ORACLE

# Oracle Enterprise Session Border Controller with Zoom Phone (Premise Peering - BYOC) and Verizon Business SIP Trunk

**Technical Application Note**

ORACLE
COMMUNICATIONS

# Disclaimer

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

## Contents

# 1 Related Documentation

## 1.1 Oracle SBC

- Oracle® Enterprise Session Border Controller ACLI Configuration Guide
- Oracle® Enterprise Session Border Controller Release Notes
- Oracle® Enterprise Session Border Controller Security Guide

## 1.2 Zoom Phone

- https://zoom.us/docs/doc/Zoom-Bring%20Your%20Own%20Carrier.pdf
- https://zoom.us/phonesystem
- https://zoom.us/zoom-phone-features

# 2 Revision History

| Version | Date Revised | Description of Changes |
|---|---|---|
| 1.0 | 02/07/2021 | Initial publication |

# 3 Intended Audience

This document describes how to connect the Oracle SBC to Zoom Phone- PREMISE PEERING - BYOC. This paper is intended for IT or telephony professionals.

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

## 3.1 Validated Oracle Versions

We have successfully conducted testing with the Oracle Communications SBC versions:

SCZ840p1

These software releases with the configuration listed below can run on any of the following products:

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

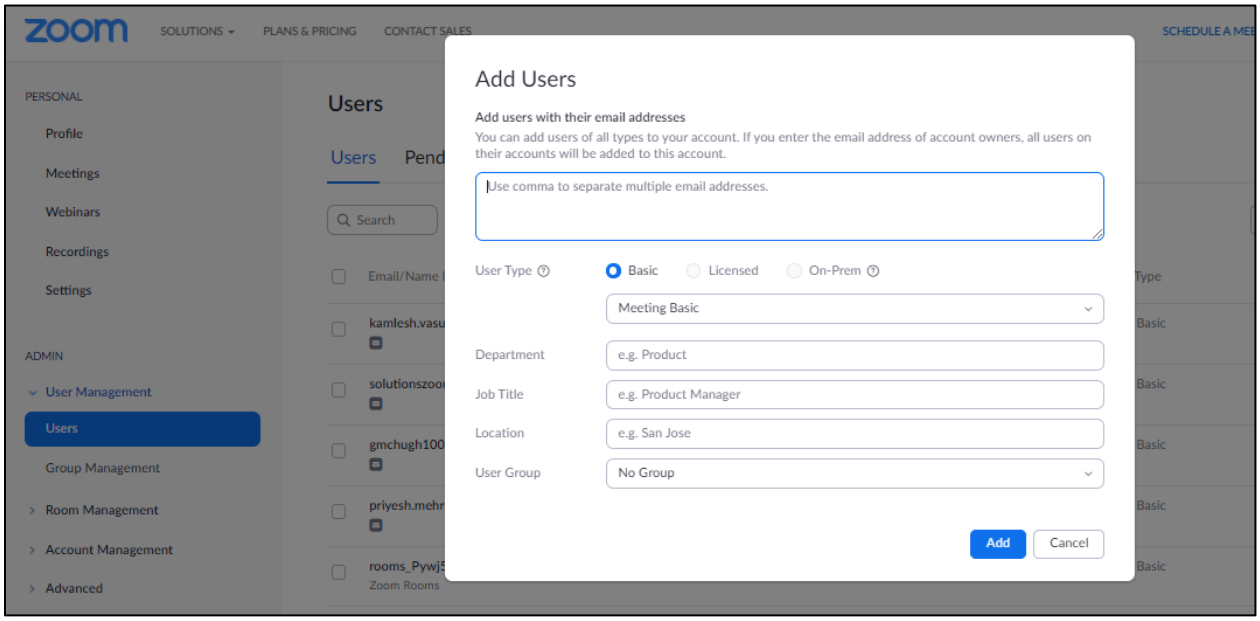
# 4 Zoom Phone Configuration

This Section describes the steps to configure BYOC Phone Numbers on the Zoom Admin Portal and assign the BYOC Number to a User. For detailed assistance with setting up and configuring your Zoom Phone System, please reach out to Zoom Sales: https://zoom.us/contactsales

## 4.1 Create a Zoom User

Navigate to **Admin>User Management > Users**.

Click Add to create new Zoom users. Provide the necessary details about the New User and Click on Add to Add the User.




Once the New User is added it will start reflecting in **Admin >Users** Section on the Web portal.

## 4.2 Add BYOC Number

Navigate to **Phone Systems Management > Phone Numbers > BYOC**

Select **Add** to add external phone numbers provided by Verizon into the Zoom portal.

**Site** - Choose the relevant Site on which the Number needs to be added. For Example Main Site.

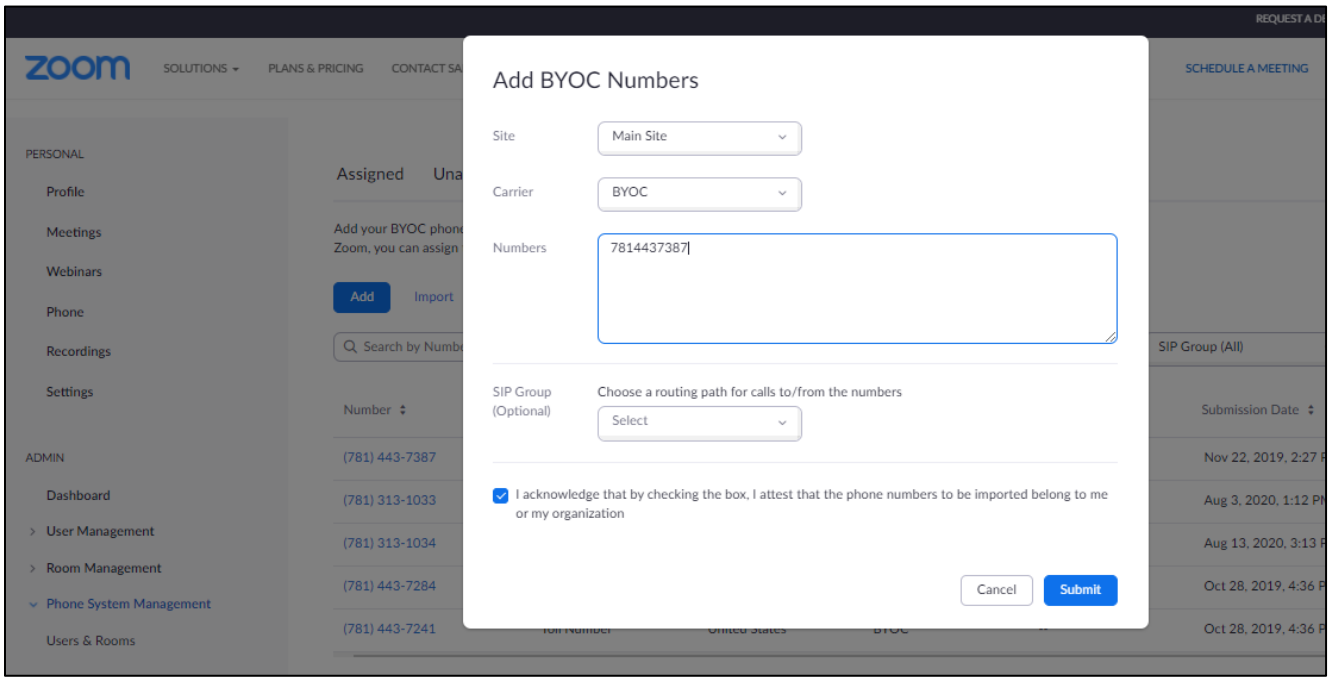
**Carrier** –Choose BYOC

Numbers- Put the BYOC DID Number provided by Verizon Carrier.

**SIP Group** – Optional Parameter (Can be Left Blank)

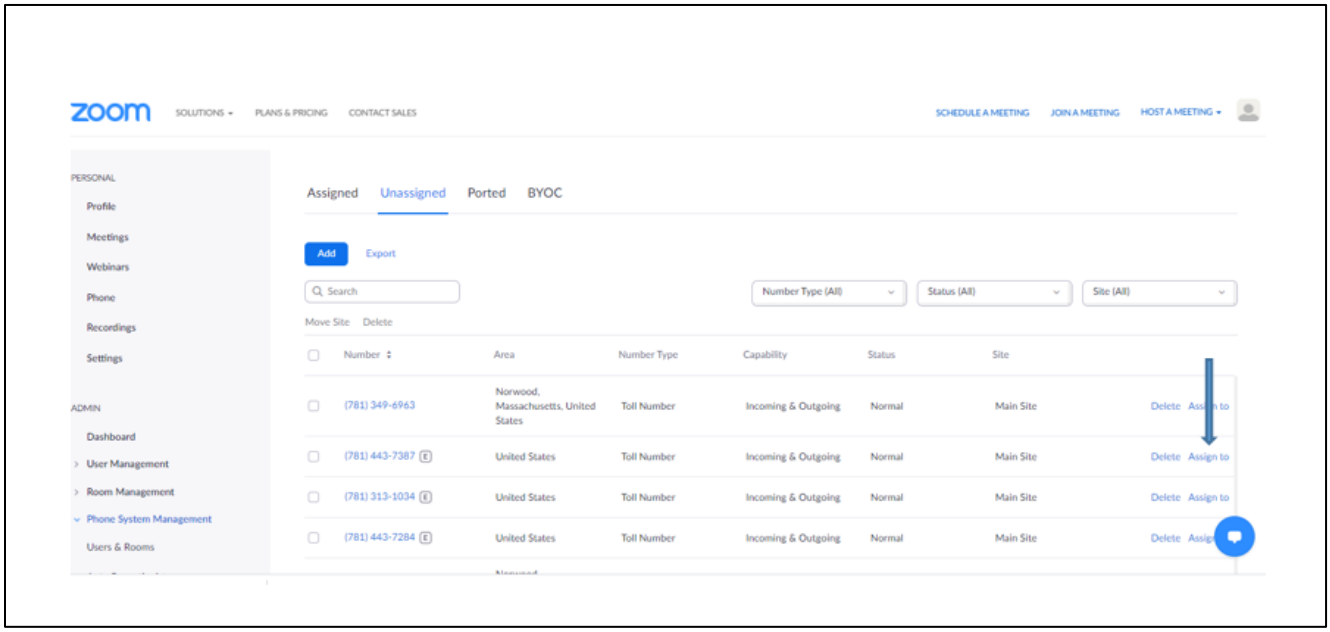
Acknowledge that the Phone Number belongs to your organization.

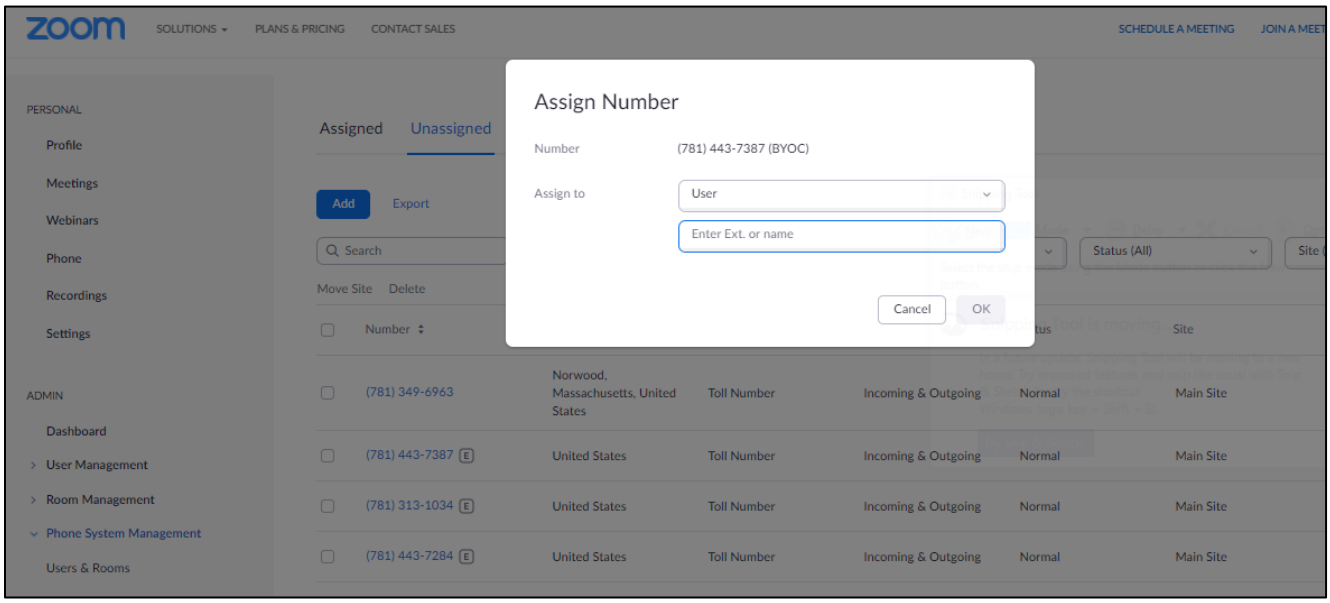
Click **Submit**.




## 4.3 Assign the BYOC Number to a User

The BYOC Number will now be visible in the Unassigned Tab on the portal. Click on Assign to Tab to assign the Number to a User.






## 5 Infrastructure Requirements

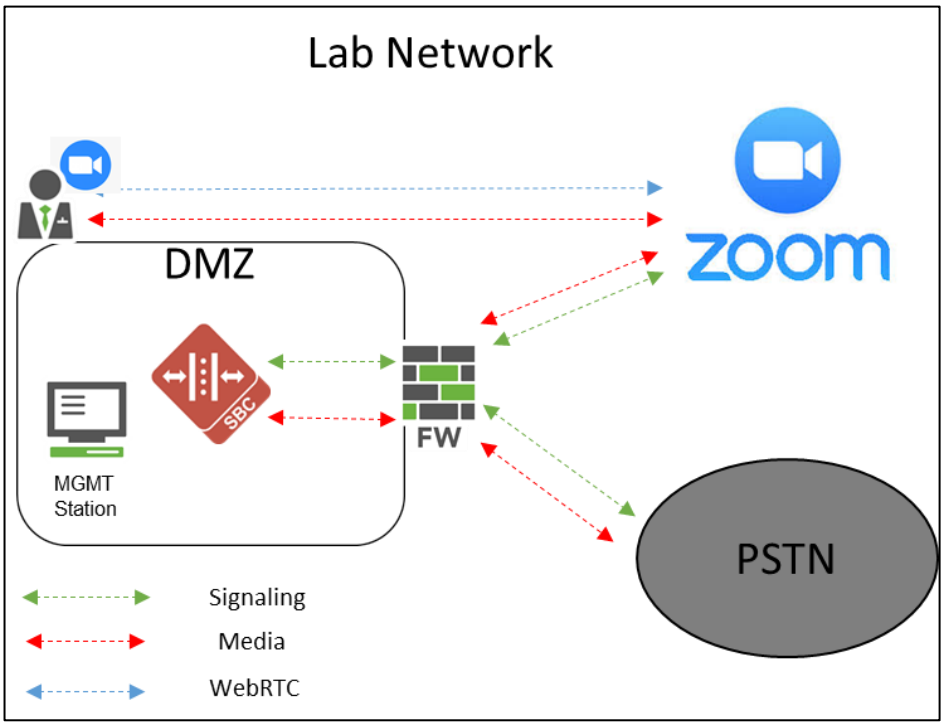
The table below shows the list of infrastructure prerequisites for deploying Zoom Premise Peering.

| | |
|---|---|
| Session Border Controller (SBC) | **See Zoom Documentation for More Details** |
| SIP Trunks connected to the SBC | |
| Zoom Phone | |
| Public IP address for the SBC | |
| Public trusted certificate for the SBC | |
| Firewall ports for Zoom Voice signaling | |
| Firewall IP addresses and ports for Zoom Voice media | |
| Media Transport Profile | |
| Firewall ports for client media | |

## 6 Configuration

This chapter provides step-by-step guidance on how to configure Oracle SBC for interworking with Zoom Phone and Verizon Business SIP trunk

All testing was performed in Oracle Labs. Below is an outline of the network setup used to conduct all testing between the Oracle SBC and Zoom Phone platform.




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

## 6.1 Prerequisites

Before you begin, make sure that you have the following per every SBC you want to pair:

- Public IP address
- Public certificate, issued by one of the supported CAs (refer to Related Documentation for details about supported Certification Authorities).
- Zoom Public CA certificates to add to trust store of SBC
- IPSEC Template Provided by Verizon Business to establish IKE/IPSEC tunnel

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

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

This guide assumes the Oracle SBC 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.

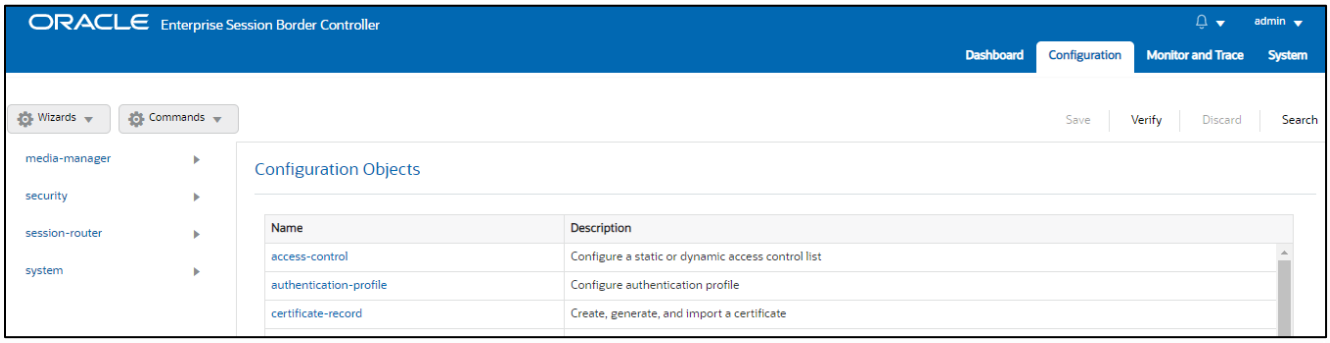
To access the Oracle SBC GUI, enter the management IP address into a web brower.
When the login screen appears, enter the username and password to access the ORACLE SBC.

Once you have accessed the Oracle SBC, at the top, click the Configuration Tab. This will bring up the ORACLE SBC Configuration Objects List on the left hand side of the screen.

Any configuration parameter not specifically listed below can remain at the ORACLE SBC default value and does not require a change for connection to Zoom Phone to function properly.

The below configuration example assumes you will be using a secure connection between the Oracle SBC and Zoom Phone Platform for both signalling and media.

*Note: All network parameters, ip addresses, hostnames etc..are specific to Oracle Labs, and cannot be used outside of the Oracle Lab enviroment. They are for example purposes only!!!*




## 6.2 Global Configuration Elements

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

- System-Config
- Media-manager-Config
- SIP-Config
- Ntp-config

### 6.2.1 System-Config

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

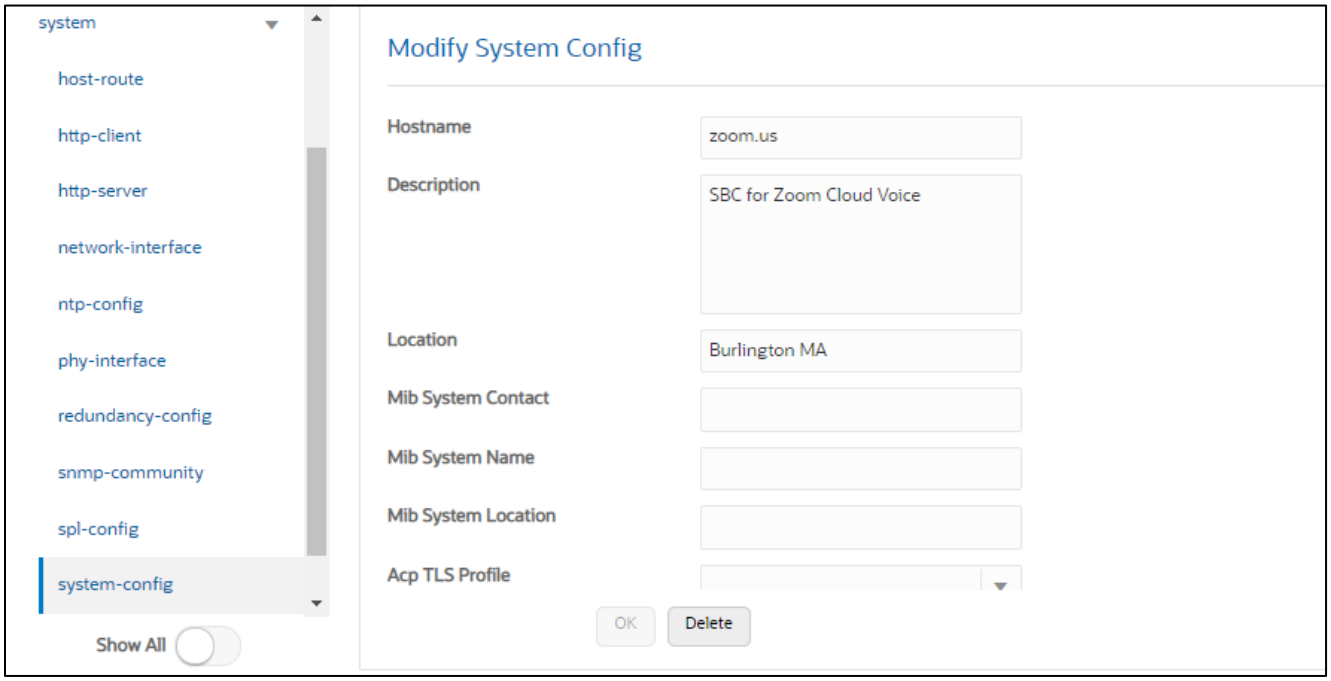
GUI Path: system/system-config

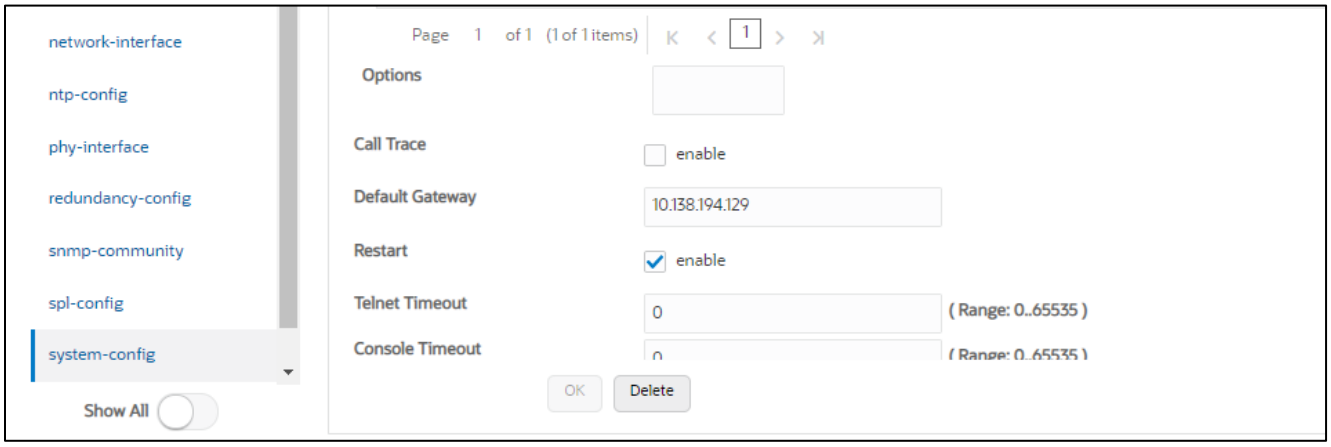
ACLI Path: config t→system→system-config

