# AVAYA

**Avaya Solution & Interoperability Test Lab**

# Application Notes for Spectralink DECT Server 2500/8000 with Avaya Aura® Communication Manager and Avaya Aura® Session Manager - Issue 1.0

## Abstract

These Application Notes describe the configuration steps required to integrate Spectralink DECT Server 2500/8000 with Avaya Aura® Communication Manager and Avaya Aura® Session Manager. Spectralink DECT Server 2500/8000 is a modular DECT wireless mobility solution that supports SIP VoIP telephony. The Spectralink DECT Server 2500/8000 supports external base stations to control the traffic in the air from Spectralink 7202, 7622, and Butterfly Handsets that register as SIP endpoints to Avaya Aura® Session Manager. The Spectralink DECT Server 2500 provides all the benefits of the larger Spectralink DECT Server 8000, but tailored to meet the needs of smaller businesses. For this compliance test, the Spectralink Server 2500 was used.

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.

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# 1. Introduction

These Application Notes describe the configuration steps required to integrate Spectralink DECT Server 2500/8000 with Avaya Aura® Communication Manager and Avaya Aura® Session Manager. Spectralink DECT Server 2500/8000 is a modular DECT wireless mobility solution that supports SIP VoIP telephony. The Spectralink DECT Server 2500/8000 supports external base stations to control the traffic in the air from Spectralink 7202, 7622, and Butterfly Handsets that register as SIP endpoints to Avaya Aura® Session Manager. The Spectralink DECT Server 2500 provides all the benefits of the larger Spectralink DECT Server 8000, but tailored to meet the needs of smaller businesses. For this compliance test, the Spectralink Server 2500 was used.

# 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 7000 Series and Butterfly Handsets and Avaya SIP/H.323 telephones and exercising basic telephony features, such as hold, mute, and transfer. The Spectralink handsets gained network access via a base station on the Spectralink DECT Server 2500. Additional telephony features, such as call forward, follow me, call park/unpark, and call pickup were also verified using Feature Access Codes (FACs).

The serviceability testing focused on verifying that Spectralink DECT Server 2500 came back into service after re-connecting the Ethernet connect or rebooting the Spectralink handsets.

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.

Avaya recommends our customers implement Avaya solutions using appropriate security and encryption capabilities enabled by our products. The testing referenced in this DevConnect Application Note included the enablement of supported encryption capabilities in the Avaya products. Readers should consult the appropriate Avaya product documentation for further information regarding security and encryption capabilities supported by those Avaya products.

Support for these security and encryption capabilities in any non-Avaya solution component is the responsibility of each individual vendor. Readers should consult the appropriate vendor-supplied product documentation for more information regarding those products.

For the testing associated with these Application Notes, the interface between Avaya systems and Spectralink DECT Server 2500 did not include use of any specific encryption features.

## 2.1. Interoperability Compliance Testing

Interoperability compliance testing covered the following features and functionality:

- SIP registration of Spectralink handsets with Session Manager. The DECT Server 2500 with base station controls the traffic in the air and works as the link between the Spectralink handsets and Session Manager.
- Calls between Spectralink handsets and Avaya SIP/H.323 telephones with Direct IP Media (Shuffling) enabled and disabled. Direct IP Media was supported between Spectralink handset and Avaya SIP deskphones.
- Calls between the Spectralink handsets and the PSTN.
- UDP transport protocol.
- Support of G.711 codec.
- Proper recognition of DTMF tones.
- Basic telephony features, including hold, mute, redial, multiple calls, blind/attended transfer and long duration calls.
- Extended telephony features using FACs for Call Forward, Call Park/Unpark, and Call Pickup.
- Voicemail coverage, MWI support, and logging into voicemail system to retrieve messages.
- Proper system recovery after a restart of DECT Server 2500 and Spectralink handsets and loss of IP connectivity.

## 2.2. Test Results

All test cases passed with the following observations noted:

- Spectralink 7000 Series Handsets do not support the initiation of 3-party conference calls.
- TLS/SRTP is currently not supported between Spectralink DECT Server 2500 and Avaya Aura® Communication Manager. When SRTP is enabled, Spectralink DECT Server 2500 only accepts encrypted SRTCP and Secure AVP (SAVP) in the SIP SDP, because RFC 5939 SDP Capability Negotiation is not supported. Although Avaya SIP deskphones 7.1 or later do support encrypted SRTCP, Avaya H.323 deskphones do not, so SRTP calls with Spectralink handsets will fail. Therefore, compliance testing was performed with TLS/SRTP disabled.

