Oracle SBC integration with Avaya Aura Session Manager for Remote Worker Config in TLS mode

Technical Application Note

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Revision History

Version	Description of Changes	Date Revision Completed
1.0	Oracle SBC integration with Avaya Aura Session Manager for Remote Worker Config in TLS mode	09th November 2020
1.1	Refreshed the app note with testing of Avaya Aura Session Manager for Remote Worker Config in TLS mode with SBC 9.0 version	08th April 2022

Table of Contents

1. Intended Audience

This document is intended for use by Oracle Systems Engineers, third party Systems Integrators, Oracle Enterprise customers and partners and end users of the Oracle Enterprise Session Border Controller (SBC). It is assumed that the reader is familiar with basic operations of the Oracle Enterprise Session Border Controller platform along with Avaya Aura System Manager GUI and Avaya Aura Session Manager.

2. Document Overview

This Oracle technical application note outlines the configuration needed to set up the interworking between on premises Avaya Aura Session Manager using Oracle SBC. The solution contained within this document has been tested using Oracle Communication **OS 840p3** and **OS 900p2** version. Our scope of this document is only limited to registering third party SIP phones (Both Local and remote location) to Avaya Session Manager using Oracle SBC and testing various types of call features with Avaya remote worker phones using TLS protocol.

In addition, it should be noted that the SBC configuration provided in this guide focuses strictly on the Avaya Server associated parameters. Many SBC applications may have additional configuration requirements that are specific to individual customer requirements. These configuration items are not covered in this guide. Please contact your Oracle representative with any questions pertaining to this topic.

Please note that the IP address, FQDN and config name and its details given in this document is used as reference purpose only. The same details cannot be used in customer config and the end users can use the configuration details according to their network requirements. There are some public facing IPs (externally routable IPs) that we use for our testing are masked in this document for security reasons. The customers can configure any publicly routable IPs for these sections as per their network architecture needs.

3. Introduction

3.1. Audience

This is a technical document intended for telecommunications engineers with the purpose of configuring Avaya Aura System Manager GUI and Avaya Aura Session manager server in 8.1 version using Oracle Enterprise SBC. There will be steps that require navigating to Oracle SBC GUI interface, understanding the basic concepts of TCP/UDP, IP/Routing, SIP/TLS/SRTP and SIP/RTP are also necessary to complete the configuration and for troubleshooting, if necessary. It is also understood that the end user has already configured Avaya Aura Session Manager configuration before referring this document.

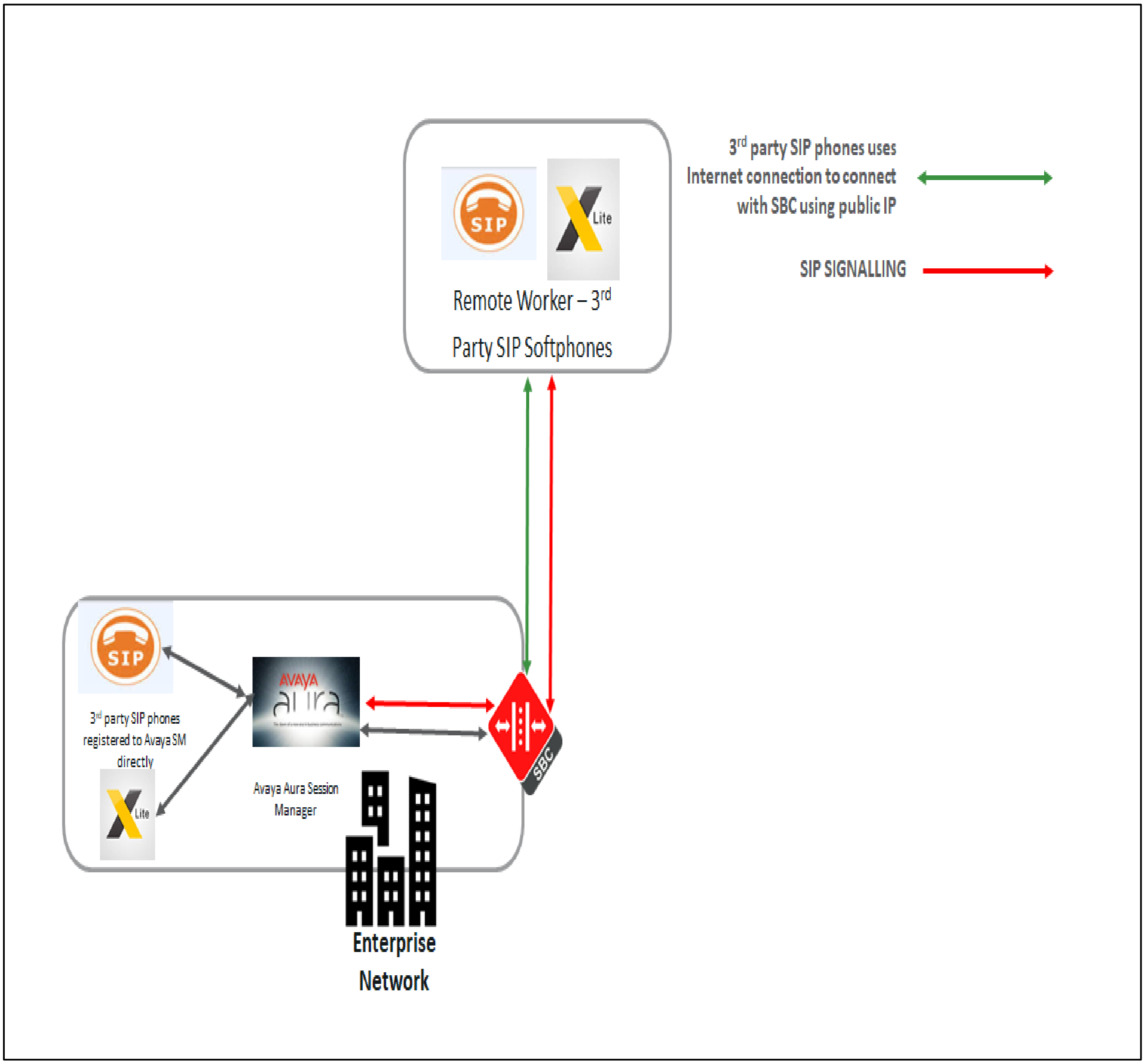
3.2. Requirements

- Fully functioning Avaya Aura Session Manager 8.1 version.
- Oracle Enterprise Session Border Controller (hereafter Oracle SBC) running 8.4.0 / 9.0.0 version

The below revision table explains the versions of the software used for each component:
This table is Revision 1 as of now:

Software Used	Avaya Aura Session Manager using Avaya Aura System Manager GUI	SBC Version
Revision 1	8.1	8.4.0
Revision 2	8.1	9.0.0

3.3. Architecture

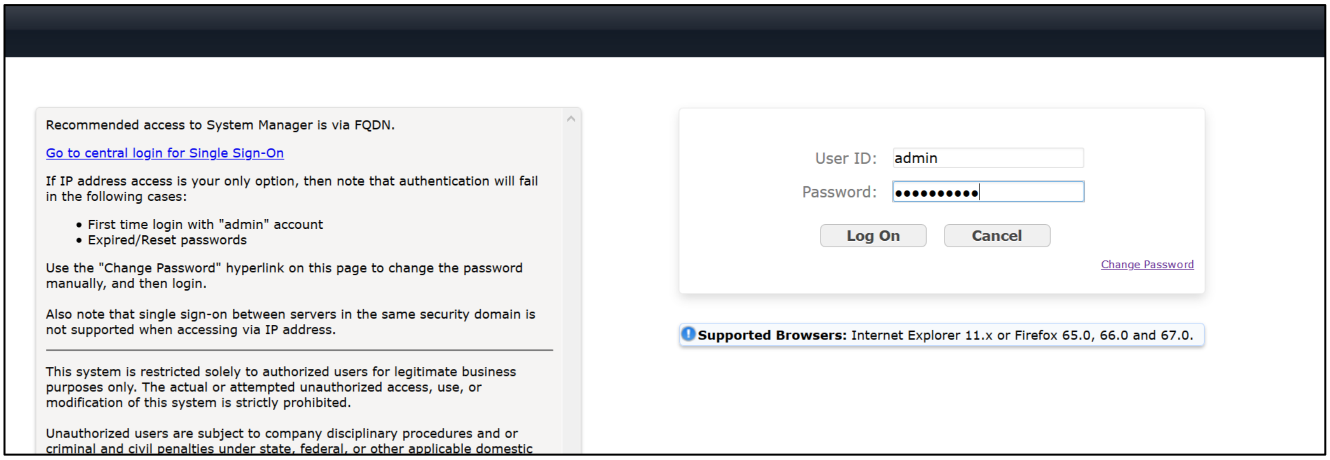

3rd party SIP phones uses Internet connection to connect with SBC using public IP
SIP SIGNALLING
SIP
Lite
Remote Worker – 3rd Party SIP Softphones
3rd party SIP phones registered to Avaya SM directly
AVAYA aura
Avaya Aura Session Manager
SBC
Enterprise Network

The configuration, validation and troubleshooting is the focus of this document and will be described in two phases:

- Phase 1 – Configuring the Avaya Aura Session Manager for Oracle SBC
- Phase 2 – Configuring the Oracle SBC.

4. Configuring the Avaya Aura Session Manager 8.1

Please login to Avaya Aura System Manager web GUI with proper login credentials (Username and password). After that, perform the steps below in the given order.



Recommended access to System Manager is via FQDN.

Go to central login for Single Sign-On

If IP address access is your only option, then note that authentication will fail in the following cases:

- First time login with "admin" account
- Expired/Reset passwords

Use the "Change Password" hyperlink on this page to change the password manually, and then login.

Also note that single sign-on between servers in the same security domain is not supported when accessing via IP address.

This system is restricted solely to authorized users for legitimate business purposes only. The actual or attempted unauthorized access, use, or modification of this system is strictly prohibited.

Unauthorized users are subject to company disciplinary procedures and or criminal and civil penalties under state, federal, or other applicable domestic

User ID: admin

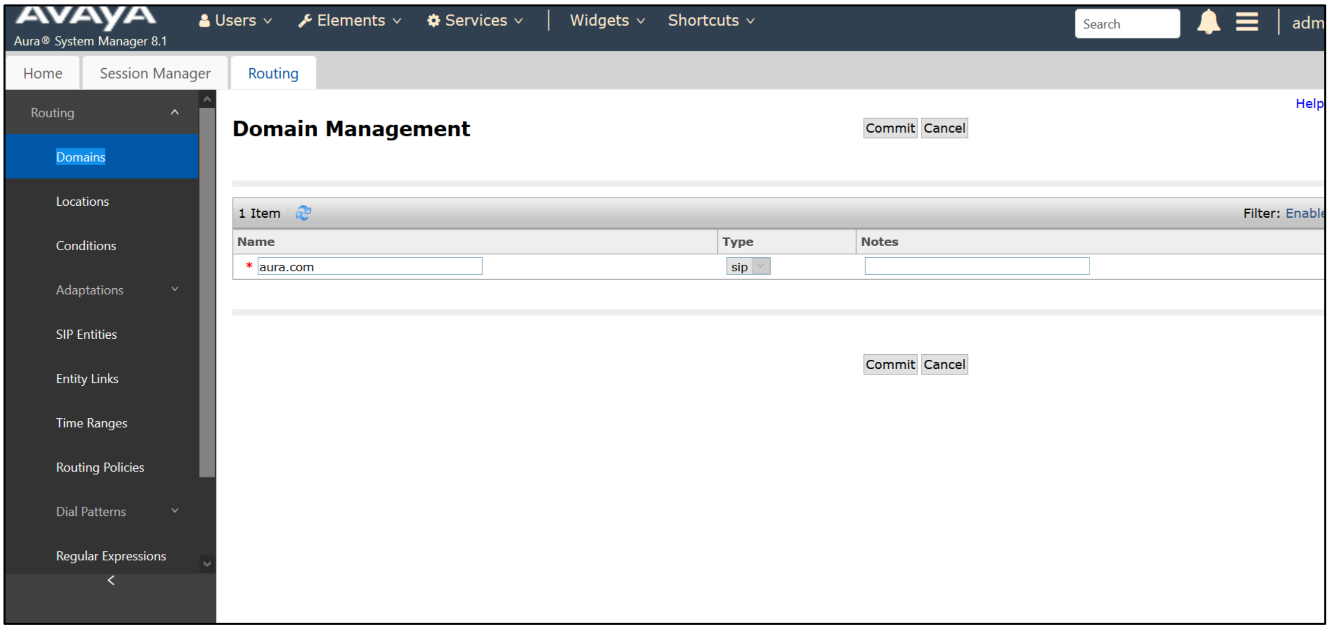
Password: ●●●●●●●●●●

Supported Browsers: Internet Explorer 11.x or Firefox 65.0, 66.0 and 67.0.

4.1. Adding SIP Domain

Click on Routing under the Elements section
On the Routing tab, select Domains and Click New

- Set domain name as aura.com (Example in this config)
- Set Type as SIP
- click “Commit” to save the configuration



Domain Management

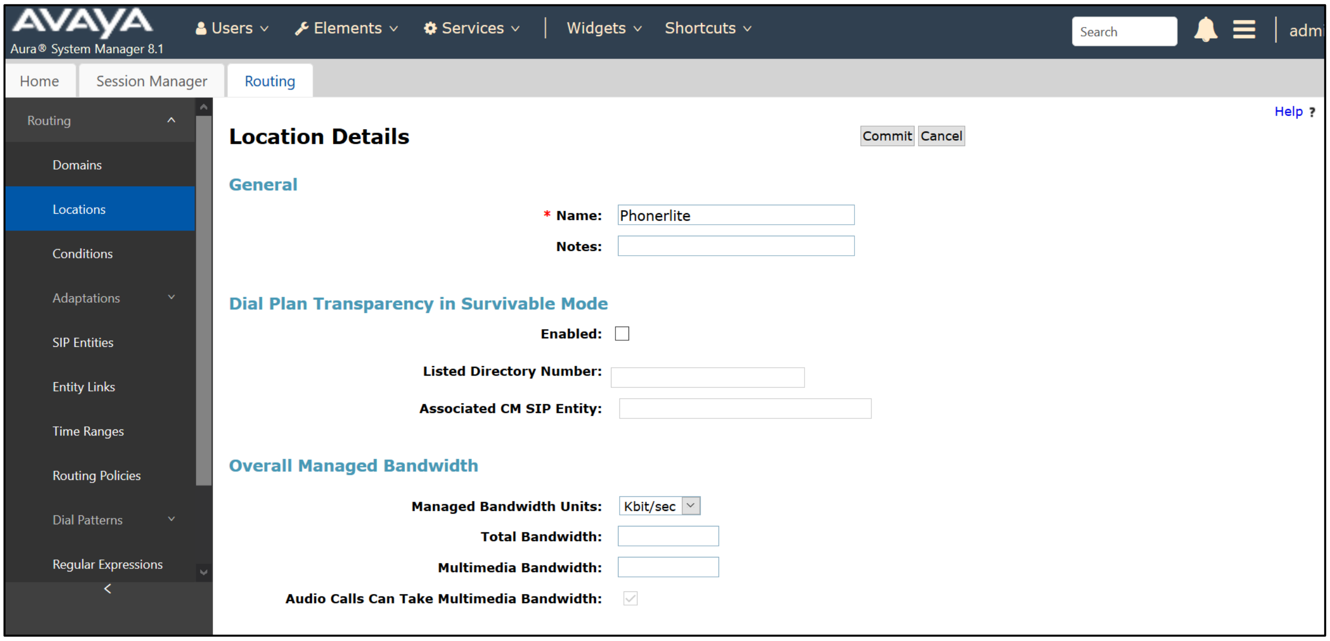
1 Item

Name	Type	Notes
* aura.com	sip	

4.2. Adding Location

Click on Routing under the Elements section
On the Routing tab, select Locations and Click New

- Set Name as Phonerlite
- Leave all other fields as default values and click "Commit" to save the configuration.



Location Details

General

* Name: Phonerlite

Notes:

Dial Plan Transparency in Survivable Mode

Enabled: □

Listed Directory Number:

Associated CM SIP Entity:

Overall Managed Bandwidth

Managed Bandwidth Units: Kbit/sec

Total Bandwidth:

Multimedia Bandwidth:

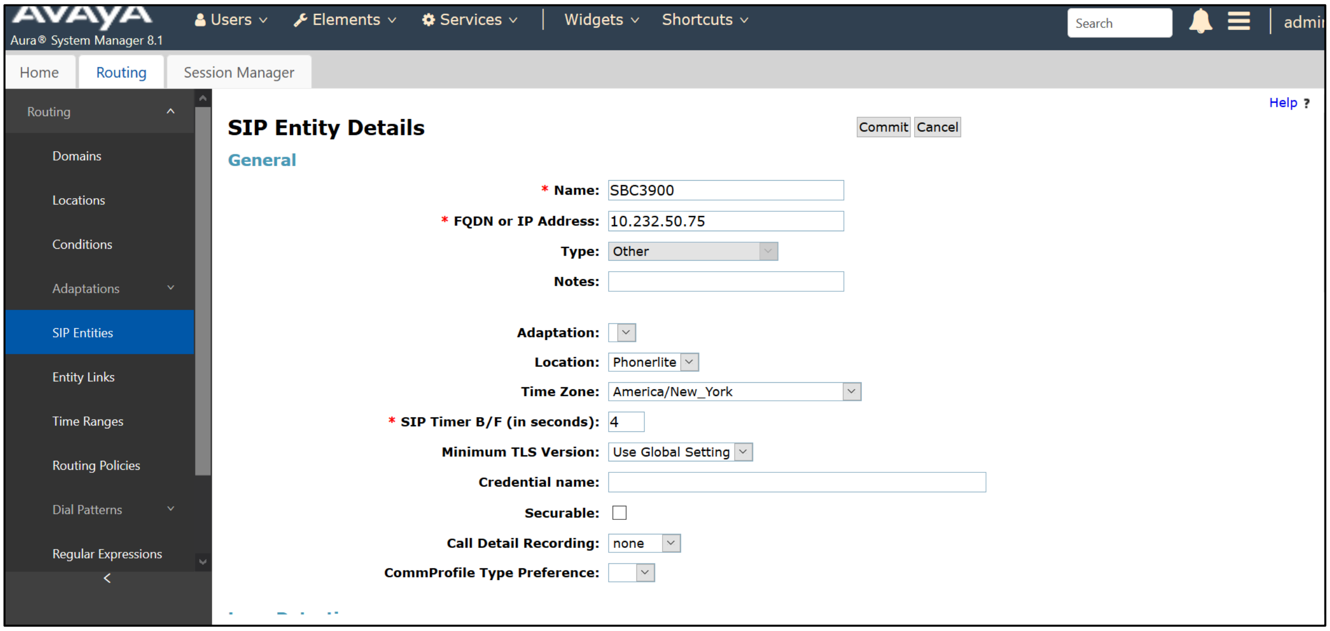
Audio Calls Can Take Multimedia Bandwidth: ☑

4.3. Adding the SBC as a SIP Entity and Configuring an Entity Link

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 the SBC as a SIP entity as shown below.

- Set Name: SBC3900 (example in this configuration)
- Set FQDN or IP Address: This is the "inside" IP address of Oracle E-SBC, 10.50.232.75 in this example.
- Set Type: Other
- Set Location: Select Phonerlite from drop down (example in this configuration)
- Set Time Zone: America/New_York (example in this configuration)
- Under Entity Links, Click Add
- Set SIP Entity 1: Select acme-sm which was previously configured
- Set SIP Entity 2: leave the default value SBC3900
- Set Protocol: UDP/TCP/TLS based on our testing
- Set Ports: Set both Ports to 5060/5061 for testing
- Set Connection Policy: trusted

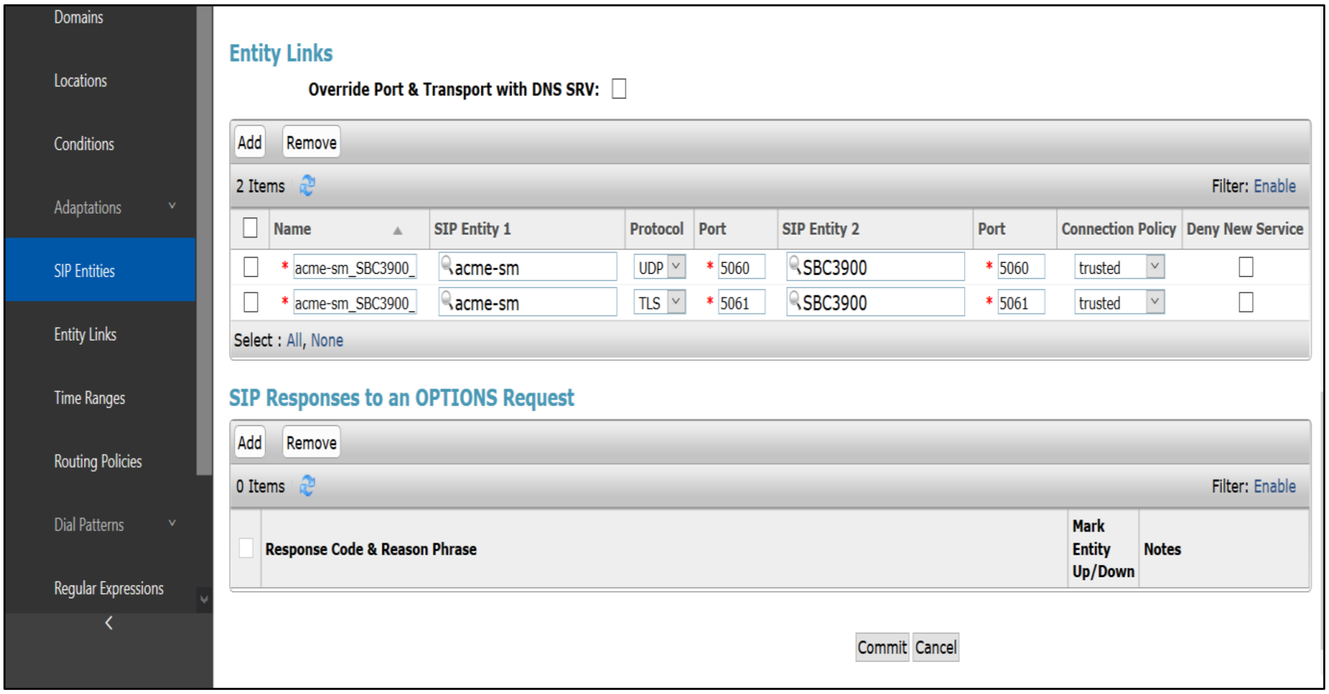
Leave all other fields as default values and click "Commit" to save the configuration.



SIP Entity Details

General

* Name:	SBC3900
* FQDN or IP Address:	10.232.50.75
Type:	Other
Notes:	
Adaptation:	
Location:	Phonerlite
Time Zone:	America/New_York
* SIP Timer B/F (in seconds):	4
Minimum TLS Version:	Use Global Setting
Credential name:	
Securable:	□
Call Detail Recording:	none
CommProfile Type Preference:	



Entity Links

Override Port & Transport with DNS SRV: □

2 Items

□	Name	SIP Entity 1	Protocol	Port	SIP Entity 2	Port	Connection Policy	Deny New Service
□	* acme-sm_SBC3900_	acme-sm	UDP	* 5060	SBC3900	* 5060	trusted	□
□	* acme-sm_SBC3900_	acme-sm	TLS	* 5061	SBC3900	* 5061	trusted	□

Select : All, None

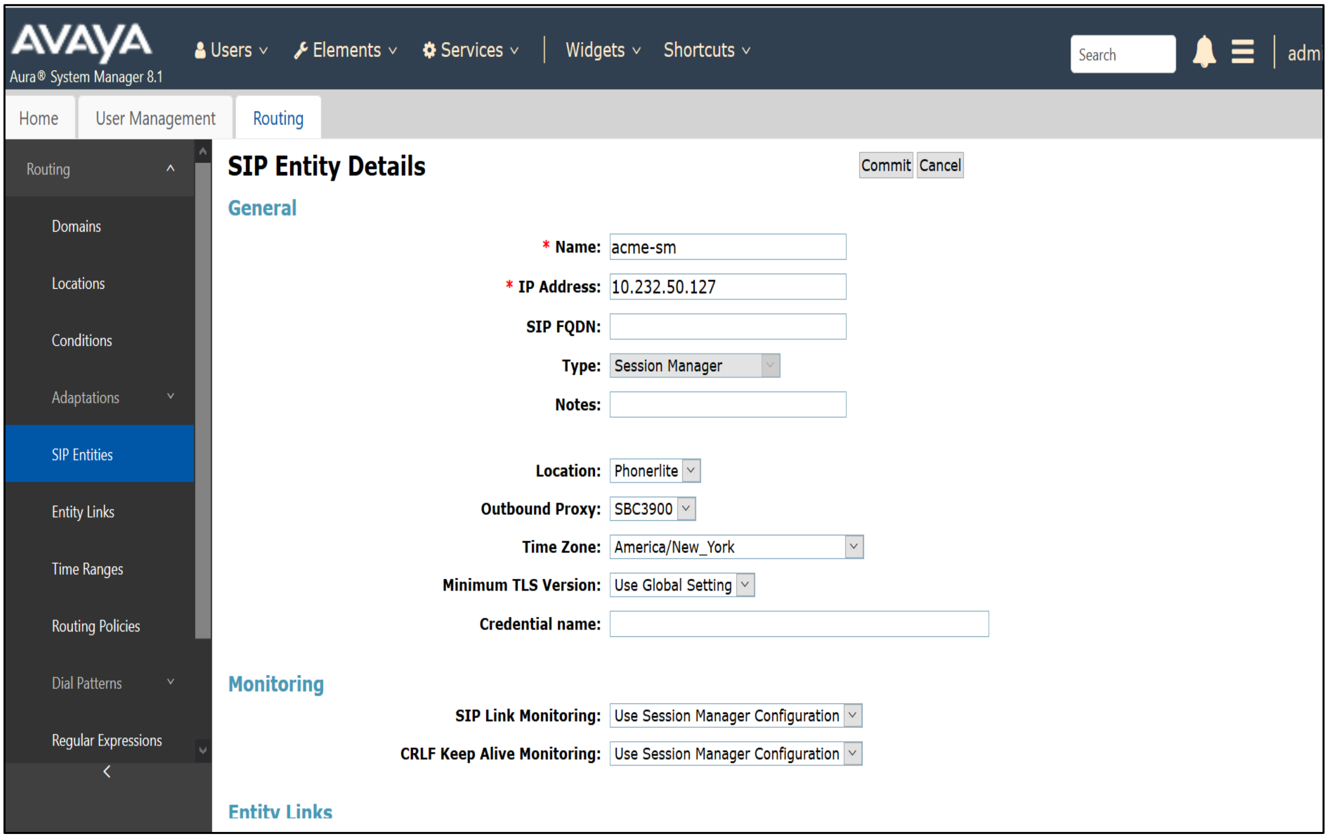
SIP Responses to an OPTIONS Request

0 Items

□	Response Code & Reason Phrase	Mark Entity Up/Down	Notes

Please configure Avaya Session Manager as another SIP entity in the same way as we added SBC:

- Set Name: acme-sm (example in this configuration)
- Set FQDN or IP Address: This is the SIP IP address of Avaya SM, 10.50.232.127 in this example.
- Set Type: Session Manager
- Leave all other fields as default values and click “Commit” to save the configuration.