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

- Hostname
- Description
- Location

- Default-gateway *(recommend using the management interface gateway for this global setting)*




- Click the OK at the bottom of the screen

### 6.2.2 Media Manager

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

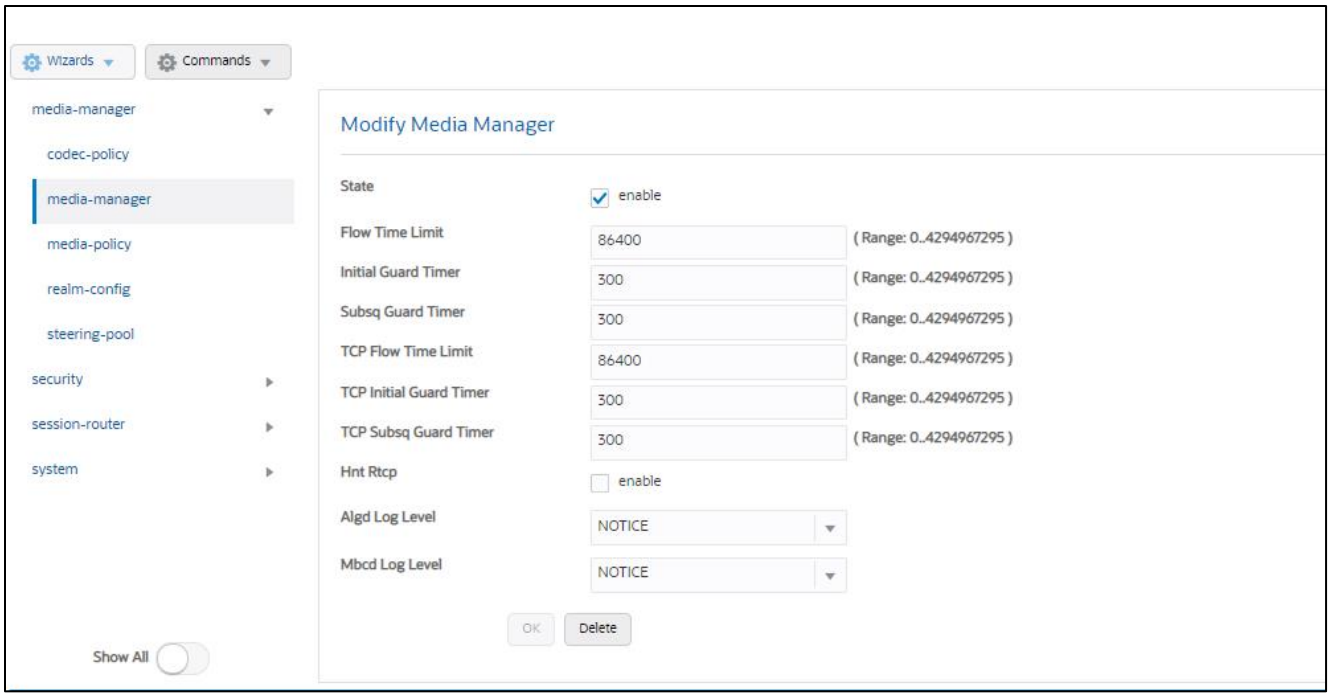
GUI Path: media-manager/media-manager

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

The following options are recommeded for global media manager to help secure the SBC.

- Max-untrusted-signalling
- Min-untrusted-signalling

*The values in both these fields are related to the SBC's security configuration. For more detailed security configuration options, please refer to the SBC's Secuirty Guide.*




- Click OK at the bottom

### 6.2.3 SIP Config

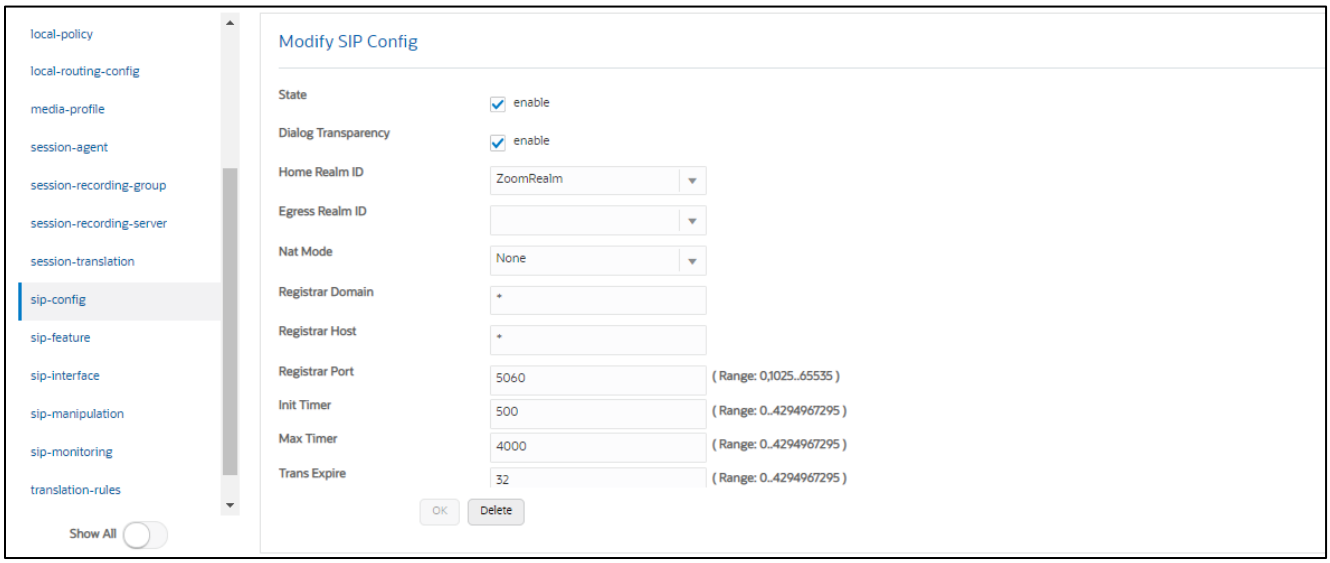
To enable SIP related objects on the ORACLE SBC, you must first configure the global SIP Config element:

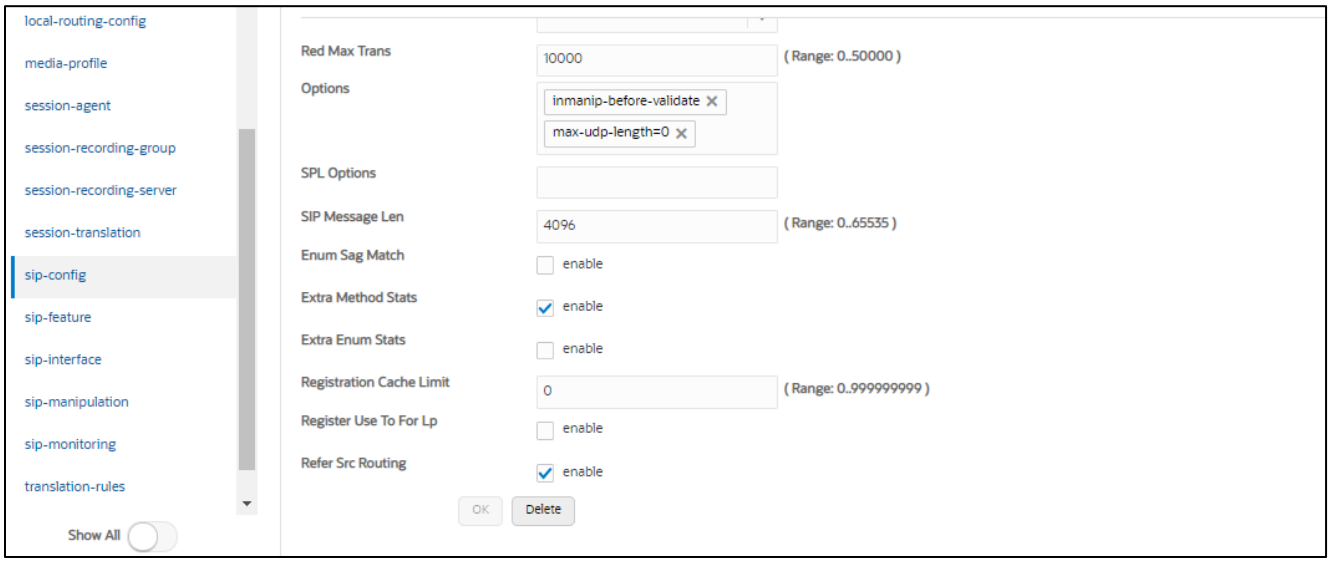
GUI Path: session-router/SIP-config

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

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

- Options: Click Add, in pop up box, enter the string: inmanip-before-validate
- Click Apply/Add another, then enter: max-udp-length=0
- Press OK in box
- Home Realm ID (Optional)



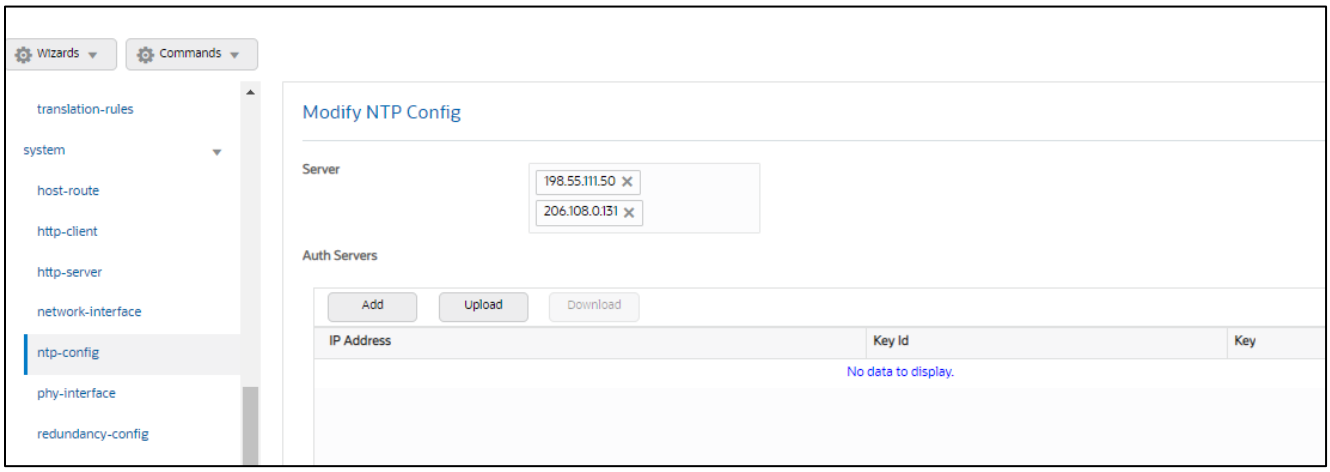




- Click OK at the bottom

### 6.2.4 NTP Config

GUI Path: system/ntp-config

ACLI Path: config t→system→ntp-config




- Click OK at the bottom

## 6.3 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 Zoom Cloud Voice, the other to connect to VERIZON TRUNK Network.

### 6.3.1 Physical Interfaces

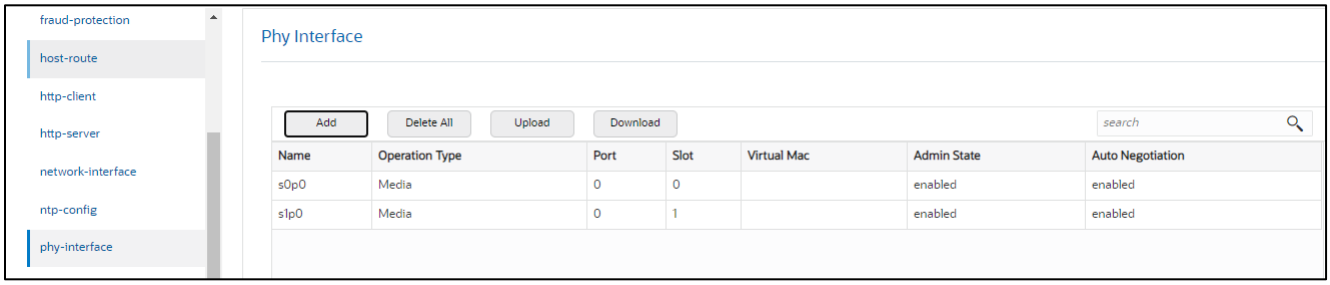
GUI Path: system/phy-interface

ACLI Path: config t→system→phy-interface

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

| Config Parameter | Zoom | VERIZON TRUNK |
|---|---|---|
| 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 of each after entering config information

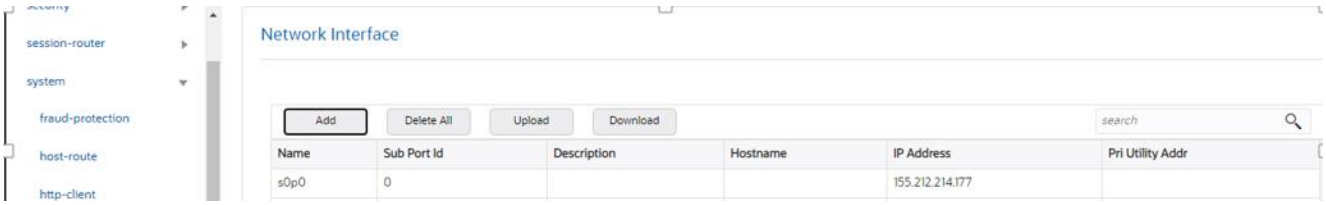
### 6.3.2 Network Interfaces

GUI Path: system/network-interface

ACLI Path: config t→system→network-interface

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

| Configuration Parameter | Zoom | Verizon |
|---|---|---|
| Name | s0p0 | s1p0 |
| Hostname | Domain (if applicable) | |
| IP Address | 155.212.214.177 | 141.146.36.101 |
| Netmask | 255.255.255.0 | 255.255.255.0 |
| Gateway | 155.212.214.1 | 141.146.36.1 |
| DNS Primary IP | 8.8.8.8 | 8.8.8.8 |
| DNS Domain | Domain(if applicable) | |




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

## 6.4 Security Configuration

This section describes how to configure the SBC for both TLS and SRTP communication with Zoom Phone Platform

Zoom Phone allows TCP or TLS connections from SBC's for SIP traffic, and RTP or SRTP for media traffic. For our testing, the connection between the Oracle SBC and Zoom Phone platform was secured via TLS/SRTP. This setup requires a certificate signed by one of the trusted Cerificate Authorities.

Verizon Business requires a secure, IPSEC tunnel be established between the Oracle SBC and the VZB network. You must obtain the IPSEC Template from your Verizon Business account team before configuring IKE/IPSEC on the Oracle SBC.

### 6.4.1 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 five certificate records. They are as follows:

- SBC Certificate (end-entity certificate)
- DigiCert RootCA Cert
- DigiCert Intermidiate Cert (this is optional – only required if your server certificate is signed by an intermediate)
- GoDaddy Root CA Cert (Zoom Presents the SBC a certficate signed by this authority)
- GoDaddy Intermediate Cert

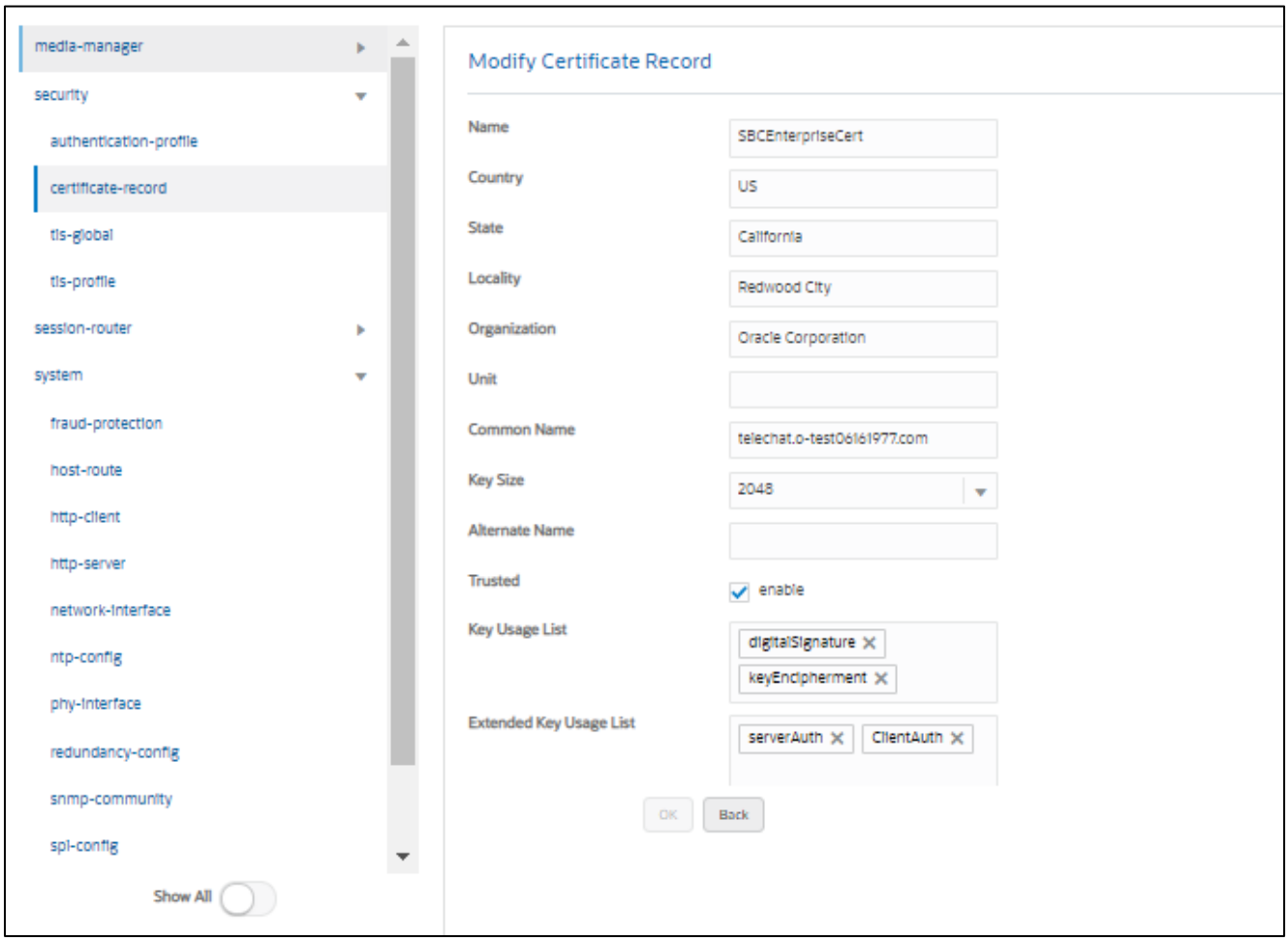
### 6.4.2 SBC End Entity Certificate

The SBC's end entity certificate is what is presented to Zoom Phone signed by your CA authority, in this example we are using Digicert as our signing authority. The certification must include a common name. For this, we are using an fqdn as the common name.

- Common name: (**telechat.o-test06161977.com**)

To Configure the certificate record:

- Click Add, and configure the SBC certificate as shown below:




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

## 6.5 Root CA and Intermediate Certificates

### 6.5.1 Digicert Root and intermediate Certificates:

The following, DigitCertRoot and DigicertInter are the root and intermediate CA certificates used to sign the SBC's end entity certificate. As mentioned above, the intermediate certificate is optional, and only required if your server certificate is signed by an intermediate.

### 6.5.2 GoDaddy Root and Intermediate Certificates:

Zoom presents a certificate to the SBC which is signed by GoDaddy root/intermediate CA. To trust this certificate, your SBC must have the certificate listed as a trusted ca certificate.

You can download these certificate here: https://ssl-ccp.godaddy.com/repository?origin=CALLISTO

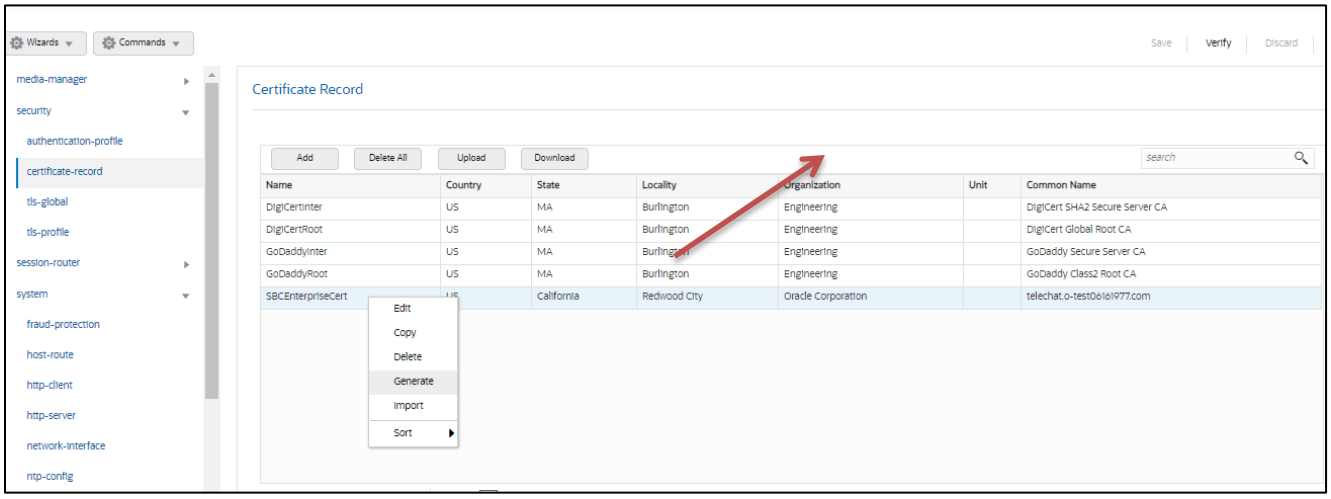
Please use the following table as a configuration reference: Modify the table according to the certificates in your environment.