## 2.3. Support

For technical support on the Spectralink DECT Server 2500/8000 or Spectralink 7000 Series and Butterfly Handsets, contact Spectralink Technical Support via phone, email, or website.

- **Phone:** +1 (800) 775-5330
- **Web:** http://support.spectralink.com/
- **Email:** technicalsupport@spectralink.com

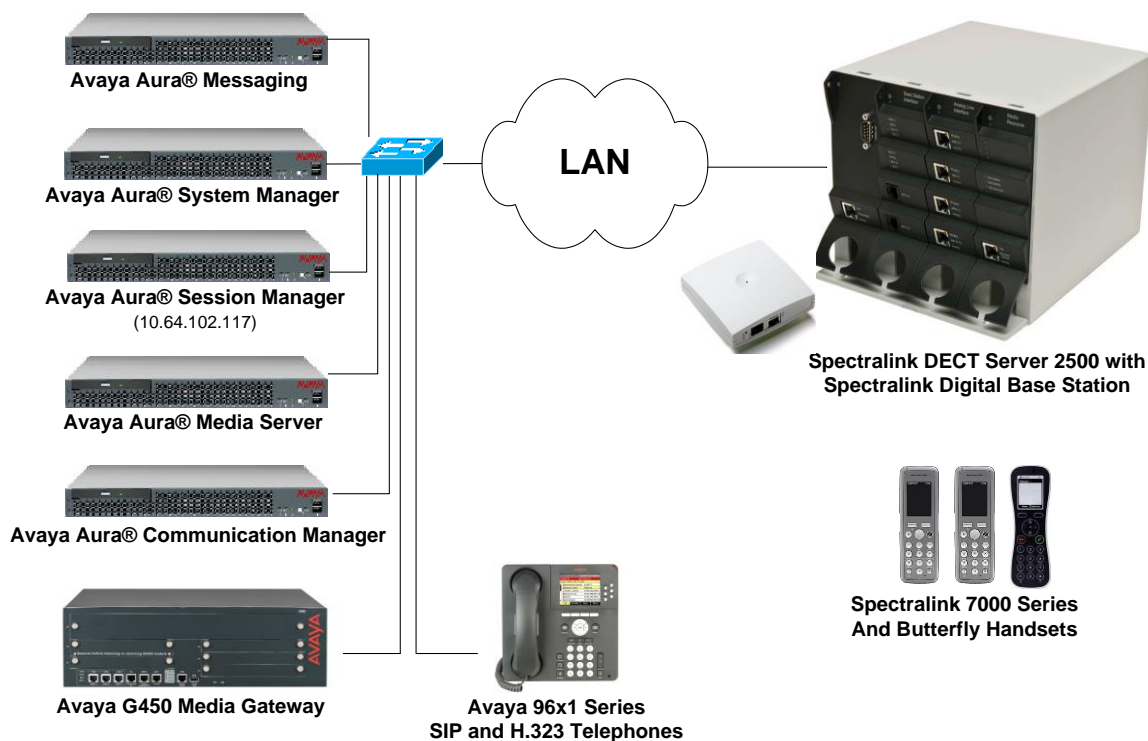# 3. Reference Configuration

**Figure 1** illustrates a sample configuration consisting of Spectralink DECT Server 2500, Spectralink Digital Base Station, and Spectralink 7000 Series and Butterfly Handsets with Avaya Aura® Communication Manager and Avaya Aura® Session Manager.  The Spectralink handsets registered with Session Manager via SIP through the DECT Server 2500.  The Spectralink Digital Base Station was used to provide network access to the Spectralink handsets.  Avaya G450 Media Gateway provided media resources and PSTN connectivity (not shown). Avaya Aura® Media Server provided additional media resources and Avaya Aura® Messaging served as the voicemail system.  Avaya Aura® System Manager was used to configure Session Manager.  Avaya 96x1 Series H.323/SIP Deskphones were used for placing and receiving calls.



