



Application Notes for Spectralink 84-Series Wireless Telephones with Avaya Aura® Session Manager and Avaya Aura® Communication Manager - Issue 1.0

Abstract

These Application Notes describe the configuration steps required to integrate the Spectralink 84-Series Wireless Telephones with Avaya Aura® Session Manager and Avaya Aura® Communication Manager. The Spectralink 84-Series Wireless Telephones registered with Avaya Aura® Session Manager via SIP. The Spectralink wireless telephones communicate with Avaya Aura® Session Manager over a converged 802.11 wireless network.

Readers should pay attention to **Section 2**, in particular the scope of testing as outlined in **Section 2.1** as well as the observations noted in **Section 2.2**, to ensure that their own use cases are adequately covered by this scope and results.

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

1. Introduction

These Application Notes describe the configuration steps required to integrate the Spectralink 84-Series Wireless Telephones with Avaya Aura® Session Manager and Avaya Aura® Communication Manager. The Spectralink 84-Series Wireless Telephones registered with Avaya Aura® Session Manager via SIP. The Spectralink 8440 Wireless Telephone was used for the compliance test. The Spectralink wireless telephones communicate with Avaya Aura® Session Manager over a converged 802.11 wireless network.

2. General Test Approach and Test Results

The interoperability compliance test included feature and serviceability testing. The feature testing focused on establishing calls between Spectralink 84-Series Wireless Telephones, Avaya SIP / H.323 deskphones, and the PSTN, and exercising basic telephony features, such as hold, mute, transfer and conference. Additional telephony features, such as call forward, call coverage, call park/unpark, and call pickup were also verified using Communication Manager Feature Access Codes (FACs) and Feature Name Extensions (FNEs).

The serviceability testing focused on verifying that the Spectralink 84-Series Wireless Telephones come back into service after re-connecting the access point or rebooting the phone.

DevConnect Compliance Testing is conducted jointly by Avaya and DevConnect members. The jointly-defined test plan focuses on exercising APIs and/or standards-based interfaces pertinent to the interoperability of the tested products and their functionalities. DevConnect Compliance Testing is not intended to substitute full product performance or feature testing performed by DevConnect members, nor is it to be construed as an endorsement by Avaya of the suitability or completeness of a DevConnect member's solution.

2.1. Interoperability Compliance Testing

Interoperability compliance testing covered the following features and functionality:

- SIP registration of Spectralink 84-Series Wireless Telephones with Session Manager.
- Calls between Spectralink 84-Series Wireless Telephones and Avaya SIP / H.323 deskphones with Direct IP Media (Shuffling) enabled and disabled.
- Calls between the Spectralink 84-Series Wireless Telephones and the PSTN.
- G.711, G.729 and G.722 codec support.
- Proper recognition of DTMF tones.
- Basic telephony features, including hold, mute, redial, multiple calls, and 3-party conference.
- Extended telephony features using Communication Manager FACs and FNEs for Call Forward, Call Park/Unpark, and Call Pickup.
- Voicemail coverage, MWI support, and logging into voicemail system to retrieve voice messages.
- Use of programmable buttons on the Spectralink 84-Series Wireless Telephones.

- Proper system recovery after a restart of the Spectralink 84-Series Wireless Telephones and loss of IP connectivity.

2.2. Test Results

All test cases passed with the exception that blind conference is not supported.

2.3. Support

For technical support and information on Spectralink 84-Series Wireless Telephones, contact Spectralink technical support at:

- Phone: 1-800-775-5330
- Website: <http://support.spectralink.com/>
- Email: technicalsupport@spectralink.com

3. Reference Configuration

Figure 1 illustrates a sample configuration with an Avaya SIP-based network that includes the following products:

- Avaya Aura® Communication Manager running with an Avaya G450 Media Gateway.
- Media resources in the Avaya G450 Media Gateway and Avaya Aura® Media Server (not shown in figure).
- Avaya Aura® Session Manager connected to Communication Manager via a SIP trunk and acting as a Registrar/Proxy for SIP telephones.
- Avaya Aura® System Manager used to configure Session Manager.
- Avaya Aura® Messaging serving as the voicemail system.
- Avaya 9600 and 96x1 Series H.323 and SIP Deskphones.
- Spectralink 8440 Wireless Telephones.
- FTP and DHCP Servers that provide configuration data and IP network information to Spectralink 8440.
- A Spectralink-approved wireless access point was used to provide Spectralink handsets access to the converged 802.11 wireless network.

