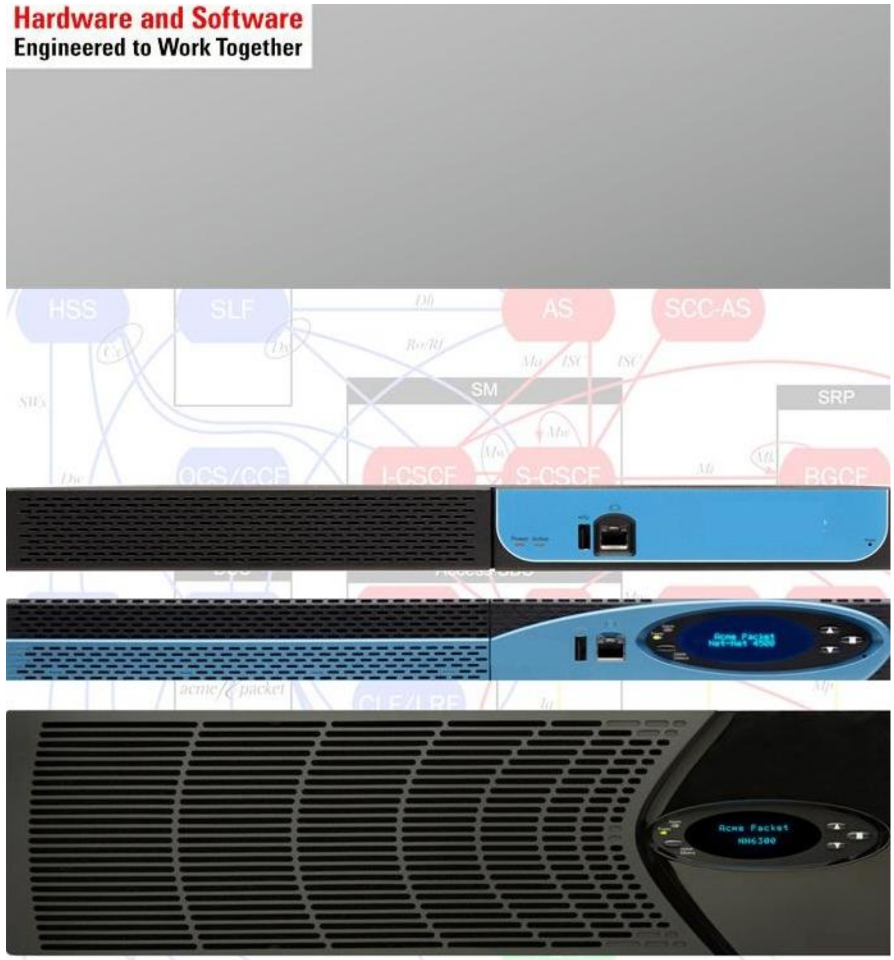

Oracle Enterprise Communications Broker & Oracle Enterprise-Session Border Controller with Microsoft Lync 2013, Avaya Aura 6.3.4 & Cisco Unified Communications Manager 8.6

Technical Application Note

Disclaimer

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle's products remains at the sole discretion of Oracle.

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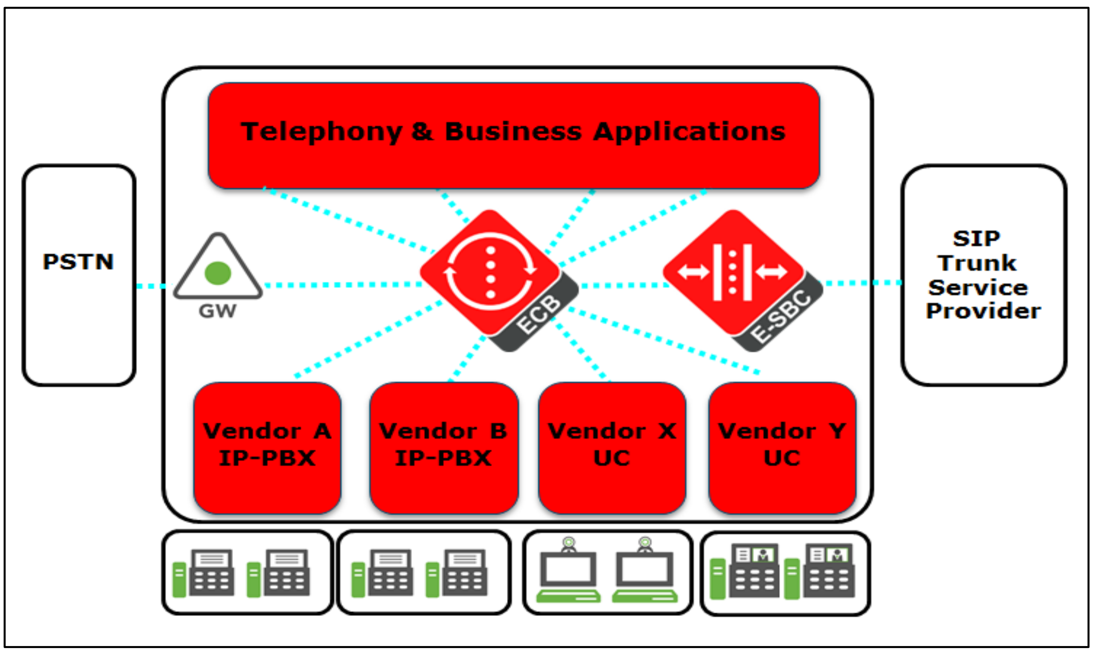
Intended Audience

This is a technical document intended for telecommunications engineers with the purpose of configuring Oracle Enterprise Session Border Controller (E-SBC), Oracle Enterprise Communications Broker (EOM), Lync Mediation Server, Avaya Aura System Manager and Cisco Unified Communications Manager. There will be steps that require navigating Microsoft Windows Server as well as the Acme Packet Command Line Interface (ACLI). Understanding the basic concepts of TCP/UDP, IP/Routing, and SIP/RTP are also necessary to complete the configuration and for troubleshooting, if necessary.

Introduction

Oracle Enterprise Communications Broker Overview

The Oracle Enterprise Communications Broker (ECB) is an enterprise-class, core signaling component designed to simplify communications networks. It combines innovative approaches toward dial plan management and SIP topology-aware routing with a purpose-built, intuitive GUI interface. While at its best in signaling environments comprised of products and solutions from multiple vendors, it is useful for consolidating policy enforcement decisions, integrating third-party applications, and managing a network-wide routing topology even in homogenous architectures.



The ECB is typically deployed in the core of a multi-vendor communications network where multiple UC, PBX and service provider trunk interfaces must be interconnected. It normalizes communications between disparate premise-based systems and connects them to service provider networks and hosted applications through E-SBCs.

Document Overview

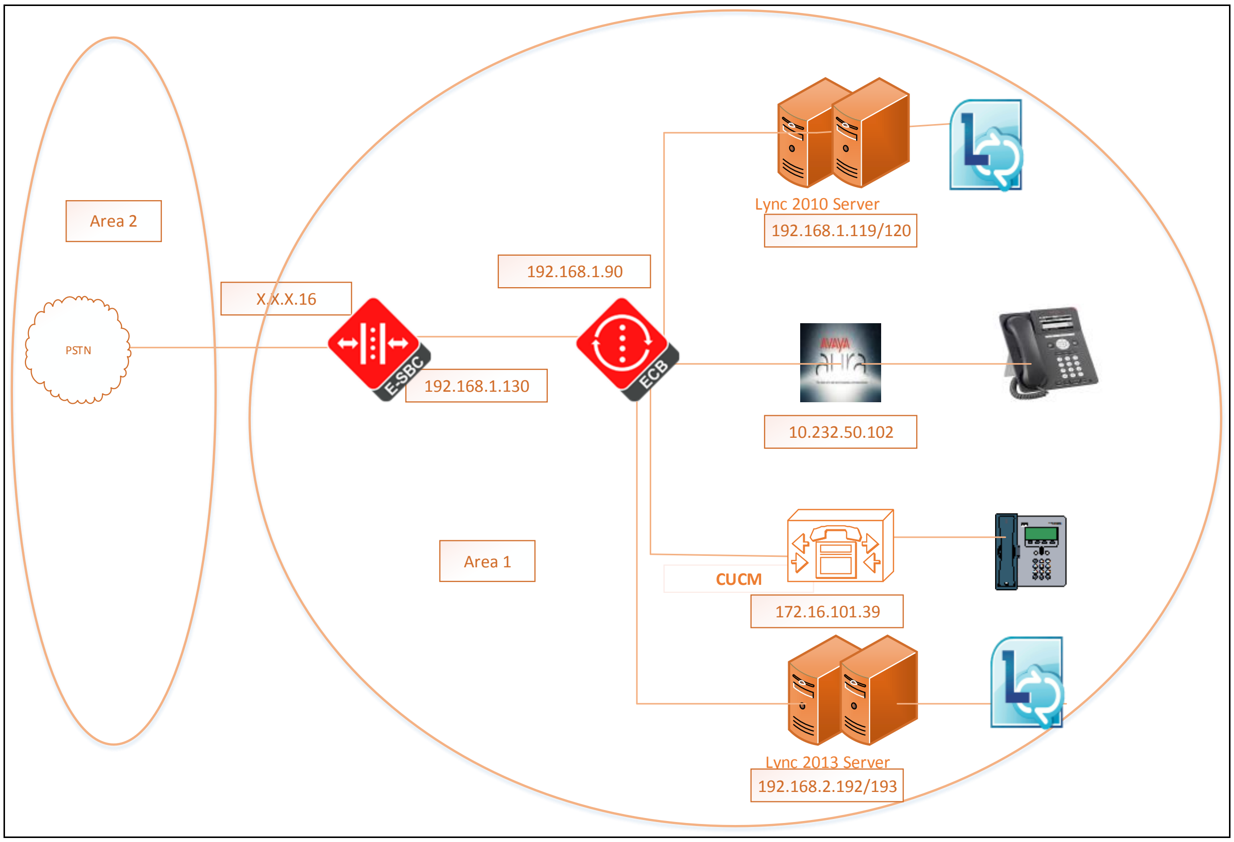
This technical application note documents the implementation of the Oracle Enterprise Communications Broker in an Enterprise network consisting of multi-vendor Unified Communications platforms - Microsoft Lync 2010/2013, Avaya Aura Session Manager and Cisco Unified Communications Manager - connecting to SIP trunk through an Enterprise Session Border Controller.

Requirements

- Oracle Enterprise Communications Broker
- Oracle Enterprise Session Border Controller
- Microsoft Lync 2010/2013
- Avaya Aura 6.3.4
- Cisco Unified Communications Manager 8.6

Lab Configuration

The following diagram illustrates the lab environment created to facilitate certification testing.



The network architecture consists of two areas. Area 1 represents the Enterprise network and Area 2 is the service provide network. The Enterprise network has ECB at its core connecting together multiple UC platforms. The ECB connects to the E-SBC which provides the enterprise network access to PSTN through the service provider network.

The configuration, validation and troubleshooting of the Area 1 is the focus of this document and will be described in five phases

- Phase 1 – Configure the ECB
- Phase 2 – Configure Lync 2010/2013 server
- Phase 3 – Configure the Avaya Aura System Manager
- Phase 4 – Configure the Cisco Unified Communications Manager
- Phase 5 – Configure the E-SBC.

Phase 1 – Configure the ECB

The Oracle Enterprise Communications Broker is available either as an appliance or as an application for operation on virtual machines. When running as an appliance, the ECB software is packaged with the Netra Server X3-2 for Oracle and delivered to the end customers. When running as a virtual application, the ECB software can be deployed on any third-party COTS hardware that meets the specified guidelines.

Once the ECB is deployed (in the appliance mode or the application mode) and connected, you can power on the ECB. Software installation of the ECB is required upon first startup. Although the ECB is primarily configured through the GUI, you need to perform the software installation and setup via the CLI.

Connecting to the ECB

The CLI can be accessed through the console connection. If the ECB is appliance based, you can connect to the ECB console using your laptop running a terminal emulator application like PuTTY and an RJ-5 cable. Start the terminal emulator application with the following settings:

- Baud Rate=115200
- Data Bits=8
- Parity=None
- Stop Bits=1
- Flow Control=None

Power the ECB on. Upon successful boot, the system prompts you to login. The default password for user mode is “acme” and super user mode is “packet”.

You can now use the installation wizard to setup your ECB. Using the wizard, you can enable the Web Server, set management access as well as configure high availability and service interface addressing.

```
Password: acme
ORACLE> enable
Password: packet
```

Running Setup

The following steps detail the process of using the installation wizard to configure the base setup of the ECB

1. Start the installation wizard by entering the command **`run setup`** in super user mode.

```
ORACLE# run setup
```

The following displays

```
--------------------------------------------------
Thank you for purchasing the Oracle ECB. The following short wizard
will guide you through the initial set-up.
--------------------------------------------------
'?' = Help; '.' = Clear; 'q' = Exit
CONFIGURATION
WARNING: Proceeding with wizard will result in existing configuration
being erased.
Erase config and proceed (yes/no) [no] : yes
```

2. Type yes and press Enter

```
Configuration will be backed up as
bkup_setup_wizard_Apr__8_13_25_49_632.gz
'-' = Previous; '?' = Help; '.' = Clear; 'q' = Exit
HIGH AVAILABILITY
This ECB may be a standalone or part of a highly available redundant
pair.
Oracle ECB mode
1 - standalone
2 - high availability
Enter choice [1 - standalone] : 1
```

3. Our setup consists of a standalone server. Type 1 and hit Enter
4. You will then be asked to configure a unique target name, the ip address, subnet mask and gateway of the management interface of the ECB. Please note at any time during configuration if you would like to keep the default values (values mentioned in [ ]), press Enter.

```
Unique target name of this ECB [primary] :ECB-Oracle
```

```
IP address on management interface [172.30.200.111] : 172.18.255.55
Subnet mask on management interface [255.255.0.0] :
Gateway IP address on management interface [172.18.0.1] :
```

5. You will then see a prompt to configure your sip-interface. This step is required; the system does not allow you to proceed without making a setting. When prompted enter the ip address, subnet mask and gateway ip address of the sip-interface.

```
IP address on SIP interface : 192.168.1.90
Subnet mask on SIP interface [255.255.255.0] :
Gateway IP address on SIP interface :192.168.1.1
```

6. The prompt to setup the system timezone will display

```
SETUP TIMEZONE Setup system timezone (yes/no) [yes] : yes
```

Type your response and press Enter.

7. You will then be asked to enter the number for sessions purchased for the ECB. Type your response and press Enter.

```
LICENSED SESSIONS
 Number of licensed sessions                         : 400
```

You will see the following message prompting to save the settings before proceeding to the timezone setup.

```
Enter 1-20 to modify,'d' to display summary,'s' to save,'q' to
exit.[s]:
Saving changes and quitting wizard. Are you sure? [y/n]?:
```

8. Type your response and press Enter.

```
SETUP TIMEZONE Setup system timezone (yes/no) [yes] : yes
```

The following message displays

```
Deleting configuration
Erase-Cache received, processing.
waiting 1200 for request to finish
Request to 'ERASE-CACHE' has Finished,
Erase-Cache: Completed
Running timezone setup application
Calling tzselect. Use ^D to cancel without save
Please identify a location so that time zone rules can be set
```

```
correctly.
Please select a continent or ocean.
1) Africa
2) Americas
3) Antarctica
4) Arctic Ocean
5) Asia
6) Atlantic Ocean
7) Australia
8) Europe
9) Indian Ocean
10) Pacific Ocean
11) none - I want to specify the time zone using the Posix TZ format.
#?2
```

Type your response, for example, 2 for Americas and press Enter. The system lists applicable countries in the Americas. Make your selection and press Enter. The system displays applicable time zones. Make your selection. The following message appears

```
The following information has been given:
United States
Eastern Time
Therefore TZ='America/New_York' will be used.
Local time is now: Thu Apr 11 10:13:38 EDT 2014.
Universal Time is now: Thu Apr 11 14:13:38 UTC 2014.
Is the above information OK?
1) Yes
2) No
#?
```

9. Type 1 and then hit Enter. You will be then shown a summary of your settings.

```
Saved configuration. ----------------------------
HIGH AVAILABILITY
 2 : ECB mode                                          : standalone
 3 : ECB role                                          : N/A
```

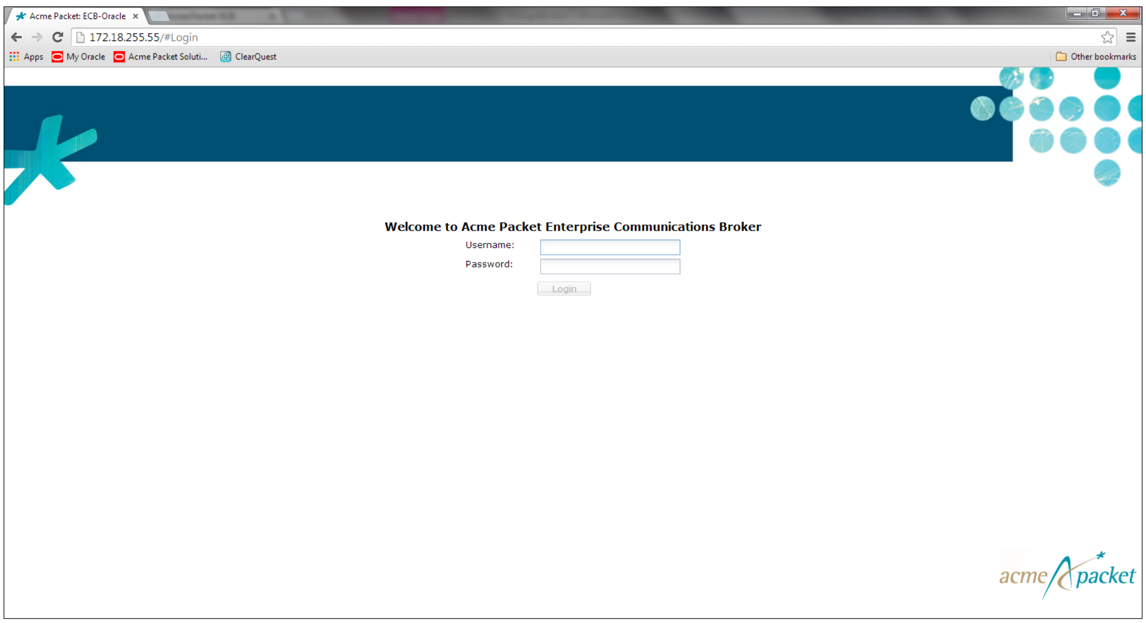
```
AUTOMATIC CONFIGURATION
 6 : Acquire config from the Primary (yes/no)            : N/A

ECB SETTINGS
 7 : Unique target name of this ECB                      : ECB-Oracle
 8  :  Management  interface  IP  address                        :
172.18.255.55
 9 : Management interface subnet mask                    : 255.255.0.0
 10: Management interface gateway IP address            : 172.18.0.1
 11: SIP interface VLAN id                              : 0
 12: SIP interface IP address                           : 192.168.1.90
 15:  SIP  interface  subnet  mask                               :
255.255.255.0
 16: SIP interface gateway IP address                   : 192.168.1.1

PEER CONFIGURATION
 18: Peer target name                                   : N/A

SETUP TIMEZONE
 19: Setup system timezone (yes/no)                     : yes

 LICENSED SESSIONS
 20: Number of licensed sessions                        : 400

You may access the GUI via http://172.18.255.55:80/ or continue using
the acli after reboot.
```

Logging in the ECB

You can now access the ECB through the Web GUI. Start an Internet browser and start the GUI using the URL:

http://server ip address/.

The login screen will appear.



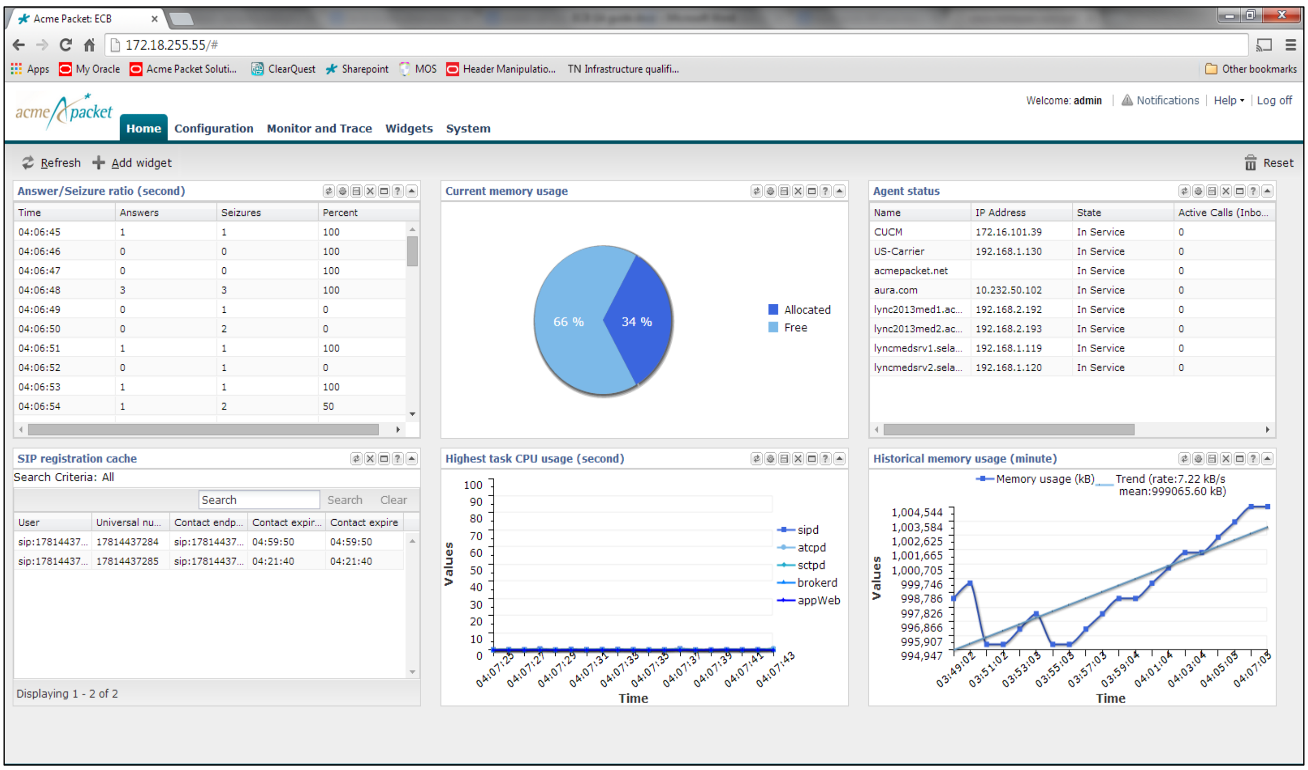
Enter your GUI username and password. The default username for the User level is “user” and the default password is “acme.

The default username for an Administrator level is “admin”, and the default password is "packet".

Configuring the ECB

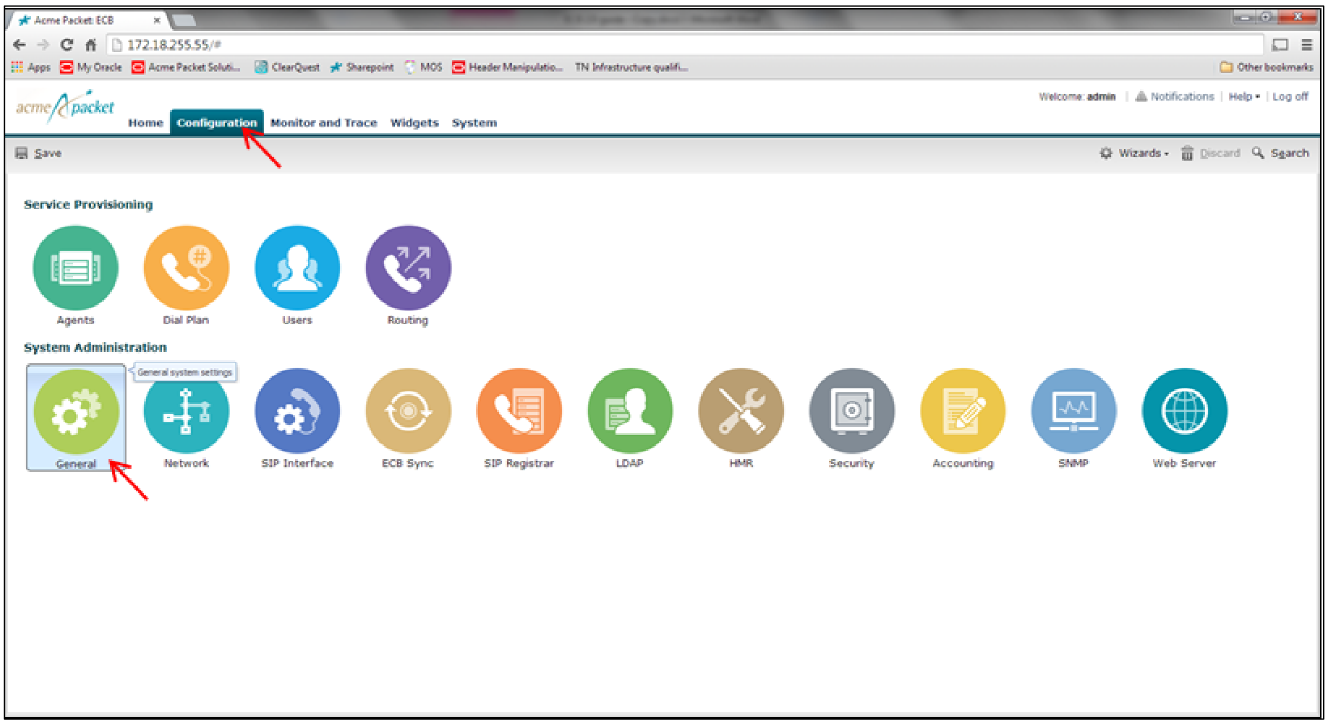
After logging into the ECB, the **Home** screen will be displayed. The ECB GUI has five tabs across the top – **Home, Configuration, Monitor and Trace, Widgets** and **System**.

The **Home** tab as shown below contains a configurable dashboard displaying the system statistics.

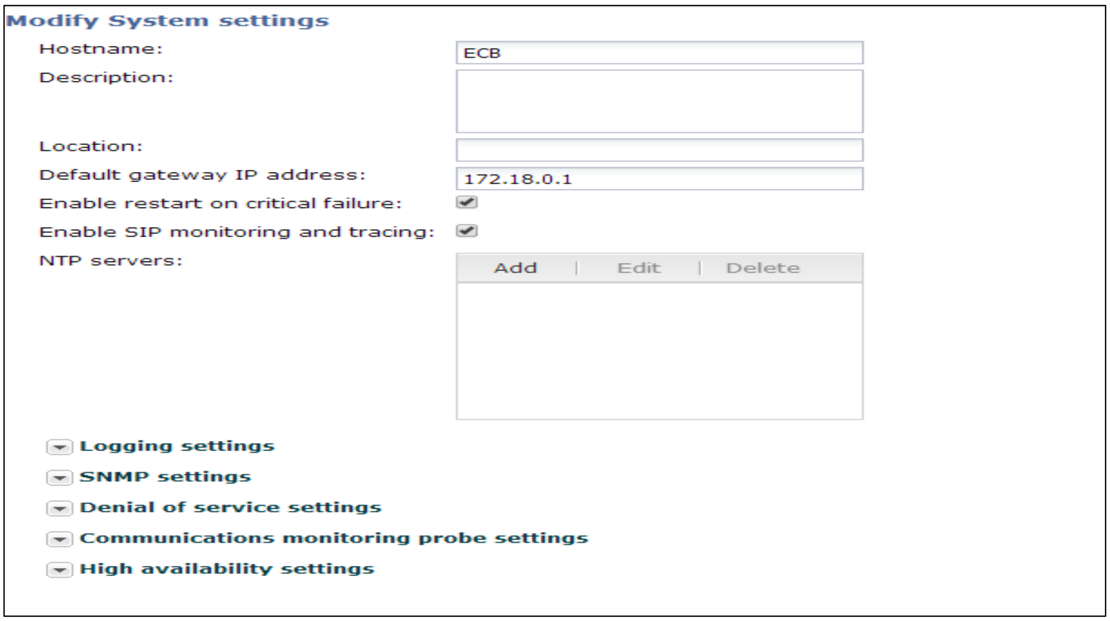


System Settings

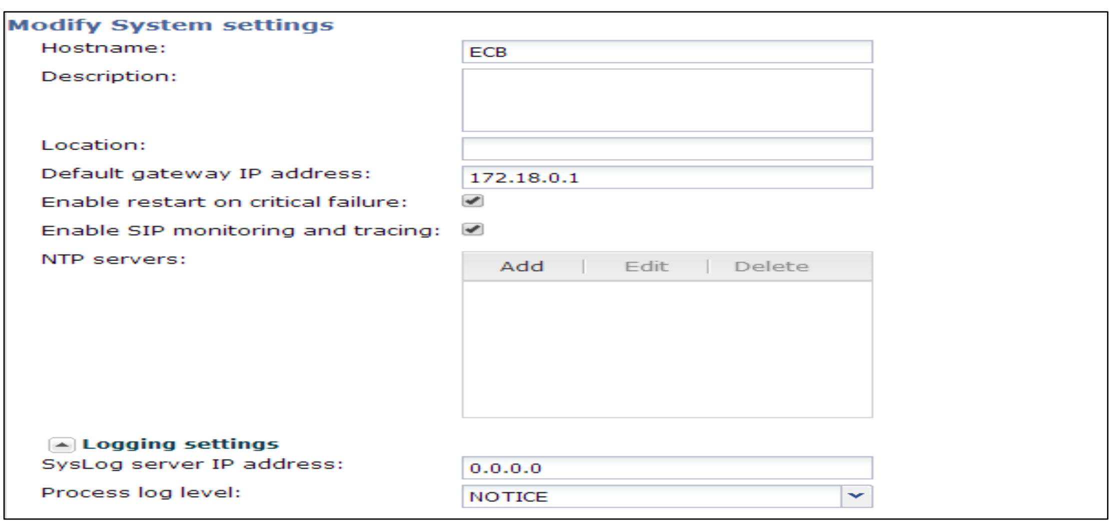
Select the **Configuration** tab. This tab displays the configurable elements in the ECB in two sections – **Service Provisioning** and **System Administration**. Click on the **General** icon under **System Administration**.



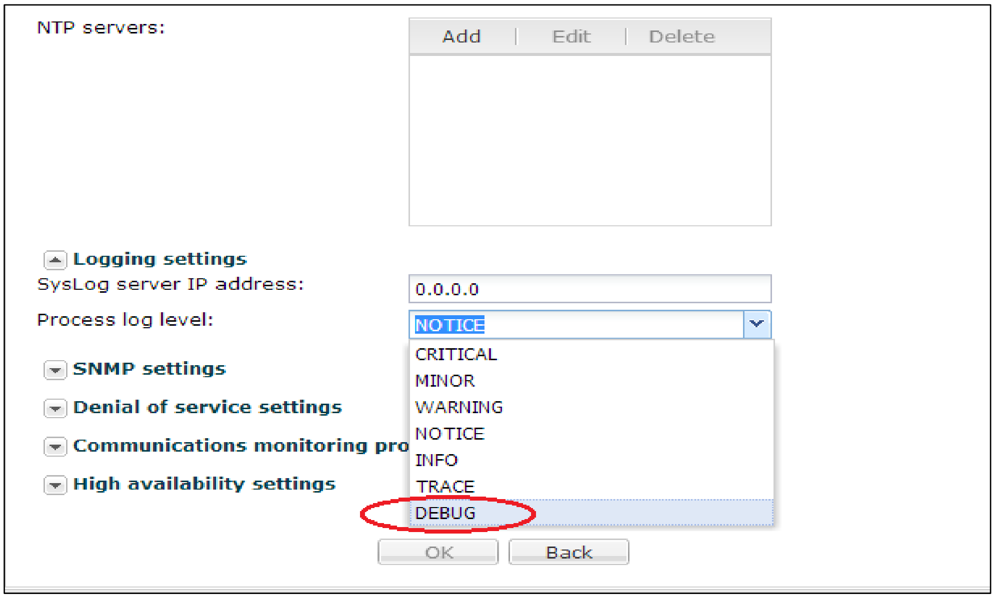
Modify System Settings page is displayed.



Expand the **Logging settings** section.

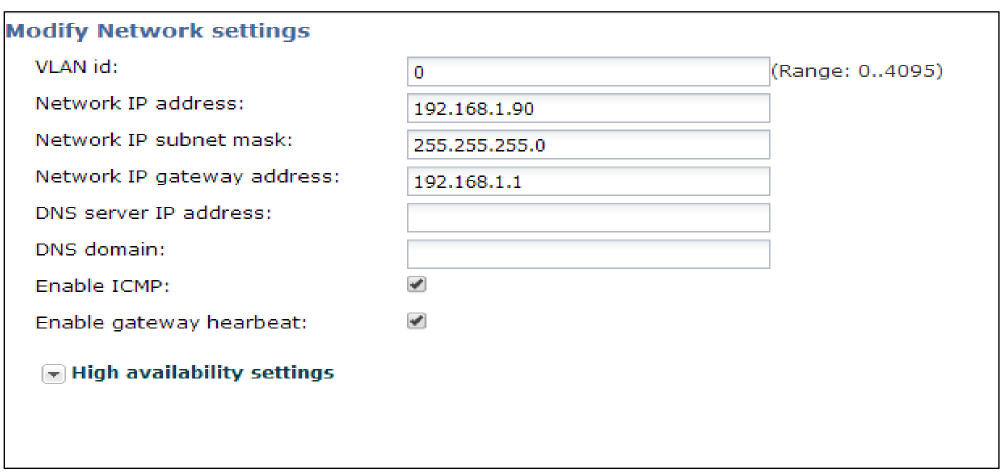


Process log level is set at **NOTICE**. Change the setting to **DEBUG** by selecting the option from the drop down menu and click **OK**.



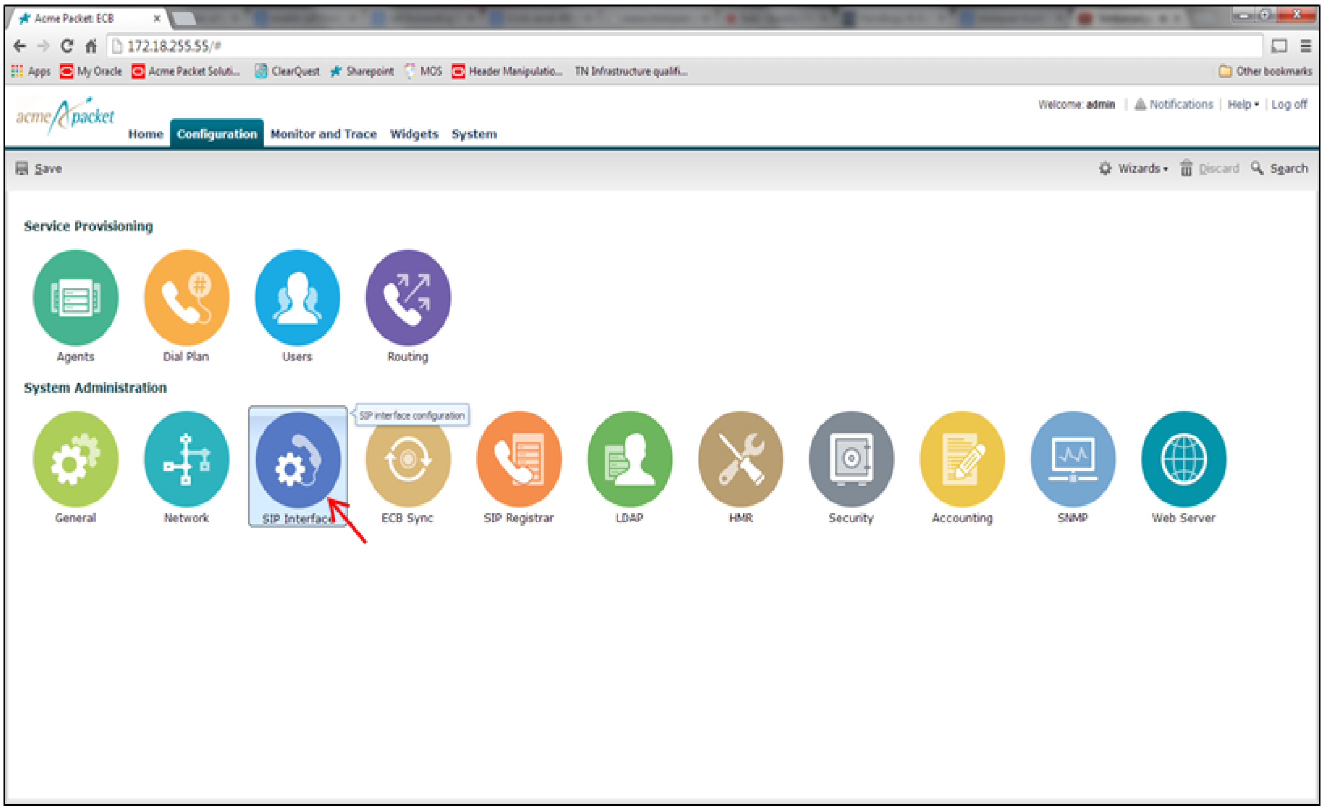
Click the **Configuration** button at the top to go to the **Configuration** tab.

You can verify the network interface settings configured through the `run setup` command by clicking on the **Network** icon under **System Administration**

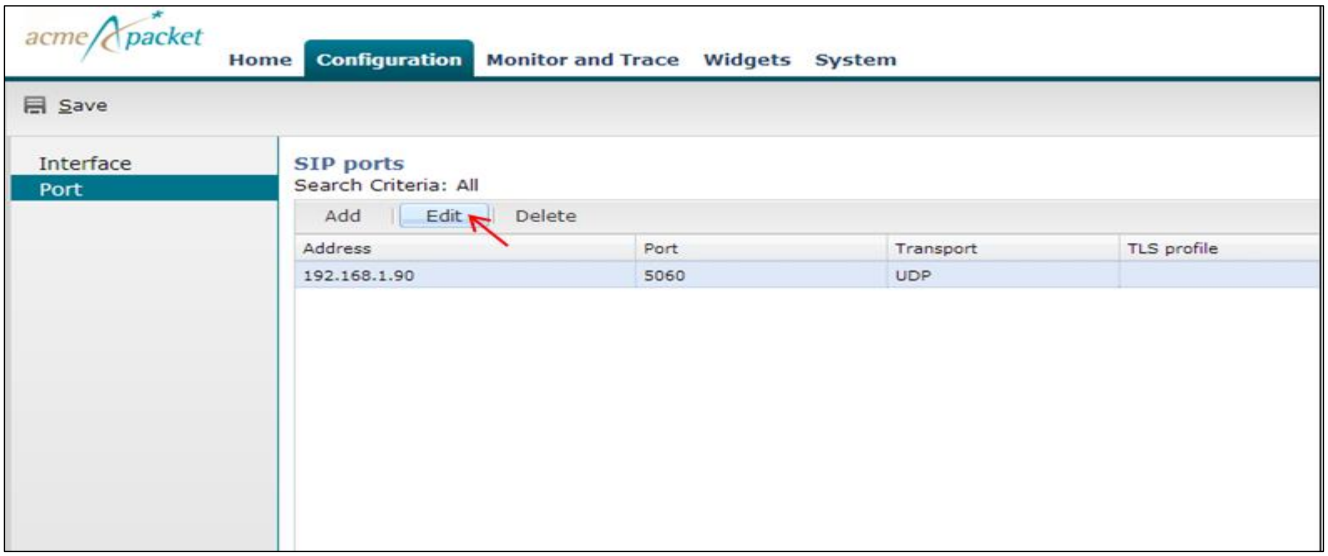


Configure SIP Interfaces

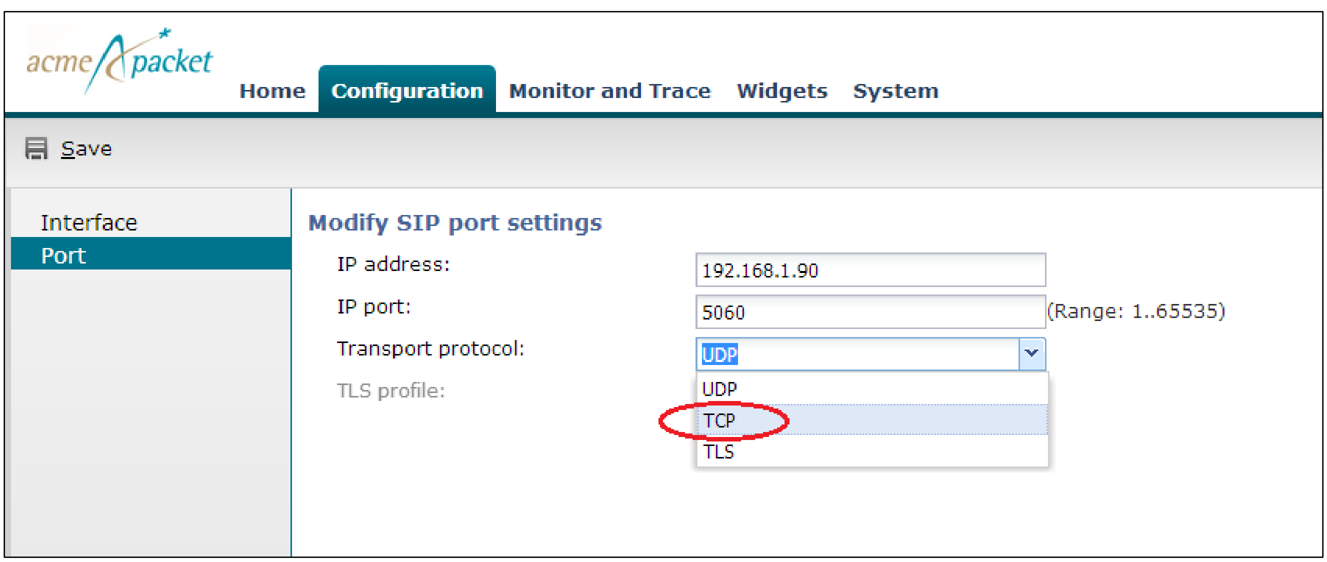
Click **Configuration** button to go to the **Configuration** tab. Select the **SIP Interface icon** under **System Administration** to make changes to the SIP interface settings configured during initial setup.



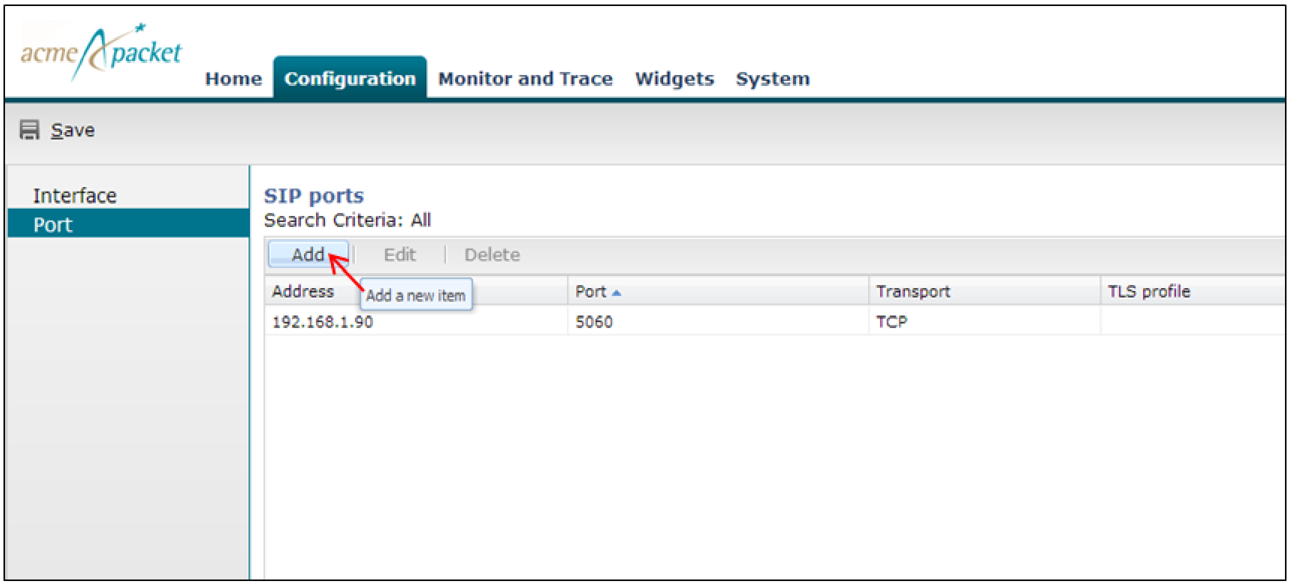
Click on the **Port** tab on the left. You will see the sip port 192.168.1.90 with protocol UDP. Click **Edit** to change its protocol to TCP.



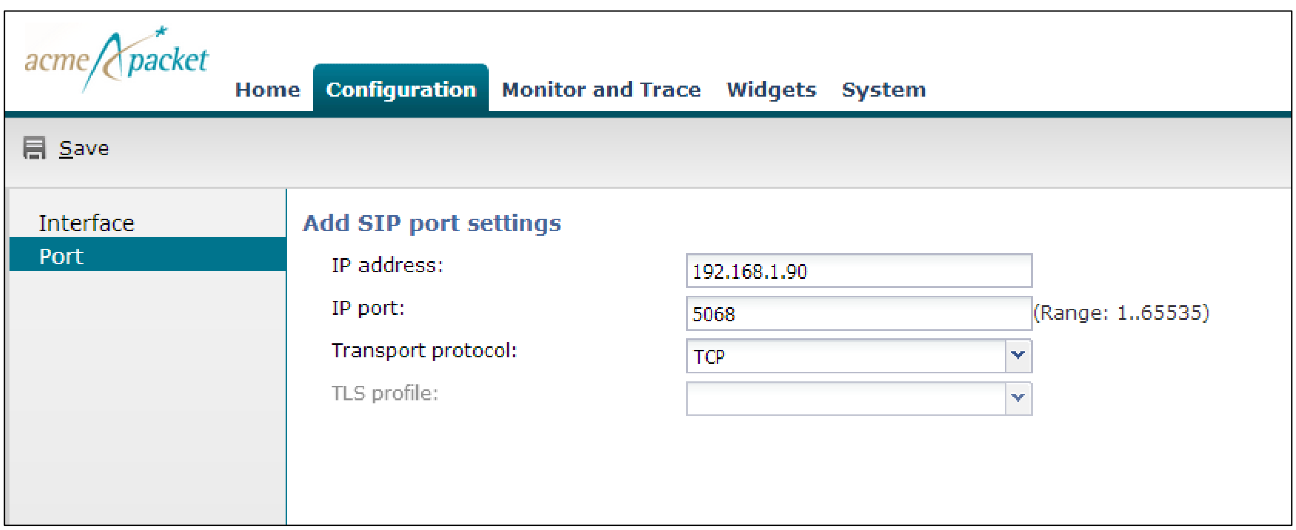
On the **Modify SIP port settings** page, select TCP as the transport protocol from the drop-down menu and click **OK**.



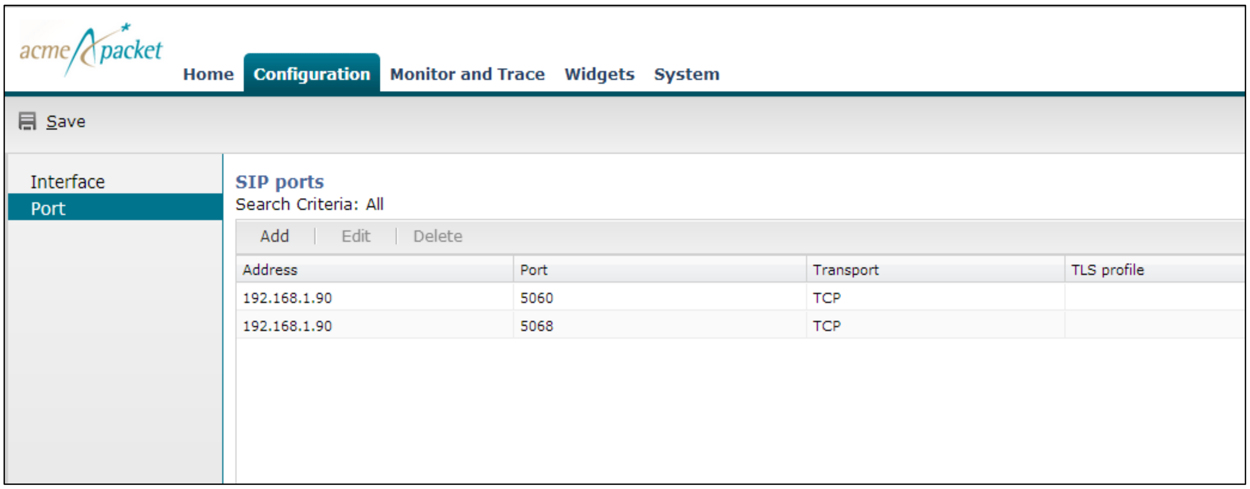
On the SIP ports page, click **Add** to add another sip port.



Add a sip port with address 192.168.1.90, port 5068 and transport protocol TCP as shown below and click **OK**.