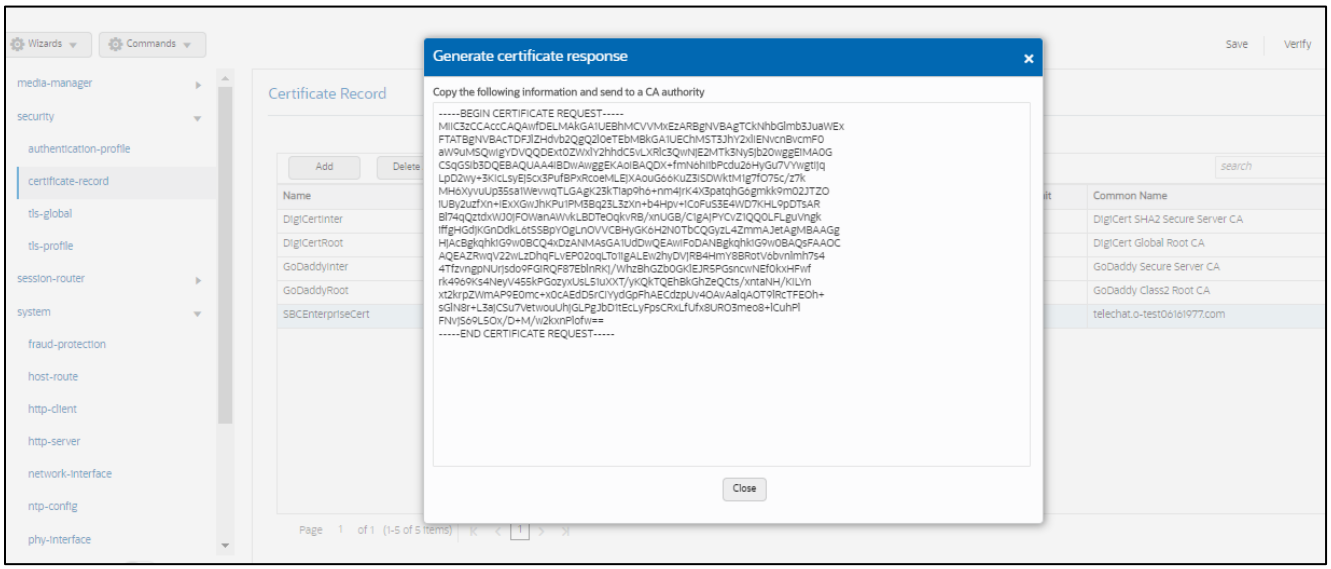
| Config Parameter | GoDaddy Root | GoDaddy Intermediate | Digicert Intermediate | DigiCert Root CA |
|---|---|---|---|---|
| Common Name | GoDaddy Class2 Root CA | GoDaddy Secure Server CA | DigiCert SHA2 Secure Server CA | DigiCert Global Root CA |
| Key Size | 2048 | 2048 | 2048 | 2048 |
| Key-Usage-List | digitalSignature keyEncipherment | digitalSignature keyEncipherment | digitalSignature keyEncipherment | digitalSignature keyEncipherment |
| Extended Key Usage List | serverAuth | serverAuth | serverAuth | serverAuth |
| Key algor | rsa | rsa | rsa | rsa |
| Digest-algor | Sha256 | Sha256 | Sha256 | Sha256 |

### 6.5.3 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:

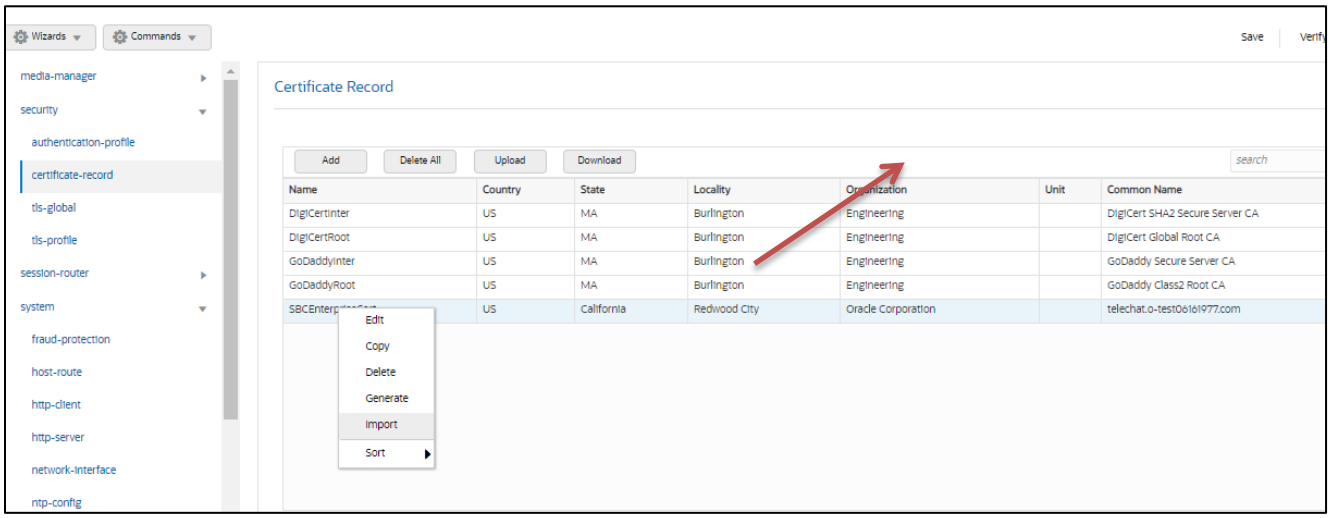


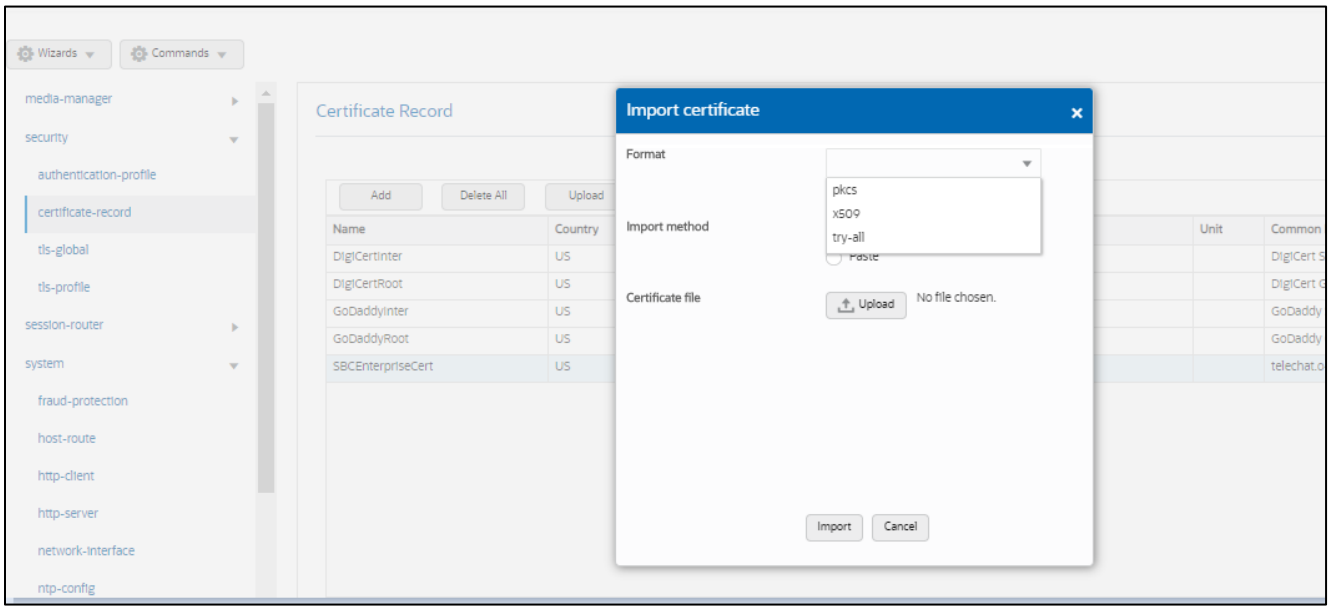



- copy/paste the text that gets printed on the screen as shown above and upload to your CA server for signature.
- Also note, at this point, **a save and activate is required** before you can import the certificates to each certificate record created above.

### 6.5.4 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 **save/activate** from the WebGUI






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

- GoDaddyRoot
- GodaddyIntermediate
- DigiCertIntermediate
- DigiCertRoot

At this stage, all required certificates have been imported.

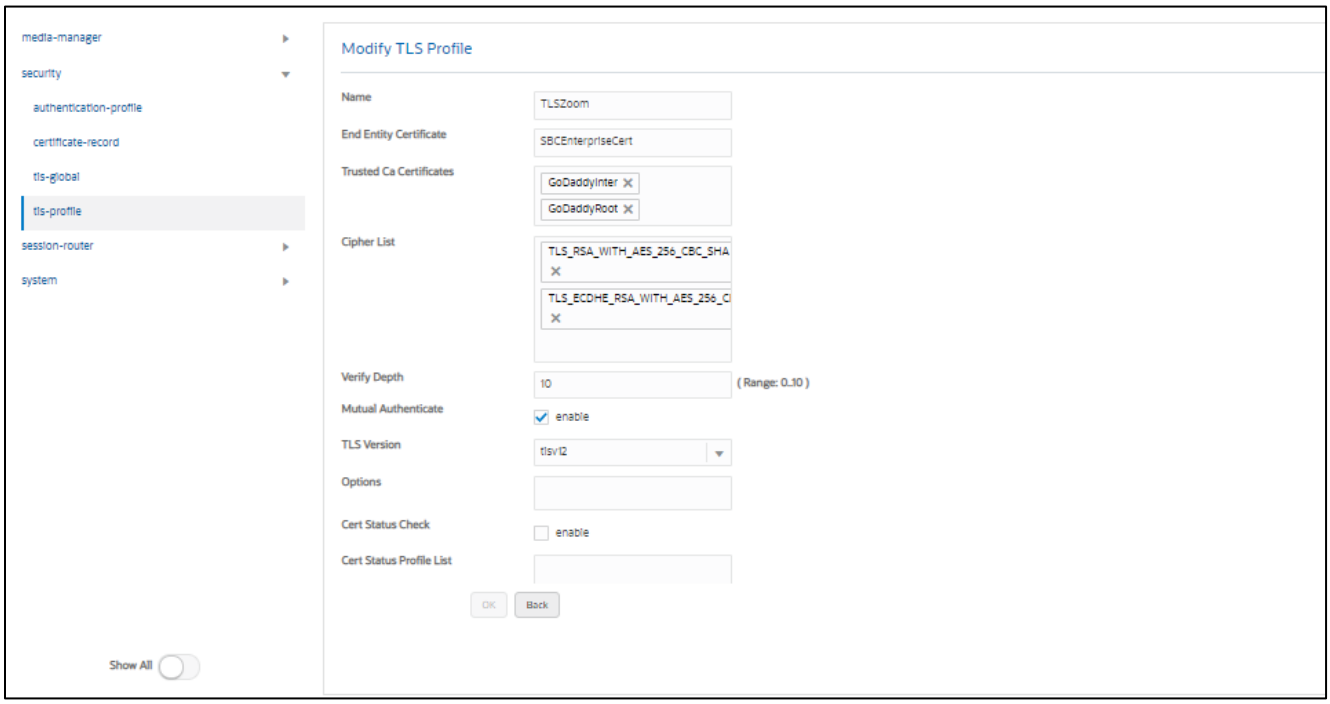
### 6.5.5 TLS Profile

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




*Note: Only the GoDaddy Certificates need to be added to the tls-profile to authenticate the certificate presented to the SBC from Zoom Phone.*

- Click OK at the bottom

## 6.6 Media Security Configuration

This section outlines how to configure support for media security between the ORACLE SBC and Zoom Cloud Voice.

### 6.6.1 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.

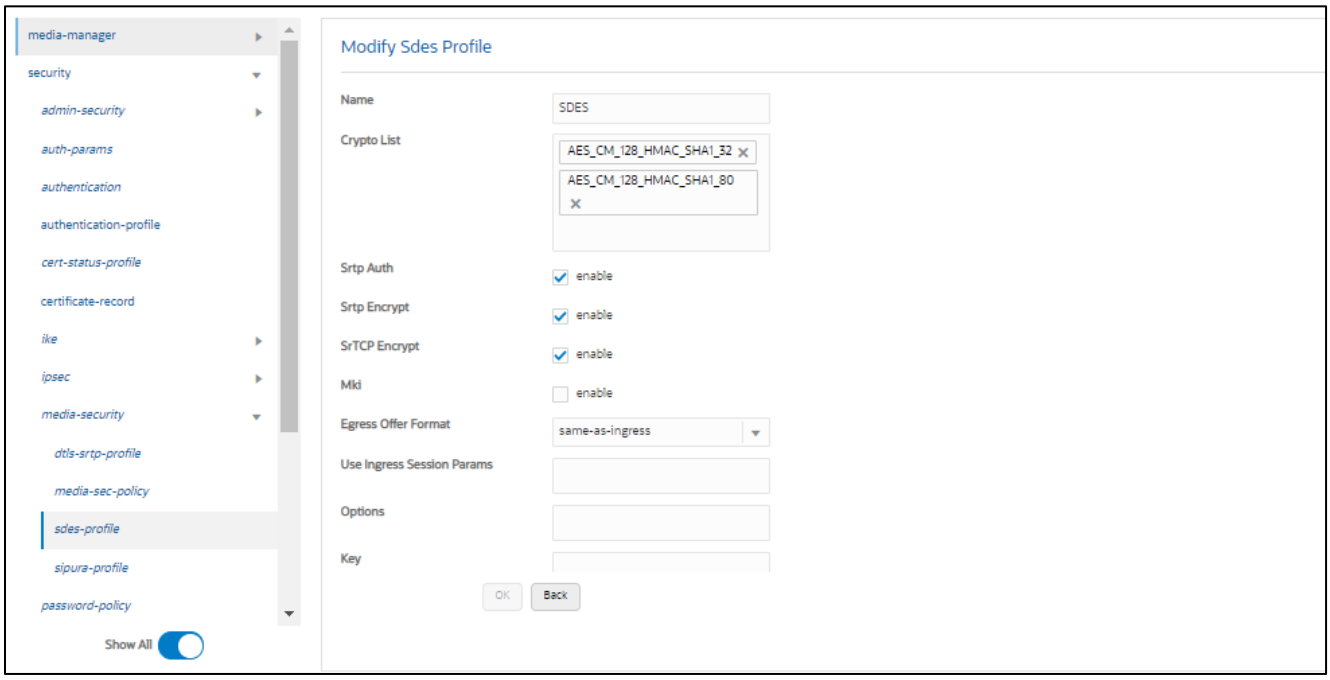
GUI Path: security/media-security/sdes-profile

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

Oracle SBC and Zoom Cloud Voice Support the following media ciphers for SRTP:

- AEAD-AES-256-GCM
- AES-CM-256-HMAC-SHA1-80
- AES-CM-128-HMAC-SHA1-80
- AES-CM-128-HMAC- SHA1-32

Click Add, and use the example below to configure




- Click OK at the bottom

### 6.6.2 Media Security Policy

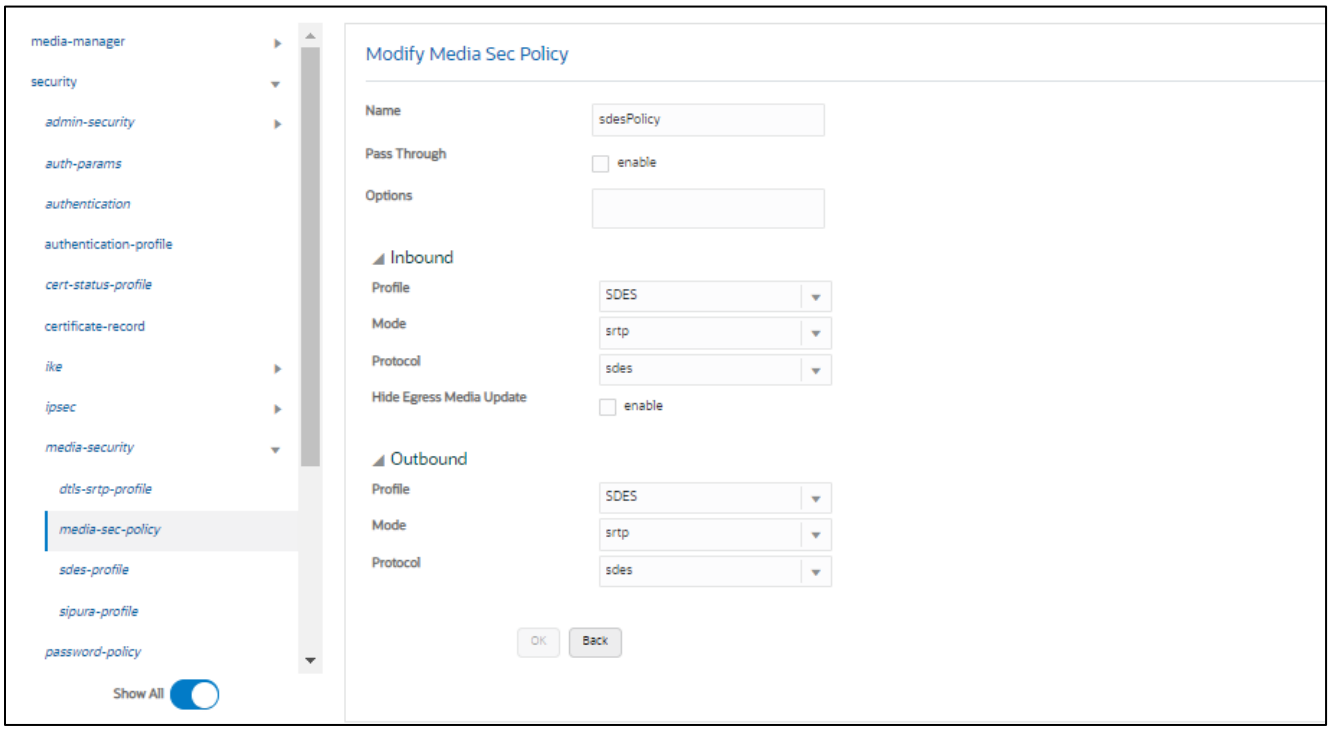
Media-sec-policy instructs the SBC how to handle the SDP received/sent under a realm (RTP, SRTP or any of them) and, if SRTP needs to be used, the sdes-profile that needs to be used

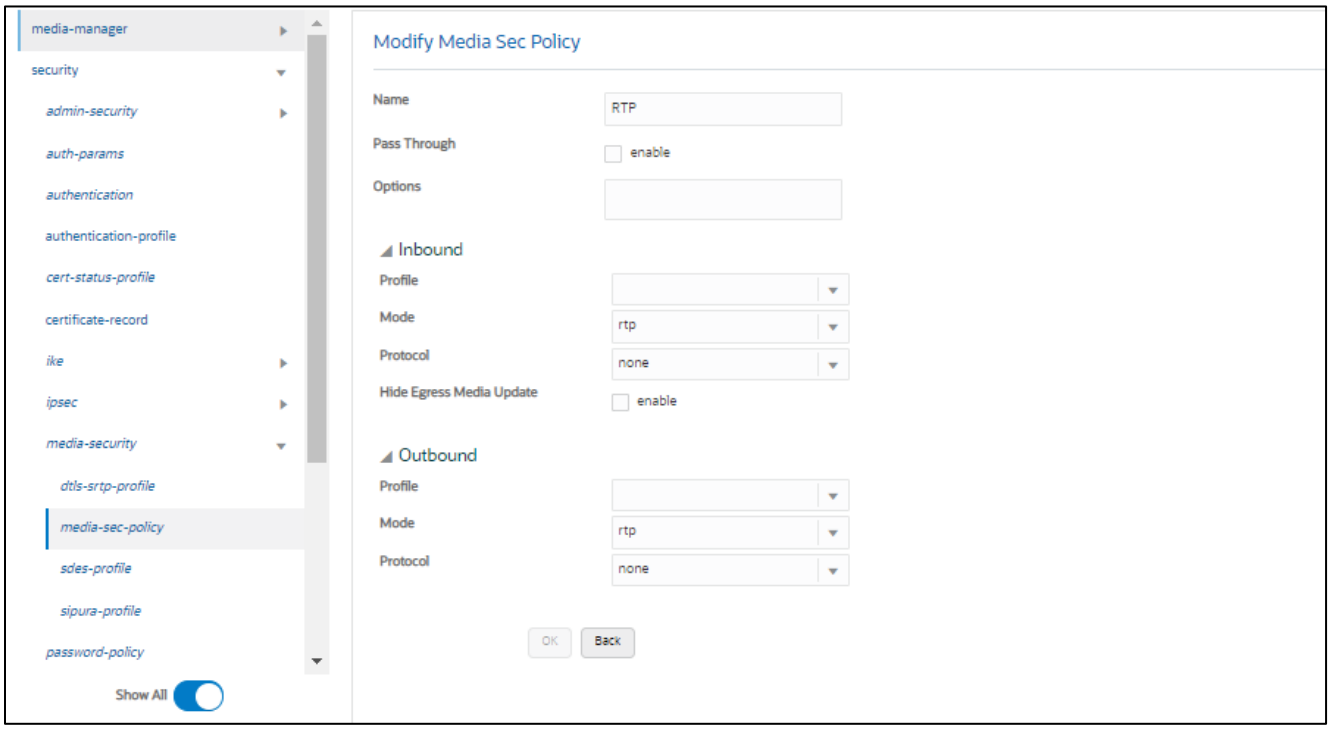
In this example, we are configuring two media security policies. One to secure and decrypt media toward Zoom, the other for non-secure media facing VERIZON TRUNK.

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


media-manager
security
admin-security
auth-params
authentication
authentication-profile
cert-status-profile
certificate-record
ike
ipsec
media-security
dtls-srtp-profile
media-sec-policy
sdes-profile
sipura-profile
password-policy
Show All
Modify Media Sec Policy
Name
sdesPolicy
Pass Through
enable
Options
Inbound
Profile
SDES
Mode
srtp
Protocol
sdes
Hide Egress Media Update
enable
Outbound
Profile
SDES
Mode
srtp
Protocol
sdes
OK
Back


media-manager
security
admin-security
auth-params
authentication
authentication-profile
cert-status-profile
certificate-record
ike
ipsec
media-security
dtls-srtp-profile
media-sec-policy
sdes-profile
sipura-profile
password-policy
Show All
Modify Media Sec Policy
Name
RTP
Pass Through
enable
Options
Inbound
Profile
Mode
rtp
Protocol
none
Hide Egress Media Update
enable
Outbound
Profile
Mode
rtp
Protocol
none
OK
Back

## 6.7 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 Zoom and VERIZON TRUNK.

### 6.7.1 Realm Config

Realms are a logical distinction representing routes (or groups of routes) reachable by the Oracle 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.