SIP Entity Details

General

* Name:	acme-sm
* IP Address:	10.232.50.127
SIP FQDN:	
Type:	Session Manager
Notes:	
Location:	Phonerlite
Outbound Proxy:	SBC3900
Time Zone:	America/New_York
Minimum TLS Version:	Use Global Setting
Credential name:	

Monitoring

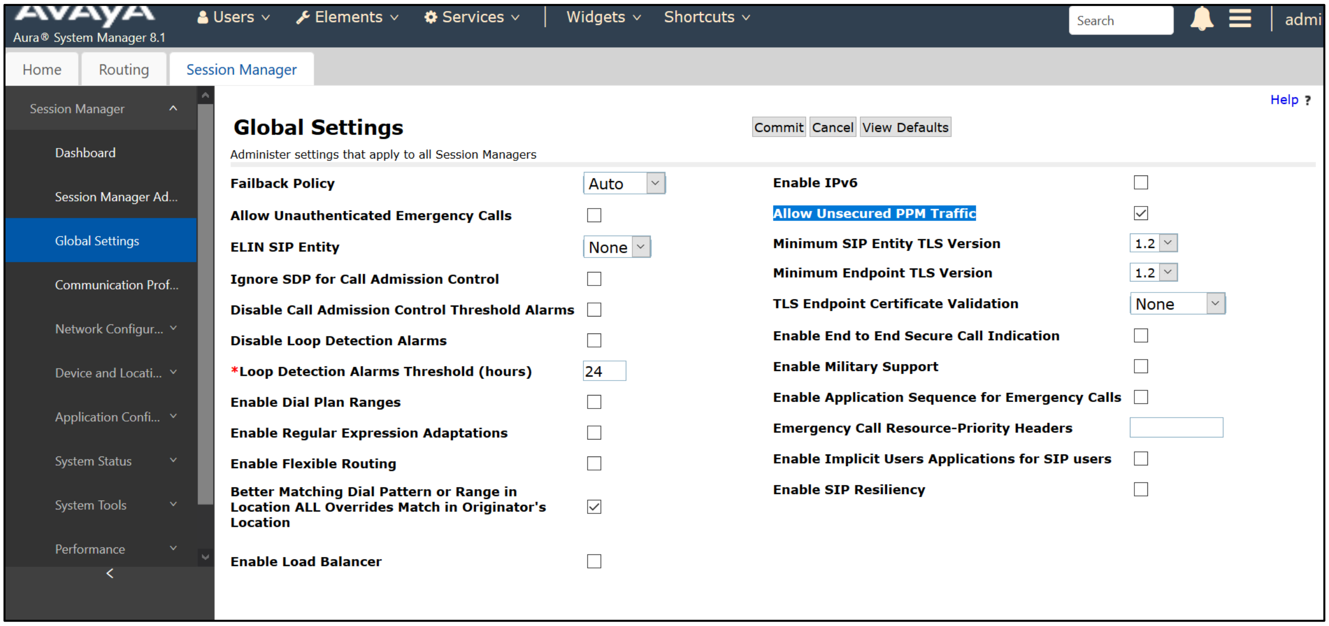
SIP Link Monitoring:	Use Session Manager Configuration
CRLF Keep Alive Monitoring:	Use Session Manager Configuration

Entity Links

4.4. Allowing Unsecured PPM Traffic (only if TLS is not used) and PPM Rate Limiting

Navigate to: Elements->Session Manager->Global Settings

Set Allow Unsecured PPM Traffic: **checked.**
Note that this is only required if you're using HTTP for the PPM downloads.
If you're using HTTPS as shown in the E-SBC configuration, leave this unchecked.



Global Settings

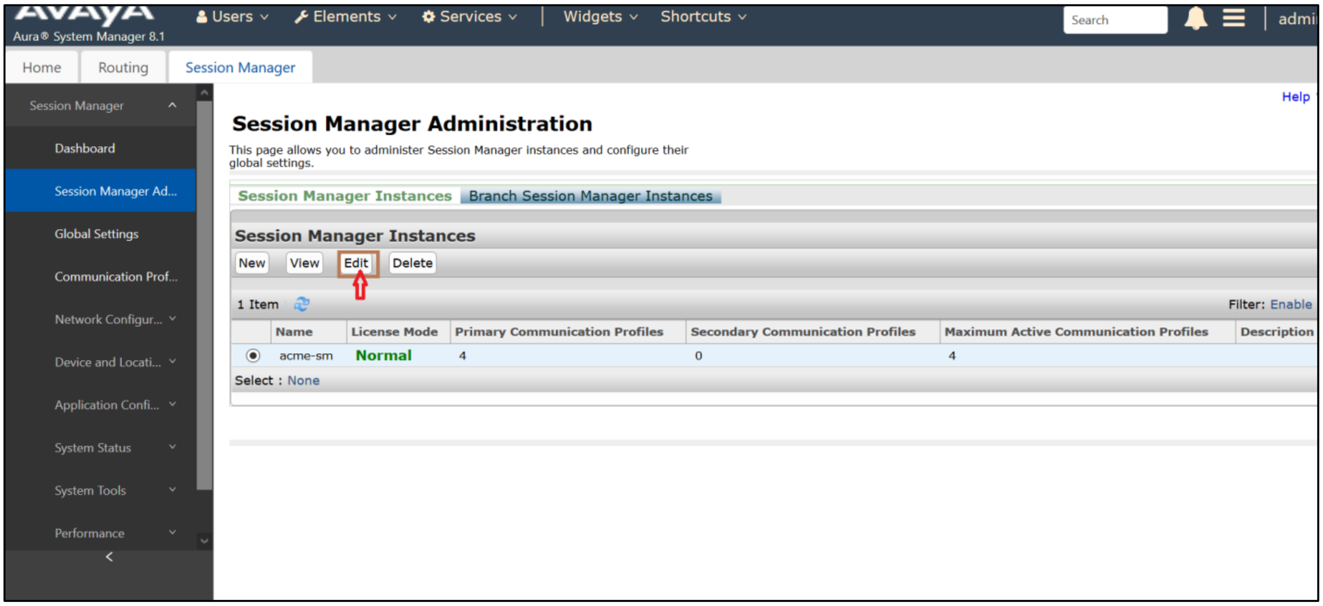
Administer settings that apply to all Session Managers

Failback Policy	Auto
Allow Unauthenticated Emergency Calls	□
ELIN SIP Entity	None
Ignore SDP for Call Admission Control	□
Disable Call Admission Control Threshold Alarms	□
Disable Loop Detection Alarms	□
*Loop Detection Alarms Threshold (hours)	24
Enable Dial Plan Ranges	□
Enable Regular Expression Adaptations	□
Enable Flexible Routing	□
Better Matching Dial Pattern or Range in Location ALL Overrides Match in Originator's Location	☑
Enable Load Balancer	□
Enable IPv6	□
Allow Unsecured PPM Traffic	☑
Minimum SIP Entity TLS Version	1.2
Minimum Endpoint TLS Version	1.2
TLS Endpoint Certificate Validation	None
Enable End to End Secure Call Indication	□
Enable Military Support	□
Enable Application Sequence for Emergency Calls	□
Emergency Call Resource-Priority Headers	
Enable Implicit Users Applications for SIP users	□
Enable SIP Resiliency	□

Navigate to: Elements->Session Manager->Global Settings Session Manager Administration.

Select the proper Session Manager instance and click Edit

- Scroll down to PPM – Connection Settings
- Set Limited PPM Client Connection: unchecked
- Set PPM Packet Rate Limiting: unchecked
- Leave all other fields as default and Click Commit to save Session Manager Administration page.



Session Manager Administration

This page allows you to administer Session Manager instances and configure their global settings.

Session Manager Instances | Branch Session Manager Instances

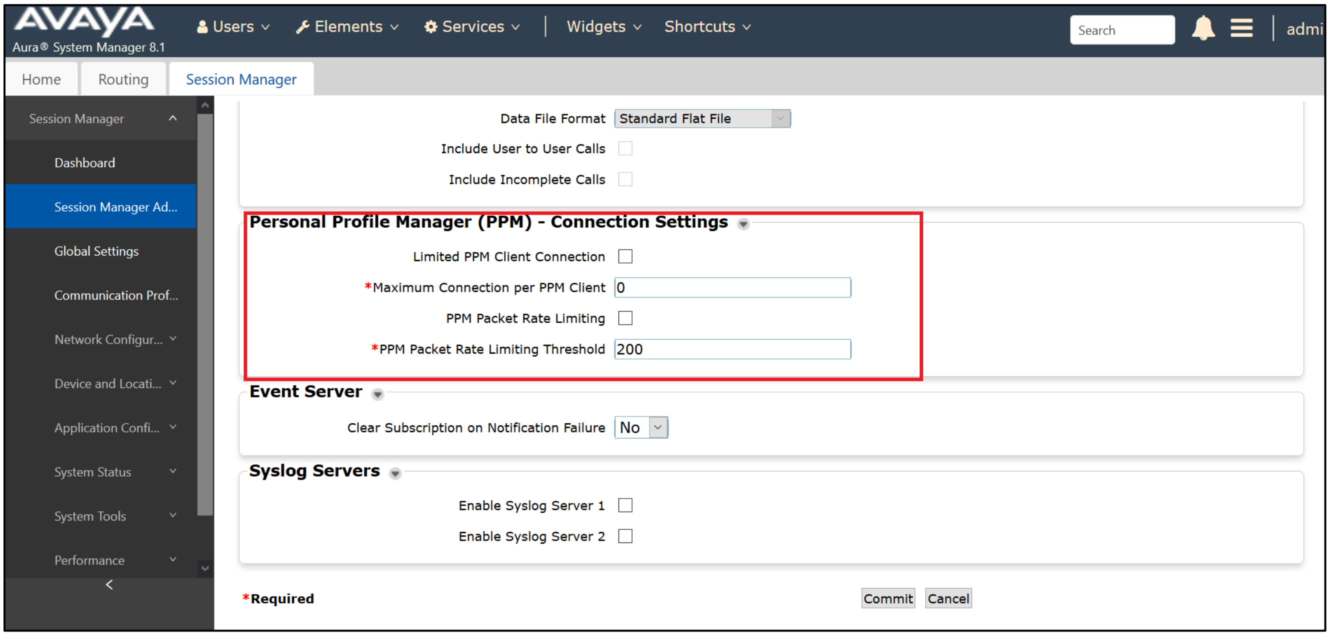
Session Manager Instances

New | View | Edit | Delete

1 Item Filter: Enable

	Name	License Mode	Primary Communication Profiles	Secondary Communication Profiles	Maximum Active Communication Profiles	Description
●	acme-sm	Normal	4	0	4	

Select : None



Data File Format	Standard Flat File
Include User to User Calls	□
Include Incomplete Calls	□

Personal Profile Manager (PPM) - Connection Settings

Limited PPM Client Connection	□
*Maximum Connection per PPM Client	0
PPM Packet Rate Limiting	□
*PPM Packet Rate Limiting Threshold	200

Event Server

Clear Subscription on Notification Failure	No

Syslog Servers

Enable Syslog Server 1	□
Enable Syslog Server 2	□

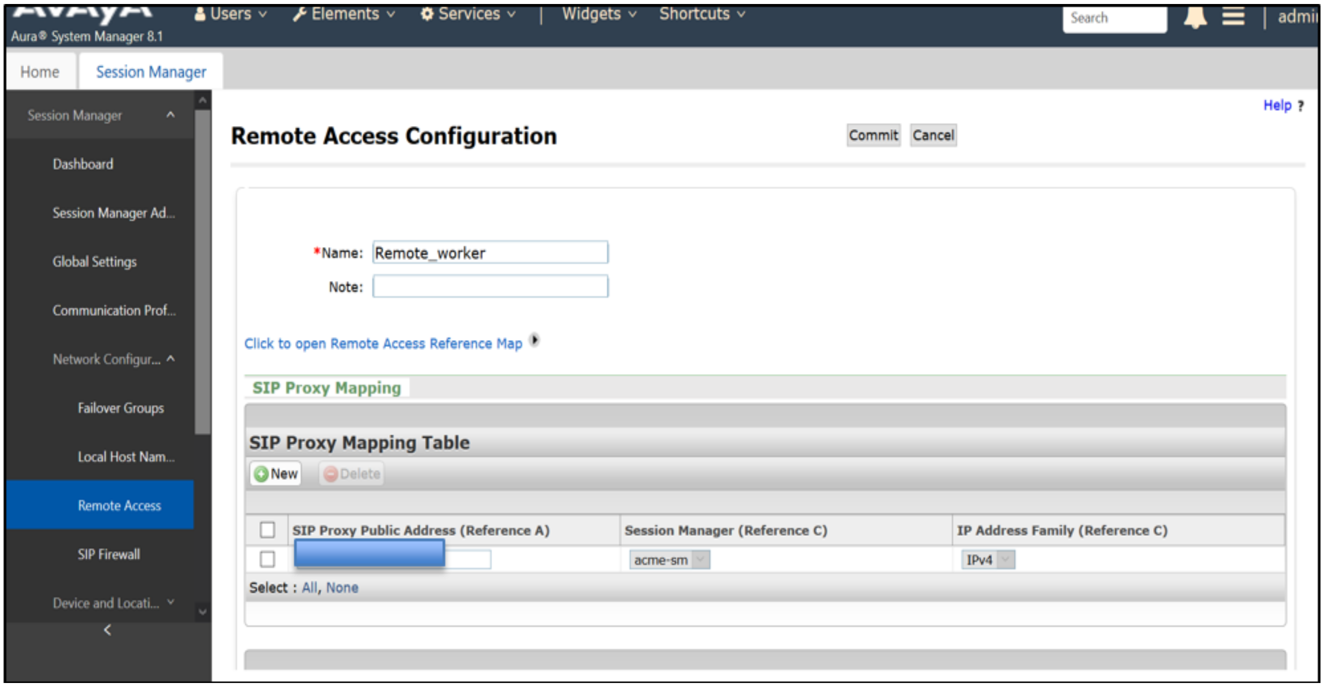
***Required**

Commit | Cancel

4.5. Enabling Remote Office

Navigate to: Elements->Session Manager->Network Configuration->Remote Access, Click New

- Set Name: Remote_worker for this setup.
- Click New under SIP Proxy Mapping Table. Add the Oracle SBC outside interface IP address for SIP Proxy Public Address.
- Click New under SIP Proxy Private IP Address. Add the Oracle SBC inside interface IP address for SIP Private Address, 10.232.50.75 is given in this example.
- Click Commit to save the configuration.



Remote Access Configuration

*Name: Remote_worker

Note:

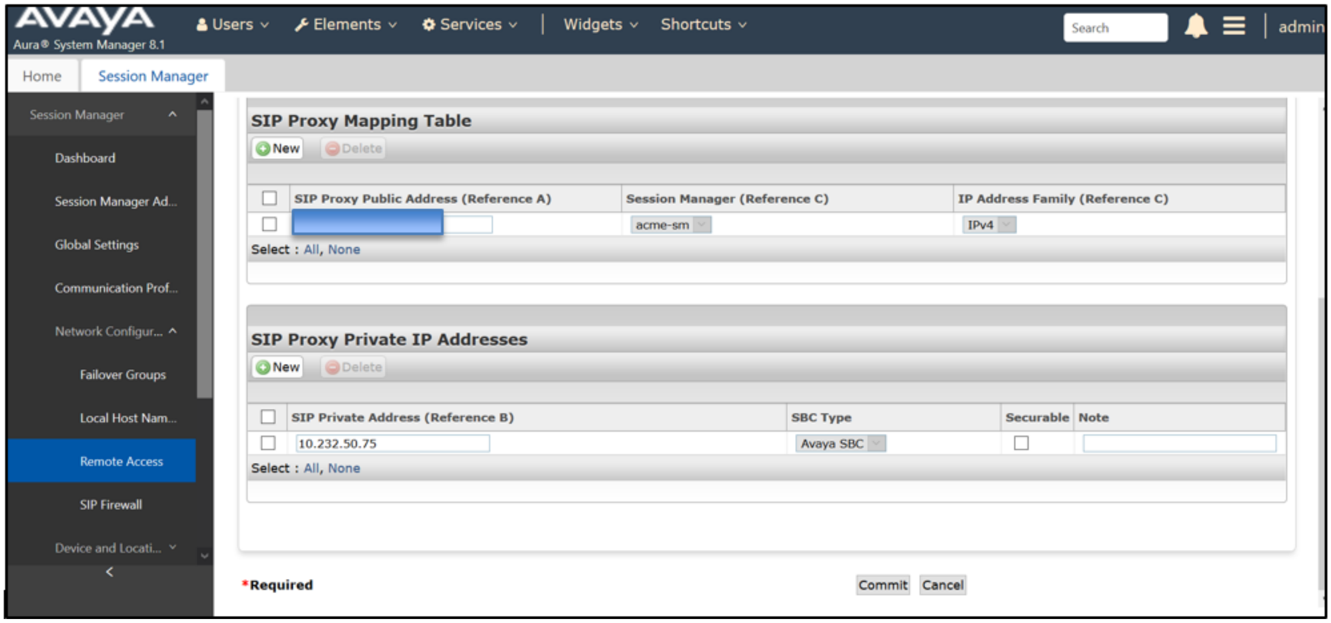
Click to open Remote Access Reference Map

SIP Proxy Mapping

SIP Proxy Mapping Table

□	SIP Proxy Public Address (Reference A)	Session Manager (Reference C)	IP Address Family (Reference C)
□	[redacted]	acme-sm	IPv4

Select : All, None



SIP Proxy Mapping Table

□	SIP Proxy Public Address (Reference A)	Session Manager (Reference C)	IP Address Family (Reference C)
□	[redacted]	acme-sm	IPv4

Select : All, None

SIP Proxy Private IP Addresses

□	SIP Private Address (Reference B)	SBC Type	Securable	Note
□	10.232.50.75	Avaya SBC	□	

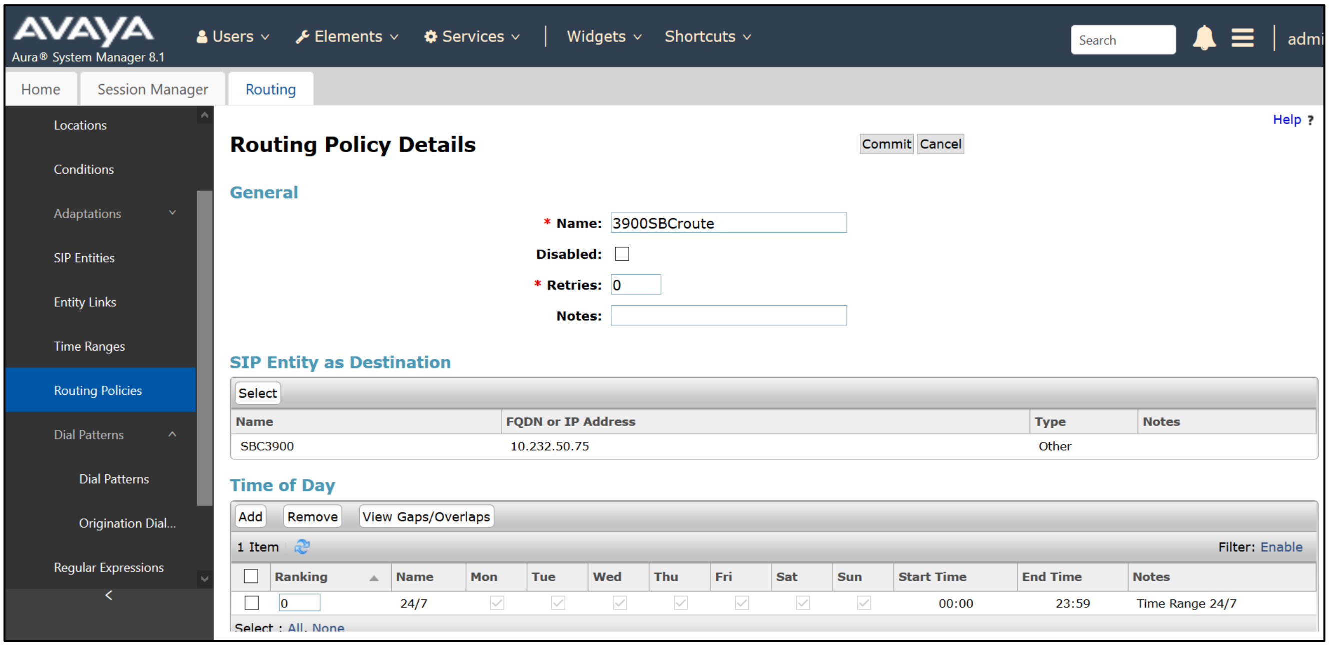
Select : All, None

*Required

4.6. Adding Routing Policies

Navigate to: Routing tab, select Routing Policies and Click New

- Set Name: 3900SBCroute (example in this configuration)
- Set Retries : Default value is 0, can be used as same value
- Select SIP Entity as Destination: Select SBC3900 which was previously configured.
- Click Commit to save the configuration



Routing Policy Details

General

* Name: 3900SBCroute

Disabled: □

* Retries: 0

Notes:

SIP Entity as Destination

Select

Name	FQDN or IP Address	Type	Notes
SBC3900	10.232.50.75	Other	

Time of Day

Add | Remove | View Gaps/Overlaps

1 Item — Filter: Enable

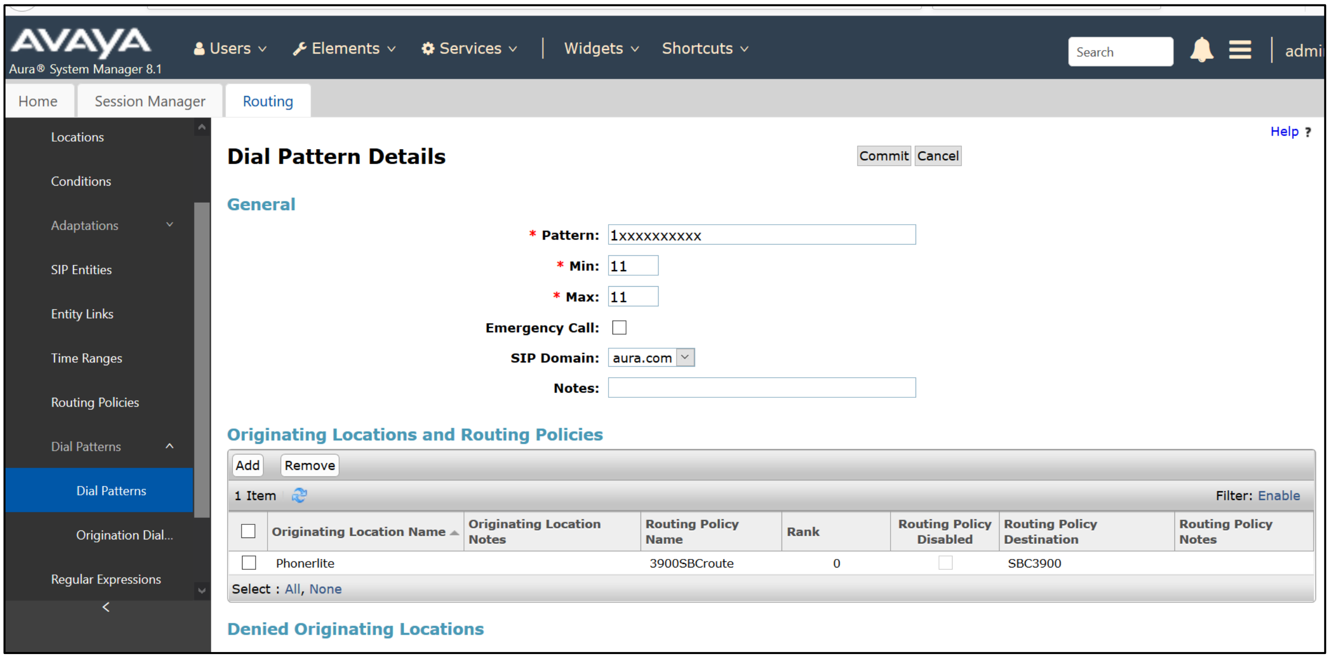
□	Ranking	Name	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Start Time	End Time	Notes
□	0	24/7	☑	☑	☑	☑	☑	☑	☑	00:00	23:59	Time Range 24/7

Select : All, None

4.7. Adding Dial Patterns:

Navigate to: Routing tab, select Dial Patterns, again Dial Patterns and Click New

- Set Pattern: 1xxxxxxxxxx (example in this configuration)
- Set Min : 11 (example in this configuration)
- Set Max: 11 (example in this configuration)
- Select SIP Domain: aura.com which was previously configured.
- Click Commit to save the configuration.



Dial Pattern Details

General

* Pattern:	1xxxxxxxxxx
* Min:	11
* Max:	11
Emergency Call:	□
SIP Domain:	aura.com
Notes:	

Originating Locations and Routing Policies

Add Remove

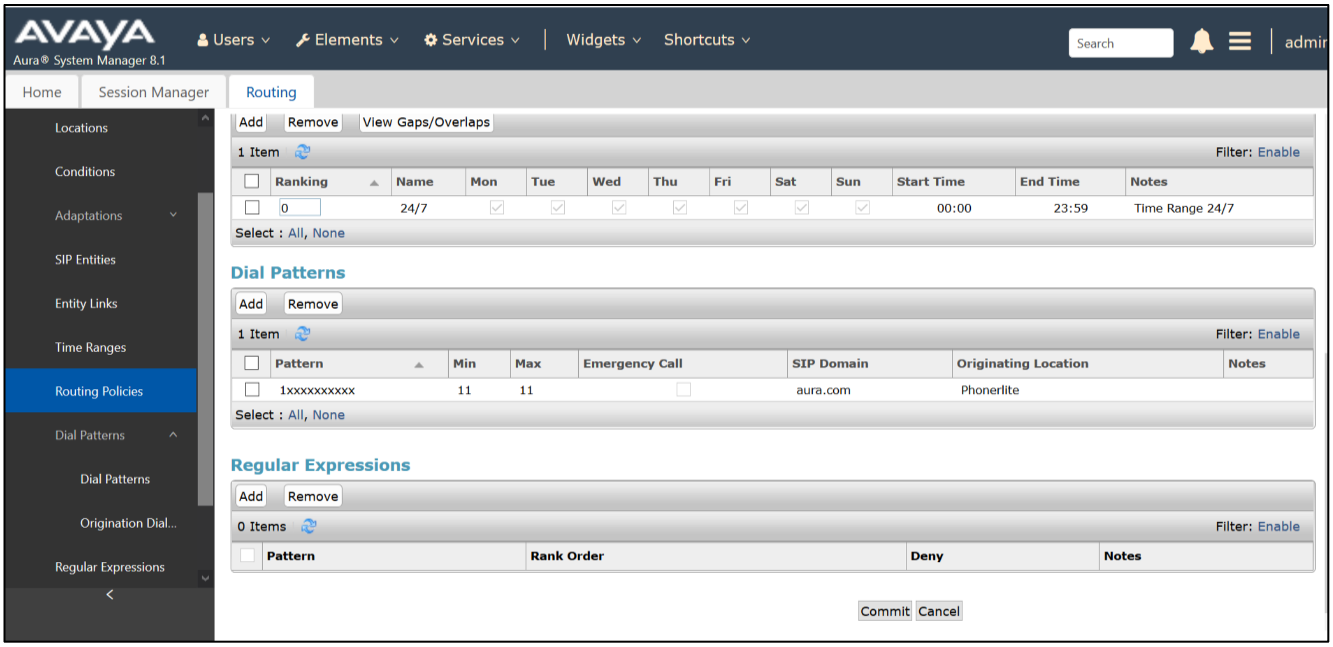
1 Item — Filter: Enable

□	Originating Location Name	Originating Location Notes	Routing Policy Name	Rank	Routing Policy Disabled	Routing Policy Destination	Routing Policy Notes
□	Phonerlite		3900SBCroute	0	□	SBC3900	

Select : All, None

Denied Originating Locations

After configuring the dial patterns, Please add the dial patterns to the routing policies created above.



Add Remove View Gaps/Overlaps

1 Item — Filter: Enable

□	Ranking	Name	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Start Time	End Time	Notes
□	0	24/7	☑	☑	☑	☑	☑	☑	☑	00:00	23:59	Time Range 24/7

Select : All, None

Dial Patterns

Add Remove

1 Item — Filter: Enable

□	Pattern	Min	Max	Emergency Call	SIP Domain	Originating Location	Notes
□	1xxxxxxxxxx	11	11	□	aura.com	Phonerlite	

Select : All, None

Regular Expressions

Add Remove

0 Items — Filter: Enable

□	Pattern	Rank Order	Deny	Notes

Commit Cancel

4.8. Adding Users to Avaya Session Manager.

Navigate to: Users tab, select User Management, select Manage Users and Click New

Under **Identity Tab**, please enter the following

- Set Last Name: User1(example in this configuration)
- Set First Name: Avaya (example in this configuration)
- Set Login Name: 17814437246@aura.com (example in this configuration)

Under **Communication Profile** tab, click Communication Profile Password

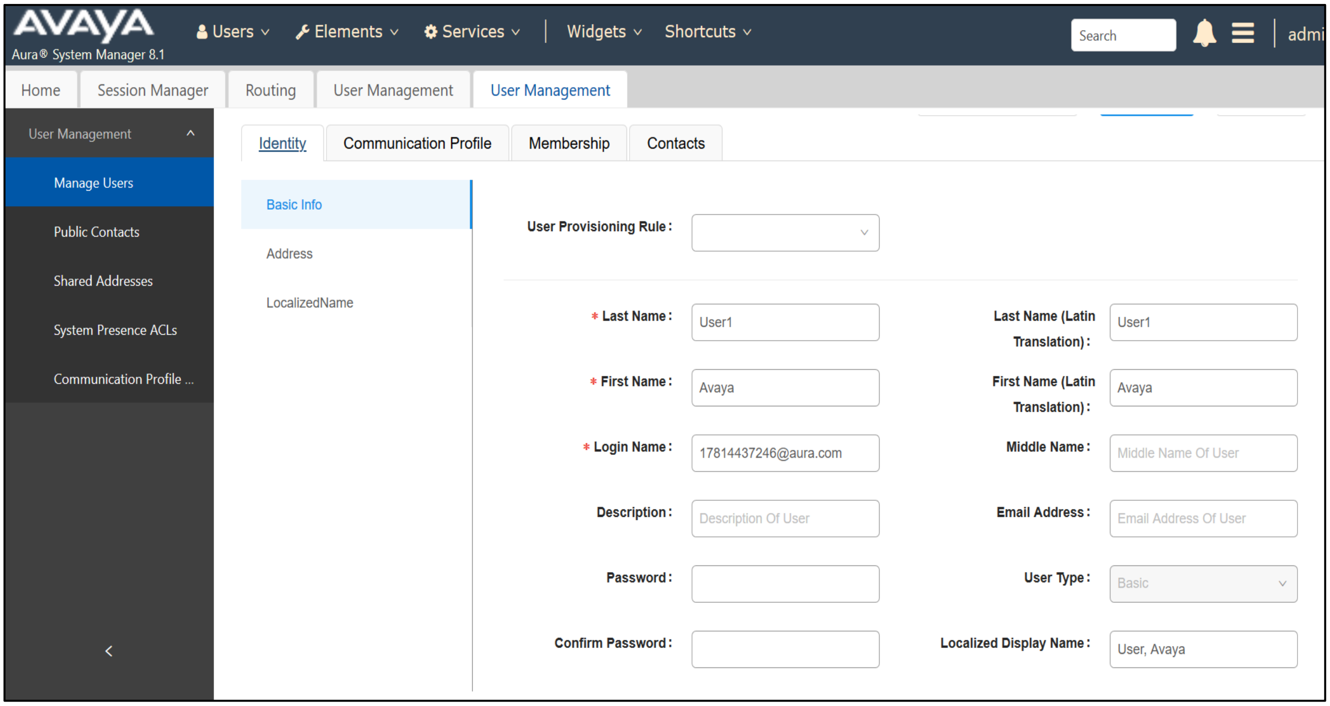
- Set Comm-Profile Password: any password (Numbers or alphabets or alphanumeric)
- Re-enter Comm-Profile Password: Type the password again for confirmation.