Spectralink 84-Series Wireless Telephones registered with Session Manager and were configured as Off-PBX Stations (OPS) on Communication Manager.

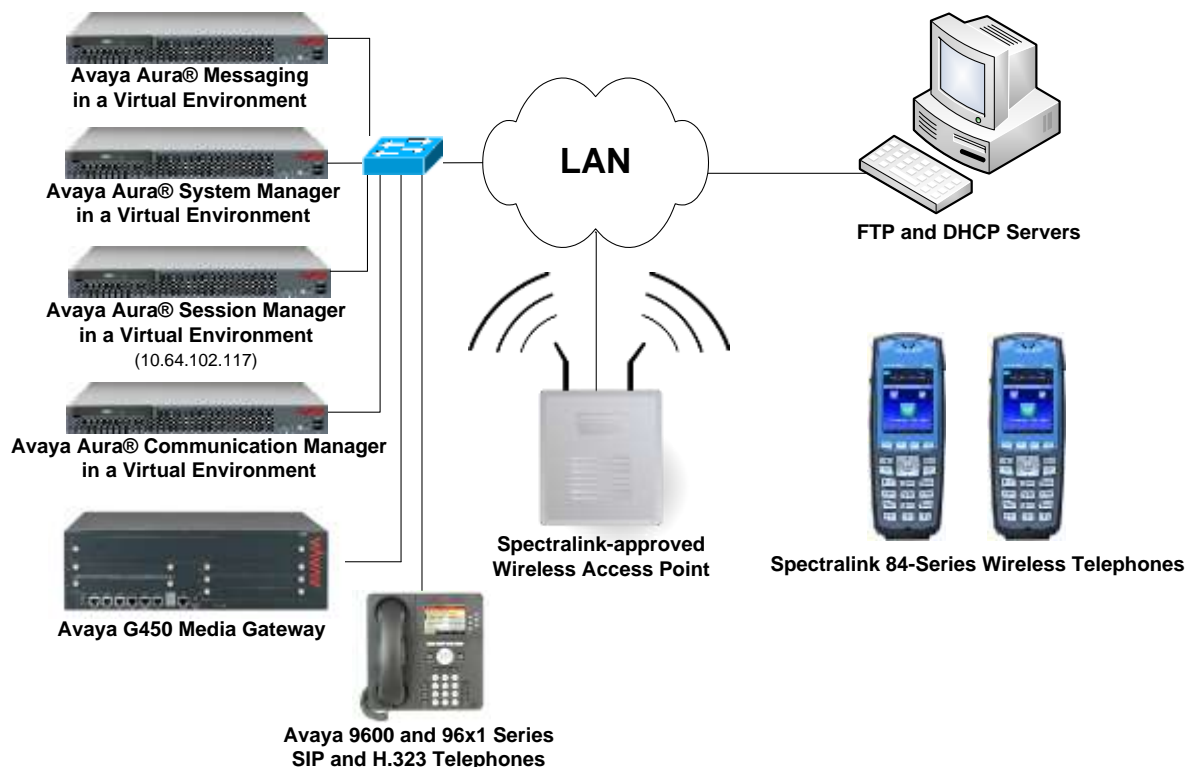


Figure 1: Avaya SIP Network with Spectralink 84-Series Wireless Telephones

4. Equipment and Software Validated

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

Equipment/Software	Release/Version
Avaya Aura® Communication Manager with an Avaya G450 Media Gateway	7.0.1.0 SP 1 (R017x.00.0.441.0 with Patch 23012)
Avaya Aura® Media Server	7.7.0.226
Avaya Aura® Session Manager	7.0.1 (7.0.1.0.701007)
Avaya Aura® System Manager	7.0.1 (Build No. 7.0.0.016266 Software Update Revision No: 7.0.1.0.064859 Feature Pack 1)
Avaya Aura® Messaging	6.3.2 SP 2 Patch 3
Avaya 9600 Series IP Deskphones	3.260A (H.323) 2.6.16.1 (SIP)
Avaya 96x1 Series IP Deskphones	7.0.1.0.46 (SIP)
Spectralink 84-Series Wireless Telephones	4.14.0.2071