**Avaya Aura® Messaging**

**Avaya Aura® System Manager**

**Avaya Aura® Session Manager**
(10.64.102.117)

**Avaya Aura® Media Server**

**Avaya Aura® Communication Manager**

**Avaya G450 Media Gateway**

**LAN**

**Spectralink DECT Server 2500 with Spectralink Digital Base Station**

**Spectralink 7000 Series And Butterfly Handsets**

**Avaya 96x1 Series SIP and H.323 Telephones**

**Figure 1: Spectralink DECT Server 2500, Spectralink Digital Base Station, and Spectralink 7000 Series and Butterfly Handsets with Avaya SIP Network**

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# 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 running in a Virtual Environment | 7.1 (R017x.01.0.532.0) |
| Avaya G450 Media Gateway | 38.20.1 |
| Avaya Aura® Media Server running in a Virtual Environment | 7.7.0.375 |
| Avaya Aura® Messaging running in a Virtual Environment | 6.3.3.SP 6 |
| Avaya Aura® Session Manager running in a Virtual Environment | 7.1 (7.1.0.0.710028) |
| Avaya Aura® System Manager running in a Virtual Environment | 7.1.0.0 (Build No. 7.1.0.0.1125193 Software Update Revision No: 7.1.0.0.116654) |
| Avaya 96x1 Series IP Deskphone | 6.6506 (H.323) 7.1.1.0.9 (SIP) |
| Spectralink DECT Server 2500 (see note) | PCS17Ea |
| Spectralink Digital Base Station 4CH | 16E |
| Spectralink 7202 and 7622 Handsets | 17J |
| Spectralink Butterfly Handset | 17A |

**Note:** These Application Notes also apply to the Spectralink DECT Server 8000, which uses the same firmware and SIP stack as the Spectralink DECT Server 2500. These two DECT server types differ in scalability only.

