Configuration Guide
For Use with AT&T's
IP Flexible Reach Service

Version 1 / Issue 7

July 30, 2008

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1 Introduction

SIP Trunking allows the use of Session Initiation Protocol (SIP) communications from an Internet Telephony Service Provider (ITSP) instead of the typical analog, Basic Rate Interface (BRI), T1 or E1 trunk connections. Having the pure IP trunk to the Internet Telephony Service Provider allows for more control and options over the communication link. This application note provides the details on connecting the ShoreTel IP phone system through an Ingate box which is connected to both the LAN and WAN and acts as a gateway to the ITSP for SIP Trunking.

1.1 Pre ShoreTel IP PBX & Ingate SIParator Configuration Activity

This guide assumes that the administrator is knowledgeable in configuring and administering the ShoreTel IP PBX and the Ingate SIParator. An important tool that administrators should have at their disposal prior to testing their ShoreTel IP PBX with IP Flexible Reach is a network protocol analyzer. Such software can be used to run traces on problem calls so the information can be shared with equipment and network engineers. There is a free version of such software that can be obtained at http://www.wireshark.org/. A second alternative that customers may use is TCPDUMP which can be found on most UNIX and Linux systems. To use this software the customer should have Wireshark or TCPDUMP loaded on a server that is connected to a LAN switch or hub that can monitor both the signaling and media packets on any calls between the customer PBX and the IP Flexible Reach managed router. The Ingate SIParator has a built in capture utility that can also be utilized for this, refer to Ingate documentation for further information. Please note, however, that AT&T does not offer, warrant, or support this software, and any use of the Wireshark or TCPDUMP software is entirely at the customer's own risk.

1.2 Customer Questions

Section 5 of this guide provides screen shots and instructions for the configuration of the ShoreTel IP PBX and Ingate SIParator. Should you have questions regarding these instructions, please call ShoreTel at 1-800-742-2348. When calling this number please have the following information available:

- Company Name
- Company Location
- Administrator Name & phone number
- ShoreTel release and build number
- Ingate SIParator type and version
- Customer Configuration Guide - Issue number & date

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1.3 Trouble Reporting

- In the event that you experience problems with the ShoreTel system or the Ingate SIParator you may contact ShoreTel's Technical Assistance Center at +1 (800) 742-2348 (Toll Free) or +1 (408) 331-3313 (International). A support contract must be in place before any assistance will be provided, for contract / account questions please send an email to shorecare_admin@shoretel.com.

- ShoreTel, Ingate and AT&T will make every effort to quickly resolve reported troubles. The time required for trouble shooting can be reduced if the customer has the necessary detailed information available when reporting a problem. Prior to reporting a problem please provide a wireshark or TCPDUMP trace of the failed call.

1.4 *Document Feedback*

ShoreTel IP PBX administrators who would like to provide feedback on the contents of this document should send it to TPPfeedback@shoretel.com with a copy to cv2915@att.com.

1.5 Document Change History

Version 1 Issue 1 10/30/2007; Initial draft
Version 1 Issue 2 11/13/2007; additional edits

Version 1 Issue 3 11/21/2007; added version and support information

Version 1 Issue 4 12/18/2007; added sections 1.2 thru 1.5 and updated section 4, additional edits

Version 1 Issue 5 01/21/2008; updated ShoreTel email alias for document feedback, added additional unsupported ShoreTel features in Section 3, along with some additional edits

Version 1 Issue 6 01/25/2008; updated "Footer"

Version 1 Issue 7 07/30/2008; updated ShoreTel and Ingate versions, new screen shots for Setup Tool and some additional edits.

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2 Version Information

		Ingate		
		Version 4.6.1 Wizard Setup Tool Version 2.3.2 (or greater)		
ShoreTel Release	ShoreTel 7.5 Build 12.14.8701 (or greater)	✓		

Following are screen shots of the versions of ShoreTel and Ingate utilized for testing interoperability with AT&T IP Flexible Reach service.

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3 Special Notes

Emergency 911/E911 Services Limitations
While AT&T IP Flexible Reach services support E911/911 calling capabilities in certain circumstances, there are significant limitations on how these capabilities are delivered. Please review the AT&T IP Flexible Reach Service Guide in detail to understand these limitations and restrictions.

Calling Number Restricted / Private not supported
For calls from ShoreTel / Ingate to AT&T, the calling party number cannot be marked as restricted. This function is not supported.

Fax Not Supported
Fax is not supported between the ShoreTel / Ingate platform and AT&T.

ShoreTel Unsupported Features

At the time of this writing, the following features are not supported, support may be added in upcoming future releases:

- Fax redirect not supported today via SIP Trunks, although Direct Inward Dialing (DID) to fax endpoint is supported

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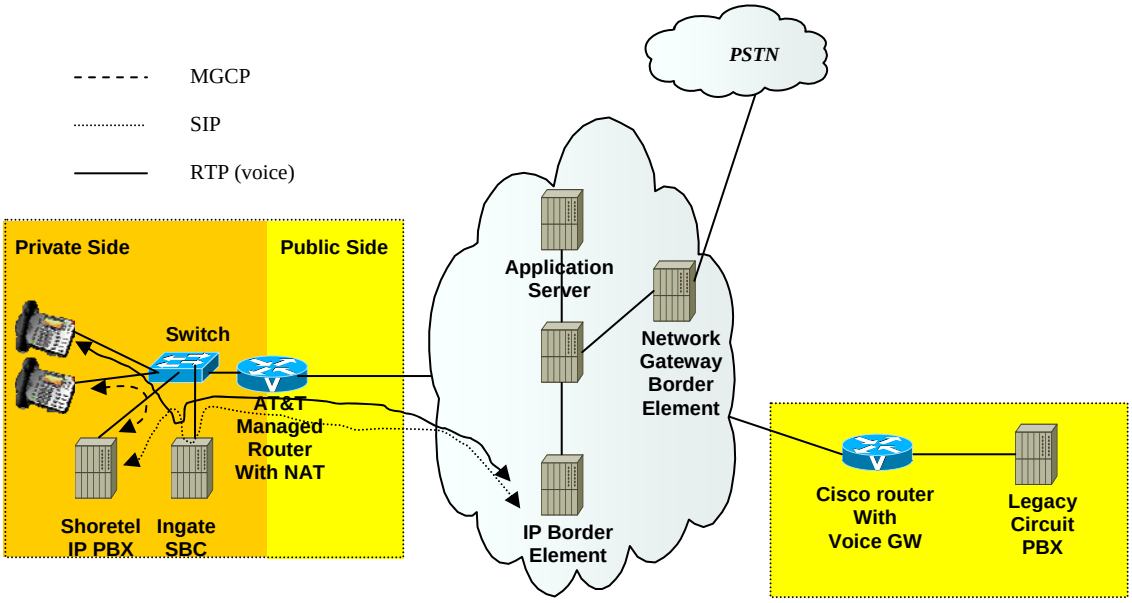
- Conferences via G.729 codec, only G.711 is supported for conferences.
- Office Anywhere External
- ShoreTel Call Recording
- Silent Monitoring
- Barge in
- Whisper paging

4 Configuration Component Overview

This section provides a more detailed description of the ShoreTel / Ingate requirements and configuration.

The ShoreTel / Ingate environment is shown next.



The ShoreTel / Ingate customer premises site shall consist of the following components:

- **ShoreTel IP Phones** – The ShoreTel IP Phones run MGCP and exchange MGCP messages with the ShoreGear switches.

- **ShoreTel PBX** –This PBX connects to the IP phones using MGCP. It connects to the Ingate Session Border Controller using SIP. The ShoreTel PBX implements PBX functionality including phone features, calling routing, voice mail, etc.

- **Ingate Session Border Controller (SBC)** – The Ingate SBC exchanges SIP with the ShoreGear switches. This SBC then exchanges the SIP messages with the AT&T network. The Ingate SBC performs some SIP conversion functions to resolve incompatibilities between the ShoreGear switches and the AT&T network. In particular, during a phone to

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phone transfer, Ingate translates the ShoreTel SIP Refer message to a SIP re-invite. The AT&T network does not currently support the SIP Refer message.

- **AT&T Managed Router (AT&T managed)** – This is the router managed by AT&T. The router shall perform packet marking and QOS for voice. This router will support a static NAT for the Ingate SBC. The following IOS was used in testing: c2800nm-spservicesk9-mz-eng-sp-124-6.T7.bin.

As shown in the diagram above, MGCP signaling is used between the IP phones and the ShoreGear switches. The ShoreGear switch uses SIP to communicate to the Ingate SBC. The Ingate SBC then uses SIP to communicate to the AT&T network. The RTP voice traffic flows from the IP phones to the Ingate SBC and then to the AT&T network.

The configuration information below shows examples for configuring ShoreTel and Ingate. Even though configuration requirements can vary from setup to setup, the information provided in these steps, along with ShoreTel's Planning and Installation Guide and documentation provided by Ingate and AT&T's IP Flexible Reach Service, should prove to be sufficient. However every design can vary and some may require more planning than others.

5 Configuration Guide

ShoreTel Configuration

This section describes the ShoreTel system configuration to support SIP Trunking. The section is divided into general system settings and trunk configurations (both group and individual) needed to support SIP Trunking.

Note: ShoreTel basically just points its Individual SIP Trunks to the Ingate SIParator.

ShoreTel System Settings – General:

The first settings to address within the ShoreTel system are the general system settings. These configurations include the Call Control, the site and the Switch Settings. If these items have already been configured on the system, skip this section and go on to the "ShoreTel System Settings – Trunk Groups" section below.

Call Control Settings:

The first settings to configure within ShoreWare® Director are the Call Control Options. To configure these settings for the ShoreTel system, log into ShoreWare Director and select "Administration" then "Call Control" followed by "Options" (**Figure 4**).

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Figure 4 –Administration Call Control Options

The "Call Control Options" screen will then appear (**Figure 5**).

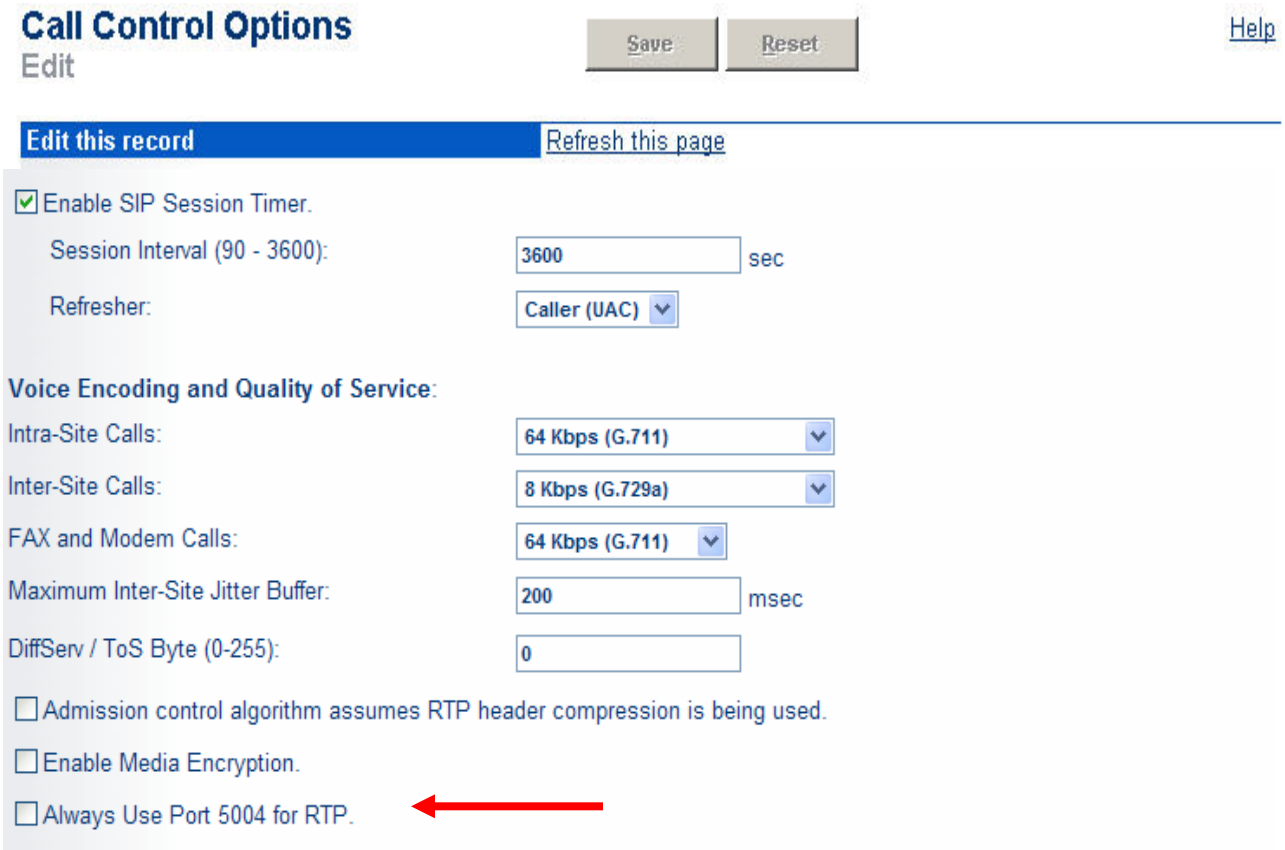

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Figure 5 – Call Control Options

Within the "Call Control Options" screen, confirm that the appropriate settings are made for the "Enable SIP Session Timer", "Intra-Site Calls", "Inter-Site Calls" and "Always Use Port 5004 for RTP" fields.