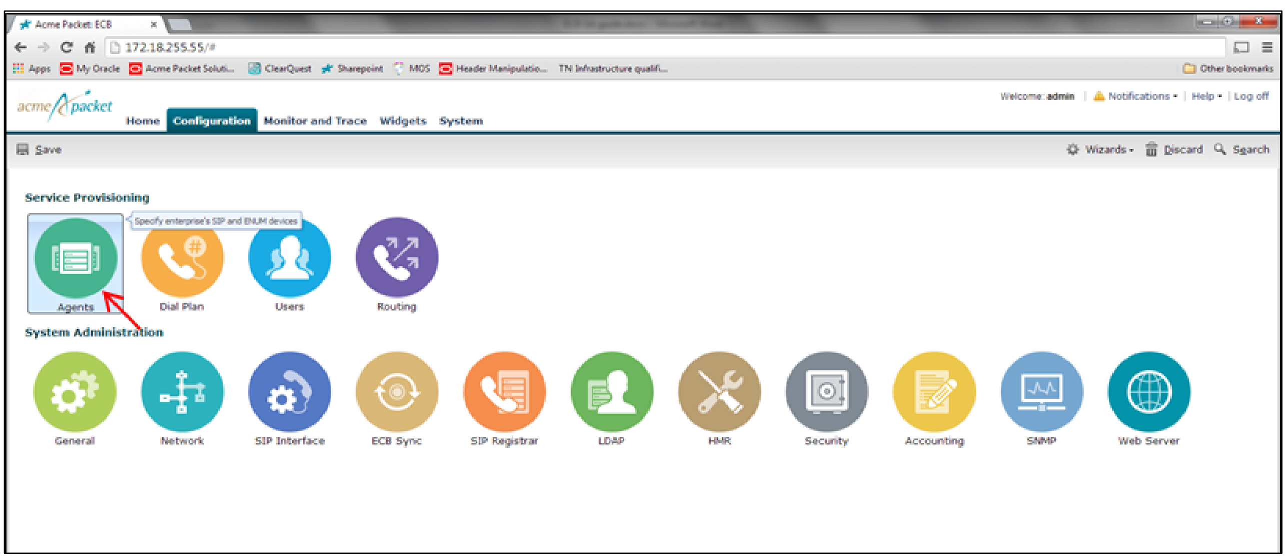
The SIP ports page will be displayed showing the two sip ports we configured.



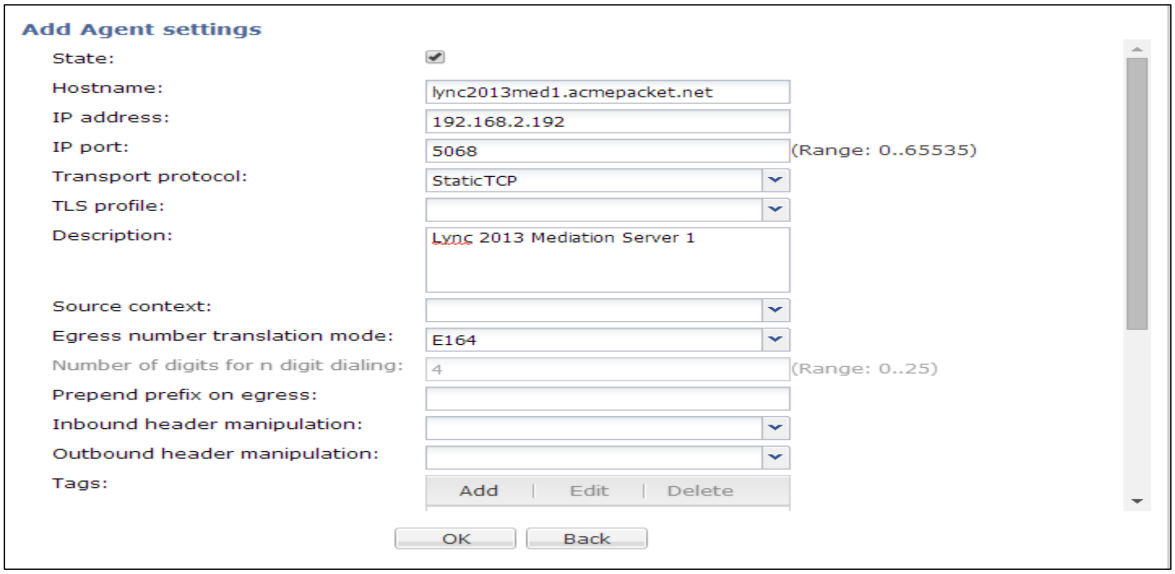
Click on **Configuration** button to back to the **Configuration** tab.

Configure Agents

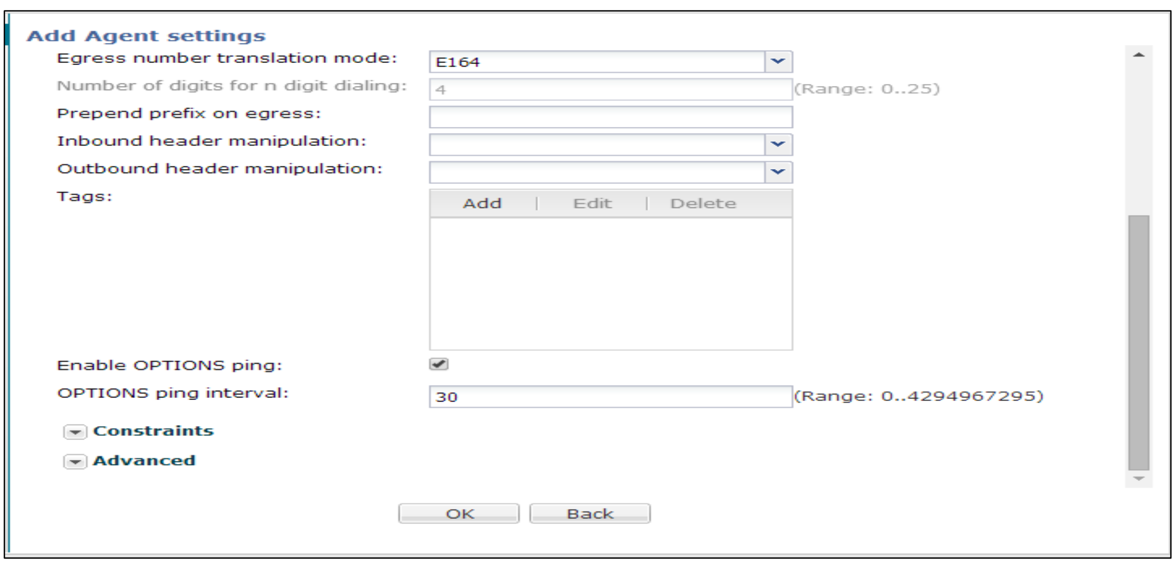
We will now configure the next hops in our routing paths – the Agents – which in our setup are the Lync Mediation Server, Avaya SM and the E-SBC which connects the ECB to the SIP trunk. Click on **Agents** icon under **Service Provisioning**.



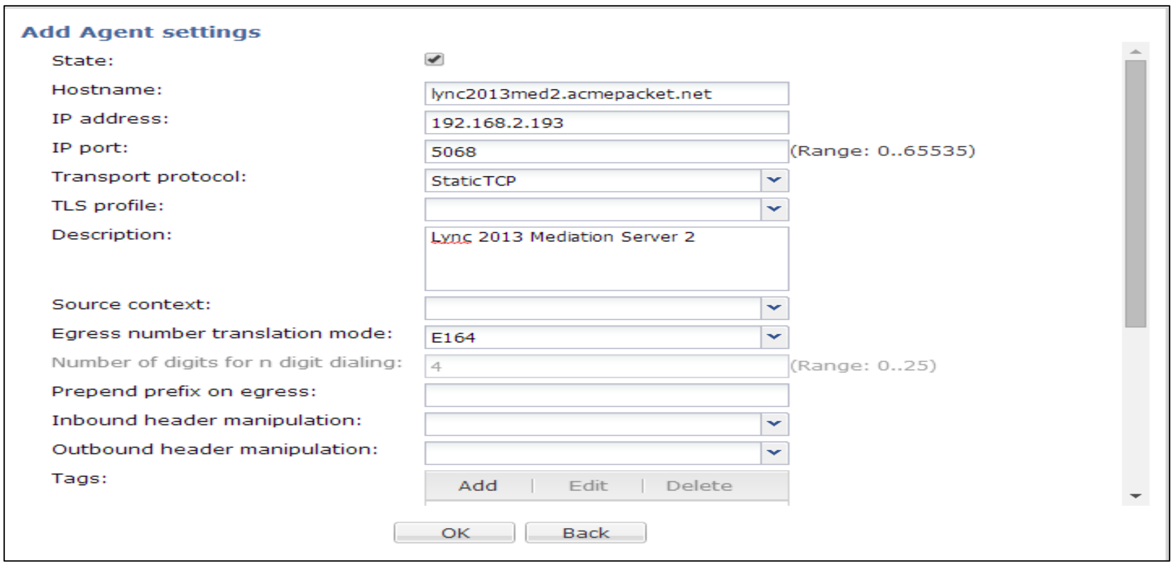
The Agents page will be displayed. Click on the **Add** button. The **Add Agent settings** page is displayed. Add the Lync mediation server by configuring the hostname, ip address and port as shown below.



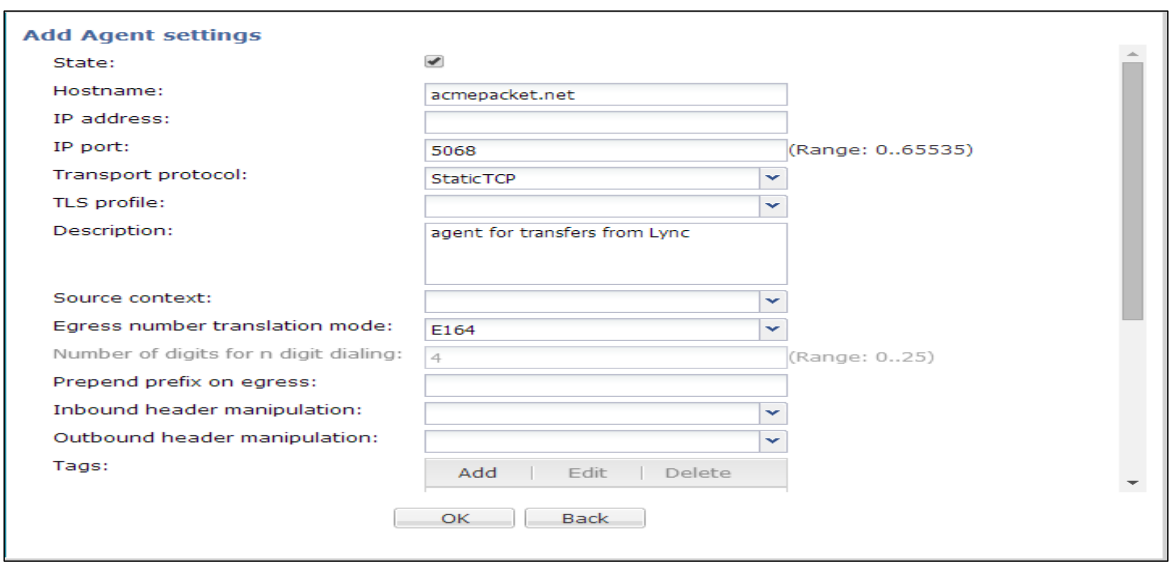
Scroll down to enable SIP OPTIONS to monitor agent health locally. Check the **Enable OPTIONS ping** check box and configure the **OPTIONS ping interval** to 30. Click **OK.**



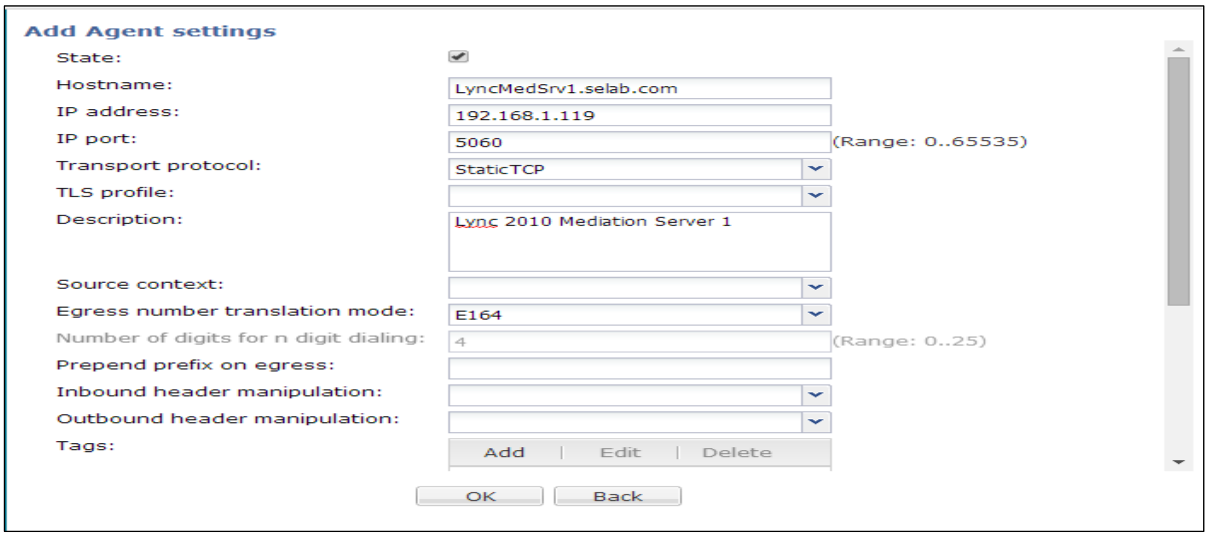
You will now see the Lync server listed under **Agents**. Click **Add** to add the second Mediation server from the pool and also enable OPTIONS as shown in the previous step.

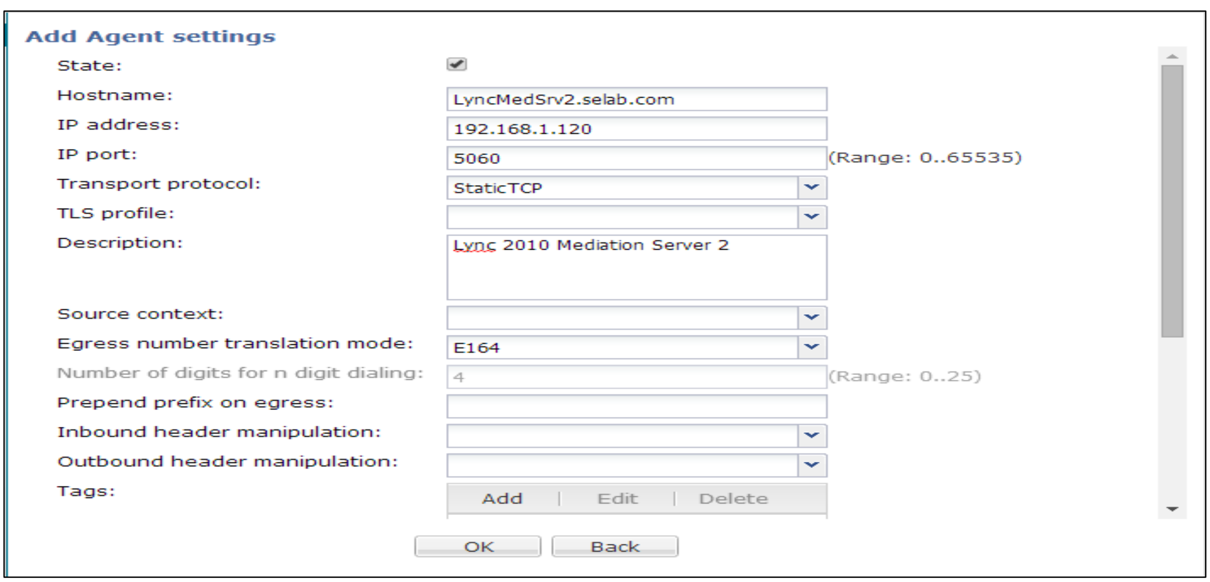


Add another agent with hostname acmepacket.net to route the INVITEs for transfers from Lync and click **OK**.

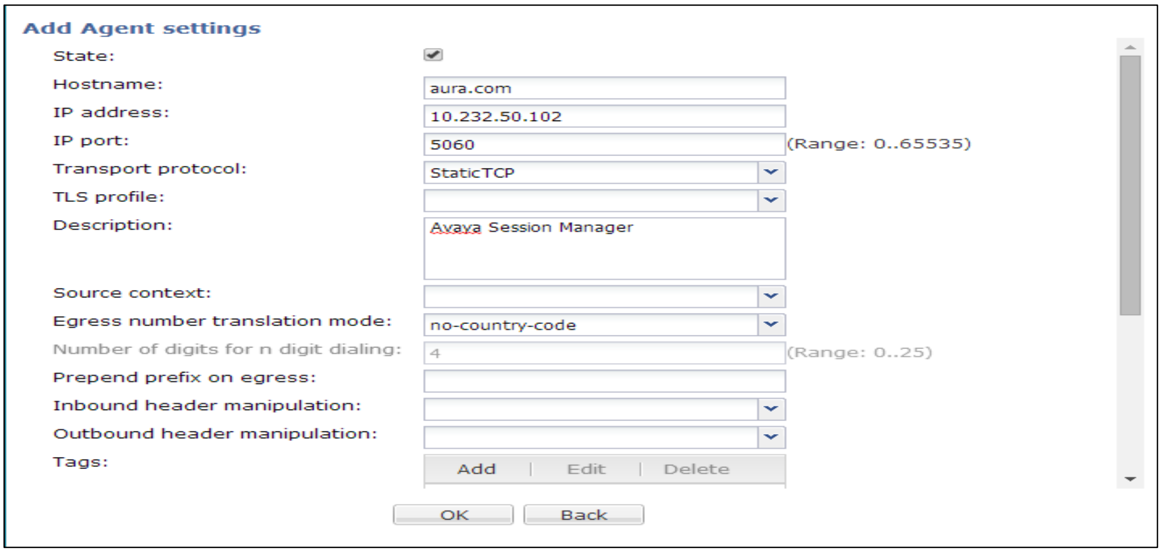


Next add the two Mediation servers from the Lync 2010 setup using the following settings. In order to monitor agent health locally, please enable OPTIONS as shown in the previous steps.

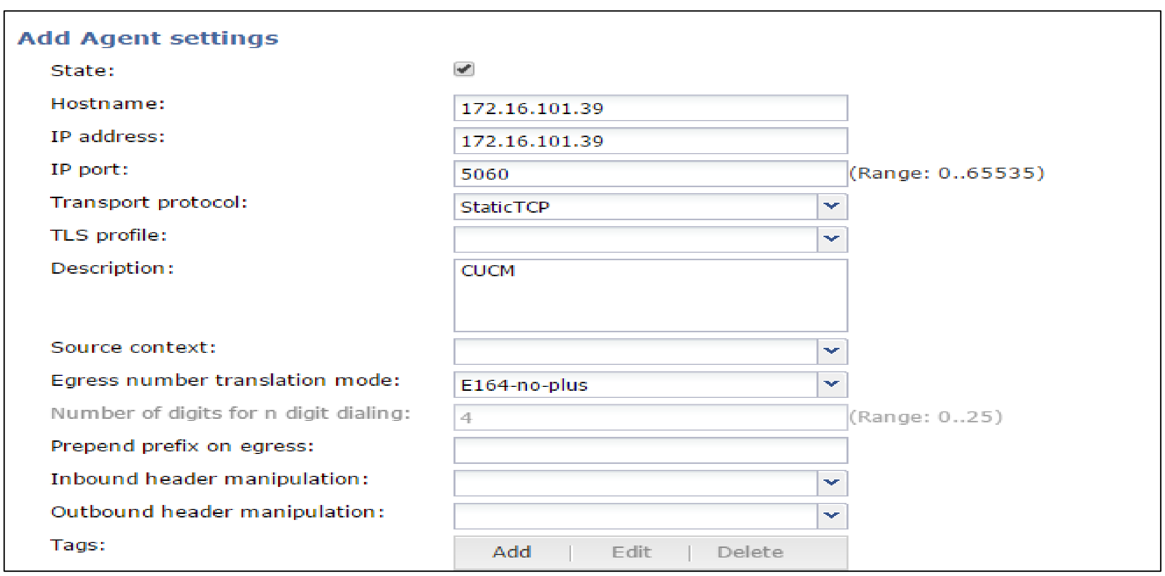




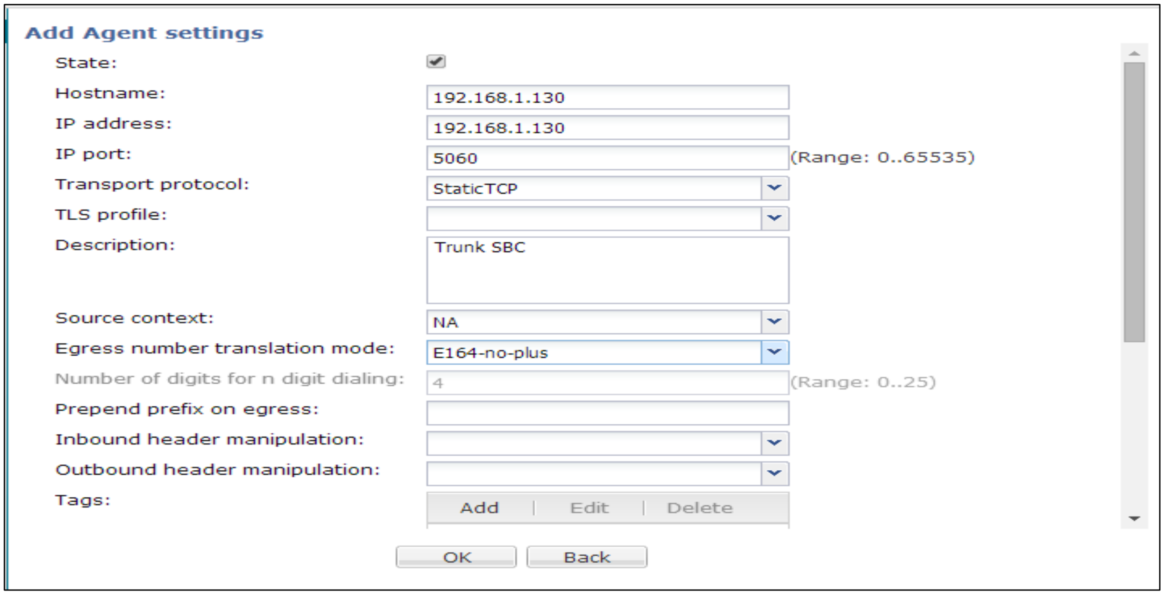
Now add the Avaya Session manager as an agent using the following settings. In our setup, the egress number translation mode for Avaya server was set to no-country code.



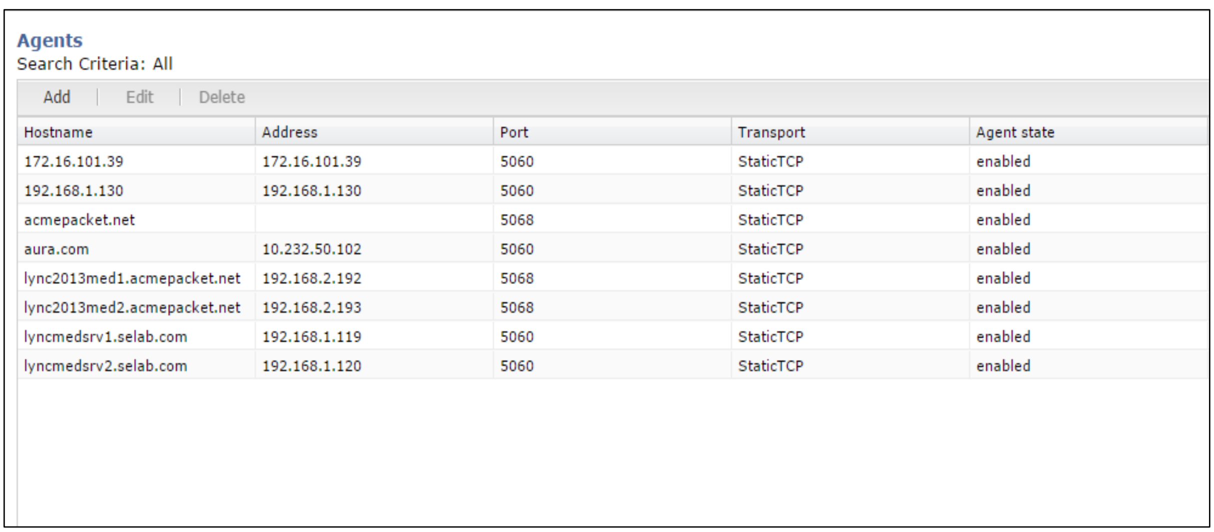
Now add the CUCM as an agent using the following settings. In our setup, the egress number translation mode for CUCM is E164-no-plus.



Next add the E-SBC which provides the enterprise network access to the SIP trunk and click **OK**.



The **Agents page** will be displayed listing the configured agents.


Agents
Search Criteria: All

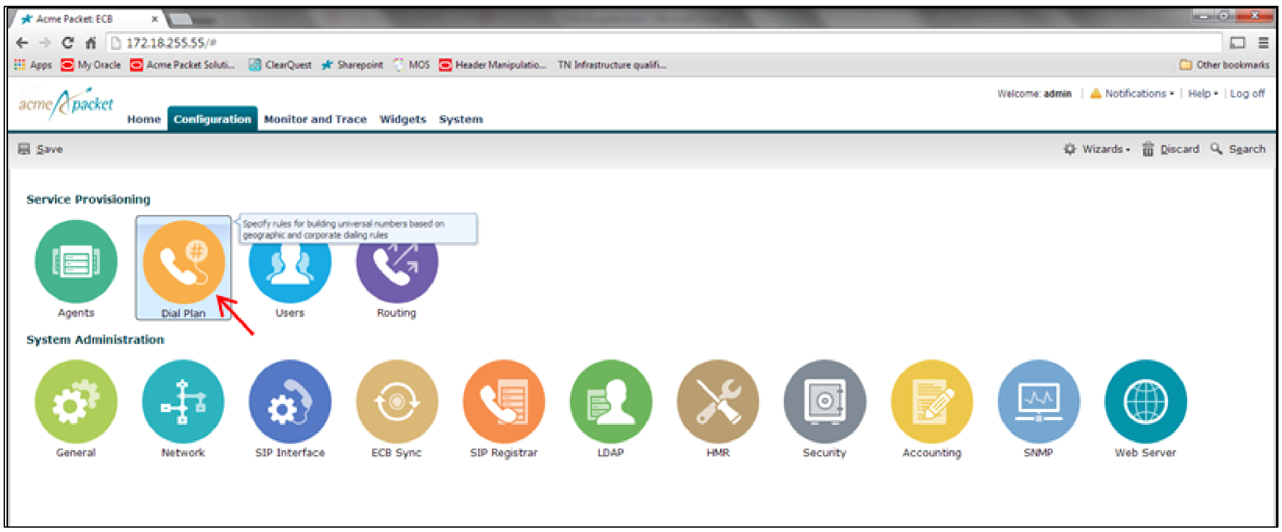
Add | Edit | Delete

Hostname	Address	Port	Transport	Agent state
172.16.101.39	172.16.101.39	5060	StaticTCP	enabled
192.168.1.130	192.168.1.130	5060	StaticTCP	enabled
acmepacket.net		5068	StaticTCP	enabled
aura.com	10.232.50.102	5060	StaticTCP	enabled
lync2013med1.acmepacket.net	192.168.2.192	5068	StaticTCP	enabled
lync2013med2.acmepacket.net	192.168.2.193	5068	StaticTCP	enabled
lyncmedsrv1.selab.com	192.168.1.119	5060	StaticTCP	enabled
lyncmedsrv2.selab.com	192.168.1.120	5060	StaticTCP	enabled

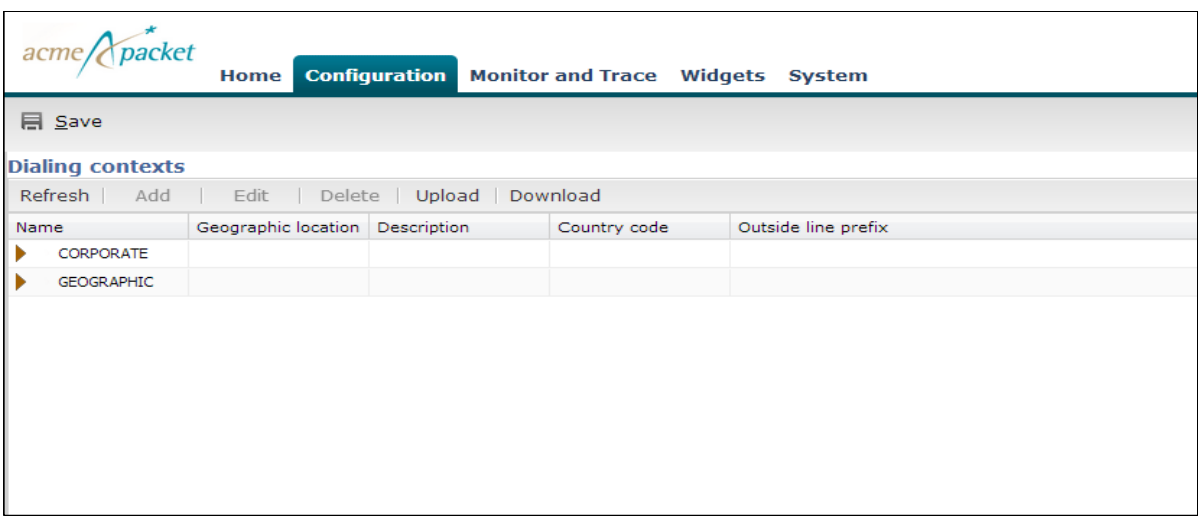
Click on **Configuration** button on the top to go back to the **Configuration** tab.

Configure Dial Plan

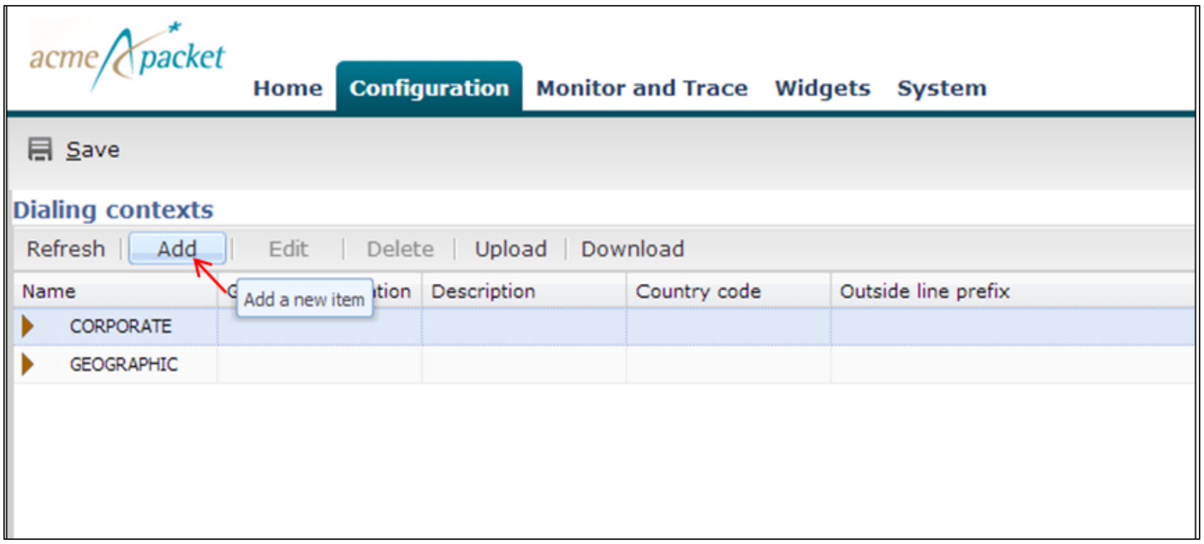
We will now configure the dialing contexts and dial plans. Dialing-contexts define the system behavior for calls placed to and from either a corporate or geographic focus. Dialing-contexts include multiple dial-patterns, which define the normalization required to most effectively manage diverse signaling structures. Click on the **Dial Plan** icon under **Service Provisioning**.



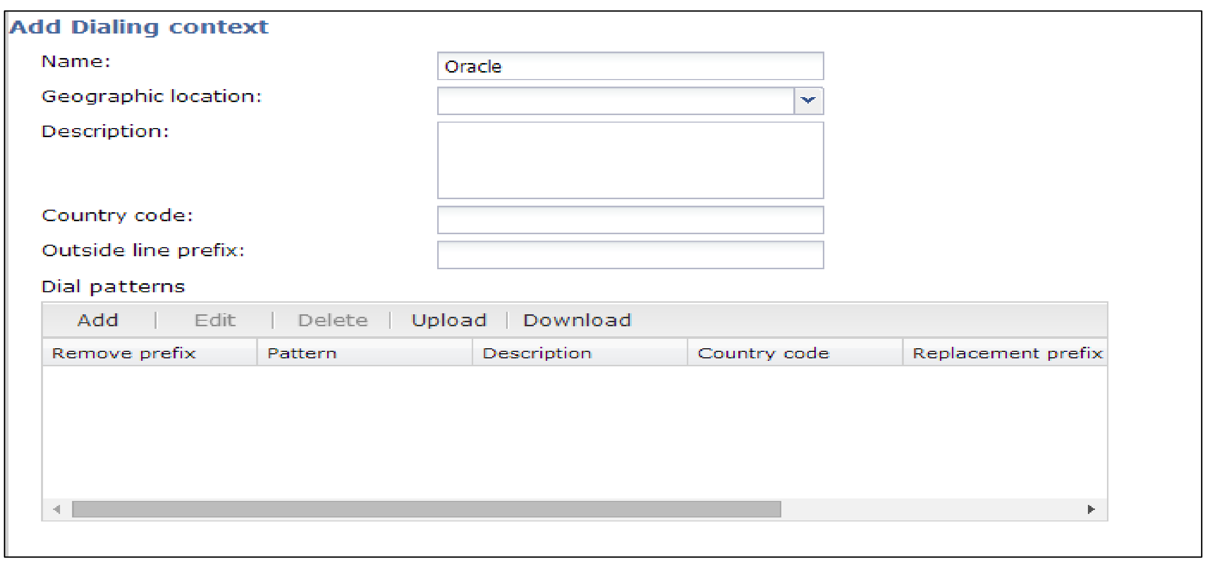
The **Dialing Contexts** page shows the default dialing context parents – Corporate and Geographic.



To configure a dialing context, select the Corporate context and click **Add**.

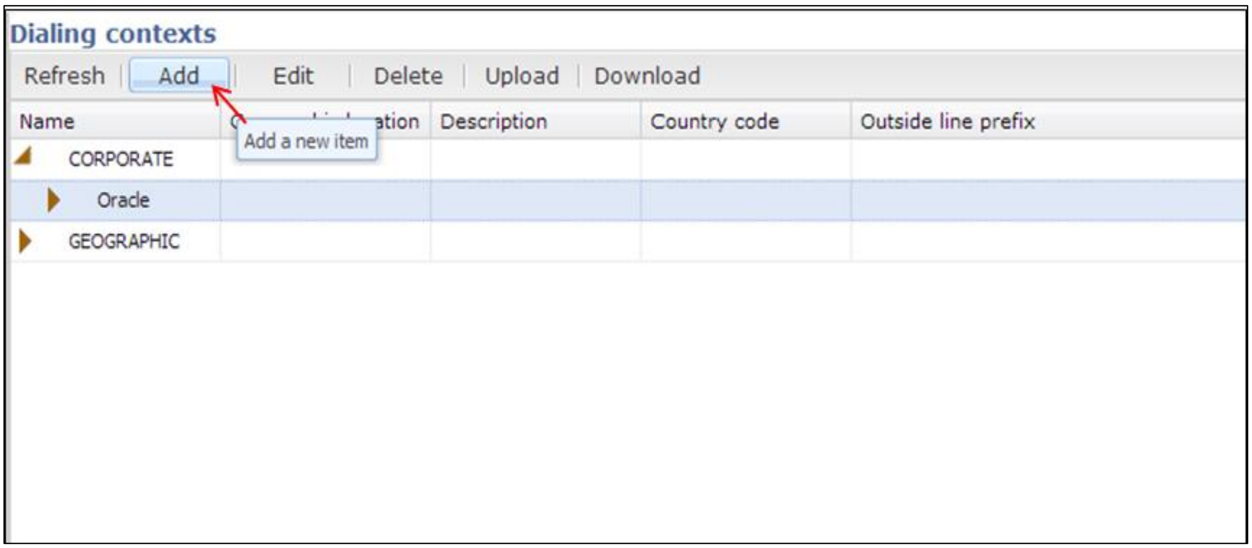


In the **Add Dialing Context** page, configure a context with the following details and click **OK**.

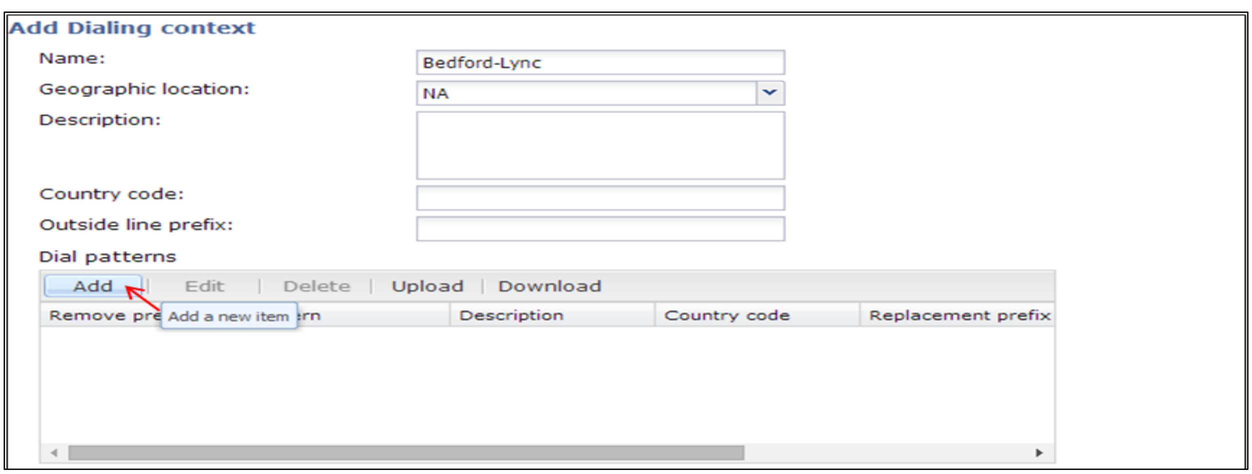


The Dialing Contexts page displays Oracle listed under corporate contexts. We will now configure child contexts under Oracle for our Lync, Avaya and CUCM servers. These can be considered as contexts for the different branches an enterprise has.

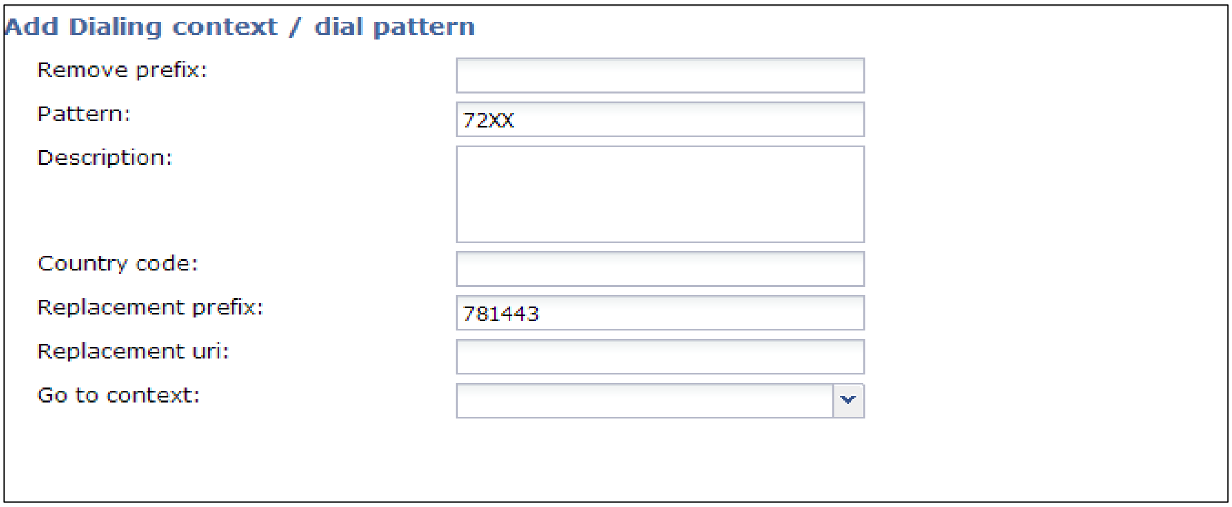
Select Oracle under the corporate context and click **Add**.



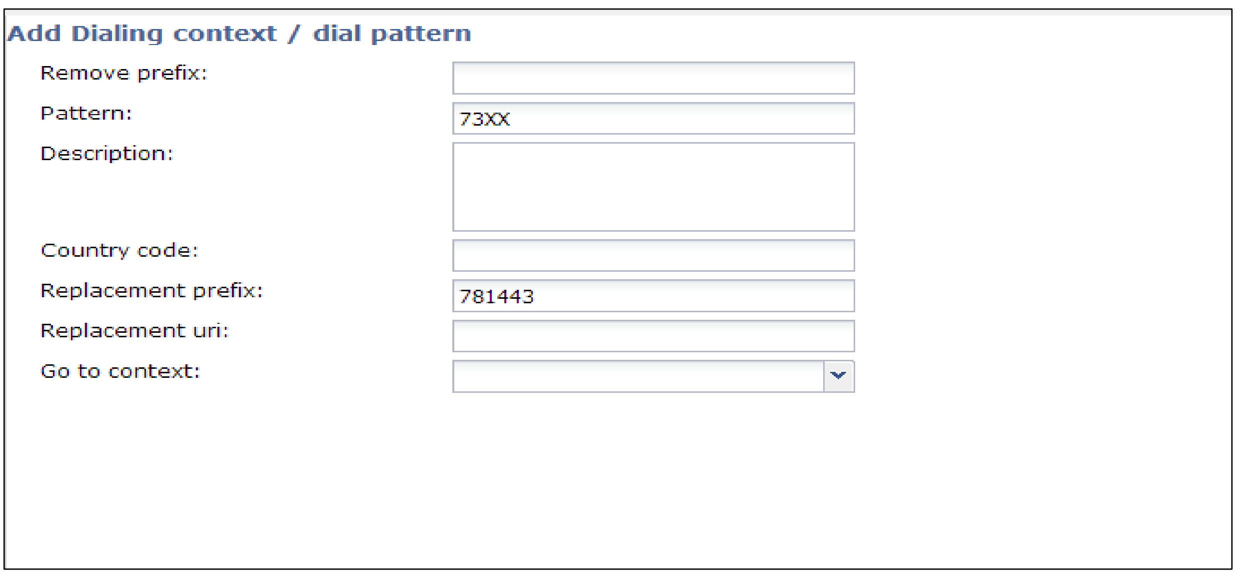
In the **Add Dialing Context** window, configure a context named Bedford-Lync and **Geographic location** as NA. To configure dial patterns, click **Add**.



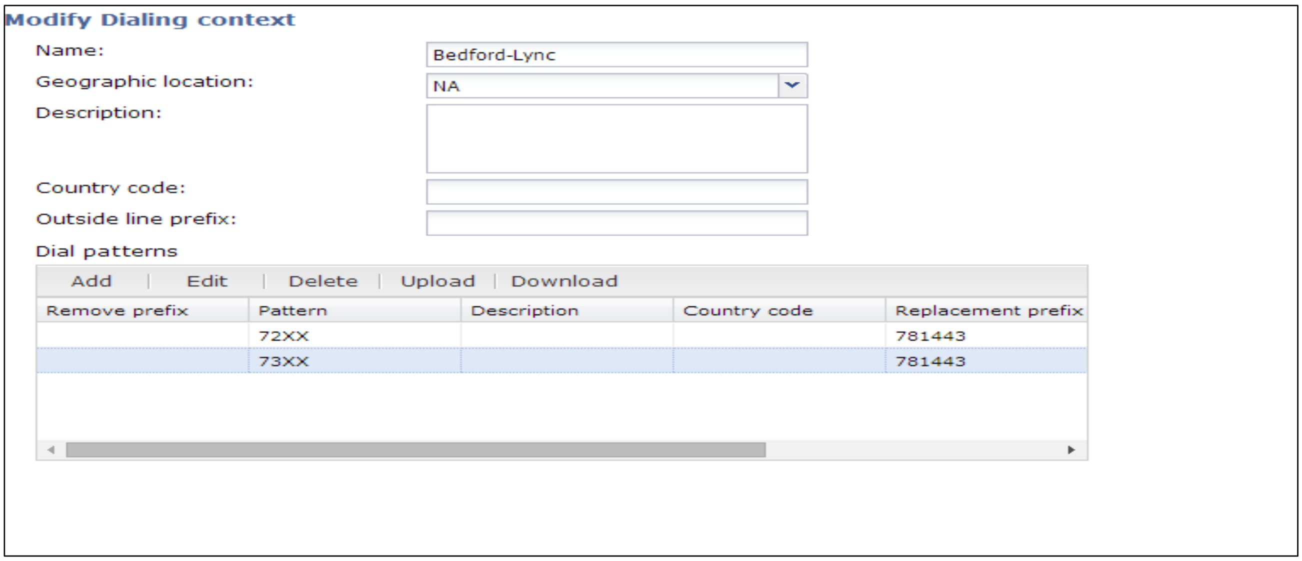
Add a dial pattern as shown below to enable 4 digit dialing and click **OK**. If the dialed digits match the pattern 72XX, ECB transforms it to a 10 digit number by adding the prefix 781443.



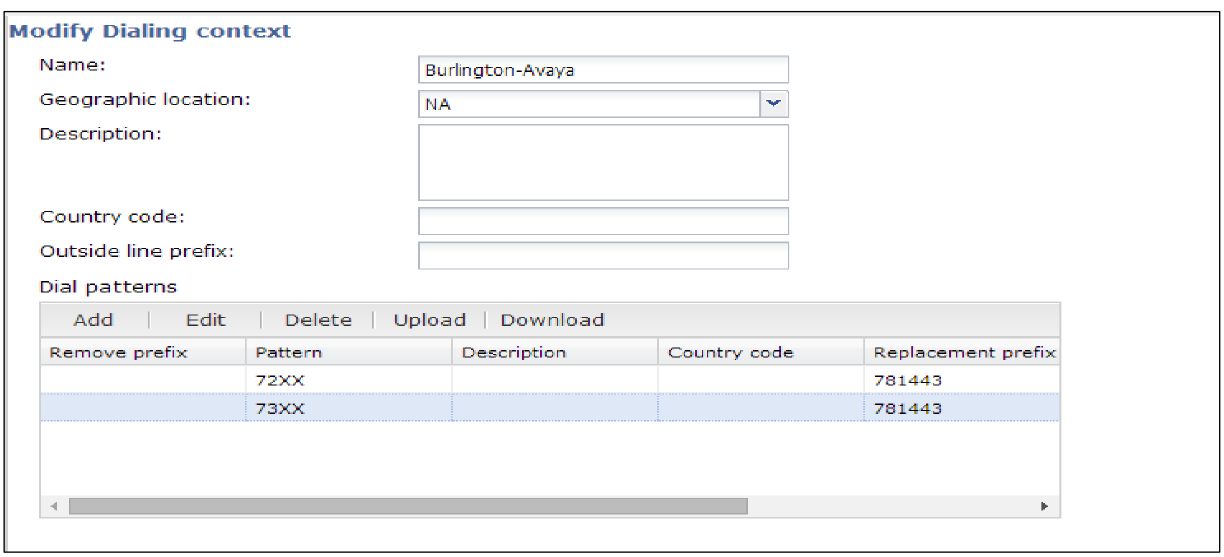
Add another dial pattern as shown below to match the pattern 73XX and click **OK**.



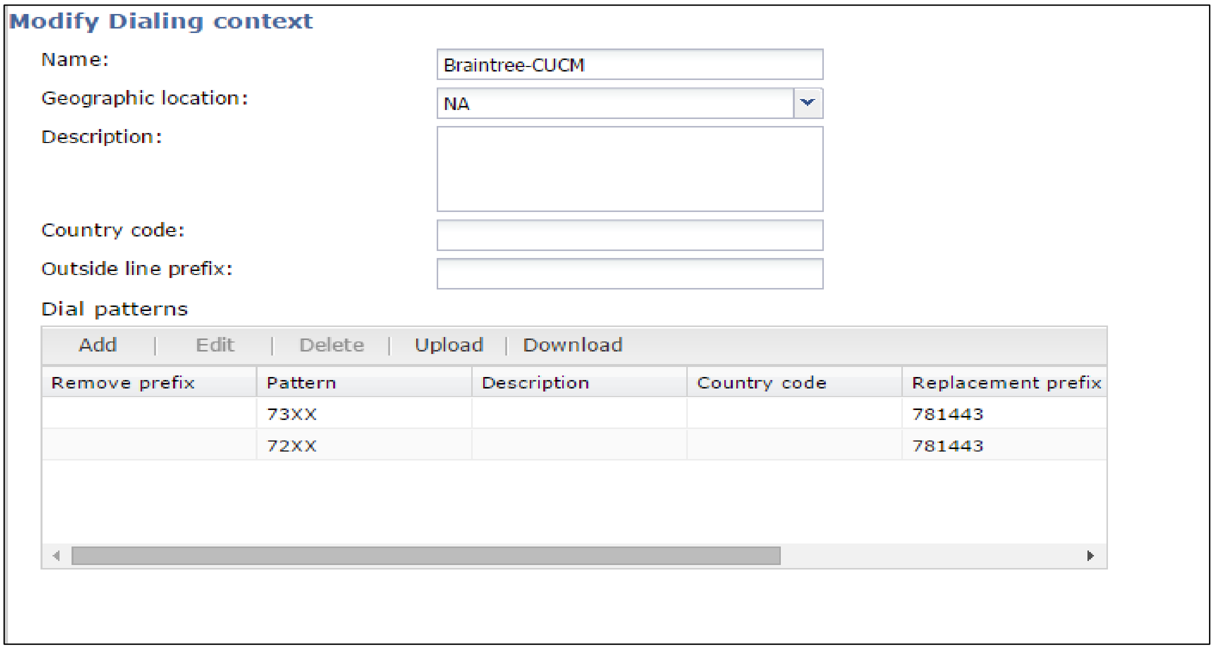
The Bedford-Lync dialing context displays the configured dial patterns.