5. Configure Avaya Aura® Communication Manager

This section provides the procedure for configuring Communication Manager. The procedure includes the following areas:

- Verify Communication Manager license
- Administer IP Network Region and IP Codec Set

Use the System Access Terminal (SAT) to configure Communication Manager and log in with the appropriate credentials.

Note: It is assumed that basic configuration of the Communication Manager has already been completed, such as the SIP trunk to Session Manager. However, implementers should ensure sufficient Maximum Administered SIP Trunks licenses are available to accommodate the traffic between Communication Manager and the Session Manager. The SIP station configuration for the Spectralink 84-Series Wireless Telephones are configured through Avaya Aura® System Manager in **Section 6.2**.

5.1. Verify License

Using the SAT, verify that the Off-PBX Telephones (OPS) option is enabled on the **system-parameters customer-options** form. The license file installed on the system controls these options. If a required feature is not enabled, contact an authorized Avaya sales representative.

On **Page 1**, verify that the number of OPS stations allowed in the system is sufficient for the number of SIP endpoints that will be deployed.

```
display system-parameters customer-options                                Page 1 of 12
                                OPTIONAL FEATURES

G3 Version: V17                                     Software Package: Enterprise
Location: 2                                           System ID (SID): 1
Platform: 28                                         Module ID (MID): 1

                                USED
Platform Maximum Ports: 6400 56
Maximum Stations: 2400 18
Maximum XMOBILE Stations: 2400 0
Maximum Off-PBX Telephones - EC500: 9600 0
Maximum Off-PBX Telephones - OPS: 9600 10
Maximum Off-PBX Telephones - PBFMC: 9600 0
Maximum Off-PBX Telephones - PVFMC: 9600 0
Maximum Off-PBX Telephones - SCCAN: 0 0
Maximum Survivable Processors: 313 0

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

5.2. Administer IP Network Region and IP Codec Set

In the **IP Network Region** form, the **Authoritative Domain** field is configured to match the domain name configured on Session Manager. In this configuration, the domain name is *avaya.com*. By default, **IP-IP Direct Audio** (shuffling) is enabled to allow audio traffic to be sent directly between IP endpoints without using media resources in the Avaya G450 Media Gateway or Avaya Aura® Media Server. The **IP Network Region** form also specifies the **IP Codec Set** to be used for calls routed over the SIP trunk to Session Manager.

```
change ip-network-region 1                                     Page 1 of 20

                                IP NETWORK REGION

Region: 1
Location: 1      Authoritative Domain: avaya.com
Name:                               Stub Network Region: n
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: 3329
DIFFSERV/TOS PARAMETERS
      Call Control PHB Value: 46
      Audio PHB Value: 46
      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
```

In the **IP Codec Set** form, select the audio codec type supported for calls routed over the SIP trunk to the Spectralink 84-Series Wireless Telephones. The form is accessed via the **change ip-codec-set 1** command. Note that IP codec set '1' was specified in IP Network Region '1' shown above. The default settings of the **IP Codec Set** form are shown below. The Spectralink 84-Series Wireless Telephones were tested using G.711, G.729, and G.722 codecs.