Navigate to **Communication address tab**, click New

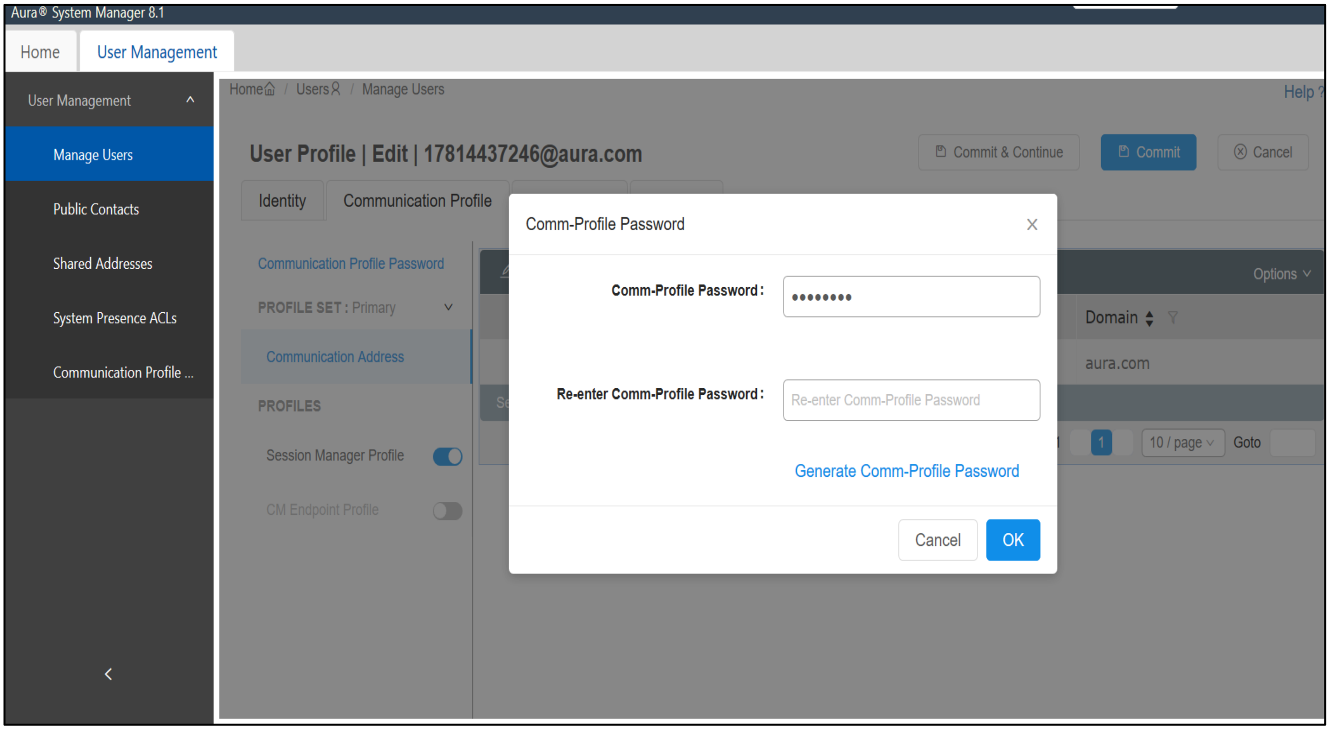
- Set Type: Avaya SIP
- Set Fully Qualified Address: Type the Directory number @domain.com
  17814437246@aura.com

Under **Profile tab,** enable **Session Manager Profile** and click it to open it.

- Set Primary Session Manager under SIP Registration: acme-sm (example in this configuration)
- Set Home Location Manager under Call Routing: Phonerlite (example in this configuration)
- Click Commit to save the configuration.



User Provisioning Rule :			
* Last Name :	User1	Last Name (Latin Translation) :	User1
* First Name :	Avaya	First Name (Latin Translation) :	Avaya
* Login Name :	17814437246@aura.com	Middle Name :	Middle Name Of User
Description :	Description Of User	Email Address :	Email Address Of User
Password :		User Type :	Basic
Confirm Password :		Localized Display Name :	User, Avaya



User Profile | Edit | 17814437246@aura.com

Comm-Profile Password

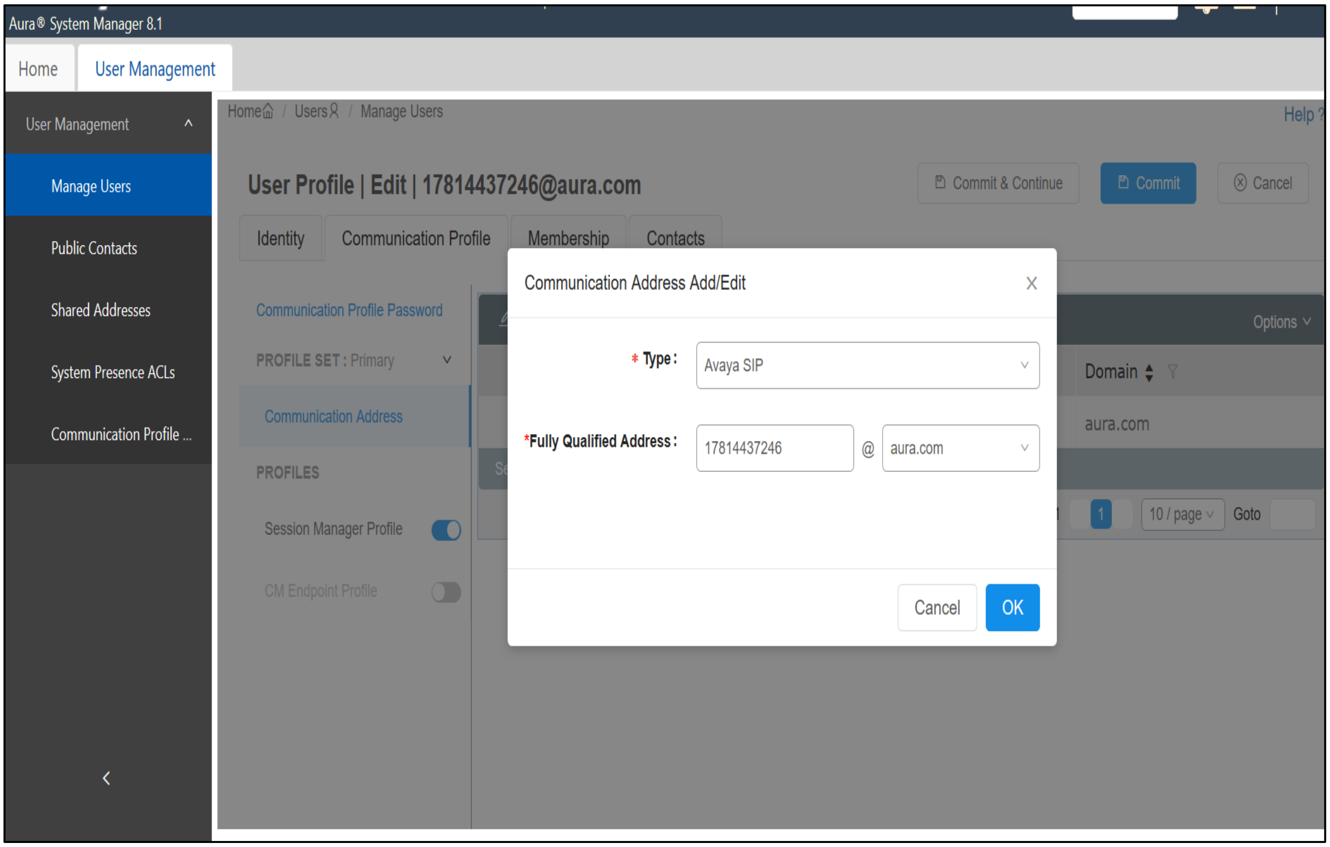
Comm-Profile Password : ••••••••

Re-enter Comm-Profile Password : Re-enter Comm-Profile Password

Generate Comm-Profile Password

Cancel OK

aura.com



User Profile | Edit | 17814437246@aura.com

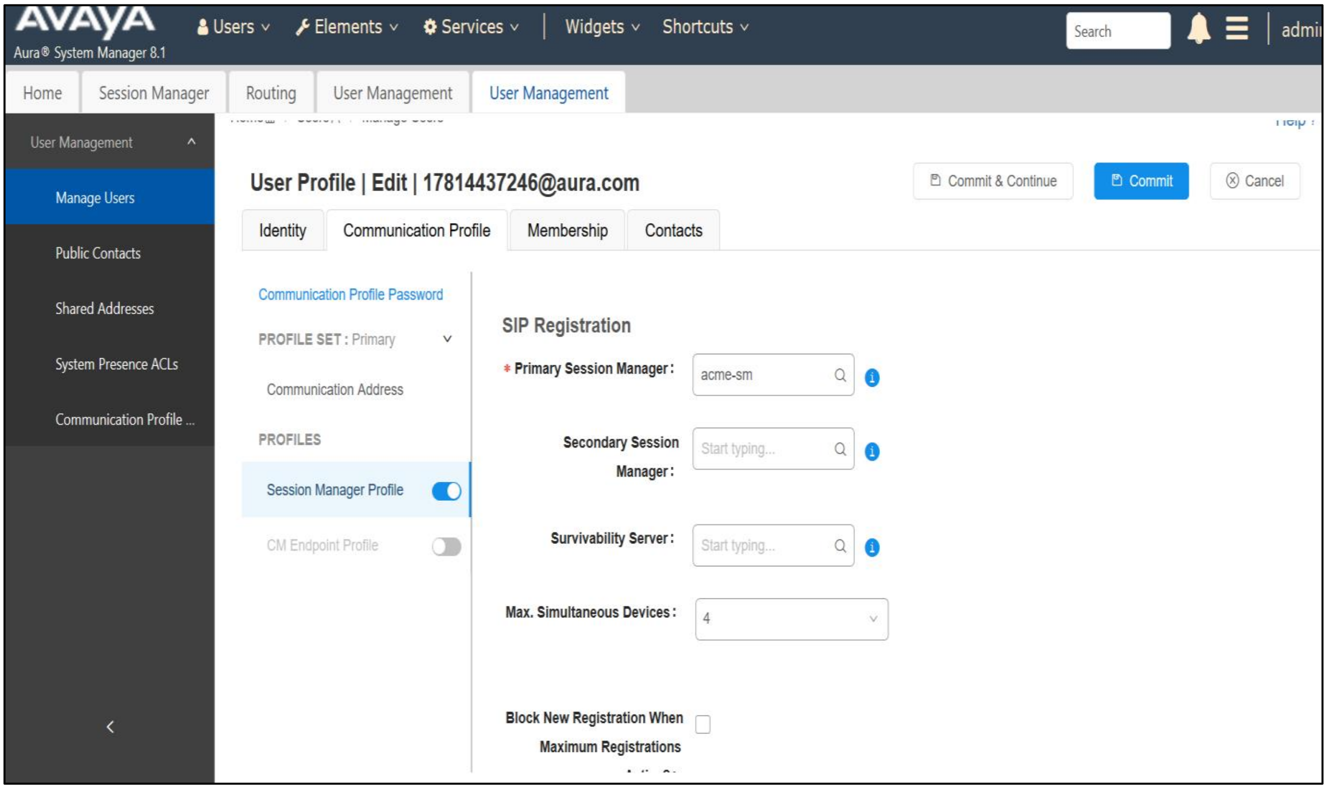
Communication Address Add/Edit

* Type : Avaya SIP

*Fully Qualified Address : 17814437246 @ aura.com

Cancel OK

aura.com



User Profile | Edit | 17814437246@aura.com

PROFILE SET : Primary

SIP Registration

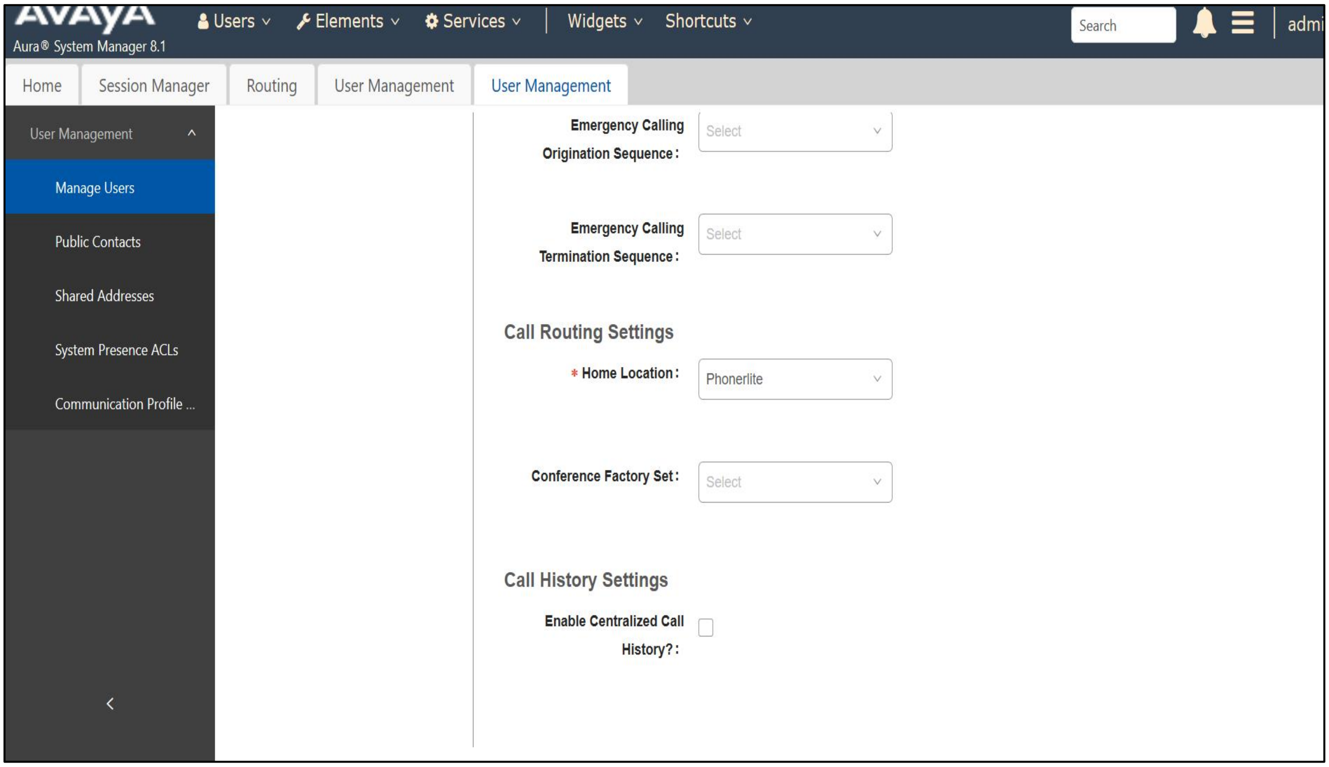
* Primary Session Manager : acme-sm

Secondary Session Manager : Start typing...

Survivability Server : Start typing...

Max. Simultaneous Devices : 4

Block New Registration When Maximum Registrations □



Emergency Calling Origination Sequence : Select

Emergency Calling Termination Sequence : Select

Call Routing Settings

* Home Location : Phonerlite

Conference Factory Set : Select

Call History Settings

Enable Centralized Call History? : □

You can repeat the above steps to add more users to the Session Manager.
With this, Avaya Session Manager Configuration is complete.

5. Configuring the SBC

This chapter provides step-by-step guidance on how to configure Oracle SBC for interworking with Avaya Session Manager for registering Avaya 3rd party SIP phones (Remote worker config) and for making calls from Remote worker phones to other phones registered to the Avaya Session Manager 8.1

5.1. Validated Oracle SBC version

Oracle conducted tests with Oracle SBC 8.4 / 9.0 software – this software with the configuration listed below can run on any of the following products:

- AP 1100
- AP 3900
- AP 4600
- AP 6350
- AP 6300
- AP 3950 (Starting from SBC 9.0 version)
- AP 4900 (Starting from SBC 9.0 version)
- VME

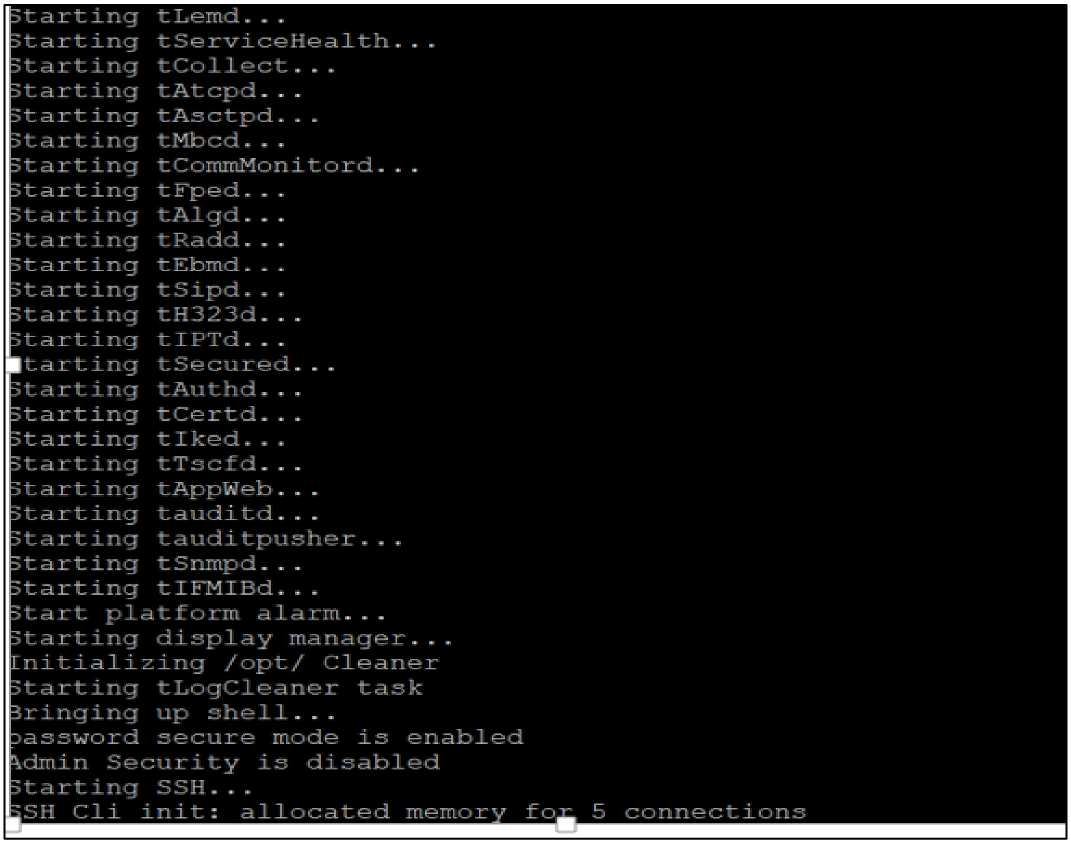
6. New SBC configuration

If the customer is looking to setup a new SBC from scratch, please follow the section below.

6.1. Establishing a serial connection to the SBC

Connect one end of a straight-through Ethernet cable to the front console port (which is active by default) on the SBC and the other end to console adapter that ships with the 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

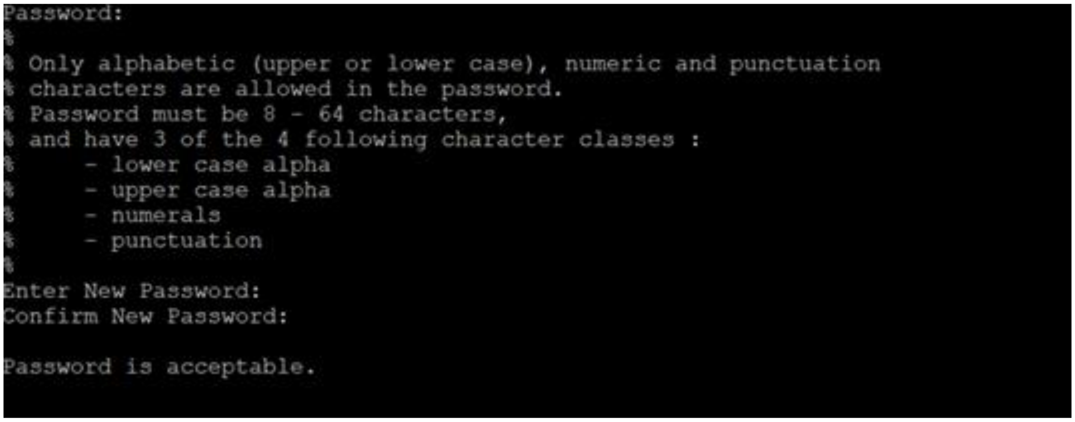


```
Starting tLemd...
Starting tServiceHealth...
Starting tCollect...
Starting tAtcpd...
Starting tAsctpd...
Starting tMbcd...
Starting tCommMonitord...
Starting tFped...
Starting tAlgd...
Starting tRadd...
Starting tEbmd...
Starting tSipd...
Starting tH323d...
Starting tIPTd...
Starting tSecured...
Starting tAuthd...
Starting tCertd...
Starting tIked...
Starting tTscfd...
Starting tAppWeb...
Starting tauditd...
Starting tauditpusher...
Starting tSnmpd...
Starting tIFMIBd...
Start platform alarm...
Starting display manager...
Initializing /opt/ Cleaner
Starting tLogCleaner task
Bringing up shell...
password secure mode is enabled
Admin Security is disabled
Starting SSH...
SSH Cli init: allocated memory for 5 connections
```

Power on the SBC and confirm that you see the following output from the boot-up sequence

Enter the default password to log in to the SBC. Note that the default SBC password is “acme” and the default super user password is “packet”.

Both passwords have to be changed according to the rules shown below.

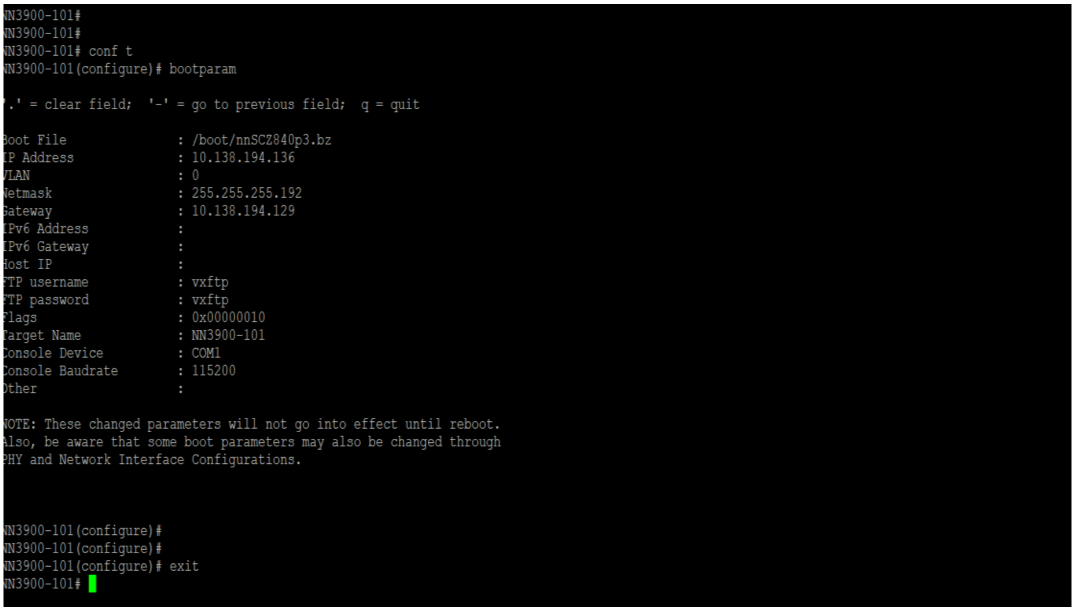


```
Password:
%
% Only alphabetic (upper or lower case), numeric and punctuation
% characters are allowed in the password.
% Password must be 8 - 64 characters,
% and have 3 of the 4 following character classes :
%      - lower case alpha
%      - upper case alpha
%      - numerals
%      - punctuation
%
Enter New Password:
Confirm New Password:

Password is acceptable.
```

Now set the management IP of the SBC by setting the IP address in bootparam to access bootparam. Go to Configure terminal->bootparam.

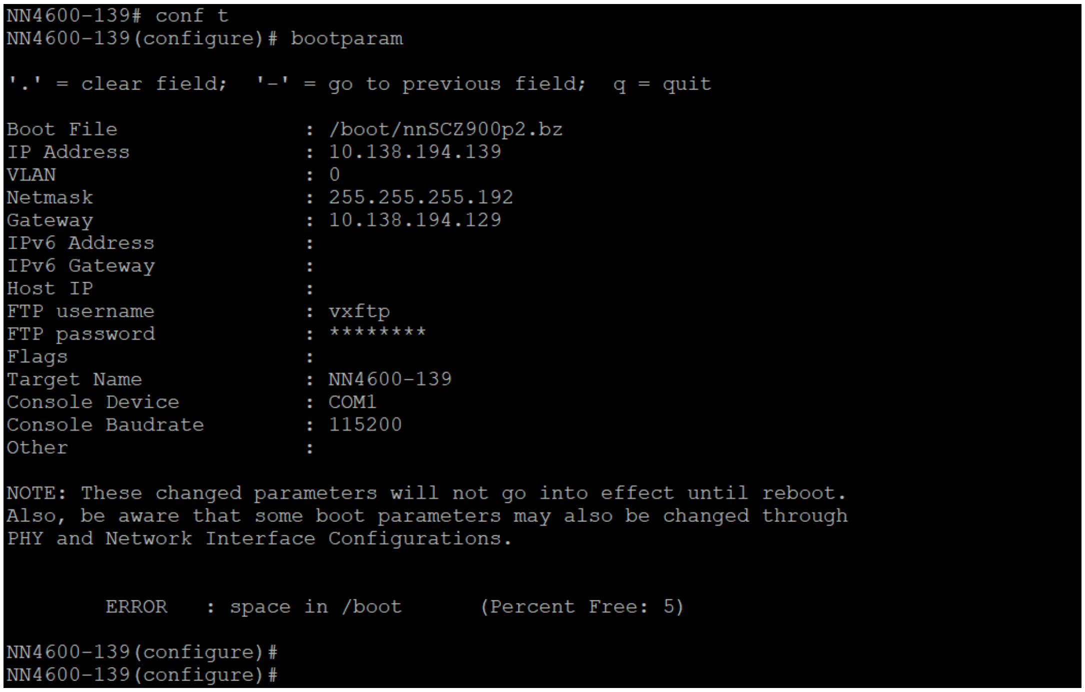
Note: There is no management IP configured by default.

