



## **Avaya Solution & Interoperability Test Lab**

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# **Application Notes for Spectralink 84-Series Wireless Telephones with Avaya IP Office Server Edition 11.0 - Issue 1.0**

### **Abstract**

These Application Notes describe the configuration steps required to integrate the Spectralink 84-Series Wireless Telephones with Avaya IP Office Server Edition 11.0. The Spectralink 84-Series Wireless Telephones registered with Avaya IP Office Server Edition via SIP. The Spectralink wireless telephones communicate with Avaya IP Office Server Edition 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 IP Office Server Edition 11.0. The Spectralink 84-Series Wireless Telephones registered with Avaya IP Office Server Edition via SIP. The Spectralink 8440, 8441, 8452, and 8453 Wireless Telephones were used for the compliance test. The Spectralink wireless telephones communicate with Avaya IP Office Server Edition 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/resume, mute, transfer and conference. Additional telephony features, such as call forward, call coverage, call park/unpark, and call pickup were also verified using IP Office Short Codes.

The serviceability testing focused on verifying that the Spectralink 84-Series Wireless Telephones come back into service after re-connecting the access point, moving outside and within the access point range, and rebooting the phones.

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 this Application Note, the interface between Avaya systems and Spectralink 84-Series Wireless Telephones did not include use of any specific encryption features as requested by Spectralink.

## 2.1. Interoperability Compliance Testing

Interoperability compliance testing covered the following features and functionality:

- SIP registration of Spectralink 84-Series Wireless Telephones with IP Office Server Edition and IP Office 500 V2 Expansion System.
- Calls between Spectralink 84-Series Wireless Telephones and Avaya SIP / H.323 Deskphones with Direct IP Media (Shuffling) enabled and disabled.
- Calls between Spectralink 84-Series Wireless Telephones and Avaya SIP / H.323 Deskphones on IP Office Server Edition and IP Office 500 V2 Expansion System.
- Calls between the Spectralink 84-Series Wireless Telephones and the PSTN.
- G.711 and G.729 codec support.
- Proper recognition of DTMF tones.
- Basic telephony features, including hold/resume, mute, redial, multiple calls, blind and attended transfer, and 3-party conference.
- Extended telephony features using Avaya IP Office Short Codes for wakeup calls, Do Not Disturb, Call Forward, Follow Me, 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.

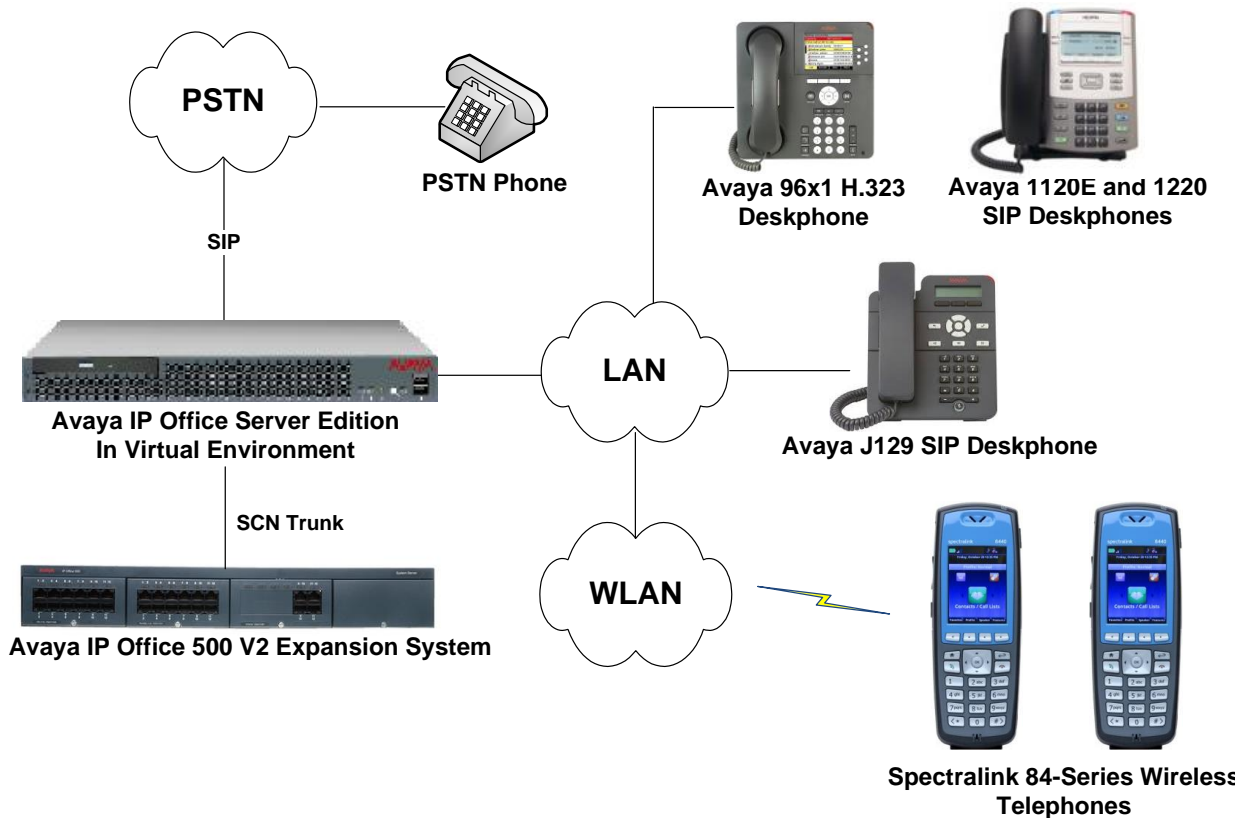
## 2.3. Support

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](mailto:technicalsupport@spectralink.com)