```
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:
3:
4:
5:
6:
7:
```

6. Configure Avaya Aura® Session Manager

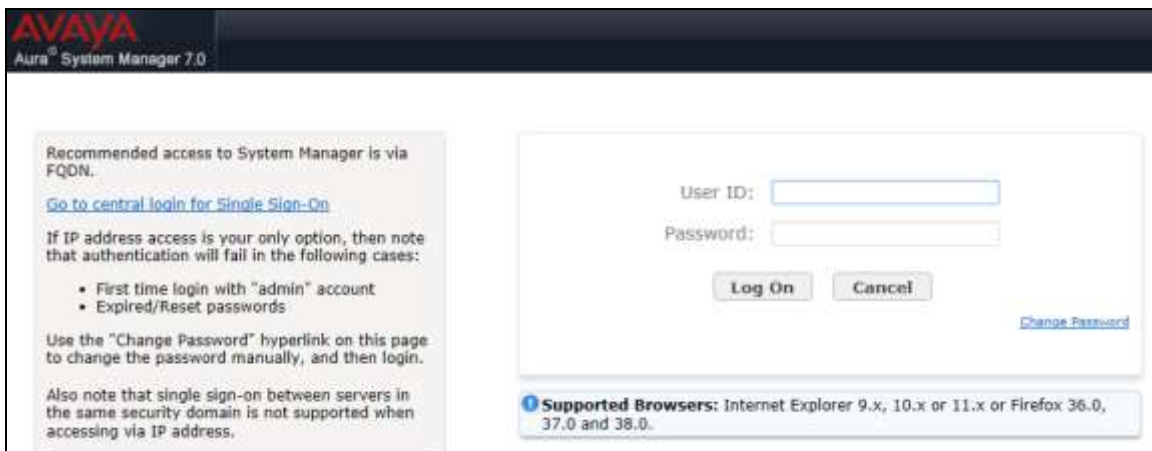
This section provides the procedure for configuring Session Manager. The procedures include the following areas:

- Launch System Manager
- Set Network Transport Protocol for Spectralink Telephones
- Administer SIP User

Note: It is assumed that basic configuration of Session Manager has already been performed. This section will focus on the configuration of a SIP user for the Spectralink 84-Series Wireless Telephones.

6.1. Launch System Manager

Access the System Manager Web interface by using the URL “https://ip-address” in an Internet browser window, where “ip-address” is the IP address of the System Manager server. Log in using the appropriate credentials.



The screenshot shows the Avaya Aura System Manager 7.0 login interface. The header includes the Avaya logo and "Aura® System Manager 7.0". The main content area is divided into two sections. The left section contains instructions: "Recommended access to System Manager is via FQDN." with a link "Go to central login for Single Sign-On", and "If IP address access is your only option, then note that authentication will fail in the following cases:" followed by a bulleted list: "• First time login with 'admin' account" and "• Expired/Reset passwords". It also states: "Use the 'Change Password' hyperlink on this page to change the password manually, and then login." and "Also note that single sign-on between servers in the same security domain is not supported when accessing via IP address." The right section is the login form, featuring "User ID:" and "Password:" labels with corresponding input fields, "Log On" and "Cancel" buttons, and a "Change Password" link. At the bottom, a blue box lists "Supported Browsers: Internet Explorer 9.x, 10.x or 11.x or Firefox 36.0, 37.0 and 38.0."

6.2. Set Network Transport Protocol for Spectralink

From the System Manager **Home** screen, select **Elements** → **Routing** → **SIP Entities** and edit the SIP Entity for Session Manager shown below.

AVAYA
Avaya System Manager 7.0

Last Logged on at June 27, 2016 2:12 PM
Log off admin

Home Routing

Routing
Domains
Locations
Adaptations
SIP Entities
Entity Links
Time Ranges
Routing Policies
Dial Patterns
Regular Expressions
Defaults

Home / Elements / Routing / SIP Entities

SIP Entity Details
General

Commit Cancel

Name: devcom-sm

FQDN or IP Address: 10.64.102.117

Type: Session Manager

Notes:

Location: Thornton

Outbound Proxy:

Time Zone: America/New_York

Credential name:

Scroll down to the **Listen Ports** section and verify that the transport network protocol used by Spectralink telephones is specified in the list below. For the compliance test, the Spectralink telephones used TCP network transport as specified in the `site.cfg` file configured in **Section 7.3**.

Listen Ports

TCP Failover port:

TLS Failover port:

Add Remove

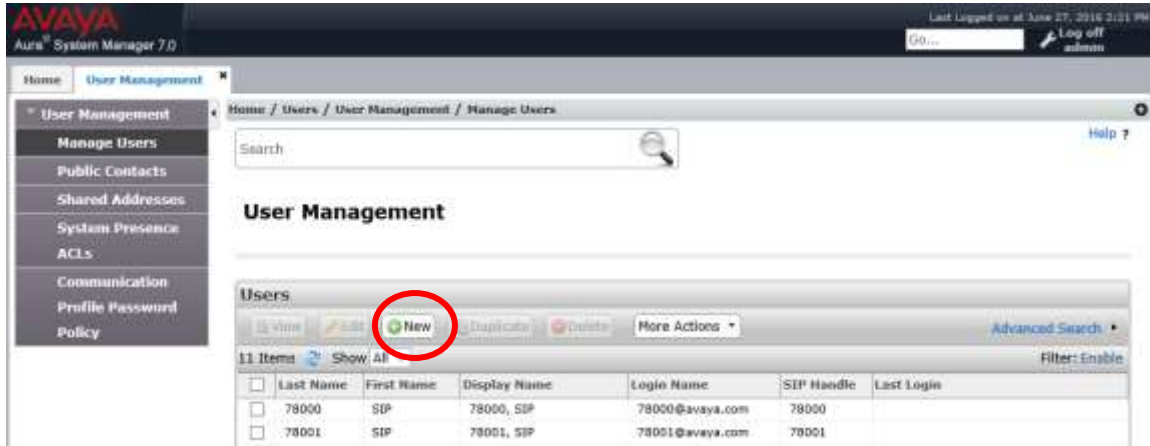
3 Items Filter: Enable

<input type="checkbox"/>	Listen Ports	Protocol	Default Domain	Endpoint	Notes
<input type="checkbox"/>	5060	TCP	avaya.com	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	5060	UDP	avaya.com	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	5061	TLS	avaya.com	<input checked="" type="checkbox"/>	

Select : All, None

6.3. Administer SIP User

In the **Home** screen (not shown), select **Users** → **User Management** → **Manage Users** to display the **User Management** screen below. Click **New** to add a user.



6.3.1. Identity

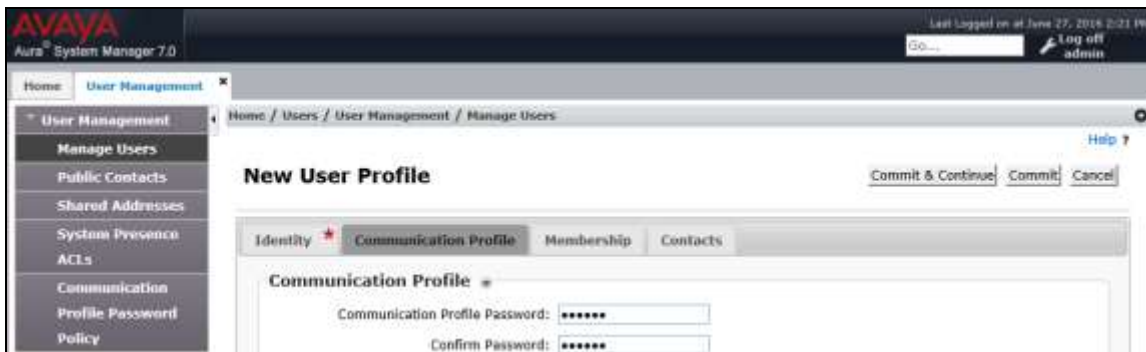
The **New User Profile** screen is displayed. Enter desired **Last Name** and **First Name**. For **Login Name**, enter “<ext>@<domain>”, where “<ext>” is the desired Spectralink 84-Series Wireless Telephone SIP extension and “<domain>” is the applicable SIP domain name from **Section 5.2**. Retain the default values in the remaining fields.

