Configuring the Oracle SBC with Microsoft Teams Direct Routing Non-Media Bypass - Enterprise Model

Technical Application Note

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Revision History

Version	Description of Changes	Date Revision Completed
1.0	Added Web GUI	12-09-2019
2.0	• Added Missing sip-manipulation • Added bug fixes ACMESOLU-106	21-10-2019
3.0	• Modified Media Manger Options • Added notes regarding new features in 830M1P8A • Modified Appendix B • Added Appendix D • Add Alert and associated Important Info • Added Config for E911 and Elin Gateway	01-06-2020
4.0	• Corrected spelling mistakes in media-manager config. • Modified powershell screenshots with Microsoft latest update • Removed media-profile config for CN	19-02-2021
5.0	• Corrected match value in SDP-line-rule	10-05-2021

1 *Alert*:

Before Moving Forward in this Document, Please Read:

Due to planned upgrades to Microsoft Teams Direct Routing Platform, there are mandatory changes that are required to the Oracle Session Border Controller Configuration in some environments. If these changes are not implemented in the near future, there may be risk of call failures. Please See Appendix D/Important Note for more details:

Please reach out to your Oracle Account Team with any questions regarding this notification.

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2 Introduction

This document describes how to connect the Oracle SBC to Microsoft Teams Direct Routing. This paper is intended for IT or telephony professionals.

3 About Microsoft Teams Direct Routing

Microsoft Teams Direct Routing allows a customer provided SBC to connect to Microsoft Phone System. The customer provided SBC can be connected to almost any telephony trunk or interconnect 3rd party PSTN equipment. The scenario allows:

- Use virtually any PSTN trunk with Microsoft Phone System;
- Oracle Enterprise Session Border Controllers are Microsoft certified to work for Direct Routing. Additional information can be found at: https://docs.microsoft.com/en-us/microsoftteams/direct-routing-border-controllers

3.1 Planning Direct Routing

If you are planning to configure direct routing with Oracle SBC, you must ensure that the following prerequisites are completed before proceeding further

- Tenant requirements
- Licensing and other requirements
- SBC domain names
- Public trusted certificate for the SBC
- SIP Signaling: FQDNs
- Transcoding Resources for the SBC (CN, RTCP, and Ringback)

3.1.1 Tenant Requirements

Make sure that you have a custom domain on your O365 tenant. Here we have created an account soladmin@solutionslab.onmicrosoft.com.

Likewise create an account, which is not the default domain created for your tenant. For more information https://docs.microsoft.com/en-us/microsoftteams/direct-routing-plan#sbc-domain-names

3.1.2 Licensing Requirements

Make sure that the following license requirements are met by the Direct routing users. (ie the users must be assigned the following licenses in Office 365)

- Microsoft Phone System
- Microsoft Teams + Skype for Business Plan 2 if included in Licensing Sku

3.1.3 DNS Requirements

Create DNS records for domains in your network that resolve to your SBC.
Before you begin, make sure that you have the following per every SBC you want to pair:

- Public IP address
- FQDN name resolving to the Public IP address

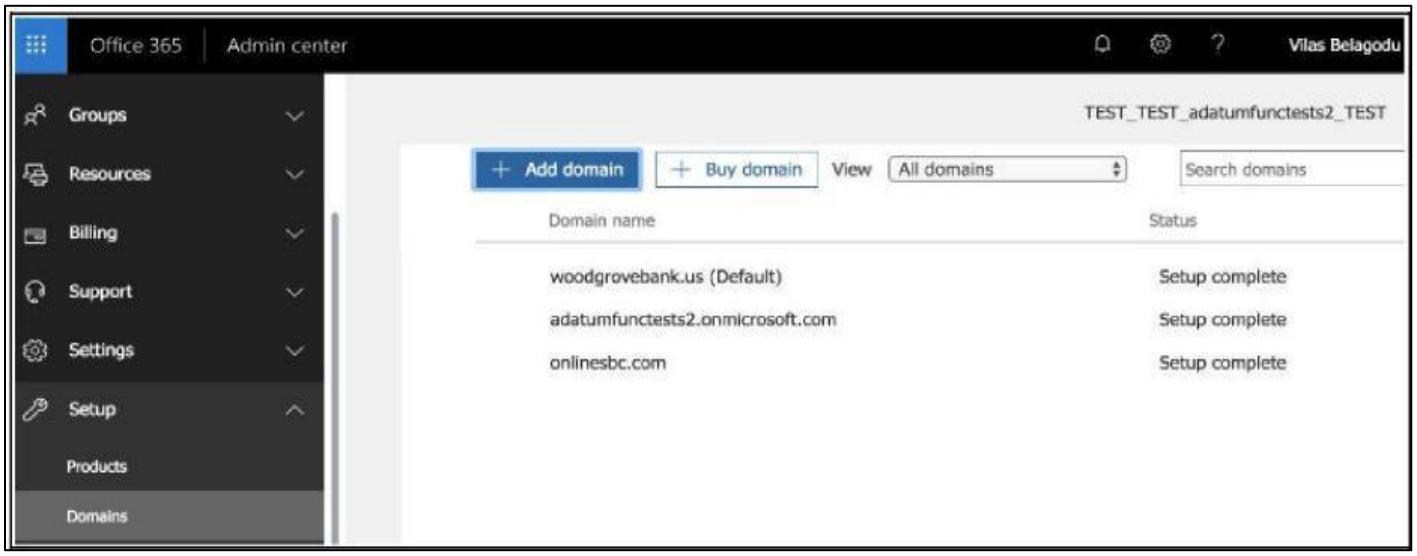
3.1.4 SBC Domain Names

The SBC domain name must be from one of the names registered in “Domains” of the tenant. You cannot use the *.onmicrosoft.com tenant for the domain name.

For example, on the picture below, the administrator registered the following DNS names for the tenant:

DNS Name	Can be used for SBC FQDN	Examples of FQDN names
woodgrovebank.us	Yes	Valid names: • sbc1.woodgrovebank.us; • ussbcs15.woodgrovebank.us • europe.woodgrovebank.us Non-Valid name: • sbc1.europe.woodgrovebank.us (requires registering domain name europe.atatum.biz in “Domains” first)
woodgrovebankus.onmicrosoft.com	No	Using *.onmicrosoft.com domains is not supported for SBC names
hybrdvoice.org	Yes	Valid names: • sbc1. hybridvoice.org • ussbcs15. hybridvoice.org • europe. hybridvoice.org Non-Valid name: • sbc1.europe.hybridvoice.org (requires registering domain name europe. hybridvoice.org in “Domains” first)

Please activate and register the domain of tenant.



In this document the following FQDN and IP is used as an example:

Public IP	FQDN Name
155.212.214.173	Oracleesbc.woodgrovebank.us

3.1.5 Public trusted certificate for the SBC

It is necessary to setup a public trusted certificate for direct routing. This certificate is used to establish TLS connection between Oracle SBC and MS Teams. The certificate needs to have the SBC FQDN in the subject, common name, or subject alternate name fields. For root certificate authorities used to generate SBC certificate refer to Microsoft documentation. https://docs.microsoft.com/en-us/microsoftteams/direct-routing-plan#public-trusted-certificate-for-the-sbc

3.2 Configure Direct Routing

The SBC has to be paired with the Direct routing interface for direct routing to work. To achieve this, follow the below steps

3.2.1 Establish a remote PowerShell session to Skype for Business Online

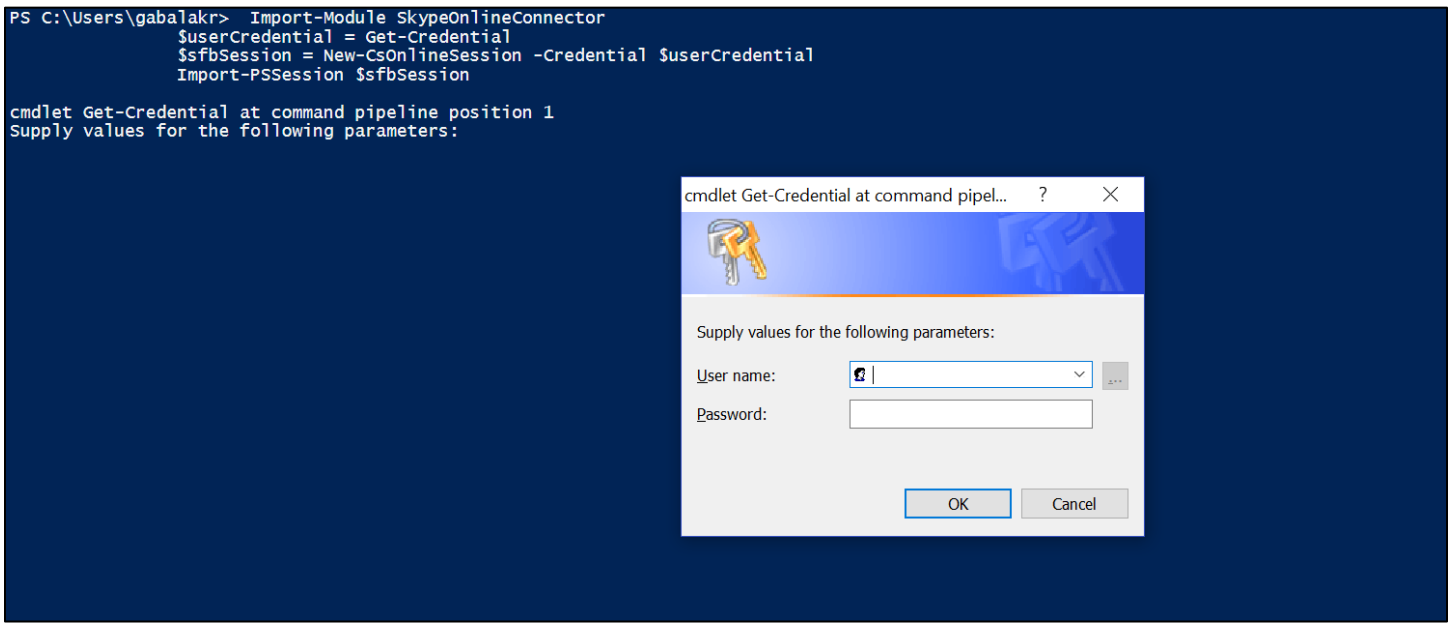
The first step is to download Microsoft PowerShell .For more information and downloading the client, visit Microsoft's website https://docs.microsoft.com/en-us/SkypeForBusiness/set-up-your-computer-for-windows-powershell/set-up-your-computer-for-windows-powershell.

