Avaya Solution & Interoperability Test Lab

Configuring Connectivity between Avaya Communication Manager, Avaya Meeting Exchange Express Edition and the Cantata Technology IMG 1010 Media Gateway Utilizing SIP and IP to IP Audio Transcoding - Issue 1.0

Abstract

These Application Notes present the procedures for configuring connectivity between Avaya Communication Manager, Avaya Meeting Exchange Express Edition (Avaya Meeting Exchange), and the Cantata Technology IMG 1010 Media Gateway (IMG). The IMG provided IP to IP audio transcoding via SIP signaling between Avaya Communication Manager and Avaya Meeting Exchange. This configuration enables telephones registered to either Avaya Communication Manager, or Avaya SIP Enablement Services access to a rich set of audio conferencing options provided by Avaya Meeting Exchange via the IMG.

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.

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1. Introduction

These Application Notes present the procedures for configuring connectivity between Avaya Communication Manager, Avaya Meeting Exchange Express Edition (Avaya Meeting Exchange), and the Cantata Technology IMG 1010 Media Gateway (IMG). The IMG provided IP to IP audio transcoding via SIP signaling between Avaya Communication Manager and Avaya Meeting Exchange. This configuration enables telephones registered to either Avaya Communication Manager, or Avaya SIP Enablement Services access to a rich set of audio conferencing options provided by Avaya Meeting Exchange via the IMG.

Figure 1 illustrates the sample configuration utilized for this compliance tested solution. Avaya Communication Manager, and the Avaya G650 Media Gateway provided endpoint aggregation and media gateway functionality. For example, any telephone or trunk type associated with Avaya Communication Manager can interoperate with Avaya Meeting Exchange via the IMG. For this sample configuration, SIP, H.323, Digital, and Analog telephones were utilized.

Avaya Meeting Exchange is a SIP based voice conferencing solution that runs on an S6100 server and provides mid-market enterprise customers with an IP based audio conferencing system. For this sample configuration, Avaya Meeting Exchange was provisioned to accept calls from Avaya Communication Manager via either direct or basic call flows. A direct call flow allows access to conferences provisioned on Avaya Meeting Exchange without entering a passcode. Conversely, to enter a conference via a basic call flow requires a passcode. Avaya Meeting Exchange was also administered for outbound calling, which enabled call origination from Avaya Meeting Exchange to participants registered to either Avaya Communication Manager, or Avaya SIP Enablement Services.

The IMG provides network connectivity for voice services, enabling the delivery of VoIP services via SIP into ISDN-PRI, CAS and SS7 networks, as well as IP to IP transcoding for network peering applications. For this sample configuration, the IMG provided IP to IP audio transcoding via SIP signaling between Avaya Communication Manager and Avaya Meeting Exchange.

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The end-to-end signaling and media connectivity is as follows:

- Signaling (SIP) and media (RTP, utilizing G.711MU) connectivity between Avaya Meeting Exchange and the IMG is depicted by the green dashed line.
- Signaling (SIP) and media (RTP, utilizing G.729A) connectivity between Avaya Communication Manager and the IMG is depicted by the blue dotted line.

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

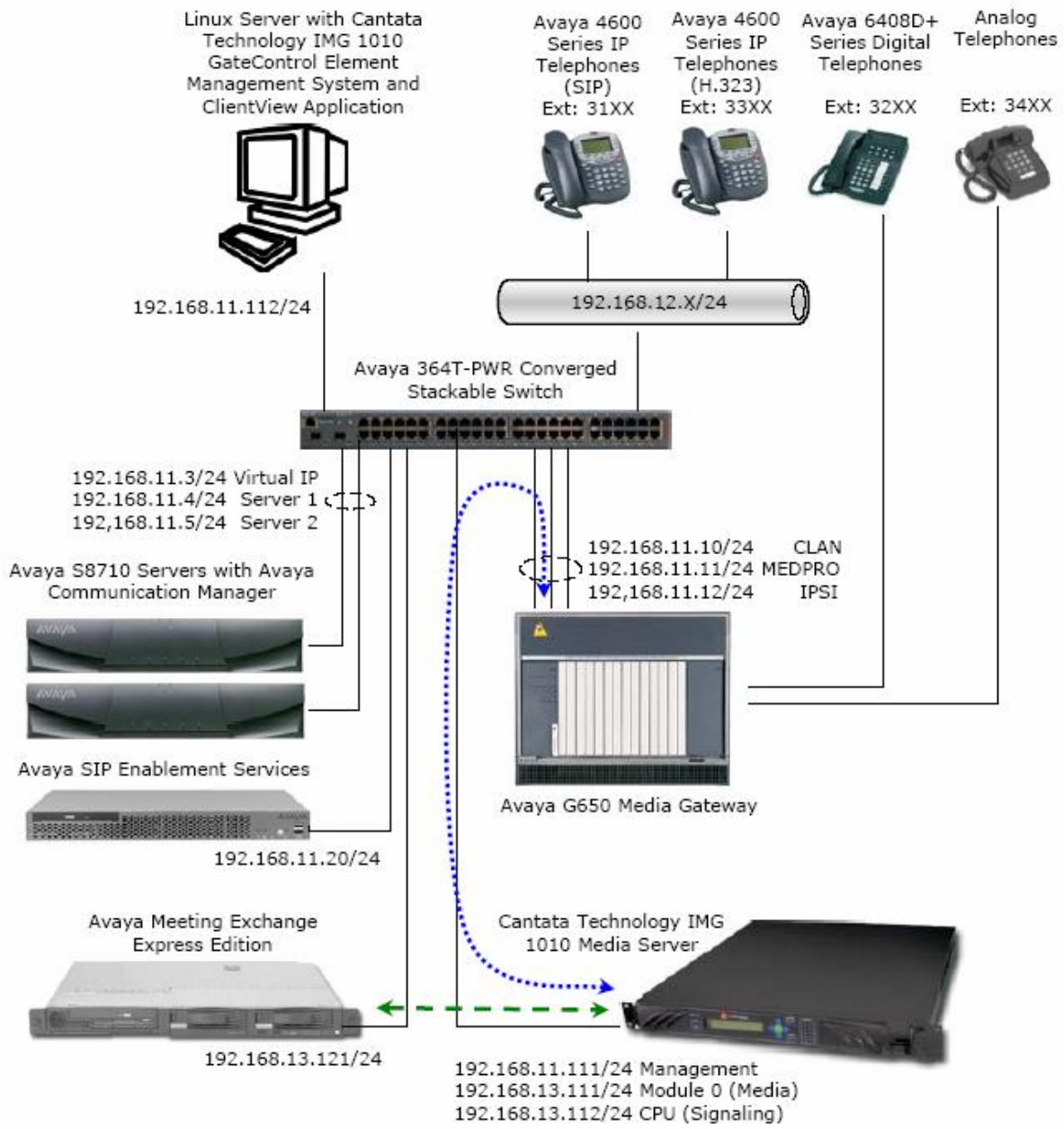

Figure 1: Sample Configuration

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2. Equipment and Software Validated

The following equipment and software versions were used for this sample configuration:

Equipment	Software 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 Meeting Exchange Express Edition	S6100-2.5.60.0
Avaya SIP Enablement Services	SES04.0-04.0.033.6
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 6408D+ Digital Telephones	--
Analog Telephones	--
Cantata Technology IMG 1010 Media Gateway	10.3.3
Cantata Technology IMG 1010 GateControl Element Management System	10.3.3.174
Cantata Technology ClientView	10.3.3.174

Table 1: Equipment and Software Versions

3. Avaya Communication Manager Configuration

This section displays the configuration for enabling Avaya Communication Manager to interoperate with Avaya Meeting Exchange via the IMG.

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 [**3**] and [**4**] for additional information regarding the configuration displayed in this section.

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3.1. Verify Licensing

The following steps verify licensing on Avaya Communication Manager that is required to support the configuration displayed 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 the **Maximum Administered SIP Trunks** supported by Avaya Communication Manager is sufficient. ***Note**: Each call between two SIP endpoints (whether internal or external) requires two SIP trunks for the duration of the call. For this sample configuration, the IMG is treated as an external SIP endpoint. Thus, a call from a SIP station registered to Avaya SIP Enablement Services to the IMG will use two SIP trunks. A call between a non-SIP station and the IMG will use only one SIP trunk.*

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

                                OPTIONAL FEATURES

IP PORT CAPACITIES                                            USED
                     Maximum Administered H.323 Trunks: 800   0
           Maximum Concurrently Registered IP Stations: 100   0
             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   0
                   Maximum Video Capable IP Softphones: 100   0
                       Maximum Administered SIP Trunks: 800   0

   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.)
```


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Step	Description
3.1.2	Proceed to page 3, and verify that the **ARS/AAR Dialing without FAC** field is enabled. ***Note**: The **ARS/AAR Dialing without FAC** feature allows direct access to Automatic Alternate Routing (AAR) and Automatic Route Selection (ARS) from the dial plan analysis table.*

```
display system-parameters customer-options                      Page   3 of  11

                                 OPTIONAL FEATURES

    Abbreviated Dialing Enhanced List? n           Audible Message Waiting? y
        Access Security Gateway (ASG)? n               Authorization Codes? n
        Analog Trunk Incoming Call ID? n Backup Cluster Automatic Takeover? n
 A/D Grp/Sys List Dialing Start at 01? n                         CAS Branch? n
Answer Supervision by Call Classifier? n                           CAS Main? n
                                   ARS? y                  Change COR by FAC? n
                 ARS/AAR Partitioning? y  Computer Telephony Adjunct Links? y
          ARS/AAR Dialing without FAC? y   Cvg Of Calls Redirected Off-net? n
          ASAI Link Core Capabilities? n                        DCS (Basic)? n
          ASAI Link Plus Capabilities? n                  DCS Call Coverage? n
       Async. Transfer Mode (ATM) PNC? n                DCS with Rerouting? n
  Async. Transfer Mode (ATM) Trunking? n
              ATM WAN Spare Processor? n    Digital Loss Plan Modification? n
                                  ATMS? n                           DS1 MSP? n
                  Attendant Vectoring? y             DS1 Echo Cancellation? n



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


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3.2. Configure Connectivity

This section describes the steps for configuring SIP trunking between Avaya Communication Manager and the IMG.

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 on the IMG. For this sample configuration, entries to support G.729 were added as displayed. ***Note**: The entry corresponding to G.729B is necessary to enable SIP connectivity with the IMG. For this sample configuration, the IMG was configured to require annexb support. Adding an entry for G.729B in the codec set will affirm annexb support in SIP INVITE messages from Avaya Communication Manager*.

```
change ip-codec-set 7                                          Page   1 of   2

                          IP Codec Set

    Codec Set: 7

    Audio        Silence      Frames   Packet
    Codec        Suppression  Per Pkt  Size(ms)
 1: G.729A            n         2        20
 2: G.729B            n         2        20
 3:
 4:
 5:
 6:
 7:
```


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Step	Description
3.2.2	Issue the command "**change ip-network-region <n>**", where **n** is the number of an available IP network region, and 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.

```
change ip-network-region 22                                     Page   1 of  19

                              IP NETWORK REGION
  Region: 22
Location:         Authoritative Domain:
    Name:
MEDIA PARAMETERS                Intra-region IP-IP Direct Audio: yes
      Codec Set: 7              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
```


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Step	Description
3.2.3	Proceed to Page 3, and enable inter-region connectivity between IP network regions 22 and 1 by entering the IP codec set provisioned in **Step 3.2.1** in the **codec set** field as displayed. For this sample configuration; the C-LAN, and all IP stations registered to either Avaya Communication Manager or Avaya SIP Enablement Services are in IP network region 1 and the IMG is in IP network region 22.

```
change ip-network-region 22                                     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
 22  1    7     y    NoLimit                                                n
 22  2
 22  3
 22  4
 22  5
 22  6
 22  7
 22  8
 22  9
 22  10
 22  11
 22  12
 22  13
 22  14
 22  15
```

3.2.4	Issue the command "**change node-names ip**", and administer settings as displayed. • Add an entry to the table corresponding to the IP address of the CPU on the IMG by assigning a descriptive name and associated IP address to the **Name** and **IP Address** fields respectively.

```
change node-names ip                                            Page   1 of   2

                                   IP NODE NAMES
    Name              IP Address
CLAN-1A02           192.168.11.10
IMG1010             192.168.13.112
MEDPRO-1A03         192.168.11.11
SES                 192.168.11.20
default             0.0.0.0
procr               192.168.11.4

( 10 of 10   administered node-names were displayed )
Use 'list node-names' command to see all the administered node-names
Use 'change node-names ip xxx' to change a node-name 'xxx' or add a node-name
```


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Step	Description
3.2.5	Issue the command "**add signaling-group <n>**", where **n** is the number of an unallocated signaling group, and administer settings as displayed: • Enter the node name for the Control LAN (CLAN) in the **Near-end Node Name** field. • Enter the node name provisioned for the IMG in **Step 3.2.4** in the **Far-end Node Name** field. • Enter the number of the network region provisioned in **Step 3.2.2** in the **Far-end Network Region** field. • Configure additional fields with boldface type as displayed, and use default settings for remaining fields.

```
add signaling-group 22                                          Page   1 of   1

                                SIGNALING GROUP

 Group Number: 22             Group Type: sip
                        Transport Method: tcp





   Near-end Node Name: CLAN-1A02             Far-end Node Name: IMG1010
 Near-end Listen Port: 5060                Far-end Listen Port: 5060
                                        Far-end Network Region: 22
       Far-end Domain:

                                             Bypass If IP Threshold Exceeded? n

         DTMF over IP: rtp-payload            Direct IP-IP Audio Connections? y
                                                        IP Audio Hairpinning? n
 Enable Layer 3 Test? n
 Session Establishment Timer(min): 3
```


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Step	Description
3.2.6	Issue the command "**add trunk-group <n**>", where **n** is the number of an unallocated trunk group, and administer settings as displayed. • Enter a descriptive name for the trunk group in the **Name** field. • Set the **Group Type** field to **SIP**. • Enter a number in the **TAC** (Trunk Access Code) field that is consistent with the configuration for the dial plan. • Enter the number of the signaling group provisioned in **Step 3.2.5** in the **Signaling Group** field. • Enter a value to define the capacity of this trunk group in the **Number of Members** field. As mentioned in **Step 3.1.1**, each call between two SIP endpoints (whether internal or external) requires two SIP trunks for the duration of the call. For this sample configuration, the IMG is treated as an external SIP endpoint. Thus, a call from a SIP station registered to Avaya SIP Enablement Services to the IMG will use two SIP trunks. A call between a non-SIP station and the IMG will use only one SIP trunk. • Configure additional fields with boldface type as displayed, and use default settings for remaining fields.

```
add trunk-group 22                                              Page   1 of  21

                                 TRUNK GROUP

Group Number: 22                   Group Type: sip           CDR Reports: y
  Group Name: To IMG1010                  COR: 1        TN: 1        TAC: 122
   Direction: two-way        Outgoing Display? n
 Dial Access? n                                    Night Service:
Queue Length: 0
Service Type: tie                   Auth Code? n

                                                     Signaling Group: 22
                                                   Number of Members: 25
```


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3.3. Configure Call Routing

This section describes the steps for configuring call routing from Avaya Communication Manager to Avaya Meeting Exchange via the IMG. For this sample configuration, ARS/AAR dialing without FAC is utilized to route calls to Avaya Meeting Exchange. Note that other forms of call routing may be utilized.

Step	Description
3.3.1	Issue the command "**change dialplan analysis**", and administer settings to route any numbers beginning with a **4** and totaling **3** digits in length via AAR as displayed.

```
change dialplan analysis                                        Page   1 of  12

                             DIAL PLAN ANALYSIS TABLE
                                                          Percent Full:    1

       Dialed   Total  Call    Dialed   Total  Call     Dialed   Total  Call
       String   Length Type    String   Length Type     String   Length Type
        0          1   fac
        1          3   dac
        2          3   aar
        3          5   ext
        4          3   aar
        5          3   aar
        6          3   aar
        7          5   ext
        8          2   fac
        9          2   dac
        *          1   fac
        #          3   fac
```


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Step	Description
3.3.2	Issue the command "**change route-pattern <n>**", where **n** is the number of an unallocated route pattern. Administer settings to utilize the trunk group provisioned in **Step 3.2.6** to route calls from Avaya Communication Manager to the IMG. • Enter the number of the trunk group provisioned in **Step 3.2.6** in the **Grp No** field. • To disable restrictions for call routing via this route pattern, set the Facility Restriction Level (**FRL**) field to the lowest setting. • Configure additional fields with boldface type as displayed, and use default settings for remaining fields.

```
change route-pattern 22                                          Page   1 of   3

                    Pattern Number: 22  Pattern Name: SIP Rt To IMG
                              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: 22   0                   0                                         n   user
 2:                                                                    n   user
 3:                                                                    n   user
 4:                                                                    n   user
 5:                                                                    n   user
 6:                                                                    n   user

    BCC VALUE  TSC CA-TSC    ITC BCIE Service/Feature 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
```


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Step	Description
3.3.3	Issue the command "**change aar analysis x**", and add an entry in the table to utilize the route pattern provisioned in **Step 3.3.2**. • Enter a number in the **Dialed String** field that will be utilized by Avaya Meeting Exchange to map to a direct call flow. • Enter the number of the route pattern provisioned in **Step 3.3.2** in the **Route Pattern** field. • Configure additional fields with boldface type as displayed, and use default settings for remaining fields.

```
change aar analysis 4                                          Page   1 of   2

                            AAR DIGIT ANALYSIS TABLE
                                                          Percent Full:    1

          Dialed           Total     Route    Call   Node  ANI
          String          Min  Max  Pattern   Type   Num   Reqd
    401                   3    3     22       aar          n
    444                   3    3     22       aar          n
```

4. Avaya Meeting Exchange Configuration

This section displays the configuration for enabling Avaya Meeting Exchange to interoperate with Avaya Communication Manager via the IMG. Avaya Meeting Exchange is administered and maintained using a standard web browser over a secure connection by entering **https://<IP address of Avaya Meeting Exchange>/mx** into the web browser's Uniform Resource Locator (URL) bar.

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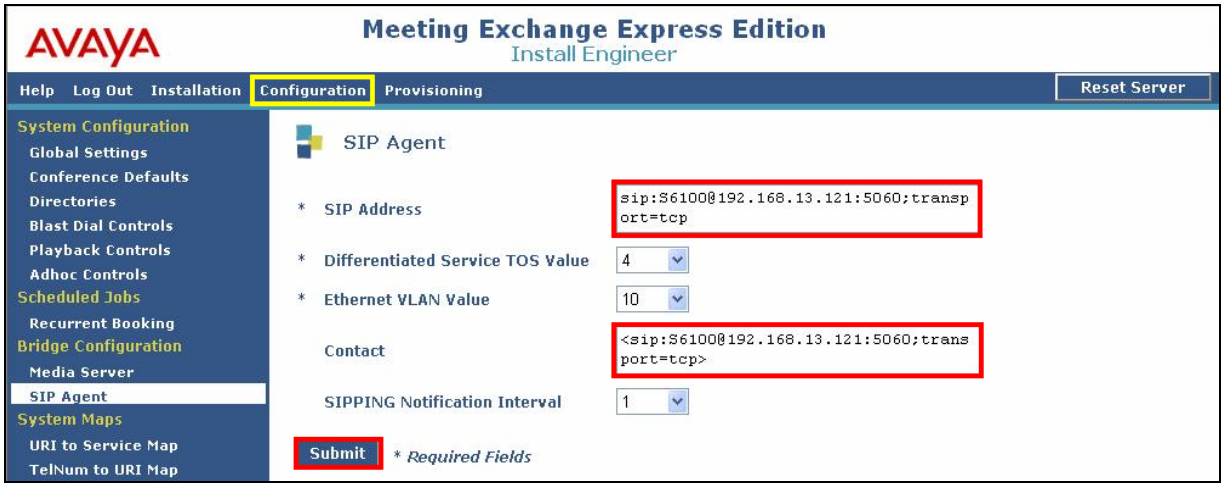
4.1. Configure Connectivity

This section describes the steps for configuring SIP/TCP connectivity between Avaya Meeting Exchange and the IMG.

Step	Description
4.1.1	Administer settings that enable SIP connectivity between Avaya Meeting Exchange and other SIP User Agents as follows: • From the web interface toolbar, click **Configuration**. • Click **SIP Agent** under **Bridge Configuration**. • Enter a SIP URI for Avaya Meeting Exchange that conforms to SIP standards in the **SIP Address** field. This field is used to populate the From Header Field in SIP INVITE messages from Avaya Meeting Exchange. To enable SIP/TCP connectivity on port 5060, this entry must contain **5060** and **transport=tcp**. The user field, **S6100**, must conform to SIP standards, and is selected to uniquely identify this server. For example, **S6100** will be inserted in the From Header Field of SIP INVITE messages from Avaya Meeting Exchange and will display on a participant's endpoint when Dial-Out procedures from Avaya Meeting Exchange are invoked. This allows end-user's to identify a call from Avaya Meeting Exchange. • Enter the SIP URI, as configured for the **SIP Address** field, in angled brackets in the **Contact** field. This field is used to populate the Contact Header Field in SIP INVITE messages from Avaya Meeting Exchange, and provides SIP User Agents, for these Application Notes the IMG, a means for acknowledging SIP messages from Avaya Meeting Exchange. • Use default settings for remaining fields. • Click the **Submit** button to add the configuration to the database. 

