



www.CoxBusiness.com

September 30th 2013

SIP Trunking using the EdgeMarc Network Services Gateway and the ShoreTel PBX 19.6.4400.

© 2011, Cox Communications, Inc. All rights reserved.

This documentation is the confidential and proprietary intellectual property of Cox Communications, Inc. Any unauthorized use, reproduction, preparation of derivative works, performance, or display of this document, or software represented by this document is strictly prohibited.



Table of Contents

1	Overview	3
2	Prerequisites	3
3	Network Topology	4
4	Description of Basic Operation and Call Flows	5
5	PBX Configuration	5

1 Overview

The purpose of this configuration guide is to describe the steps needed to configure the ShoreTel PBX for proper operation in a SIP Trunking application with the e-SBC EdgeMarc. Please note that this guide documents the basic configuration needed in the ShoreTel PBX and that the requirements of specific SIP Trunking environments may require modifications to the configuration steps provided in this document.

2 Prerequisites

SIP Trunking information provided by the VoIP service provider:

- SIP proxy server IP address or DNS name.
- Trunking Direct Inward Dial (DID) phone numbers
 - Calls to the Trunking DID(s) are forwarded from the service provider to the wide area network (WAN) IP address of the EdgeMarc. There may be a single "Pilot" phone number used for all inbound calls and/or multiple DIDs depending on the service provider settings.
- SIP authentication credentials (optional)
 - Some SIP Trunking service providers require a unique username and password to be supplied for IP PBX registrations and/or SIP signaling using P-Asserted-Identity (RFC 3325). This configuration guide provides the configuration steps for both PBX registration and static or non-registration modes of PBX operation.

3 Network Topology

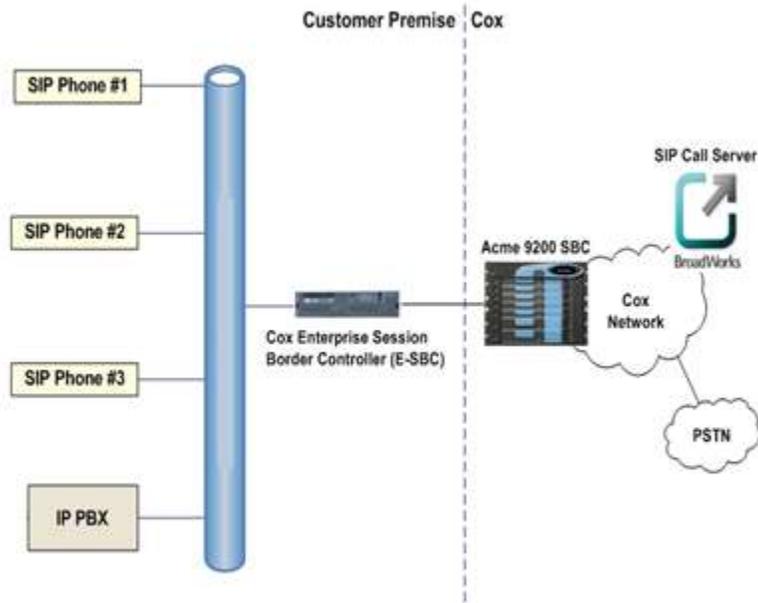


Figure 1 Test Set up

The PBX in the above network topology represents the PBX that is connected via its LAN port to the LAN port of the EdgeMarc Network Services gateway.

Table 1 – PBX Information

Manufacturer:	ShoreTel
Model:	Shoreware Director
Software Version:	19.6.4400.0
Does the PBX send SIP Registration messages (Yes/No)?	PBX doesn't support trunk registration
Vendor Contact:	408-331-3300

Table 2 – E-SBC Information

Manufacturer:	Edgewater Network, Inc.
---------------	-------------------------

Model:	4552
Software Version:	11.6.14

4 Description of Basic Operation and Call Flows

Basic Call Flow:

All phones connect to the PBX. The PBX will interface with the service provider using SIP trunks.

Internal calls:

- Calls between phones on the LAN
- LAN phone PBX LAN phone

Outbound calls:

- Call is initiated by a LAN phone to a WAN phone.
- LAN phone PBX <SIP trunk> EdgeMarc SIP trunk service provider WAN phone

Inbound call:

- Call is initiated by a WAN phone to a LAN phone.
- WAN phone SIP trunk service provider EdgeMarc <SIP trunk> PBX LAN phone

5 PBX Configuration

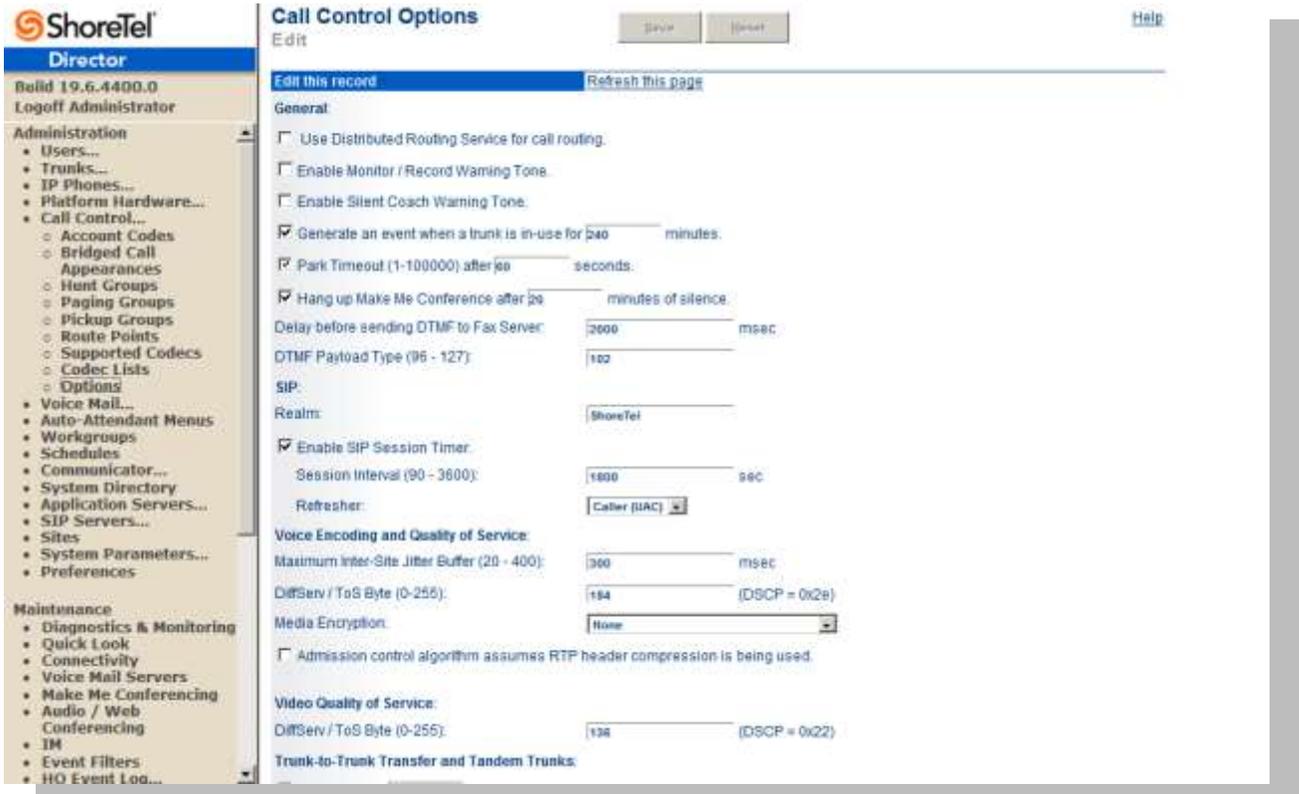
The steps below describe the minimum configuration required to enable the PBX to use a SIP trunk for inbound and outbound calling. Please refer to the ShoreTel product documentation for more information on SIP trunking or other advanced PBX features.

The configuration described here assumes that the PBX is already configured and operational with station side phones using assigned extensions or DIDs. This configuration is based on ShoreTel PBX.

Start the ShoreWare Director software application from Windows 2003 server. Login to the ShoreWare Director. The default login is "**admin**" and the default password is "**changeme**". The initial screen defaults to the Quick Look screen.



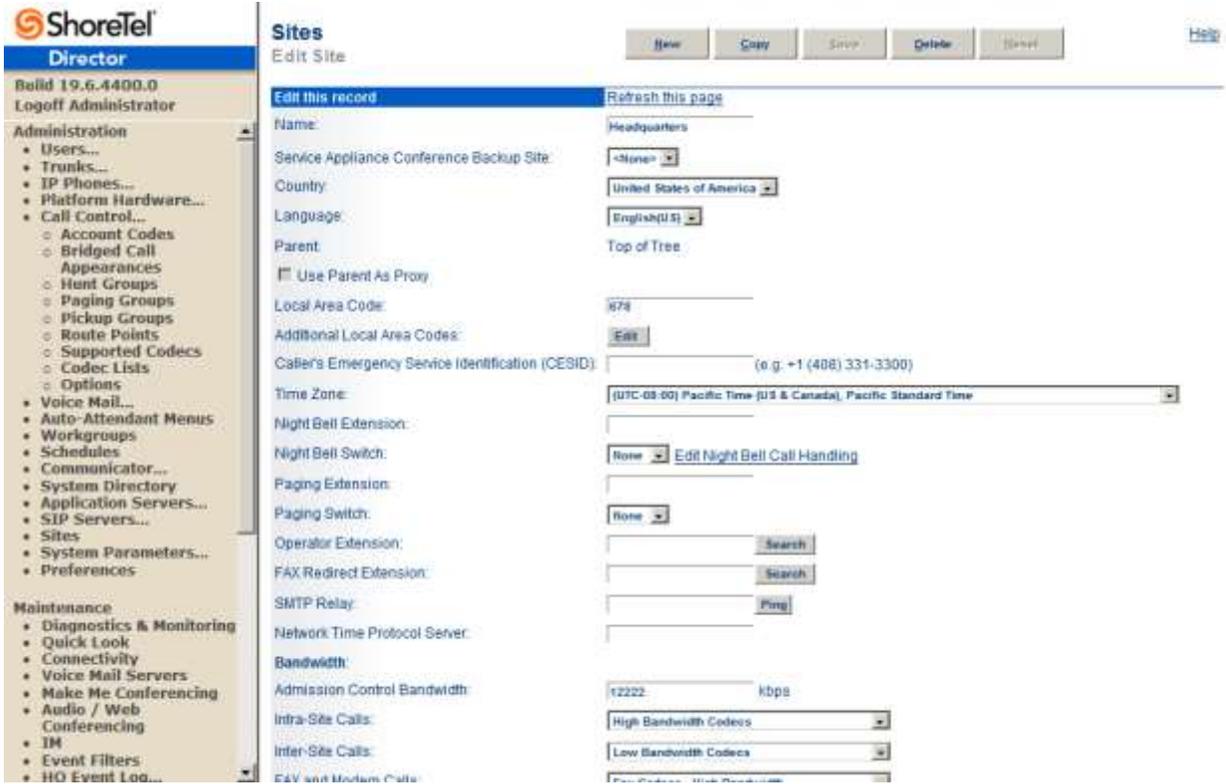
Select “**Administration>Call Control>Options**” to configure the Call Control options.