To establish a remote connection, follow the below steps

Open PowerShell and type in the below commands
Import-Module -Name MicrosoftTeams
$userCredential = Get-Credential
$sfbSession = New-CsOnlineSession -Credential $userCredential
Import-PSSession $sfbSession

```
PS C:\WINDOWS\system32> Import-Module -Name MicrosoftTeams
$userCredential = Get-Credential
$sfbSession = New-CsOnlineSession -Credential $userCredential
Import-PSSession $sfbSession
cmdlet Get-Credential at command pipeline position 1
Supply values for the following parameters:
```

- PowerShell prompts for a username and password. Enter the tenant username and password. Tenants are used in pairing the SBC with the direct routing interface.



```
PS C:\WINDOWS\system32> Import-Module -Name MicrosoftTeams
$userCredential = Get-Credential
$sfbSession = New-CsOnlineSession -Credential $userCredential
Import-PSSession $sfbSession
cmdlet Get-Credential at command pipeline position 1
Supply values for the following parameters:

ModuleType Version    Name                                ExportedCommands
---------- -------    ----                                ----------------
Script     1.0        tmp_tyoOuglc.age                    {Clear-CsOnlineTelephoneNumberReservation, ConvertTo-JsonForPSW...


PS C:\WINDOWS\system32> |
```

- Now the remote connection is established. Check whether the remote connection is proper by using the below command
  "Get-Command *onlinePSTNGateway*"
  The command will return the four functions shown here that will let you manage the SBC.

```
PS C:\Users\gabalakr> Get-Command *onlinePSTNGateway*

CommandType     Name                                               Version    Source
-----------     ----                                               -------    ------
Function        Get-CsOnlinePSTNGateway                            1.0        tmp_fcnyz43x.w0h
Function        New-CsOnlinePSTNGateway                            1.0        tmp_fcnyz43x.w0h
Function        Remove-CsOnlinePSTNGateway                         1.0        tmp_fcnyz43x.w0h
Function        Set-CsOnlinePSTNGateway                            1.0        tmp_fcnyz43x.w0h
```

3.2.2 Pair the SBC to tenant

To pair SBC to the tenant, type the command as shown below. Here the FQDN used is oraclesbc.woodgrovebank.us

New-CsOnlinePSTNGateway -Fqdn <SBC FQDN> -SipSignalingPort <SBC SIP Port> -MaxConcurrentSessions <Max Concurrent Sessions the SBC can handle> -Enabled $true

For more information ,please visit the Microsoft documentation here:

https://docs.microsoft.com/en-us/microsoftteams/direct-routing-configure#connect-to-skype-for-business-online-by-using-powershell

```
PS C:\Users\gabalakr>
PS C:\Users\gabalakr> New-CsOnlinePSTNGateway -Fqdn oracleesbc2.woodgrovebank.us -SipSignallingPort 5061 -MaxConcurrentSessions 500 -Enabled $true -MediaBypass $false
```

After pairing, we can check whether the SBC is present in the list of paired SBC's by typing in the command:

Get-CsOnlinePSTNGateway -Identity oracleesbc2.woodgrovebank.us

The details of the gateway are listed when the above command is entered.
Verify whether the enabled parameter is set to true.
The OPTIONS ping from the SBC is now responded with 200OK.Once there are incoming options to the direct routing interface, it starts sending OPTIONS to the SBC.

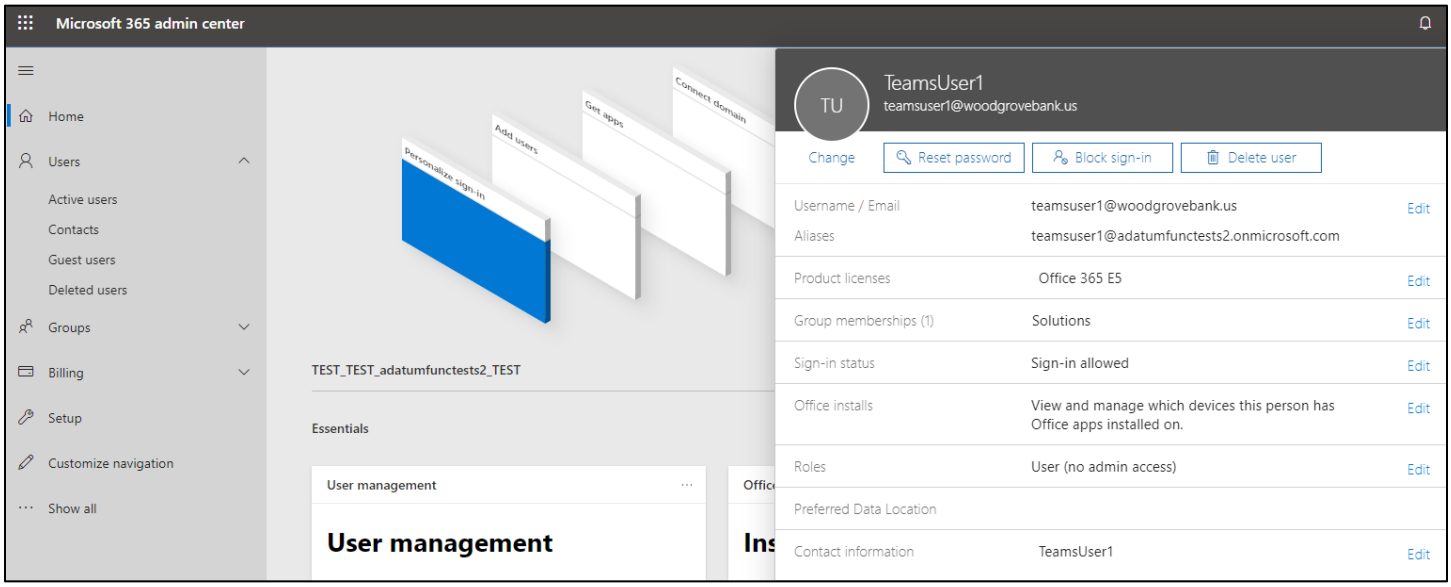
```
Identity                              : oracleesbc2.woodgrovebank.us
Fqdn                                  : oracleesbc2.woodgrovebank.us
SipSignallingPort                     : 5061
FailoverTimeSeconds                   : 10
ForwardCallHistory                    : True
ForwardPai                            : True
SendSipOptions                        : True
MaxConcurrentSessions                 :
Enabled                               : True
MediaBypass                           : False
GatewaySiteId                         :
GatewaySiteLbrEnabled                 : False
FailoverResponseCodes                 : 408,503,504
GenerateRingingWhileLocatingUser      : True
PidfLoSupported                       : False
MediaRelayRoutingLocationOverride     :
ProxySbc                              :
BypassMode                            : None
```

3.2.3 Enable users for Direct Routing

To add users, create a user in Office 365 and assign a license. Here the following user is created: teamsuser1@woodgrovebank.us

Here the following license is added

- Office 365 Enterprise E5 (including SfB Plan2, Exchange Plan2, Teams, and Phone System)



Verify whether the user is homed in Skype for business Online by issuing the below command in PowerShell

“Get-CsOnlineUser -Identity "<User name>" | fl RegistrarPool”
Here the “infra.lync.com” verifies that the user is homed.

```
PS C:\WINDOWS\system32> Get-CsOnlineUser -Identity "teamsuser1@telechat.o-test06161977.com" | fl RegistrarPool

RegistrarPool : sippoolSN44A01.infra.lync.com
```

Assign a phone number to the user

After creating a user, a phone number and voice mail has to be assigned through Powershell. Enter the below command for assigning a phone number.

Set-CsUser -Identity "<User name>" -EnterpriseVoiceEnabled $true -HostedVoiceMail $true -OnPremLineURI tel:<E.164 phone number>

```
PS C:\WINDOWS\system32> Set-CsUser -Identity "teamsuser2@woodgrovebank.us" -EnterpriseVoiceEnabled $true -HostedVoiceMail $true -OnPremLineURI +17841313123
```

The phone number used has to be configured as a full E.164 phone number with country code.

