Configuring SIP Telephony between Avaya one-X Quick Edition IP Telephones and Avaya Communication Manager with Avaya SIP Enablement Services – Issue 1.0

Abstract

These Application Notes describe steps to configure SIP connectivity between Avaya one-X Quick Edition IP Telephones and Avaya SIP Enablement Services (SES) without using the Avaya one-X Quick Edition G10 PSTN Gateway. Avaya one-X Quick Edition IP Telephones as SIP identities in the SES Server use a numbering plan for the one-X Quick Edition network to reach endpoints registered to Avaya Communication Manager.

Procedures for the staging of Avaya IP Telephones configured with the Avaya one-X Quick Edition software will be discussed briefly in these Application Notes.

1. Introduction

These Application Notes describe steps to configure SIP connectivity between Avaya one-X Quick Edition IP Telephones and Avaya SIP Enablement Services (SES) without using the Avaya one-X Quick Edition G10 PSTN Gateway. Avaya one-X Quick Edition IP Telephones as SIP identities in the SES Server use a numbering plan for the one-X Quick Edition network to reach endpoints registered to Avaya Communication Manager. The numbering plan configured on Avaya Communication Manager can be used to route calls through the SES Server and forwarded to the one-X Quick Edition network.

The Avaya one-X Quick Edition IP Telephones use broadcast messages to establish association with other Avaya one-X Quick Edition peers to form a one-X Quick Edition network. The Avaya one-X Quick Edition network uses a service provider configuration to establish SIP trunking with the SES Server. SIP requests from one-X Quick Edition IP Telephones, including registration, are authenticated with a password configured on the SES Server for the corresponding SES user. Standard features for Avaya one-X Quick Edition IP Telephones, including automatic SIP registration and recovery capabilities, are retained when placed in a service provider configuration. Avaya Communication Manager is administered with SIP trunking to the SES Server for routing calls destined to the one-X Quick Edition network. When Avaya one-X Quick Edition IP Telephones are provisioned without a one-X Quick Edition G10 PSTN Gateway, each telephone will register with the SES server for handling its own incoming and outgoing calls. When Avaya one-X Quick Edition IP Telephones are provisioned with a one-X Quick Edition G10 PSTN Gateway, the gateway acts as a proxy and will register with the SES Server, on behalf of each Avaya one-X Quick Edition IP Telephone, for handling incoming and outgoing calls.

The sample network environment in **Figure 1** represents a Main location with Avaya Communication Manager connected through a WAN to a Branch location with an Avaya one-X Quick Edition network. The Main location consists of S8710 Media Servers with an Avaya G650 Media Gateway and hosts an SES Server to support SIP proxy requests from registered endpoints. The Branch location was configured with three Avaya one-X Quick Edition IP Telephones and the system-wide Auto Attendant for SIP communication with the SES Server. One Avaya one-X Quick Edition IP Telephone was mapped as an individual SIP identity in the SES Server. The other two Avaya one-X Quick Edition IP Telephones were configured in a hunt group and mapped to a corresponding SIP identity in the SES Server. The global (local) extension used by the embedded Auto Attendant for the Avaya one-X Quick Edition network was also mapped to a SIP identity in the SES Server.

The network diagram in **Figure 1** illustrates the network components that were used to verify these Application Notes. Any configuration related to the underlying infrastructure and other network elements will not be covered. Also, these Application Notes provide a sample of capabilities that is featured by Avaya one-X Quick Edition and does not cover all functionality. Please see **Section 9** of these Application Notes to view additional references.

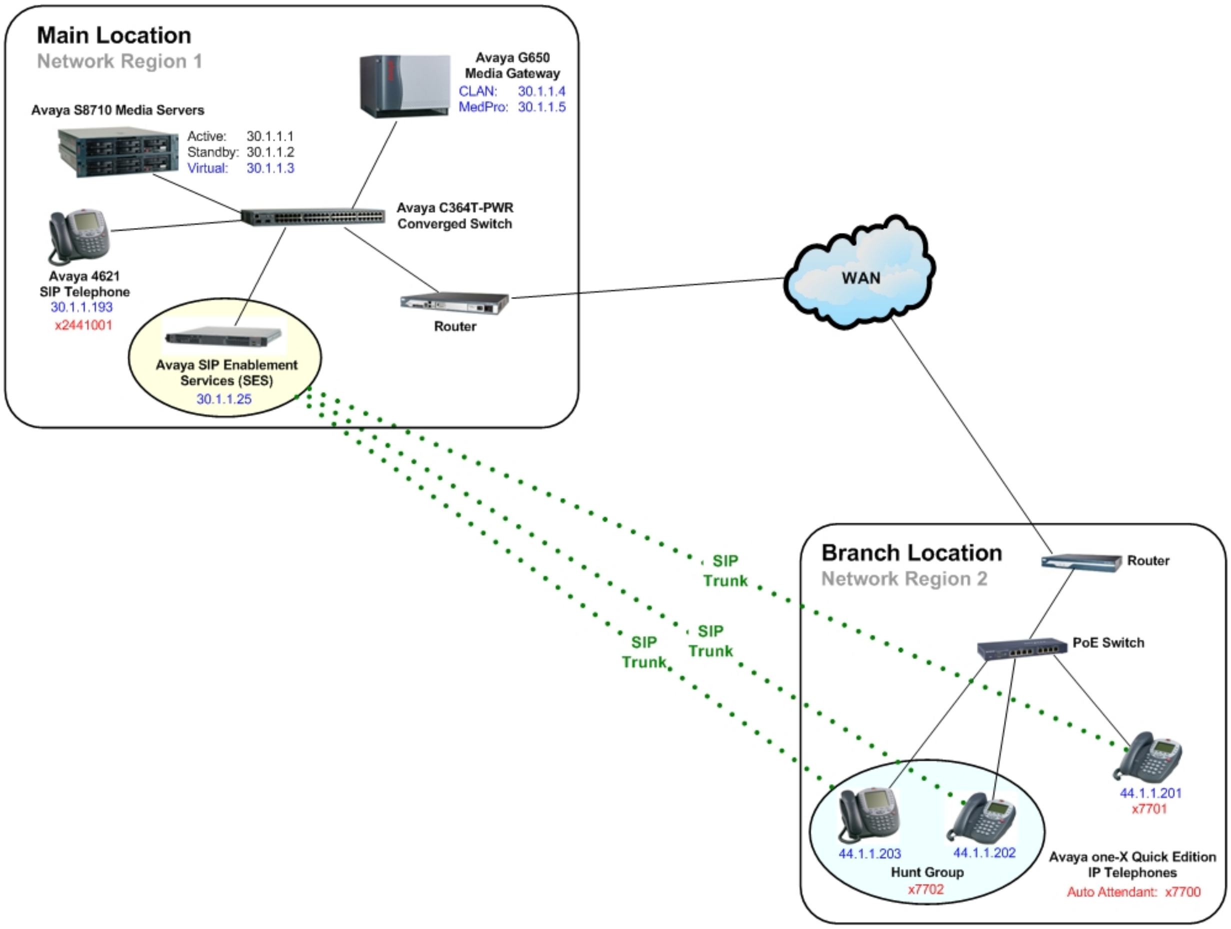


Figure 1: Network Environment

2. Equipment and Software Validated

The following table describes the equipment and software used in the above network configuration was used for validation in these Application Notes:

Equipment	Software
Avaya S8710 Media Server (2) • Avaya Communication Manager	3.1.2
Avaya G650 Media Gateway • IPSI (TN2312BP) • C-LAN (TN799DP) • MEDPRO (TN2602AP)	• FW31 • FW17 • FW112
Avaya SIP Enablement Services	3.1.1
Avaya C363T-PWR Converged Switch	4.5.14
Avaya one-X Quick Edition IP Telephone • Avaya 4610SW • Avaya 4621SW	3.0.0
Avaya 4621SW IP Telephone (SIP)	2.7

3. Avaya one-X Quick Edition IP Telephone Approach

Listed below are steps to manually change the network address settings for the Avaya one-X Quick Edition IP Telephone. All Avaya one-X Quick Edition IP Telephones were given a static configuration in the network environment illustrated in **Figure 1**:

1. Upon phone startup, enter an ASCII string to create a site ID or join a created site when prompted.

2. From the main screen on the Avaya one-X Quick Edition IP Telephone, select the softkey for **System Options > Network Options**.

3. From the **Network Options** menu, select **IP Address**.

4. Select the **Chg** softkey. Assign an IP address (ex. 44.1.1.201) and select the **Next** softkey.

5. Enter the network mask (ex. 255.255.255.0) and select the **Next** softkey.

6. Enter the IP address of the default gateway and select the **Next** softkey.

7. (*Optional*) Enter the IP address of the DNS server and select the **Next** softkey

8. Select the **Save** softkey.

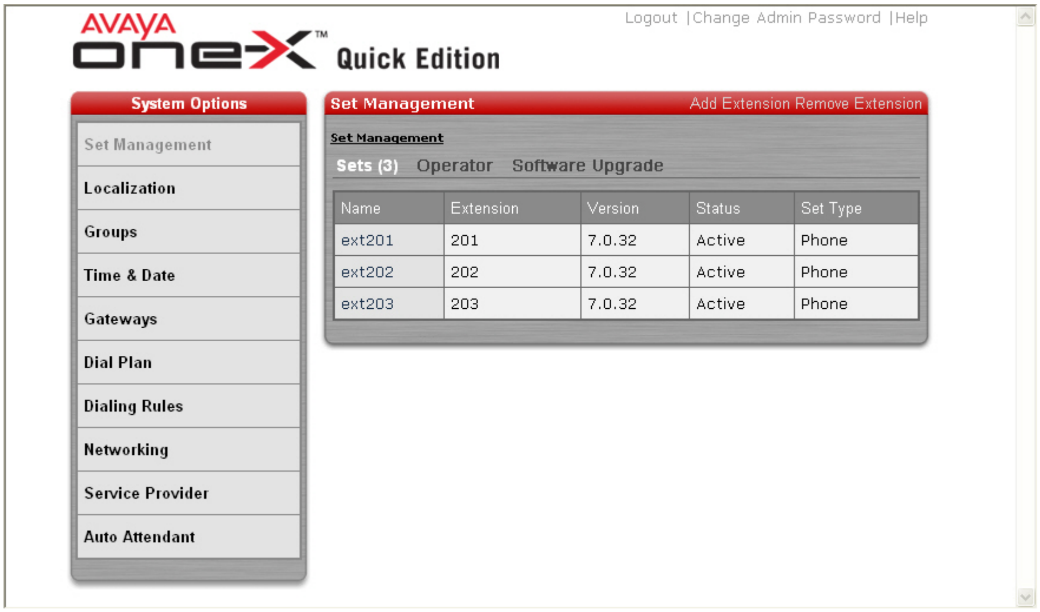
9. Repeat Steps 1 through 7 for other Avaya one-X Quick Edition IP Telephones.

4. Configure the Avaya one-X Quick Edition Network

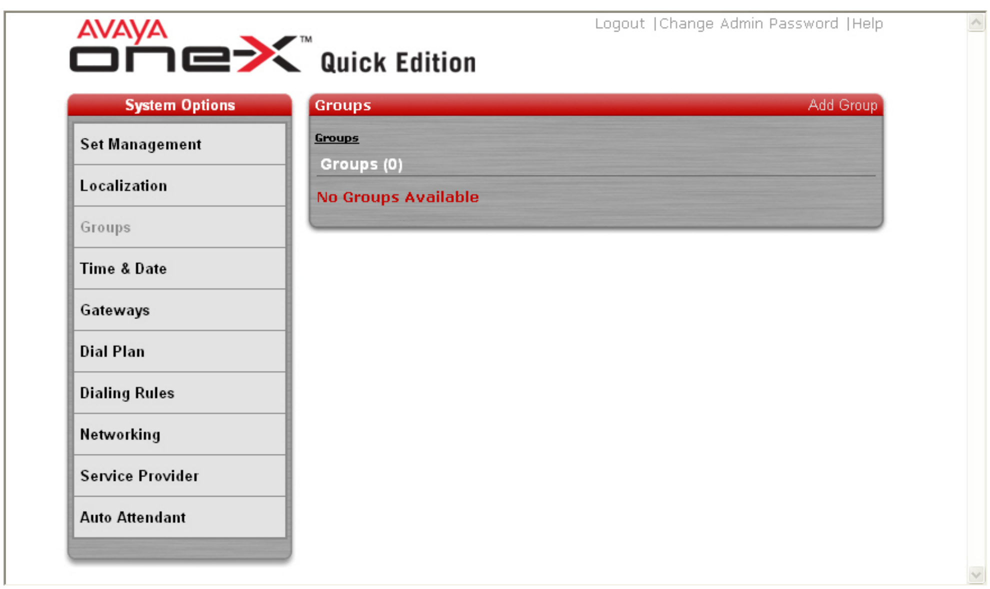
Listed below are the steps used to configure the Avaya one-X Quick Edition network with standalone one-X Quick Edition IP Telephones for communication with the SES Server to enable SIP Telephony with endpoints registered to Avaya Communication Manager.

