



Avaya Solution & Interoperability Test Lab

Application Notes for Configuring Windstream SIP Trunking Service (Sonus Platform) with Avaya IP Office Release 9.0 – Issue 1.0

Abstract

These Application Notes describe a sample configuration using Session Initiation Protocol (SIP) trunking between the Windstream (Sonus Platform) and an Avaya IP Office solution. In the sample configuration, the Avaya IP Office solution consists of an Avaya IP Office 500 V2 Release 9.0, Avaya Voicemail Pro, and Avaya SIP, H.323, digital, and analog endpoints.

The Windstream SIP Trunking Service provides PSTN access via a SIP trunk between the enterprise and the Windstream network as an alternative to legacy analog or digital trunks. This approach generally results in lower cost for the enterprise.

Windstream is a member of the Avaya DevConnect Service Provider program. Information in these Application Notes has been obtained through DevConnect compliance testing and additional technical discussions. Testing was conducted in the Avaya Solution & Interoperability Test Lab.

1. Introduction

These Application Notes describe a sample configuration using Session Initiation Protocol (SIP) trunking between Windstream (Sonus platform) and an Avaya IP Office solution. In the sample configuration, the Avaya IP Office solution consists of an Avaya IP Office 500 V2 Release 9.0, Avaya Voicemail Pro, and Avaya SIP, H.323, digital, and analog endpoints.

Customers using Avaya IP Office with the Windstream SIP Trunk service are able to place and receive PSTN calls via the SIP protocol. The converged network solution is an alternative to traditional PSTN trunks such as ISDN-PRI.

2. General Test Approach and Test Results

The general test approach was to connect a simulated enterprise site to the Windstream SIP Trunking service as a non-registering device via the public Internet and exercise the features and functionality listed in **Section 2.1**. The simulated enterprise site was comprised of Avaya IP Office and various Avaya endpoints.

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

To verify SIP trunking interoperability, the following features and functionality were covered during the interoperability compliance test:

- Incoming calls from the PSTN were routed to the DID numbers assigned by Windstream to the Avaya IP Office location. These incoming PSTN calls arrived via the SIP Line and were answered by Avaya SIP telephones, Avaya H.323 telephones, Avaya digital telephones, analog telephones, analog fax machines, Avaya IP Office Softphone, Avaya Flare® Experience, and Avaya Voicemail Pro. The display of caller ID on display-equipped Avaya IP Office telephones was verified.
- Outgoing calls from the Avaya IP Office location to the PSTN were routed via the SIP Line to Windstream. These outgoing PSTN calls were originated from Avaya SIP phones, Avaya H.323 telephones, Avaya digital telephones, analog endpoints, Avaya IP Office Softphone, Avaya Flare® Experience, and Avaya Voicemail Pro. The display of caller ID on display-equipped PSTN telephones was verified.
- Inbound / Outbound fax calls were verified.
- Proper disconnect when the caller abandoned a call before answer for both inbound and outbound calls.
- Proper disconnect when the IP Office party or the PSTN party terminated an active call.

- Proper busy tone heard when an IP Office user called a busy PSTN user, or a PSTN user called a busy IP Office user (i.e., if no redirection was configured for user busy conditions).
- Various outbound PSTN call types were tested including long distance, international, toll-free, and directory assistance calls.
- Requests for privacy (i.e., caller anonymity) for IP Office outbound calls to the PSTN were verified. That is, when privacy is requested by IP Office, outbound PSTN calls were successfully completed while withholding the caller ID from the displays of display-equipped PSTN telephones.
- Privacy requests for inbound calls from the PSTN to IP Office users were verified. That is, when privacy is requested by a PSTN caller, the inbound PSTN call was successfully completed to an IP Office user while presenting an “anonymous” display to the IP Office user.
- SIP OPTIONS monitoring of the health of the SIP trunk was verified.
- Incoming and outgoing calls using the G.729A and G.711MU codecs.
- DTMF transmission (RFC 2833) with successful voice mail navigation for incoming and outgoing calls. Successful navigation of a simple auto-attendant application configured on Avaya Voicemail Pro.
- Inbound and outbound long holding time call stability.
- Telephony features such as call waiting, hold, transfer, and conference.
- Inbound calls from Windstream SIP Trunk service that were call forwarded back to PSTN destinations, presenting true calling party information to the PSTN phone, via Windstream.
- Mobile twinning to a mobile phone, presenting true calling party information to the mobile phone. Outbound mobile call control was also verified successfully (e.g., using DTMF on a twinned call to place new calls and create a conference via a mobile phone).
- DiffServ markings in accordance with network requirements for IP Office SIP signaling and RTP media.

Items not supported or not tested included the following:

- Inbound toll-free and emergency calls (911) are supported but were not tested as part of the compliance test.
- Operator (0) calls are not supported by Windstream.
- Network Call Redirection using the SIP REFER method is not supported by Windstream.

2.2. Test Results

Interoperability testing of the sample configuration was completed with successful results. The following observations were noted.

- **T.38 Fax** – When the fax call is initiated with G.729A codec as the first choice on an outbound fax call, Windstream will send a re-Invite to G.711MU first before the call is negotiated to T.38. The G.711MU codec needs to be an available codec on IP Office for the fax call to properly negotiate to T.38. See **Section 5.4.5**.

On an inbound fax call, IP Office will send a re-Invite with the original voice codec when the fax transmission is complete. If the original voice codec is G.729A, Windstream will return a “488 Not Acceptable Here” error. This does not have a negative effect on fax calls because it happens after the fax has been sent at the end of the call.

2.3. Support

Contact information for technical support on the Windstream SIP Trunking service:

- Web: <http://www.windstreambusiness.com/customer/support>
- Telephone: (866) 445-5882

Avaya customers may obtain documentation and support for Avaya products by visiting <http://support.avaya.com>. Alternatively, in the United States, (866) GO-AVAYA (866-462-8292) provides access to overall sales and service support menus

3. Reference Configuration

Figure 1 illustrates the sample configuration used for the DevConnect compliance testing. The sample configuration shows an enterprise site connected to the Windstream SIP Trunk service.

Located at the enterprise site is an Avaya IP Office 500 V2. The LAN port of Avaya IP Office is connected to the enterprise LAN while the WAN port is connected to the public network. Endpoints include an Avaya 1616 IP Telephone (with H.323 firmware), an Avaya 1140E IP Telephone (with SIP firmware), an Avaya 9611 IP Telephone (with H.323 firmware), and an Avaya 6210 Analog Telephone. The site also has an IP Office Application Server running the Voicemail Pro for voicemail and one-X® Portal.

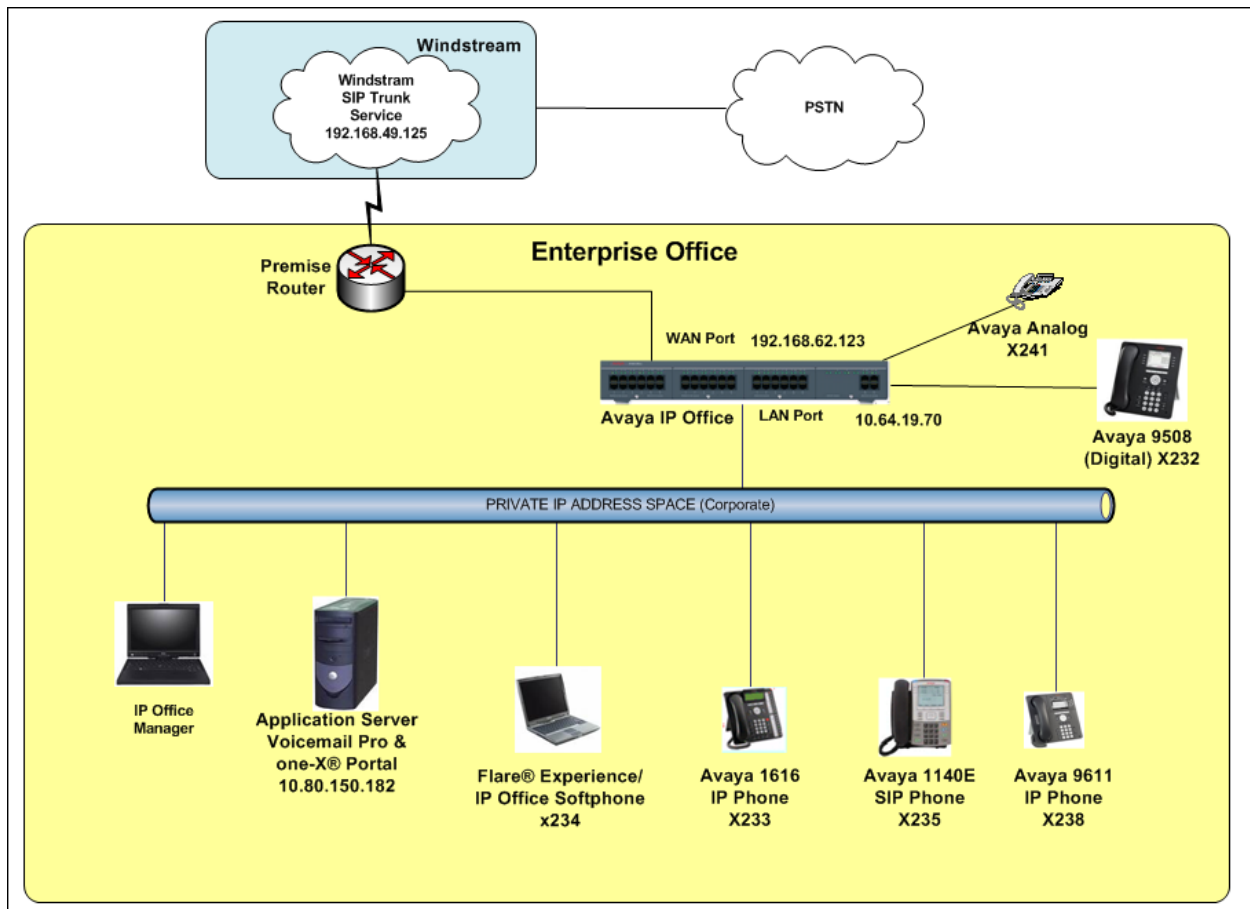


Figure 1: Avaya Interoperability Test Lab Configuration

For security purposes, any public IP addresses or PSTN routable phone numbers used in the compliance test are not shown in these Application Notes. Instead, public IP addresses have been replaced with private addresses and all phone numbers have been replaced with numbers that cannot be routed.