Configure Voice Routing

Voice Routing is performed by the direct routing Interface based on the following elements

- Voice Routing Policy
- PSTN Usages
- Voice Routes
- Online PSTN Gateway

Here is an example to configure routes, PSTN usage, voice routing policy and assigning the policy to user.

1. Create the PSTN Usage "US and Canada".

```
PS C:\Users\gabalakr> Set-CsOnlinePstnUsage -Identity Global -Usage @{Add="US and Canada"}
```

2. Verify this by executing the command below

```
PS C:\Users\gabalakr> Get-CSOnlinePSTNUsage


Identity : Global
Usage    : {US and Canada}



PS C:\Users\gabalakr>
```

3. Configure voice route as shown below. Here all calls are routed to the same SBC.This is achieved by using -NumberPattern ".*"

New-CsOnlineVoiceRoute -id "$Routename" -NumberPattern "*" -OnlinePstnGatewayList “oracleesbc2.woodgrovebank.us” -Priority 5 -OnlinePstnUsages “US and Canada”

```
2> New-CsOnlineVoiceRoute -id "Bedford1" -NumberPattern "*"  -OnlinePstnGatewayList “oracleesbc2.woodgrovebank.us” -Priority 5 -OnlinePstnUsages “US and Canada
```

4.Verify the configuration by typing in the following command Get-CsOnlineVoiceRoute

```
Identity              : Oracle_US
Priority              : 3
Description           :
NumberPattern         : ^(\+1[0-9]{10})$
OnlinePstnUsages      : {Oracle_US}
OnlinePstnGatewayList : {sbc2.customers.telechat.o-test06161977.com, oracleesbc2.woodgrovebank.us}
Name                  : Oracle_US
```

5. Create a Voice Routing Policy "US Only" and add to the policy the PSTN Usage "US and Canada.".Use the following command

New-CsOnlineVoiceRoutingPolicy "US Only" -OnlinePstnUsages "US and Canada"

This can be verified through the following command.

```
PS C:\Users\gabalakr> Get-CsOnlineVoiceRoutingPolicy


Identity          : Global
OnlinePstnUsages  : {}
Description       :
RouteType         :

Identity          : Tag:US Only
OnlinePstnUsages  : {US and Canada}
Description       :
RouteType         : BYOT
```

6. Grant to user teamsuser1 a voice routing policy by using PowerShell

```
PS C:\WINDOWS\system32> Grant-CsOnlineVoiceRoutingPolicy -Identity "teamsuser2@woodgrovebank.us" -PolicyName "US Only"
```

7. Validate the same using the PowerShell command as shown below
   $GetUserDetails=Get-CsOnlineUser -Identity teamsuser2@woodgrovebank.us
   $GetUserVoiceRoutePolicy = $GetUserDetails.OnlineVoiceRoutingPolicy

3.3 Microsoft Teams Direct Routing Interface characteristics

Table 1 contains the technical characteristics of the Direct Routing Interface. Microsoft, in most cases, uses RFC standards as a guide during the development. However, Microsoft does not guarantee interoperability with SBCs even if they support all the parameters in table 1 due to specifics of implementation of the standards by SBC vendors. Microsoft has a partnership with some SBC vendors and guarantees their device's interoperability with the interface. All validated devices are listed on Microsoft's site. Microsoft only supports the validated devices to connect to Direct Routing Interface. Oracle is one of the vendors who have a partnership with Microsoft.

Ports and IP	SIP Interface FQDN Name	Refer to Microsoft documentation	
	IP Addresses range for SIP interfaces	Refer to Microsoft documentation	
	SIP Port	5061	
	IP Address range for Media	Refer to Microsoft documentation	
	Media port range on Media Processors	Refer to Microsoft documentation	
	Media Port range on the client	Refer to Microsoft documentation	
Transport and Security	SIP transport	TLS	
	Media Transport	SRTP	
	SRTP Crypto Suite	AES_CM_128_HMAC_SHA1_80, non-MKI	DTLS-SRTP is not supported
	Control protocol for media transport	SRTCP (SRTCP-Mux recommended)	Using RTCP mux helps reduce number of required ports
	Supported Certification Authorities	Refer to Microsoft documentation	
	Transport for Media Bypass	ICE-lite (RFC5245) – recommended, • Client also has Transport Relays	
Codecs	Audio codecs	• G711 • G722 • Silk (Teams clients) • Opus (WebRTC clients) - Only if Media Bypass is used; • G729	
	Other codecs	• DTMF – Required • Events 0-16 • CN • Required narrowband and wideband • RED – Not required • Silence Suppression – Not required	

3.4 Requirements to SIP messages “Invite” and “Options”

Microsoft Teams Hybrid Voice Connectivity interface has requirements for the syntax of SIP messages.

The section covers high-level requirements to SIP syntax of Invite and Options messages. The information can be used as a first step during troubleshooting when calls don’t go through. From our experience most of the issues are related to the wrong syntax of SIP messages.

Terminology

- Recommended – not required, but to simplify the troubleshooting, it is recommended to configure as in examples as follow
- Must – strict requirement, the system does not work without the configuration of these parameters

3.5 Requirements for “INVITE” messages syntax

Picture 1 Example of INVITE message

```
INVITE sip:+17814437382@sip.pstnhub.microsoft.com:5061;user=phone;transport=tls SIP/2.0
Via: SIP/2.0/TLS 155.212.214.172:5061;branch=z9hG4bKndcs1720d08dhhs5s8g0.1
Max-Forwards: 45
From:<sip:+17657601680@oracleesbc2.woodgrovebank.us:5060;user=phone>;tag=af50c97a0a020200
To: <sip:+17814437382@sip.pstnhub.microsoft.com:5060;user=phone>
Call-ID: 1-af50c97a0a020200.2e95886d@68.68.117.67
CSeq: 2 INVITE
Contact:<sip:7657601680@oracleesbc2.woodgrovebank.us:5061;user=phone;transport=tls>;sip.ice
Allow: ACK, BYE, CANCEL, INVITE, OPTIONS, PRACK, REFER
User-Agent: Oracle ESBC
Supported: 100rel,replaces
Content-Type: application/sdp
```

1. **Request-URI**

   The recommendation is to set the Global FQDN name of the direct routing, in URI hostname when sending calls to Hybrid Voice Connectivity interface.

   Syntax: INVITE sip: <phone number>@<Global FQDN > SIP/2.0
2. **From and To headers**

   Must: When placing calls to Teams Hybrid Voice Connectivity Interface “FROM” header MUST have SBC FQDN in URI hostname:

   Syntax: From:sip: <phone number>@<FQDN of the SBC>;tag=....

   If the parameter is not set correctly, the calls are rejected with “403 Forbidden” message.

   Recommended: When placing calls to Teams Hybrid Voice Connectivity Interface “To” header have SBC FQDN in URI hostname of the Syntax: To: INVITE sip: <phone number>@<FQDN of the SBC>
3. **Contact**

Must have the SBC FQDN for media negotiation. Syntax: Contact: <phone number>@<FQDN of the SBC>:<SBC Port>;<transport type>

The above requirements are automatically fulfilled in the referenced build of the software.

3.6 Requirements for "OPTIONS" messages syntax

Picture 2 Example of OPTIONS message

```
OPTIONS sip:sip.pstnhub.microsoft.com:5061;transport=tls SIP/2.0
Via: SIP/2.0/TLS 155.212.214.172:5061;branch=z9hG4bKk5ilpo00cobbgo9614h0
Call-ID: 98980084af15b946c779c9873165808f020000khp2@155.212.214.172
To: sip:ping@sip.pstnhub.microsoft.com
From: <sip:ping@oracleSBC2.woodgrovebank.us>;tag=db4ec94e7d8227d305c068e7a408a6a0000khp2
Max-Forwards: 70
CSeq: 6835 OPTIONS
Route: <sip:52.114.132.46:5061;lr>
Content-Length: 0
Contact: <sip:ping@oracleSBC2.woodgrovebank.us:5061;transport=tls>
Record-Route: <sip:oracleSBC2.woodgrovebank.us>
```

1. **From header**

   When sending OPTIONS to Teams Hybrid Voice Connectivity Interface "FROM" header MUST have SBC FQDN in URI hostname:

   Syntax: From: sip: <phone number>@<FQDN of the SBC>;tag=....

   If the parameter is not set correctly, the OPTIONS are rejected with "403 Forbidden" message.

2. **Contact.**

   When sending OPTIONS to Teams Hybrid Voice Connectivity Interface "Contact" header should have SBC FQDN in URI hostname along with Port & transport parameter set to TLS.

   Syntax: Contact: sip: <FQDN of the SBC:port;transport=tls> If the parameter is not set correctly, outbound OPTIONS won't be sent by Teams

The above requirements are automatically fulfilled in the referenced build of the software.

3.7 Validated Oracle version

Oracle conducted tests with Oracle SBC SCZ8.3 software – this software with the configuration listed below can run on any of the following products:

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

Here Release SCZ830p7 is the software version used. Please upgrade to SCZ830p7 before configuring Oracle SBC for MS Teams.