**Zoom Realm**

This is a standalone realm facing Zoom Phone Platform

**Verizon Realm**

This is a standalone realm facing VERIZON TRUNK

GUI Path; media-manager/realm-config

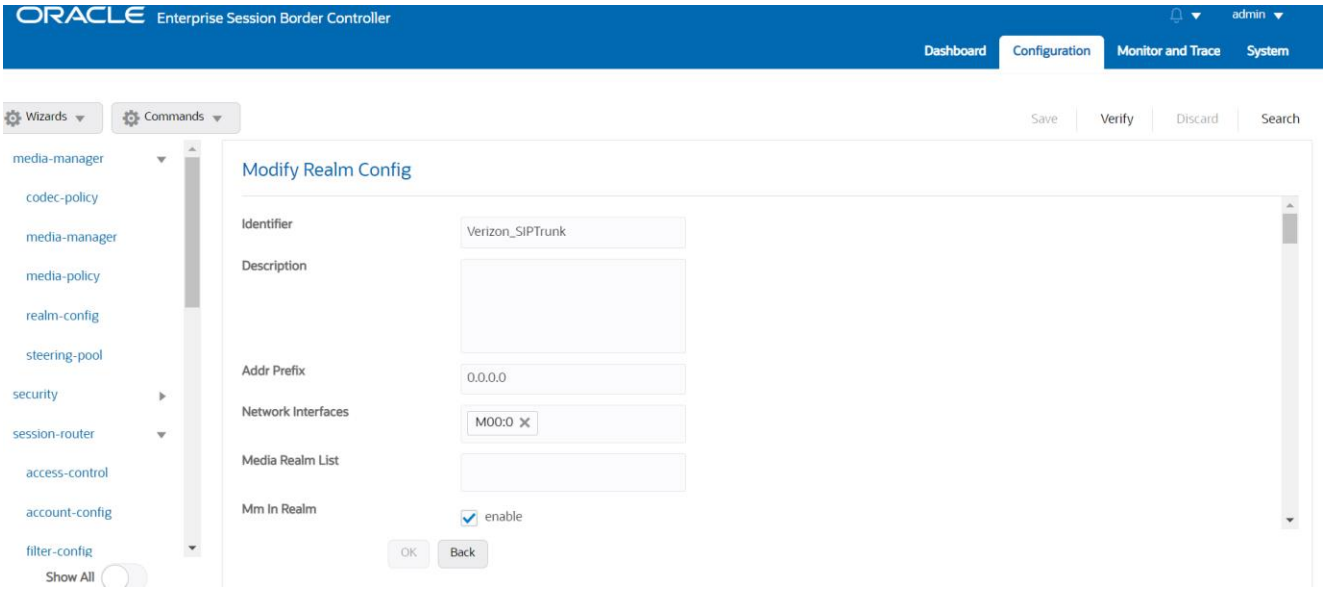
ACLI Path: config t→media-manager→realm-config

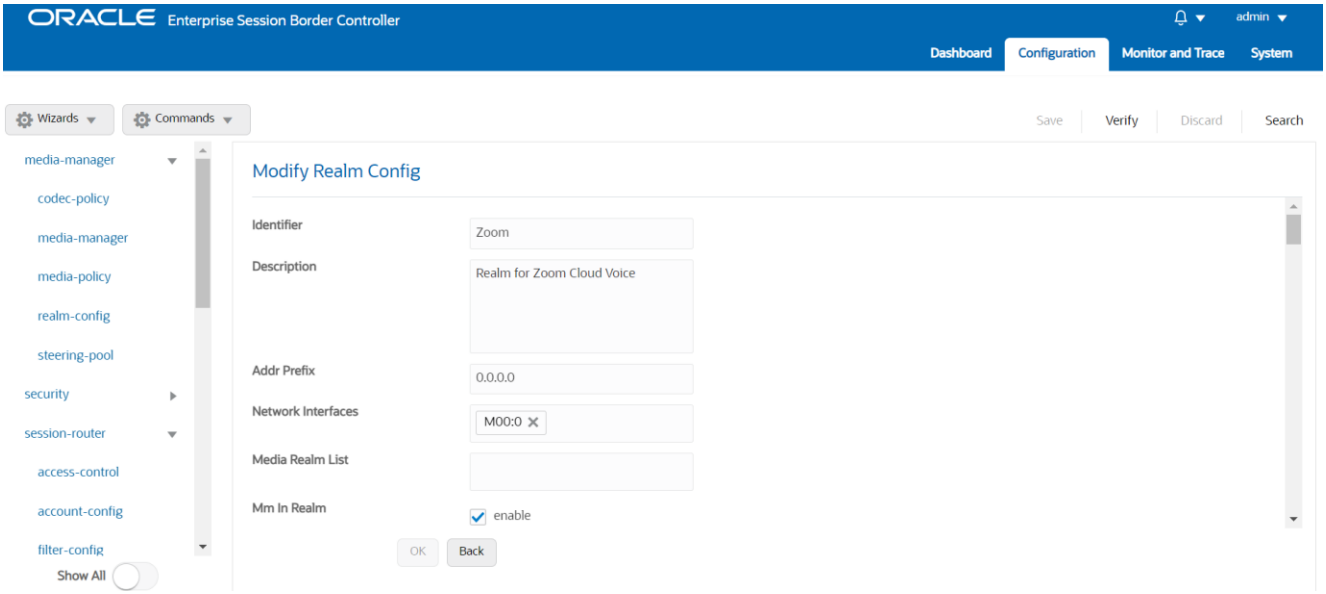
- Click Add, and use the following table as a configuration example for the three realms used in this configuration example

| Config Parameter | Zoom Phone | Verizon Realm |
|---|---|---|
| Identifier | Core_Zoom | Verizon_SIPTrunk |
| Network Interface | s0p0:0 | s1p0:0 |
| Mm in realm | ☑ | ☑ |
| Access-control-trust-level | High | High |
| Media Sec policy | sdespolicy | RTP |
| RTCP mux | ☑ (optional) | |

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

- Network interface
- Media security policy




### 6.7.2 Steering Pools

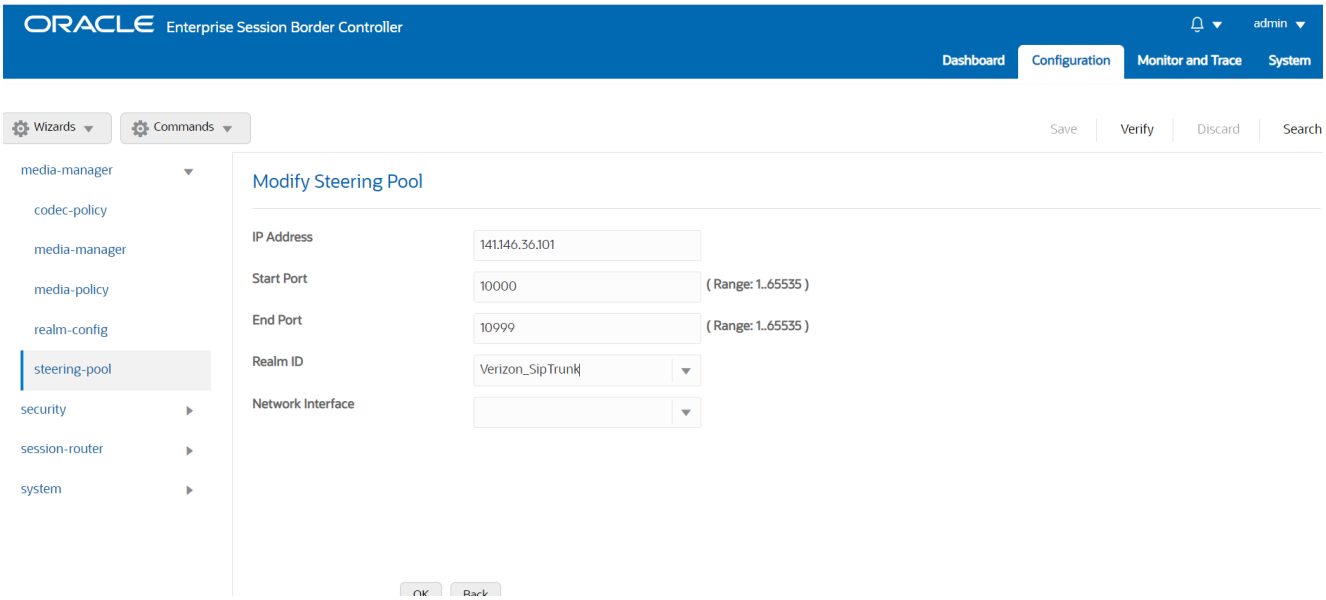
Steering pools define sets of ports that are used for steering media flows through the ORACLE SBC.
These selected ports are used to modify the SDP to cause receiving session agents to direct their media toward this system.

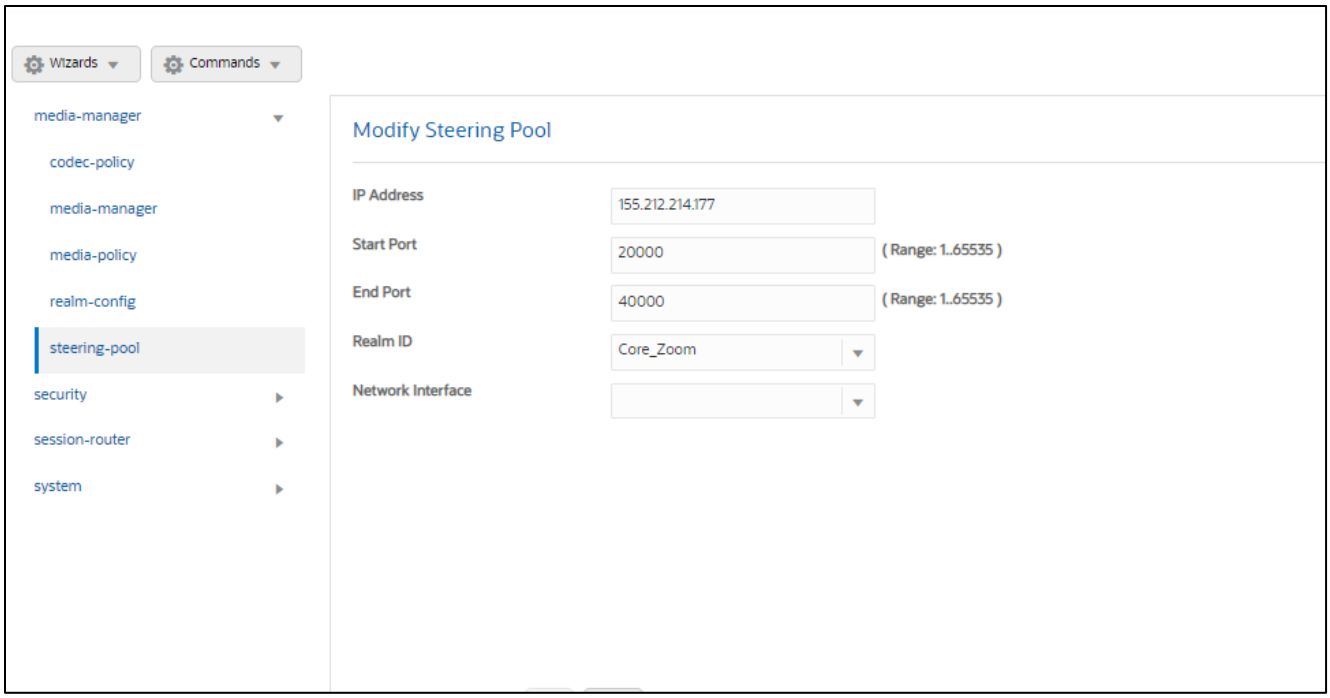
We configure one steering pool for VERIZON TRUNK and one steering pool for Zoom Phone

GUI Path: media-manager/steering-pool

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

- Click Add, and use the below examples to configure




### 6.7.3 IKE/IPSEC Config

The configuration elements required for IKE are not available via the Oracle ESBC GUI, and must be configured via ACLI.

*Note: The examples provided will only display the parameters of each element that have been changed. All others can be left at default values unless required to be changed for your specific purposes:*

### 6.7.4 IKE Config

ACLI Path: config t→security→ike→ike-config

Type Select, and use the below example to configure the global Ike configuration on the SBC.

```
ike-config
      ike-version                    1
      log-level                      NOTICE
      phase1-dh-mode                 dh-group2
      phase2-exchange-mode           dh-group2
```

### 6.7.5 Ike Interface

ACLI Path: config t→security→ike→ike-interface

```
ike-interface
      ike-version                    1
      address                        141.146.36.101
      realm-id                       Verizon
      ike-mode                       initiator
      shared-password                ********
      sd-authentication-method       shared-password
```

### 6.7.6 Ike SaInfo

ACLI Path: config t→security→ike→ike-sainfo

```
ike-sainfo
      name                           VZ1
      auth-algo                      md5
      encryption-algo                3des
      tunnel-local-addr              141.146.36.101
      tunnel-remote-addr             152.188.29.84
ike-sainfo
      name                           VZ2
      auth-algo                      md5
      encryption-algo                3des
      tunnel-local-addr              141.146.36.101
      tunnel-remote-addr             152.188.28.212
```

### 6.7.7 Security Policy

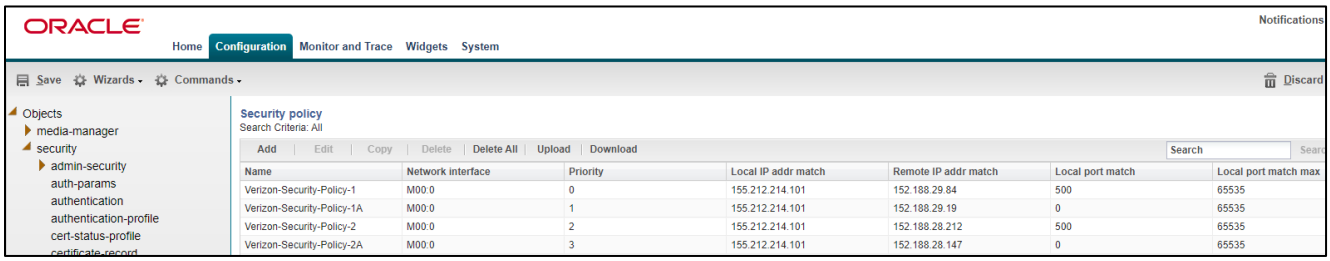
Security Policies are part of the IPSEC configuration on the SBC, and this is available through the GUI.

GUI Path: security/ipsec/security policy

ACLI Path: config t→security→ipsec→security-policy

Use the below table as an example to configure security policies on the SBC toward Verizon Business:

| Function | IPSEC | SIP | IPSEC | SIP |
|---|---|---|---|---|
| Name | Verizon-Security-Policy-1 | Verizon-Security-Policy-1A | Verizon-Security-Policy-2 | Verizon-Security-Policy-2A |
| Network-Interface | S1p0:0 | S1p0:0 | S1p0:0 | S1p0:0 |
| Priority | 0 | 1 | 2 | 3 |
| Local IP addr match | 141.146.36.101 | 141.146.36.101 | 141.146.36.101 | 141.146.36.101 |
| Remote ip addr match | <Vz-IPSEC-IP> | <VZ-SIP-IP> | <VZ-IPSEC-IP> | <VZ-Sip-IP> |
| Local port match | 500 | 0 | 500 | 0 |
| Remote port match | 500 | 0 | 500 | 0 |
| Local IP Mask | 255.255.255.0 | 255.255.255.255 | 255.255.255.0 | 255.255.255.255 |
| Remote IP mask | 255.255.255.224 | 255.255.255.255 | 255.255.255.224 | 255.255.255.255 |
| Ike-sainfo-name | | VZ1 | | VZ2 |
| Action | Allow | IPSEC | Allow | IPSEC |
| **Outbound-sa-fine-grained-mask** | | | | |
| Local ip mask | 255.255.255.255 | 255.255.255.0 | 255.255.255.255 | 255.255.255.0 |
| Remote ip mask | 255.255.255.255 | 255.255.255.224 | 255.255.255.255 | 255.255.255.224 |




## 6.8 SIP Configuration

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

### 6.8.1 SIP Manipulations

In order to comply with the signaling message requirements of Verizon and Zoom we have applied following sip-manipulations.

*Note: Applying these manipulations are necessary for using Verizon*

*.*

#### 6.8.1.1 Manipulation towards Zoom Side

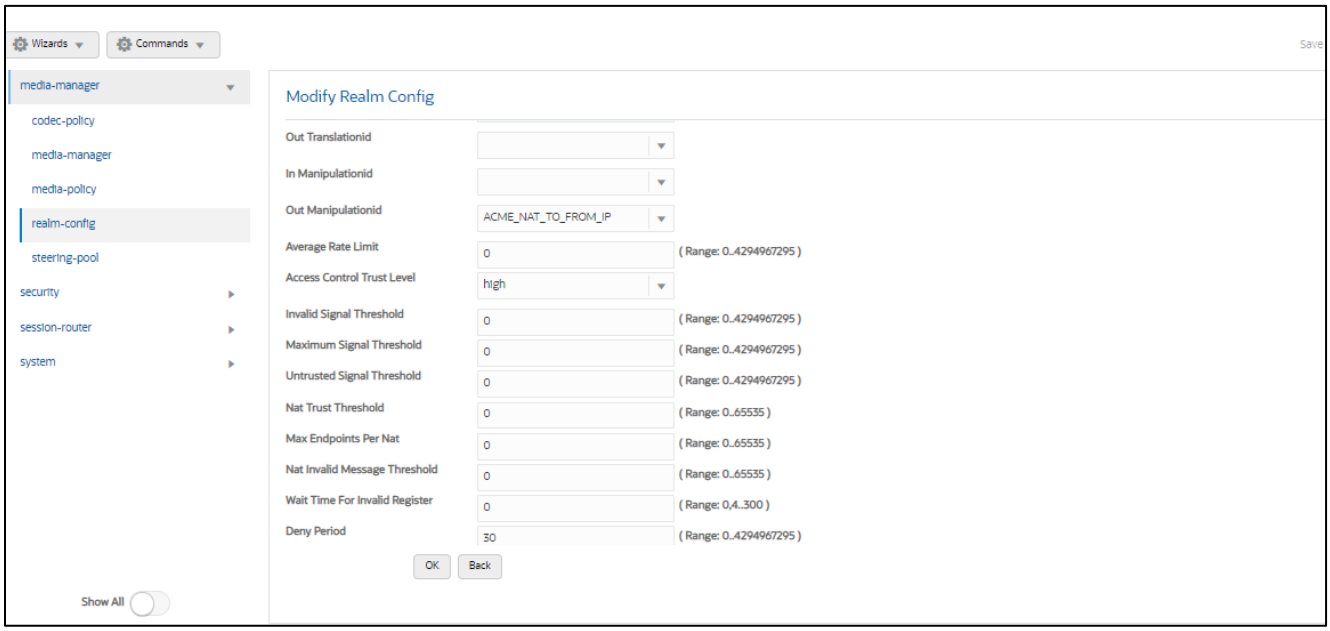
For calls to be presented to Zoom Phone from the Oracle SBC, the Oracle SBC requires alterations to the SIP signaling natively created. To do this, we should we can use the prebuilt HMR ACME_NAT_TO_FROM_IP

The following SIP manipulation is applied as the out-manipulationId to the sip-interface created for Zoom and modifies packets generated by the Oracle SBC to Zoom Phone:

The manipulation performs the following modifications to SIP packets

1. Changes the host portion of From address with the SBC sip-interface IP Address.

2. Changes the host portion of To Header with Zoom IP Address.

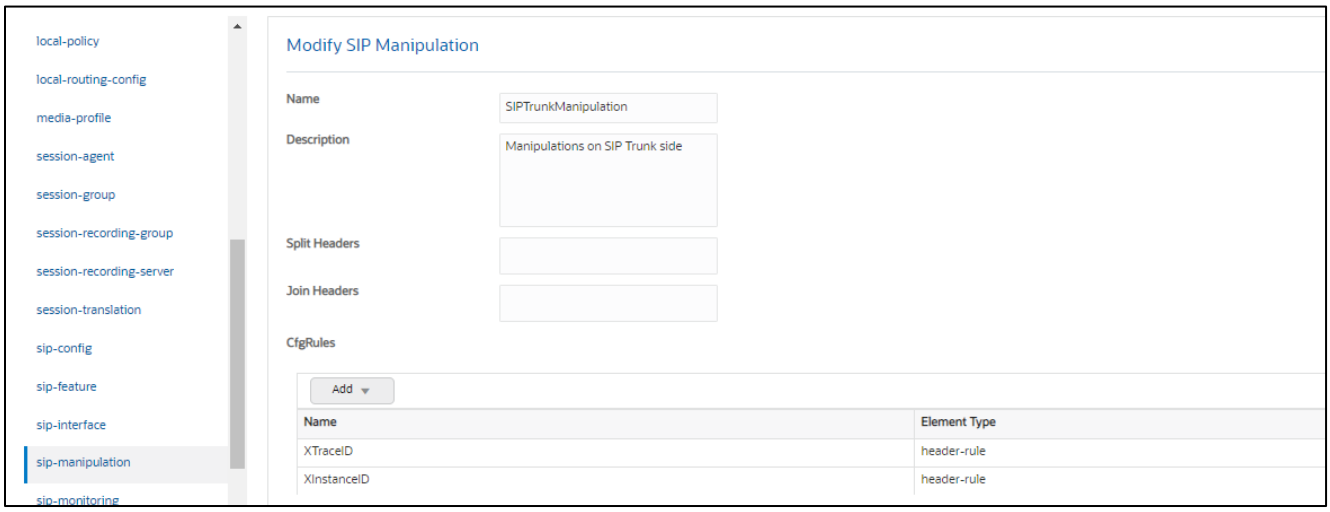



#### 6.8.1.2 Manipulation towards Verizon sip interface

The following SIP manipulation is applied as the out-manipulationId on the Session-Agent created for the Carrier Trunk. This manipulation modifies packets generated by the Oracle SBC to Verizon Side as stated below:

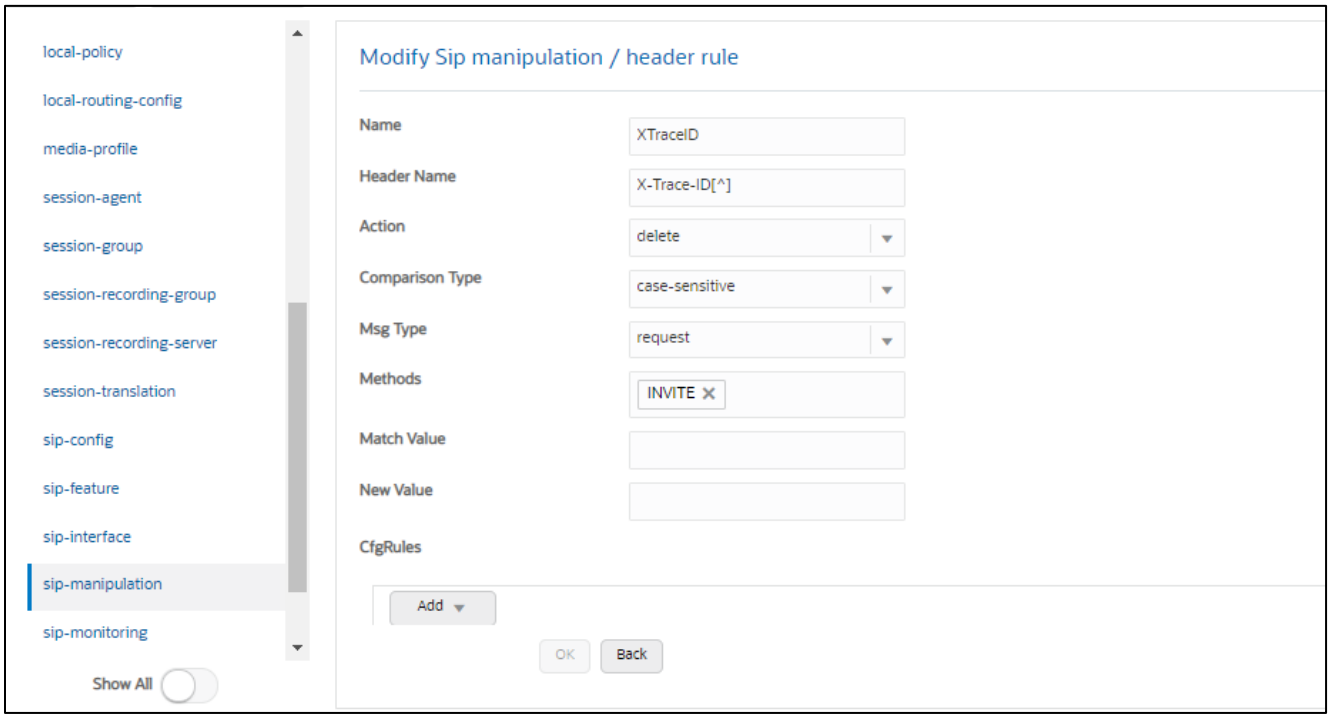
1. Removes the unwanted headers inserted by Zoom in the signaling when forwarding the message to Carrier.
2. Changes the Host portion of From Header with the Local SBC IP Address.
3. Changes the Host portion of To Header with Verizon side IP Address
4. Changes the Host portion of P-Asserted Identity with Verizon side IP Address.

