



Avaya Solution & Interoperability Test Lab

Application Notes for SIP Softphone by QSC Q-Sys platform and Avaya IP Office R9.0 – Issue 1.0

Abstract

These Application Notes describe the procedures for configuring QSC Q-Sys platform SIP Softphone which was compliance tested with Avaya IP Office R9.0.

The overall objective of the interoperability compliance testing was to verify QSC Q-Sys platform SIP Softphone functionalities in an environment comprised of Avaya IP Office R9.0 and various Avaya H.323 and SIP Telephones.

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 procedures for configuring QSC Q-Sys platform (Q-Sys Core) and Q-Sys SIP Softphone which were compliance tested with Avaya IP Office R9.0. The Q-Sys Core and Softphone features are collectively referred in this document as the Q-Sys Softphone.

The Q-Sys Core is an Intel-based embedded Linux PC digital audio processor used for commercial installations. The Q-Sys Softphone feature of Q-Sys Core is completely virtual, requiring no additional hardware to function. The typical application of the Q-Sys Softphone is to provide a telephony endpoint to both conference rooms and wide-area paging. The Q-Sys Core product line runs on a range of Linux-based platforms, which handle audio Digital Signal Processing tasks and support very scalable input/output channel counts from small to large, either locally or across a Layer 3 infrastructure. The Q-Sys Softphone is a highly-configurable SIP-based telephone endpoint which, because of its component nature within the Q-Sys environment, is accessible from any Windows-based desktop, iOS device or using the TCP-based External Control Protocol.

These Application Notes assume that Avaya IP Office is already installed and basic configuration steps have been performed. Only steps relevant to this compliance test will be described in this document. For further details on configuration steps not covered in this document, consult references [1] and [2].

2. General Test Approach and Test Results

The general test approach was to place calls to and from the Q-Sys Softphone and exercise basic telephone operations. The main objectives were to verify the following:

- Registration
- Codecs (G.711MU, G729A and G.722)
- Inbound calls
- Outbound calls
- Hold/Resume, Call Transfer and Conferencing
- Call termination (origination/destination)
- Avaya Features using Short Codes
 - Call Park
 - Call Pickup
 - Call Forward (Unconditional, Busy/no answer)
 - Find Me
- Message Waiting Indicator (MWI)
- Voicemail
- Serviceability

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

The interoperability compliance test included features and serviceability. The focus of interoperability compliance testing was primarily on verifying call establishment on the Q-Sys Softphone. The Q-Sys Softphone operations such as inbound calls, outbound calls, hold/resume, transfer, conference, short code, and Q-Sys Softphone interactions with Avaya IP Office, and Avaya SIP, H.323, Analog and Digital telephones were verified. The serviceability testing introduced failure scenarios to see if Q-Sys Softphone can recover from failures.

2.2. Test Results

The test objectives were verified. For serviceability testing, Q-Sys Softphone operated properly after recovering from failures such as network disconnects, and resets of Q-Sys Softphone and Avaya IP Office.

The feature mentioned in **Section 2** worked successfully during compliance testing with the following exceptions, as these features are currently not supported by the Q-Sys Softphone:

- Call Hold/Resume
- Call Transfer
- Call Conference

- Call Park
- Message Waiting Indication (MWI) – Since this phone is sold as a conference room phone or for wide area paging, the MWI feature would not be required.
- G729A Codec

The following observations were made during the testing:

- If the silence suppression is turned on in the Q-Sys Softphone configuration within IP Office (**Section 5.4**), the far end audio gets clipped.
- For proper DTMF operation of the Q-Sys Softphone, the Acoustic Echo Cancellation component needs to be active in the audio path leading from room microphones to the Q-Sys Softphone's audio output. This is to prevent local DTMF playback from entering the outbound audio stream.

2.3. Support

Technical support on QSC Q-Sys can be obtained through the following:

North America:

Phone: 1-800-854-4079

Email: support@qsc.com

Web: <http://www.qsc.com/support>

3. Reference Configuration

Figure 1 illustrates a sample configuration consisting of an Avaya IP Office, Q-Sys Core and Softphone. For completeness, Avaya 1600 and 9600 Series H.323 IP Telephones, and Avaya 1100 and 1200 Series SIP IP Telephones are included in **Figure 1** to demonstrate calls with the SIP-based Q-Sys Softphone.

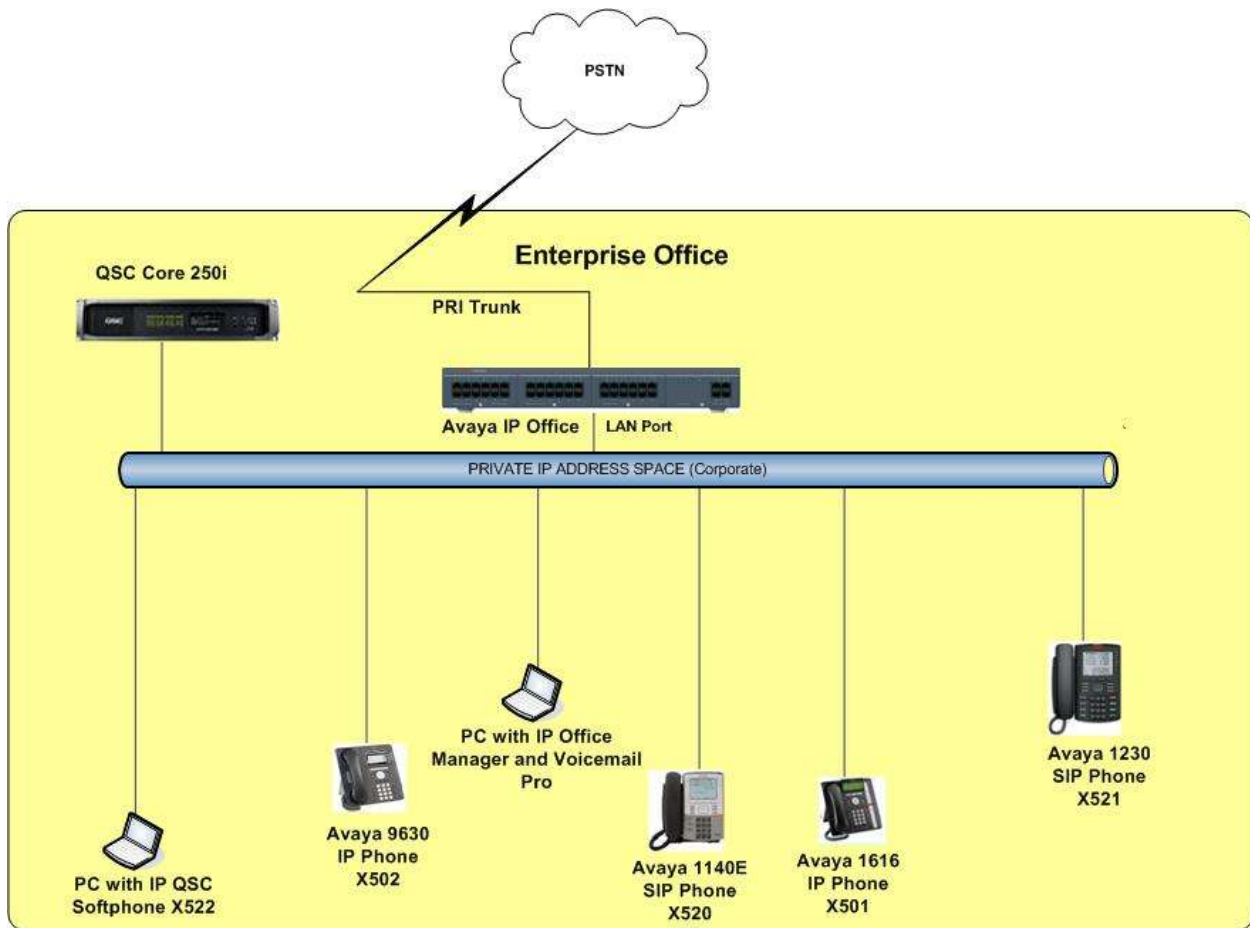


Figure 1: Test Configuration of Q-Sys Core and Softphone with Avaya IP Office

4. Equipment and Software Validated

The following equipment and software were used for the test configuration.