Bootparam for SBC version 8.4



```
NN3900-101#
NN3900-101#
NN3900-101# conf t
NN3900-101(configure)# bootparam

'.' = clear field;  '-' = go to previous field;  q = quit

Boot File               : /boot/nnSCZ840p3.bz
IP Address              : 10.138.194.136
VLAN                    : 0
Netmask                 : 255.255.255.192
Gateway                 : 10.138.194.129
IPv6 Address            :
IPv6 Gateway            :
Host IP                 :
FTP username            : vxftp
FTP password            : vxftp
Flags                   : 0x00000010
Target Name             : NN3900-101
Console Device          : COM1
Console Baudrate        : 115200
Other                   :

NOTE: These changed parameters will not go into effect until reboot.
Also, be aware that some boot parameters may also be changed through
PHY and Network Interface Configurations.


NN3900-101(configure)#
NN3900-101(configure)#
NN3900-101(configure)# exit
NN3900-101#
```

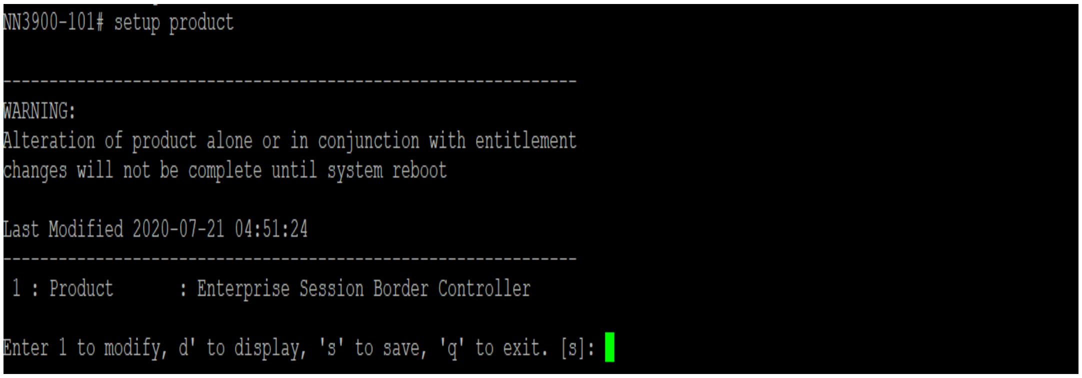
Bootparam for SBC version 9.0



```
NN4600-139# conf t
NN4600-139(configure)# bootparam

'.' = clear field;  '-' = go to previous field;  q = quit

Boot File               : /boot/nnSCZ900p2.bz
IP Address              : 10.138.194.139
VLAN                    : 0
Netmask                 : 255.255.255.192
Gateway                 : 10.138.194.129
IPv6 Address            :
IPv6 Gateway            :
Host IP                 :
FTP username            : vxftp
FTP password            : ********
Flags                   :
Target Name             : NN4600-139
Console Device          : COM1
Console Baudrate        : 115200
Other                   :

NOTE: These changed parameters will not go into effect until reboot.
Also, be aware that some boot parameters may also be changed through
PHY and Network Interface Configurations.


        ERROR    : space in /boot      (Percent Free: 5)

NN4600-139(configure)#
NN4600-139(configure)#
```

Setup product type to Enterprise Session Border Controller as shown below.

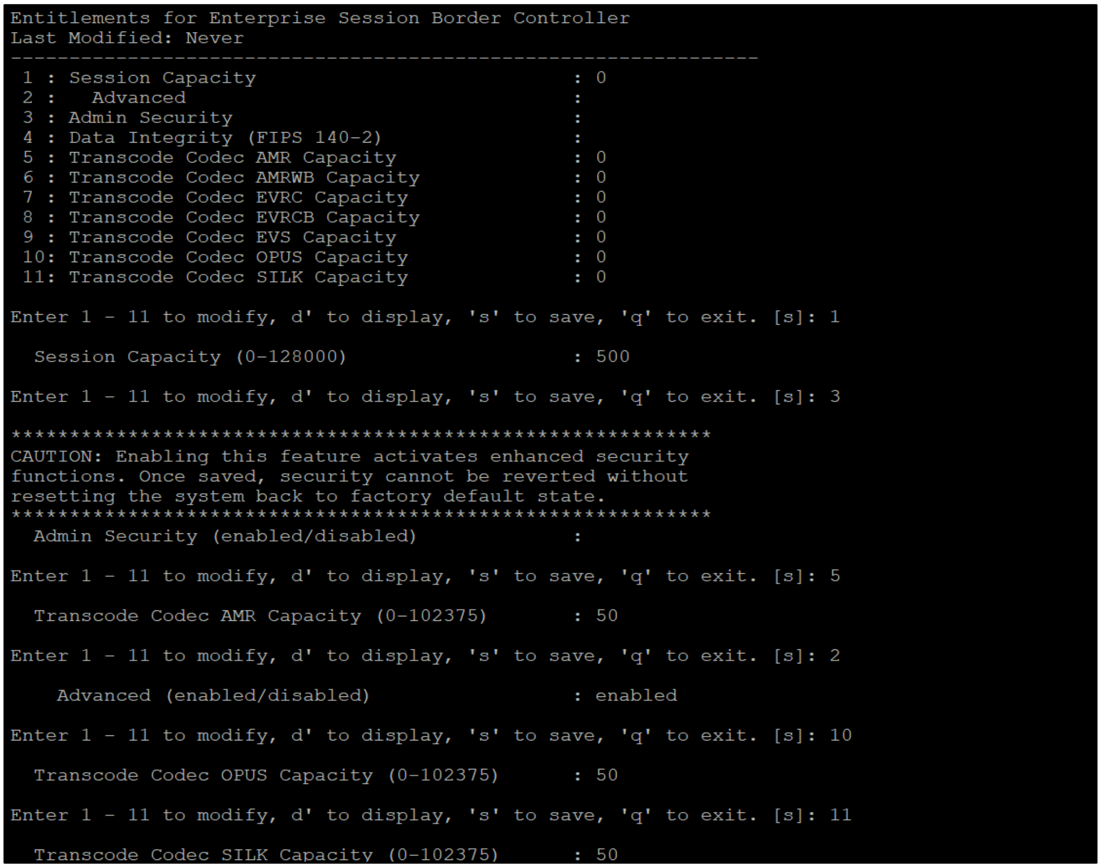
To configure product type, type in setup product in the terminal



```
NN3900-101# setup product

-------------------------------------------------------------
WARNING:
Alteration of product alone or in conjunction with entitlement
changes will not be complete until system reboot

Last Modified 2020-07-21 04:51:24
-------------------------------------------------------------
 1 : Product       : Enterprise Session Border Controller

Enter 1 to modify, d' to display, 's' to save, 'q' to exit. [s]:
```

Enable the features for the ESBC using the setup entitlements command as shown

Save the changes and reboot the SBC.

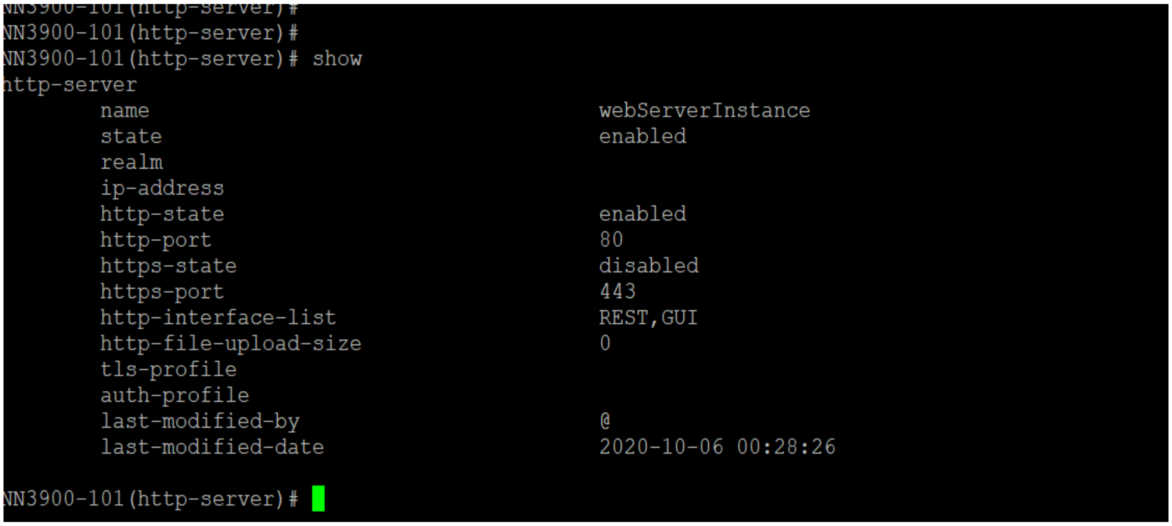


```
Entitlements for Enterprise Session Border Controller
Last Modified: Never
----------------------------------------------------------------
 1 : Session Capacity                            : 0
 2 :   Advanced                                  :
 3 : Admin Security                              :
 4 : Data Integrity (FIPS 140-2)                 :
 5 : Transcode Codec AMR Capacity                : 0
 6 : Transcode Codec AMRWB Capacity              : 0
 7 : Transcode Codec EVRC Capacity               : 0
 8 : Transcode Codec EVRCB Capacity              : 0
 9 : Transcode Codec EVS Capacity                : 0
 10: Transcode Codec OPUS Capacity               : 0
 11: Transcode Codec SILK Capacity               : 0

Enter 1 - 11 to modify, d' to display, 's' to save, 'q' to exit. [s]: 1

  Session Capacity (0-128000)                    : 500

Enter 1 - 11 to modify, d' to display, 's' to save, 'q' to exit. [s]: 3

************************************************************
CAUTION: Enabling this feature activates enhanced security
functions. Once saved, security cannot be reverted without
resetting the system back to factory default state.
************************************************************
  Admin Security (enabled/disabled)              :

Enter 1 - 11 to modify, d' to display, 's' to save, 'q' to exit. [s]: 5

  Transcode Codec AMR Capacity (0-102375)        : 50

Enter 1 - 11 to modify, d' to display, 's' to save, 'q' to exit. [s]: 2

    Advanced (enabled/disabled)                  : enabled

Enter 1 - 11 to modify, d' to display, 's' to save, 'q' to exit. [s]: 10

  Transcode Codec OPUS Capacity (0-102375)       : 50

Enter 1 - 11 to modify, d' to display, 's' to save, 'q' to exit. [s]: 11

  Transcode Codec SILK Capacity (0-102375)       : 50
```

The SBC comes up after reboot and is now ready for configuration.

Go to configure terminal->system->http-server-config.

Enable the http-server-config to access the SBC using Web GUI. Save and activate the config.

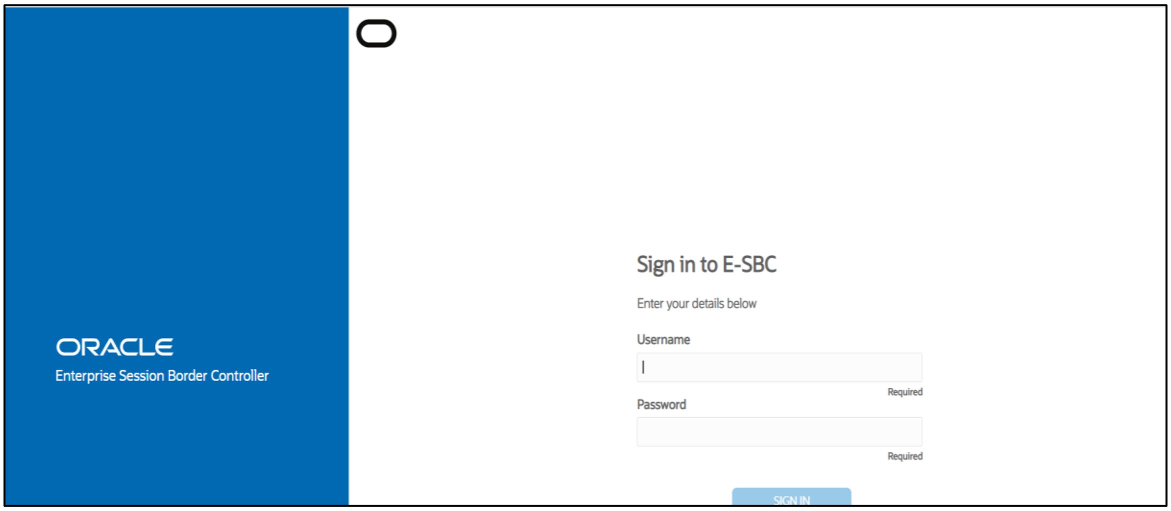


```
NN3900-101(http-server)#
NN3900-101(http-server)#
NN3900-101(http-server)# show
http-server
        name                                    webServerInstance
        state                                   enabled
        realm
        ip-address
        http-state                              enabled
        http-port                               80
        https-state                             disabled
        https-port                              443
        http-interface-list                     REST,GUI
        http-file-upload-size                   0
        tls-profile
        auth-profile
        last-modified-by                        @
        last-modified-date                      2020-10-06 00:28:26

NN3900-101(http-server)#
```

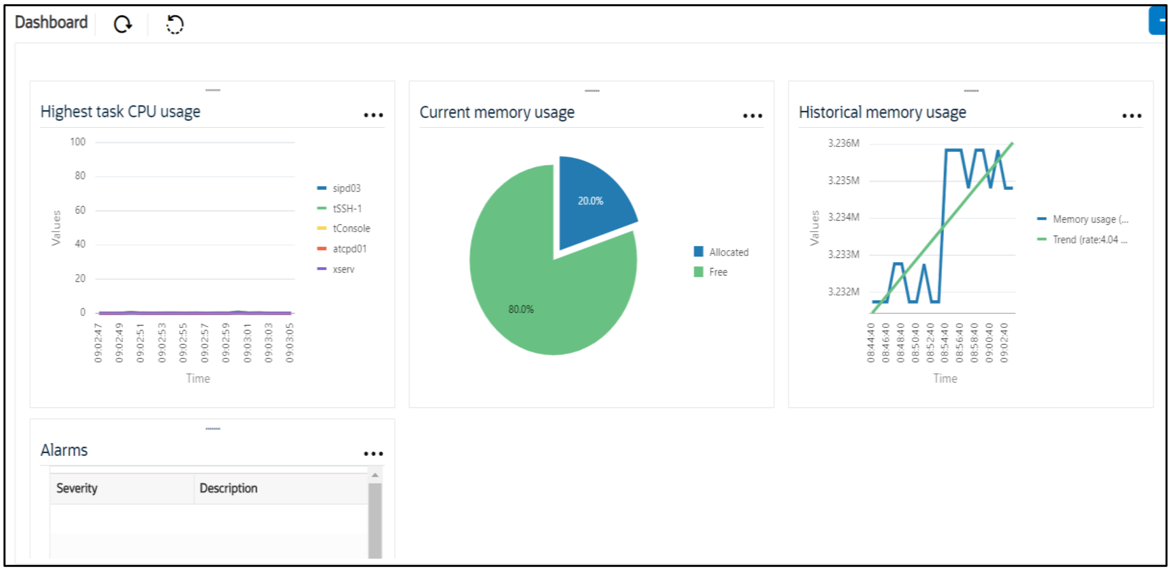
6.2. Configure SBC using Web GUI

In this app note, we configure SBC using the WebGUI.

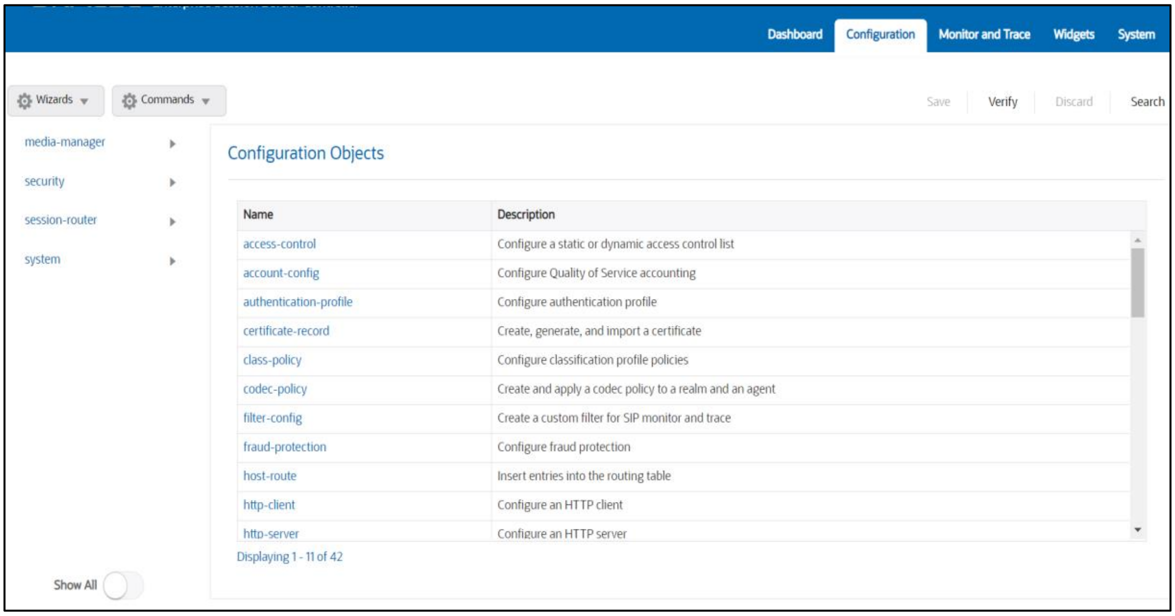
The Web GUI can be accessed through the url http://<SBC_MGMT_IP>.



The username and password is the same as that of CLI.



Go to Configuration as shown below, to configure the SBC



Configuration Objects

Name	Description
access-control	Configure a static or dynamic access control list
account-config	Configure Quality of Service accounting
authentication-profile	Configure authentication profile
certificate-record	Create, generate, and import a certificate
class-policy	Configure classification profile policies
codec-policy	Create and apply a codec policy to a realm and an agent
filter-config	Create a custom filter for SIP monitor and trace
fraud-protection	Configure fraud protection
host-route	Insert entries into the routing table
http-client	Configure an HTTP client
http-server	Configure an HTTP server

Displaying 1 - 11 of 42

Kindly refer to the GUI User Guide given below for more information.

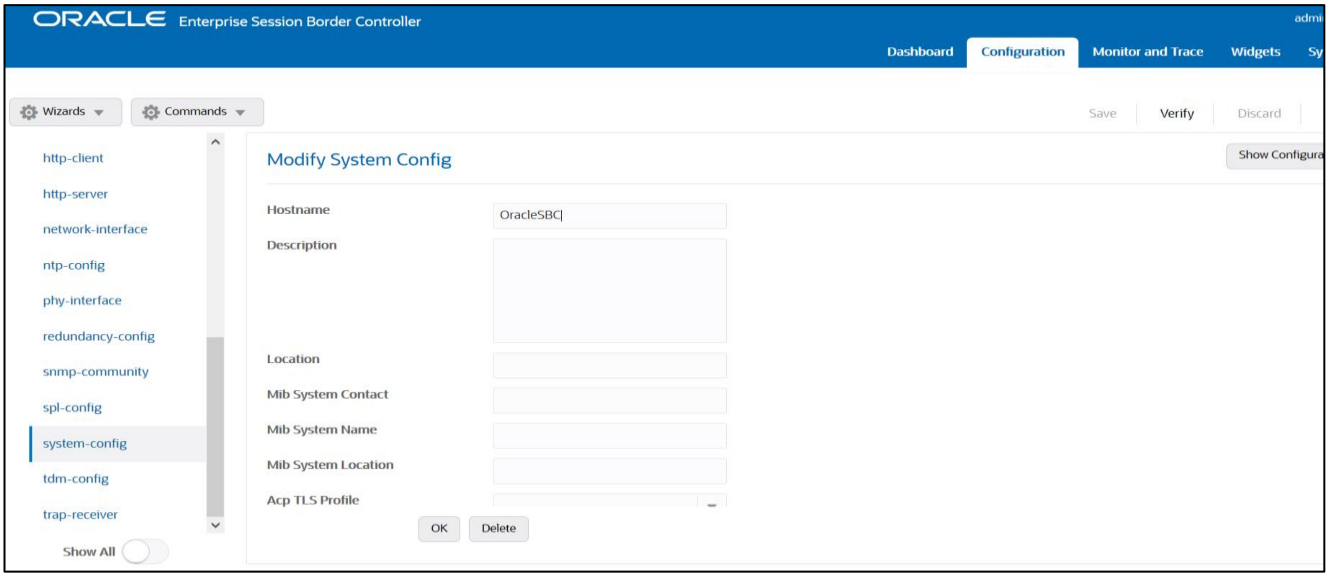
https://docs.oracle.com/en/industries/communications/enterprise-session-border-controller/9.0.0/webgui/web-gui-guide.pdf

The expert mode is used for configuration.

Tip: To make this configuration simpler, one can directly search the element to be configured, from the Objects tab available.

6.3. Configure system-config

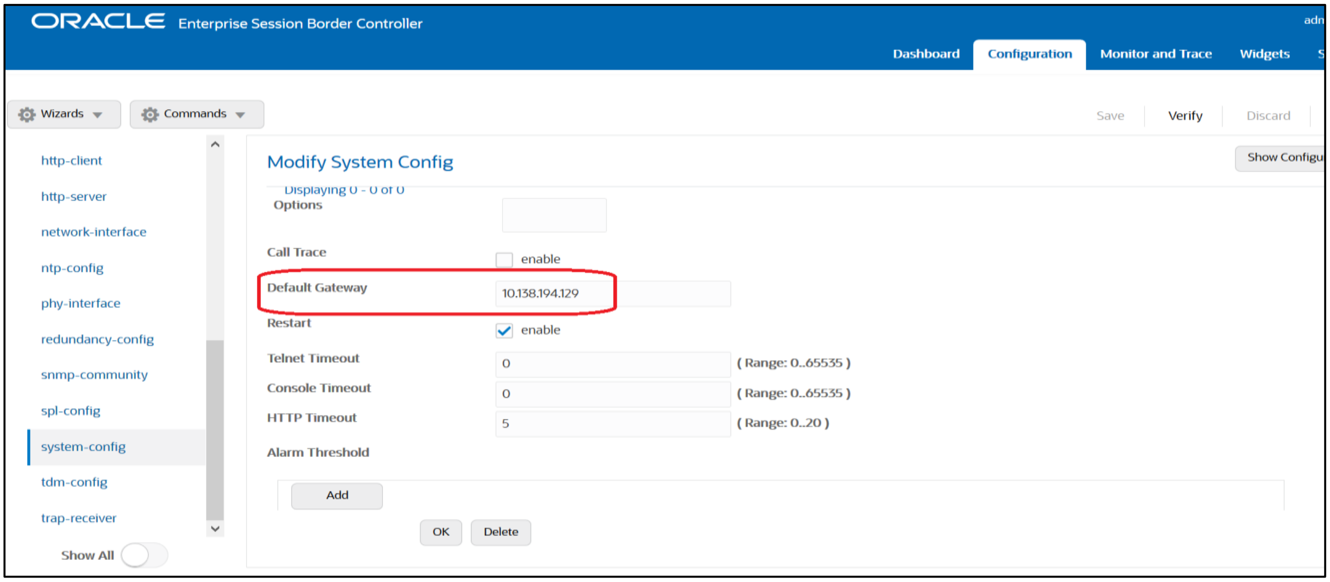
Go to system->system-config



Modify System Config

Hostname	OracleSBC
Description	
Location	
Mib System Contact	
Mib System Name	
Mib System Location	
Acp TLS Profile	

Please enter the default gateway value in the system config page.



Modify System Config

Options		
Call Trace	□ enable	
Default Gateway	10.138.194.129	
Restart	☑ enable	
Telnet Timeout	0	(Range: 0..65535)
Console Timeout	0	(Range: 0..65535)
HTTP Timeout	5	(Range: 0..20)
Alarm Threshold		

For VME, transcoding cores are required. Please refer the documentation here for more information

https://docs.oracle.com/en/industries/communications/enterprise-session-border-controller/9.0.0/releasenotes/esbc-release-notes.pdf

The above step is needed only if any transcoding is used in the configuration.
If there is no transcoding involved, then the above step is not needed.

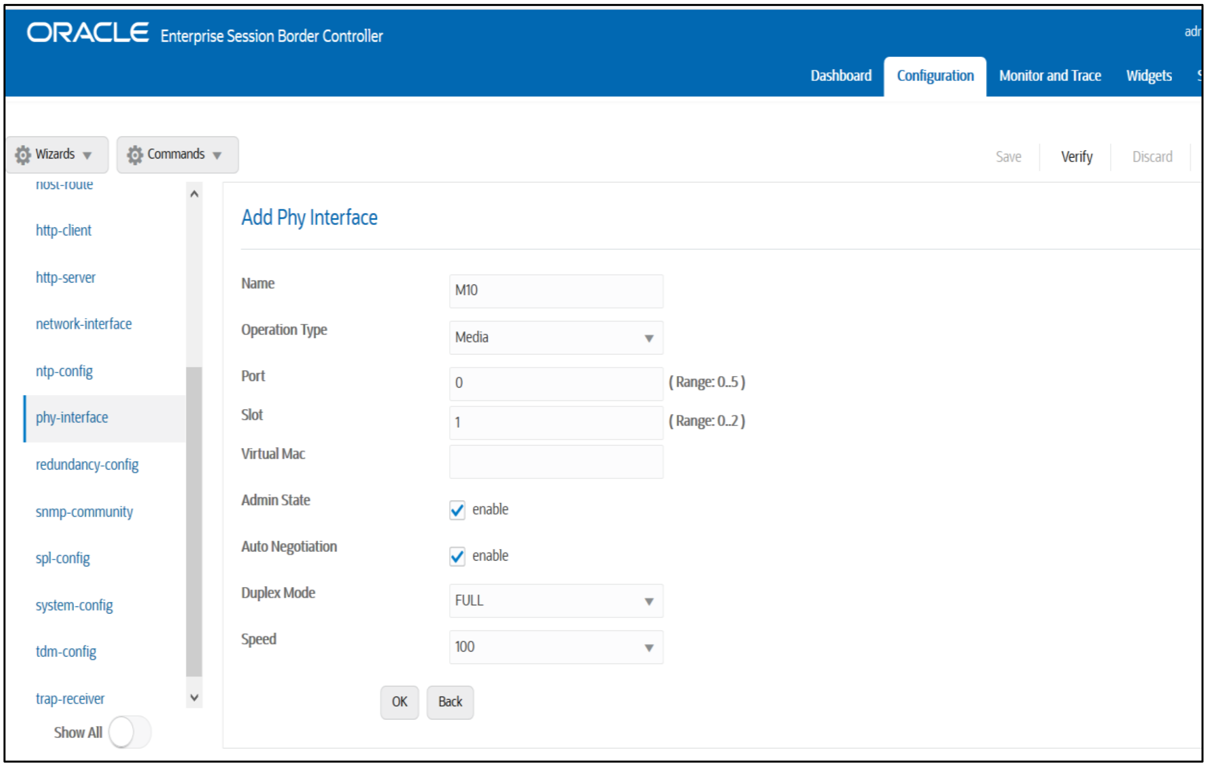
6.4. Configure Physical Interface values

To configure physical Interface values, go to System->phy-interface.

You will first configure the slot 0, port 1 interface designated with the name M10.
This will be the port plugged into your (connection to the Remote Worker) public interface.
Avaya Core side side is configured on the slot 1 port 1.

Parameter Name	Avaya Remote worker (M10)	Avaya Core Side (M11)
Slot	0	1
Port	1	1
Operation Mode	Media	Media

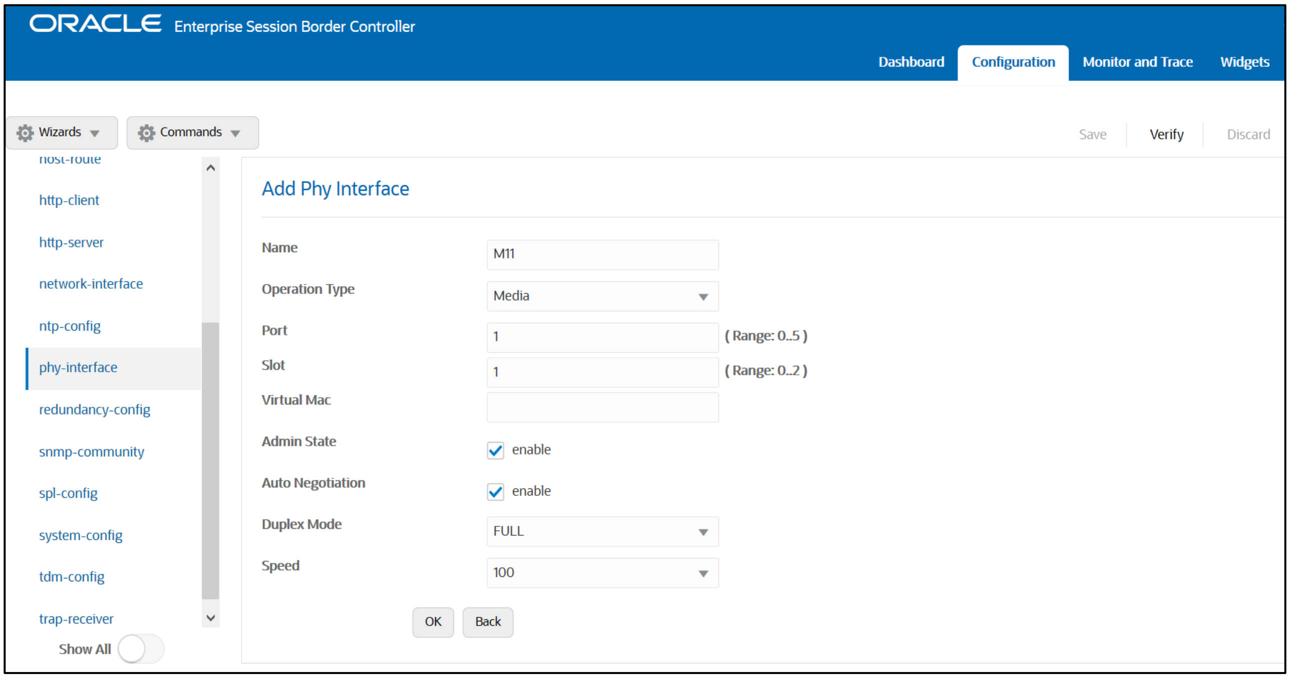
Please configure M10 interface as below.