.

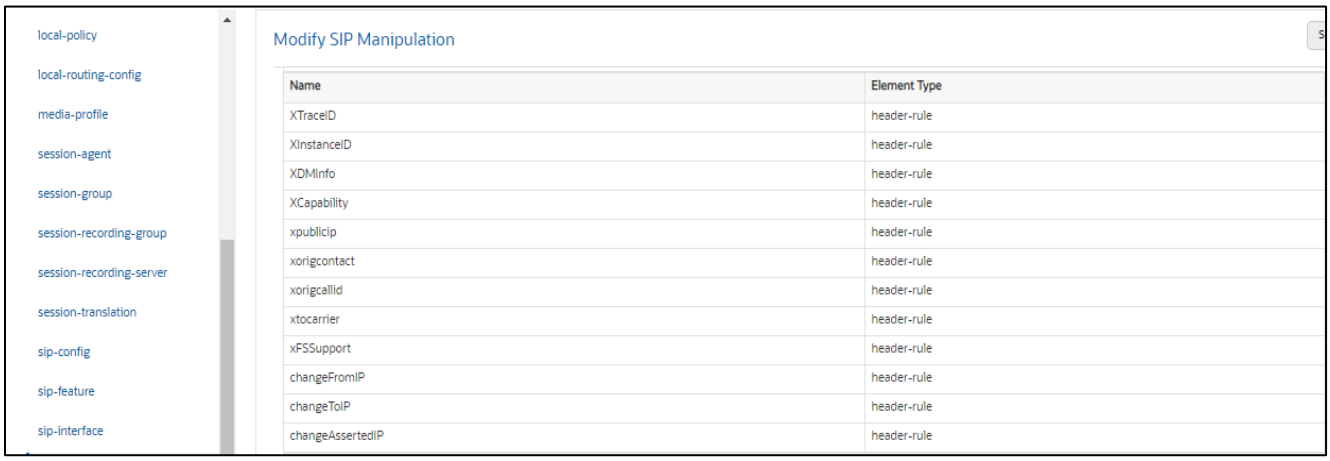



Header-Rules

Below is an example to remove the X-TraceID header towards Verizon. In similar fashion other header-rules can be created to remove other headers such as XInstanceID, XDInfo etc.



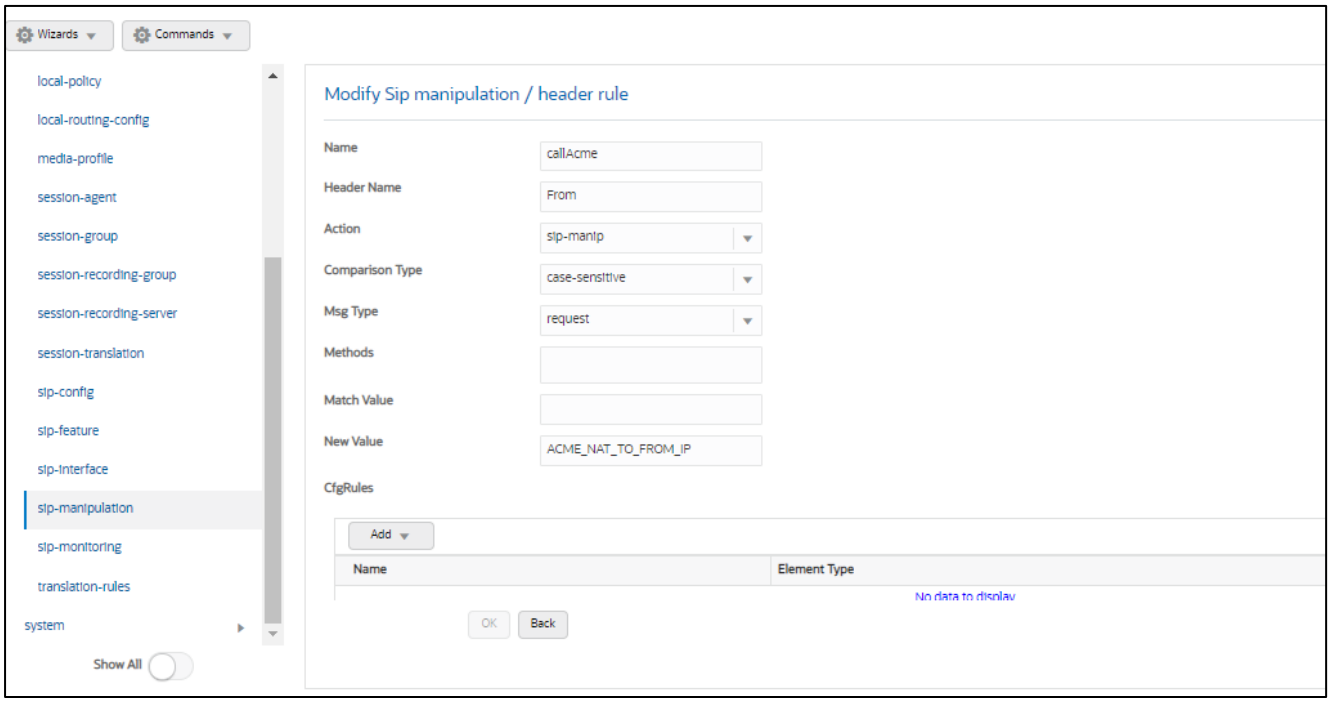

Similar Header-rules are created to remove the other X headers which are inserted by Zoom on the Sip Signaling.




On the same Sip-manipulation we have called the ACME_NAT_TO_FROM_IP Manipulation which performs the topology hiding as below -

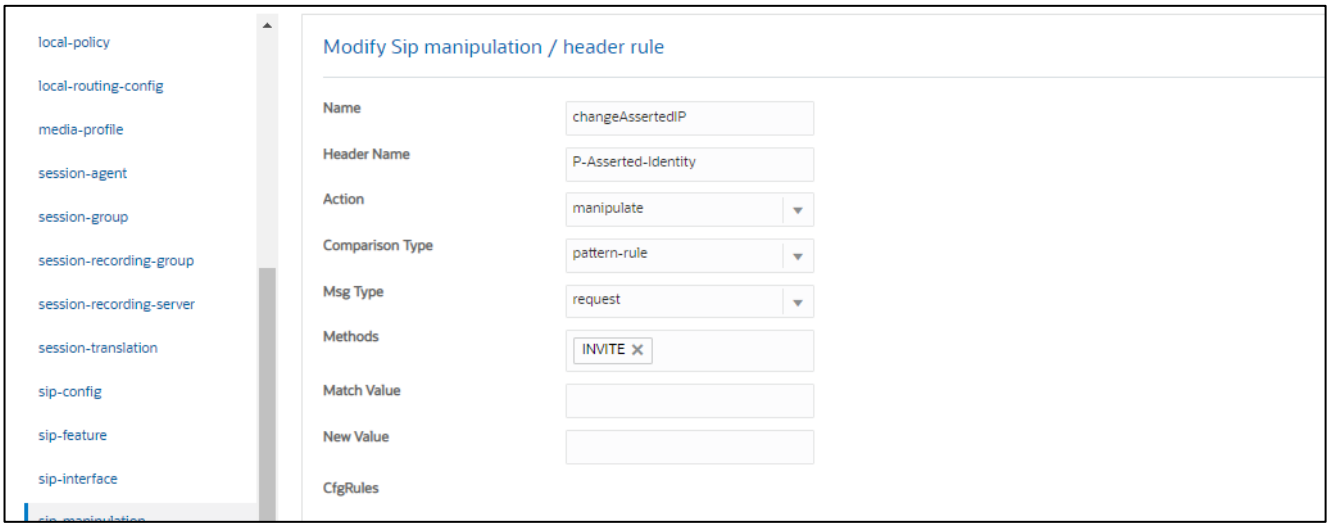
1. Changes the host portion of From Header with the Local SBC IP Address.
2. Changes the host portion of To Header with Verizon side IP Address
3. Changes the host portion of P Asserted Identity with Verizon side IP Address.

Header-rule

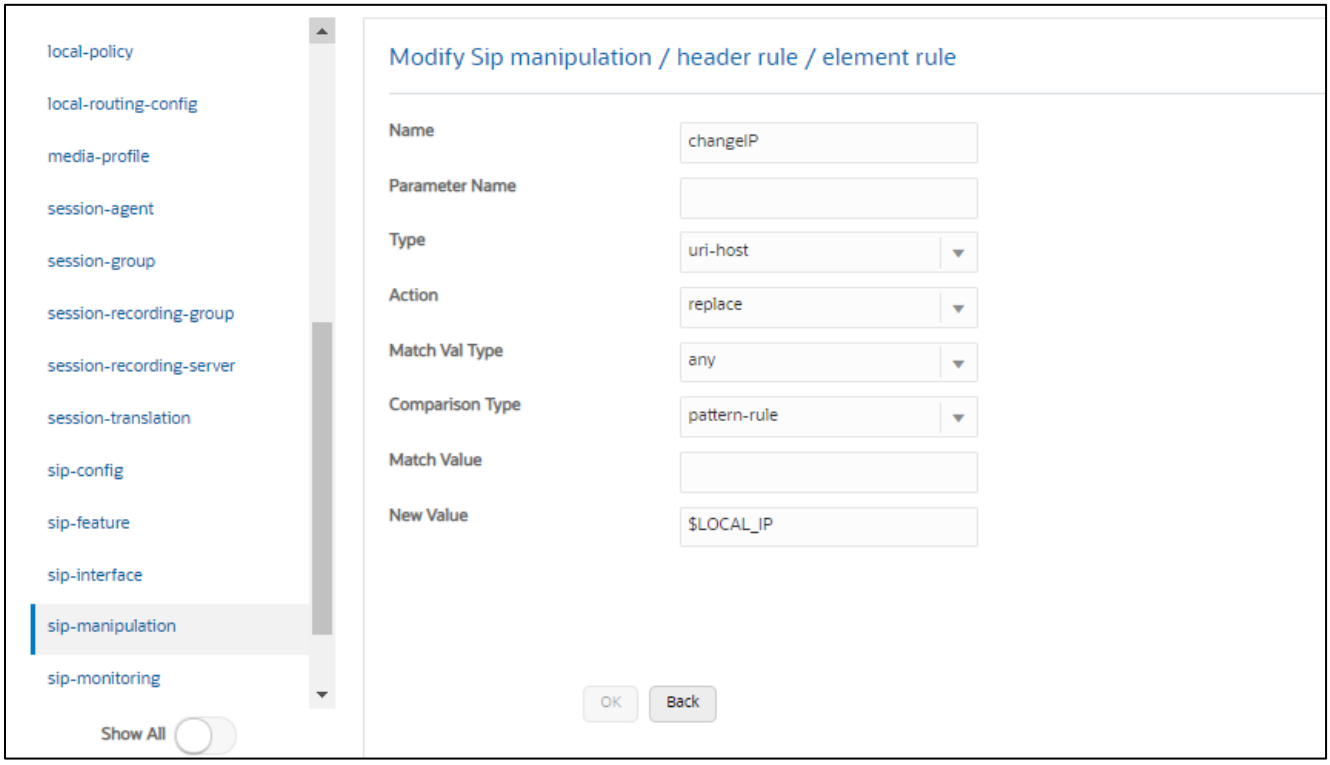



Below Portion of the HMR Changes the Host portion of P-Asserted Identity with Verizon side IP Address.

Header-rule



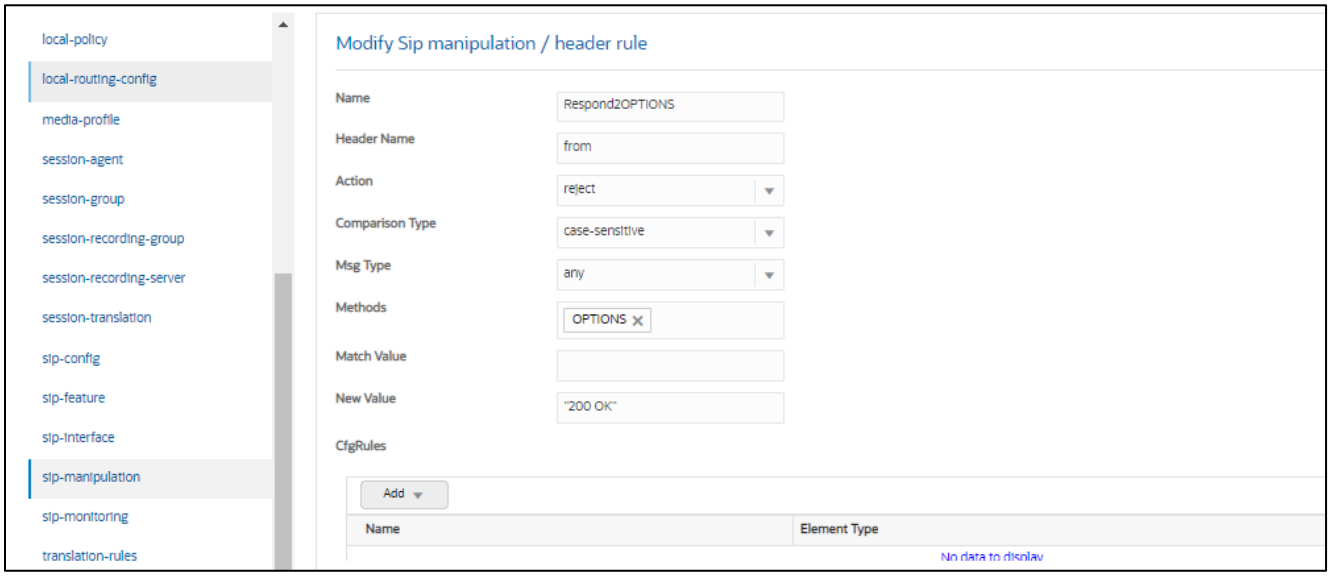

Element Rule



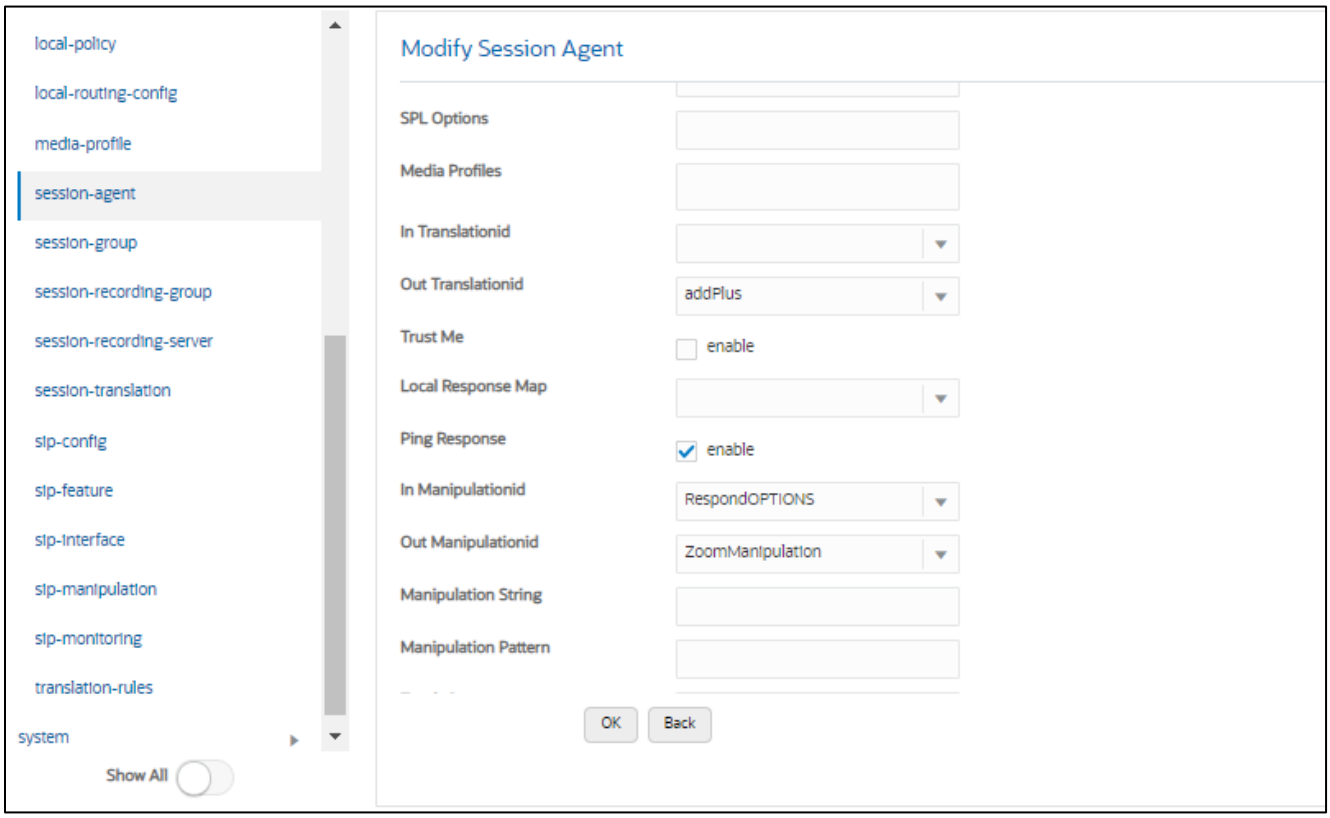

#### 6.8.1.3 Manipulation for OPTIONS Ping.

The following SIP manipulation can be applied as the in-manipulationId to be applied to Options Requests generated by Zoom to the SBC. This will allow the SBC to respond locally to Options Requests.