The first step is to make sure that the "Enable SIP Session Timer" box is checked. Next the Session Interval Timer needs to be set. The recommended setting for "Session Interval" is 3600 seconds. The last item to select is the appropriate refresher (from the pull down menu) for the SIP Session Timer. The "Refresher" field will be set either to "Caller (UAC)" [User Agent Client] or to "Callee (UAS)" [User Agent Server]. If the "Refresher" field is set to "Caller (UAC)", the Caller's device will be in control of the session timer refresh. If "Refresher" is set to "Callee (UAS)", the device of the person called will control the session timer refresh.

The next settings to verify are the "Intra-Site Calls" and the "Inter-Site Calls" settings under the" Voice Encoding and Quality of Service" prompt. For the Intra-Site Calls, verify that the desired audio bandwidth is selected for the CODEC for calls within the system. The settings should then be confirmed for the desired audio bandwidth CODEC for Inter-Site calls (calls between sites).

Note: SIP uses both G.711 and G.729 CODECs. The CODEC setting will be negotiated to the highest bandwidth CODEC supported (fax requires G.711 at minimum).

Disabling the parameter for "Always Use Port 5004 for RTP" is required for implementing SIP on the ShoreTel system. For SIP configurations, Dynamic User Datagram Protocol (UDP) must be used for RTP Traffic. If the parameter is disabled, Media Gateway Control Protocol (MGCP) will no longer use UDP port 5004; MGCP and SIP traffic will use dynamic UDP ports. Once this parameter is disabled (unchecked), make sure that "everything" (IP Phones, ShoreGear® Switches, ShoreWare Server, Distributed Voice Mail Servers / Remote Servers, Conference Bridges and Contact Centers) is "fully" rebooted – this is a "one time only" item. By not performing a full system reboot, one way audio will probably occur during initial testing.

Sites Settings:

The next settings to address are the administration of sites. These settings are modified under the ShoreWare Director by selecting "Administration" then "Sites" (**Figure 6**).

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Figure 6 – Administration Site

This selection brings up the "Sites" screen. Within the "Sites" screen select the name of the site to configure. The "Edit Site" screen will then appear. The only change required to the "Edit Site" screen is to the "Admission Control Bandwidth" field (**Figure 7**).

Note: Bandwidth of 1024 is just an example. Please see the *ShoreTel Planning and Installation Guide* for additional information on setting Admission Control Bandwidth.

Sites Edit screen – Admission Control Bandwidth

The Admission Control Bandwidth defines the bandwidth available to and from the site. This is important as SIP devices will be counted against the site bandwidth. Bandwidth needs to be set appropriately based on site setup and configuration with AT&T' s IP Flexible Reach Service. See the *ShoreTel Planning and Installation Guide* for more information.

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Switch Settings - Allocating Ports for SIP Trunks

The final general settings to configure are the ShoreGear switch settings. These changes are modified by selecting "Administration" then "Switches" in ShoreWare Director (**Figure 5**).

Figure 7 – Administration Switches

This action brings up the "Switches" screen. From the "Switches" screen simply select the name of the switch to configure. The "Edit ShoreGear Switch" screen will be displayed. Within the "Edit ShoreGear Switch" screen, select the desired number of SIP Trunks from the ports available (**Figure 8**).

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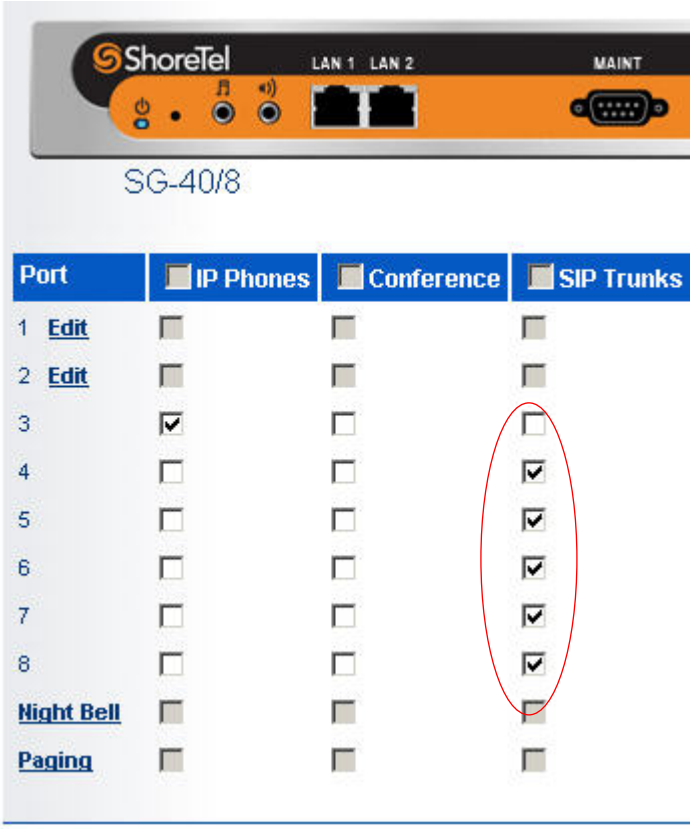

Figure 8 – ShoreGear Switch Settings

Each port designated as a SIP Trunk enables the support for 5 individual trunks.

ShoreTel System Settings – Trunk Groups

ShoreTel Trunk Groups support both Dynamic and Static SIP endpoint Individual Trunks.

Note: A ShoreGear switch can only support one Trunk Group with Dynamic IP addressing.

In trunk planning, the following needs to be considered.

- Ingate SIParator LAN and WAN interfaces should always be configured to use a " Static" IP Address.

The settings for Trunk Groups are changed by selecting "Administration", then "Trunks" followed by "Trunk Groups" within ShoreWare Director (**Figure 9**).

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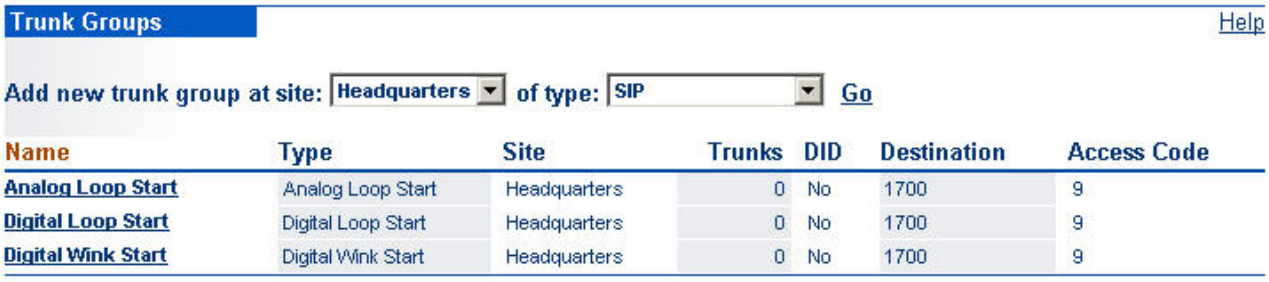
Figure 9 – Administration Trunk Groups

This selection brings up the "Trunk Groups" screen (**Figure 10**).



Name	Type	Site	Trunks	DID	Destination	Access Code
Analog Loop Start	Analog Loop Start	Headquarters	0	No	1700	9
Digital Loop Start	Digital Loop Start	Headquarters	0	No	1700	9
Digital Wink Start	Digital Wink Start	Headquarters	0	No	1700	9

Figure 10 – Trunk Groups Settings

From the pull down menus on the "Trunk Groups" screen, select the site desired and select the "SIP" trunk type to configure. Then click on the "Go" link from "Add new trunk group at site". The "Edit SIP Trunk Group" screen will appear (**Figure 11**).

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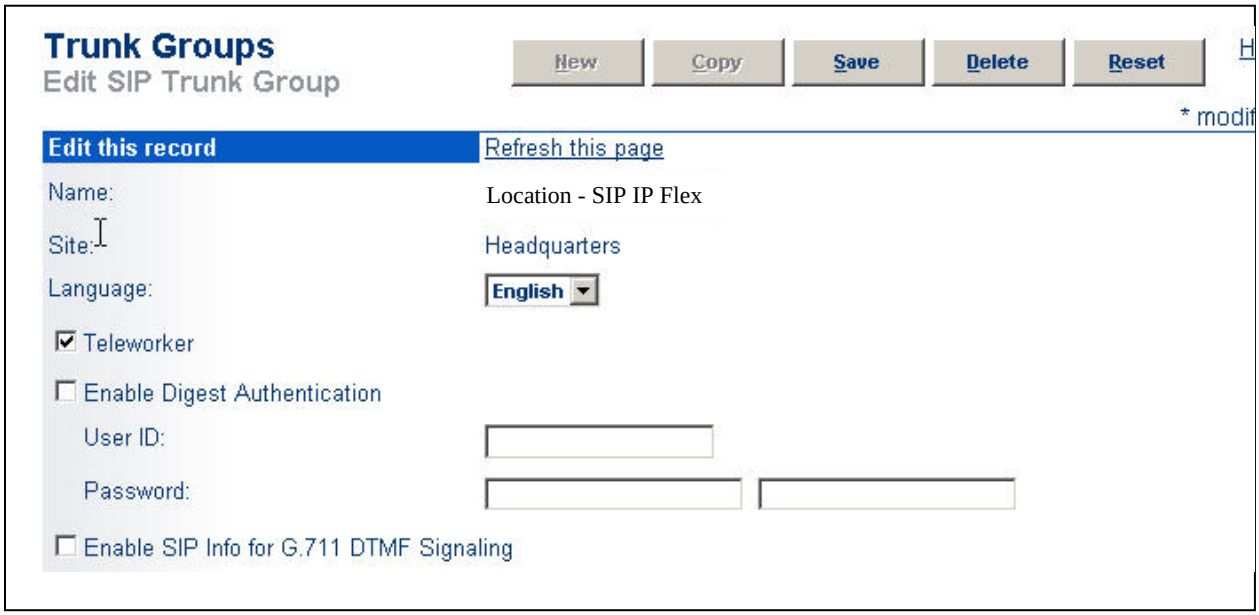

Figure 11 – SIP Trunk Group Settings

For the Ingate SIP Trunking, the trunks will be configured as static.

The next step within the "Edit SIP Trunks Group" screen is to input the name for the trunk group. In the example in Figure 9, the name "SIP" has been created. The next step is to verify the setting of the "Teleworker" parameter. Enabling the "Teleworker" parameter will configure the trunk group as **inter-site**, if the inter-site codec is G.729 then it will use this codec for calls terminated or initiated via this trunk group**.** Once this parameter is enabled, it will count against the site bandwidth.

The "Enable Digest Authentication" field is not required when connecting to an Ingate box.

The "Enable SIP Info for G.711 DTMF Signaling" box should not be checked. Enabling SIP info is currently only used with tie trunks between ShoreTel systems.

The next item to change in the "Edit SIP Trunks Group" screen is to make the appropriate settings for the "Inbound:" fields (**Figure 12**).