1. To access the one-X Quick Edition network, enter http://<a.b.c.d> at a web browser where a.b.c.d is the IP address of any Avaya one-X Quick Edition IP Telephone previously configured in Section 3. Enter a valid password at the **System Options** page to modify system parameters for the Avaya one-X Quick Edition network and click **Login**.

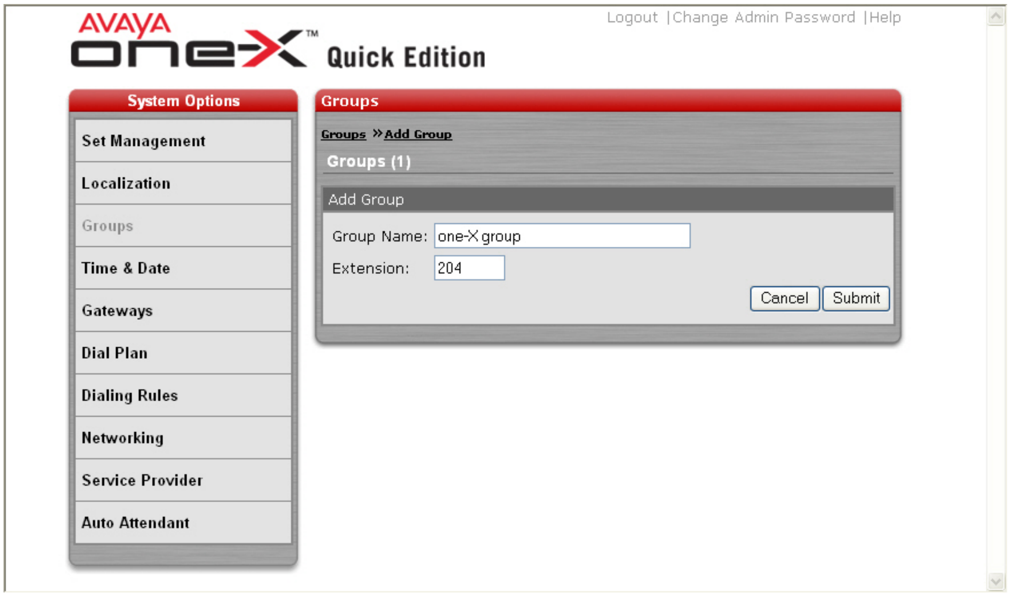
2. From the System Options menu, click the **Groups** link to open the Groups screen to configure parameters for a hunt group with Avaya one-X Quick Edition IP Telephones.



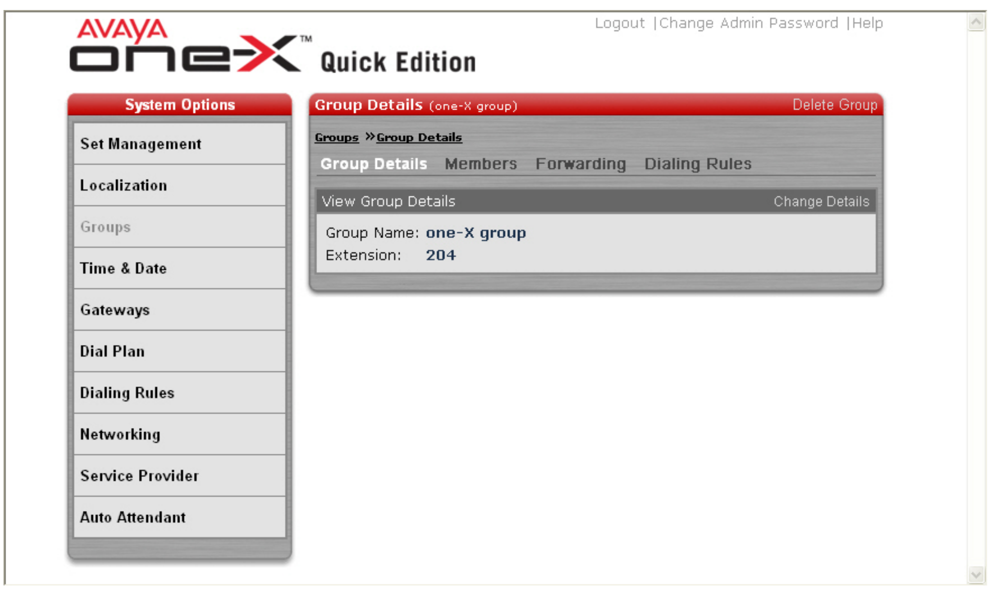
3. From the Groups screen, click the **Add Group** link to add a hunt group to the one-X Quick Edition network.



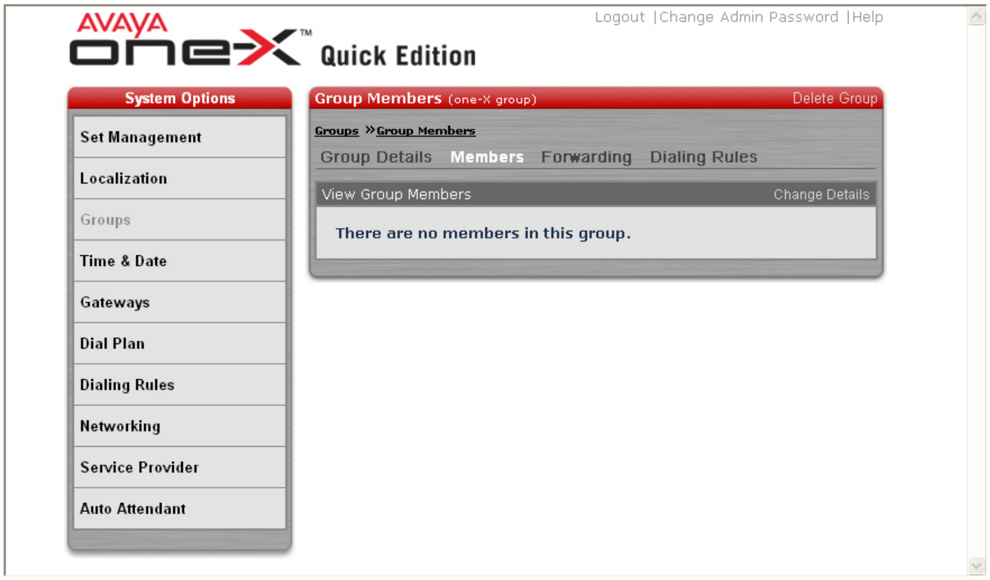
4. At the Add Group page, enter a descriptive name for the hunt group in the **Group Name** field. Enter an extension for this hunt group in the **Extension** field that will be used locally by the Avaya one-X Quick Edition network. Click the **Submit** button when finished to display the Group > Group Details page.



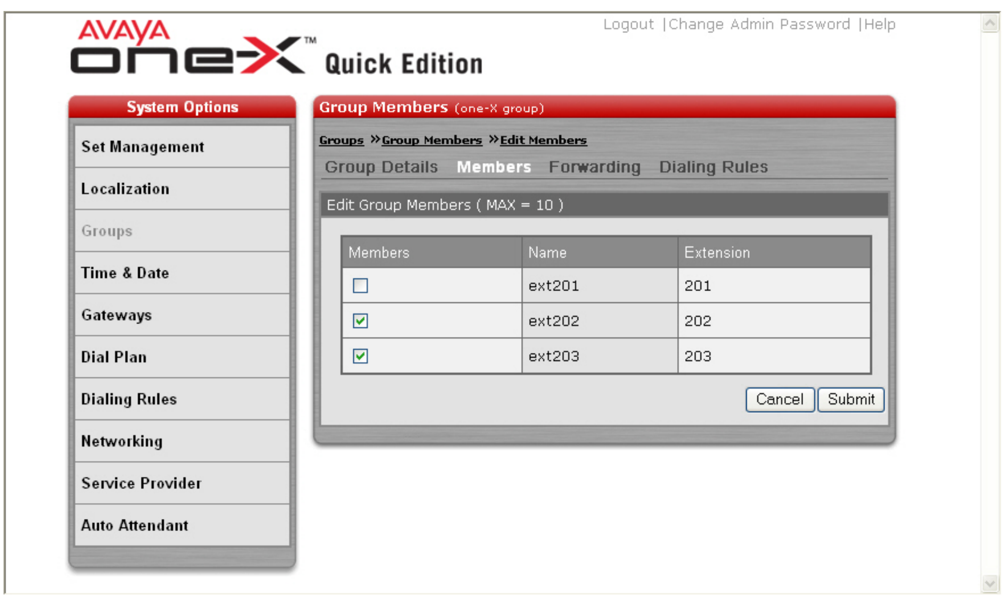
5. At the Group > Group Details page, click the **Members** link to configure membership of Avaya one-X Quick Edition IP Telephones for the hunt group.



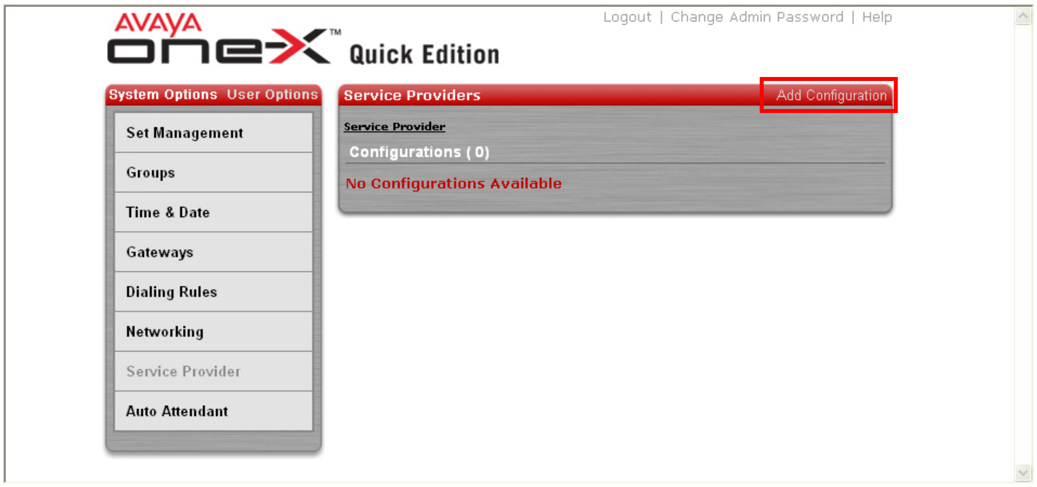
6. At the Group > Group Members page, click the **Change Details** link to enter the Group > Group Members > Edit Members page for adding Avaya one-X Quick Edition IP Telephones to the hunt group.



7. At the Group > Group Members > Edit Members page, select the checkbox in the **Members** list for each Avaya one-X Quick Edition IP Telephone that is designated for membership to the hunt group. Click the **Submit** button when finished.