The screenshot shows the 'New User Profile' screen in the Avaya Aura System Manager 7.0. The 'Identity' tab is selected. The 'User Provisioning Rule' is set to 'User Provisioning Rule:'. The 'Identity' section contains the following fields:

- Last Name: 78005
- Last Name (Latin Translation): 78005
- First Name: Spectralink
- First Name (Latin Translation): Spectralink
- Middle Name:
- Description:
- Login Name: 78005@avaya.com
- User Type: Basic
- Password:
- Confirm Password:

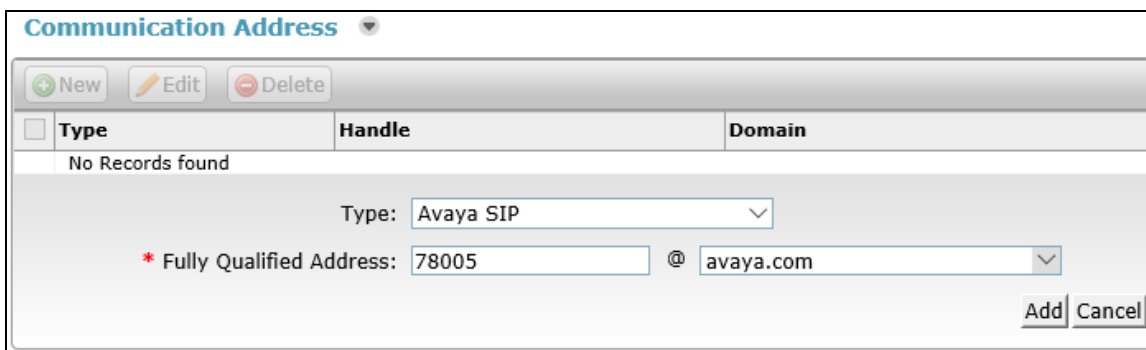
6.3.2. Communication Profile

Select the **Communication Profile** tab. For **Communication Profile Password** and **Confirm Password**, enter the desired password for the SIP user to use for registration.



6.3.3. Communication Address

In the **Communication Address** sub-section, click **New** to add a new entry. The **Communication Address** sub-section is updated with additional fields as shown below. For **Type**, retain “Avaya SIP”. For **Fully Qualified Address**, enter and select the SIP user extension and domain name to match the login name from **Section 6.3.1**. Click **Add**.



6.3.4. Session Manager Profile

Scroll down to check and expand **Session Manager Profile**. For **Primary Session Manager**, **Origination Application Sequence**, **Termination Application Sequence**, and **Home Location**, select the values corresponding to the applicable Session Manager and Communication Manager. Retain the default values in the remaining fields.

☒ **Session Manager Profile**

SIP Registration

* Primary Session Manager

devcon-sm

Secondary Session Manager

Survivability Server

Max. Simultaneous Devices

1

Block New Registration When Maximum Registrations Active?☐

Primary	Secondary	Maximum
11	0	11

Application Sequences

Origination Sequence

DEVCON-CM App Sequence

Termination Sequence

DEVCON-CM App Sequence

Call Routing Settings

* Home Location

Thornton

Conference Factory Set

(None)

Call History Settings

Enable Centralized Call History?☐

6.3.5. CM Endpoint Profile

Scroll down to check and expand **CM Endpoint Profile**. For **System**, select the value corresponding to the applicable Communication Manager. For **Extension**, enter the SIP user extension from **Section 6.3.1**. For **Template**, select *9630SIP_DEFAULT_CM_7_0*. For **Port**, click and select *IP*. Retain the default values in the remaining fields. Click **Commit** to save the configuration (not shown).

☒ **CM Endpoint Profile** ▼

* System

devcon-cm ▼

* Profile Type

Endpoint ▼

Use Existing Endpoints

☐

* Extension

Endpoint Editor

* Template

9630SIP_DEFAULT_CM_7_0 ▼

Set Type

9630SIP

Security Code

Port

IP

Voice Mail Number

Preferred Handle

(None) ▼

Calculate Route Pattern

☐

Sip Trunk

aar

Enhanced Callr-Info display for 1-line phones

☐

Delete Endpoint on Unassign of Endpoint from User or on Delete User

☒

Override Endpoint Name and Localized Name

☒

Allow H.323 and SIP Endpoint Dual Registration

☐

In the **CM Endpoint Profile** sub-section, click the **Endpoint Editor** button to display the page below. In the **General Options** tab, specify that coverage path that points to the voicemail system in the **Coverage Path 1** field. This provides voicemail coverage for the SIP user. In this example, coverage path 10 was used.

The screenshot shows the 'Edit Endpoint' page in the Avaya Aura System Manager 7.0. The left sidebar contains a 'User Management' menu with options: Manage Users, Public Contacts, Shared Addresses, System Presence, ACLs, Communication, Profile Password, and Policy. The main content area is titled 'Edit Endpoint' and includes a breadcrumb trail: Home / Users / User Management / Manage Users. Below the title are 'Done' and 'Cancel' buttons, and a '[Save As Template]' link. The form fields are organized into two columns:

System	devcon-cm	Extension	78005
Template	9630SIP_DEFAULT_CM_7_0	Set Type	9630SIP
Port	IP	Security Code	
Name	78005,Spectralink		

Below these fields are several tabs: General Options (G), Feature Options (F), Site Data (S), Abbreviated Call Dialing (A), and Enhanced Call Fwd (E). The 'General Options' tab is active, showing a sub-tab for 'Group Membership (M)'. The fields in this tab are:

Class of Restriction (COR)	1	Class Of Service (COS)	1
Emergency Location Ext.	78005	Message Lamp Ext.	78005
Tenant Number	1	Type of 3PCC Enabled	None
SIP Trunk	Qaar	Coverage Path 2	
Coverage Path 1	10	Localized Display Name	78005,Spectralink
Lock Message	<input type="checkbox"/>	Enable Reachability for Station Domain Control	
Multibyte Language	Not Applicable		

A red asterisk indicates that the 'Class of Restriction (COR)' field is required. At the bottom right are 'Done' and 'Cancel' buttons.

In the **Feature Options** tab, set the **MWI Served User Type** field to *sip-adjunct*. This allows MWI to be enabled for the SIP user. The voicemail system was connected via SIP to Session Manager.

The screenshot shows the 'Edit Endpoint' page in the Avaya Aura System Manager 7.0, with the 'Feature Options' tab selected. The left sidebar and breadcrumb trail are the same as in the previous screenshot. The 'Feature Options' tab shows the following fields:

Active Station Ringing	single	Auto Answer	none
MWI Served User Type	sip-adjunct	Coverage After Forwarding	

At the bottom right are 'Done' and 'Cancel' buttons.

7. Configure Spectralink 84-Series Wireless Telephones

This section covers the SIP configuration of the Spectralink 84-Series Wireless Telephones. Refer to [4] for more information on configuring the Spectralink 84-Series Wireless Telephones. The procedure covers the following areas:

- Configure DHCP Server
- Configure FTP Server
- Edit `site.cfg`
- Edit `<mac-address>-ext.cfg`

7.1. Configure DHCP Server

The Spectralink 84-Series Wireless Telephones must first acquire several IP network settings before proceeding with provisioning. These settings were automatically obtained from a DHCP server. Alternatively, the Spectralink telephones could be configured with static IP addresses, but for the compliance test, a DHCP server was used.

In addition to obtaining IPv4 addresses from the DHCP server for each Spectralink telephone, the DHCP server also provided the following settings:

- Option 3: Default Gateway
- Option 6: DNS Server (optional)
- Option 66: FTP Server (or Provisioning Server)

7.2. Configure FTP Server

By default, Spectralink sets FTP as the provisioning protocol on Spectralink handsets. For the compliance test, a free and popular server, FileZilla Server, available for Windows was used. Refer to [4] for instructions on setting up the FTP server, such as specifying the FTP username and password. The Spectralink telephones will receive configuration parameters from XML files placed on the FTP or Provisioning server and will also upload log files detailing their operation. The two required XML files are `site.cfg` and `<mac-address>-ext.cfg` described in the following sections. The uploaded log files will appear as `<mac-address>-app.log` files, where `<mac-address>` is the MAC address of the Spectralink handset. These XML files are located in the folder specified in the FTP server configuration.

7.3. Edit `site.cfg` File

The `site.cfg` file will be used by all of the Spectralink handsets and should provide parameters that are common to all phones. The following parameters were set in this file:

- **reg.1.server.1.address** Set to the SIP signaling IP address of Session Manager.
- **reg.1.server.1.transport** Set to TCP transport.
- **msg.mwi.1.callback** Set to the voicemail pilot number.