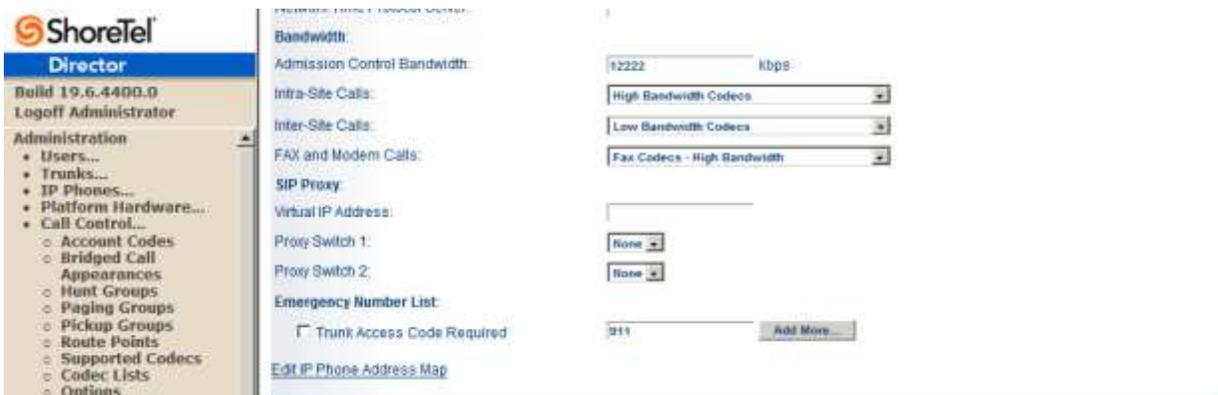
The screenshot shows the ShoreTel Director web interface for configuring Call Control Options. The left sidebar contains a navigation tree with 'Administration' > 'Call Control' > 'Options' selected. The main content area is titled 'Call Control Options' and includes an 'Edit' button and a 'Help' link. Below the title, there are links for 'Edit this record' and 'Refresh this page'. The configuration is organized into several sections:

- General:**
 - Use Distributed Routing Service for call routing.
 - Enable Monitor / Record Warning Tone.
 - Enable Silent Coach Warning Tone.
 - Generate an event when a trunk is in-use for 540 minutes.
 - Park Timeout (1-100000) after 60 seconds.
 - Hang up Make Me Conference after 20 minutes of silence.
 - Delay before sending DTMF to Fax Server: 2000 msec.
 - DTMF Payload Type (96 - 127): 102
 - SIP:
 - Realm: ShoreTel
 - Enable SIP Session Timer.
 - Session Interval (90 - 3600): 1800 sec
 - Refresher: Caller (IAC)
- Voice Encoding and Quality of Service:**
 - Maximum Inter-Site Jitter Buffer (20 - 400): 300 msec
 - DiffServ / ToS Byte (0-255): 184 (DSCP = 0x2e)
 - Media Encryption: None
 - Admission control algorithm assumes RTP header compression is being used.
- Video Quality of Service:**
 - DiffServ / ToS Byte (0-255): 138 (DSCP = 0x22)
- Trunk-to-Trunk Transfer and Tandem Trunks:** (Section header visible)

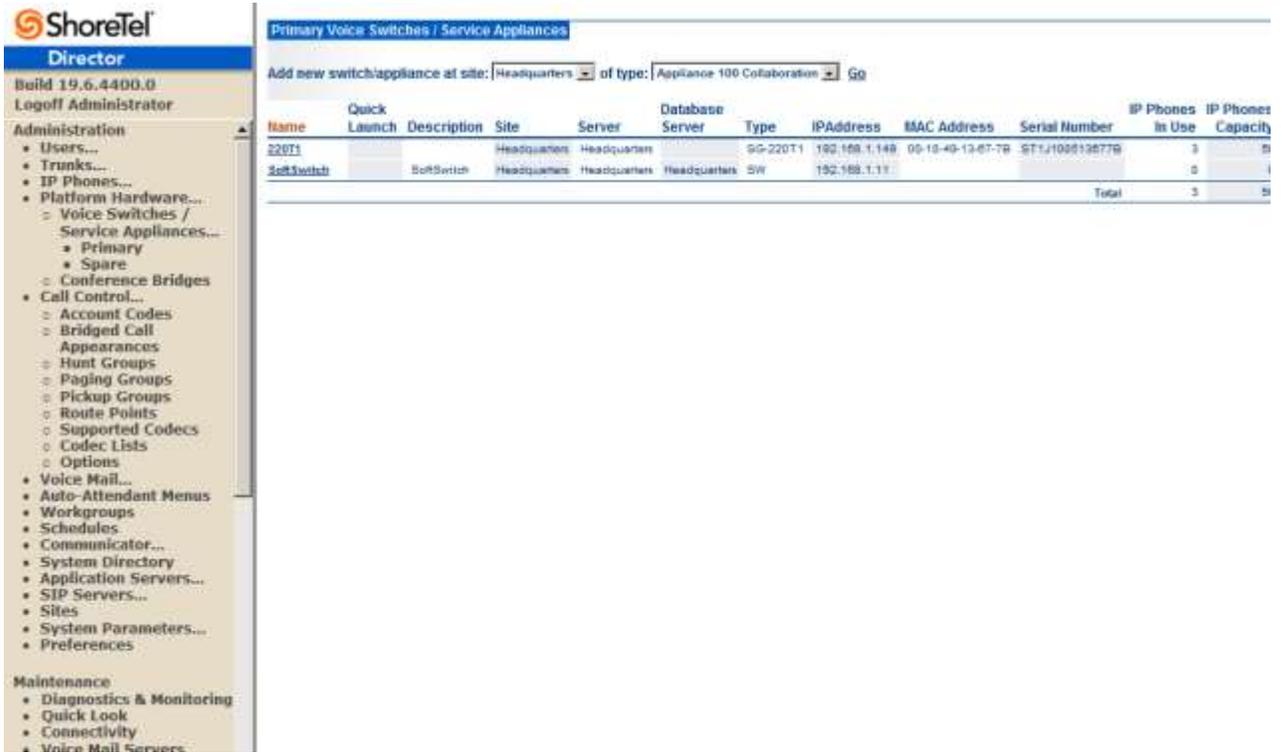
Select "**Administration>Sites**" to configure the Site settings



From "**Administration>Sites**", continue to configure the Admission Control Bandwidth.



Select “**Administration>Platform Hardware>Voice Switches>Primary**” to get to the ShoreGear-220T1 switch for resource allocation.



ShoreTel Director
Build 19.6.4400.0
Logoff Administrator

Administration

- Users...
- Trunks...
- IP Phones...
- Platform Hardware...
 - Voice Switches / Service Appliances...
 - Primary
 - Spare
 - Conference Bridges
- Call Control...
 - Account Codes
 - Bridged Call Appearances
 - Hunt Groups
 - Paging Groups
 - Pickup Groups
 - Route Points
 - Supported Codecs
 - Codec Lists
 - Options...
- Voice Mail...
- Auto-Attendant Menus
- Workgroups
- Schedules
- Communicator...
- System Directory
- Application Servers...
- SIP Servers...
- Sites
- System Parameters...
- Preferences