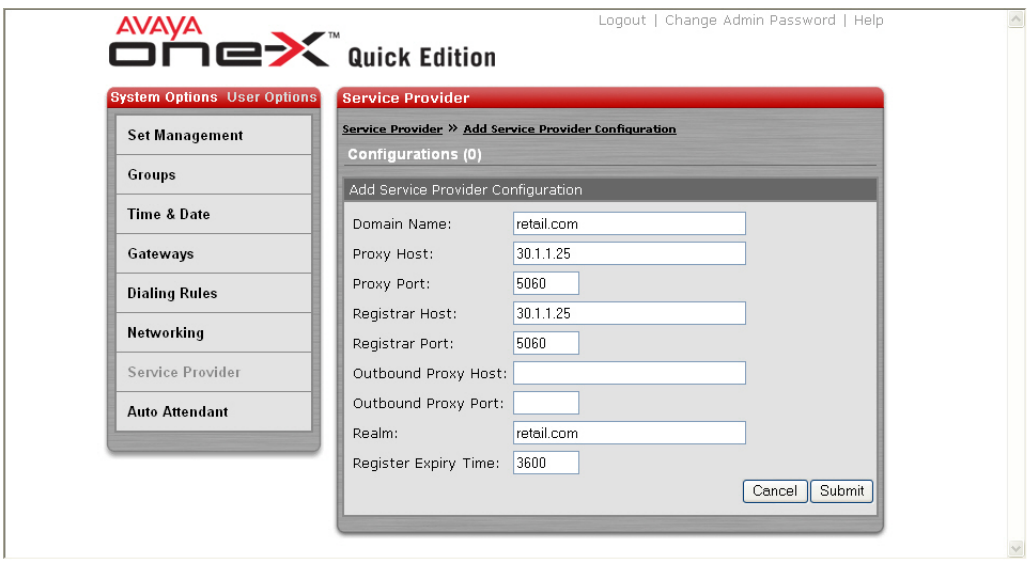
8. At the System Options menu, click the Service Provider link to add a service provider configuration to the one-X Quick Edition network. The **Service Provider > Configurations** page is displayed. Click **Add Configuration** to create a service provider profile for the one-X Quick Edition network.



9. At the Add Service Provider Configuration screen, enter a domain name associated with the SIP domain in the **Domain Name** and **Realm** fields. Enter the IP address of the SES server in the fields for **Proxy Host** and **Registrar Host**. Enter the port number to listen for SIP communication from the SES server in the fields for **Proxy Port** and **Registrar Port**.

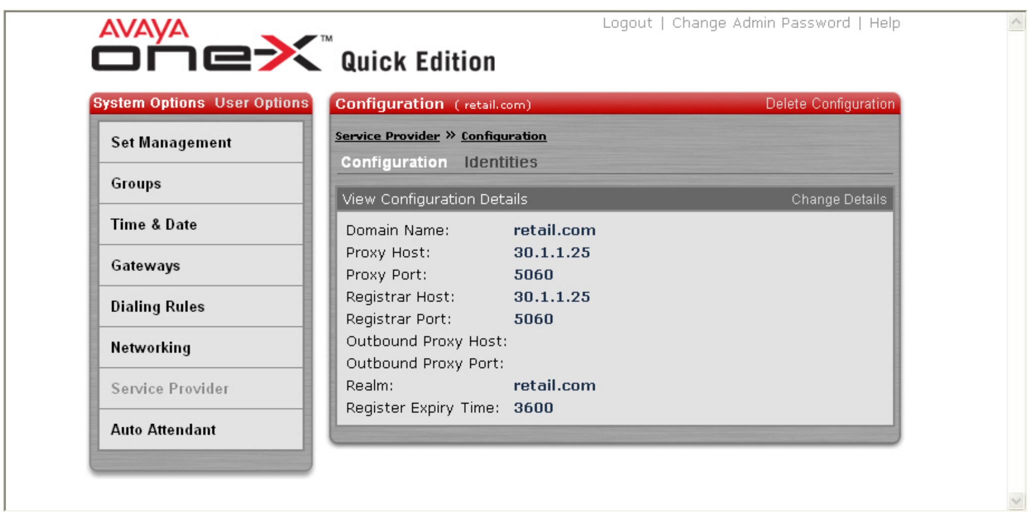
In the **Register Expiry Time field**, enter the amount of time for the one-X Quick Edition IP Telephones to refresh registration information with the SES Server. This value is measured in seconds. Leave the remaining fields blank for **Outbound Proxy Host** and **Outbound Proxy Port**. Click the **Submit** button when finished.

Note: *Values will be needed for* **Outbound Proxy Host** *and* **Outbound Proxy Port** *if the one-X Quick Edition network is using a Session Border Controller (SBC) for NAT filtering*



10. From the **System Options** menu, select **Service Provider** to display the **Service Provider > Configurations** list. From the **Service Provider > Configurations** list, click the domain name for the service provider configuration created in Steps 8 and 9.

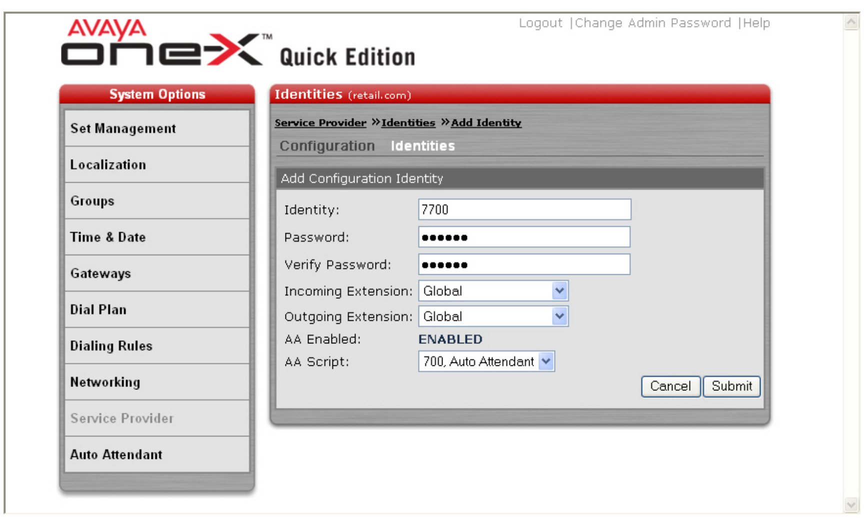
11. At the View Configuration Details screen, click on **Identities** to enter the configuration list for one-X Quick Edition SIP identities.



12. From the **Service Provider > Identities** screen, click **Add Identity** to add SIP identities associated with this service provider configuration for the one-X Quick Edition network. In this case, an identity is an Avaya one-X Quick Edition IP Telephone configured as a user in the service provider configuration.

13. At the Add Configuration Identity screen, enter an extension that will be assigned to the one-X Quick Edition Auto Attendant in the **Identity** field. Enter a password in the **Password** field for the one-X Quick Edition Auto Attendant extension that will be associated with the SES Server.

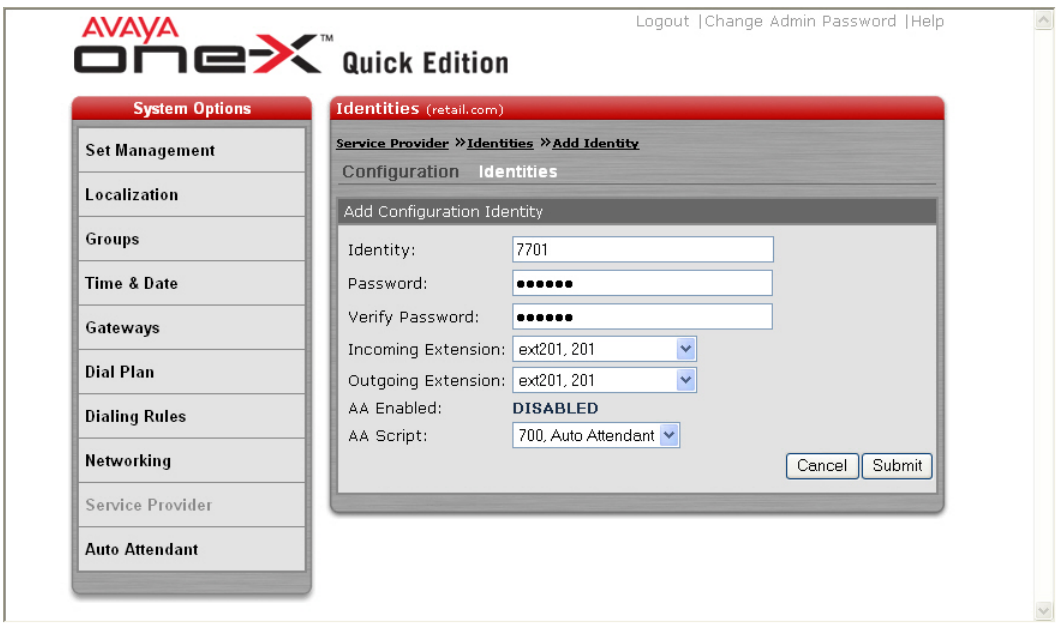
Select the **Global** option from the **Incoming Extension** and **Outgoing Extension** drop-down list to enable the one-X Quick Edition Auto Attendant for this identity. Select a name from the **AA Script** drop-down list to use the default Auto Attendant or a custom Auto Attendant configuration. Click **Submit** when finished.



14. At the Add Configuration Identity screen, enter an extension that will be assigned directly to a one-X Quick Edition IP Telephone in the **Identity** field. Enter a password in the **Password** field for the one-X Quick Edition IP Telephone that will be associated with the SES Server.

From the **Incoming Extension** list, select the one-X Quick Edition IP Telephone that will handle incoming calls for the specified identity. From the **Outgoing Extension** list, select the one-X Quick Edition IP Telephone that will place outgoing calls for the specified identity. Repeat this step as necessary to define the corresponding one-X Quick Edition IP Telephones provisioned as users on the SES server.

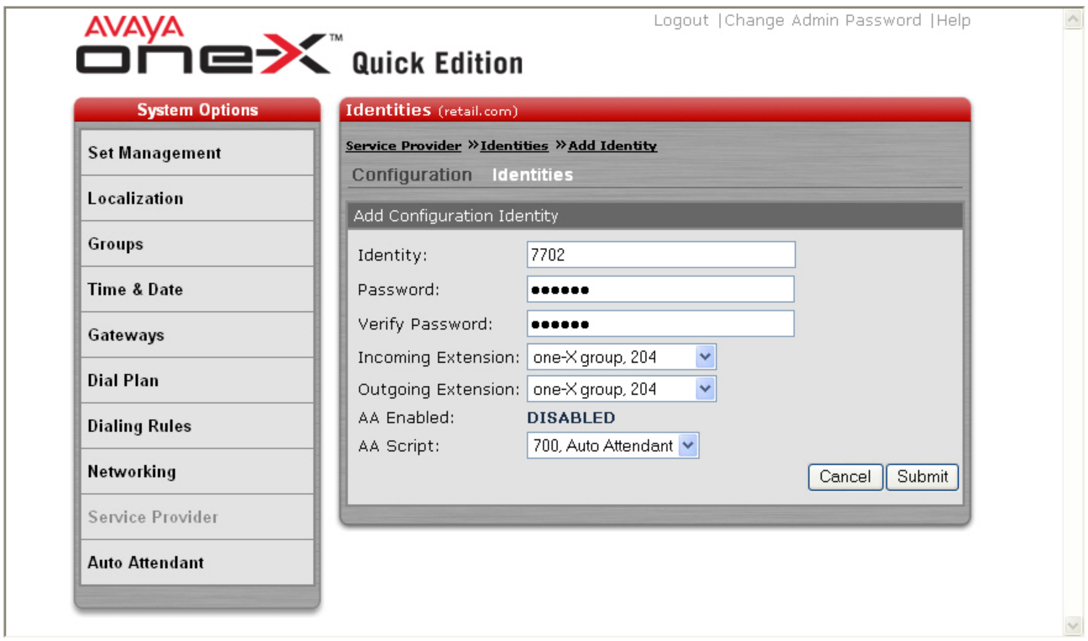
Note: *The* **AA Enabled** *field changes from* **ENABLED** *to* **DISABLED** *when a one-X Quick Edition extension is selected from the* **Incoming Extension** *drop-down list.*



15. At the Add Configuration Identity screen, enter an extension that will be assigned to the group of one-X Quick Edition IP Telephones created in Steps 3 through 7 in the **Identity** field. Enter a password in the **Password** field that will be used to authenticate the group of one-X Quick Edition IP Telephones with the SES Server.