4. Equipment and Software Validated

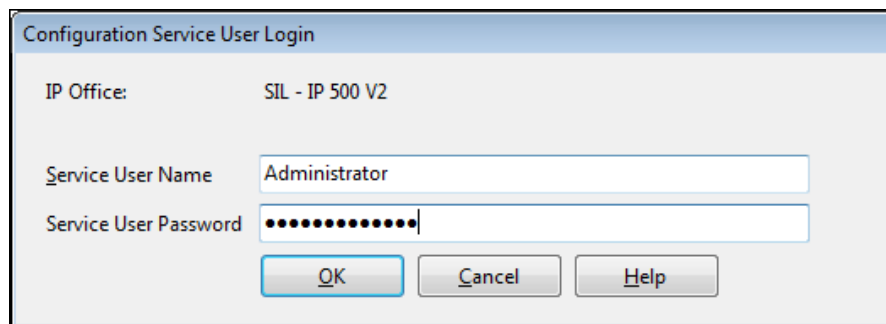
Table 2 shows the equipment and software used in the sample configuration

Avaya IP Telephony Solution Components	
Equipment	Software
Avaya IP Office 500 V2	Release 9.0.200.860
Avaya Application Server	Release 9.0.200-860
Avaya IP Office Manager	Release 9.0.2.0 Build 860
Avaya 1616SW IP Telephone (H.323)	Release 1.343A
Avaya 9611SW IP Telephone (H.323)	Release 6.2209
Avaya 1140E IP Telephone (SIP)	Release 04.04.10
Avaya 9508 Digital Telephone	Release 0.45
Avaya IP Office Softphone	Release 3.2.3.49
Avaya Flare® Experience for Windows	Release 1.1.4.23
Windstream Components	
Equipment	Software
Sonus	Release 9.1.0

Table 2: Equipment and Software Tested

5. Avaya IP Office Configuration

IP Office is configured via the IP Office Manager program. For more information on IP Office Manager, consult Reference [2]. From the IP Office Manager PC, select **Start → Programs → IP Office → Manager** to launch the Manager application. Provided that the IP Office system is accessible to IP Office Manager, the following will be displayed in the center of the opening screen:



Log in with the appropriate configuration credentials. The appearance of the IP Office Manager can be customized using the **View** menu. In the screens presented in this section, the View menu was configured to show the Navigation pane on the left side, the Group pane in the center, and the Details pane on the right side.

5.1. Licensing and Physical Hardware

The configuration and features described in these Application Notes require the IP Office system to be licensed appropriately. If a desired feature is not enabled or there is insufficient capacity, contact an authorized Avaya sales representative.

To verify that there is a SIP Trunk Channels License with sufficient capacity; click **License** in the Navigation pane. Confirm a valid **SIP Trunk Channels** license with sufficient **Instances** (trunk channels). If Avaya IP Telephones will be used as is the case in these Application Notes, verify the **Avaya IP endpoints** license.

Feature	License Key	Instances	Status	Expiry Date
VMP Pro TTS (Scansoft)	_2NKvG1vX1a@7gKbig_LuIX3VNNAFZa	1	Valid	Never
Preferred Edition (Voicemail Pro)	yGV6_YvNgdlRbd15ywsa5A4@LCLtdkoH	255	Valid	Never
Office Worker	0s5R27bo5tq1vpb@F0BPrmw3ZAm2dsEK	5	Valid	Never
Receptionist	pSyhoOm2VD5TDwJNdawfL2JuRNHsdon	1	Valid	Never
Mobile Worker	xN@IF5vRVDSZ@6qa5TB8NhmM89uhAqMn	5	Valid	Never
Phone Manager Pro IP Audio Enab...	O@cNoad2Xh5peBjllf_@y3WO9uPdct	1	Valid	Never
Power User	1NWBWbhpjXSf604HE48dHVENy3STA90	5	Valid	Never
IPsec Tunneling	lv0QuRgH5SuLfc1b3Z9JkrzeJz4wxzH	255	Valid	Never
SIP Trunk Channels	t@HYRX6RAvH0lp8FoCkpxU3K3_Lww4xI	5	Valid	Never
Customer Service Supervisor	UFC2aTtOVNB43NgS8L6k94Qt9rLU5dV	1	Valid	Never
Advanced Edition	mXCf6Hv9tKaf29UQ3Gm2LVfkY4@egIEQ	255	Valid	Never
AUDDX Voicemail	q3tnqzoHPD760K9BpwcT8pSNvpNWvp@B	255	Valid	Never
Teleworker	WVCqxPLb9DGyTxKcDIJK4LwkOVkvNND	5	Valid	Never
CTI Link Pro	yX1OBVtBdG_C0t5KXMeCwc59MLSrEc9C	255	Valid	Never
Wave User	KOn@Zy9TgAKWVvbtTjAFYfSYxdjyEbbK	4	Valid	Never
Phone Manager Pro (per seat)	8SBMhevKLA41XM19_aw95GznISpZAOL0	1	Valid	Never
VMP Pro Networked Messaging	shDdqpYWMAtuA2YBQzM3oT4WP3u6ECOW	255	Valid	Never
IP500 Voice Networking Channels	1IWkzLvEMG@ia2MvM1gnfnvLypo_GNID	4	Valid	Never
Customer Service Agent	Sj0ZxdyB95ybGmff8VRmHG6Ah7uSPJOT	5	Valid	Never
Avaya IP endpoints	G2xc7BdND0a7XnhHkzR01TPzZ9dvpG_N	5	Valid	Never
Software Upgrade 255	43CTB_9EXSiXb5ewBtpR6rERIUz8wruJ	1	Valid	Never
Essential Edition	Virtual Essential Edition	1	Valid	Never

In the sample configuration, looking at the IP Office 500 V2 from left to right, the first module is a TCM 8 Digital Station Module. This module supports BCM / Norstar T-Series and M-Series telephones. The second module is a Combination Card. This module has 6 Digital Stations ports, 2 Analog Station ports, 4 Analog Trunk ports and 10 VCM channels. The VCM is a Voice Compression Module supporting VoIP codecs. An IP Office hardware configuration with a VCM component is necessary to support SIP trunking.

The following screen shows the modules in the IP Office used in the sample configuration. To access such a screen, select **Control Unit** in the Navigation pane. The modules appear in the Group pane. In the screen below, **IP 500 V2** is selected in the Group pane, revealing additional information about the IP 500 V2 in the Details pane.

The screenshot displays the IP Office configuration interface. The top menu bar includes File, Edit, View, Tools, and Help. Below the menu is a toolbar with various icons. The main interface is divided into three panes:

- Navigation Pane (Left):** Shows a tree structure of configuration elements. The 'Control Unit' is selected, and its sub-items are expanded, including BOOTP (4), Operator (3), SIL, System (1), Line (5), Control Unit (3), Extension (24), User (26), Group (5), Short Code (78), Service (1), RAS (1), Incoming Call Rout, WanPort (0), and Directory (1).
- Group Pane (Middle):** Displays a table of modules under the 'Control Unit' group. The table has columns for Dev No., Dev Type, and Version.

Dev No.	Dev Type	Version
1	IP 500 V2	9.0.200.860
2	TCM8	9.0.200.860
3	COMBO6210/ATM4	9.0.200.860
- Details Pane (Right):** Shows the configuration details for the selected 'IP 500 V2' module. The details include:
 - Unit: 1
 - Device Number: 1
 - Unit Type: IP 500 V2
 - Version: 9.0.200.860
 - Serial Number: 00e007058e33
 - Unit IP Address: 10.64.19.70
 - Interconnect Number: 0
 - Module Number: Control Unit

5.2. System Settings

This section illustrates the configuration of system settings. The settings presented here simply illustrate the sample configuration and are not intended to be prescriptive. Select **System** in the Navigation pane to configure these settings. The subsection order corresponds to a left to right navigation of the tabs in the Details pane for System settings.

5.2.1. LAN 2 Settings

The IP500/IP500 V2 control units have 2 RJ45 Ethernet ports, physically marked as LAN and WAN. Within the system configuration, the physical LAN port is LAN1, the physical WAN port is LAN2.

In the sample configuration, LAN2 is used to connect the IP Office to the public network. To view or configure the **IP Address** of LAN2, select the **LAN2** tab followed by the **LAN Settings** tab. Set the **IP Address** field to the IP address assigned to the Avaya IP Office LAN2 port. Set the **IP Mask** field to the mask used on the public network. All other parameters should be set according to customer requirements.

The screenshot displays the SIL configuration window. The top navigation bar includes tabs for System, LAN1, LAN2, DNS, Voicemail, Telephony, Directory Services, System Events, SMTP, SMDR, Twinning, VCM, CCR, and Codecs. The LAN2 tab is selected. Below this, the 'LAN Settings' sub-tab is active. The configuration fields are as follows:

- IP Address: 192 . 168 . 62 . 123
- IP Mask: 255 . 255 . 255 . 128
- Primary Trans. IP Address: 0 . 0 . 0 . 0
- Firewall Profile: <None>
- RIP Mode: None
- Enable NAT: ☐
- Number Of DHCP IP Addresses: 1
- DHCP Mode: ☐ Server ☐ Client ☐ Dialin ☒ Disabled

An 'Advanced' button is located at the bottom right of the configuration area.

Select the **VoIP** tab as shown in the following screen. The **SIP Trunks Enable** box must be checked to enable the configuration of SIP trunks to Windstream.

If desired, the **RTP Port Number Range** can be customized to a specific range of receive ports for the RTP media paths from Windstream to IP Office. The defaults are used here.

SIL

System LAN1 LAN2 DNS Voicemail Telephony Directory Services System Events SMTP SMDR Twinning VCM CCR Codecs

LAN Settings VoIP Network Topology

☐ H323 Gatekeeper Enable

☐ Auto-create Extn ☐ Auto-create User ☐ H323 Remote Extn Enable

☒ SIP Trunks Enable

☐ SIP Registrar Enable

☒ Auto-create Extn/User ☐ SIP Remote Extn Enable

Domain Name

Layer 4 Protocol

☒ UDP UDP Port 5060 Remote UDP Port 5060

☒ TCP TCP Port 5060 Remote TCP Port 5060

☐ TLS TLS Port 5061 Remote TLS Port 5061

Challenge Expiry Time (secs) 10

RTP

Port Number Range

Minimum 49152 Maximum 53246

Port Number Range (NAT)

Minimum 49152 Maximum 53246

Scroll down to the **DiffServ Settings** section. Avaya IP Office can be configured to mark the Differentiated Services Code Point (DSCP) in the IP Header with specific values to support Quality of Services policies for both signaling and media. The **DSCP** field is the value used for media and the **SIG DSCP** is the value used for signaling. The specific values used for the compliance test are shown in the screen below and are also the default values. For a customer installation, if the default values are not sufficient, appropriate values should be provided by the customer.