Maintenance

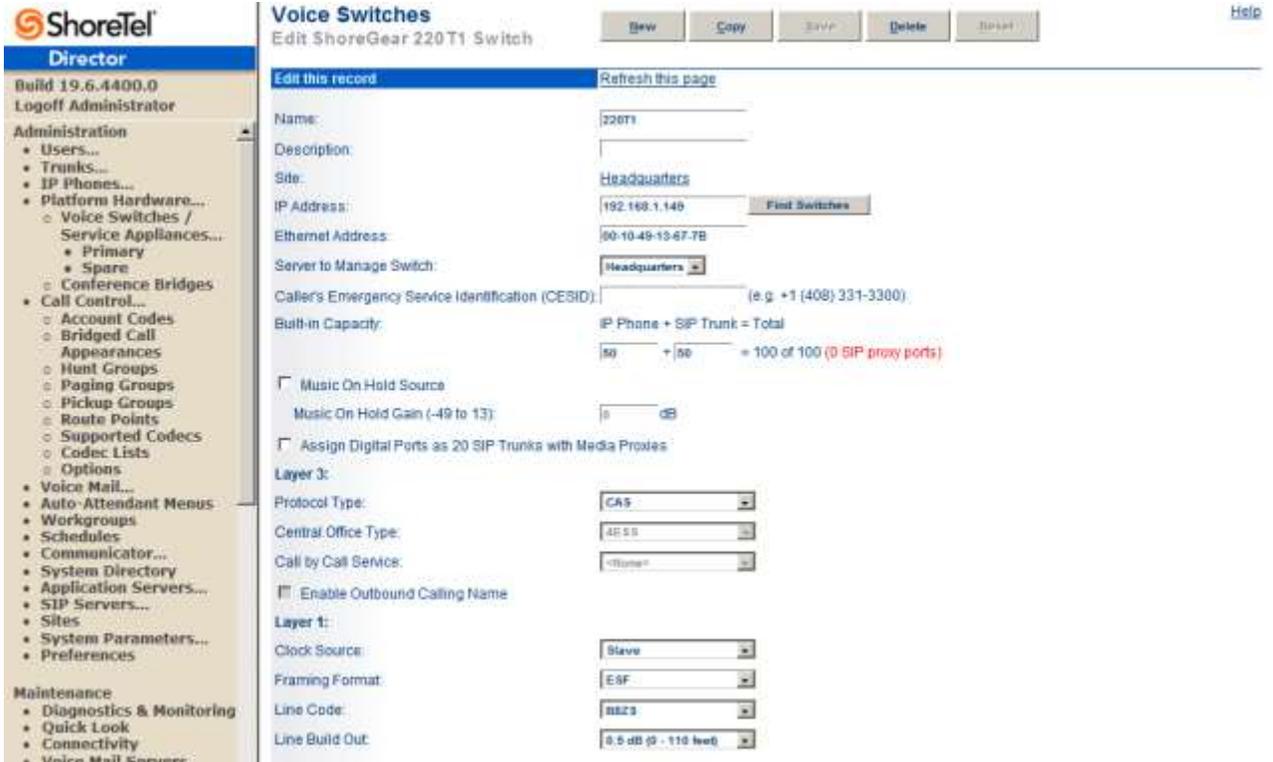
- Diagnostics & Monitoring
- Quick Look
- Connectivity
- Voice Mail Servers

Primary Voice Switches / Service Appliances

Add new switch/appliance at site: of type: Go

Name	Quick Launch	Description	Site	Server	Database Server	Type	IPAddress	MAC Address	Serial Number	IP Phones In Use	IP Phones Capacity
220T1			Headquarters	Headquarters		SG-220T1	192.168.1.148	00-10-40-13-07-70	ST1J1038198770	3	8
SoftSwitch		SoftSwitch	Headquarters	Headquarters	Headquarters	SW	192.168.1.111			0	1
Total										3	9

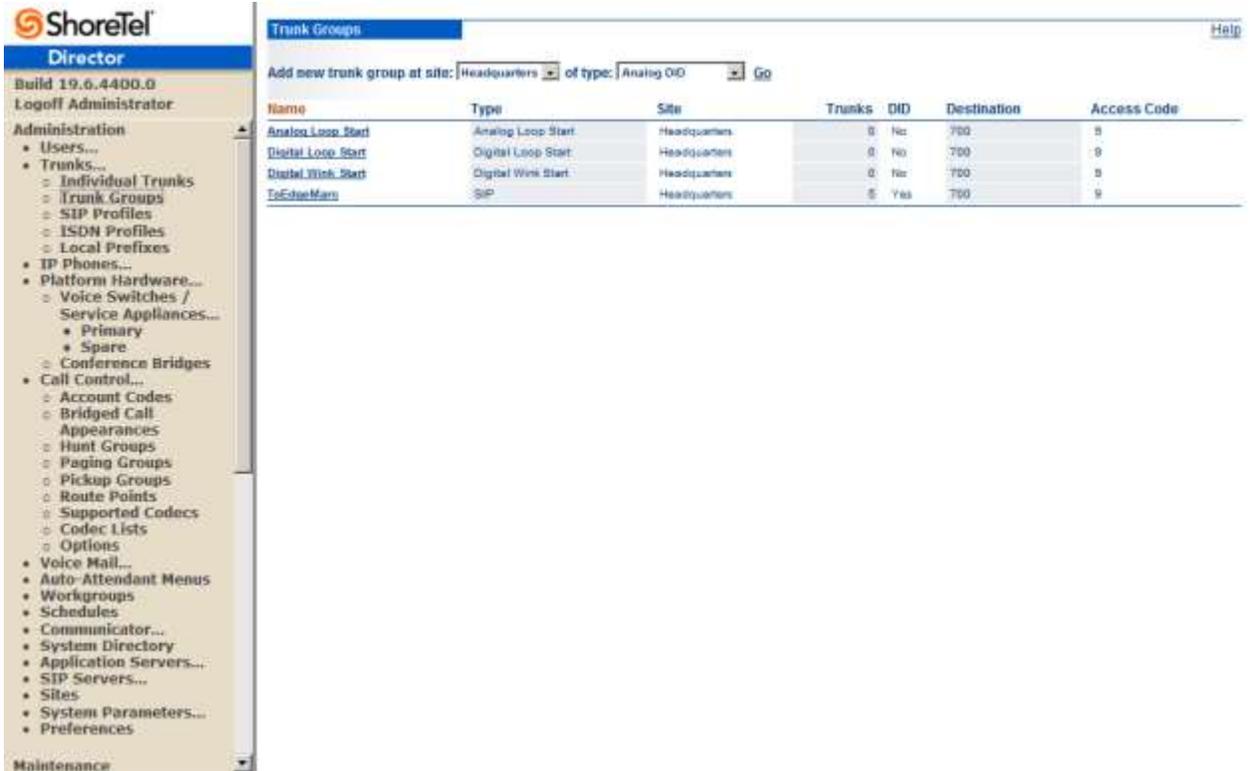
Click on "220T1" to configure the ShoreGear-220T1 Switch PBX to set aside resources for SIP Trunks and DSP resources for phone conferences (a minimum of 4 ports). Note that in the EdgeMarc's configuration the PBX's IP address needs to be the same as the ShoreGear-220T1 Switch's IP address.



The screenshot shows the ShoreTel Director web interface. On the left is a navigation tree under 'Director' with 'Administration' expanded to 'Voice Switches / Service Appliances...'. The main area is titled 'Voice Switches' and shows the configuration for a switch named '220T1'. The configuration includes:

- Name: 220T1
- Description: (empty)
- Site: Headquarters
- IP Address: 192.168.1.148 (with a 'Find Switches' button)
- Ethernet Address: 00-10-49-10-67-7B
- Server to Manage Switch: Headquarters
- Caller's Emergency Service Identification (CESID): (empty, with example '(e.g. +1 (408) 331-3300)')
- Built-in Capacity: IP Phone + SIP Trunk = Total. 50 + 50 = 100 of 100 (0 SIP proxy ports)
- Music On Hold Source: (unchecked)
- Music On Hold Gain (-49 to 13): 0 dB
- Assign Digital Ports as 20 SIP Trunks with Media Proxies: (unchecked)
- Layer 3:
 - Protocol Type: G45
 - Central Office Type: 4053
 - Call by Call Service: Home
 - Enable Outbound Calling Name: (checked)
- Layer 1:
 - Clock Source: Steve
 - Framing Format: ESF
 - Line Code: B2B3
 - Line Build Out: 6.5 dB (2 - 110 feet)

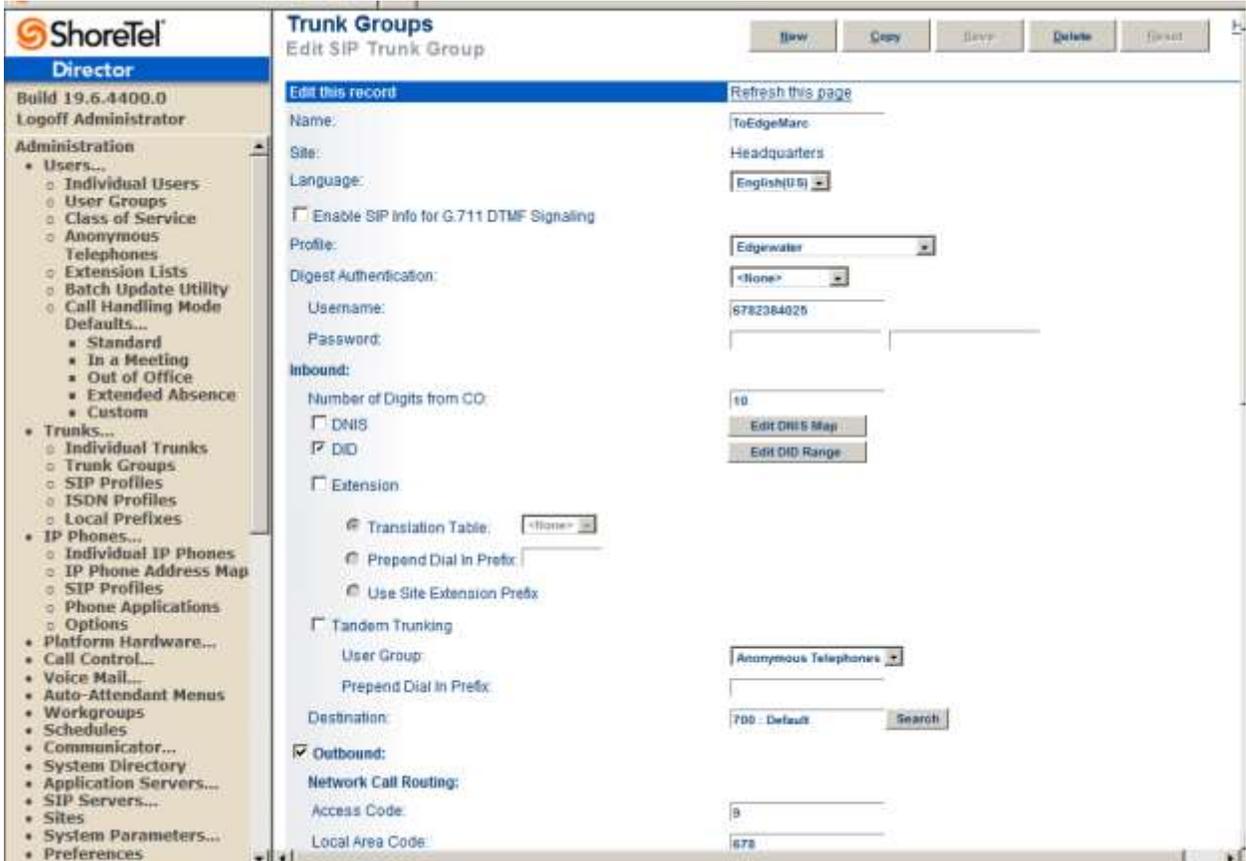
Select "**Administration>Trunks>Trunk Groups**" to configure the SIP Trunk Group.