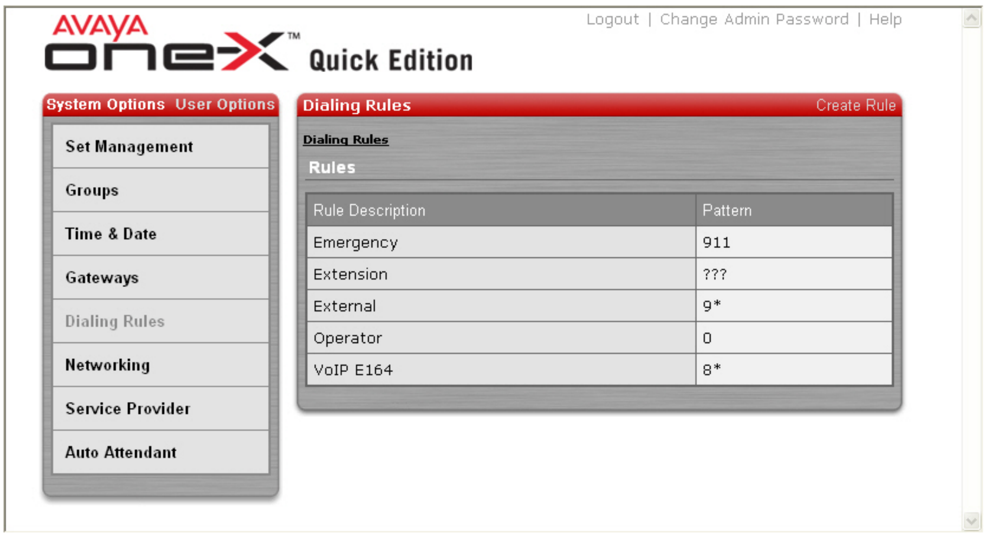
From the **Incoming Extension** list, select the group of one-X Quick Edition IP Telephones that will handle incoming calls for the specified identity. From the **Outgoing Extension** list, select the group configured in Steps 4 through 7 to enable outgoing calls from the one-X Quick Edition IP Telephones with group membership for the specified identity.

Note: *The* **AA Enabled** *field changes from* **ENABLED** *to* **DISABLED** *when a one-X Quick Edition extension is selected from the* **Incoming Extension** *drop-down list.*



16. From the **System Options** menu, select **Dialing Rules** to display the **Dialing Rules > Rules** list. The default **VoIP E164** Rule Description with an **8*** dialing pattern seizes the SIP trunk to the SES Server for redirecting calls from the one-X Quick Edition network to Avaya Communication Manager.

Note: *The dialing patterns for* **Emergency**, **Extension**, **External**, **Operator**, *and* **VoIP E164** *are pre-configured values and cannot be deleted or modified.*



5. Configure Avaya Communication Manager

Listed below are the steps used to configure the Avaya Communication Manager on the S8710 Media Server for integration with Avaya SIP Enablement Services and Avaya one-X Quick Edition. Start a SAT terminal session to Avaya Communication Manager and access the system using valid login credentials. These Application Notes assume the proper licensing and customer options for Avaya Communication Manager have been installed and enabled for SIP integration with Avaya SIP Enablement Services.

1. Enter the **change node-names ip** command at the SAT terminal to configure association between a node name and the IP address of the SES Server. Enter a node name under the field for **Name** and the IP address of the SES Server under the field for **IP Address**. Identify node name and IP address of the C-LAN communicating with Avaya Communication Manager.

```
change node-names ip                                            Page   1 of   1
                                  IP NODE NAMES
    Name                 IP Address          Name                 IP Address
C-LAN                 30 .1   .1   .4                                 .   .   .
G700-HQ1              40 .1   .1   .1                                 .   .   .
HQ-VAL                30 .1   .1   .31                                .   .   .
MM-MAS                30 .1   .1   .9                                 .   .   .
MediaResource         30 .1   .1   .32                                .   .   .
Medpro                30 .1   .1   .5                                 .   .   .
default               0  .0   .0   .0                                 .   .   .
exchange-mas          30 .1   .1   .19                                .   .   .
procr                    .    .    .                                  .   .   .
hq-ses                30 .1   .1   .25                                .   .   .
                         .    .    .                                  .   .   .
                         .    .    .                                  .   .   .
                         .    .    .                                  .   .   .
```

2. Enter the **change dialplan analysis** command at the SAT terminal to modify the dial plan analysis table. Enter values under **Dialed String**, **Total Length** and set the **Call Type** field to **dac** to create a dial access code that will be used for the trunk group to SIP Enablement Services.

Enter values under **Dialed String**, **Total Length** and set the **Call Type** field to **ext** to create a dialing string that will be used by Avaya Communication Manager for SIP endpoints. Enter values under **Dialed String**, **Total Length** and set the **Call Type** field to **ext** to create a dialing string that represents SIP identities associated with the one-X Quick Edition network. This is necessary for digit analysis of extensions configured on the SES Server for the one-X Quick Edition network.

```
change dialplan analysis                                        Page   1 of  12
                             DIAL PLAN ANALYSIS TABLE
                                                            Percent Full:    2

      Dialed  Total  Call      Dialed  Total  Call      Dialed  Total  Call
      String  Length Type      String  Length Type      String  Length Type
        1       3    dac         73      4    ext
        2       7    ext         74      4    ext
        2000    5    ext         77      4    ext
        244     7    ext         8       1    fac
        255     7    ext         9       1    dac
        2800    5    ext         *       3    fac
        3       3    ext         #       3    fac
        333     7    ext
        422     5    ext
        66      5    ext
        70      4    ext
```

3. Enter the **change ip-codec-set <codec set number>** command at the SAT terminal to configure codec parameters for communication between Avaya Communication Manager and the Avaya one-X Quick Edition network. Enter **G.729A** in addition to the default G.711mu codec under the **Audio Codec** field. Auto Attendant and voice mail on the Avaya one-X Quick Edition network requires the G.729a codec for interoperability with Avaya Communication Manager.

Note: *Avaya one-X Quick Edition IP Telephones will automatically negotiate between G.711mu and G.729a if both are provisioned in the codec configuration for Avaya Communication Manager.*

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

                          IP Codec Set

    Codec Set: 1

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


     Media Encryption
 1: none
 2:
 3:
```

4. Enter the **change ip-network-region <network region number>** command to define network properties used for communicating with the Avaya one-X Quick Edition network within the administrative domain. Enter the domain name used for this network region in the **Authoritative Domain** field. Enter the ip-codec set configured in the previous step in the **Codec Set** field. Navigate to Page 3 of this network region when finished.

```
change ip-network-region 2                                      Page   1 of  19
                               IP NETWORK REGION
  Region: 2
Location:          Authoritative Domain: retail.com
    Name:QE-Region
MEDIA PARAMETERS                Intra-region IP-IP Direct Audio: yes
      Codec Set: 1              Inter-region IP-IP Direct Audio: yes
   UDP Port Min: 2048                      IP Audio Hairpinning? n
   UDP Port Max: 3327
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
```

5. On Page 3 of the **change ip-network-region <network region number>** command, configure the network region to specify call admission control between Avaya Communication Manager and the network region designated for the Avaya one-X Quick Edition Network.

In the example below, calls sourced from the one-X Quick Edition network in network region 2 are connected to the Avaya Communication Manager through a direct WAN link to network region 1. The Avaya one-X Quick Edition network is configured to use the ip-codec set administered in Step 3 and is allocated a maximum of four (4) calls when network region 2 passes call control to network region 1. Leave the remaining parameters at the default setting and submit this command for the administered network region.

```
change ip-network-region 2                                      Page   3 of  19

                   Inter Network Region Connection Management

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

6. Enter the **change ip-network-region <network region number>** command to define network properties used for communicating with the SES Server network within the administrative domain. Enter the domain name used for this network region in the **Authoritative Domain** field. Enter the ip-codec set configured in Step 3 in the **Codec Set** field. Navigate to Page 3 of this network region when finished.

```
change ip-network-region 1                                      Page   1 of  19
                               IP NETWORK REGION
  Region: 1
Location:         Authoritative Domain: retail.com
    Name:SES-Region
MEDIA PARAMETERS                Intra-region IP-IP Direct Audio: yes
      Codec Set: 1              Inter-region IP-IP Direct Audio: yes
   UDP Port Min: 5000                      IP Audio Hairpinning? y
   UDP Port Max: 5999
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
```

7. On Page 3 of the **change ip-network-region <network region number>** command, configure the network region to specify call admission control between Avaya Communication Manager and the network region designated for the SES Server.

In the example below, calls sourced from SIP-enabled endpoints registered to Avaya Communication Manager in network region 1 are connected to the Avaya one-X Quick Edition network through a direct WAN link to network region 2. The SIP-enabled endpoints registered to Avaya Communication Manager are configured to use the ip-codec set administered in Step 3 and is allocated unlimited calling privileges when network region 2 passes call control to network region 1. Leave the remaining parameters at the default setting and submit this command for the administered network region.

```
change ip-network-region 2                                      Page   3 of  19

                   Inter Network Region Connection Management

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

8. Enter the **change ip-network-map** command to define address mapping to the corresponding network region for SIP-enabled endpoints registered to Avaya Communication Manager and the Avaya one-X Quick Edition network.

Under the **From IP Address** and **(To IP Address or Subnet Mask)** fields, enter the IP address range used by the Avaya one-X Quick Edition network and enter the network region configured in Steps 4 and 5 under the **Region** field. Under the **From IP Address** and **(To IP Address or Subnet Mask)** fields, enter the IP address range used by SIP-enabled endpoints registered to Avaya Communication Manager and enter the network region configured in Steps 6 and 7 under the **Region** field.

```
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
 30 .1  .1  .100  30 .1  .1  .200             1        n
 40 .1  .1  .1    40 .1  .1  .254             3        n
 44 .1  .1  .100  44 .1  .1  .200             2        n
    .   .   .        .   .   .                         n
    .   .   .        .   .   .                         n
    .   .   .        .   .   .                         n
    .   .   .        .   .   .                         n
```

9. Enter the **add signaling-group <group number>** command at the SAT terminal to configure signaling parameters between Avaya Communication Manager and SES Server. Select **sip** as the signaling group type in the **Group Type** field and enter **tls** in the **Transport Method** field.

Enter the node name defined in Step 1 for the C-LAN in the **Near-end Node Name** field and enter a value for the **Near-end Listen Port**. Enter the node name defined in Step 1 for the SES Server in the **Far-end Node Name** field and enter the **Far-end Listen Port** for signaling termination.

Set a network region in the **Far-end Network Region** field that will be used by SIP Enablement Services. Enter the domain name in the **Far-end Domain** field that was defined for the network region configured in Step 6 for the SES Server. Set the field for **Direct IP-IP Audio Connections** to **n** to disable shuffling during call signaling.

```
add signaling-group 5                                           Page   1 of   1
                                SIGNALING GROUP

 Group Number: 5               Group Type: sip
                         Transport Method: tls






   Near-end Node Name: C-LAN                  Far-end Node Name: hq-ses
 Near-end Listen Port: 5061                 Far-end Listen Port: 5061
                                         Far-end Network Region: 1
       Far-end Domain: retail.com

                                              Bypass If IP Threshold Exceeded? n

         DTMF over IP: rtp-payload             Direct IP-IP Audio Connections? n
                                                         IP Audio Hairpinning? y
 Session Establishment Timer(min): 120
```

10. Enter the **add trunk-group <trunk group number>** command at the SAT terminal and select **sip** in the **Group Type** field. Enter a descriptive name for the **Group Name** field and a value for the **TAC** field that is consistent with the dial access code defined in Step 2 of this section.

Set the **Service Type** field to **tie** and under the **Signaling Group** field, enter the signaling group configured in the previous step. Enter the trunk group members that are designated for the SIP trunk in the **Number of Members** field. Each trunk group member is dynamically assigned by the trunk group.