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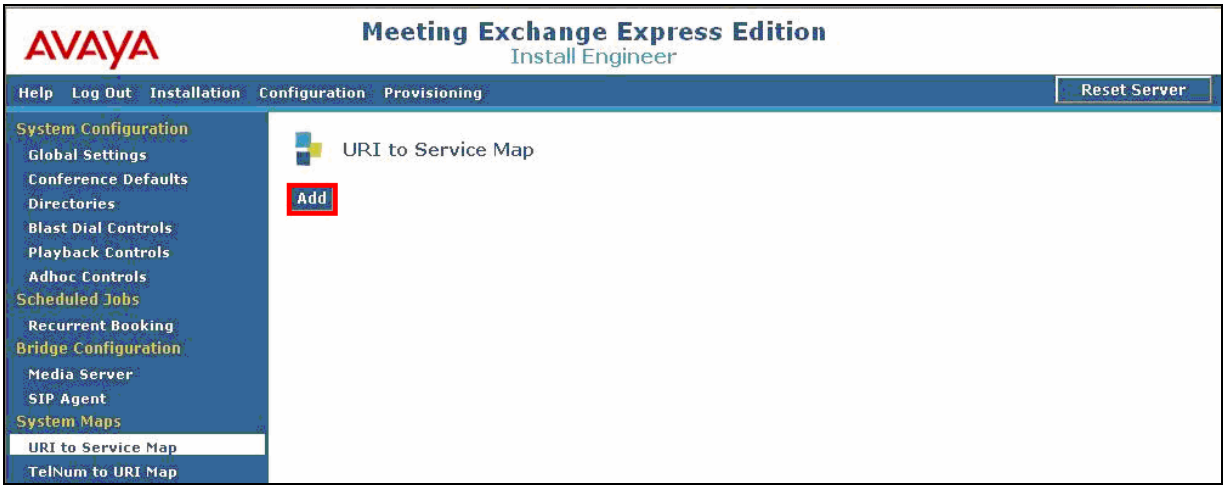
4.2. Configure Call Routing

This section describes the steps for configuring call routing for Avaya Meeting Exchange. On Avaya Meeting Exchange, call routing is defined by service maps as follows:

- For inbound calls to Avaya Meeting Exchange, service maps for URI to telephone number translations are utilized. These translations associate calls to Avaya Meeting Exchange with corresponding call flows, thus allowing for specific treatment for a participant based on incoming calls based on a SIP Uniform Resource Identifier (URI).
- For outbound calls from Avaya Meeting Exchange, service maps for telephone number to URI translations are utilized. These translations associate a telephone number pattern with a corresponding SIP URI of a SIP User Agent (UA), thus allowing call origination from Avaya Meeting Exchange to the SIP UA.

Step	Description
4.2.1	To associate incoming calls to Avaya Meeting Exchange with a call flow, add a URI to service map entry as follows: • Click **URI to Service Map** under **System Maps**. • Click the **Add** button. 

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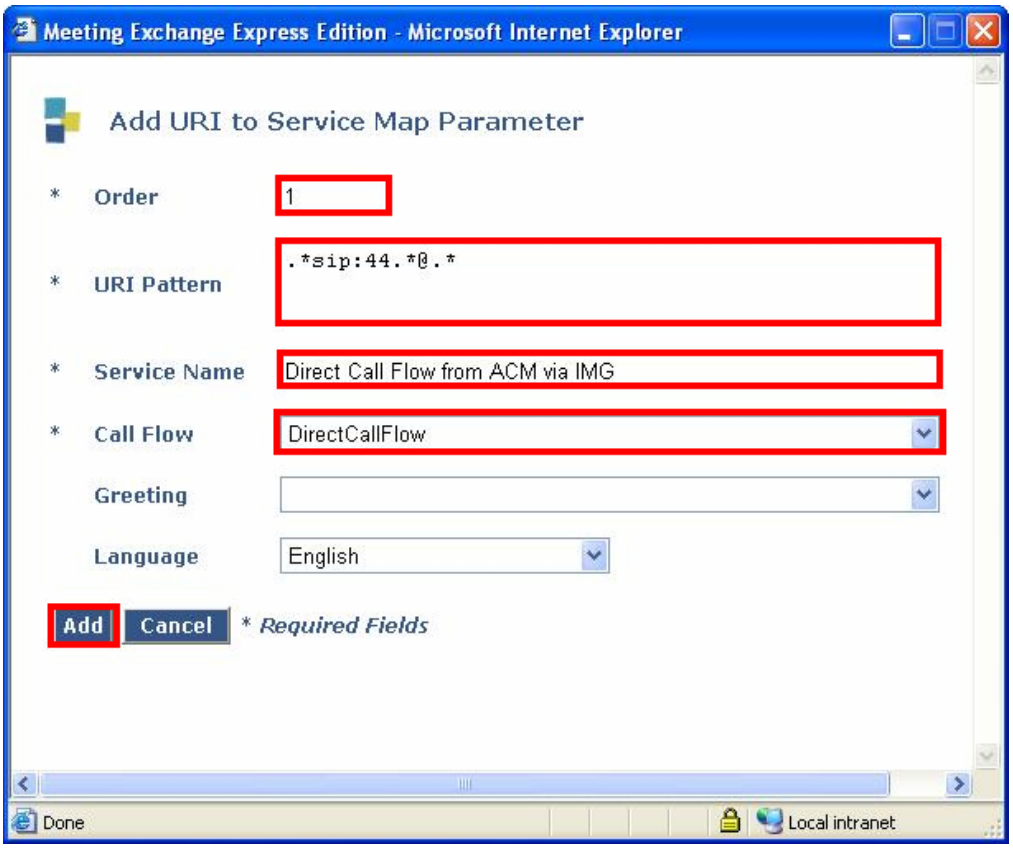
Step	Description
4.2.2	From the **Add URI to Service Map Parameter** screen, administer settings to enable a direct call flow for calls from Avaya Communication Manager via the IMG as follows: • Leave the **Order** field at the default value. Avaya Meeting Exchange parses URI to service map entries for pattern matches in descending order, terminating the search once a pattern is matched. For this sample configuration, order is irrelevant as the patterns for call flows are mutually exclusive. • Enter a rule in the **URI Pattern** field to match the pattern of incoming Request URIs in SIP INVITE messages from Avaya Communication Manager via the IMG. Metacharacters such as **.** (matches any one character) or ***** (matches zero or more of the preceding character) may be utilized. For example, assume the IMG sends the following URI: ***sip:444@192.168.13.121:5060;transport=tcp***. The entry in the **URI Pattern** field, **.*sip:44.*@.***, would match ***sip:44***, then zero or more characters, followed by **@**, then zero or more characters. • To allow access to conferences as moderator, without entering a passcode, select **DirectCallFlow** from the drop down menu for the **Call Flow** field. • Enter a descriptive name for this map in the **Service Name** field. • Click the **Add** button to add the map to the database. 

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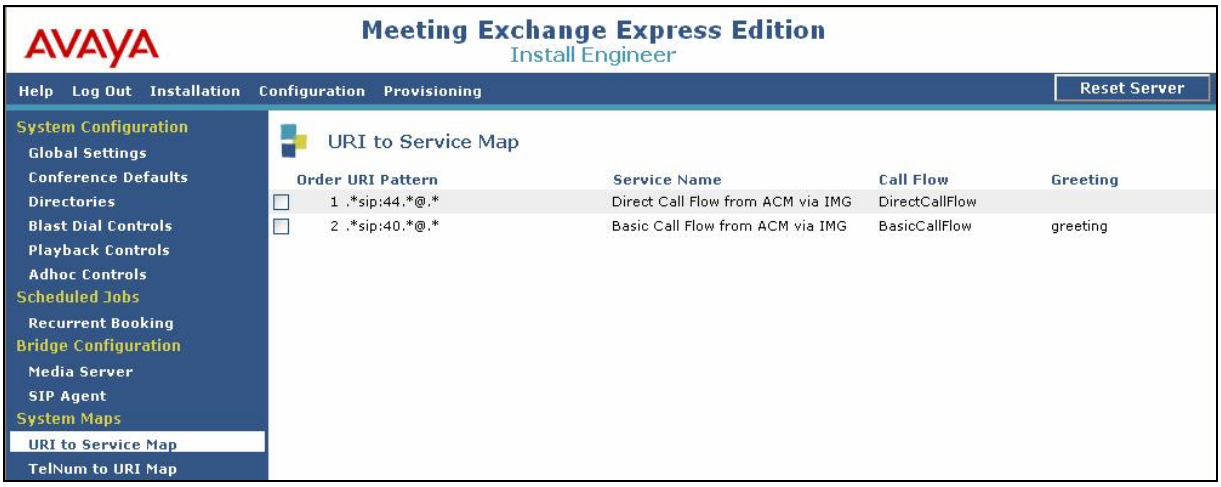
Step	Description
4.2.3	To associate incoming calls to Avaya Meeting Exchange with a basic call flow, repeat **Step 4.2.1** to add a URI to service map entry for a basic call flow with the following parameters: • Leave the **Order** field at the default value. • Enter **.*sip:40.*@.*** in the **URI Pattern** field to match the pattern of incoming Request URIs in SIP INVITE messages from Avaya Communication Manager via the IMG. • To access a conference with an associated passcode, select **BasicCallFlow** from the drop down menu for the **Call Flow** field. • Enter a descriptive name for this map in the **Service Name** field. • The resulting URI to service map list is displayed below. ***Note**: The provisioning for the **URI Pattern** fields for the direct and basic call flows are mutually exclusive while utilizing wild cards to maximizing the breadth of the pattern match. For example, the **URI Pattern** field for the basic call flow is **.*sip:40.*@.***. This aligns with the provisioning for call routing on Avaya Communication Manager in **Section 3.3**, and allows 40x, where x can be any digit, to match this direct call flow.* 

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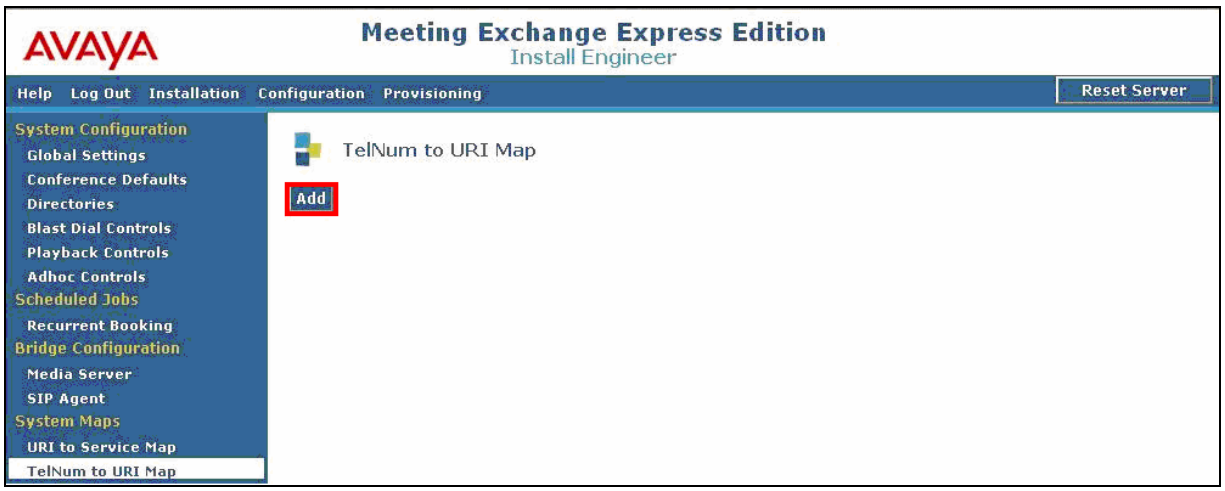
Step	Description
4.2.4	To enable routing of outbound calls from Avaya Meeting Exchange, add a TelNum to URI map entry as follows: • Click **TelNum to URI Map** under **System Maps**. • Click the **Add** button. 

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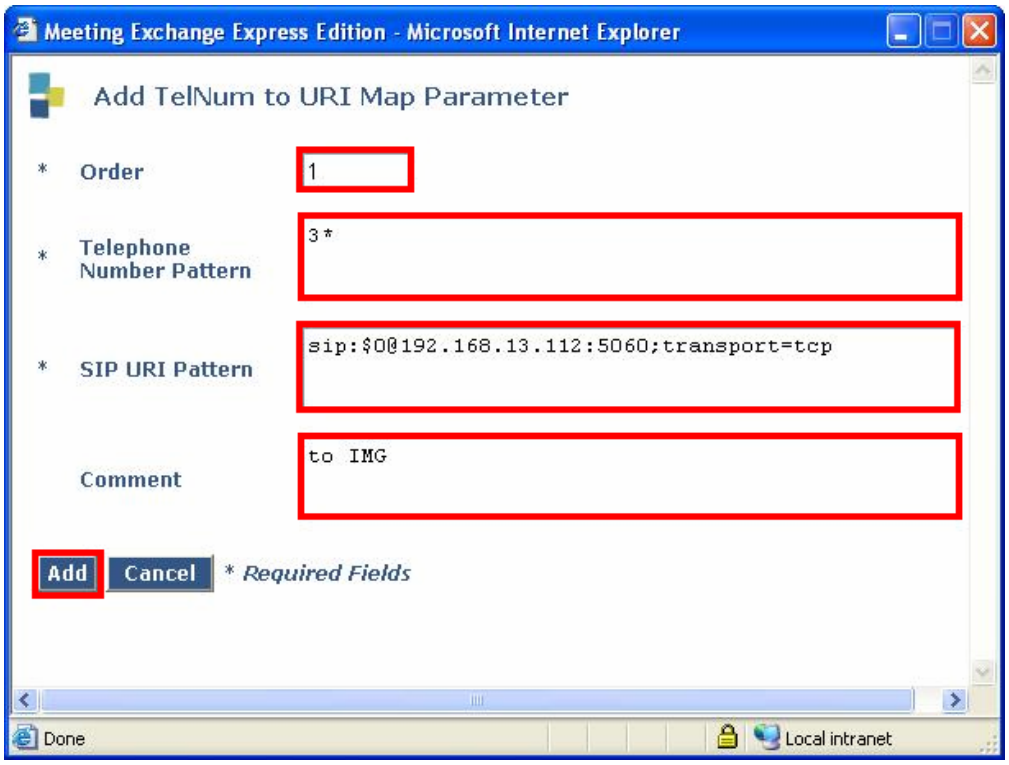
Step	Description
4.2.5	From the **Add TelNum to URI Map Parameter** screen, administer settings to enable outbound calling to Avaya Communication Manager via the IMG as follows: • Leave the **Order** field at the default value. Avaya Meeting Exchange parses TelNum to URI map entries for pattern matches in descending order, terminating the search once a pattern is matched. For this sample configuration, order is irrelevant as there is only one entry in the database. • Enter a rule in the **Telephone Number Pattern** field that matches the administration on for telephone extensions on Avaya Communication Manager. Metacharacters such as * (refers to a character string) or ? (refers to a single character) may be utilized. • To enable outbound calling from Avaya Meeting Exchange, enter a rule in the **SIP URI Pattern** field that conforms to SIP standards. To enable SIP/TCP connectivity for outbound calls to Avaya Communication Manager via the IMG, the rule must contain **5060** and **transport=tcp**. The metacharacter, **$0** is replaced by the entire **Telephone Number Pattern** at the location of **$0** in the **SIP URI Pattern**. For example, if ***31002*** is the dialed string, Avaya Meeting Exchange will send a SIP INVITE message with a SIP URI and To Header Field formatted as follows: ***sip:31002@192.168.13.112:5060;transport=tcp***. • Click the **Add** button to add the map to the database. 

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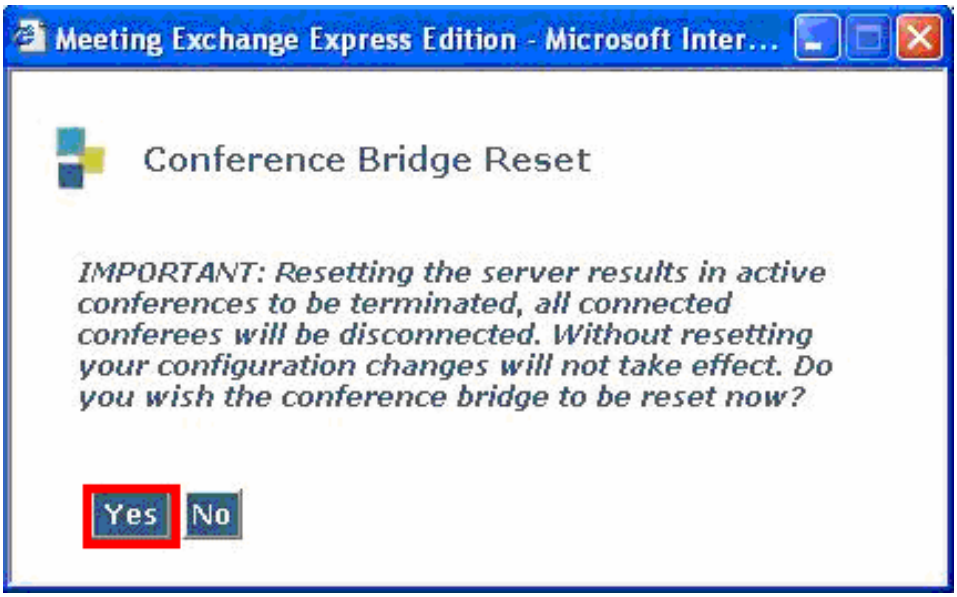
Step	Description
4.2.6	Apply the configuration by clicking the **Reset Serve**r button Reset Server located on the right hand side of the web interface toolbar. Confirm this action by clicking **Yes** in the pop up window. 

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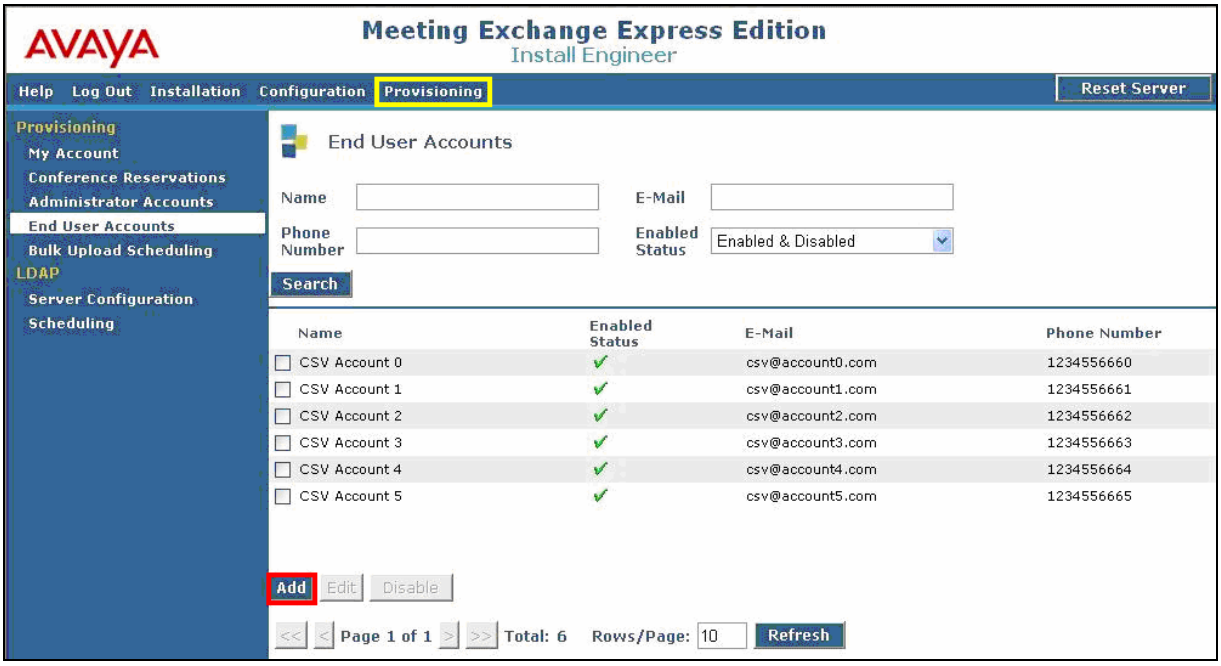
4.3. Provision Accounts

The following steps present an example of provisioning an end user account and associated conference reservation on Avaya Meeting Exchange.

Step	Description
4.3.1	To provide end users access to the conferencing features available on Avaya Meeting Exchange, add an end user account as follows: • From the web interface toolbar, click **Provisioning**. • Click **End User Accounts** under **Provisioning**. • Click the **Add** button. ***Note**: Avaya Meeting Exchange comes with pre-provisioned accounts as displayed.* 

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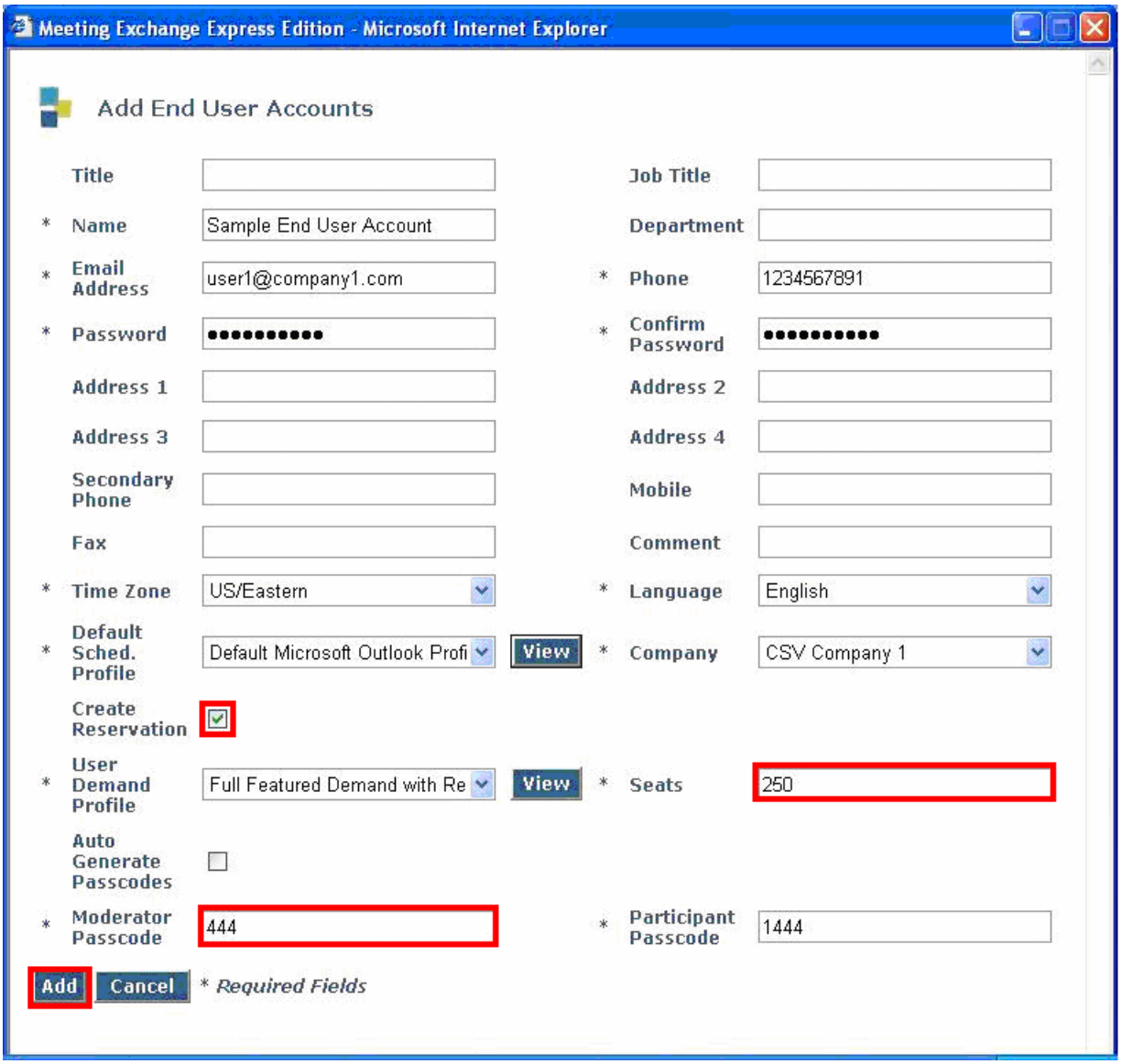
Step	Description
4.3.2	From the **Add End User Accounts** screen, provision an end user account as follows: • Check **Create Reservation** to generate a reservation for a conference that is associated with this end user account. • Enter the number of ports assigned to this conference in the **Seats** field. • Enter a number in the **Moderator Passcode** field that corresponds to the direct call flow provisioned in **Step 4.2.2**. • Refer to [**1**] for definitions regarding the remaining required fields on this screen. • Click the **Add** button to add the account to the database. 