### 3. Reference Configuration

**Figure 1** illustrates a sample configuration consisting of Spectralink 84-Series Wireless Telephones with Avaya IP Office Server Edition and an Avaya IP Office 500 V2 Expansion System. The Spectralink wireless telephones and Avaya H.323/SIP Deskphones registered with Avaya IP Office Server Edition and Avaya IP Office 500 V2 Expansion System via SIP. An access point was used to provide the Spectralink wireless telephones with access to the converged 802.11 wireless network. In addition, FTP and DHCP servers were used to provide configuration data and IP network information to the Spectralink wireless telephones.



**Figure 1: Spectralink 84-Series Wireless Telephones with Avaya IP Office Server Edition**

## 4. Equipment and Software Validated

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

Equipment/Software	Release/Version
Avaya IP Office Server Edition	11.0 Build 849
Avaya IP Office 500 V2 Expansion System	11.0 Build 849
Avaya 9600 Series IP Deskphones	S3.280A (H.323)
Avaya 96x1 Series IP Deskphones	6.6506 (H.323)
Avaya J129 Deskphone	2.0.0.0.45 (45)
Avaya 1120E IP Deskphone	SIP 1120e.04.04.26.00
Avaya 1220 IP Deskphone	SIP 12x0.04.04.26.00
Spectralink 84-Series Wireless Telephones	5.6.1.2185

## 5. Configure Avaya IP Office Server Edition

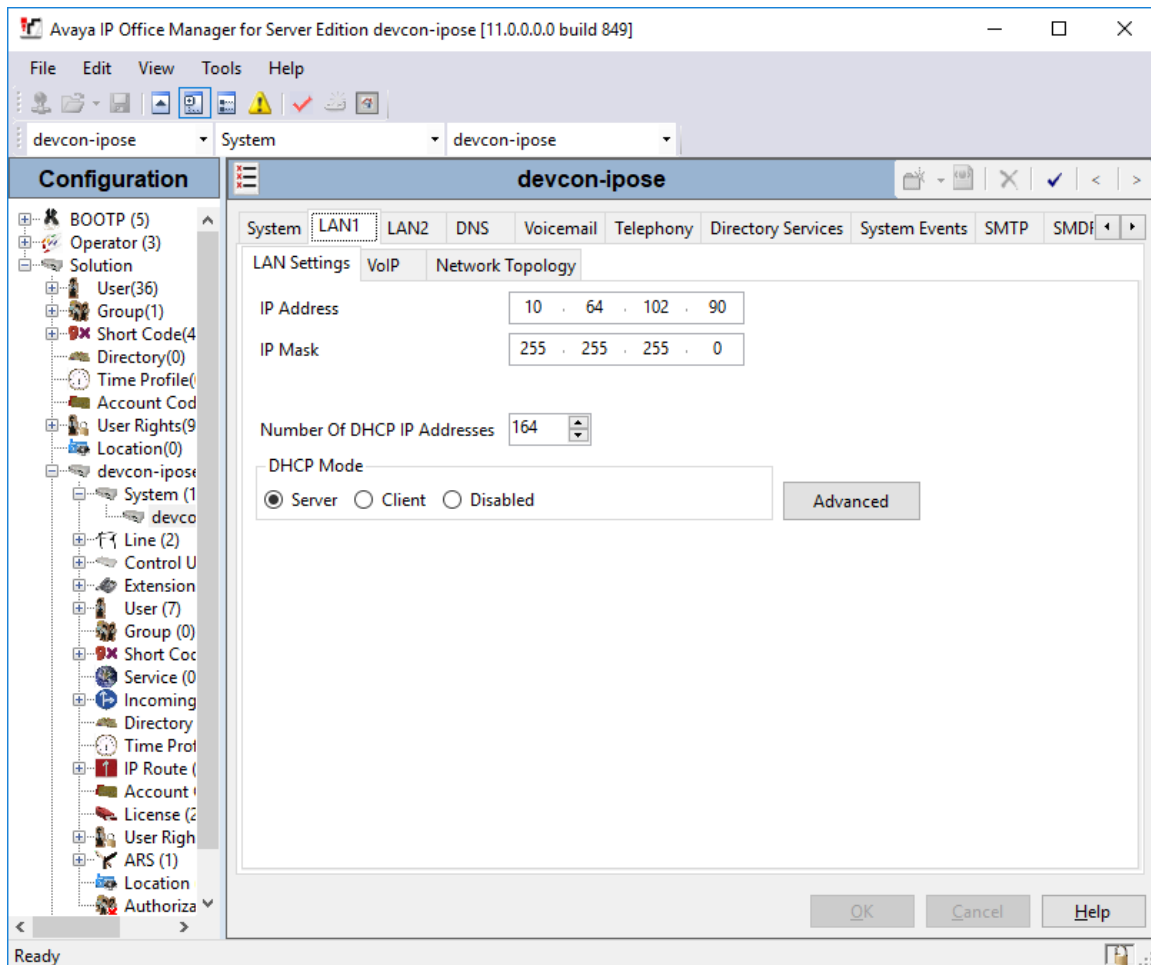
This section provides the procedures for configuring Avaya IP Office Server Edition. The procedures include the following areas:

- Obtain LAN IP address
- Administer SIP registrar
- Administer SIP extension for 84-series wireless telephone
- Administer SIP user for 84-series wireless telephone

**Note:** This section covers the configuration of Avaya IP Office Server Edition, but the configuration is the same for Avaya IP Office 500 V2 Expansion System.