Add Phy Interface

Name	M10	
Operation Type	Media	
Port	0	(Range: 0..5)
Slot	1	(Range: 0..2)
Virtual Mac		
Admin State	☑ enable	
Auto Negotiation	☑ enable	
Duplex Mode	FULL	
Speed	100	

Similarly, configure M11 interface as below.



Add Phy Interface

Name	M11
Operation Type	Media
Port	1 (Range: 0..5)
Slot	1 (Range: 0..2)
Virtual Mac	
Admin State	☑ enable
Auto Negotiation	☑ enable
Duplex Mode	FULL
Speed	100

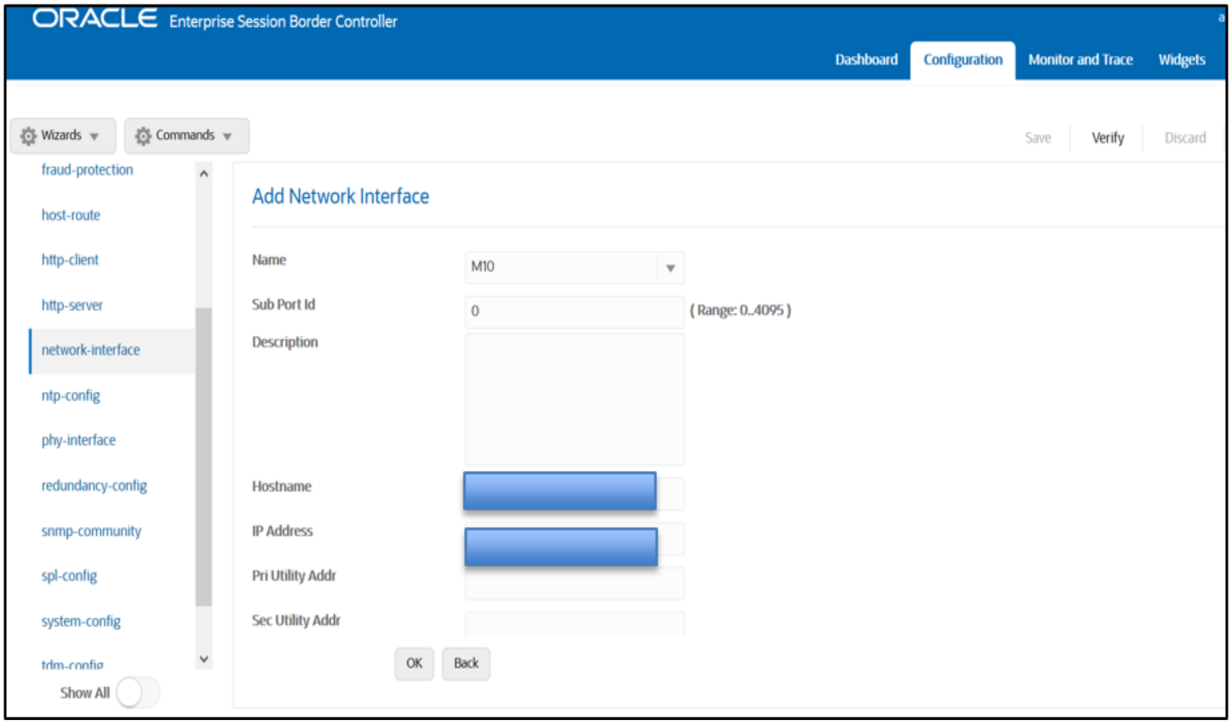
6.5. Configure Network Interface values

To configure network-interface, go to system->Network-Interface. Configure two interfaces, one for Avaya Remote worker side and one for Avaya Core side.

The table below lists the parameters, to be configured for both the interfaces.

Parameter Name	Avaya Remote Worker side Network Interface (Avaya Public Interface)	Avaya Core side Network interface
Name	M10	M11
Host Name		
IP address	[redacted]	10.232.50.75
Netmask	255.255.255.192	255.255.255.0
Gateway	[redacted]	10.232.50.1

Please configure network interface M10 as below



Add Network Interface

Name: M10

Sub Port Id: 0 (Range: 0..4095)

Description:

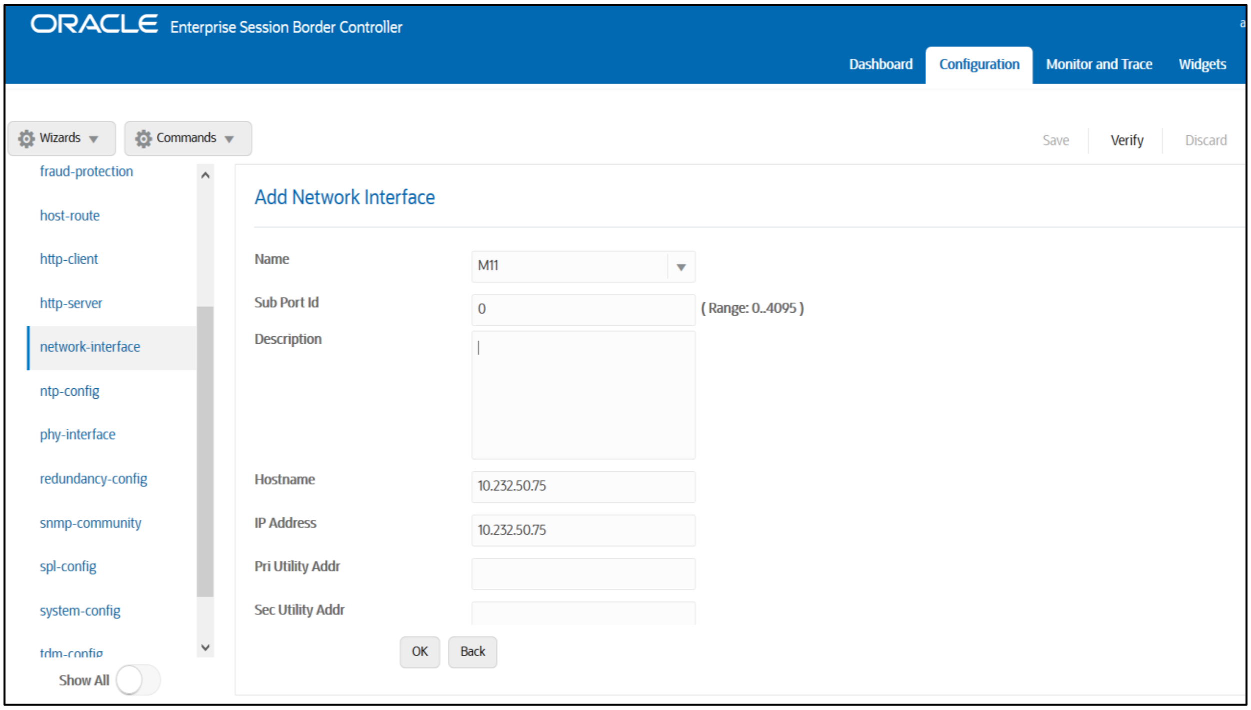
Hostname: [redacted]

IP Address: [redacted]

Pri Utility Addr:

Sec Utility Addr:

Please configure network interface M11as below



Add Network Interface

Name: M11

Sub Port Id: 0 (Range: 0..4095)

Description:

Hostname: 10.232.50.75

IP Address: 10.232.50.75

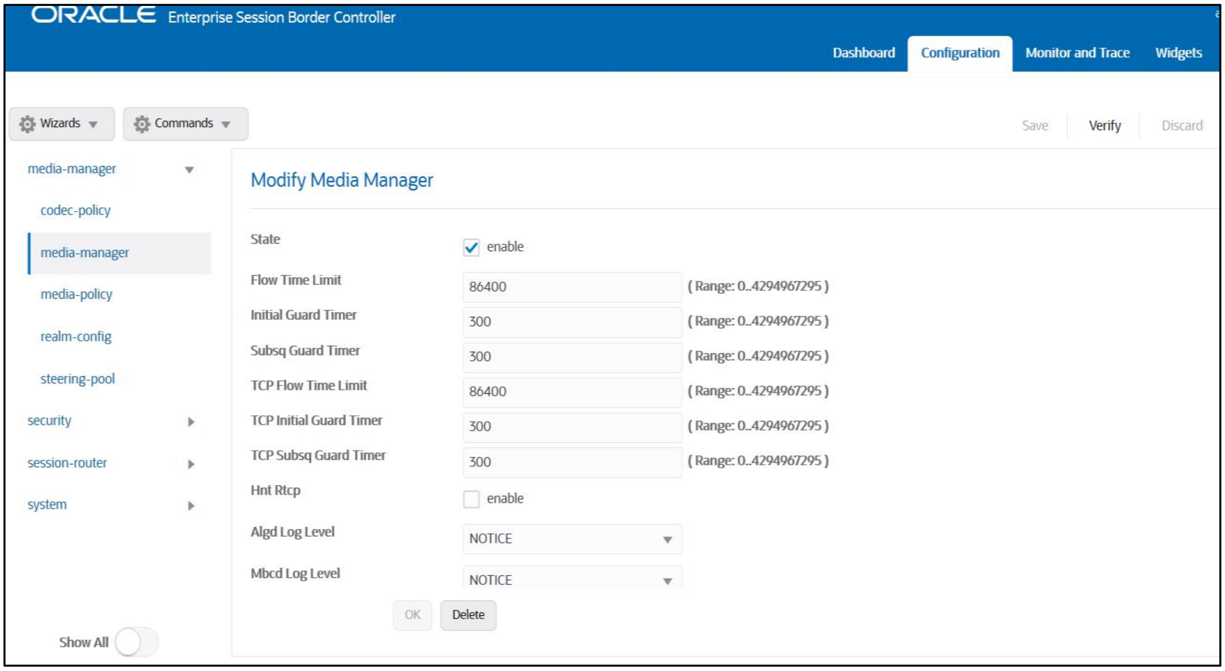
Pri Utility Addr:

Sec Utility Addr:

6.6. Enable media manager

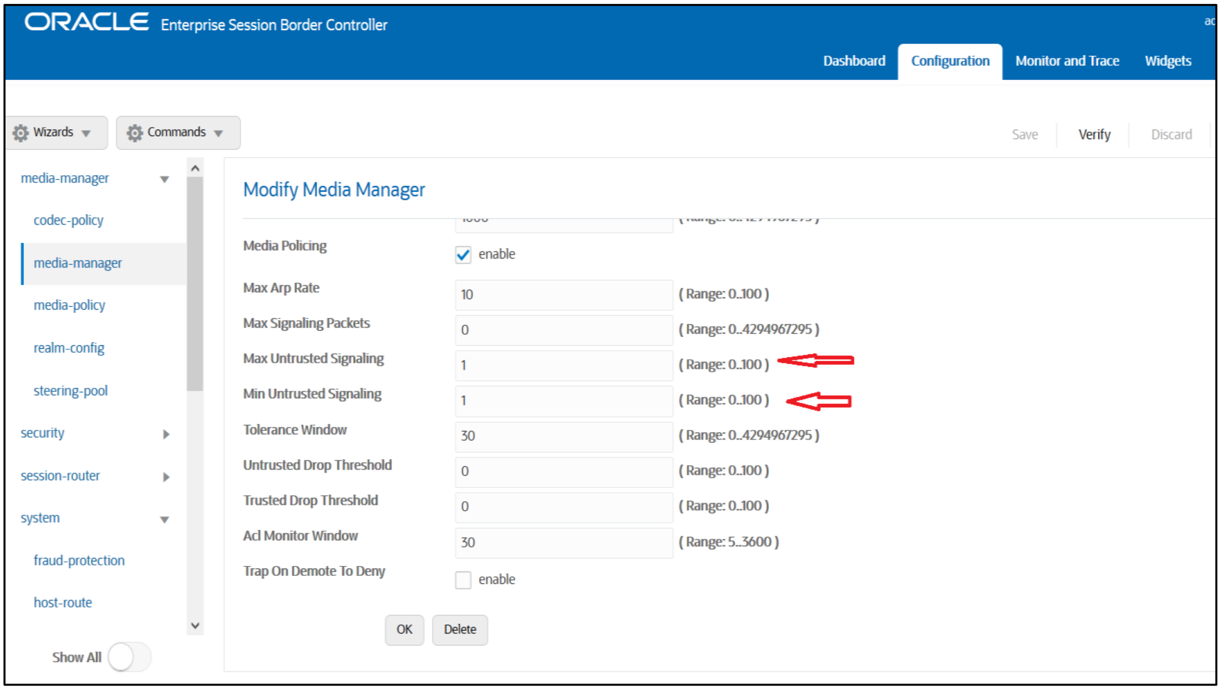
Media-manager handles the media stack required for SIP sessions on the SBC. Enable the media manager option as below.

In addition to the above config, please set the max and min untrusted signaling values to 1.
Go to Media-Manager->Media-Manager



Modify Media Manager

State	☑ enable	
Flow Time Limit	86400	(Range: 0..4294967295)
Initial Guard Timer	300	(Range: 0..4294967295)
Subsq Guard Timer	300	(Range: 0..4294967295)
TCP Flow Time Limit	86400	(Range: 0..4294967295)
TCP Initial Guard Timer	300	(Range: 0..4294967295)
TCP Subsq Guard Timer	300	(Range: 0..4294967295)
Hnt Rtcp	□ enable	
Algd Log Level	NOTICE	
Mbcd Log Level	NOTICE	



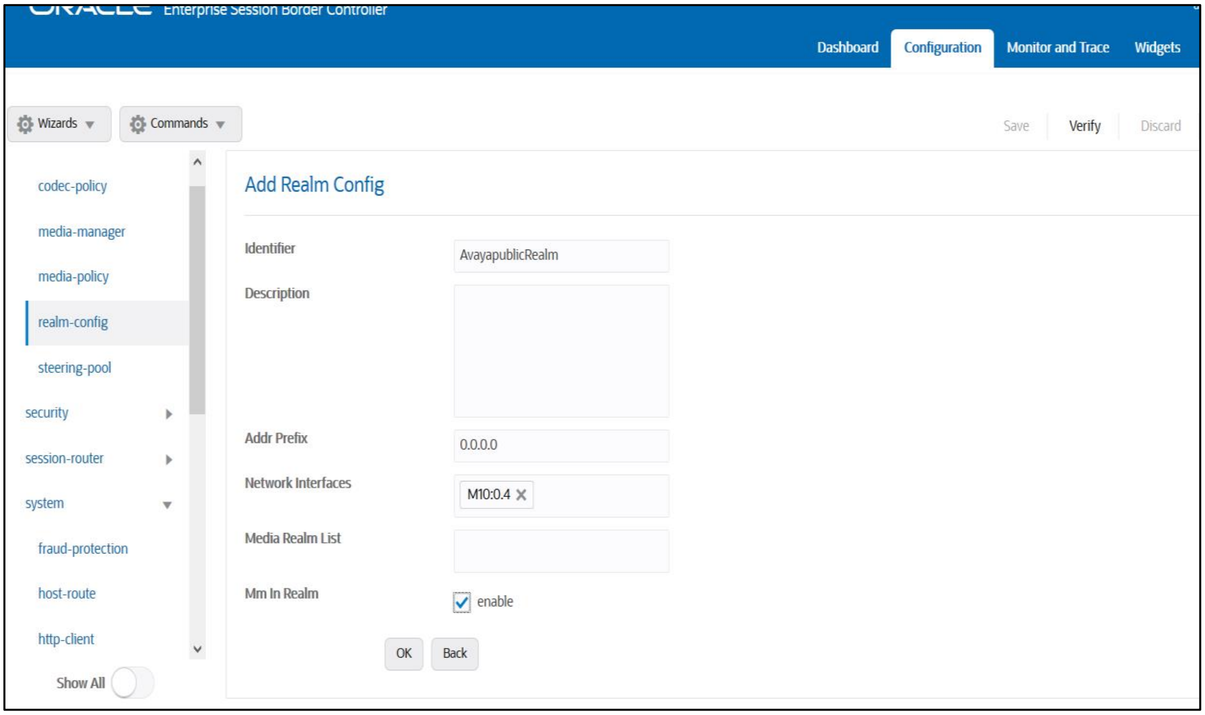
Modify Media Manager

Media Policing	☑ enable	
Max Arp Rate	10	(Range: 0..100)
Max Signaling Packets	0	(Range: 0..4294967295)
Max Untrusted Signaling	1	(Range: 0..100)
Min Untrusted Signaling	1	(Range: 0..100)
Tolerance Window	30	(Range: 0..4294967295)
Untrusted Drop Threshold	0	(Range: 0..100)
Trusted Drop Threshold	0	(Range: 0..100)
Acl Monitor Window	30	(Range: 5..3600)
Trap On Demote To Deny	□ enable	

6.7. Configure Realms

Navigate to realm-config under media-manager and configure a realm as shown below
The name of the Realm can be any relevant name according to the user convenience.

In the below case, Realm name is given as AvayapublicRealm (SBC to Remote Worker side).
Please set the Access Control Trust Level to medium for this realm



Add Realm Config

Identifier: AvayapublicRealm

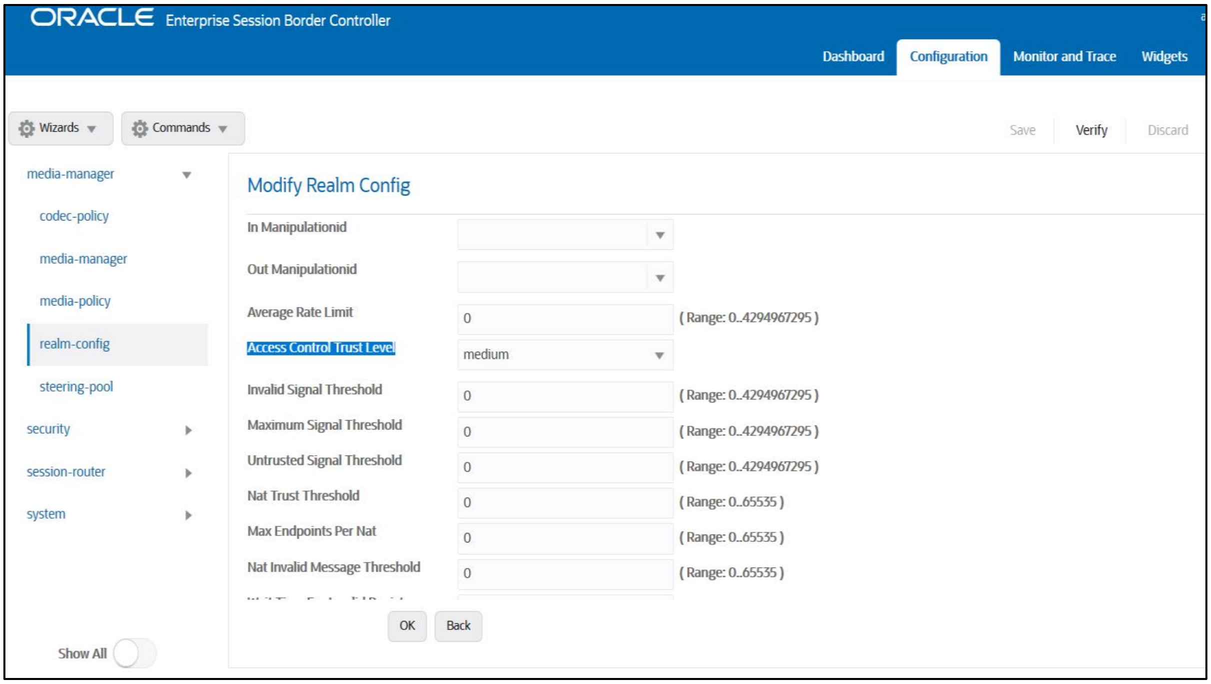
Description:

Addr Prefix: 0.0.0.0

Network Interfaces: M10:0.4

Media Realm List:

Mm In Realm: ☑ enable



Modify Realm Config

In Manipulationid:

Out Manipulationid:

Average Rate Limit: 0 (Range: 0..4294967295)

Access Control Trust Level: medium

Invalid Signal Threshold: 0 (Range: 0..4294967295)

Maximum Signal Threshold: 0 (Range: 0..4294967295)

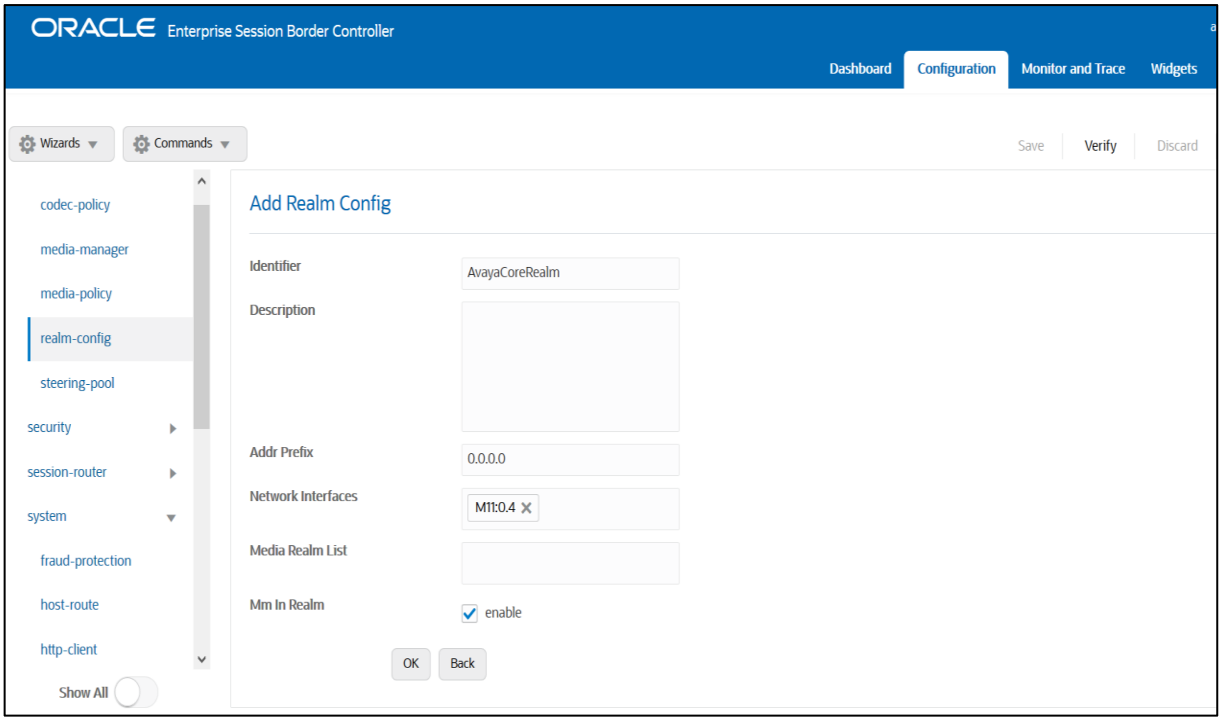
Untrusted Signal Threshold: 0 (Range: 0..4294967295)

Nat Trust Threshold: 0 (Range: 0..65535)

Max Endpoints Per Nat: 0 (Range: 0..65535)

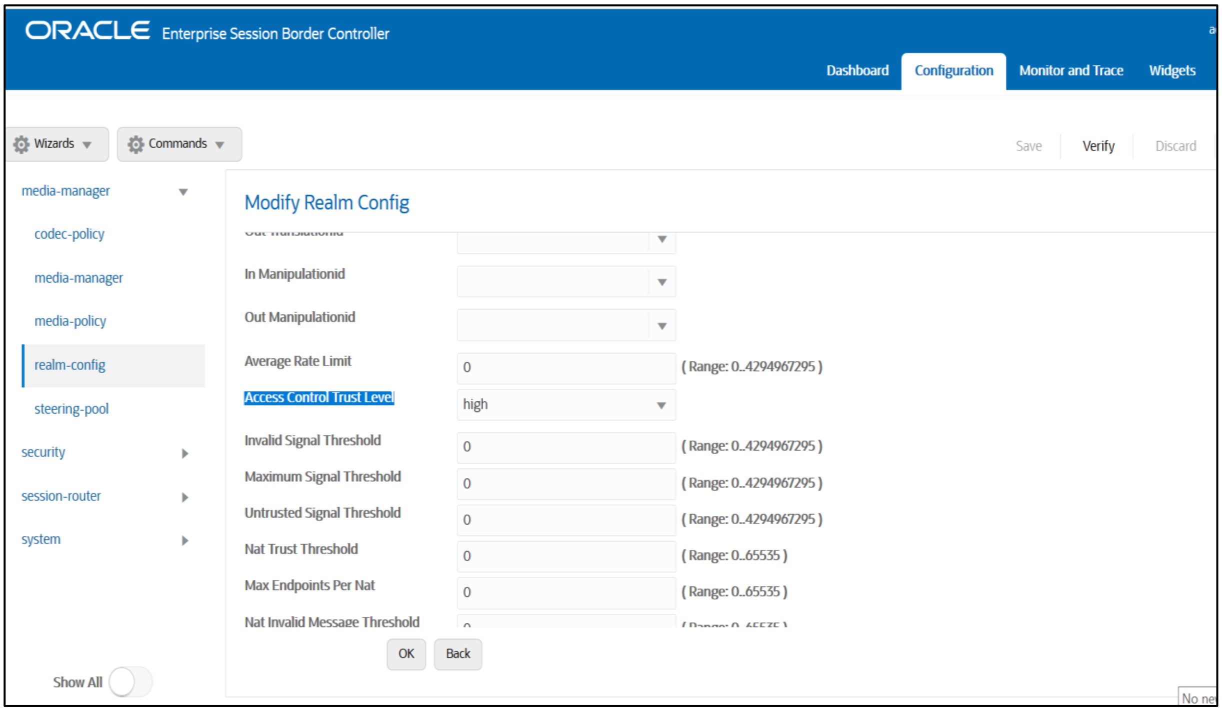
Nat Invalid Message Threshold: 0 (Range: 0..65535)

Similarly, Realm name is given as AvayaCoreRealm (SBC to Avaya Session Manager)
Please set the Access Control Trust Level to high for this realm



Add Realm Config

Identifier	AvayaCoreRealm
Description	
Addr Prefix	0.0.0.0
Network Interfaces	M11:0.4 ✕
Media Realm List	
Mm In Realm	☑ enable



Modify Realm Config

Out Translationid		
In Manipulationid		
Out Manipulationid		
Average Rate Limit	0	(Range: 0..4294967295)
Access Control Trust Level	high	
Invalid Signal Threshold	0	(Range: 0..4294967295)
Maximum Signal Threshold	0	(Range: 0..4294967295)
Untrusted Signal Threshold	0	(Range: 0..4294967295)
Nat Trust Threshold	0	(Range: 0..65535)
Max Endpoints Per Nat	0	(Range: 0..65535)
Nat Invalid Message Threshold	0	(Range: 0..65535)

For more information on Access Control Trust Level, please refer to SBC Security guide link given below:

https://docs.oracle.com/en/industries/communications/session-border-controller/9.0.0/security/security-guide.pdf

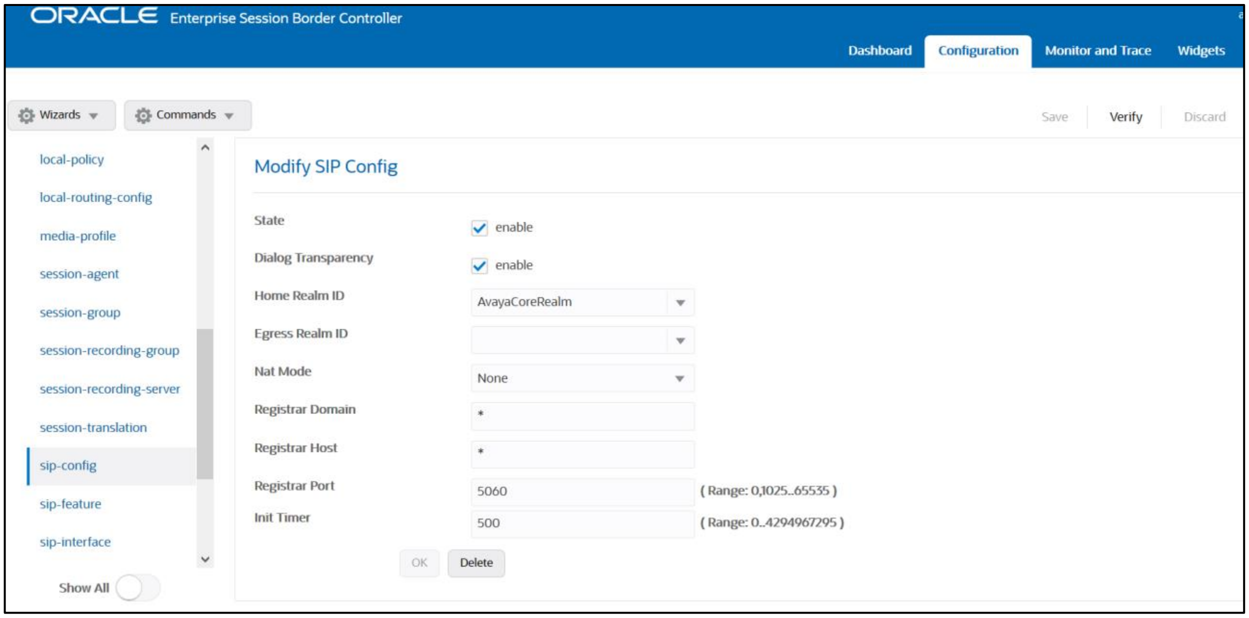
6.8. Enable sip-config

SIP config enables SIP handling in the SBC.
Make sure the home realm-id, registrar-domain and registrar-host are configured.

