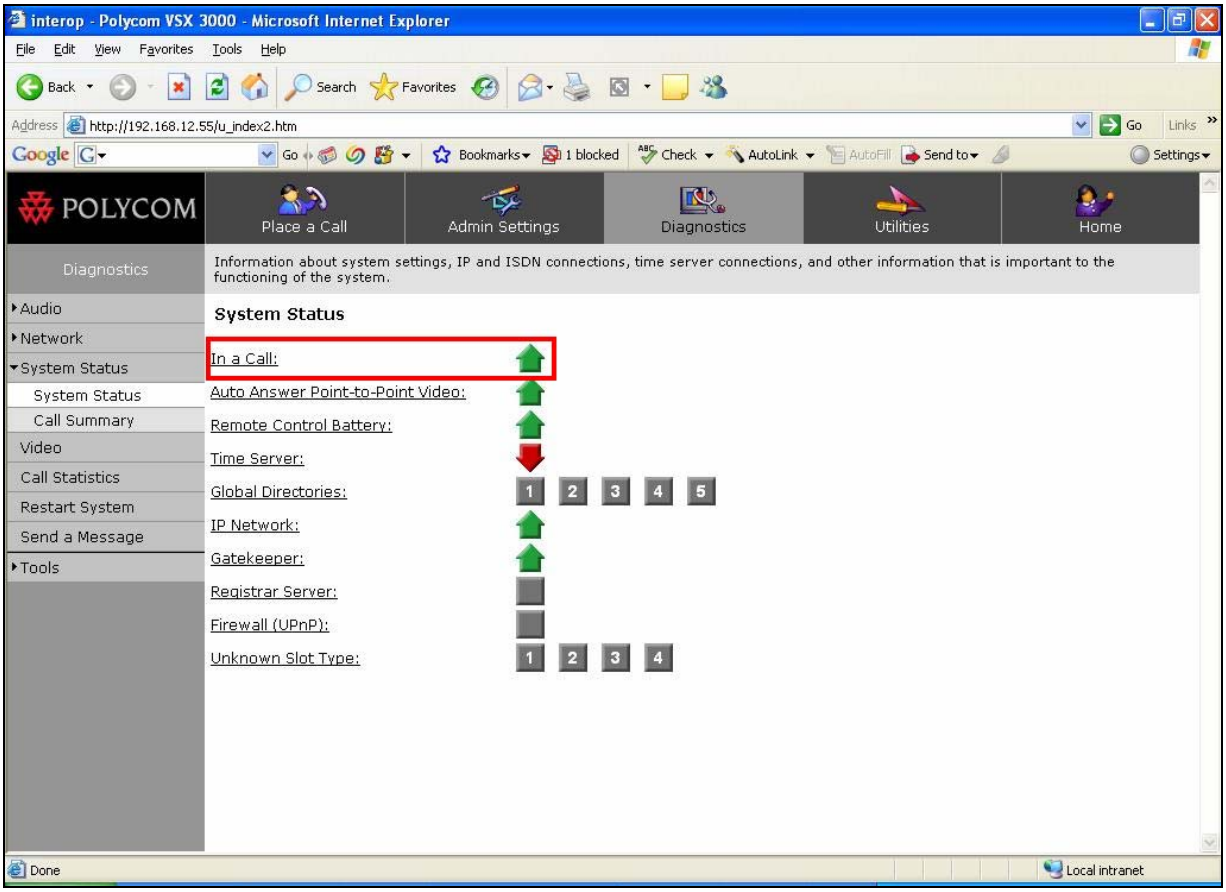
```
status station 33611                                          Page   1 of   7

                              GENERAL STATUS
     Administered Type: H.323              Service State: in-service/off-hook
        Connected Type: N/A            TCP Signal Status: not connected
             Extension: 33611
                  Port: S00015        Parameter Download: not-applicable
           Call Parked? no                SAC Activated? no
      Ring Cut Off Act? no
Active Coverage Option: 1

          EC500 Status: N/A        Off-PBX Service State: N/A
   Message Waiting:
   Connected Ports: S00019


  Limit Incoming Calls? no

 User Cntrl Restr: none                        HOSPITALITY STATUS
Group Cntrl Restr: none                      Awaken at:
                                              User DND: not activated
                                             Group DND: not activated
                                           Room Status: non-guest room
```