Add another dialing context under Oracle named Burlington-Avaya with the following settings and click **OK**.



Add a dialing context named Braintree-CUCM with the following settings and click **OK**.



Modify Dialing context

Name: Braintree-CUCM

Geographic location: NA

Description:

Country code:

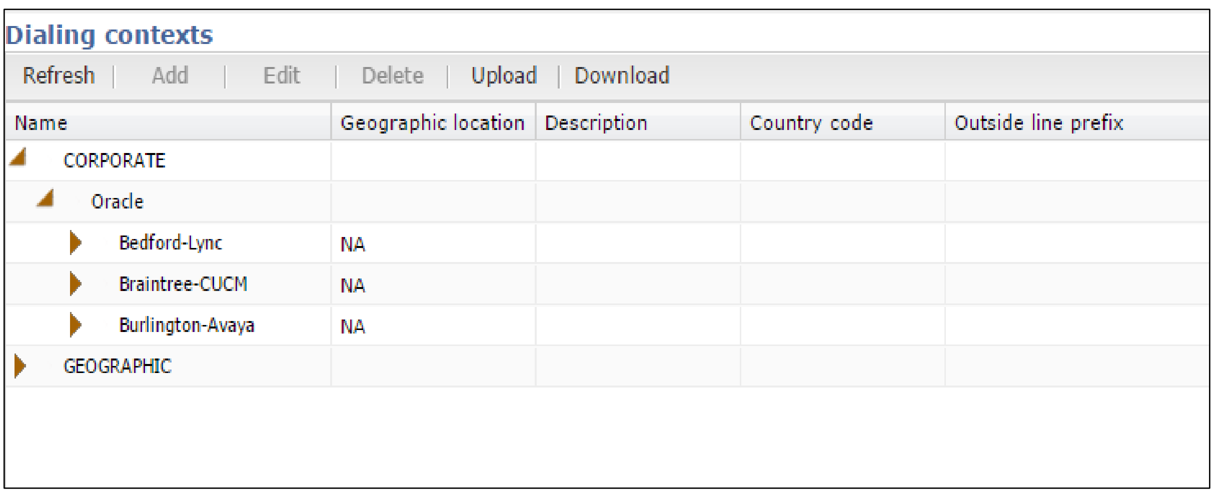
Outside line prefix:

Dial patterns

Add | Edit | Delete | Upload | Download

Remove prefix	Pattern	Description	Country code	Replacement prefix
	73XX			781443
	72XX			781443

The **Dialing Contexts** page shows the parent context – Oracle and the child contexts.



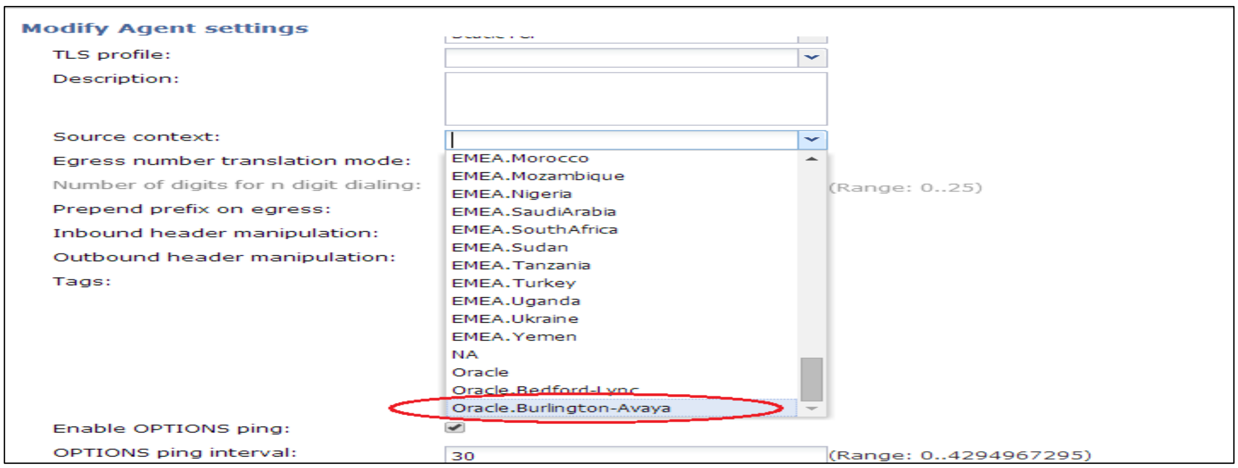
Dialing contexts

Refresh | Add | Edit | Delete | Upload | Download

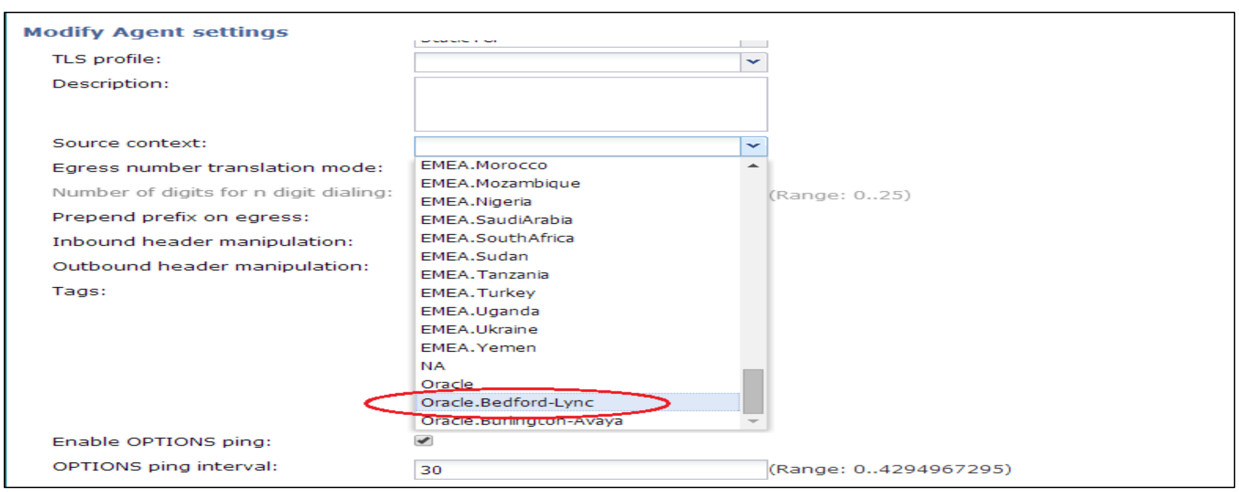
Name	Geographic location	Description	Country code	Outside line prefix
CORPORATE				
Oracle				
Bedford-Lync	NA			
Braintree-CUCM	NA			
Burlington-Avaya	NA			
GEOGRAPHIC				

We need to associate the agents with the contexts within which they reside to assign the dialing rules. Click on the **Configuration** button at the top to go to the **Configuration** tab and click on **Agents**.

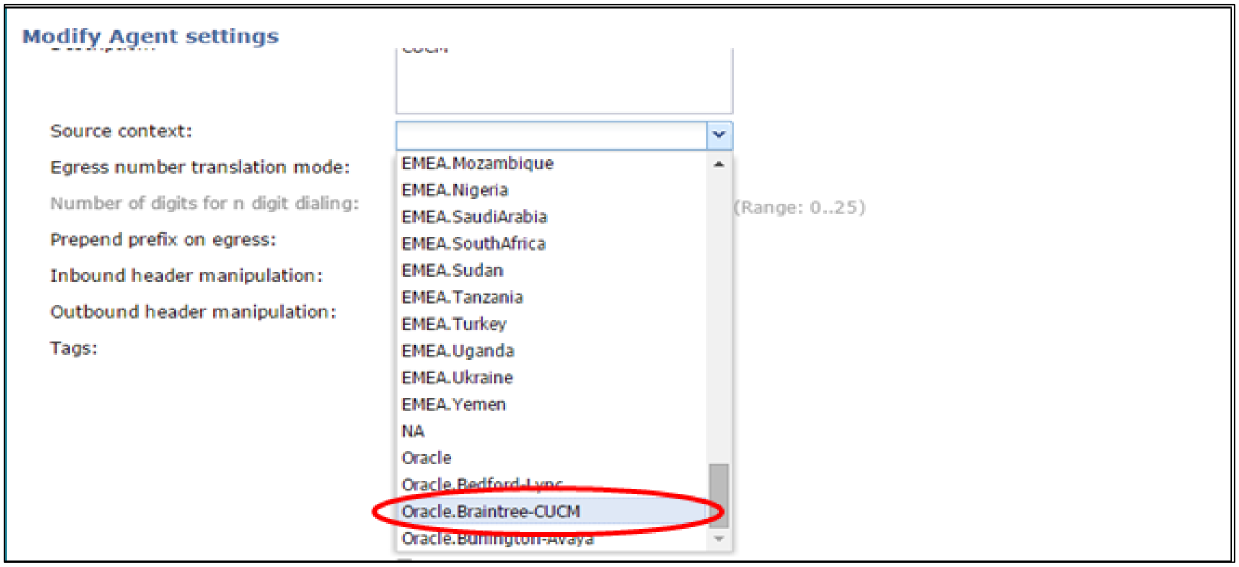
On the **Agents** page, select the agent configured for Avaya server and click **Edit**. On the **Modify Agent Settings** page, select Oracle.Burlington-Avaya from **Source context** drop-down menu and click **OK**.



Next, configure the Lync 2013/2010 mediation servers with the source context – Oracle.Bedford-Lync since the Lync 2010 and Lync 2013 servers have the same dialing rules.

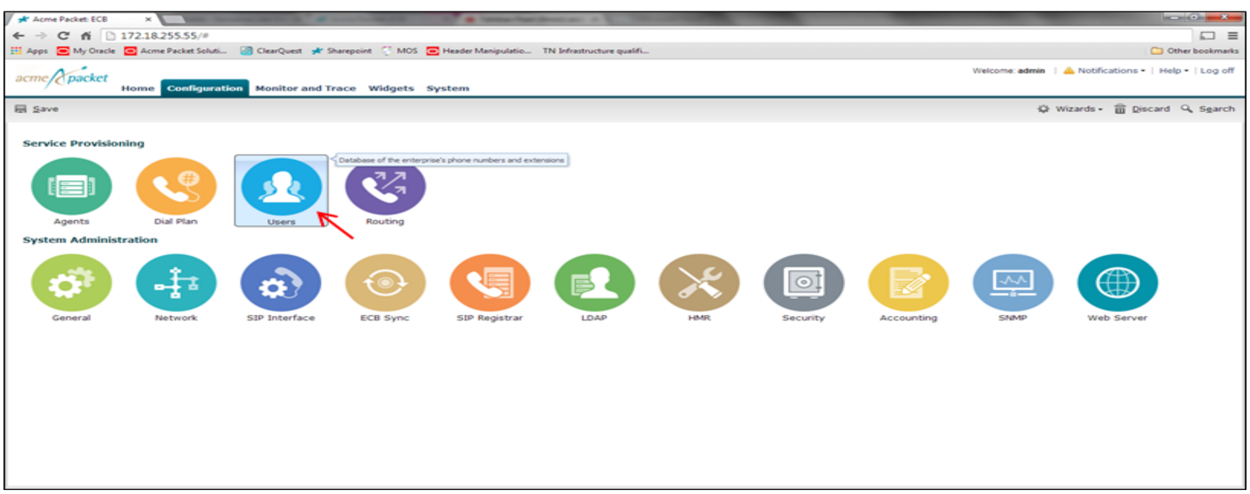


Finally, configure the CUCM server with the source context – Oracle.Braintree-CUCM.

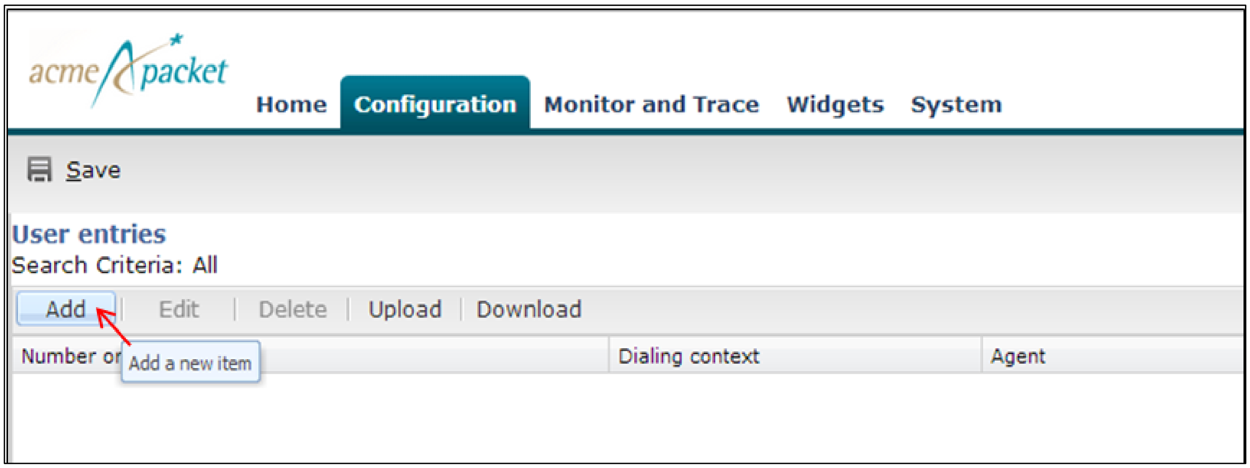


Configure Users

Next we will populate users in the User database. User entries can be added manually or uploaded in a format pre-configured to translate into a user database. Click on the **Users** icon under **Service Provisioning**.



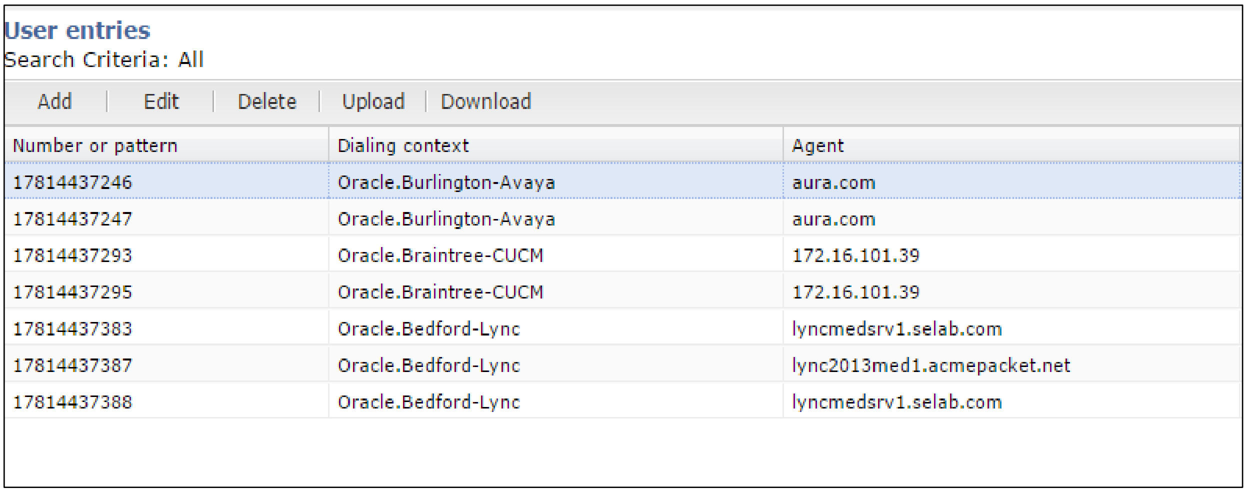
The **User entries** page will be displayed. Click on **Add** to start adding users.



The **Add User entries** page will be displayed. You can enter the user numbers in E164 format without the + (17814437383) or a number range (17814437[400-599]) in the **Number** field. Assign the appropriate **Agent** and **Dialing context** and click **OK**.

Continue adding users as shown above using the corresponding agents and dialing contexts.

The User entries page will list all the users configured. Click **Configuration** button on the top to go to the **Configuration** tab



User entries
Search Criteria: All

Add | Edit | Delete | Upload | Download

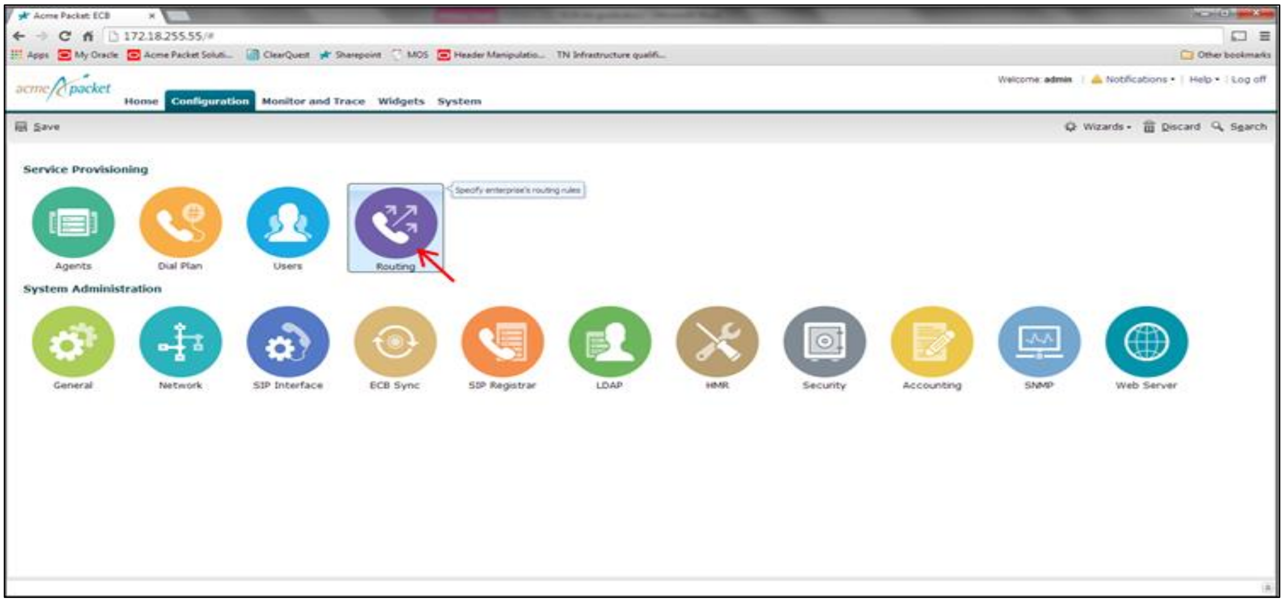
Number or pattern	Dialing context	Agent
17814437246	Oracle.Burlington-Avaya	aura.com
17814437247	Oracle.Burlington-Avaya	aura.com
17814437293	Oracle.Braintree-CUCM	172.16.101.39
17814437295	Oracle.Braintree-CUCM	172.16.101.39
17814437383	Oracle.Bedford-Lync	lyncmedsrv1.selab.com
17814437387	Oracle.Bedford-Lync	lync2013med1.acmepacket.net
17814437388	Oracle.Bedford-Lync	lyncmedsrv1.selab.com

Configure Routing

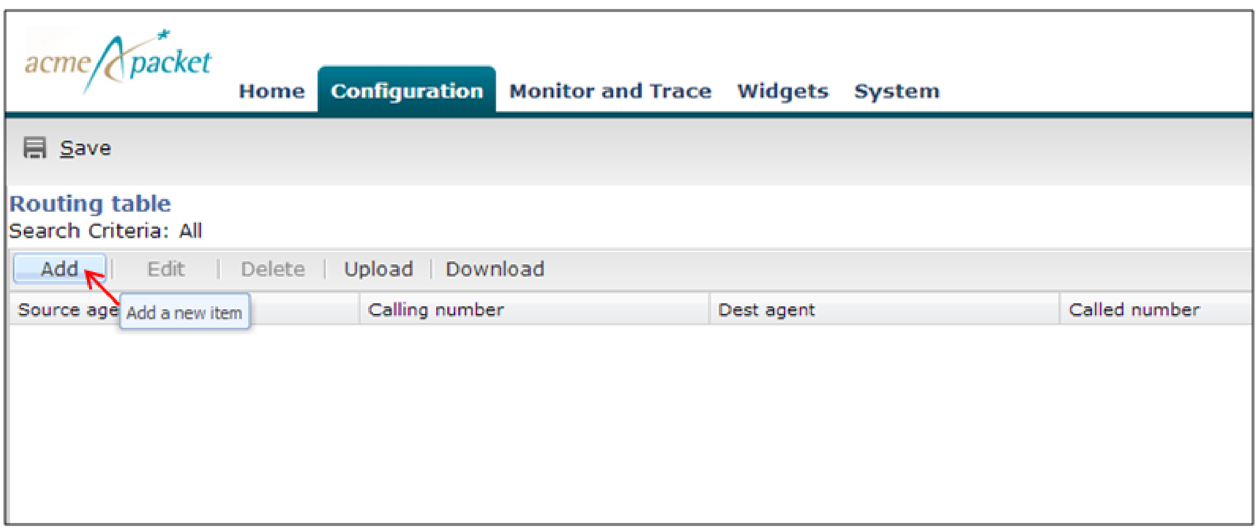
The ECB performs its session routing via the route configuration. Route configuration establishes hop-by-hop paths to signaling endpoints. ECB routing configuration allows the user to specify a route's cost to specify route preference. Cost may or may not be based on monetary considerations. But the reach of an enterprise's network often does allow the user to configure routes that keep session traffic within the enterprise infrastructure rather than incurring cost associated with a service provider.

The ECB allows for a range of route preference criteria to differentiate between routing paths. Criteria include source routing based on the agent or calling number. Target-oriented criteria are also available, allowing the enterprise to designate preferred paths for specific called numbers.

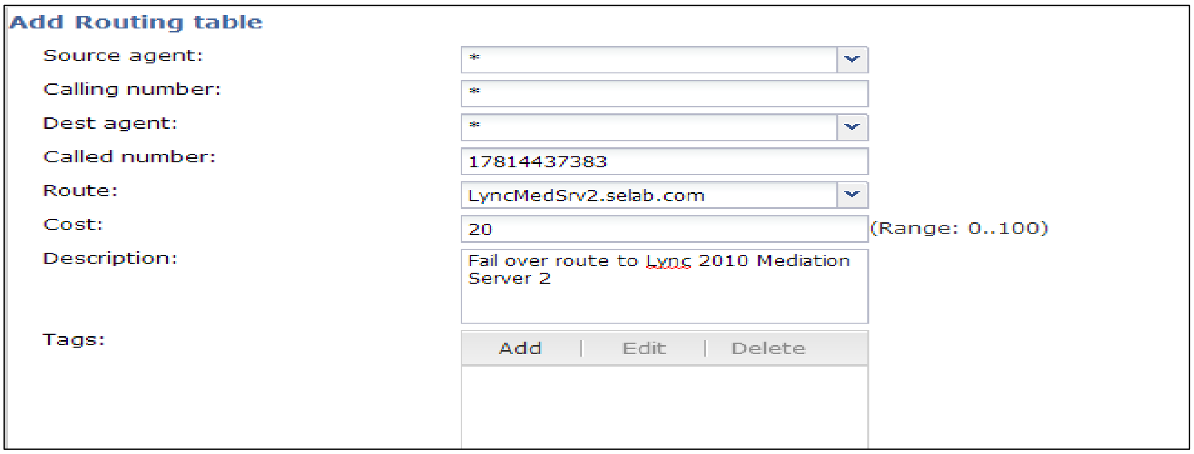
We need not configure a route for the users defined in the user database as the ECB will use their configured agents as next hop to route the calls. Since ECB does not support DNS load balancing as of now, the Lync users are assigned with one mediation server as their agent. To ensure the calls complete if the first mediation server in the pool goes down, we will configure a route to the second agent of the pool with a higher cost. On the **Configuration** tab click on the **Routing** icon under **Service Provisioning**.



On the **Routing table** page, click **Add** to add a route.

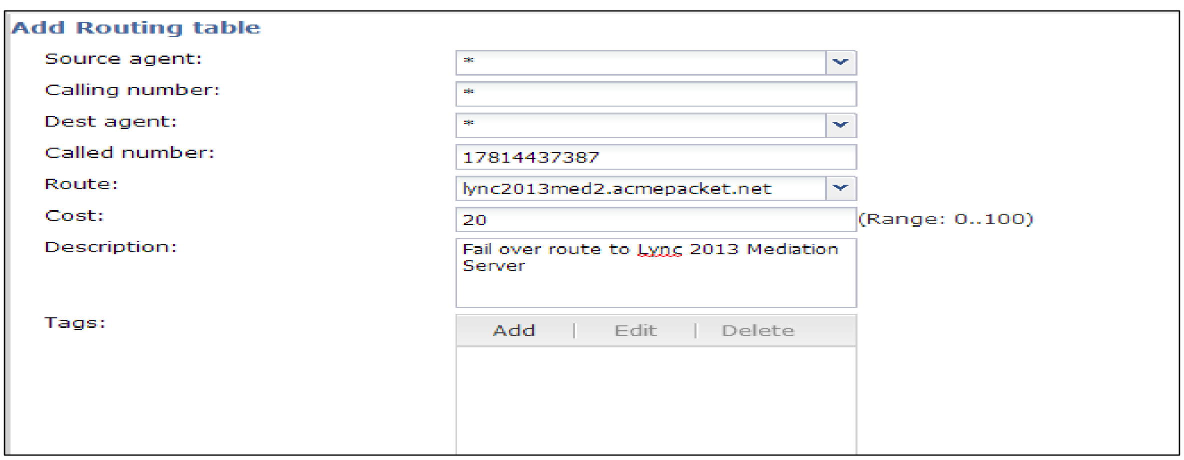


Add a routing entry for the Lync 2010 user – 17814437383 with the **Route** set to the second mediation server – LyncMedSrv2.selab.com with a cost of 20 and click **OK**.



When the ECB receives a call for 1781437383, it looks up the user DB and finds that this user is associated to LyncMedSrv1.selab.com and routes the call to it. If this agent is down, ECB will find the above entry and route the call to the second agent of the pool – LyncMedSrv2.selab.com.

Similarly add a routing entry for user 17814437387 pointing to lyncmed2.acmepacket.net as its failover route.



For calls being made from the Enterprise to the outside world, we will define routes with the SBC (which connects to the SIP trunk) as the next hop.

In the **Add Routing table** page, add a route as shown below, routing all calls from the source agent - Lync mediation server – LyncMed1Srv.selab.com to the trunk SBC with **cost** 10 and click **OK.**

Add Routing table

Source agent:	LyncMedSrv1.selab.com
Calling number:	*
Dest agent:	*
Called number:	*
Route:	192.168.1.130
Cost:	10 (Range: 0..100)
Description:	Route from Lync 2010 Med Server 1 to Trunk SBC
Tags:	Add | Edit | Delete

The cost for these route needs to be higher than 0 so that the ECB does not route the calls for the configured users (like Avaya/Lync users) to the Trunk SBC.

Add similar entries with remaining servers as source agents as shown below.

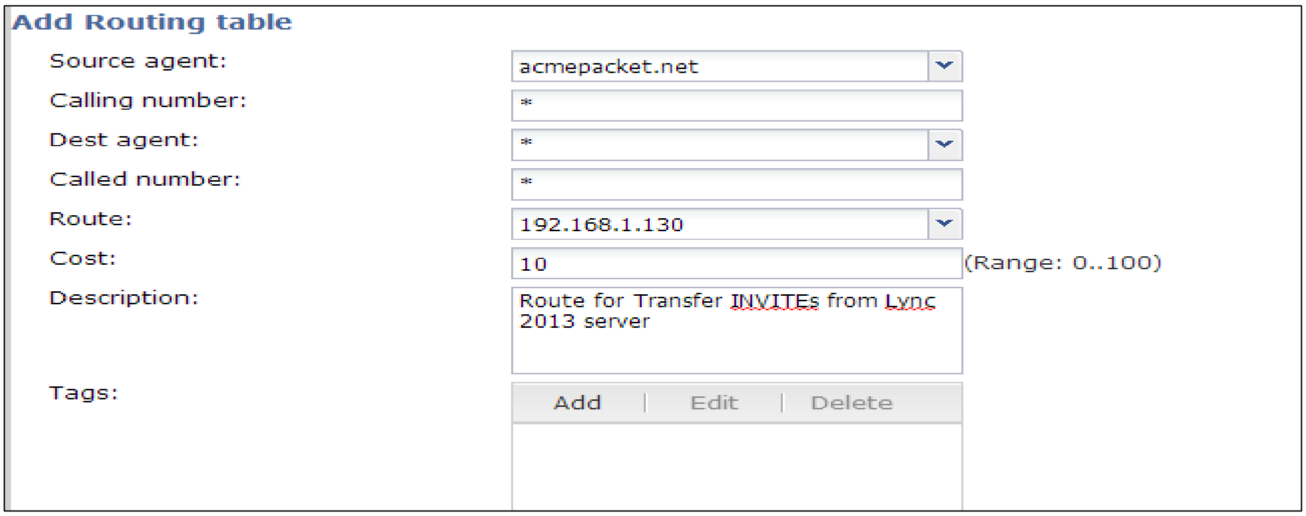
Routing table

Search Criteria: All

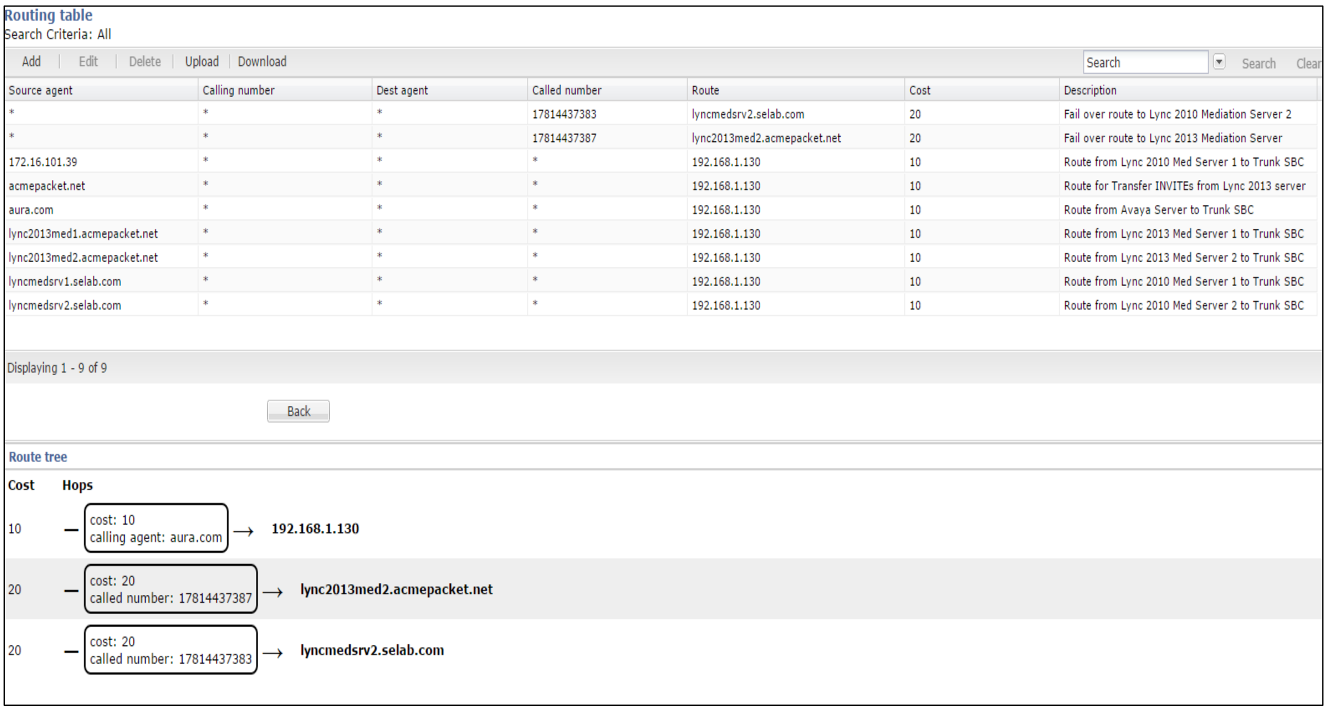
Add | Edit | Delete | Upload | Download — Search — Search — Clear

Source agent	Calling number	Dest agent	Called number	Route	Cost	Description
*	*	*	17814437383	lyncmedsrv2.selab.com	20	Fail over route to Lync 2010 Mediation Server 2
*	*	*	17814437387	lync2013med2.acmepacket.net	20	Fail over route to Lync 2013 Mediation Server
172.16.101.39	*	*	*	192.168.1.130	10	Route from Lync 2010 Med Server 1 to Trunk SBC
acmepacket.net	*	*	*	192.168.1.130	10	Route for Transfer INVITEs from Lync 2013 server
aura.com	*	*	*	192.168.1.130	10	Route from Avaya Server to Trunk SBC
lync2013med1.acmepacket.net	*	*	*	192.168.1.130	10	Route from Lync 2013 Med Server 1 to Trunk SBC
lync2013med2.acmepacket.net	*	*	*	192.168.1.130	10	Route from Lync 2013 Med Server 2 to Trunk SBC
lyncmedsrv1.selab.com	*	*	*	192.168.1.130	10	Route from Lync 2010 Med Server 1 to Trunk SBC
lyncmedsrv2.selab.com	*	*	*	192.168.1.130	10	Route from Lync 2010 Med Server 2 to Trunk SBC

To route the INVITEs in case of transfers from Lync 2013, add a route as shown below routing from source agent – acmepacket.net to the trunk SBC and click **OK**.



The **Routing Table** page will be displayed listing all the routes added. When you select a specific route, its **Route tree** is displayed at the bottom.

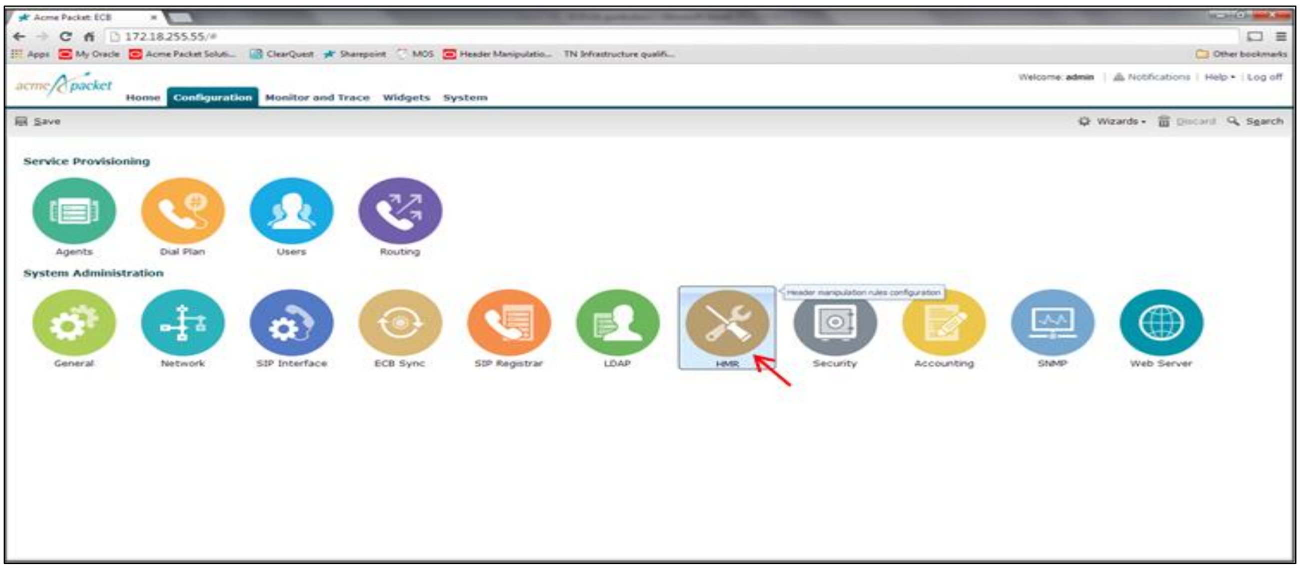


Click on **Configuration** button on the top to go to the **Configuration** tab.

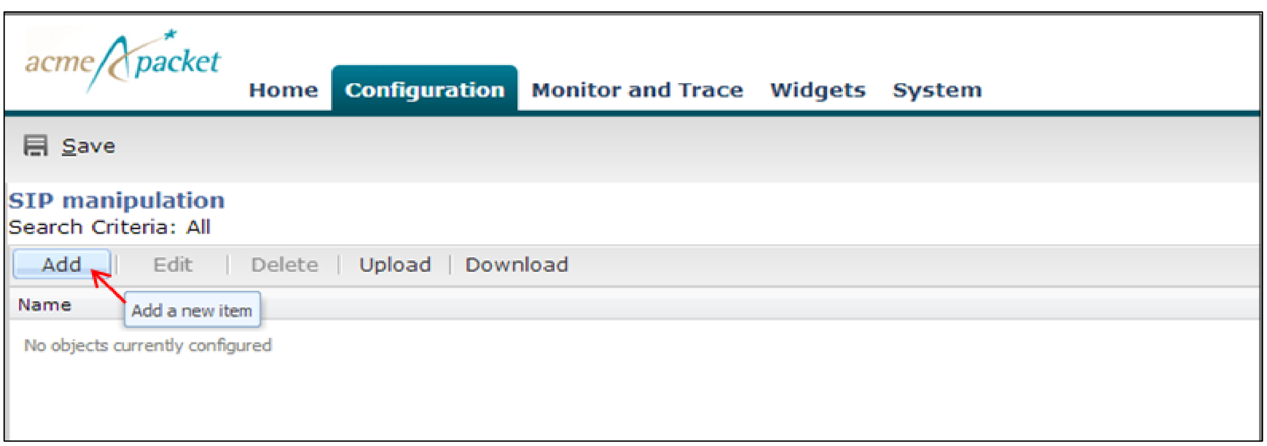
Configure Header manipulation rules

We will now configure header manipulation rules to hide network topology and ensure that the SIP messages sent to all agents cater to their specific signaling standards.

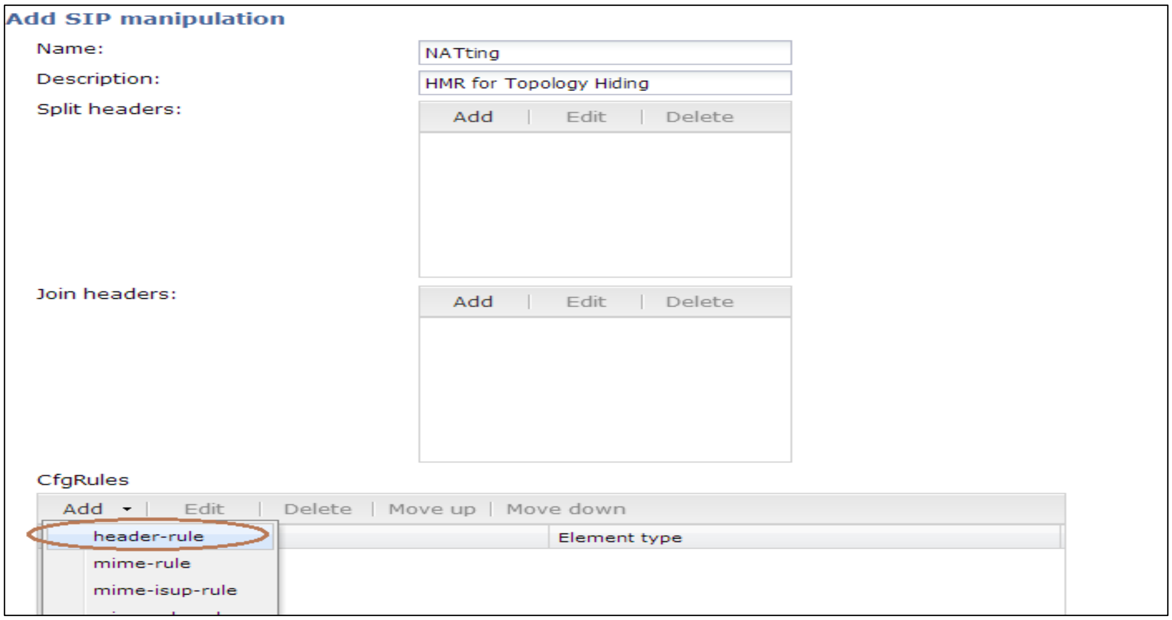
Click on the **HMR** icon under System **Administration** on the **Configuration** tab.



The **SIP manipulation** page is displayed. We need to configure a sip-manipulation to replace the ip-addresses in the From and To headers to hide the network topology. Click Add to add a sip manipulation for this purpose.



In the **Add SIP manipulation** page, enter a name and description for the manipulation. In our case, it is called NATting. To add a header-rule, select **header-rule** from the **Add** drop down menu under the **CfgRules** section.



In the **Add SIP manipulation / header rule** page, add a header-rule From as shown below to manipulate the From header. To configure an element-rule for this From Header-rule, select **element-rule** from the **Add** drop down menu under the **CfgRules** section.

Add an element-rule named From_header to replace the uri-host with ECB’s local ip-address (192.168.1.90) as shown below and click **OK**.

Add SIP manipulation / header rule / element rule

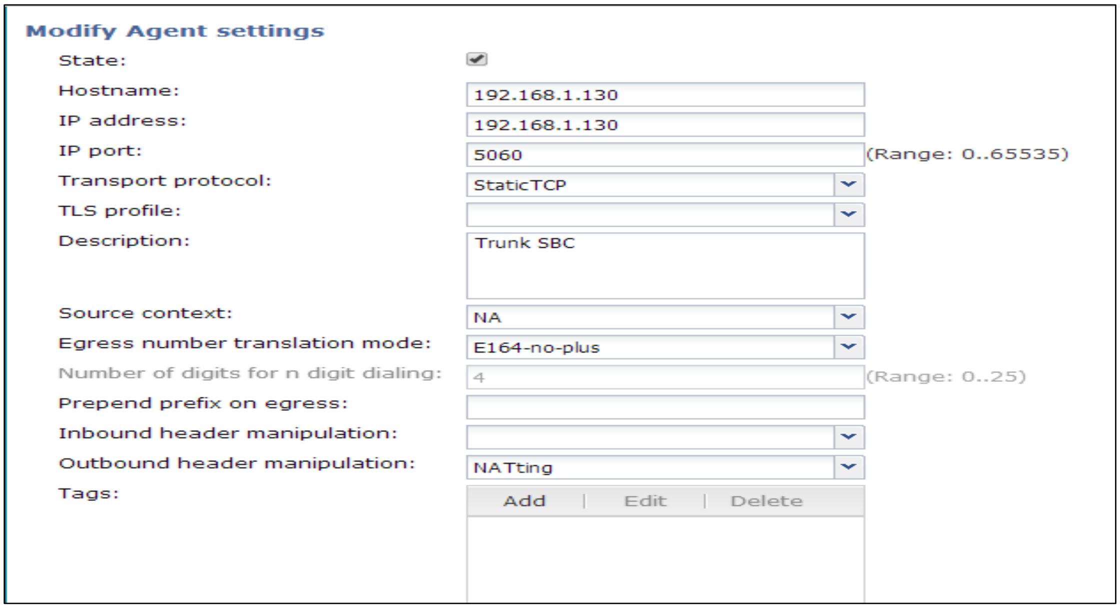
Name:	From_header
Parameter name:	
Type:	uri-host
Action:	replace
Match val type:	any
Comparison type:	case-sensitive
Match value:	
New value:	$LOCAL_IP

The From header-rule page is displayed. Click **OK** and the NATting sip-manipulation page is displayed. Following the steps explained above configure a header-rule to manipulate the To header as shown below.

```
        header-rule
                name                                    To
                header-name                             To
                action                                  manipulate
                comparison-type                         case-sensitive
                msg-type                                request
                methods
                match-value
                new-value
                element-rule
                        name                                    To
                        parameter-name
                        type                                    uri-host
                        action                                  replace
                        match-val-type                          any
                        comparison-type                         case-sensitive
                        match-value
                        new-value                               $REMOTE_IP
```

This completes the configuration of the sip-manipulation for topology hiding.

Apply this sip manipulation as an outbound manipulation to the Trunk SBC agent and click **OK**.



Next we will configure the manipulations required for the Avaya server. The Avaya setup in our lab uses a FQDN of aura.com. The uri-host portions of the Request-Uri, From and To headers in the SIP messages sent to the Avaya server need to be changed to aura.com. If the INVITE contains a PAI header, we will need to change the uri-host to aura.com. Configure the following manipulation to change the uri-host portion to aura.com. This will be applied as an outbound manipulation to the Avaya server.

```
sip-manipulation
        name                                    NATtingavaya
        description
        split-headers
        join-headers
        header-rule
                name                                    From
                header-name                             From
                action                                  manipulate
                comparison-type                         case-sensitive
                msg-type                                any
                methods
                match-value
                new-value
                element-rule
```

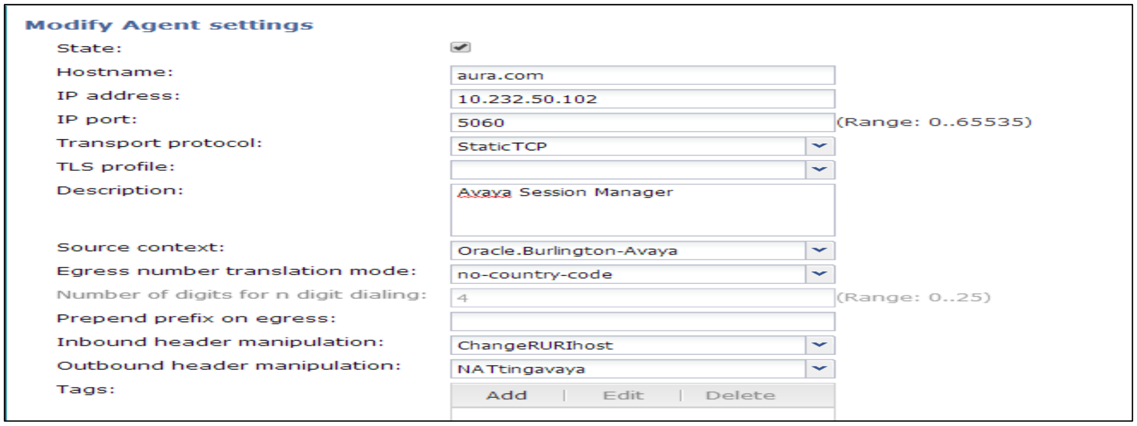
```
                name                                        From_header
                parameter-name
                type                                        uri-host
                action                                      replace
                match-val-type                              any
                comparison-type                             case-sensitive
                match-value
                new-value                                   aura.com
header-rule
        name                                        To
        header-name                                 To
        action                                      manipulate
        comparison-type                             case-sensitive
        msg-type                                    request
        methods
        match-value
        new-value
        element-rule
                name                                        To
                parameter-name
                type                                        uri-host
                action                                      replace
                match-val-type                              any
                comparison-type                             case-sensitive
                match-value
                new-value                                   aura.com
header-rule
        name                                        Ruri_hr
        header-name                                 Request-URI
        action                                      manipulate
        comparison-type                             case-sensitive
        msg-type                                    any
        methods
        match-value
        new-value
        element-rule
                name                                        Ruri_er
                parameter-name
                type                                        uri-host
                action                                      find-replace-all
                match-val-type                              any
                comparison-type                             case-sensitive
                match-value
                new-value                                   aura.com
header-rule
        name                                        Pai
        header-name                                 P-Asserted-Identity
```

```
                action                                   manipulate
                comparison-type                          case-sensitive
                msg-type                                 any
                methods
                match-value
                new-value
                element-rule
                        name                                     Pai_header
                        parameter-name
                        type                                     uri-host
                        action                                   replace
                        match-val-type                           any
                        comparison-type                          case-sensitive
                        match-value
                        new-value                                aura.com
```

The Request-Uri of the INVITEs sent from the Avaya session manager contains the uri-host as aura.com. This causes issues with the routing in ECB when the dialed numbers are not configured as users in userDB. To resolve this issue, we configure a manipulation to replace the aura.com in the RURI with the ip address of the ECB, in our case – 192.168.1.90 and apply in the inbound direction on the Avaya server agent. This HMR is configured as an out-of-dialog manipulation so that it does not affect the INVITEs for hold and transfers.

```
    sip-manipulation
        name                                     ChangeRURIhost
        description
        split-headers
        join-headers
        header-rule
                name                                     fixRURI
                header-name                              Request-URI
                action                                   manipulate
                comparison-type                          case-sensitive
                msg-type                                 out-of-dialog
                methods                                  INVITE
                match-value
                new-value
                element-rule
                        name                                     updateRURI
                        parameter-name
                        type                                     uri-host
                        action                                   replace
                        match-val-type                           any
                        comparison-type                          pattern-rule
                        match-value                              (.*)$
                        new-value                                192.168.1.90
```

Apply NATtingavaya as an outbound manipulation and ChangeRURIhost as an inbound manipulation to the Avaya server agent and click OK.