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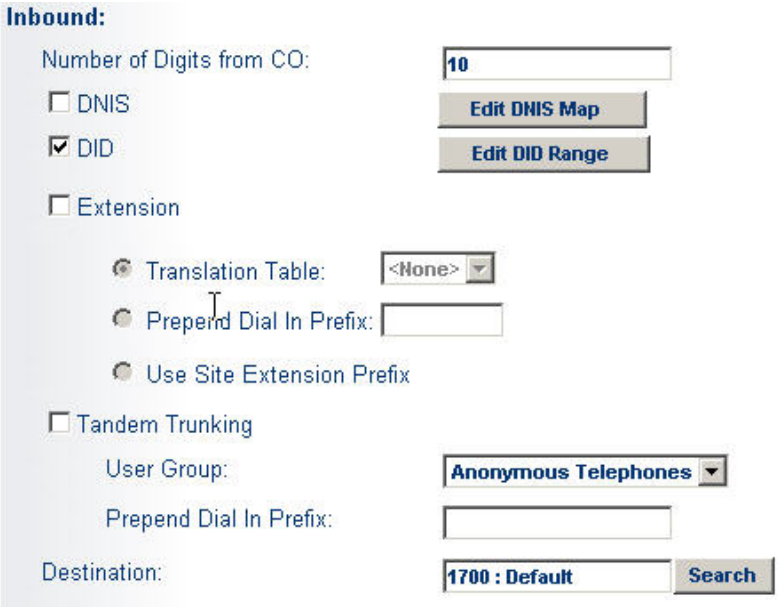

Figure 12 – Inbound:

Within the "Inbound:" settings, ensure the "Number of Digits from CO" is set to match what the CO is sending and ensure the "DNIS" or "DID" box is checked, along with the Extension parameter (see Planning and Installation Guide for further information on configuration).

Note: AT&T IP Flexible Reach Service can be provisioned to deliver 10, 7 or 4 digits for incoming calls, the ShoreTel Trunk Group will only allow one setting. If your service has been provisioned for more than 10, 7 or 4 digits configure the trunk group for 10 digits, you will then need to configure Ingate to add digits to the 7 or 4 digit calls, so that they will be 10 digits in length. See section **5 Configuring Ingate to convert 7 or 4 digit called number to 10 digits.**

Tandem Trunking is not required unless you plan on routing incoming SIP trunk calls out other ShoreTel trunks.

Note: This section is configured in the same way as any normal Trunk Group.

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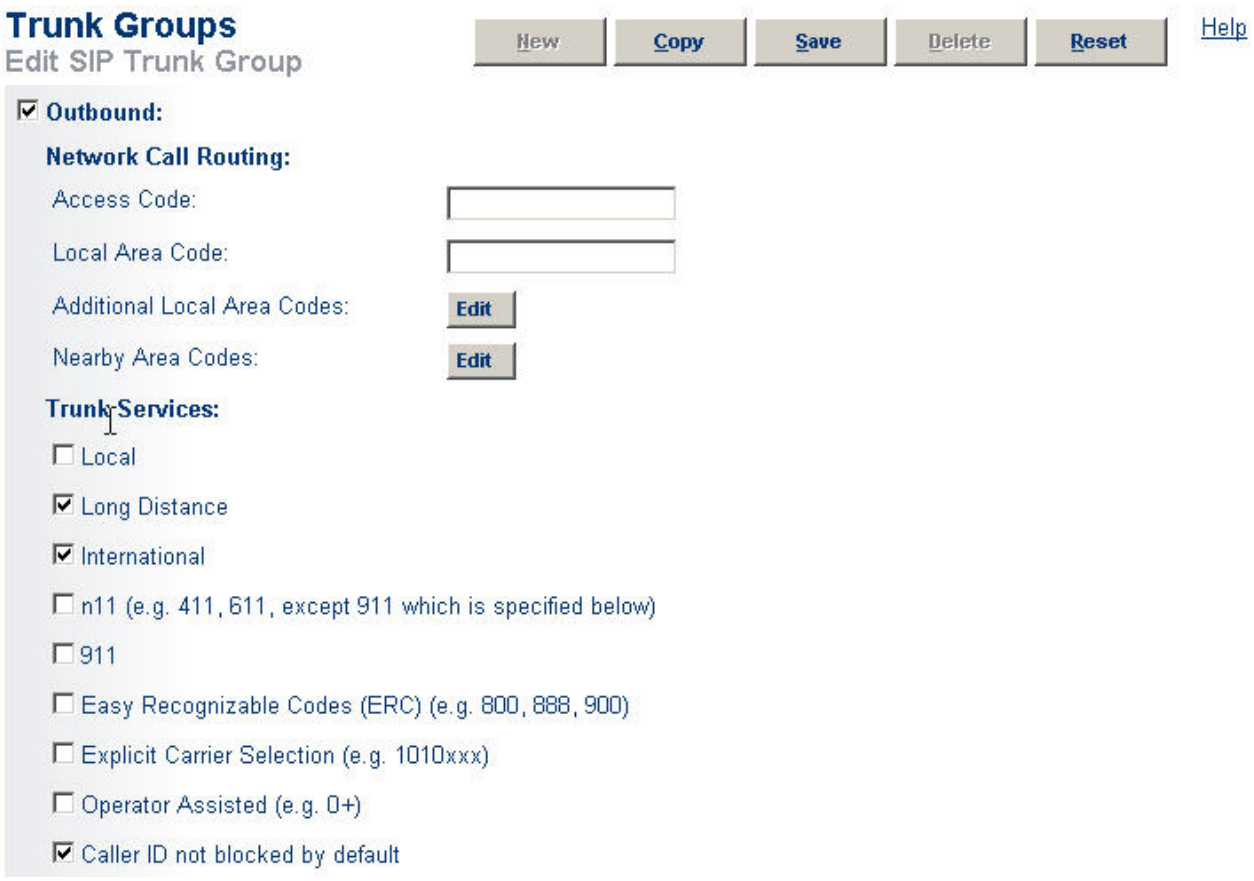

Figure 13 – Trunk Services:

On the "Trunk Services:" screen, make sure the appropriate services are enabled or disabled based on what AT&T IP Flexible Reach Service supports and what features are needed from this Trunk Group.

The last parameter determines if the call is sent out as <unknown> or with caller information (Caller ID). User DID will impact how information is passed out to the SIP Trunk group.

After these settings are made to the "Edit SIP Trunk Group" screen, select the "Save" button to input the changes.

This completes the settings needed to set up the trunk groups on the ShoreTel system.

ShoreTel System Settings – Individual Trunks:

This section covers the configuration of the individual trunks. Select "Administration", then "Trunks" followed by "Individual Trunks" to configure the individual trunks (**Figure 14**).

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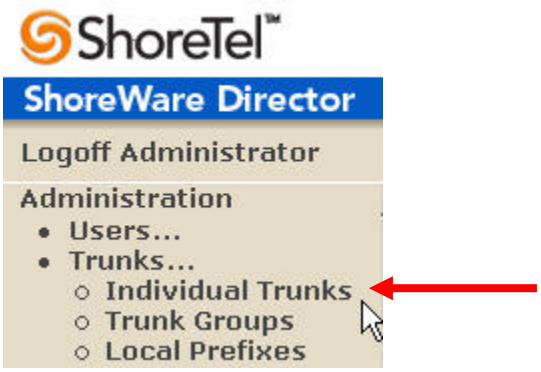

Figure 14 – Individual Trunks

The "Trunks by Group" screen is used to change the individual trunks settings that appear (**Figure 15**).

Figure 15 – Trunks by Group

Select the site for the new individual trunk(s) to be added and select the appropriate trunk group from the pull down menu in the "Add new trunk at site" area. In this example, the site is "Headquarters" and the trunk group is "SIP". Click on the "Go" button to bring up the "Edit Trunk" screen (**Figure 16**).

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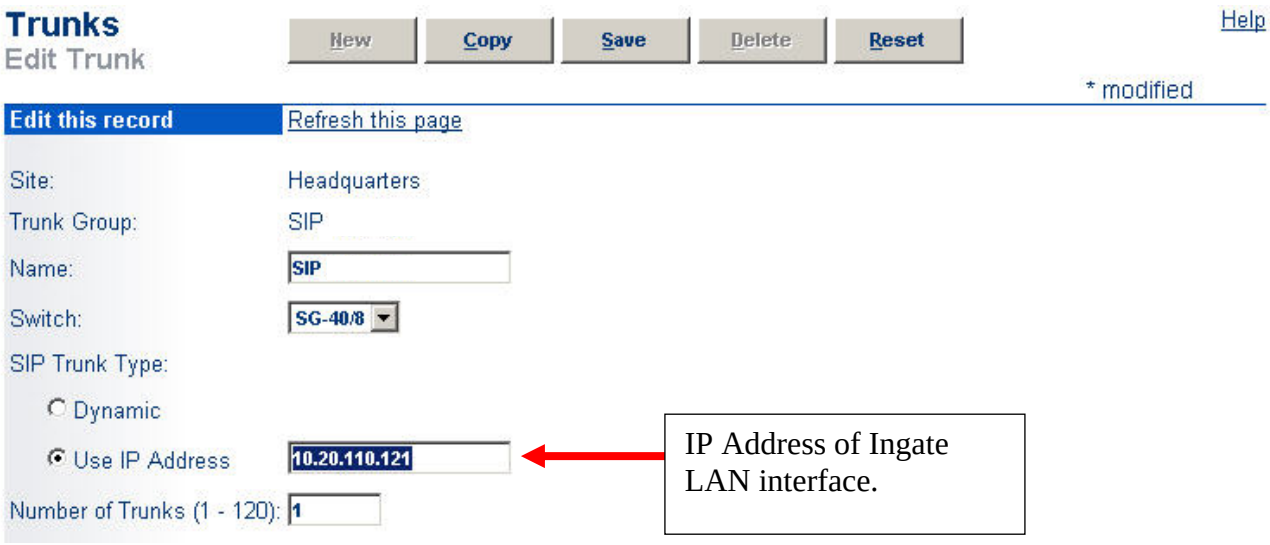

Figure 16 - Edit Trunks Screen for Individual Trunks

From the individual trunks "Edit Trunk" screen, input a name for the individual trunks, select the appropriate switch, select the SIP Trunk type and input the number of trunks. When selecting a name, the recommendation is to name the individual trunks the same as the name of the trunk group so that the trunk type can easily be tracked. Select the switch upon which the individual trunk will be created. For the ITSP Trunk, select "Use IP Address" button and input the IP address of the Ingate SIParator product. The last step is to select the number of individual trunks desired (each one supports "one" audio path – example if 5 is input, then 5 audio paths can be up at one time). Once these changes are complete, select the "Save" button to commit changes.

Note: Individual SIP Trunks cannot span networks. SIP Trunks can only terminate on the switch selected. There is no failover to another switch. For redundancy two trunk groups will be needed with each pointing to another Ingate SIParator – just the same as if PRI were being used.

After setting up the trunk groups and individual trunks, refer to the ShoreTel Product Installation Guide to make the appropriate changes for the User Group settings. This completes the settings for the ShoreTel system side.

ShoreTel Technical Support

In the event that you have problems with the ShoreTel system you may contact ShoreTel Technical Assistance Center at +1 (800) 742-2348 (Toll Free) or +1 (408) 331-3313 (International). A support contract must be in place before any assistance will be provided, for contract / account questions please send an email to shorecare_admin@shoretel.com.

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6 Ingate Configuration

The Ingate product can be configured using two alternative methods: (a) the Ingate StartupTool via a wizard for a complete first time configuration (covered in this document), or (b) the traditional configuration via the web GUI (which is not covered in this document – refer to the Ingate manual for additional information or contact a trained Ingate engineer).

Ingate Startup Tool

When you have received your Ingate device, unpack it and connect it to the network according to *INGATE SIPARATOR startguide*. Install the StartupTool on a Windows PC (should be on same subnet as Ingate) and start the tool.

Note: Ping is disabled both on the LAN and WAN interfaces by default, consult the Ingate documentation to enable if needed.

6.1 Select Product Type

When the Startup Tool launches from the drop down tool select the model from the drop down and click "next".