Equipment	Software/Firmware
Avaya IP Office 500 V2	9.0 SP5
Avaya IP Office Manager	9.0 SP5
Avaya IP Office Voicemail Pro	9.0 SP5
Avaya 9600 Series H.323 Deskphones	
96x0	3.2.0
96x1	6.3.0
Avaya 12x0 Series SIP Phones	4.3.18
QSC Q-Sys Designer	4.1.27
QSC Q-Sys Core 250i	4.1.27
QSC Q-Sys Softphone	4.1.27

Note: Testing was performed with IP Office 500 v2 R9.0, but it also applies to IP Office Server Edition R9.0. Note that IP Office Server Edition requires an Expansion IP Office 500 v2 R9.0 to support analog or digital endpoints or trunks. IP Office Server Edition does not support TAPI Wave or Group Voicemail.

5. Configure Avaya IP Office

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

- Verify IP Office license
- Obtain LAN IP address
- Administer SIP registrar
- Administer SIP extensions
- Administer SIP users

These steps are performed from the Avaya IP Office Manager.

5.1. Verify IP Office License

From a PC running the Avaya IP Office Manager application, select **Start → All Programs → IP Office → Manager** to launch the Manager application. Select the proper IP Office system if there are more than one IP Office system, and log in with the appropriate credentials.

The Avaya IP Office Manager screen is displayed. From the configuration tree in the left pane, select **Licence → 3rd Party IP Endpoints** to display the Avaya IP endpoints screen in the right pane. Verify that the **Status** field is set to **Valid**. The total number of valid **3rd Party IP Endpoints** must equal or exceed the number of simultaneous Q-Sys Softphones which will be registered.

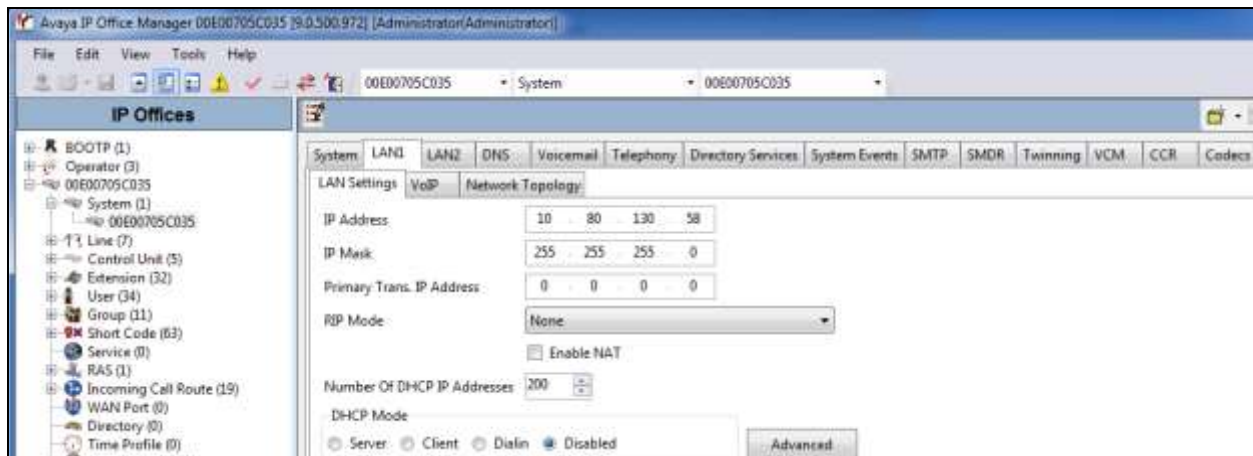


Feature	License Key	Instances	Status	Expiry Date	Source
Unused (1)	yGNTmo@7vFLj@_uQK6LvoEYjgM9v0SSC	255	Valid	Never	ADX Nodal
CTI Link Pro	V8bq29WVWz2x88bEbnabkDvWp7LH	255	Valid	Never	ADX Nodal
Wave User	VAYNTGmbu7V0hnhH7pLkEdVxmVz2u	255	Valid	Never	ADX Nodal
Integrated Messaging	uGeeF3L2QyR0D0u4a7C5wpGdJNvwmM	255	Valid	Never	ADX Nodal
Preferred Edition (Voicemail Pro)	uv0w4Zc2td5MjKcdJWdfeEPTdEjVgqOH	255	Valid	Never	ADX Nodal
Microsoft CRM Integration (agent)	yAqB3PvPvKJFDuctFntwIqkQmptm8	255	Valid	Never	ADX Nodal
CCC Spectrum Wallboards	uK2UBW6B84hD0QHET_JL5VQdVYMSB	255	Valid	Never	ADX Nodal
Phone Manager Pro	BTmbH4LDQ0h5OpLx5Bqpc5BclVagcmC	255	Valid	Never	ADX Nodal
Phone Manager Pro IP Audio Enab...	y3dN@h3VOKbwWoxoR5AhVQ9RqBj	255	Valid	Never	ADX Nodal
Compact Business Centre	ehWP231D0JM9VTCyCv76Qr59A8cB_9	255	Valid	Never	ADX Nodal
CCC Server	wW0@8LW3wFHDQWwqkDRpmt@9d5	255	Valid	Never	ADX Nodal
CCC Agents	aqKT7_V8Dtp4S8xyg6dIL74F1dggwuZl	255	Valid	Never	ADX Nodal
CCC PC Wallboards	ShnD8pVedh5N6SetpnyBUo7d72P8y9	255	Valid	Never	ADX Nodal
CCC Supervisors	14D5n_J1LlAk_ScBj07r0pPvgIeJ8L	255	Valid	Never	ADX Nodal
Receptionist	UWteFXYvWQwmvJ2c@9c7XaBpww7JC	255	Valid	Never	ADX Nodal
aBLF	gtUaemLVBH0QpmKCb442560uukDW	255	Valid	Never	ADX Nodal
Preferred Edition Additional Voice...	50hgud5Ev3uXbz20WBN_ockUQ@uV8TQ	255	Valid	Never	ADX Nodal
CCC Designer (users)	FUHtgGmmrNTshUpnKjaulJusVNDp0F9	255	Valid	Never	ADX Nodal
CCC Agent Restarting	8kcy4P8w05wKocVW6d1sbTQhW7Me	255	Valid	Never	ADX Nodal
3rd Party IP Endpoints	yWk_qk@W5A6aZ7Raa@pD_yAAdhM6M	255	Valid	Never	ADX Nodal
Phone Manager Pro (per seat)	3GBmvd05v5JDSwm4PCBzJZM6CjWd	255	Valid	Never	ADX Nodal
CCC Email	GQ2nuPvWVDH2LwATank532cxdpBjW	255	Valid	Never	ADX Nodal
CCC Chat	RqGNKmqm8D1E5TREpAqQpCam8vYhm	255	Valid	Never	ADX Nodal
AUDIX Voicemail	gatz38oT8G6FDgD5v6Me6vLuzEd9	255	Valid	Never	ADX Nodal
VMPro Networked Messaging	8yQd4qpdtaIamEGicJGmmN4NeWLL8	255	Valid	Never	ADX Nodal
VMPro Database Interface	3TTv_ams5JEGORIQWm@_WJQON0KEPw	255	Valid	Never	ADX Nodal
VMPro VS Script	Pd8B8@PFC_FyBHzSpE_HEZyubR2W	255	Valid	Never	ADX Nodal
VMPro Recordings Administration	byCDEUmt8Om9pm83kx8P9KmsW25	255	Valid	Never	ADX Nodal
VMPro Outlook Interface	o3nTBTdp5dID@AQZnv95gIvye4g_SPLH	255	Valid	Never	ADX Nodal
VMPro TTS (ScanSoft)	RTakqJddjyulH4ET6suH8WqKypW8L	255	Valid	Never	ADX Nodal
VMPro TTS (Genetic)	yKmbh6uAQm6dLQWmWY3_Yczwlp8	255	Valid	Never	ADX Nodal
IPSec Tunneling	DHCouL2EJjeGdV4qg_x_AEP983vmlC	255	Valid	Never	ADX Nodal
Proactive Reporting	lvQ7yK5tL DGSXNRUw8d6vdu@8wE@C	255	Valid	Never	ADX Nodal
Report Viewer	z9R8@r8QNGTAWwh70v8KvJosoPB_c	255	Valid	Never	ADX Nodal
Mobility Features	CITx_8yL9SH-KM54Hs_3g0_OG5F_S6H	255	Obsolete	Never	ADX Nodal
BS90 Voice Networking Channels	BTt8hT7d4k6vCC6V7Cv8wAB6C6deu8	255	Valid	Never	ADX Nodal