We will now configure manipulations to modify the SIP messages being sent to and received from the Lync server. Lync typically sends mediation server FQDN in the Contact header with no username in the SIP URI which is not acceptable by SIP trunk providers. We configure a manipulation to update the Contact header to include the username appropriately and apply it as an in manipulation on the Lync server.

The manipulation consists of two header rules – StoreFromnumber and ChangeContact. The StoreFromnumber header rule stores the uri-user-only element in the From header which is then added as the uri-user in the Contact header in the ChangeContact header rule.

```
sip-manipulation
        name                                    ChangeContact
        description
        split-headers
        join-headers
        header-rule
                name                                    StoreFromnumber
                header-name                             From
                action                                  manipulate
                comparison-type                         case-sensitive
                msg-type                                any
                methods
                match-value
                new-value
                element-rule
                        name                                    StoreFromnumber_er
```

```
                         parameter-name
                         type                                    uri-user-only
                         action                                  store
                         match-val-type                          any
                         comparison-type                         case-sensitive
                         match-value
                         new-value
         header-rule
                 name                                    ChangeContact
                 header-name                             Contact
                 action                                  manipulate
                 comparison-type                         case-sensitive
                 msg-type                                any
                 methods
                 match-value
                 new-value
                 element-rule
                         name                                    ChangeContact_er
                         parameter-name
                         type                                    uri-user
                         action                                  add
                         match-val-type                          any
                         comparison-type                         case-sensitive
                         match-value
                         new-value
$StoreFromnumber.$StoreFromnumber_er.$0
```

Avaya server sends certain b-lines in the SDP which are not supported by Lync server. We configure the following manipulation to delete these lines from SDP before the messages are being sent out to Lync.

```
sip-manipulation
         name                                    Delblines
         description                             Deleting b-lines from Avaya
         split-headers
         join-headers
         header-rule
                 name                                    manipContentType
                 header-name                             Content-Type
                 action                                  manipulate
                 comparison-type                         pattern-rule
                 msg-type                                any
                 methods
                 match-value
                 new-value
                 element-rule
                         name                                    deleteB
                         parameter-name                          application/sdp
```

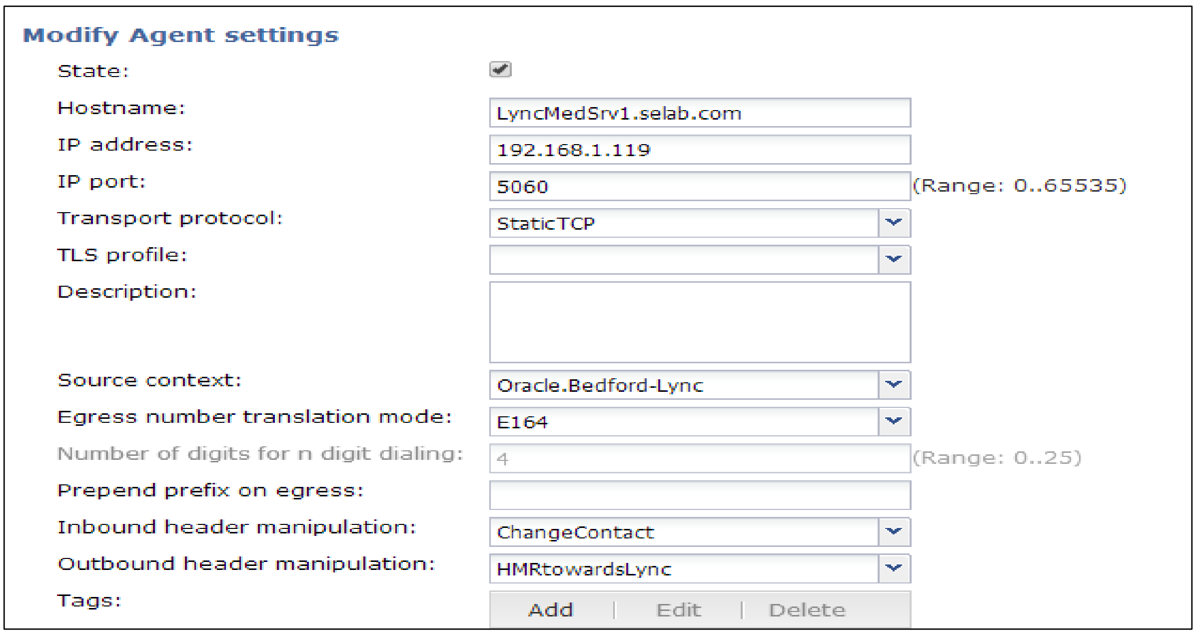
```
                type                                        mime
                action                                      find-replace-all
                match-val-type                              any
                comparison-type                             pattern-rule
                match-value                                 b=CT:.*(\n|\r\n)
                new-value
        element-rule
                name                                        deleteLABEL
                parameter-name                              application/sdp
                type                                        mime
                action                                      find-replace-all
                match-val-type                              any
                comparison-type                             pattern-rule
                match-value                                 b=AS:.*(\n|\r\n)
                new-value
        element-rule
                name                                        deleteLABEL1
                parameter-name                              application/sdp
                type                                        mime
                action                                      find-replace-all
                match-val-type                              any
                comparison-type                             pattern-rule
                match-value                                 b=TIAS:.*(\n|\r\n)
                new-value
```

A nested manipulation named HMRtowardsLync is configured to include the manipulations –NATting and Delblines and applied in the outbound direction to the Lync server.

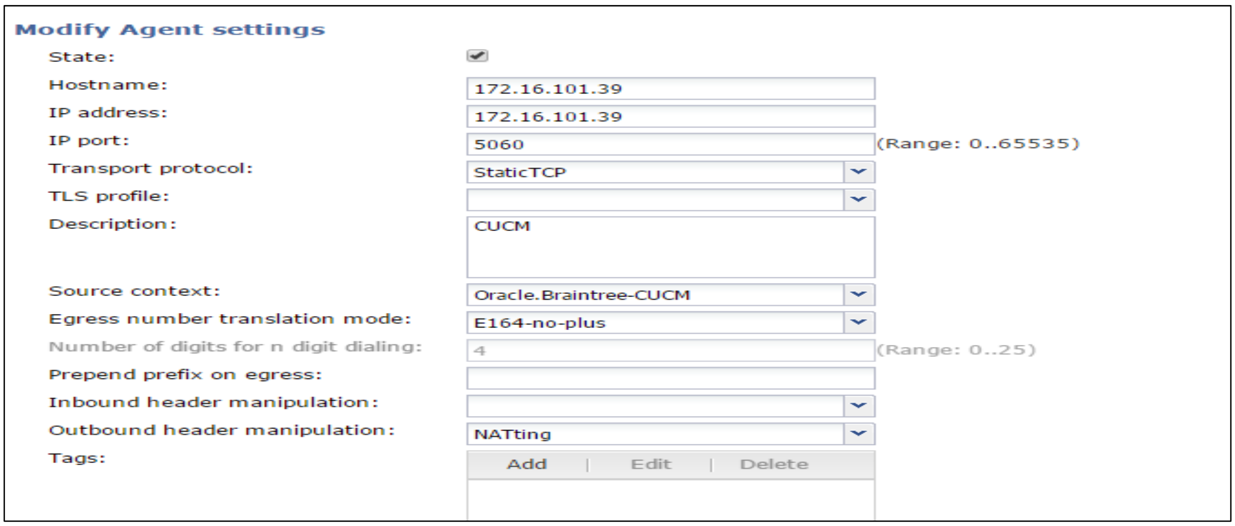
```
sip-manipulation
        name                                    HMRtowardsLync
        description                             HMR NAT+deleting the blines
        split-headers
        join-headers
        header-rule
                name                                    doNAT
                header-name                             From
                action                                  sip-manip
                comparison-type                         case-sensitive
                msg-type                                any
                methods
                match-value
                new-value                               NATting
        header-rule
                name                                    deleteblines
                header-name                             From
                action                                  sip-manip
                comparison-type                         case-sensitive
```

```
msg-type                                        any
methods
match-value
new-value                                       Delblines
```

Apply ChangeContact as in inbound manipulation and HMRtowardsLync as an outbound manipulation to all the Lync servers configured as agents.



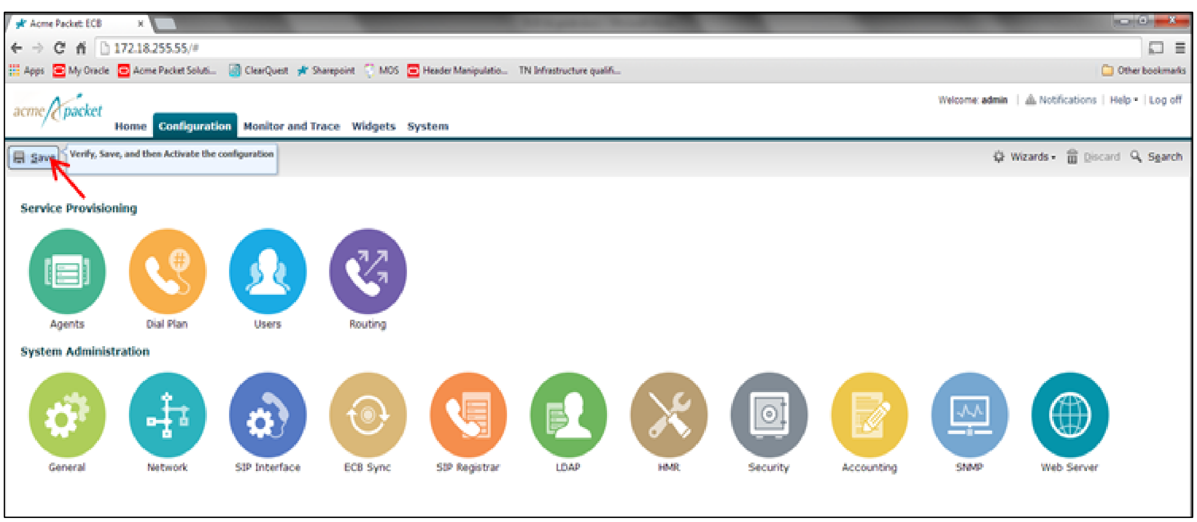
Next apply NATting as an outbound manipulation to the CUCM server.



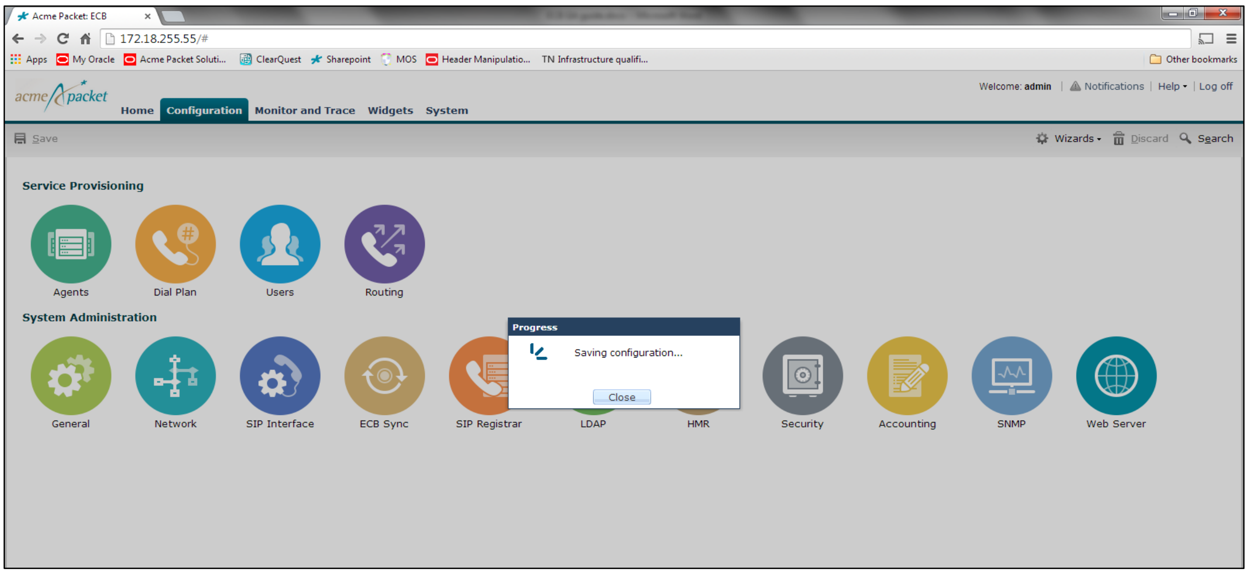
Click **Configuration** on the top to go back to the **Configuration** tab.

Save and activate the configuration

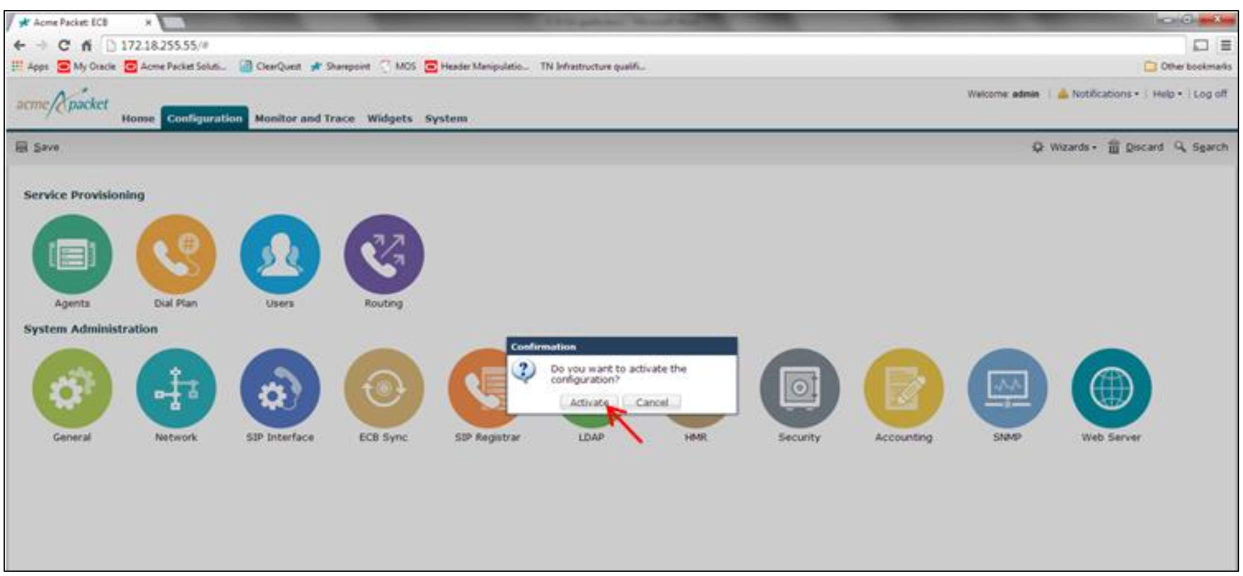
We will now save and activate our ECB configuration. Click **Save** on the top left hand side of the **Configuration** tab.



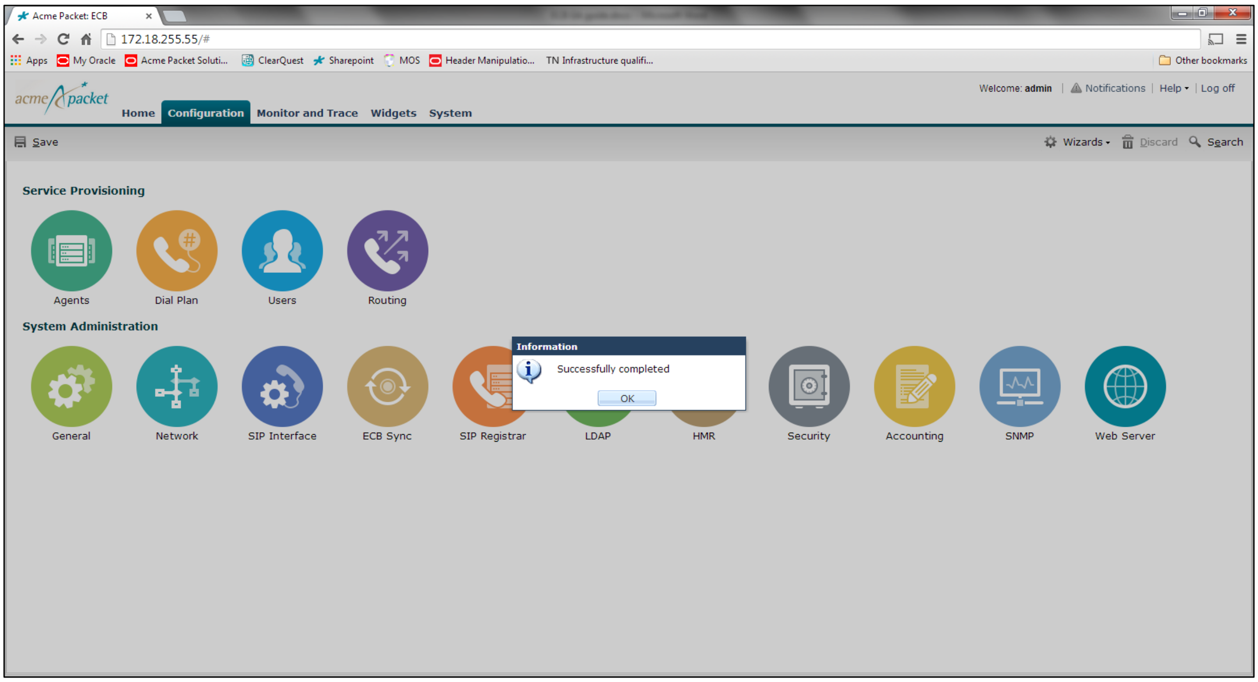
A progress dialog box will appear showing that the configuration in being saved.



You will be asked to confirm if you would like to activate the configuration. Click **Activate**.



After the activation is completed, you will see the screen below



Click OK and the ECB configuration is now complete.

Phase 2 – Configuring the Lync 2013 server

The enterprise will have a fully functioning Lync Server infrastructure with Enterprise Voice deployed and a Mediation Server dedicated to this installation. If there is no Mediation Server present for this purpose, one will have to be deployed.

There are two parts for configuring Lync Server to operate with the Oracle ECB:

- Adding the ECB as a PSTN gateway to the Lync Server infrastructure
- Creating a route within the Lync Server infrastructure to utilize the SIP trunk connected through the ECB.

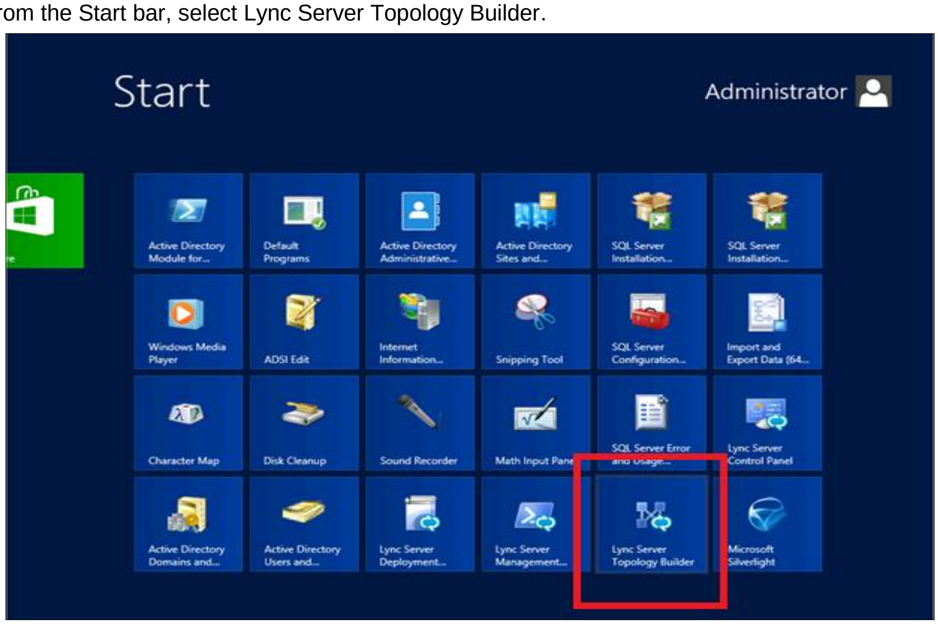
To add the PSTN gateway, we will need:

- IP addresses of the external facing NICs of the Mediation Servers
- IP address of the sip interface of the ECB
- Rights to administer Lync Server Topology Builder
- Access to the Lync Server Topology Builder

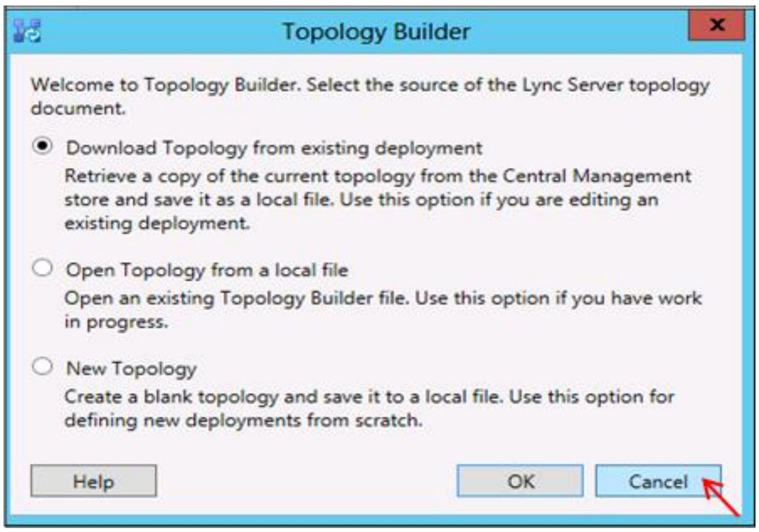
Adding the ECB as a PSTN gateway

The following process details the steps to add the ECB as the PSTN gateway

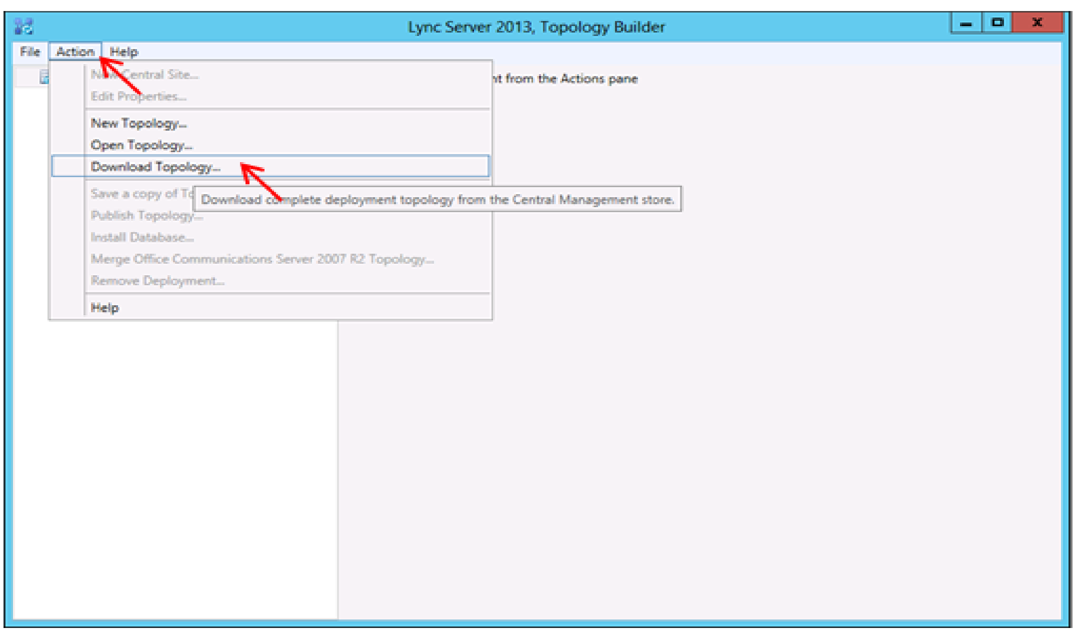
1. On the server where the Topology Builder is located start the console.
2. From the Start bar, select Lync Server Topology Builder.



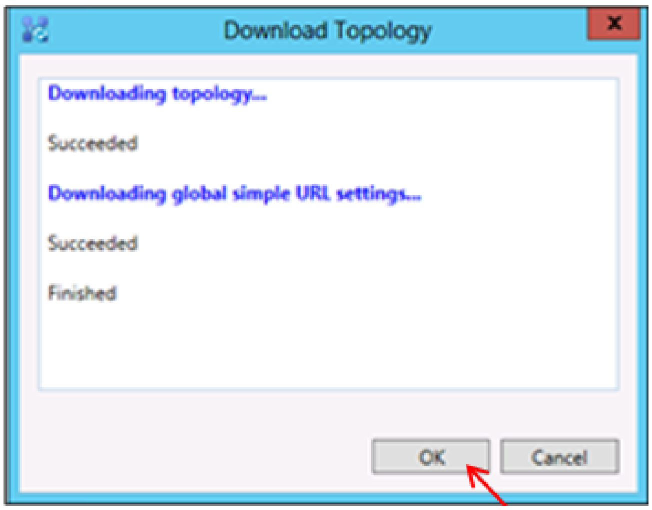
3. The opening screen of the Topology builder will be displayed. Click on the **Cancel** button.



4. The Topology Builder window will now be displayed. Click on **Action** and select **Download Topology**.

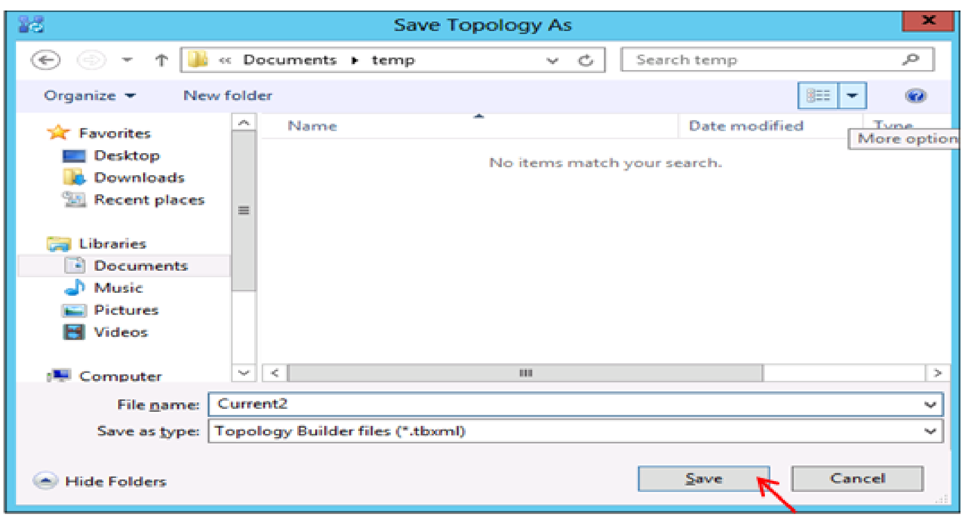


5. You will then see a screen showing that you have successfully imported the topology. Click the **Ok** button.

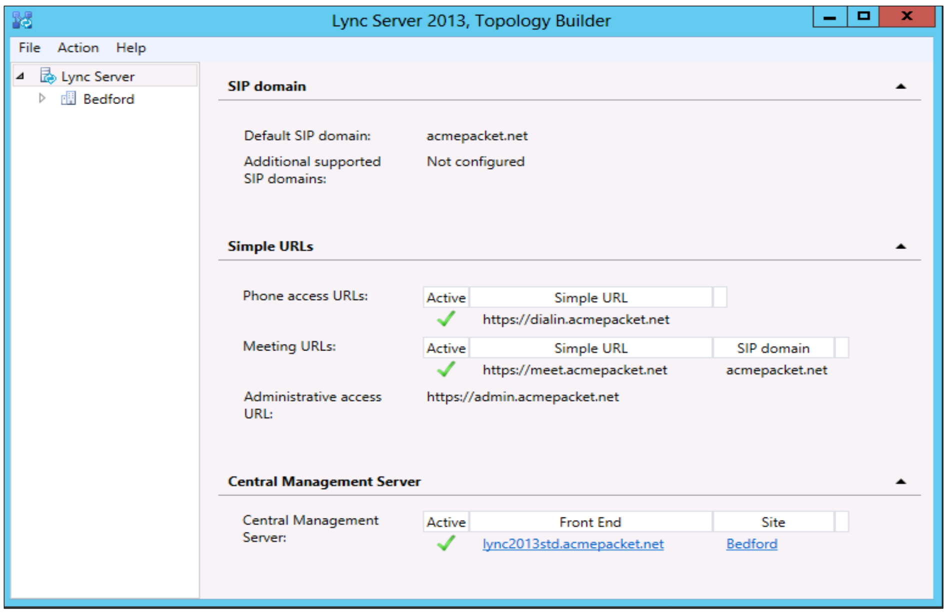


6. Next you will be prompted to save the topology which you have imported. You should revision the name or number of the topology according to the standards used within the enterprise. Click the **Save** button

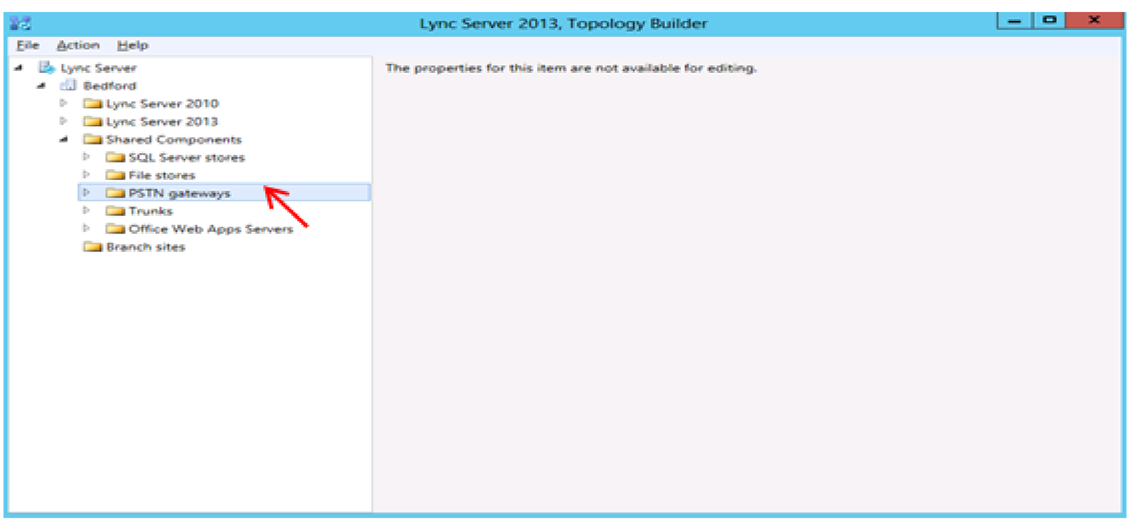
   Note: This keeps track of topology changes and, if desired, will allow you to fall back from any changes you make during this installation



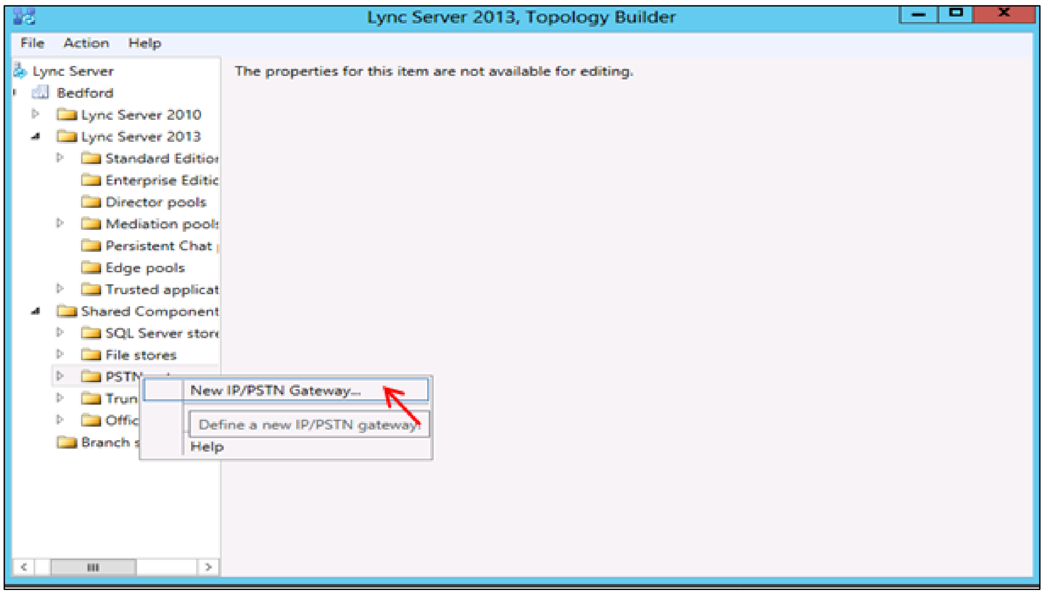
7. You will now see the topology builder screen with the enterprise’s topology imported.



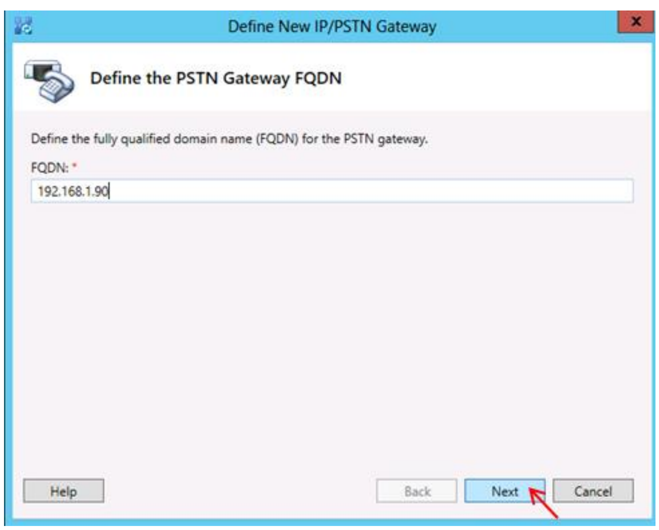
8. In the upper left hand corner, expand the site in which the PSTN gateway will be added. In our case, the site is **Bedford**. Then click on the **PSTN Gateways**



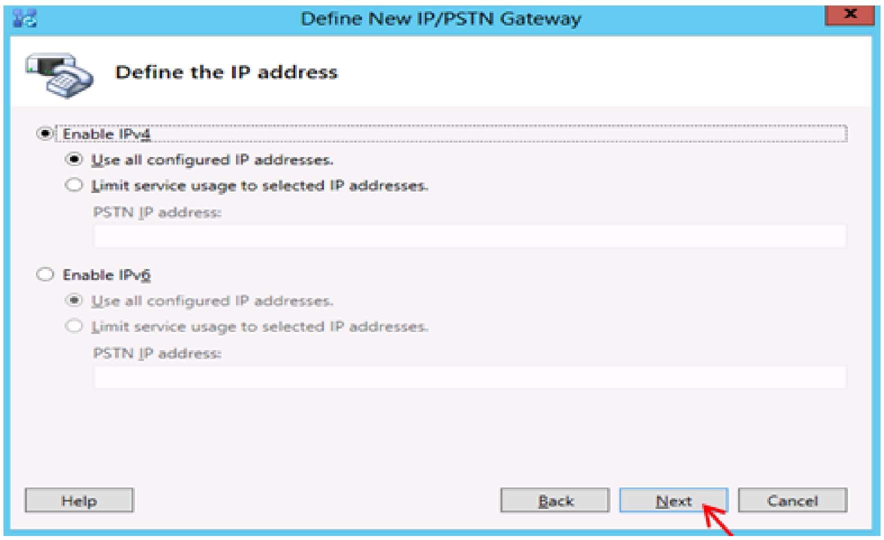
9. Right click on **PSTN gateways** and select **New IP/PSTN Gateway**.



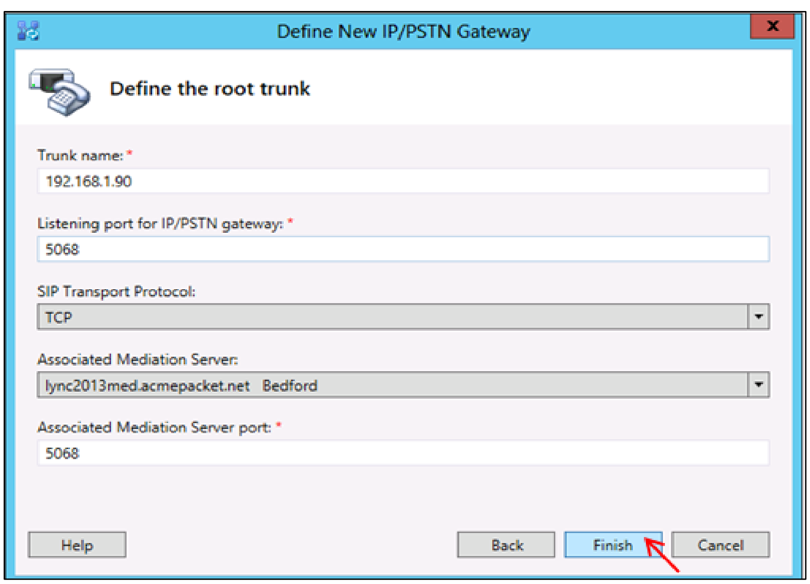
10. In the **Define New IP/PSTN Gateway** window, enter the ip address of the SIP interface of the ECB in the **FQDN** text box and click **Next**.



11. Select **Enable IPv4** in the **Define the IP address** section and click **Next**.



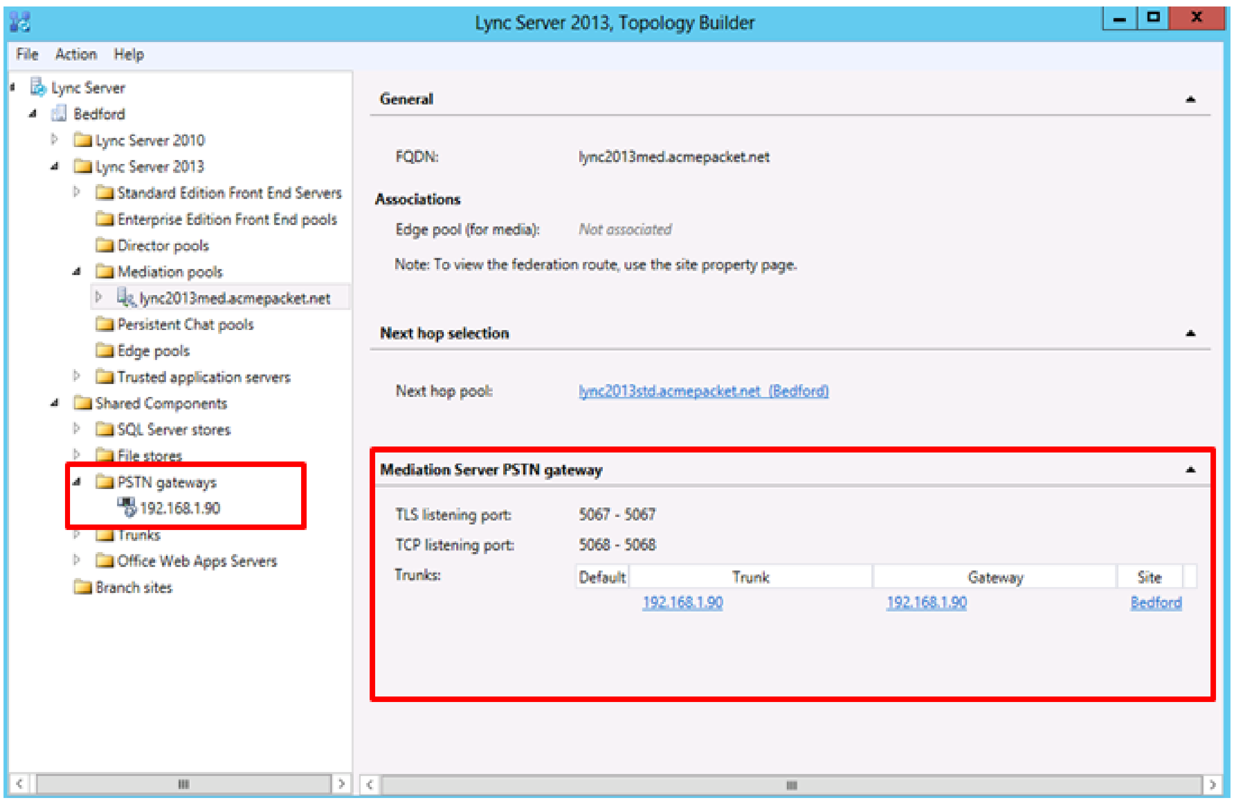
12. In the next section, enter the ip address of the ECB's sip interface under **Trunk name**. Configure the **Listening port for IP/PSTN gateway** as 5068, TCP as the **SIP Transport Protocol** and click **Finish**.



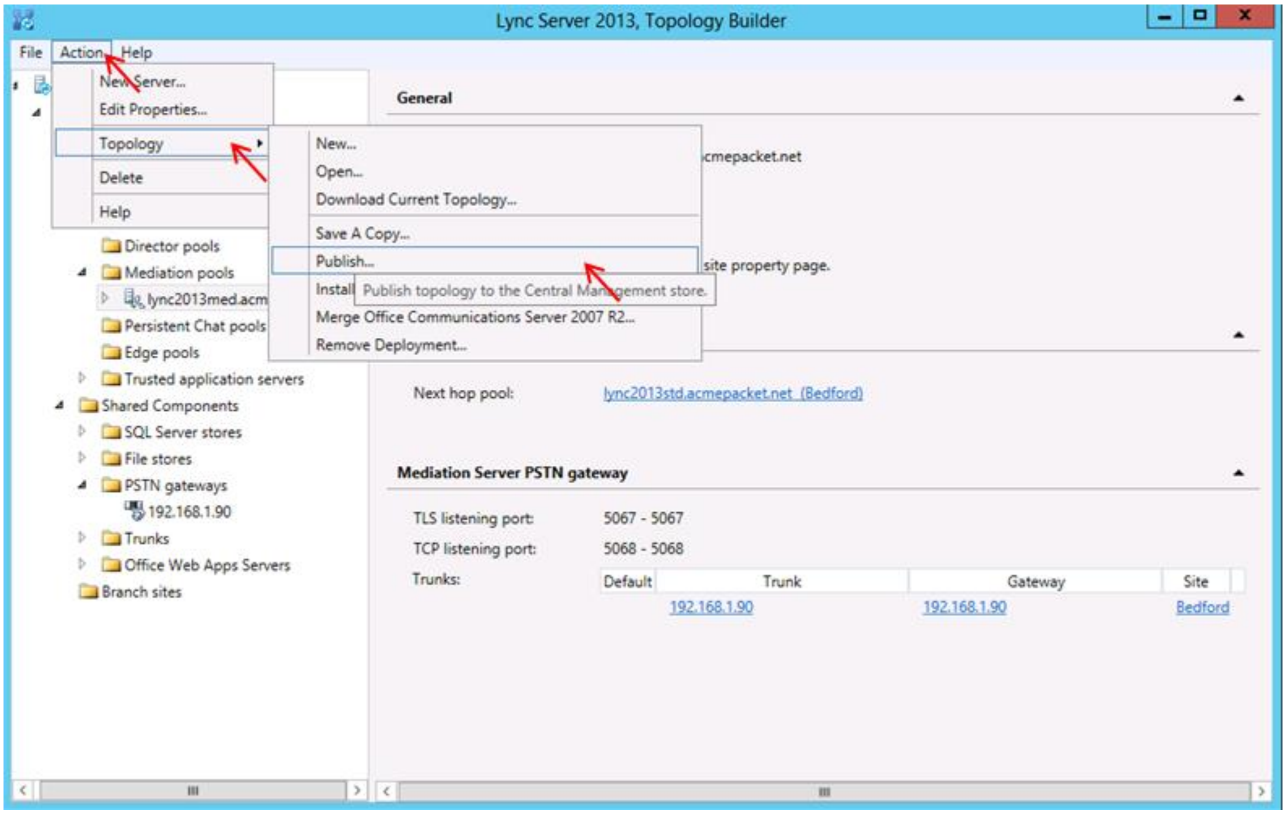
13. The PSTN gateway for the Lync server has been added. It will be listed under **PSTN gateways**.

Expand the **Mediation Pool** list and click on the Mediation Server to be utilized. In our example the Mediation Server is **lync2013med.acmepacket.net**.

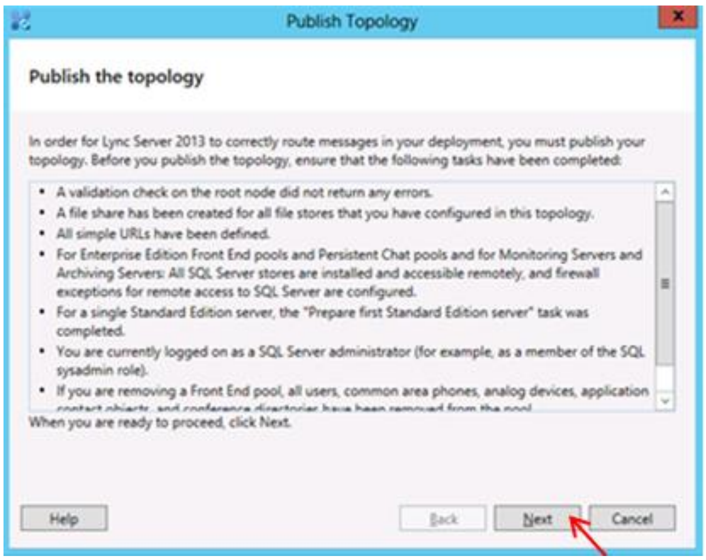
You will see that the PSTN gateway is associated with the Mediation server.



14. In the upper right hand corner of your screen under **Actions** select **Topology** then select **Publish**.

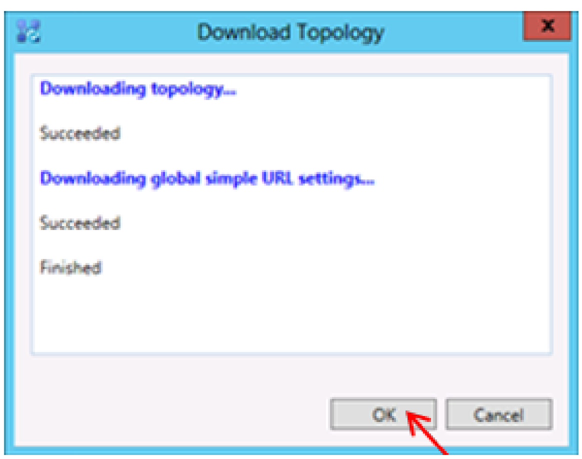


15. You will now see the **Publish Topology** window. Click on the **Next** button



You will now be at a window showing the databases associated with site. Click **Next**.

16. When complete you should see a window from Topology Builder stating that your topology was successfully published. Click the **OK** button.



17. You will be at the Topology Builder main window, expand your site and double check that your PSTN entries are correct and that the appropriate Mediation Server has the PSTN gateway associated.

Creating a route within the Lync Server infrastructure

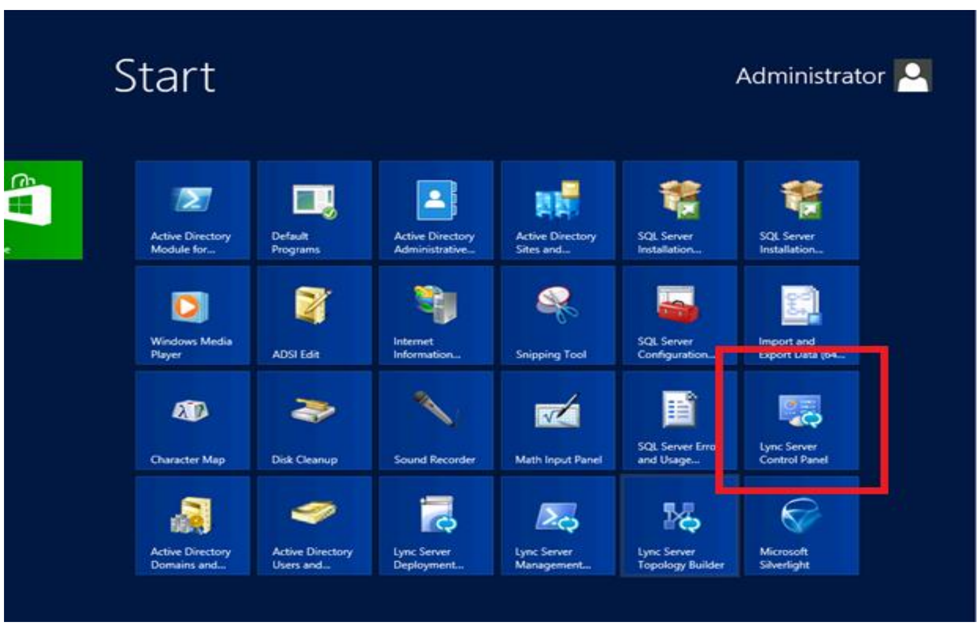
In order for the Lync Server Enterprise Voice clients to utilize the SIP trunking infrastructure that has been put in place, a route will need to be created to allow direction to this egress. Routes specify how Lync Server handles calls placed by enterprise voice users. When a user places a call, the server, if necessary, normalizes the phone number to the E.164 format and then attempts to match that phone number to a SIP Uniform Resource Identifier (URI). If the server is unable to make a match, it applies outgoing call routing logic based on the number. That logic is defined in the form of a separate voice route for each set of target phone numbers listed in the location profile for a locale. For this document we are only describing how to set up a route. Other aspects which apply to Lync Server Enterprise Voice deployments such as dial plans, voice policies, and PSTN usages are not covered.