```
add trunk-group 5                                                Page   1 of  21
                                TRUNK GROUP

Group Number: 5                   Group Type: sip          CDR Reports: y
  Group Name: To-SES                     COR: 1        TN: 1        TAC: 105
   Direction: two-way       Outgoing Display? y
 Dial Access? n                                         Night Service:
Queue Length: 0
Service Type: tie                  Auth Code? n

                                                      Signaling Group: 5
                                                    Number of Members: 23
```

11. Enter the **change uniform-dialplan <dial string >** command at the SAT terminal to assign uniform dialing between the one-X Quick Edition network and Avaya Communication Manager. Enter a value under the **Matching Pattern**, **Len**, and **Del** fields for the dialing patterns designated for the one-X Quick Edition network and for Avaya Communication Manager SIP extensions.

For each dialing pattern, select **aar** in the **Net** field to send the dialed strings for AAR analysis. These values should be consistent with the dialing pattern configured in Step 2 of this section.

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

  Matching         Insert          Node   Matching         Insert          Node
  Pattern   Len Del Digits Net Conv Num    Pattern  Len Del Digits Net Conv Num
  244        7   0          aar  n                                     n
  3          7   0          aar  n                                     n
  45         4   0          aar  n                                     n
  5          5   0          aar  n                                     n
  66         5   0          aar  n                                     n
  77         4   0          aar  n                                     n
```

12. Enter the **change aar analysis <dial string >** command at the SAT terminal to assign a route pattern for the one-X Quick Edition network based on digit analysis. Enter values under the **Dialed String**, **Total Min** and **Total Max** fields for the one-X Quick Edition network and Avaya Communication Manager SIP extensions. These values should be consistent with the dialing pattern configured in Step 2 of this section.

Add a value under the **Route Pattern** field to reference a route pattern to the SES Server for the one-X Quick Edition network and for Avaya Communication Manager SIP endpoints. Select **aar** in the **Call Type** field for each dialed string.

```
change aar analysis 2                                           Page   1 of   2
                             AAR DIGIT ANALYSIS TABLE
                                                            Percent Full:    2

          Dialed           Total     Route    Call   Node   ANI
          String          Min  Max  Pattern   Type   Num    Reqd
    244                   7    7     5        aar           n
    333                   7    7     2        aar           n
    42                    5    5     5        aar           n
    45                    4    4     2        aar           n
    50                    5    5     11       aar           n
    66                    5    5     3        aar           n
    77                    4    4     5        aar           n
```

13. Enter the **change route-pattern <route-pattern number>** command at the SAT terminal to administer a route pattern for the trunk group used for SIP communication with the SES Server. Under the first entry for the **Grp No** field, enter the trunk group created in Step 10 of this section. Set the **FRL** field to **0**.

```
change route-pattern 5                                          Page   1 of   3
                    Pattern Number: 5   Pattern Name: SIP
                             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: 5    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 3 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
```

14. Enter the **add station <extension>** command at the SAT terminal to create a SIP extension for Avaya Communication Manager. The extension must be consistent with the dialing plan configured in Step 2 of this section.

Set the **Type** field to **6408D+** and set the **Port** field to **X**. Enter a password with at least six digits for the extension in the **Security Code** field. Repeat this step as necessary for other SIP-enabled extensions on Avaya Communication Manager.

```
add station 2441001                                             Page   1 of   5
                                     STATION

Extension: 2441001                          Lock Messages? n          BCC: 0
     Type: 6408D+                           Security Code: ******      TN: 1
     Port: X                              Coverage Path 1:            COR: 1
     Name: sip-hq1                        Coverage Path 2:            COS: 1
                                          Hunt-to Station:

STATION OPTIONS
              Loss Group: 2               Personalized Ringing Pattern: 1
             Data Module? n                           Message Lamp Ext: 2441001
            Speakerphone: 2-way                    Mute Button Enabled? y
        Display Language: english

                                                     Media Complex Ext:
                                                          IP SoftPhone? n
```

15. Enter the **add off-pbx-telephone station-mapping** command at the SAT terminal to map Avaya Communication Manager SIP extensions with extensions configured on the SES Server. Add the extension administered in the previous step under the fields for **Station Extension** and **Phone Number**. Select **OPS** under the **Application** field to assign this extension as a SIP-enabled endpoint.

Enter the trunk group number configured in Step 10 of this section under the **Trunk Selection** field. Repeat this step as necessary for other extensions on Avaya Communication Manager using the SES Server.

```
add off-pbx-telephone station-mapping                           Page   1 of   2
                  STATIONS WITH OFF-PBX TELEPHONE INTEGRATION

 Station     Application   Dial   Phone Number      Trunk       Configuration
 Extension                 Prefix                   Selection   Set
 2441001       OPS            - 2441001              5
                              -
                              -
                              -
                              -
                              -
```

16. Enter the **change public-unknown-numbering <extension digits>** command at the SAT terminal to expose the numbering information between Avaya Communication Manager SIP extensions and the one-X Quick Edition network during call signaling.

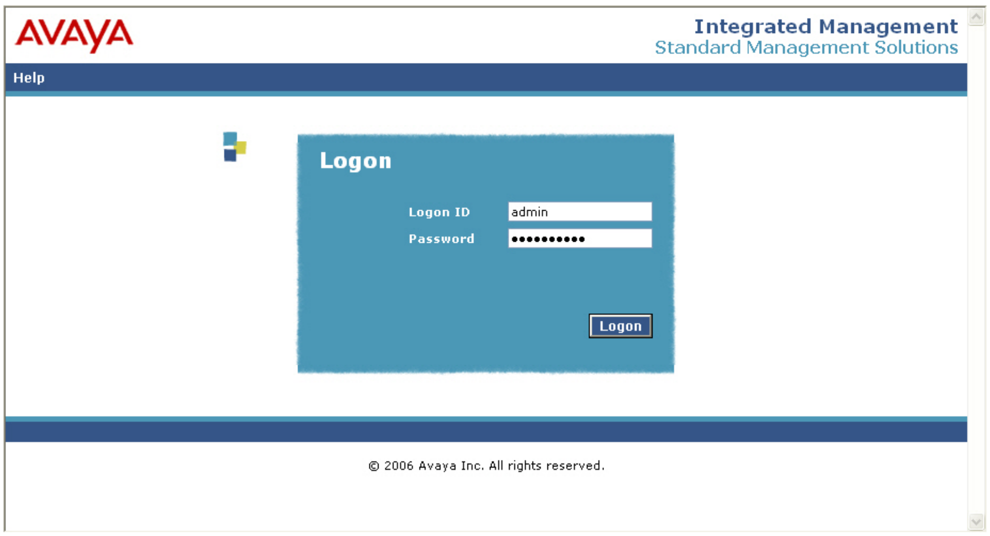
Enter values under the **Total Ext Length**, **Total Ext Code** and **CPN Len** fields with extension digits for Avaya Communication Manager SIP extensions. Repeat with extension digits for the one-X Quick Edition network communicating with the SES Server. These values must be consistent with the dialing plan configured in Step 2 of this section.

```
change public-unknown-numbering 4                            Page   1 of   2
                      NUMBERING - PUBLIC/UNKNOWN FORMAT
                                   Total
Total
Ext Ext    Trk       CPN            CPN Ext Ext    Trk       CPN            CPN
Len Code   Grp(s)    Prefix         Len Len Code   Grp(s)    Prefix         Len

 4 45                                4
 5 50                                5
 7 244                               7
 7 333                               7
 5 42                                5
```

6. Configure Avaya SIP Enablement Services

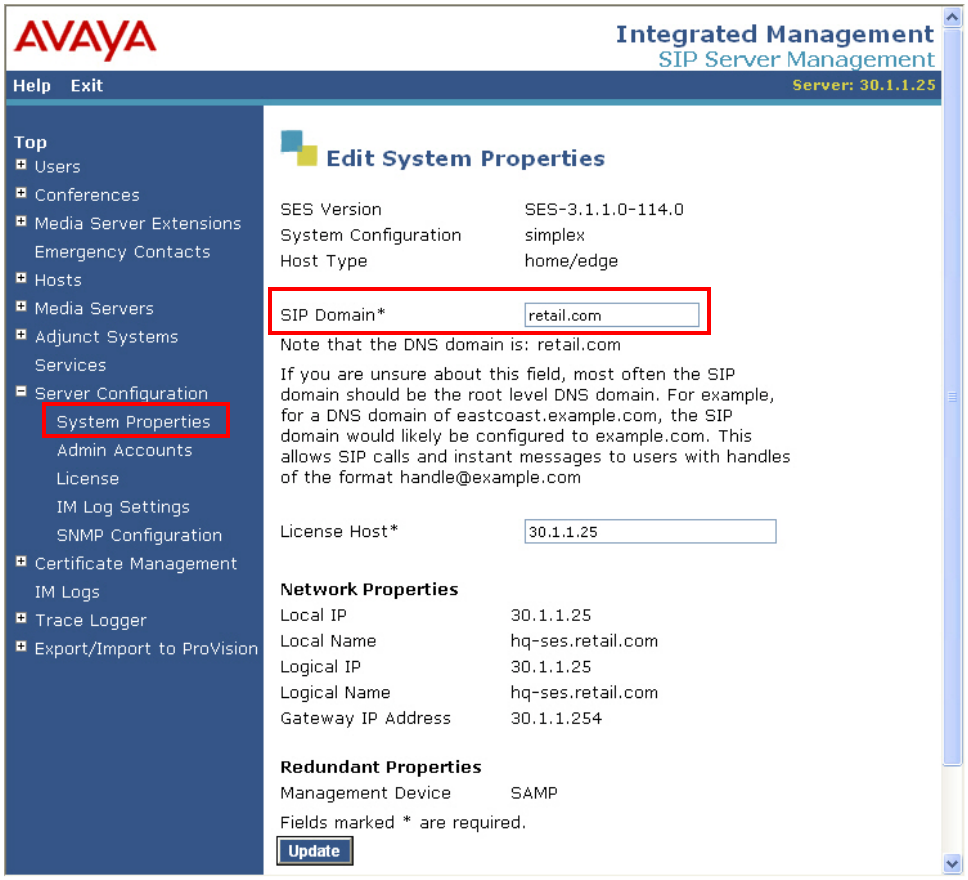
Listed below are the steps used to configure Avaya SIP Enablement Services as home/edge SIP proxy for integration with Avaya Communication Manager and Avaya one-X Quick Edition. These Application Notes assume the proper licensing and initial setup for the SES Server has been provisioned.

1. Using a web browser, enter http://<a.b.c.d> at a web browser where a.b.c.d is the IP address of the SES server. At the prompt, enter valid login credentials in the **Logon ID** and **Password** fields. Click **Logon** when finished to display the administration and maintenance web interface.



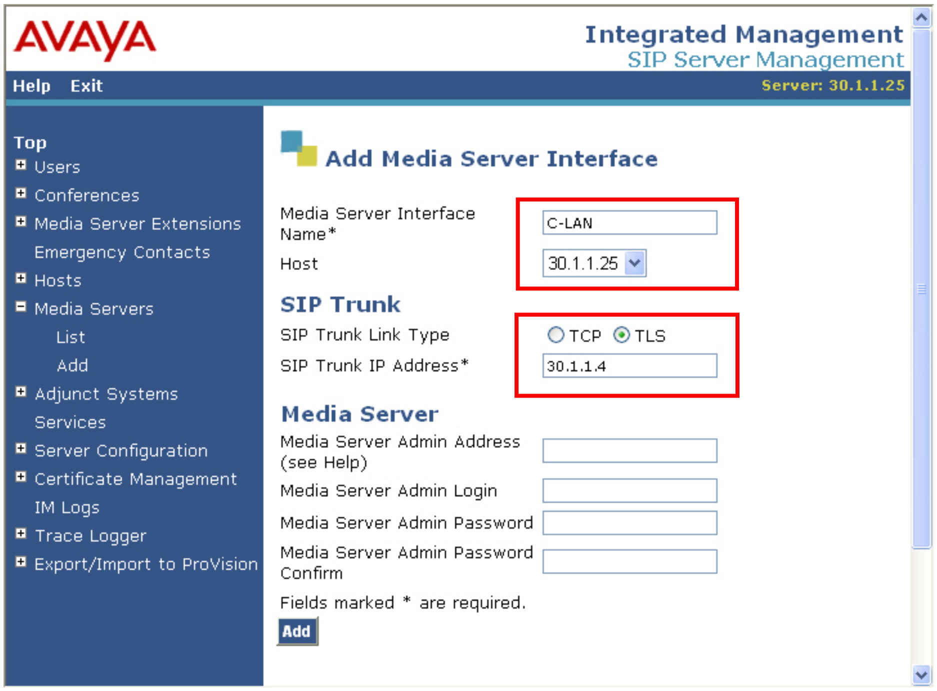
2. Click **Launch Administration Web Interface** to open the SIP Server Management window containing the options for SES Server administration.

