ORACLE

Configuring the Oracle SBC with Microsoft Azure Communication Services

Technical Application Note

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COMMUNICATIONS

Disclaimer

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1 Contents

1 Related Documentation

1.1 Oracle SBC

- Oracle® Enterprise Session Border Controller Configuration Guide
- Oracle® Enterprise Session Border Controller Release Notes
- Oracle® Enterprise Session Border Controller Security Guide
- Oracle® Enterprise Session Border Controller Web Gui User's Guide

1.2 Microsoft Azure Communication Services

- Direct Routing Telephony Concepts
- Azure Direct Routing Infrastructure Requirements
- Session Border Controllers and Voice Routing
- Azure Communication Services Overview
- Quickstart: Create and Manage Communication Services resources
- Quickstart: Build your own App
- Get Started with Web Calling Sample

2 Revision History

Version	Date Revised	Description of Changes
1.0	9/16/2021	Initial Release
1.1	9/5/2022	Added DigiCert Global G2 Cert as root CA for Teams Changed certificate-record screenshots
1.2	07/20/2024	Removed reference to ping-response parameter and added notes for using RespondOptions HMR

3 Intended Audience

This document describes how to connect the Oracle SBC to Microsoft Azure Communication Services. This paper is intended for IT or telephony professionals.

Note: To zoom in on screenshots of Web GUI configuration examples, press Ctrl and +.

4 Validated Oracle Versions

Microsoft has successfully conducted testing with the Oracle Communications SBC version:

SCZ840

This software release with the configuration outlined in this application note can run on any of the following products:

- AP 1100
- AP 3900
- AP 3950
- AP 4600
- AP 4900
- AP 6350
- AP 6300
- VME

5 About Azure Communication Services

Azure Communication Services allows you to easily add real-time voice, video, and telephone communication to your applications. Communication Services SDKs also allow you to add SMS functionality to your communications solutions. Azure Communication Services is identity agnostic; you have complete control over how end users are identified and authenticated. You can connect people to the communication data plane or services (bots).

Applications include:

- Business to Consumer (B2C). Business employees and services can interact with consumers using voice, video, and rich text chat in a custom browser or mobile application. An organization can send and receive SMS messages, or operate an interactive voice response system (IVR) using a phone number acquired through Azure.

Integration with Microsoft Teams allows consumers to join Teams meetings hosted by employees; ideal for remote healthcare, banking, and product support scenarios where employees might already be familiar with Teams.

- Consumer to Consumer. Build engaging social spaces for consumer-to-consumer interaction with voice, video, and rich text chat. Any type of user interface can be built on Azure Communication Services SDKs. Complete application samples and UI assets are available to help you get started quickly.

5.1 Infrastructure Requirements

The table below shows the list of infrastructure prerequisites for deploying Direct Routing.

Infrastructure Prerequisite	Details
Certified Session Border Controller (SBC)	**See Microsoft's Plan Direct Routing document**
SIP Trunks connected to the SBC	
Azure Subscription	
Communication Services Access Token	
Public IP address for the SBC	
Fully Qualified Domain Name (FQDN) for the SBC	
Public DNS entry for the SBC	
Public trusted certificate for the SBC	
Firewall IP addresses and ports for SIP Signaling and media	

5.2 SBC Domain Names

Customers without Office 365 can use any domain name for which they can obtain a public certificate.

The following table shows examples of DNS names registered for the tenant, whether the name can be used as an FQDN for the SBC, and examples of valid FQDN names:

DNS name	Can be used for SBC FQDN	Examples of FQDN names
contoso.com	Yes	**Valid names:** sbc1.contoso.com ssbcs15.contoso.com europe.contoso.com
contoso.onmicrosoft.com	No	Using *.onmicrosoft.com domains is not supported for SBC names

If you are an Office 365 customer, then the SBC domain name must not match registered in Domains of the Office 365 tenant. Below is the example of Office 365 and Azure Communication Service coexistence:

Domain registered in Office 365	Examples of SBC FQDN in Teams	Examples of SBC FQDN names in ACS
contoso.com (second level domain)	**sbc.contoso.com** (name in the second level domain)	**sbc.acs.contoso.com** (name in the third level domain) **sbc.fabrikam.com** (any name within different domain)
o365.contoso.com (third level domain)	**sbc.o365.contoso.com** (name in the third level domain)	**sbc.contoso.com** (name in the second level domain) **sbc.acs.o365.contoso.com** (name in the fourth level domain) **sbc.fabrikam.com** (any name within different domain)

SBC pairing works on an ACS resource level, meaning you can pair many SBCs to a single ACS resource, but you cannot pair a single SBC to more than one ACS resource.
Unique SBC FQDNs are required for pairing to different resources.

5.3 Public trusted certificate for the SBC

Microsoft recommends that you request the certificate for the SBC by generating a certification signing request (CSR). Instructions on generating a CSR for an Oracle SBC are provided in the Configuration section of this application note.

NOTE: Most Certificate Authorities (CAs) require the private key size to be at least 2048. Keep this in mind when generating the CSR.
The certificate needs to have the SBC FQDN as the common name (CN) or the subject alternative name (SAN) field. The certificate should be issued directly from a certification authority, not from an intermediate provider.

Alternatively, ACS SIP Interface supports a wildcard in the CN and/or SAN, and the wildcard needs to conform to standard RFC HTTP Over TLS. An example would be using *.contoso.com which would match the SBC FQDN sbc.contoso.com, but wouldn't match with sbc.test.contoso.com.

The certificate needs to be generated by one of the following root certificate authorities:

- AffirmTrust
- AddTrust External CA Root
- Baltimore CyberTrust Root*
- Buypass
- Cybertrust
- Class 3 Public Primary Certification Authority
- Comodo Secure Root CA
- Deutsche Telekom
- DigiCert Global Root CA
- DigiCert High Assurance EV Root CA
- Entrust

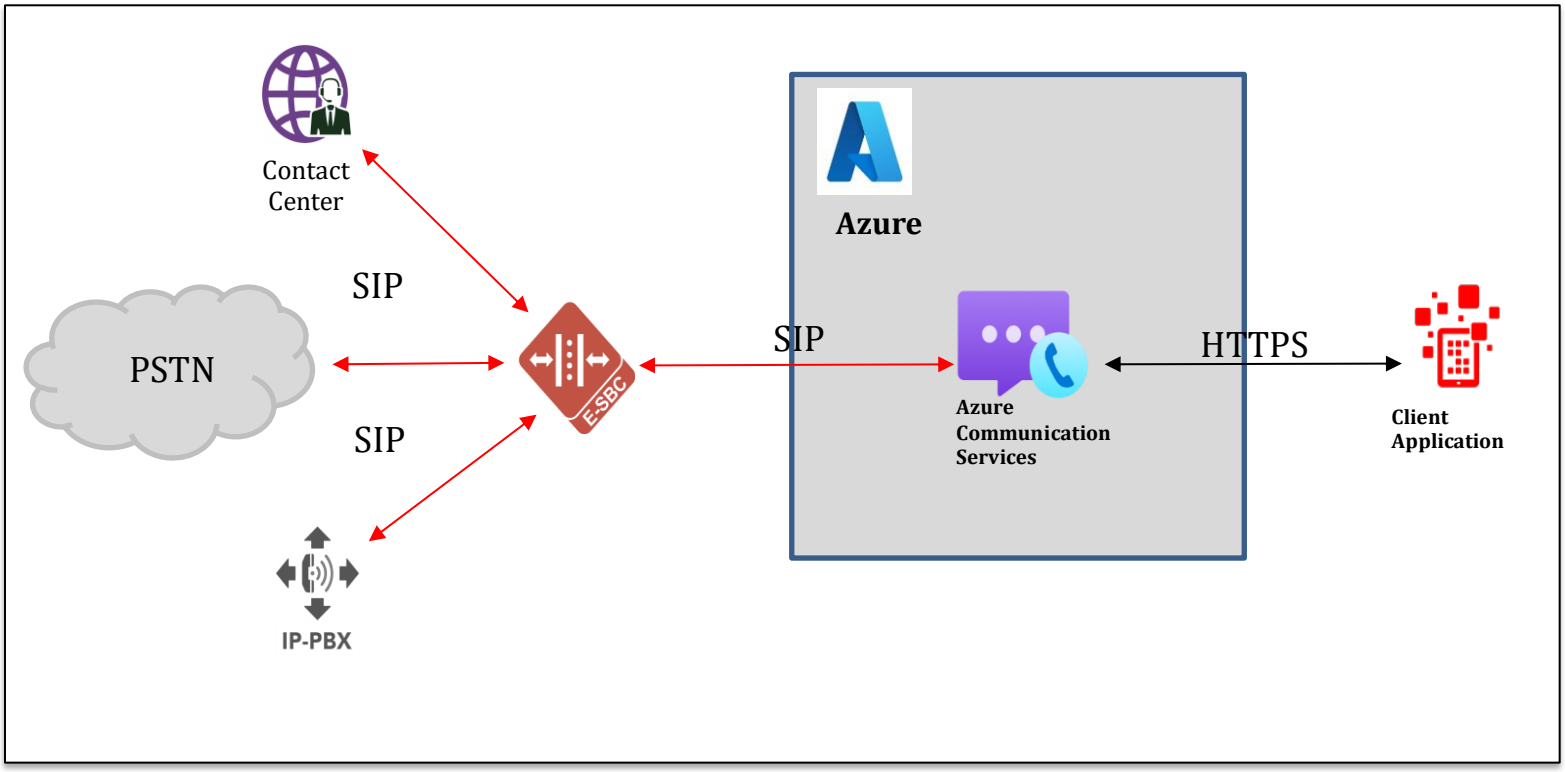
- GlobalSign
- Go Daddy
- GeoTrust
- Verisign, Inc.
- SSL.com
- Starfield
- Symantec Enterprise Mobile Root for Microsoft
- SwissSign
- Thawte Timestamping CA
- Trustwave
- TeliaSonera
- T-Systems International GmbH (Deutsche Telekom)
- QuoVadis

Microsoft is working on adding additional certification authorities based on customer requests.

6 Configuration

This chapter provides step by step guidance on how to configure the Oracle SBC for interworking with Microsoft Azure Communication Services.

Below shows the connection topology example for MSFT Azure Communication Services.



These instructions cover configuration steps between the Oracle SBC and Microsoft Azure Communications Services. The interconnection of other entities, such as connection of the SIP trunk, 3rd Party PBX and/or analog devices are not covered in this instruction. The details of such connection are available in other instructions produced by the vendors of retrospective components.

7 Azure Communication Services Direct Routing

Azure Communication Services supports a "SIP-Interface" option that allows you to connect, through Oracle's certified session border controller, your legacy on-premises telephony and your carrier of choice to ACS. It provides PSTN calling capabilities to your ACS applications even if Azure Cloud Calling is not available in your country/region.

With this option:

- You connect your own supported Oracle SBC to Azure Communication Services without the need for additional on-premises software.
- You can use literally any telephony carrier with ACS.

- You can configure interoperability between your telephony equipment—such as a third-party PBX and analog devices—and ACS.

The cloud deployment and setup of Azure Communication Services is outside the scope of this document.

Please see Related Documentation for more information on the setup and configuration of Azure Communication Services

8 Oracle SBC Configuration

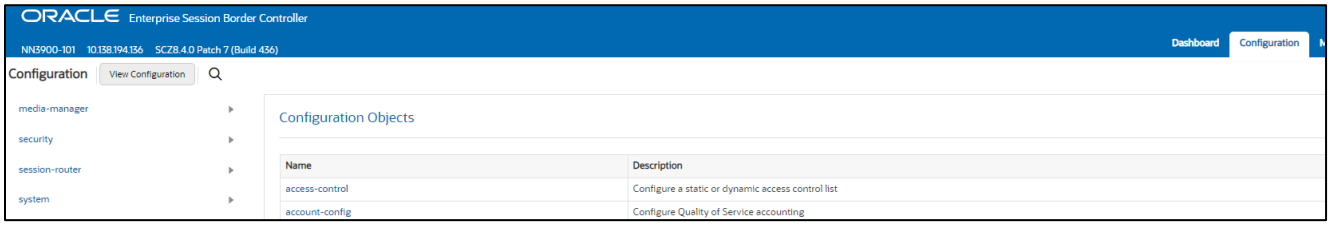
There are two methods for configuring the OCSBC, ACLI, or GUI.

For the purposes of this note, we'll be using the OCSBC GUI for all configuration examples. We will however provide the ACLI path to each element.

This guide assumes the OCSBC has been installed, management interface has been configured, product selected and entitlements have been assigned. Also, http-server has been enabled for GUI access. If you require more information on how to install your SBC platform, please refer to the ACLI configuration guide.

To access the OCSBC GUI, enter the management IP address into a web browser.
When the login screen appears, enter the username and password to access the OCSBC.

Once you have accessed the OCSBC, at the top, click the Configuration Tab. This will bring up the OCSBC Configuration Objects List on the screen.



Any configuration parameter not specifically listed below can remain at the OCSBC default value and does not require a change for connection to MSFT Teams Direct routing to function properly. Also, all FQDN, IP Address, SBC TLS certificates, or other network information outlined in this configuration example is only usable within the Oracle LAB, and cannot be added to any other configuration or SBC outside of that lab environment. This is for example purposes only.

8.1 Global Configuration Elements

Before you can configuration more granular parameters on the SBC, there are four global configuration elements that must be enabled to proceed.