Also add the options to the sip-config as shown below.
To configure sip-config, Go to Session-Router->sip-config and in options, add the below

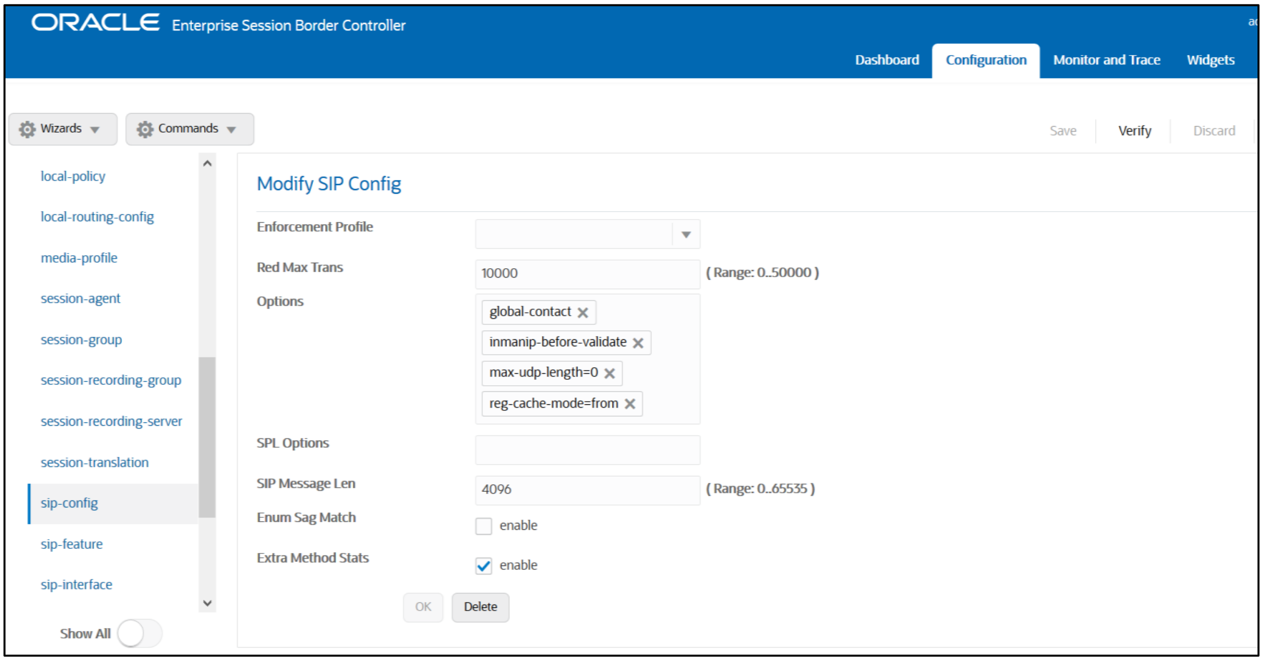
- add max-udp-length =0 & global-contact
- inmanip-before-validate & reg-cache-mode=from

For more info, please refer to SBC security guide given in the above section.



Modify SIP Config

State ☑ enable
Dialog Transparency ☑ enable
Home Realm ID AvayaCoreRealm
Egress Realm ID
Nat Mode None
Registrar Domain *
Registrar Host *
Registrar Port 5060 (Range: 0,1025..65535)
Init Timer 500 (Range: 0..4294967295)



Modify SIP Config

Enforcement Profile
Red Max Trans 10000 (Range: 0..50000)
Options global-contact ✕
inmanip-before-validate ✕
max-udp-length=0 ✕
reg-cache-mode=from ✕
SPL Options
SIP Message Len 4096 (Range: 0..65535)
Enum Sag Match ☐ enable
Extra Method Stats ☑ enable

6.9. Configuring a certificate for SBC

As we need to test Remote worker configuration with TLS connections (Remote worker to SBC side which is aces side), we need to have certificates for the same.

The step below describes how to request a certificate for SBC External interface and configure it based on the example of DigiCert. The process includes the following steps:

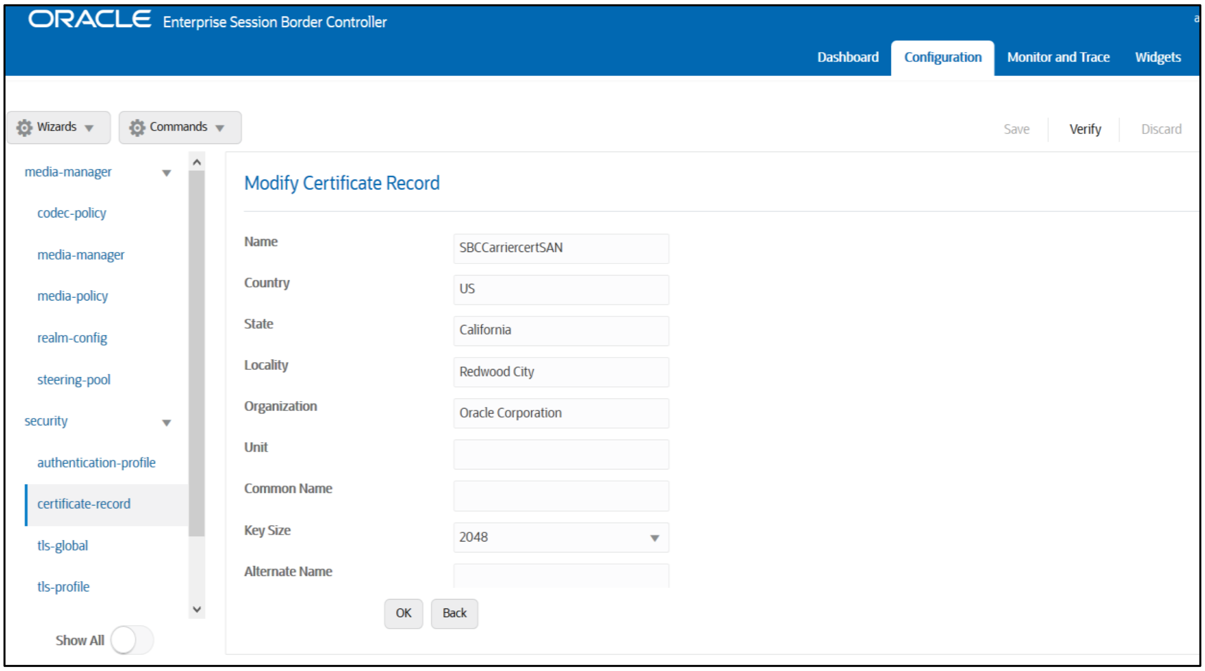
1) Create a certificate-record – "Certificate-record" are configuration elements on Oracle SBC which captures information for a TLS certificate – such as common-name, key-size, key-usage etc.

- SBC – 1 certificate-record assigned to SBC
- Root – 1 certificate-record for root cert

2) Deploy the SBC and Root certificates on the SBC

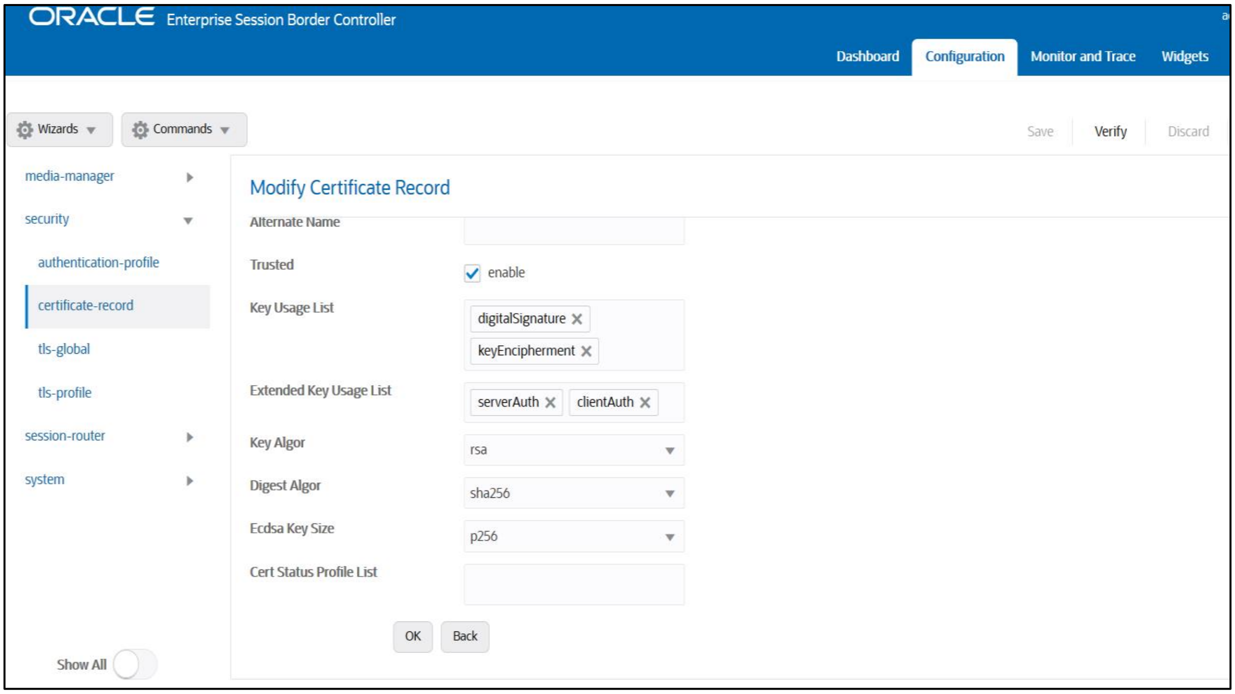
Step 1 – Creating the certificate record

Go to security->Certificate Record and configure the SBC entity certificate for SBC as shown below.



Modify Certificate Record

Name	SBCCarriercertSAN
Country	US
State	California
Locality	Redwood City
Organization	Oracle Corporation
Unit	
Common Name	
Key Size	2048
Alternate Name	



Modify Certificate Record

Alternate Name	
Trusted	☑ enable
Key Usage List	digitalSignature ✕ keyEncipherment ✕
Extended Key Usage List	serverAuth ✕ clientAuth ✕
Key Algor	rsa
Digest Algor	sha256
Ecdsa Key Size	p256
Cert Status Profile List	

Repeat the above steps again to create DigiCert root certificate.
We need to import this root certificate to Windows machine where the 3rd party SIP phones are installed. Once this certificate is imported, the softphones will work in TLS mode.

The table below specifies the parameters required for certificate configuration.
Modify the configuration according to the certificates in your environment.

Parameter	DigiCertRoot
Common-name	DigiCert Global Root CA
Key-size	2048
Key-usage-list	digitalSignature keyEncipherment
Extended-key-usage-list	serverAuth
key-algor	rsa
digest-algor	sha256

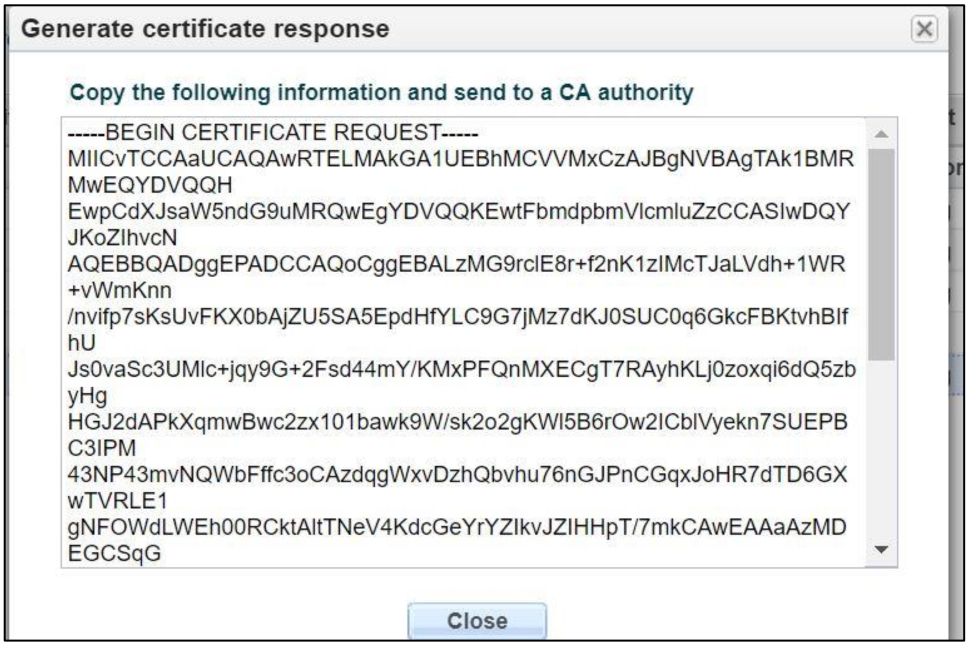
Step 2 – Generating a certificate signing request

(Only required for the SBC’s end entity certificate, and not for root CA certs)

Please note – certificate signing request is only required to be executed for SBC Certificate – not for the root/intermediate certificates.

- Select the certificate and generate certificate on clicking the “Generate” command.

- Please copy/paste the text that gets printed on the screen as shown below and upload to your CA server for signature.



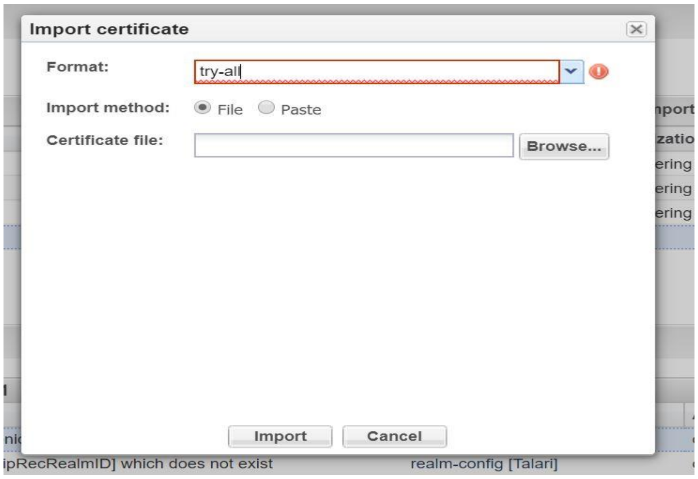
Copy the following information and send to a CA authority

```
-----BEGIN CERTIFICATE REQUEST-----
MIICvTCCAaUCAQAwRTELMAkGA1UEBhMCVVMxCzAJBgNVBAgTAk1BMR
MwEQYDVQQH
EwpCdXJsaW5ndG9uMRQwEgYDVQQKEwtFbmdpbmVlcmluZzCCASIwDQY
JKoZIhvcN
AQEBBQADggEPADCCAQoCggEBALzMG9rclE8r+f2nK1zIMcTJaLVdh+1WR
+vWmKnn
/nvifp7sKsUvFKX0bAjZU5SA5EpdHfYLC9G7jMz7dKJ0SUC0q6GkcFBKtvhBIf
hU
Js0vaSc3UMIc+jqy9G+2Fsd44mY/KMxPFQnMXECgT7RAyhKLj0zoxqi6dQ5zb
yHg
HGJ2dAPkXqmwBwc2zx101bawk9W/sk2o2gKWI5B6rOw2ICblVyekn7SUEPB
C3IPM
43NP43mvNQWbFffc3oCAzdqgWxvDzhQbvhu76nGJPnCGqxJoHR7dTD6GX
wTVRLE1
gNFOWdLWEh00RCktAltTNeV4KdcGeYrYZIkvJZIHHpT/7mkCAwEAAaAzMD
EGCSqG
```

- Also, note that a save/activate is required

Step 3 – Deploy SBC & root certificates

Once certificate signing request have been completed – import the signed certificate to the SBC. Please note – all certificates including root and intermediate certificates are required to be imported to the SBC. Once done, issue save/activate from the WebGUI



Import certificate

Format: try-all

Import method: ● File ○ Paste

Certificate file:

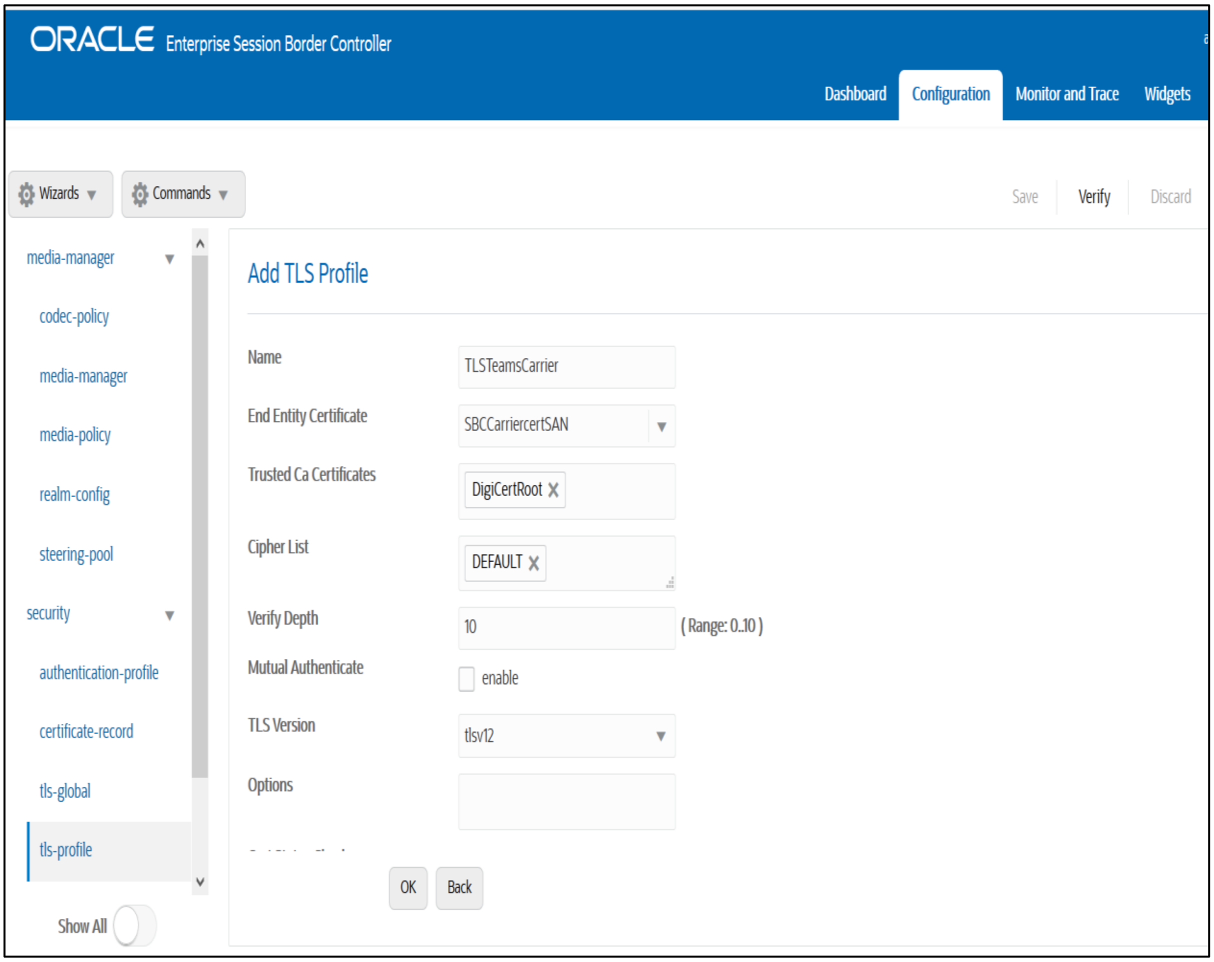
Repeat the steps for the following certificates:

- DigiCertRoot.

At this stage all the required certificates have been imported to the SBC.

6.10. TLS-Profile

A TLS profile configuration on the SBC allows for specific certificates to be assigned.
Go to security-> TLS-profile config element and configure the tls-profile as shown below



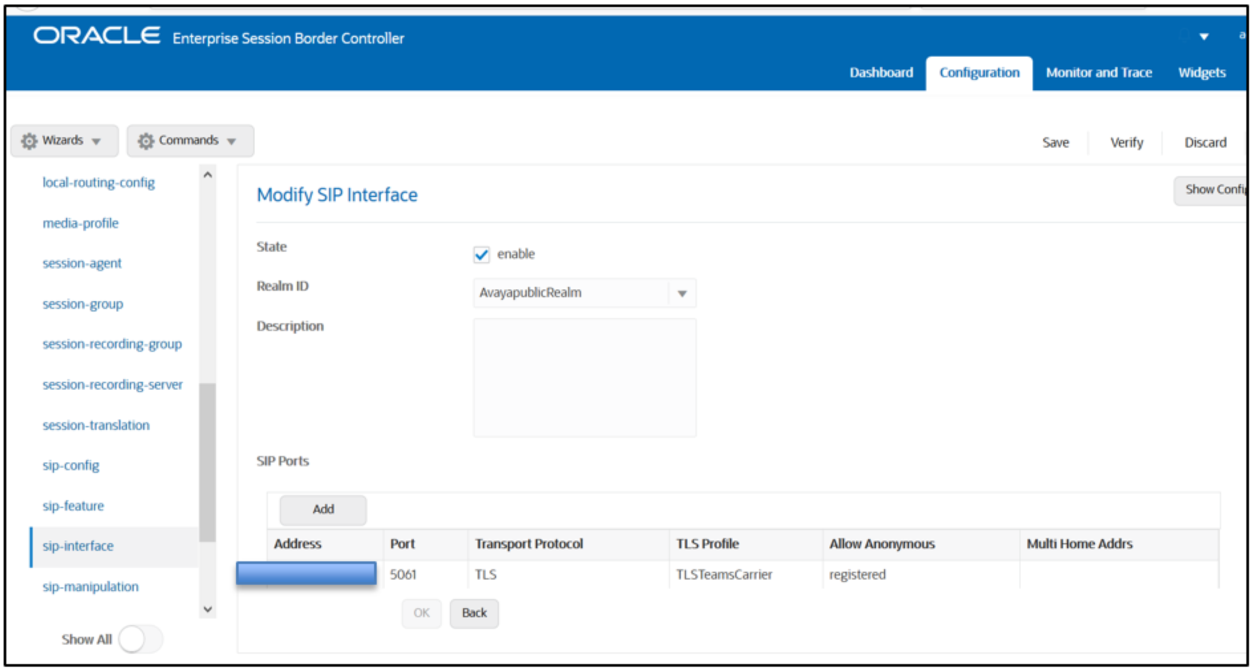
Add TLS Profile

Name	TLSTeamsCarrier
End Entity Certificate	SBCCarriercertSAN ▾
Trusted Ca Certificates	DigiCertRoot X
Cipher List	DEFAULT X
Verify Depth	10 (Range: 0..10)
Mutual Authenticate	□ enable
TLS Version	tlsv12 ▾
Options	

6.11. Configure SIP Interfaces.

Navigate to sip-interface under session-router and configure the sip-interface as shown below. Please configure the below settings under the sip-interface which is configured for remote workers.

- Tls-profile needs to match the name of the tls-profile previously created
- Set allow-anonymous to registered to ensure traffic to this sip-interface only comes from remote workers which are registered to Avaya Session Manager via SBC.
- Set NAT traversal to always for the remote workers to register.



Modify SIP Interface

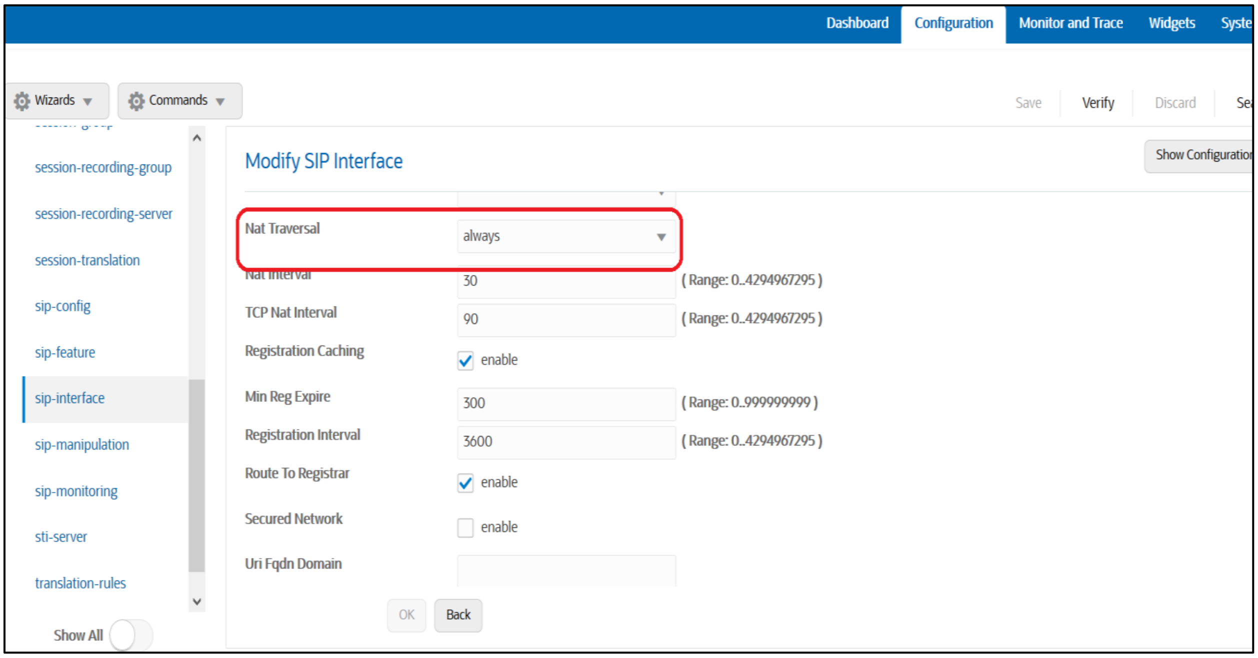
State ☑ enable

Realm ID AvayapublicRealm

Description

SIP Ports

Address	Port	Transport Protocol	TLS Profile	Allow Anonymous	Multi Home Addrs
[redacted]	5061	TLS	TLSTeamsCarrier	registered	



Modify SIP Interface

Nat Traversal always

Nat Interval 30 (Range: 0..4294967295)

TCP Nat Interval 90 (Range: 0..4294967295)

Registration Caching ☑ enable

Min Reg Expire 300 (Range: 0..999999999)

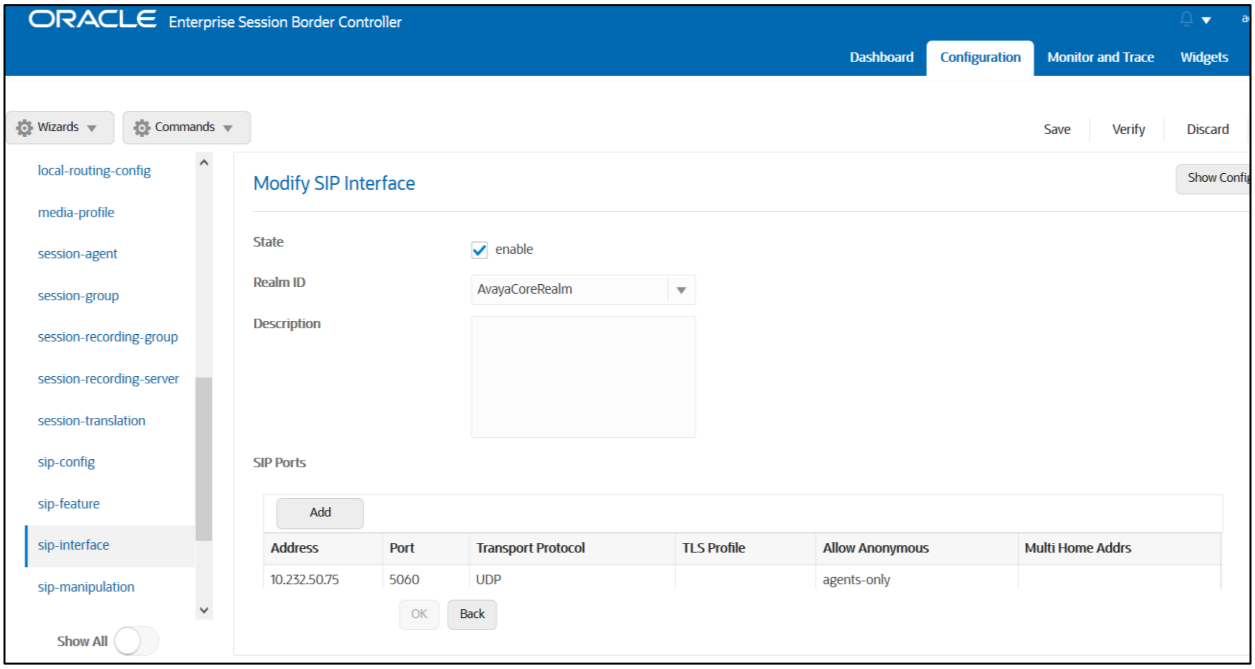
Registration Interval 3600 (Range: 0..4294967295)

Route To Registrar ☑ enable

Secured Network □ enable

Uri Fqdn Domain

Similarly, Configure Internal IP under sip-port of sip-interface for Avaya Session Manager side. (Avaya Core Side). Set allow-anonymous to agents-only.