The screenshot shows the ShoreTel Director Administration interface. On the left is a navigation tree with 'Administration' expanded to 'Trunks' and 'Trunk Groups' selected. The main content area is titled 'Trunk Groups' and includes a 'Help' link. Below the title is a form to 'Add new trunk group at site: Headquarters of type: Analog O0'. A table lists existing trunk groups:

Name	Type	Site	Trunks	DID	Destination	Access Code
Analog Loop Start	Analog Loop Start	Headquarters	0	No	700	0
Digital Loop Start	Digital Loop Start	Headquarters	0	No	700	0
Digital Wink Start	Digital Wink Start	Headquarters	0	No	700	0
ToEdgeMan	SIP	Headquarters	5	Yes	700	0

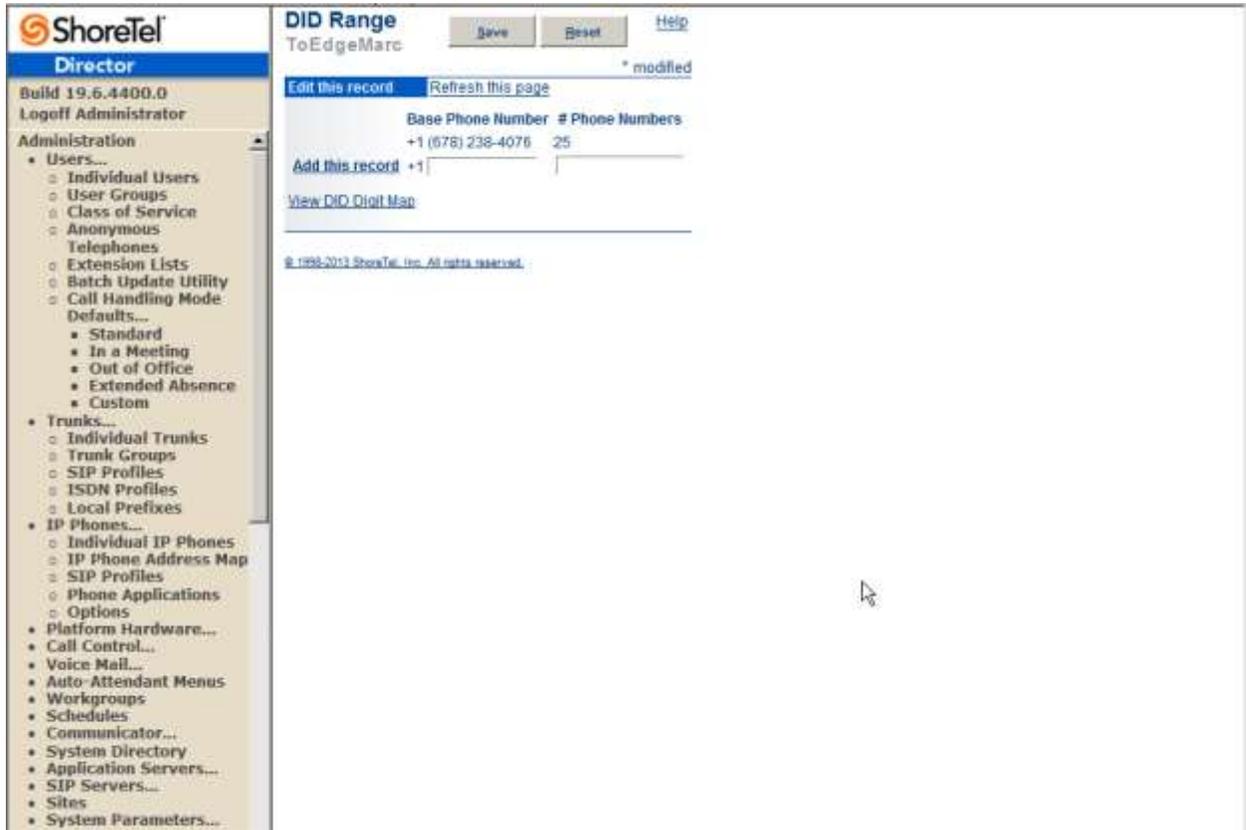
Click on **"ToEdgeMarc"** to configure the SIP Trunk Group for inbound calls. Check the DID box as shown below.



The screenshot shows the ShoreTel Director web interface for editing a SIP Trunk Group. The left sidebar contains a navigation menu with categories like Administration, Trunks, IP Phones, and Platform Hardware. The main content area is titled 'Trunk Groups' and 'Edit SIP Trunk Group'. The configuration form includes the following fields and options:

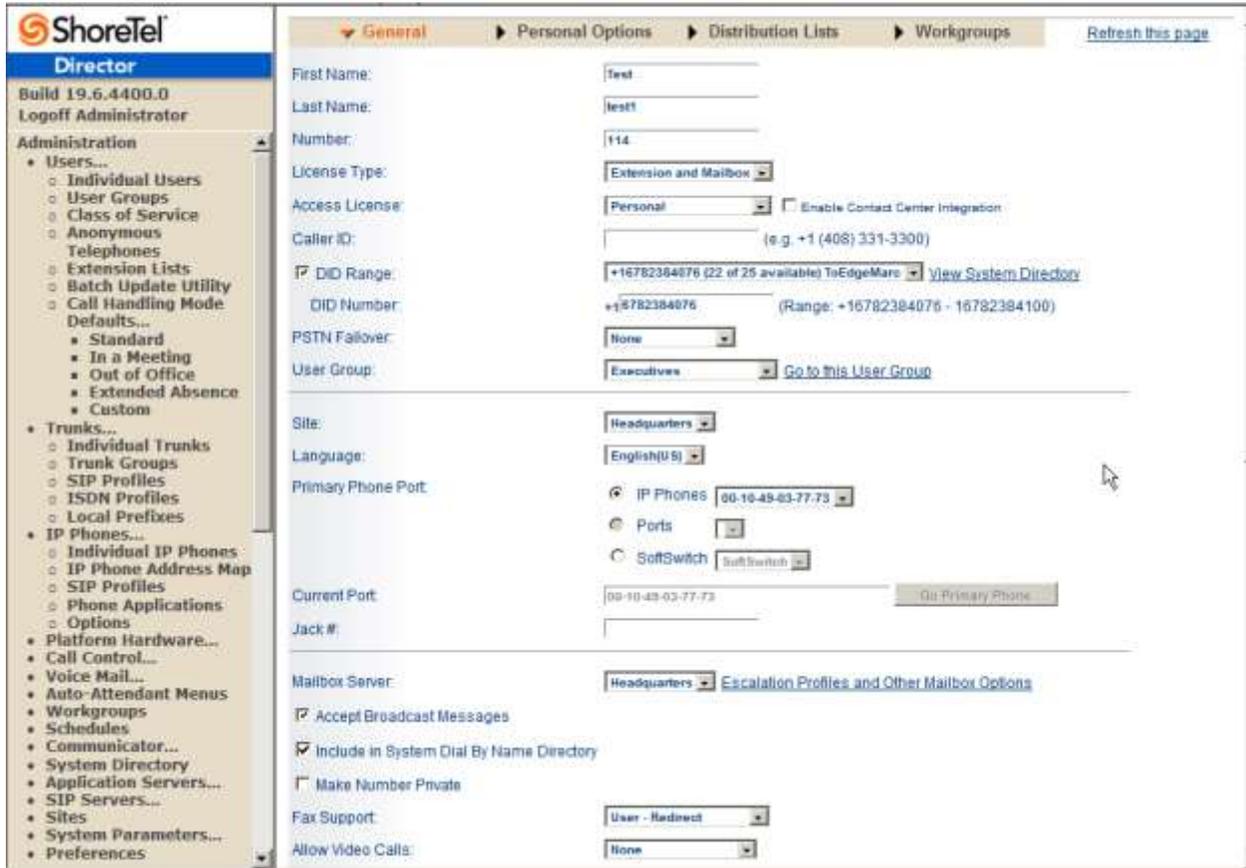
- Name:** ToEdgeMarc
- Site:** Headquarters
- Language:** English(US)
- Enable SIP info for G.711 DTMF Signaling
- Profile:** Edgewater
- Digest Authentication:**
 - DNIS
 - DID
 - Extension
- Inbound:**
 - Number of Digits from CO:** 10
 - DNIS
 - DID
 - Extension
 - Translation Table: <None>
 - Prepend Dial In Prefix:
 - Use Site Extension Prefix
 - Tandem Trunking
 - User Group:** Anonymous Telephones
 - Prepend Dial In Prefix:**
 - Destination:** 700 - Default
- Outbound:**
- Network Call Routing:**
 - Access Code:** 9
 - Local Area Code:** 678

Then click on **"Edit DID range"**, and add the Pilot DID next to **"Add this record"** and the number of phone numbers, in this case 25. When done click on **"Add this record"** then click on save. When finished you should see your base phone number and number of associated users as shown.