- System-Config
- Ntp-config
- Media-manager-Config
- Sip-Config

8.1.1 System-Config

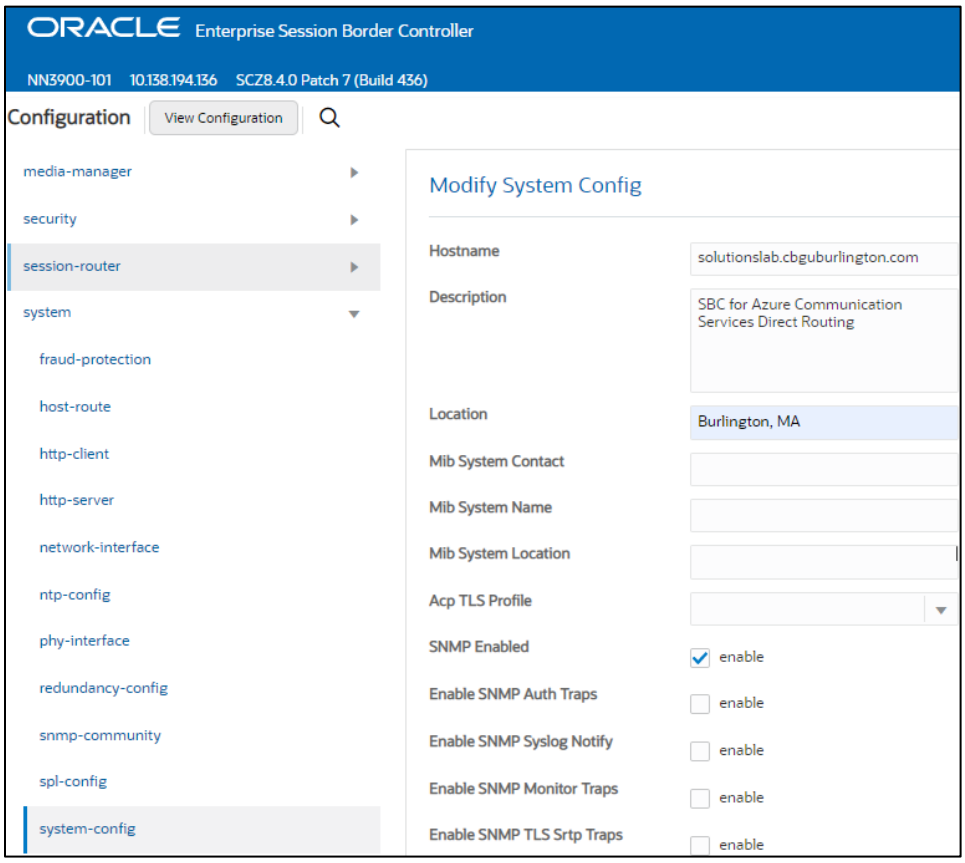
To configure system level functionality for the OCSBC, you must first enable the system-config

GUI Path: system/system-config

ACLI Path: config t→system→system-config

Note: The following parameters are optional but recommended for system config

- Hostname
- Description
- Location
- Default Gateway (recommended to be the same as management interface gateway)



- Click OK at the bottom of the screen

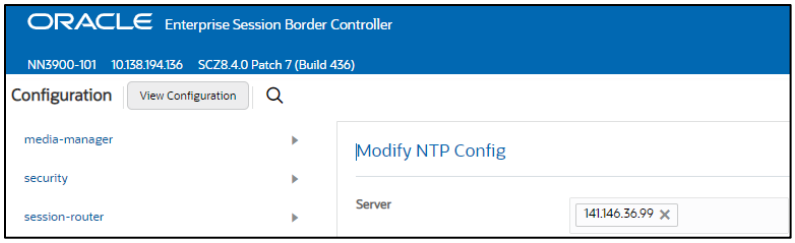
8.1.2 NTP Config

To enable NTP on the SBC:

GUI Path: system/ntp-config

ACLI Path: config t→system→ntp-config

- Add the IP address in the box for server



- Click OK at the bottom

8.1.3 Media Manager

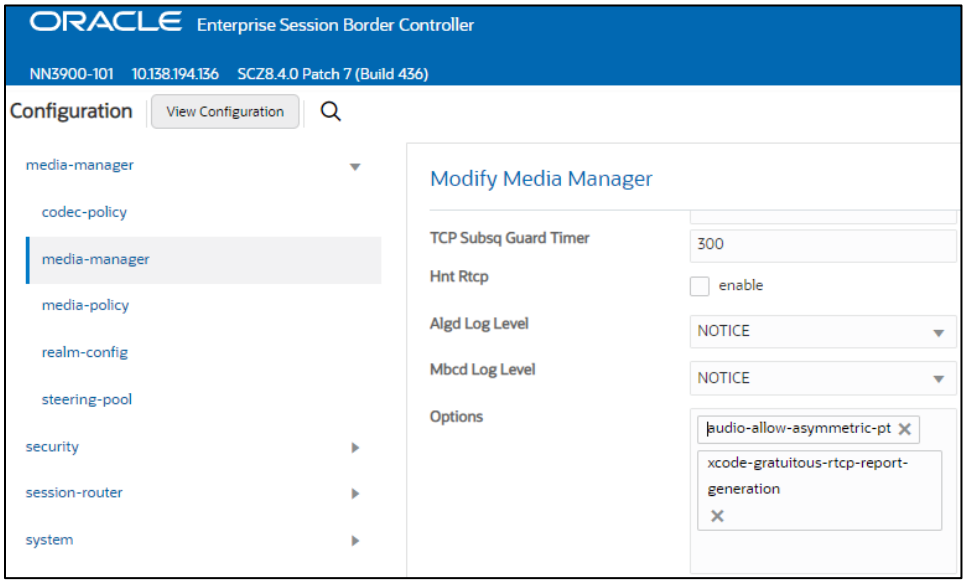
To configure media functionality on the SBC, you must first enabled the global media manager

GUI Path: media-manager/media-manager

ACLI Path: config t→media-manager→media-manager-config

The following options are recommeded for global media manager when interfacing with MSFT Teams Direct Routing

- Options: In the box next to options, add the string: audio-allow-asymmetric-pt
- Hit enter, then add: xcode-gratuitous-rtcp-report-generation (requires a reboot to take effect), hit enter again.



- Click ok at the bottom

8.1.4 Sip Config

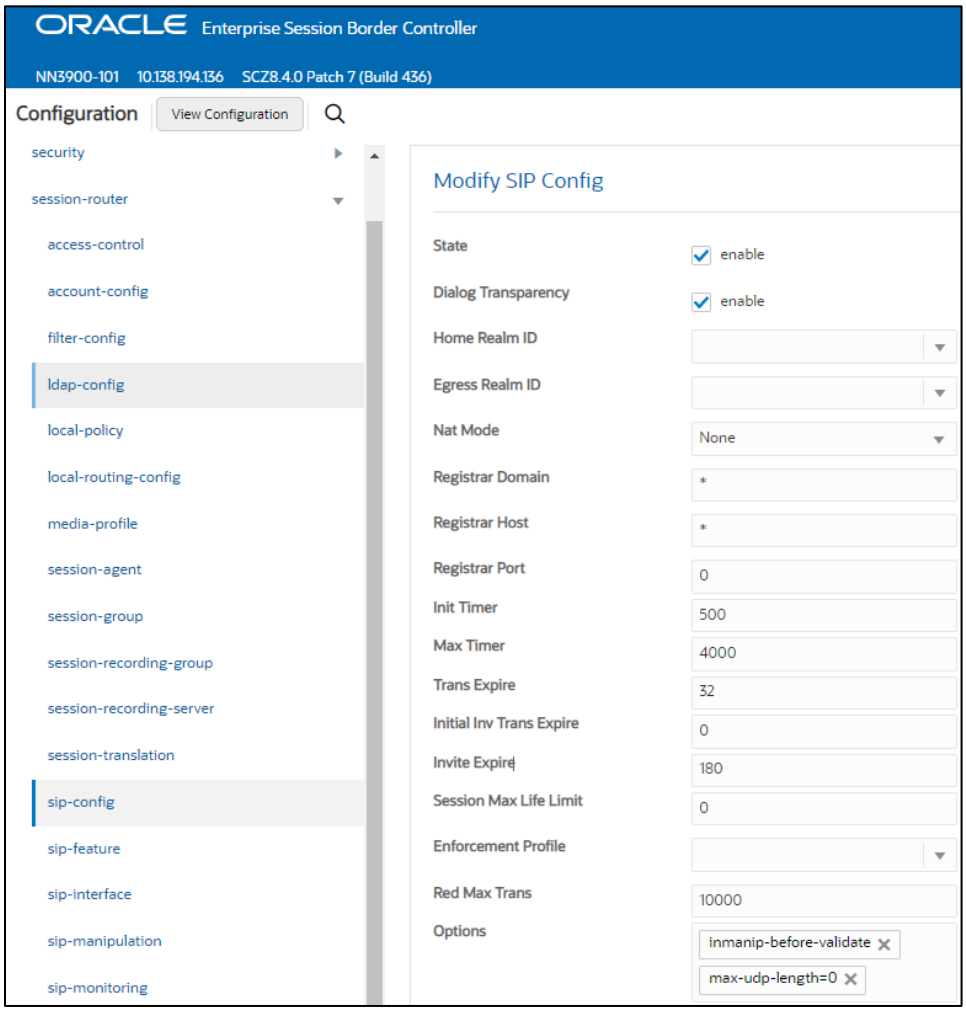
To enable sip related objects on the OCSBC, you must first configure the global Sip Config element:

GUI Path: session-router/sip-config

ACLI Path: config t→session-router→sip-config

The following are recommended parameters under the global sip-config:

- Options: In the box next to options, add the string: inmanip-before-validate
- Hit enter, then add: max-udp-length=0, hit enter again



- Click OK at the bottom

8.2 Network Configuration

To connect the SBC to network elements, we must configure both physical and network interfaces. For the purposes of this example, we will configure two physical interfaces, and two network interfaces. One to communicate with MSFT Azure Communications Direct Routing, and the other to connect to PSTN Network.

8.2.1 Physical Interfaces

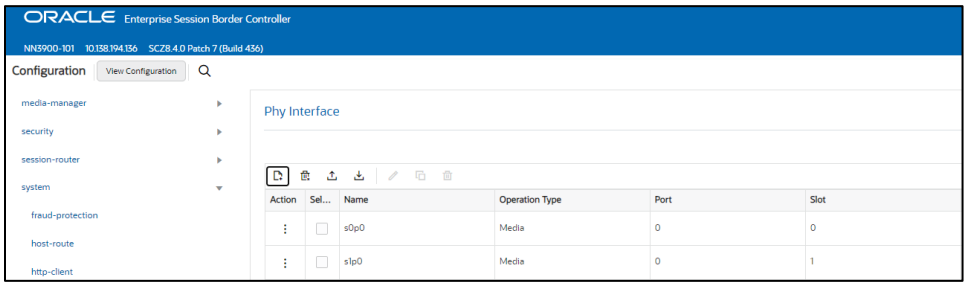
GUI Path: system/phy-interface

ACLI Path: config t→system→phy-interface

- Click Add, use the following table as a configuration example:

Config Parameter	ACS Interface	PSTN
Name	s0p0	S1p0
Operation Type	Media	Media
Slot	0	1
Port	0	0

Note: Physical interface names, slot and port may vary depending on environment



- Click OK at the bottom after entering config information for each.

8.2.2 Network Interfaces

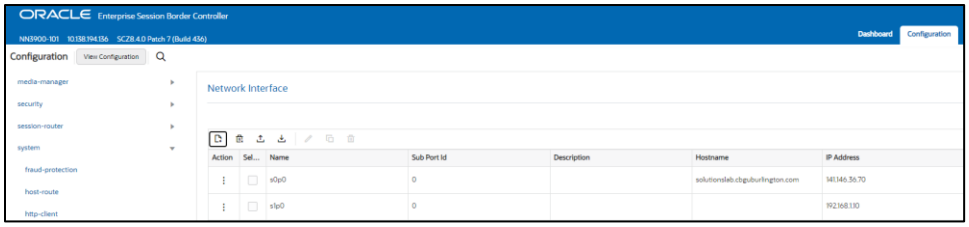
GUI Path: system/network-interface

ACLI Path: config t→system→network-interface

- Click Add, use the following table as a configuration example: (hostname is optional)

Configuration Parameter	ACS Interface	PSTN
Name	s0p0	s1p0
Hostname	Solutionslab.cgbuburlington.com	
IP Address	141.146.36.70	192.168.1.10
Netmask	255.255.255.192	255.255.255.0
Gateway	141.146.36.65	192.168.1.1
DNS Primary IP	8.8.8.8	
DNS Domain	Solutionslab.cgbuburlington.com	

- Click OK at the bottom of each after entering config information



- Click OK at the bottom of each after entering config information

8.3 Security Configuration

This section describes how to configure the SBC for both TLS and SRTP communication with Microsoft Azure Communication Services Direct Routing

8.3.1 Certificate Records

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

This section walks you through how to configure certificate records, create a certificate signing request, and import the necessary certificates into the SBC's configuration.