```
<openSIP>
  <SIPserver
    reg.1.server.1.address="10.64.102.117"
    reg.1.server.1.expires="120"
    reg.1.server.1.transport="TCPpreferred"
  />
  <dialplan
    dialplan.impossibleMatchHandling="2"
    dialplan.digitmap="" />
  <DND_CallForwarding
    voIpProt.SIP.serverFeatureControl.dnd="0"
    voIpProt.SIP.serverFeatureControl.cf="0"
    voIpProt.SIP.use486forReject="1"
  >
</DND_CallForwarding>
  <voicemail
    up.oneTouchVoicemail="1"
    up.mwiVisible="1"
    msg.mwi.1.callBackMode="contact"
    msg.mwi.1.callBack="78500"
    np.normal.alert.messageWaiting.tonePattern="silent">
  </voicemail>
</openSIP>
```


7.4. Edit <mac-address>-ext.cfg Files

There will be one of these XML files per handset. This file should contain parameters that are handset-specific and that aren't specified in the `site.cfg` file because they are unique to a particular phone. Edit the following parameters in each <mac-address>-ext.cfg file:

- **reg.1.address** Set to the SIP extension of the handset (e.g., 78005).
- **reg.1.label** Set to the SIP extension of the handset.
- **reg.1.displayName** Set to the SIP extension of the handset.
- **reg.1.auth.userId** Set to the SIP extension of the handset, which is the authentication user ID for registering with Session Manager.
- **reg.1.auth.password** Set to the SIP password used for SIP registration with Session Manager.
- **msg.mwi.1.subscribe** Set to the SIP extension of the handset to subscribe to MWI.