3. At the SIP Server Management window, click on **System Properties** under the **Server Configuration** menu to view the SES configuration. If it is not populated, enter the domain name used by the SIP environment in the **SIP Domain** field. Leave the remaining fields at default settings and click the **Update** button.



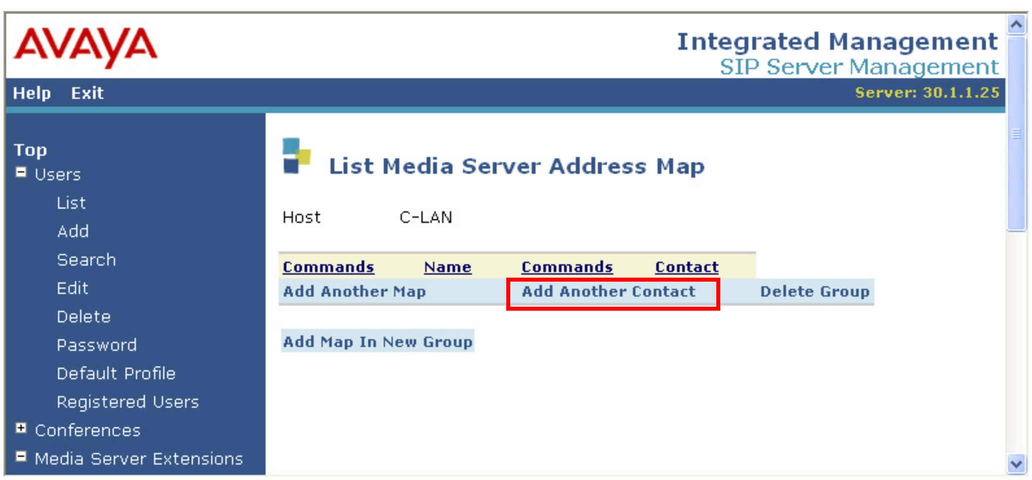
4. At the SIP Server Management window, click on **Add** under the **Media Servers** menu to configure SIP trunking between the SES Server and Avaya Communication Manager. Enter a name for the endpoint terminating the SIP trunk under **Media Server Interface Name**. Select the SES Server used in this configuration from the **Host** drop-down list.

In the **SIP Trunk Link Type** field, select the dialog box for **TLS** to define the transport method. Enter the IP address of the terminating SIP endpoint in the **SIP Trunk IP Address** field. Leave the remaining fields at default settings and click the **Add** button.



5. At the SIP Server Management window, click on **List** under the **Media Servers** menu to display the media server interface configured in the previous step. Click on **Map** under **Commands** to list map statements for the configured media server interface.

6. At the List Media Server Address Map window, click on **Add Another Contact** to create a media server contact for redirecting calls to Avaya Communication Manager.



7. At the Add Media Server Contact window, enter the string used for routing traffic to Avaya Communication Manager in the **Contact** field. Click the **Add** button when finished to return to the List Media Server Address Map window.

Use the Linux regular expressions below to configure the map string for the media server contact.

sip:	Indicates the protocol used
$ (user)	Variable for user portion of the SIP message
@ x.x.x.x	Format for Media Server IP address (ex. C-LAN)
5061:	Port number used by TLS transport method.
transport = tls	Indicates transport method.

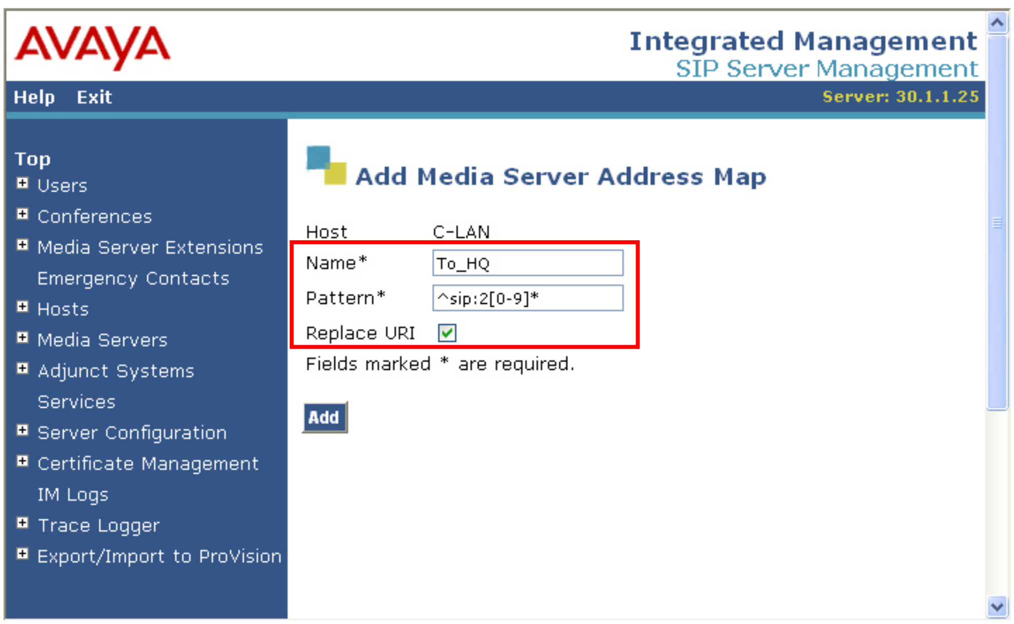
8. At the List Media Server Address Map window, click on **Add Another Map** to create an address map statement for the media server contact configured in the previous step.

9. At the Add Media Server Address Map window, enter a descriptive name for identifying the address map statement in the **Name** field. Enter the map string used to match incoming digits for Avaya Communication Manager in the **Pattern** field. The values for the matching pattern should be consistent with the dial plan configured on Avaya Communication Manager.

Place a check mark in the **Replace URI** box to indicate this pattern will be forwarded by the **Host** shown. Click the **Add** button when finished to return to the List Media Server Address Map window.

Use the Linux regular expressions below to configure the map string for the media server contact:

^	Matches first line in initial SIP message
sip:	Indicates the protocol used
0–9	Match a specific digit
[0–9]	Match any digits
*****	Indicates any digit and length



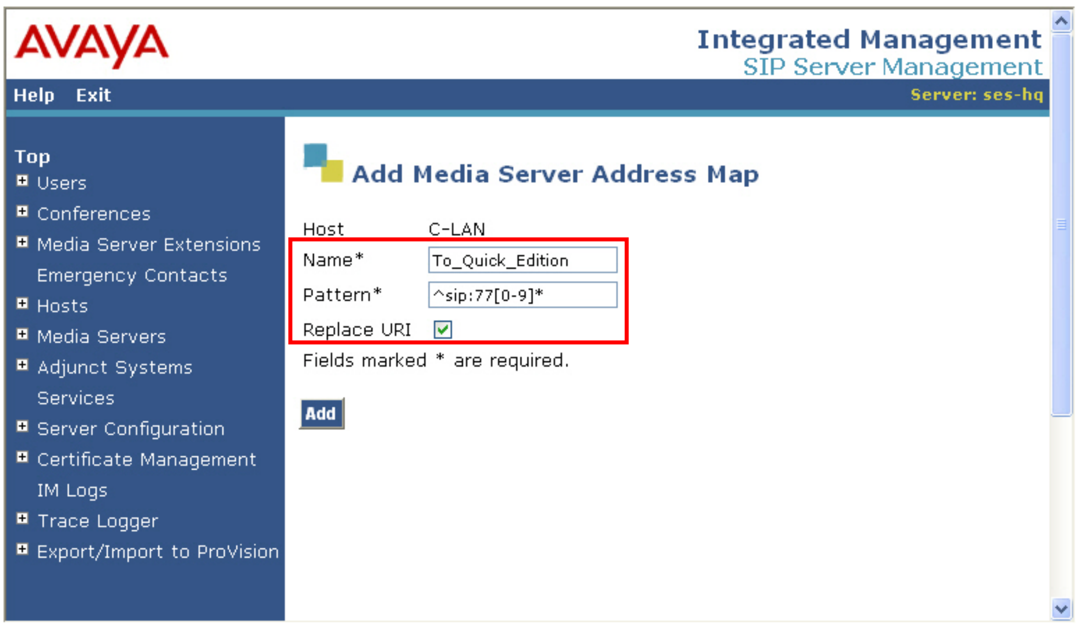
10. At the List Media Server Address Map window, click on **Add Map In New Group** to create an address map statement in a new group.

11. At the Add Media Server Address Map window, enter a descriptive name for identifying the address map statement in the **Name** field. Enter the map string used to match incoming digits for the Avaya one-X Quick Edition network in the **Pattern** field.

Place a check mark in the **Replace URI** box to indicate this pattern will be forwarded by the **Host** shown. Click the **Add** button when finished to return to the List Media Server Address Map window.

Use the Linux regular expressions below to configure the map string for the media server contact.

^	Matches first line in initial SIP message
sip:	Indicates the protocol used
0–9	Match a specific digit
[0–9]	Match any digits
*****	Indicates any digit and length



12. At the List Media Server Address Map window, click on **Edit** under **Commands** to modify the media server contact in the new group created in the previous step.

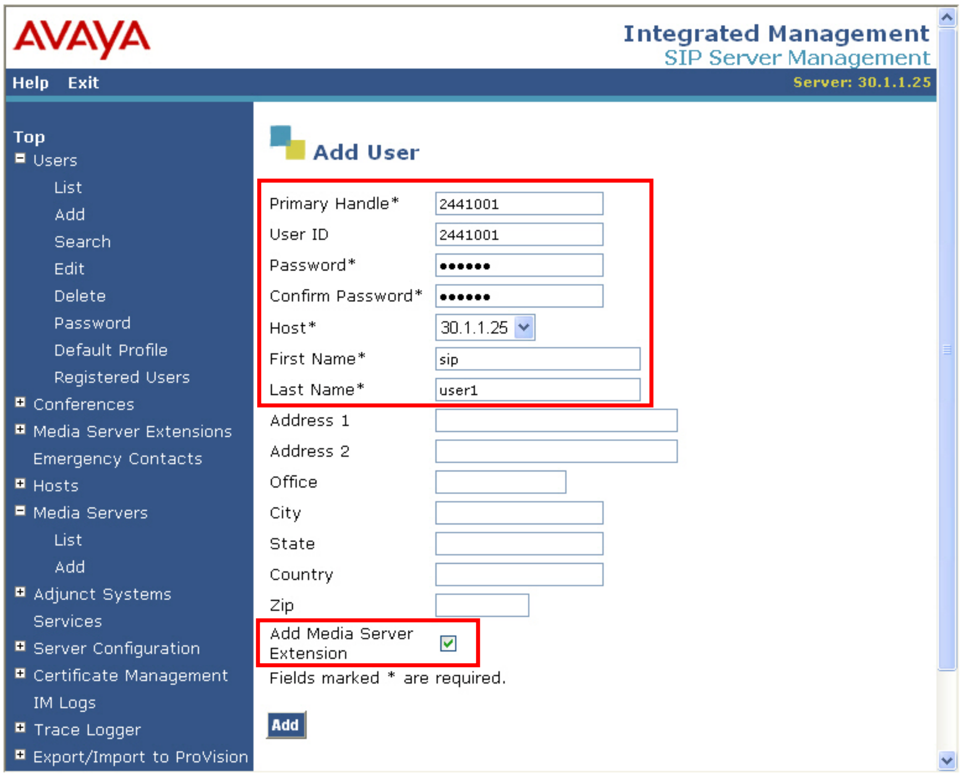
13. At the Edit Media Server Contact window, modify the string in the **Contact** field to enable routing between the SES Server and the one-X Quick Edition network. Click the **Update** button when finished to return to the List Media Server Address Map window.

Use the Linux regular expressions below to configure the map string for the media server contact.