GUI Path: security/certificate-record

ACLI Path: config t→security→certificate-record

For the purposes of this application note, we'll create four certificate records. They are as follows:

- SBC Certificate (end-entity certificate)
- GoDaddy Root Cert (Root CA used to sign the SBC's end entity certificate)
- BaltimoreRoot CA Cert (Microsoft Presents the SBC a certficate signed by this authority)
- DigiCert Global G2 Cert (Microsoft Presents the SBC a certficate signed by this authority)

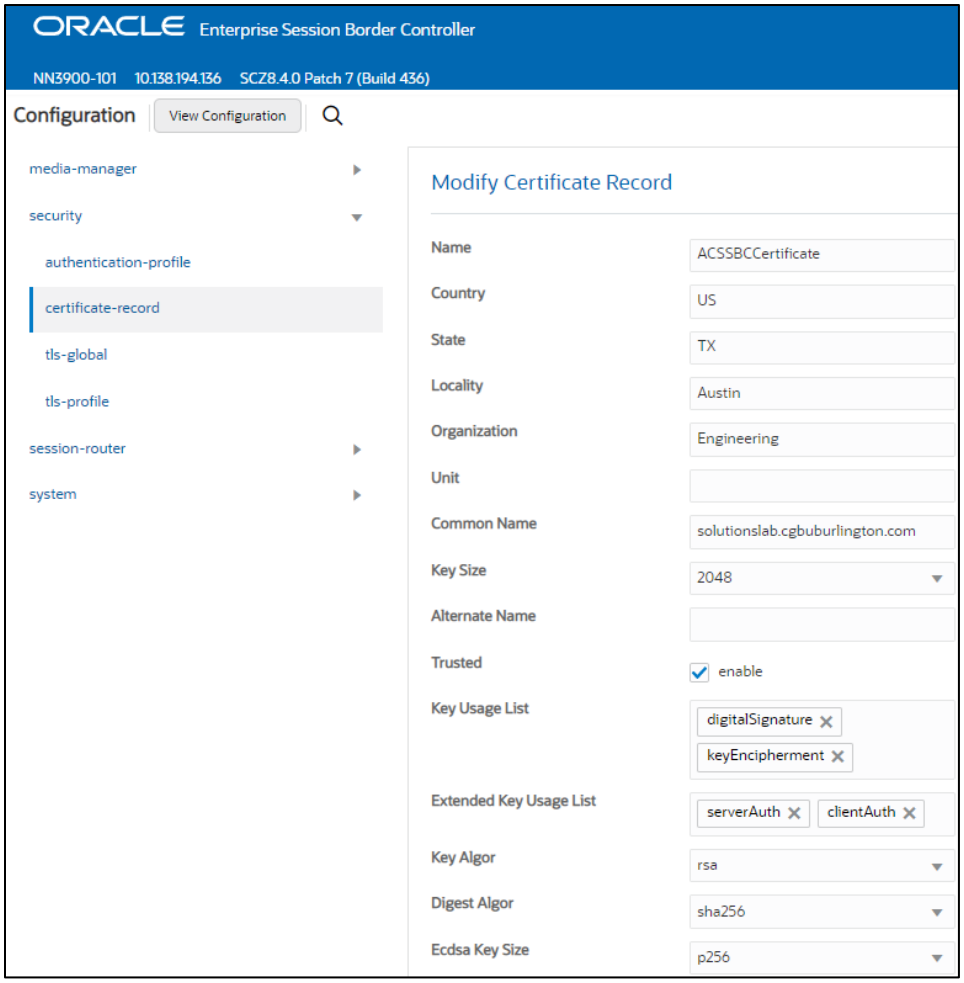
8.3.2 SBC End Entity Certificate

This is the certificate the SBC will present to Microsoft during the TLS handshake to establish a secure connection to Microsoft ACS Direct Routing.

The common name of this certificate should contain the SBC's FQDN.

To configure this certificate record:

- Click ADD, and configure as shown below:



- Click OK at the bottom
- Next, using this same procedure, configure certificate records for Root and Intermediate CA Certificates

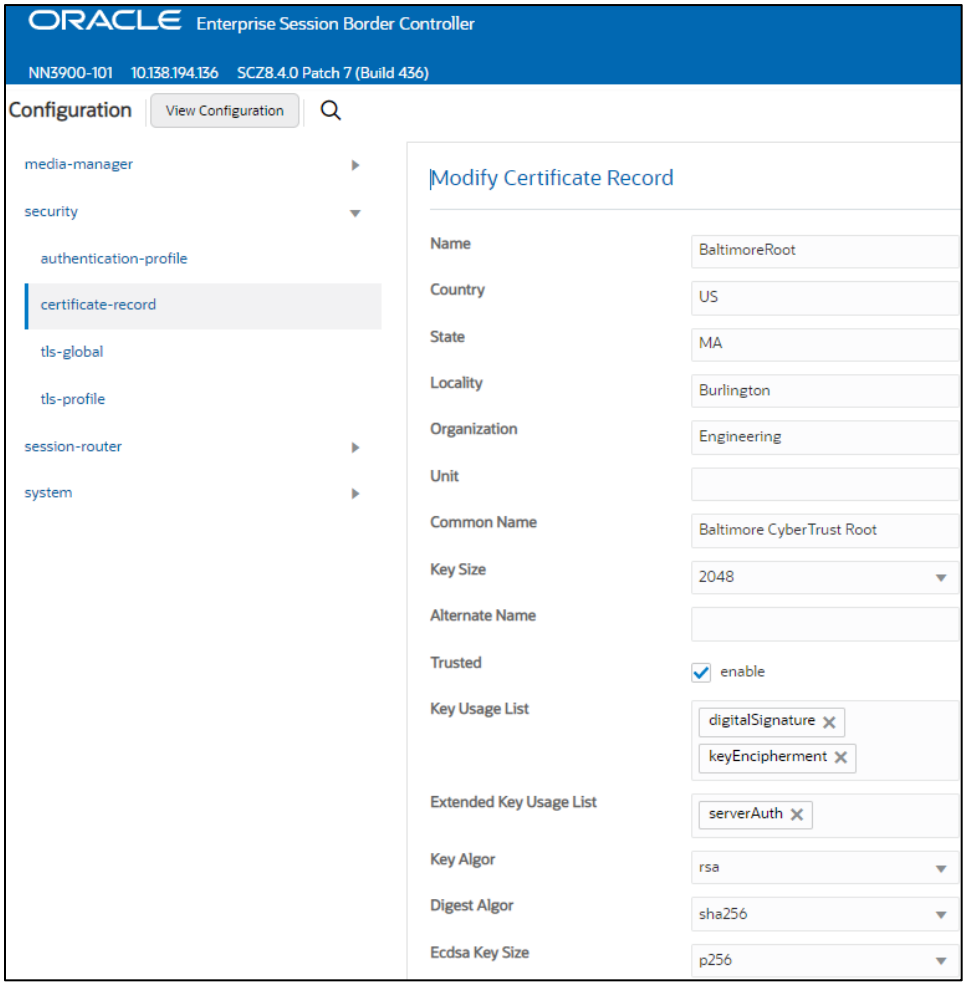
8.3.3 Root CA and Intermediate Certificates

8.3.3.1 Baltimore Root CA Certificate:

Microsoft presents a certificate to the SBC which is signed by Baltimore Cyber Baltimore CyberTrust Root. To trust this certificate, your SBC must have the certificate configured, imported and listed as a trusted CA certificate.

You can download this certificate here: https://cacert.omniroot.com/bc2025.pem

Please use the example below to configure this certificate on the Oracle SBC.



8.3.3.2 Go Daddy Root

The following, GoDaddyRoot, is the root CA certificate used to sign the SBC's end entity certificate. As mentioned above, your root CA and/or intermediate certificate may differ. This is for example purposes only.

8.3.3.3 DigiCert Global Root G2

The DNS name of the Microsoft Teams Direct Routing interface is sip.pstnhub.microsoft.com. Microsoft presents a certificate to the SBC which is signed by DigiCert Global Root G2.To trust this certificate, your SBC must have the certificate listed as a trusted ca certificate. You can download this certificate here: DigiCert Global Root G2

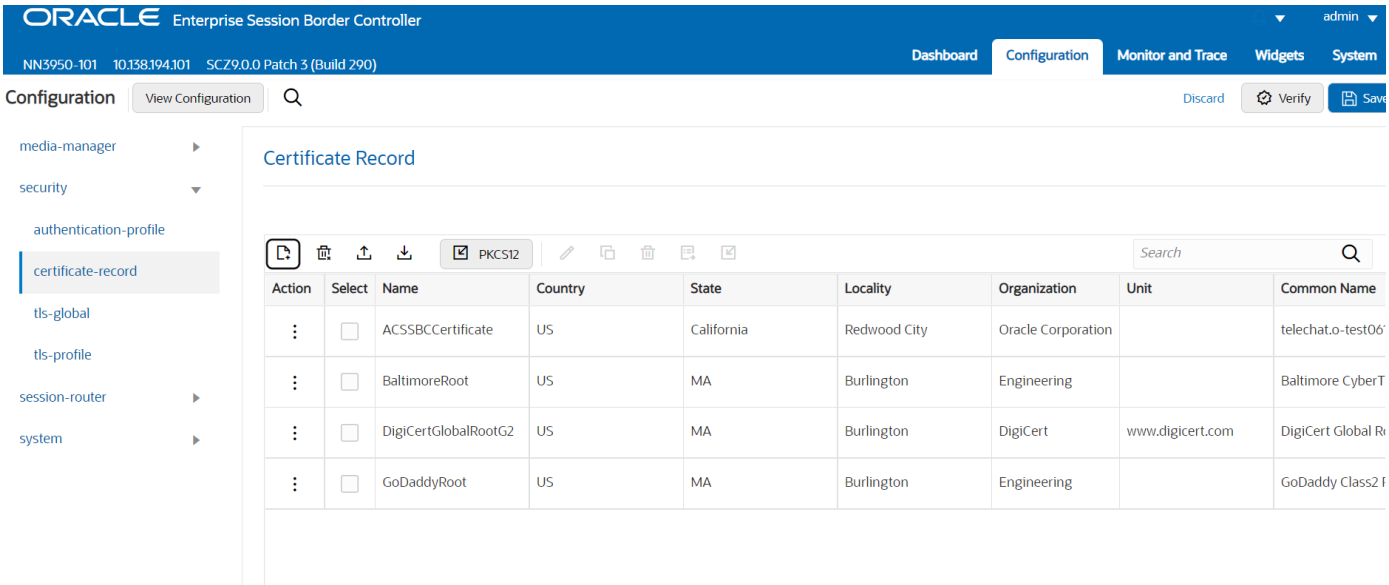
8.3.3.4 Baltimore Root

The DNS name of the Microsoft Teams Direct Routing interface is sip.pstnhub.microsoft.com. Microsoft presents a certificate to the SBC which is signed by Baltimore Cyber Baltimore CyberTrust Root. To trust this certificate, your SBC must have the certificate listed as a trusted ca certificate.

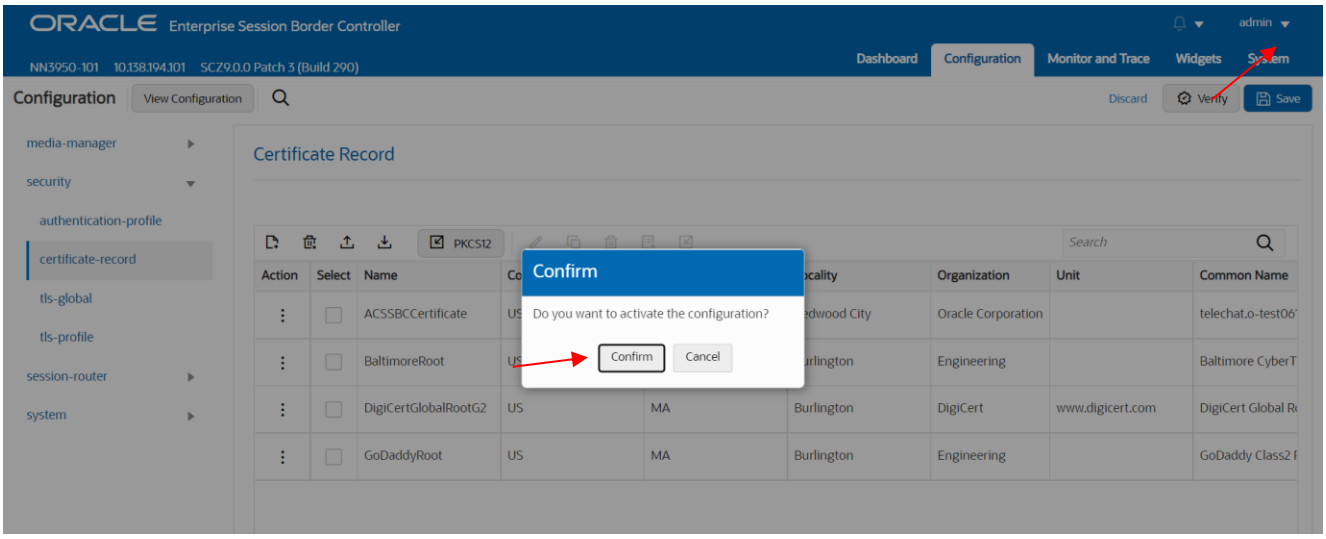
You can download this certificate here: https://cacerts.digicert.com/BaltimoreCyberTrustRoot.crt.pem

Please use the following table as a configuration reference: Modify the table according to the certificates in your environment.