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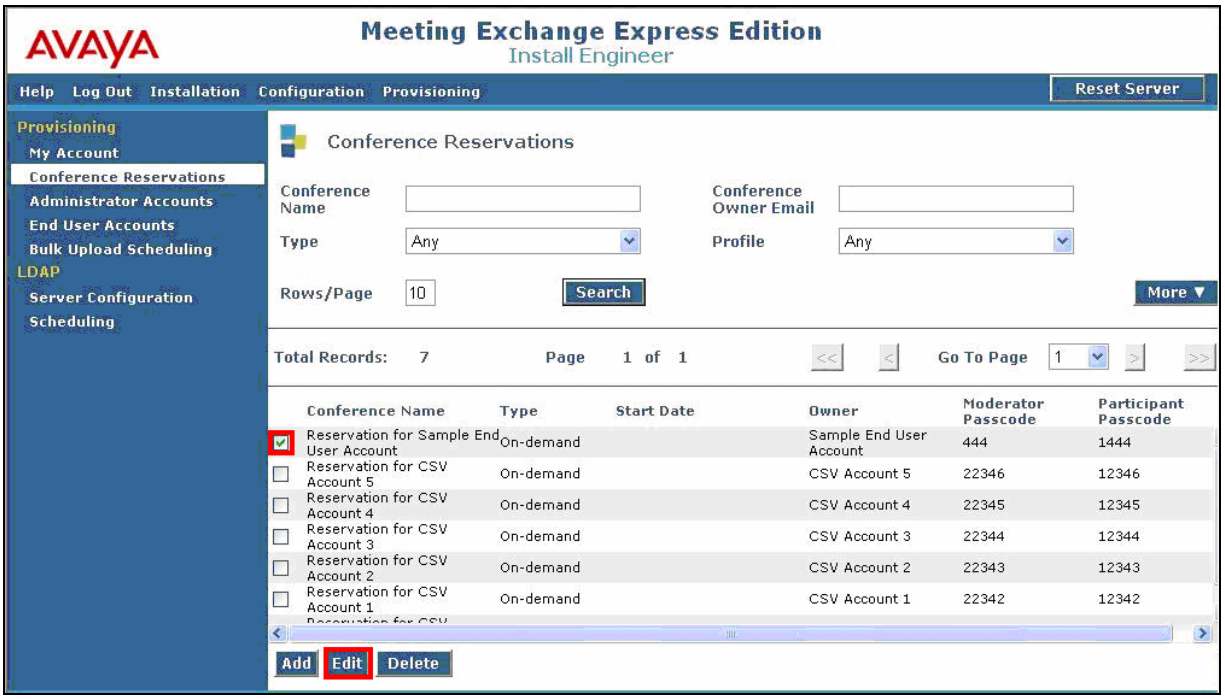
Step	Description
4.3.3	Modify the conference reservation corresponding to the end user account provisioned in **Step 4.3.2** as follows: • Click **Conference Reservations** under **Provisioning**. • Check the conference reservation corresponding to the end user account provisioned in **Step 4.3.2**. • Click the **Edit** button. 

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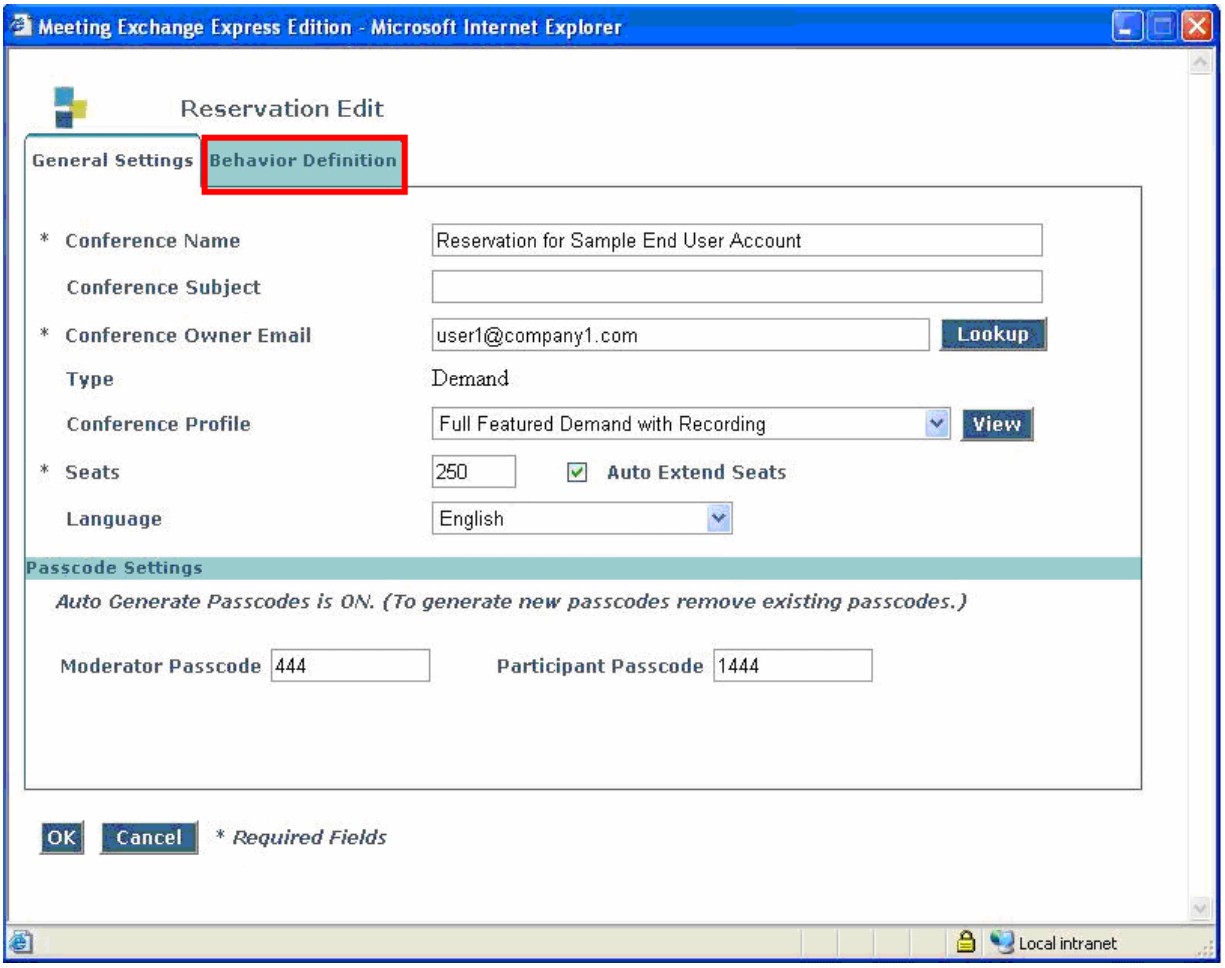
Step	Description
4.3.4	The configuration displayed in the **General Settings** tab for this conference reservation is correlated with the configuration administered for the end user account provisioned in **Step 4.3.2**. Any updates made in this screen will be reflected in the corresponding end user account and vice-versa. To modify parameters associated with this conference reservation, click the **Behavior Definition** tab.



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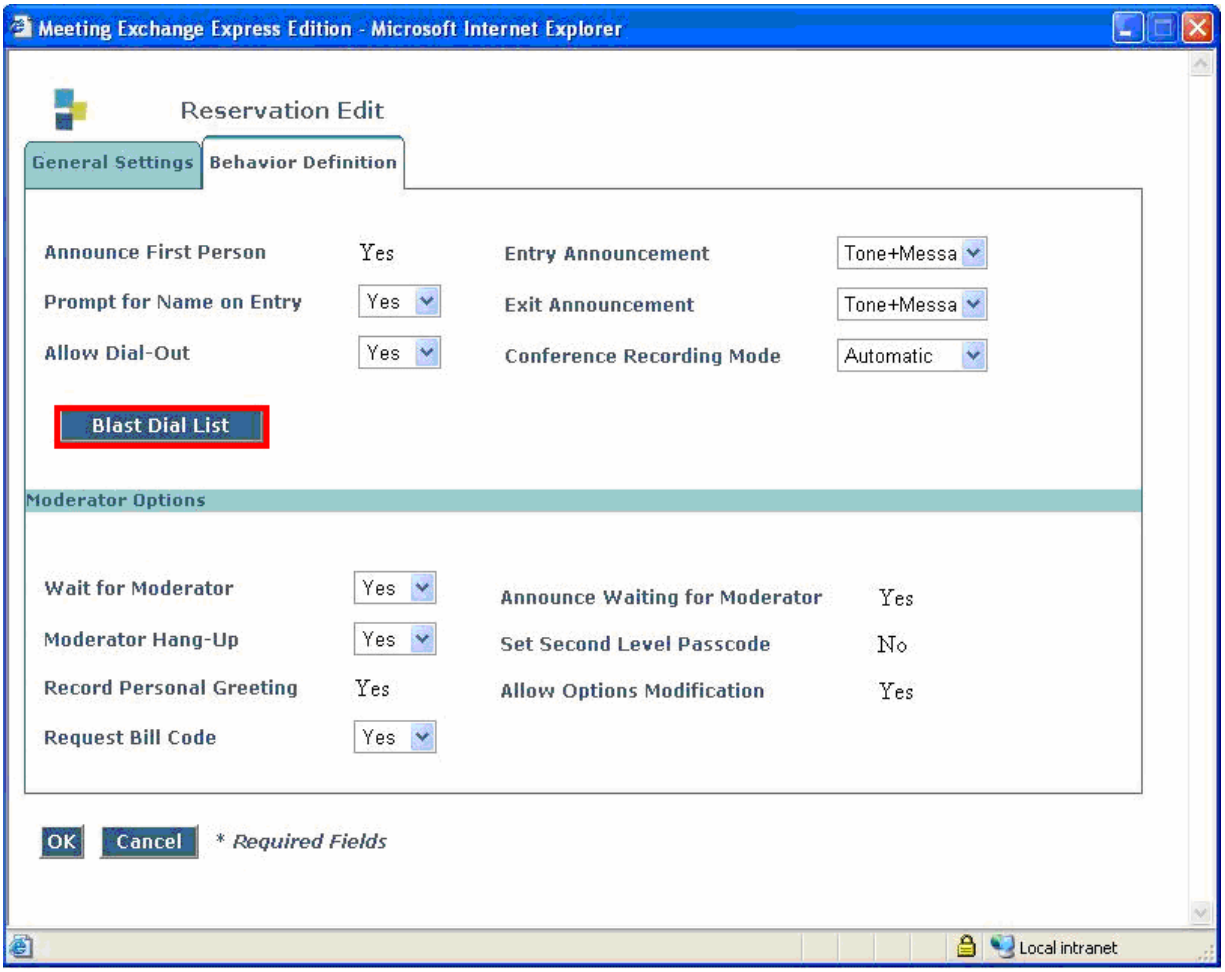
Step	Description
4.3.5	The configuration displayed in the **Behavior Definition** tab may be modified to suit the requirements for this conference. For this sample configuration, a blast dial list was provisioned. To configure a blast dial list, click the **Blast Dial List** button.



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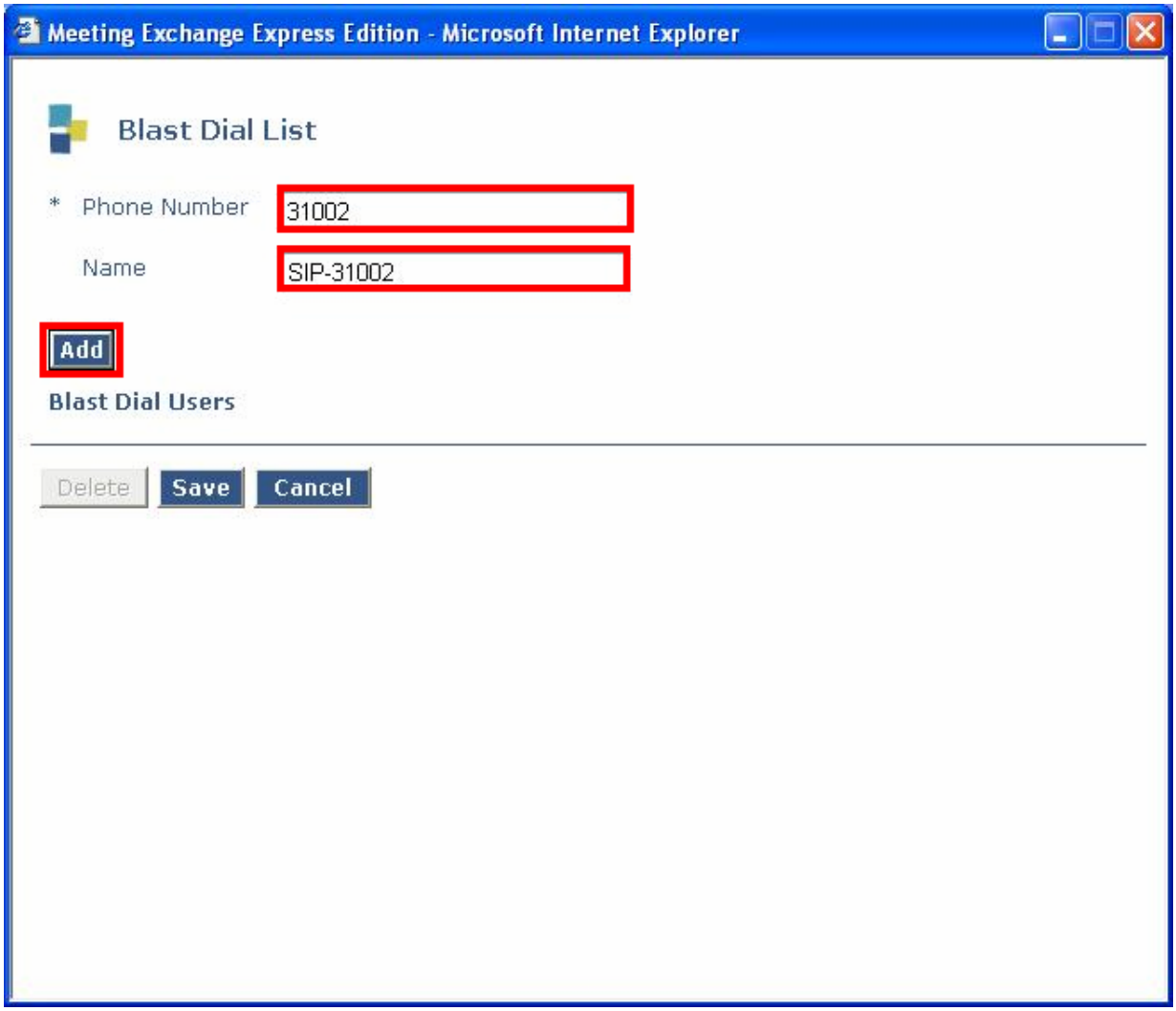
Step	Description

4.3.6	From the **Blast Dial List** screen, add entries to the blast dial list as follows:
	• Enter a number in the **Phone Number** field that is associated with the following:
	  o The telephone number pattern provisioned for the TelNum to URI map in **Step 4.2.5**.
	  o Telephones registered to either Avaya Communication Manager, or Avaya SIP Enablement Services.
	• Enter a descriptive name for this phone number in the **Name** field.
	• Click the **Add** button to add entries to this blast dial list.
	• The resultant provisioning is shown below.
	 

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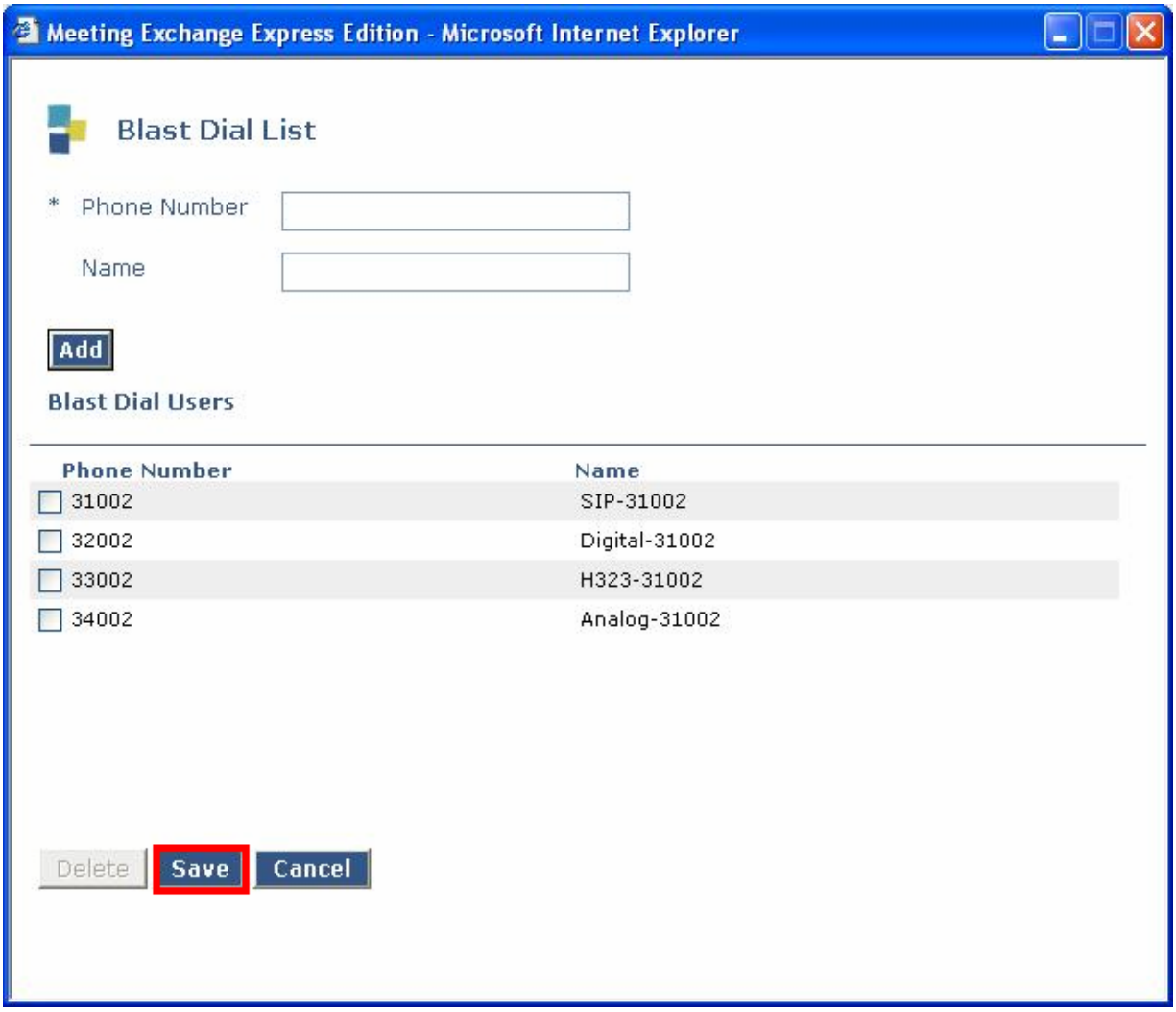
Step	Description
4.3.7	Repeat **Step 4.3.6** to add additional phone numbers to the blast dial list. The resultant blast dial list is displayed below. • Click the **Save** button to save and associate the blast dial list with this conference. • Click the **OK** button OK (displayed in the lower left hand corner of the **Behavior Definition** tab in **Step 4.3.5**) to save the modifications to this conference in the database. 

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5. Cantata Technology IMG 1010 Configuration

This section displays the configuration for enabling the IMG to interoperate with Avaya Communication Manager as well as Avaya Meeting Exchange.

The IMG was administered from the Cantata Technology ClientView (ClientView) application running which was co-resident with the Cantata Technology GateControl Element Management System (GCEMS) running on a Linux server. Refer to the Cantata website for on-line documentation regarding the IMG, GCEMS and the ClientView application.

Note that this section displays the provisioning that was utilized for this sample configuration, and does not show exhaustive procedures for administering an initial configuration. For example, the screens for adding “new” elements to this sample configuration are not shown. However, the sequence of these procedures is relevant, as the configuration was administered in the order presented. Refer to the on-line help available on the Cantata website regarding procedures/commands to administer an initial configuration.

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Figure 2 illustrates the main window of the ClientView application that was utilized to provision the IMG. The following panes appear in the main window:

- The **Configuration Tree**, which is located in the top-left portion of the main window. This pane contains all of the items that can be configured. Right-click an item to access additional configuration items. Creating an entry in the Configuration Tree opens the corresponding Configuration Pane.
- The **Configuration Pane**, which is located in the top-right portion of the main window. This pane shows the properties of the selected object. This pane is used to view and edit the configuration.
    - The column titled **As-Configured**, shows the current configuration for parameters, as defined by the **Property** column. Enter or edit values in the **User-Specified** column.