7.1.3	Proceed to Page 4 and note the items as displayed with boldface type.

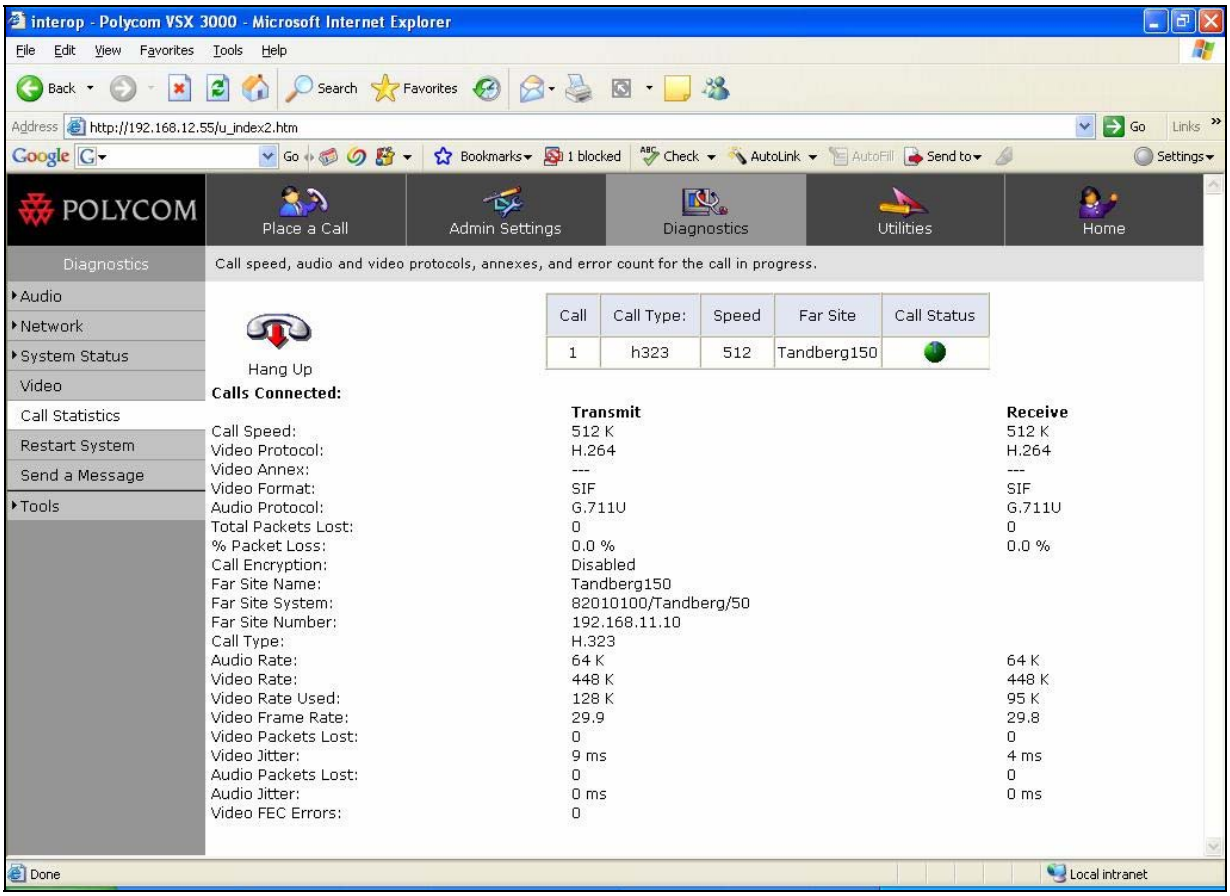
```
status station 33611                                          Page   4 of   7

                           AUDIO CHANNEL Port: S00015
G.711MU       Switch-End Audio Location:
           IP Address                                 Port  Node Name       Rgn
Other-End: 192.168. 12. 55                            49270                 100
  Set-End: 192.168. 12. 52                            2326                  100
Audio Connection Type: ip-direct
```

Step	Description
7.1.4	Call statistics are also obtained from the Tandberg Centric 150 MXP by issuing the command "**xstatus Call**" from the Tandberg Centric 150 MXP CLI. Utilizing the call from **Step 7.1.2**, the following statistics are displayed.

```
xstatus call

*s Call 1 (status=Synced, type=Vtlph, protocol=H323, direction=Outgoing, logTag=3):
     CallRate: 512
     RemoteNumber: "33501"
     Mute: Off
     Microphone: On
     Duration: 74
     Channels 1 (type=Incoming):
       Rate: 512
       Restrict: Off
       Encryption (status=Off): /
       Audio (status=Active):
         Protocol: G711
         Rate: 64
       Video 1 (status=Active):
         Protocol: H264
         Resolution: SIF
         Rate: 448
       Video 2 (status=Inactive): /
       Data (status=Inactive): /
     Channels 2 (type=Outgoing):
       Rate: 512
       Restrict: Off
       Encryption (status=Off): /
       Audio (status=Active):
         Protocol: G711
         Rate: 64
       Video 1 (status=Active):
         Protocol: H264
         Resolution: SIF
         Rate: 448
       Video 2 (status=Inactive): /
       Data (status=Inactive): /
*s/end

*s Call 2 (status=Disconnected, type=NA, protocol=NA, direction=NA, logTag=NA):
     Cause: 16
*s/end

OK
```

Step	Description
7.1.5	Call statistics are also obtained from the Polycom VSX 3000 web interface. From the **Diagnostics** tab, navigate to **System Status ➔ System Status** and click **In a Call**. 

Step	Description
7.1.6	Utilizing the call from **Step 7.1.2**, note the statistics as displayed in the **Call Statistics** screen.



8. Conclusion

These Application Notes presented a compliance-tested solution comprised of Tandberg, Polycom and Avaya endpoints with Avaya Communication Manager. This solution enables connectivity between the aforementioned endpoints and Avaya Communication Manager via H.323 signaling.

9. Additional References

Avaya references are available at http://support.avaya.com.

[1] *Administrator Guide for Avaya Communication Manager*, Issue 3.1, Doc ID: 03-300509, February 2007.

[2] *Administration for Network Connectivity for Avaya Communication Manager*, Issue 12, Doc ID: 555-233-504, February 2007.

[3] *IP Softphone Release 6.0 User Reference*, Issue 1, Doc ID: N/A, May 2007

Tandberg references are available at: http://www.tandberg.com/.

[4] *Tandberg MXP Administrator's Guide (F6)*, Doc ID: 0 D14033.01, March 2007.

[5] *Tandberg 150MXP Administrator's Guide (L5)*, Doc ID: 0 D14061.01, May 2007.

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

[6] *Administrator's Guide for the VSX Series Version 8.5.3*, Doc ID: 3725-20235-011/A, February 2007.

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 DevConnect Program at devconnect@avaya.com.