4 Configuring the SBC

This chapter provides step-by-step guidance on how to configure Oracle SBC for interworking with Microsoft Teams Direct Routing Interface with Non -Media Bypass.

The Figure 1 below shows the connection topology example.

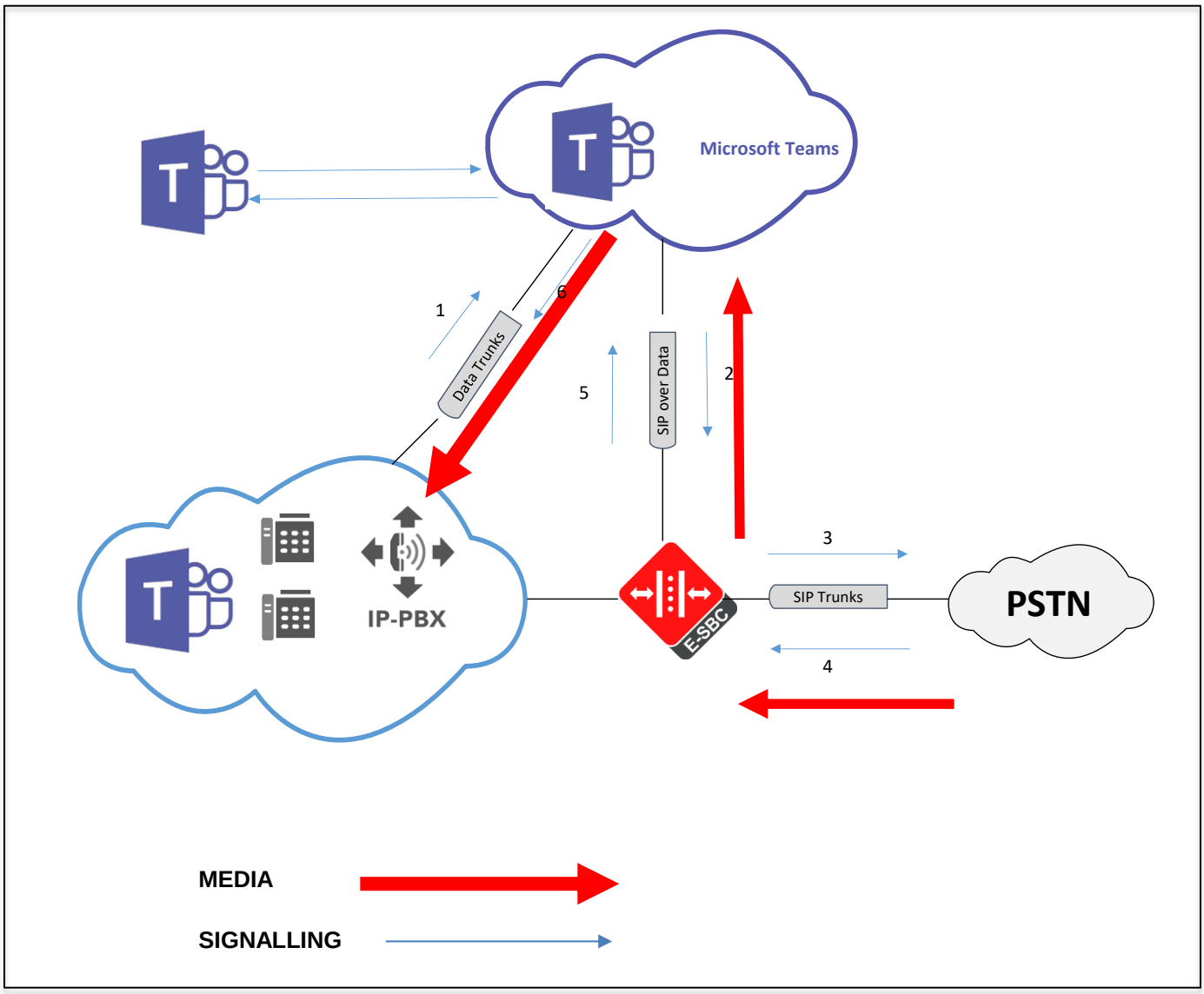


Figure :1: Signaling & media flow with media-bypass disabled

There are several connection entities on the picture:

- Enterprise network consisting of an IP-PBX and Teams client
- Microsoft Teams Direct Routing Interface on the WAN
- SIP trunk from a 3rd party provider on the WAN

These instructions cover configuration steps between the Oracle SBC and Microsoft Teams Direct Routing Interface. 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.

5 New SBC configuration

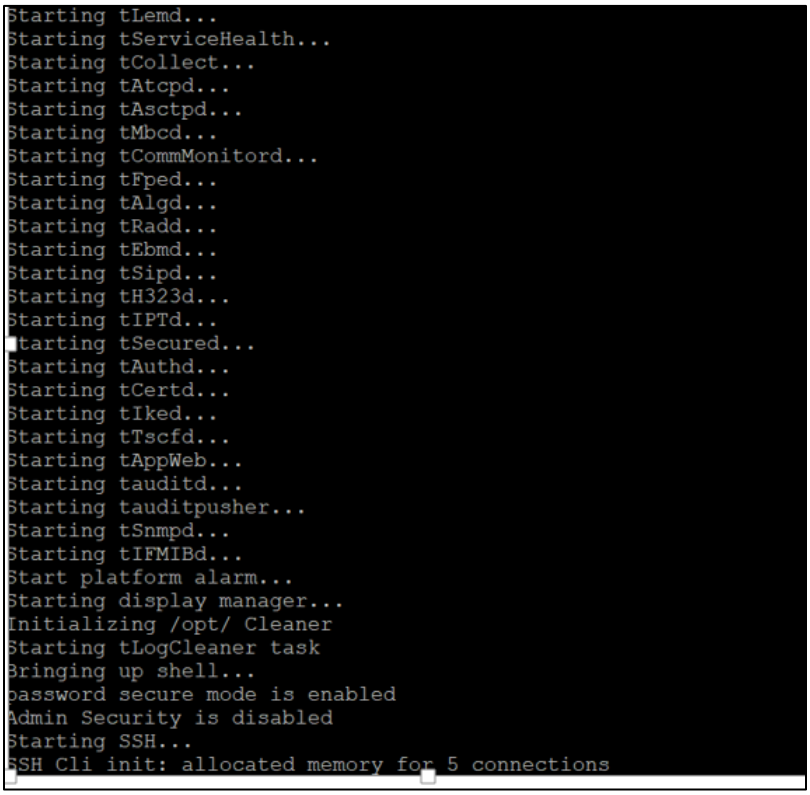
If the customer is looking to setup a new out of the box Oracle SBC with Microsoft teams, please follow the section below.

5.1 Establishing a serial connection to the SBC

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

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

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



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

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

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

Password is acceptable.
```

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

Note: There is no management IP configured by default.

```
PE-6300-1(configure)# bootparam

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

Boot File               : /boot/nnSCZ830p7.bz
IP Address              : 172.18.255.115
VLAN                    :
Netmask                 : 255.255.0.0
Gateway                 : 172.18.0.1
IPv6 Address            :
IPv6 Gateway            :
Host IP                 :
FTP username            : vxftp
FTP password            : vxftp
Flags                   :
Target Name             : PE-6300-1
Console Device          : COM1
Console Baudrate        : 115200
Other                   :

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

PE-6300-1(configure)#
```

Setup product type to Enterprise Session Border Controller as shown. To configure product type, type in setup product in the terminal.

```
PE-6300-1# setup product

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

Last Modified 2019-09-11 13:57:32
---------------------------------------------------------------
 1 : Product          : Enterprise Session Border Controller
```

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

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

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

  Session Capacity (0-128000)              : 500

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

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

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

  Transcode Codec AMR Capacity (0-102375)  : 50

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

    Advanced (enabled/disabled)            : enabled

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

  Transcode Codec OPUS Capacity (0-102375) : 50

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

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

Save the changes and reboot the SBC.

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

Enter 1 - 11 to modify, d' to display, 's' to save, 'q' to exit. [s]: s
SAVE SUCCEEDED
PE-6300-1#
PE-6300-1#
PE-6300-1#
PE-6300-1# reboot

------------------------------------------------------------
WARNING: you are about to reboot this ESBC!
------------------------------------------------------------
```

When the SBC comes up after reboot, it is now ready for you to add a configuration.