DiffServ Settings

B8 DSCP (Hex) B8 Video DSCP (Hex) FC DSCP Mask (Hex) 88 SIG DSCP (Hex)

46 DSCP 46 Video DSCP 63 DSCP Mask 34 SIG DSCP

Select the **Network Topology** tab as shown in the following screen. In the sample configuration, the default settings are used and the **Use Network Topology Info** in the **SIP Line** is set to “None” in **Section 5.4.3**.

The screenshot shows the 'SIL' configuration window with the 'Network Topology' tab selected. The 'Network Topology Discovery' section contains the following settings:

- STUN Server Address: (empty text box)
- STUN Port: 3478 (spin box)
- Firewall/NAT Type: Unknown (dropdown menu)
- Binding Refresh Time (seconds): 300 (spin box)
- Public IP Address: 0 . 0 . 0 . 0 (text box)
- Run STUN: (button)
- Cancel: (button)
- Public Port section:
 - UDP: 0 (spin box)
 - TCP: 0 (spin box)
 - TLS: 0 (spin box)
- Run STUN on startup: (unchecked checkbox)

5.2.2. Voicemail Settings

To view or change voicemail settings, select the **Voicemail** tab as shown in the following screen. The **Voicemail Type** in the sample configuration is “Voicemail Lite/Pro”. Other Voicemail types may be used. The Voicemail IP address in the sample configuration is 10.80.150.182, the IP address of the IP Office Application Server running the Voicemail Pro software, as shown in **Figure 1**.

The screenshot shows the 'SIL' configuration window with the 'Voicemail' tab selected. The settings are as follows:

- Voicemail Type: Voicemail Lite/Pro (dropdown menu)
- Messages Button Goes To Visual Voice: (checked checkbox)
- Voicemail Destination: (empty dropdown menu)
- Voicemail IP Address: 10 . 80 . 150 . 182 (text box)
- Backup Voicemail IP Address: 0 . 0 . 0 . 0 (text box)

In the sample configuration, the “Callback” application of Avaya Voicemail Pro was used to allow Voicemail Pro to call out via the SIP Line to Windstream when a message is left in a voice mailbox. The **SIP Settings** shown in the screen below enable IP Office to populate the SIP headers for an outbound “callback” call from Voicemail Pro, similar to the way the fields with these same names apply to calls made from telephone users (e.g., see **Section 5.5**).

SIP Settings	
SIP Name	8645553749
SIP Display Name (Alias)	Voicemail
Contact	8645553749
Anonymous	<input type="checkbox"/>

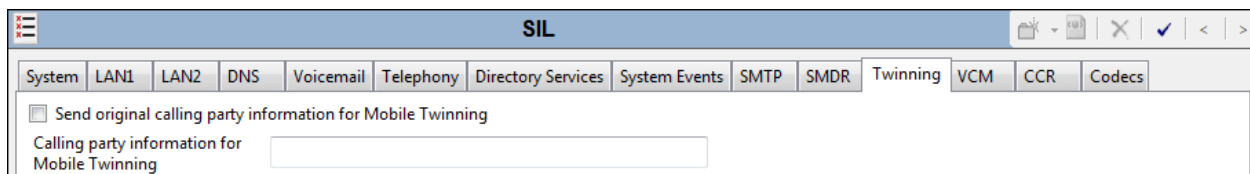
5.2.3. System Telephony Configuration

To view or change telephony settings, select the **Telephony** tab and **Telephony** sub-tab as shown in the following screen. In the sample configuration, the **Inhibit Off-Switch Forward/Transfer** box is unchecked so that call forwarding and call transfer to PSTN destinations via the Windstream service can be tested. That is, a call can arrive to IP Office via Windstream, and be forwarded or transferred back to the PSTN with the outbound leg of the call using the Windstream SIP Trunk service. The **Companding Law** parameters are set to “ULAW” as is typical in North American locales. Other parameters on this screen may be set according to customer requirements.

SIL			
System LAN1 LAN2 DNS Voicemail Telephony Directory Services System Events SMTP SMDR Twinning VCM CCR Codecs			
Telephony Park & Page Tones & Music Ring Tones SM Call Log TUI			
Analogue Extensions Default Outside Call Sequence: Normal Default Inside Call Sequence: Ring Type 1 Default Ring Back Sequence: Ring Type 2 Restrict Analogue Extension Ringer Voltage: <input type="checkbox"/>			
Dial Delay Time (secs): 4 Dial Delay Count: 0 Default No Answer Time (secs): 15 Hold Timeout (secs): 0 Park Timeout (secs): 300 Ring Delay (secs): 5 Call Priority Promotion Time (secs): Disabled Default Currency: USD Default Name Priority: Favor Trunk Media Connection Preservation: Disabled	Companding Law <table border="1"> <tr> <td> Switch <input checked="" type="radio"/> U-Law <input type="radio"/> A-Law </td> <td> Line <input checked="" type="radio"/> U-Law Line <input type="radio"/> A-Law Line </td> </tr> </table> <input type="checkbox"/> DSS Status <input checked="" type="checkbox"/> Auto Hold <input checked="" type="checkbox"/> Dial By Name <input checked="" type="checkbox"/> Show Account Code <input type="checkbox"/> Inhibit Off-Switch Forward/Transfer <input type="checkbox"/> Restrict Network Interconnect <input type="checkbox"/> Drop External Only Impromptu Conference <input checked="" type="checkbox"/> Visually Differentiate External Call <input type="checkbox"/> Unsupervised Analog Trunk Disconnect Handling <input checked="" type="checkbox"/> High Quality Conferencing <input type="checkbox"/> Strict SIPs <input checked="" type="checkbox"/> Digital/Analogue Auto Create User	Switch <input checked="" type="radio"/> U-Law <input type="radio"/> A-Law	Line <input checked="" type="radio"/> U-Law Line <input type="radio"/> A-Law Line
Switch <input checked="" type="radio"/> U-Law <input type="radio"/> A-Law	Line <input checked="" type="radio"/> U-Law Line <input type="radio"/> A-Law Line		

5.2.4. System Twinning Configuration

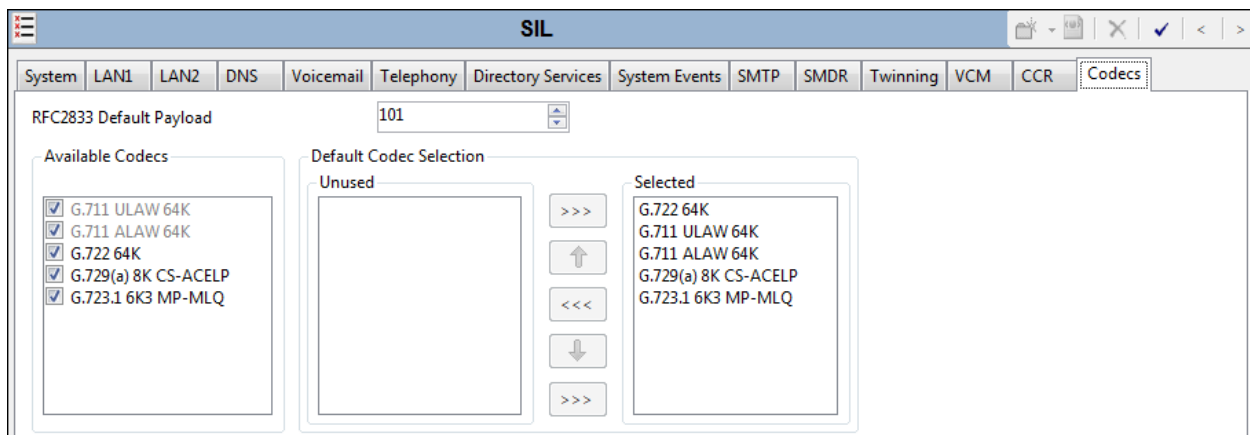
To view or change Twinning settings, select the **Twining** tab as shown in the following screen. The **Send original calling party information for Mobile Twinning** box is not checked in the sample configuration, and the **Calling party information for Mobile Twinning** is left blank. With this configuration, and related configuration of “Diversion header” on the SIP Line (Section 5.4.2), the true identity of a PSTN caller can be presented to the twinning destination (e.g., a user’s mobile phone) when a call is twinned out via the Windstream SIP Trunk service.



The screenshot shows the SIL configuration window with the 'Twining' tab selected. The 'Send original calling party information for Mobile Twinning' checkbox is unchecked. Below it, the 'Calling party information for Mobile Twinning' field is empty.

5.2.5. System Codecs Configuration

To view or change system codec settings, select the **Codecs** tab. On the left, observe the list of **Available Codecs**. In the example screen below, the box next to each codec is checked, making all the codecs available in other screens where codec configuration may be performed (such as the SIP Line in Section 5.4.5). The **Default Codec Selection** area enables the codec preference order to be configured on a system-wide basis, using the up, down, left, and right arrows. By default, all IP (SIP and H.323) lines and extensions will assume the system default codec selection, unless configured otherwise for the specific line or extension. The **RFC2833 Default Payload** parameter is new in IP Office 9.0. Set the payload parameter to “101”, the value preferred by Windstream.



The screenshot shows the SIL configuration window with the 'Codecs' tab selected. The 'RFC2833 Default Payload' is set to '101'. The 'Available Codecs' list on the left includes G.711 ULAW 64K, G.711 ALAW 64K, G.722 64K, G.729(a) 8K CS-ACELP, and G.723.1 6K3 MP-MLQ, all of which are checked. The 'Default Codec Selection' area shows an 'Unused' list and a 'Selected' list. The 'Selected' list contains G.722 64K, G.711 ULAW 64K, G.711 ALAW 64K, G.729(a) 8K CS-ACELP, and G.723.1 6K3 MP-MLQ. Navigation buttons (left, right, up, down) are present between the lists.

5.3. IP Route

In the sample configuration, the IP Office LAN1 port is physically connected to the local area network switch at the IP Office customer site. The default gateway for this network is 10.64.19.1.

The IP Office LAN2 port is physically connected to the service provider and has a default gateway of 192.168.62.1. To add an IP Route in IP Office, right-click **IP Route** from the Navigation pane, and select **New**. To view or edit an existing route, select **IP Route** from the Navigation pane, and select the appropriate route from the Group pane. The following screen shows the Details pane with the relevant route using **Destination** “LAN2”.