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# 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 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 Spectralink DECT Server 2500 and handsets 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   60
                                    Maximum Stations: 2400   22
                             Maximum XMOBILE Stations: 2400   0
                    Maximum Off-PBX Telephones - EC500: 9600   0
                    Maximum Off-PBX Telephones -   OPS: 9600   14
                    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 DECT Server 2500. 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. DECT Server 2500 was tested using G.711 codec.

```
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 DECT Server 2500
- 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 DECT Server 2500.

## 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.

## 6.2. Set Network Transport Protocol for Spectralink DECT Server 2500

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



Scroll down to the **Listen Ports** section and verify that the transport network protocol used by DECT Server 2500 is specified in the list below. For the compliance test, DECT Server 2500 used UDP network transport.

## 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.
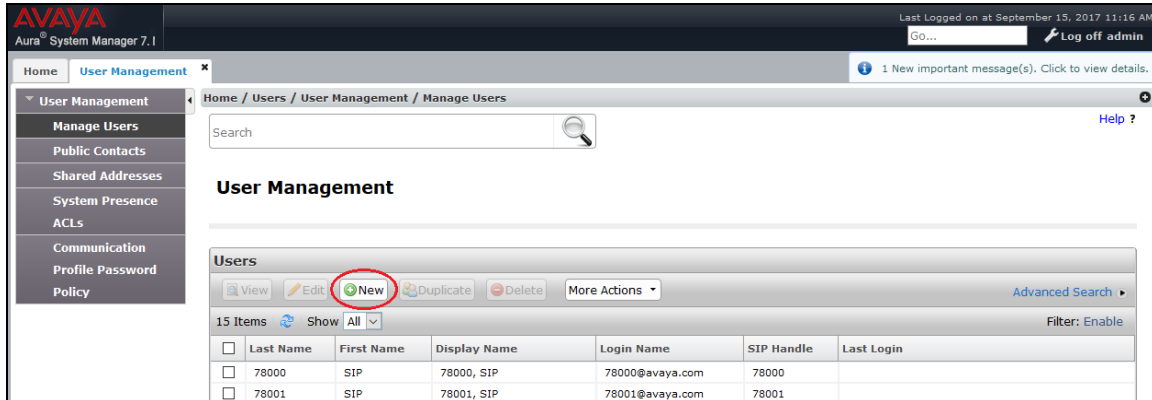


## 6.3.1. Identity
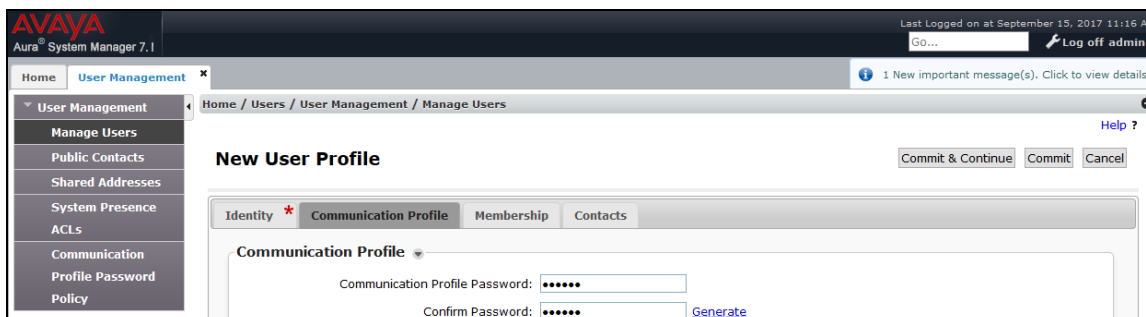
The **New User Profile** screen is displayed.  Enter desired **Last Name** and **First Name**.  For **Login Name**, enter "*<ext>@<domain>*", where "*<ext>*" is the desired DECT Server 2500 SIP extension and "*<domain>*" is the applicable SIP domain name from **Section 5.2**.  Retain the default values in the remaining fields.

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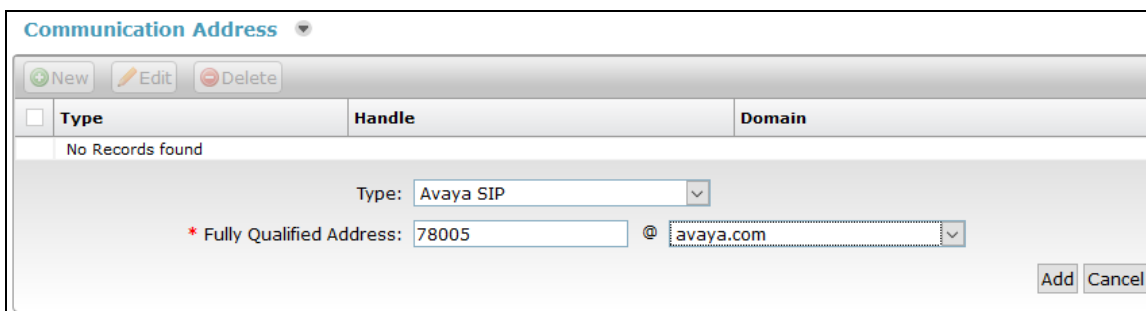
## 6.3.2. Communication Profile

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.

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### 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 *9600SIP_DEFAULT_CM_7_1*. For **Port**, click and select *IP*. Retain the default values in the remaining fields. Click **Commit** to save the configuration (not shown).