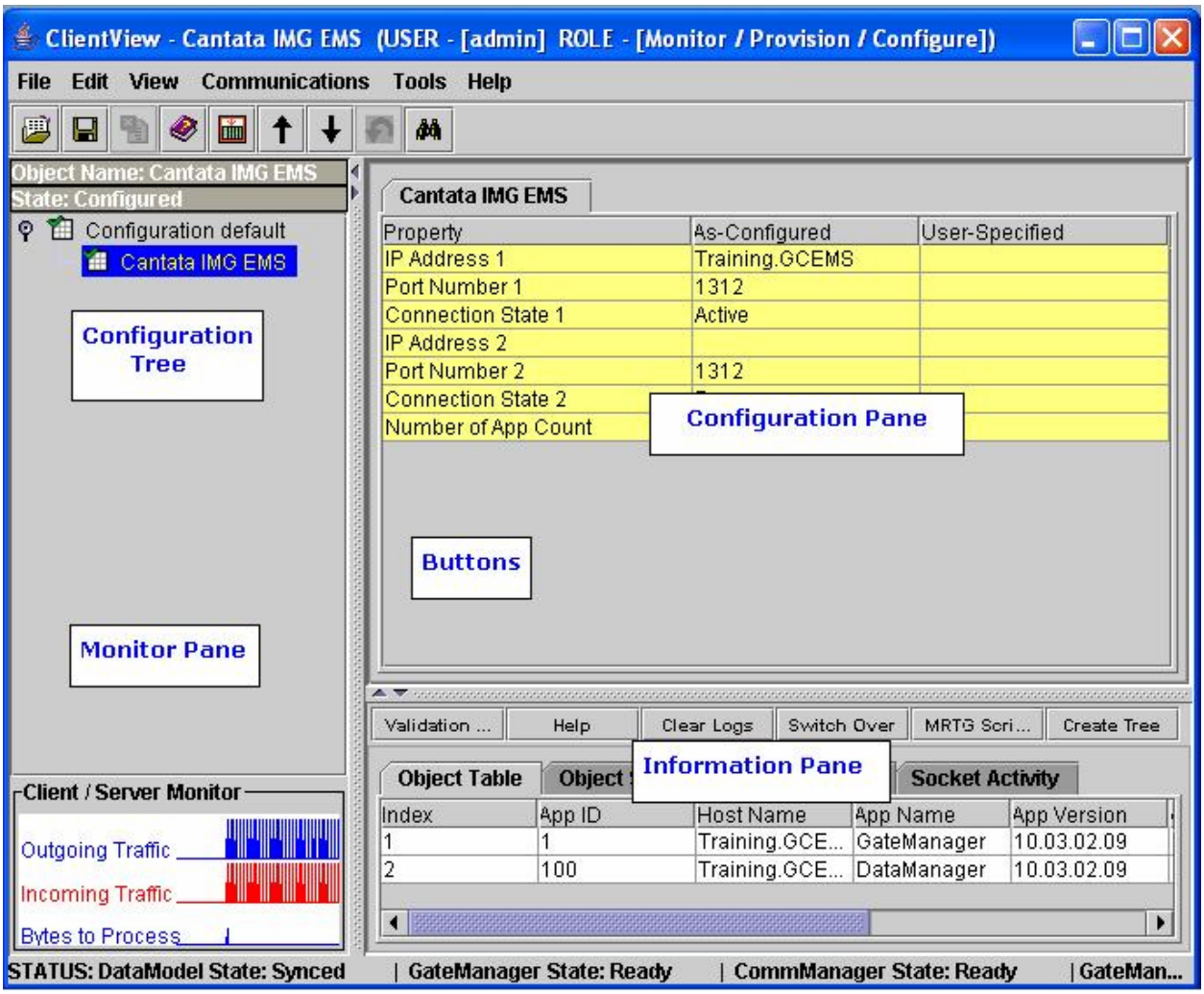

Figure 2: Cantata Technology ClientView Main Window

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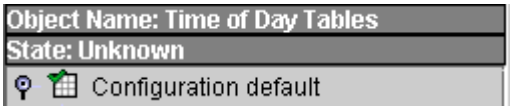
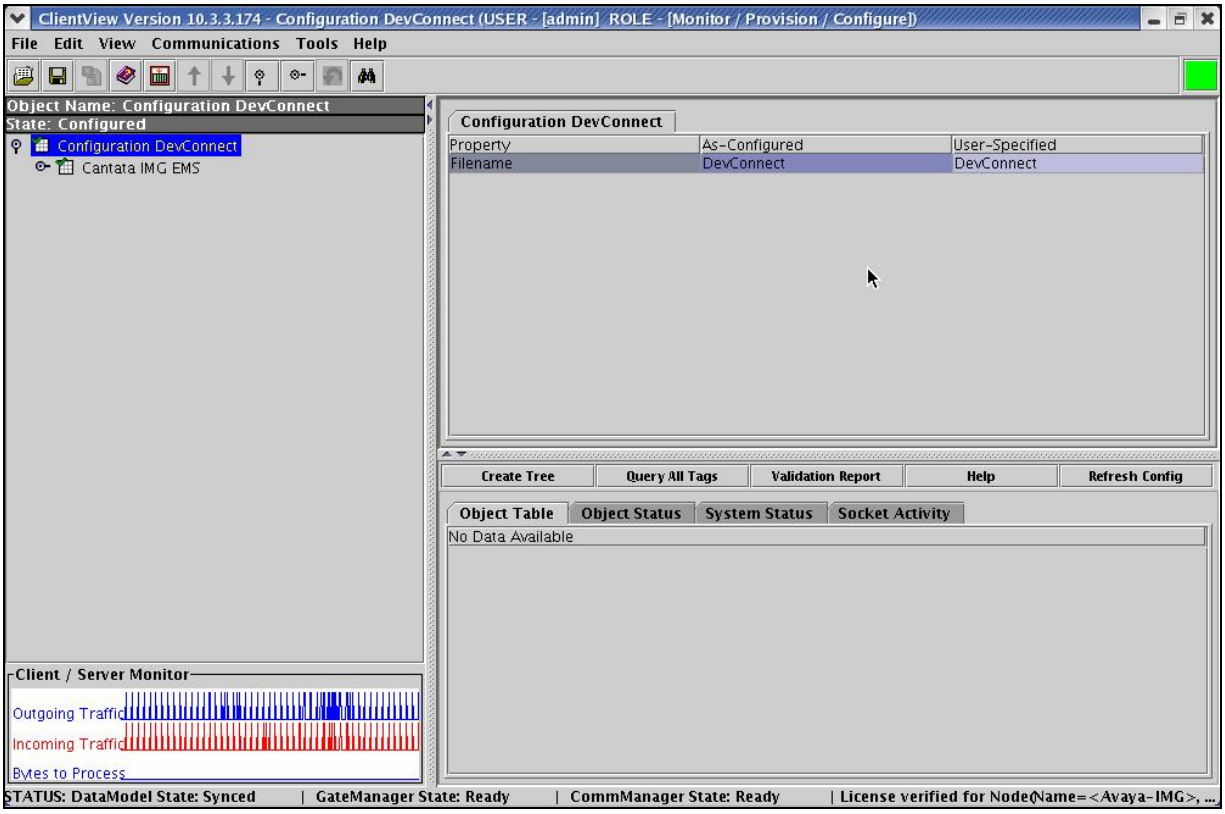
Step	Description
5.1.1	A default configuration file named “default” is created when ClientView connects to GCEMS. To save the configuration file with a new name: • Right-click **Configuration default** in the Configuration Tree, and select **Modify**.  • Enter a descriptive name in the **Filename** field in the Configuration Pane. • To save the changes, right-click **Configuration DevConnect**, and select **Commit**. • The resultant provisioning is shown below. 

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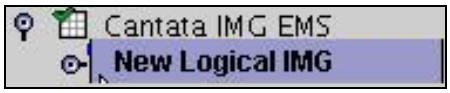
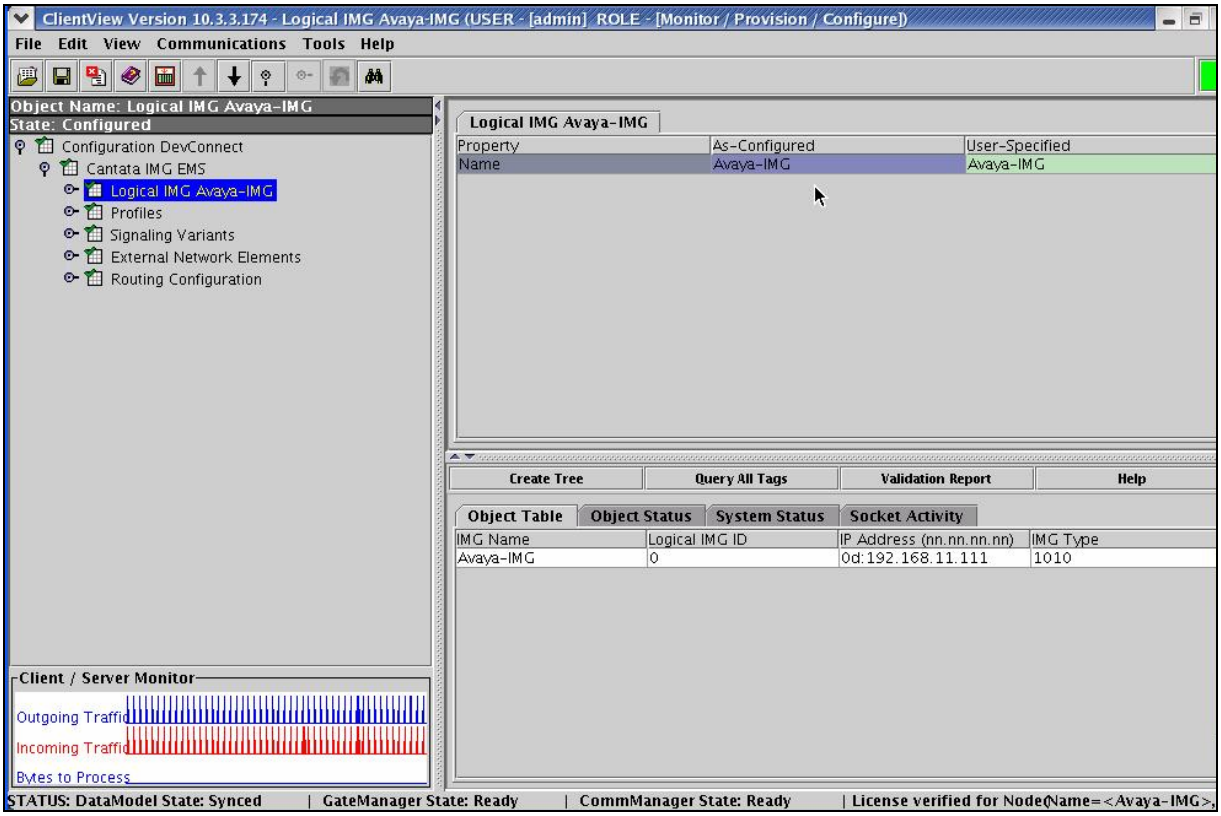
Step	Description
5.1.2	Create a logical IMG as follows: • Right-click **Cantata IMG EMS** in the Configuration Tree, and select **New Logical IMG**.  • Enter a descriptive name for the logical IMG in the **Name** field in the Configuration Pane. • To save the changes, right-click **Logical IMG Avaya-IMG**, and select **Commit**. • The resultant provisioning is shown below. 

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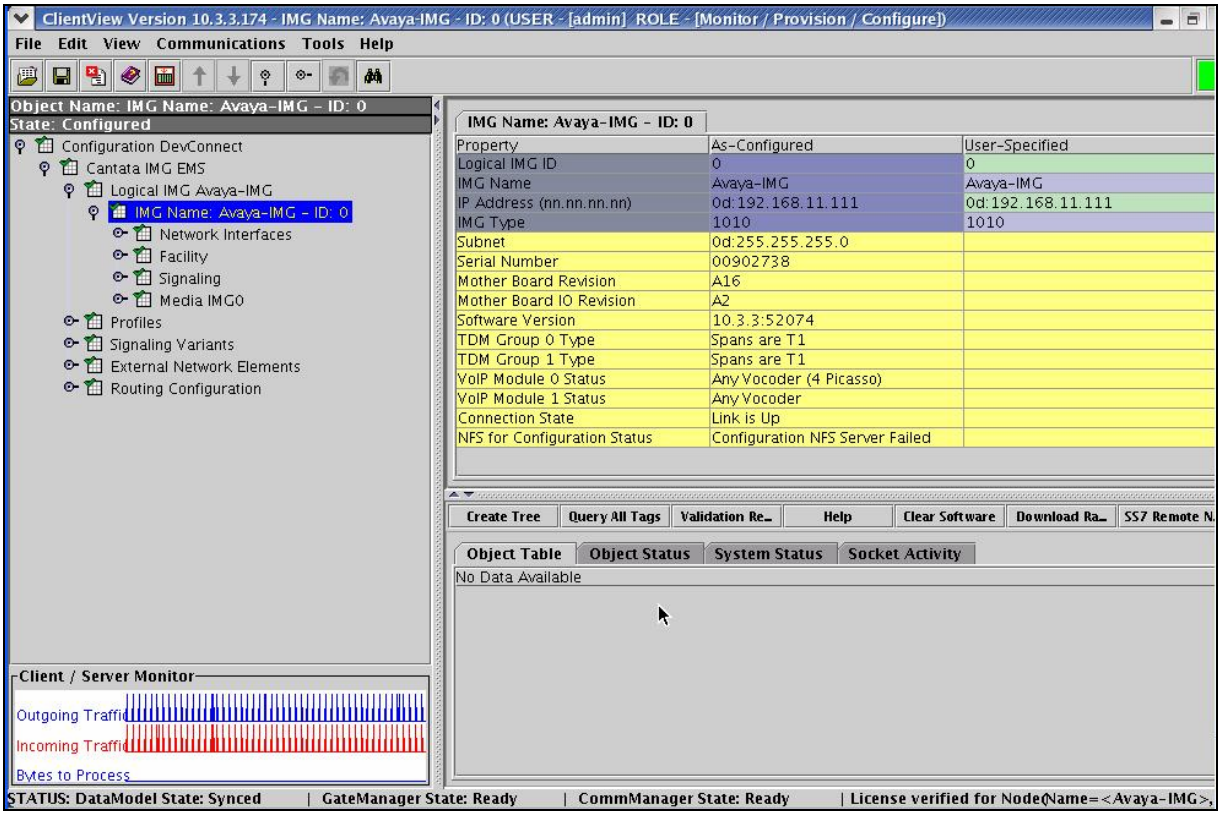
Step	Description
5.1.3	Create a physical IMG as follows: • Right-click the logical IMG in the Configuration Tree, and select **New Physical IMG**. • Enter a descriptive name for the physical IMG in the **IMG Name** field in the Configuration Pane. • Enter the IP address of the physical IMG in the **IP Address** field. This is the same IP address assigned to the CTRL 0 port on the back of the IMG. • Use default settings for remaining fields. • To save the changes, right-click **IMG Name: Avaya-IMG - ID:0**, and select **Commit**. • The resultant provisioning is shown below. 

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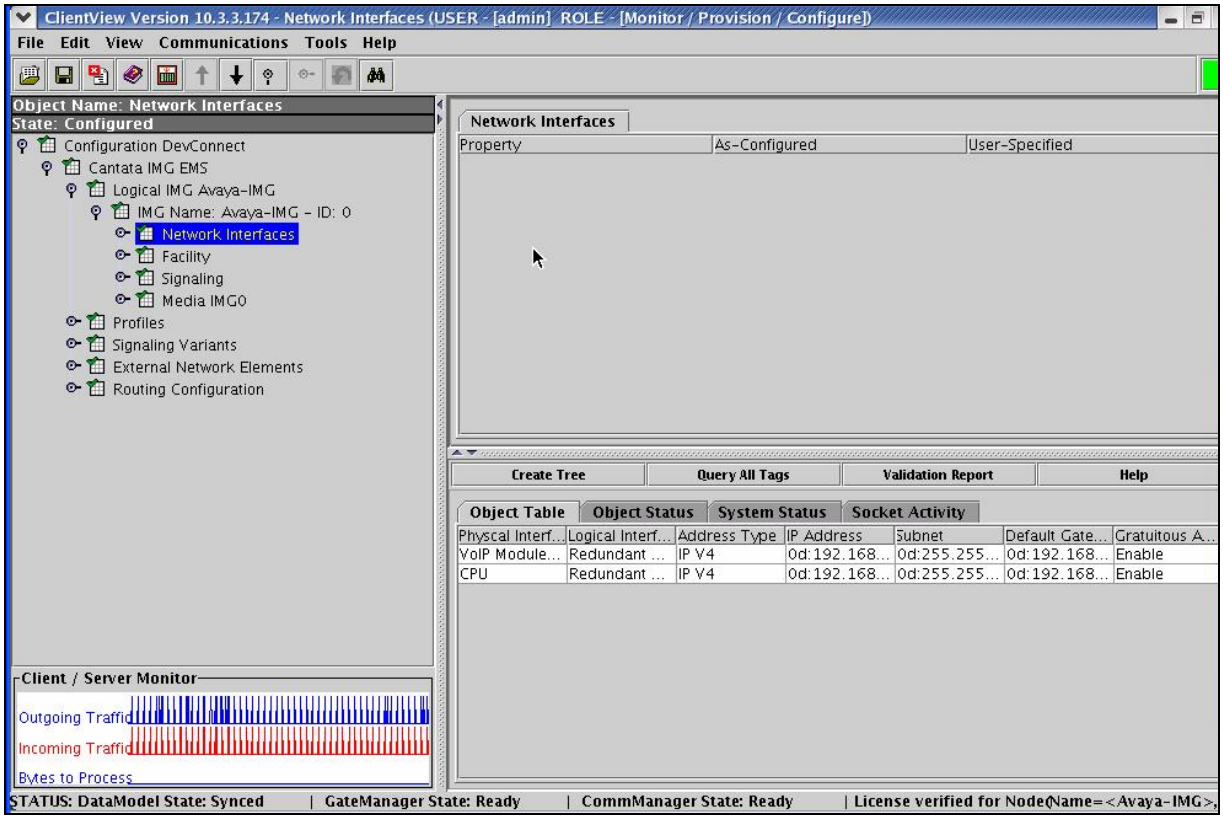
Step	Description
5.1.4	Create an object for Network Interfaces as follows: • Right-click the physical IMG in the Configuration Tree, and select **New Network Interfaces**. • To save the changes, right-click **Network Interfaces**, and select **Commit**. • The resultant provisioning is shown below. 

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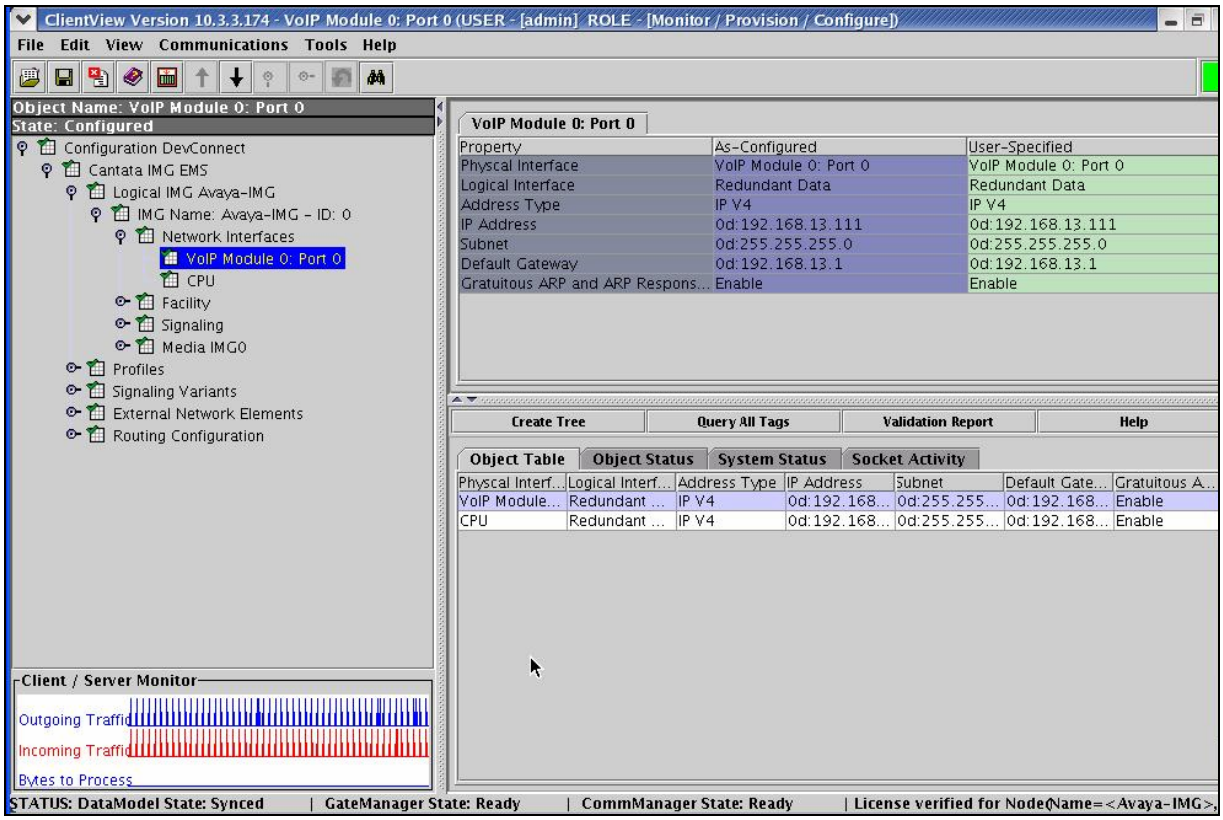
Step	Description
5.1.5	Create a Network Interface corresponding to VoIP Module 0: Port 0 as follows: • Right-click **Network Interfaces** in the Configuration Tree, and select **New Network Interface**. • Select **VoIP Module 0: Port 0** from the drop down list for the **Physical Interface** field in the Configuration Pane. • Administer settings for module's IP network configuration in the **IP Address**, **Subnet** and **Default Gateway** fields respectively. • Use default settings for remaining fields. • To save the changes, right-click **VoIP Module 0: Port 0**, and select **Commit**. • The resultant provisioning is shown below. 