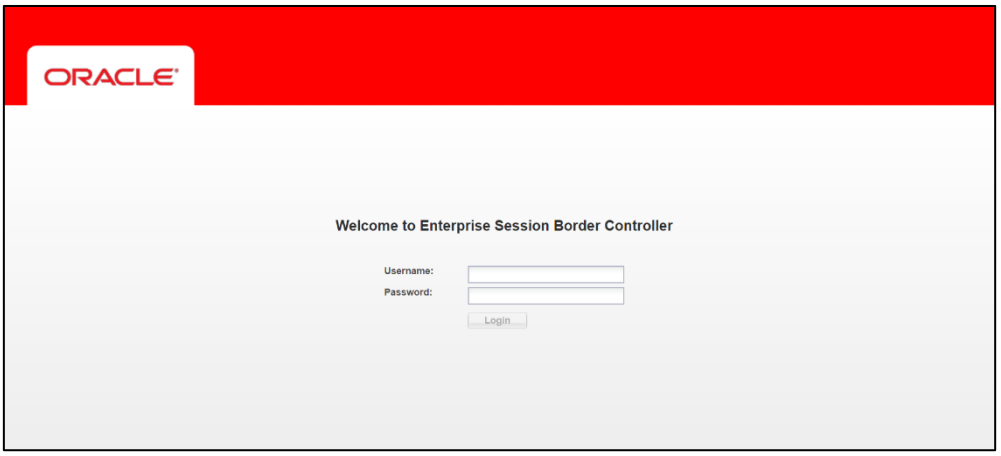
Go to configure terminal->system->web-server-config. Enable the web-server-config to access the SBC using WebGUI. Save and activate the config.

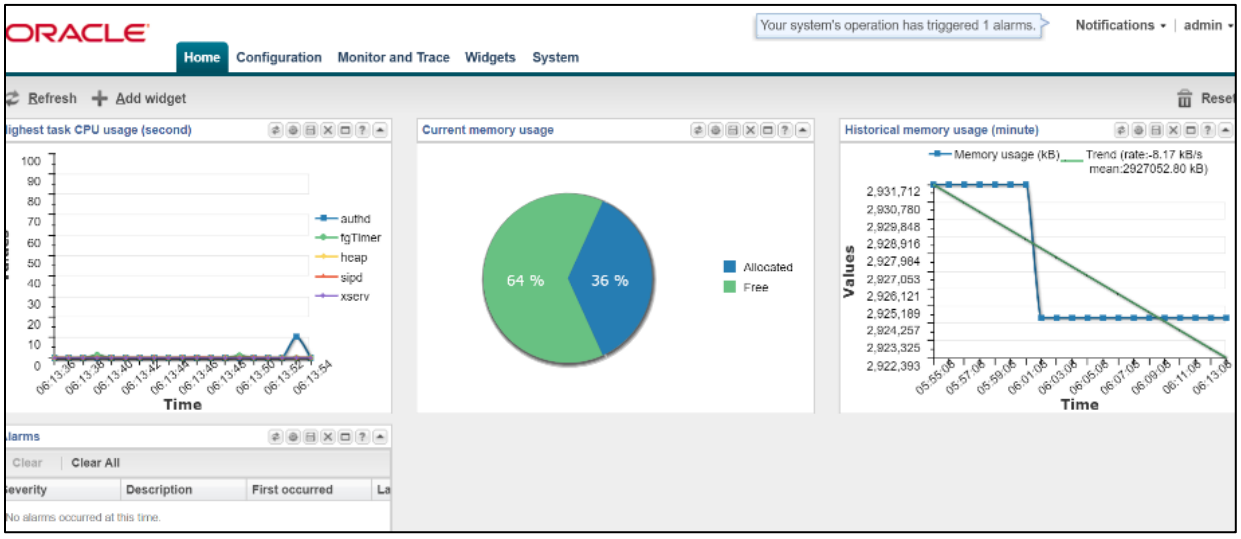
```
PE-6300-1(web-server-config)#
PE-6300-1(web-server-config)# state enabled
PE-6300-1(web-server-config)# done
web-server-config
        state                                   enabled
        inactivity-timeout                      5
        http-state                              enabled
        http-port                               80
        https-state                             disabled
        https-port                              443
        tls-profile
        last-modified-by                        admin@172.18.0.176
        last-modified-date                      2019-09-12 05:31:51

PE-6300-1(web-server-config)# exit
PE-6300-1(system)# exit
PE-6300-1(configure)# exit
PE-6300-1# save-config
checking configuration
------------------------------------------------------------------------------
Results of config verification:
   1 configuration error
Run 'verify-config' for more details
------------------------------------------------------------------------------
Save-Config received, processing.
waiting for request to finish
Request to 'SAVE-CONFIG' has Finished,
Save complete
Currently active and saved configurations do not match!
To sync & activate, run 'activate-config' or 'reboot activate'.
PE-6300-1# activate-config
Activate-Config received, processing.
waiting for request to finish
Request to 'ACTIVATE-CONFIG' has Finished,
Activate Complete
```

5.2 Configure SBC using Web GUI

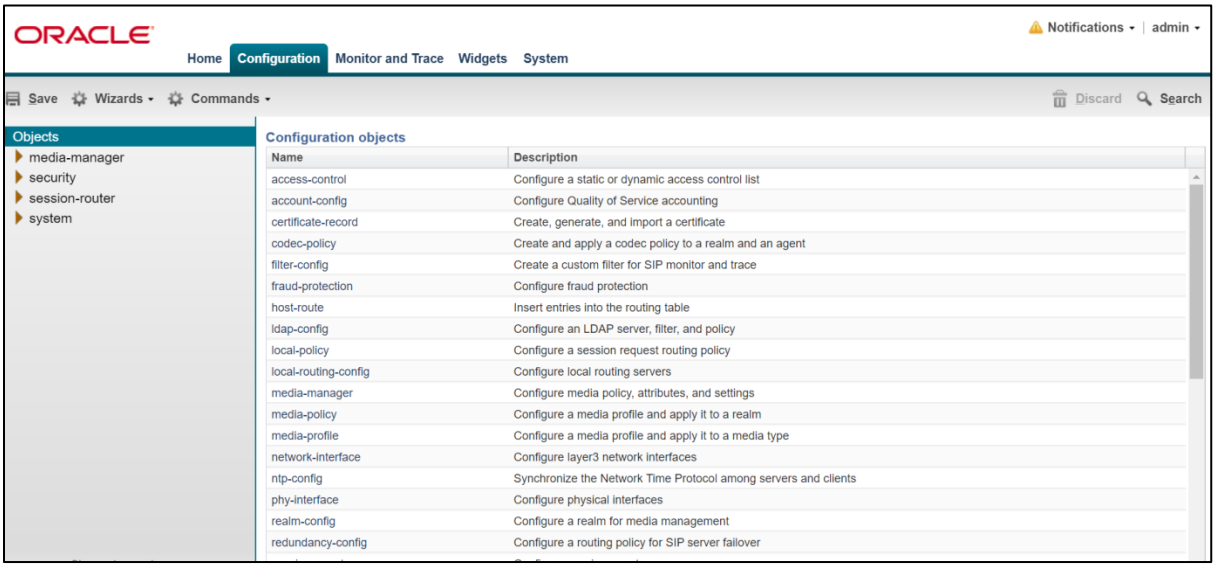
In this app note, we configure SBC using the WebGUI.

The WebGUI can be accessed through the url https://<SBC_MGMT_IP>. The username and password is the same as that of CLI.





Go to Configuration as shown below, to configure the SBC.



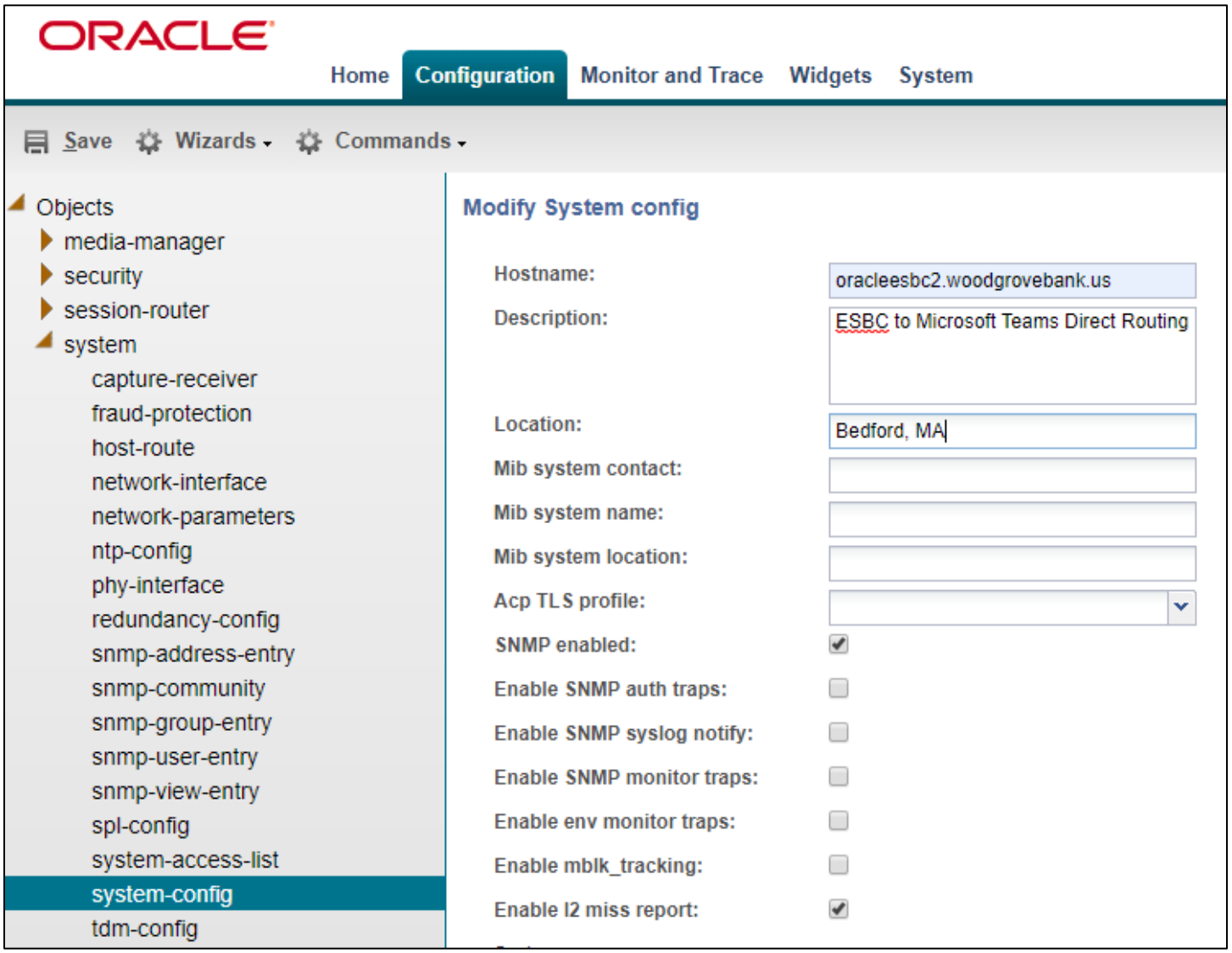
Kindly refer to the GUI User Guide https://docs.oracle.com/en/industries/communications/enterprise-session-border-controller/8.3.0/webgui/esbc_scz830_webgui.pdf for more information.