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.

# 7. Configure Spectralink DECT Server 2500

This section provides the procedures for configuring Spectralink DECT Server 2500. The procedures fall into the following areas:

- Launch web interface.
- Administer network settings.
- Administer SIP settings, including SIP port, transport protocol, Message Waiting Indicator (MWI) and audio codecs.
- Add SIP Users.

## 7.1. Launch Web Interface
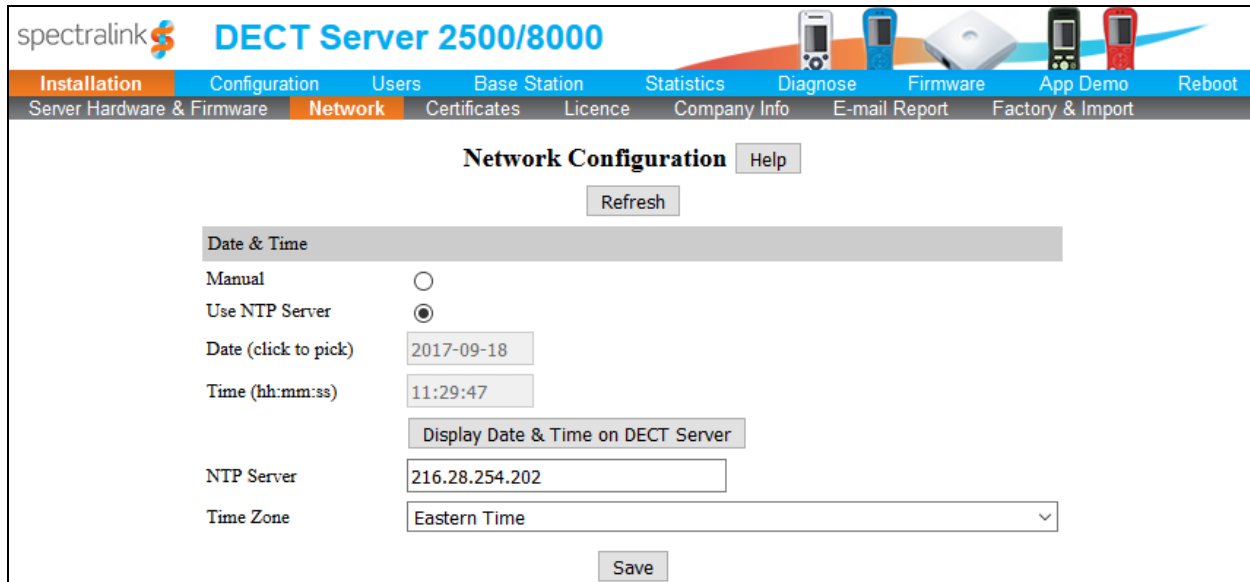
Spectralink DECT Server 2500 was configured through the web interface by using the URL "https://ip-address" in an Internet browser window, where "ip-address" is the IP address of DECT Server 2500. Log in using the appropriate credentials and then click **OK**.

## 7.2. Administer Network Settings

To configure network settings, click **Installation** and then select the **Network** tab. Under **Date & Time**, configure the **NTP Server**, if desired, and specify the appropriate **Time Zone**.
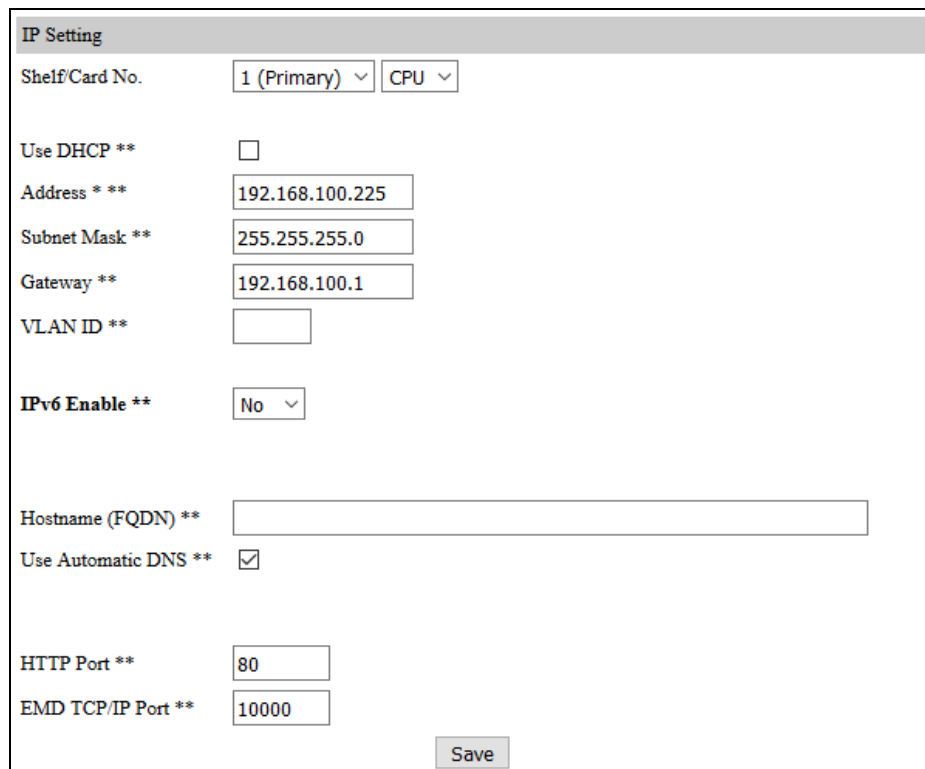


Scroll down to the **IP Setting** section. The Spectralink DECT Server 2500 is pre-configured to use DHCP. However, for the compliance test, a static IP address was used as shown below.

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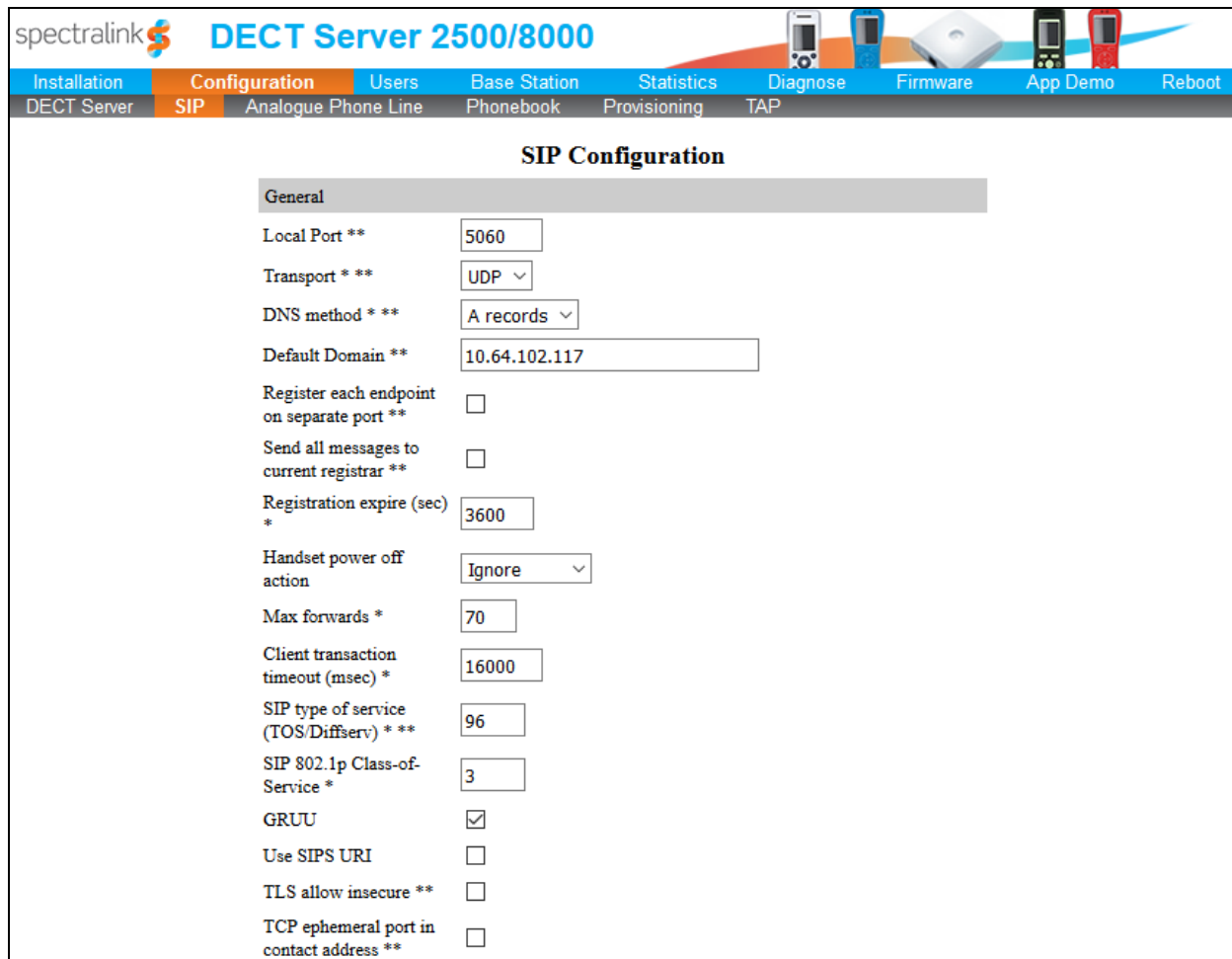
## 7.3. Administer SIP Settings

To configure SIP settings, click **Configuration** and then select the **SIP** tab.  Under **General**, configure the following fields:

- **Local port**  Specify UDP port *5060*.  This also matches the ports configured on System Manager in **Section 6.2**.
- **Transport**  Specify the *UDP* transport protocol.
- **Default Domain**  Specify the IP address of Session Manager.

Retain the default values for the other fields as shown below.

Scroll down to the **Message Waiting Indication** and **Media** sections. In the **Message waiting indication section**, select the **Enable indication** and **Enable subscription** check boxes as shown below. This is required to support updates to the Message Waiting Indicator (MWI) lamp. In the **Media** section, allow G.711 as shown below.