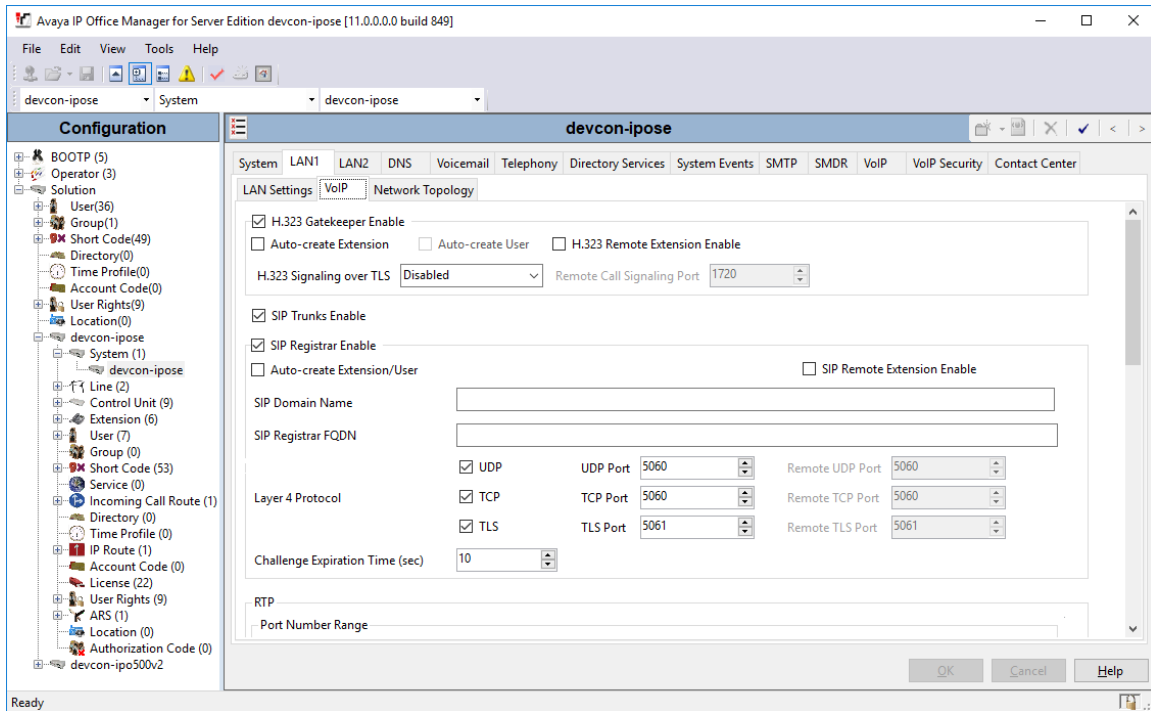
### 5.1. Obtain LAN IP Address

From the configuration tree in the left pane, select **System** to display the **System** screen for the IP Office Server Edition in the right pane. Select the **LAN1** tab, followed by the **LAN Settings** sub-tab in the right pane. Make a note of the **IP Address**, which will be used later to configure the *reg.1.server.1.address* parameter in the 84-series wireless telephones.