The expert mode is used for configuration.

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

5.3 Configure system-config

Go to system->system-config



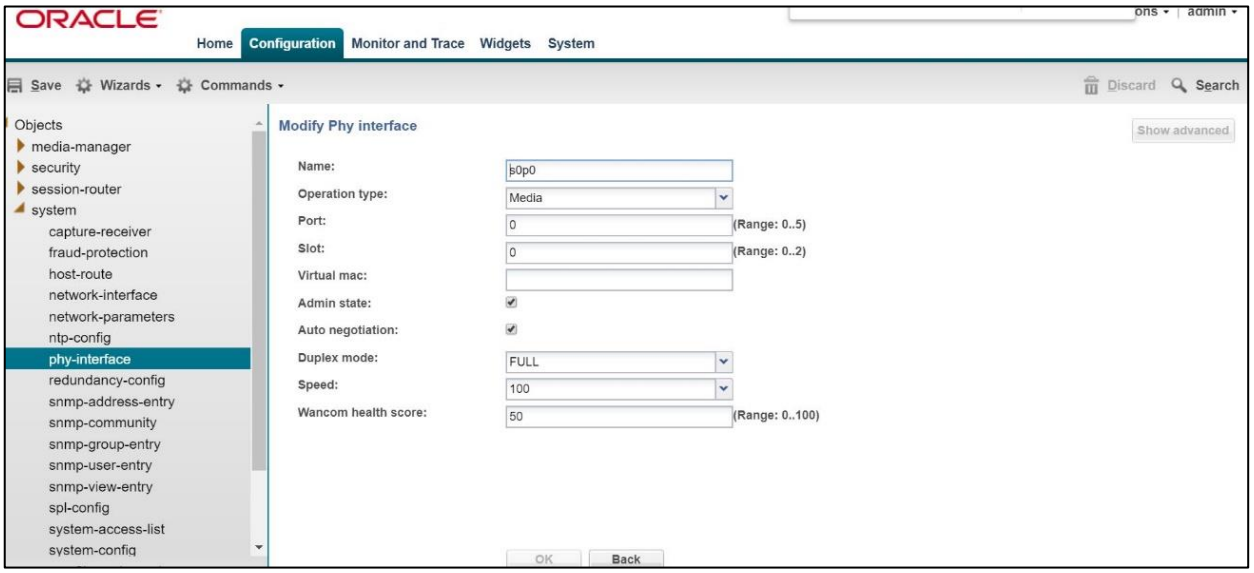
5.4 Configure Physical Interface values

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

You will first configure the slot 0, port 0 interface designated with the name s0p0. This will be the port plugged into your inside (connection to the PSTN gateway) interface. Teams is configured on the slot 0 port 1. Below is the screenshot for creating a phy-interface on s0p0

Create a similar interface for Teams as well from the WebGUI. The table below specifies the values for both teams and Trunk.

Parameter Name	Trunk(s0p0)	MSTeams(s0p1)
Slot	0	0
Port	0	1
Operation Mode	Media	Media



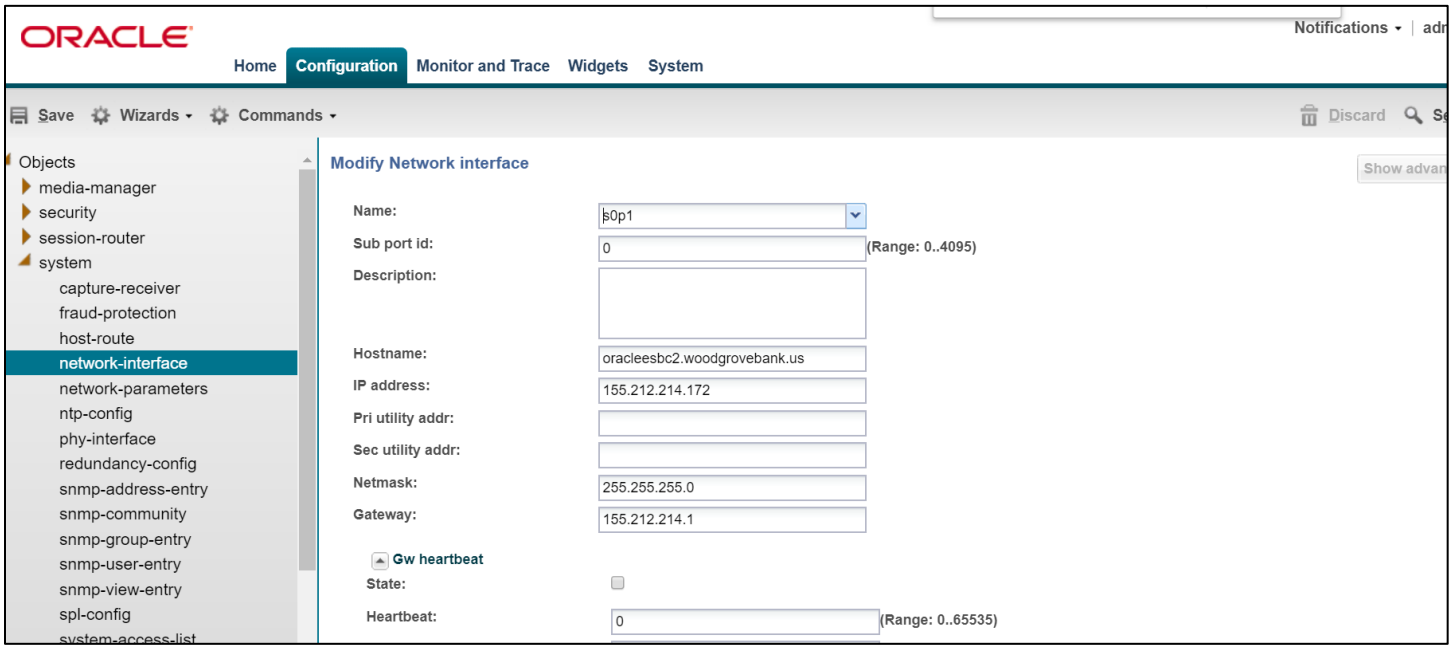
5.5 Configure Network Interface values

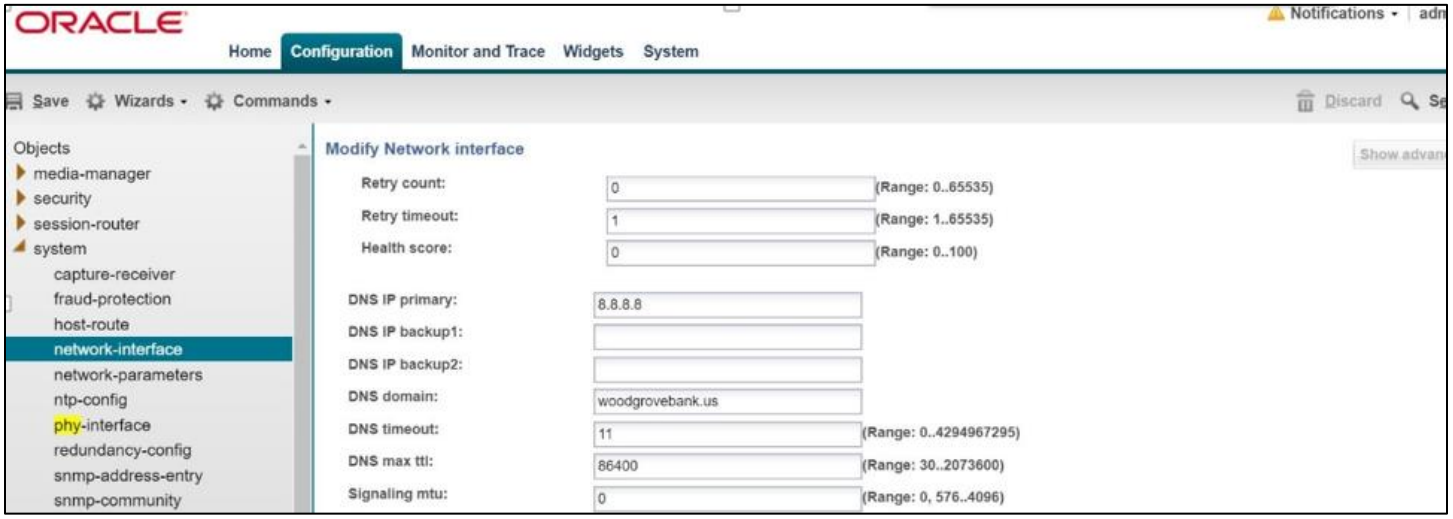
To configure network-interface, go to system->Network-Interface. Configure two interfaces, one for teams and one for PSTN trunk. Here,in the example the Teams network interface is shown. Configure the PSTN interface in the same manner.