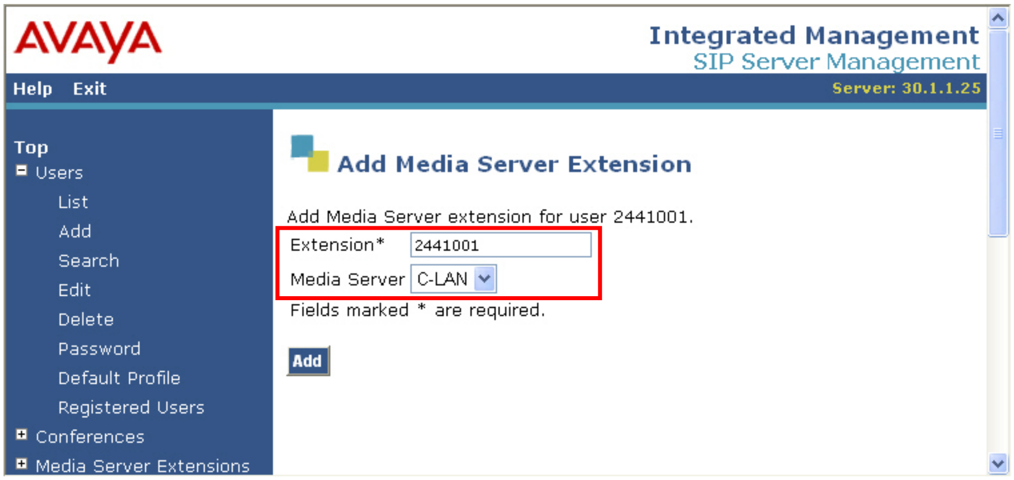
sip: Indicates the protocol used
$ (user) Variable for user portion of the SIP message
@ x.x.x.x Format for SES Server IP address
5061: Port number used by TLS transport method.
transport = tls Indicates transport method.

14. At the SIP Server Management window, click on **Add** under the **Users** menu to configure a SIP identity for an endpoint registered to Avaya Communication Manager. Enter an extension for the user in the **Primary Handle** field. This value should be consistent with the dial plan configured on Avaya Communication Manager.

Enter a password for the user in the fields for **Password** and **Confirm Password**. Select the SES Server managing the SIP Domain from the **Host** drop-down list. Enter a descriptive name for the user in the fields for **First Name** and **Last Name**. Select the check box for **Add Media Server Extension** and click the **Add** button when finished to display the Add Media Server Extension screen.

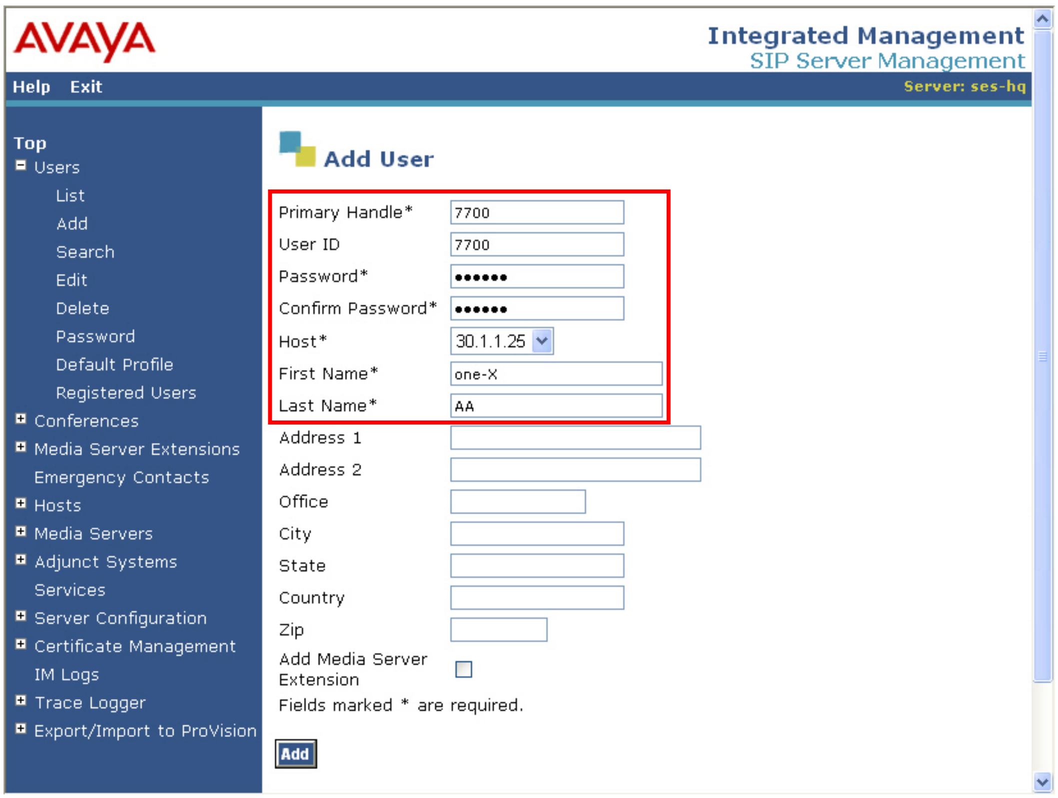


15. At the Add Media Server Extension screen, enter the extension configured as an off-pbx-telephone station in Avaya Communication Manager in the **Extension** field. Select the name of the media server interface from the **Media Server** drop-down list. Click the **Add** button when finished.



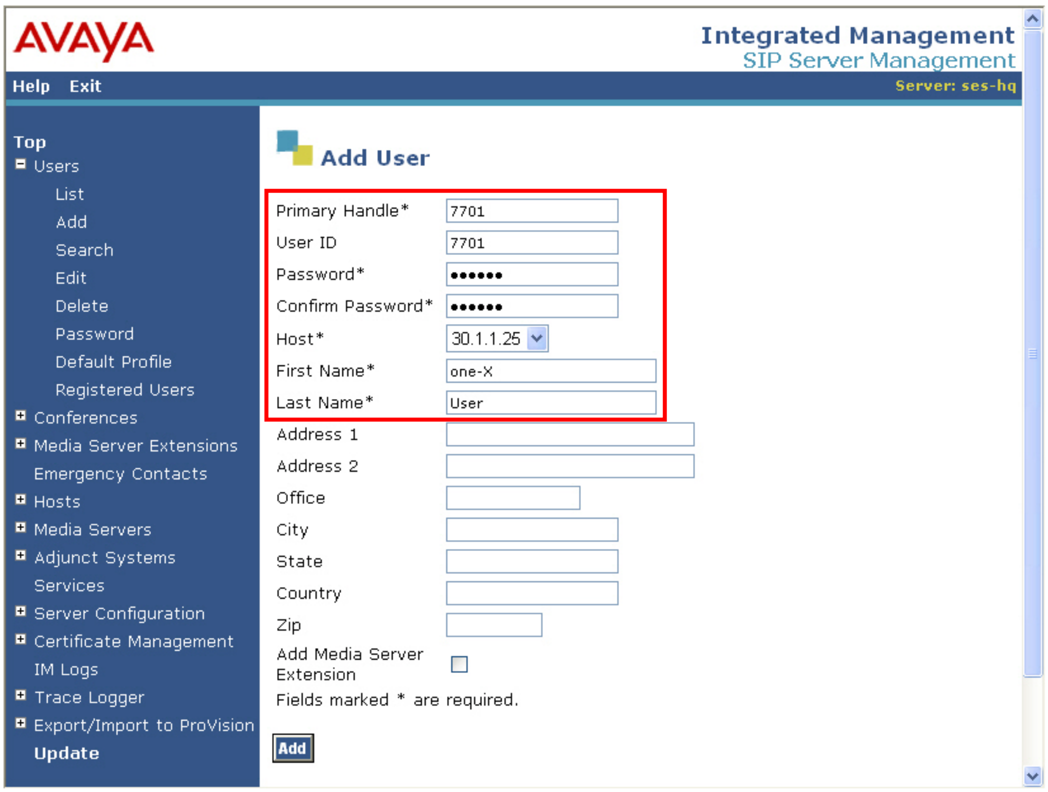
16. At the SIP Server Management window, click on **Add** under the **Users** menu to configure a SIP identity for the one-X Quick Edition Auto Attendant. Enter the extension associated with the one-X Quick Edition Auto Attendant in the **Primary Handle** field. This value should be consistent with the identity provisioned for the one-X Quick Edition Auto Attendant in Step 13 of Section 4 as well as the dial plan configured on Avaya Communication Manager.

Enter a password for the user in the fields for **Password** and **Confirm Password**. Select the SES Server managing the SIP Domain from the **Host** drop-down list. Enter a descriptive name for the user in the fields for **First Name** and **Last Name**. Click the **Add** button when finished.



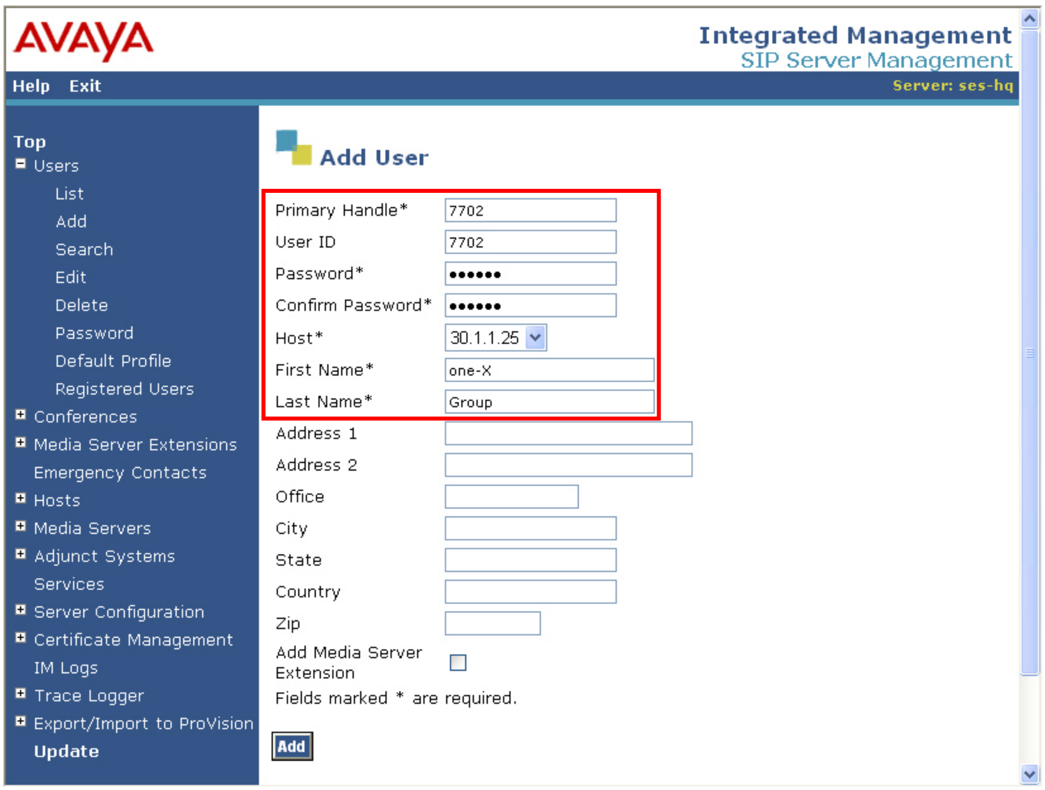
17. At the SIP Server Management window, click on **Add** under the **Users** menu to configure a SIP identity for a one-X Quick Edition IP Telephone. Enter the extension associated with the one-X Quick Edition IP Telephone in the **Primary Handle** field. This value should be consistent with the identity provisioned for the one-X Quick Edition IP Telephone as a direct extension in Step 14 of Section 4. This value should also be consistent with the dial plan configured on Avaya Communication Manager.

Enter a password for the user in the fields for **Password** and **Confirm Password**. Select the SES Server managing the SIP Domain from the **Host** drop-down list. Enter a descriptive name for the user in the fields for **First Name** and **Last Name**. Click the **Add** button when finished.



18. At the SIP Server Management window, click on **Add** under the **Users** menu to configure a SIP identity for the hunt group of Avaya one-X Quick Edition IP Telephones. Enter the extension associated with the one-X Quick Edition group in the **Primary Handle** field. This value should be consistent with the identity provisioned in Step 15 of Section 4 for the one-X Quick Edition group as well as the dial plan configured on Avaya Communication Manager.