**Header Rule:**

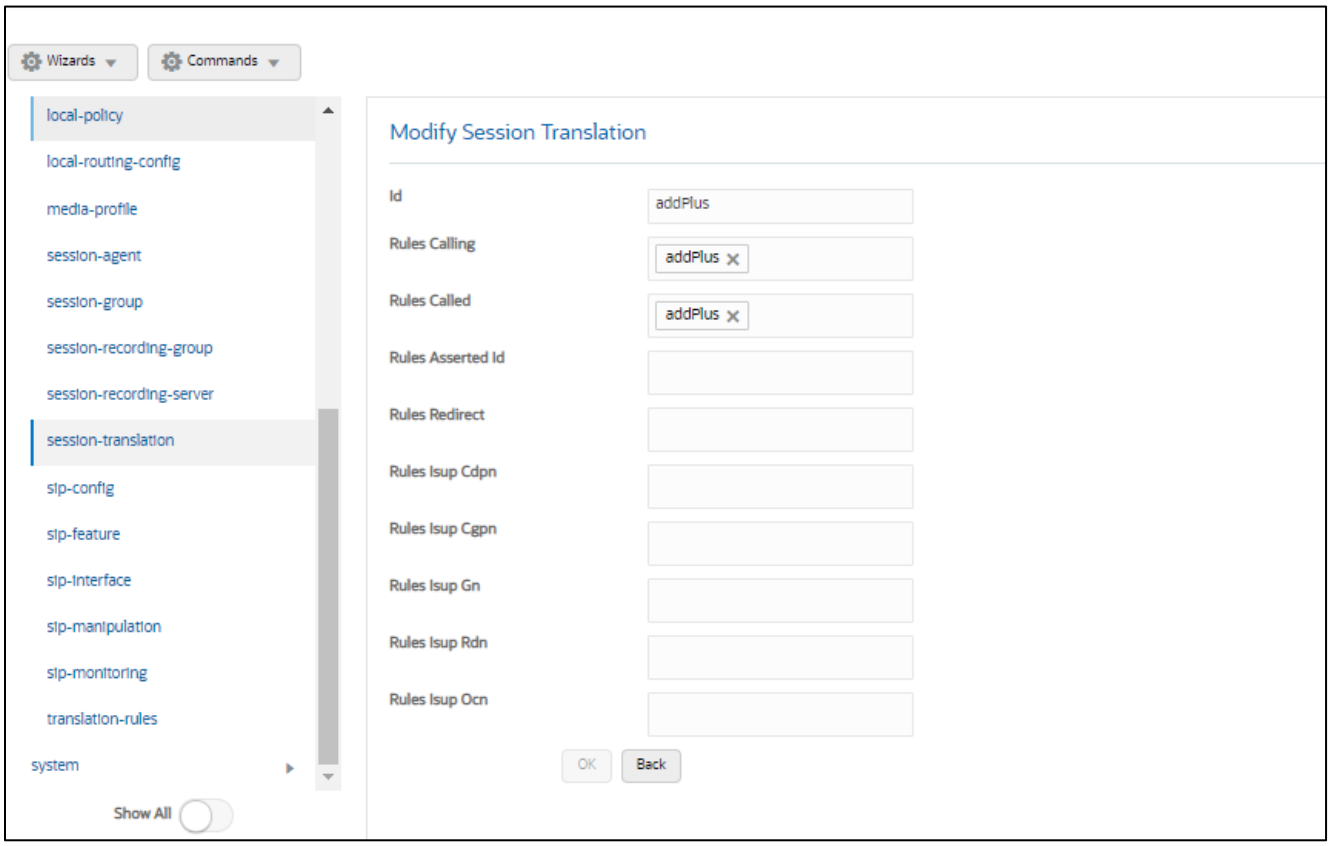


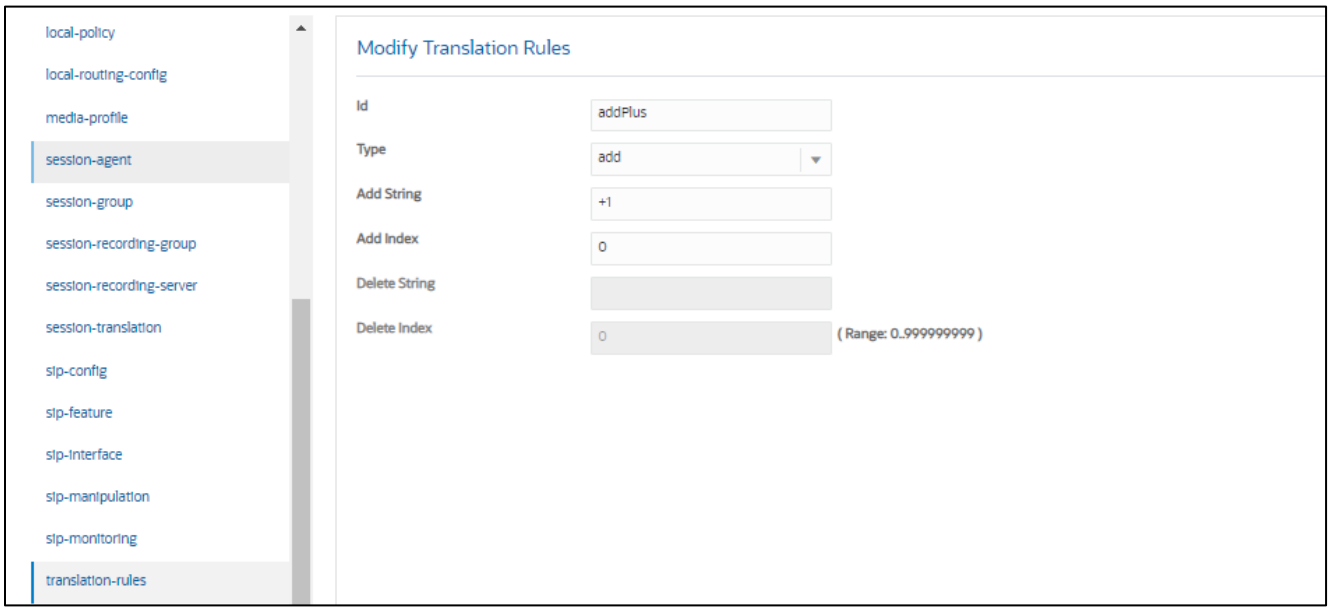

*Please note, If running release SCZ830m1p7 or later, there is a new configuration parameters on the Session Agent Config element, called ping-response. When enabled on each agent, it will take that place of the following SIP-Manipulation.*



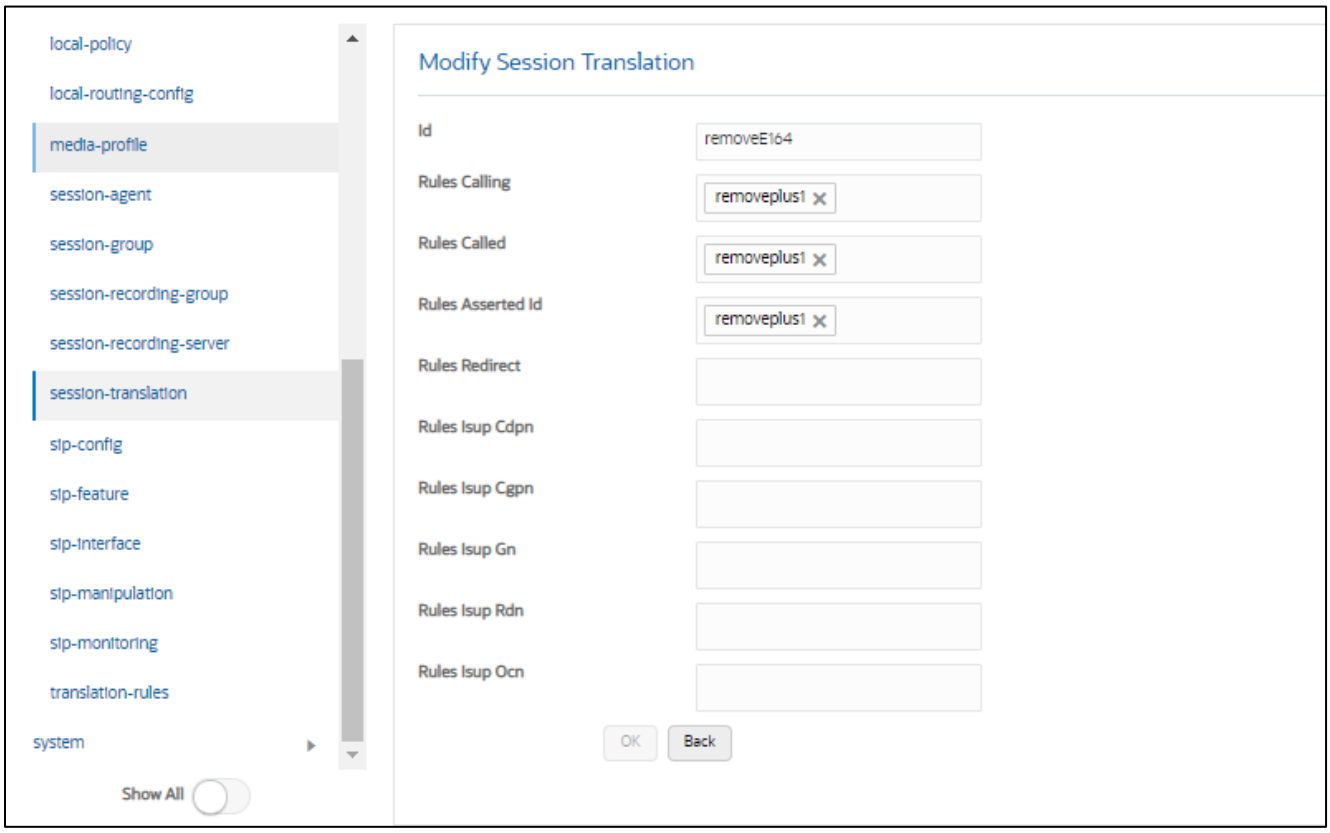

## 6.9 Session-Translation

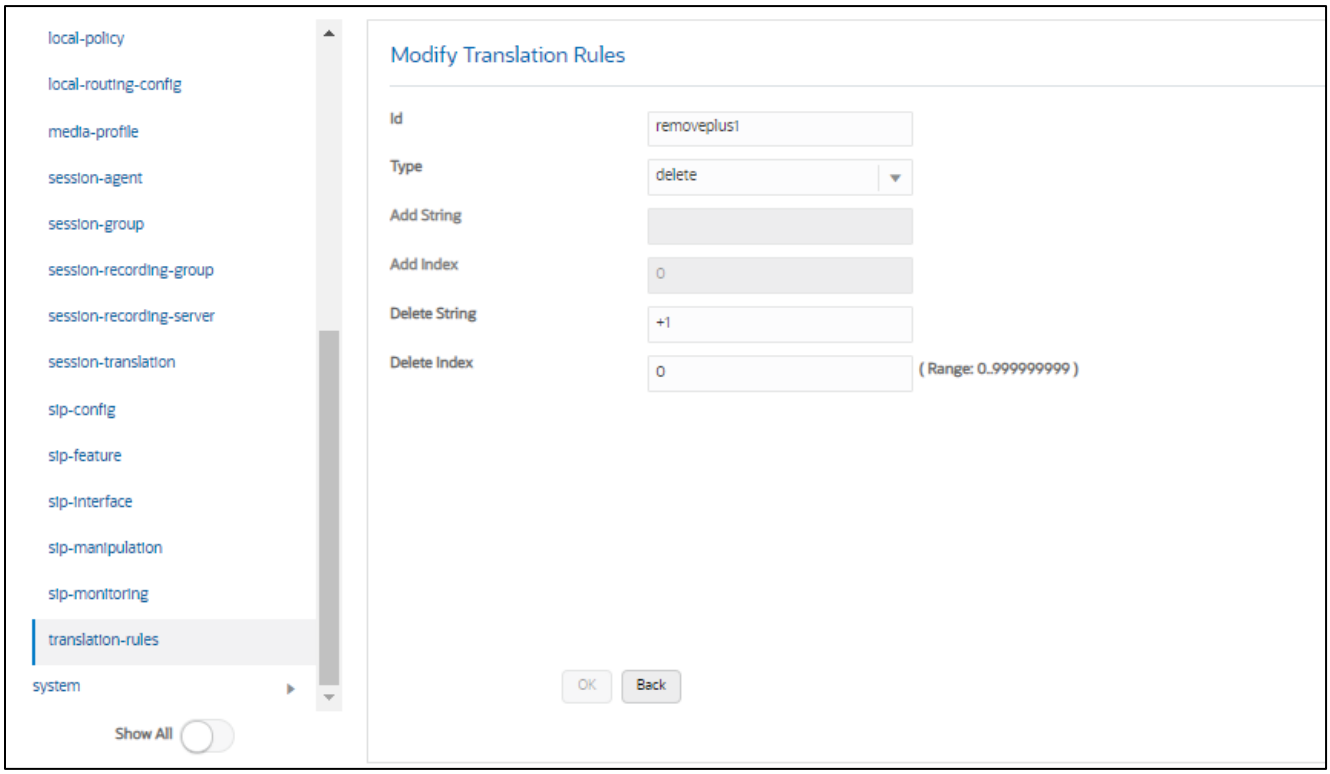
The following session-translation is created and applied as out-translationid on the Session-Agent towards Zoom. This session-translation is created to add a +1 when call is sent towards Zoom as Zoom requires calls to be presented in E.164 format.




The following session-translation is created and applied as out-translationid on the Session-Agent towards Verizon. This session-translation is created to add remove +1 when call is sent towards Verizon as Verizon in this case requires calls to be presented in 10 digit dial format.


local-policy
local-routing-config
media-profile
session-agent
session-group
session-recording-group
session-recording-server
session-translation
sip-config
sip-feature
sip-interface
sip-manipulation
sip-monitoring
translation-rules
system
Show All
Modify Session Translation
Id
removeE164
Rules Calling
removeplus1
Rules Called
removeplus1
Rules Asserted Id
removeplus1
Rules Redirect
Rules Isup Cdpn
Rules Isup Cgpn
Rules Isup Gn
Rules Isup Rdn
Rules Isup Ocn
OK
Back


local-policy
local-routing-config
media-profile
session-agent
session-group
session-recording-group
session-recording-server
session-translation
sip-config
sip-feature
sip-interface
sip-manipulation
sip-monitoring
translation-rules
system
Show All
Modify Translation Rules
Id
removeplus1
Type
delete
Add String
Add Index
0
Delete String
+1
Delete Index
0
( Range: 0..999999999 )
OK
Back

### 6.9.1 Session Timer Profile (Optional)

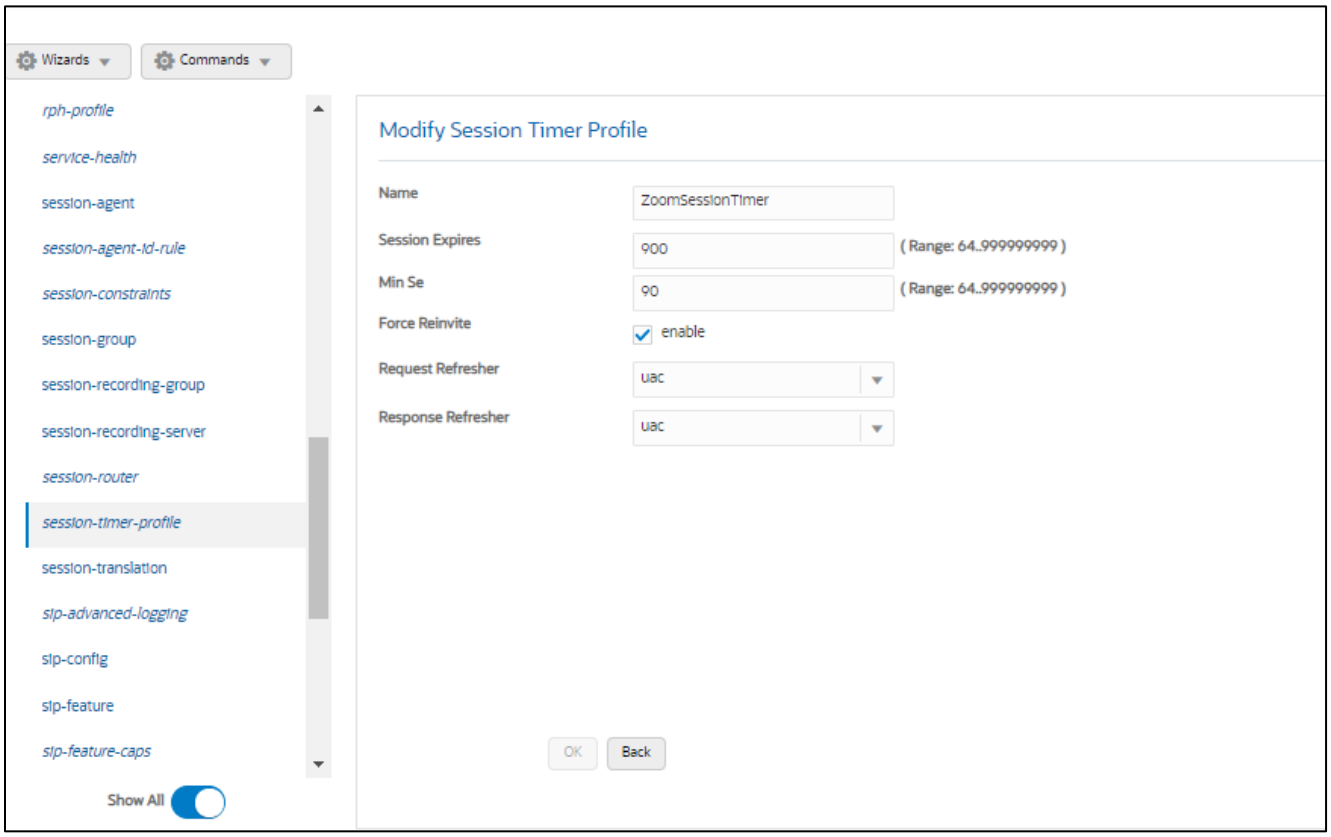
Zoom Phone does support RFC 4028 Session Timers In SIP. In many cases, RFC 4028 is not supported by Verizon SIP trunking services to their customers. In order to accommodate this, the SBC will interwork between VERIZON TRUNK carrier and Zoom Phone in order to provide support for Session Timers in SIP.

For more information about the Oracle SBC's support for RFC4028, please see the [840 Configuration Guide, page 4-300]

GUI Path: session-router/session-timer-profile

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

Use the following as an example to configure session timer profile on your Oracle SBC. Some parameters may vary to fit your specific environment.




### 6.9.2 SIP Interface

The SIP interface defines the transport addresses (IP address and port) upon which the Oracle SBC receives and sends SIP messages

Configure two SIP interfaces, one associated with VERIZON TRUNK Realm, and the other for Zoom Phone.

GUI Path: session-router/SIP-interface

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

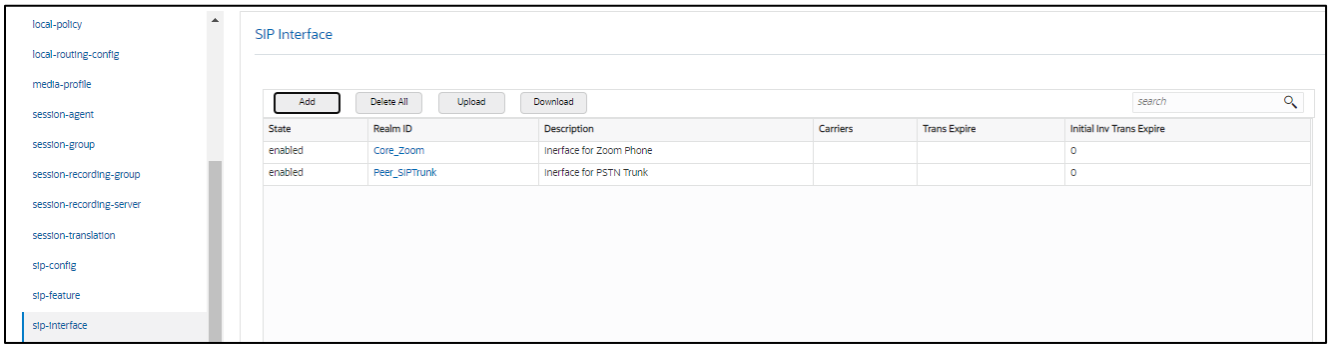
Click Add, and use the table below as an example to Configure:

Please note, this is also where we will be assigned some of the configuration elements configured earlier in this document, ie….

- TLS Profile
- Session-timer-profile
- SIP-Manipulations

Use the following as an example to configure SIP interfaces:

| Config Parameter | Verizon SIPTrunk | Zoom |
|---|---|---|
| Realm ID | Verizon_SIPTrunk | Core_Zoom |
| Out manipulationid | | ACME_NAT_TO_FROM_IP |
| In manipulationid | | RespondOPTIONS |
| **SIP Port Config Parmeter** | **Verizon SIP Trunk** | **Zoom** |
| Address | 141.146.36.101 | 155.212.214.177 |
| Port | 5060 | 5061 |
| Transport protocol | UDP | TLS |
| TLS profile | | TLSZoom |
| Allow anonymous | agents-only | agents-only |
| Session Timer Profile | | ZoomSessionTimer |




### 6.9.3 Session Agents

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

GUI Path: session-router/session-agent

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

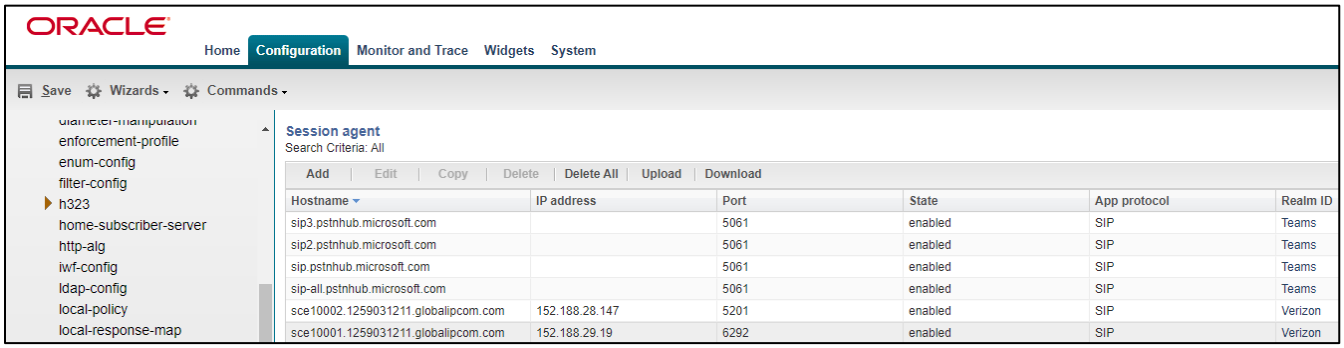
You will need to configure two session agents for Zoom Phone, and in our example, one for SIPTrunk.