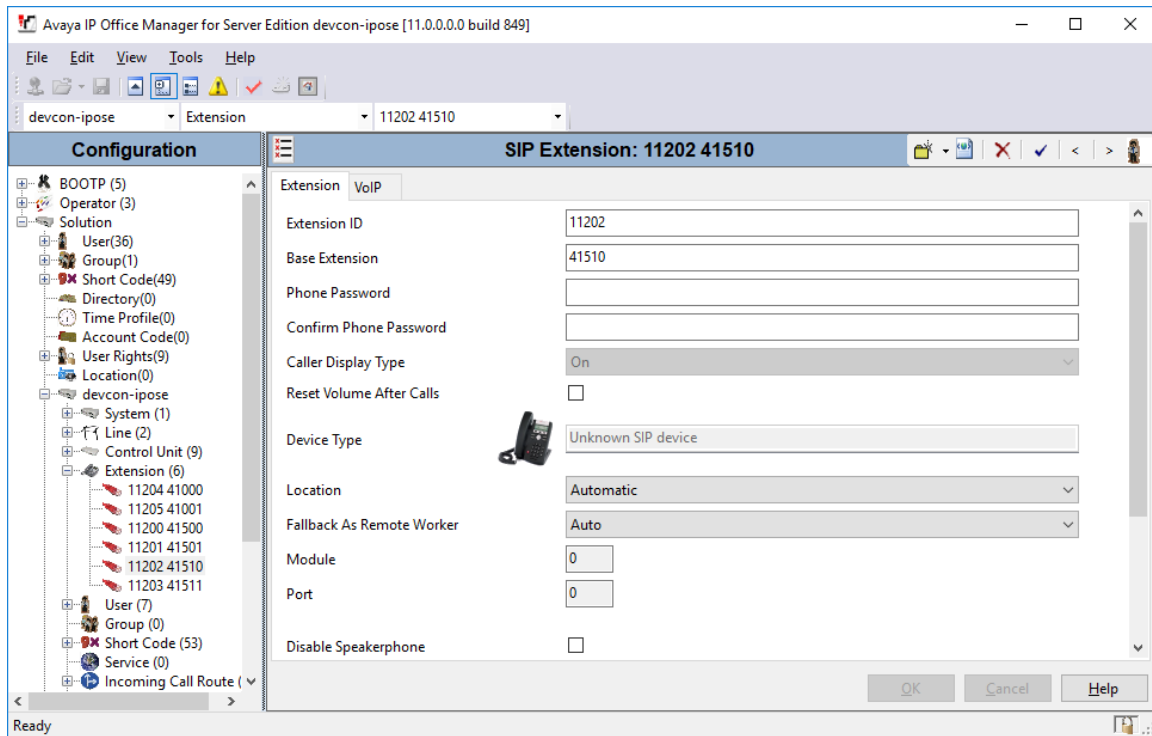
## 5.2. Administer SIP Registrar

Select the **VoIP** sub-tab. Ensure that **SIP Registrar Enable** is checked and enter a valid **Domain Name**. In the compliance testing, the **Domain Name** field was left blank so the LAN IP address was used.



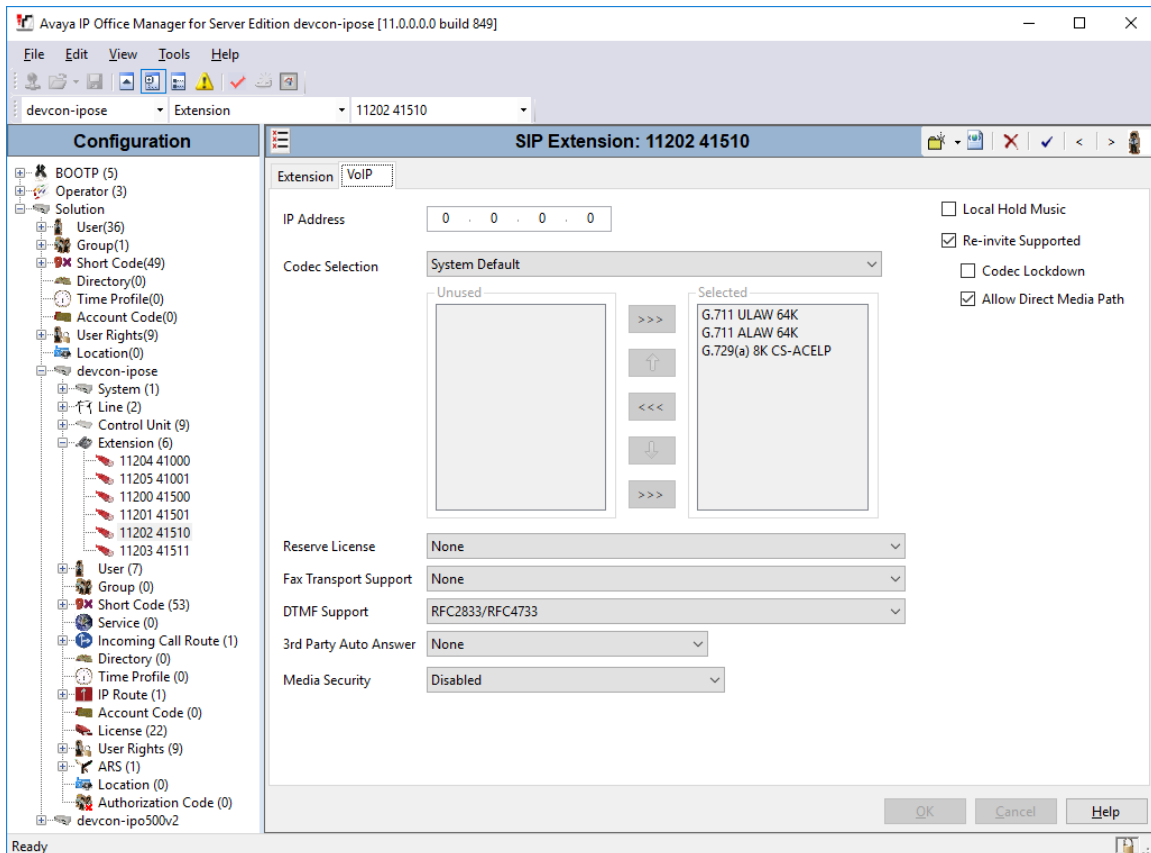
### 5.3. Administer SIP Extension for Spectralink 84-Series Wireless Telephone

From the configuration tree in the left pane, right-click on **Extension** and select **New → SIP** from the pop-up list to add a new SIP extension. Enter the desired extension for the **Base Extension** field as shown below. In this example, the 84-series wireless telephone was assigned extension **41510**. This is the extension that the 84-series wireless telephone will use to register with IP Office Server Edition.





Select the **VoIP** tab and retain the default values in the all fields. During the compliance test, 84-series wireless telephones were tested using G.711 and G.729 codecs. Enable **Allow Direct Media Path** so that audio/RTP flows directly between two SIP endpoints without using media resources in Avaya IP Office Server Edition.