Enter a password for the user in the fields for **Password** and **Confirm Password**. Select the SES Server managing the SIP Domain from the **Host** drop-down list. Enter a descriptive name for the user in the fields for **First Name** and **Last Name**. Click the **Add** button when finished.



7. Verification

These Application Notes were confirmed using the following verification steps listed below.

1. Place call between the Avaya one-X Quick Edition IP Telephone with a direct extension and a station configured on Avaya Communication Manager. Verify voice quality is acceptable.

2. Place call from a station configured on Avaya Communication Manager to the extension configured for the hunt group with Avaya one-X Quick Edition IP Telephones on the SES Server. Verify all Avaya one-X Quick Edition IP Telephones configured in the huntgroup are ringing and voice quality is acceptable when call is answered by one of the telephones.

3. Place 4 calls between stations configured on Avaya Communication Manager and the Avaya one-X Quick Edition IP Telephones on the SES Server. Place a fifth call between stations configured on Avaya Communication Manager and the Avaya one-X Quick Edition IP Telephones on the SES Server. Verify the fifth call is never established due to call control performed by Avaya Communication Manager.

4. Place call from a station configured on Avaya Communication Manager to the extension configured for one-X Quick Edition Auto Attendant on the SES Server. Verify the one-X Quick Edition Auto Attendant answers incoming calls after specified number of rings and transfers incoming calls to the appropriate extension.

5. Disconnect the Avaya one-X Quick Edition network from the WAN. Verify calls between the Avaya one-X Quick Edition IP Telephones and Avaya Communication Manager are unsuccessful. Verify local calls between Avaya one-X Quick Edition IP Telephones are successful and voice quality is acceptable.

7.1. Avaya Communication Manager Verification

1. Enter the **status signaling-group <group number>** command at the SAT terminal in Avaya Communication Manager. Verify **in-service** status of the signaling group defined for the SES Server under the **Group State** field.

```
status signaling-group 5
                         STATUS SIGNALING GROUP

        Group ID: 5                               Active NCA-TSC Count: 0
      Group Type: sip                              Active CA-TSC Count: 0
  Signaling Type: facility associated signaling
     Group State: in-service
```

2. Enter the **status trunk-group <group number>** command at the SAT terminal. Verify **in-service/idle** or **in-service/active** status of the trunk group defined for the SES Server under the **Service State** field.

```
status trunk 5                                                    Page   1

                             TRUNK GROUP STATUS

Member   Port     Service State      Mtce Connected Ports
                                     Busy

0005/001 T00119   in-service/idle    no
0005/002 T00120   in-service/idle    no
0005/003 T00121   in-service/idle    no
0005/004 T00122   in-service/idle    no
0005/005 T00123   in-service/idle    no
0005/006 T00124   in-service/idle    no
0005/007 T00125   in-service/idle    no
0005/008 T00126   in-service/idle    no
0005/009 T00127   in-service/idle    no
0005/010 T00128   in-service/idle    no
0005/011 T00129   in-service/idle    no
0005/012 T00130   in-service/idle    no
0005/013 T00131   in-service/idle    no
```

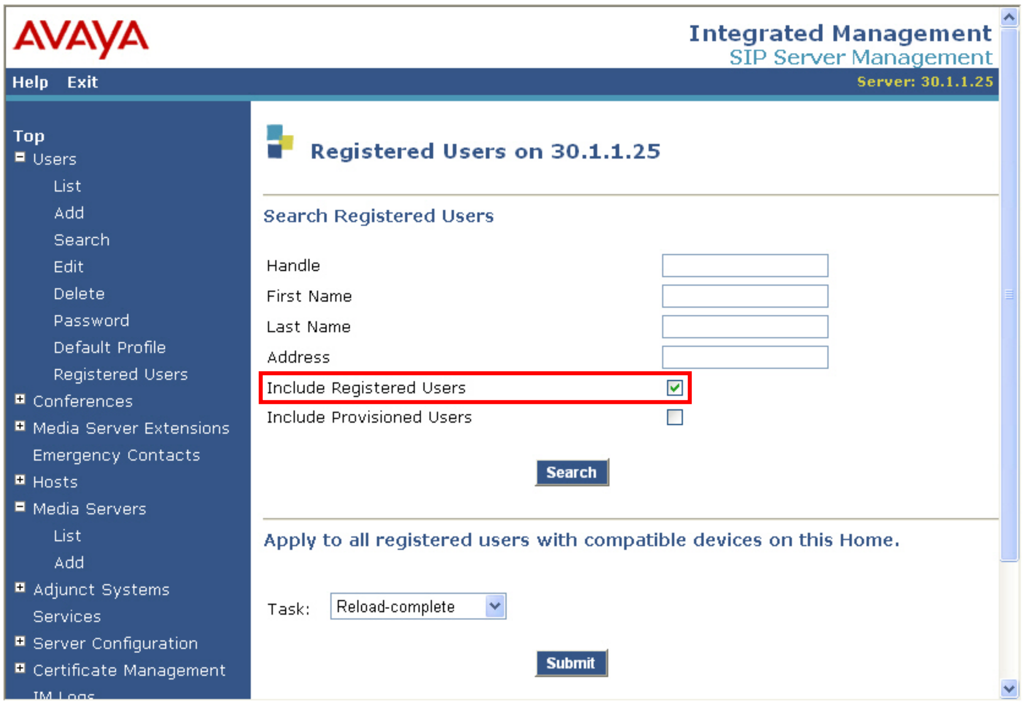
2. Enter the **status off-pbx-telephone station <extension>** command at the SAT terminal during an active call with a Station configured on Avaya Communication Manager. Verify status of SIP-enabled station.

```
status off-pbx-telephone station 2441001

                       OFF PBX TELEPHONE STATUS

 Appl     Trk/Mem   Port      Connected Ports
No Type   Grp

1  OPS    0005/001  T00119    T00136
```

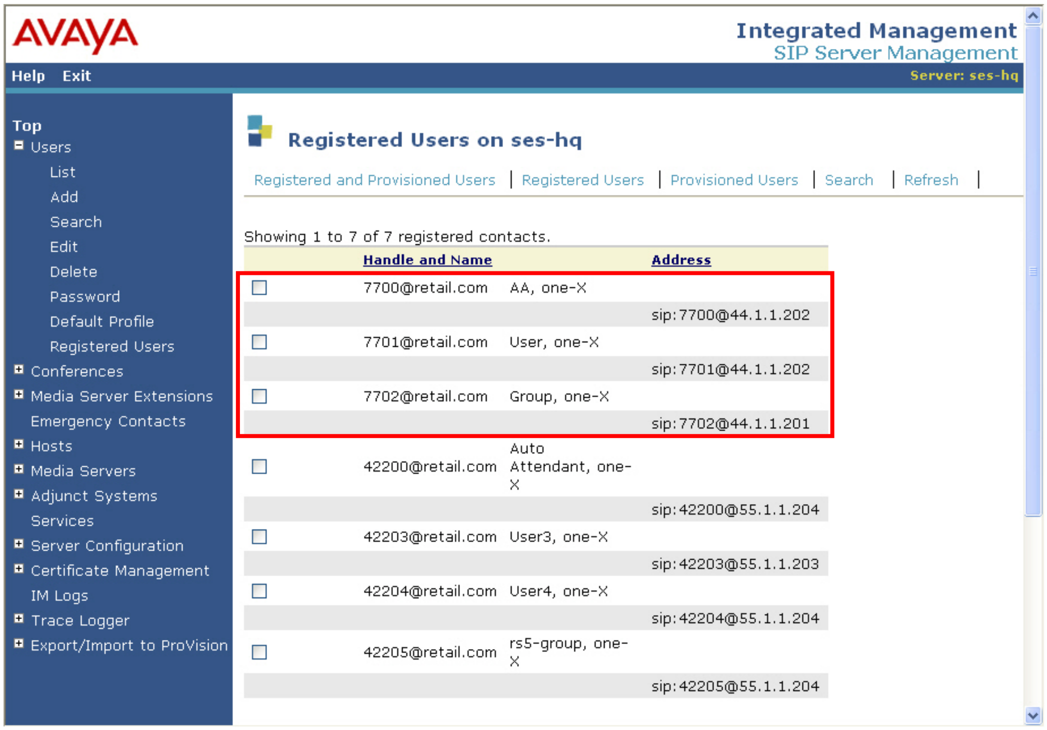
7.2. SIP Enablement Services Verification

1. At the SIP Server Management window, click on **Registered Users** under the **Users** menu. Leave all parameters blank and select the checkbox for **Include Registered Users**. Click the **Search** button when finished to view users registered to the SES Server.

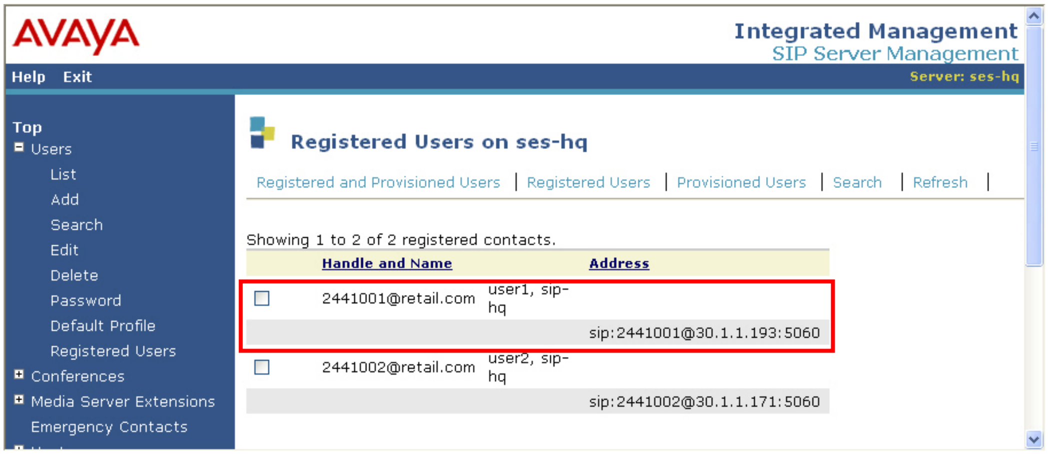
Note: *Search information can also be entered for a specific extension designated for one-X Quick Edition that was provisioned on the SES Server.*



2. At the Registered Users screen, verify registration status for the one-X Quick Edition Auto Attendant (7700), the one-X Quick Edition IP Telephone with direct extension (7701) and the one-X Quick Edition group (7702) administered as SIP identities in the SES Server. For Auto Attendant and the one-X Quick Edition group, one of the one-X Quick Edition IP Telephones in the network will register to receive all incoming calls and outgoing calls on behalf of the other telephones.



3. At the Registered Users screen, verify registration status of the SIP-enabled endpoint (2441001) configured in Avaya Communication Manager that is administered as a SIP identity in the SES Server.



8. Conclusion

As depicted by these Application Notes, an Avaya one-X Quick Edition network can be implemented as a small office solution supporting call processing with Avaya Communication Manager through SIP Enablement Services. For implementation of one-X Quick Edition without a one-X Quick Edition G10 PSTN Gateway

For the configuration used in these Application Notes, the Avaya one-X Quick Edition network at the Branch location is dependent upon reliable WAN connectivity to the SES Server at the Main location. An Avaya one-X Quick Edition implementation without the Avaya one-X Quick Edition G10 PSTN Gateway cannot provide failover or redundancy for calls destined to Avaya Communication Manager in the event of WAN failure.

9. References

The following references can be found at http://support.avaya.com:

- Avaya one-X Quick Edition Administrator Guide, Release 3.0.0, November 2006
- Avaya one-X Quick Edition Telephone User Guide, Release 3.0.0, November 2006
- Installing and Administering SIP Enablement Services Release 3.1.1, December 2006
- SIP Support in Release 3.1 of Avaya Communication Manager Running on the Avaya S8300, S8500, S8500B, S8700, and S8710 Media Server, February 2006
- Administration for Network Connectivity for Avaya Communication Manager, Issue 11, February 2006

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