5.2. Obtain LAN IP Address

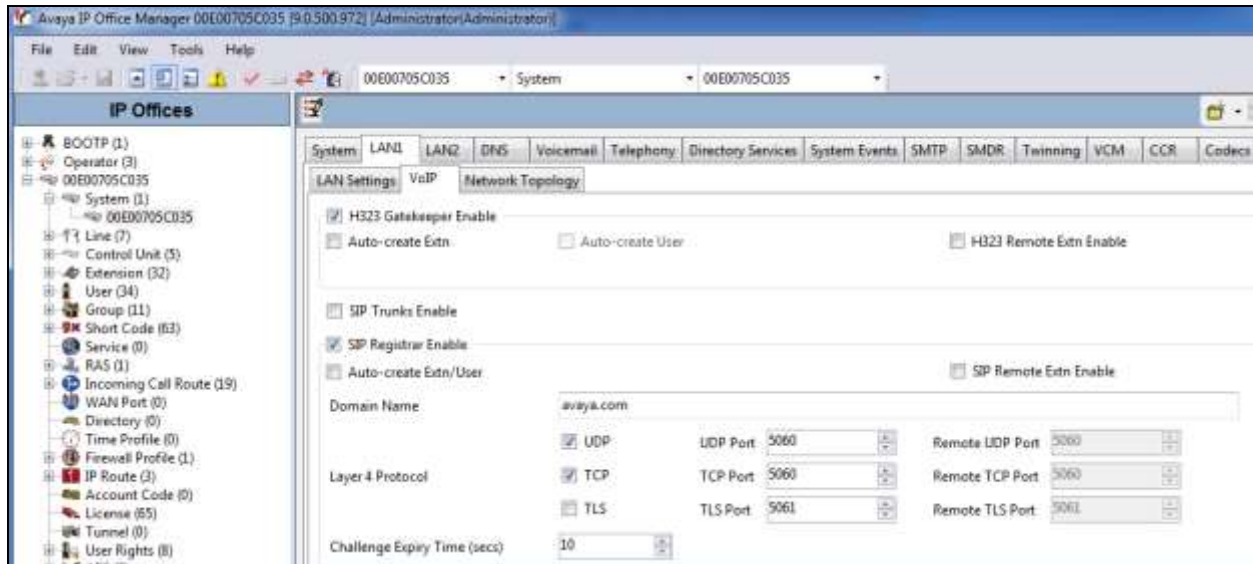
From the configuration tree in the left pane, select **System** to display the System screen in the right pane. Select the **LAN1** tab, followed by the **LAN Settings** sub-tab in the right pane. Make a note of the **IP Address**, which will be used later to configure Q-Sys Core.

Note: During the initial configuration of Avaya IP Office, the LAN1 was configured on the private network side and LAN2 was configured on the public network side. Avaya IP Office can support SIP extensions on the LAN1 and/or LAN2 interfaces, but the compliance test used the LAN1 interface. Thus, only the LAN1 configuration will be discussed in these Application Notes.



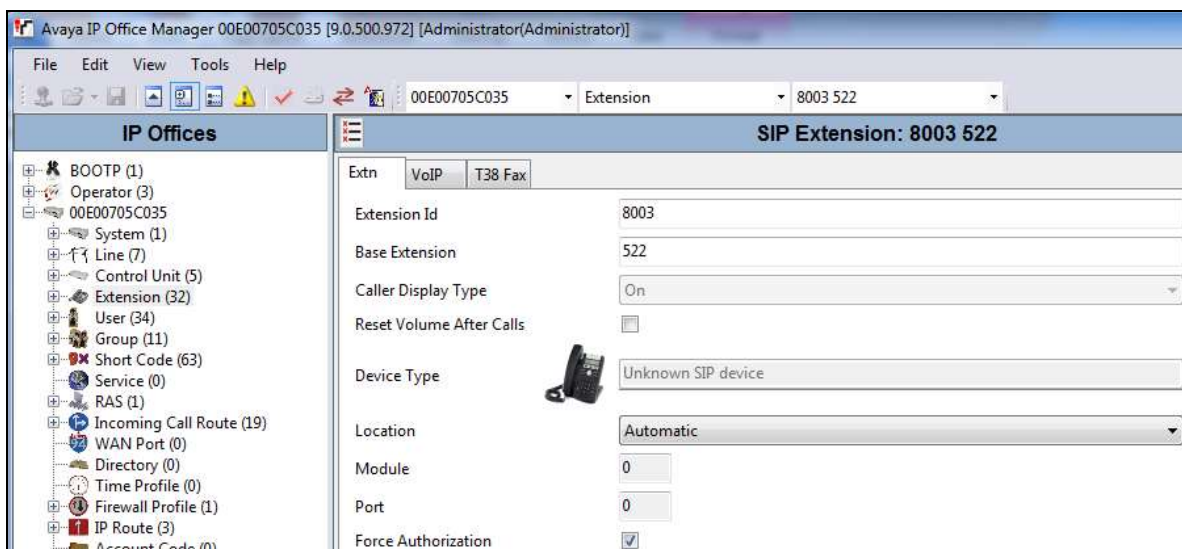
5.3. Administer SIP Registrar

Select the **VoIP** sub-tab. Ensure that **SIP Registrar Enable** is checked, as shown below. In the compliance testing, the **Domain Name** field was set to **avaya.com**. If the **Domain Name** field is left blank, then the SIP endpoints will use the LAN IP address for registration.