```
<?xml version="1.0" encoding="utf-8" standalone="yes"?>
<handsetConfig xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="handsetConfig.xsd">
  <LineRegistration>
    <openSIPTelephony>
      <TelephonyLine1
        reg.1.address="78005"
        reg.1.label="78005"
        reg.1.displayName="78005"
        reg.1.auth.userId="78005"
        reg.1.auth.password="123456"
        msg.mwi.1.subscribe="78005"
      >
      </TelephonyLine1>
      <!-- Additional lines: -->
      <!-- * -->
      <!-- Additional telephony lines can be added (reg.3, etc...) by copying the
TelephonyLine1 group above and -->
      <!-- editing appropriately-->
    </openSIPTelephony>
  </LineRegistration>
</handsetConfig>
```

7.5. Verification Steps

This section provides the tests that can be performed to verify proper configuration of the Spectralink 84-Series Wireless Telephone with Avaya Aura® Communication Manager and Avaya Aura® Session Manager.

1. Verify that the Spectralink 84-Series Wireless Telephone has successfully registered with Session Manager. In System Manager, navigate to **Elements → Session Manager → System Status → User Registrations** to check the registration status.
2. Verify basic telephony features by establishing calls between a Spectralink 84-Series Wireless Telephone and another phone.

8. Conclusion

These Application Notes have described the administration steps required to integrate the Spectralink 84-Series Wireless Telephones with Avaya Aura® Communication Manager and Avaya Aura® Session Manager. The Spectralink 84-Series Wireless Telephones successfully registered with Session Manager and basic and supplementary telephony features were verified. All test cases passed with observations noted in **Section 2.2**.

9. Additional References

This section references the Avaya and Spectralink documentation relevant to these Application Notes. The following Avaya product documentation is available at support.avaya.com.

- [1] *Administering Avaya Aura® Communication Manager*, Release 7.0.1, Issue 2, May 2016, Document Number 03-300509.
- [2] *Administering Avaya Aura® Session Manager*, Release 7.0.1, Issue 2, May 2016.

The following Spectralink documentation may be found at <http://support.spectralink.com/products/wi-fi/spectralink-84-series-wireless-telephone>.

- [3] *Spectralink 84-Series Wireless Telephone User Guide*, 1725-86720-000 Rev: N, May 2016.
- [4] *Spectralink 84-Series Wireless Telephone Administration Guide*, 1725-86984-000 Rev: N, June 2016.
- [5] *Spectralink 84-Series Wireless Telephone Deployment Guide*, 1725-86724-000 Rev: T, March 2016.

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