The screenshot shows the ShoreTel Director web interface. On the left is a navigation menu with categories like Administration, Trunks, IP Phones, Platform Hardware, Call Control, Voice Mail, Auto-Attendant Menus, Workgroups, Schedules, Communicator, System Directory, Application Servers, SIP Servers, Sites, and System Parameters. The main content area is titled "DID Range" and shows a table with columns "Base Phone Number" and "# Phone Numbers". The table contains one row with the value "+1 (678) 238-4076" and "25". There are buttons for "Save", "Reset", and "Help" at the top right. Below the table, there is a link "Add this record" and a "View DID Digit Map" link. The footer of the interface reads "© 1998-2013 ShoreTel, Inc. All rights reserved."

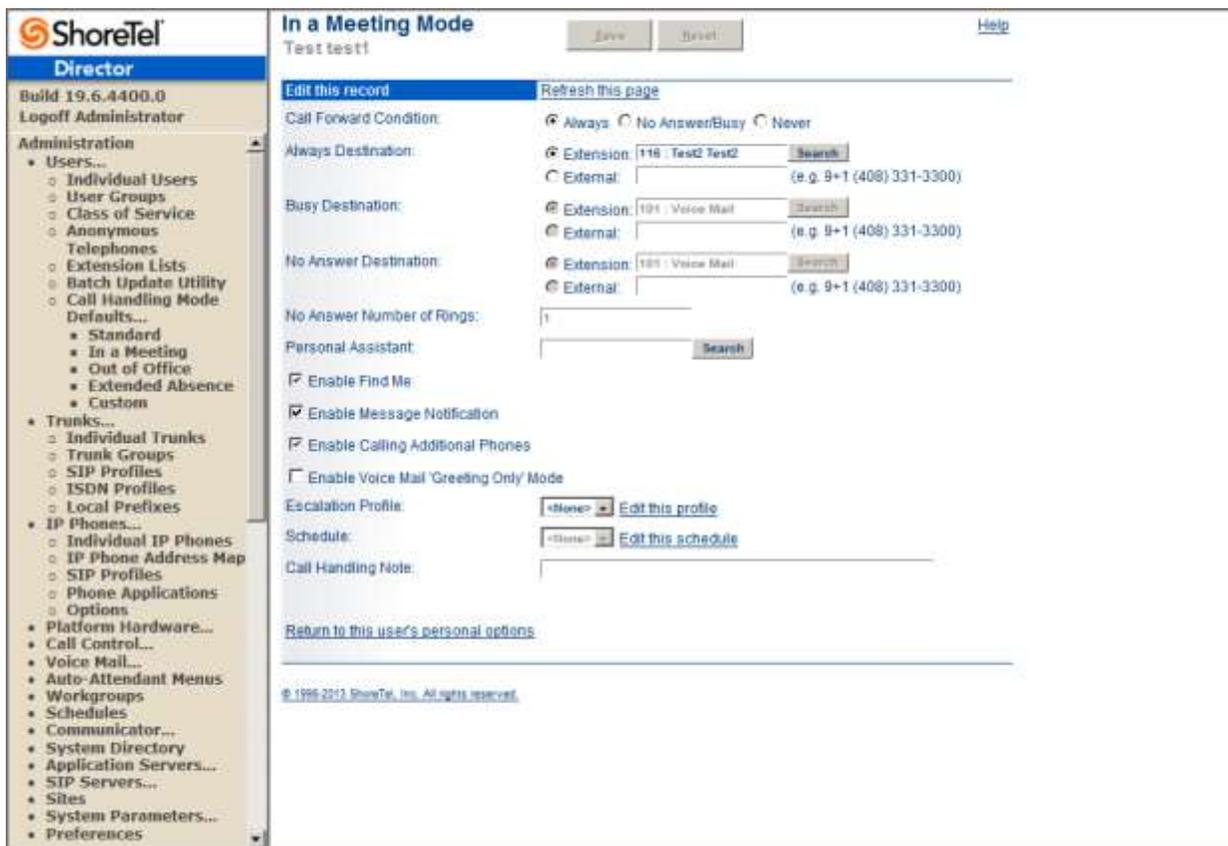
Also make sure that the DID range is checked under users. To do this from “**Administration**” go to “**Individual Users**”, select the Individual user name, and make sure DID range box is checked as shown below.



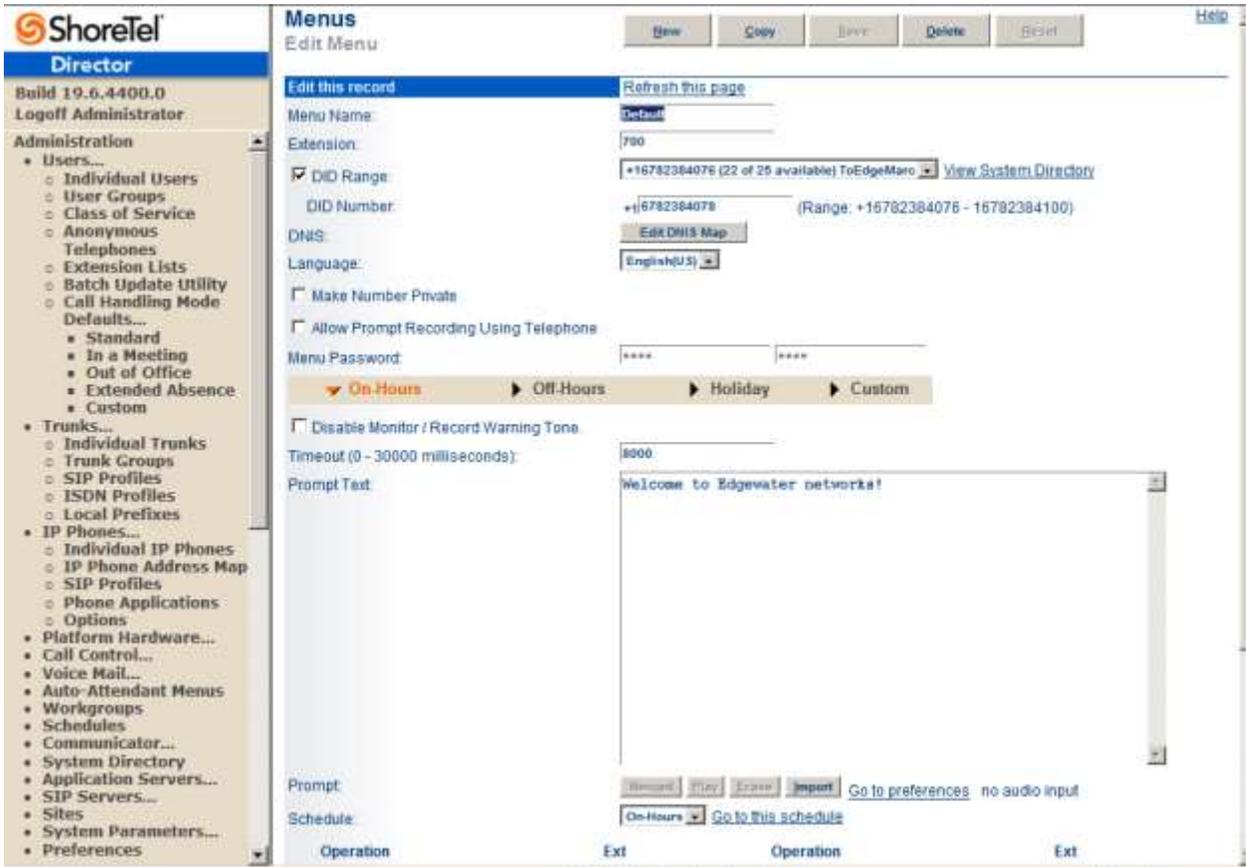
The screenshot shows the ShoreTel Director administration interface. The left sidebar contains a navigation tree under 'Administration' with 'Individual Users' selected. The main content area is titled 'General' and shows configuration for a user named 'test1'. The 'DID Range' checkbox is checked, and the 'DID Number' is set to '+16782384076'. The 'Primary Phone Port' is set to 'IP Phones' with the number '00-10-48-03-77-73'. The 'Mailbox Server' is set to 'Headquarters' and 'Include in System Dial By Name Directory' is checked.

First Name:	test
Last Name:	test1
Number:	114
License Type:	Extension and Mailbox
Access License:	Personal <input type="checkbox"/> Enable Contact Center Integration
Caller ID:	(e.g. +1 (408) 331-3300)
<input checked="" type="checkbox"/> DID Range:	+16782384076 (22 of 25 available) ToEdgeMars View System Directory
DID Number:	+16782384076 (Range: +16782384076 - 16782384100)
PSTN Fallback:	None
User Group:	Executives Go to this User Group
Site:	Headquarters
Language:	English(US)
Primary Phone Port:	<input checked="" type="radio"/> IP Phones 00-10-48-03-77-73 <input type="radio"/> Ports <input type="radio"/> SoftSwitch softswitch
Current Port:	00-10-48-03-77-73 Go Primary Phone
Jack #:	
Mailbox Server:	Headquarters Escalation Profiles and Other Mailbox Options
<input checked="" type="checkbox"/> Accept Broadcast Messages	
<input checked="" type="checkbox"/> Include in System Dial By Name Directory	
<input type="checkbox"/> Make Number Private	
Fax Support:	User - Redirect
Allow Video Calls:	None