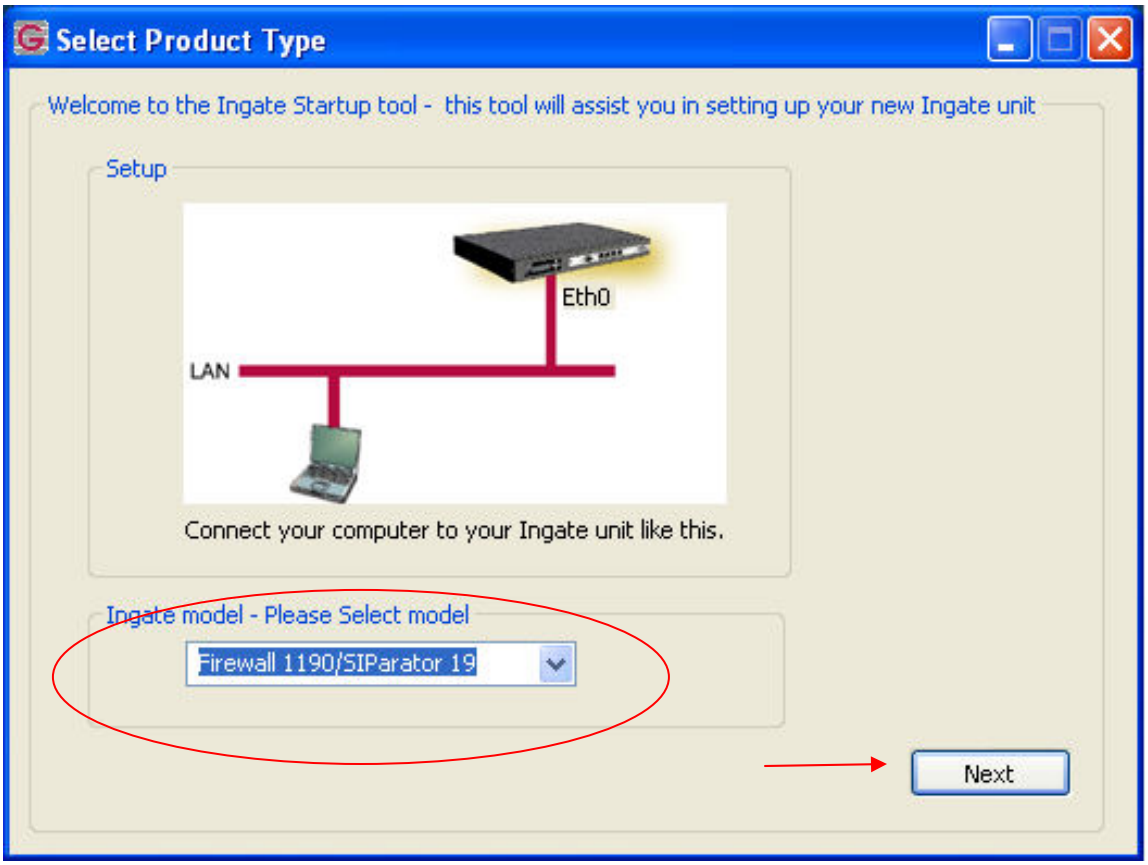

Figure 17 – Select Product Type

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6.2 Configure the unit for the first time

Select the radio button“ Configure the unit for the first time” and the check box “ Configure SIP Trunking” . Next step is to input the IP Address needed for Eth0 interface (Eth0 is normally used for LAN). Must input the “ MAC Address” followed by inserting desired password.

Next click “ Contact” as shown in Figure 18

Note: This tool can be used once the device is already configured though this document only covers first time installation. If the IP Address and password got set via the serial interface as per the “ Ingate Install Guide” then simply check the “ Change or update configuration of the unit” radio button – though these steps aren’ t part of this document.

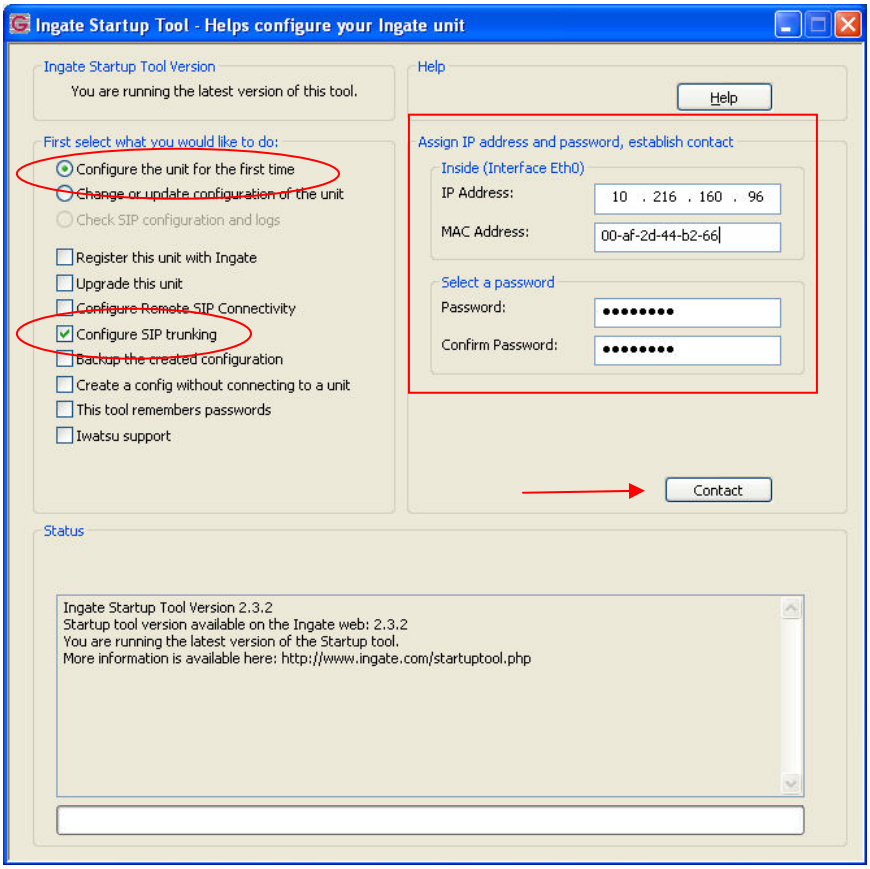

Figure 18 – Configuration Options and connecting to device

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6.3 Network Topology

Select the first tab called " Network Topology" – in this application note the design is based on " Standalone SIParator" and will utilize two Ethernet ports. Eth0 should be addressed for use in the LAN and Eth1 should be configured with a WAN address as shown in Figure 19

Note: The configuration tool allows for configuration of the WAN gateway address shown in figure 19. The steps to configure LAN gateway or any Static Routes will be covered further down in the document.

Configure

- LAN (Inside) IP Address with Netmask
- WAN (Outside) IP Address with Netmask
- Gateway – this is the WAN (Outside) IP Address.
- " Allow https access ..." is optional and is not covered in this document
- Next set the IP address of a DNS

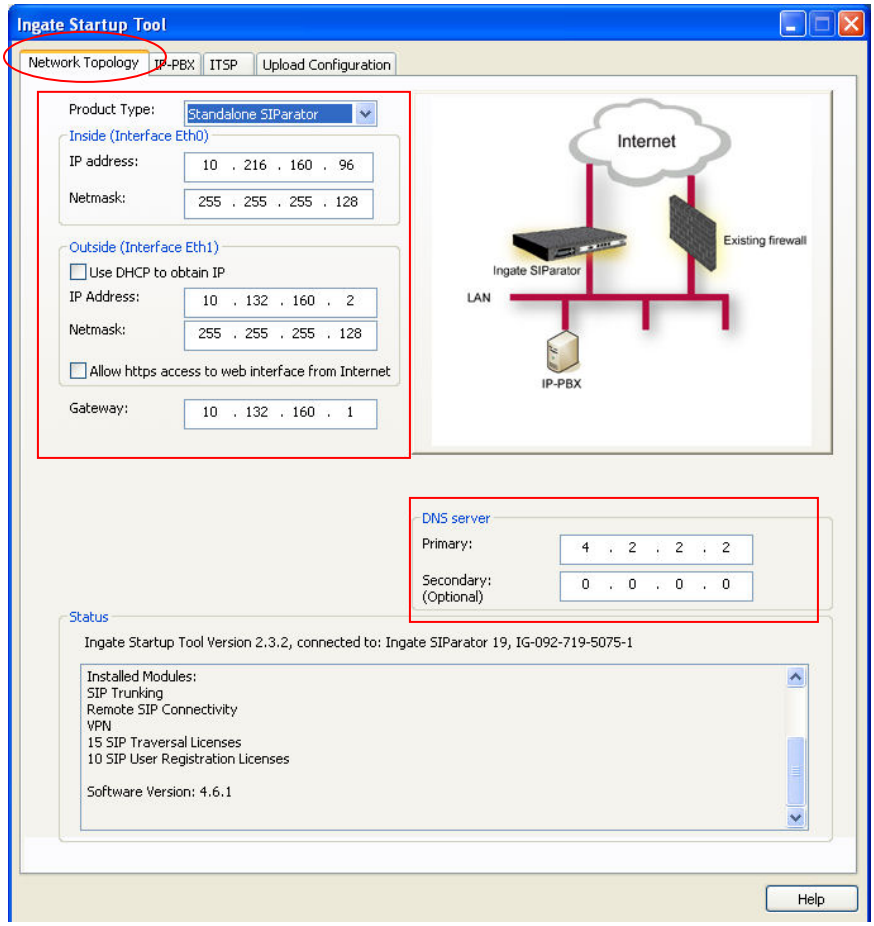

Figure 19 – Network Topology

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6.4 IP-PBX

This area needs the IP Address of the ShoreTel ShoreGear switch which has the “Individual Trunks” configured.

Click on the “IP-PBX” tab at the top of the window and from the drop down “Type” select “ShoreTel” and then define the IP Address of the ShoreGear switch that contains the SIP Trunks, as shown in Figure 20

Note: Do NOT use “Domain Name”

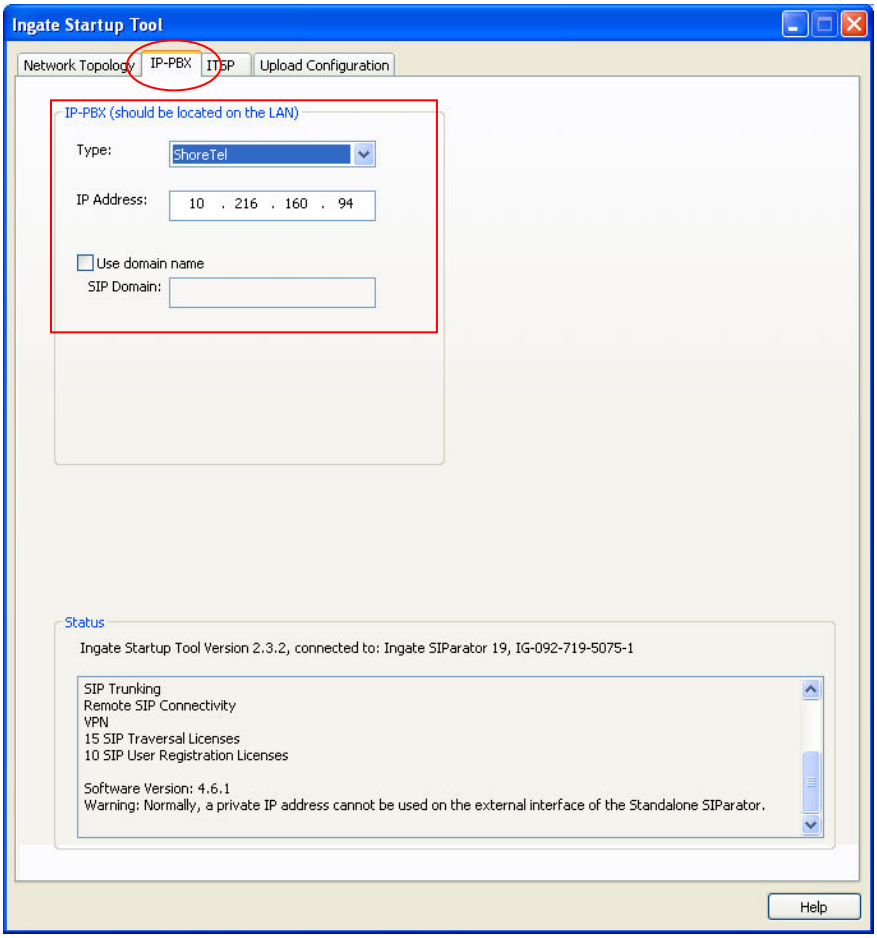

Figure 20 – IP-PBX

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6.5 ITSP Configuration

This part of the setup is pointing the WAN (Outside) interface to the AT&T IPFlex "BE – Boarder Element" IP Address as shown in Figure 21. This is where the calls are being sent so AT&T can route the calls appropriately.