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

| Config parameter | Zoom 1 | Zoom 2 |
|---|---|---|
| Hostname | 162.12.232.59 | 162.12.233.59 |
| IP Address | 162.12.232.59 | 162.12.233.59 |
| Port | 5061 | 5061 |
| Transport method | StaticTLS | StaticTLS |
| Realm ID | Core_Zoom | Core_Zoom |
| Ping Method | OPTIONS | OPTIONS |
| Ping Interval | 30 | 30 |
| Ping Response | Enabled | Enabled |

- And two additional Session Agents for Verizon Sip Trunk

| Config parameter | Verizon One | Verizon Two |
|---|---|---|
| Hostname | <Verizon FQDN-1> | <Verizon FQDN-2> |
| IP-Address | <IPV4 Address> | <IPV4 Address> |
| Port | 5201 | 6292 |
| Transport method | UDP | UDP |
| Realm ID | Verizon | Verizon |
| Ping Method | OPTIONS | OPTIONS |
| Ping Interval | 30 | 30 |
| Refer Call Transfer | enabled | enabled |
| Ping Response | ☑ | ☑ |




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

*Note: Ping Response enabled takes the place of the [Respond Options Sip Manipulation Rule]*


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

### 6.9.4 Session Agent Group

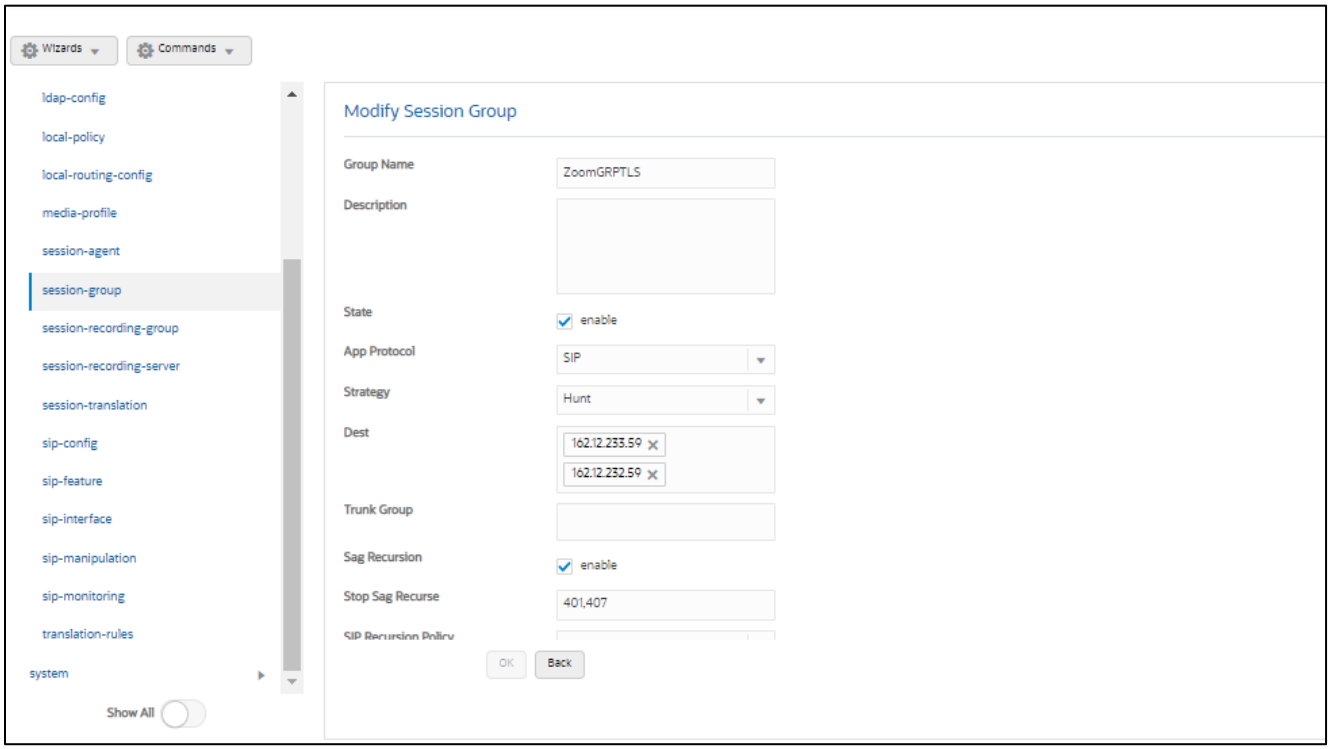
A session agent group allows the SBC to create a load balancing model:

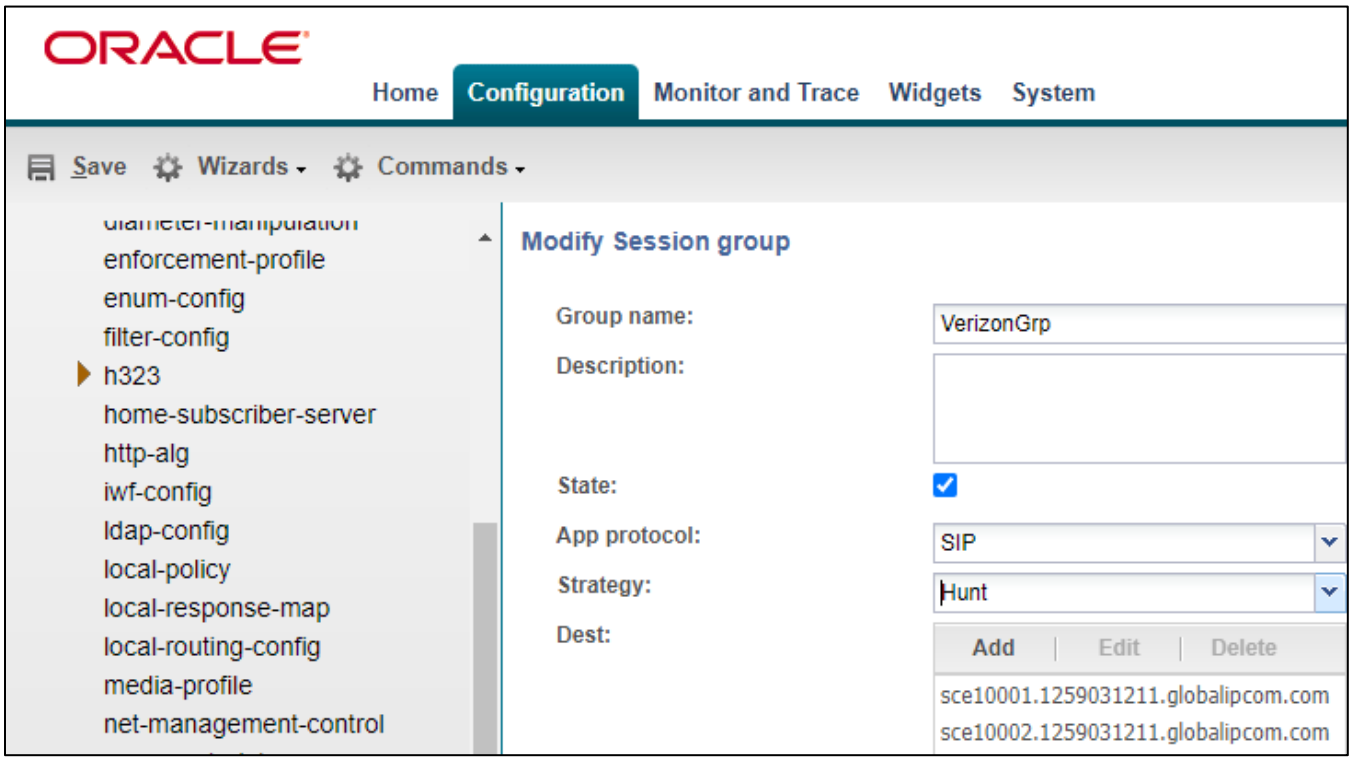
Both session agents configured for Zoom will be added to one group and the session agents configured for Verizon will be added in another group.

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

### 6.9.5 Routing Configuration

This section outlines how to configure the ORACLE SBC to route SIP traffic to and from VERIZON TRUNK and Zoom Phone Platform.

The Oracle SBC has multiple routing options that can be configured based on environment. For the purpose of this example configuration, we are utilizing the Oracle SBC's Local Policy Routing for all traffic to and from Zoom.

### 6.9.6 Local Policy Configuration

Local Policy config allows for the SBC to route calls from one end of the network to the other based on routing criteria.

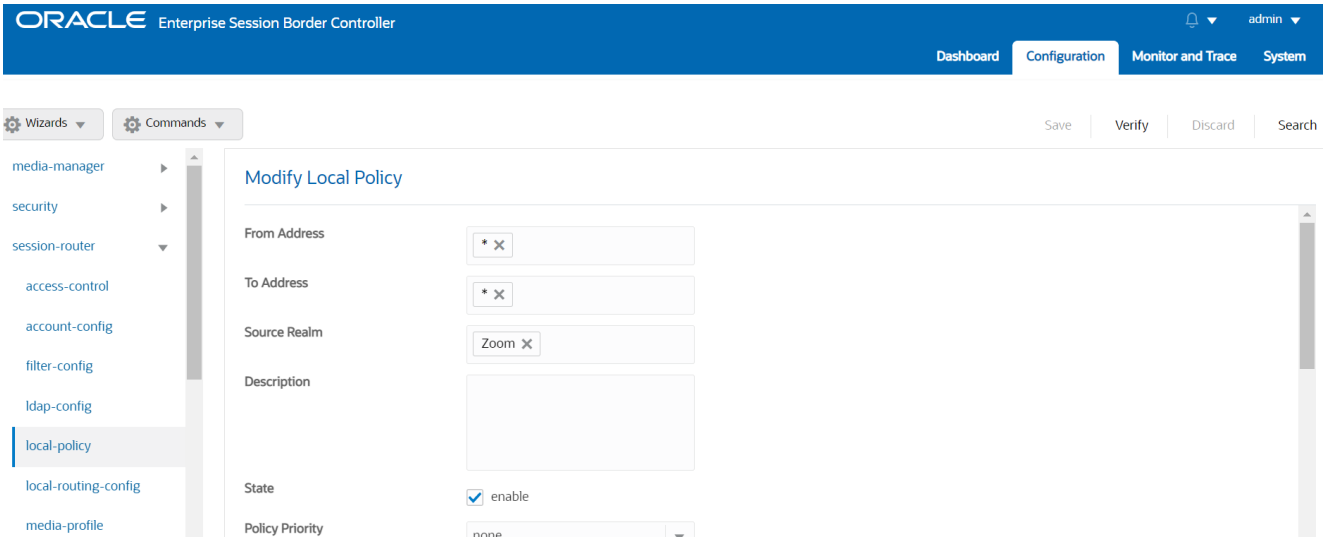
GUI Path: session-router/local-policy

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

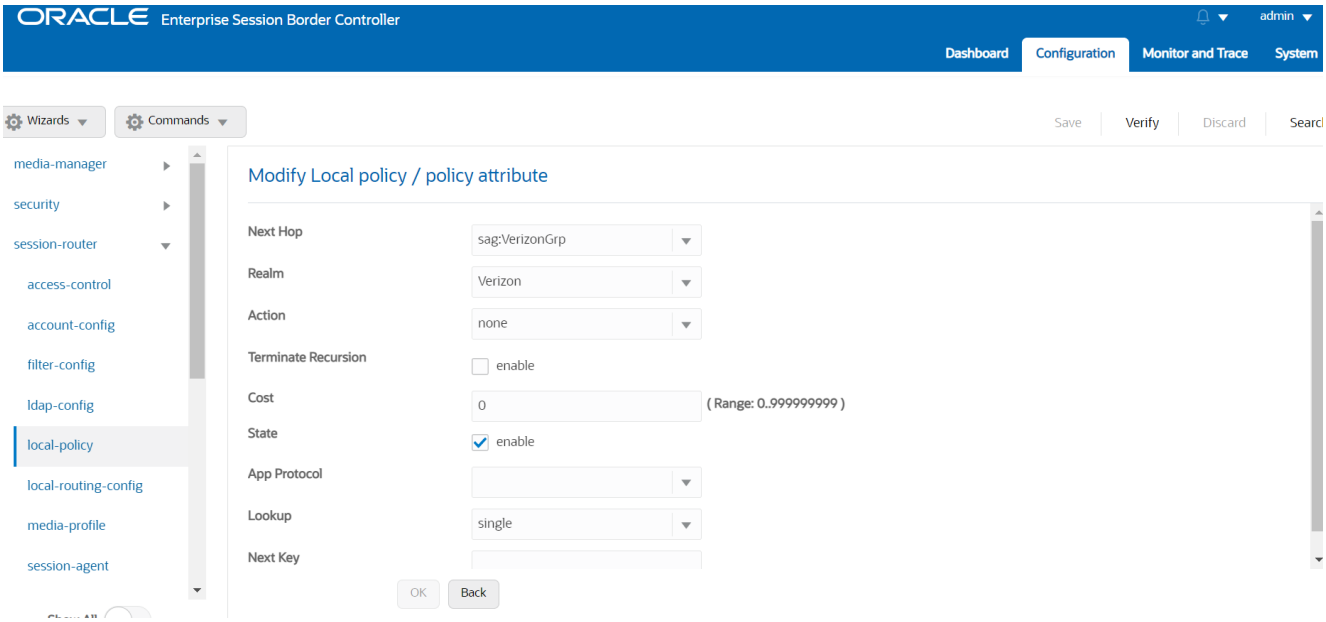
In order to route SIP traffic to and from Zoom Phone Platform, the following local-policies will need to be configured.

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

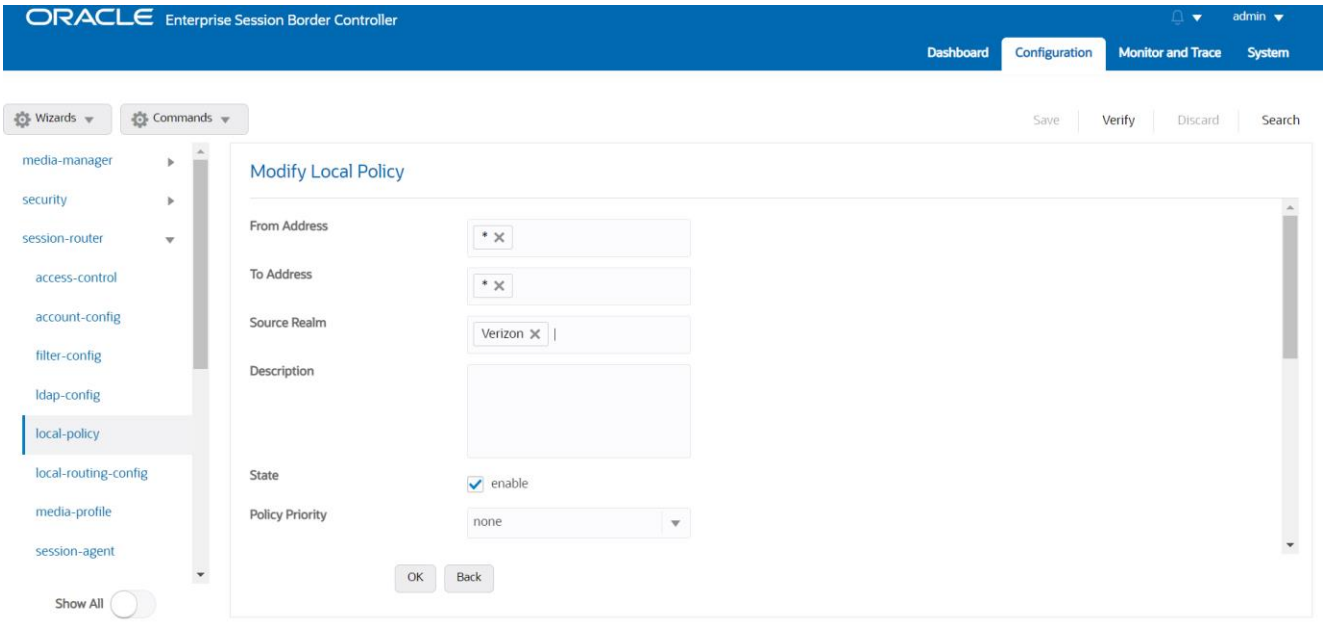
**Route Calls from Zoom To VERIZON TRUNK:**



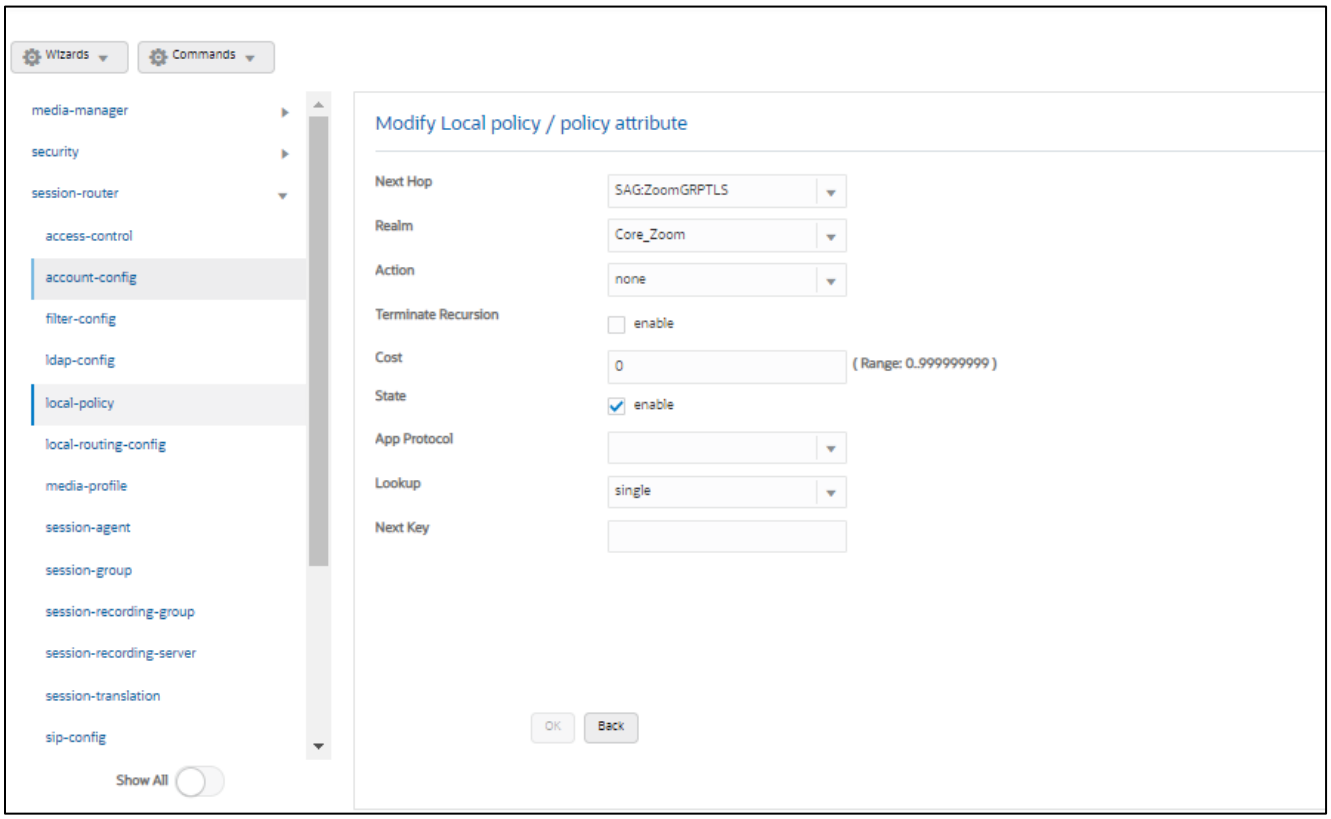

**Policy Attribute:**




**Calls from VERIZON TRUNK To Zoom:**




**Policy Attribute:**




- Click OK at the bottom of each when applicable:

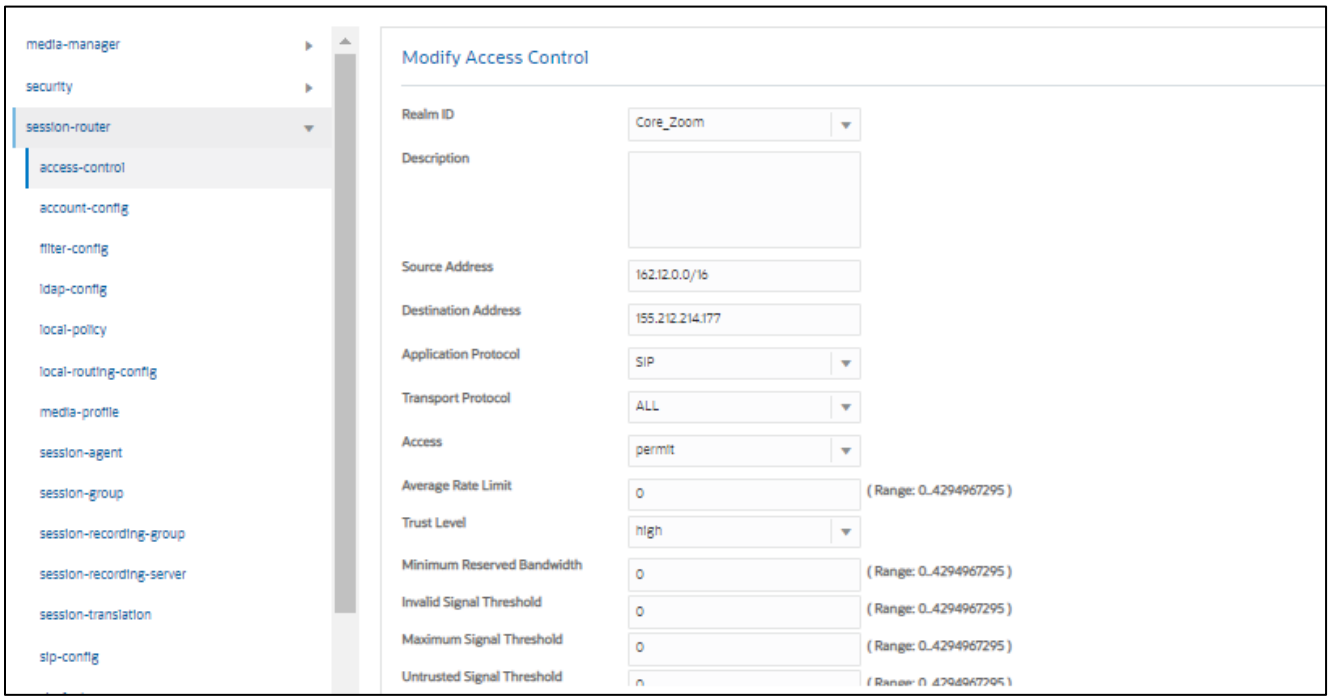
### 6.9.7 Access Controls

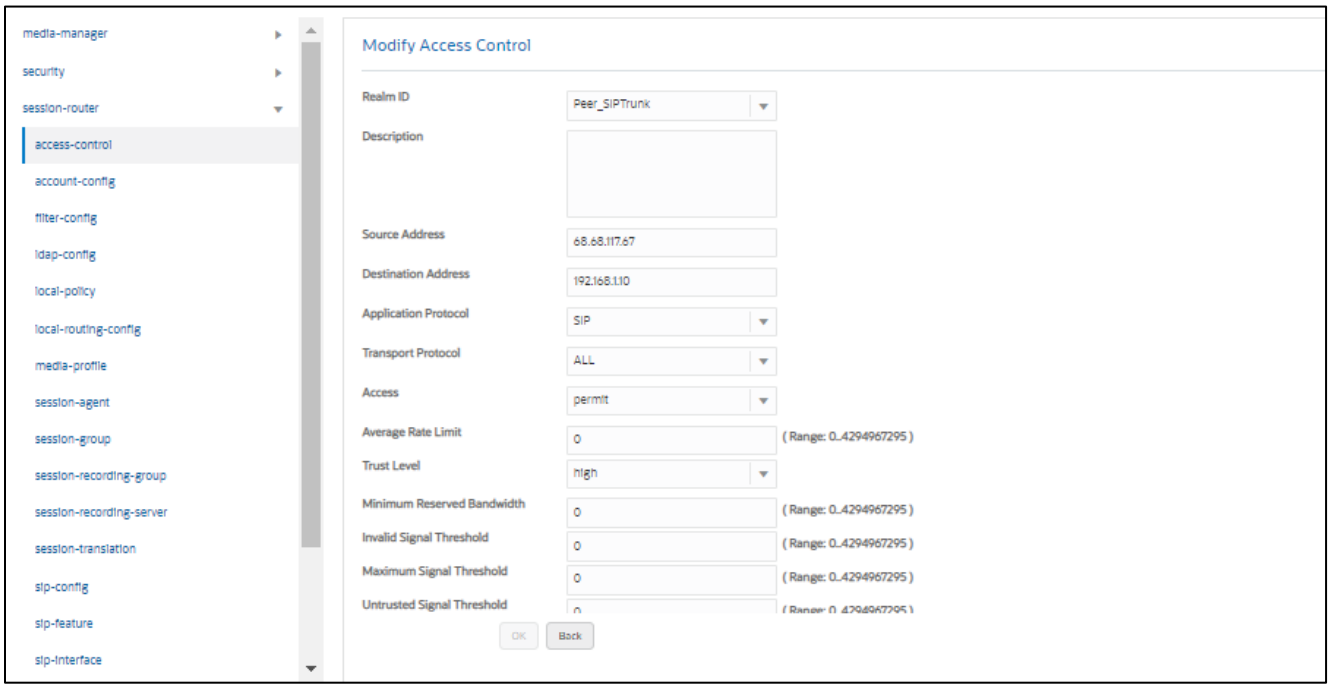
To enhance the security of your Oracle Session Border Controller, we recommend configuration access controls to limit traffic to only trusted IP addresses on all public facing interfaces

GUI Path: session-router/access-control

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

Please use the example below to configure access controls in your environment for both Zoom IP's, as well as SIPTrunk IP's (if applicable).