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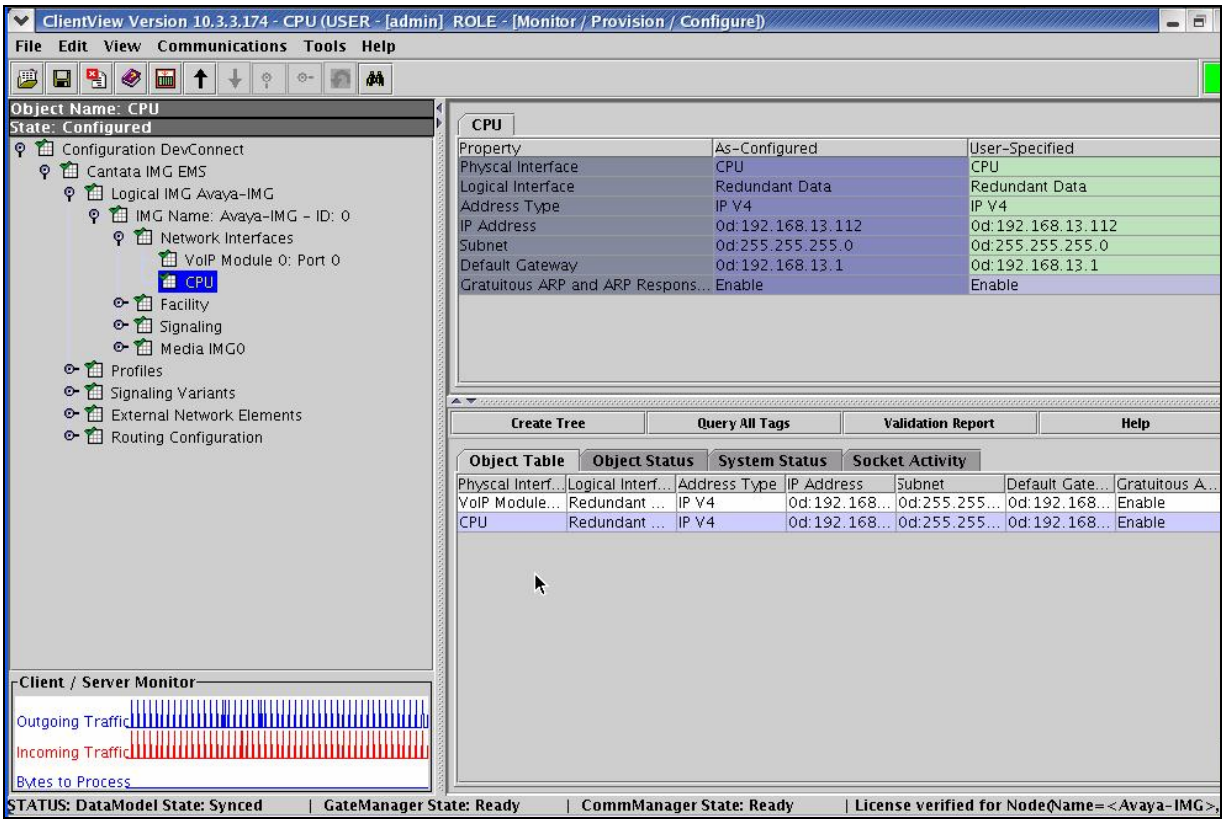
Step	Description
5.1.6	Create a Network Interface corresponding to the CPU as follows: • Right-click **Network Interfaces** in the Configuration Tree, and select **New Network Interface**. • Select **CPU** from the drop down list for the **Physical Interface** field in the Configuration Pane. • Administer settings for module's IP network configuration in the **IP Address**, **Subnet** and **Default Gateway** fields respectively. • Use default settings for remaining fields. • To save the changes, right-click **CPU**, and select **Commit**. • The resultant provisioning is shown below. 

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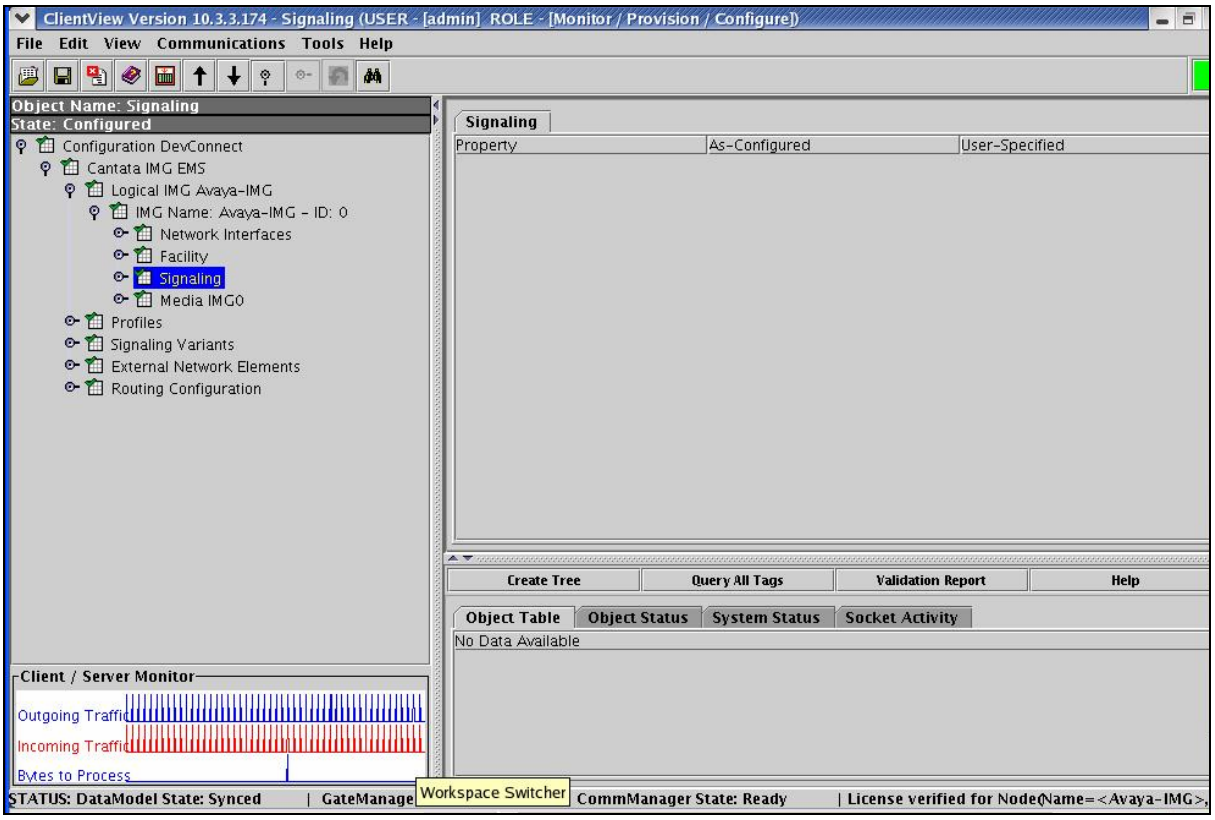
Step	Description
5.1.7	Create an object for Signaling as follows: • Right-click the physical IMG in the Configuration Tree, and select **New Signaling**. • To save the changes, right-click **Signaling**, and select **Commit**. • The resultant provisioning is shown below. 

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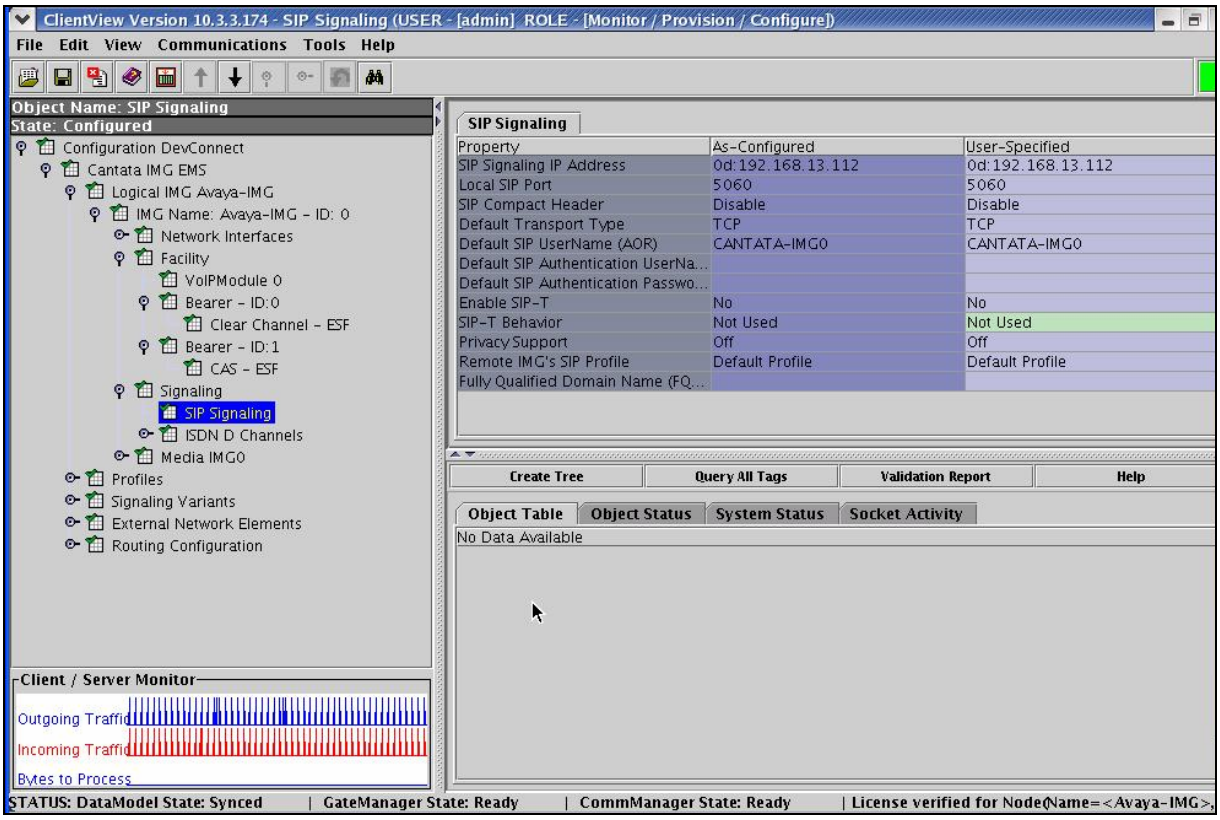
Step	Description
5.1.8	Configure SIP Signaling as follows • Right-click **Signaling** in the Configuration Tree, and select **New SIP**. • Administer settings for the module's network connectivity in the **SIP Signaling IP Address** and **Default Transport Type** fields in the Configuration Pane that correspond to the configuration on Avaya Meeting Exchange (see **Step 4.1.1**, and **Step 4.2.5**). • Use default settings for remaining fields. • To save the changes, right-click **SIP Signaling**, and select **Commit**. • The resultant provisioning is shown below. 

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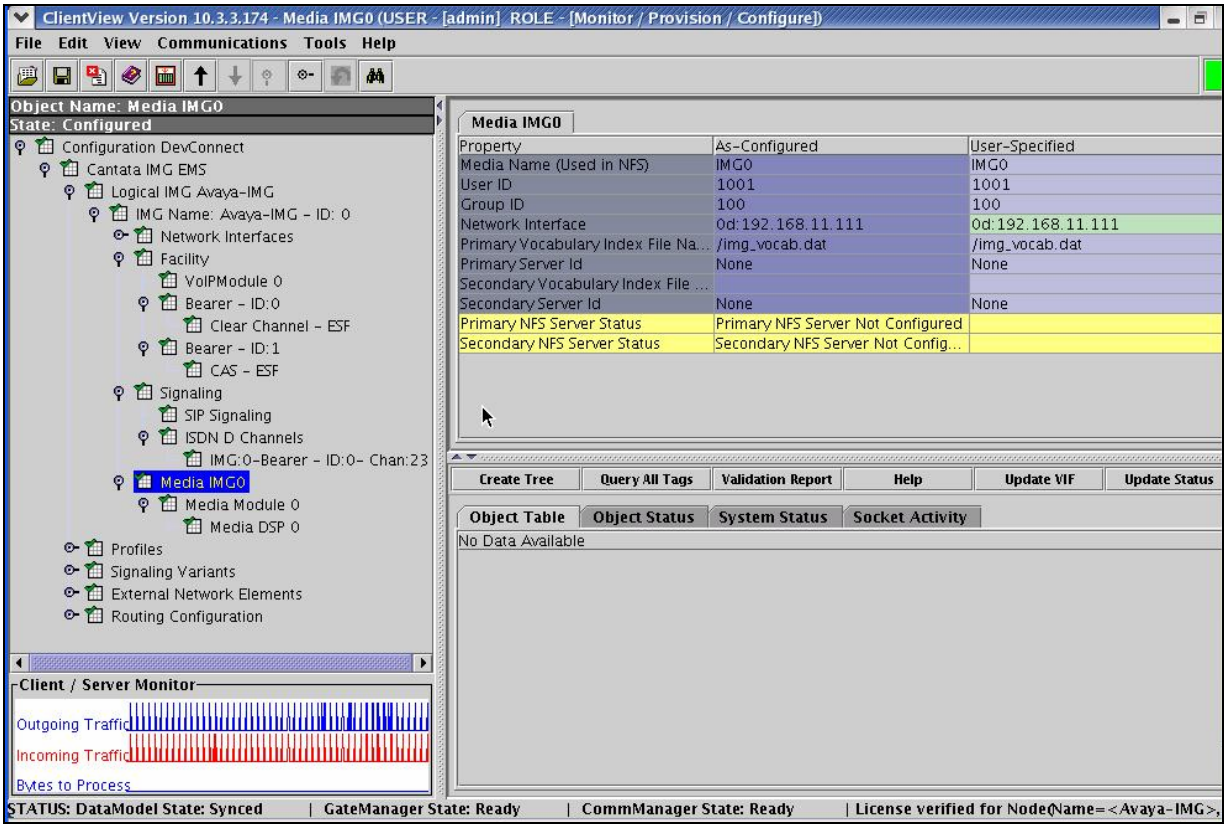
Step	Description
5.1.9	Configure settings for Media as follows: • Right-click the physical IMG in the Configuration Tree, and select **New Media**. • Select the Network File Server (NFS) from the drop down list for the **Media Name** field in the Configuration Pane. • Enter the User ID of the NFS for UNIX permissions in the **User ID** field. • Enter the Group ID of the NFS for UNIX permissions in the **Group ID** field. • Use default settings for remaining fields. *__Note__: The __Network Interface__ field is automatically populated with the IP address provisioned for the management interface for the IMG.* • To save the changes, right-click **Media IMG0**, and select **Commit**. • The resultant provisioning is shown below. 

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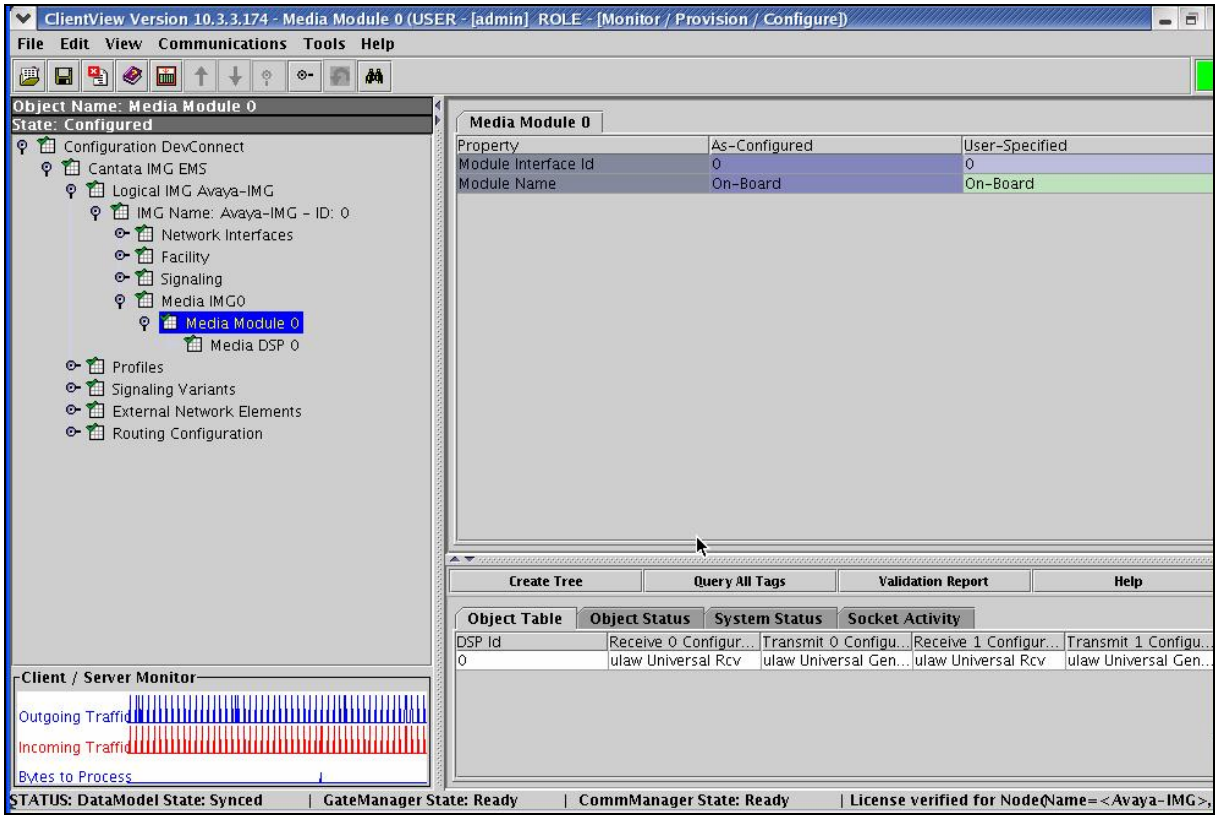
Step	Description
5.1.10	Create an object for a Media Module as follows: • Right-click **Media IMGO** in the Configuration Tree, and select **New Media Module**. • Use default settings for all fields. • To save the changes, right-click **Media Module 0**, and select **Commit**. • The resultant provisioning is shown below. 

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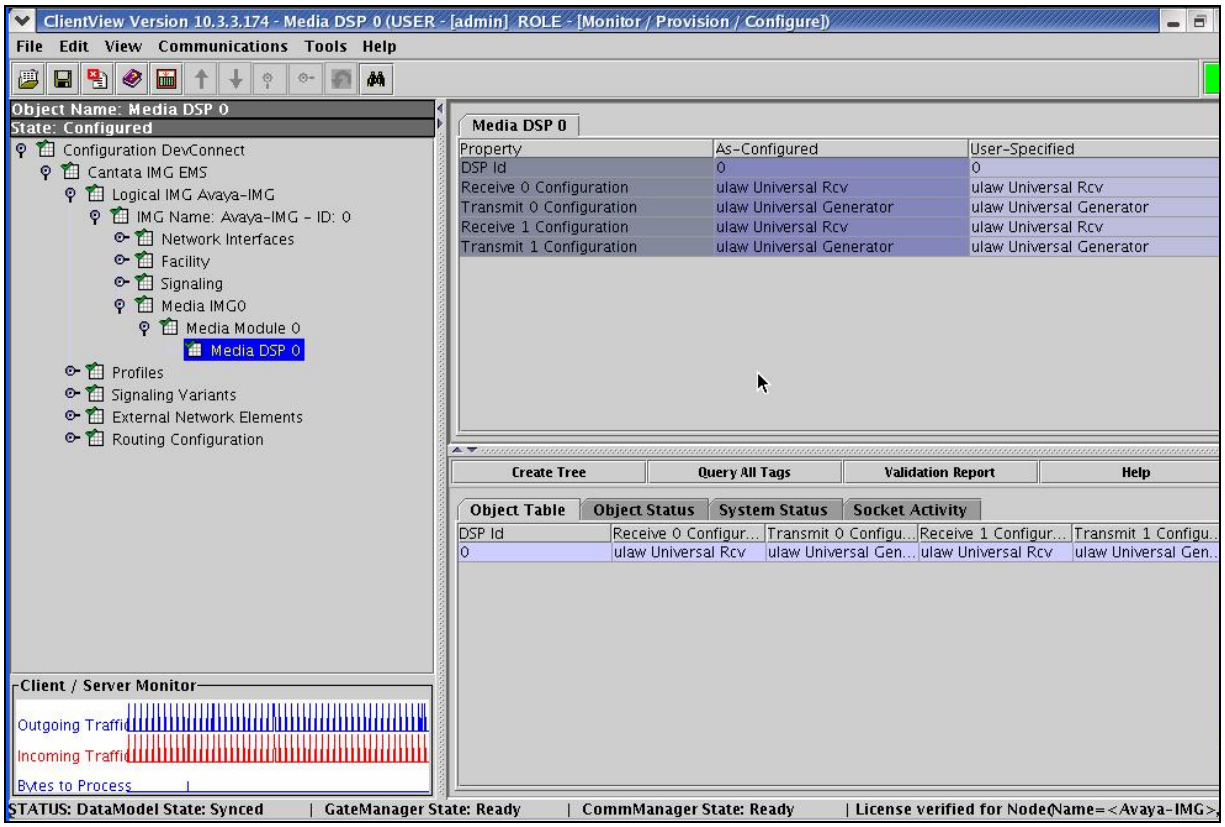
Step	Description
5.1.11	Configure the Media Module DSP as follows: • Right-click the Media Module created in **Step 5.1.10** in the Configuration Tree, and select **New Media DSP**. • Use default settings for all fields. • To save the changes, right-click **Media DSP 0**, and select **Commit**. • The resultant provisioning is shown below. 

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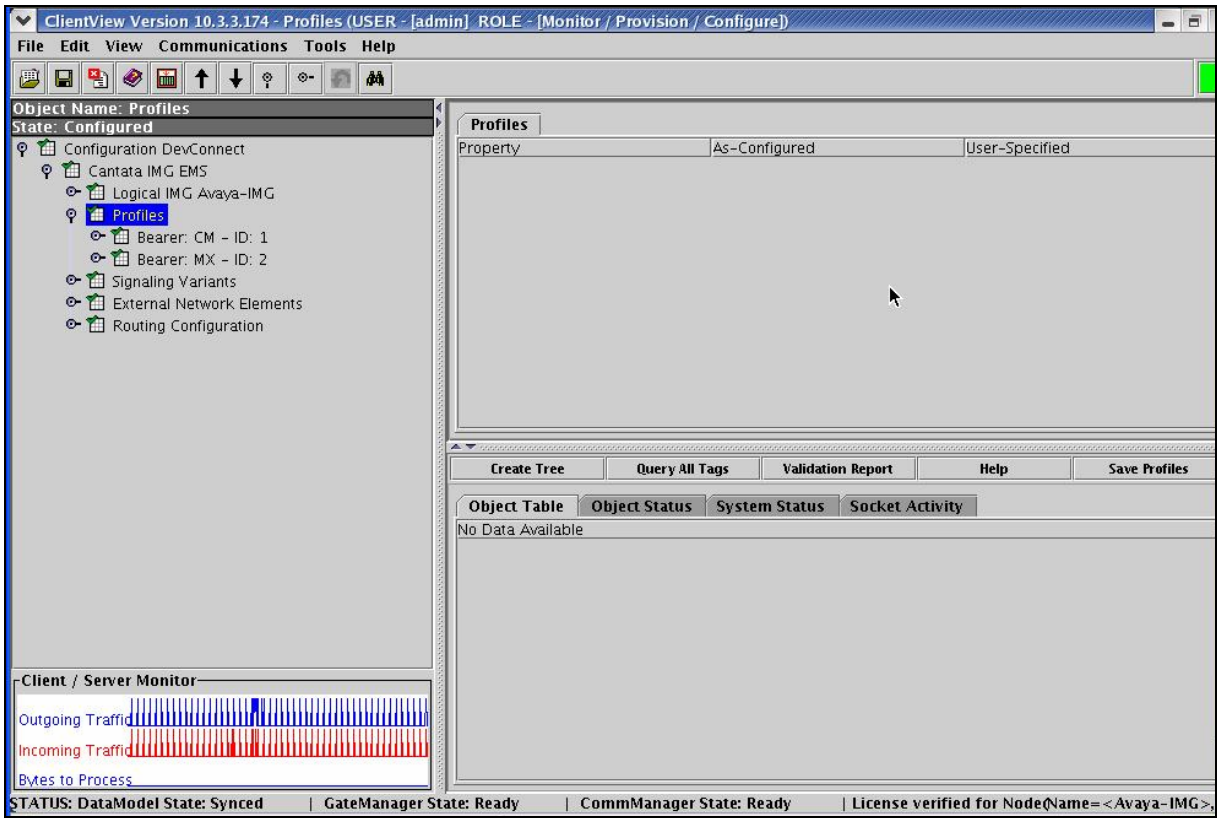
Step	Description
5.1.12	Create an object for Profiles as follows: • Right-click **Cantata IMG EMS** in the Configuration Tree, and select **New Profiles**. • To save the changes, right-click **Profiles**, and select **Commit**. • The resultant provisioning is shown below. 