To add the route we will need:

- Rights to administer Lync Server Control Panel
    - Membership in the CS Administrator Active Directory Group
- Access to the Lync Server Control Panel

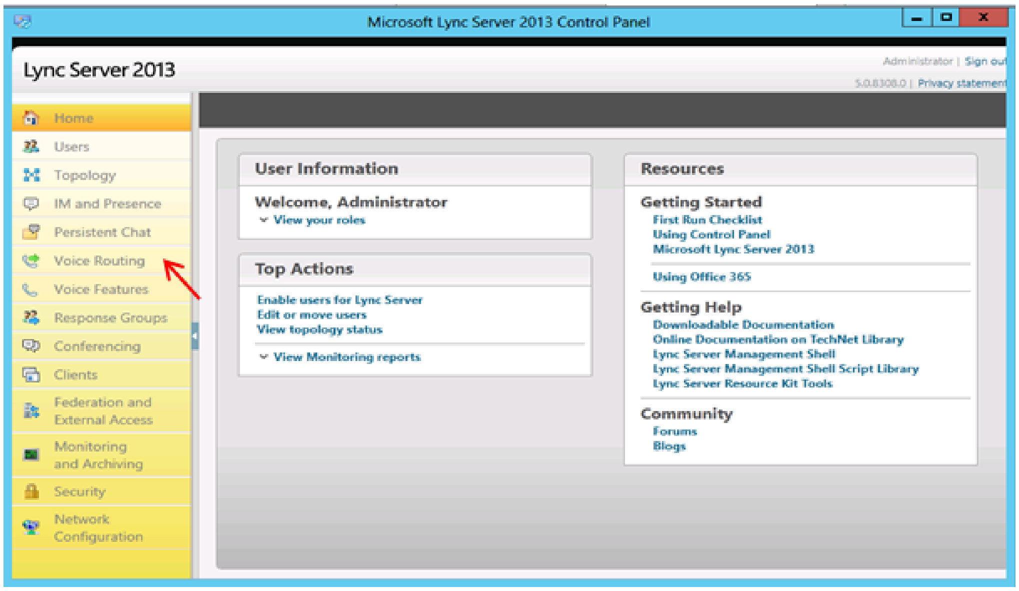
The following process details the steps to create the route:

1. From the Start bar, select Lync Server Control Panel.

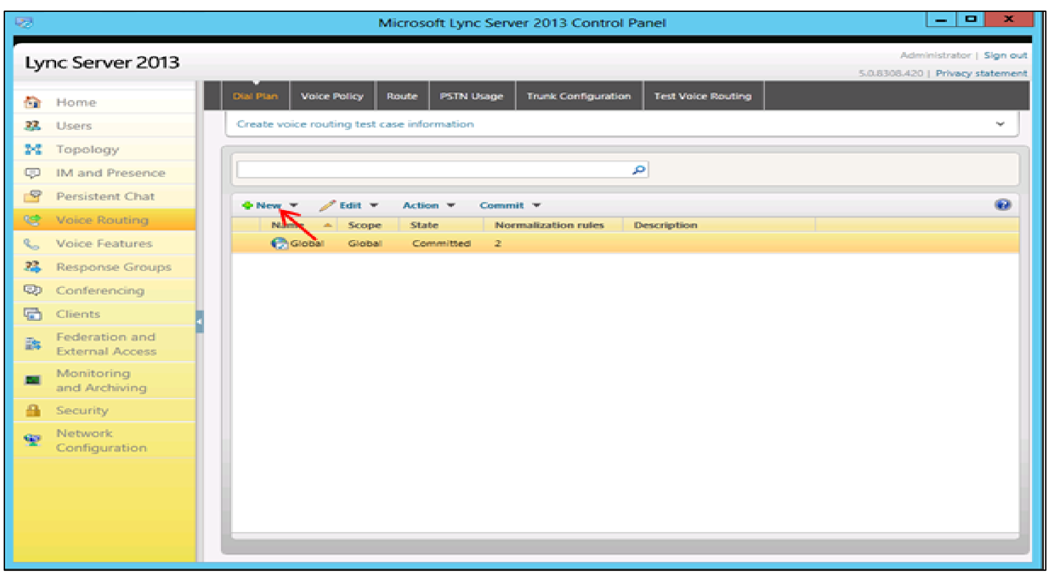


You will be prompted for credential, enter your domain username and password.

2. Once logged in, you will now be at the "Welcome Screen". On the left hand side of the window, click on **Voice Routing**.



3. The Dial Plan tab in the Voice Routing section will be displayed. On the content area toolbar, click +New.



4. Next you build a Dial Plan and a translation rule for the phone numbers you want this route to handle. You have to create two separate dial plans for US and EMEA.

US Dial-plan

Match this pattern: ^(\d*)$

Translation rule: $1

International call Dial-plan

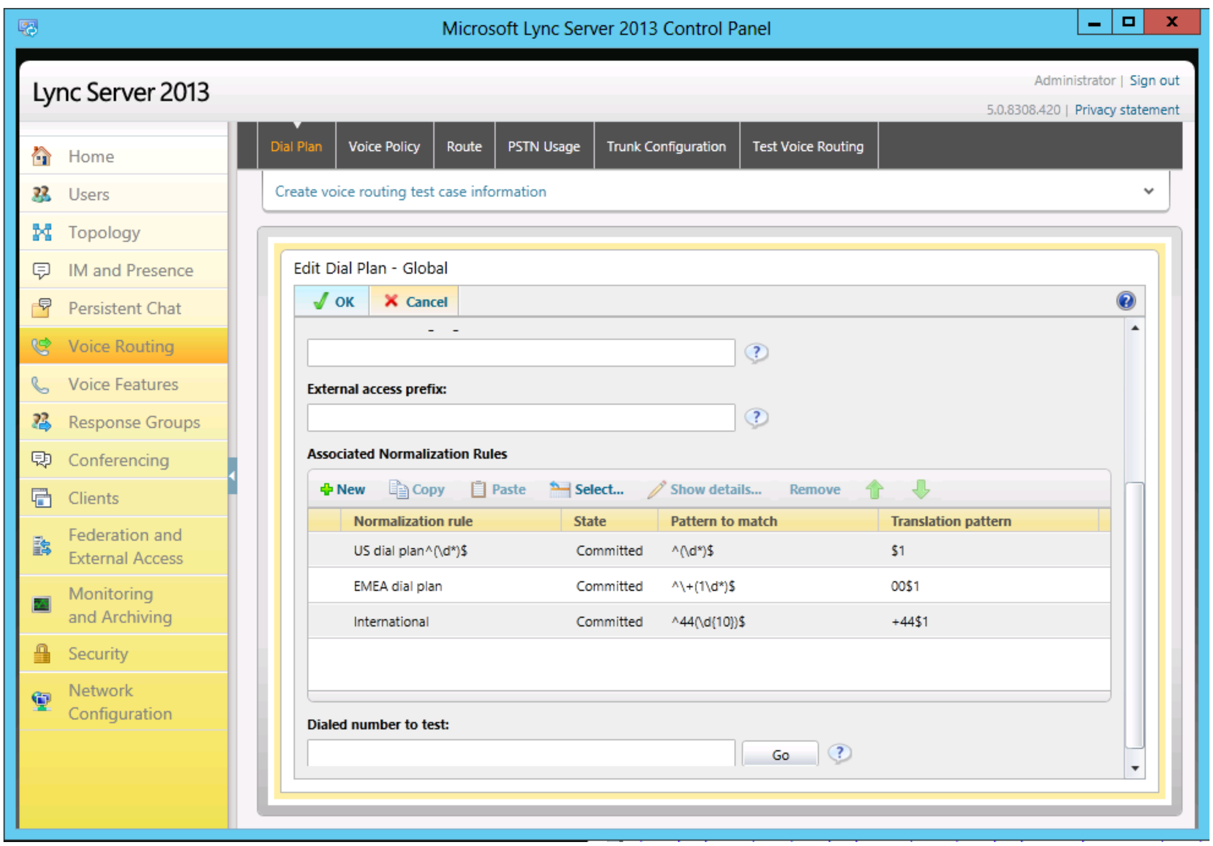
Match this pattern: ^44(\d{10})$

Translation rule: +44$1

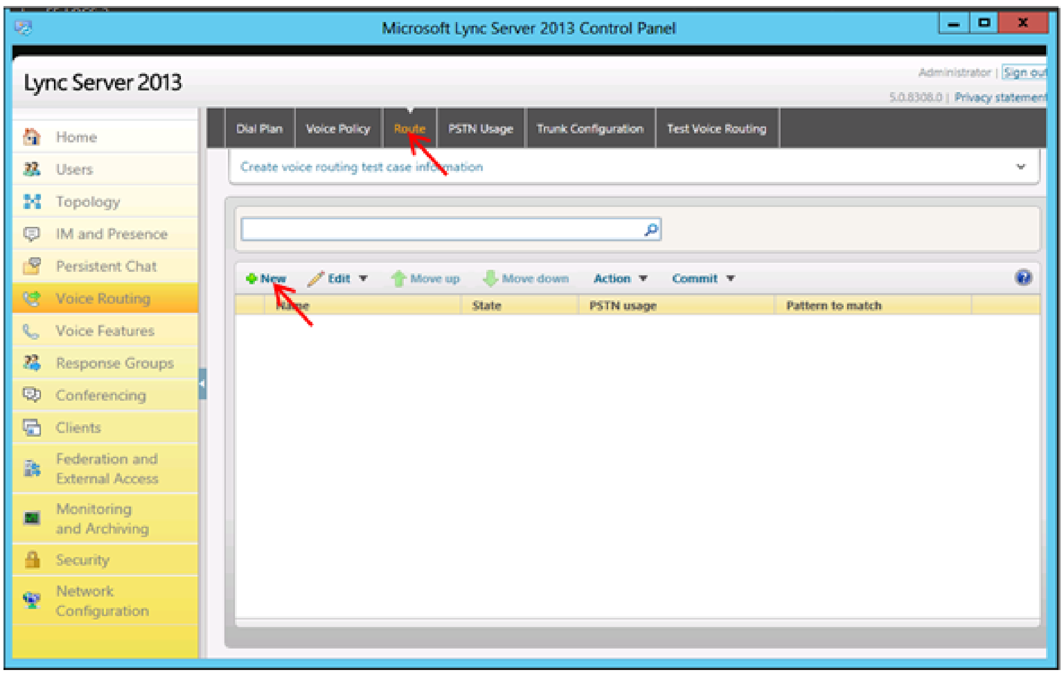
EMEA dial plan

Match this pattern: ^\+(1\d*)$

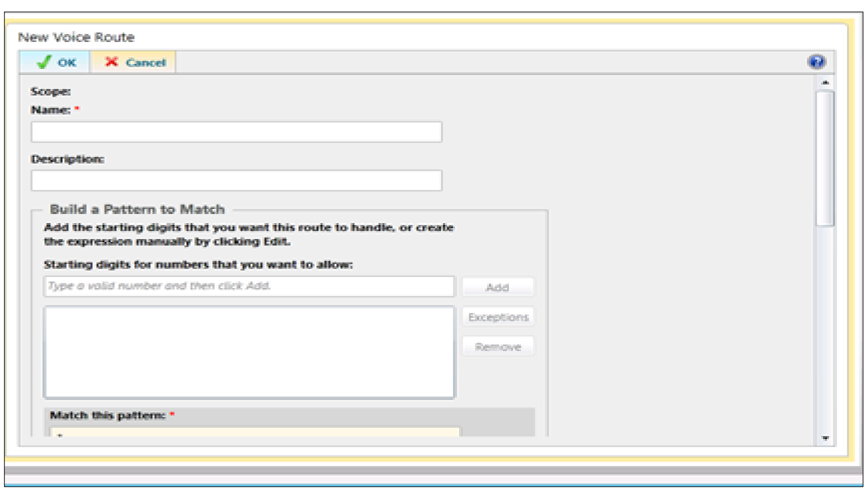
Translation rule: 00$1



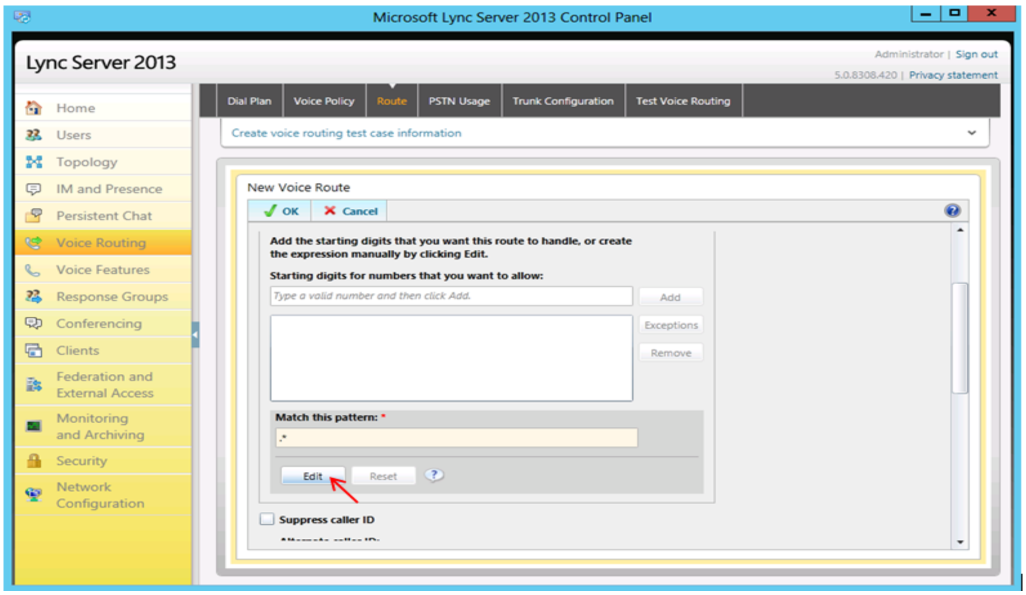
5. On the top row of the tabs, select **Route**. On the content area toolbar, click **+New**.



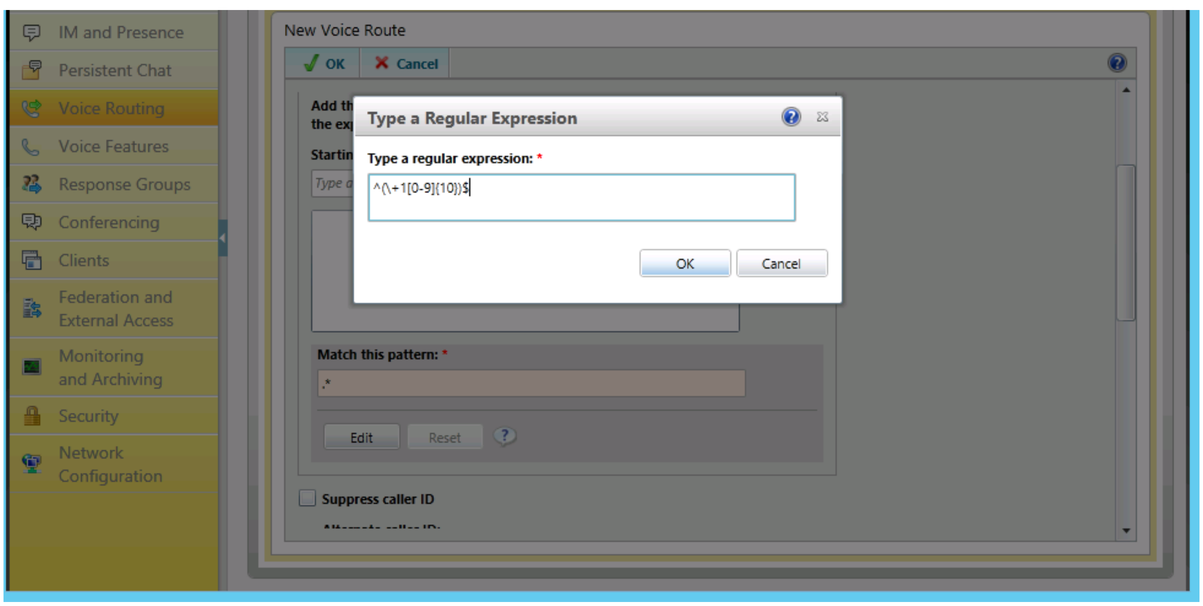
6. On the **New Voice Route** page, in the **Name** field, enter the name you have selected for the Route. In our example, it is US route.



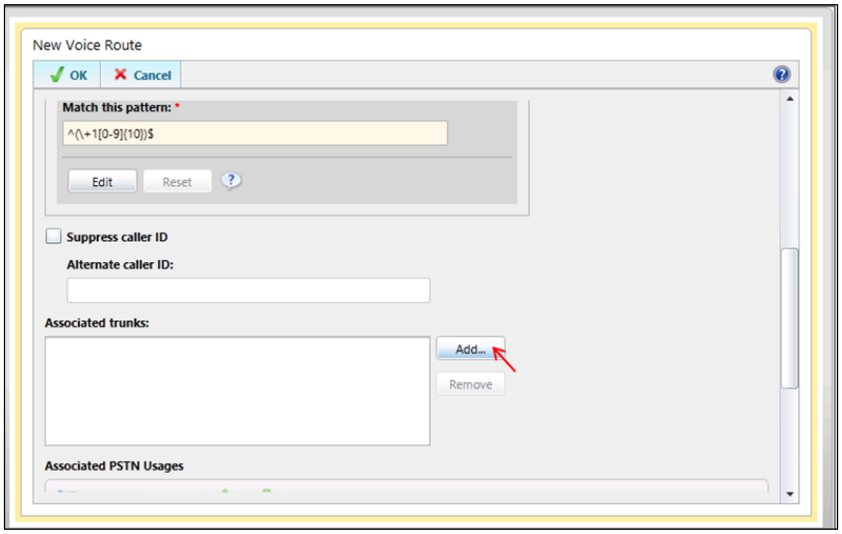
7. Next you build a Pattern Match for the phone numbers you want this route to handle. Click **Edit**.



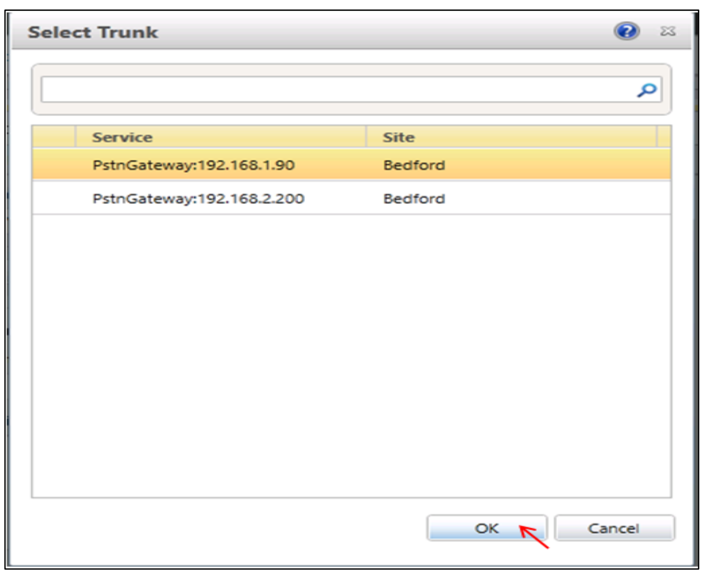
8. Enter the pattern for US - ^(\+1[0-9]{10})$ and click **OK**. To enable 4 digit dial, add the pattern ^(\d{4})$.



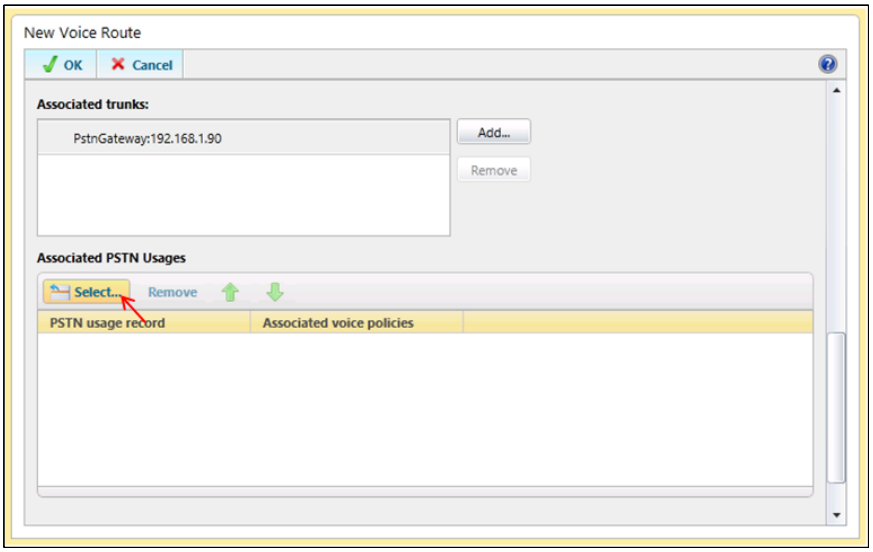
9. Next you want to associate the Voice Route with the **Trunk** you have just created. Scroll down to **Associated Trunks**, click on the **Add** button.



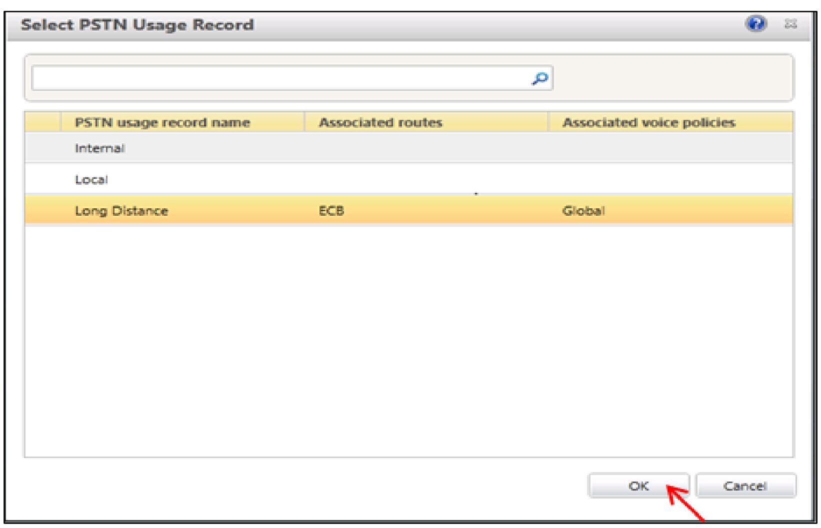
10. You will now be at a window showing available Trunks to associate your Voice Route. Click on the PSTN gateway that you just created and then click the **OK** button.



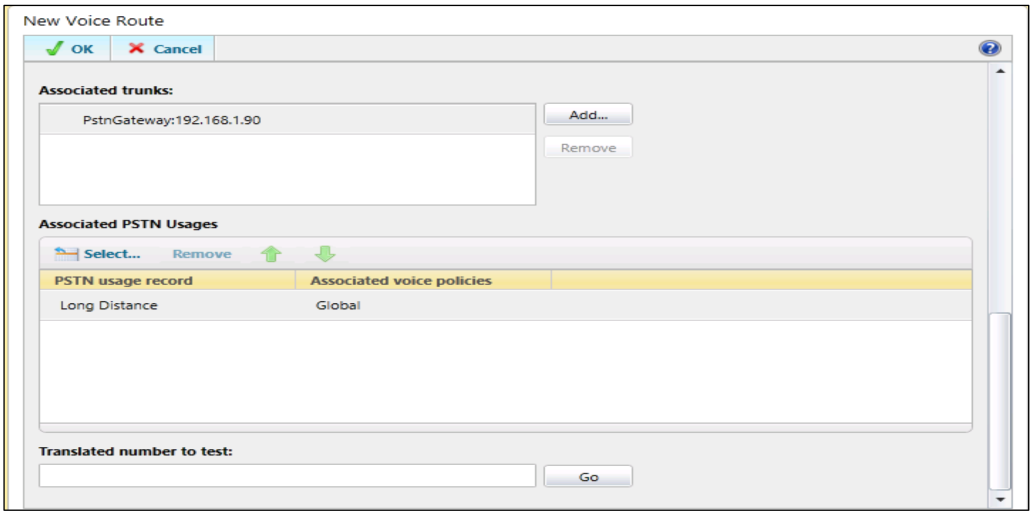
11. You can now see that you have associated your trunk with the route you created. An appropriate PSTN usage record will need to be assigned as well. In our example, we use one that was already created in the enterprise. Click on the **Select** button under **Associated PSTN Usages**.



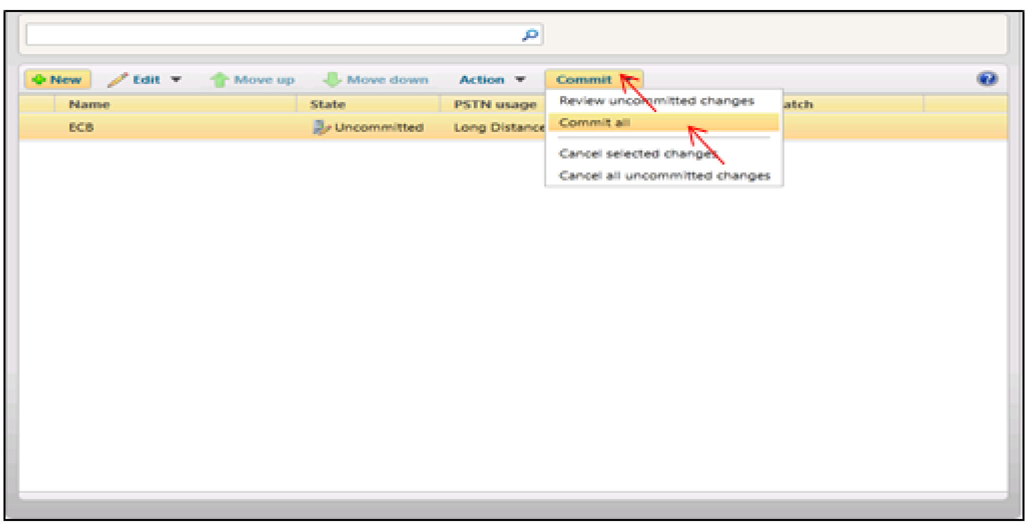
12. In the **Select PSTN Usage Record** window displayed, select the appropriate PSTN Usage Record and click **OK**.



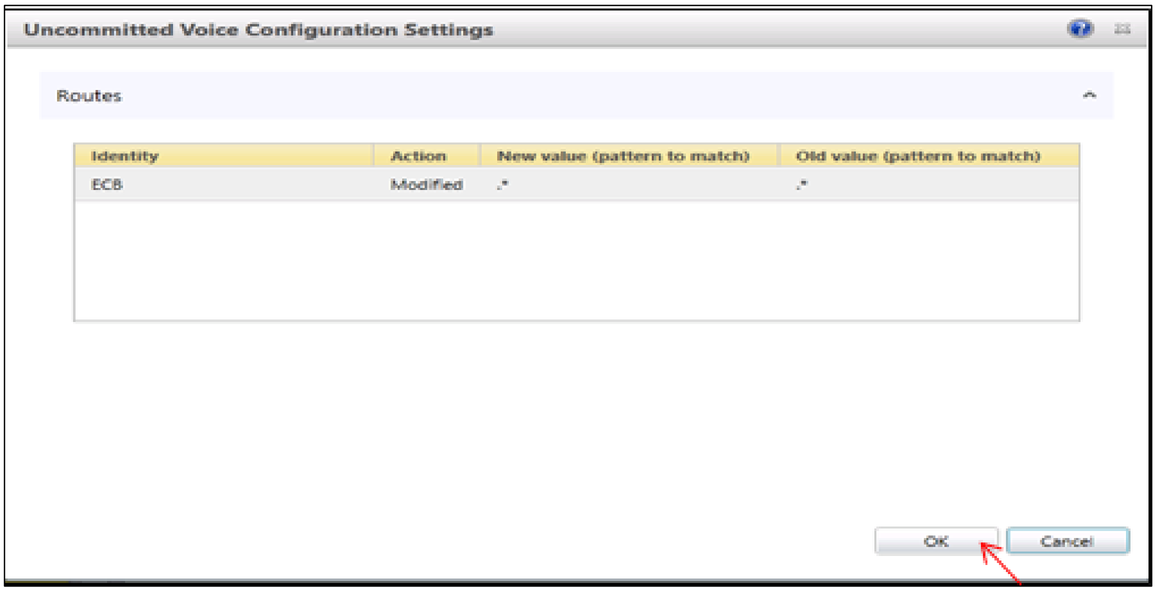
13. You will now see the Associated PSTN Usages which you have added. Click the **OK** button at the top of the **New Voice Route** screen.



14. You will now be at the Routes page showing the US route. Click the **Commit** drop-down menu, and then **Commit All**.



15. On the Uncommitted Voice Configuration Settings window, click OK.



If there are no errors, the new Voice Route has now been successfully created and the state will show as **Committed.**

Additional Steps

There are other aspects to a Lync Server Enterprise Voice deployment such as

- Site, local, and global dial plans
- Voice Policies
- Assigning Voice Policies to users
- PSTN usage policies

Refer to MSDN technet for relevant information.

Following the same procedure, configure ECB as a PSTN gateway in the Lync 2010 environment.

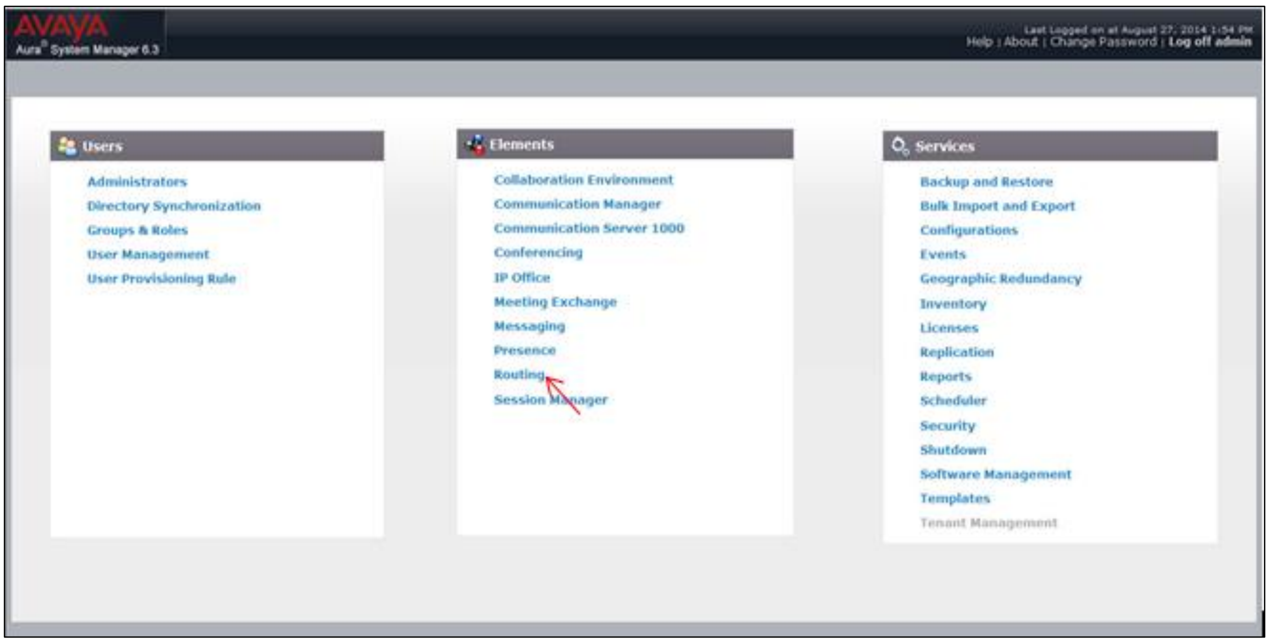
Phase 3 – Configuring the Avaya Session Manager

The enterprise has a fully functional Avaya Aura System Manager. Configuring the System Manager to operate with ECB consists of three steps –

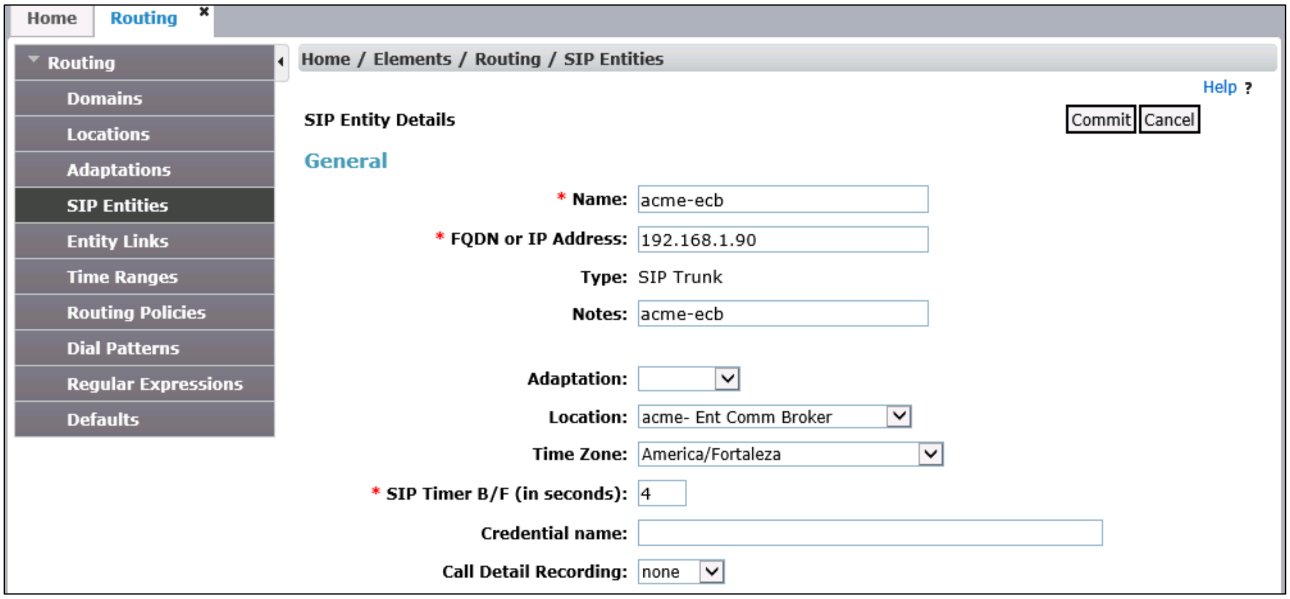
- Adding the ECB as a SIP Entity
- Configuring an Entity link between ECB and Session Manager
- Creating a Routing policy to assign the appropriate routing destination.

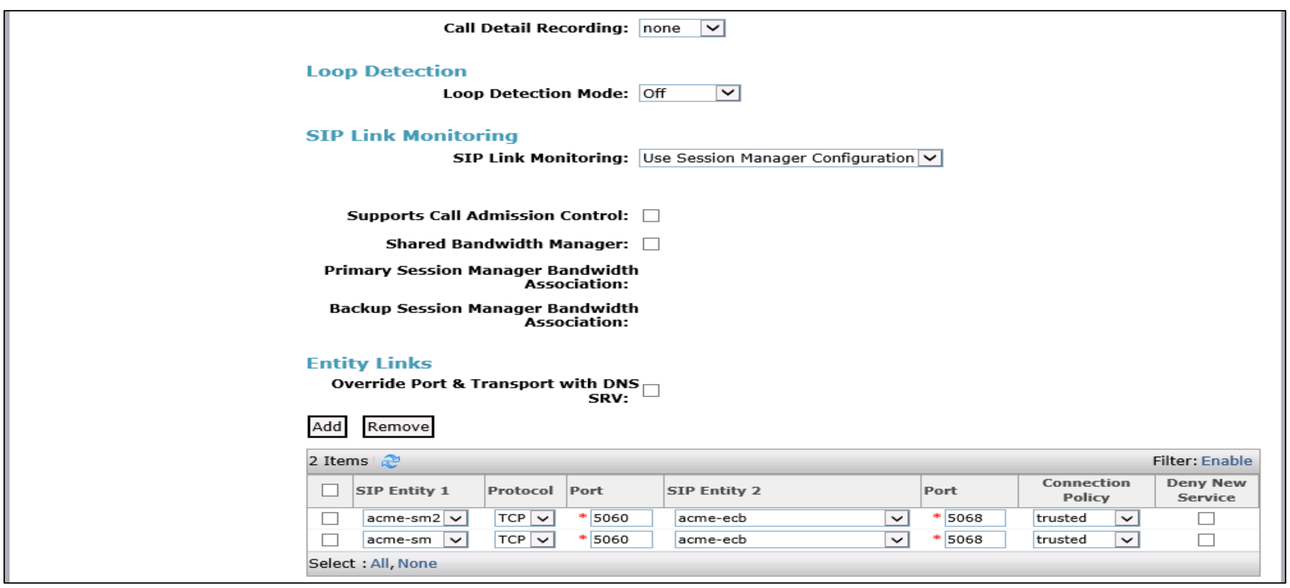
Adding the ECB as a SIP Entity

Log in to the Aura System Manager. Click on **Routing** under the **Elements** section.



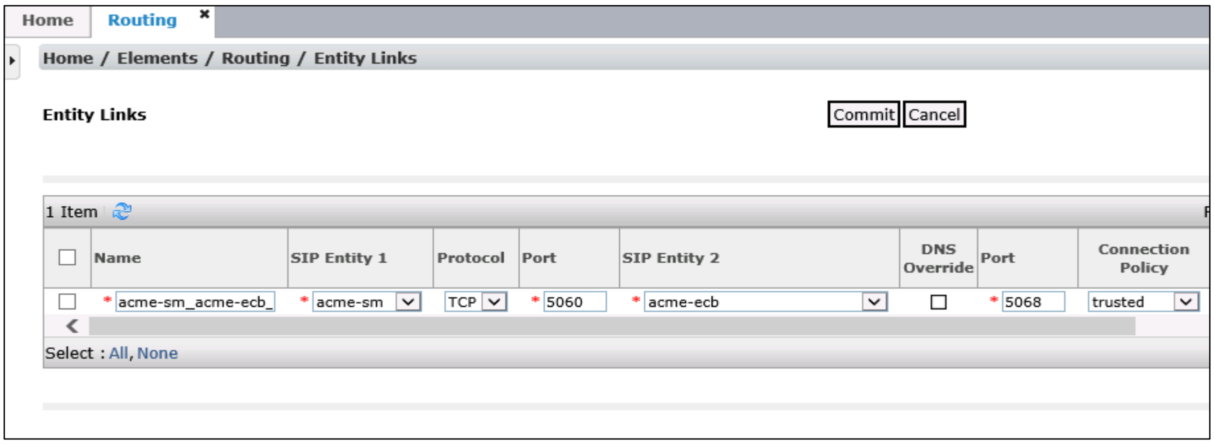
On the **Routing** tab, select **SIP Entities** from the menu on the left side of the screen. Click **New** to add ECB as a SIP entity as shown below and click **Commit**.





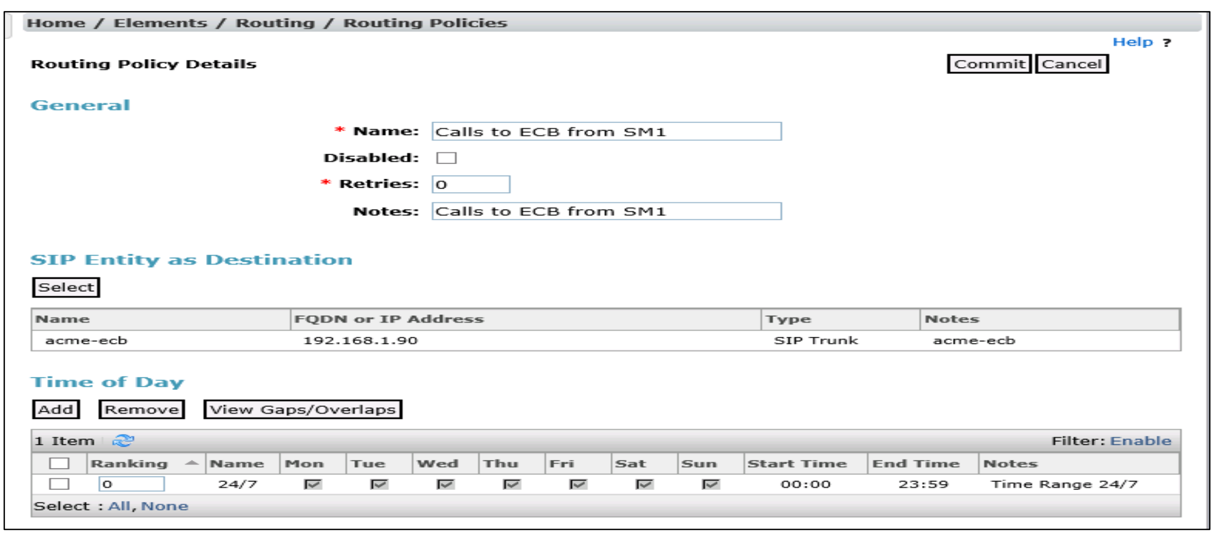
Configuring an Entity link between ECB and Session Manager

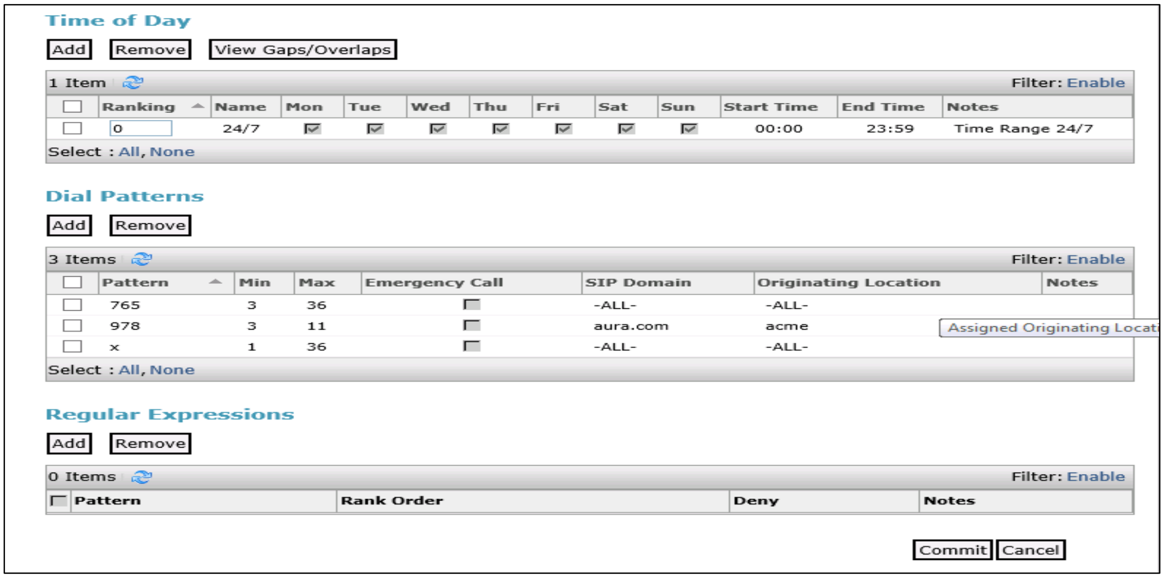
Select **Entity Links** from the menu and click on **New** to add an Entity Link between ECB and SM with the following settings and click **Commit.**



Creating a Routing policy to assign the appropriate routing destination

Select **Routing policies** from the menu and click on **New** to add a routing policy between ECB and SM with the following settings and click **Commit**.





The Avaya System Manager is now configured to operate with ECB.

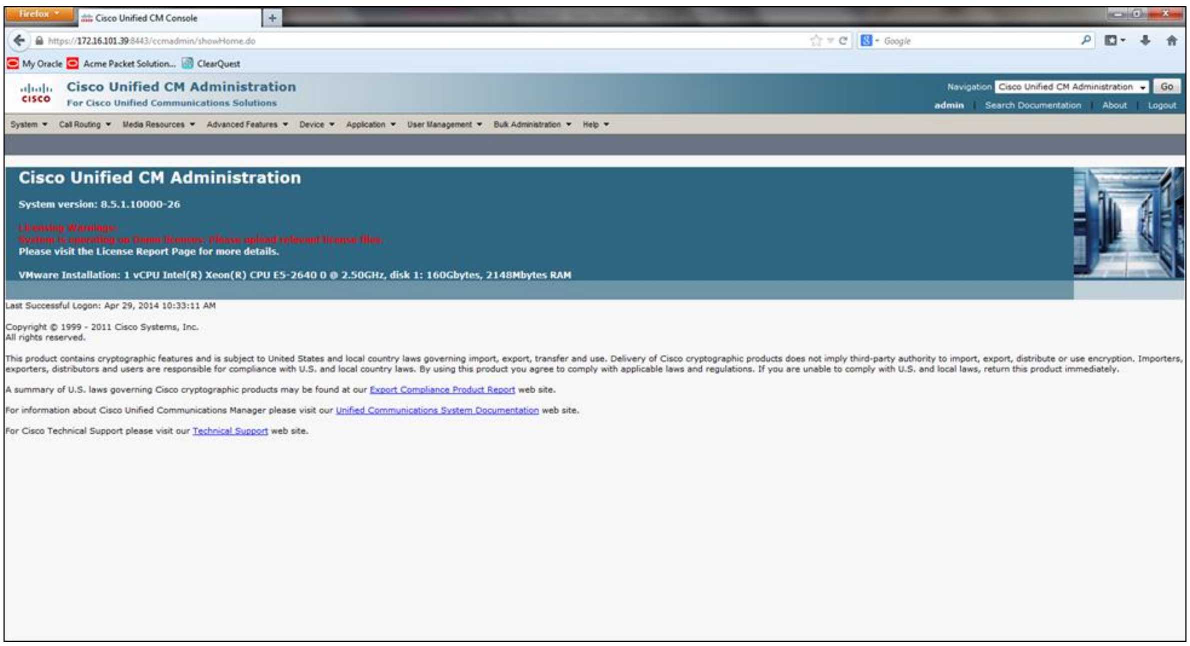
Phase 4 – Configuring the Cisco Unified Communications Manager

The enterprise will have a fully functioning Cisco Unified Communications Manager deployed. We will now configure it to operate with ECB. This consists of the following steps

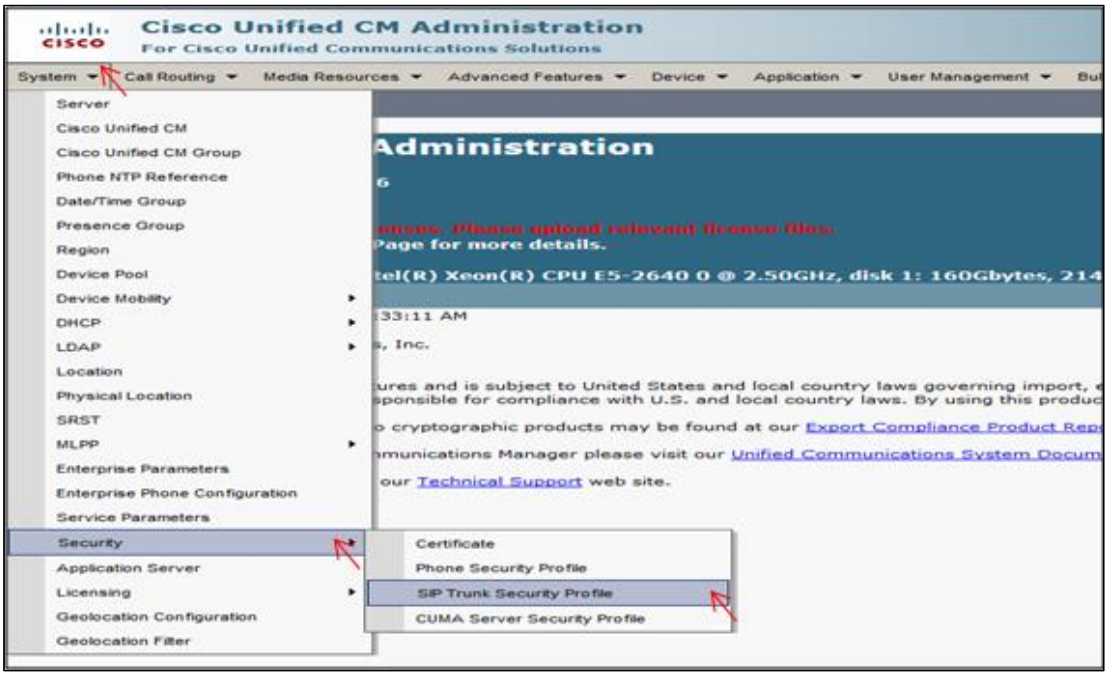
- Configuring the SIP Trunk Security profile
- Configuring the SIP profile
- Configure the Trunk
- Configuring the Route Pattern

Configuring the SIP Trunk Security Profile

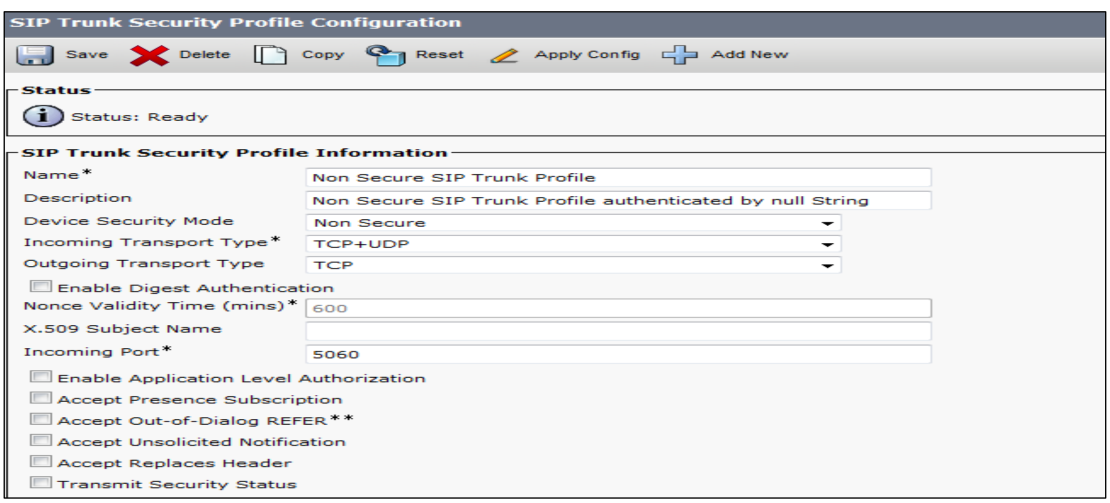
1. Log into the Cisco Unified CM administration page using the link https://server-ip/.