The screenshot displays the IP Office configuration interface. On the left, the 'IP Offices' navigation pane shows a tree structure with items like BOOTP (4), Operator (3), SIL, System (1), Line (6), Control Unit (3), Extension (24), User (26), Group (5), Short Code (78), Service (1), and RAS (1). The main area is divided into two panes. The left pane, titled 'IP Route', contains a table with the following data:

IP Address	IP Mask	Gateway	Destination
0.0.0.0	0.0.0.0	10.64.19.1	LAN1
192.168.49.124	255.255.255.255	192.168.62.1	LAN2
192.168.49.125	255.255.255.255	192.168.62.1	LAN2
192.168.99.0	255.255.255.0	0.0.0.0	RemoteManager

The right pane, titled '192.168.49.124', shows the details for the selected route. It includes fields for IP Address (192 . 168 . 49 . 124), IP Mask (255 . 255 . 255 . 255), Gateway IP Address (192 . 168 . 62 . 1), Destination (LAN2), and Metric (0). There is also a checkbox for 'Proxy ARP'.

5.4. SIP Line

This section shows the configuration screens for the SIP Line in IP Office Release 9. The recommended method for configuring a SIP Line is to use the template associated with these Application Notes. The template is an .xml file that can be used by IP Office Manager to create a SIP Line. Follow the steps in **Section 5.4.1** to create the SIP Line from the template.

Some items relevant to a specific customer environment are not included in the template or may need to be updated after the SIP Line is created. Examples include the following:

- IP addresses
- SIP Credentials (if applicable)
- SIP URI entries
- Setting of the **Use Network Topology Info** field on the Transport tab.

Therefore, it is important that the SIP Line configuration be reviewed and updated if necessary after the SIP Line is created via the template. The resulting SIP Line data can be verified against the manual configuration shown in **Sections 5.4.2 – 5.4.6**.

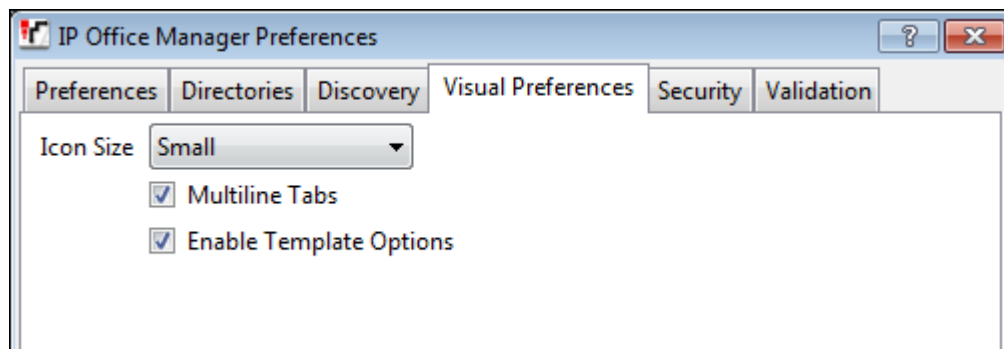
Also, the following SIP Line settings are not supported on Basic Edition:

- SIP Line – Originator number for forwarded and twinning calls
- Transport – Second Explicit DNS Server
- SIP Credentials – Registration Required

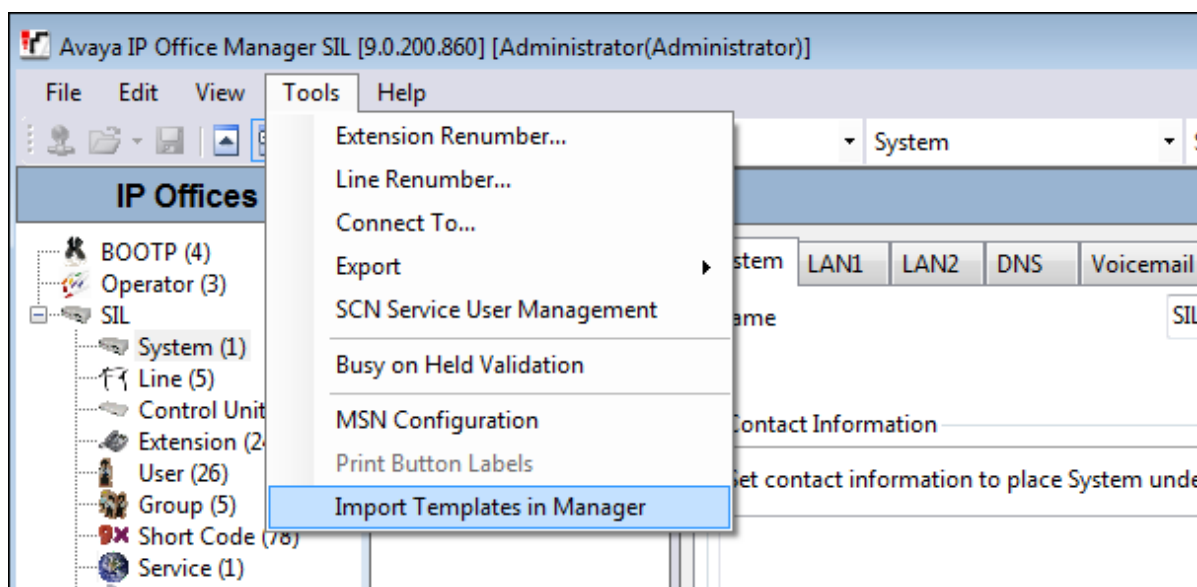
Alternatively, a SIP Line can be created manually. To do so, right-click **Line** in the Navigation Pane and select **New → SIP Line**. Then, follow the steps outlined in **Sections 5.4.2 – 5.4.6**.

5.4.1. SIP Line From Template

1. Copy the template file to the computer where IP Office Manager is installed. Verify the template file is **US_WindstreamSonus.xml**. The file name is important in locating the proper template file in **Step 5**.
2. Verify that template options are enabled in IP Office Manager. In IP Office Manager, navigate to **File → Preferences**. In the IP Office Manager Preferences window that appears, select the **Visual Preferences** tab. Verify that the box is checked next to **Enable Template Options**. Click **OK**.

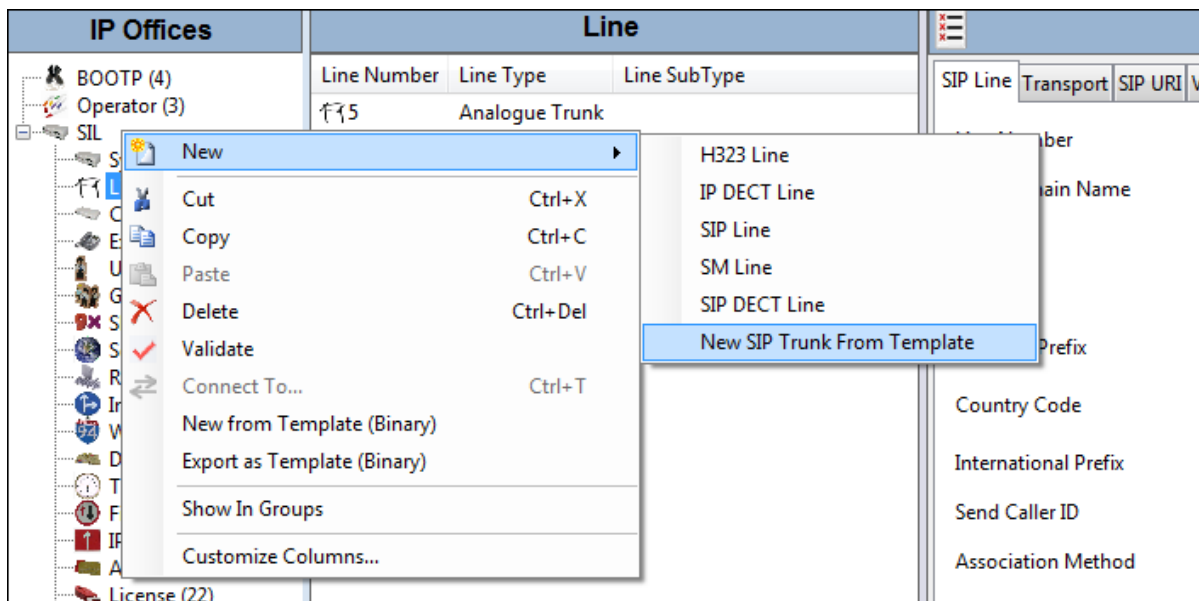


3. Import the template into IP Office Manager. From IP Office Manager, select **Tools → Import Templates in Manager**. This action will copy the template file into the IP Office template directory and make the template available in the IP Office Manager pull-down menus in **Step 5**. The default template location is **C:\Program Files\Avaya\IP Office\Manager\Templates**.

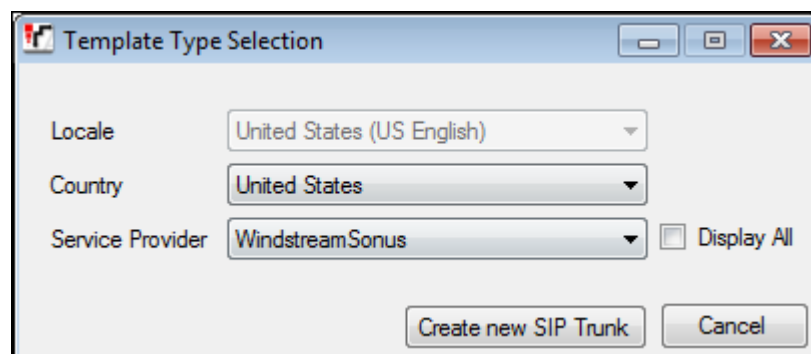


In the pop-up window (not shown) that appears, select the directory where the template file was copied in **Step 1**. After the import is complete, a final import status pop-up window (not shown) will appear stating success or failure. Click **OK** (not shown) to continue. If preferred, this step may be skipped if the template file is copied directly to the IP Office template directory.

4. To create the SIP Trunk from the template, right-click on **Line** in the Navigation Pane, then navigate to **New → New SIP Trunk From Template**.



5. In the subsequent Template Type Selection pop-up window, select “United States” from the **Country** pull-down menu and select “WindstreamSonus” from the **Service Provider** pull-down menu as shown below. These values correspond to parts of the file name (**US_WindstreamSonus.xml**) created in **Step 1**. Click **Create new SIP Trunk** to finish creating the trunk.



Once the SIP Line is created, verify the configuration of the SIP Line with the configuration shown in **Sections 5.4.2 – 5.4.6**.