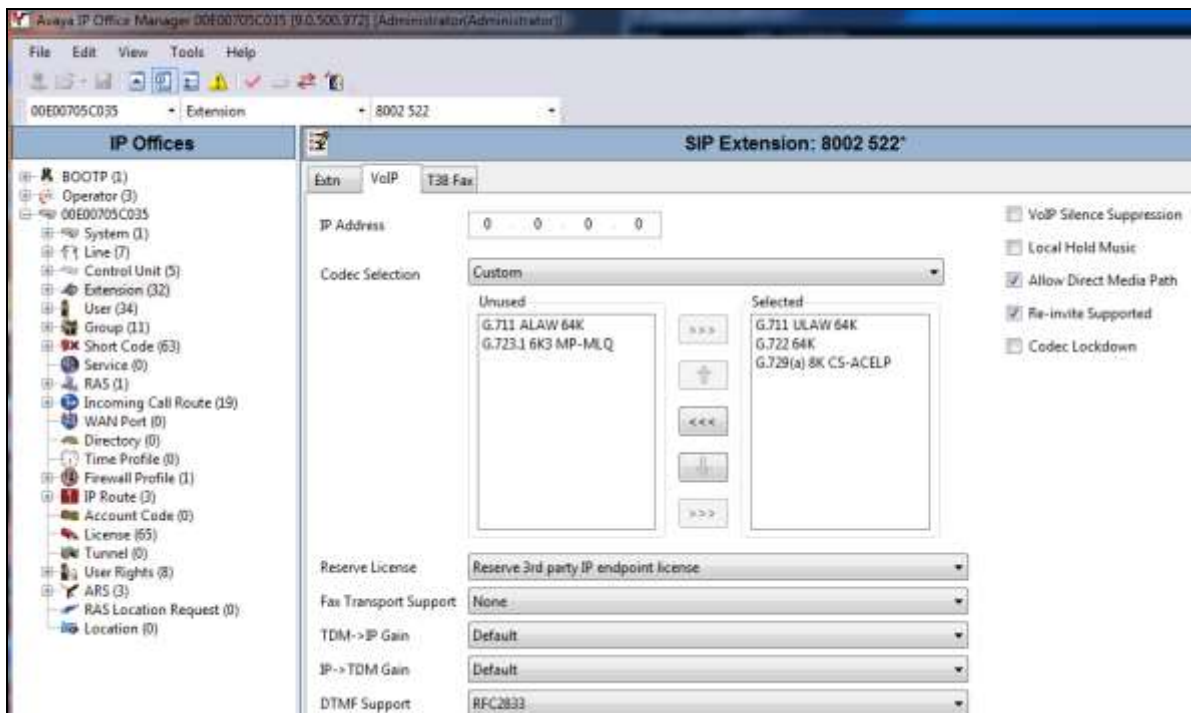


5.4. Administer SIP Extensions

From the configuration tree in the left pane, right-click on **Extension** and select **New → SIP Extension** from the pop-up list (not shown) to add a new SIP extension. Enter the desired digits for the **Base Extension** field, and retain the default check in the **Force Authorization** field as shown below.



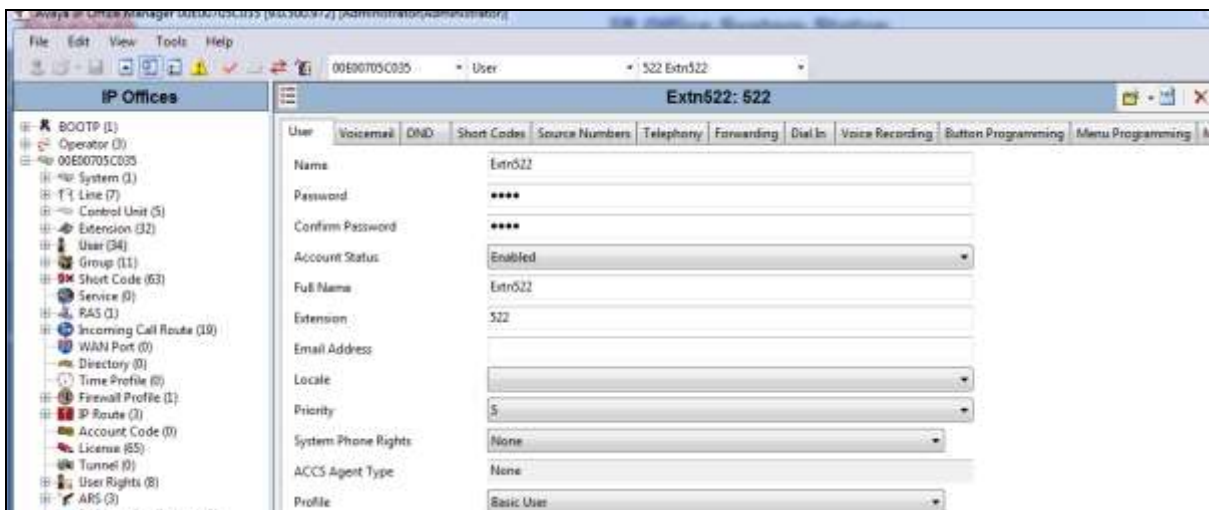
In the following screen, make sure that **VoIP Silence Suppression** box is unchecked. See **Section 2.2** for an explanation.



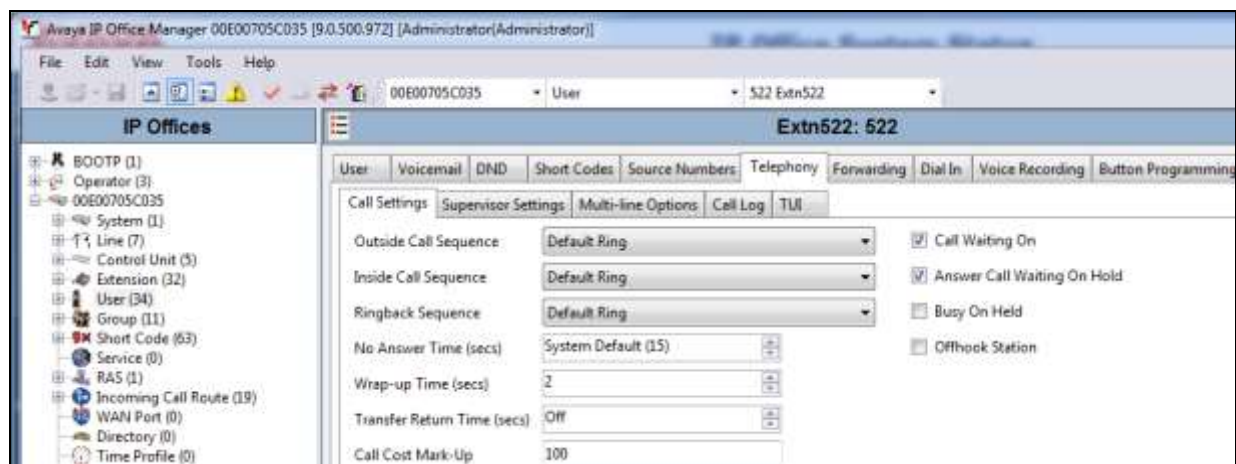
Repeat this step to add a new SIP extension for each Q-Sys Softphone. During the compliance test, extensions 522 and 523 were created for two Q-Sys Softphone instances.