| DTMF Signalling | |
| --- | --- |
| Send as RTP (RFC2833) | ☑ |
| Offered RFC2833 payload type | 96 |
| Send as SIP INFO | ☐ |
| Tone duration (msec) * | 270 |
| **Message Waiting Indication** | |
| Enable indication | ☑ |
| Enable subscription ** | ☑ |
| Subscription expire (sec) * | 3600 |
| **Media** | |
| Packet duration (msec) * | 20 ∨ |
| Media type of service (TOS/Diffserv) * ** | 184 |
| Media 802.1p Class-of-Service * | 5 |
| Port range start * ** | 58000 |
| Codec Priority * | 1: PCMU/8000 ∨ |
| | 2: PCMA/8000 ∨ |
| | 3: None ∨ |
| | 4: None ∨ |
| | 5: None ∨ |
| | 6: None ∨ |
| SDP answer with preferred codec | ☐ |
| SDP answer with a single codec | ☐ |
| Ignore SDP version | ☐ |
| Enable RTP encryption ** | ☐ |
| Require RTP encryption | ☐ |
| Include lifetime in SDES offers | ☐ |
| Include MKI in SDES offers | ☐ |
| Enable ICE | ☐ |
| Enable TURN | ☐ |

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Use the default settings for the **Call Status** section shown below. Click **Save**.



## 7.4. Add SIP Users

To create a SIP user for one of the Spectralink handsets, click **Users** and then click **List Users**. Next, click on the **New** button shown below.

In the **Add new entry** page shown below, configure the following fields.

Under **DECT Device**:
- **IPEI**                              Enter the IPEI number of the handset.

Under **User**:
- **Local Number (DN):**        Enter the SIP extension.
- **Standby Text:**               Enter the SIP extension.

Under **SIP**:

- **SIP Username**          Specify user name for handset.
- **Domain**          Specify the Session Manager IP address of IP Office (e.g., *192.168.100.117*). May leave blank if **Default Domain** was configured in **Section 7.3**.
- **Displayname**          Specify a display name for the handset (e.g., *Spectralink 1*).
- **Authentication user**          Set to the SIP extension configured in **Section 6.3**.
- **Authentication password**          Enter the password configured in the **Communication Password Profile** field in **Section 6.3.2**.