The table below lists the parameters, to be configured for both the interfaces. The same is modified as per customer environment.

Parameter Name	Teams Network Interface	PSTN trunk Network interface
Name	s0p1	s0p0
Host Name	oracleesbc2.woodgrovebank.us	
IP address	155.212.214.172	192.65.72.196
Netmask	255.255.255.0	255.255.255.0
Gateway	155.212.214.1	192.65.72.1
DNS-IP Primary	8.8.8.8	
DNS-domain	woodgrovebank.us	

Please note: If running the GA release SCZ830m1p8A, hostname parameter in Network Interface is not mandatory, See Appendix D for additional details on how the hostname parameter is used with new features to help simplify your configuration by eliminating most, if not all required sip manipulations.





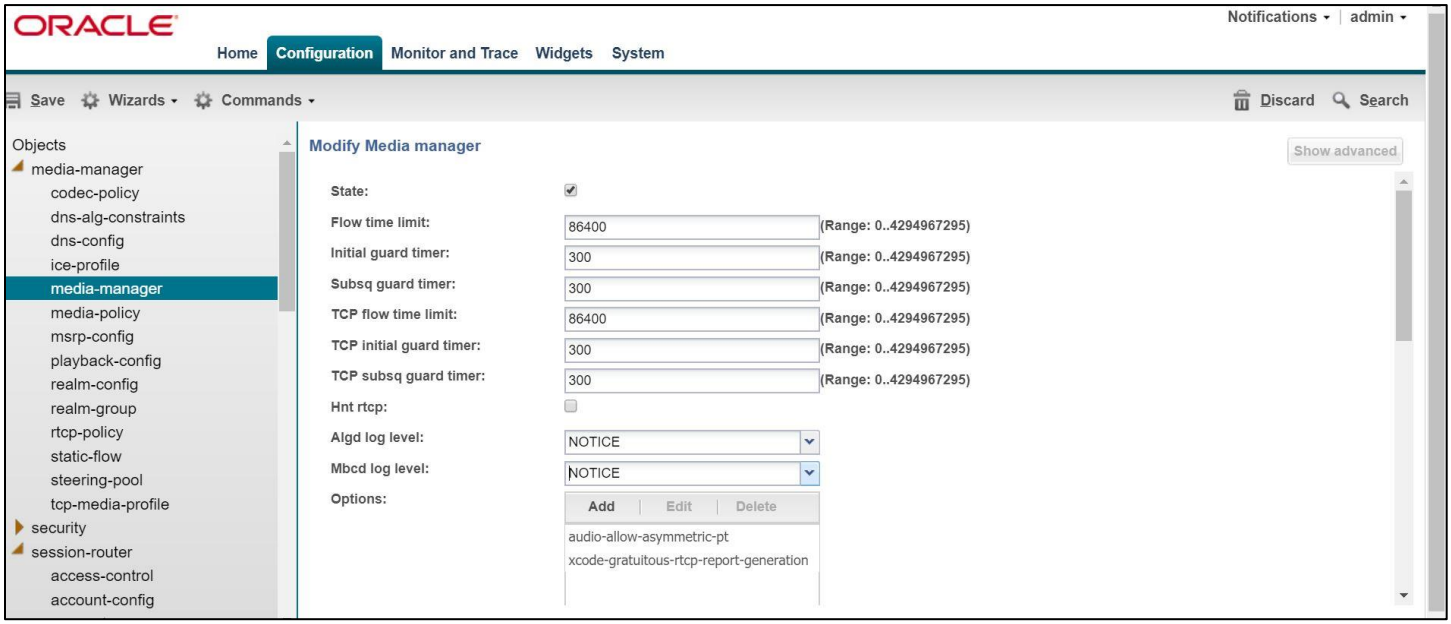
Tip: Configure ICMP IP and HIP IP only on the PSTN side.It is not advisable to configure the ICMP ip and HIP ip on the teams facing side because of inherint risks.

5.6 Enable media manager

Media-manager handles the media stack required for SIP sessions on the SBC. Enable the media manager and configure the below option for generating rtcp reports.

- audio-allow-asymmetric-pt
- xcode-gratuitous-rtcp-report-generation (requires a reboot)