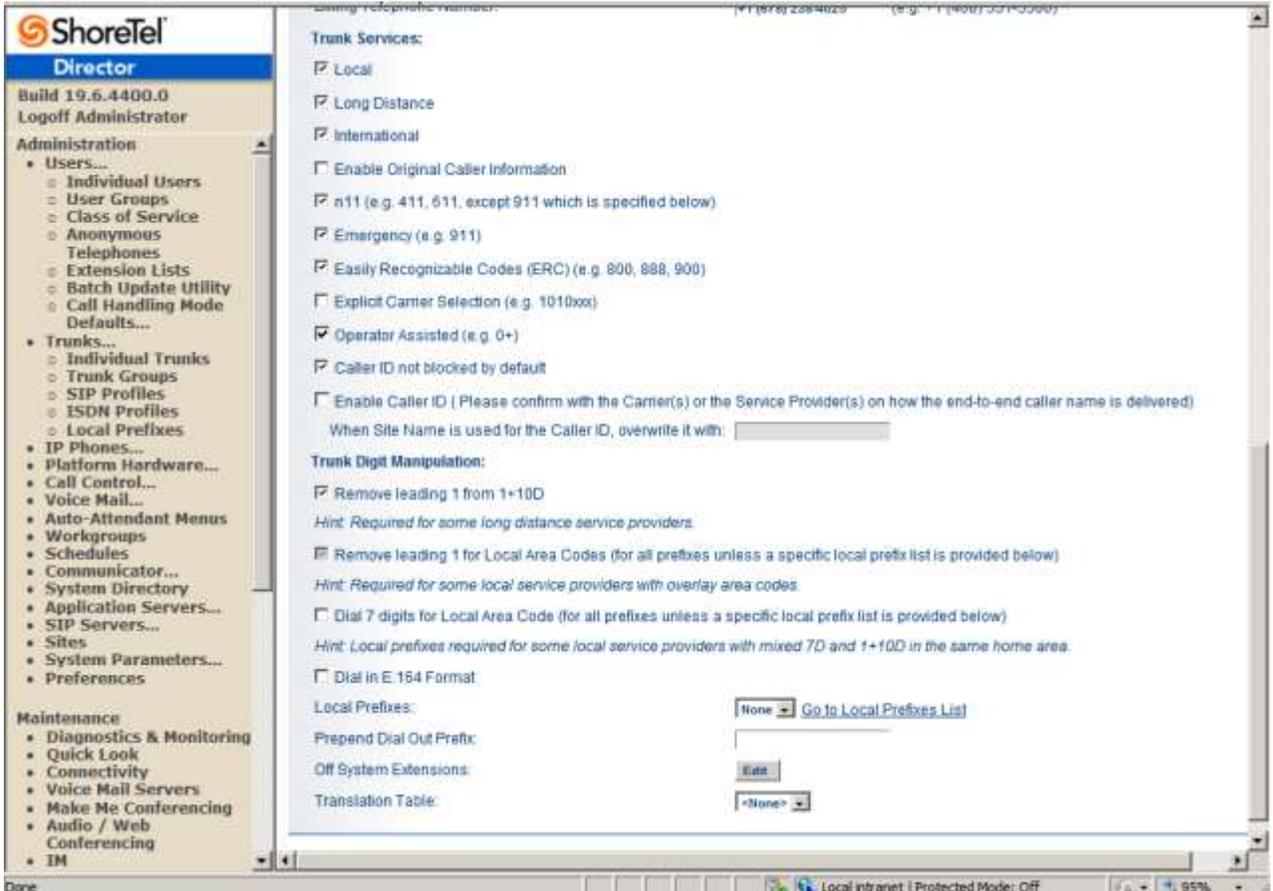
To configure Call forward, from Administration go to Individual Users, Click on user name, click on **“Personal Options”** on top, scroll down and under **“Edit Call Handling Modes”** check the call forwarding option of your desire. By way of example we will click on **“In a Meeting”**. Add the Extension number you want to forward to next to **“Always Destination”** then click save above. Make sure you set the mode on your phone to correspond to the mode you selected on your PBX. Below is a screen shot displaying **“In a Meeting Mode”** and the extension we used for call forwarding.



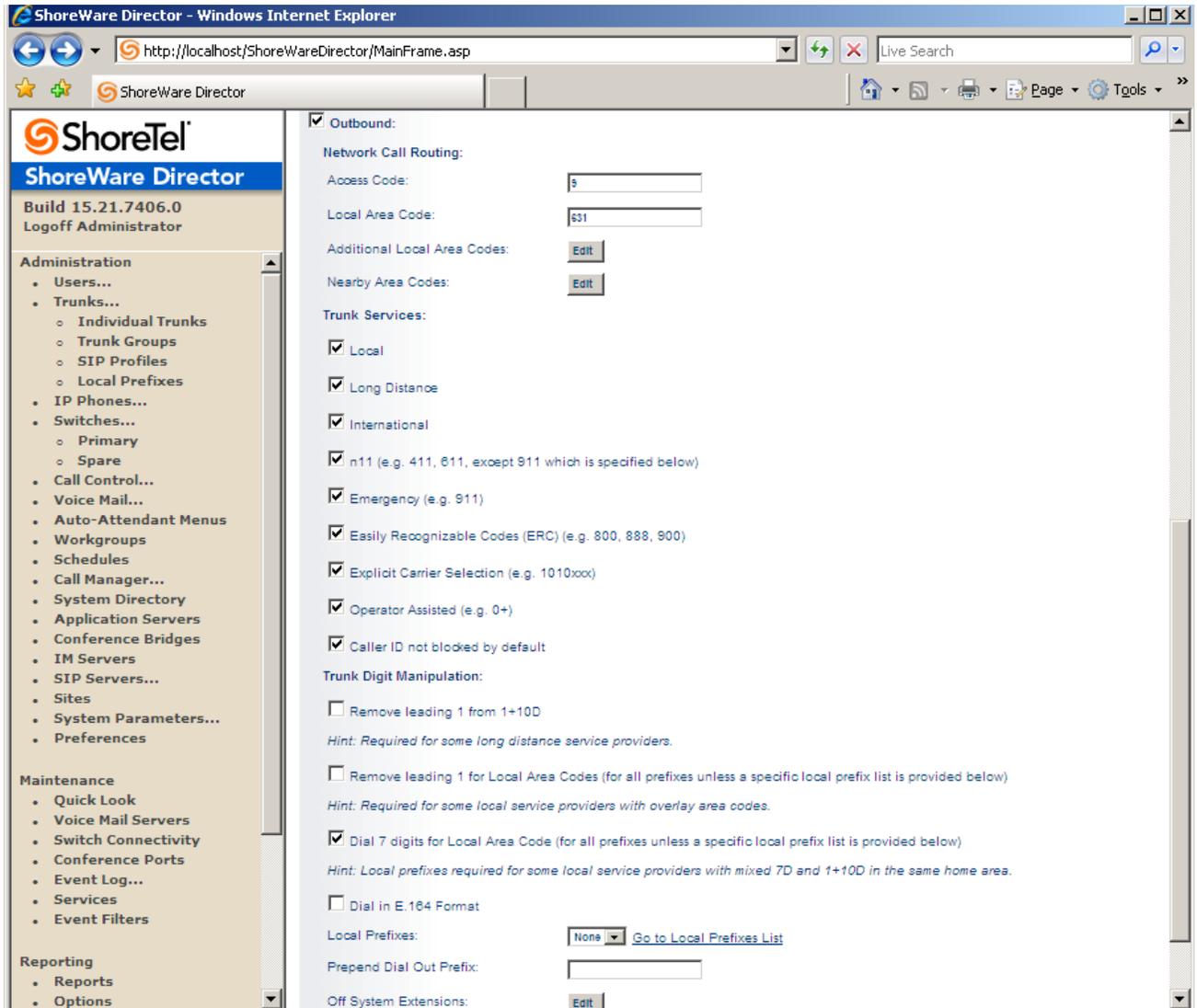
To configure Auto-Attendant, click from the menu on Auto-Attendant Menus. Click on "default", check the "DID range" box, then click save. Below displays a screenshot of the Auto-Attendant DID number we added next to DID number. This number will be the number of your Auto-Attendant.



With Respect to Dial Plan & configuration for various calls, from Trunks, click on Trunk Groups, click on **“To EdgeMarc”**, scroll down to **“Trunk Services”** and check desired calls. Refer to screenshot below.



Continue to configure the “**SIP TRUNK TEST**” SIP Trunk Group for outbound calls. Note that the ShoreTel PBX does not support “**9+ 10-digit number**” dialing, you must dial “**91**” first, followed by the 10-digit number. For 7-digit number dialing, dial “**9**” first, followed by the 7-digit number within the same area code.



The screenshot shows the ShoreWare Director web interface in Internet Explorer. The browser address bar shows `http://localhost/ShoreWareDirector/MainFrame.asp`. The page title is "ShoreWare Director" and the version is "Build 15.21.7406.0". The user is logged off as "Administrator".