5.4.2. SIP Line – SIP Line Tab

The **SIP Line** tab in the Details pane is shown below for Line Number 17, used for the Windstream SIP Trunk service. The **ITSP Domain Name** is configured with the IP address supplied by Windstream. By default, the **In Service** and **Check OOS** boxes are checked. In the sample configuration, IP Office will use the SIP OPTIONS method to periodically check the SIP Line.

The **Send Caller ID** parameter is set to “Diversion Header”. With this setting and the related configuration in **Section 5.2.5**, IP Office will include the Diversion Header for calls that are directed via Mobile Twinning out the SIP Line to Windstream. The Diversion Header will contain the number associated with the Twinning user, allowing Windstream to admit the call. The From Header will be populated with the true calling party identity, allowing the twinning destination (e.g., mobile phone) to see the true caller id. IP Office will also include the Diversion header for calls that are call forwarded out the SIP Line to Windstream. **REFER Support** is unchecked as Windstream does not support REFER.

The **Method for Session Refresh** parameter and the related **Session Timer (seconds)** parameter are new with IP Office Release 9.0. The **Method for Session Refresh** is set to “Auto” and the **Session Timer (seconds)** is set to “1800”. With this configuration, IP Office will send UPDATE messages every 15 minutes (half of the set value) to keep the active session alive. If UPDATE is not supported, re-INVITE messages are sent. The **Media Connection Preservation** parameter retains the default setting “Disabled”

SIP Line - Line 17

SIP Line | Transport | SIP URI | VoIP | T38 Fax | SIP Credentials

Line Number: 17

ITSP Domain Name: 192.168.49.125

Prefix:

National Prefix:

Country Code:

International Prefix:

Send Caller ID: Diversion Header

Association Method: By Source IP address

In Service: ☒

URI Type: SIP

Check OOS: ☒

Call Routing Method: Request URI

Originator number for forwarded and twinning calls:

Name Priority: System Default

Caller ID from From header: ☐

Send From In Clear: ☐

User-Agent and Server Headers:

Service Busy Response: 486 - Busy Here

Action on CAC Location Limit: Allow Voicemail

☐ REFER Support

Incoming: Auto

Outgoing: Auto

Method for Session Refresh: Auto

Session Timer (seconds): 1800

Media Connection Preservation: Disabled

5.4.3. SIP Line - Transport Tab

Select the **Transport** tab. The **ITSP Proxy Address** is set to the IP address supplied by Windstream. In the **Network Configuration** area, “UDP” is selected as the **Layer 4 Protocol**. The **Send Port** and **Listen Port** can retain the default value 5060. The **Use Network Topology Info** parameter is set to “None”.

The screenshot shows the 'SIP Line - Line 17' configuration window with the 'Transport' tab selected. The 'ITSP Proxy Address' is set to '192.168.49.125'. In the 'Network Configuration' section, 'UDP' is selected for 'Layer 4 Protocol', and 'None' is selected for 'Use Network Topology Info'. The 'Send Port' and 'Listen Port' are both set to '5060'. The 'Explicit DNS Server(s)' are set to '0 . 0 . 0 . 0'. The 'Calls Route via Registrar' checkbox is checked. The 'Separate Registrar' field is empty.

SIP Line	Transport	SIP URI	VoIP	T38 Fax	SIP Credentials
ITSP Proxy Address: 192.168.49.125					
Network Configuration					
Layer 4 Protocol		UDP			
Send Port		5060			
Use Network Topology Info		None			
Listen Port		5060			
Explicit DNS Server(s)		0 . 0 . 0 . 0			
Calls Route via Registrar		<input checked="" type="checkbox"/>			
Separate Registrar					

5.4.4. SIP Line - SIP URI Tab

Select the **SIP URI** tab. To add a new SIP URI, click the **Add...** button. In the bottom of the screen, a New Channel area will be opened. To edit an existing entry, click an entry in the list at the top, and click the **Edit...** button. In the bottom of the screen, the Edit Channel area will be opened. In the example screen below, a previously configured entry is edited. “Use Internal Data” is selected for the **Local URI**, **Contact**, and **Display Name**. Information configured on the SIP Tab for individual users will be used to populate the SIP headers. The **PAI** parameter is set to “None”. The **Registration** parameter is set to the default “0: <None>” since Windstream service does not require registration. The **Incoming Group** parameter, set here to 17, will be referenced when configuring Incoming Call Routes to map inbound SIP trunk calls to IP Office destinations in **Section 5.7**. The **Outgoing Group** parameter, set here to 17, will be used for routing outbound calls to Windstream via the Short Codes (**Section 5.6**) or ARS configuration (**Section 5.8**). The **Max Calls per Channel** parameter, configured here to 10, sets the maximum number of simultaneous calls that can use the URI before IP Office returns busy to any further calls. Click **OK**.

The screenshot displays the 'SIP Line - Line 17' configuration window. The 'SIP URI' tab is selected, showing a table with two entries. Entry 1 is selected, and the 'Edit...' button is clicked, opening the 'Edit Channel' dialog.

Channel	Groups	Via	Local URI	Contact	Display Name	PAI	Credential	Max Calls
1	17 17	<...>	<...>	864555...	8645553749	N...	0: <Non...	10
2	17 0	<...>	864555...	86455...	8645553749	N...	0: <Non...	10

Edit Channel

Via: <None>

Local URI: Use Internal Data

Contact: Use Internal Data

Display Name: Use Internal Data

PAI: None

Registration: 0: <None>

Incoming Group: 17

Outgoing Group: 17

Max Calls per Channel: 10

Buttons: Add..., Remove, Edit..., OK, Cancel

In the sample configuration, the single SIP URI shown above is sufficient to allow incoming calls for Windstream DID numbers destined for specific IP Office users or IP Office hunt groups. The calls are accepted by IP Office since the incoming number will match the SIP Name configured for the user or hunt group that is the destination for the call. Channel 2 displays a service number, such as a DID number routed directly to voicemail or DID used for Mobile Call Control. DID numbers that IP Office should admit can be entered into the **Local URI** and **Contact** fields instead of “Use Internal Data”. The number 864-555-3749 will be assigned as a service number in the Incoming Call Routes in **Section 5.7**.

SIP Line - Line 17

SIP Line
Transport
SIP URI
VoIP
T38 Fax
SIP Credentials

Channel	Groups	Via	Local URI	Contact	Display Name	PAI	Credential	Max Calls
1	17 17	<...>				N...	0: <Non...	10
2	17 0	<...>	864555...	86455...	8645553749	N...	0: <Non...	10

Add...

Remove

Edit...

Edit Channel

Via: <None>

Local URI: 8645553749

Contact: 8645553749

Display Name: 8645553749

PAI: None

Registration: 0: <None>

Incoming Group: 17

Outgoing Group: 0

Max Calls per Channel: 10

OK

Cancel

5.4.5. SIP Line - VoIP Tab

Select the **VoIP** tab. The **Codec Selection** drop-down box **System Default** (default) will match the codecs set in the system wide Default Selection list (**System → Codecs**). In the sample configuration, “Custom” is selected and codecs preferred by Windstream are included (i.e., G729(a) 8K CS-ACELP and G.711 ULAW 64K). This will cause IP Office to include G.729a and G.711MU in the Session Description Protocol (SDP) offer, in that order. Set the **Fax Transport Support** drop-down to “T38”. This enables T.38 fax relay to be used when fax tones are detected during the call. The **DTMF Support** parameter can remain set to the default value “RFC2833”. The **Re-invite Supported** parameter can be checked to allow for codec re-negotiation in cases where the target of an incoming call or transfer does not support the codec originally negotiated on the trunk. The **Re-invite Supported** parameter should be checked and the G.711 ULAW codec should be an available choice if the SIP Line will be used for fax. For PSTN originations, Windstream preferred the G.729 codec in the SDP, while also allowing the G.711MU codec. Click **OK** (not shown).

The screenshot shows the 'SIP Line - Line 17' configuration window with the 'VoIP' tab selected. The window has a title bar with standard icons and a tab bar with 'SIP Line', 'Transport', 'SIP URI', 'VoIP', 'T38 Fax', and 'SIP Credentials'. The 'VoIP' tab is active. The 'Codec Selection' dropdown is set to 'Custom'. Below it, there are two lists: 'Unused' and 'Selected'. The 'Unused' list contains 'G.711 ALAW 64K', 'G.722 64K', and 'G.723.1 6K3 MP-MLQ'. The 'Selected' list contains 'G.729(a) 8K CS-ACELP' and 'G.711 ULAW 64K'. Between the lists are buttons for moving items: '>>>', '<<<', '<<<<', '>>>>', and '<<>>'. To the right of the lists are several checkboxes: 'VoIP Silence Suppression', 'Allow Direct Media Path', 'Re-invite Supported' (checked), 'Codec Lockdown', 'PRACK/100rel Supported', 'Force direct media with phones', and 'G.711 Fax ECAN'. Below the codec lists, there are dropdown menus for 'Fax Transport Support' (set to 'T38'), 'Location' (set to 'Cloud'), and 'DTMF Support' (set to 'RFC2833'). There is also a 'Call Initiation Timeout (s)' field set to '4'.

5.4.6. SIP Line- T38 Fax

The settings on this tab are only accessible if **Re-invite Supported** is checked and a value for **Fax Transport Support** other than “None” are selected on the **VoIP** tab. Fax relay is only supported on IP500/IP500 V2 systems with an IP500 VCM card. Uncheck **Use Default Values** at the bottom of the screen and set **T38 Fax Version** to “0”. This is the version supported by Windstream.