Config Parameter	Baltimore Root	GoDaddy Root	DigiCert Global Root G2
Common Name	Baltimore CyberTrust Root	Go Daddy Class2 Root CA	DigiCert Global Root G2
Key Size	2048	2048	2048
Key-Usage-List	digitalSignature keyEncipherment	digitalSignature keyEncipherment	digitalSignature keyEncipherment
Extended Key Usage List	serverAuth	serverAuth	serverAuth
Key algor	rsa	rsa	rsa
Digest-algor	Sha256	Sha256	Sha256



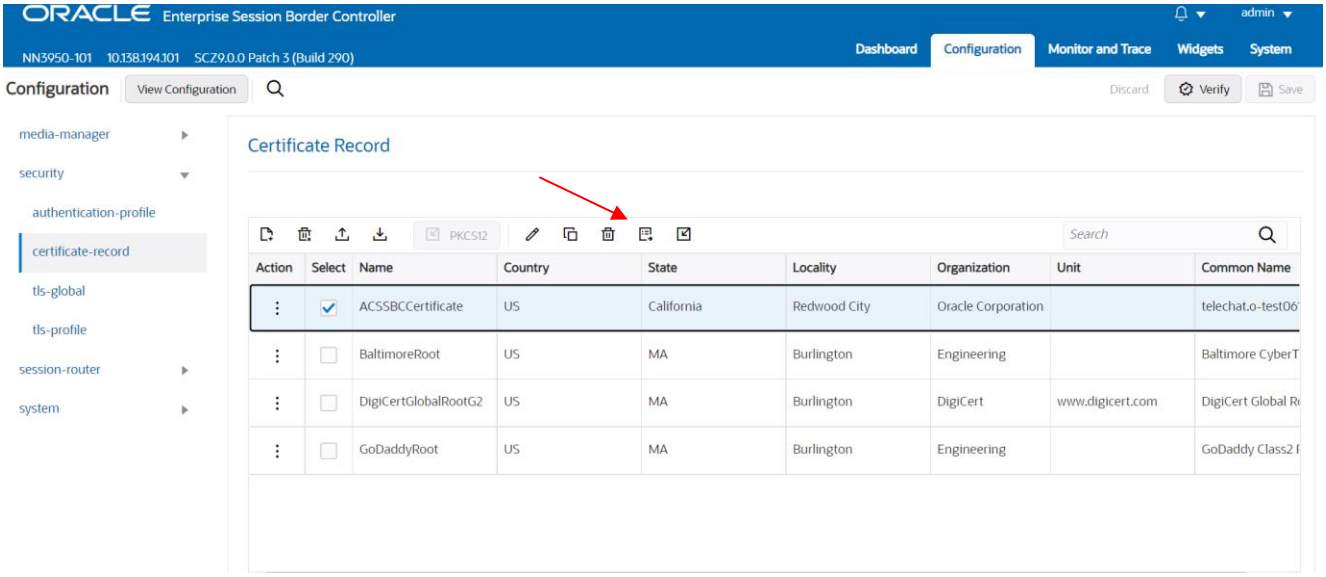
At this point, before generating a certificate signing request, or importing any of the Root CA certs, we must save and activate the configuration of the SBC.



8.3.3.5 Generate Certificate Signing Request

Now that the SBC's certificate has been configured, create a certificate signing request for the SBC's end entity only. **This is not required for any of the Root CA or intermidiate certificates that have been created**.

On the certificate record page in the Oracle SBC GUI, select the SBC's end entity certificate that was created above, and click the "generate" tab at the top:



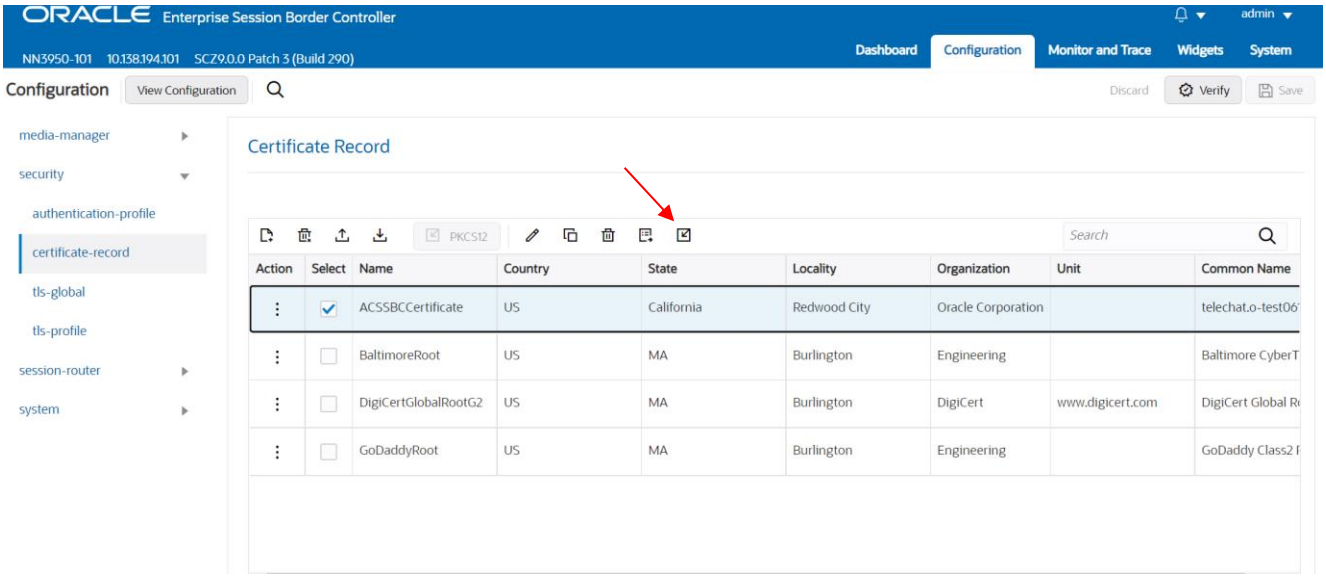
Copy/paste the text that gets printed on the screen as shown above and upload to your CA server for signature. Also note, at this point, **another save and activate is required** before you can import the certificates to each certificate record created above.

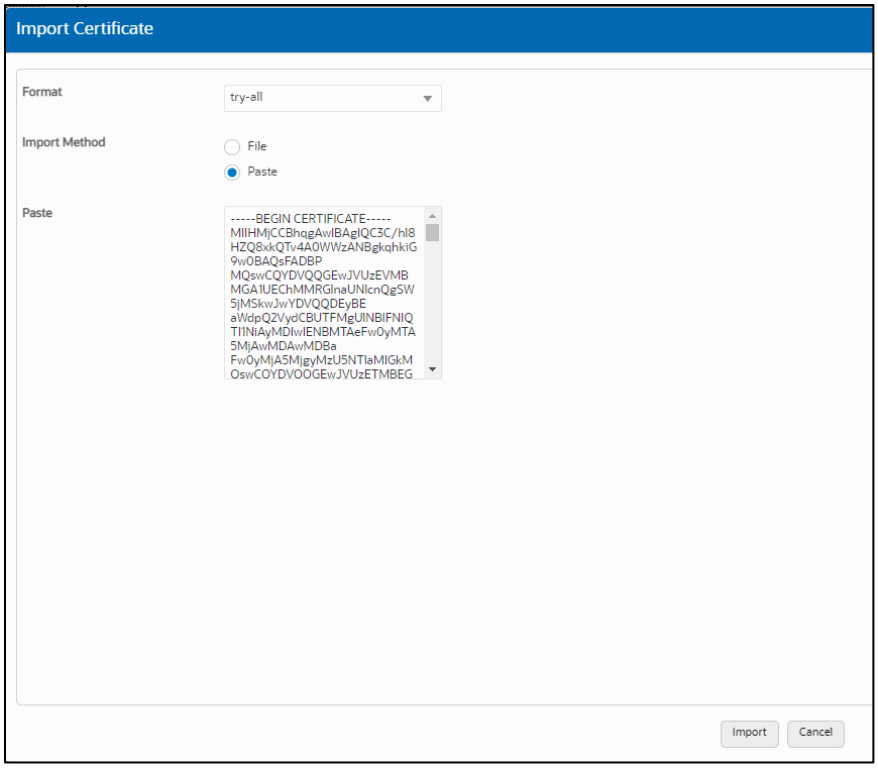
Once you have received the signed certificate back from your signing authority, we can now import all certificates to the SBC configuration.

8.3.3.6 Import Certificates to SBC

Once certificate signing request has 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 all certificates have been imported, issue a third **save/activate** from the WebGUI to complete the configuration of certificates on the Oracle SBC.





- Once pasted in the text box, select Import at the bottom, then **save and activate** your configuration.

Repeat these steps to import all the root and intermediate CA certificates into the SBC:

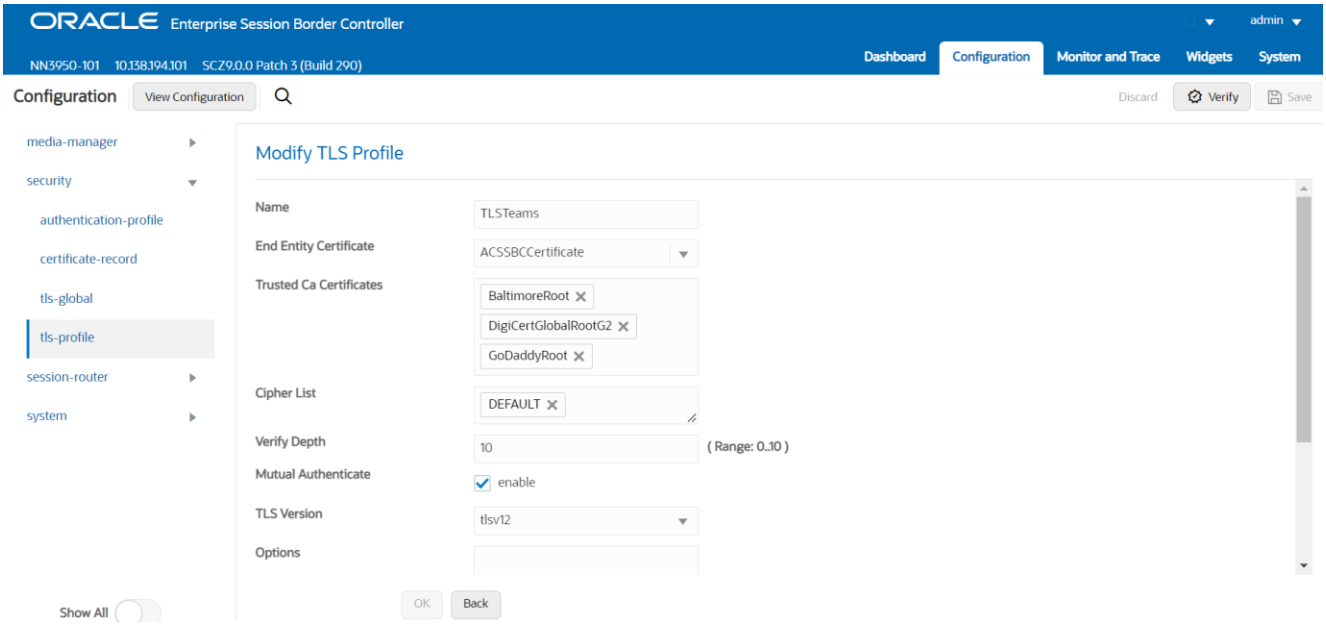
8.3.4 TLS Profile

TLS profile configuration on the SBC allows for specific certificates to be assigned.

GUI Path: security/tls-profile

ACLI Path: config t→security→tls-profile

- Click Add, use the example below to configure



- As you can see in the example above, the tls-profile is where we assign the SBC end entity certificate, as well as the trusted CA certs that have been created and imported to the SBC.
- Once the tls profile config is in place, click OK at the bottom

8.4 Media Security Configuration

This section outlines how to configure support for media security (SRTP) between the OCSBC and Microsoft ACS Direct Routing.

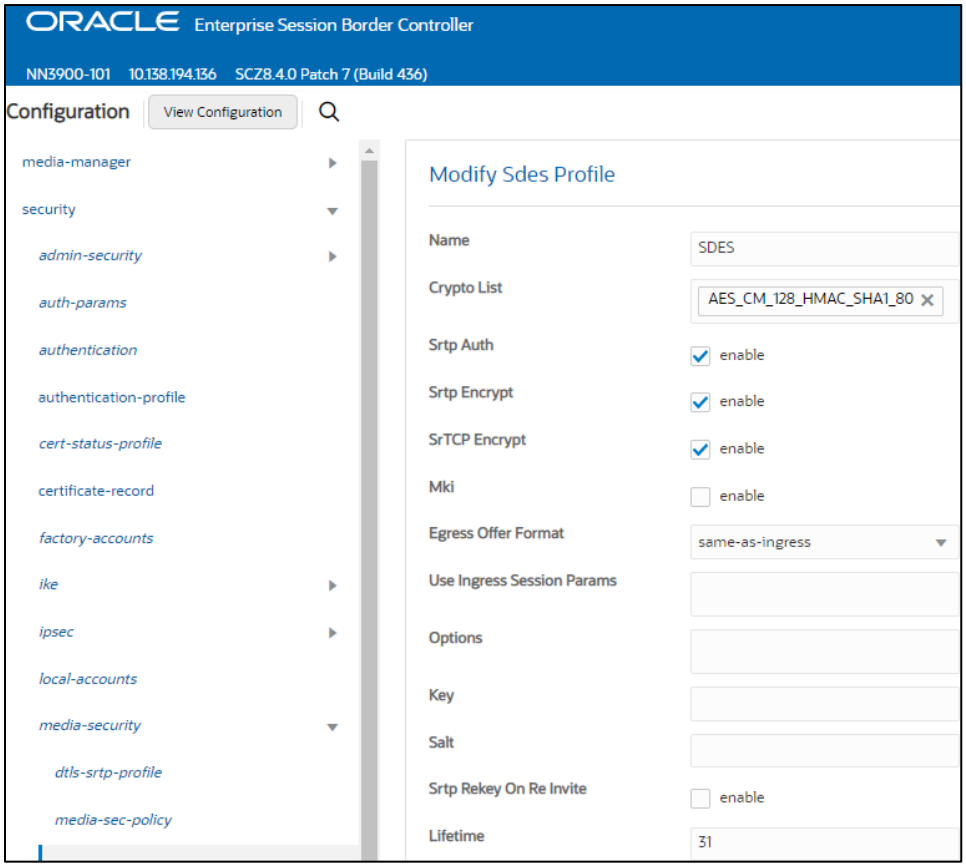
8.4.1 SDES-Profile

This is the first element to be configured for media security, where the algorithm and the crypto's to be used are configured. The only crypto-suite option supported by Microsoft is AES_CM_128_HMAC_SHA1_80 and must be included in the crypto list