## 5.4. Administer SIP User for Spectralink 84-Series Wireless Telephone

From the configuration tree in the left pane, right-click on **User** and select **New** from the pop-up list. Enter desired values for the **Name** and **Full Name** fields. For the **Extension** field, enter the SIP extension created above.

The screenshot shows the Avaya IP Office Manager for Server Edition configuration window. The left pane displays a configuration tree with the following structure:

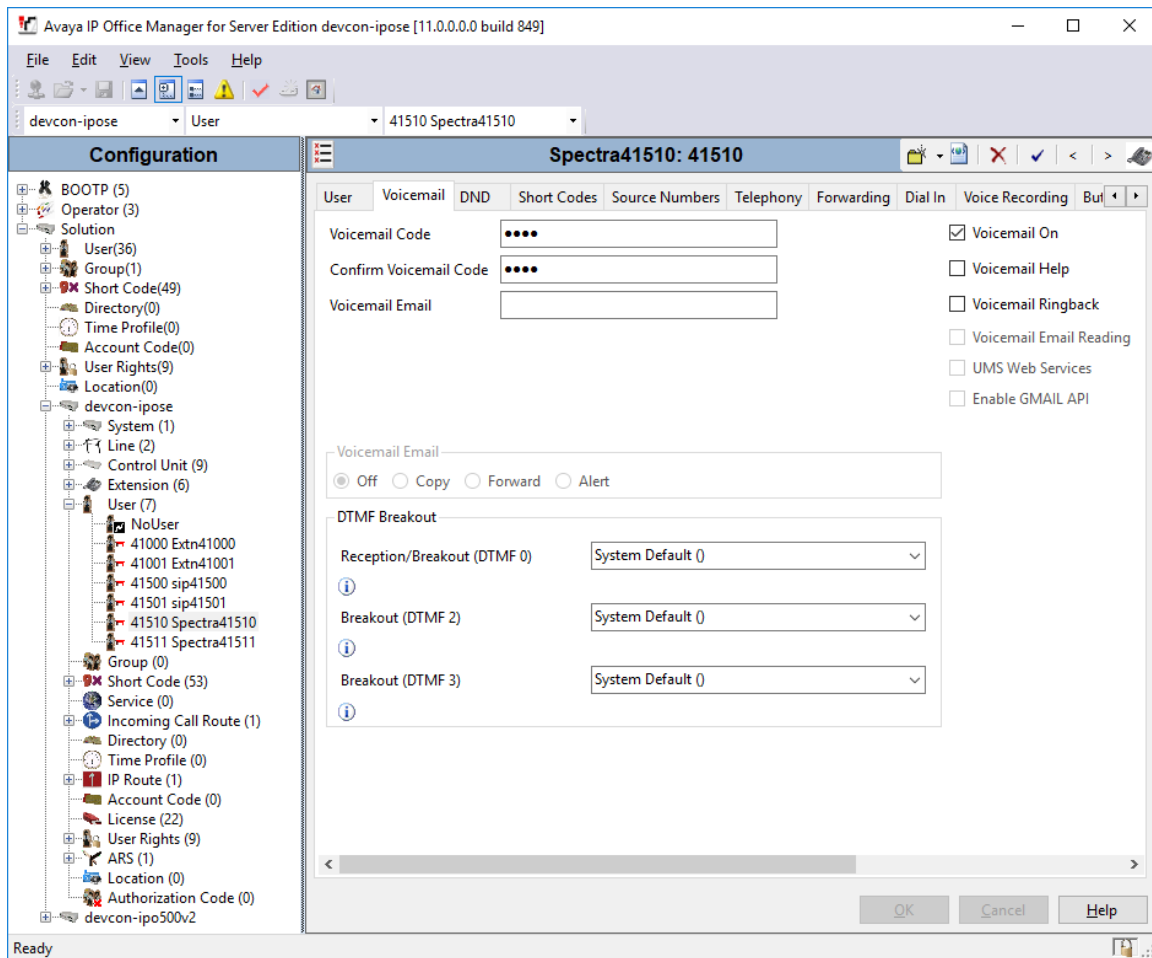
- BOOTP (5)
- Solution (3)
  - User (36)
    - Group (1)
    - Short Code (49)
    - Directory (0)
    - Time Profile (0)
    - Account Code (0)
    - User Rights (9)
    - Location (0)
  - devcon-ipose
    - System (1)
    - Line (2)
    - Control Unit (9)
    - Extension (6)
      - User (7)
        - NoUser
        - 41000 Extn41000
        - 41001 Extn41001
        - 41500 sip41500
        - 41501 sip41501
        - 41510 Spectra41510**
        - 41511 Spectra41511
      - Group (0)
      - Short Code (53)
      - Service (0)
      - Incoming Call Route (1)
      - Directory (0)
      - Time Profile (0)
      - IP Route (1)
      - Account Code (0)
      - License (22)
      - User Rights (9)
      - ARS (1)
      - Location (0)
      - Authorization Code (0)

The right pane shows the configuration for the selected user, **Spectra41510: 41510**. The tabs are: User, Voicemail, DND, Short Codes, Source Numbers, Telephony, Forwarding, Dial In, Voice Recording, and Button Programming. The **User** tab is active, showing the following fields:

- Name: Spectra41510
- Password:
- Confirm Password:
- Unique Identity:
- Conference PIN:
- Confirm Audio Conference PIN:
- Account Status: Enabled
- Full Name: Spectralink
- Extension: 41510
- Email Address:
- Locale:
- Priority: 5
- System Phone Rights: None
- Profile: Basic User
- ☐ Receptionist
- ☐ Enable Softphone
- ☐ Enable one-X Portal Services
- ☐ Enable one-X TeleCommuter
- ☐ Enable Remote Worker
- ☐ Enable Desktop/Tablet VoIP client
- ☐ Enable Mobile VoIP Client
- ☐ Send Mobility Email
- ☐ Web Collaboration
- ☐ Exclude From Directory
- Device Type: Unknown SIP device

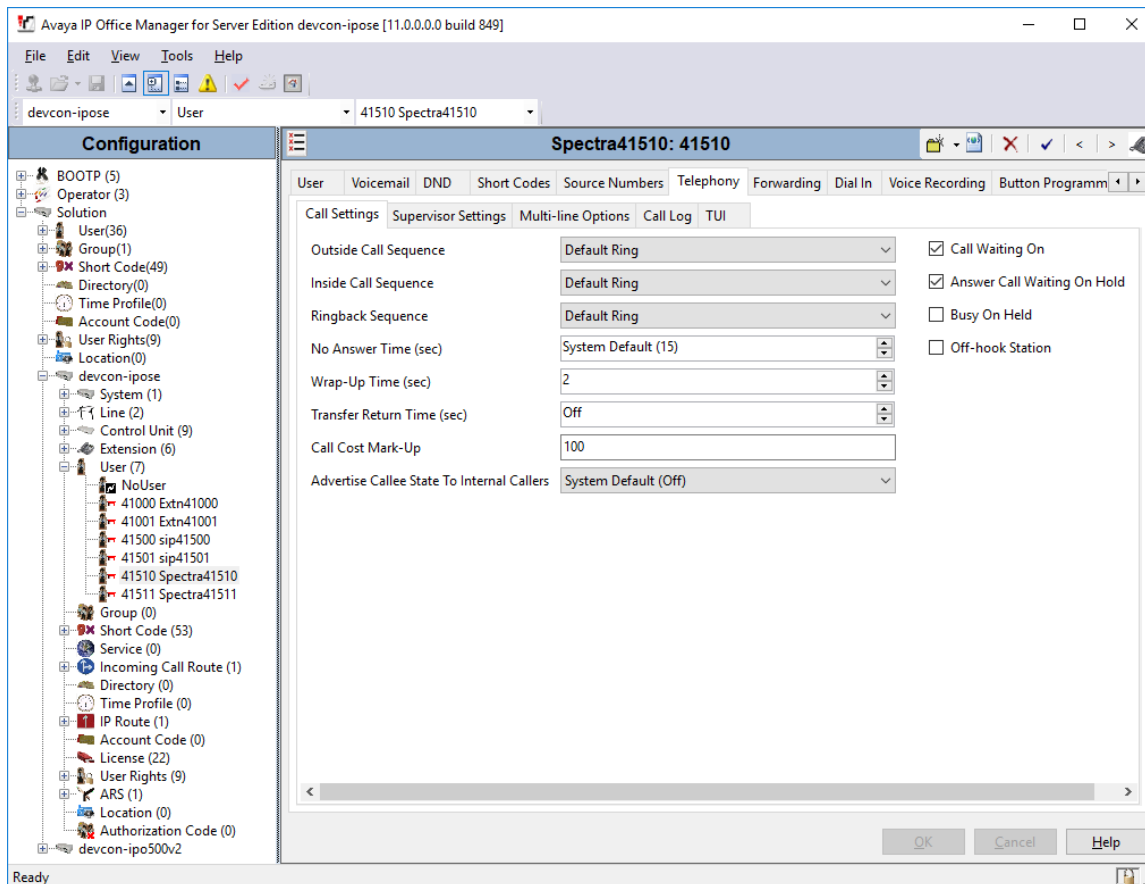
At the bottom of the window, there are buttons for OK, Cancel, and Help.

Select the **Voicemail** tab and select **Voicemail On** to enable voicemail for the 84-series wireless telephone.