Notice the trust level on this ACL is set to high. When the trust level on an ACL is set to the same value of as the access control trust level of its associated realm, this create an implicit deny, so only traffic from IP addresses configured as ACL's with the same trust level will be allowed to send traffic to the SBC. For more information about trust level on ACL's and Realms, please see the SBC Security Guide, Page 3-10.

- Click OK at the bottom

Save and activate your configuration**!**

The SBC configuration is now complete. Move to verify the connection with Zoom.

# 7 Verify Connectivity

## 7.1 ORACLE SBC Options Ping

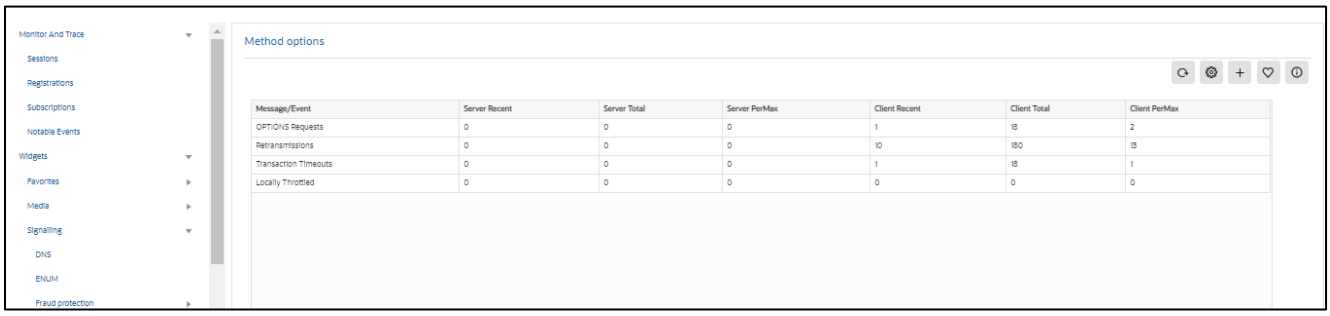
After you've paired the ORACLE SBC with Zoom, validate that the SBC can successfully exchange SIP Options with Zoom Cloud Voice.

While in the ORACLE SBC GUI, Utilize the "Widgets" to check for OPTIONS to and from the SBC.

- At the top, click "Widgets"

This brings up the Widgets menu on the left hand side of the screen

GUI Path: Monitor and Trace/Signaling/SIP/Methods/OPTIONS




| Message/Event | Server Recent | Server Total | Server PerMax | Client Recent | Client Total | Client PerMax |
|---|---|---|---|---|---|---|
| OPTIONS Requests | 0 | 0 | 0 | 1 | 18 | 2 |
| Retransmissions | 0 | 0 | 0 | 10 | 180 | 15 |
| Transaction Timeouts | 0 | 0 | 0 | 1 | 18 | 1 |
| Locally Throttled | 0 | 0 | 0 | 0 | 0 | 0 |

- Looking at both the **Server Recent** and **Client Recent**, verify the counters are showing OPTIONS Requests and 200OK responses.

# 8 Appendix A

## 8.1 SBC Behind NAT SPL configuration

This configuration is needed when your SBC is behind a NAT device. This is configured to avoid loss in voice path and SIP signaling.

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 that the Support for SBC Behind NAT SPL plug-in changes depends on the direction of the call.

For example, 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, as follows.

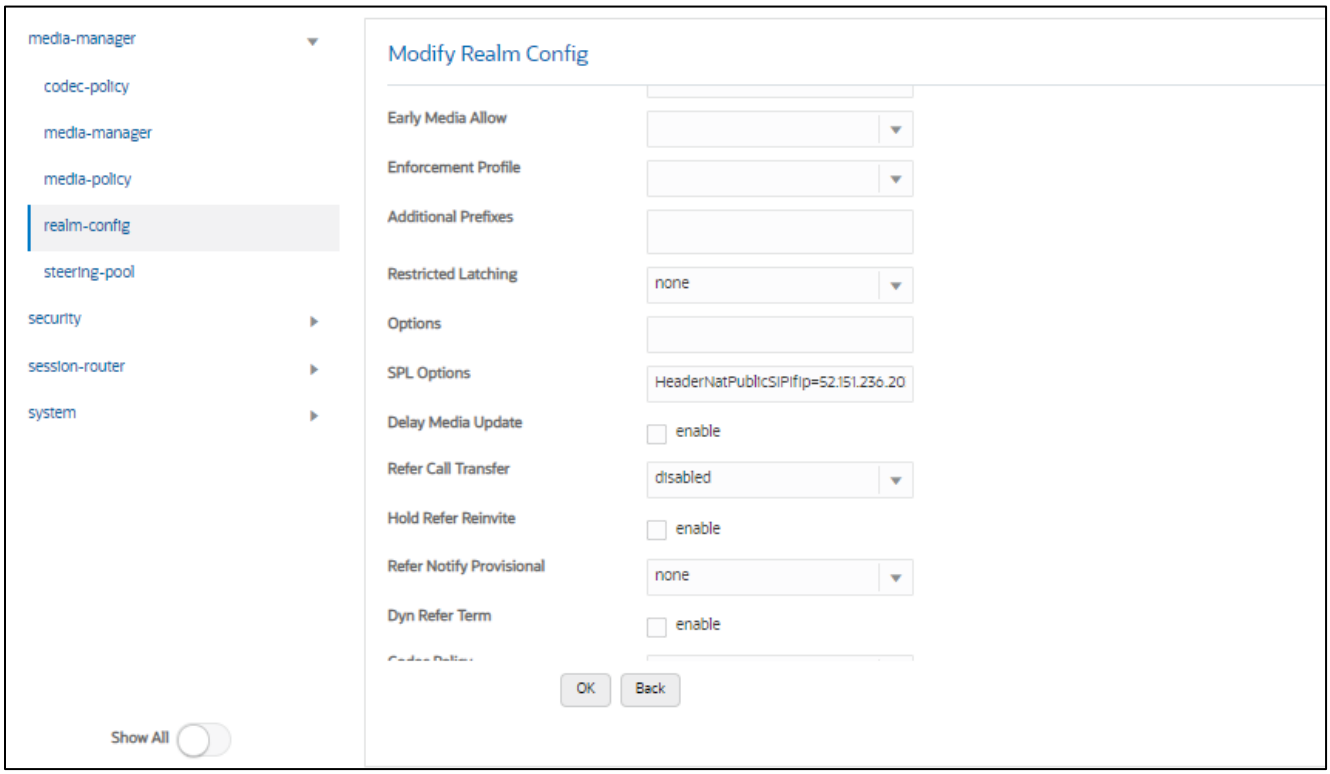
- The private IP address must be the same as the SIP Interface IP address.
- The public IP address must be the public IP address of the NAT device

Here is an example configuration with SBC Behind NAT SPL config. The SPL is applied to the Zoom 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.

HeaderNatPublicSIPIfIp=52.151.236.203,HeaderNatPrivateSIPIfIp=10.0.4.4

Here HeaderNatPublicSIPIfIp is the public interface ip and HeaderNatPrivateSIPIfIp is the private ip.




This configuration would be applied to each SIP Interface in the ORACLE SBC configuration that was deployed behind a Nat Device.

# 9 Caveat

## 9.1 Transcoding Opus Codec

Opus is an audio codec developed by the IETF that supports constant and variable bitrate encoding from 6 kbit/s to 510 kbit/s and sampling rates from 8 kHz (with 4 kHz bandwidth) to 48 kHz (with 20 kHz bandwidth, where the entire hearing range of the human auditory system can be reproduced). It incorporates technology from both Skype's speech-oriented SILK codec and Xiph.Org's low-latency CELT codec. This feature adds the Opus codec as well as support for transrating, transcoding, and pooled transcoding. Opus can be adjusted seamlessly between high and low bit rates, and transitions internally between linear predictive coding at lower bit rates and transform coding at higher bit rates (as well as a hybrid for a short overlap). Opus has a very low algorithmic delay (26.5 ms by default), which is a necessity for use as part of a low audio latency communication link, which can permit natural conversation, networked music performances, or lip sync at live events. Opus permits trading-off quality or bit rate to achieve an even smaller algorithmic delay, down to 5 ms. Its delay is very low compared to well over 100 ms for popular music formats such as MP3, Ogg Vorbis, and HE-AAC; yet Opus performs very competitively with these formats in terms of quality across bit rates.

Zoom Phone fully support the use of OPUS, but advertises a static value of 40000 for max average bit rate

Although the range for maxaveragebitrate is 6000 to 51000, only bit rates of 6000 to 30000 bps are transcodable by the DSP's on the Oracle SBC. A media profile configured with a value for maxaveragebitrate greater than 30000 is not transcodable and cannot be added on egress in the codec-policy element.

The Oracle SBC will however support the entire range of of maxaveragebitrate if negotiated between the parties of each call flow.

## 10 ACLI Running Configuration

```
access-control
        realm-id                                Core_Zoom
        source-address                          162.12.0.0/16
        destination-address                     155.212.214.177
        application-protocol                    SIP
        trust-level                             high
access-control
        realm-id                                Verizon_SIPTrunk
        source-address                          68.68.117.67
        destination-address                     141.146.36.101
        application-protocol                    SIP
        trust-level                             high
capture-receiver
        address                                 141.146.36.158
        network-interface                       M10:0
certificate-record
        name                                    DigiCertInter
        common-name                             DigiCert SHA2 Secure Server CA
certificate-record
        name                                    DigiCertRoot
        common-name                             DigiCert Global Root CA
certificate-record
        name                                    GoDaddyInter
        common-name                             GoDaddy Secure Server CA
certificate-record
        name                                    GoDaddyRoot
        common-name                             GoDaddy Class2 Root CA
certificate-record
        name                                    SBCEnterpriseCert
        state                                   California
        locality                                Redwood City
        organization                            Oracle Corporation
        common-name                             telechat.o-test06161977.com
```

```
        extended-key-usage-list                 serverAuth
                                                ClientAuth
codec-policy
        name                                    OptimizeCodecs
        allow-codecs                            * G722:no PCMA:no CN:no SIREN:no
RED:no G729:no
        add-codecs-on-egress                    PCMU
codec-policy
        name                                    audiotest
        allow-codecs                            * SILK:no G729:no
filter-config
        name                                    all
        user                                    *
local-policy
        from-address                            *
        to-address                              *
        source-realm                            Core_Zoom
        policy-attribute
                next-hop                                SAG:VerizonGrp
                realm                                   Verizon_SIPTrunk
local-policy
        from-address                            *
        to-address                              *
        source-realm                            Verizon_SIPTrunk
        policy-attribute
                next-hop                                SAG:ZoomGRPTLS
                realm                                   Core_Zoom
media-manager
        max-untrusted-signaling                 1
        min-untrusted-signaling                 1
media-profile
        name                                    CN
        subname                                 wideband
        payload-type                            118
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
        ip-address                              155.212.214.177
        netmask                                 255.255.255.0
        gateway                                 155.212.214.1
        dns-ip-primary                          8.8.8.8
        dns-domain                              customers.telechat.o-
test06161977.com
        hip-ip-list                             155.212.214.177
        icmp-address                            155.212.214.177
network-interface
        name                                    s1p0
        ip-address                              141.146.36.101
        netmask                                 255.255.255.0
        gateway                                 141.146.36.1
        hip-ip-list                             141.146.36.101
        icmp-address                            141.146.36.101
ntp-config
        server                                  198.55.111.50
                                                206.108.0.131
```

```
phy-interface
        name                                    s0p0
        operation-type                          Media
phy-interface
        name                                    s1p0
        operation-type                          Media
        slot                                    1
realm-config
        identifier                              Core_Zoom
        description                             Realm Facing Zoom Phone
        network-interfaces                      s0p0:0.4
        mm-in-realm                             enabled
        media-sec-policy                        sdesPolicy
        access-control-trust-level              high
        refer-call-transfer                     enabled
        codec-policy                            audiotest
realm-config
        identifier                              Verizon_SIPTrunk
        description                             Ream facing SIP trunk
        network-interfaces                      s1p0:0.4
        mm-in-realm                             enabled
        qos-enable                              enabled
        media-sec-policy                        RTP
        access-control-trust-level              high
        codec-policy                            OptimizeCodecs
        hide-egress-media-update                enabled
sdes-profile
        name                                    SDES
        crypto-list                             AES_CM_128_HMAC_SHA1_32
                                                AES_CM_128_HMAC_SHA1_80
        lifetime                                31
session-agent
        hostname                                162.12.232.59
        ip-address                              162.12.232.59
        port                                    5061
        transport-method                        StaticTLS
        realm-id                                Core_Zoom
```

```
        description                             SA to Zoom TLS
        ping-method                             OPTIONS
        ping-interval                           30
        in-manipulationid                       RespondOPTIONS
        out-manipulationid                      ZoomManipulation
            out-translationid                       addPlus
session-agent
        hostname                                162.12.233.59
        ip-address                              162.12.233.59
        port                                    5061
        transport-method                        StaticTLS
        realm-id                                Core_Zoom
        description                             SA to Zoom TLS
        ping-method                             OPTIONS
        ping-interval                           30
        in-manipulationid                       RespondOPTIONS
        out-manipulationid                      ZoomManipulation
            out-translationid                       addPlus
session-agent
        hostname                                68.68.117.67
        ip-address                              68.68.117.67
        realm-id                                Verizon_SIPTrunk
        ping-method                             OPTIONS
        ping-interval                           60
            out-manipulationid                      SIPTrunkManipulation
            out-translationid                       removeE164
session-group
        group-name                              ZoomGRPTLS
        dest                                    162.12.233.59
                                                162.12.232.59
        sag-recursion                           enabled
session-group
        group-name                              VerizonGrp
        strategy                                RoundRobin
        dest                                    sce10001.1259031211.globalipcom.
com
                                                sce10002.1259031211.globalipcom.
com
```

```
        sag-recursion                           enabled

security-policy
        name                                    Verizon-Security-Policy-1
        network-interface                       M00:0
        local-ip-addr-match                     141.146.36.101
        remote-ip-addr-match                    152.188.29.84
        local-port-match                        500
        remote-port-match                       500
        local-ip-mask                           255.255.255.192
        remote-ip-mask                          255.255.255.224
        action                                  allow
security-policy
        name                                    Verizon-Security-Policy-1A
        network-interface                       M00:0
        priority                                1
        local-ip-addr-match                     141.146.36.101
        remote-ip-addr-match                    152.188.29.19
        ike-sainfo-name                         VZ1
        outbound-sa-fine-grained-mask
                local-ip-mask                           255.255.255.192
                remote-ip-mask                          255.255.255.224
security-policy
        name                                    Verizon-Security-Policy-2
        network-interface                       M00:0
        priority                                2
        local-ip-addr-match                     141.146.36.101
        remote-ip-addr-match                    152.188.28.212
        local-port-match                        500
        remote-port-match                       500
        local-ip-mask                           255.255.255.192
        remote-ip-mask                          255.255.255.224
        action                                  allow
security-policy
        name                                    Verizon-Security-Policy-2A
        network-interface                       M00:0
        priority                                3
```

```
        local-ip-addr-match                     141.146.36.101
        remote-ip-addr-match                    152.188.28.147
        ike-sainfo-name                         VZ2
        outbound-sa-fine-grained-mask
                local-ip-mask                           255.255.255.192
                remote-ip-mask                          255.255.255.224

ike-config
        ike-version                             1
        log-level                               NOTICE
        phase1-dh-mode                          dh-group2
        phase2-exchange-mode                    dh-group2
ike-interface
        ike-version                             1
        address                                 141.146.36.101
        realm-id                                Verizon
        ike-mode                                initiator
        shared-password                         ********
        sd-authentication-method                shared-password
ike-sainfo
        name                                    VZ1
        auth-algo                               md5
        encryption-algo                         3des
        tunnel-local-addr                       141.146.36.101
        tunnel-remote-addr                      152.188.29.84
ike-sainfo
        name                                    VZ2
        auth-algo                               md5
        encryption-algo                         3des
        tunnel-local-addr                       141.146.36.101
        tunnel-remote-addr                      152.188.28.212
session-agent
        hostname                                sce10001.1259031211.globalipcom.
com
        ip-address                              152.188.29.19
        port                                    6292
        transport-method                        UDP+TCP
        realm-id                                Verizon
```

```
        ping-method                             OPTIONS
        ping-interval                           30
        ping-response                           enabled
        rfc2833-mode                            preferred
        rfc2833-payload                         101
session-agent
        hostname                                sce10002.1259031211.globalipcom.
com
        ip-address                              152.188.28.147
        port                                    5201
        transport-method                        UDP+TCP
        realm-id                                Verizon
        ping-method                             OPTIONS
        ping-interval                           30
        ping-response                           enabled
        rfc2833-mode                            prefe
session-timer-profile
        name                                    ZoomSessionTimer
        session-expires                         900
        force-reinvite                          enabled
        response-refresher                      uac
session-translation
        id                                      addPlus
        rules-calling                           addPlus
        rules-called                            addPlus
session-translation
        id                                      removeE164
        rules-calling                           removeplus1
        rules-called                            removeplus1
        rules-asserted-id                       removeplus1
SIP-config
        home-realm-id                           Core_Zoom
        registrar-domain                        *
        registrar-host                          *
        registrar-port                          5060
        options                                 inmanip-before-validate
                                                max-udp-length=0
        extra-method-stats                      enabled
```

```
sip-interface
        realm-id                                Core_Zoom
        description                             Inerface for Zoom Phone
        sip-port
                address                                 155.212.214.177
                port                                    5061
                transport-protocol                      TLS
                tls-profile                             TLSZoom
                allow-anonymous                         agents-only
        in-manipulationid                       RespondOPTIONS
        out-manipulationid                      ACME_NAT_TO_FROM_IP
        sip-profile                             forreplaces
        session-timer-profile                   ZoomSessionTimerSIP-interface
        realm-id                                Verizon_SIPTrunk
        description                             Inerface for VERIZON TRUNK Trunk
        SIP-port
                address                                 141.146.36.101
                allow-anonymous                         agents-only
sip-manipulation
        name                                    RespondOPTIONS
        header-rule
                name                                    Respond2OPTIONS
                header-name                             from
                action                                  reject
                methods                                 OPTIONS
                new-value                               "200 OK"
sip-manipulation
        name                                    SIPTrunkManipulation
        description                             Manipulations on SIP Trunk side
        header-rule
                name                                    XTraceID
                header-name                             X-Trace-ID[^]
                action                                  delete
                msg-type                                request
                methods                                 INVITE
        header-rule
                name                                    XInstanceID
```

```
                header-name                                 X-Instance-ID[^]
                action                                      delete
                msg-type                                    request
                methods                                     INVITE
        header-rule
                name                                        XDMInfo
                header-name                                 X-DM-Info[^]
                action                                      delete
                msg-type                                    request
                methods                                     INVITE
        header-rule
                name                                        XCapability
                header-name                                 X-Capability[^]
                action                                      delete
                msg-type                                    request
                methods                                     INVITE
        header-rule
                name                                        xpublicip
                header-name                                 X-PUBLIC-IP[^]
                action                                      delete
                msg-type                                    request
                methods                                     INVITE
        header-rule
                name                                        xorigcontact
                header-name                                 X-ORIGINAL-CONTACT[^]
                action                                      delete
                msg-type                                    request
                methods                                     INVITE
        header-rule
                name                                        xorigcallid
                header-name                                 X-ORIGINAL-CALLID[^]
                action                                      delete
                msg-type                                    request
                methods                                     INVITE
        header-rule
                name                                        xtocarrier
                header-name                                 X-TO-CARRIER[^]
```

```
                action                                  delete
                msg-type                                request
                methods                                 INVITE
        header-rule
                name                                    xFSSupport
                header-name                             X-FS-Support[^]
                action                                  delete
                msg-type                                request
                methods                                 INVITE
        header-rule
                name                                    callAcme
                header-name                             From
                action                                  sip-manip
                msg-type                                request
                new-value                               ACME_NAT_TO_FROM_IP
        header-rule
                name                                    changeAssertedIP
                header-name                             P-Asserted-Identity
                action                                  manipulate
                comparison-type                         pattern-rule
                msg-type                                request
                methods                                 INVITE
                element-rule
                        name                                    changeIP
                        type                                    uri-host
                        action                                  replace
                        comparison-type                         pattern-rule
                        new-value                               $LOCAL IP

SIP-monitoring
        match-any-filter                        enabled
        monitoring-filters                      *
SIP-profile
        name                                    forreplaces
        replace-dialogs                         enabled
steering-pool
        ip-address                              141.146.36.101
        start-port                              20000
```

```
        end-port                                40000
        realm-id                                Verizon_SIPTrunk
steering-pool
        ip-address                              155.212.214.177
        start-port                              20000
        end-port                                40000
        realm-id                                Core_Zoom
system-config
        hostname                                zoom.us
        description                             SBC for Zoom Phone
        location                                Burlington,MA
        system-log-level                        NOTICE
        default-gateway                         10.138.194.129
        source-routing                          enabled
        snmp-agent-mode                         v1v2
tls-global
        session-caching                         enabled
tls-profile
        name                                    TLSZoom
        end-entity-certificate                  SBCEnterpriseCert
        trusted-ca-certificates                 GoDaddyInter
                                                GoDaddyRoot
        mutual-authenticate                     enabled
translation-rules
        id                                      addPlus
        type                                    add
        add-string                              +1
translation-rules
        id                                      removeplus1
        type                                    delete
        delete-string                           +1
web-server-config
        http-interface-list                     GUI
```

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