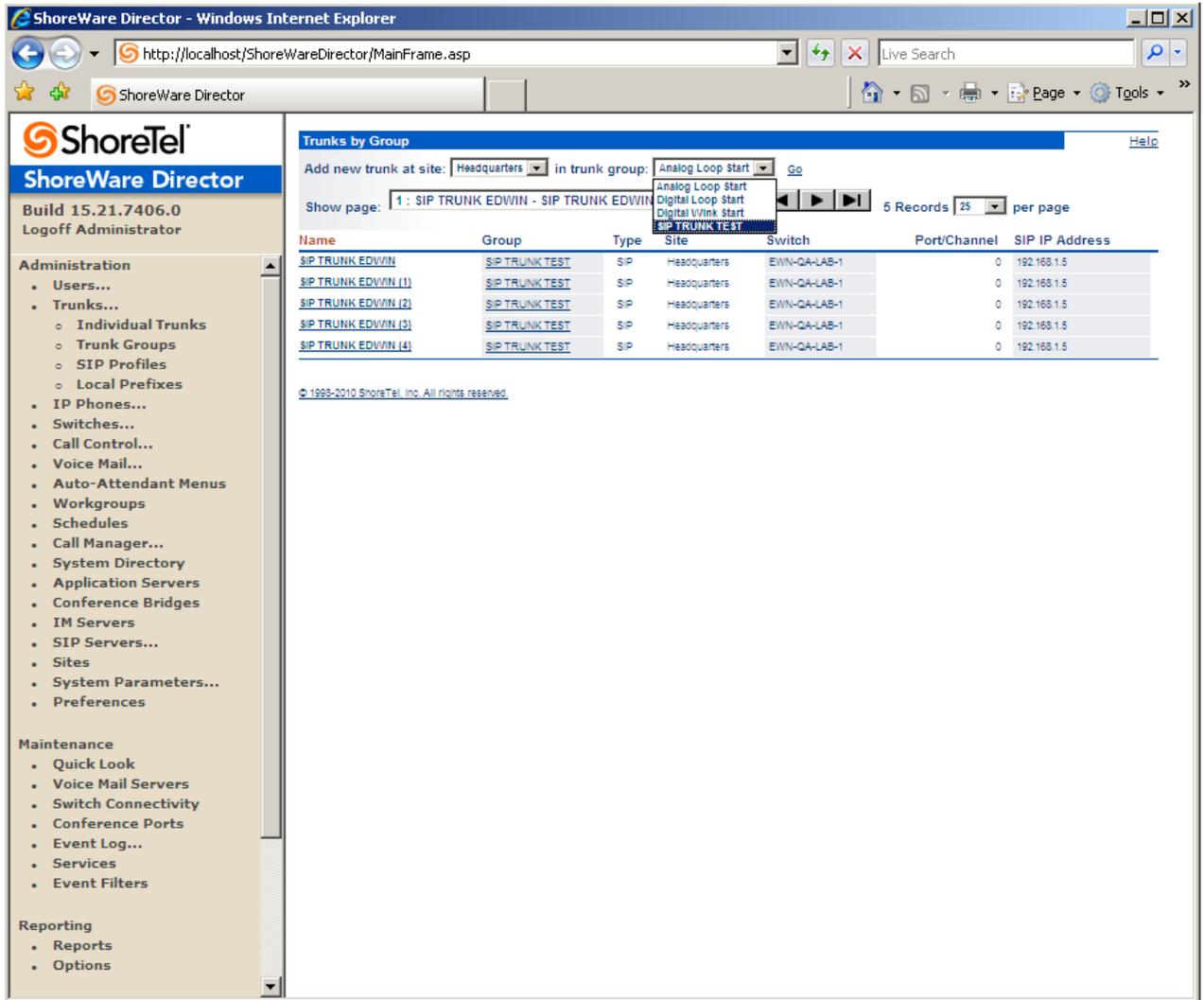
The left sidebar contains a navigation menu with the following sections:

- Administration
 - Users...
 - Trunks...
 - Individual Trunks
 - Trunk Groups
 - SIP Profiles
 - Local Prefixes
 - IP Phones...
 - Switches...
 - Primary
 - Spare
 - Call Control...
 - Voice Mail...
 - Auto-Attendant Menus
 - Workgroups
 - Schedules
 - Call Manager...
 - System Directory
 - Application Servers
 - Conference Bridges
 - IM Servers
 - SIP Servers...
 - Sites
 - System Parameters...
 - Preferences
- Maintenance
 - Quick Look
 - Voice Mail Servers
 - Switch Connectivity
 - Conference Ports
 - Event Log...
 - Services
 - Event Filters
- Reporting
 - Reports
 - Options

The main content area is titled "Outbound:" and contains the following configuration options:

- Outbound:
- Network Call Routing:
 - Access Code:
 - Local Area Code:
 - Additional Local Area Codes:
 - Nearby Area Codes:
- Trunk Services:
 - Local
 - Long Distance
 - International
 - n11 (e.g. 411, 811, except 911 which is specified below)
 - Emergency (e.g. 911)
 - Easily Recognizable Codes (ERC) (e.g. 800, 888, 900)
 - Explicit Carrier Selection (e.g. 1010xxx)
 - Operator Assisted (e.g. 0+)
 - Caller ID not blocked by default
- Trunk Digit Manipulation:
 - Remove leading 1 from 1+10D
Hint: Required for some long distance service providers.
 - Remove leading 1 for Local Area Codes (for all prefixes unless a specific local prefix list is provided below)
Hint: Required for some local service providers with overlay area codes.
 - Dial 7 digits for Local Area Code (for all prefixes unless a specific local prefix list is provided below)
Hint: Local prefixes required for some local service providers with mixed 7D and 1+10D in the same home area.
 - Dial in E.164 Format
- Local Prefixes: [Go to Local Prefixes List](#)
- Prepend Dial Out Prefix:
- Off System Extensions:

Select “**Administration>Trunks>Individual Trunks**” to add SIP Trunks to the SIP Trunk Group.



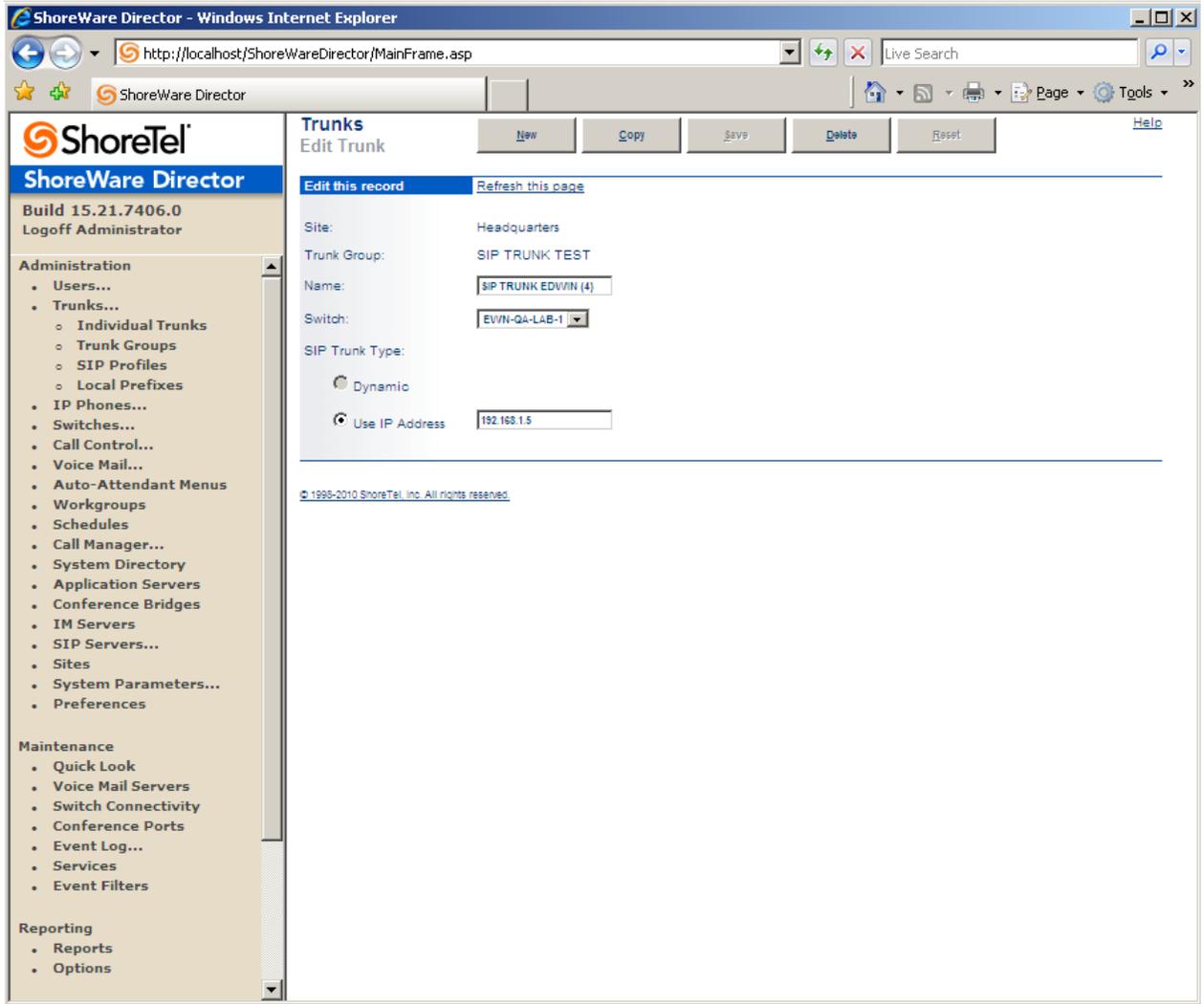
The screenshot shows the ShoreWare Director web interface in Internet Explorer. The browser address bar shows `http://localhost/ShoreWareDirector/MainFrame.asp`. The page title is "ShoreTel ShoreWare Director". The left sidebar contains a navigation menu with categories: Administration, Maintenance, and Reporting. Under Administration, "Trunks..." is expanded to show "Individual Trunks".

The main content area is titled "Trunks by Group". It includes a form to "Add new trunk at site: Headquarters in trunk group: Analog Loop Start" with a "Go" button. Below this is a table of existing trunks. The table has columns: Name, Group, Type, Site, Switch, Port/Channel, and SIP IP Address. There are 5 records displayed, all with the same configuration.