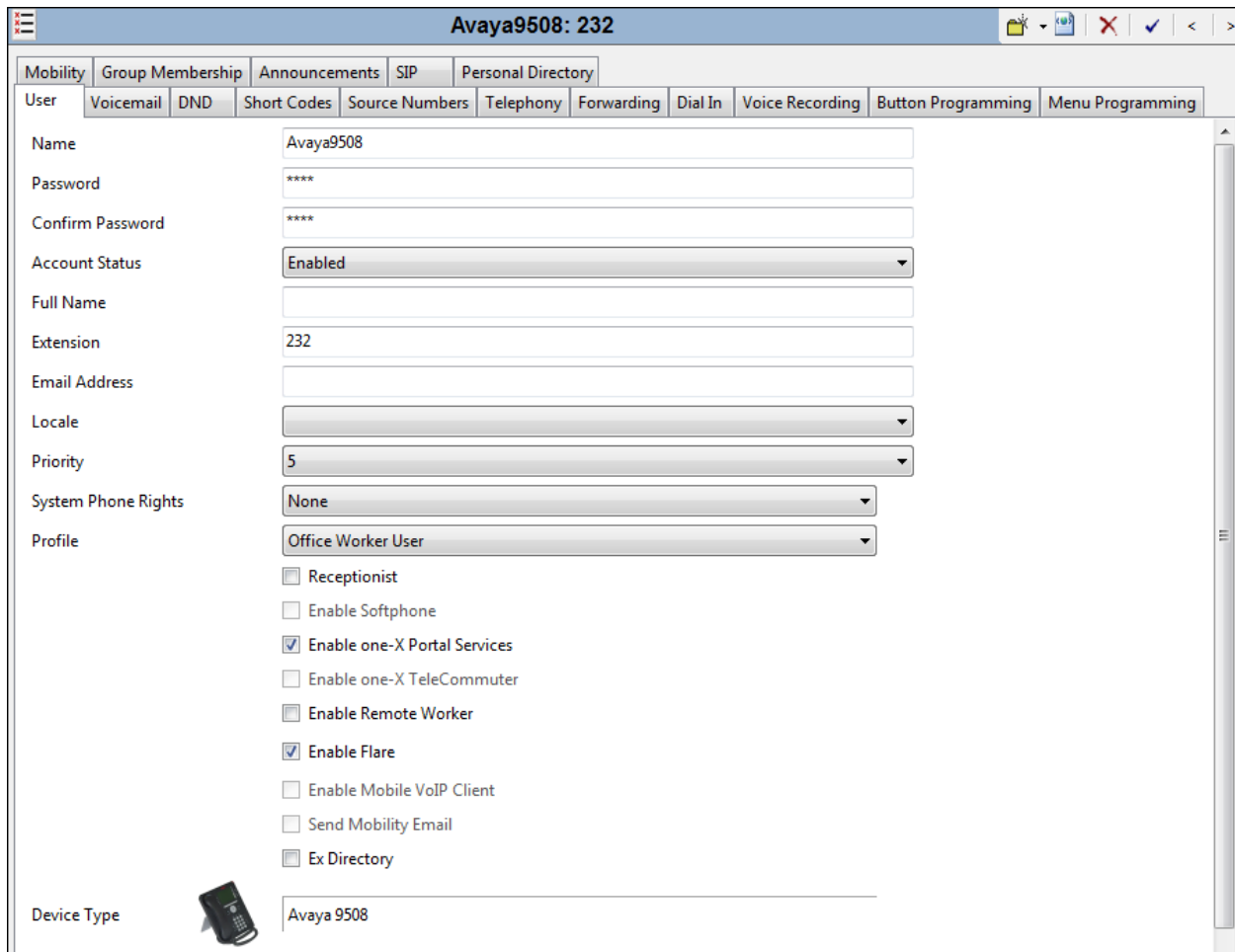
The screenshot shows the 'SIP Line - Line 18' configuration window with the 'T38 Fax' tab selected. The window has a title bar with standard icons and a tabbed interface with tabs for 'SIP Line', 'Transport', 'SIP URI', 'VoIP', 'T38 Fax', and 'SIP Credentials'. The 'T38 Fax' tab contains the following settings:

- T38 Fax Version:** A dropdown menu set to '0'.
- Transport:** A dropdown menu set to 'UDPTL'.
- Redundancy:** A section containing two spinners: 'Low Speed' set to '0' and 'High Speed' set to '0'.
- TCF Method:** A dropdown menu set to 'Trans TCF'.
- Max Bit Rate (bps):** A dropdown menu set to '14400'.
- EFlag Start Timer (msecs):** A spinner set to '2600'.
- EFlag Stop Timer (msecs):** A spinner set to '2300'.
- Tx Network Timeout (secs):** A spinner set to '150'.
- Checkboxes on the right:**
 - ☒ Scan Line Fix-up
 - ☒ TFOP Enhancement
 - ☐ Disable T30 ECM
 - ☐ Disable EFlags For First DIS
 - ☐ Disable T30 MR Compression
 - ☐ NSF Override
- Country Code:** A spinner set to '0'.
- Vendor Code:** A spinner set to '0'.
- Use Default Values:** An unchecked checkbox at the bottom left.

5.5. Users

In this section, an example of an IP Office User will be illustrated. In the interests of brevity, not all users shown in **Figure 1** will be presented, since the configuration can be easily extrapolated to other users. To add a User, right click on **User** in the Navigation pane, and select **New**. To edit an existing User, select **User** in the Navigation pane, and select the appropriate user to be configured in the Group pane.

The following screen shows the **User** tab for User 232. As shown in **Figure 1**, this user corresponds to the Avaya Digital 9508.



The screenshot displays the configuration window for User 232, titled "Avaya9508: 232". The window features a navigation pane on the left with tabs: Mobility, Group Membership, Announcements, SIP, and Personal Directory. The main pane shows the "User" tab, which includes sub-tabs: Voicemail, DND, Short Codes, Source Numbers, Telephony, Forwarding, Dial In, Voice Recording, Button Programming, and Menu Programming. The configuration fields are as follows:

- Name: Avaya9508
- Password: ****
- Confirm Password: ****
- Account Status: Enabled (dropdown)
- Full Name: (empty field)
- Extension: 232
- Email Address: (empty field)
- Locale: (empty dropdown)
- Priority: 5 (dropdown)
- System Phone Rights: None (dropdown)
- Profile: Office Worker User (dropdown)
- Receptionist: ☐
- Enable Softphone: ☐
- Enable one-X Portal Services: ☒
- Enable one-X TeleCommuter: ☐
- Enable Remote Worker: ☐
- Enable Flare: ☒
- Enable Mobile VoIP Client: ☐
- Send Mobility Email: ☐
- Ex Directory: ☐
- Device Type: Avaya 9508 (with a small phone icon)

The following screen shows the **SIP** tab for User 232. The **SIP Name** and **Contact** parameters are configured with the DID number of the user, 864-555-3744. These parameters configure the user part of the SIP URI in the From header for outgoing SIP trunk calls, and allow matching of the SIP URI for incoming calls, without having to enter this number as an explicit SIP URI for the SIP Line. The **SIP Display Name (Alias)** parameter can optionally be configured with a descriptive name. If all calls involving this user and a SIP Line should be considered private, then the **Anonymous** box may be checked to withhold the user's information from the network.

See **Section 5.6** for a method of using a short code (rather than static user provisioning) to place an anonymous call.

The screenshot shows the 'Avaya9508: 232' configuration window with the 'SIP' tab selected. The tabs at the top are: User, Voicemail, DND, Short Codes, Source Numbers, Telephony, Forwarding, Dial In, Voice Recording, Button Programming, Menu Programming, Mobility, Group Membership, Announcements, SIP, and Personal Directory. The SIP tab contains the following fields:

- SIP Name: 8645553744
- SIP Display Name (Alias): Avaya9508
- Contact: 8645553744
- ☐ Anonymous

From **Figure 1**, note that user 232 will use the Mobile Twinning feature. The following screen shows the **Mobility** tab for User 232. The **Mobility Features** and **Mobile Twinning** boxes are checked. The **Twinned Mobile Number** field is configured with the number to dial to reach the twinned mobile telephone, in this case 913035552215. Other options can be set according to customer requirements.

The screenshot shows the 'Avaya9508: 232' configuration window with the 'Mobility' tab selected. The tabs at the top are: User, Voicemail, DND, Short Codes, Source Numbers, Telephony, Forwarding, Dial In, Voice Recording, Button Programming, Menu Programming, Mobility, Group Membership, Announcements, SIP, and Personal Directory. The Mobility tab contains the following sections and fields:

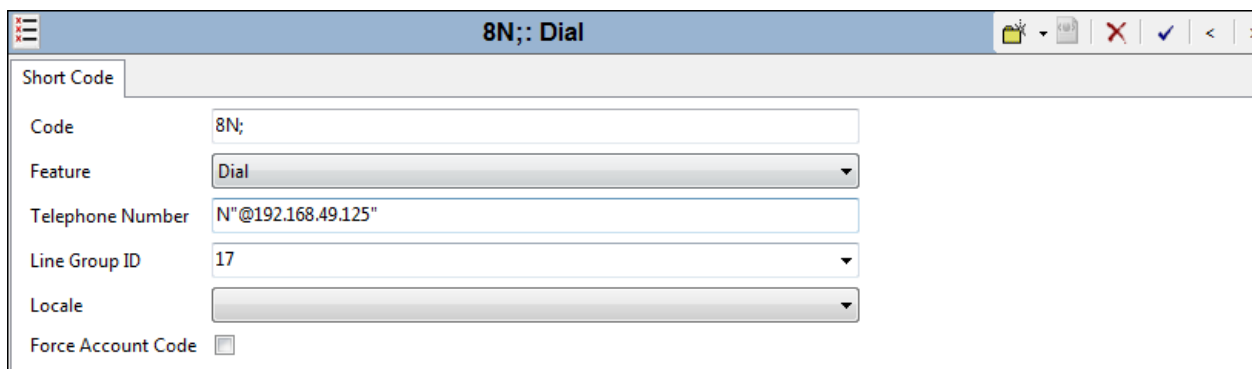
- ☐ Internal Twinning
 - Twinned Handset: <None>
 - Maximum Number of Calls: 1
 - ☐ Twin Bridge Appearances
 - ☐ Twin Coverage Appearances
 - ☐ Twin Line Appearances
- ☒ Mobility Features
 - ☒ Mobile Twinning
 - Twinned Mobile Number (including dial access code): 913035552215
 - Twinning Time Profile: <None>
 - Mobile Dial Delay (secs): 0
 - Mobile Answer Guard (secs): 0
 - ☐ Hunt group calls eligible for mobile twinning
 - ☐ Forwarded calls eligible for mobile twinning
 - ☐ Twin When Logged Out
 - ☐ one-X Mobile Client
 - ☒ Mobile Call Control
 - ☒ Mobile Callback

5.6. Short Codes

In this section, various examples of IP Office short codes will be illustrated. To add a short code, right click on **Short Code** in the Navigation pane, and select **New**. To edit an existing short code, click **Short Code** in the Navigation pane, and the short code to be configured in the Group pane.

In the screen shown below, the short code “8N;” is illustrated. The **Code** parameter is set to “8N;”. The **Feature** parameter is set to “Dial”. The **Telephone Number** parameter is set to N“@192.168.49.125”. The **Telephone Number** field is used to construct the Request URI and To Header in the outgoing SIP INVITE message. The value “N” represents the number dialed by the user. The IP address 192.168.49.125 represents the IP address of the Windstream SIP Trunk service. The **Line Group ID** parameter is set to “17”, matching the number of the **Outgoing Group** configured on the **SIP URI** tab of SIP Line 17 to Windstream (**Section 5.4.4**).