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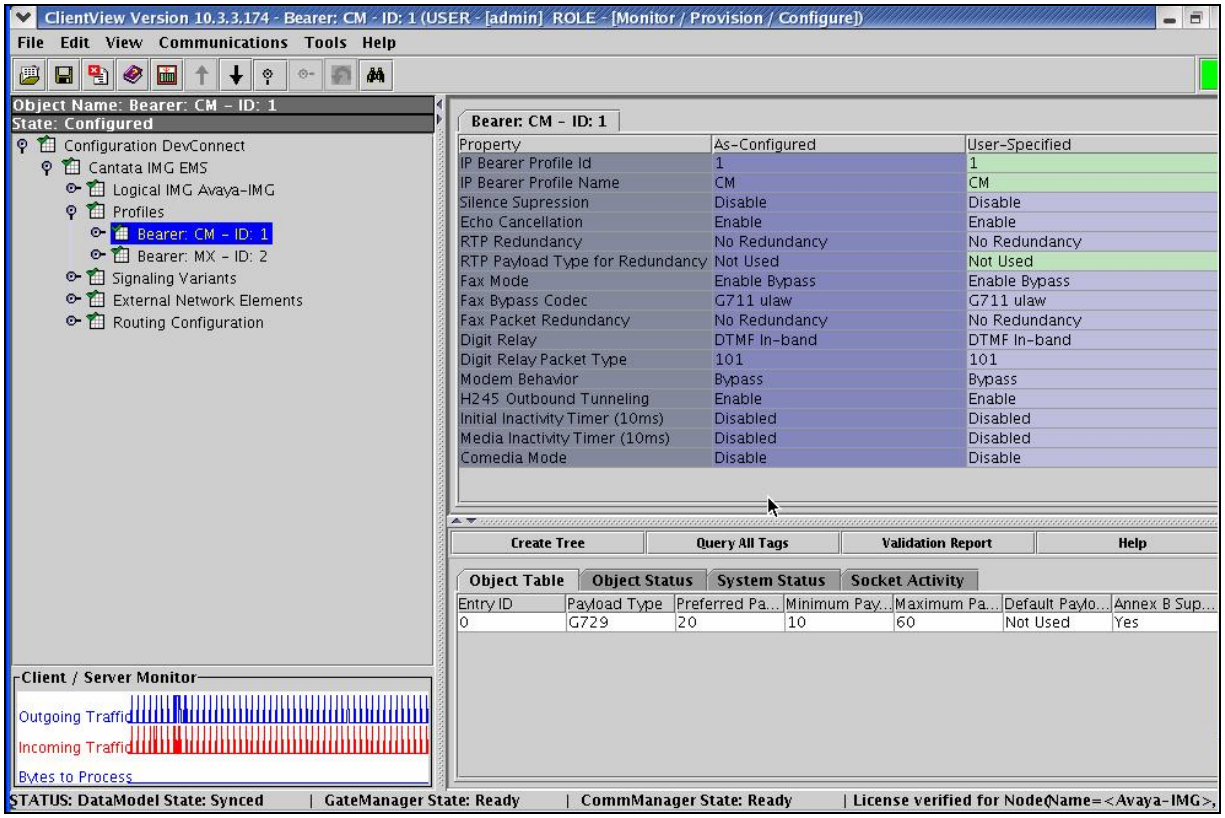
Step	Description
5.1.13	Configure an IP Bearer Profile corresponding to Avaya Communication Manager as follows: • Right-click **Profiles** in the Configuration Tree, and select **New IP Bearer Profile**. • Enter a descriptive name for the IP Bearer Profile in the **IP Bearer Profile Name** field in the Configuration Pane. • Use default settings for remaining fields. • To save the changes, right-click **Bearer: CM - ID:1**, and select **Commit**. • The resultant provisioning is shown below. 

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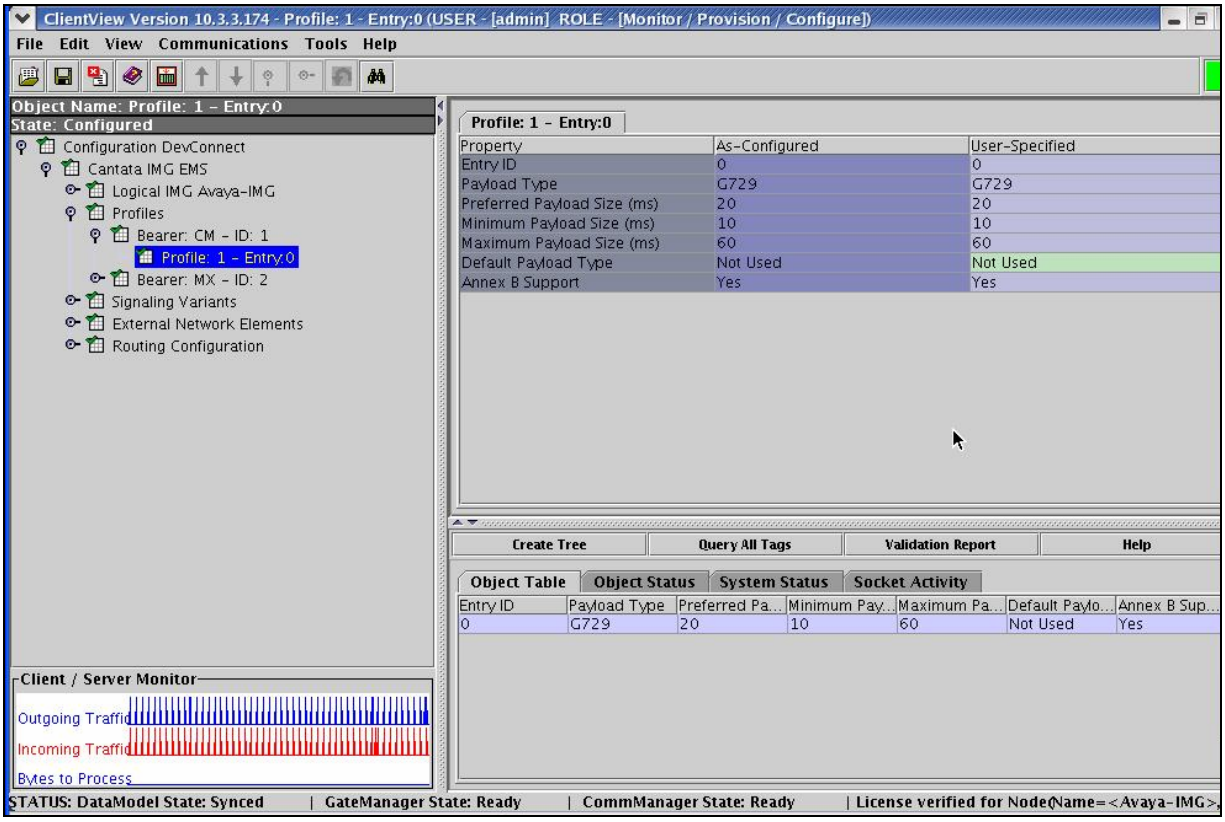
Step	Description
5.1.14	Assign a codec to the IP Bearer Profile corresponding to Avaya Communication Manager as follows: • Right-click the IP Bearer Profile created in **Step 5.1.13** in the Configuration Tree, and select **New Supported Vocoders**. • Select a codec from the drop down list for the **Payload Type** field that is supported on Avaya Communication Manager (see **Step 3.2.1**) in the Configuration Pane. • Use default settings for remaining fields. • To save the changes, right-click **Profile: 1 - Entry:0**, and select **Commit**. • The resultant provisioning is shown below. 

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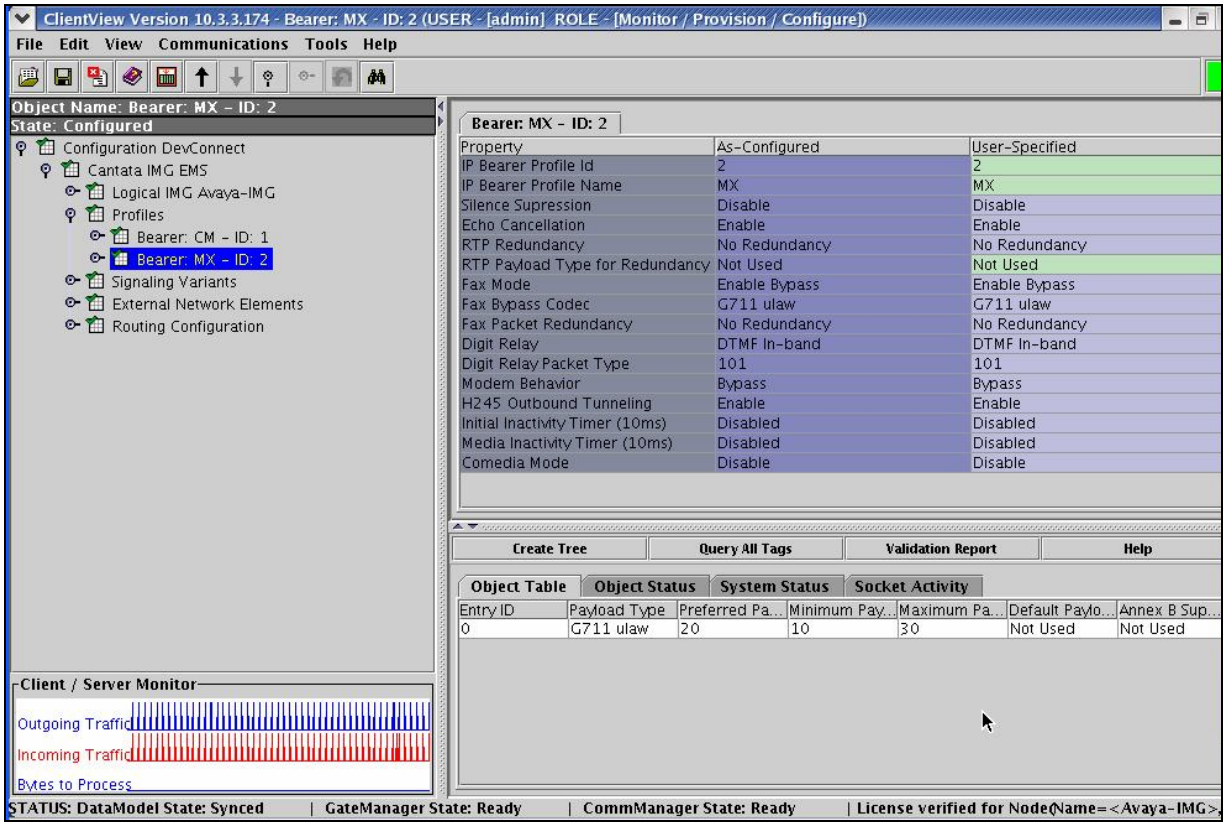
Step	Description
5.1.15	Configure an IP Bearer Profile corresponding to Avaya Meeting Exchange as follows: • Right-click **Profiles** in the Configuration Tree, and select **New IP Bearer Profile**. • Enter a descriptive name for the IP Bearer Profile in the **IP Bearer Profile Name** field in the Configuration Pane. • Use default settings for remaining fields. • To save the changes, right-click **Bearer: MX - ID:2**, and select **Commit**. • The resultant provisioning is shown below. 

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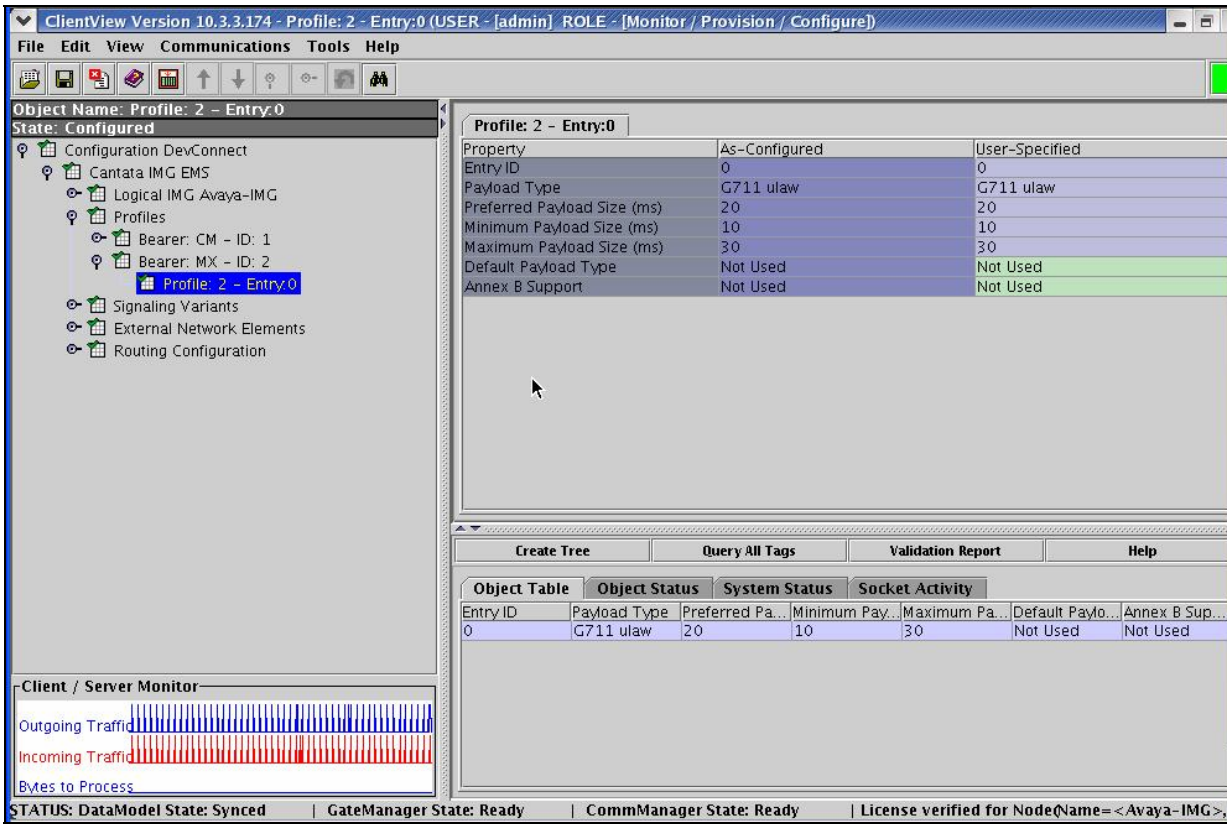
Step	Description
5.1.16	Assign a codec to the IP Bearer Profile corresponding to Avaya Meeting Exchange as follows: • Right-click the IP Bearer Profile created in **Step 5.1.15** in the Configuration Tree, and select **New Supported Vocoders**. • Select a codec from the drop down list for the **Payload Type** field that is supported on Avaya Meeting Exchange in the Configuration Pane. • Use default settings for remaining fields. • To save the changes, right-click **Profile: 2 - Entry:0**, and select **Commit**. • The resultant provisioning is shown below. 

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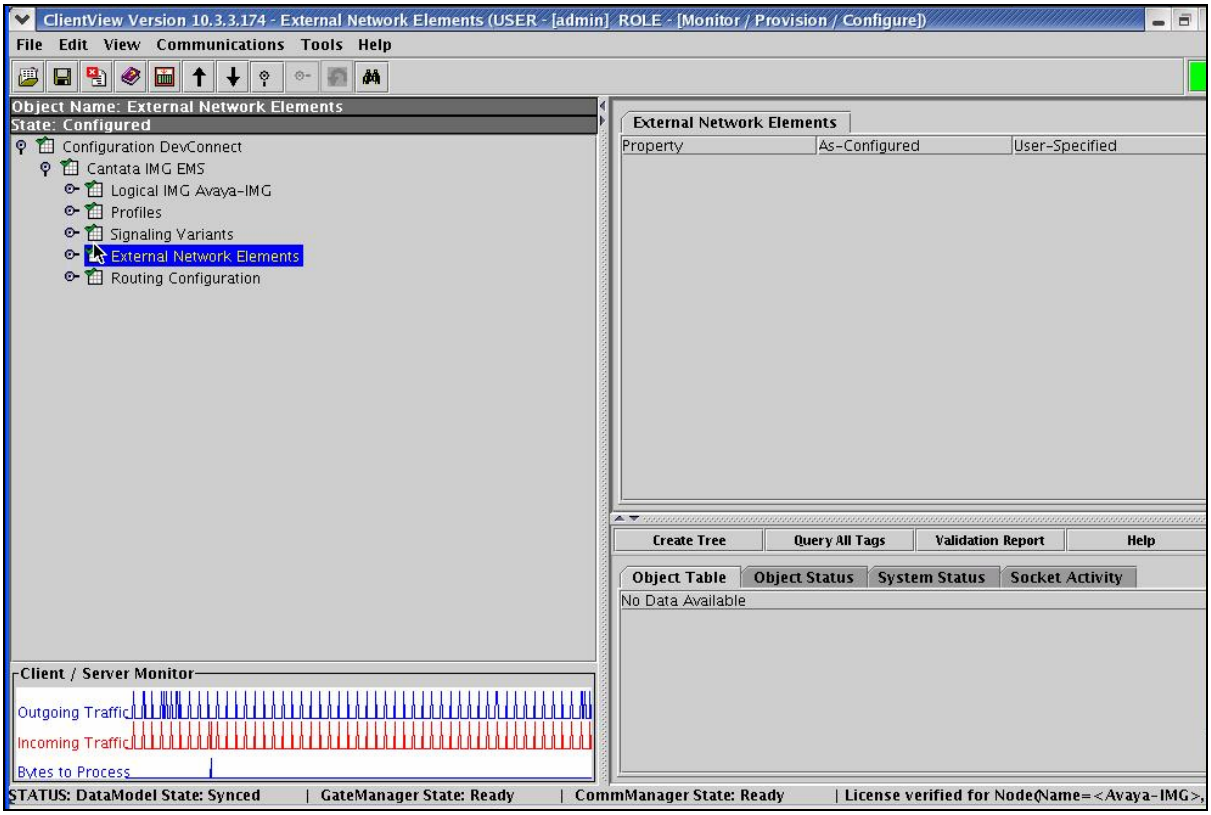
Step	Description
5.1.17	Create an object for External Network Elements as follows: • Right-click **Cantata IMG EMS** in the Configuration Tree, and select **New External Network Elements**. • To save the changes, right-click **External Network Elements**, and select **Commit**. • The resultant provisioning is shown below. 

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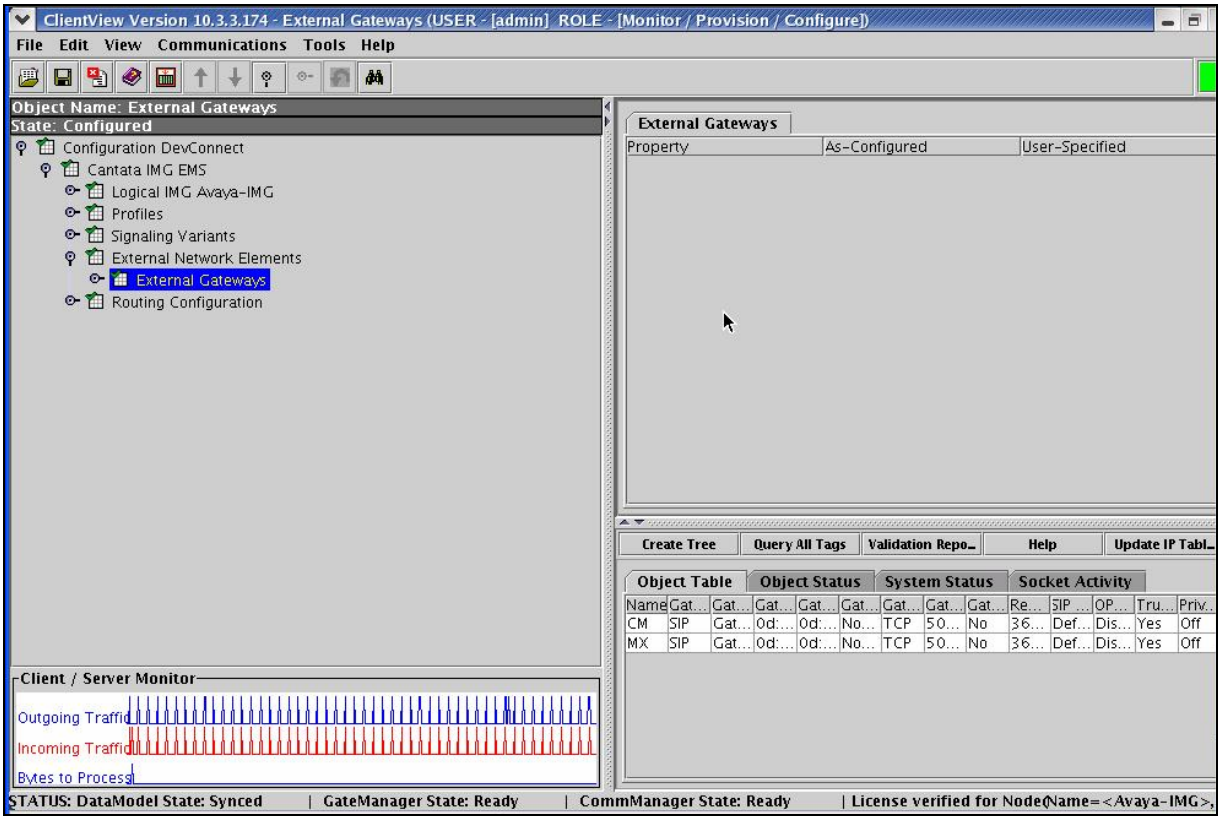
Step	Description
5.1.18	Create an object for External Gateways as follows: • Right-click **External Network Elements** in the Configuration Tree, and select **New External Gateways**. • To save the changes, right-click **External Gateways**, and select **Commit**. • The resultant provisioning is shown below. 