- Click on the "ITSP_1" tab at top of the page (ITSP = Internet Telephony Service Provider)
- From the drop down select "AT&T"
- Next enter in the "primary" IP Address of the BE (Boarder Element) provided by AT&T IP Flexible Reach Service

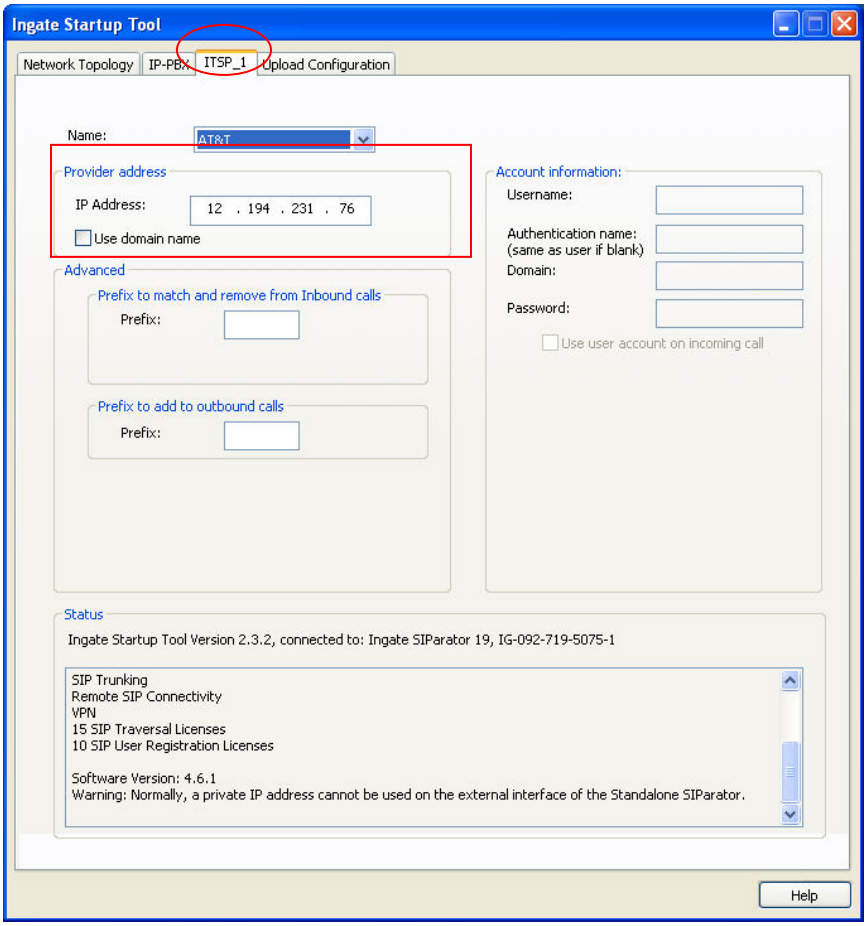

Figure 21 – ITSP Configuration

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6.6 Upload Configuration

This step will now upload the configuration onto the Ingate box. Click the last tab called "Upload Configuration" as shown in Figure 22.

- Verbose Logging can be "**unchecked**"
- Next click the radio button "Logon to web GUI and apply settings"

Note: Optional to "backup the configuration" prior to uploading, though if this is a new system backing it up isn't needed.

- Last click on "Upload" to begin the configuration process

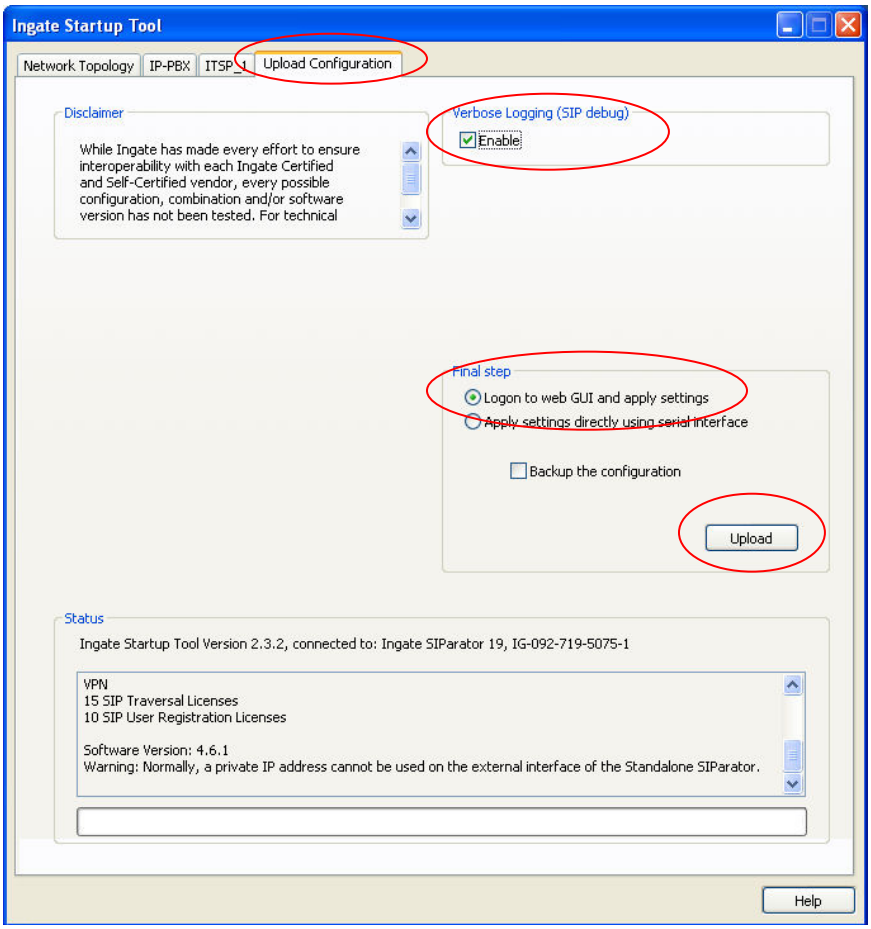

Figure 22 – Upload Configuration

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6.7 Upload Configuration – Process

This step just shows in Figure 23 the upload process underway.

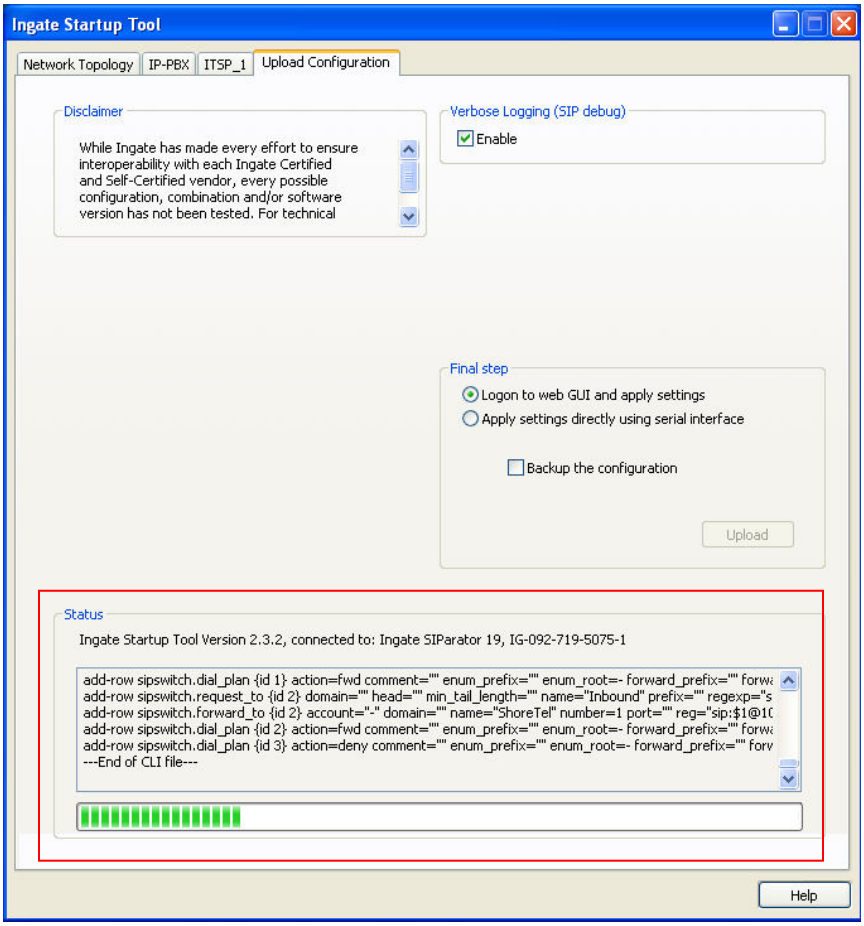

Figure 23 – upload process

6.8 Success

Once complete a window will pop-up telling the administrator that the process was a “success” as shown in Figure 24. When “OK” is clicked a web page will open as the administrator is redirected to the web login for the Ingate SIParator just configured.

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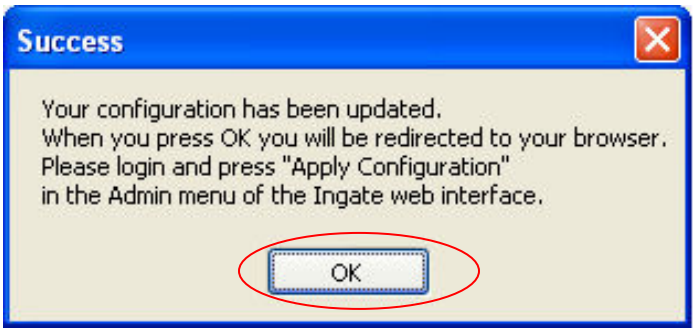

Figure 24 - Success

6.9 Logging into the Ingate web interface

Login using " admin" and the password configured from above step 6.2. Next click on " Log in" as shown in Figure 25

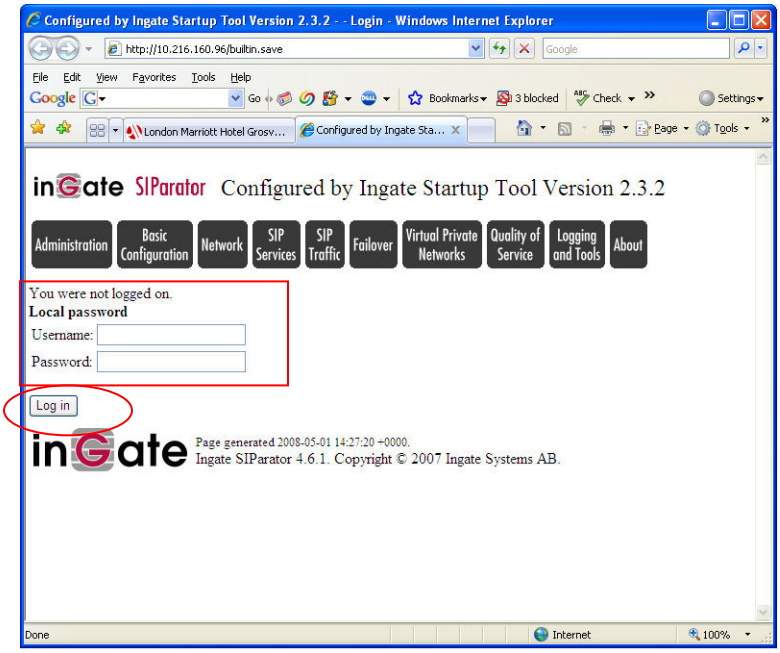

Figure 25 – Log in

6.10 Saving Modifications

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Once logged in the web page should display “Save / Load Configuration”. Click on the “Apply Configuration” as shown below in figure 26. Follow the steps presented by the web page to complete the applying of the new configuration.