5.5. Administer SIP Users

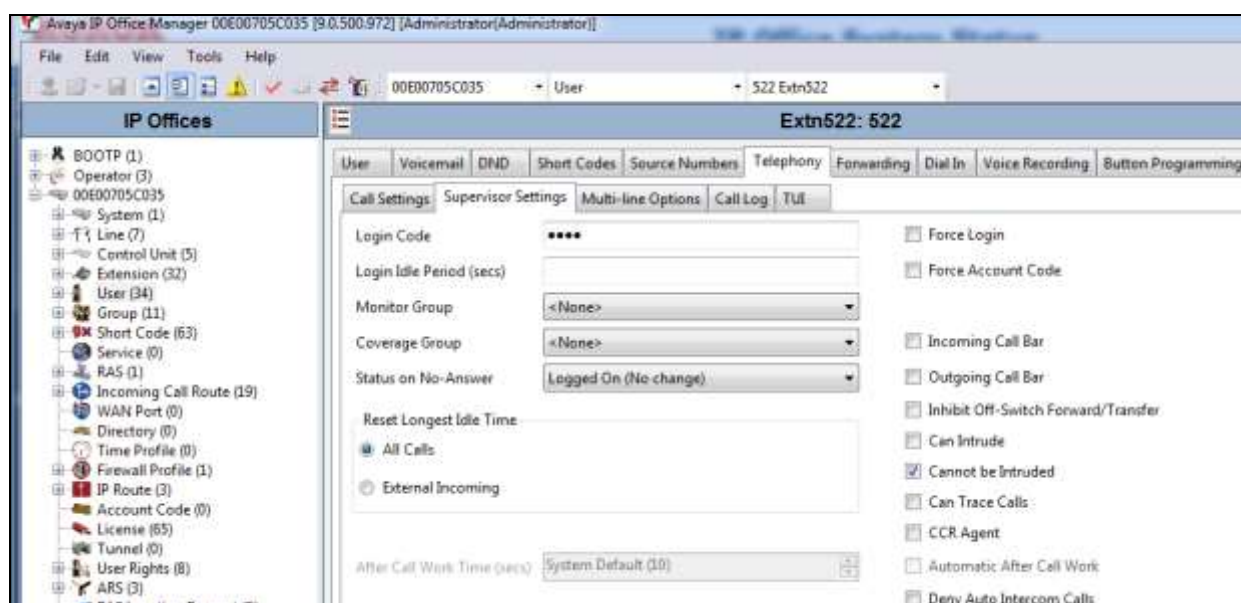
From the left pane, right-click on **User**, and select **New** from the pop-up list (not shown). Enter the desired values for the **Name** and **Full Name** fields. For the **Extension** field, enter the SIP extension created in **Section 5.4**.



Select the **Telephony** tab, followed by the **Call Settings** sub-tab. Check the **Call Waiting On** field, as shown below.



Select the **Supervisor Settings** tab, and enter a desired **Login Code**. This code will be used as a password for Q-Sys Softphone.



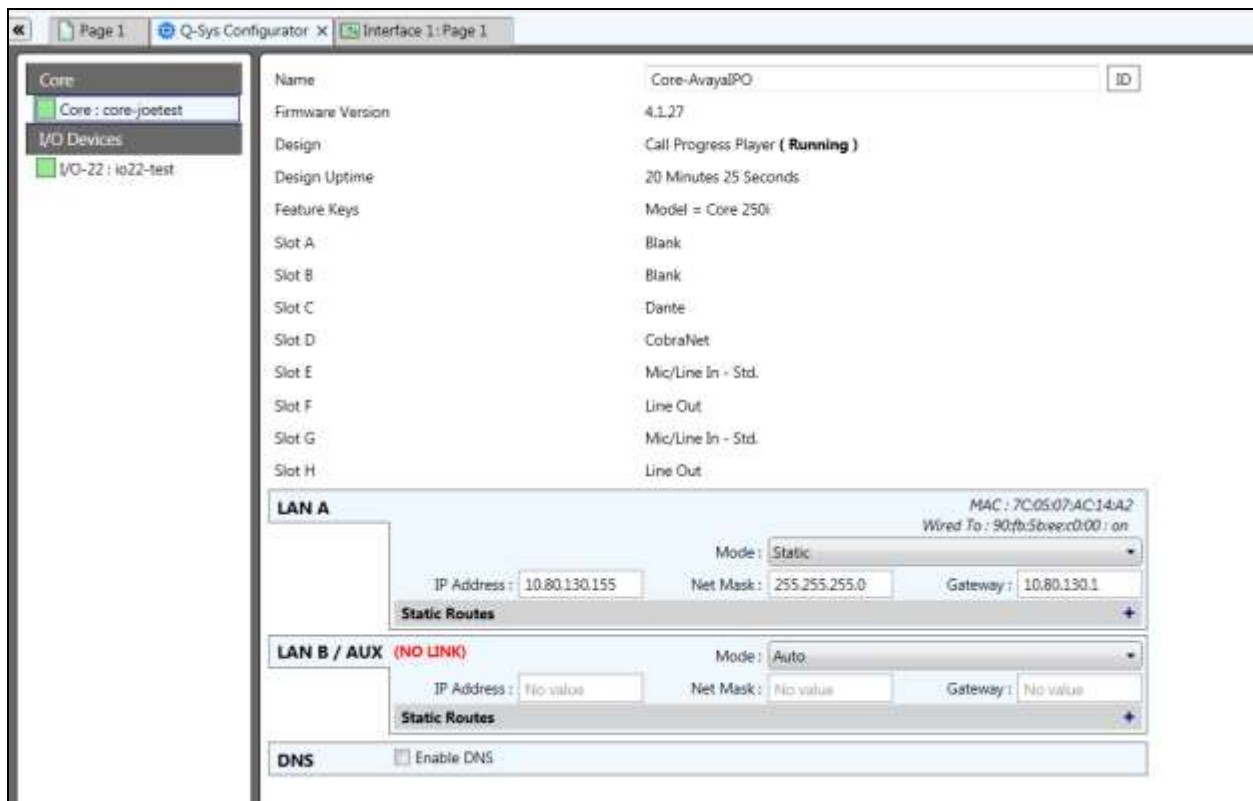
Repeat this step for each SIP extension to be configured in **Section 5.4**.

6. Configure QSC Q-Sys Core and Q-Sys Softphone

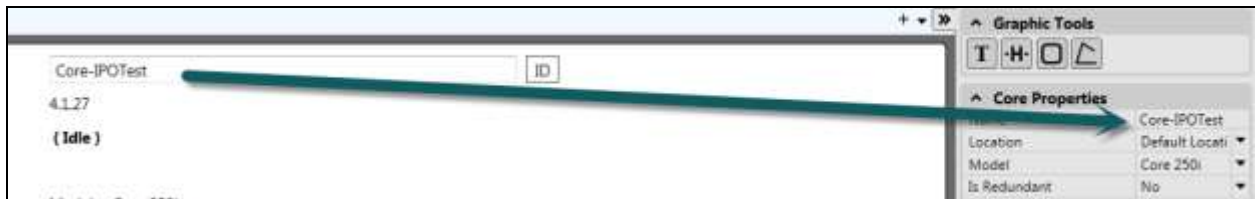
Run the Q-Sys Designer 4.1 software on a Windows desktop. Select **Tools** → **Show Q-Sys Configurator**.