2. To go to the **SIP trunk security profile** page, expand the **System** drop down menu, select **SIP Trunk Security Profile** under **Security**.

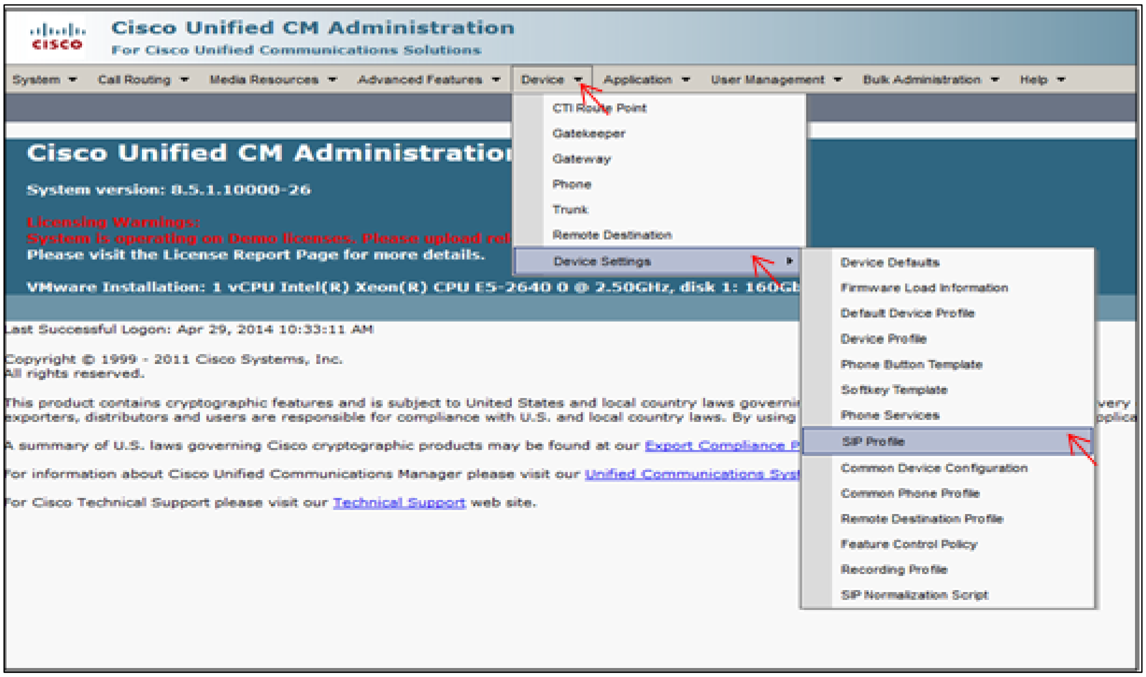


3. A Non Secure SIP Trunk security profile should be present, if not create one as shown below



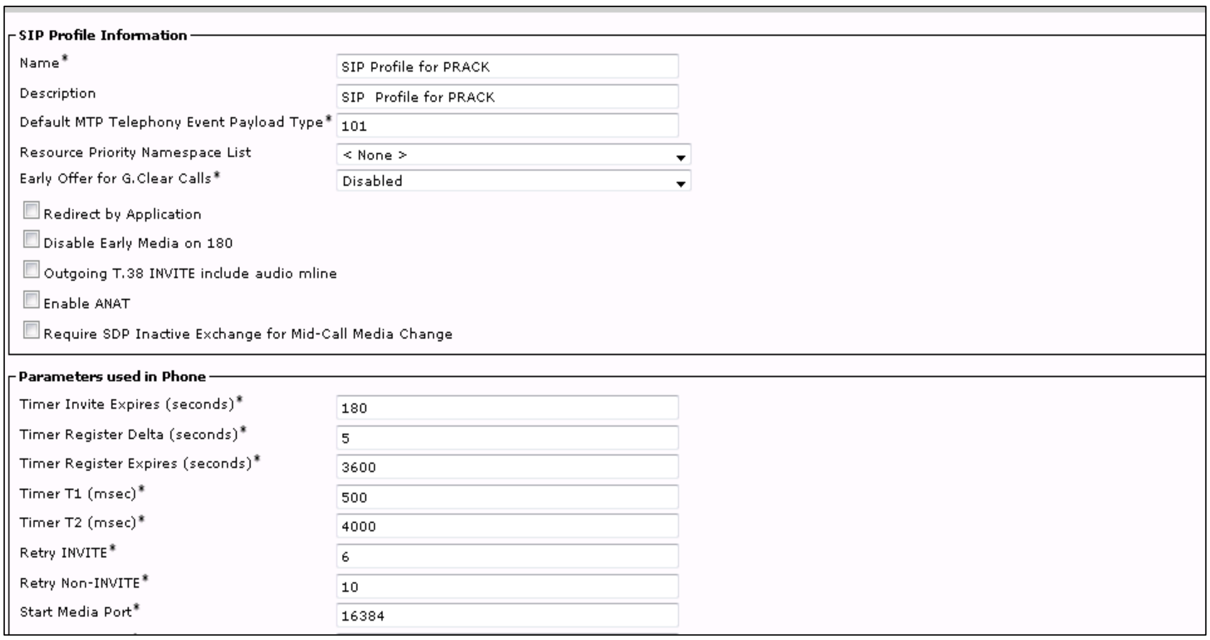
Configuring the SIP Profile

1. To go to the SIP Profile page, expand the **Device** drop down menu and select **SIP Profile** from **Device Settings**.



2. The **Find and List SIP Profiles** page will display the default SIP profile. Click on the **Copy** button to create a new SIP profile.

3. Add a new SIP profile with the following settings. It is same as the default profile but includes PRACK support.



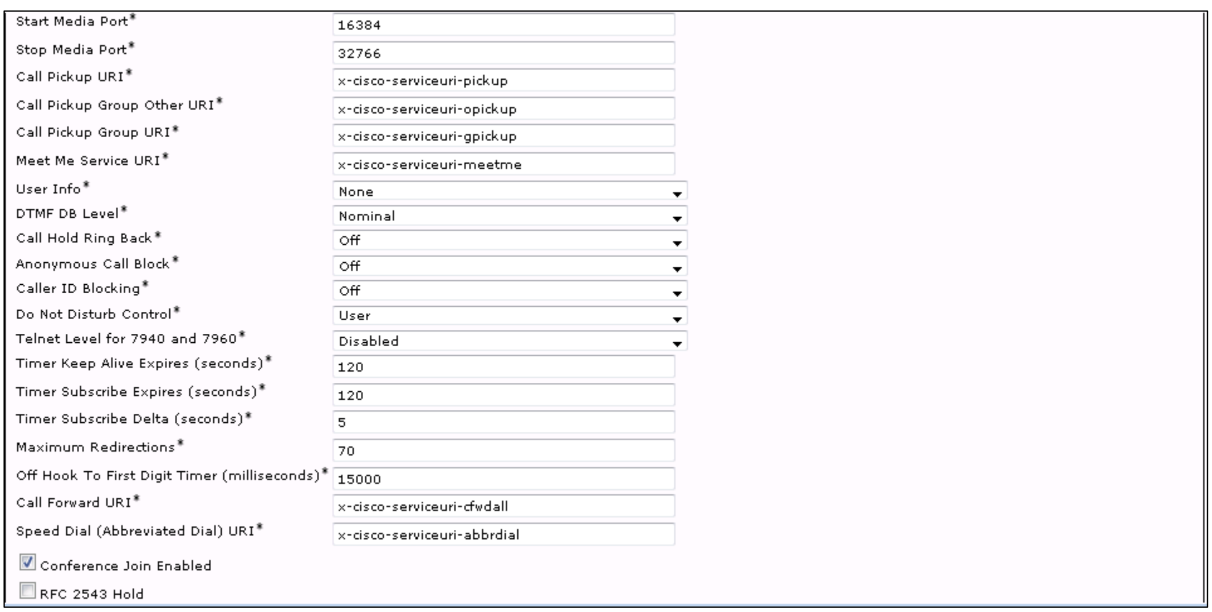
SIP Profile Information

Name*	SIP Profile for PRACK
Description	SIP Profile for PRACK
Default MTP Telephony Event Payload Type*	101
Resource Priority Namespace List	< None >
Early Offer for G.Clear Calls*	Disabled

- [ ] Redirect by Application
- [ ] Disable Early Media on 180
- [ ] Outgoing T.38 INVITE include audio mline
- [ ] Enable ANAT
- [ ] Require SDP Inactive Exchange for Mid-Call Media Change

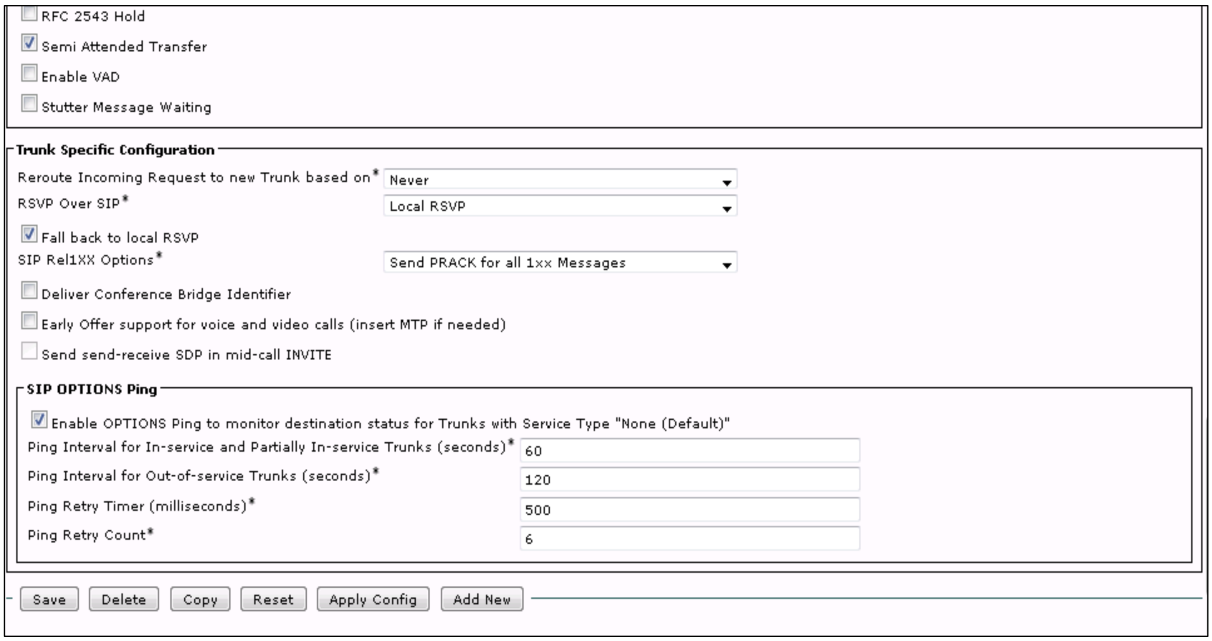
Parameters used in Phone

Timer Invite Expires (seconds)*	180
Timer Register Delta (seconds)*	5
Timer Register Expires (seconds)*	3600
Timer T1 (msec)*	500
Timer T2 (msec)*	4000
Retry INVITE*	6
Retry Non-INVITE*	10
Start Media Port*	16384



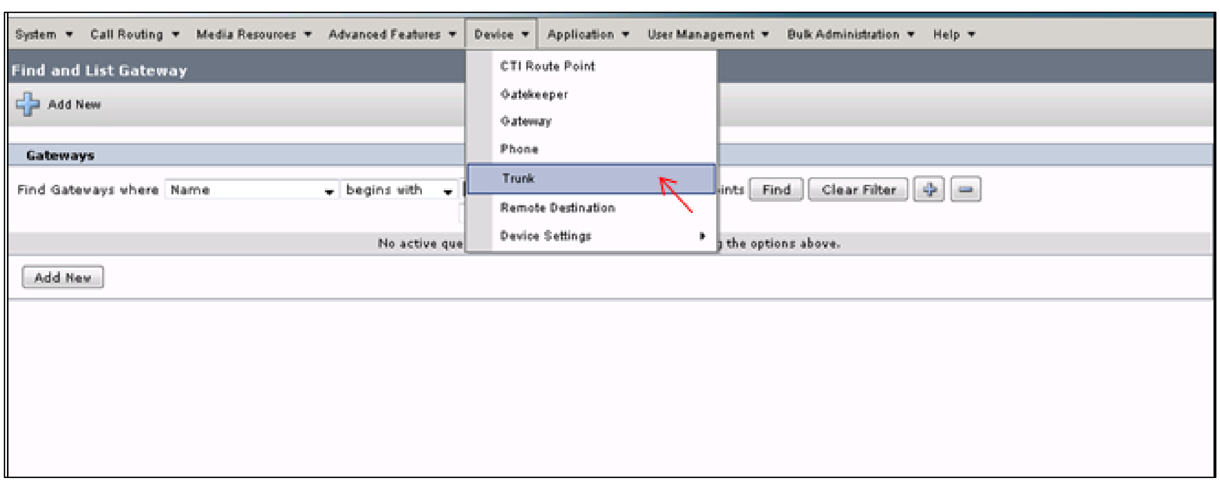
Start Media Port*	16384
Stop Media Port*	32766
Call Pickup URI*	x-cisco-serviceuri-pickup
Call Pickup Group Other URI*	x-cisco-serviceuri-opickup
Call Pickup Group URI*	x-cisco-serviceuri-gpickup
Meet Me Service URI*	x-cisco-serviceuri-meetme
User Info*	None
DTMF DB Level*	Nominal
Call Hold Ring Back*	Off
Anonymous Call Block*	Off
Caller ID Blocking*	Off
Do Not Disturb Control*	User
Telnet Level for 7940 and 7960*	Disabled
Timer Keep Alive Expires (seconds)*	120
Timer Subscribe Expires (seconds)*	120
Timer Subscribe Delta (seconds)*	5
Maximum Redirections*	70
Off Hook To First Digit Timer (milliseconds)*	15000
Call Forward URI*	x-cisco-serviceuri-cfwdall
Speed Dial (Abbreviated Dial) URI*	x-cisco-serviceuri-abbrdial

- [x] Conference Join Enabled
- [ ] RFC 2543 Hold

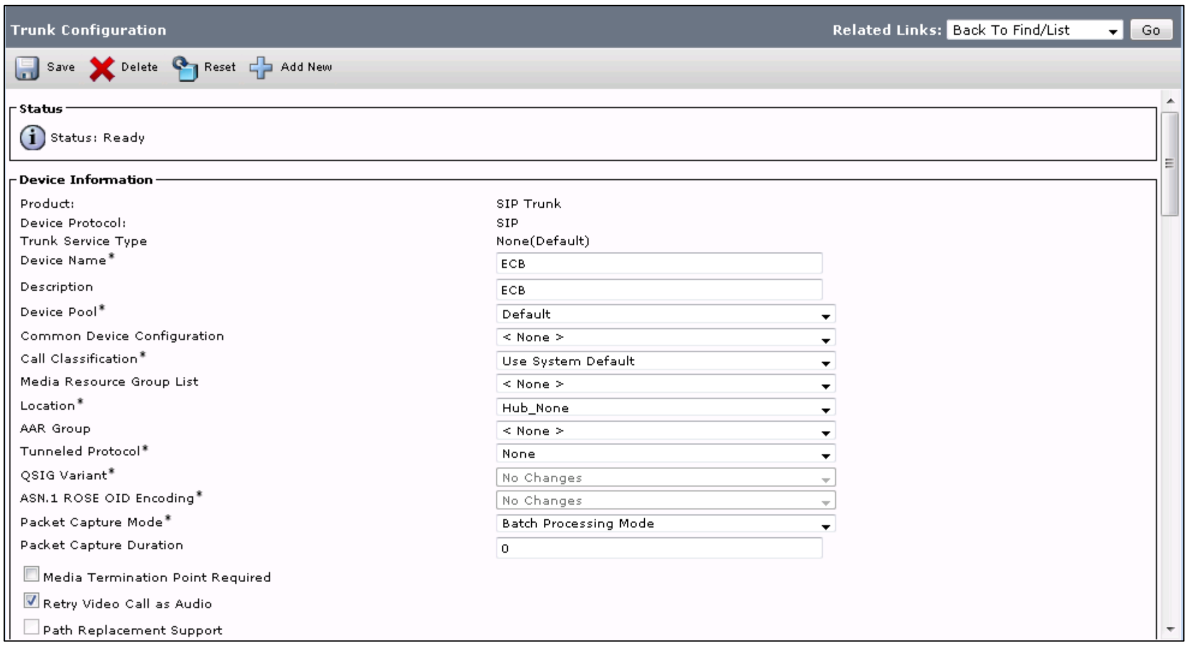


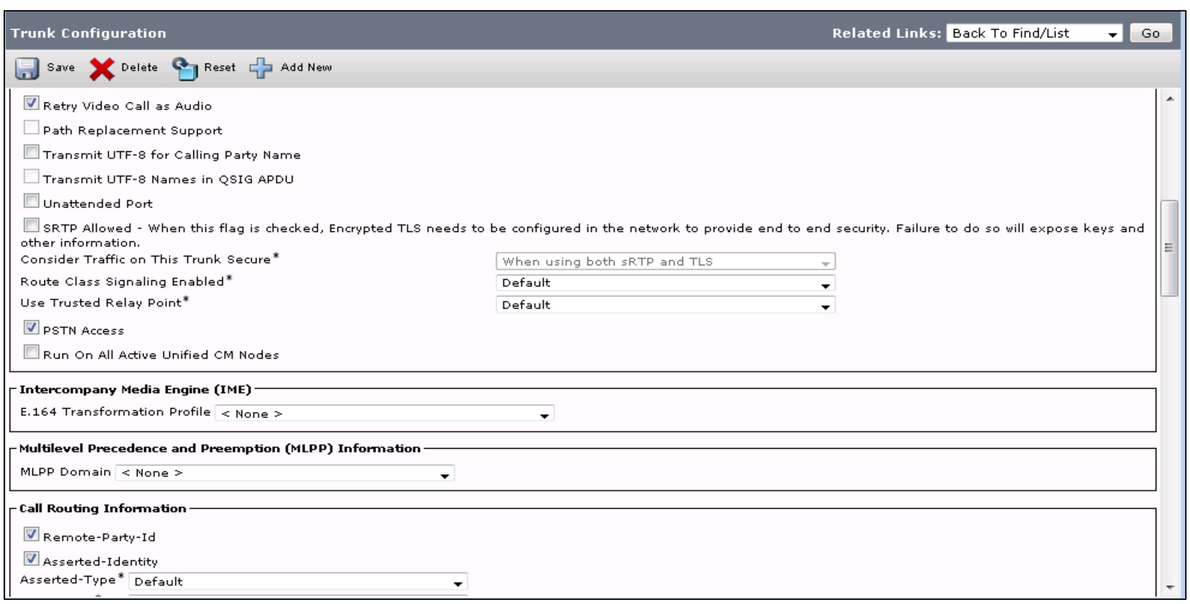
Configuring the Trunk

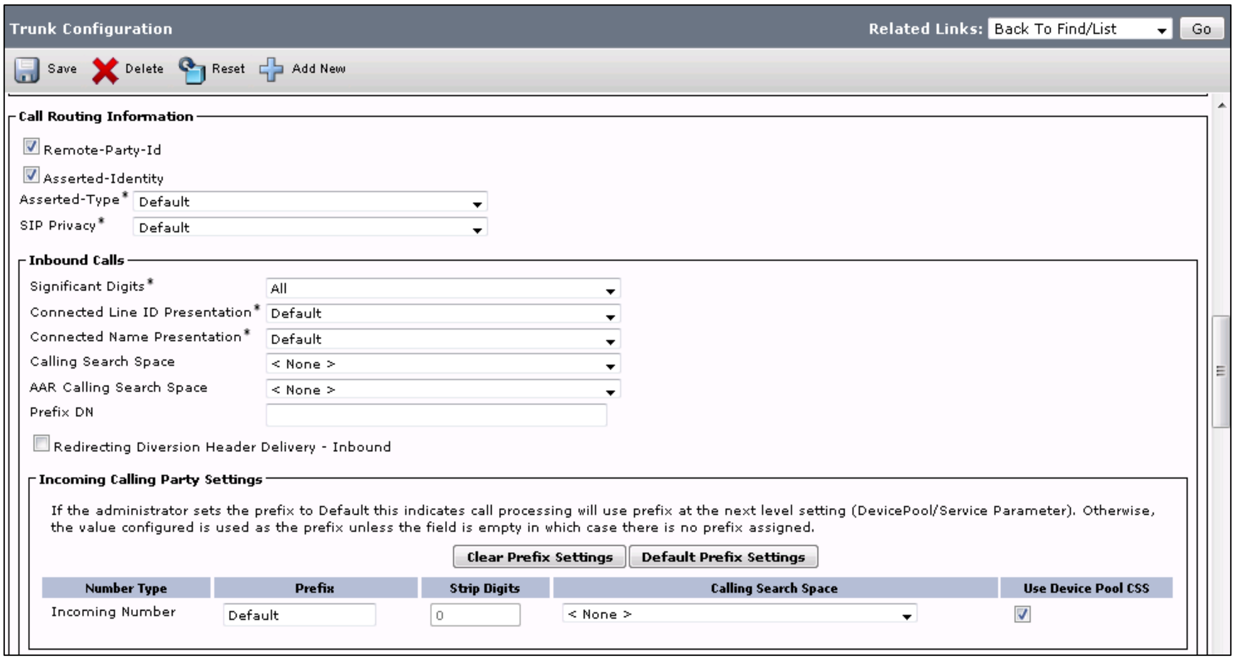
1. To go to the Trunks page, select **Trunk** from the **Device** drop down menu.

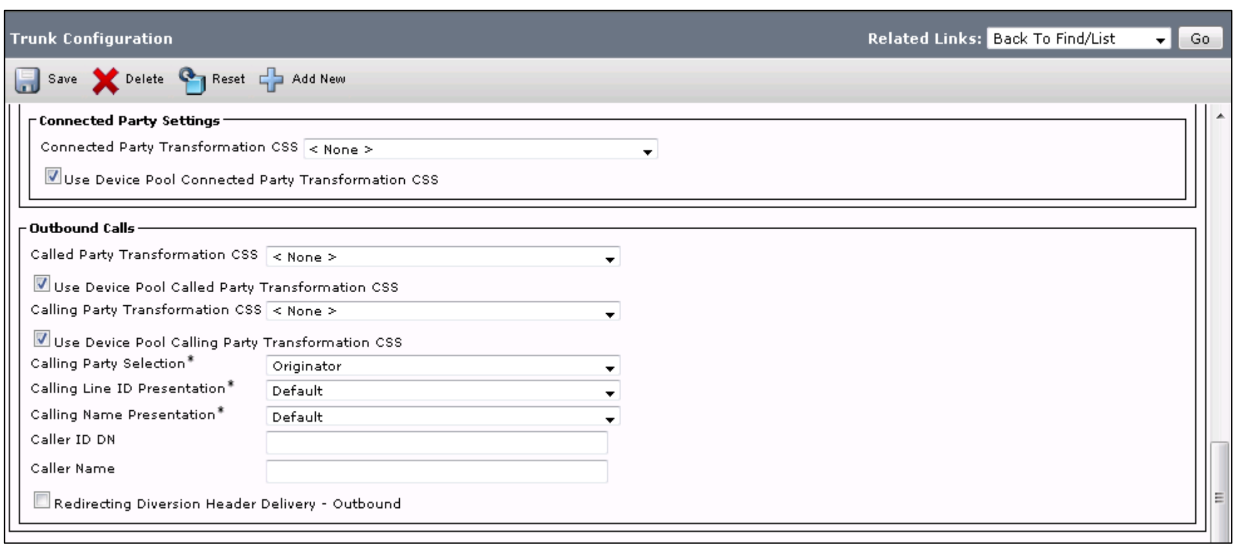


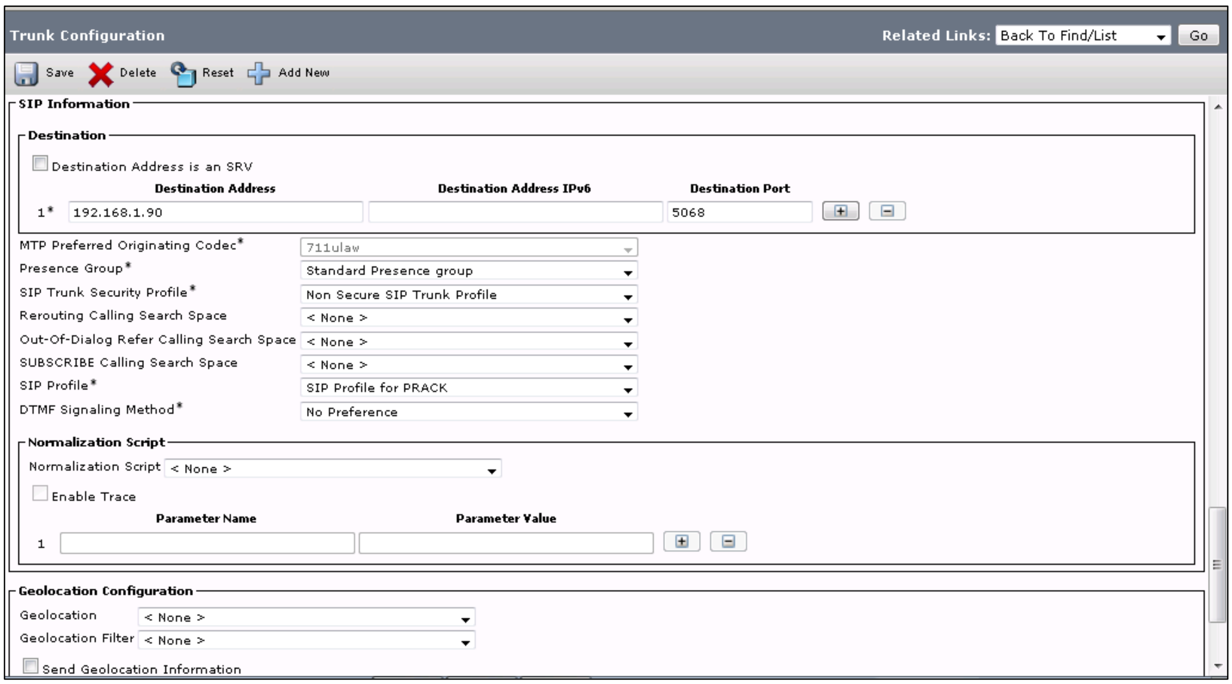
2. Add a trunk with the following settings and click **Save**.





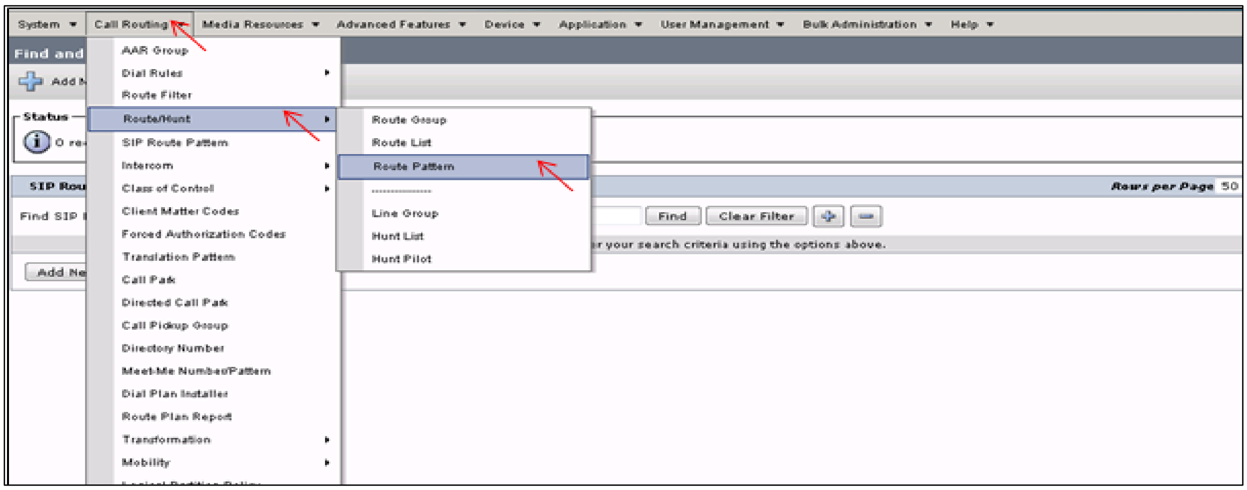

Trunk Configuration
Related Links: Back To Find/List
Go
Save
Delete
Reset
Add New
Call Routing Information
Remote-Party-Id
Asserted-Identity
Asserted-Type* Default
SIP Privacy* Default
Inbound Calls
Significant Digits* All
Connected Line ID Presentation* Default
Connected Name Presentation* Default
Calling Search Space < None >
AAR Calling Search Space < None >
Prefix DN
Redirecting Diversion Header Delivery - Inbound
Incoming Calling Party Settings
If the administrator sets the prefix to Default this indicates call processing will use prefix at the next level setting (DevicePool/Service Parameter). Otherwise, the value configured is used as the prefix unless the field is empty in which case there is no prefix assigned.
Clear Prefix Settings
Default Prefix Settings
Number Type
Prefix
Strip Digits
Calling Search Space
Use Device Pool CSS
Incoming Number
Default
0
< None >


Trunk Configuration
Related Links: Back To Find/List
Go
Save
Delete
Reset
Add New
Connected Party Settings
Connected Party Transformation CSS < None >
Use Device Pool Connected Party Transformation CSS
Outbound Calls
Called Party Transformation CSS < None >
Use Device Pool Called Party Transformation CSS
Calling Party Transformation CSS < None >
Use Device Pool Calling Party Transformation CSS
Calling Party Selection* Originator
Calling Line ID Presentation* Default
Calling Name Presentation* Default
Caller ID DN
Caller Name
Redirecting Diversion Header Delivery - Outbound

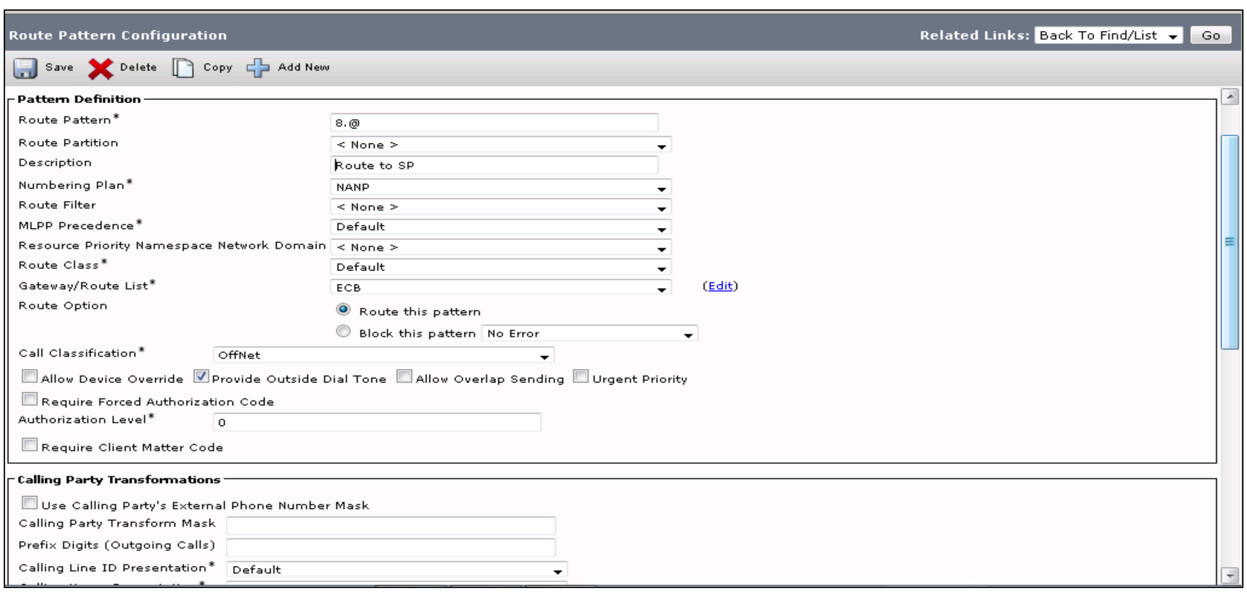

Trunk Configuration
Related Links: Back To Find/List
Go
Save
Delete
Reset
Add New
SIP Information
Destination
Destination Address is an SRV
Destination Address
Destination Address IPv6
Destination Port
1* 192.168.1.90
5068
MTP Preferred Originating Codec* 711ulaw
Presence Group* Standard Presence group
SIP Trunk Security Profile* Non Secure SIP Trunk Profile
Rerouting Calling Search Space < None >
Out-Of-Dialog Refer Calling Search Space < None >
SUBSCRIBE Calling Search Space < None >
SIP Profile* SIP Profile for PRACK
DTMF Signaling Method* No Preference
Normalization Script
Normalization Script < None >
Enable Trace
Parameter Name
Parameter Value
1
Geolocation Configuration
Geolocation < None >
Geolocation Filter < None >
Send Geolocation Information

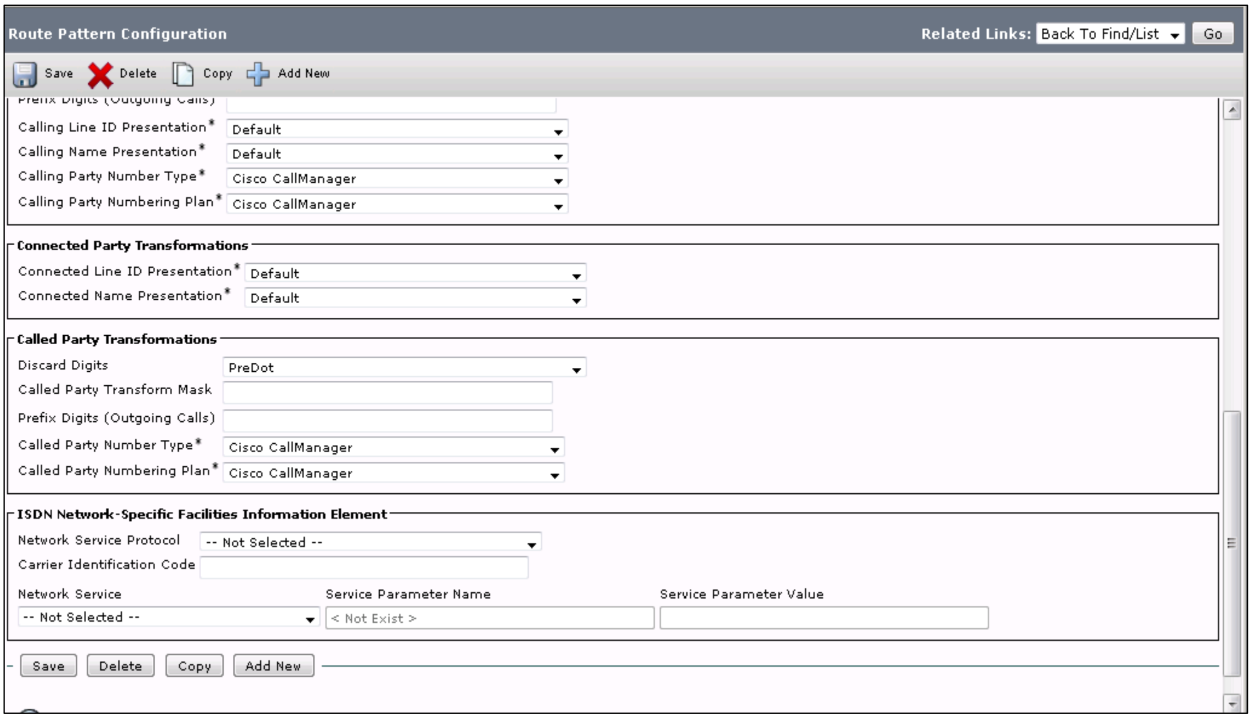
Configuring the Route Pattern

1. To go to the Route pattern page, click on Call Routing and select Route Pattern from the Route/Hunt drop down menu.



2. In our setup, users dial 8 to dial out. Add a route pattern with the following settings and associate it with the trunk configured in the previous step.





The CUCM configuration is now complete.

Phase 5 – Configuring the Oracle Enterprise Session Border Controller

In this section we describe the steps for configuring an Oracle Enterprise Session Border Controller (E-SBC), formally known as an Acme Packet Net-Net Enterprise Session Director (E-SBC), for use with the Oracle Enterprise Communications Broker in a SIP trunking scenario.

In Scope

The following step-by-step guide configuring the E-SBC assumes that this is a newly deployed device dedicated to a single customer. If the enterprise currently has the E-SBC deployed and is adding ECB, then please see the appendix for a better understanding of the Acme Packet Command Line Interface (ACLI).

Note that Oracle offers several models of E-SBC. This document covers the setup for the Acme Packet 3820 and Acme Packet 4500 platform series running Net-Net OS ECX 6.2.0 or later. If instructions are needed for other E-SBC models, please contact your Oracle representative.

Out of Scope

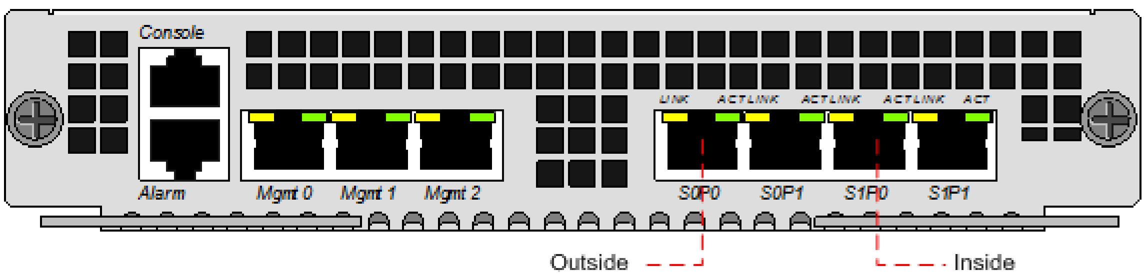
- Configuration of Network management including SNMP and RADIUS; and
- Redundancy configuration

What will you need

- Serial Console cross over cable with RJ-45 connector
- Terminal emulation application such as PuTTY or HyperTerm
- Passwords for the User and Superuser modes on the E-SBC
- IP address to be assigned to management interface (Wancom0) of the E-SBC - the Wancom0 management interface must be connected and configured to a management network separate from the service interfaces. Otherwise the E-SBC is subject to ARP overlap issues, loss of system access when the network is down, and compromising DDoS protection. Oracle does not support E-SBC configurations with management and media/service interfaces on the same subnet.
- IP address of the ECB
- IP address to be used for the E-SBC internal and external facing ports (Service Interfaces)
- IP address of the next hop gateway in the SIP trunk provider network

Configuring the Oracle Enterprise Session Border Controller (E-SBC)

Once the E-SBC is racked and the power cable connected, you are ready to set up physical network connectivity.



Plug the slot 0 port 0 (s0p0) interface into your outside (gateway facing) network and the slot 0 port 1 (s1p0) interface into your inside (mediation server-facing) network. Once connected, perform you are ready to power on and perform the following steps.

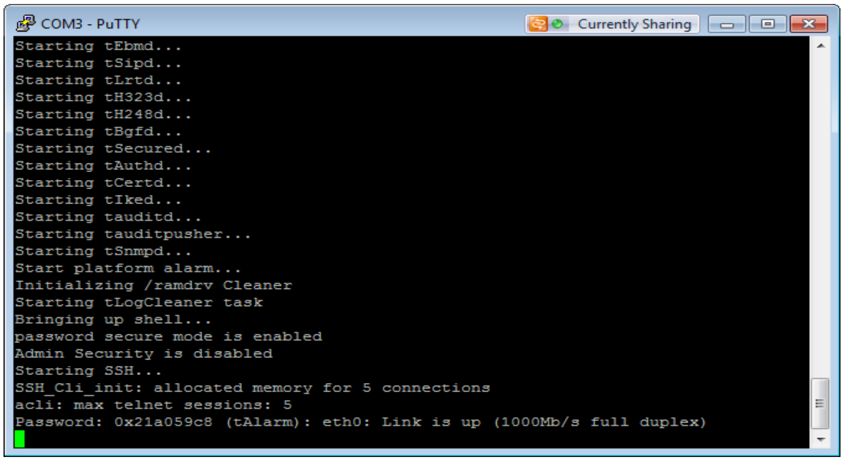
All commands are in bold, such as **`configure terminal`**; parameters in bold red such as ORACLE-SBC are parameters which are specific to an individual deployment. **Note:** The ACLI is case sensitive.

Establish the serial connection and logging in the SBC

Confirm the E-SBC is powered off and connect one end of a straight-through Ethernet cable to the front console port (which is active by default) on the E-SBC and the other end to console adapter that ships with the E-SBC, connect the console adapter (a DB-9 adapter) to the DB-9 port on a workstation, running a terminal emulator application such as PuTTY. Start the terminal emulation application using the following settings:

- Baud Rate=115200
- Data Bits=8
- Parity=None
- Stop Bits=1
- Flow Control=None

Power on the E-SBC and confirm that you see the following output from the bootup sequence.



Enter the following commands to login to the E-SBC and move to the configuration mode. Note that the default E-SBC password is "**acme**" and the default super user password is "**packet**".

```
Password: acme
ORACLE-SBC> enable
Password: packet
ORACLE-SBC# configure terminal
ORACLE-SBC(configure)#
```

You are now in the global configuration mode.

Initial Configuration – Assigning the management Interface an IP address

To assign an IP address, one has to configure the bootparams on the E-SBC by going to

Oracle-SBC# configure terminal --- >bootparams

- Once you type "bootparam" you have to use "carriage return" key to navigate down
- A reboot is required if changes are made to the existing bootparams

```
Oracle-SBC#(configure)bootparam
'.' = clear field;  '-' = go to previous field;  q = quit
boot device              : eth0
processor number         : 0
host name                : acmesystem
file name                : /code/images/nnECX640m2.tar--- >location where
the software is loaded on the SBC
inet on ethernet (e)     : 172.18.255.52:ffffff80 --- > This is the ip
address of the management interface of the SBC, type the IP address and
mask in hex
```

```
inet on backplane (b)    :
host inet (h)            :
gateway inet (g)         : 172.18.0.1 --- > gateway address here
user (u)                 : vxftp
ftp password (pw) (blank = use rsh)      : vxftp
flags (f)                :
target name (tn)         : ORACLE-SBC
startup script (s)       :
other (o)                :
```

Configure System element values

To configure system element values, use the **system-config** command under the system branch. Then enter values appropriate to your environment, including your default gateway IP address for your management Ethernet interface.

```
ORACLE-SBC(configure)# system
ORACLE-SBC(system)# system-config
ORACLE-SBC(system-config)# hostname ORACLE-SBC
ORACLE-SBC(system-config)# description "SBC for SIP Trunking"
ORACLE-SBC(system-config)# location "Bedford, MA"
ORACLE-SBC(system-config)# default-gateway 172.18.0.1
ORACLE-SBC(system-config)# done
```

Once the **system-config** settings have completed and you enter **done**, the E-SBC will output a complete listing of all current settings. This will apply throughout the rest of the configuration and is a function of the **done** command. Confirm the output reflects the values you just entered as well as any configuration defaults.

```
system-config
        hostname
        description                     SBC for SIP Trunking
        location                        Bedford, MA
        mib-system-contact
        mib-system-name
        mib-system-location
        snmp-enabled                    enabled
        enable-snmp-auth-traps          disabled
        enable-snmp-syslog-notify       disabled
        enable-snmp-monitor-traps       disabled
        enable-env-monitor-traps        disabled
        snmp-syslog-his-table-length    1
        snmp-syslog-level               WARNING
        system-log-level                WARNING
```

```
        process-log-level               DEBUG
        process-log-ip-address          0.0.0.0
        process-log-port                0
        collect
                sample-interval                 5
                push-interval                   15
                boot-state                      disabled
                start-time                      now
                end-time                        never
                red-collect-state               disabled
                red-max-trans                   1000
                red-sync-start-time             5000
                red-sync-comp-time              1000
                push-success-trap-state         disabled
        call-trace                      disabled
        internal-trace                  disabled
        log-filter                      all
        default-gateway                 172.18.0.1
        restart                         enabled
        exceptions
        telnet-timeout                  0
        console-timeout                 0
        remote-control                  enabled
        cli-audit-trail                 enabled
        link-redundancy-state           disabled
        source-routing                  disabled
        cli-more                        disabled
        terminal-height                 24
        debug-timeout                   0
        trap-event-lifetime             0
        default-v6-gateway              ::
        ipv6-signaling-mtu              1500
        ipv4-signaling-mtu              1500
        cleanup-time-of-day             00:00
        snmp-engine-id-suffix
        snmp-agent-mode                 v1v2
        comm-monitor
                state                           disabled
                qos-enable                      enabled
                sbc-grp-id                      0
                tls-profile
```

Configure Physical Interface values

To configure physical Interface values, use the `phy-interface` command under the system branch. To enter the system branch from system-config, you issue the `exit` command then the `phy-interface` command.

You will first configure the slot 0, port 0 interface designated with the name s0p0. This will be the port plugged into your outside (connection to the trunk) interface.

```
ORACLE-SBC(system-config)# exit
ORACLE-SBC(system)# phy-interface
ORACLE-SBC(phy-interface)# name M00
ORACLE-SBC(phy-interface)# operation-type media
ORACLE-SBC(phy-interface)# slot 0
ORACLE-SBC(phy-interface)# port 0
ORACLE-SBC(phy-interface)# done
```

Once the **phy-interface** settings have completed for slot 0 port 0 and you enter **done**, the E-SBC will output a complete listing of all current settings. Confirm the output reflects the values you just entered.

```
phy-interface
       name                          M00
       operation-type                Media
       port                          0
       slot                          0
       virtual-mac
       admin-state                   enabled
       auto-negotiation              enabled
       duplex-mode                   FULL
       speed                         100
       overload-protection           disabled
```

You will now configure the slot 1 port 0 phy-interface, specifying the appropriate values. This will be the port plugged into your inside (connection to the ECB) interface.

```
ORACLE-SBC(phy-interface)# name M10
ORACLE-SBC(phy-interface)# operation-type media
ORACLE-SBC(phy-interface)# slot 1
ORACLE-SBC(phy-interface)# port 0
ORACLE-SBC(phy-interface)# done
phy-interface
       name                          M10
       operation-type                Media
       port                          0
```

```
        slot                           1
        virtual-mac
        admin-state                    enabled
        auto-negotiation               enabled
        duplex-mode                    FULL
        speed                          100
        overload-protection            disabled
```

Configure Network Interface values

To configure Network Interface values, use the `network-interface` command under the system branch. To enter the system branch from phy-interface, you issue the `exit` command, then the `network-interface` command.