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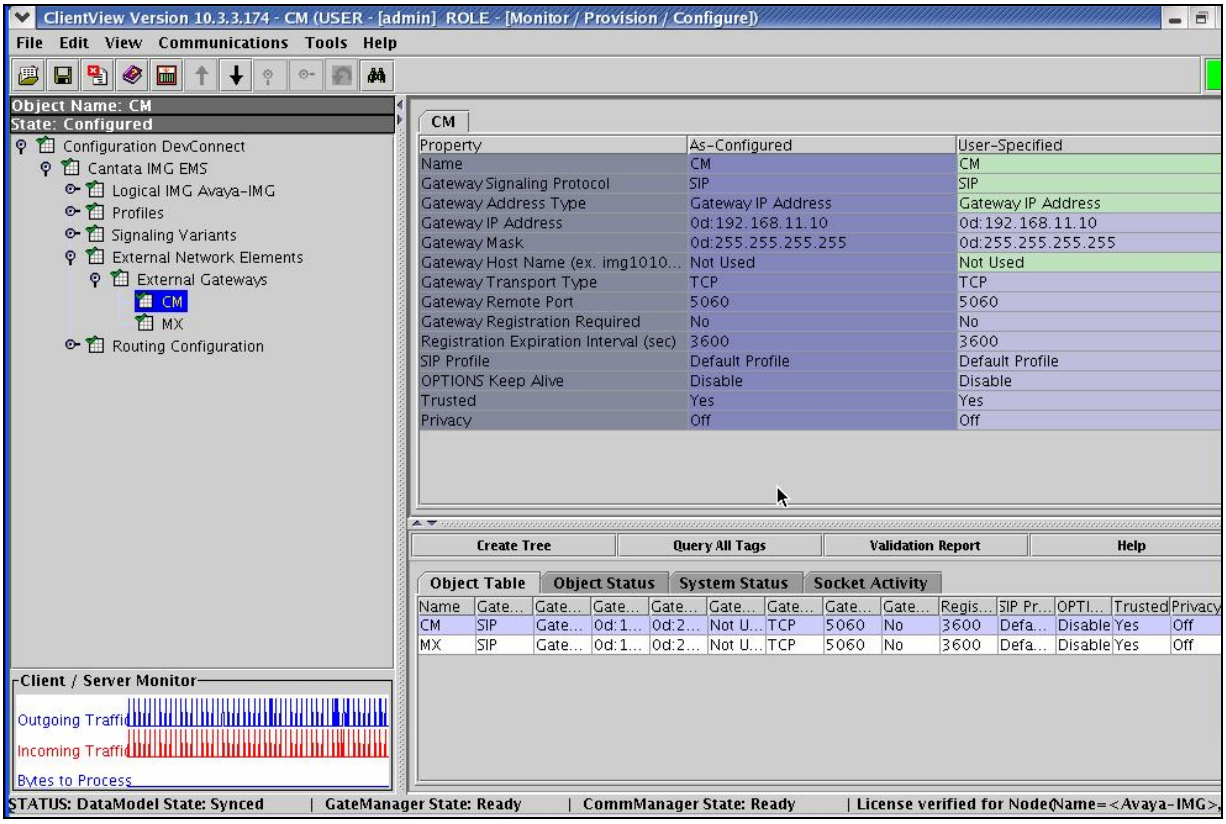
Step	Description
5.1.19	Configure an External Gateway corresponding to Avaya Communication Manager as follows: • Right-click **External Gateways** in the Configuration Tree, and select **New External Gateway**. • Enter a descriptive name for the IP Bearer Profile in the **Name** field in the Configuration Pane. • Select **SIP** from the drop down list for the **Gateway Signaling Protocol** field. • Enter the IP address of the CLAN for Avaya Communication Manager in the **Gateway IP Address** field. • Use default settings for remaining fields. *__Note__: The settings for the __Gateway Transport Type__, and __Gateway Remote Port__ fields are compatible with the configuration on Avaya Communication Manager (see __Step 3.2.5__).* • To save the changes, right-click **CM**, and select **Commit**. • The resultant provisioning is shown below. 

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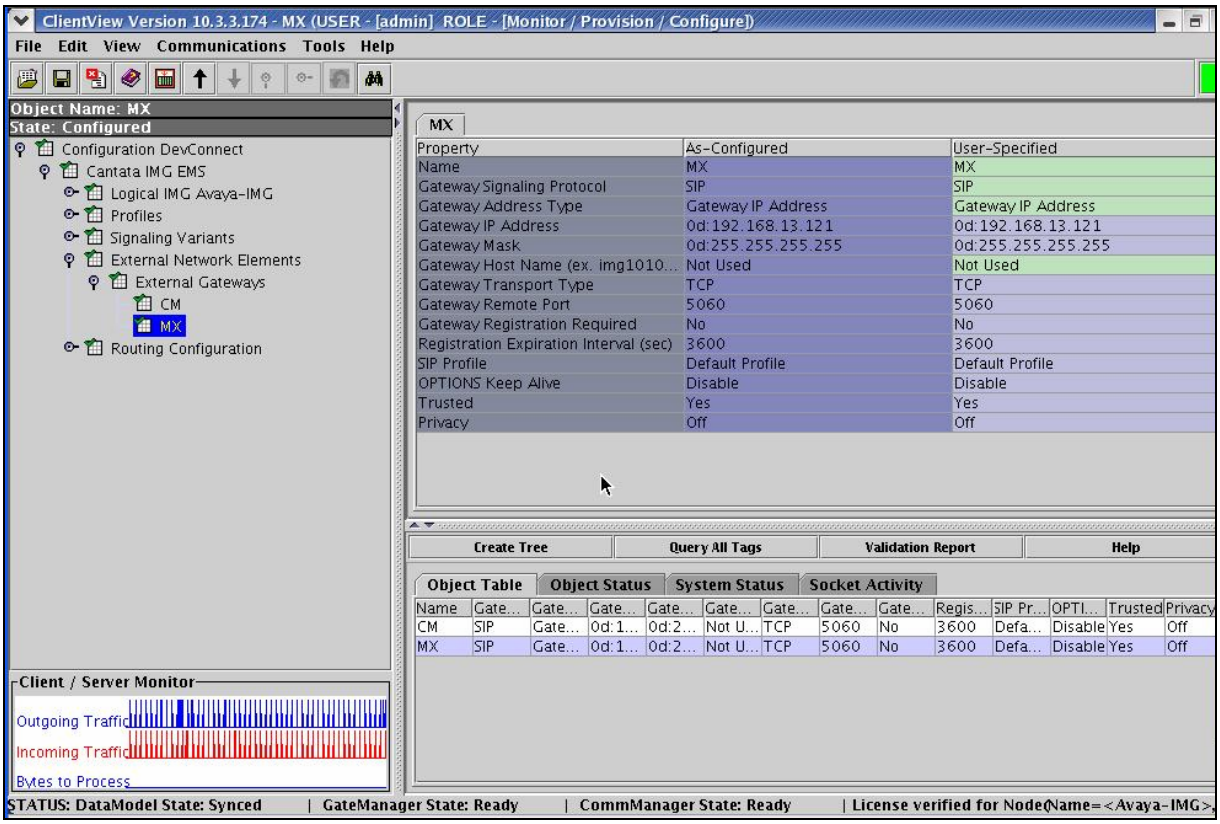
Step	Description
5.1.20	Configure an External Gateway corresponding to Avaya Meeting Exchange as follows: • Right-click **External Gateways** in the Configuration Tree, and select **New External Gateway**. • Enter a descriptive name for the IP Bearer Profile in the **Name** field in the Configuration Pane. • Select **SIP** from the drop down list for the **Gateway Signaling Protocol** field. • Enter the IP address of Avaya Meeting Exchange in the **Gateway IP Address** field. • Use default settings for remaining fields. *__Note__: The settings for the __Gateway Transport Type__, and __Gateway Remote Port__ fields are compatible with the configuration on Avaya Meeting Exchange (see __Step 4.1.1__, and __Step 4.2.5__).* • To save the changes, right-click **MX**, and select **Commit**. • The resultant provisioning is shown below. 

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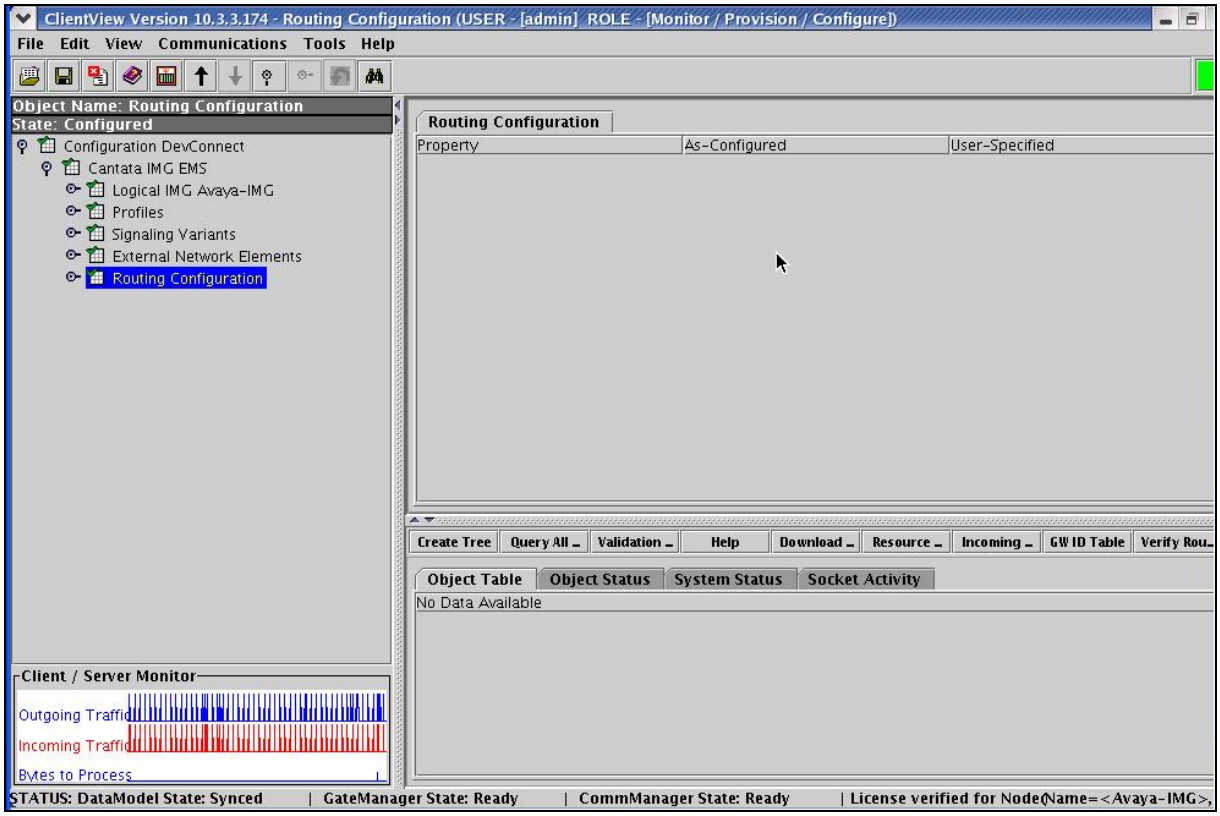
Step	Description
5.1.21	Create an object for Routing Configuration as follows: • Right-click **Cantata IMG EMS** in the Configuration Tree, and select **New Routing Configuration**. • To save the changes, right-click **Routing Configuration**, and select **Commit**. • The resultant provisioning is shown below. 

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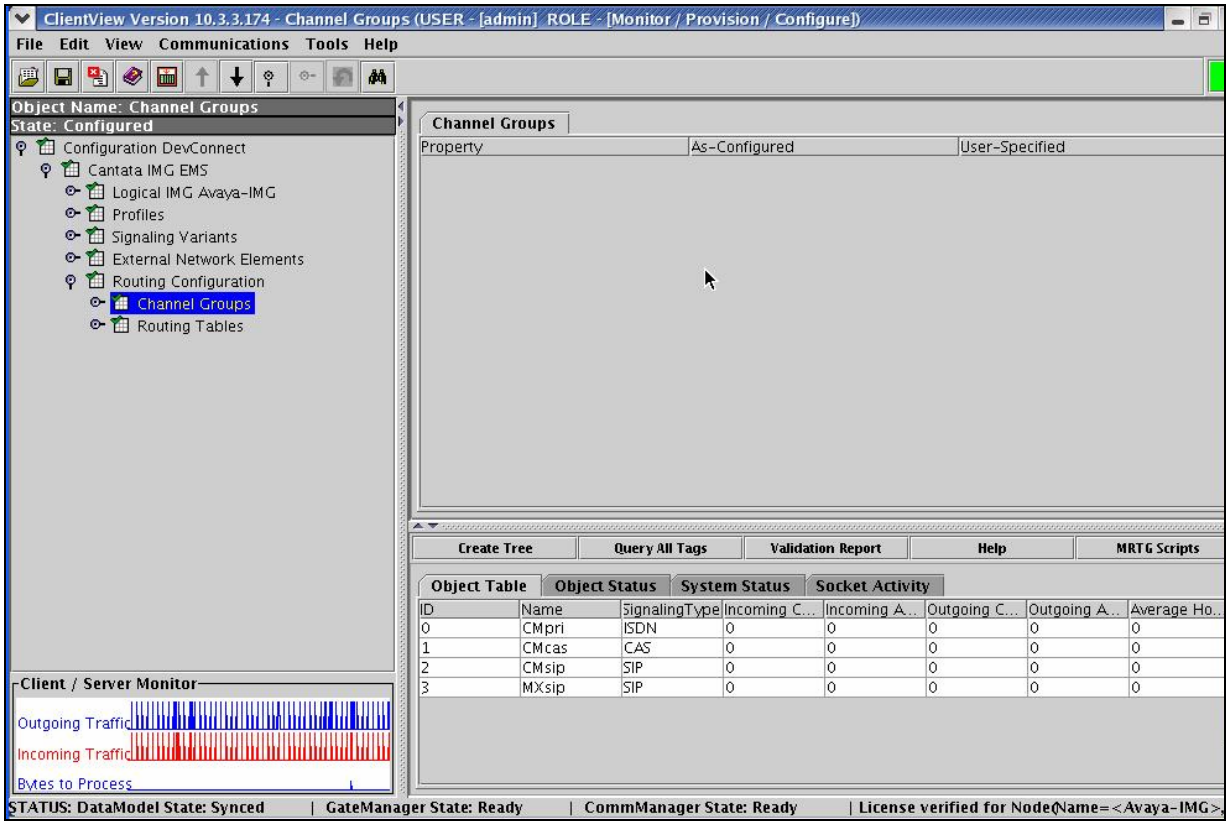
Step	Description
5.1.22	Create an object for Channel Groups as follows: • Right-click **Routing Configuration** in the Configuration Tree, and select **New Channel Groups**. • To save the changes, right-click **Channel Groups**, and select **Commit**. • The resultant provisioning is shown below. 

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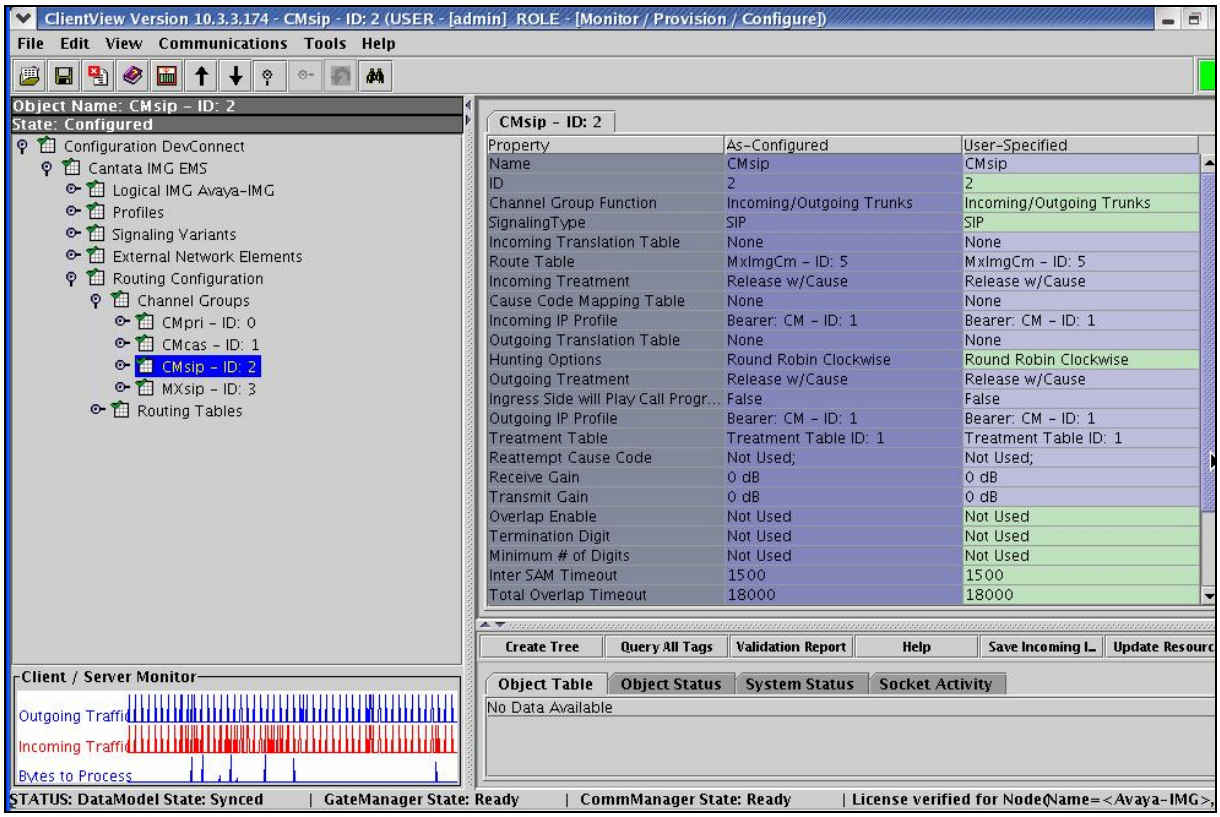
Step	Description
5.1.23	Configure a Channel Group corresponding to Avaya Communication Manager as follows: • Right-click **Channel Groups** in the Configuration Tree, and select **New Channel Group**. • Enter a descriptive name for the Channel Group in the **Name** field in the Configuration Pane. • Select **SIP** from the drop down list for the **Signaling Type** field. • Use default settings for remaining fields. *__Note__: The administration for the __Route Table__ field is displayed in this screen capture, although the __Route Table__ has not been created. When providing the IMG with an initial configuration, create a __Channel Group__ first, then create a __Route Table__, then edit the __Channel Group__ to include the __Route Table__.* • To save the changes, right-click **CMsip - ID: 2**, and select **Commit**. • The resultant provisioning is shown below. 

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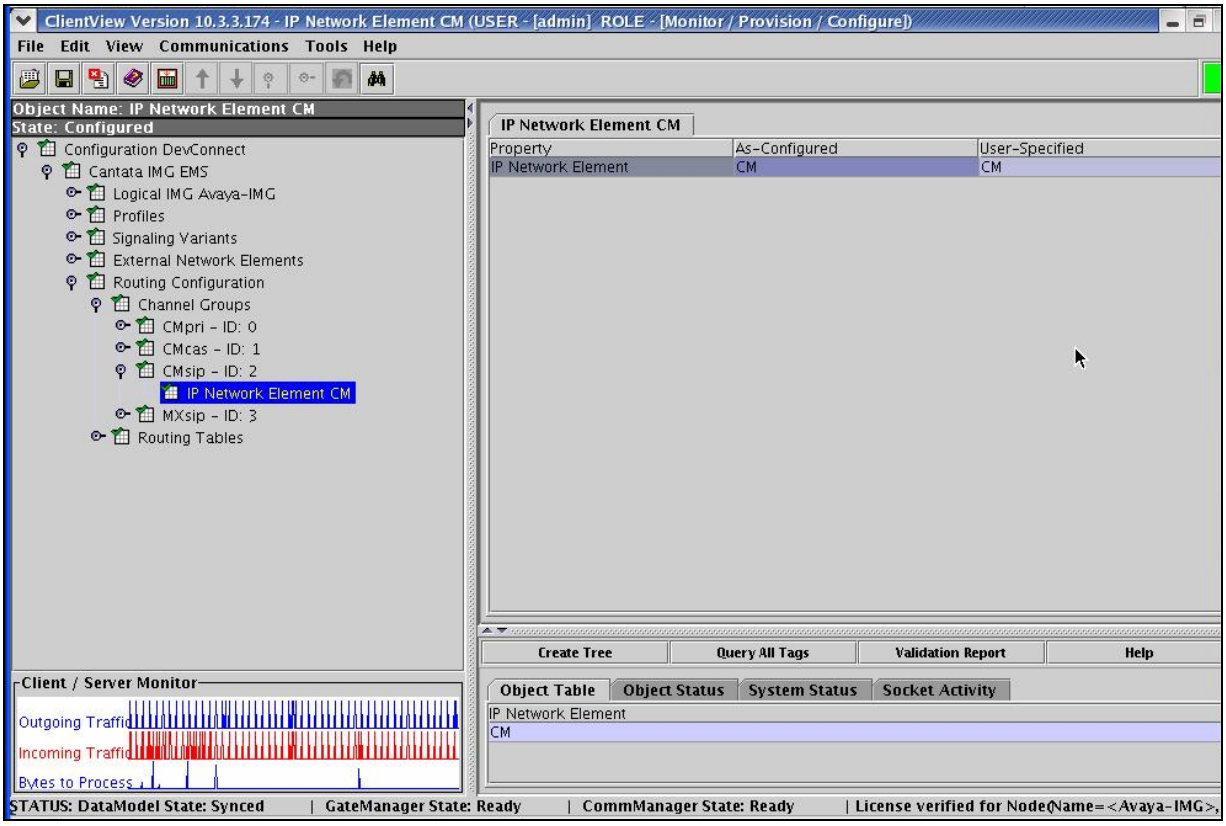
Step	Description
5.1.24	Assign an IP Network Element to the Channel Group corresponding to Avaya Communication Manager as follows: • Right-click the Channel Group created in **Step 5.1.23** in the Configuration Tree, and select **New IP Network Element**. • Select the External Gateway provisioned in **Step 5.1.19** from the drop down list for the **IP Network Element** field. • To save the changes, right-click **IP Network Element CM**, and select **Commit**. • The resultant provisioning is shown below. 