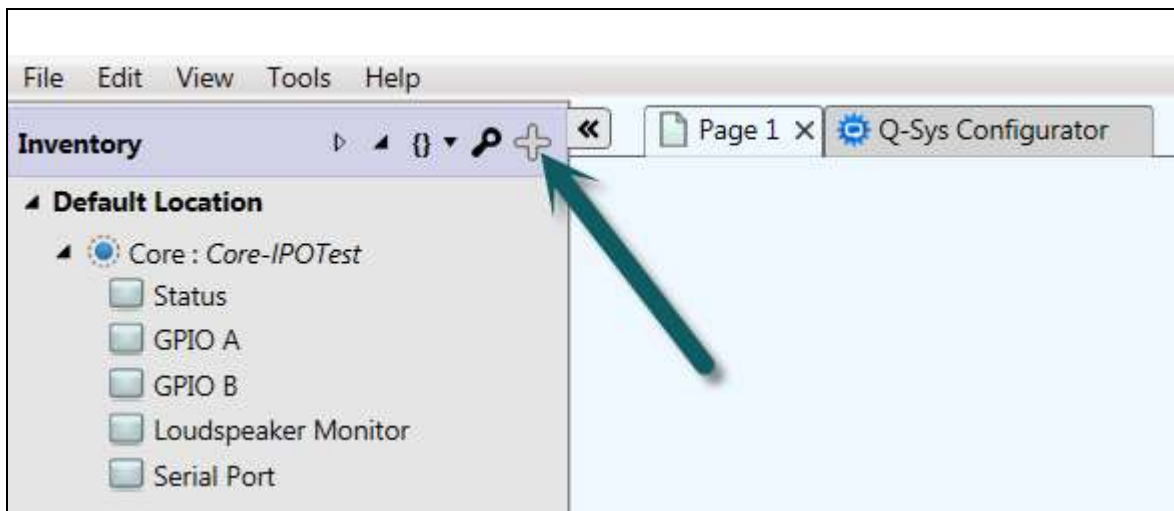
Select the Core model being configured for Softphone usage from the list of discovered Cores in the left column of the Q-Sys Configurator. Set the appropriate network settings on the network interface used to connect to IP Office. **LAN A** is often used for connection to Q-Sys peripherals, so the **AUX** port is often chosen to isolate VoIP traffic from other Q-Sys audio and control traffic. End user can configure any network interface for use with IP Office. For this testing, **LAN A** was chosen and configured as shown below. After configuring the network settings, click the **Update Settings** button.



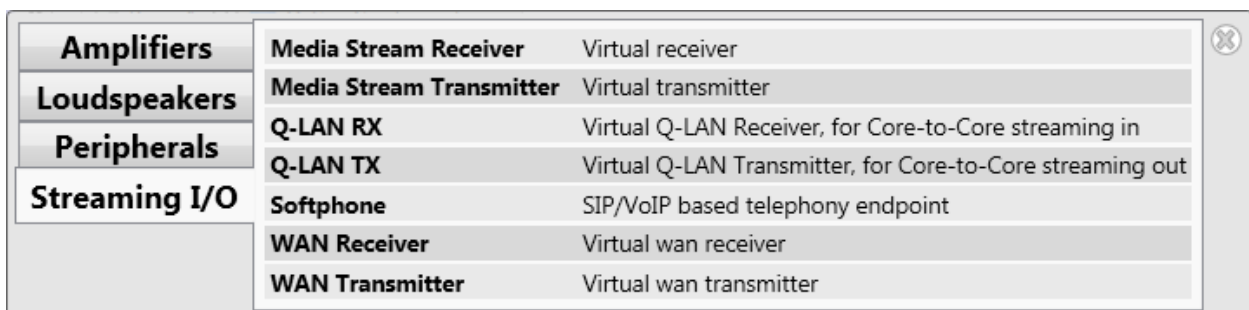
Copy the Core name from the Configurator to the Core Property name and choose the proper model.



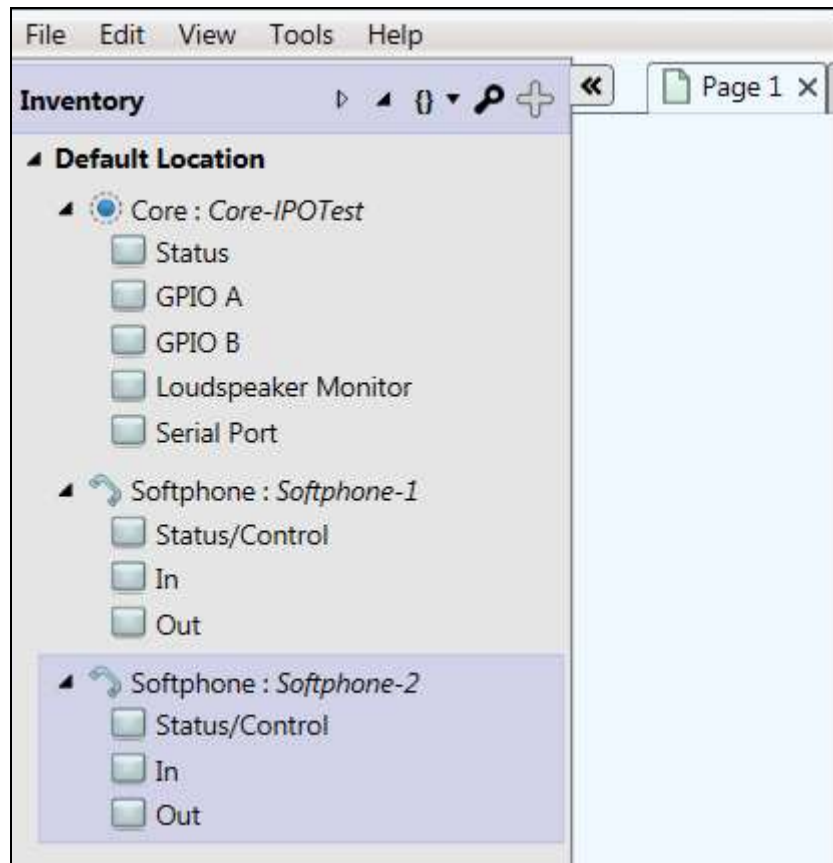
In the far left column of Q-Sys Designer, click on plus sign to add a Softphone instance to the current design file.



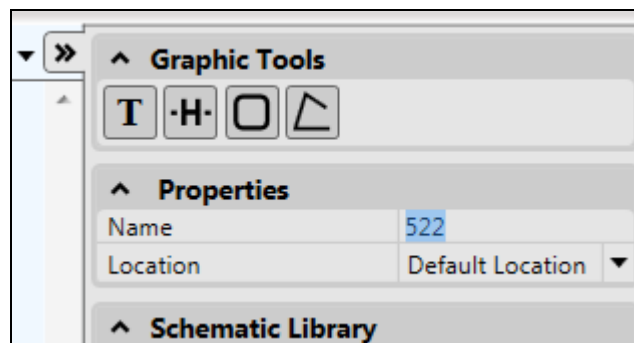
The **Add Inventory Item** menu will appear to the right of the plus button showing all of the items available to add to the design. Navigate to and click **Streaming I/O → Softphone** to insert a Softphone instance to the Inventory list. The **Add Inventory Menu** disappears. Follow the same steps to add additional items to the design as needed.