You will first configure the IP characteristics for the M10 interface defined above

```
ORACLE-SBC(phy-interface)# exit
ORACLE-SBC(system)# network-interface
ORACLE-SBC(network-interface)# name s1p0
ORACLE-SBC(network-interface)# description "ECB-facing inside interface"
ORACLE-SBC(network-interface)# ip-address 192.168.1.130
ORACLE-SBC(network-interface)# netmask 255.255.255.0
ORACLE-SBC(network-interface)# gateway 192.168.1.1
ORACLE-SBC(network-interface)# pri-utility-addr 192.168.1.131
ORACLE-SBC(network-interface)# sec-utility-addr 192.168.1.132
ORACLE-SBC(network-interface)# add-hip-ip 192.168.1.130
ORACLE-SBC(network-interface)# add-icmp-ip 192.168.1.130
ORACLE-SBC(network-interface)# done

network-interface
        name                           s1p0
        sub-port-id                    0
        description                    ECB-facing inside interface
        hostname
        ip-address                     192.168.1.130
        pri-utility-addr               192.168.1.131
        sec-utility-addr               192.168.1.132
        netmask                        255.255.255.0
        gateway                        192.168.1.1
        sec-gateway
        gw-heartbeat
                state                          disabled
                heartbeat                      0
```

```
            retry-count                    0
            retry-timeout                  1
            health-score                   0
    dns-ip-primary
    dns-ip-backup1
    dns-ip-backup2
    dns-domain
    dns-timeout                    11
    hip-ip-list                    192.168.1.130
    ftp-address
    icmp-address                   192.168.1.130
    snmp-address
    telnet-address
    ssh-address
```

You will now configure the slot 0 port 0 sub port 0 network-interface, specifying the appropriate values.

```
ORACLE-SBC(network-interface)# name s0p0
ORACLE-SBC(network-interface)# description "VoIP gateway-facing outside
interface"
ORACLE-SBC(network-interface)# ip-address 192.20.0.108
ORACLE-SBC(network-interface)# netmask 255.255.255.0
ORACLE-SBC(network-interface)# gateway 192.20.0.1
ORACLE-SBC(network-interface)# pri-utility-addr 192.20.0.109
ORACLE-SBC(network-interface)# sec-utility-addr 192.20.0.110
ORACLE-SBC(network-interface)# dns-ip-primary 8.8.8.8
ORACLE-SBC(network-interface)# dns-ip-backup1 8.8.4.4
ORACLE-SBC(network-interface)# dns-domain tsengr.com
ORACLE-SBC(network-interface)# add-hip-ip 192.20.0.108
ORACLE-SBC(network-interface)# add-icmp-ip 192.20.0.108
ORACLE-SBC(network-interface)# done

network-interface
         name                          s0p0
         sub-port-id                   0
         description                   VoIP gateway-facing outside
interface
        hostname
        ip-address                     192.20.0.108
        pri-utility-addr               192.20.0.109
        sec-utility-addr               192.20.0.110
        netmask                        255.255.255.0
        gateway                        192.20.0.1
```

```
        sec-gateway
        gw-heartbeat
                state                          disabled
                heartbeat                      0
                retry-count                    0
                retry-timeout                  1
                health-score                   0
        dns-ip-primary                 8.8.8.8
        dns-ip-backup1                 8.8.4.4
        dns-ip-backup2
        dns-domain                     tsengr.com
        dns-timeout                    11
        hip-ip-list                    192.20.0.108
        ftp-address
        icmp-address                   192.20.0.108
        snmp-address
        telnet-address
        ssh-address
```

You will now configure the wancom1 and wancom2 for redundancy, specifying the appropriate values.

```
ORACLE-SBC(network-interface)# name wancom1
ORACLE-SBC(network-interface)# netmask 255.255.255.252
ORACLE-SBC(network-interface)# pri-utility-addr 169.254.1.1
ORACLE-SBC(network-interface)# sec-utility-addr 169.254.1.2
ORACLE-SBC(network-interface)# done

network-interface
        name                           wancom1
        sub-port-id                    0
        description
        hostname
        ip-address
        pri-utility-addr               169.254.1.1
        sec-utility-addr               169.254.1.2
        netmask                        255.255.255.252
        gateway
        sec-gateway
        gw-heartbeat
                state                          disabled
                heartbeat                      0
                retry-count                    0
```

```
                retry-timeout                    1
                health-score                     0
        dns-ip-primary
        dns-ip-backup1
        dns-ip-backup2
        dns-domain
        dns-timeout                      11
        hip-ip-list
        ftp-address
        icmp-address
        snmp-address
        telnet-address
        ssh-address

ORACLE-SBC(network-interface)# name wancom2
ORACLE-SBC(network-interface)# netmask 255.255.255.252
ORACLE-SBC(network-interface)# pri-utility-addr 169.254.2.1
ORACLE-SBC(network-interface)# sec-utility-addr 169.254.2.2
ORACLE-SBC(network-interface)# done

network-interface
        name                             wancom2
        sub-port-id                      0
        description
        hostname
        ip-address
        pri-utility-addr                 169.254.2.1
        sec-utility-addr                 169.254.2.2
        netmask                          255.255.255.252
        gateway
        sec-gateway
        gw-heartbeat
                state                            disabled
                heartbeat                        0
                retry-count                      0
                retry-timeout                    1
                health-score                     0
        dns-ip-primary
        dns-ip-backup1
        dns-ip-backup2
        dns-domain
```

```
        dns-timeout                     11
        hip-ip-list
        ftp-address
        icmp-address
        snmp-address
        telnet-address
        ssh-address
```

Configure Global SIP configuration

To configure the Global SIP values, use the **sip-config** command under the session-router branch. To enter the session-router branch from network-interface, you issue the **exit** command twice, followed by the **sip-config** command.

```
ORACLE-SBC(network-interface)# exit
ORACLE-SBC(system)# exit
ORACLE-SBC(configure)# session-router
ORACLE-SBC(session-router)# sip-config
ORACLE-SBC(sip-config)# operation-mode dialog
ORACLE-SBC(sip-config)# done

sip-config
        state                           enabled
        operation-mode                  dialog
        dialog-transparency             enabled
        home-realm-id
        egress-realm-id
        nat-mode                        None
        registrar-domain
        registrar-host
        registrar-port                  0
        register-service-route          always
        init-timer                      500
        max-timer                       4000
        trans-expire                    32
        invite-expire                   180
        inactive-dynamic-conn           32
        enforcement-profile
        pac-method
        pac-interval                    10
        pac-strategy                    PropDist
        pac-load-weight                 1
```

```
        pac-session-weight              1
        pac-route-weight                1
        pac-callid-lifetime             600
        pac-user-lifetime               3600
        red-sip-port                    1988
        red-max-trans                   10000
        red-sync-start-time             5000
        red-sync-comp-time              1000
        add-reason-header               disabled
        sip-message-len                 4096
        enum-sag-match                  disabled
        extra-method-stats              disabled
        rph-feature                     disabled
        nsep-user-sessions-rate         0
        nsep-sa-sessions-rate           0
        registration-cache-limit        0
        register-use-to-for-lp          disabled
        refer-src-routing               disabled
        add-ucid-header                 disabled
        proxy-sub-events
        pass-gruu-contact               disabled
        sag-lookup-on-redirect          disabled
        set-disconnect-time-on-bye      disabled
```

Configure Global Media configuration

To configure the Media values, use the **media-manager** command under the media-manager branch. To enter the media-manager branch from sip-config, you issue the **exit** command twice, followed by the **media-manager** command twice.

By issuing the **select** then **done** commands at this level, you will be creating the media-manager element, enabling the media management functions in the E-SBC with the default values.

```
ORACLE-SBC(sip-config)# exit
ORACLE-SBC(session-router)# exit
ORACLE-SBC(configure)# media-manager
ORACLE-SBC(media-manager)# media-manager
ORACLE-SBC(media-manager)# select
ORACLE-SBC(media-manager-config)# done

media-manager
       state                           enabled
       latching                        enabled
```

```
        flow-time-limit                86400
        initial-guard-timer            300
        subsq-guard-timer              300
        tcp-flow-time-limit            86400
        tcp-initial-guard-timer        300
        tcp-subsq-guard-timer          300
        tcp-number-of-ports-per-flow   2
        hnt-rtcp                       disabled
        algd-log-level                 NOTICE
        mbcd-log-level                 NOTICE
        red-flow-port                  1985
        red-mgcp-port                  1986
        red-max-trans                  10000
        red-sync-start-time            5000
        red-sync-comp-time             1000
        media-policing                 enabled
        max-signaling-bandwidth        10000000
        max-untrusted-signaling        100
        min-untrusted-signaling        30
        app-signaling-bandwidth        0
        tolerance-window               30
        rtcp-rate-limit                0
        trap-on-demote-to-deny         disabled
        min-media-allocation           2000
        min-trusted-allocation         4000
        deny-allocation                64000
        anonymous-sdp                  disabled
        arp-msg-bandwidth              32000
        fragment-msg-bandwidth         0
        rfc2833-timestamp              disabled
        default-2833-duration          100
        rfc2833-end-pkts-only-for-non-sig enabled
        translate-non-rfc2833-event    disabled
        media-supervision-traps        disabled
        dnsalg-server-failover         disabled
```

Configure Realms

To configure the realm values, use the **realm-config** command under the media-manager branch. To enter the media-manager branch from media-manager-config, you issue the **exit** command, followed by the **realm-config** command.

You will create two realms:

- The ECB- Peer, which represents the ECB-facing (inside) network; and
- The SIP-trunk, which represents the gateway-facing (outside) network.

```
ORACLE-SBC(media-manager-config)# exit
ORACLE-SBC(media-manager)# realm-config
ORACLE-SBC(realm-config)# identifier ECB-Peer
ORACLE-SBC(realm-config)# description "ECB-facing(Inside)"
ORACLE-SBC(realm-config)# network-interfaces s1p0:0
ORACLE-SBC(realm-config)# done

realm-config
        identifier                      ECB-Peer
        description                     ECB-facing(Inside)
        addr-prefix                     0.0.0.0
        network-interfaces
                                        s1p0:0
        mm-in-realm                     enabled
        mm-in-network                   enabled
        mm-same-ip                      enabled
        mm-in-system                    enabled
        bw-cac-non-mm                   disabled
        msm-release                     disabled
        qos-enable                      disabled
        generate-UDP-checksum           disabled
        max-bandwidth                   0
        fallback-bandwidth              0
        max-priority-bandwidth          0
        max-latency                     0
        max-jitter                      0
        max-packet-loss                 0
        observ-window-size              0
        parent-realm
        dns-realm
        media-policy
        media-sec-policy
        in-translationid
        out-translationid
        in-manipulationid
        out-manipulationid
        manipulation-string
```

```
        manipulation-pattern
        class-profile
        average-rate-limit              0
        access-control-trust-level      none
        invalid-signal-threshold        0
        maximum-signal-threshold        0
        untrusted-signal-threshold      0
        nat-trust-threshold             0
        deny-period                     30
        cac-failure-threshold           0
        untrust-cac-failure-threshold   0
        ext-policy-svr
        diam-e2-address-realm
        symmetric-latching              disabled
        pai-strip                       disabled
        trunk-context
        early-media-allow
        enforcement-profile
        additional-prefixes
        restricted-latching             none
        restriction-mask                32
        accounting-enable               enabled
        user-cac-mode                   none
        user-cac-bandwidth              0
        user-cac-sessions               0
        icmp-detect-multiplier          0
        icmp-advertisement-interval     0
        icmp-target-ip
        monthly-minutes                 0
        net-management-control          disabled
        delay-media-update              disabled
        refer-call-transfer             disabled
        dyn-refer-term                  disabled
        codec-policy
        codec-manip-in-realm            disabled
        codec-manip-in-network          disabled
        constraint-name
        call-recording-server-id
        xnq-state                       xnq-unknown
        hairpin-id                      0
        stun-enable                     disabled
```

```
        stun-server-ip                  0.0.0.0
        stun-server-port                3478
        stun-changed-ip                 0.0.0.0
        stun-changed-port               3479
        match-media-profiles
        qos-constraint
        sip-profile
        sip-isup-profile
        block-rtcp                      disabled
        hide-egress-media-update        disabled
```

You will now configure the realm for SIP Trunk side of the E-SBC, specifying the appropriate values.

```
ORACLE-SBC(realm-config)# identifier SIP-trunk
ORACLE-SBC(realm-config)# description "Gateway(Outside)"
ORACLE-SBC(realm-config)# network-interfaces s0p0:0
ORACLE-SBC(realm-config)# done

realm-config
        identifier                      SIP-trunk
        description                     Gateway(Outside)
        addr-prefix                     0.0.0.0
        network-interfaces
                                        s0p0:0
        mm-in-realm                     enabled
        mm-in-network                   enabled
        mm-same-ip                      enabled
        mm-in-system                    enabled
        bw-cac-non-mm                   disabled
        msm-release                     disabled
        qos-enable                      disabled
        generate-UDP-checksum           disabled
        max-bandwidth                   0
        fallback-bandwidth              0
        max-priority-bandwidth          0
        max-latency                     0
        max-jitter                      0
        max-packet-loss                 0
        observ-window-size              0
        parent-realm
        dns-realm
        media-policy
```

```
media-sec-policy
in-translationid
out-translationid
in-manipulationid
out-manipulationid
manipulation-string
manipulation-pattern
class-profile
average-rate-limit              0
access-control-trust-level      none
invalid-signal-threshold        0
maximum-signal-threshold        0
untrusted-signal-threshold      0
nat-trust-threshold             0
deny-period                     30
cac-failure-threshold           0
untrust-cac-failure-threshold   0
ext-policy-svr
diam-e2-address-realm
symmetric-latching              disabled
pai-strip                       disabled
trunk-context
early-media-allow
enforcement-profile
additional-prefixes
restricted-latching             none
restriction-mask                32
accounting-enable               enabled
user-cac-mode                   none
user-cac-bandwidth              0
user-cac-sessions               0
icmp-detect-multiplier          0
icmp-advertisement-interval     0
icmp-target-ip
monthly-minutes                 0
net-management-control          disabled
delay-media-update              disabled
refer-call-transfer             disabled
dyn-refer-term                  disabled
codec-policy
codec-manip-in-realm            disabled
```

```
        codec-manip-in-network         disabled
        constraint-name
        call-recording-server-id
        xnq-state                      xnq-unknown
        hairpin-id                     0
        stun-enable                    disabled
        stun-server-ip                 0.0.0.0
        stun-server-port               3478
        stun-changed-ip                0.0.0.0
        stun-changed-port              3479
        match-media-profiles
        qos-constraint
        sip-profile
        sip-isup-profile
        block-rtcp                     disabled
        hide-egress-media-update       disabled
```

Configure E-SBC redundancy configuration

To configure the E-SBC redundancy configuration, use the **`redundancy-config`** command under **`system`** element.

```
ORACLE-SBC(realm-config)# exit
ORACLE-SBC(media-manager)# exit
ORACLE-SBC(configure)# system
ORACLE-SBC(system)# redundancy
ORACLE-SBC(redundancy)# state enabled
ORACLE-SBC(redundancy)# peer
ORACLE-SBC(rdncy-peer)# name Oracle-SBC
ORACLE-SBC(rdncy-peer)# state enabled
ORACLE-SBC(rdncy-peer)# type Primary
ORACLE-SBC(rdncy-peer)# destination
ORACLE-SBC(rdncy-peer-dest)# address 169.254.1.1:9090
ORACLE-SBC(rdncy-peer-dest)# network-interface wancom1:0
ORACLE-SBC(rdncy-peer-dest)# done
destination
    address                        169.254.1.1:9090
    network-interface              wancom1:0
ORACLE-SBC(rdncy-peer-dest)# address 169.254.2.1:9090
ORACLE-SBC(rdncy-peer-dest)# network-interface wancom2:0
ORACLE-SBC(rdncy-peer-dest)# done
destination
    address                        169.254.2.1:9090
    network-interface              wancom2:0
```

```
ORACLE-SBC(rdncy-peer-dest)# exit
ORACLE-SBC(rdncy-peer)# done
peer
    name                            Oracle-SBC
    state                           enabled
    type                            Primary
    destination
          address                         169.254.1.1:9090
          network-interface               wancom1:0
    destination
          address                         169.254.2.1:9090
          network-interface               wancom2:0
ORACLE-SBC(rdncy-peer)# name SN1Secondary
ORACLE-SBC(rdncy-peer)# state enabled
ORACLE-SBC(rdncy-peer)# type Secondary
ORACLE-SBC(rdncy-peer)# destination
ORACLE-SBC(rdncy-peer-dest)# address 169.254.1.2:9090
ORACLE-SBC(rdncy-peer-dest)# network-interface wancom1:0
ORACLE-SBC(rdncy-peer-dest)# done
destination
    address                         169.254.1.2:9090
    network-interface               wancom1:0
ORACLE-SBC(rdncy-peer-dest)# address 169.254.2.2:9090
ORACLE-SBC(rdncy-peer-dest)# network-interface wancom2:0
ORACLE-SBC(rdncy-peer-dest)# done
destination
    address                         169.254.2.2:9090
    network-interface               wancom2:0
ORACLE-SBC(rdncy-peer-dest)# exit
ORACLE-SBC(rdncy-peer)# done
peer
    name                            SN1Secondary
    state                           enabled
    type                            Secondary
    destination
          address                         169.254.1.2:9090
          network-interface               wancom1:0
    destination
          address                         169.254.2.2:9090
          network-interface               wancom2:0
ORACLE-SBC(rdncy-peer)# exit
```

```
ORACLE-SBC(redundancy)# done
redundancy-config
        state                          enabled
        log-level                      INFO
        health-threshold               75
        emergency-threshold            50
        port                           9090
        advertisement-time             500
        percent-drift                  210
        initial-time                   1250
        becoming-standby-time          180000
        becoming-active-time           100
        cfg-port                       1987
        cfg-max-trans                  10000
        cfg-sync-start-time            5000
        cfg-sync-comp-time             1000
        gateway-heartbeat-interval     10
        gateway-heartbeat-retry        3
        gateway-heartbeat-timeout      1
        gateway-heartbeat-health       1
        media-if-peercheck-time        0
        peer
                name                           SN1Secondary
                state                          enabled
                type                           Secondary
                destination
                        address                        169.254.1.2:9090
                        network-interface              wancom1:0
                destination
                        address                        169.254.2.2:9090
                        network-interface              wancom2:0
        peer
                name                           Oracle-SBC
                state                          enabled
                type                           Primary
                destination
                        address                        169.254.1.1:9090
                        network-interface              wancom1:0
                destination
                        address                        169.254.2.1:9090
                        network-interface              wancom2:0
```

```
ORACLE-SBC(redundancy)# exit
```

Configure SIP signaling configuration

To configure the SIP signaling values, use the **sip-interface** command under the session-router branch. To enter the session-router branch from realm-config, you issue the **exit** command twice, followed by the **sip-interface** command.

Here you will be configuring the IP addresses and TCP ports on which the E-SBC will listen for and transmit SIP messages. These will be the same IP addresses as configured on the associated network-interface elements.

```
ORACLE-SBC(realm-config)# exit
ORACLE-SBC(media-manager)# exit
ORACLE-SBC(configure)# session-router
ORACLE-SBC(session-router)# sip-interface
ORACLE-SBC(sip-interface)# realm SIP-trunk
ORACLE-SBC(sip-interface)# description "SIP Trunk-facing (Outside)"
ORACLE-SBC(sip-interface)# sip-ports
ORACLE-SBC(sip-port)# address 192.20.0.108
ORACLE-SBC(sip-port)# done

sip-port
address                        192.20.0.108
port                           5060
transport-protocol             UDP
tls-profile
allow-anonymous                all
ims-aka-profile

ORACLE-SBC(sip-port)# exit
ORACLE-SBC(sip-interface)# done

sip-interface
        state                          enabled
        realm-id                       SIP-trunk
        description                    SIP Trunk-facing (Outside)
        sip-port
                address                        192.20.0.108
                port                           5060
                transport-protocol             UDP
                tls-profile
                allow-anonymous                all
                ims-aka-profile
        carriers
```

```
trans-expire                   0
invite-expire                  0
max-redirect-contacts          0
proxy-mode
redirect-action
contact-mode                   none
nat-traversal                  none
nat-interval                   30
tcp-nat-interval               90
registration-caching           disabled
min-reg-expire                 300
registration-interval          3600
route-to-registrar             disabled
secured-network                disabled
teluri-scheme                  disabled
uri-fqdn-domain
options
trust-mode                     all
max-nat-interval               3600
nat-int-increment              10
nat-test-increment             30
sip-dynamic-hnt                disabled
stop-recurse                   401,407
port-map-start                 0
port-map-end                   0
in-manipulationid
out-manipulationid
manipulation-string
manipulation-pattern
sip-ims-feature                disabled
operator-identifier
anonymous-priority             none
max-incoming-conns             0
per-src-ip-max-incoming-conns  0
inactive-conn-timeout          0
untrusted-conn-timeout         0
network-id
ext-policy-server
default-location-string
charging-vector-mode           pass
charging-function-address-mode pass
```

```
        ccf-address
        ecf-address
        term-tgrp-mode                 none
        implicit-service-route         disabled
        rfc2833-payload                101
        rfc2833-mode                   transparent
        constraint-name
        response-map
        local-response-map
        ims-aka-feature                disabled
        enforcement-profile
        route-unauthorized-calls
        tcp-keepalive                  none
        add-sdp-invite                 disabled
        add-sdp-profiles
        sip-profile
        sip-isup-profile
```

You will now configure the ECB-facing SIP interface.

```
ORACLE-SBC(sip-interface)# realm-id ECB-Peer
ORACLE-SBC(sip-interface)# description "ECB-Facing(Inside)"
ORACLE-SBC(sip-interface)# sip-ports
ORACLE-SBC(sip-port)# address 192.168.1.130
ORACLE-SBC(sip-port)# transport-protocol TCP
ORACLE-SBC(sip-port)# done
sip-port
address                        192.168.1.130
port                           5060
transport-protocol             TCP
tls-profile
allow-anonymous                all
ims-aka-profile

ORACLE-SBC(sip-port)# exit
ORACLE-SBCORACLE-SBC(sip-interface)# done

sip-interface
        state                          enabled
        realm-id                       ECB-Peer
        description                    ECB-Facing(Inside)
        sip-port
```

```
        address                         192.168.1.130
        port                            5060
        transport-protocol              TCP
        tls-profile
        allow-anonymous                 all
        ims-aka-profile
carriers
trans-expire                    0
invite-expire                   0
max-redirect-contacts           0
proxy-mode
redirect-action
contact-mode                    none
nat-traversal                   none
nat-interval                    30
tcp-nat-interval                90
registration-caching            disabled
min-reg-expire                  300
registration-interval           3600
route-to-registrar              disabled
secured-network                 disabled
teluri-scheme                   disabled
uri-fqdn-domain
trust-mode                      all
max-nat-interval                3600
nat-int-increment               10
nat-test-increment              30
sip-dynamic-hnt                 disabled
stop-recurse                    401,407
port-map-start                  0
port-map-end                    0
in-manipulationid
out-manipulationid
manipulation-string
manipulation-pattern
sip-ims-feature                 disabled
operator-identifier
anonymous-priority              none
max-incoming-conns              0
per-src-ip-max-incoming-conns   0
inactive-conn-timeout           0
```

```
        untrusted-conn-timeout         0
        network-id
        ext-policy-server
        default-location-string
        charging-vector-mode           pass
        charging-function-address-mode pass
        ccf-address
        ecf-address
        term-tgrp-mode                 none
        implicit-service-route         disabled
        rfc2833-payload                101
        rfc2833-mode                   transparent
        constraint-name
        response-map
        local-response-map
        ims-aka-feature                disabled
        enforcement-profile
        route-unauthorized-calls
        tcp-keepalive                  none
        add-sdp-invite                 disabled
        add-sdp-profiles
        sip-profile
        sip-isup-profile
```

Configure Next-hop signaling configuration

To configure the next-hop signaling elements (i.e., the ECB and PSTN gateway) you define session-agents. Use the **session-agent** command under the session-router branch. To enter the session-router branch from sip-interface, you issue the **exit** command, followed by the **session-agent** command.

Here you will be configuring the IP addresses and TCP ports to which the E-SBC will send and from which it will expect to receive SIP messages for your next-hop signaling elements.

We will first configure the PSTN gateway.

```
ORACLE-SBCORACLE-SBC(sip-interface)# exit
ORACLE-SBC(session-router)# hostname 10.10.1.8
ORACLE-SBC(session-router)# ip-address 10.10.1.8
ORACLE-SBC(session-router)# port 5060
ORACLE-SBC(session-router)# realm-id SIP-trunk
ORACLE-SBC(session-router)# done
```

```
session-agent
        hostname                          10.10.1.8
        ip-address                        10.10.1.8
        port                              5060
        state                             enabled
        app-protocol                      SIP
        app-type
        transport-method                  UDP
        realm-id                          SIP-trunk
        egress-realm-id
        description
        carriers
        allow-next-hop-lp                 enabled
        constraints                       disabled
        max-sessions                      0
        max-inbound-sessions              0
        max-outbound-sessions             0
        max-burst-rate                    0
        max-inbound-burst-rate            0
        max-outbound-burst-rate           0
        max-sustain-rate                  0
        max-inbound-sustain-rate          0
        max-outbound-sustain-rate         0
        min-seizures                      5
        min-asr                           0
        time-to-resume                    0
        ttr-no-response                   0
        in-service-period                 0
        burst-rate-window                 0
        sustain-rate-window               0
        req-uri-carrier-mode              None
        proxy-mode
        redirect-action
        loose-routing                     enabled
        send-media-session                enabled
        response-map
        ping-method
        ping-interval                     0
        ping-send-mode                    keep-alive
        ping-all-addresses                disabled
        ping-in-service-response-codes
```

```
        out-service-response-codes
        media-profiles
        in-translationid
        out-translationid
        trust-me                       disabled
        request-uri-headers
        stop-recurse
        local-response-map
        ping-to-user-part
        ping-from-user-part
        li-trust-me                    disabled
        in-manipulationid
        out-manipulationid
        manipulation-string
        manipulation-pattern
        p-asserted-id
        trunk-group
        max-register-sustain-rate      0
        early-media-allow
        invalidate-registrations       disabled
        rfc2833-mode                   none
        rfc2833-payload                0
        codec-policy
        enforcement-profile
        refer-call-transfer            disabled
        reuse-connections              NONE
        tcp-keepalive                  none
        tcp-reconn-interval            0
        max-register-burst-rate        0
        register-burst-window          0
        sip-profile
        sip-isup-profile
```

We will now configure the ECB as the second session agent.

```
ORACLE-SBC(session-router)# ip-address 192.168.1.90
ORACLE-SBC(session-router)# port 5060
ORACLE-SBC(session-router)# realm-id ECB-Peer
ORACLE-SBC(session-router)# transport-method StaticTCP
ORACLE-SBC(session-router)# ping-method OPTIONS+hops=0
Oracle-SBC(session-agent)# refer-call-transfer enabled
ORACLE-SBC(session-router)# done
```

```
session-agent
        hostname
        ip-address                     192.168.1.90
        port                           5060
        state                          enabled
        app-protocol                   SIP
        app-type
        transport-method               StaticTCP
        realm-id                       ECB-Peer
        egress-realm-id
        description
        carriers
        allow-next-hop-lp              enabled
        constraints                    disabled
        max-sessions                   0
        max-inbound-sessions           0
        max-outbound-sessions          0
        max-burst-rate                 0
        max-inbound-burst-rate         0
        max-outbound-burst-rate        0
        max-sustain-rate               0
        max-inbound-sustain-rate       0
        max-outbound-sustain-rate      0
        min-seizures                   5
        min-asr                        0
        time-to-resume                 0
        ttr-no-response                0
        in-service-period              0
        burst-rate-window              0
        sustain-rate-window            0
        req-uri-carrier-mode           None
        proxy-mode
        redirect-action
        loose-routing                  enabled
        send-media-session             enabled
        response-map
        ping-method                    OPTIONS;hops=0
        ping-interval                  30
        ping-send-mode                 keep-alive
        ping-all-addresses             disabled
```

```
ping-in-service-response-codes
out-service-response-codes
media-profiles
in-translationid
out-translationid
trust-me                       disabled
request-uri-headers
stop-recurse
local-response-map
ping-to-user-part
ping-from-user-part
li-trust-me                    disabled
in-manipulationid
out-manipulationid
manipulation-string
manipulation-pattern
p-asserted-id
trunk-group
max-register-sustain-rate      0
early-media-allow
invalidate-registrations       disabled
rfc2833-mode                   none
rfc2833-payload                0
codec-policy
enforcement-profile
refer-call-transfer            enabled
reuse-connections              NONE
tcp-keepalive                  none
tcp-reconn-interval            0
max-register-burst-rate        0
register-burst-window          0
sip-profile
sip-isup-profile
```

Configure SIP routing

To configure the SIP routing, use the **`local-policy`** command under the session-router branch. To enter the session-router branch from session-agent, you issue the **`exit`** command, followed by the **`local-policy`** command.

We will first configure the route from the gateway to the ECB.

```
ORACLE-SBC(session-agent)# exit
ORACLE-SBC(session-router)# local-policy
ORACLE-SBC(local-policy)# from-address *
ORACLE-SBC(local-policy)# to-address *
ORACLE-SBC(local-policy)# source-realm SIP-trunk
ORACLE-SBC(local-policy)# policy-attributes
ORACLE-SBC(local-policy-attributes)#next-hop 192.168.1.90
ORACLE-SBC(local-policy-attributes)# realm ECB-Peer
ORACLE-SBC(local-policy-attributes)# app-protocol sip
ORACLE-SBC(local-policy-attributes)# done

policy-attribute
              next-hop                       192.168.1.90
              realm                          ECB-Peer
              action                         none
              terminate-recursion            disabled
              carrier
              start-time                     0000
              end-time                       2400
              days-of-week                   U-S
              cost                           0
              app-protocol                   SIP
              state                          enabled
              methods
              media-profiles
              lookup                         single
              next-key
              eloc-str-lkup                  disabled
              eloc-str-match

ORACLE-SBC(local-policy-attributes)# exit
ORACLE-SBC(local-policy)# done
local-policy
        from-address
                                      *
        to-address
                                      *
        source-realm
                                      SIP-trunk
        description
        activate-time                 N/A
```

```
        deactivate-time                N/A
        state                          enabled
        policy-priority                none

        policy-attribute
                next-hop                       192.168.1.90
                realm                          ECB-Peer
                action                         none
                terminate-recursion            disabled
                carrier
                start-time                     0000
                end-time                       2400
                days-of-week                   U-S
                cost                           0
                app-protocol                   SIP
                state                          enabled
                methods
                media-profiles
                lookup                         single
                next-key
                eloc-str-lkup                  disabled
                eloc-str-match
```

We will first configure the route from the ECB to the gateway.

```
ORACLE-SBC(local-policy)# from-address *
ORACLE-SBC(local-policy)# to-address *
ORACLE-SBC(local-policy)# source-realm ECB-Peer
ORACLE-SBC(local-policy)# policy-attributes
ORACLE-SBC(local-policy-attributes)# next-hop 10.10.1.8
ORACLE-SBC(local-policy-attributes)# realm SIP-trunk
ORACLE-SBC(local-policy-attributes)# app-protocol sip
ORACLE-SBC(local-policy-attributes)# done
policy-attribute
       next-hop                       10.10.1.8
       realm                          SIP-trunk
       action                         none
       terminate-recursion            disabled
       carrier
       start-time                     0000
       end-time                       2400
       days-of-week                   U-S
```

```
        cost                           0
        app-protocol                   SIP
        state                          enabled
        methods
        media-profiles
        lookup                         single
        next-key
        eloc-str-lkup                  disabled
        eloc-str-match

ORACLE-SBC(local-policy-attributes)# exit
ORACLE-SBC(local-policy)# done

local-policy
        from-address
                                       *
        to-address
                                       *
        source-realm
                                       ECB-Peer
        description
        activate-time                  N/A
        deactivate-time                N/A
        state                          enabled
        policy-priority                none
        last-modified-by               admin@172.41.0.11
        last-modified-date             2012-03-06 11:43:03
        policy-attribute
                next-hop                       10.10.1.8
                realm                          SIP-trunk
                action                         none
                terminate-recursion            disabled
                carrier
                start-time                     0000
                end-time                       2400
                days-of-week                   U-S
                cost                           0
                app-protocol
                state                          enabled
                methods
                media-profiles
```

```
                lookup                          single
                next-key
                eloc-str-lkup                   disabled
                eloc-str-match
```

We will need a route to handle call transfer and refer scenarios (local refer handling by the E-SBC) when Lync client 1 refers/transfers the call to Lync Client 2.

```
local-policy
        from-address
                                       *
        to-address
                                       192.168.1.90
        source-realm
                                       SIP-trunk
        description                    For referred party header
        activate-time                  N/A
        deactivate-time                N/A
        state                          enabled
        policy-priority                none
        last-modified-by               admin@console
        last-modified-date             2012-02-28 13:05:51
        policy-attribute
                next-hop                        192.168.1.90
                realm                           ECB-Peer
                action                          replace-uri
                terminate-recursion             disabled
                carriers
                start-time                      0000
                end-time                        2400
                days-of-week                    U-S
                cost                            0
                app-protocol                    SIP
                state                           enabled
                methods
                media-profiles
                lookup                          single
                next-key
                eloc-str-lkup                   disabled
                eloc-str-match
```

Configure Media handling

To configure the media handling, use the **steering-pool** command under the media-manager branch. To enter the steering-pool branch from local-policy, you issue the **exit** command twice, followed by the **media-manager** then the **steering-pool** command.

You will use the same IP address for the steering pool as the one used for the SIP interface. Note that the port ranges provide a means of limiting the number of concurrent media sessions within a given realm. For example, assigning 100 ports to a realm would limit it to 50 concurrent bidirectional calls, where two ports are assigned (one per unidirectional media stream).

```
ORACLE-SBC(local-policy)# exit
ORACLE-SBC(session-router)# exit
ORACLE-SBC(configure)# media-manager
ORACLE-SBC(media-manager)# steering-pool
ORACLE-SBC(steering-pool)# ip-address 192.168.1.130
ORACLE-SBC(steering-pool)# start-port 30000
ORACLE-SBC(steering-pool)# end-port 40000
ORACLE-SBC(steering-pool)# realm-id ECB-Peer
ORACLE-SBC(steering-pool)# network-interface s1p0:0
ORACLE-SBC(steering-pool)# done
steering-pool
        ip-address                    192.168.1.130
        start-port                    30000
        end-port                      40000
        realm-id                      ECB-Peer
        network-interface             s1p0:0
```

You will now configure the media handling for the pstn realm

```
ORACLE-SBC(steering-pool)# ip-address 192.20.0.108
ORACLE-SBC(steering-pool)# start-port 40000
ORACLE-SBC(steering-pool)# end-port 50000
ORACLE-SBC(steering-pool)# realm-id SIP-trunk
ORACLE-SBC(steering-pool)# network-interface s0p0:0
ORACLE-SBC(steering-pool)# done
steering-pool
        ip-address                    192.20.0.108
        start-port                    40000
        end-port                      50000
        realm-id                      SIP-trunk
        network-interface             s0p0:0
```

Configure Sip-manipulations and translation rules

To ensure that the E-SBC is doing topology hiding and replacing host-portions in SIP URIs of From and To headers, a sip manipulation will need to be created and configured as the out-manipulation id on the sip-interface.

The sip-manipulation element can be found under the session-router element.

```
sip-manipulation
     name                                    NATting
     description
     split-headers
     join-headers
     header-rule
             name                                    From
             header-name                             From
             action                                  manipulate
             comparison-type                         case-sensitive
             msg-type                                any
             methods
             match-value
             new-value
             element-rule
                     name                                    From_header
                     parameter-name
                     type                                    uri-host
                     action                                  replace
                     match-val-type                          any
                     comparison-type                         case-sensitive
                     match-value
                     new-value                               $LOCAL_IP
     header-rule
             name                                    To
             header-name                             To
             action                                  manipulate
             comparison-type                         case-sensitive
             msg-type                                request
             methods
             match-value
             new-value
             element-rule
                     name                                    To
                     parameter-name
                     type                                    uri-host
                     action                                  replace
                     match-val-type                          any
                     comparison-type                         case-sensitive
                     match-value
                     new-value                               $REMOTE_IP
```

The sip-manipulation then needs to be applied on the realm or sip-interface or session-agent towards the trunk and ECB side. We apply it on the sip-interface here:

```
ORACLE-SBC(session-router)# sip-interface
Oracle-SBC(sip-interface)# sel
<realm-id>:
1: ECB-Peer  192.168.1.130:5060
2: SIP-trunk 192.20.0.108:5060

selection: 2
Oracle-SBC(sip-interface)# out-manipulationid NATting
Oracle-SBC(sip-interface)# done

sip-interface
        state                          enabled
        realm-id                       SIP-trunk
        description                    SIP Trunk-facing (Outside)
        sip-port
                address                        192.20.0.108
                port                           5060
                transport-protocol             UDP
                tls-profile
                allow-anonymous                all
                ims-aka-profile
        carriers
        trans-expire                   0
        invite-expire                  0
        max-redirect-contacts          0
        proxy-mode
        redirect-action
        contact-mode                   none
        nat-traversal                  none
        nat-interval                   30
        tcp-nat-interval               90
        registration-caching           disabled
        min-reg-expire                 300
        registration-interval          3600
        route-to-registrar             disabled
        secured-network                disabled
        teluri-scheme                  disabled
        uri-fqdn-domain
        options
```

```
        trust-mode                      all
        max-nat-interval                3600
        nat-int-increment               10
        nat-test-increment              30
        sip-dynamic-hnt                 disabled
        stop-recurse                    401,407
        port-map-start                  0
        port-map-end                    0
        in-manipulationid
        out-manipulationid              NATting
        manipulation-string
        manipulation-pattern
        sip-ims-feature                 disabled
        operator-identifier
        anonymous-priority              none
        max-incoming-conns              0
        per-src-ip-max-incoming-conns   0
        inactive-conn-timeout           0
        untrusted-conn-timeout          0
        network-id
        ext-policy-server
        default-location-string
        charging-vector-mode            pass
        charging-function-address-mode pass
        ccf-address
        ecf-address
        term-tgrp-mode                  none
        implicit-service-route          disabled
        rfc2833-payload                 101
        rfc2833-mode                    transparent
        constraint-name
        response-map
        local-response-map
        ims-aka-feature                 disabled
        enforcement-profile
        route-unauthorized-calls
        tcp-keepalive                   none
        add-sdp-invite                  disabled
        add-sdp-profiles
        sip-profile
        sip-isup-profile
```

```
ORACLE-SBC(session-router)# sip-interface
Oracle-SBC(sip-interface)# sel
<realm-id>:
1: ECB-Peer  192.168.1.130:5060
2: SIP-trunk 192.20.0.108:5060

selection: 1
Oracle-SBC(sip-interface)# out-manipulationid NATting
Oracle-SBC(sip-interface)# done


sip-interface
        state                          enabled
        realm-id                       ECB-Peer
        description                    ECB-Facing(Inside)
        sip-port
                address                        192.168.1.130
                port                           5060
                transport-protocol             TCP
                tls-profile
                allow-anonymous                all
                ims-aka-profile
        carriers
        trans-expire                   0
        invite-expire                  0
        max-redirect-contacts          0
        proxy-mode
        redirect-action
        contact-mode                   none
        nat-traversal                  none
        nat-interval                   30
        tcp-nat-interval               90
        registration-caching           disabled
        min-reg-expire                 300
        registration-interval          3600
        route-to-registrar             disabled
        secured-network                disabled
        teluri-scheme                  disabled
        uri-fqdn-domain
        trust-mode                     all
        max-nat-interval               3600
```

```
        nat-int-increment                10
        nat-test-increment               30
        sip-dynamic-hnt                  disabled
        stop-recurse                     401,407
        port-map-start                   0
        port-map-end                     0
        in-manipulationid
        out-manipulationid               NATting
        manipulation-string
        manipulation-pattern
        sip-ims-feature                  disabled
        operator-identifier
        anonymous-priority               none
        max-incoming-conns               0
        per-src-ip-max-incoming-conns    0
        inactive-conn-timeout            0
        untrusted-conn-timeout           0
        network-id
        ext-policy-server
        default-location-string
        charging-vector-mode             pass
        charging-function-address-mode pass
        ccf-address
        ecf-address
        term-tgrp-mode                   none
        implicit-service-route           disabled
        rfc2833-payload                  101
        rfc2833-mode                     transparent
        constraint-name
        response-map
        local-response-map
        ims-aka-feature                  disabled
        enforcement-profile
        route-unauthorized-calls
        tcp-keepalive                    none
        add-sdp-invite                   disabled
        add-sdp-profiles
        sip-profile
        sip-isup-profile
```

Lync does send E164 numbers in the To and From headers whereas the trunk does not accept E164 numbers. Hence we need a translation rule on the E-SBC to translate the E164 phone numbers into a regular one by stripping off the +1 from the phone numbers. The translation rule then needs to be added on the session-translation which then gets called from the trunk session-agent.

```
Oracle-SBC(sip-interface)# exit
Oracle-SBC(session-router)# translation-rules
Oracle-SBC(translation-rules)# id stripplus1
Oracle-SBC(translation-rules)# type delete
Oracle-SBC(translation-rules)# delete-string +1
Oracle-SBC(translation-rules)# done

translation-rules
        id                             stripplus1
        type                           delete
        add-string
        add-index                      0
        delete-string                  +1
        delete-index                   0

Oracle-SBC(translation-rules)# exit
Oracle-SBC(session-router)# session-translation
Oracle-SBC(session-translation)# id stripplus1
Oracle-SBC(session-translation)# rules-calling stripplus1
Oracle-SBC(session-translation)# rules-called stripplus1
Oracle-SBC(session-translation)# done

session-translation
        id                             stripplus1
        rules-calling                  stripplus1
        rules-called                   stripplus1
        last-modified-by               admin@console
        last-modified-date             2012-01-26 18:28:59

Oracle-SBC(session-translation)# exit
Oracle-SBC(session-router)# session-agent
Oracle-SBC(session-agent)# sel
<hostname>:
1: 10.10.1.8                 realm=SIP-trunk
2: 192.168.1.130             realm=ECB-Lync-Peer  ip=192.168.1.130
```

```
selection: 1
Oracle-SBC(session-agent)# out-translationid stripplus1
Oracle-SBC(session-agent)# done

session-agent
        hostname                        10.10.1.8
        ip-address                      10.10.1.8
        port                            5060
        state                           enabled
        app-protocol                    SIP
        app-type
        transport-method                UDP
        realm-id                        SIP-trunk
        egress-realm-id
        description
        carriers
        allow-next-hop-lp               enabled
        constraints                     disabled
        max-sessions                    0
        max-inbound-sessions            0
        max-outbound-sessions           0
        max-burst-rate                  0
        max-inbound-burst-rate          0
        max-outbound-burst-rate         0
        max-sustain-rate                0
        max-inbound-sustain-rate        0
        max-outbound-sustain-rate       0
        min-seizures                    5
        min-asr                         0
        time-to-resume                  0
        ttr-no-response                 0
        in-service-period               0
        burst-rate-window               0
        sustain-rate-window             0
        req-uri-carrier-mode            None
        proxy-mode
        redirect-action
        loose-routing                   enabled
        send-media-session              enabled
        response-map
```

```
ping-method
ping-interval                  0
ping-send-mode                 keep-alive
ping-all-addresses             disabled
ping-in-service-response-codes
out-service-response-codes
media-profiles
in-translationid
out-translationid              stripplus1
trust-me                       disabled
request-uri-headers
stop-recurse
local-response-map
ping-to-user-part
ping-from-user-part
li-trust-me                    disabled
in-manipulationid
out-manipulationid             NATting
manipulation-string
manipulation-pattern
p-asserted-id
trunk-group
max-register-sustain-rate      0
early-media-allow
invalidate-registrations       disabled
rfc2833-mode                   none
rfc2833-payload                0
codec-policy
enforcement-profile
refer-call-transfer            disabled
reuse-connections              NONE
tcp-keepalive                  none
tcp-reconn-interval            0
max-register-burst-rate        0
register-burst-window          0
sip-profile
sip-isup-profile
```

Configure SIP PRACK Interworking

In order to establish an early media session for outbound calls, Lync Server gateway specification mandates the PSTN gateways to offer a reliable provisional response and for inbound calls offer INVITEs with a supported header The E-SBC can interwork and provide RFC 3262 PRACK interworking towards Lync and it is a mandatory configuration in all Oracle – Microsoft Lync deployments. For this, the following need to be configured

- Configure option 100rel-inerwokring on the sip-interface facing ECB
- Configure a sip-feature to pass the 100-rel in Supported and Required headers
- Configure a sip-manipulation to add a Require:100rel header in incoming SIP INVITE from mediation server and delete the Supported:100rel header.

```
ORACLE-SBC(session-router)# sip-interface
Oracle-SBC(sip-interface)# sel
<realm-id>:
1: ECB-Peer  192.168.1.130:5060
2: SIP-trunk 192.20.0.108:5060

selection: 1
Oracle-SBC(sip-interface)# options 100rel-interworking
Oracle-SBC(sip-interface)# done


sip-interface
        state                          enabled
        realm-id                       ECB-Peer
        description                    ECB-Facing(Inside)
        sip-port
                address                        192.168.1.130
                port                           5060
                transport-protocol             TCP
                tls-profile
                allow-anonymous                all
                ims-aka-profile
        carriers
        trans-expire                   0
        invite-expire                  0
        max-redirect-contacts          0
        proxy-mode
        redirect-action
```

```
contact-mode                      none
nat-traversal                     none
nat-interval                      30
tcp-nat-interval                  90
registration-caching              disabled
min-reg-expire                    300
registration-interval             3600
route-to-registrar                disabled
secured-network                   disabled
teluri-scheme                     disabled
uri-fqdn-domain
options                           100rel-interworking
trust-mode                        all
max-nat-interval                  3600
nat-int-increment                 10
nat-test-increment                30
sip-dynamic-hnt                   disabled
stop-recurse                      401,407
port-map-start                    0
port-map-end                      0
in-manipulationid
out-manipulationid                NATting
manipulation-string
manipulation-pattern
sip-ims-feature                   disabled
operator-identifier
anonymous-priority                none
max-incoming-conns                0
per-src-ip-max-incoming-conns     0
inactive-conn-timeout             0
untrusted-conn-timeout            0
network-id
ext-policy-server
default-location-string
charging-vector-mode              pass
charging-function-address-mode pass
ccf-address
ecf-address
term-tgrp-mode                    none
implicit-service-route            disabled
rfc2833-payload                   101
```

```
        rfc2833-mode                       transparent
        constraint-name
        response-map
        local-response-map
        ims-aka-feature                    disabled
        enforcement-profile
        route-unauthorized-calls
        tcp-keepalive                      none
        add-sdp-invite                     disabled
        add-sdp-profiles
        sip-profile
        sip-isup-profile
```

Configure Sip-feature to pass Supported and Require headers in SIP messages. The sip-feature element can be found under session-router.

```
ORACLE-SBC(session-router)#sip-feature
ORACLE-SBC(sip-feature)#name 100rel
ORACLE-SBC(sip-feature)#realm pstn
ORACLE-SBC(sip-feature)# support-mode-inbound Pass
ORACLE-SBC(sip-feature)# require-mode-inbound Pass
ORACLE-SBC(sip-feature)# proxy-require-mode-inbound Pass
ORACLE-SBC(sip-feature)# support-mode-outbound Pass
ORACLE-SBC(sip-feature)# require-mode-outbound Pass
ORACLE-SBC(sip-feature)# proxy-require-mode-outbound Pass
ORACLE-SBC(sip-feature)# done

sip-feature
       name                               100rel
       realm                              SIP-Trunk
       support-mode-inbound               Pass
       require-mode-inbound               Pass
       proxy-require-mode-inbound         Pass
       support-mode-outbound              Pass
       require-mode-outbound              Pass
       proxy-require-mode-outbound        Pass
```

Configure the sip-manipulation For early media to delete the Supported header and add the Required header and apply it as an in-manipulation in the interface facing ECB.

```
sip-manipulation
       name                           Forearlymedia
       description
       split-headers
       join-headers
       header-rule
              name                           delsupported
              header-name                    Supported
              action                         delete
              comparison-type                case-sensitive
              msg-type                       request
              methods                        INVITE
              match-value
              new-value
       header-rule
              name                           addrequireinINVITE
              header-name                    Require
              action                         add
              comparison-type                case-sensitive
              msg-type                       request
              methods                        INVITE
              new-value                      100rel


ORACLE-SBC(session-router)# sip-interface
Oracle-SBC(sip-interface)# sel
<realm-id>:
1: ECB-Peer  192.168.1.130:5060
2: SIP-trunk 192.20.0.108:5060

selection: 1
Oracle-SBC(sip-interface)# in-manipulationid Forearlymedia
Oracle-SBC(sip-interface)# done

sip-interface
        state                          enabled
        realm-id                       ECB-Peer
        description                    ECB-Facing(Inside)
        sip-port
                address                        192.168.1.130
```

```
        port                            5060
        transport-protocol              TCP
        tls-profile
        allow-anonymous                 all
        ims-aka-profile
carriers
trans-expire                    0
invite-expire                   0
max-redirect-contacts           0
proxy-mode
redirect-action
contact-mode                    none
nat-traversal                   none
nat-interval                    30
tcp-nat-interval                90
registration-caching            disabled
min-reg-expire                  300
registration-interval           3600
route-to-registrar              disabled
secured-network                 disabled
teluri-scheme                   disabled
uri-fqdn-domain
trust-mode                      all
max-nat-interval                3600
nat-int-increment               10
nat-test-increment              30
sip-dynamic-hnt                 disabled
stop-recurse                    401,407
port-map-start                  0
port-map-end                    0
in-manipulationid               Forearlymedia
out-manipulationid              NATting
manipulation-string
manipulation-pattern
sip-ims-feature                 disabled
operator-identifier
anonymous-priority              none
max-incoming-conns              0
per-src-ip-max-incoming-conns   0
inactive-conn-timeout           0
untrusted-conn-timeout          0
```

```
        network-id
        ext-policy-server
        default-location-string
        charging-vector-mode           pass
        charging-function-address-mode pass
        ccf-address
        ecf-address
        term-tgrp-mode                 none
        implicit-service-route         disabled
        rfc2833-payload                101
        rfc2833-mode                   transparent
        constraint-name
        response-map
        local-response-map
        ims-aka-feature                disabled
        enforcement-profile
        route-unauthorized-calls
        tcp-keepalive                  none
        add-sdp-invite                 disabled
        add-sdp-profiles
        sip-profile
        sip-isup-profile
```

Configuring REFER Handling for Transfers

Lync Server authorizes transfers of all Lync initiated calls whether it is Lync to Lync or Lync to PSTN. The E-SBC provides REFER handling by terminating the REFER from Lync and generating an INVITE for the referred party back towards the Lync Mediation server. Lync then process the INVITE, authorizes the call transfer and sends either a new INVITE (for calls transferred to PSTN) to the E- SBC or transfers call internally to the transferred Lync client

To handle the call transfer and refer scenarios – when Lync client 1 refers/transfers the call to Lync Client 2 or to a party on the PSTN, we will need a route to the ECB.

```
local-policy
        from-address                            *
        to-address                              192.168.1.90
        source-realm                            Trunk
        description                             For referred party
        activate-time
        deactivate-time
        state                                   enabled
        policy-priority                         none
```

```
        policy-attribute
                next-hop                                192.168.1.90
                realm                                   ECB-Peer
                action                                  replace-uri
                terminate-recursion                     disabled
                carrier
                start-time                              0000
                end-time                                2400
                days-of-week                            U-S
                cost                                    0
                state                                   enabled
                app-protocol                            SIP
                methods
                media-profiles
                lookup                                  single
                next-key
                eloc-str-lkup                           disabled
                eloc-str-match
```

Addressing No Ringback tone on Transfers

During call transfer to a PSTN party, the transfer completes but the calling party does not hear a ring back tone during the process of transfer. The INVITE Lync sends to the E-SBC to initiate the transfer contains the SDP attribute, a=inactive which is forwarded to the trunk and as a result of which the E-SBC cannot play the ring back tone to the original PSTN caller (while call is being transferred). A send only attribute is required for MoH and transfer scenarios for the calling party to be able to hear ringback or MoH when it is kept on hold. The E-SBC is able to signal appropriately towards the SIP trunk by changing the a=inactive SDP attribute in the INVITE to sendonly towards PSTN.