This simple short code will allow an IP Office user to dial the digit 8 followed by any telephone number, symbolized by the letter N, to reach the SIP Line to Windstream. “N” can be any number such as a 1+10 digit number, a toll free number, directory assistance (e.g., 411), etc. This short code approach has the virtue of simplicity, but does not provide for alternate routing or an awareness of the end of a dialed digit string. When users dial 8 plus the number, IP Office must wait for an end of dialing timeout before sending the SIP INVITE to Windstream.



The screenshot shows a configuration window titled "8N;: Dial". The window has a "Short Code" tab selected. The configuration fields are as follows:

Field	Value
Code	8N;
Feature	Dial
Telephone Number	N"@192.168.49.125"
Line Group ID	17
Locale	
Force Account Code	<input type="checkbox"/>

The simple “8N;” short code previously illustrated does not provide a means of alternate routing if the configured SIP Line is out of service or temporarily not responding. When alternate routing options and/or more customized analysis of the digits following the short code are desired, the Automatic Route Selection (ARS) feature may be used. In the following example screen, the short code “9N” is illustrated for access to ARS. When the Avaya IP Office user dials 9 plus any number “N”, rather than being directed to a specific **Line Group Id**, the call is directed to “50:Main”, configurable via ARS. See **Section 5.8** for example ARS route configuration for “50:Main” as well as a backup route.

9N: Dial	
Short Code	
Code	9N
Feature	Dial
Telephone Number	N
Line Group ID	50: Main
Locale	
Force Account Code	<input type="checkbox"/>

Optionally, add or edit a short code that can be used to access the SIP Line anonymously. In the screen shown below, the short code “*67N;” is illustrated. This short code is similar to the “8N;” short code except that the **Telephone Number** field begins with the letter “W”, which means “withhold the outgoing calling line identification”. In the case of the SIP Line connecting to Windstream documented in these Application Notes, when a user dials *67 plus any number “N”, IP Office will include the user’s telephone number in the P-Preferred-Identity header along with “Privacy: id”. With these headers, Windstream will prevent presentation of the caller id to the called PSTN destination.

*67N: Dial	
Short Code	
Code	*67N
Feature	Dial
Telephone Number	WN"@192.168.49.125"
Line Group ID	17
Locale	
Force Account Code	<input type="checkbox"/>

The following screen illustrates a short code that acts like a feature access code rather than a means to access a SIP Line. In this case, the **Code** “FNE31” is defined for **Feature** “FNE Service” to **Telephone Number** “31” (Mobile Call Control). This short code will be used as a means to allow a Windstream DID to be programmed to route directly to this feature, via inclusion of this short code as the destination of an Incoming Call Route. See **Section 5.7**. This feature is used to provide dial tone to twinned mobile devices (e.g., cell phone) directly from IP Office; once dial tone is received the user can perform dialing actions including making calls and activating short codes.

5.7. Incoming Call Routes

In this section, IP Office Incoming Call Routes are illustrated. To add an incoming call route, right click on **Incoming Call Route** in the Navigation pane, and select **New**. To edit an existing incoming call route, select **Incoming Call Route** in the Navigation pane, and the appropriate incoming call route to be configured in the Group pane.

In the screen shown below, the incoming call route for **Incoming Number** “8645553744” is illustrated. The **Line Group Id** is “17”, matching the **Incoming Group** field configured in the **SIP URI** tab for the SIP Line to Windstream in **Section 5.4.4**.

Line Group ID	Incoming Number
17	8645553744
17	8645553745
17	8645553746
17	8645553747
17	8645553748
17	8645553749

Standard	Voice Recording	Destinations
Bearer Capability: Any Voice		
Line Group ID: 17		
Incoming Number: 8645553744		
Incoming Sub Address:		
Incoming CLI:		
Locale:		
Priority: 1 - Low		
Tag:		
Hold Music Source: System Source		
Ring Tone Override: None		

Select the **Destinations** tab. From the **Destination** drop-down, select the extension to receive the call when a PSTN user dials 864-555-3744.

IP Offices		Incoming Call Route			17 8645553744		
<ul style="list-style-type: none"> BOOTP (4) Operator (3) SIL System (1) Line (6) Control Unit (3) Extension (24) User (26) Group (5) 	Line Group ID	Incoming Number	Destination	Standard	Voice Recording	Destinations	
	17	8645553744	232 Avaya9508				
	17	8645553745	233 Avaya1616				
	17	8645553746	234 Softphone				
	17	8645553747	235 Avaya1140E				
	17	8645553748	238 Avaya9621				
	17	8645553749	VoiceMail				

TimeProfile	Destination	Fallback Extension
Default Value	232 Avaya9508	

Incoming Call Routes for other direct mappings of DID numbers to IP Office users listed in **Figure 1** are omitted here, but can be configured in the same fashion.

When configuring an Incoming Call Route, the **Destination** field can be manually configured with a number such as a short code, or certain keywords available from the pull-down menu. For example, the following **Destinations** tab for an incoming call route contains the **Destination** “VoiceMail” entered manually. An incoming call to 864-555-3749 will be delivered directly to voicemail, allowing the caller to log-in to voicemail and access messages.

IP Offices		Incoming Call Route			17 8645553749		
<ul style="list-style-type: none"> BOOTP (4) Operator (3) SIL System (1) Line (6) Control Unit (3) Extension (24) User (26) Group (5) 	Line Group ID	Incoming Number	Destination	Standard	Voice Recording	Destinations	
	17	8645553744	232 Avaya9508				
	17	8645553745	233 Avaya1616				
	17	8645553746	234 Softphone				
	17	8645553747	235 Avaya1140E				
	17	8645553748	238 Avaya9621				
	17	8645553749	VoiceMail				

TimeProfile	Destination	Fallback Extension
Default Value	VoiceMail	

At different times during testing, the destination for 864-555-3749 was changed to test the IP Office Mobile Call Control feature. The following **Destinations** tab for the incoming call route contains the **Destination** “FNE31” entered manually. With this destination, an incoming call to 864-555-3749 will be delivered directly to internal dial tone from the IP Office, allowing the caller to perform dialing actions including making calls and activating Short Codes. The incoming caller ID must match the Twinned Mobile Number entered in the User Mobility tab (**Section 5.5**); otherwise the IP Office responds with a 486 Busy Here and the caller will hear a busy tone.

IP Offices		Incoming Call Route			17 8645553749		
<ul style="list-style-type: none"> BOOTP (4) Operator (3) SIL System (1) Line (6) Control Unit (3) Extension (24) User (26) Group (5) 	Line Group ID	Incoming Number	Destination	Standard	Voice Recording	Destinations	
	17	8645553744	232 Avaya9508				
	17	8645553745	233 Avaya1616				
	17	8645553746	234 Softphone				
	17	8645553747	235 Avaya1140E				
	17	8645553748	238 Avaya9621				
	17	8645553749	FNE31				

TimeProfile	Destination	Fallback Extension
Default Value	FNE31	

5.8. ARS and Alternate Routing

While detailed coverage of ARS is beyond the scope of these Application Notes, this section includes basic ARS screen illustrations and considerations. ARS is illustrated here mainly to demonstrate alternate routing should the SIP Line be out of service or temporarily not responding.

Optionally, Automatic Route Selection (ARS) can be used rather than the simple “8N;” short code approach documented in **Section 5.6**. With ARS, secondary dial tone can be provided after the access code, time-based routing criteria can be introduced, and alternate routing can be specified so that a call can re-route automatically if the primary route or outgoing line group is not available. ARS also facilitates more specific dialed telephone number matching, enabling immediate routing and alternate treatment for different types of numbers following the access code. For example, if all 1+10 digit calls following an access code should use the SIP Line preferentially, but certain service numbers following the access code should prefer a different outgoing line group, ARS can be used to distinguish the call behaviors.

To add a new ARS route, right-click **ARS** in the Navigation pane, and select **New**. To view or edit an existing ARS route, select **ARS** in the Navigation pane, and select the appropriate route name in the Group pane.

The following screen shows an example ARS configuration for the route named “Main”. The **In Service** parameter refers to the ARS form itself, not the Line Groups that may be referenced in the form. If the **In Service** box is un-checked, calls are routed to the ARS route name specified in the **Out of Service Route** parameter. IP Office short codes may also be defined to allow an ARS route to be disabled or enabled from a telephone. The configurable provisioning of an Out of Service Route and the means to manually activate the Out of Service Route can be helpful for scheduled maintenance or other known service-affecting events for the primary route.

Main*

ARS

ARS Route Id: 50

Route Name: Main

Dial Delay Time: System Default (4)

☒ Secondary Dial tone: SystemTone

☒ Check User Call Barring

In Service: ☒ → Out of Service Route: <None>

Time Profile: <None> → Out of Hours Route: <None>

Code	Telephone Number	Feature	Line Group ID
011N;	011N"@192.168.49.125"	Dial	17
0N;	0N"@192.168.49.125"	Dial	17
1010288XXXXXX...	1010288N"@192.168.49.125"	Dial	17
11	911	Dial Emergency	0
1XXXXXXX	1N"@192.168.49.125"	Dial	17
311	311"@192.168.49.125"	Dial	17
411	411"@192.168.49.125"	Dial	17

Buttons: Add..., Remove, Edit...

Alternate Route Priority Level: 3

Alternate Route Wait Time: 30

Alternate Route: 52: backup

Assuming the primary route is in-service, the number passed from the short code used to access ARS (e.g., 9N in **Section 5.6**) can be further analyzed to direct the call to a specific Line Group ID. Per the example screen above, if the user dialed 9-1-303-555-1234, the call would be directed to Line Group 17. If Line Group 17 cannot be used, the call can automatically route to the route name configured in the **Alternate Route** parameter in the lower right of the screen. Since alternate routing can be considered a privilege not available to all callers, IP Office can control access to the alternate route by comparing the calling user's priority to the value in the **Alternate Route Priority Level** field.

The following screen shows an example ARS configuration for the route named “backup”, **ARS Route Id** “52”. Continuing the example, if the user dialed 9-1-303-555-1234, and the call could not be routed via the primary route “50: Main” described above, the call will be delivered to this “backup” route. Per the configuration shown below, the call will be delivered to Line Group 0 using the analog lines. The configuration of the **Code**, **Telephone Number**, **Feature**, and **Line Group ID** for an ARS route is similar to the configuration already shown for short codes in **Section 5.6**.