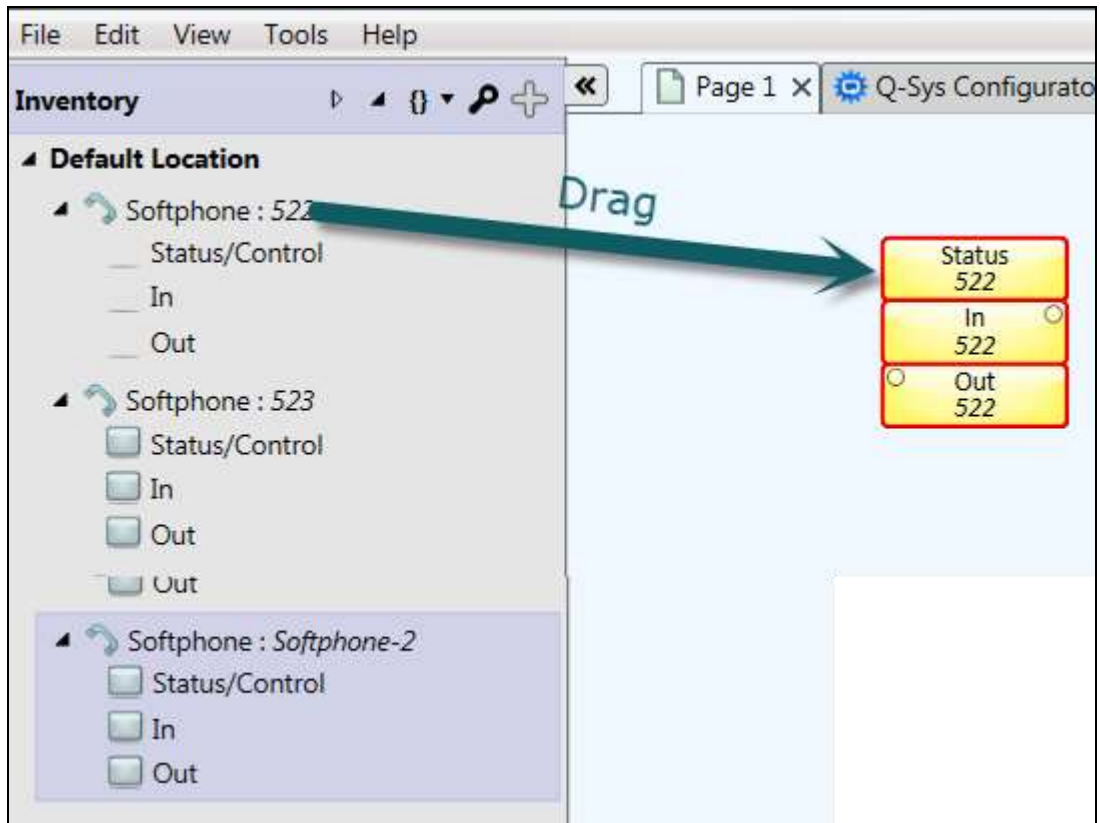
This screenshot shows two softphones were added to the Inventory list of the design file.



Softphone parameters should be added by first selecting a Softphone instance in the Inventory Item list and changing the values in the **Properties** section to the right side of the Q-Sys Designer user interface. The following screenshot shows that the Name property has been changed to represent the desired IP Office extension number. This step is necessary to ensure that the SIP URI in messages exchanged with IP Office are formatted correctly:

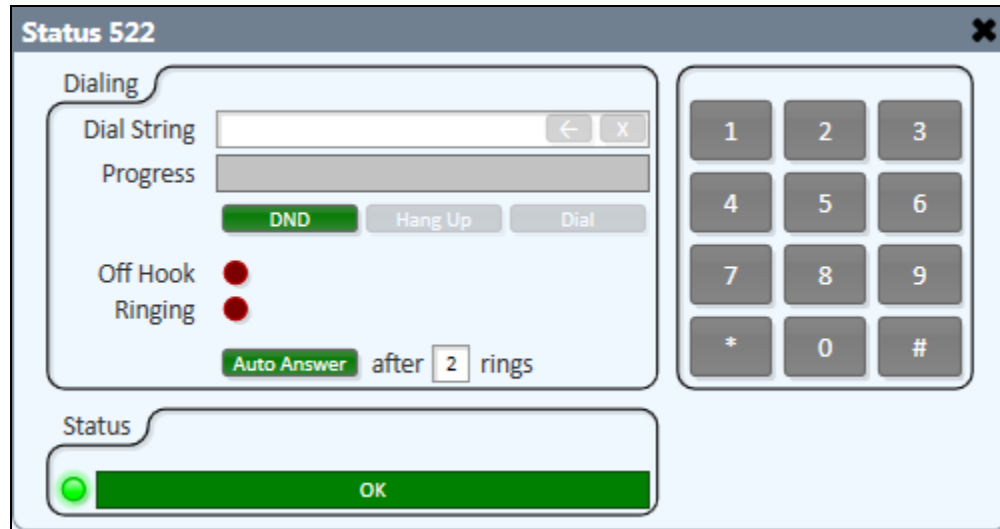


From the Inventory list, drag the individual components of the Softphone into the work area by clicking on the  icon. Alternately, click on the Softphone name and drag into the work area to place all three sub-components into the design at one time (as shown below).

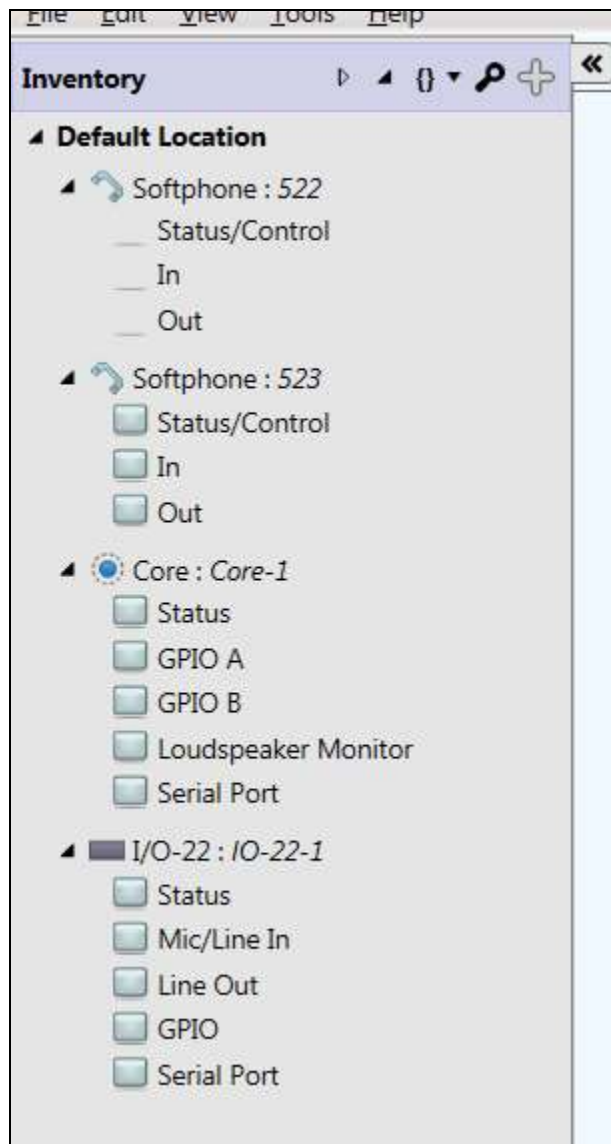


The three sub-components each Softphone instance provides are the following:

- **Status/Control** – this block contains the user interface for the dialpad, off/on hook, redial, auto-answer, local do-not-disturb (not the IP Office Do Not Disturb). Overall Status and call progress blocks, Off Hook and Ringing LEDs are provided for creating user interfaces for monitoring.
- **In** – brings the incoming telephony audio into the Q-Sys design for routing as an audio source (Audio from IP Office)
- **Out** – receives the audio from the Q-Sys design which is intended to be sent as telephony audio (Audio to IP Office).

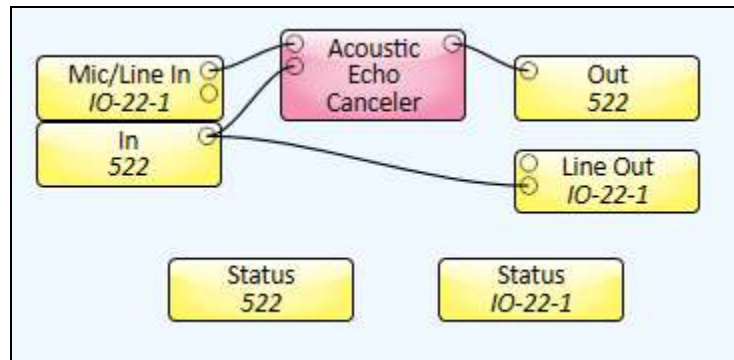


Add any additional Input/Output peripherals to the design using the + icon. In this example, an **I/O-22** was selected but any card-based or remote Q-Sys I/O peripheral for microphone input(s) and amplified speaker outputs can be used.