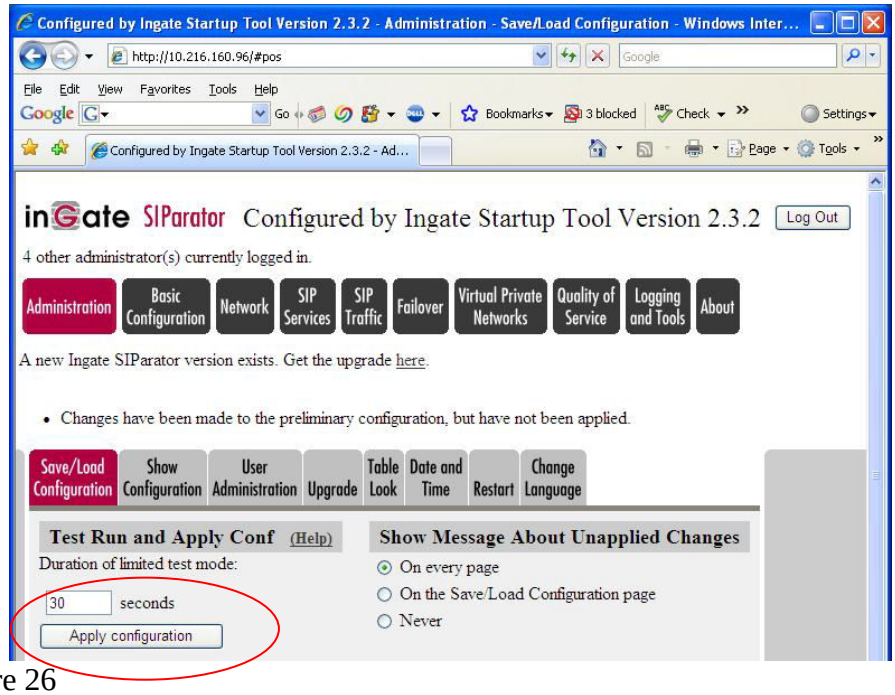

Figure 26

Note: If the LAN (Inside) interface is connect to a network with “NO” other subnets then continue to section 7. If other subnets exist on the LAN then continue on to configure a LAN gateway and static routes so traffic can reach those networks.

6.11 Configuration of “Default Gateway”

From the web interface click on the top tab called “Network” and then click on “Default Gateways”. Next fill in the following fields as shown in Figure 27.

- Enter the gateway address of the WAN (Outside) network
- Select the “Outside (eth1) interface from the drop down
- Click “Save” at the bottom of the page.

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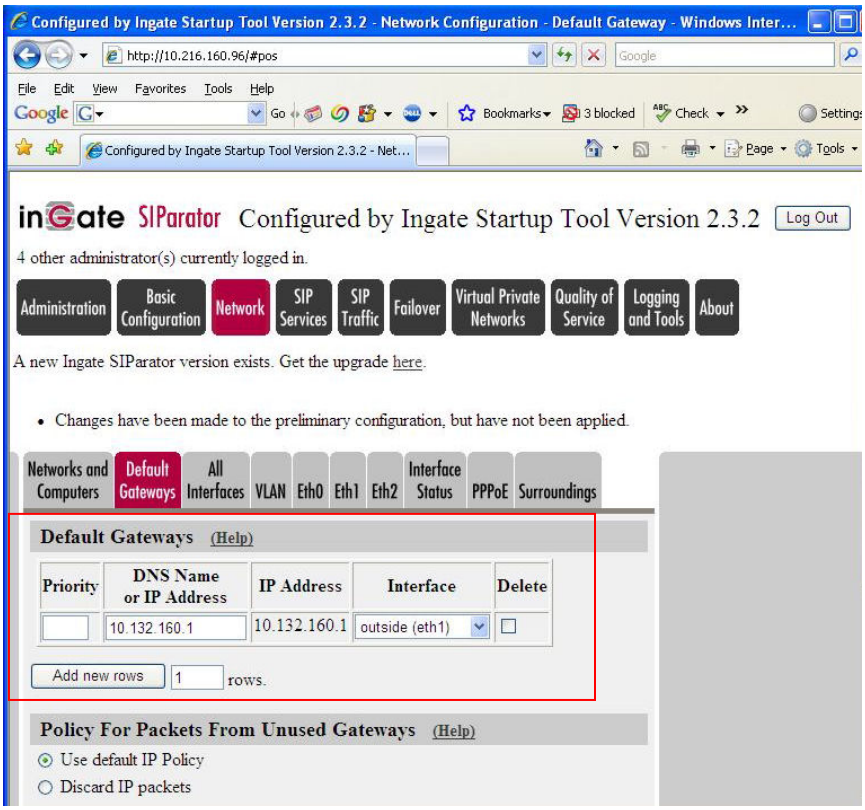

Figure 27 – Default Gateway configuration

6.12 Eth0 LAN (Inside) Static Route

Click on “Eth0” tab and at the bottom of the page is a section called “Static Routing”.

Complete the following as shown in Figure 28. DNS Name or Network Address, enter in the “Network” portion that covers all IP Address (subnets) in the LAN network.

For example if the network has 10.1.0.0 plus 10.2.0.0 and 10.3.0.0 then 10 is the common (first octet) portion of the address. One would then use 10.0.0.0 in this example 10 is the network and the three zero’s represent endpoints or “hosts”. What this means is anything with a 10.x.x.x type address will route out the LAN (Inside) interface vs. going out the WAN (Outside) interface which is set to 0.0.0.0

Next is “Netmask / Bits” some call this “Subnet Mask” for the LAN (Inside) network. In this example it would be 255.0.0.0 (each 255 represents the network portion of the address and the 0 represents end devices or “hosts”.

Final field is “Router” or gateway off the LAN (Inside) network. In this section the interface ask’s for “DNS Name or IP Address. In our example we input the IP Address of the Gateway. Normally it might be something like 10.2.0.1

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Final step is to click “Save”

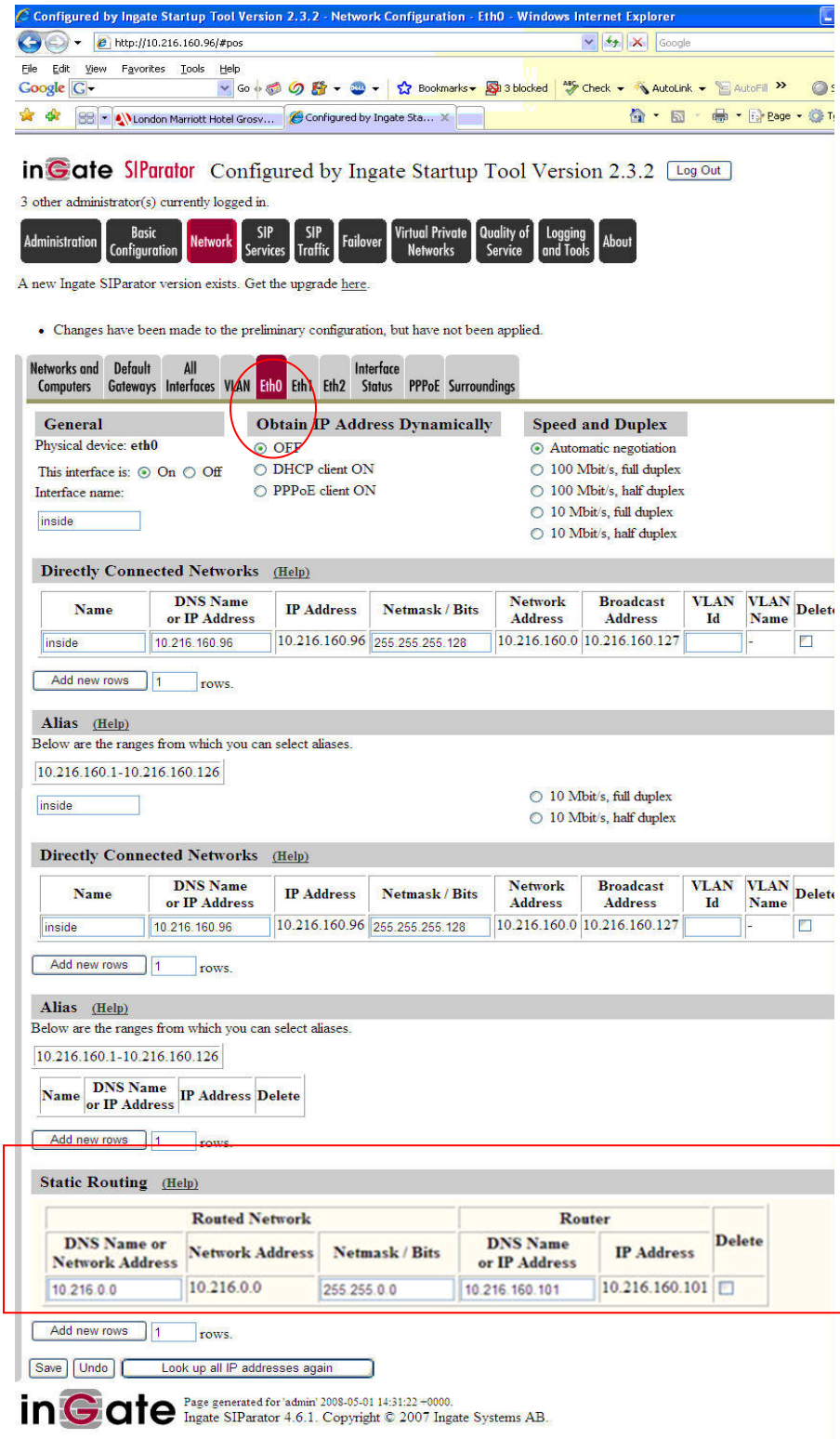

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Figure 28 – Static Routing – LAN (Inside) Interface

6.13 Saving Modifications

Click on the "Administration" tab at the very top of the web page. Next click on the "Save / Load Configuration" and then click "Apply Configuration" as shown below in figure 29. Follow the steps presented by the web page to complete the applying of the new configuration.