GUI Path: security/media-security/sdes-profile

ACLI Path: config t→security→media-security→sdes-profile

- Click Add, and use the example below to configure (you may first have to toggle the "show all" button on the bottom left of the screen to see media secuirty configuration options)



Note: The lifetime parameter set to a value of 31 is required for Microsoft ACS Direct Routing

- Click OK at the bottom

8.4.2 Media Security Policy

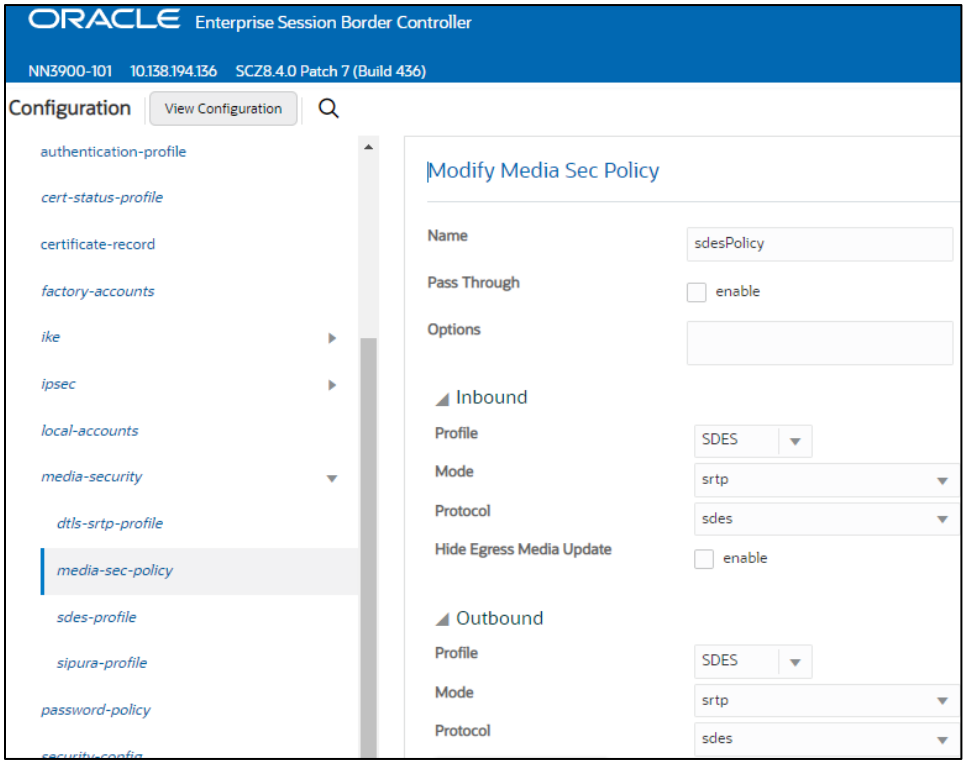
Media-sec-policy instructs the SBC how to handle the SDP received/sent under a realm (RTP, SRTP or both) and, if SRTP needs to be used, the sdes-profile that will be used.

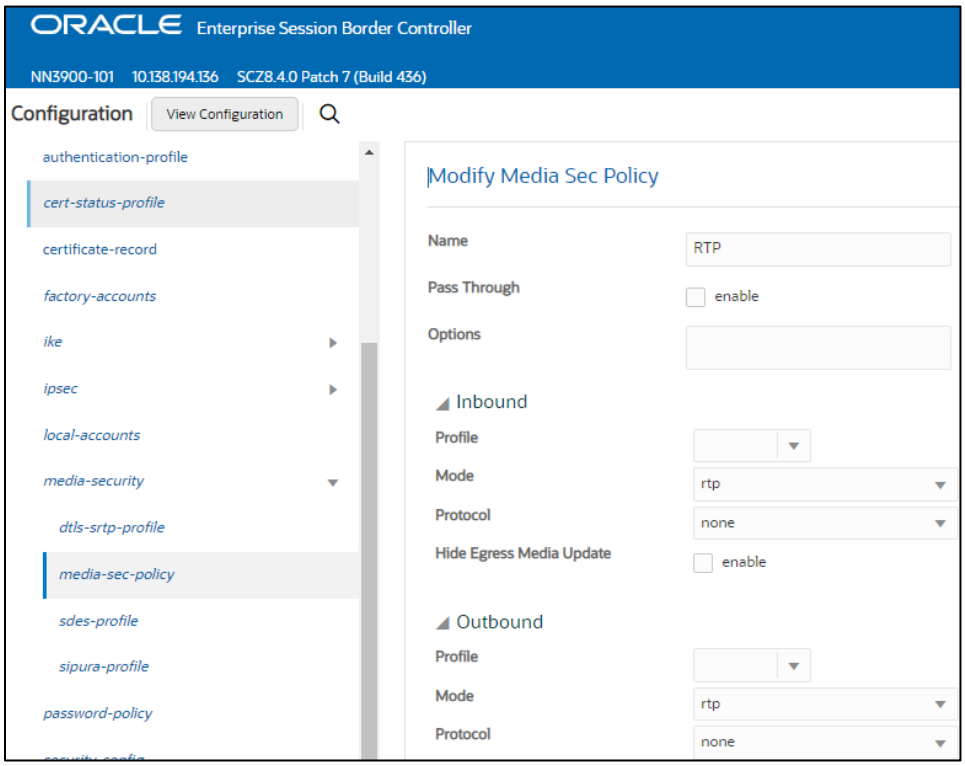
In this example, we are configuring two media security policies. One to secure and decrypt media toward Microsoft, the other for non secure media facing PSTN.

GUI Path: security/media-security/media-sec-policy

ACLI Path: config t→security→media-security→media-sec-policy

- Click Add, use the examples below to configure





- Click OK at the bottom of each when applicable

8.5 Transcoding Configuration

Transcoding is the ability to convert between media streams that are based upon disparate codecs. The OCSBC supports IP-to-IP transcoding for SIP sessions, and can connect two voice streams that use different coding algorithms with one another.

8.5.1 Codec Policies

Codec policies are sets of rules that specify the manipulations to be performed on SDP offers allowing the OCSBC the ability to add, strip, and reorder codecs for SIP sessions

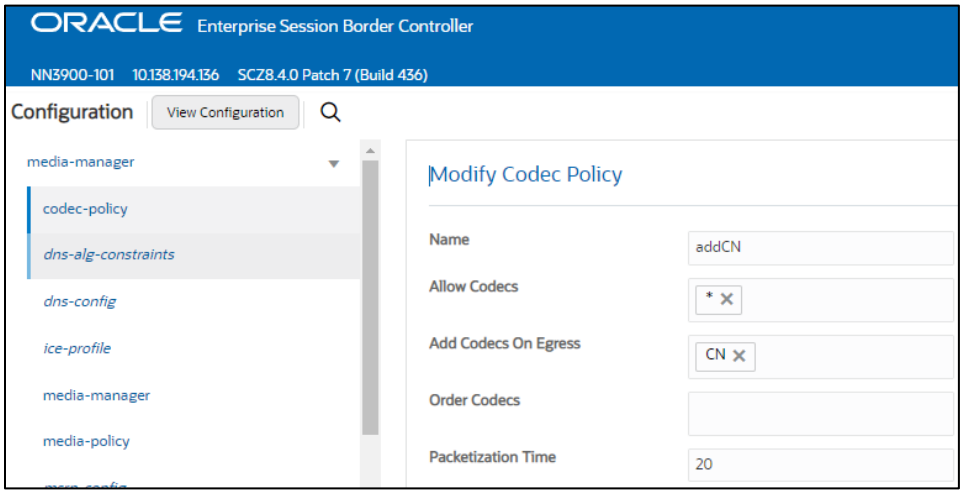
Note: This is an optional configuration. Only configure codec policies if deemed necessary in your environment

GUI Path: media-manager/codec-policy

ACLI Path: config t→media-manager→codec-policy

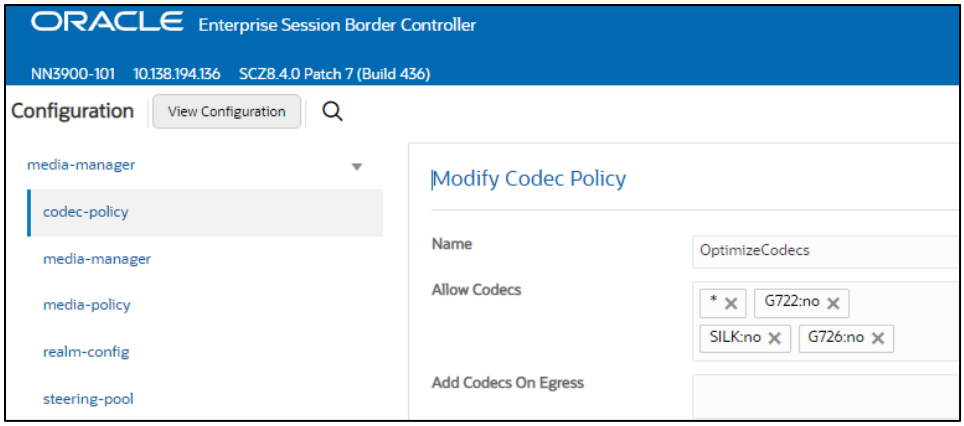
We create the codec-policy, addCN, to allow the SBC to generate Comfort Noise packets towards Teams

- Click Add, and use the examples below to configure



In some instances, SIP trunks may have issues with codec being offered by Microsoft teams. For this reason, we have created another codec policy, “OptimizeCodecs”, for the SIP trunk to remove the codecs that are not required or supported.

- Click Add and use the example below to configure if applicable in your environment.



- Click OK at the bottom of each when applicable

8.5.2 Media Profiles

For different codecs and media types, you can setup customized media profiles that serve to police media values and define media bandwidth policies.

SILK & CN offered by Microsoft teams are using a payload type which is different usual, so to support this, we configure media profiles on the SBC.

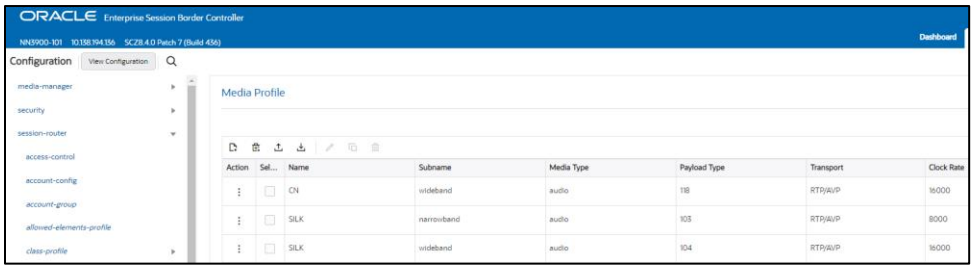
GUI Path: session-router/media-profile

ACLI Path: config t→session-router→media-profile

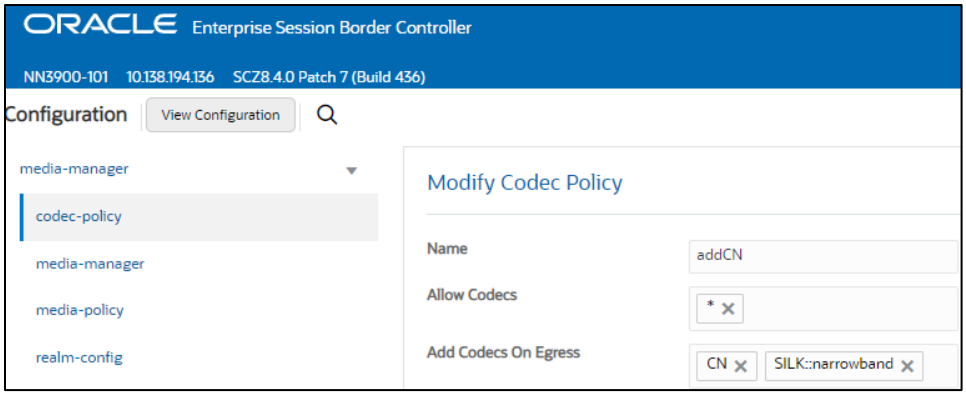
Configure three media profiles to support the following:

- Silk Wideband
- Silk Narrowband
- CN
- Click Add, then use the table below as an example to configure each:

Parameters	Silk-1	Silk-2	CN
Subname	narrowband	wideband	wideband
Payload-Type	103	104	118
Clock-rate	8000	16000	0



- Once media profiles are configured, then can then be added to the codec policy towards Microsoft. Please see the example below:



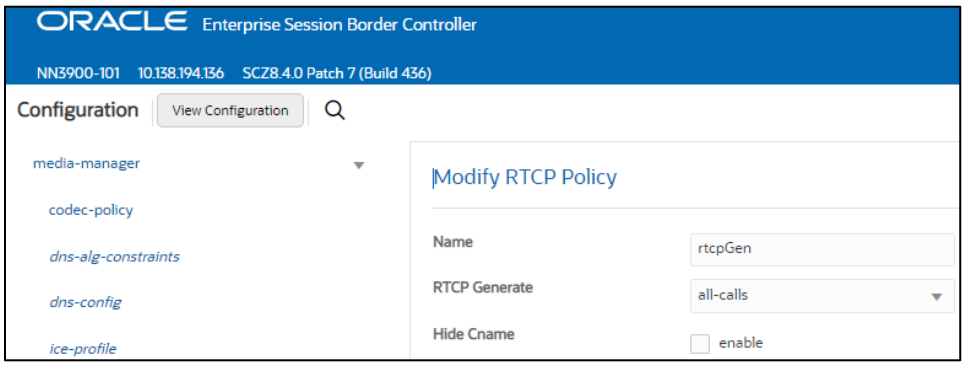
8.5.3 RTCP Policy

The following RTCP policy needs to be configured for the OCSBC to generate RTCP sender reports toward Microsoft Teams. The media manger options config, xcode-gratuitous-rtcp-report-generation, allows the SBC to generate receiver reports

GUI Path: media-manager/rtcp-policy

ACLI Path: config t→media-manger→rtcp-policy

- Click Add, use the example below as a configuration guide



- Click OK at the bottom of the screen

8.6 Media Configuration

This section will guide you through the configuration of realms and steering pools, both of which are required for the SBC to handle signaling and media flows toward Microsoft ACS Direct Routing and PSTN.