Modify SIP Interface

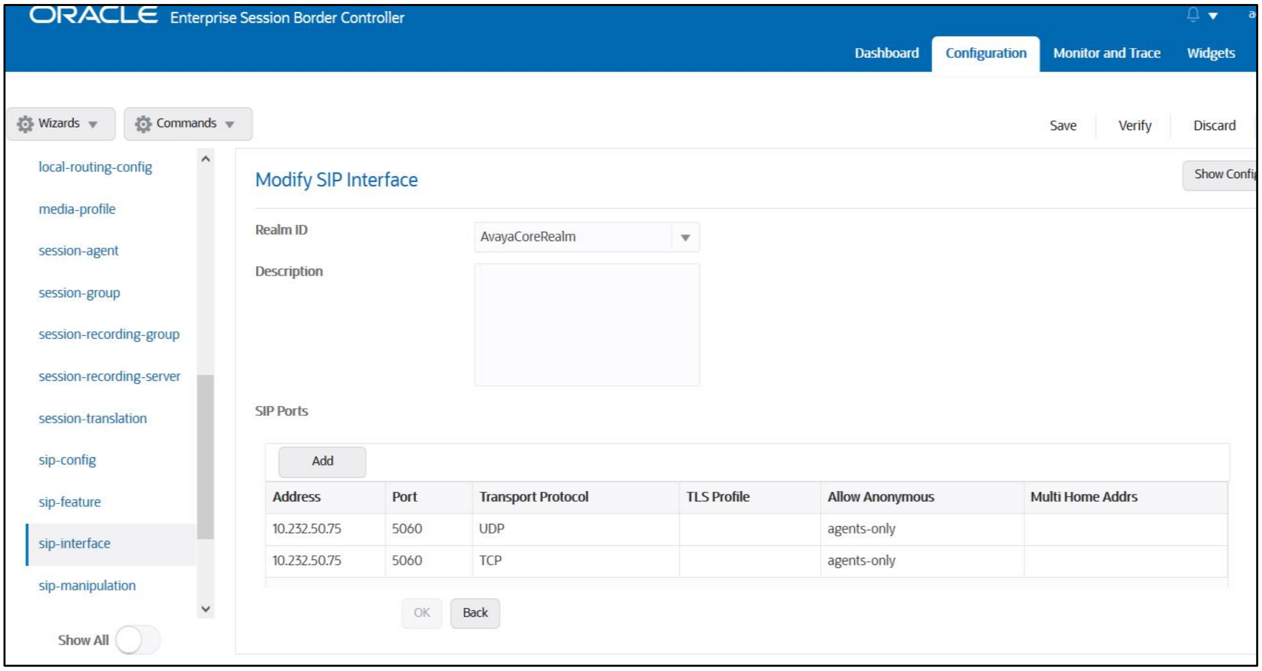
State ☑ enable

Realm ID AvayaCoreRealm

Description

SIP Ports

Address	Port	Transport Protocol	TLS Profile	Allow Anonymous	Multi Home Addrs
10.232.50.75	5060	UDP		agents-only	



Modify SIP Interface

Realm ID AvayaCoreRealm

Description

SIP Ports

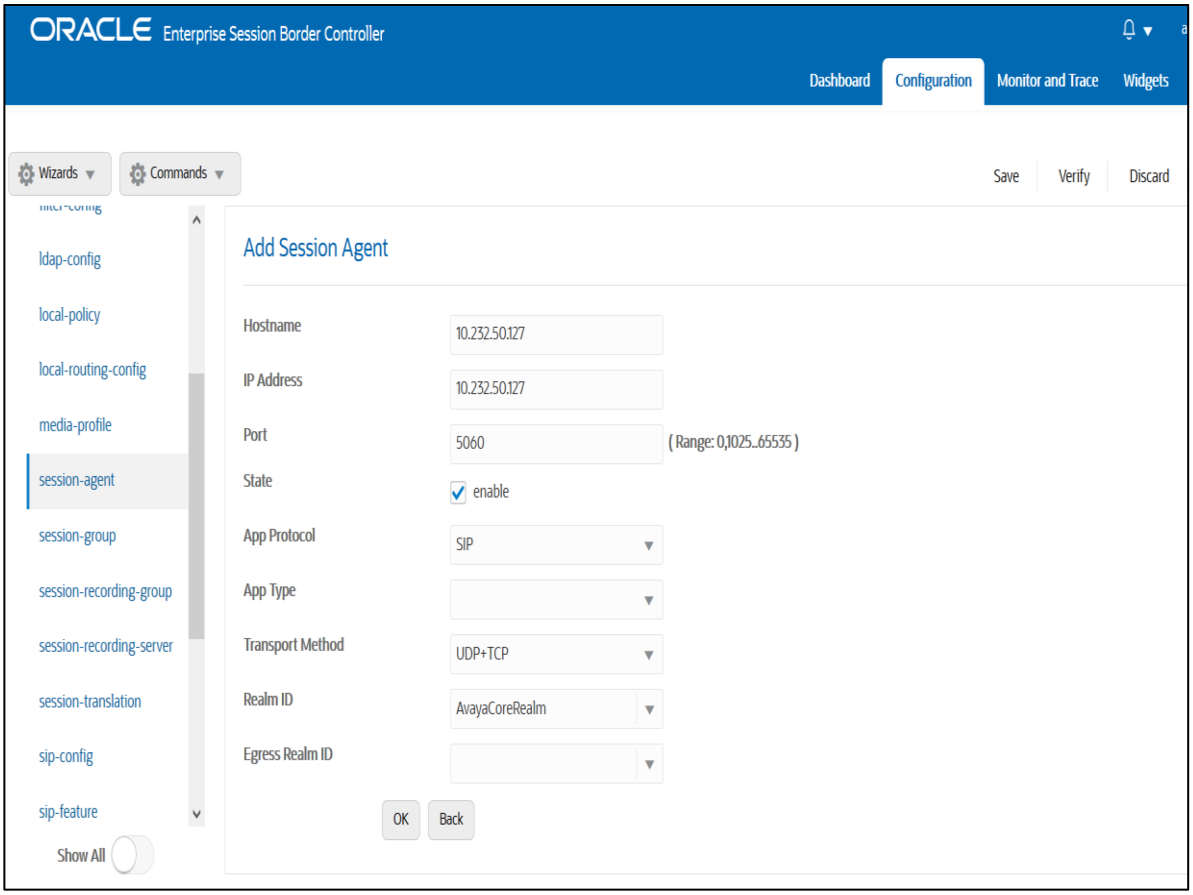
Address	Port	Transport Protocol	TLS Profile	Allow Anonymous	Multi Home Addrs
10.232.50.75	5060	UDP		agents-only	
10.232.50.75	5060	TCP		agents-only	

Once sip-interface is configured – the SBC is ready to accept traffic on the allocated IP address.

6.12. Configure session-agent

Session-agents are config elements which are trusted agents who can send/receive traffic from the SBC with direct access to trusted data path. Session-agents are config elements which are trusted agents who can send/receive traffic from the SBC with direct access to trusted data.
Configure the session-agent for Avaya Session Manager where SBC should route the calls.
Go to session-router->Session-Agent.

- Host name and IP address to 10.232.50.127 which is the Avaya SM IP.
- Port set to 5060
- Realm ID – Needs to match the realm created for Avaya SM.
  Transport set to “UDP+TCP



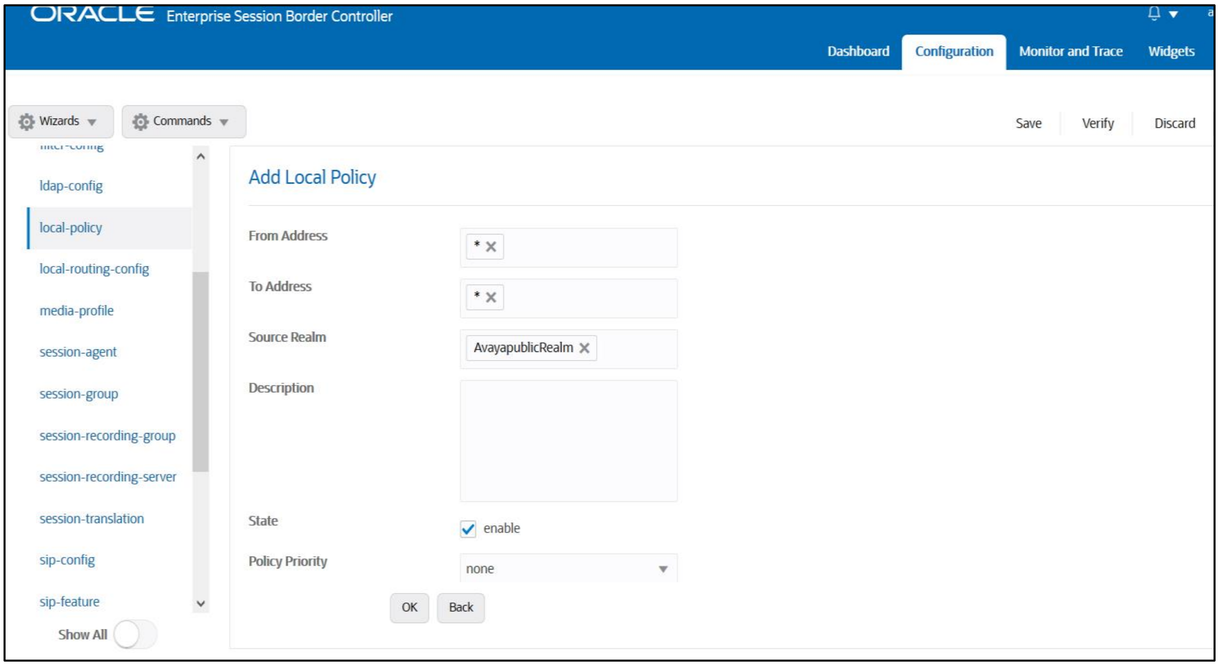
Add Session Agent

Hostname	10.232.50.127
IP Address	10.232.50.127
Port	5060 (Range: 0,1025..65535)
State	☑ enable
App Protocol	SIP
App Type	
Transport Method	UDP+TCP
Realm ID	AvayaCoreRealm
Egress Realm ID	

6.13. Configure local-policy

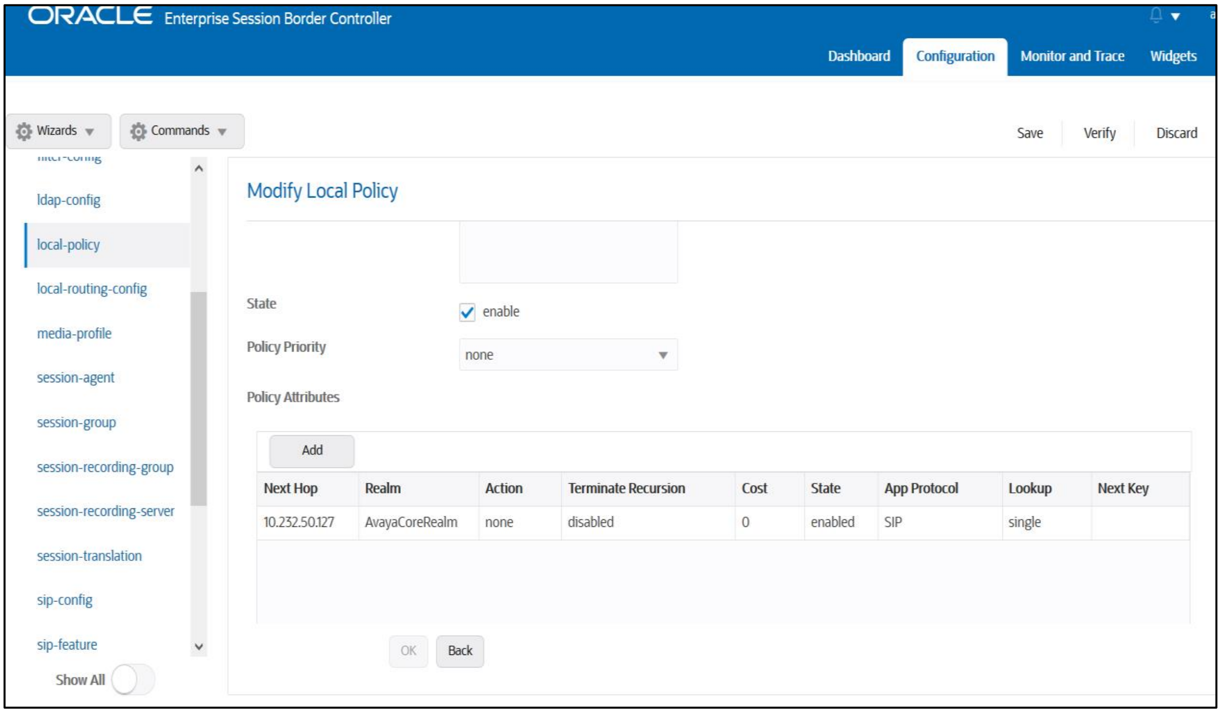
Local policy config allows for the SBC to route calls from one end of the network to the other based on routing criteria. To configure local-policy, go to Session-Router->local-policy.

To register and make calls from Remote Worker to Other Phones via sbc,
The next hop here should be the Avaya SM IP which is 10.232.50.127



Add Local Policy

From Address	*
To Address	*
Source Realm	AvayapublicRealm
Description	
State	☑ enable
Policy Priority	none



Modify Local Policy

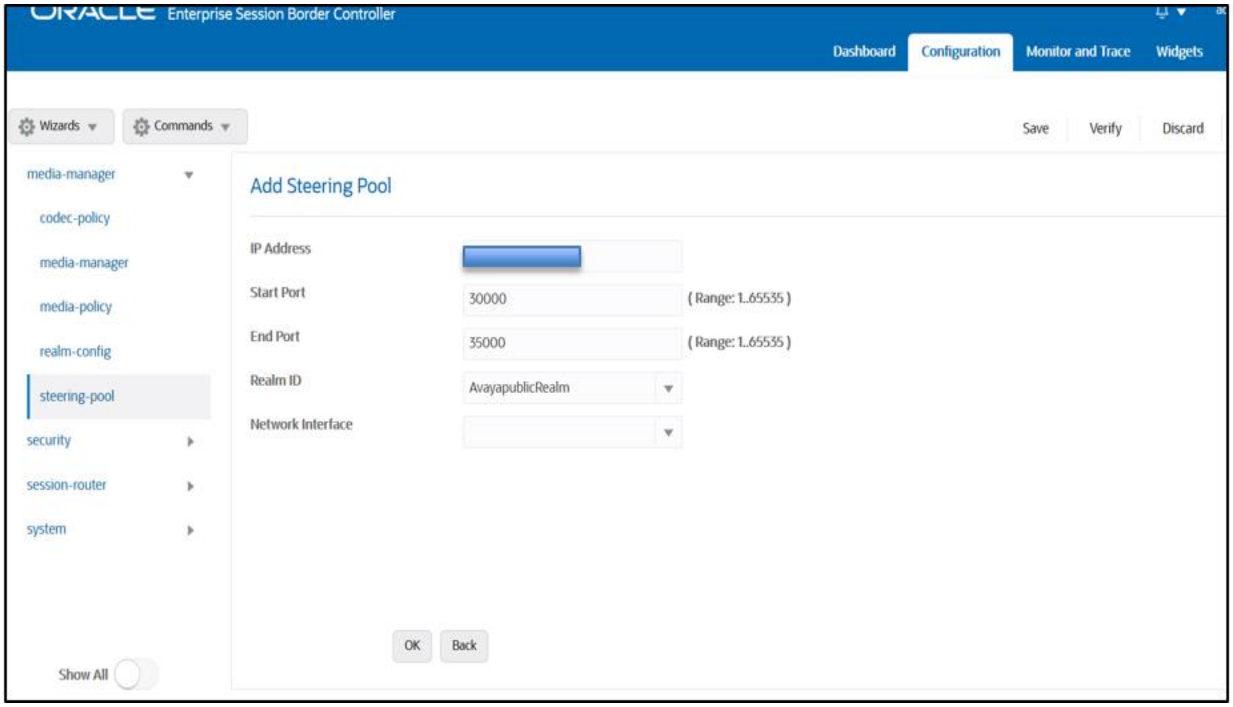
State	☑ enable
Policy Priority	none

Policy Attributes

Next Hop	Realm	Action	Terminate Recursion	Cost	State	App Protocol	Lookup	Next Key
10.232.50.127	AvayaCoreRealm	none	disabled	0	enabled	SIP	single	

6.14. Configure steering-pool

Steering-pool config allows configuration to assign IP address(es), ports & a realm.



Add Steering Pool

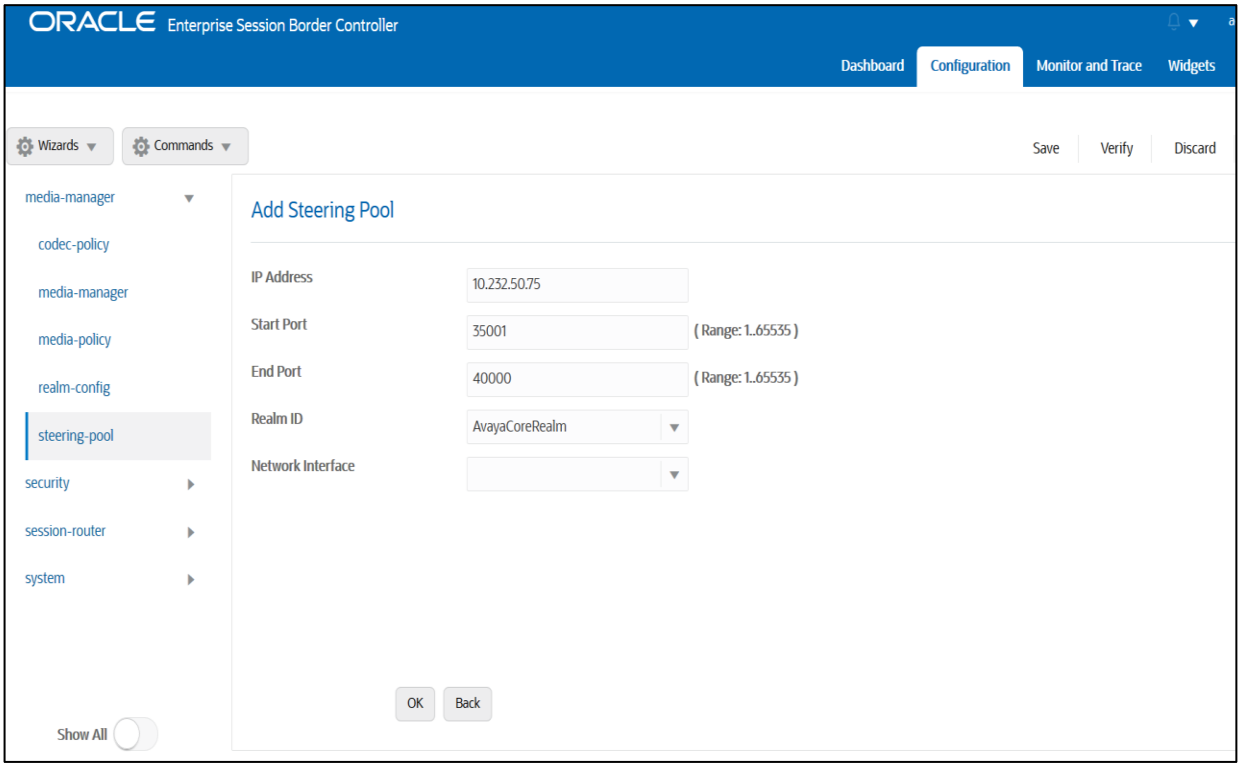
IP Address [redacted]

Start Port 30000 (Range: 1..65535)

End Port 35000 (Range: 1..65535)

Realm ID AvayapublicRealm

Network Interface



Add Steering Pool

IP Address 10.232.50.75

Start Port 35001 (Range: 1..65535)

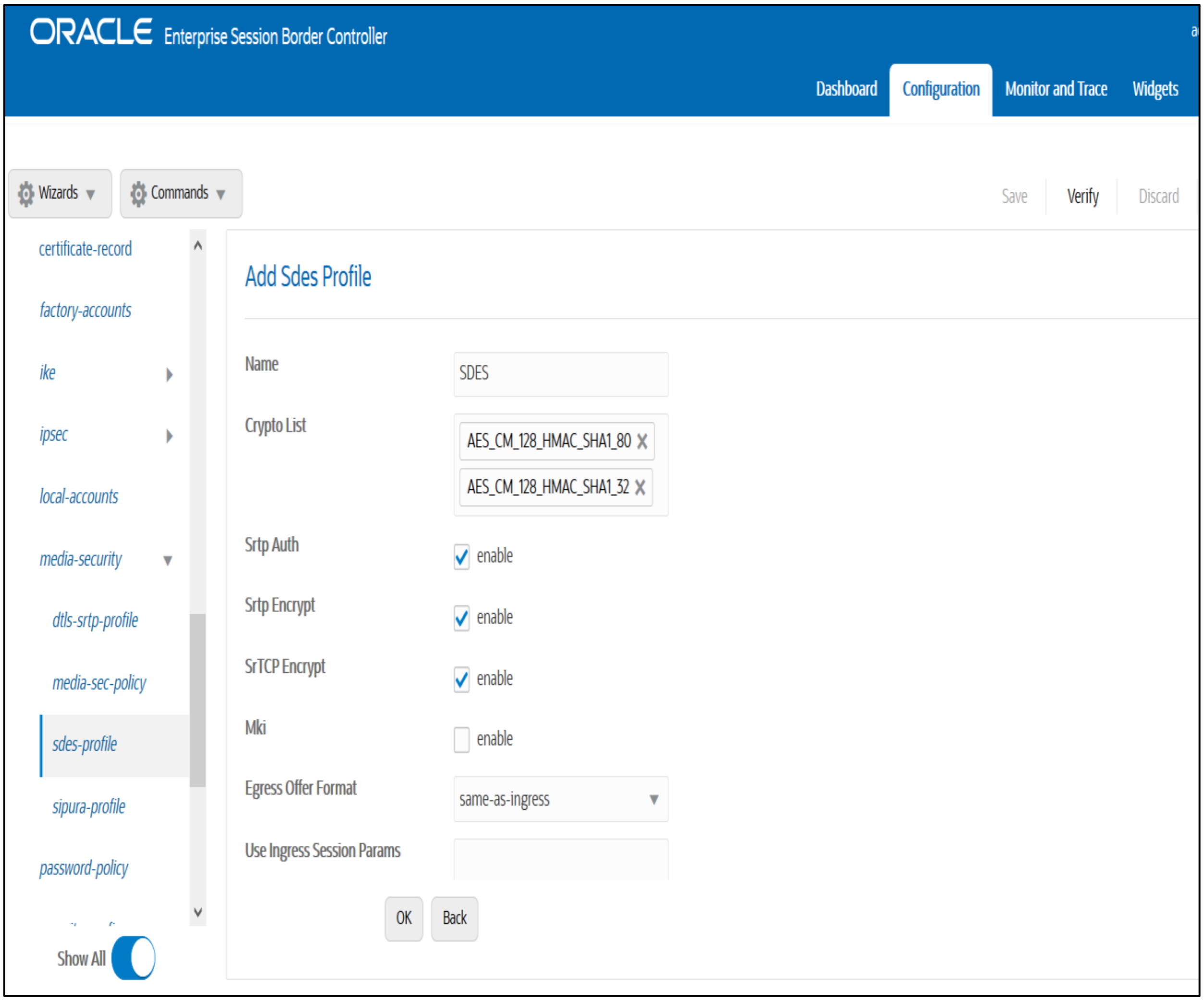
End Port 40000 (Range: 1..65535)

Realm ID AvayaCoreRealm

Network Interface

6.15. Configure sdes profile

Please go to →Security → Media Security →sdes profile and create the policy as below.



Add Sdes Profile

Name: SDES

Crypto List: AES_CM_128_HMAC_SHA1_80, AES_CM_128_HMAC_SHA1_32

Srtp Auth: ☑ enable

Srtp Encrypt: ☑ enable

SrTCP Encrypt: ☑ enable

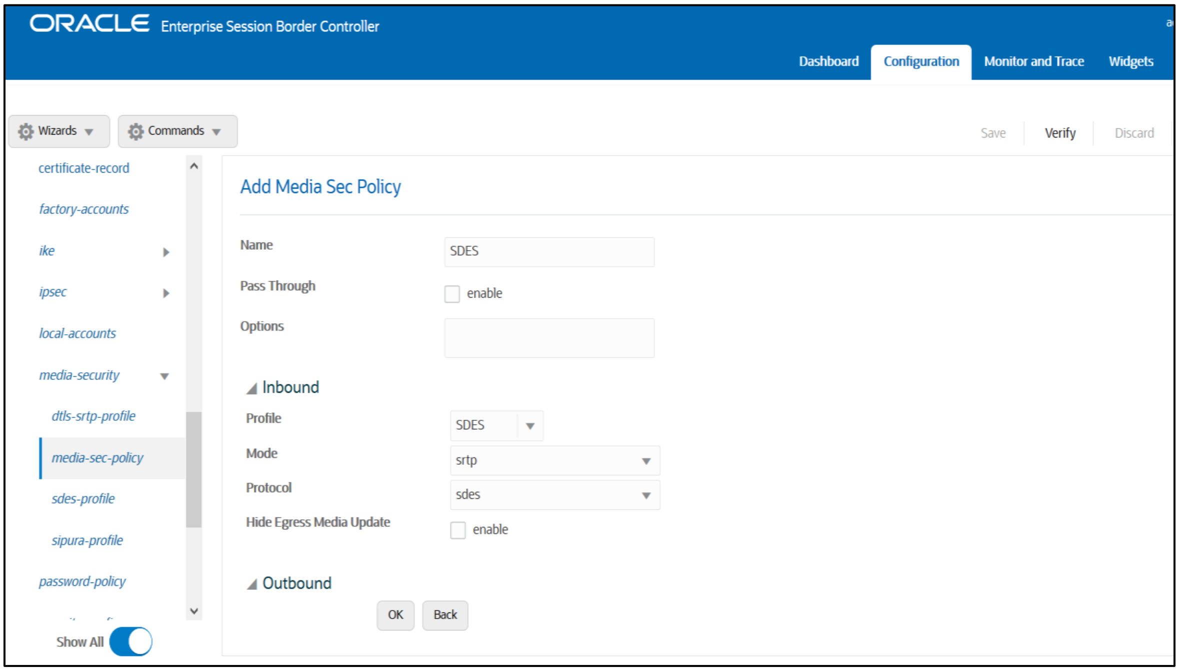
Mki: □ enable

Egress Offer Format: same-as-ingress

Use Ingress Session Params:

6.16. Configure Media Security Profile

Please go to →Security → Media Security →media Sec policy and create the policy as below: Create Media Sec policy with name SDES for the Avaya Public Side which will have the sdes profile created above. Assign this media policy to the AvayapublicRealm.