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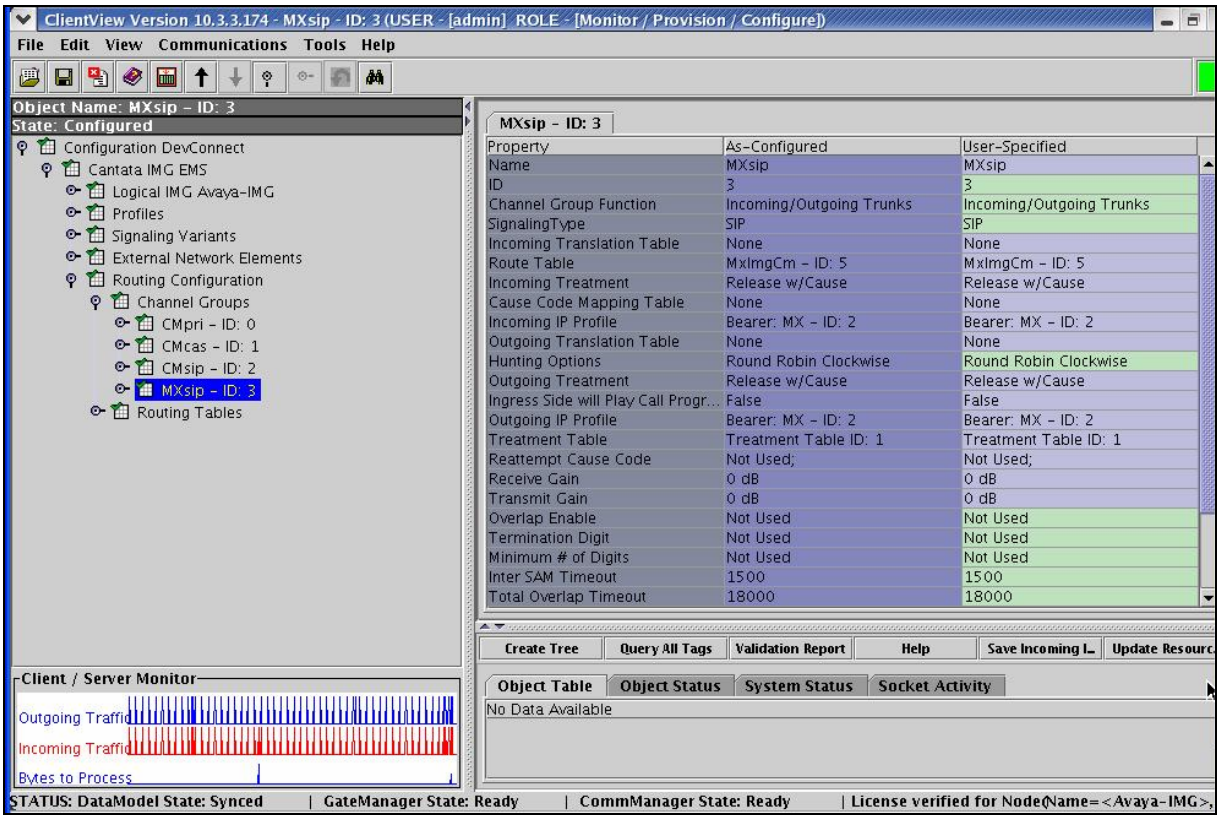
Step	Description
5.1.25	Configure a Channel Group corresponding to Avaya Meeting Exchange as follows: • Right-click **Channel Groups** in the Configuration Tree, and select **New Channel Group**. • Enter a descriptive name for the Channel Group in the **Name** field in the Configuration Pane. • Select **SIP** from the drop down list for the **Signaling Type** field. • Use default settings for remaining fields. ***Note**: The administration for the **Route Table** field is displayed in this screen capture, although the **Route Table** has not been created. When providing the IMG with an initial configuration, create a **Channel Group** first, then create a **Route Table**, then edit the **Channel Group** to include the **Route Table**.* • To save the changes, right-click **MXsip - ID: 3**, and select **Commit**. • The resultant provisioning is shown below. 

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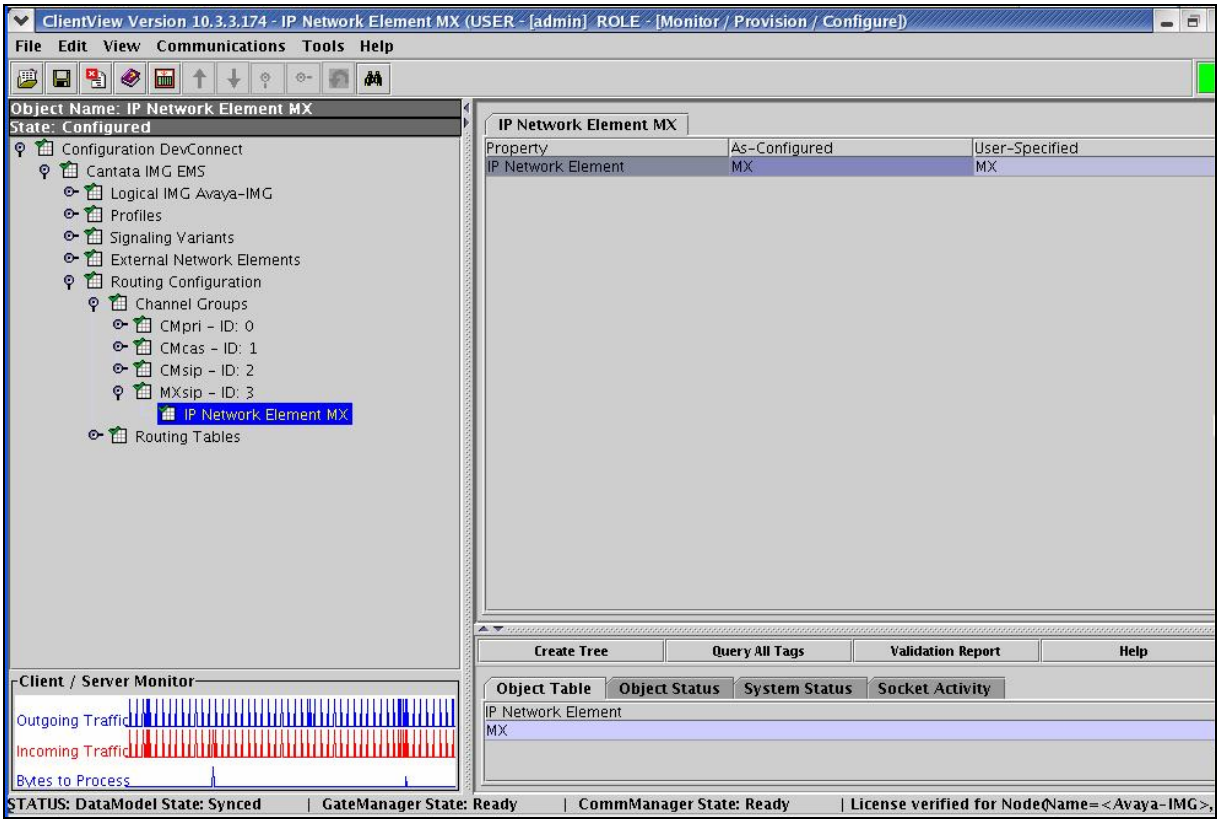
Step	Description
5.1.26	Assign an IP Network Element to the Channel Group corresponding to Avaya Meeting Exchange as follows: • Right-click the Channel Group created in **Step 5.1.25** in the Configuration Tree, and select **New IP Network Element**. • Select the External Gateway provisioned in **Step 5.1.20** from the drop down list for the **IP Network Element** field. • To save the changes, right-click **IP Network Element MX**, and select **Commit**. • The resultant provisioning is shown below. 

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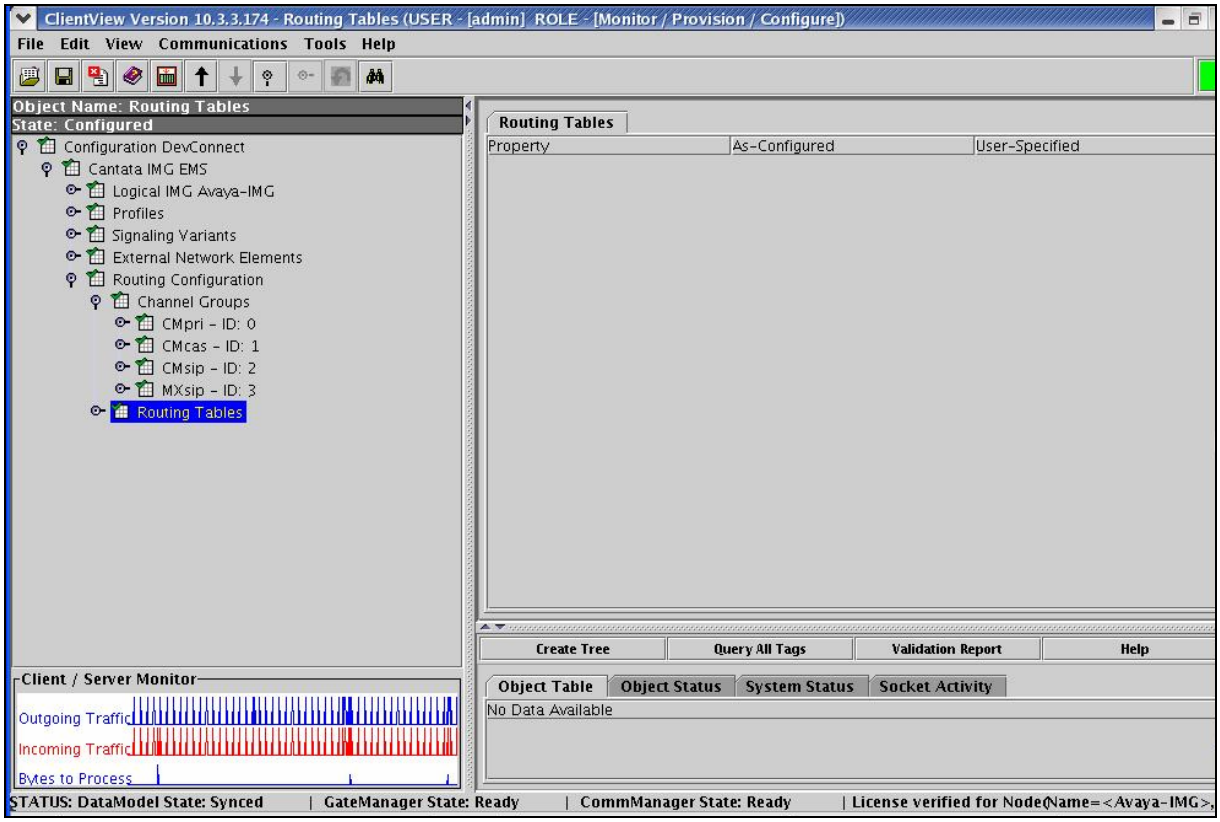
Step	Description
5.1.27	Create an object for Routing Tables as follows: • Right-click **Routing Configuration** in the Configuration Tree, and select **New Routing Tables**. • To save the changes, right-click **Routing Tables**, and select **Commit**. • The resultant provisioning is shown below. 
5.1.28	Configure a Route Table as follows: • Right-click **Routing Tables** in the Configuration Tree, and select **New Route Table**. • Enter a descriptive name for the Route Table in the **Name** field in the Configuration Pane. • Use default settings for remaining fields. • To save the changes, right-click the entry, and select **Commit**. See **Step 5.1.29** for resultant provisioning.

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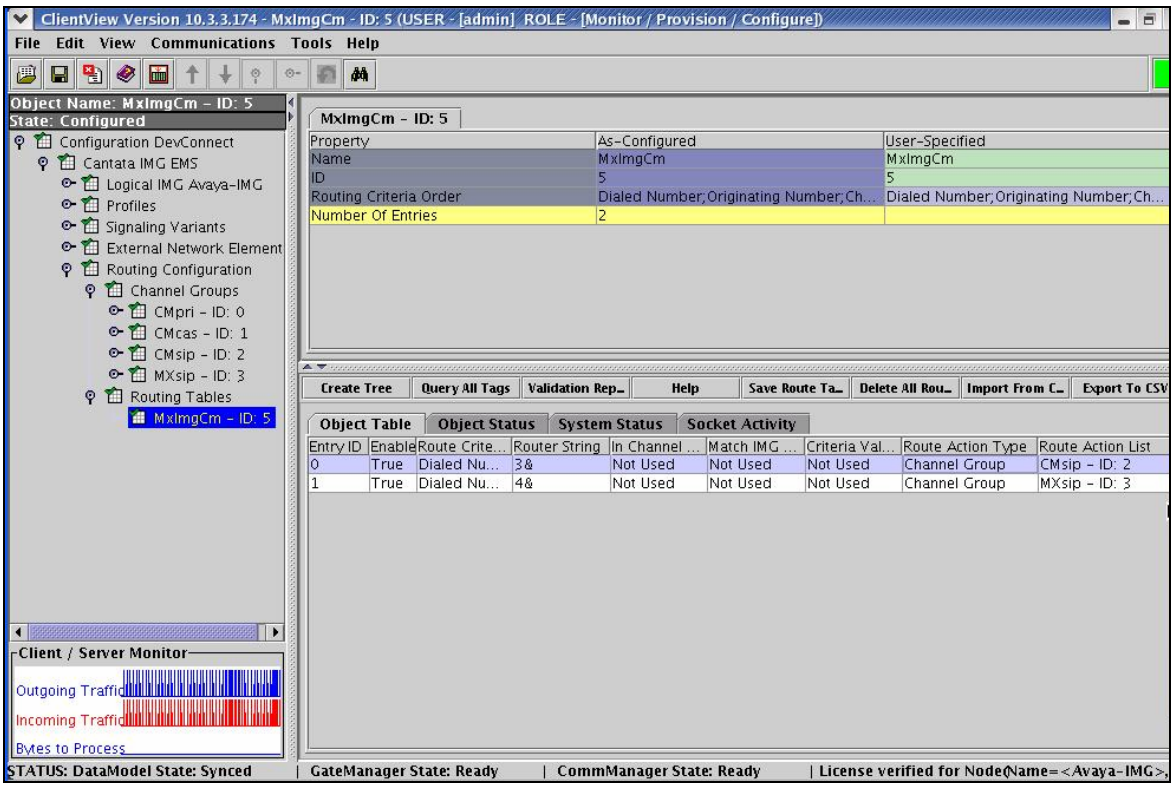
Step	Description

5.1.29	Add route entries to the Route Table provisioned in **Step 5.1.28** as follows:
	• To add a route entry corresponding to Avaya Communication Manager, right-click the Route Table in the Configuration Tree and select **Add Route Entry**.
	  o Enter a pattern to match extensions on Avaya Communication Manager, where & is a wildcard, in the **Router String** field in the **New Entry** dialog box.
	  o Select the Channel Group provisioned in **Step 5.1.23** from the drop down list for the **Outgoing Channel Group** field.
	  *Note: This is displayed below under the **Route Action List** column.*
	  o Click **OK** in the **New Entry** dialog box.
	• To add a route entry corresponding to Avaya Meeting Exchange, right-click the Route Table in the Configuration Tree and select **Add Route Entry**.
	  o Enter a pattern to match the provisioning for call flows on Avaya Meeting Exchange, where & is a wildcard, in the **Router String** field in the **New Entry** dialog box.
	  o Select the Channel Group provisioned in **Step 5.1.25** from the drop down list for the **Outgoing Channel Group** field.
	  *Note: This is displayed below under the **Route Action List** column.*
	  o Click **OK** in the **New Entry** dialog box.
	• The resultant provisioning is shown below.
	 

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6. Interoperability Compliance Testing

6.1. General Test Approach

The general test approach was to place calls between Avaya Communication Manager and Avaya Meeting Exchange via the IMG utilizing the sample configuration displayed in **Figure 1**. The main objectives were to verify the following:

- Inbound calling from Avaya Communication Manager to scheduled and demand conferences provisioned on Avaya Meeting Exchange via the Cantata IMG 1010:
  - Direct call flow (without participant-access-code)
  - Basic call flow (with participant-access-code)
- Outbound calling from Avaya Meeting Exchange to stations registered to either Avaya Communication Manager, or Avaya SIP Enablement Services via the Cantata IMG 1010:
  - Blast dial to a pre-provisioned blast dial list
  - Originator dial-out
- Conference features for both moderator and participant accessed during a conference call via touchtone commands
- The following sub-set of the SIPPING-19 supplementary features for SIP endpoints:
  - Call hold
  - Attended/unattended call transfer
  - Call forward
  - Three-way conference
- The following transport methods for signaling between Avaya Meeting Exchange and the IMG:
  - TCP
  - UDP
- The following codecs:
  - G711MU
  - G.729 was tested utilizing the transcoding functionality provided by the IMG.
- Subjective voice quality for endpoints participating in a conference.
- DTMF transmission via RFC 2833.

6.2. Test Results

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

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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 SIP connectivity between Avaya Communication Manager and the IMG by retrieving status regarding the trunk group provisioned in **Step 3.2.6**. From a SAT session: • Issue the command "**status trunk <n>**", where **n** is the number of the trunk group to verify. • Verify that all members in the trunk group are **in-service/idle**.
7.1.2	Validate signaling and media connectivity for inbound calls to Avaya Meeting Exchange from Avaya Communication Manager via the IMG. This is accomplished by verifying that the trunk provisioned in **Step 3.2.6** is utilized when a call from a phone registered to either Avaya Communication Manager, or Avaya SIP Enablement Services dials in to a conference provisioned on Avaya Meeting Exchange. From a SAT session: • Issue the command "**list trace tac <n>**", where **n** is the TAC defined for the trunk group. • From a station registered to either Avaya Communication Manager, or Avaya SIP Enablement Services, dial **444** to enter the conference provisioned in **Section 4.3** as moderator via the direct call flow provisioned in **Step 4.2.2**. ***Note**: The trace below shows a station (**33006**) that dialed (**444**) and utilized the call routing provisioned in **Section 3.3** to route the call to Avaya Meeting Exchange. This trace also shows audio connectivity between Media Module 0 on the IMG (**192.168.13.111**) and the Media Processor (MEDPRO) on Avaya Communication Manager (**192.168.11.11**) utilizing **G.729B**.*

```
list trace tac 122                                                    Page   1

                                 LIST TRACE

time            data

11:11:25     dial 444 route:AAR
11:11:25     term trunk-group 22    cid 0x295
11:11:25     dial 444 route:AAR
11:11:25     route-pattern  22 preference 1  cid 0x295
11:11:25     seize trunk-group 22 member 7  cid 0x295
11:11:25     Calling Number & Name NO-CPNumber SIP 31002
11:11:25     Proceed trunk-group 22 member 7  cid 0x295
11:11:26     active trunk-group 22 member 7  cid 0x295
11:11:26     G729B ss:off ps:20 rn:22/1 192.168.13.111:8276 192.168.11.11:2152
11:11:26     xoip: fax:Relay modem:off tty:US 192.168.11.11:2152 uid:0x5011e
```


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Step	Description
7.1.3	Validate signaling and media connectivity for outbound calls from Avaya Meeting Exchange to Avaya Communication Manager via the IMG. This is accomplished by verifying that the trunk provisioned in **Step 3.2.6** is utilized when a call is placed from a participant in conference on Avaya Meeting Exchange to a station registered to either Avaya Communication Manager, or Avaya SIP Enablement Services. From a SAT session: • Issue the command "**list trace tac <n>**", where **n** is the TAC defined for the trunk group. • From a station in a conference on Avaya Meeting Exchange, enter the appropriate touchtone command to invoke a blast dial to the blast dial list provisioned in **Section 4.3**. ***Note**: The trace below shows the call that originated from Avaya Meeting Exchange to a SIP station registered to Avaya SIP Enablement Services. The call utilized the trunk group between Avaya Communication Manager and the IMG. This trace also shows audio connectivity between Media Module 0 on the IMG (**192.168.13.111**) and the Media Processor (MEDPRO) on Avaya Communication Manager (**192.168.11.11**) utilizing **G.729B**.*

```
list trace tac 122                                                    Page   1

                                 LIST TRACE

time            data

11:12:25     Calling party trunk-group 22 member 1  cid 0x296
11:12:25     Calling Number & Name 444 NO-CPName
11:12:25     active trunk-group 22 member 1  cid 0x296
11:12:25     G729B ss:off ps:20 rn:22/1 192.168.13.111:8288 192.168.11.11:2160
11:12:25     xoip: fax:Relay modem:off tty:US 192.168.11.11:2160 uid:0x50118
11:12:25     dial 33006
11:12:25     ring station    33006 cid 0x296
11:12:25     G711MU ss:off ps:20 rn:1/1 192.168.12.106:2222 192.168.11.11:2164
11:12:25     xoip: fax:Relay modem:off tty:US 192.168.11.11:2164 uid:0x6
11:12:27     active station    33006 cid 0x296
```

7.1.4	Verify that calls to and from Avaya Meeting Exchange are managed correctly, e.g., callers are added/removed from conferences. This is verified by the following procedures: • Log in to the Avaya Meeting Exchange server console with the appropriate credentials. • At the command prompt, enter the command: **watch -t -n 5 -d "ipinfo -l |egrep -ci active"** o This command provides a real time, continuous update of port utilization on Avaya Meeting Exchange.

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8. Conclusion

These Application Notes presented a compliance-tested solution comprised of Avaya Communication Manager, Avaya Meeting Exchange Express Edition, and the Cantata Technology IMG 1010 Media Gateway. This solution enables connectivity between Avaya Communication Manager and Avaya Meeting Exchange Express Edition via the Cantata Technology IMG 1010 Media Gateway utilizing standards based IP to IP audio transcoding via SIP signaling.

9. Additional References

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

[1] *Avaya Meeting Exchange Express Edition Release 1.5 Administration and Maintenance Guide*, Issue 1, Doc ID: 04-601909, March 2007.

[2] *Avaya Meeting Exchange Express Edition Release 1.5 Installation and Configuration Guide*, Issue 1, Doc ID: 04-601898, March 2007.

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

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

Cantata references are available at: http://www.cantata.com/.

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