8.6.1 Realm Config

Realms are a logical distinction representing routes (or groups of routes) reachable by the Oracle® Enterprise Session Border Controller and what kinds of resources and special functions apply to those routes. Realms are used as a basis for determining ingress and egress associations to network interfaces, which can reside in different VPNs.

In this example, we're creating two realms. One facing Microsoft ACS, the other facing PSTN.

GUI Path; media-manger/realm-config

ACLI Path: config t→media-manger→realm-config

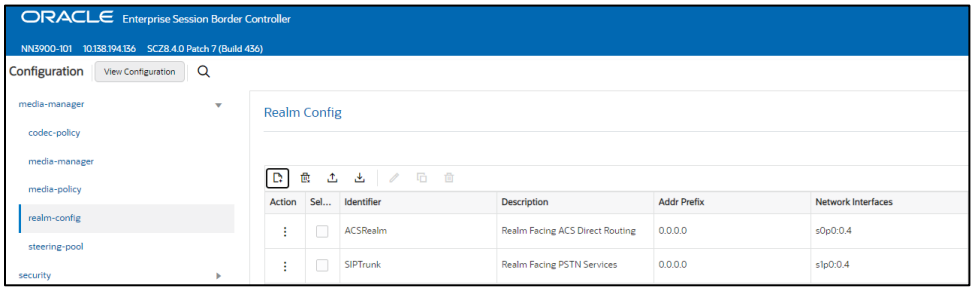
- Click Add, and use the following table as a configuration example for the three realms used in this configuration example

Config Parameter	ACS Realm	PSTN Realm
Identifier	ACSRealm	SIPTrunk
Network Interface	s0p0:0	s1p0:0
Mm in realm	☑	☑
Media Sec policy	sdespolicy	RTP
RTCP mux	☑	
Teams Fqdn	solutionslab.cgbuburlington.com	
Teams fqdn in uri	☑	
Sdp Inactive Only	☑	
Codec policy	addCN	OptimizeCodecs
RTCP policy	rtcpGen	
Access Control Trust Level	HIGH	HIGH

Teams FQDN field on the ACS facing realm must contain the SBC's FQDN. This is used by the SBC to properly format signaling messages the SBC sends to Microsoft.

Notice, the realm configuration is where we assign some of the elements configured earlier in this document, ie…

- Network interface
- Media security policy
- Codec policy
- Rtcp policy



- Click OK at the bottom after configuring each realm.

8.6.2 Steering Pools

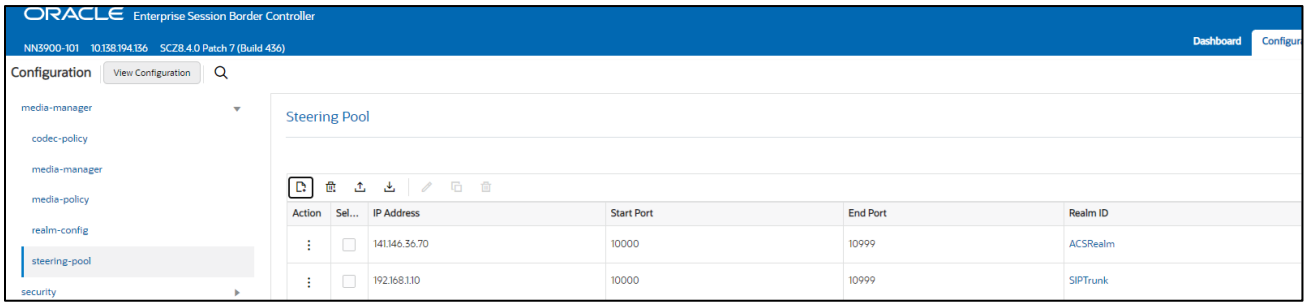
Steering pools define sets of ports that are used for steering media flows through the OCSBC.
These selected ports are used to modify the SDP to cause receiving session agents to direct their media toward this system.

We configure one steering pool for PSTN and another for Microsoft ACS.

GUI Path: media-manger/steering-pool

ACLI Path: config t→media-manger→steering-pool

- Click Add, and use the below examples to configure



- Click OK at the bottom after configuring each

8.7 Sip Configuration

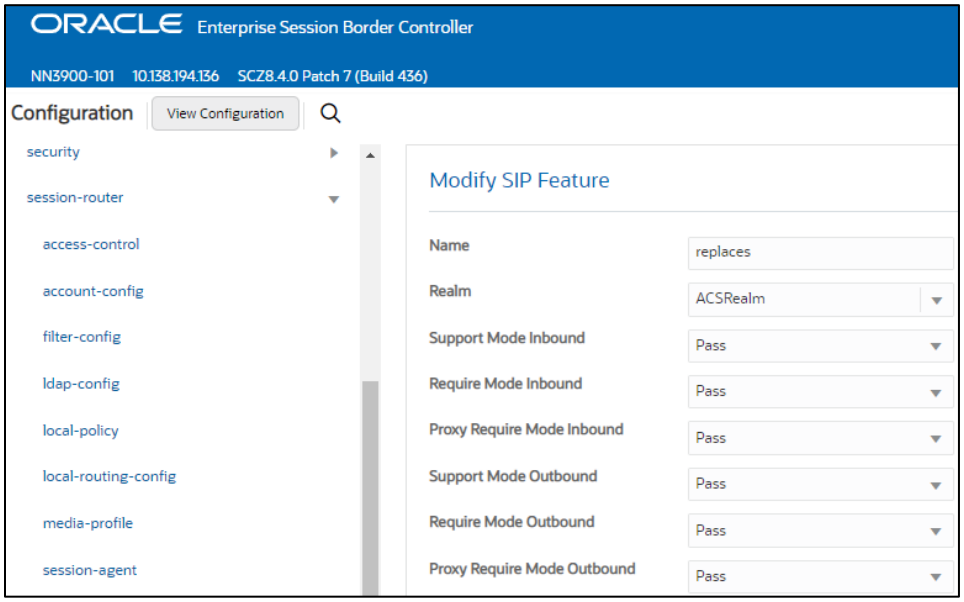
This section outlines the configuration parameters required for processing, modifying and securing sip signaling traffic.

8.7.1 Sip Feature

The following sip feature needs to be added to the Configuration of the SBC to enable support for the replaces header, allowing for successful consultative transfer. This applies to sip messages received by the SBC with replaces listed under the Supported header.

GUI Path: session-router/sip-feature

ALCI Path: config t→session-router→sip-feature



- Click ok at the bottom

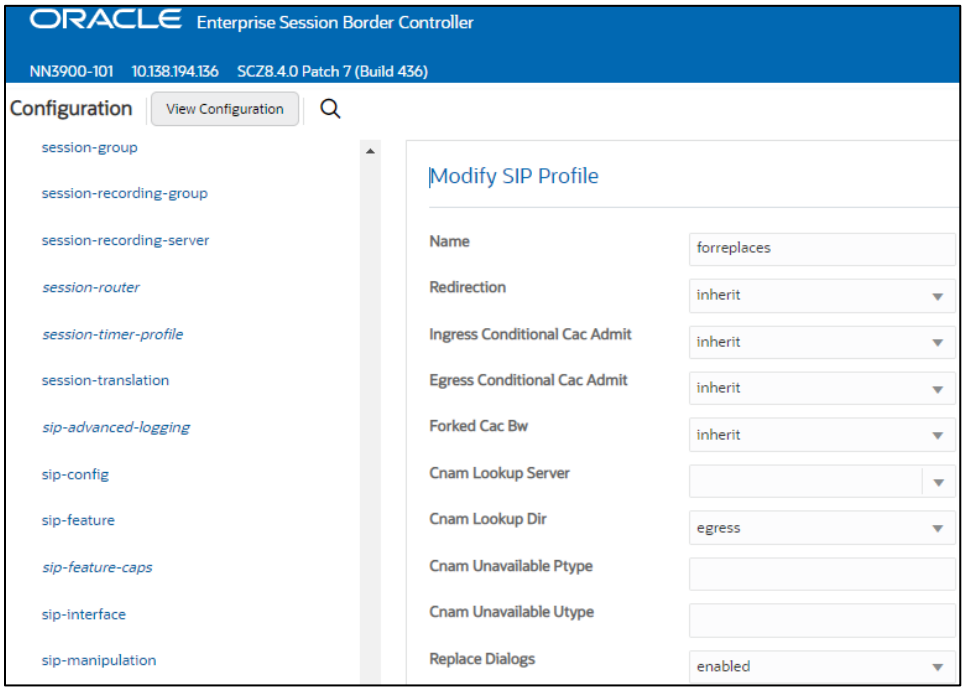
8.7.2 Sip Profile

A sip profile needs to be configured an assigned to the ACS sip interface. The sip profile allows the SBC to replace a dialog when it receives a request form MSFT with a replaces header.

GUI Path: session-router/sip-profile

ACLI Path: config t→session-router→sip-profile

- Click Add and use the example below to configure a sip profile on the SBC.



- Click OK at the bottom

8.7.3 Sip Interface

The SIP interface defines the transport addresses (IP address and port) upon which the OCSBC

Receives and sends SIP messages

Configure two sip interfaces, one associated with PSTN Realm, and the other will be for Microsoft ACS realm.

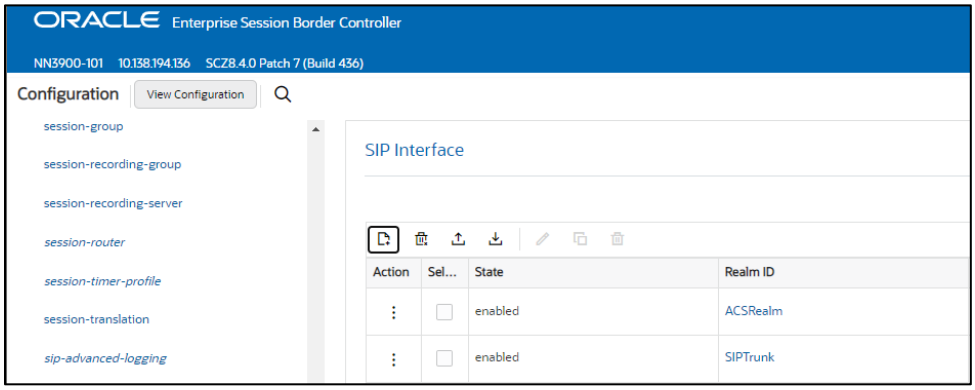
GUI Path: session-router/sip-interface

ACLI Path: config t→session-router→sip-interface

- Click Add, and use the table below as an example to Configure:

Config Parameter	SipTrunk	ACS
Realm ID	SipTrunk	ACSRealm
Sip profile		forreplaces
Sip Port Config Parmeter	**Sip Trunk**	**Teams**
Address	192.168.1.10	141.146.36.70
Port	5060	5061
Transport protocol	UDP	TLS
TLS profile		TLSCGBUBURLINGTON
Allow anonymous	agents-only	agents-only
in-manipulationid		RespondOptions

- This is also where we are assigning two parameters configured earlier in the guide. TLSProfile to secure sip signaling between the OCSBC and Microsoft ACS, and the sip profile to allow the SBC to replace dialogs.



- Click OK at the bottom of each after they are configured.

8.7.4 Session Agents

Session Agents are configuration elements which are trusted agents that can both send and receive traffic from the OCSBC with direct access to the trusted data path.