Sip manipulations are configured to make the necessary changes. The manipulation Changeinactosendonly is configured to change the SDP attribute from a=inactive to a=sendonly in the INVITEs sent to the calling party for transfer.

```
sip-manipulation
        name                            Changeinactosendonly
        description                     Change inactive to sendonly for transfer
        split-headers
        join-headers
        header-rule
                name                            changeSDP
                header-name                     Content-Type
                action                          manipulate
                comparison-type                 case-sensitive
                msg-type                        request
                methods                         INVITE
                match-value
                new-value
```

```
                 element-rule
                         name                              inacttosendonly
                         parameter-name                    application/sdp
                         type                              mime
                         action                            find-replace-all
                         match-val-type                    any
                         comparison-type                   pattern-rule
                         match-value                       a=inactive
                         new-value                         a=sendonly
```

The above manipulation is applied as a nested manip in the manipulation – Forearlymedia that is applied inbound on the sip-interface facing ECB.

```
sip-manipulation
       name                                       Forearlymedia
       description
       split-headers
       join-headers
       header-rule
               name                                        delsupported
               header-name                                 Supported
               action                                      delete
               comparison-type                             case-sensitive
               msg-type                                    request
               methods                                     INVITE
               match-value
               new-value
       header-rule
               name                                        addrequireinINVITE
               header-name                                 Require
               action                                      add
               comparison-type                             case-sensitive
               msg-type                                    request
               methods                                     INVITE
               match-value
               new-value                                   100rel
       header-rule
               name                                        inactosendonly
               header-name                                 From
               action                                      sip-manip
               comparison-type                             case-sensitive
               msg-type                                    request
               methods
               match-value
               new-value                                   Changeinactosendonly
```

We utilize the local playback feature of the E-SBC to play ring back tone during transfers. The ringback tone is played based on REFER. You must upload a file containing to /code/media on the E-SBC for the media you want played. This file must be raw media binary containing data for the desired codec. A separate file is required for each different codec type, even if the media itself is the same.

The playback configuration is defined listing the media files that you want to play. The playback-config element is configured under media-manager.

```
playback-config
        name                                transferrbt
        entry
                encoding                            PCMU
                filename                            US_ringbackPCMU.raw
                bytes-per-sec                       8000
```

The playback options can be applied to realms, sip-interfaces or session agents using the `spl-options` command.

```
    ORACLE-SBC(session-router)# sip-interface
Oracle-SBC(sip-interface)# sel
<realm-id>:
1: ECB-Peer  192.168.1.130:5060
2: SIP-trunk 192.20.0.108:5060

selection: 1
Oracle-SBC(sip-interface)# spl-options  playback-on-refer="transferrbt"
Oracle-SBC(sip-interface)# done


sip-interface
        state                         enabled
        realm-id                      ECB-Peer
        description                   ECB-Facing(Inside)
        sip-port
                address                       192.168.1.130
                port                          5060
                transport-protocol            TCP
                tls-profile
                allow-anonymous               all
                ims-aka-profile
        carriers
        trans-expire                  0
        invite-expire                 0
        max-redirect-contacts         0
        proxy-mode
        redirect-action
        contact-mode                  none
```

```
nat-traversal                  none
nat-interval                   30
tcp-nat-interval               90
registration-caching           disabled
min-reg-expire                 300
registration-interval          3600
route-to-registrar             disabled
secured-network                disabled
teluri-scheme                  disabled
uri-fqdn-domain
options                        100rel-interworking
spl-options                    playback-on-refer="transferrbt"
trust-mode                     all
max-nat-interval               3600
nat-int-increment              10
nat-test-increment             30
sip-dynamic-hnt                disabled
stop-recurse                   401,407
port-map-start                 0
port-map-end                   0
in-manipulationid
out-manipulationid             NATting
manipulation-string
manipulation-pattern
sip-ims-feature                disabled
operator-identifier
anonymous-priority             none
max-incoming-conns             0
per-src-ip-max-incoming-conns  0
inactive-conn-timeout          0
untrusted-conn-timeout         0
network-id
ext-policy-server
default-location-string
charging-vector-mode           pass
charging-function-address-mode pass
ccf-address
ecf-address
term-tgrp-mode                 none
implicit-service-route         disabled
rfc2833-payload                101
rfc2833-mode                   transparent
constraint-name
response-map
local-response-map
ims-aka-feature                disabled
enforcement-profile
```

```
        route-unauthorized-calls
        tcp-keepalive                    none
        add-sdp-invite                   disabled
        add-sdp-profiles
        sip-profile
        sip-isup-profile
```

Verify configuration integrity

You will verify your configuration referential integrity before saving and activating it with the verify-**config** command. This command is available from Superuser Mode. To enter the Superuser Mode from session-agent, you issue the **exit** command three times.

```
ORACLE-SBC(session-agent)# exit
ORACLE-SBC(session-router)# exit
ORACLE-SBC(configure)# exit
ORACLE-SBC# verify-config
------------------------------------------------------------------------

Verification successful! No errors nor warnings in the configuration
```

Save and activate your configuration

You will now save your configuration with the **save-config** command. This will make it persistent through reboots, but it will not take effect until after you issue the **activate-config** command.

```
ORACLE-SBC# save-config
checking configuration
Save-Config received, processing.
waiting for request to finish
Request to 'SAVE-CONFIG' has Finished,
Save complete
Currently active and saved configurations do not match!
To sync & activate, run 'activate-config' or 'reboot activate'.
ORACLE-SBC# activate-config
Activate-Config received, processing.
waiting for request to finish
Setting phy0 on Slot=0, Port=0, MAC=00:08:25:03:FC:43,
VMAC=00:08:25:03:FC:43
Setting phy1 on Slot=1, Port=0, MAC=00:08:25:03:FC:45,
VMAC=00:08:25:03:FC:45
Request to 'ACTIVATE-CONFIG' has Finished,
Activate Complete
```

E-SBC configuration is now complete.

Interoperability testing

Interoperability between Avaya and Lync

The following observations were made during testing –

- In versions prior to the 6.2 release, Avaya SM uses INVITEs for session refreshes. These INVITEs do not include SDP. This results in an interoperability issue with Microsoft Lync when media bypass is enabled as it does not accept INVITEs without SDP.
- In releases 6.2 and later, UPDATE message can be used for session refresh, to enable UPDATEs from the Avaya SM instead of the INVITEs without SDP, the signaling group was configured as follows

```
change signaling-group 2                                              Page   1 of   2
                                  SIGNALING GROUP

 Group Number: 2              Group Type: sip
  IMS Enabled? n          Transport Method: tcp
        Q-SIP? n
     IP Video? n                                     Enforce SIPS URI for SRTP? n
  Peer Detection Enabled? y  Peer Server: SM
 Prepend '+' to Outgoing Calling/Alerting/Diverting/Connected Public Numbers? y
Remove '+' from Incoming Called/Calling/Alerting/Diverting/Connected Numbers? y

  Near-end Node Name: procr                  Far-end Node Name: acme-sm
 Near-end Listen Port: 5060                Far-end Listen Port: 5060
                                       Far-end Network Region: 1

Far-end Domain: aura.com
                                           Bypass If IP Threshold Exceeded? n
Incoming Dialog Loopbacks: eliminate                RFC 3389 Comfort Noise? n
         DTMF over IP: rtp-payload          Direct IP-IP Audio Connections? n
Session Establishment Timer(min): 3                   IP Audio Hairpinning? y
         Enable Layer 3 Test? y
                                                  Alternate Route Timer(sec): 6
```

- With UPDATEs enabled, the calls flows for hold and resume were as follows:
  - When Avaya server places a call on hold during the inbound calls, the call flow does not include INVITE messages to signal the hold and resume. It utilizes the UPDATE messages.
  - When Avaya server performs a call hold and resume during the outbound calls, it sends INVITE message to signal the hold and resume.
- For lync initiated transfers, Avaya does not support REFER from Lync. The Refer-To in the REFER from Lync does not contain the uri-user. Avaya sends a **403 Forbidden (Refer-to user is null)** error.
  - In Lync environments with REFER enabled, the calls will need to be sent through the E-SBC to the ECB for REFER termination on the E-SBC.
  - Or Lync needs to be reconfigured to use INVITEs for transfer scenarios.

Interoperability between CUCM and Lync

During an inbound call from Lync, when CUCM performs a call hold and resume, CUCM sends an INVITE without SDP. When media bypass is enabled on Lync, the mediation server does not accept INVITEs without SDP and responds with *488 GatewayCall is not in Connected State*. As a result the hold and resume fails. To resolve this issue we either have to insert SDP or disable media bypass. To insert SDP, the call will need to be placed through a E-SBC.

When media bypass is disabled, Lync accepts the INVITE when it is sent without SDP. However, during call resume, the INVITE sent from CUCM contains SDP without the telephone event. Lync responds with the error *488 Invalid SDP: Gateway ParseSdpOffer Error: No DTMF support on Gateway side.*

To resolve this issue, we configure a sip-manipulation to add the SDP line for telephone event if it does not exist before forwarding the INVITE to Lync.

```
sip-manipulation
        name                                    fixSDP
        description                             To bypass the 488 due to missing DTMF from CUCM during hold
        split-headers
        join-headers
        header-rule
                name                                    Checkfordtmf
                header-name                             Content-type
                action                                  store
                comparison-type                         case-sensitive
                msg-type                                any
                methods                                 INVITE
                match-value
                new-value
                element-rule
                        name                                    Checkdtmfexists
                        parameter-name                          application/sdp
                        type                                    mime
                        action                                  store
                        match-val-type                          any
```

```
                    comparison-type                         case-sensitive
                    match-value                             (a=rtpmap:101 telephone-event/8000)
                    new-value
        header-rule
                name                                    AddPtime10
                header-name                             Content-Type
                action                                  manipulate
                comparison-type                         boolean
                msg-type                                any
                methods                                 INVITE
                match-value                             !$Checkfordtmf.$Checkdtmfexists
                new-value
                element-rule
                        name                    Adddtmf
                        parameter-name          application/sdp
                        type                    mime
                        action                  find-replace-all
                        match-val-type          any
                        comparison-type         pattern-rule
                        match-value             (\,*)
                        new-value               $0+"a=rtpmap:101 telephone-event/8000"+$CRLF+"a=fmtp:101 0-15"+$CRLF
        header-rule
                name                                    Modifymline
                header-name                             From
                action                                  sip-manip
                comparison-type                         case-sensitive
                msg-type                                request
                methods
                match-value
                new-value                               Modmline
        last-modified-by                        web@
        last-modified-date                      2014-07-23 15:43:00
```

This manipulation is then nested into the HMR, `HMRtowardsLync` that is applied in the outbound directions towards the Lync servers.

```
sip-manipulation
        name                                    HMRtowardsLync
        description                             HMR NAT+deleting the blines+addDTMF
        split-headers
        join-headers
        header-rule
                name                                    doNAT
                header-name                             From
                action                                  sip-manip
                comparison-type                         case-sensitive
                msg-type                                any
                methods
                match-value
                new-value                               NATting
        header-rule
                name                                    deleteblines
```

```
            header-name                                 From
            action                                      sip-manip
            comparison-type                             case-sensitive
            msg-type                                    any
            methods
            match-value
            new-value                                   Delblines
        header-rule
            name                                        adddtmflines
            header-name                                 From
            action                                      sip-manip
            comparison-type                             case-sensitive
            msg-type                                    any
            methods                                     INVITE
            match-value
            new-value                                   fixSDP
```

Please note that when CUCM calls Lync and the call is placed on hold by Lync, the issue mentioned above does not occur.

In Lync environments with media bypass and REFER enabled, the calls will need to be sent through the E-SBC to the ECB to utilize the add-sdp-profile and REFER termination features of the E-SBC.

Test Plan & Results

Test Plan

The testing was done with TCP/RTP. Lync 2010 and Lync 2013 servers are two different environments independent of each other. Lync 2010 has media bypass and refer enabled. Lync 2013 setup has media bypass and refer disabled.

The test plan consisted of the following test cases.

Test case	**Result**	**Notes**
Basic inbound and Outbound calls		
PSTN calls Lync 2010	Pass	
PSTN calls Lync 2013	Pass	
PSTN calls Avaya	Pass	
PSTN calls CUCM	Pass	
Lync 2013 calls CUCM	Pass	
Lync 2013 calls Avaya	Pass	
Lync 2013 calls PSTN	Pass	
CUCM calls Avaya	Pass	
CUCM calls PSTN	Pass	
CUCM calls Lync 2010	Pass	
CUCM calls Lync 2013	Pass	
Lync 2010 calls CUCM	Pass	
Lync 2010 calls Avaya	Pass	
Lync 2010 calls PSTN	Pass	
Avaya calls PSTN	Pass	
Avaya calls Lync 2010	Pass	
Avaya calls Lync 2013	Pass	
Avaya calls CUCM	Pass	
Back up route (replicating the SAG in ECB)		
PSTN calls Lync 2010 (home agent med1 paused)	Pass	

4 digit dialing		
Lync 2010 calls Avaya	Pass	
Lync 2010 calls CUCM	Pass	
CUCM calls Avaya	Pass	
CUCM calls Lync 2010	Pass	
Avaya calls Lync 2010	Pass	
Avaya calls CUCM	Pass	
Transfers		
PSTN calls Lync 2010 and Lync transfers to PSTN	Pass	
PSTN calls Lync 2013 and Lync transfers to PSTN	Pass	
PSTN calls CUCM and CUCM transfers to PSTN	Pass	The transfer was successful but the calling number displayed to the second PSTN party is that of Cisco phone and not the Original PSTN party
PSTN calls Lync 2010 and Lync transfers to CUCM using 4 digit dial	Pass	
PSTN calls Avaya and Avaya transfers to Lync using 4 digit dial	Pass	
PSTN calls Avaya and Avaya transfers to Lync 2013 using 10 digits	Pass	
PSTN calls Lync 2013 and Lync transfers to CUCM using 10 digit dial	Pass	
Lync 2013 calls Lync 2010 and transfers to CUCM	Pass	
Lync 2013 calls CUCM(10 digit) and CUCM transfers to Lync 2010 (4 digit) - no media bypass on Lync 2013	Pass	The transfer was successful but the calling number displayed to the second PSTN party is that of Cisco phone and not the Original PSTN party
Lync calls Avaya and transfer to CUCM (refer disabled)	Pass	Transfer works with refer disabled
CUCM calls Avaya and Avaya transfers to Lync	Pass	
CUCM calls Lync 2013 and Lync transfers to Lync 2010 (refer disabled)	Pass	
CUCM calls Avaya and CUCM transfers to Lync	Pass	
CUCM calls Avaya and CUCM transfers to PSTN	Pass	
Avaya calls Lync and transfers to CUCM	Pass	

Call Hold/Resume		
PSTN calls Lync and Lync places call on hold	Pass	
PSTN call Avaya and Avaya places call on hold	Pass	
PSTN calls CUCM and CUCM places call on hold	Pass	
Lync 2013 calls Avaya and Lync places call on hold	Pass	
Lync 2013 calls Avaya and Avaya places call on hold	Pass	
Lync 2013 calls CUCM and CUCM places call on hold	Pass	During the call hold process, one of the re-invites with sdp from CUCM does not contain a lines for DTMF support to which Lync responds with a 488 DTMF not supported. To overcome this issue we have an HMR towards Lync to add the a lines for DTMF in SDP if not present
CUCM calls Lync 2010 and CUCM places the call on hold	Pass	
Avaya calls Lync 2013 and Avaya places the call on hold	Pass	
Lync 2010 calls Avaya and Avaya places the call on hold	Pass	
CUCM calls Avaya and CUCM places the call on hold	Pass	
Avaya calls PSTN and Avaya places the call on hold	Pass	
Avaya calls CUCM and Avaya places the call on hold	Pass	

Troubleshooting Tools

If you find that you are not able to complete calls or have problems with the test cases, there are a few tools available for Windows Server, Lync Server, and the E-SBC like logging and tracing which may be of assistance. In this section we will provide a list of tools which you can use to aid in troubleshooting any issues you may encounter.

Since we are concerned with communication between the Lync Server mediation server and the E-SBC we will focus on the troubleshooting tools to use between those devices if calls are not working or tests are not passing.

Microsoft Network Monitor (NetMon)

NetMon is a network protocol analyzer which is freely downloadable from Microsoft. It can be found at www.microsoft.com/downloads. NetMon could be installed on the Lync Server mediation server, the Lync Server Standard Edition server, or Enterprise Edition front end server.

Wireshark

Wireshark is also a network protocol analyzer which is freely downloadable from www.wireshark.org. Wireshark could be installed on the Lync Server mediation server, the Lync Server Standard Edition server, or MCS Enterprise Edition front end server.

Eventviewer

There are several locations in the event viewer where you can find valuable information to aid in troubleshooting issues with your deployment.

With the requirement that there is a completely functioning Lync Server with Enterprise Voice deployment in place, there are only a few areas in which one would use the Event Viewer for troubleshooting:

- The Enterprise Voice client;
- The Lync Server Front End server;
- A Lync Server Standard Edition Server; and
- A Lync Server Mediation Server.

On the Oracle Enterprise Communications Broker and Oracle Enterprise Session Border Controller

The Oracle Enterprise Session Border Controller and Oracle Enterprise Communications Broker provide a rich set of statistical counters available from the ACLI, as well as log file output with configurable detail. The follow sections detail enabling, adjusting and accessing those interfaces.

Resetting the statistical counters, enabling logging and restarting the log files

At the E-SBC Console:

```
ORACLE-SBC# reset sipd
ORACLE-SBC# notify sipd debug
ORACLE-SBC#
enabled SIP Debugging
ORACLE-SBC# notify all rotate-logs
```

Examining the log files

Note: You will FTP to the management interface of the E-SBC with the username user and user mode password (the default is "**acme**").

```
C:\Documents and Settings\user>ftp 192.168.5.24
Connected to 192.168.85.55.
220 ORACLE-SBCFTP server (VxWorks 6.4) ready.
User (192.168.85.55:(none)): user
331 Password required for user.
Password: acme
230 User user logged in.
ftp> cd /ramdrv/logs
250 CWD command successful.
ftp> get sipmsg.log
200 PORT command successful.
150 Opening ASCII mode data connection for '/ramdrv/logs/sipmsg.log' (3353
bytes).
226 Transfer complete.
ftp: 3447 bytes received in 0.00Seconds 3447000.00Kbytes/sec.
ftp> get log.sipd
200 PORT command successful.
150 Opening ASCII mode data connection for '/ramdrv/logs/log.sipd' (204681
```

```
bytes).
226 Transfer complete.
ftp: 206823 bytes received in 0.11Seconds 1897.46Kbytes/sec.
ftp> bye
221 Goodbye.
```

You may now examine the log files with the text editor of your choice.

Telnet

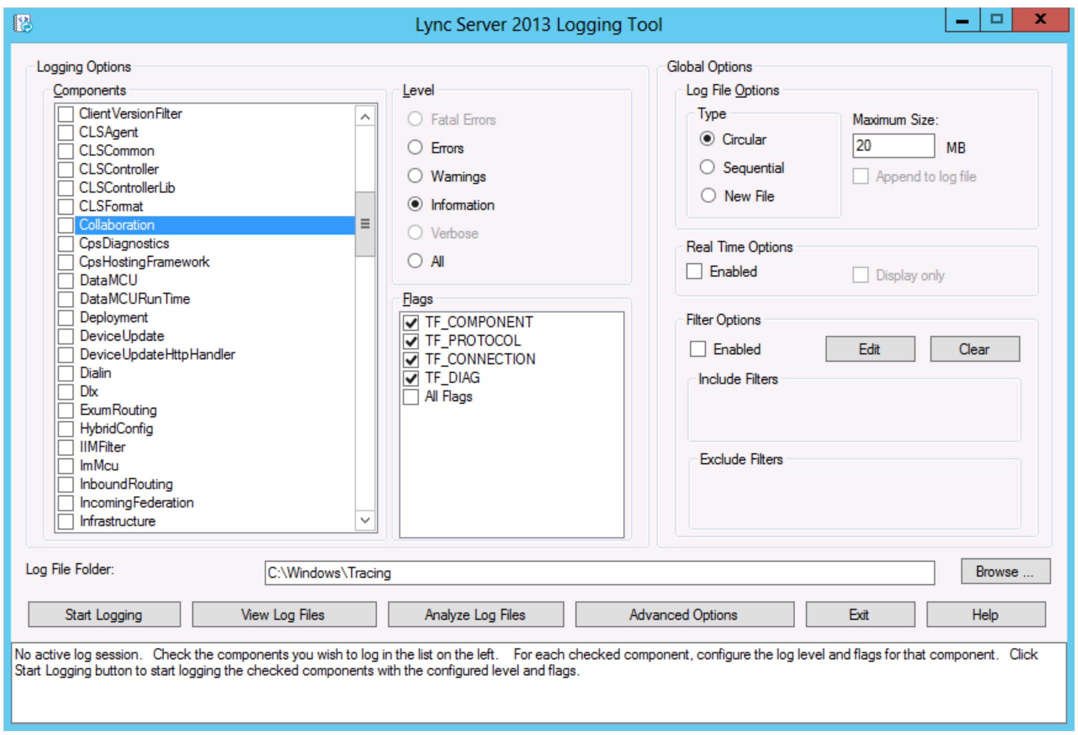
Since we are working within an architecture which uses bound TCP listening ports for functionality, the simplest form of troubleshooting can be seeing if the devices are listening on a particular port, as well as confirming that the there is nothing blocking them such as firewalls. Ensure that you have a TELNET client available on a workstation as well as on the Lync Server mediation server.

The Lync Server mediation server will listen on TCP port 5067 by default for SIP signaling. In our example we are listening on 5060 on the PSTN facing NIC. From the Standard Edition pool or Enterprise Edition pool the Mediation Server would be listening on port 5061. Tests may include:

- Client to pool server: **`telnet <servername> 5061`**
- Pool server to Mediation Server: **`telnet <servername> 5061`**

Lync Server Logging Tool

The Lync Server 2013 Logging Tool provides internal traces and messaging between different Lync Server 2013 elements like Front-end, Mediation server, Lync Clients, etc. File name is OCSReskit.msi. Once installed, it can be accessed from any one of the Lync Server servers by running Start/Microsoft Lync Server 2013/Lync Server Logging Tool.



Appendix A

No Ring Back Tone heard for inbound calls from PSTN to MS Lync through E-SBC

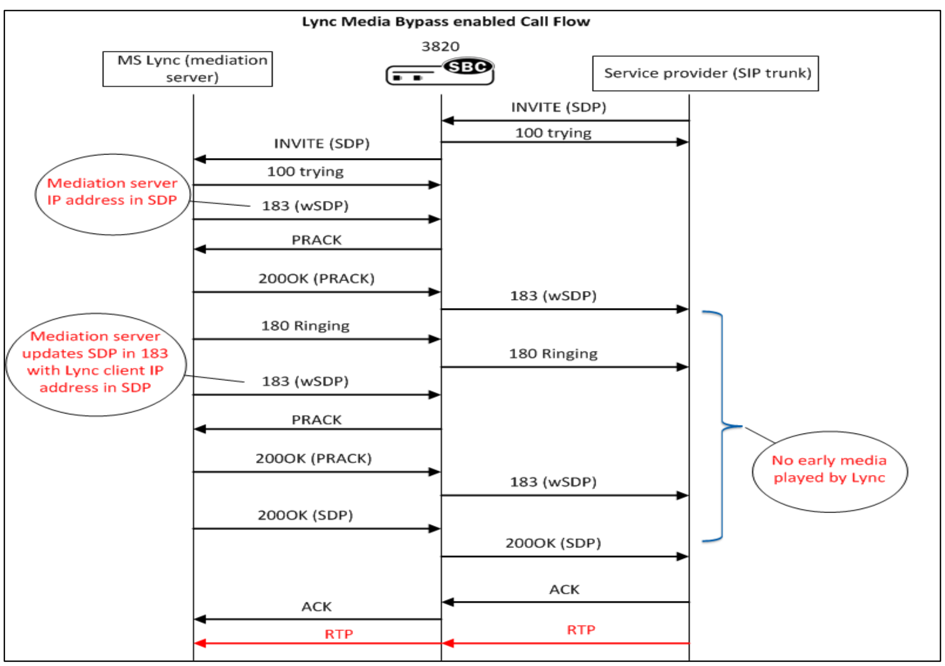
Recently, in some accounts where MS Lync and E-SBCs are deployed for enterprise voice and SIP trunk termination to an enterprise, there have been complaints of the PSTN caller hearing a silence when a call is placed from PSTN to a Lync user on the enterprise especially when Media Bypass is enabled on MS Lync

The configuration note below aims to explain this scenario briefly, steps taken to rectify this issue and proposed workaround by Oracle. The workaround is an interim solution while a permanent solution is being researched and developed by Oracle Engineering

Media Bypass

As explained earlier in the document, in order for Media Bypass to work, both Client and gateway (E-SBC) need to use the same RTP format, either SRTP (by default) or RTP. In default configuration of MS Lync, Lync client is required to use media encryption, so Media Bypass is mainly when media is encrypted (SRTP) and exchanged between Lync client and PSTN gateway (E-SBC).

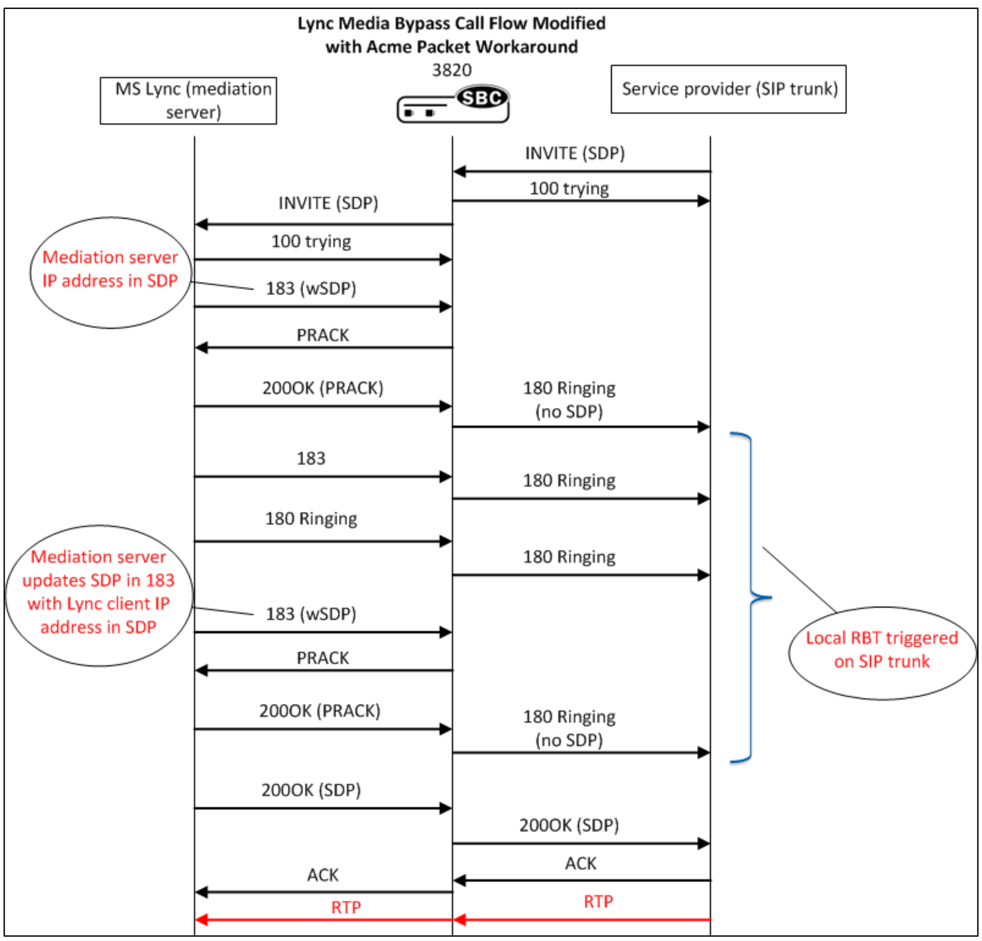
Signaling between mediation server and E-SBC is a little different (Two 183s with SDP coming from mediation server) when media bypass is enabled on Lync. The following is the call flow



Note that after signaling 183 with SDP, Lync never plays any early media and expects gateway (E-SBC) to signal appropriately to the SIP Trunk provider to follow RFC 3960 and play local RBT. The second 183w SDP coming from Mediation server which is forwarded to the SIP trunk and stops the local RBT which was started after 180 Ringing was sent, hence PSTN caller would hear a silence before Lync client answers call.

Acme Packet Work Around

The interim solution is to present 180 ringing (convert all 183s on lync side to 180 ringing towards SIP trunk and strip the SDP) to trigger RBT in ISUP. The call flow is modified with the help of Oracle's robust Sip Manipulation and Sip Response Map features to the following:



A sip manipulation, Stripsdp183, is configured to delete the SDP from the 183 messages.

```
 sip-manipulation
        name                                    Stripsdp183
        description                             For incoming 183 from Lync, 
strip SDP
        split-headers
        join-headers
        header-rule
                name                                    check183
                header-name                             @status-line
                action                                  store
                comparison-type                         pattern-rule
                msg-type                                any
                methods
                match-value
                new-value
                element-rule
                        name                                    is183
                        parameter-name
                        type                                    status-code
                        action                                  store
                        match-val-type                          any
                        comparison-type                         pattern-rule
                        match-value                             183
                        new-value
        header-rule
                name                                    delSDP
                header-name                             Content-Type
                action                                  manipulate
                comparison-type                         case-insensitive
                msg-type                                any
                methods
                match-value                             $check183.$is183
                new-value
                element-rule
                        name                                    del183SDP
                        parameter-name                          application/sdp
                        type                                    mime
                        action                                  delete-element
                        match-val-type                          any
                        comparison-type                         boolean
                        match-value
                        new-value
        header-rule
                name                                    delContentType
                header-name                             Content-Type
                action                                  manipulate
```

```
                comparison-type                         boolean
                msg-type                                any
                methods
                match-value                             $check183.$is183
                new-value
                element-rule
                        name                                    delCT
                        parameter-name                          *
                        type                                    header-param
                        action                                  delete-header
                        match-val-type                          any
                        comparison-type                         case-sensitive
                        match-value
                        new-value
```

The above manipulation is applied as a nested manip in the manipulation – Forearlymedia that is applied inbound on the sip-interface facing ECB.

```
sip-manipulation
        name                                    Forearlymedia
        description
        split-headers
        join-headers
        header-rule
                name                                    delsupported
                header-name                             Supported
                action                                  delete
                comparison-type                         case-sensitive
                msg-type                                request
                methods                                 INVITE
                match-value
                new-value
        header-rule
                name                                    addrequireinINVITE
                header-name                             Require
                action                                  add
                comparison-type                         case-sensitive
                msg-type                                request
                methods                                 INVITE
                match-value
                new-value                               100rel
        header-rule
                name                                    inactosendonly
                header-name                             From
                action                                  sip-manip
                comparison-type                         case-sensitive
```

```
                msg-type                                        request
                methods
                match-value
                new-value                                       Changeinactosendonly
        header-rule
                name                                            mod183
                header-name                                     From
                action                                          sip-manip
                comparison-type                                 case-sensitive
                msg-type                                        any
                methods
                match-value
                new-value                                       Stripsdp183
```

A sip response map is configured to change the 183s to 180 and applied on the sip-interface facing the trunk.

```
 response-map
        name                                            change183to180
        entries
                recv-code                                       183
                xmit-code                                       180
                reason                                          Ringing
                method
                register-response-expires



ORACLE-SBC(session-router)# sip-interface
Oracle-SBC(sip-interface)# sel
<realm-id>:
1: ECB-Peer  192.168.1.130:5060
2: SIP-trunk 192.20.0.108:5060

selection: 1
Oracle-SBC(sip-interface)# response-map  change183to180
Oracle-SBC(sip-interface)# done


sip-interface
        state                           enabled
        realm-id                        ECB-Peer
        description                     ECB-Facing(Inside)
        sip-port
                address                         192.168.1.130
```

```
        port                            5060
        transport-protocol              TCP
        tls-profile
        allow-anonymous                 all
        ims-aka-profile
carriers
trans-expire                    0
invite-expire                   0
max-redirect-contacts           0
proxy-mode
redirect-action
contact-mode                    none
nat-traversal                   none
nat-interval                    30
tcp-nat-interval                90
registration-caching            disabled
min-reg-expire                  300
registration-interval           3600
route-to-registrar              disabled
secured-network                 disabled
teluri-scheme                   disabled
uri-fqdn-domain
options                         100rel-interworking
spl-options                     playback-on-refer="transferrbt"
trust-mode                      all
max-nat-interval                3600
nat-int-increment               10
nat-test-increment              30
sip-dynamic-hnt                 disabled
stop-recurse                    401,407
port-map-start                  0
port-map-end                    0
in-manipulationid
out-manipulationid              NATting
manipulation-string
manipulation-pattern
sip-ims-feature                 disabled
operator-identifier
anonymous-priority              none
max-incoming-conns              0
per-src-ip-max-incoming-conns   0
inactive-conn-timeout           0
untrusted-conn-timeout          0
network-id
ext-policy-server
default-location-string
charging-vector-mode            pass
```

```
        charging-function-address-mode pass
        ccf-address
        ecf-address
        term-tgrp-mode                 none
        implicit-service-route         disabled
        rfc2833-payload                101
        rfc2833-mode                   transparent
        constraint-name
        response-map                   change183to180
        local-response-map
        ims-aka-feature                disabled
        enforcement-profile
        route-unauthorized-calls
        tcp-keepalive                  none
        add-sdp-invite                 disabled
        add-sdp-profiles
        sip-profile
        sip-isup-profile
```

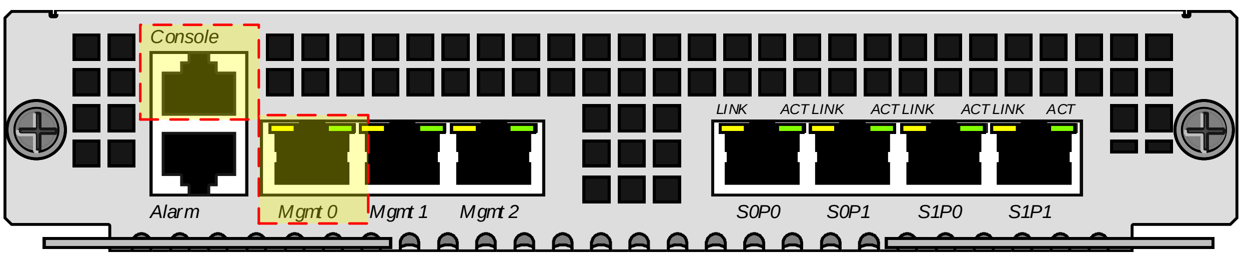
Appendix B

Accessing the ACLI

Access to the ACLI is provided by:

- The serial console connection;
- TELNET, which is enabled by default but may be disabled; and
- SSH, this must be explicitly configured.

Initial connectivity will be through the serial console port. At a minimum, this is how to configure the management (eth0) interface on the E-SBC.

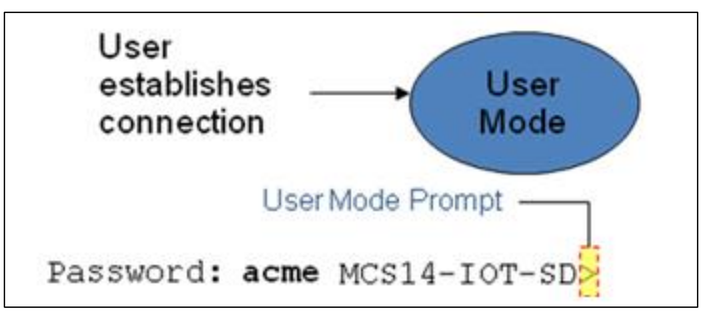


ACLI Basics

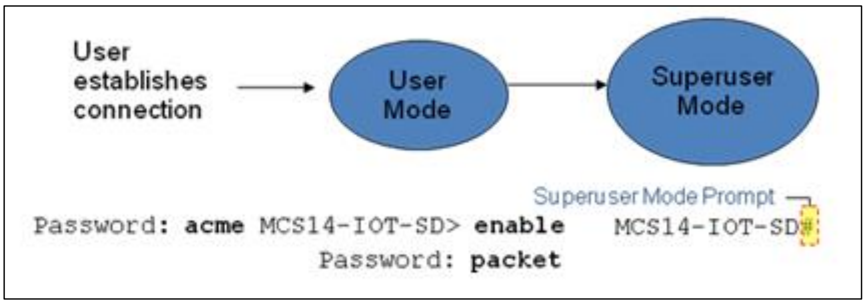
There are two password protected modes of operation within the ACLI, User mode and Superuser mode.

When you establish a connection to the E-SBC, the prompt for the User mode password appears. The default password is acme.

User mode consists of a restricted set of basic monitoring commands and is identified by the greater than sign (>) in the system prompt after the target name.   You cannot perform configuration and maintenance from this mode.



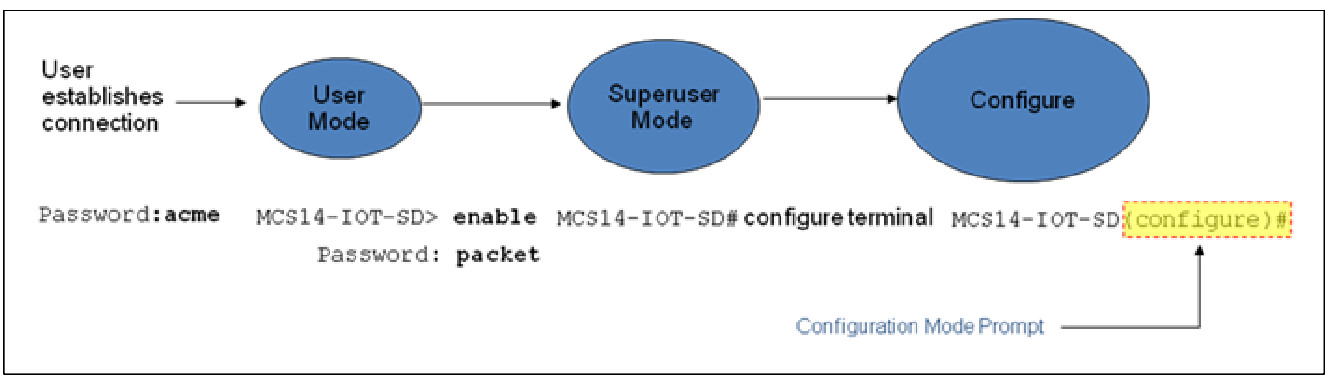
The Superuser mode allows for access to all system commands for operation, maintenance, and administration. This mode is identified by the pound sign (#) in the prompt after the target name. To enter the Superuser mode, issue the enable command in the User mode.



From the Superuser mode, you can perform monitoring and administrative tasks; however you cannot configure any elements. To return to User mode, issue the exit command.

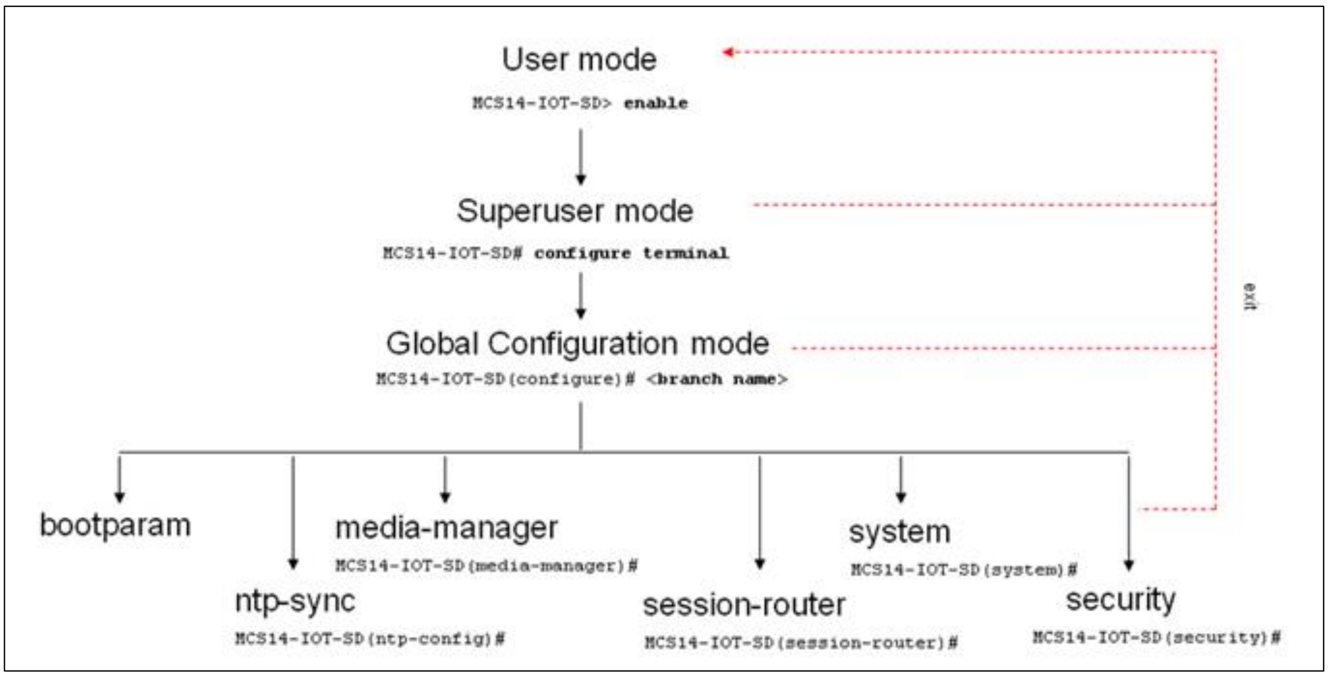
You must enter the Configuration mode to configure elements. For example, you can access the configuration branches and configuration elements for signaling and media configurations. To enter the Configuration mode, issue the **`configure terminal`** command in the Superuser mode.

Configuration mode is identified by the word configure in parenthesis followed by the pound sign (#) in the prompt after the target name, for example, **ORACLE-SBC(configure)#**. To return to the Superuser mode, issue the **`exit`** command.



In the configuration mode, there are six configuration branches:

- bootparam;
- ntp-sync;
- media-manager;
- session-router;
- system; and
- security.



The ntp-sync and bootparams branches are flat branches (i.e., they do not have elements inside the branches). The rest of the branches have several elements under each of the branches.

The bootparam branch provides access to E-SBC boot parameters. Key boot parameters include:

- boot device – The global management port, usually eth0
- file name – The boot path and the image file.
- inet on ethernet – The IP address and subnet mask (in hex) of the management port of the SD.

- host inet –The IP address of external server where image file resides.
- user and ftp password – Used to boot from the external FTP server.
- gateway inet – The gateway IP address for reaching the external server, if the server is located in a different network.

```
'.' = clear field;  '-' = go to previous field;  q = quit
boot device              : eth0
processor number         : 0
host name                :
file name                : /tffs0/nnSCX620.gz
inet on ethernet (e)     : 10.0.3.11:ffff0000
inet on backplane (b)    :
host inet (h)            : 10.0.3.100
gateway inet (g)         : 10.0.0.1
user (u)                 : anonymous
ftp password (pw) (blank = rsh)       : anonymous
flags (f)                : 0x8
target name (tn)         : MCS14-IOT-SD
startup script (s)       :
other (o)
```

The ntp-sync branch provides access to ntp server configuration commands for synchronizing the E-SBC time and date.

The security branch provides access to security configuration.

The system branch provides access to basic configuration elements as system-config, snmp-community, redundancy, physical interfaces, network interfaces, etc.

The session-router branch provides access to signaling and routing related elements, including H323-config, sip-config, iwf-config, local-policy, sip-manipulation, session-agent, etc.

The media-manager branch provides access to media-related elements, including realms, steering pools, dns-config, media-manager, and so forth.

You will use media-manager, session-router, and system branches for most of your working configuration.

Configuration Elements

The configuration branches contain the configuration elements. Each configurable object is referred to as an element. Each element consists of a number of configurable parameters.

Some elements are single-instance elements, meaning that there is only one of that type of the element - for example, the global system configuration and redundancy configuration.

Some elements are multiple-instance elements. There may be one or more of the elements of any given type. For example, physical and network interfaces.

Some elements (both single and multiple instance) have sub-elements. For example:

- SIP-ports - are children of the sip-interface element
- peers – are children of the redundancy element
- destinations – are children of the peer element

Creating an Element

1. To create a single-instance element, you go to the appropriate level in the ACLI path and enter its parameters. There is no need to specify a unique identifier property because a single-instance element is a global element and there is only one instance of this element.
2. When creating a multiple-instance element, you must specify a unique identifier for each instance of the element.
3. It is important to check the parameters of the element you are configuring before committing the changes. You do this by issuing the **`show`** command before issuing the **`done`** command. The parameters that you did not configure are filled with either default values or left empty.
4. On completion, you must issue the **`done`** command. The done command causes the configuration to be echoed to the screen and commits the changes to the volatile memory. It is a good idea to review this output to ensure that your configurations are correct.
5. Issue the **`exit`** command to exit the selected element.

Note that the configurations at this point are not permanently saved yet. If the E-SBC reboots, your configurations will be lost.

Editing an Element

The procedure of editing an element is similar to creating an element, except that you must select the element that you will edit before editing it.

1. Enter the element that you will edit at the correct level of the ACLI path.

2. Select the element that you will edit, and view it before editing it.
   The **select** command loads the element to the volatile memory for editing. The **show** command allows you to view the element to ensure that it is the right one that you want to edit.
3. Once you are sure that the element you selected is the right one for editing, edit the parameter one by one. The new value you provide will overwrite the old value.
4. It is important to check the properties of the element you are configuring before committing it to the volatile memory. You do this by issuing the **show** command before issuing the **done** command.
5. On completion, you must issue the **done** command.
6. Issue the **exit** command to exit the selected element.

Note that the configurations at this point are not permanently saved yet. If the E-SBC reboots, your configurations will be lost.

Deleting an Element

The **no** command deletes an element from the configuration in editing.

To delete a single-instance element,

1. Enter the **no** command from within the path for that specific element
2. Issue the **exit** command.

To delete a multiple-instance element,

1. Enter the **no** command from within the path for that particular element.
   The key field prompt, such as <name>:<sub-port-id>, appears.
2. Use the <Enter> key to display a list of the existing configured elements.
3. Enter the number corresponding to the element you wish to delete.
4. Issue the **select** command to view the list of elements to confirm that the element was removed.

Note that the configuration changes at this point are not permanently saved yet. If the E-SBC reboots, your configurations will be lost.

Configuration Versions

At any time, three versions of the configuration can exist on the E-SBC: the edited configuration, the saved configuration, and the running configuration.

- The **edited configuration** – this is the version that you are making changes to. This version of the configuration is stored in the E-SBC's volatile memory and will be lost on a reboot.
  To view the editing configuration, issue the **show configuration** command.

- The **saved configuration –** on issuing the **`save-config`** command, the edited configuration is copied into the non-volatile memory on the SBC and becomes the saved configuration. Because the saved configuration has not been activated yet, the changes in the configuration will not take effect. On reboot, the last activated configuration (i.e., the last running configuration) will be loaded, not the saved configuration.
- The **running configuration** is the saved then activated configuration. On issuing the **`activate-config`** command, the saved configuration is copied from the non-volatile memory to the volatile memory. The saved configuration is activated and becomes the running configuration. Although most of the configurations can take effect once being activated without reboot, some configurations require a reboot for the changes to take effect.
  To view the running configuration, issue command show **`running-config`**.

Saving the Configuration

The **`save-config`** command stores the edited configuration persistently.

Because the saved configuration has not been activated yet, changes in configuration will not take effect. On reboot, the last activated configuration (i.e., the last running configuration) will be loaded. At this stage, the saved configuration is different from the running configuration.

Because the saved configuration is stored in non-volatile memory, it can be accessed and activated at later time.

Upon issuing the **`save-config`** command, the E-SBC displays a reminder on screen stating that you must use the **`activate-config`** command if you want the configurations to be updated.

```
MCS14-IOT-SD# save-config
Save-Config received, processing.
waiting 1200 for request to finish
Request to 'SAVE-CONFIG' has Finished,
Save complete
Currently active and saved configurations do not match!
To sync & activate, run 'activate-config' or 'reboot activate'.
MCS14-IOT-SD#
```

Activating the Configuration

On issuing the **activate-config** command, the saved configuration is copied from the non-volatile memory to the volatile memory. The saved configuration is activated and becomes the running configuration.

Some configuration changes are service affecting when activated. For these configurations, the E-SBC warns that the change could have an impact on service with the configuration elements that will potentially be service affecting. You may decide whether or not to continue with applying these changes immediately or to apply them at a later time.

```
MCS14-IOT-SD# activate-config
Activate-Config received, processing.
waiting 120000 for request to finish
Request to 'ACTIVATE-CONFIG' has Finished,
Activate Complete
MCS14-IOT-SD#
```

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