Add Media Sec Policy

Name: SDES

Pass Through: □ enable

Options:

Inbound

Profile: SDES

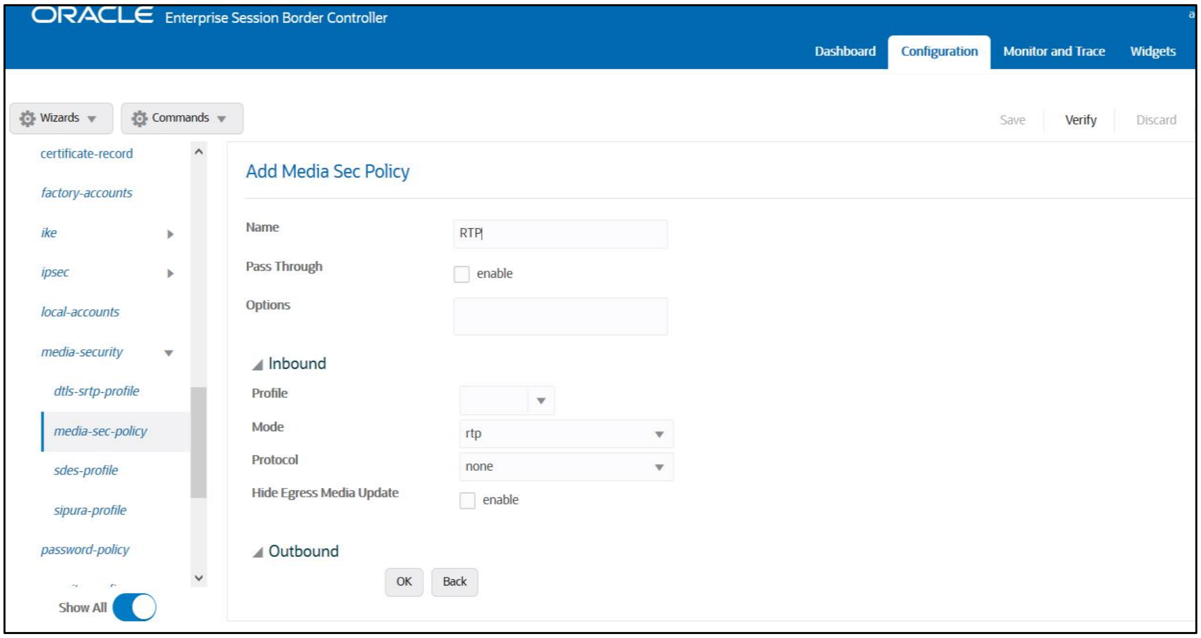
Mode: srtp

Protocol: sdes

Hide Egress Media Update: □ enable

Outbound

Similarly, Create Media Sec policy with name RTP to convert srtp to rtp for the Avaya SM side which will use only TCP/UDP as transport protocol. Assign this media policy to the AvayaCoreRealm.



Add Media Sec Policy

Name: RTP

Pass Through: □ enable

Options:

Inbound

Profile:

Mode: rtp

Protocol: none

Hide Egress Media Update: □ enable

Outbound

With this, the SBC configuration is complete.

7. Existing SBC configuration

If the SBC being used with Avaya Session Manager is an existing SBC with functional configuration, following configuration elements are required:

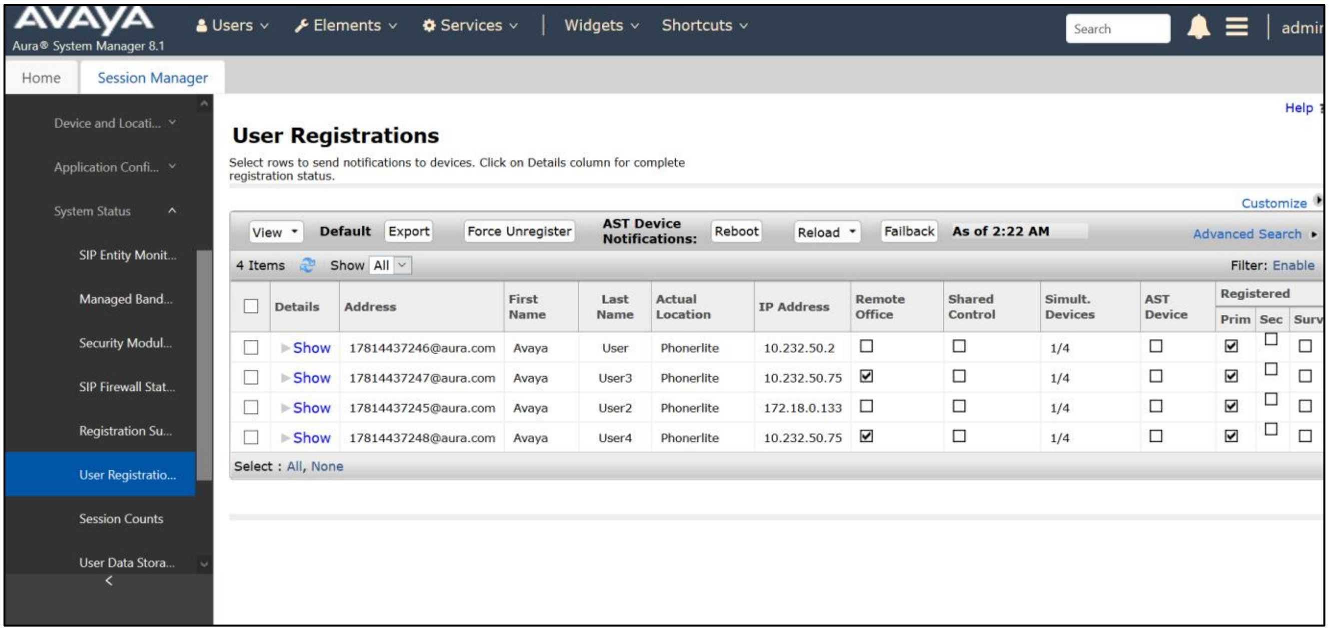
- New realm-config
- Configuring a certificate for SBC Interface
- TLS-Profile
- New sip-interface
- New session-agent
- New steering-pools
- New local-policy
- SDES Profile
- Media-sec-Policy

Please follow the steps mentioned in the above chapters to configure these elements.

8. Registration and Verification of Avaya 3rd party SIP Phones configuration

Once the SBC and Avaya Session Manager configuration is complete, we can try registering the remote phones and local phones and can verify whether they are successfully registered to the Avaya Session Manager.

Please Navigate to: Elements->Session Manager->System Status-> User registration.
Verify whether the users are registered successfully to the Session Manager.



User Registrations

Select rows to send notifications to devices. Click on Details column for complete registration status.

As of 2:22 AM

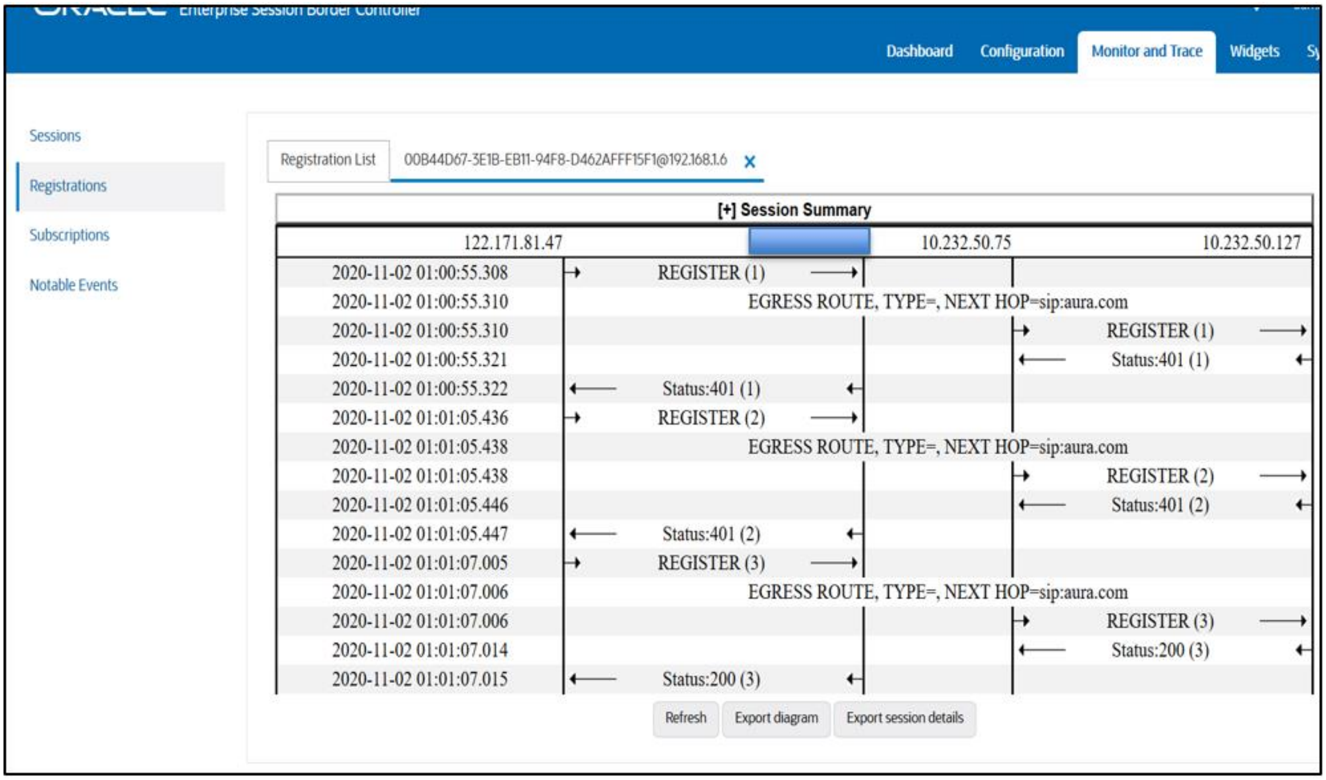
4 Items Show All

□	Details	Address	First Name	Last Name	Actual Location	IP Address	Remote Office	Shared Control	Simult. Devices	AST Device	Registered		
											Prim	Sec	Surv
□	Show	17814437246@aura.com	Avaya	User	Phonerlite	10.232.50.2	□	□	1/4	□	☑	□	□
□	Show	17814437247@aura.com	Avaya	User3	Phonerlite	10.232.50.75	☑	□	1/4	□	☑	□	□
□	Show	17814437245@aura.com	Avaya	User2	Phonerlite	172.18.0.133	□	□	1/4	□	☑	□	□
□	Show	17814437248@aura.com	Avaya	User4	Phonerlite	10.232.50.75	☑	□	1/4	□	☑	□	□

Select : All, None

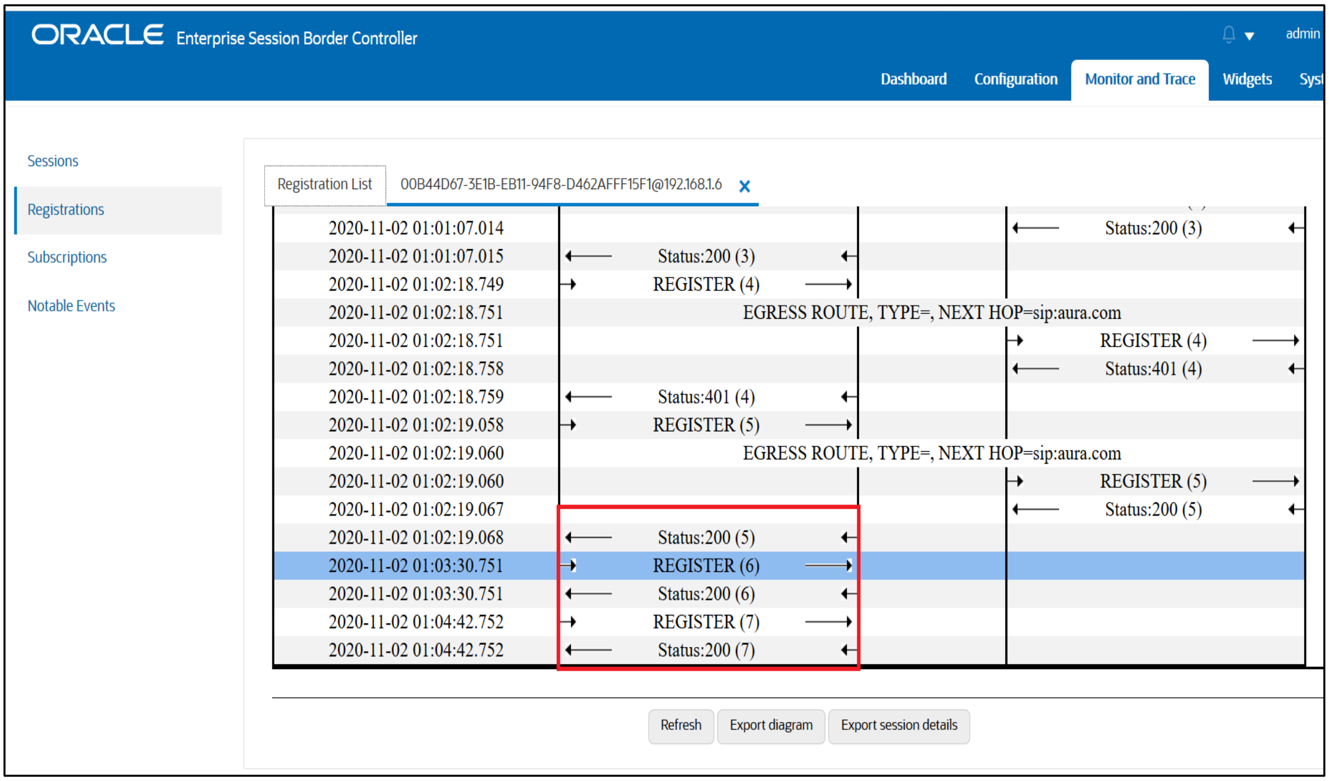
As we can see, there are couple of DNs registered as Remote office phones which has the IP address of SBC inside IP (10.232.50.75) and these phones are registered via Oracle SBC to Avaya Session Manager. There are also two phones registered to Avaya Session Manager directly

We can register the remote worker to Avaya SM through Oracle SBC and you can see the registration flow below. We can see that REGISTER is successful and also SBC caches registration info.
After that, register is directly answered by SBC instead of routing to Avaya SM till next expires time.



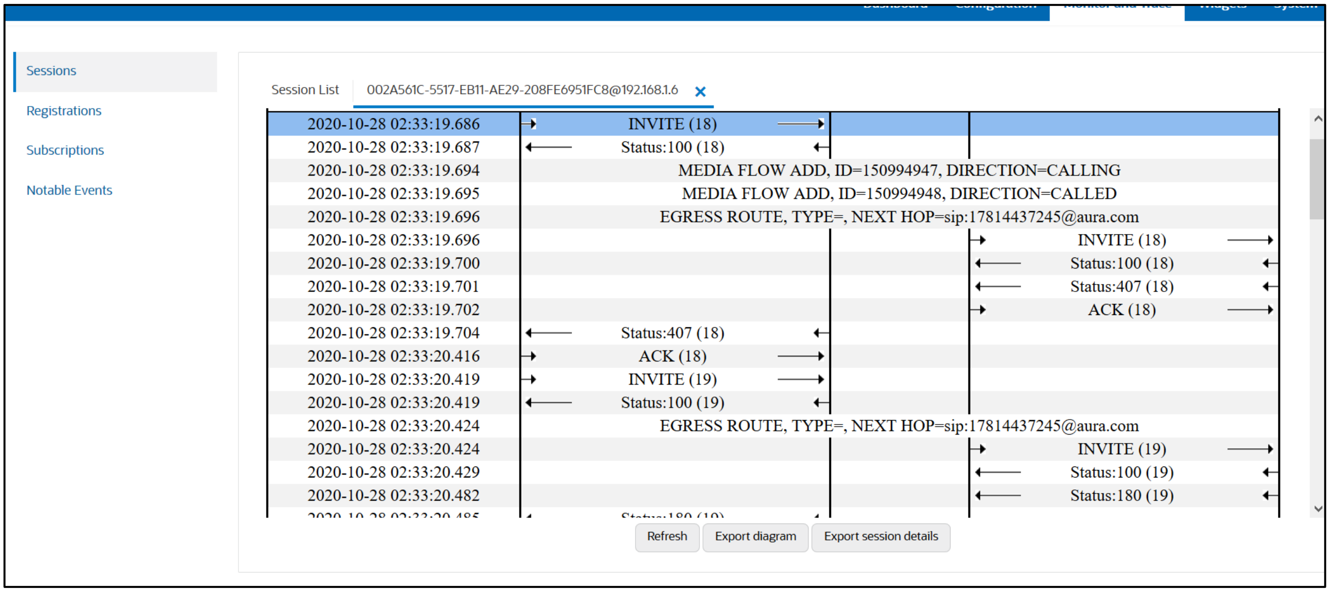
[+] Session Summary

```
                          122.171.81.47                 10.232.50.75                10.232.50.127
2020-11-02 01:00:55.308   → REGISTER (1) →
2020-11-02 01:00:55.310   EGRESS ROUTE, TYPE=, NEXT HOP=sip:aura.com
2020-11-02 01:00:55.310                                              → REGISTER (1) →
2020-11-02 01:00:55.321                                              ← Status:401 (1) ←
2020-11-02 01:00:55.322   ← Status:401 (1) ←
2020-11-02 01:01:05.436   → REGISTER (2) →
2020-11-02 01:01:05.438   EGRESS ROUTE, TYPE=, NEXT HOP=sip:aura.com
2020-11-02 01:01:05.438                                              → REGISTER (2) →
2020-11-02 01:01:05.446                                              ← Status:401 (2) ←
2020-11-02 01:01:05.447   ← Status:401 (2) ←
2020-11-02 01:01:07.005   → REGISTER (3) →
2020-11-02 01:01:07.006   EGRESS ROUTE, TYPE=, NEXT HOP=sip:aura.com
2020-11-02 01:01:07.006                                              → REGISTER (3) →
2020-11-02 01:01:07.014                                              ← Status:200 (3) ←
2020-11-02 01:01:07.015   ← Status:200 (3) ←
```



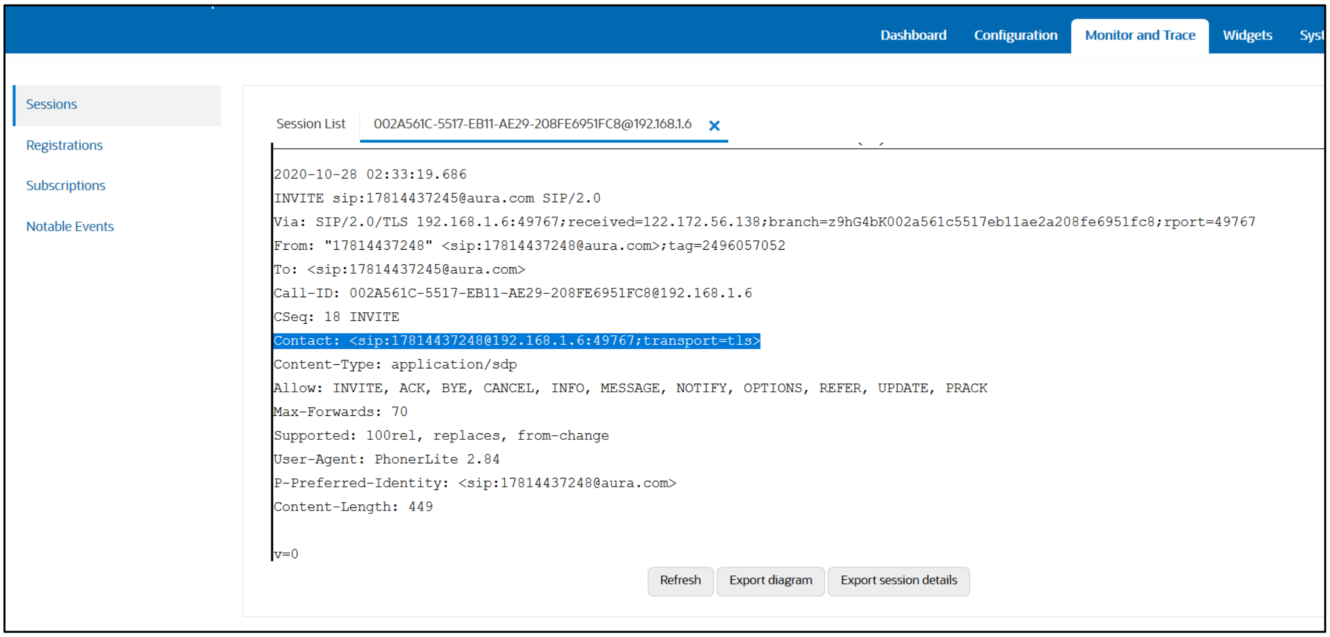
```
2020-11-02 01:01:07.014                                              ← Status:200 (3) ←
2020-11-02 01:01:07.015   ← Status:200 (3) ←
2020-11-02 01:02:18.749   → REGISTER (4) →
2020-11-02 01:02:18.751   EGRESS ROUTE, TYPE=, NEXT HOP=sip:aura.com
2020-11-02 01:02:18.751                                              → REGISTER (4) →
2020-11-02 01:02:18.758                                              ← Status:401 (4) ←
2020-11-02 01:02:18.759   ← Status:401 (4) ←
2020-11-02 01:02:19.058   → REGISTER (5) →
2020-11-02 01:02:19.060   EGRESS ROUTE, TYPE=, NEXT HOP=sip:aura.com
2020-11-02 01:02:19.060                                              → REGISTER (5) →
2020-11-02 01:02:19.067                                              ← Status:200 (5) ←
2020-11-02 01:02:19.068   ← Status:200 (5) ←
2020-11-02 01:03:30.751   → REGISTER (6) →
2020-11-02 01:03:30.751   ← Status:200 (6) ←
2020-11-02 01:04:42.752   → REGISTER (7) →
2020-11-02 01:04:42.752   ← Status:200 (7) ←
```

We can also make calls between these phones and we can verify the signaling path. The above call is made from access side to core side.



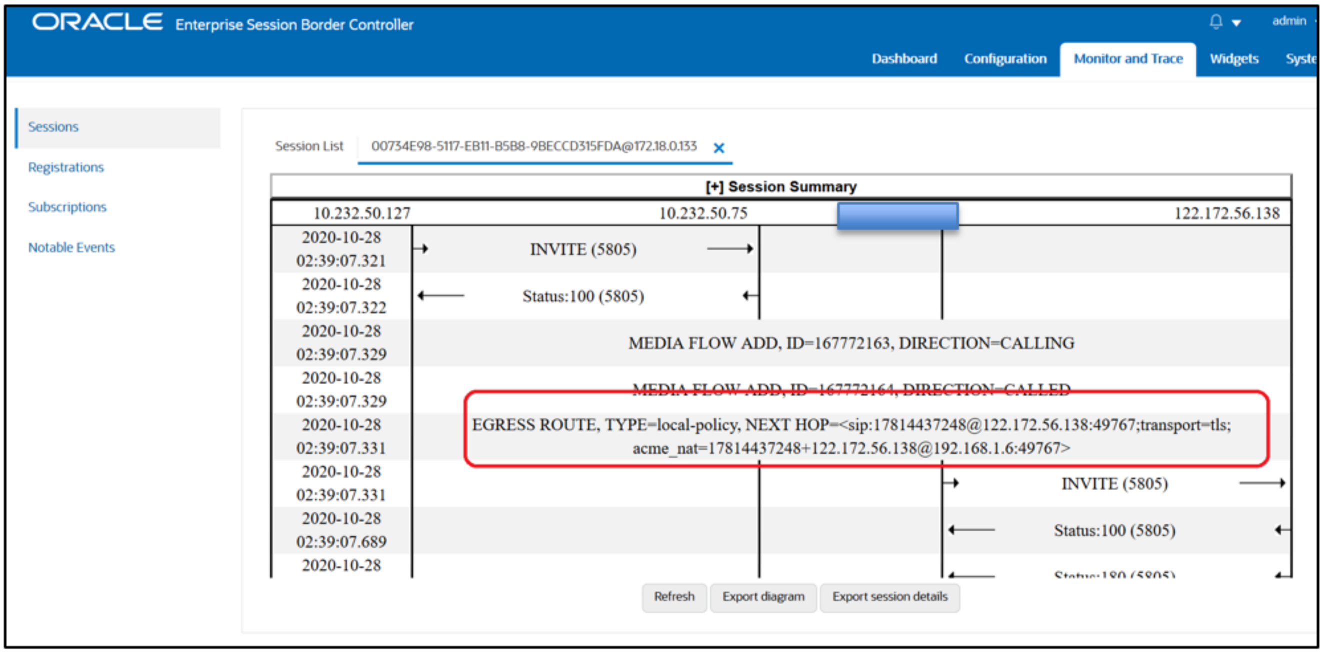
```
2020-10-28 02:33:19.686   INVITE (18)
2020-10-28 02:33:19.687   Status:100 (18)
2020-10-28 02:33:19.694   MEDIA FLOW ADD, ID=150994947, DIRECTION=CALLING
2020-10-28 02:33:19.695   MEDIA FLOW ADD, ID=150994948, DIRECTION=CALLED
2020-10-28 02:33:19.696   EGRESS ROUTE, TYPE=, NEXT HOP=sip:17814437245@aura.com
2020-10-28 02:33:19.696   INVITE (18)
2020-10-28 02:33:19.700   Status:100 (18)
2020-10-28 02:33:19.701   Status:407 (18)
2020-10-28 02:33:19.702   ACK (18)
2020-10-28 02:33:19.704   Status:407 (18)
2020-10-28 02:33:20.416   ACK (18)
2020-10-28 02:33:20.419   INVITE (19)
2020-10-28 02:33:20.419   Status:100 (19)
2020-10-28 02:33:20.424   EGRESS ROUTE, TYPE=, NEXT HOP=sip:17814437245@aura.com
2020-10-28 02:33:20.424   INVITE (19)
2020-10-28 02:33:20.429   Status:100 (19)
2020-10-28 02:33:20.482   Status:180 (19)
```

Here the INVITE from access side comes with TLS protocol and from SBC it is changed to TCP/UDP



```
2020-10-28 02:33:19.686
INVITE sip:17814437245@aura.com SIP/2.0
Via: SIP/2.0/TLS 192.168.1.6:49767;received=122.172.56.138;branch=z9hG4bK002a561c5517eb11ae2a208fe6951fc8;rport=49767
From: "17814437248" <sip:17814437248@aura.com>;tag=2496057052
To: <sip:17814437245@aura.com>
Call-ID: 002A561C-5517-EB11-AE29-208FE6951FC8@192.168.1.6
CSeq: 18 INVITE
Contact: <sip:17814437248@192.168.1.6:49767;transport=tls>
Content-Type: application/sdp
Allow: INVITE, ACK, BYE, CANCEL, INFO, MESSAGE, NOTIFY, OPTIONS, REFER, UPDATE, PRACK
Max-Forwards: 70
Supported: 100rel, replaces, from-change
User-Agent: PhonerLite 2.84
P-Preferred-Identity: <sip:17814437248@aura.com>
Content-Length: 449

v=0
```

Similarly, we can also make calls from core side to access side and check the SIP path.
Here the call is converted to TLS after reaching SBC.



```
2020-10-28 02:39:07.321   INVITE (5805)
2020-10-28 02:39:07.322   Status:100 (5805)
2020-10-28 02:39:07.329   MEDIA FLOW ADD, ID=167772163, DIRECTION=CALLING
2020-10-28 02:39:07.329   MEDIA FLOW ADD, ID=167772164, DIRECTION=CALLED
2020-10-28 02:39:07.331   EGRESS ROUTE, TYPE=local-policy, NEXT HOP=<sip:17814437248@122.172.56.138:49767;transport=tls;
                          acme_nat=17814437248+122.172.56.138@192.168.1.6:49767>
2020-10-28 02:39:07.331   INVITE (5805)
2020-10-28 02:39:07.689   Status:100 (5805)
2020-10-28                Status:180 (5805)
```

Calls between remote worker phones is also working (This works like Hair pinned calls)

In those calls, calls will first reach to Avaya Session Manager via Oracle SBC and the call again reaches another remote worker from Avaya Session Manager again via our SBC,

Appendix A

Following are the test cases that are executed as part of Avaya Remote worker TLS config and Avaya Session Manager with Oracle SBC in between.

Note: Please note that the remote worker side is configured to work in TLS mode (Remote worker to SBC) and Core side is configured to work in TCP/UDP mode (SBC to Avaya Session Manager)

Serial Number	Test Cases Executed	Result
1	Register Avaya 3rd party SIP phone to Avaya Session manager via Oracle SBC	Pass
2	Outbound Call from Remote Worker to other users, calling party hangs up after call	Pass
3	Outbound Call from Remote Worker to other users, called party hangs up after call	Pass
4	Inbound Call to Remote Worker from other user, calling party hangs up	Pass
5	Inbound Call to Remote Worker from other user, called party hangs up	Pass
6	Inbound Call from Remote Worker and calling party CANCEL the call before caller party answers	Pass
7	Outbound call to Remote Worker and calling party CANCEL the caller before call is established	Pass
8	Outbound Call from Remote Worker to other user, answers the call, caller puts call on hold, then retrieves the call to ensure speech path is returned	Pass
9	Inbound call to Remote Worker, answers the call, caller puts call on hold, then retrieve the call to ensure speech path is returned	Pass
10	Outbound Call from Remote Worker phone to other device; Keep the call active for more than 30 minutes	Pass
11	Inbound Call to Remote Worker and keep the call active for more than 30 minutes	Pass
12	Call Forward All is set on Remote Worker	Pass
13	Call Forward Busy is set on Remote Worker	Pass
14	Inbound Call to Remote Worker; Unattended transfer to another user	Pass
15	Remote Worker makes Outbound call to User A and User A makes Unattended transfer to User B	Pass
16	Remote Worker makes outbound call User A, User A attends the call and consult transfers the call to User B	Pass
17	User A calls inbound call to Remote Worker and Remote worker attends the call and consult transfers to User B	Pass
18	Conference Call is made with Remote Worker	Pass

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