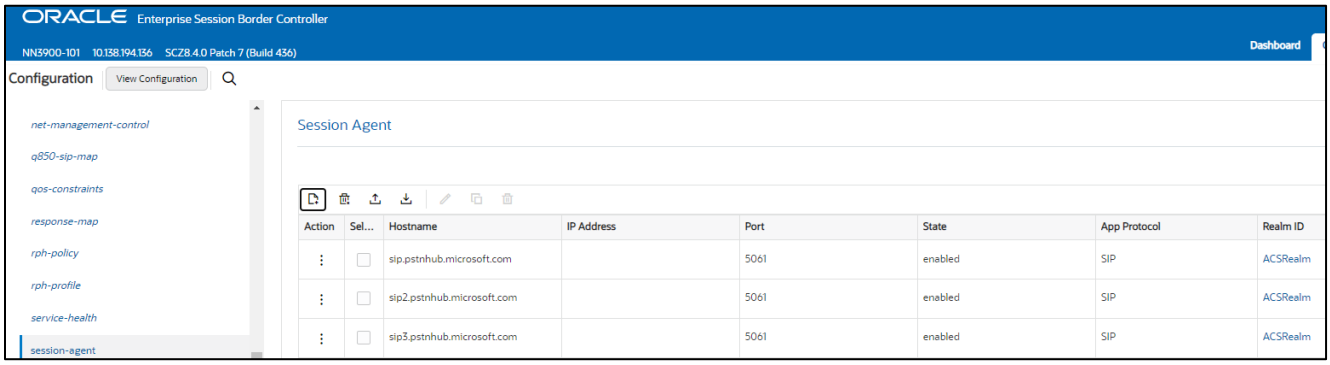
GUI Path: session-router/session-agent

ACLI Path: config t→session-router→session-agent

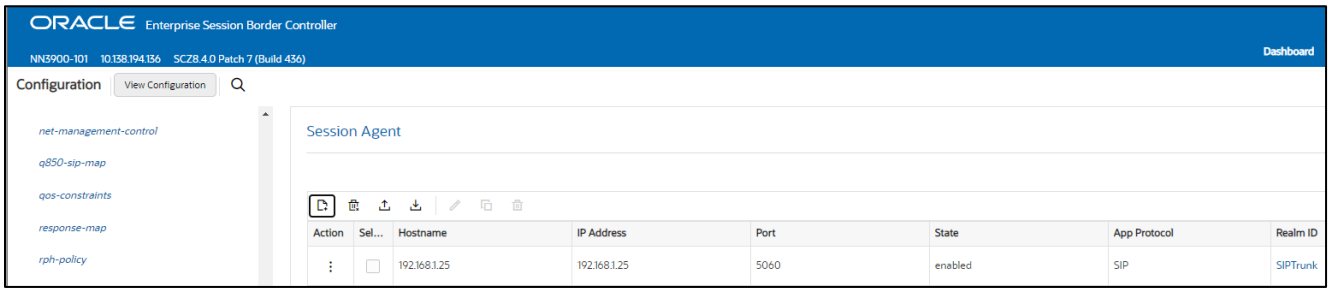
You will need to configure three Session Agents for the Microsoft ACS Direct Routing Interface

- Click Add, and use the table below to configure:

Config parameter	Session Agent 1	Session Agent 2	Session Agent 3
Hostname	sip.pstnhub.microsoft.com	sip2.pstnhub.microsoft.com	sip3.pstnhub.microsoft.com
Port	5061	5061	5061
Transport method	StaticTLS	StaticTLS	StaticTLS
Realm ID	ACSRealm	ACSRealm	ACSRealm
Ping Method	OPTIONS	OPTIONS	OPTIONS
Ping Interval	30	30	30
Refer Call Transfer	enabled	enabled	enabled



- In our example config, we have also configured another session agent for PSTN. This is the signaling IP or FQDN to send and receive calls to and from your carrier.



- Hit the OK tab at the bottom of each when applicable

8.7.5 Session Agent Group

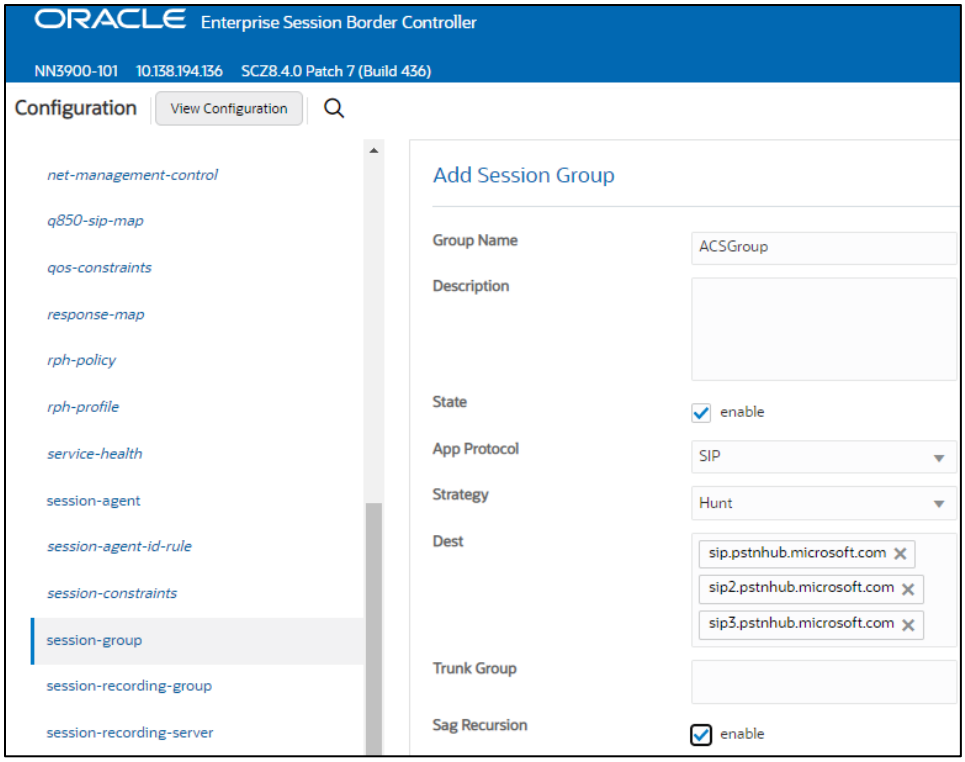
A session agent group allows the SBC to create a load balancing model:

All three session agents configured above for Microsoft ACS will be added to the group.

GUI Path: session-router/session-group

ACLI Path: config t→session-router→session-group

- Click Add, and use the following as an example to configure:



- Click OK at the bottom

8.7.6 Routing Configuration-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.

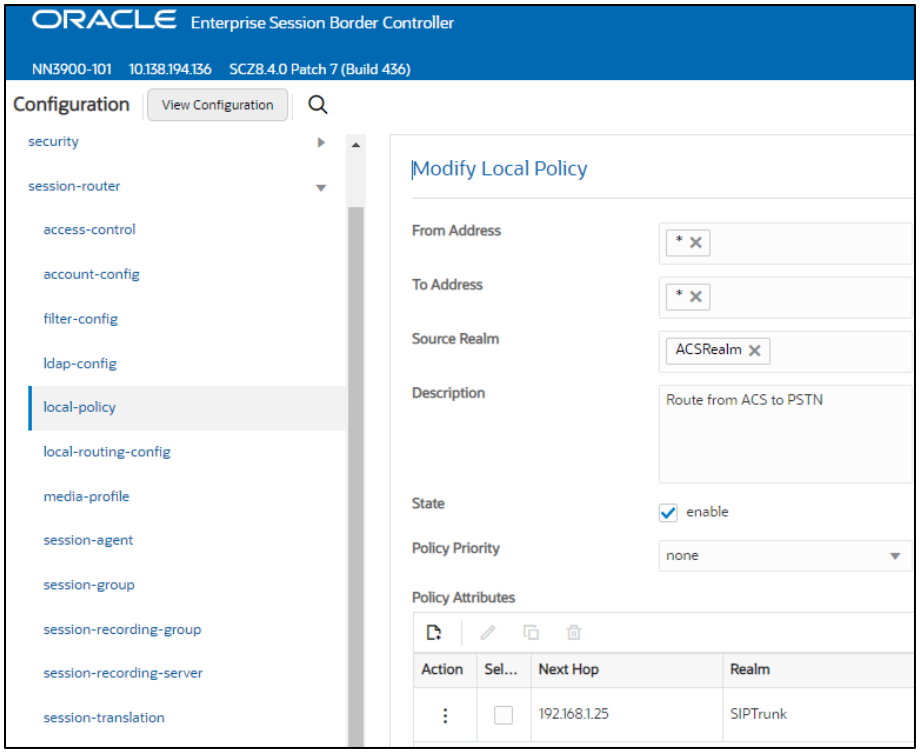
Below there are two local policies configured, one to route sip traffic from Microsoft ACS Direct Routing to PSTN, and the other to route sip traffic from PSTN to Microsoft ACS sip interface.

GUI Path: session-router/local-policy

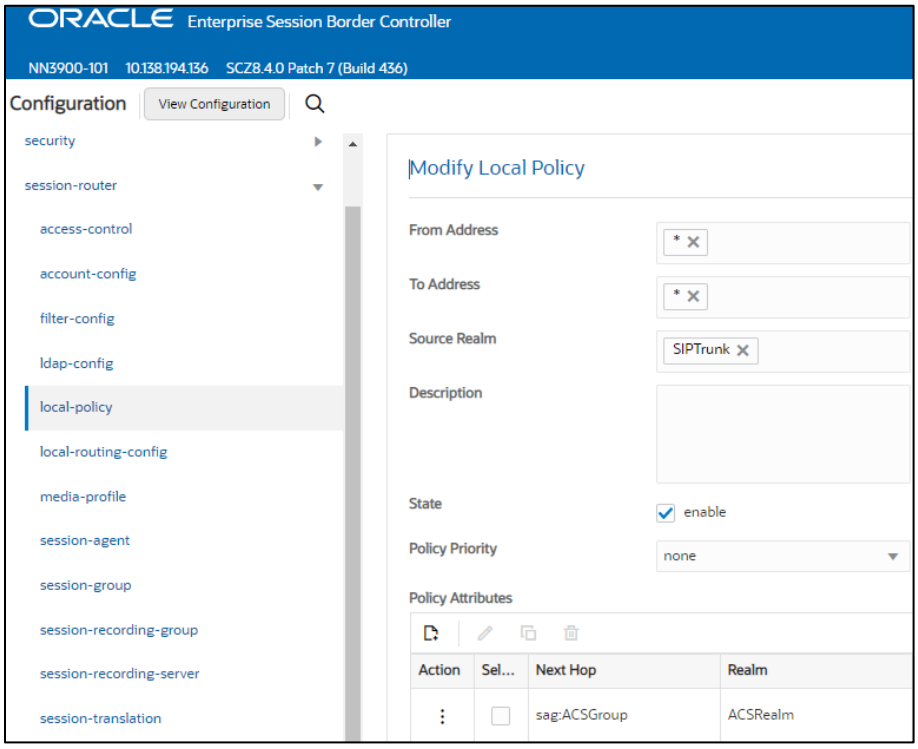
ACLI Path: config t→session-router→local-policy

- Click Add and use the following as an example to configure:

Route from ACS to PSTN:



Route from PSTN to ACS:



- Notice here we utilize the session group and PSTN session agent configured earlier in this guide. They have now become the next hops for each realm for routing sip traffic.

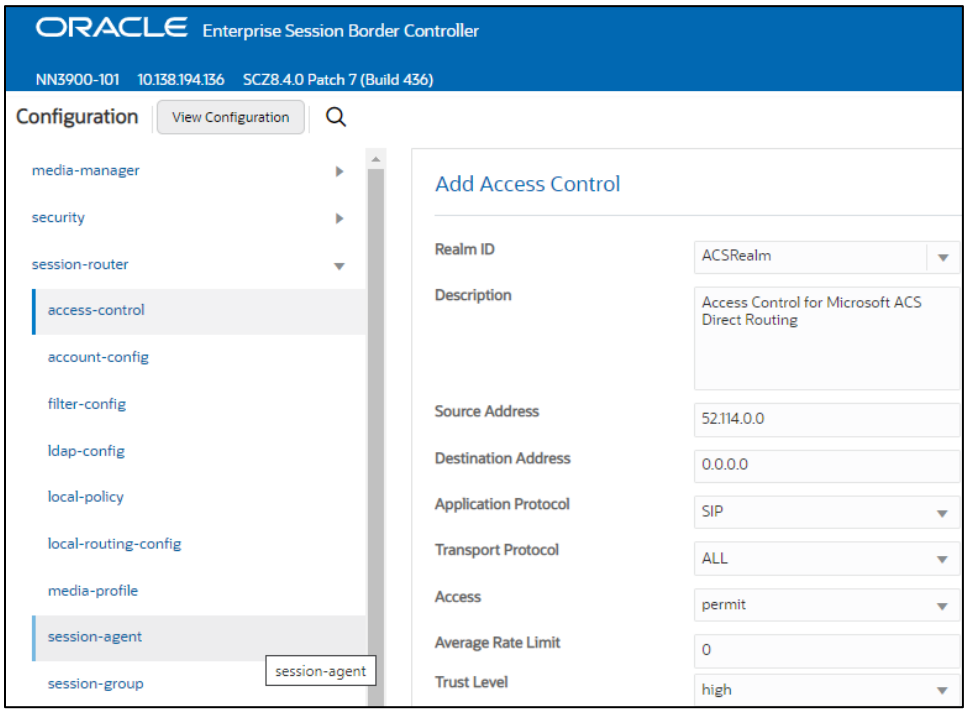
8.7.7 Access Control

As this configuration is a peering environment, we would only want to allow layer 3 and layer 5 traffic from trusted sources. We can do this by configuring access controls on the SBC and setting the trust level of the access control to the same trust level as the associated realm. This creates an implicit deny on the SBC, so only traffic from trusted IP addresses will be allowed.

GUI Path: session router/access-control

ACLI Path: config t→session-router→access-control

- Click add and use the examples below to configure.

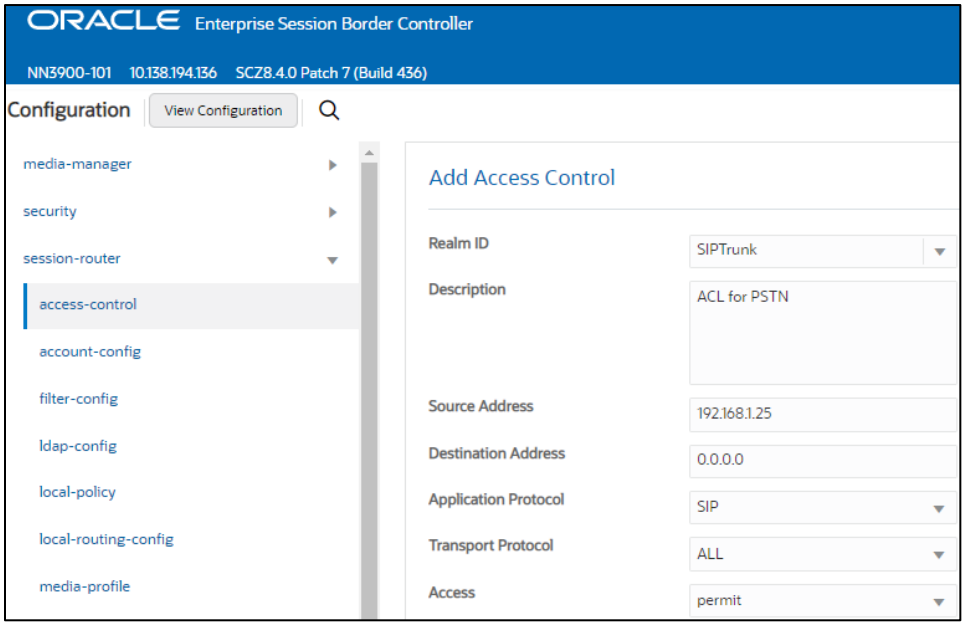


- Click OK at the bottom

Notice in the ACL above, we are using a source address of 52.112.0.0/14. This creates a static permit entry on the SBC for the entire network. This is for example purposes only. We'll need to create another ACL for 52.120.0.0/14 and assign that to the ACS realm as well.