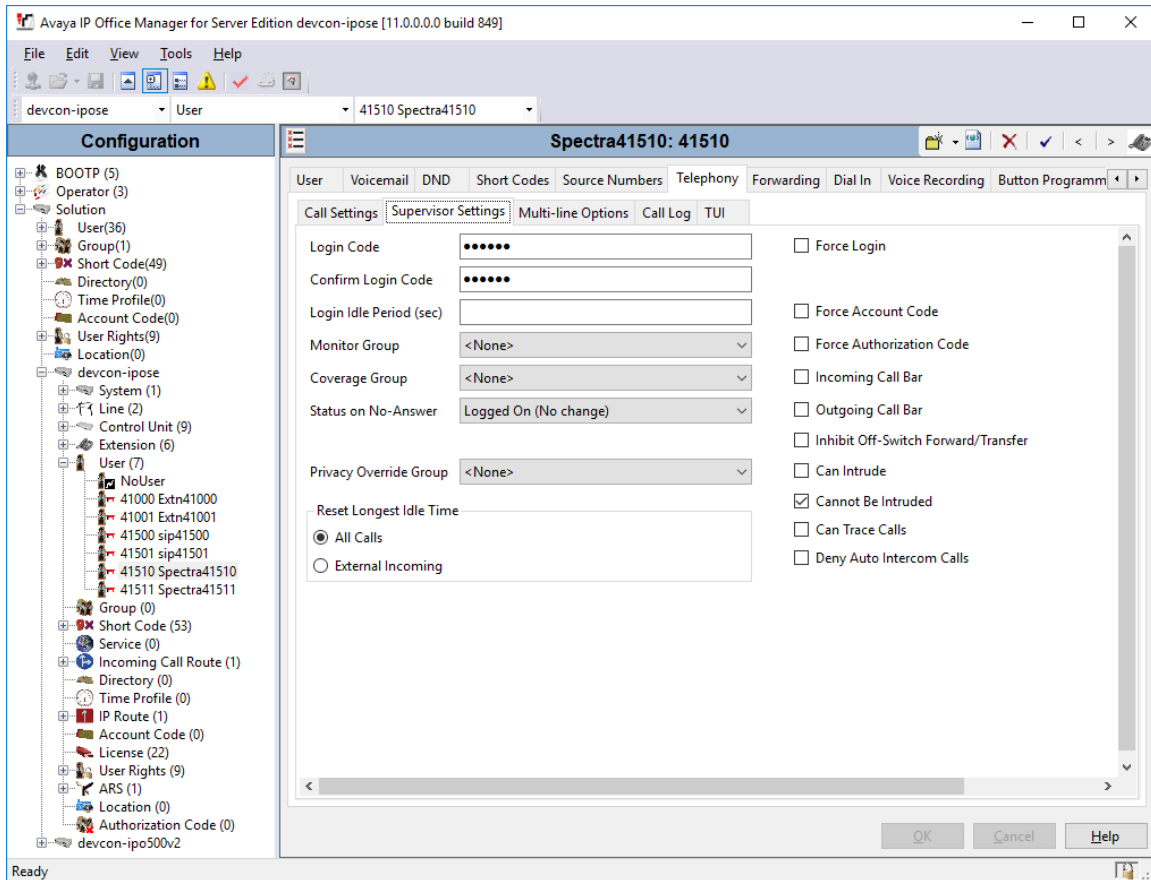


Select the **Telephony** tab followed by the **Call Settings** sub-tab. Note the settings below for the user.

**Note:** Call Waiting is required to allow a secondary incoming call to the Spectralink 84-Series Wireless Telephone; otherwise, a second incoming call will be denied.



Select the **Supervisor Settings** tab and enter a desired **Login Code**. The **Login Code** is the password that will be used by the 84-series wireless telephone to register with IP Office Server Edition. The value used in this field should be used to configure the *reg.1.auth.password* parameter in the 84-series wireless telephone.



## 6. Configure Spectralink 84-Series Wireless Telephones

This section covers the SIP configuration of the Spectralink 84-Series Wireless Telephones. Refer to [3] for more information on configuring the Spectralink 84-Series Wireless Telephones. The procedure covers the following areas:

- Configure DHCP Server
- Configure FTP Server (i.e., Provisioning Server)
- Edit 0000000000000000.cfg
- Edit <mac-address>-ext.cfg
- Edit site.cfg

### 6.1. 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)

### 6.2. Configure FTP Server (i.e., Provisioning 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 [3] 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 three required XML files are 0000000000000000.cfg, 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 telephone. These XML files are located in the folder specified in the FTP server configuration.

### 6.3. Edit 000000000000.cfg File

The 000000000000.cfg file specifies which parameter settings take precedence. For example, during the compliance test, the settings in the <mac-address>-ext.cfg files took precedence over settings in the site.cfg file as shown below. Note that the file listed first for the **CONFIG FILES** parameter takes precedence. The default settings were used for this file.

```
<?xml version="1.0" standalone="yes"?>
<!-- ***** -->
<!-- * Default Master SIP Configuration File for FLAT DEPLOYMENTS * -->
<!-- * -->
<!-- * This file is read by every handset at boot to specify where to load its * -->
<!-- * software from (APP_FILE_PATH), to specify the sequence in which to read* -->
<!-- * configuration files (CONFIG_FILES) and whether to store or retrieve * -->
<!-- * information in specific directories (server root by default) * -->
<!-- ***** -->

<MASTER_CONFIG>

<!-- You can specify a path with subdirectories to specify the location of the handset
software. -->
<!-- See the Deployment Guide for more information about setting up subdirectories. --
>

    <SOFTWARE
        APP_FILE_PATH="slnk84xx.sip.ld"
    />

    <!-- Information from files on the left overrides information from files to their
right -->
    <!-- [PHONE_MAC_ADDRESS]dynamically gets replaced by that handset's MAC address -->
    <!-- For FLAT DEPLOYMENT, create a <macaddress>-ext.cfg for each handset following
the -->
    <!-- template provided in this directory -->
    <CONFIGURATION
        CONFIG_FILES="[PHONE_MAC_ADDRESS]-ext.cfg, site.cfg"
    />

    <DIRECTORIES
        LOG_FILE_DIRECTORY=""
        OVERRIDES_DIRECTORY=""
        CONTACTS_DIRECTORY=""
        CALL_LISTS_DIRECTORY=""
    />

</MASTER_CONFIG>
```

## 6.4. Edit <mac-address>-ext.cfg Files

There will be one of these XML files per wireless telephone. 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. This file can also provide settings that should take precedence over the same setting in the `site.cfg` file. Edit the following parameters in each <mac-address>-ext.cfg file:

- **reg.1.address** Set to the SIP extension of the handset (e.g., *41510*).
- **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 IP Office.
- **reg.1.auth.password** Set to the SIP password used for SIP registration with IP Office.
- **msg.mwi.1.subscribe** Set to the SIP extension of the handset to subscribe to MWI.