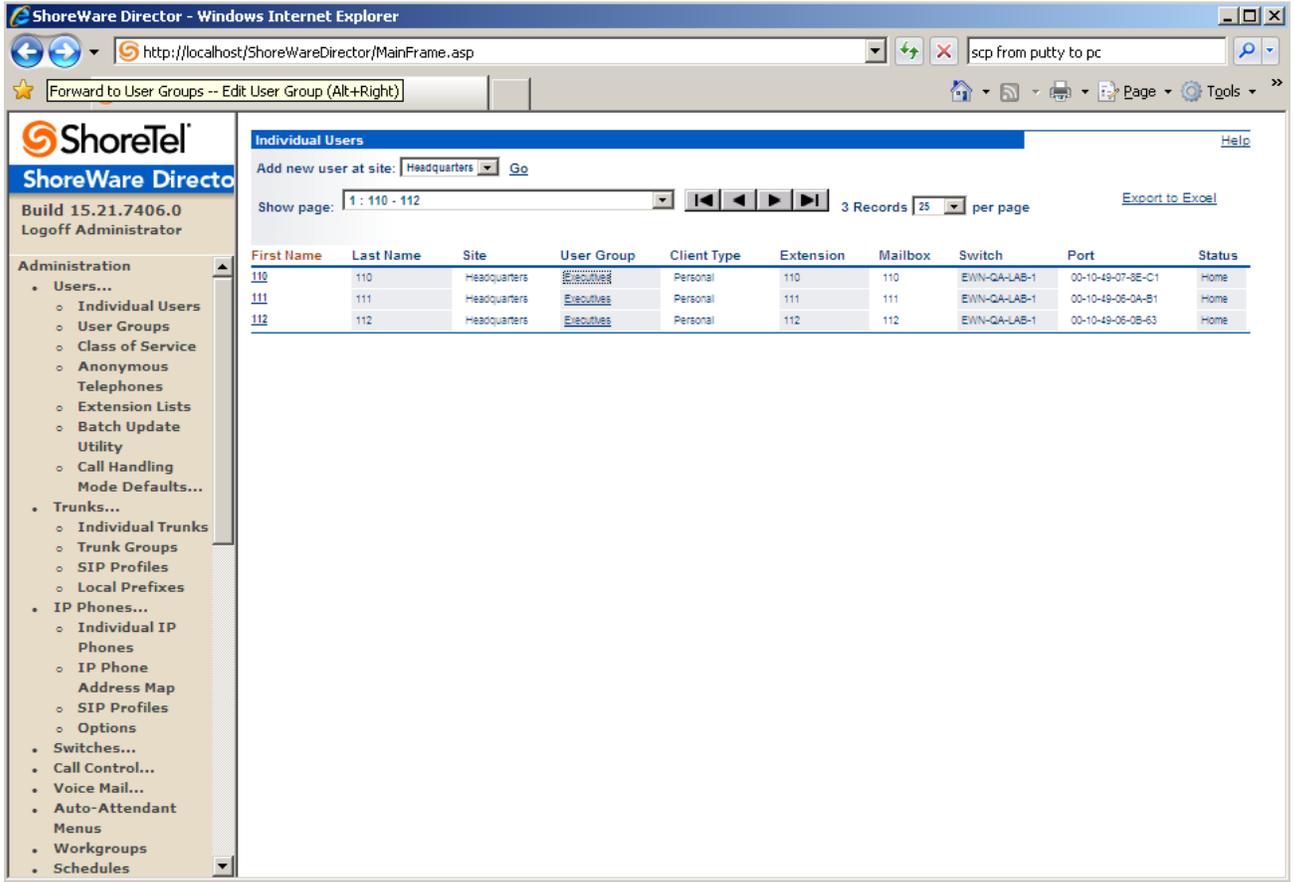
Name	Group	Type	Site	Switch	Port/Channel	SIP IP Address
SIP TRUNK EDWIN	SIP TRUNK TEST	SIP	Headquarters	EWN-QA-LAB-1	0	192.168.1.5
SIP TRUNK EDWIN (1)	SIP TRUNK TEST	SIP	Headquarters	EWN-QA-LAB-1	0	192.168.1.5
SIP TRUNK EDWIN (2)	SIP TRUNK TEST	SIP	Headquarters	EWN-QA-LAB-1	0	192.168.1.5
SIP TRUNK EDWIN (3)	SIP TRUNK TEST	SIP	Headquarters	EWN-QA-LAB-1	0	192.168.1.5
SIP TRUNK EDWIN (4)	SIP TRUNK TEST	SIP	Headquarters	EWN-QA-LAB-1	0	192.168.1.5

At the bottom of the table area, there is a copyright notice: © 1998-2010 ShoreTel, Inc. All rights reserved.

By default the ShoreTel PBX does not support SIP registration. Click each SIP Trunk to make sure the **“Use IP Address”** is selected for **“SIP Trunk Type”** and the IP address is configured to be the same as EdgeMarc’s LAN IP.



Select “**Administration>Users>Individual Users**” to get to the extensions and assign Caller ID.



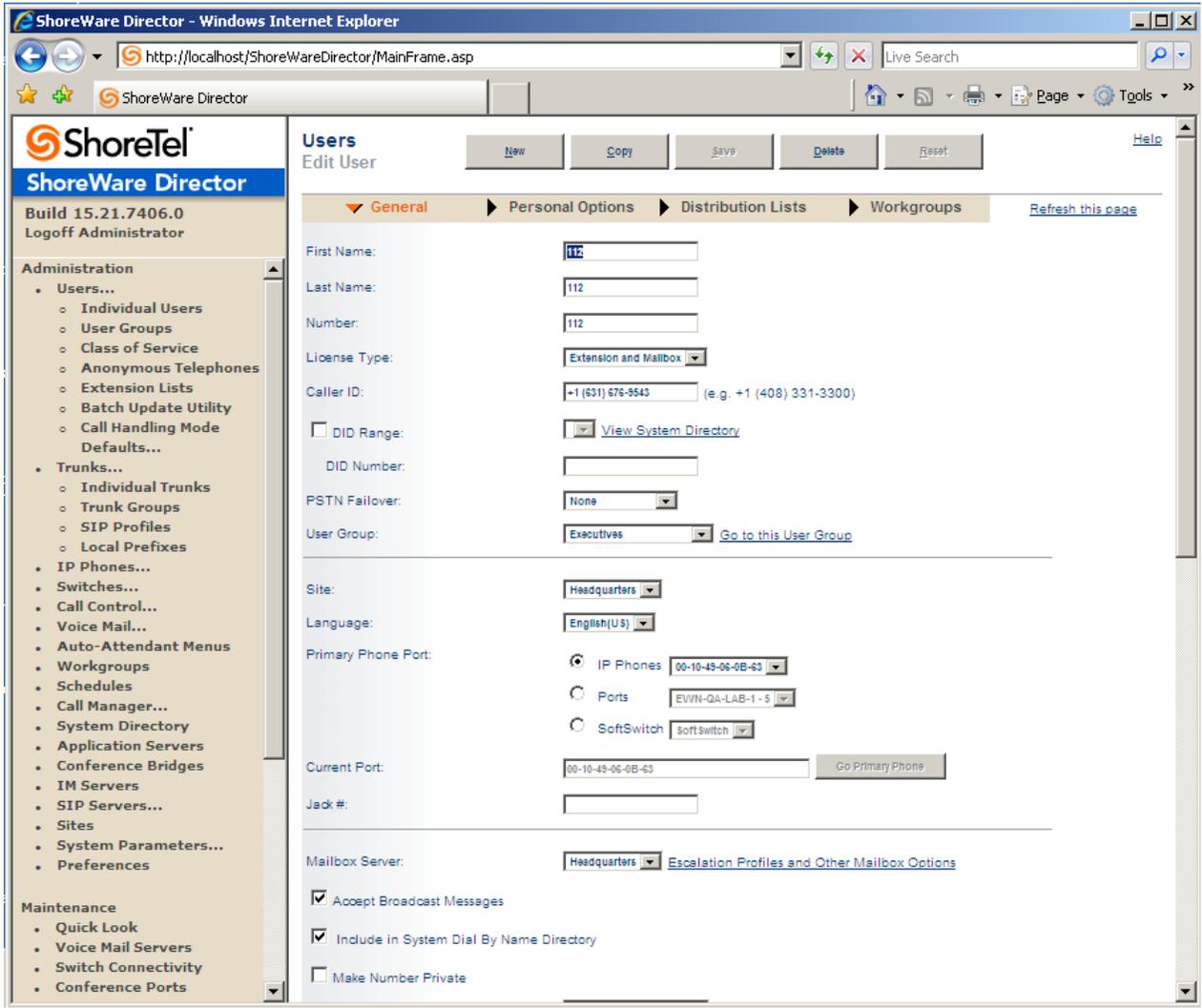
The screenshot shows the ShoreTel ShoreWare Director web interface. The left sidebar contains a navigation menu with the following items:

- Administration
 - Users...
 - Individual Users
 - User Groups
 - Class of Service
 - Anonymous Telephones
 - Extension Lists
 - Batch Update Utility
 - Call Handling Mode Defaults...
 - Trunks...
 - Individual Trunks
 - Trunk Groups
 - SIP Profiles
 - Local Prefixes
 - IP Phones...
 - Individual IP Phones
 - IP Phone Address Map
 - SIP Profiles
 - Options
 - Switches...
 - Call Control...
 - Voice Mail...
 - Auto-Attendant Menus
 - Workgroups
 - Schedules

The main content area is titled "Individual Users" and includes a "Help" link. Below the title, there is a form to "Add new user at site: Headquarters" with a "Go" button. A "Show page: 1 : 110 - 112" dropdown and navigation buttons are present. The page indicates "3 Records" and "25 per page". An "Export to Excel" link is also visible. The table below contains the following data:

First Name	Last Name	Site	User Group	Client Type	Extension	Mailbox	Switch	Port	Status
110	110	Headquarters	Executives	Personal	110	110	EWN-QA-LAB-1	00-10-49-07-3E-C1	Home
111	111	Headquarters	Executives	Personal	111	111	EWN-QA-LAB-1	00-10-49-06-0A-B1	Home
112	112	Headquarters	Executives	Personal	112	112	EWN-QA-LAB-1	00-10-49-06-0B-B3	Home

Click each extension's **"First Name"** link and configure the Caller ID for that extension. Caller ID can be set to be any valid DID.



For advanced configurations and support please contact the Edgewater Technical Assistance Center support@edgewaternetworks.com or call [408.351.7255](tel:408.351.7255).