The screenshot shows the ARS configuration window for a route named "backup" with ARS Route Id 52. The configuration includes the following fields and options:

- ARS Route Id:** 52
- Route Name:** backup
- Dial Delay Time:** System Default (4)
- Secondary Dial tone:** ☒ (checked), SystemTone (dropdown)
- Check User Call Barring:** ☒ (checked)
- In Service:** ☒ (checked), Out of Service Route: <None>
- Time Profile:** <None>, Out of Hours Route: <None>
- Table:**

Code	Telephone Number	Feature	Line Group ID
0N;	0N	Dial 3K1	0
11	911	Dial Emergency	0
1XXXXXXXXXX	1N	Dial 3K1	0
911	911	Dial Emergency	0
XXXXXXXXXX	N	Dial 3K1	0
- Alternate Route Priority Level:** 3
- Alternate Route Wait Time:** 30
- Alternate Route:** <None>

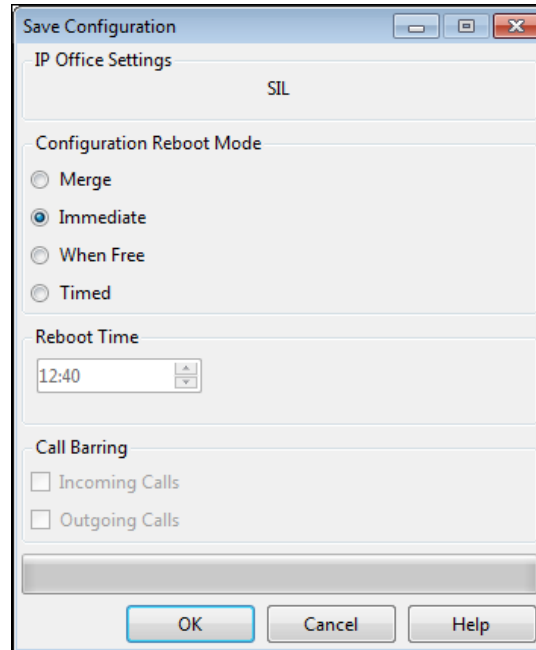
Buttons on the right side of the table include Add..., Remove, and Edit... Arrows indicate dependencies between fields, such as In Service leading to Out of Service Route, and Priority Level leading to Alternate Route.

If a primary route experiences a network outage such that no response is received to an outbound INVITE, IP Office successfully routes the call via the backup route. The user receives an audible tone when the re-routing occurs and may briefly see “Waiting for Line” on the display.

5.9. Save Configuration

Navigate to **File → Save Configuration** in the menu bar at the top of the screen to save the configuration performed in the preceding sections.

The following will appear, with either **Merge** or **Immediate** selected, based on the nature of the configuration changes made since the last save. Note that clicking **OK** may cause a service disruption. Click **OK** if desired.



6. Windstream Configuration

Windstream is responsible for the configuration of its SIP Trunking Service. The customer will need to provide the IP address used to reach the Avaya IP Office at the enterprise site (i.e., the IP address of the public interface on the Avaya IP Office). Windstream will provide the customer the necessary information to configure the Avaya IP Office including:

- Network edge IP addresses of the Windstream SIP Trunking Service
- Transport and port for the Windstream SIP Trunking connection to the Avaya IP Office at the enterprise
- DID numbers to assign to users at the enterprise
- Supported codecs and their preference order

7. Verification Steps

This section provides example verifications of the Avaya configuration with Windstream SIP Trunk service.

The following steps may be used to verify the configuration:

- Use the Avaya IP Office System Status application to verify the state of the SIP connection. Launch the application from **Start → Programs → IP Office → System Status** on the PC where Avaya IP Office Manager was installed. Select the SIP line of interest from the left pane. On the **Status** tab in the right pane, verify that the Current Stat for each channel (The following screen shot shows an active call).

The screenshot displays the Avaya IP Office System Status application. The left sidebar shows a tree view with 'System' selected, and 'Line: 17' highlighted under 'Trunks (6)'. The main window has tabs for 'Status', 'Utilization Summary', and 'Alarms'. The 'Status' tab is active, showing a 'SIP Trunk Summary' section with the following details:

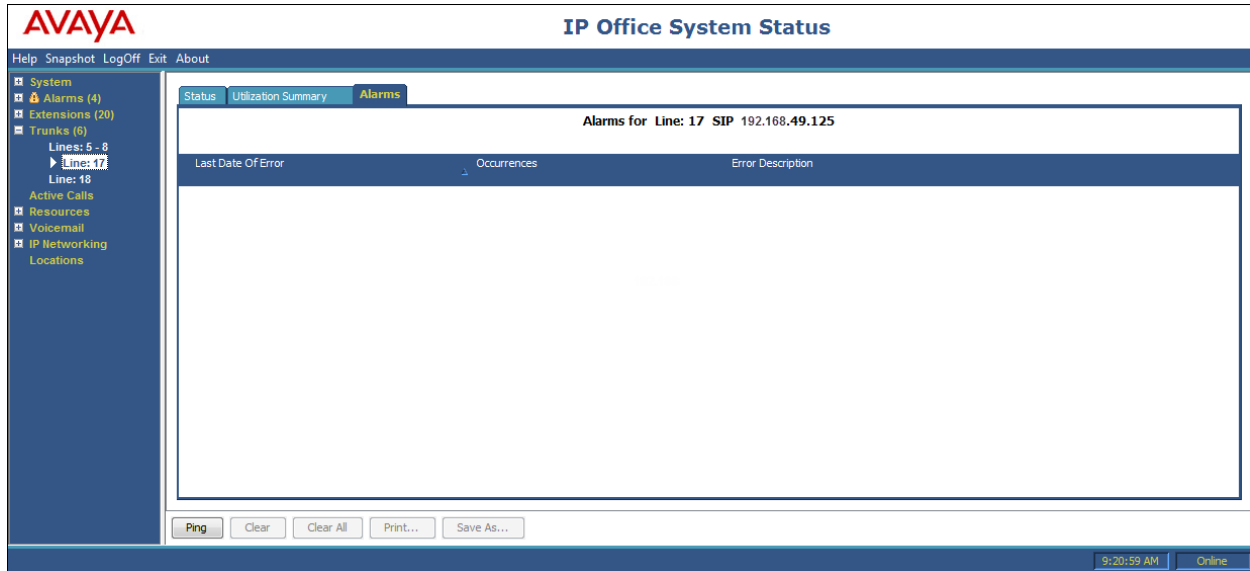
- Peer Domain Name: 192.168.49.125
- Resolved Address: 192.168.49.125
- Line Number: 17
- Number of Administered Channels: 12
- Number of Channels in Use: 1
- Administered Compression: G729 A
- Silence Suppression: Off
- Layer 4 Protocol: UDP
- SIP Trunk Channel Licenses: 5
- SIP Trunk Channel Licenses in Use: 1
- SIP Device Features: UPDATE (Incoming and Outgoing)

A circular progress indicator shows 20% utilization. Below this is a table with 14 columns: Channel Number, URI, Call Ref, Current State, Time in State, Remote Media Address, Codec, Connection Type, Caller ID or Dialed Digits, Other Party on Call, Direction of Call, Round Trip Delay, Receive Jitter, Receive Packet Lo..., Transmit Jitter, and Transmit Packet Lo... The table shows 6 channels. Channel 1 is 'Connected' with a time in state of 00:00:09. Channels 2 through 6 are 'Idle' with a time in state of 4 days 23:00:00.

Channel Number	URI	Call Ref	Current State	Time in State	Remote Media Address	Codec	Connection Type	Caller ID or Dialed Digits	Other Party on Call	Direction of Call	Round Trip Delay	Receive Jitter	Receive Packet Lo...	Transmit Jitter	Transmit Packet Lo...
1	0	10	Connected	00:00:09	192.168.49.124	G729 A	VCM		Extn 232, Avaya9508	Outgoing	0ms	0.4ms	0%		
2			Idle	00:00:25											
3			Idle	4 days 23:00:00											
4			Idle	4 days 23:00:00											
5			Idle	4 days 23:00:00											
6			Idle	4 days 23:00:00											

At the bottom of the window, there are buttons for 'Trace', 'Trace All', 'Pause', 'Ping', 'Call Details', 'Print...', and 'Save As...'. The status bar at the bottom right shows '9:20:28 AM' and 'Online'.

- Select the Alarms tab and verify that no alarms are active on the SIP line.



8. Conclusion

IP Office is a highly modular IP telephone system designed to meet the needs of home offices, standalone businesses, and networked branch and head offices for small and medium enterprises. These Application Notes demonstrated how IP Office Release 9.0 can be successfully combined with a Windstream SIP Trunk service connection to create an end-to-end SIP Telephony business solution. By following the example configurations provided in this document, customers using Avaya IP Office can connect to the PSTN via a Windstream SIP Trunk service connection, thus eliminating the costs of analog or digital trunk connections previously required to access the PSTN. Utilizing this solution, IP Office customers can leverage the operational efficiencies and cost savings associated with SIP trunking while gaining the advanced technical features provided through the marriage of best of breed technologies from Avaya and Windstream.

9. Additional References

This section references documentation relevant to these Application Notes. In general, Avaya product documentation is available at <http://support.avaya.com>

[1] *IP Office 9.0 Installing IP500/IP 500 V2*, Document Number 15-601042, November 2013

[2] *IP Office Manager*, Document Number 15-601011, November 2013

[3] *IP Office Application server 9.0 Installation and Maintenance*, August 2013

[4] *IP Office 9.0 Using System Status*, Document Number 15-601758, August 2013

[5] *Administering Avaya Flare® Experience for iPad Devices and Windows*, September 2013

[6] RFC 3261 *SIP: Session Initiation Protocol* <http://www.ietf.org/rfc/rfc3261.txt>

Additional IP Office documentation can be found at:
<http://marketingtools.avaya.com/knowledgebase/>

©2014 Avaya Inc. All Rights Reserved.

Avaya and the Avaya Logo are trademarks of Avaya Inc. All trademarks identified by ® and ™ are registered trademarks or trademarks, respectively, of Avaya Inc. All other trademarks are the property of their respective owners. The information provided in these Application Notes is subject to change without notice. The configurations, technical data, and recommendations provided in these Application Notes are believed to be accurate and dependable, but are presented without express or implied warranty. Users are responsible for their application of any products specified in these Application Notes.

Please e-mail any questions or comments pertaining to these Application Notes along with the full title name and filename, located in the lower right corner, directly to the Avaya DevConnect Program at devconnect@avaya.com.