**Note:** The **reg.1.server.1.address** parameter containing the IP Office IP address may also be set in this file if it needs to be different than the one specified in the `site.cfg` file. For example, if an 84-series wireless telephone needs to register with the IP Office 500 V2 Expansion System, instead of IP Office Server Edition, this parameter may be set to the IP Office 500 V2 Expansion System IP address.

```
<?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="41510"
        reg.1.label="41510"
        reg.1.displayName="41510"
        reg.1.auth.userId="41510"
        reg.1.auth.password="123456"
        msg.mwi.1.subscribe="41510">
      </TelephonyLine1>
      <!-- Additional lines: -->
      <!-- * -->
      <!-- Additional telephony lines can be added (reg.3, etc...) by copying the
TelephonyLine1 group above and -->
      <!-- editing appropriately-->
    </openSIPTelephony>
  </LineRegistration>
</handsetConfig>
```



## 6.5. 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 IP Office.
- **reg.1.server.1.transport** The default of UDP was used (not shown in file).
- **msg.mwi.1.callback** Set to the voicemail pilot number.

```
<openSIP>
  <SIPserver
    reg.1.server.1.address="10.64.102.90"
    reg.1.server.1.expires="300"/>
  <dialplan
    dialplan.impossibleMatchHandling="2"
    dialplan.digitmap=""
    dialplan.removeEndOfDial="0" />
  <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="*17"
  np.normal.alert.messageWaiting.tonePattern="silent">
</voicemail>
</openSIP>
```

## 7. Verification Steps

This section provides the tests that can be performed to verify proper configuration of the Spectralink 84-Series Wireless Telephone with Avaya IP Office Server Edition.

1. Verify that the Spectralink 84-Series Wireless Telephone has successfully registered with IP Office Server Edition. Launch **IP Office System Status** and navigate to **Extensions** → **<SIP Extension>**, where **<SIP Extension>** is the 84-series wireless telephone extension. Verify that the **Current State** is *Idle* as shown below.

The screenshot shows the Avaya IP Office System Status application window. The title bar reads "Avaya IP Office System Status - devcon-ipose (10.64.102.90) - IP Office Linux PC 11.0.0.0 build 849". The main window has a blue header with the Avaya logo and the title "IP Office System Status". Below the header is a menu bar with "Help", "Snapshot", "LogOff", "Exit", and "About". On the left is a navigation pane with a tree view containing "System", "Alarms (4)", "Extensions (6)", "Trunks (2)", "Active Calls", "Resources", "Voicemail", and "IP Networking Locations". The "Extensions (6)" folder is expanded, showing a list of extensions: 41000, 41001, 41500, 41501, 41510 (selected), and 41511. The main content area displays the "Extension Status" for extension 41510. It includes a list of configuration parameters and their values, such as "Extension Number: 41510", "IP address: 192.168.100.192", "Standard Location: None", "Registrar: Primary", "Telephone Type: Unknown SIP Device", "User-Agent SIP header: Spectralink-SL\_8440-UA/5.6.1.2185", "Media Stream: RTP", "Layer 4 Protocol: UDP", "Current User Extension Number: 41510", "Current User Name: Spectra41510", "Forwarding: Forward On Busy 41000", "Twinning: Off", "Do Not Disturb: Off", "Message Waiting: Off", "Number of New Messages: 0", "Phone Manager Type: None", "SIP Device Features: REFER,UPDATE", "License Reserved: No", "Last Date and Time License Allocated: 6/19/2018 2:29:13 PM", "Packet Loss Fraction:", "Jitter:", "Round Trip Delay:", "Connection Type:", "Codec:", and "Remote Media Address:". Below this list is a table with the following columns: "Call Ref", "Current State", "Time in State", "Calling Number or Called Number", "Direction", and "Other Party on Call". The table contains one row with the values: "", "Idle", "00:16:28", "", "", and "". At the bottom of the main content area are buttons for "Trace", "Trace All", "Pause", "Ping", "Call Details", "Print...", and "Save As...". The bottom status bar shows the time "2:45:42 PM" and the status "Online" with a small icon.

Call Ref	Current State	Time in State	Calling Number or Called Number	Direction	Other Party on Call
	Idle	00:16:28			

2. The registration status can also be checked on the Spectralink 84-Series Wireless Telephone by navigating to **Settings** → **Status** → **Lines**.
3. 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 IP Office Server Edition 11.0. The Spectralink 84-Series Wireless Telephones successfully registered with IP Office Server Edition and IP Office 500 V2 Expansion System 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](http://support.avaya.com).

[1] *Administering Avaya IP Office™ Platform Manager*, Release 11.0, May 2018.

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

[2] *Spectralink 84-Series Wireless Telephone User Guide*, 1725-86720-000 Rev: R, September 2017.

[3] *Spectralink 84-Series Wireless Telephone Administration Guide*, 1725-86984-000 Rev: W, September 2017.

[4] *Spectralink 84-Series Wireless Telephone Deployment Guide*, 1725-86724-000 Rev: W, March 2017.

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