Retain the default values for the other fields. Click **Save**.

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# 8. Verification Steps

This section provides the tests that can be performed to verify proper configuration of Communication Manager, Session Manager and DECT Server 2500.

1. Verify that the Spectralink handset has successfully registered with Session Manager. In System Manager, navigate to **Elements → Session Manager → System Status → User Registrations** to check the registration status.



2. The registration status may also be viewed on the DECT Server 2500 web interface by navigating to **Users** and selecting the **SIP** tab as shown below.



3. Verify basic telephony features by establishing calls between a Spectralink handset and another phone.

# 9. Conclusion

These Application Notes described the configuration steps required to integrate Spectralink DECT Server 2500/8000 with Avaya Aura® Communication Manager and Avaya Aura® Session Manager.  Spectralink DECT Server 2500 allowed Spectralink 7000 Series and Butterfly Handsets to register with Avaya Aura® Session Manager and establish calls to H.323 stations, SIP stations, and the PSTN. In addition, basic telephony features were verified.  All feature and serviceability test cases were completed successfully with observations noted in **Section 2.2**.

# 10.  References

This section references the Avaya and Spectralink documentation relevant to these Application Notes. The Avaya product documentation is available at http://support.avaya.com and the Spectralink documentation is available at http://support.spectralink.com/products.

[1] *Administering Avaya Aura® Communication Manager*, Release 7.1, Issue 1, May 2017.
[2] *Administering Avaya Aura® Session Manager*, Release 7.1, Issue 2, May 2017.
[3] *Spectralink DECT Server 2500 Installation Guide,* 14205700 version 9.0, June 2015.
[4] *Spectralink DECT Server 8000 and Spectralink DECT Server 2500 Configuration Guide,* 14184634 version 6.0, K016, June 2015.

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