The Microsoft FQDN's configured earlier as session agents, – sip.pstnhub.microsoft.com, sip2.pstnhub.microsoft.com and sip3.pstnhub.microsoft.com – will be resolved to one of the following IP addresses:

Now we'll configure another ACL for the PSTN side of the SBC:



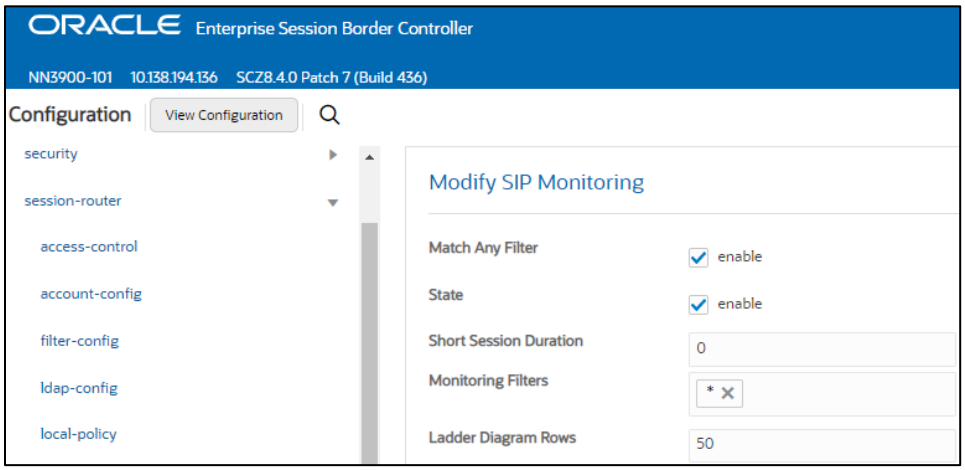
- Click OK at the bottom

8.7.8 Sip Monitoring

Sip monitoring configuration allows the SBC to capture calls and display them in the GUI under the Monitor and Trace Tab.

GUI Path: session router/sip monitoring

ACLI Path: config t→session-router→sip-monitoring



Click OK at the bottom

This concludes the SBC configuration via the GUI on the SBC. Save and activate the configuration. After that, we recommend you create a backup of your configuration as well.

9 ACLI Running Config

9.1 Show running config short

Below is the output for running the ACLI command, “show running-config short”

```
access-control
        realm-id                        SIPTrunk
        description                      ACL for PSTN
        source-address                      192.168.1.25
        application-protocol                 SIP
        trust-level                     high
access-control
        realm-id                        ACSRealm
        description                      Access Control for Microsoft ACS Direct Routing
        source-address                      52.112.0.0/14
        application-protocol                 SIP
        trust-level                     high
certificate-record
        name                            ACSSBCCertificate
        state                          TX
        locality                       Austin
        common-name                          solutionslab.cgbuburlington.com
        extended-key-usage-list                serverAuth
                                     clientAuth
certificate-record
        name                            BaltimoreRoot
        common-name                          Baltimore CyberTrust Root
certificate-record
        name                            DigiCertInter
        common-name                          DigiCert SHA2 Secure Server CA
certificate-record
        name                            DigiCertRoot
        common-name                          DigiCert Global Root CA
codec-policy
        name                            OptimizeCodecs
        allow-codecs                       * G722:no SILK:no G726:no
codec-policy
        name                            addCN
        allow-codecs                       *
        add-codecs-on-egress                   CN
filter-config
        name                            all
        user                           *
http-server
        name                            webServerInstance
        http-interface-list              GUI
local-policy
        from-address                       *
        to-address                       *
        source-realm                       ACSRealm
        description                      Route from ACS to PSTN
        policy-attribute
                next-hop                     192.168.1.25
                realm                       SIPTrunk
local-policy
        from-address                       *
        to-address                       *
        source-realm                       SIPTrunk
        policy-attribute
```

```
            next-hop                    sag:ACSGroup
            realm                       ACSRealm
media-manager
      options                     audio-allow-asymmetric-pt
                                xcode-gratuitous-rtcp-report-generation
media-profile
      name                        SILK
      subname                       narrowband
      payload-type                    103
      clock-rate                    8000
media-profile
      name                        SILK
      subname                       wideband
      payload-type                    104
      clock-rate                    16000
media-sec-policy
      name                        RTP
media-sec-policy
      name                        sdesPolicy
      inbound
            profile                     SDES
            mode                          srtp
            protocol                      sdes
      outbound
            profile                     SDES
            mode                          srtp
            protocol                      sdes
network-interface
      name                        s0p0
      hostname                      solutionslab.cbguburlington.com
      ip-address                    141.146.36.70
      netmask                       255.255.255.192
      gateway                       141.146.36.65
      dns-ip-primary                  8.8.8.8
      dns-domain                    solutionslab.cgbuburlington.com
network-interface
      name                        s1p0
      ip-address                    192.168.1.10
      netmask                       255.255.255.0
      gateway                       192.168.1.1
ntp-config
      server                      141.146.36.99
phy-interface
      name                        s0p0
      operation-type                  Media
phy-interface
      name                        s1p0
      operation-type                  Media
      slot                      1
realm-config
      identifier                  ACSRealm
      description                   Realm Facing ACS Direct Routing
      network-interfaces                s0p0:0.4
      mm-in-realm                     enabled
      media-sec-policy                  sdesPolicy
      rtcp-mux                      enabled
      teams-fqdn                    solutionslab.cgbuburlington.com
      teams-fqdn-in-uri               enabled
      sdp-inactive-only               enabled
      access-control-trust-level          high
      codec-policy                  addCN
      rtcp-policy                   rtcpGen
```

```
realm-config
        identifier                      SIPTrunk
        description                     Realm Facing PSTN Services
        network-interfaces              s1p0:0.4
        mm-in-realm                     enabled
        media-sec-policy                RTP
        access-control-trust-level      high
        codec-policy                    OptimizeCodecs
rtcp-policy
        name                            rtcpGen
        rtcp-generate                   all-calls
sdes-profile
        name                            SDES
        lifetime                        31
session-agent
        hostname                        192.168.1.25
        ip-address                      192.168.1.25
        realm-id                        SIPTrunk
session-agent
        hostname                        sip.pstnhub.microsoft.com
        port                            5061
        transport-method                StaticTLS
        realm-id                        ACSRealm
        ping-method                     OPTIONS
        ping-interval                   30
        refer-call-transfer             enabled
session-agent
        hostname                        sip2.pstnhub.microsoft.com
        port                            5061
        transport-method                StaticTLS
        realm-id                        ACSRealm
        ping-method                     OPTIONS
        ping-interval                   30
        refer-call-transfer             enabled
session-agent
        hostname                        sip3.pstnhub.microsoft.com
        port                            5061
        transport-method                StaticTLS
        realm-id                        ACSRealm
        ping-method                     OPTIONS
        ping-interval                   30
        refer-call-transfer             enabled
session-group
        group-name                      ACSGroup
        dest                            sip.pstnhub.microsoft.com
                                        sip2.pstnhub.microsoft.com
                                        sip3.pstnhub.microsoft.com
        sag-recursion                   enabled
sip-config
        registrar-domain                *
        registrar-host                  *
        options                         inmanip-before-validate
                                        max-udp-length=0
        allow-pani-for-trusted-only     disabled
        add-ue-location-in-pani         disabled
        npli-upon-register              disabled
```

```
tls-globasip-feature
        name                          replaces
        realm                         ACSRealm
        require-mode-inbound                Pass

 require-mode-outbound                Pass
sip-interface
        realm-id                      ACSRealm
        sip-port
                address                       141.146.36.70
                port                        5061
                transport-protocol                TLS
                tls-profile                 TLSCGBUBURLINGTON
                allow-anonymous                   agents-only
                in-manipulationid           RespondOptions
        sip-profile                   forreplaces
sip-interface
        realm-id                      SIPTrunk
        sip-port
                address                       192.168.1.10
                allow-anonymous                   agents-only
sip-monitoring
        match-any-filter                enabled
        monitoring-filters              *
sip-profile
        name                          forreplaces
        replace-dialogs                 enabled
steering-pool
        ip-address                      141.146.36.70
        start-port                    10000
        end-port                      10999
        realm-id                      ACSRealm
steering-pool
        ip-address                      192.168.1.10
        start-port                    10000
        end-port                      10999
        realm-id                      SIPTrunk
system-config
        hostname                        solutionslab.cbguburlington.com
        description                     SBC for Azure Communication Services Direct Routing
        location                      Burlington, MA
        system-log-level                NOTICE
        default-gateway                 10.138.194.129
tls-global
        session-caching                 enabled
tls-profile
        name                          TLSCGBUBURLINGTON
        end-entity-certificate          ACSSBCCertificate
        trusted-ca-certificates         DigiCertGlobalRootG2
                                      DigiCertRoot
                                      BaltimoreRoot
        mutual-authenticate               enabled
```

10 Appendix A

10.1 SBC Behind NAT SPL Configuration

This configuration is needed when your SBC is behind a NAT device. This SPL is configured to avoid any loss in signaling or media traffic when the SBC is deployed behind a nat device or in a public cloud.

The Support for “SBC Behind NAT SPL plug-in” changes information in SIP messages to hide the end point located inside the private network. The specific information the “Support for SBC Behind NAT SPL plug-in” changes depends on the direction of the call.

Ie.. from the NAT device to the SBC or from the SBC to the NAT device.

Configure the “Support for SBC Behind NAT SPL plug-in” for each SIP interface that is connected to a NAT device. One public-private address pair is required for each SIP interface that uses the SPL plug-in.

- The private IP address must be the same as the SIP Interface and Steering Pool IP address, both of which much match in the SBC’s configuration.
- The public IP address must be the public IP address of the NAT device

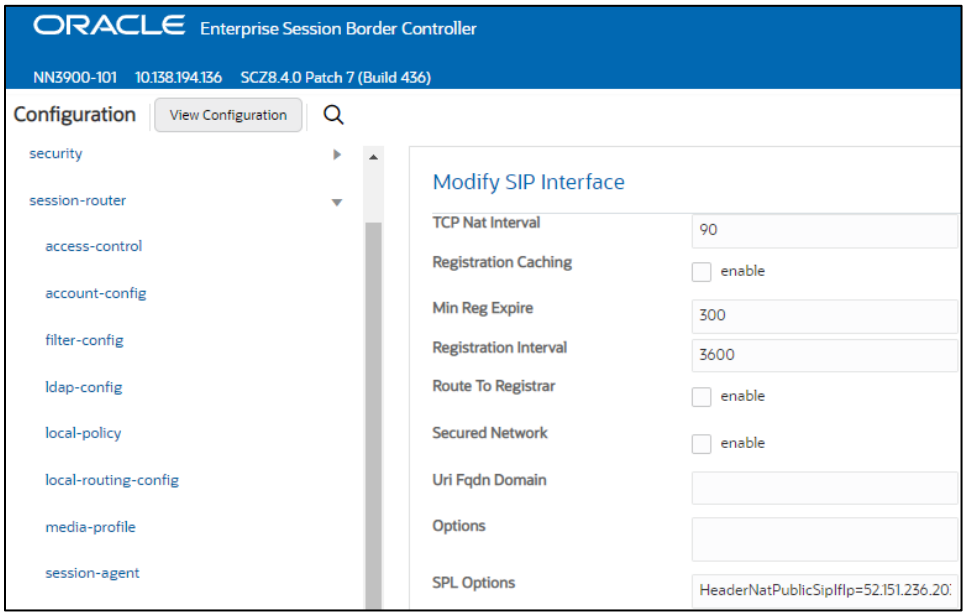
Here is an example configuration with SBC Behind NAT SPL config. The SPL is applied to the Microsoft ACS side SIP interface.

To configure SBC Behind NAT SPL Plug in, Go to:

session-router->sip-interface->spl-options and input the following value, save and activate. This is only an example:

HeaderNatPublicSipIfIp=52.151.236.203,HeaderNatPrivateSipIfIp=10.0.4.4

Here HeaderNatPublicSipIfIp is the public ip of the nat device, and HeaderNatPrivateSipIfIp is the private ip configured on the SBC sip interface and steering pool



11 Caveat

The OCSBC processes RTCP packets in two ways.

The first, as outlined in this application note, the Oracle SBC has the capability to use its own DSP resources to generate RTCP packets towards Microsoft ACS direct routing sip interface when PSTN does not have the ability to send RTCP.

The second, when both endpoints/agents involved in a call have the ability to send RTCP, the SBC will work as a pass-through by forwarding RTCP packets it receives unchanged to the other side.

When transcoding is enabled on the SBC, in some instances, the SBC will duplicate RTCP packets upon egress instead of just passing each individual packet through to the other side. If you experience this behavior, the resolution is to remove the codec polices from each realm. Once those transcoding (codec policies) are removed, the issue is resolved.

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