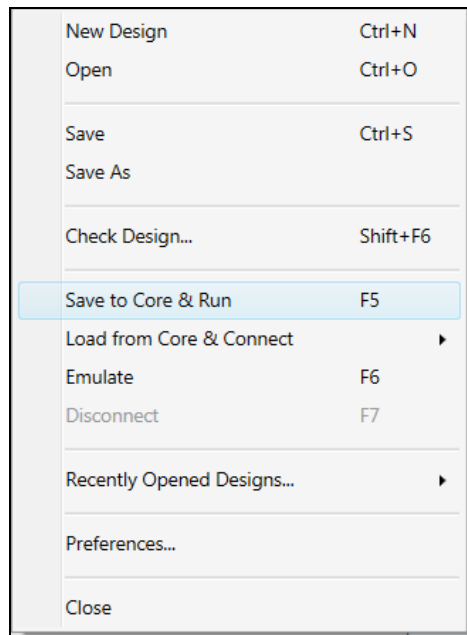


Add the I/O components to the design by dragging, then “wire” them similarly to the softphone as shown below. To draw a wire between components, click within an audio pin circle and then drag the mouse and release the mouse button over another appropriate pin (outputs to inputs).


An Acoustic Echo Canceller audio component should be included in the telephony signal path. This component is necessary in order to cancel any far-end audio or local DTMF playback received by room microphones from being returned to the far end. The lower pin on the left side of the AEC component is the “reference” pin. Any audio received on this pin will be automatically removed from the audio signal received from the room microphone(s) before being sent into the Q-Sys Softphone **Out** block for transmission.

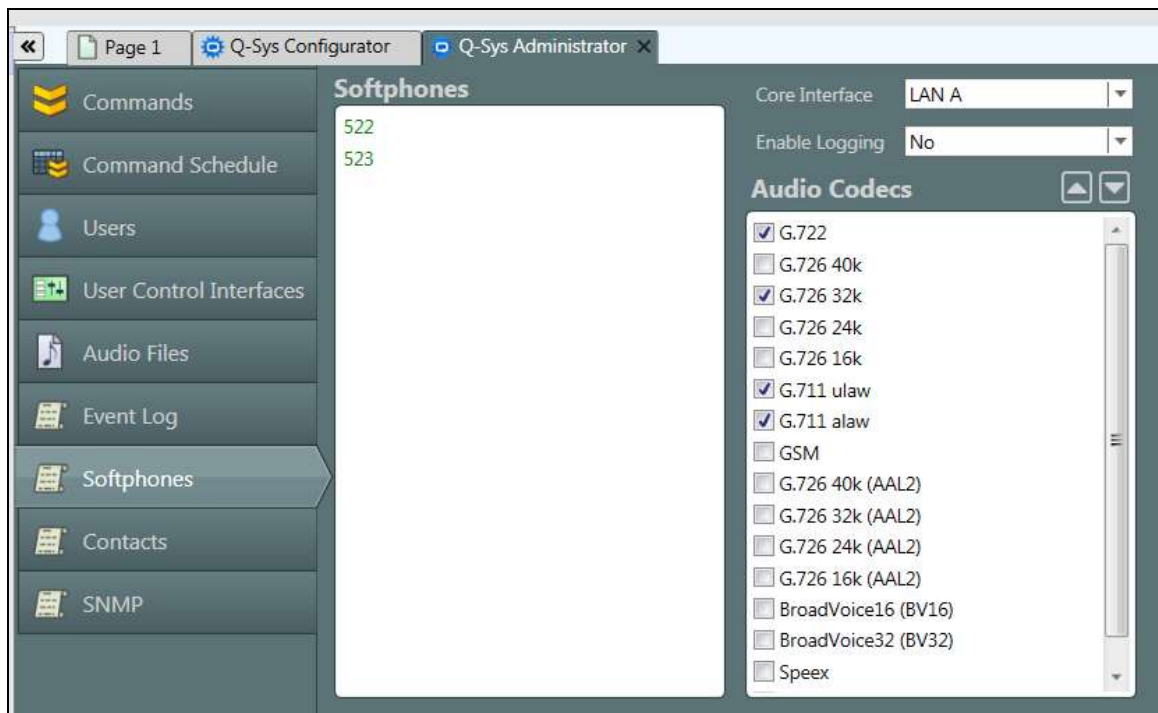


To “Deploy” the design to the Q-Sys Core press **F5** or **File → Save to Core & Run**

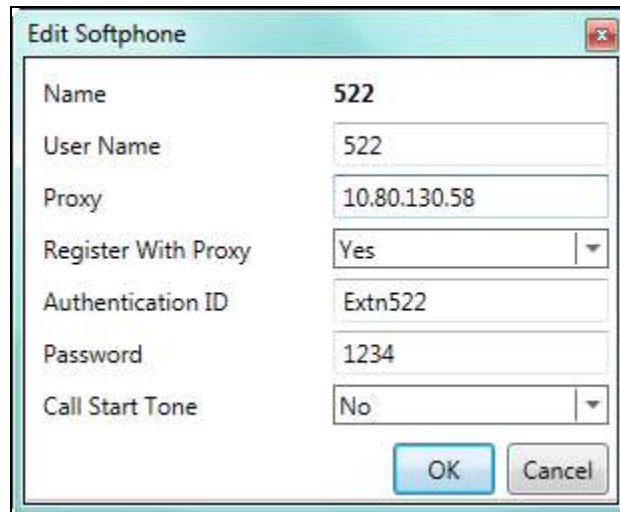


Once the design is running and a green Core Status LED is visible in the upper left of the user interface, further configuration of the Softphone is required to allow registration to the IP Office.

Navigate to **Tools → Q-Sys Administrator** or use the  button which appears in the upper right corner of the user interface. Once the Q-Sys Administrator appears, select the **Softphones** tab.



Double-click an entry in the Softphones list to be configured. When the **Edit Softphone** dialog box appears, enter the softphone registration details similarly to those shown below, which correspond to the details configured within IP Office Manager . The User Name field should match the value of the non-editable **Name** field above it and the **Base Extension** in **Section 5.4**. The **Proxy** corresponds to the **IP Address** in **Section 5.2** and **Authentication ID** corresponds to the **Name** configured in **Section 5.5**. Password is same as configured in **Section 5.5**.



Name	522
User Name	522
Proxy	10.80.130.58
Register With Proxy	Yes
Authentication ID	Extn522
Password	1234
Call Start Tone	No

7. Verification Steps

The following steps may be used to verify the configuration:

- From a PC running the Avaya IP Office Monitor application, select **Start → Programs → IP Office → Monitor** to launch the application. The **Avaya IP Office SysMonitor** screen is displayed (not shown). Select **Status → SIP Phone Status** from the top menu.
- Verify that there is an entry for each Q-Sys Softphone extensions configured in **Section 5.4** and the Status is **SIP: Registered**.
- Place calls to and from Q-Sys Softphone and verify that the calls are successfully established with two-way talk path.

8. Conclusion

Q-Sys Softphone was compliance tested with Avaya IP Office. Q-Sys Softphone by QSC functioned properly for feature and serviceability with the exception that is mentioned in **Section 2.2**.

9. Additional References

The following Avaya product documentation can be found at <http://marketingtools.avaya.com/knowledgebase/>

1. *Installing IP Office Basic Edition*, November 2014
2. *IP Office 9.0*, May 2014

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