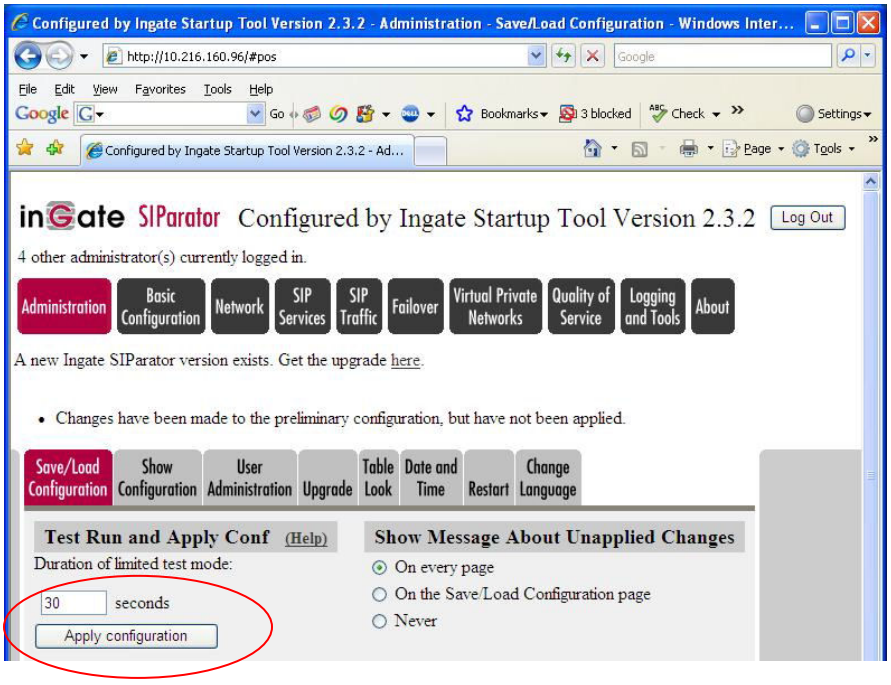

Figure 29

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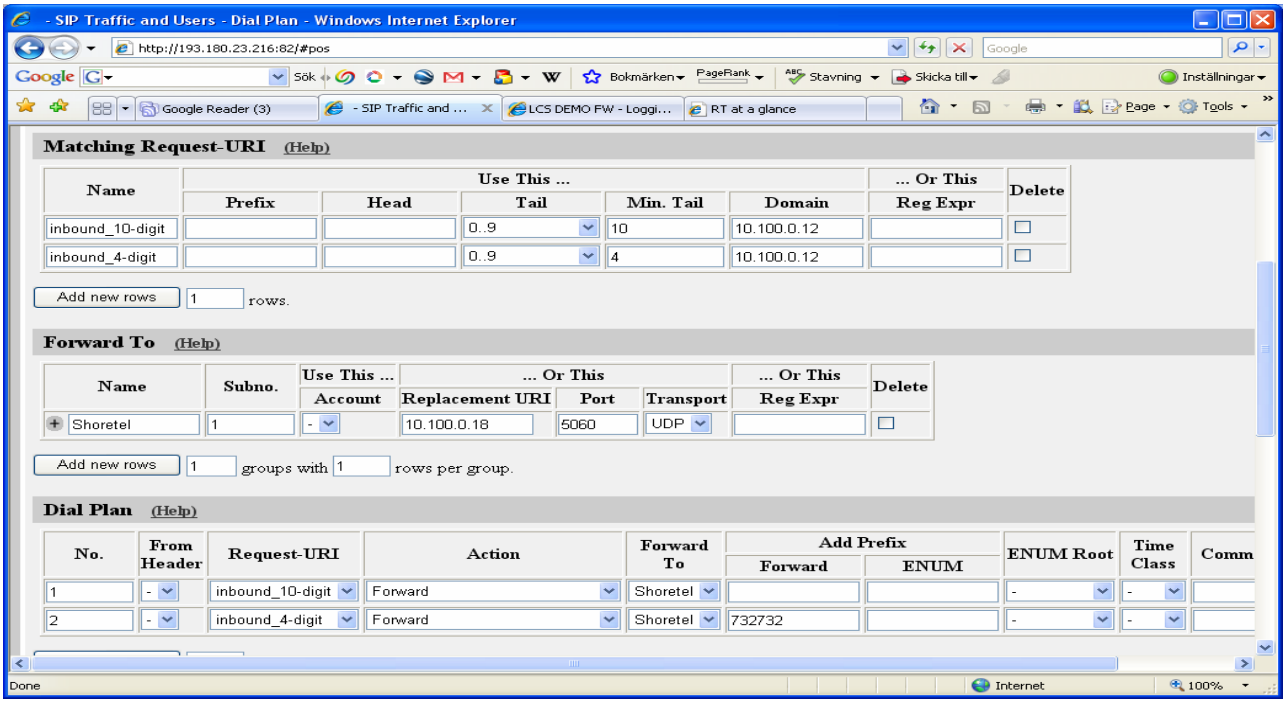
7 Configuring Ingate to convert 4 or 7 digit called number to 10 digits

It is possible for AT&T IP Flexible Reach Service to provision your service to receive both 10 and 4 digit Direct Inward Dial (DID) calls. As noted previously, the ShoreTel trunk group configuration only allows for one or the other not both. Ingate can be configured to convert the 4 digit calls to 10 digits, you can do so via the following configuration, see screen shot below.

In this example 10.100.0.12 is the external IP address of the Ingate (would normally be a public IP address) and 10.100.0.18 is the ShoreTel ShoreGear switch.

The “Dial Plan” page is located under “SIP Traffic | Dial Plan”. The first line, in the Matching Request-URI table, matches inbound call with 10 or more digits and the second one matches inbound calls with 4 or more digits.

It is in the Dial Plan that the actual processing is made and here the order of the lines matter. The first line will match incoming calls with 10 or more digits and it will be forwarded to the ShoreGear switch without any change of numbers. The second line will match inbound calls with 4 or more digits and it will forward the call to the ShoreGear switch after adding the prefix 732732 for example.



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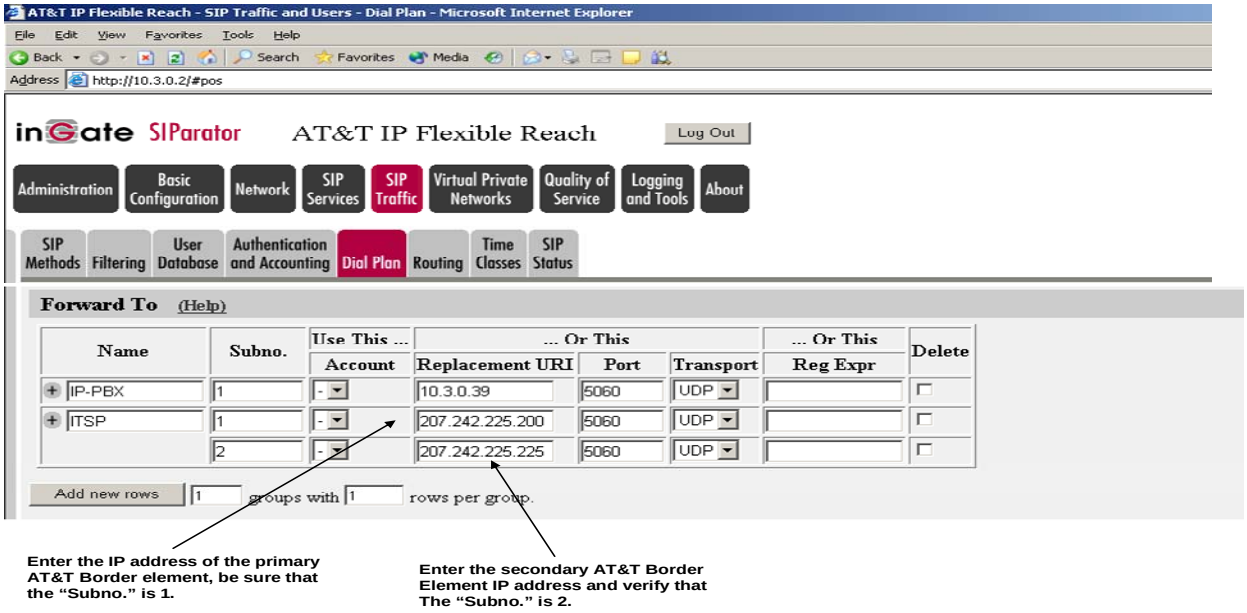
8 Configuring Ingate for a secondary Border Element

The AT&T IP Flexible Reach service will provide you with multiple IP addresses for the Border Element, for failover conditions. You will need to add the secondary IP addresses in the Ingate configuration. Log into the Ingate web GUI and navigate to the Dial Plan page under SIP Traffic tab, then under the "Forward To" parameters select the "Add new rows" radio button and enter the IP address of any secondary Border Elements you wish to add. Be sure to set the "Port" parameter to 5060 and the "Transport" to UDP.



In this example the primary Border element IP address is 207.242.225.200, all outbound calls will first attempt to utilize this Border element. The secondary IP address (207.242.225.225) will only be used if the primary fails.

9 Troubleshooting

Troubleshooting Outbound Calls

Symptom: When trying to make a call from an internal ShoreTel extension to PSTN, there is no ringing signal on the PSTN phone.

Note: If you get a ringing signal on the PSTN phone, these troubleshooting steps will not help you to find the problem. Please contact your sales representative for support.

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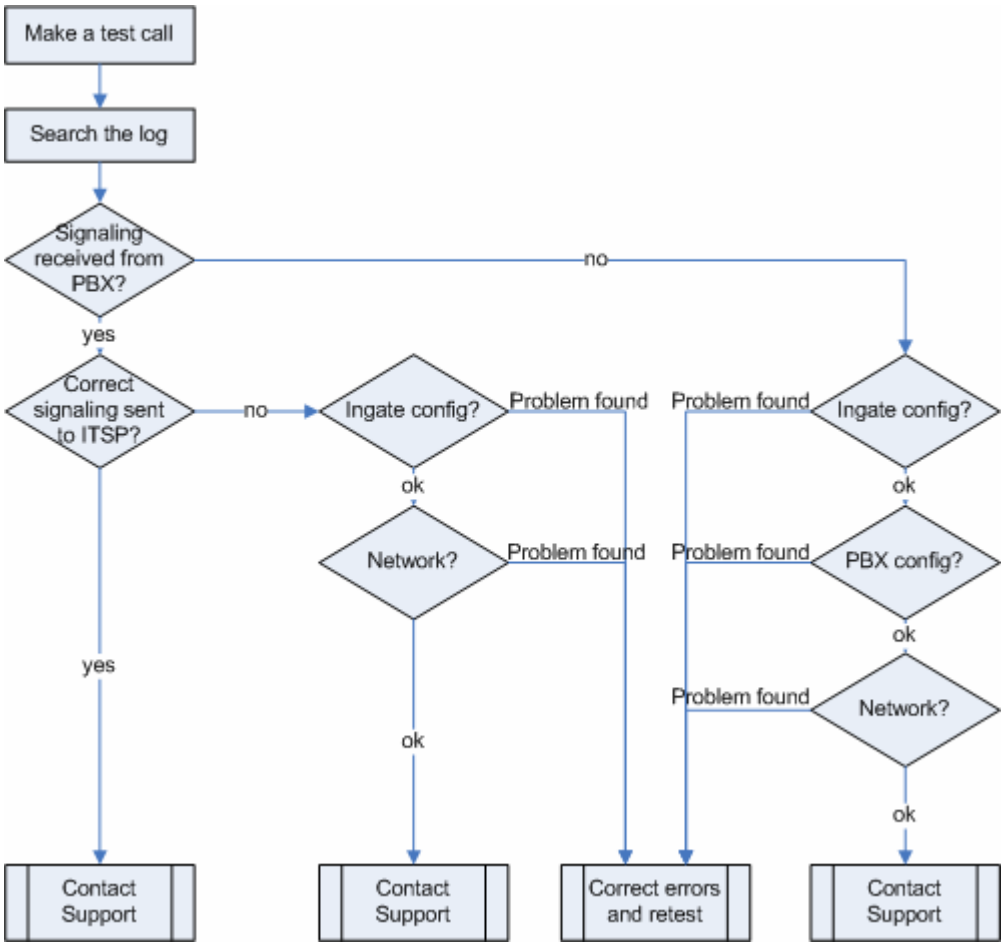

Following is an outbound traffic troubleshooting overview.

Get a log for the failing call:

First try to make a call to a PSTN number from a ShoreTel phone and notice the behavior on the ShoreTel phone as well as on the PSTN phone.

Next step is to search the log on the Ingate. Log into the Ingate box and navigate to the Display Log page. Make necessary settings on this page according to the picture below. Especially make sure that you have the highlighted checkboxes in the correct state.

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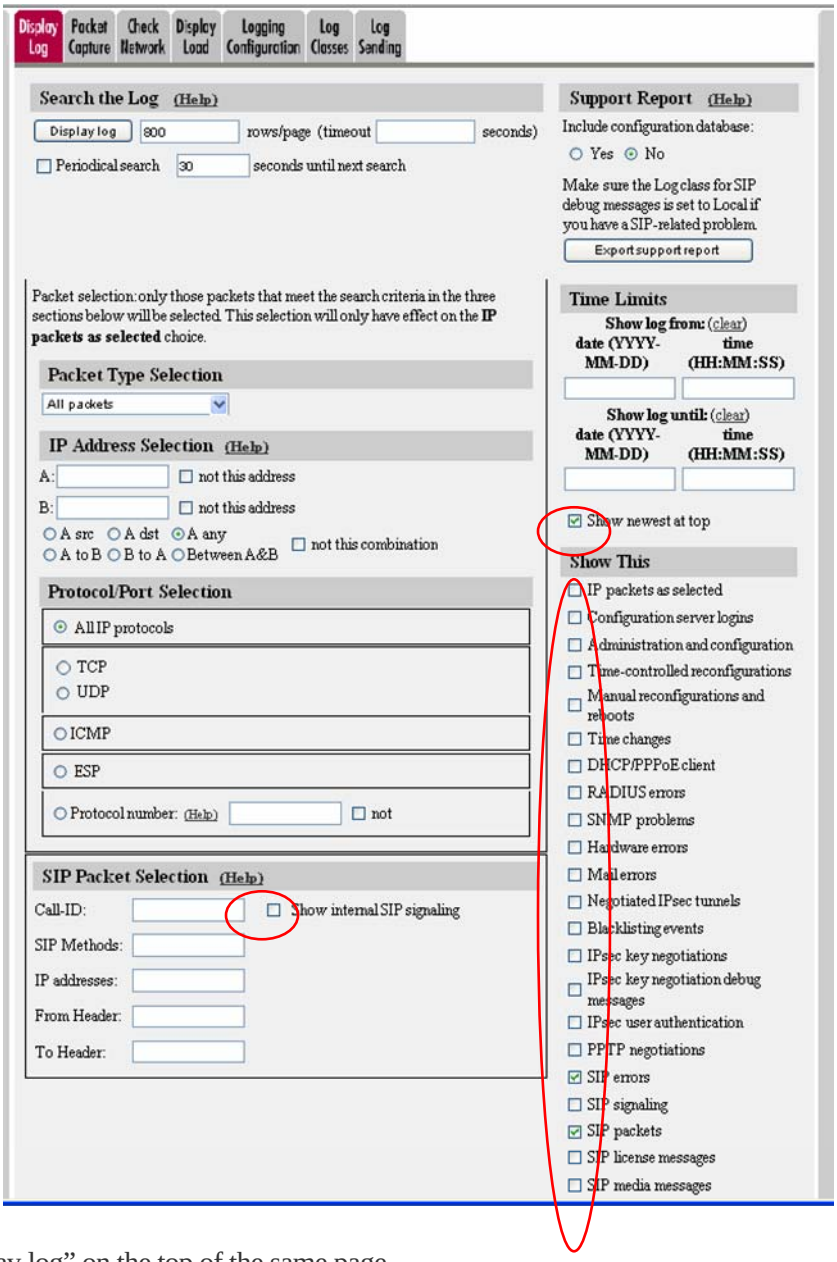

Then press “Display log” on the top of the same page.

You will now see a log of all SIP packets received and sent by the Ingate, with the newest log entry on the top.

Ensure the signaling is received from the ShoreTel:

Localize the call initiation from the ShoreTel by searching for “invite sip” in your browser. You should look for the first packet coming from the ShoreTel system that starts with a “recv from <IP address of the ShoreGear switch>” as you can see in the example (only the first lines of the log messages are shown here).

```
>>> Info: sipfw:  recv from 10.100.0.40:5060 via UDP connection 12746:
```

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```
INVITE sip:16037914522@10.100.0.13:5060 SIP/2.0
```

If you cannot find a packet like the one above, the problem is in the communication from ShoreGear to the Ingate. Follow these steps:

1. Make sure the configuration is applied. If you have the text: `Changes have been made to the preliminary configuration, but have not been applied` just above the tabs on the top of the page you need to apply the settings. Retest if settings applied.

2. Make sure the Ingate SIP module is turned on, SIP Services – SIP Module – On. Retest if you change any setting.

3. Make sure the ShoreTel configuration is correct. Check the IP address pointing at Ingate one extra time. Retest if you change any setting.

4. Make sure there is IP connectivity between the ShoreTel and Ingate. On the Ingate use: Logging and Tools – Check Network. Contact your network administrator for assistance if needed.

If none of the steps above solves the problem, contact your sales representative for support.

Ensure that the signaling to the ITSP works:

If you find the incoming packet, you should find a similar packet leaving the Ingate just above (just after in time) the incoming packet. The first rows of the outgoing packet will look something like this:

```
>>> Info: sipfw:  send sf (0x8422820) to 208.49.124.49:5060 via UDP connection 12748:
  INVITE sip:16037914522@208.49.124.49:5060;transport=udp SIP/2.0
```

If you don't see the outgoing packet, something is probably wrong with the Ingate configuration or you lack Internet connectivity:

1. Make sure the Ingate is configured correctly.

2. Make sure the IP connectivity between the Ingate and the ITSP is working. On the Ingate use: Logging and Tools – Check Network and ping the ITSP IP address. Contact your network administrator for assistance if needed.

If you see a packet sent from the Ingate, verify that it was sent to the IP address provided by the ITSP. If not, correct your configuration and retest.

If none of the steps above solves the problem, contact your sales representative for support.

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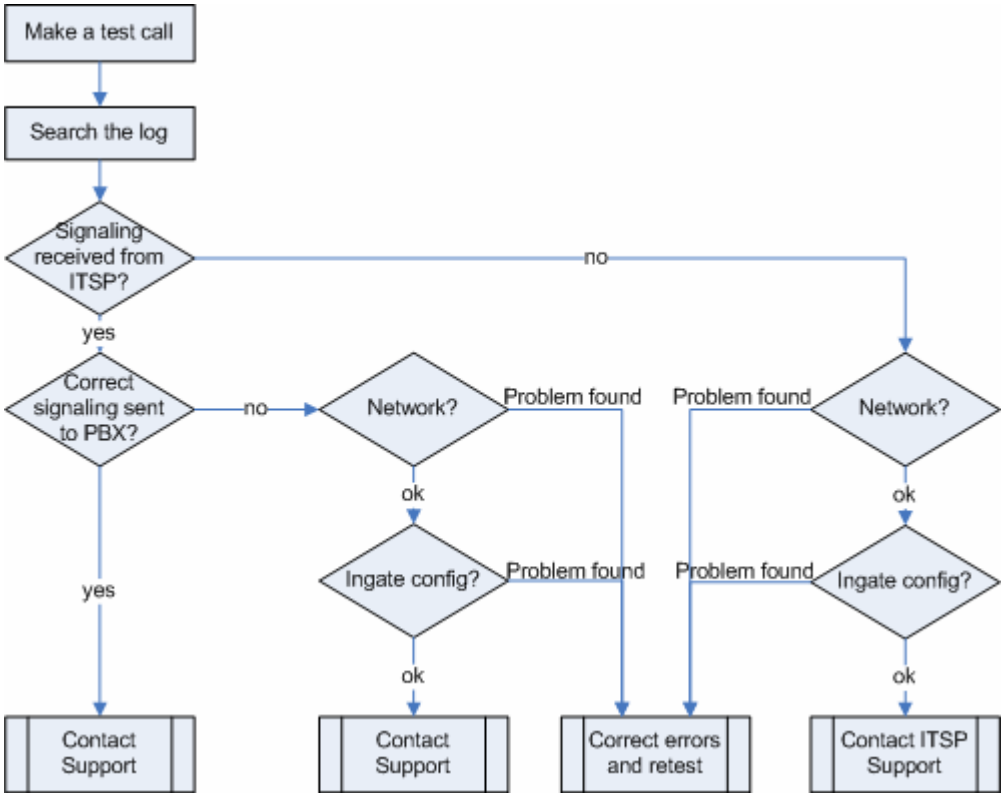
Troubleshooting Inbound calls

Symptom: When trying to make an inbound call to a ShoreTel phone via the SIP Trunk, there is no ringing signal on the ShoreTel phone.

Note: If you get a ringing signal on the ShoreTel phone, these troubleshooting steps will not help you to find the problem. Please contact your sales representative for support.



Inbound troubleshooting overview

Get a log for the failing call:

First try to make a call to a ShoreTel phone from a PSTN phone and notice the behavior on the ShoreTel phone as well as on the PSTN phone.

Next step is to search the log on the Ingate. Log in to the Ingate box and navigate to the Display Log page. Make necessary settings on the logging page according to the picture below. Especially make sure that you have the highlighted checkboxes in the correct state.

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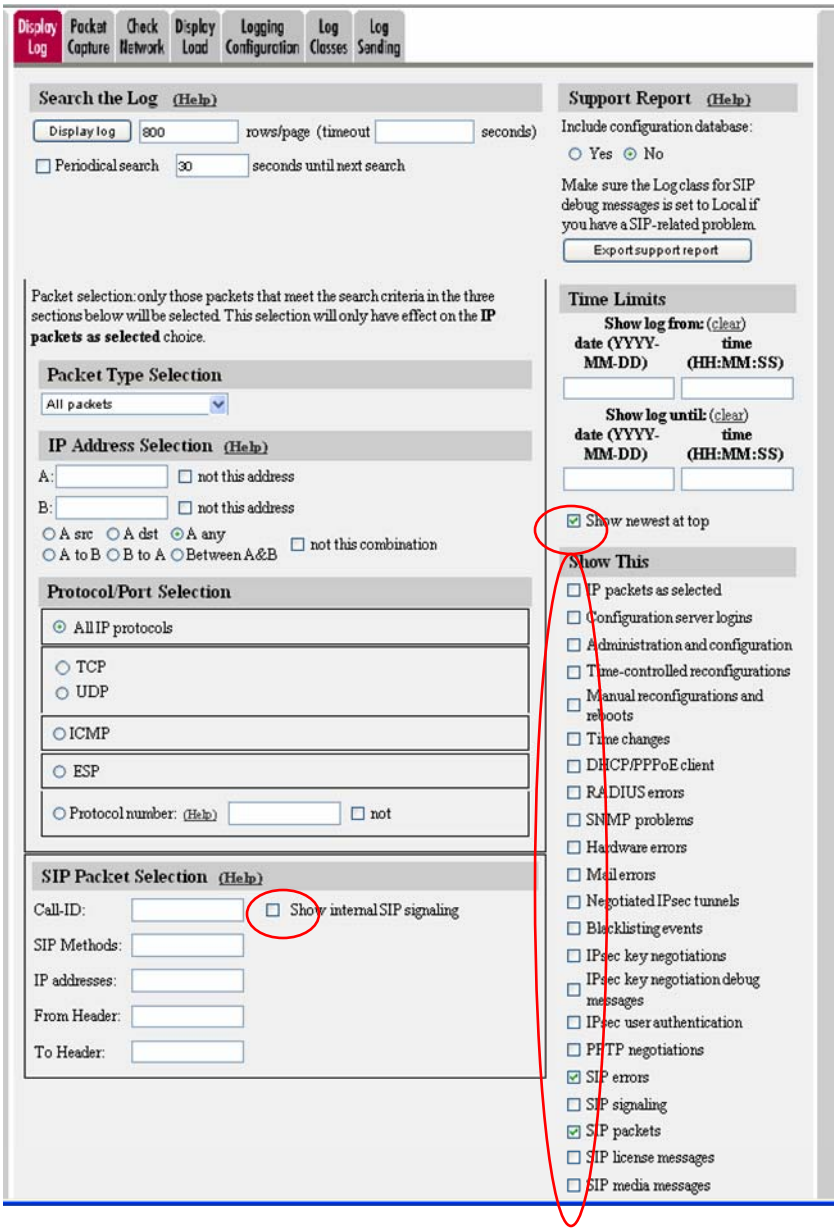

Then press “Display log” on the top of the page.

You will now see a log of all SIP packets received and sent by the Ingate, with the newest log entry on the top.

Ensure that the signaling is received from the ITSP:

Localize the call initiation from the Trunking provider by searching for “invite sip” in your browser. (use Ctrl-F). You should look for the first packet coming from the ITSP system that starts with a “recv from <IP address of the ITSP>” as you can see in the example (only the first lines of the log message are shown here).

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```
>>> Info: sipfw:  recv from 208.49.124.49:5060 via UDP connection 12748:

  INVITE sip:6023574058;npdi=yes@193.12.253.37:5060 SIP/2.0
```

If you cannot find a packet like the one above, the problem is in the communication from the ITSP to the Ingate. Follow these steps:

1. Make sure the configuration is applied. If you have the text: `Changes have been made to the preliminary configuration, but have not been applied` just above the tabs on the top of the page you need to apply the settings. Retest if settings applied.

2. Make sure you have IP connectivity between the Ingate and your ITSP. On the Ingate use: Logging and Tools – Check Network and ping the ITSP IP address. Contact your network administrator for assistance if needed.

3. Make sure the Ingate SIP module is turned on, SIP Services – SIP Module – On. Retest if you change any setting.

If you still don't see any packets in the log, contact your ITSP for further troubleshooting.

Ensure correct signaling to the ShoreTel PBX:

If you find the incoming packet, you should find a similar packet leaving the Ingate just above (just after in time) the incoming packet. The first lines of the outgoing packet will look something like this:

```
>>> Info: sipfw:  send sf (0x8419848) to 10.100.0.40:5060 via UDP connection 12746:

  INVITE sip:6023574058;npdi=yes@10.100.0.40:5060;transport=udp SIP/2.0
```

If you don't see the outgoing packet, something is probably wrong with the Ingate configuration or you might lack a connection to your LAN where the ShoreTel is located:

1. Ensure you have IP connectivity between ShoreTel and the Ingate. On the Ingate use: Logging and Tools – Check Network and ping the Shoretel IP address. Contact your network administrator for assistance if needed.

2. Make sure your Ingate is configured correctly.

If you see the outgoing packet, make sure that it was sent to the IP address that was used by the Shoregear switch.

If the call still fails after executing the steps described above, please contact your sales representative for support.

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Ingate Technical Support

If you require further assistance with the Ingate SIParator you may contact ShoreTel's Technical Assistance Center (TAC) at +1 (800) 742-2348 (Toll Free) or +1 (408) 331-3313 (International). A support contract must be in place before any assistance will be provided, for contract / account questions please send an email to shorecare_admin@shoretel.com.

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