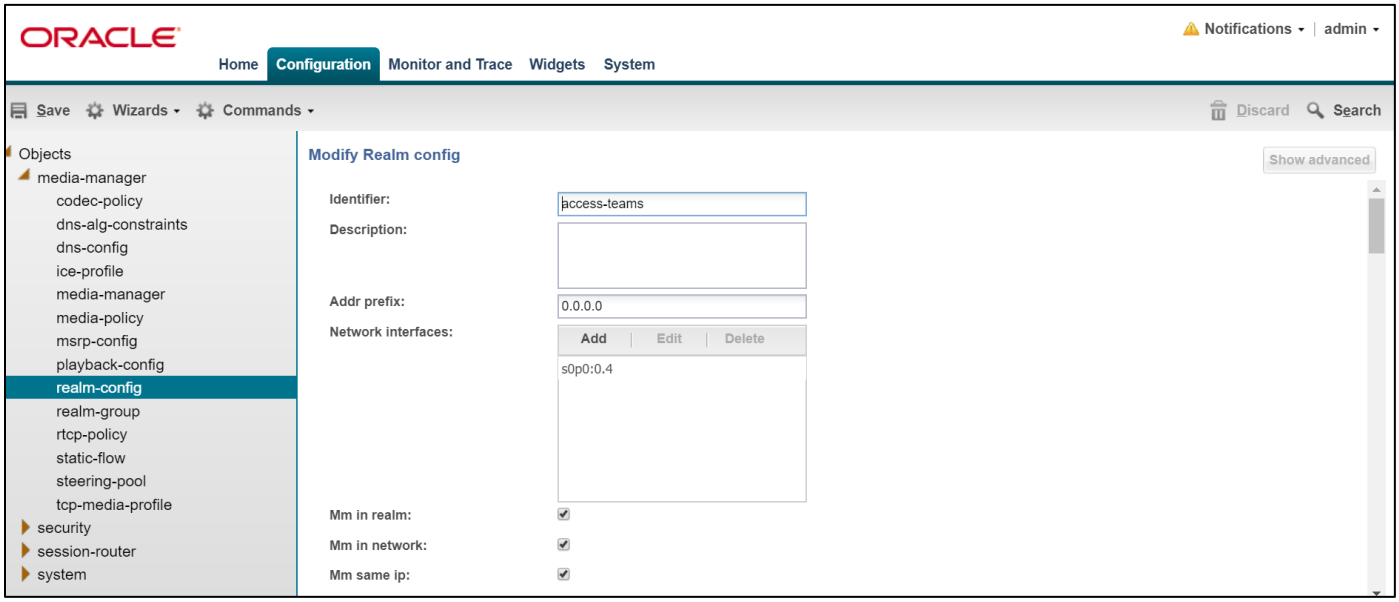
Go to Media-Manager->Media-Manager



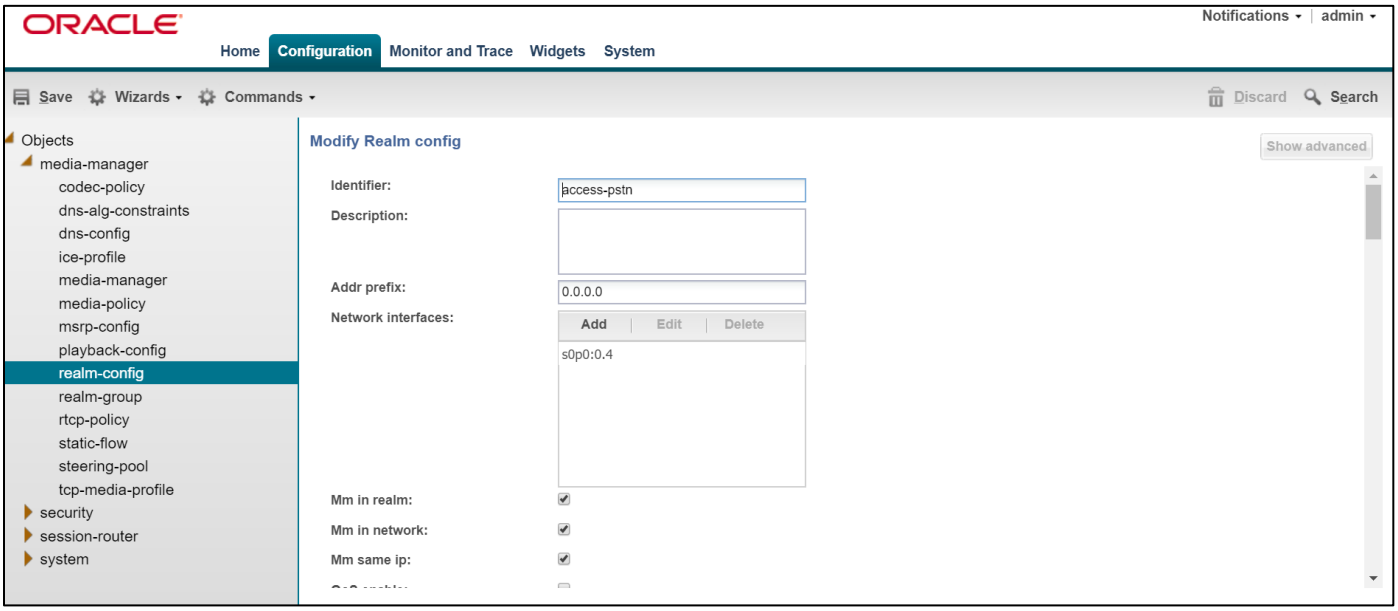
5.7 Configure Realms

Navigate to realm-config under media-manager and configure a realm as shown below

Configure realm for teams as shown below



Configure the realm, similarly for SIP Trunk



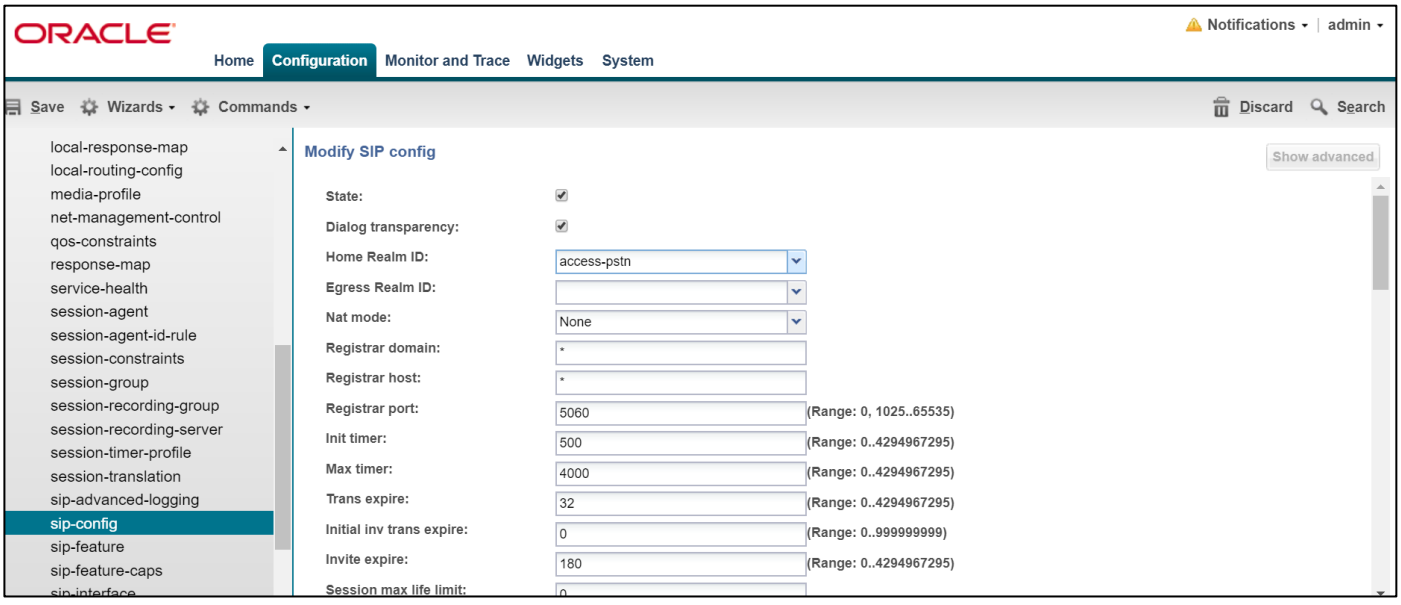
5.8 Enable sip-config

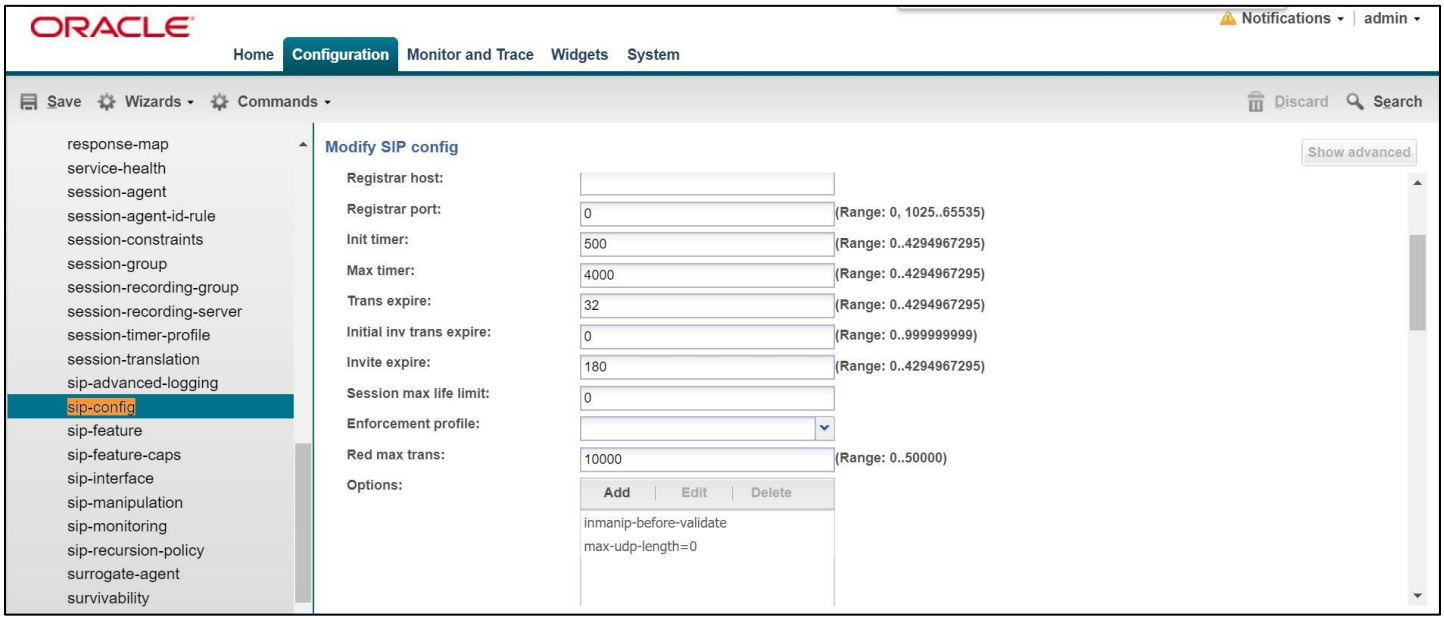
SIP config enables SIP handling in the SBC. Make sure the home realm-id, registrar-domain and registrar-host are configured. Also add the options to the sip-config as shown below.

To configure sip-config,

Go to Session-Router->sip-config.

- In options add max-udp-length =0.

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response-map
service-health
session-agent
session-agent-id-rule
session-constraints
session-group
session-recording-group
session-recording-server
session-timer-profile
session-translation
sip-advanced-logging
sip-config
sip-feature
sip-feature-caps
sip-interface
sip-manipulation
sip-monitoring
sip-recursion-policy
surrogate-agent
survivability
Modify SIP config
Show advanced
Registrar host:
Registrar port:
0
(Range: 0, 1025..65535)
Init timer:
500
(Range: 0..4294967295)
Max timer:
4000
(Range: 0..4294967295)
Trans expire:
32
(Range: 0..4294967295)
Initial inv trans expire:
0
(Range: 0..999999999)
Invite expire:
180
(Range: 0..4294967295)
Session max life limit:
0
Enforcement profile:
Red max trans:
10000
(Range: 0..50000)
Options:
Add
Edit
Delete
inmanip-before-validate
max-udp-length=0

5.9 Configuring a certificate for SBC Interface

Microsoft Teams Direct Routing Interface only allows TLS connections from SBCs for SIP traffic with a certificate signed by one of the trusted certification authorities.
The step below describes how to request a certificate for SBC External interface and configure it based on the example of DigiCert. The process includes the following steps:

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

The following certificate-records are required on the Oracle SBC in order for the SBC to connect with Microsoft Teams

- SBC – 1 certificate-record assigned to SBC
- Root – 1 certificate-record for root cert
- Intermediate – 1 certificate-record for intermediate (this is optional – only required if your server certificate is signed by an intermediate)

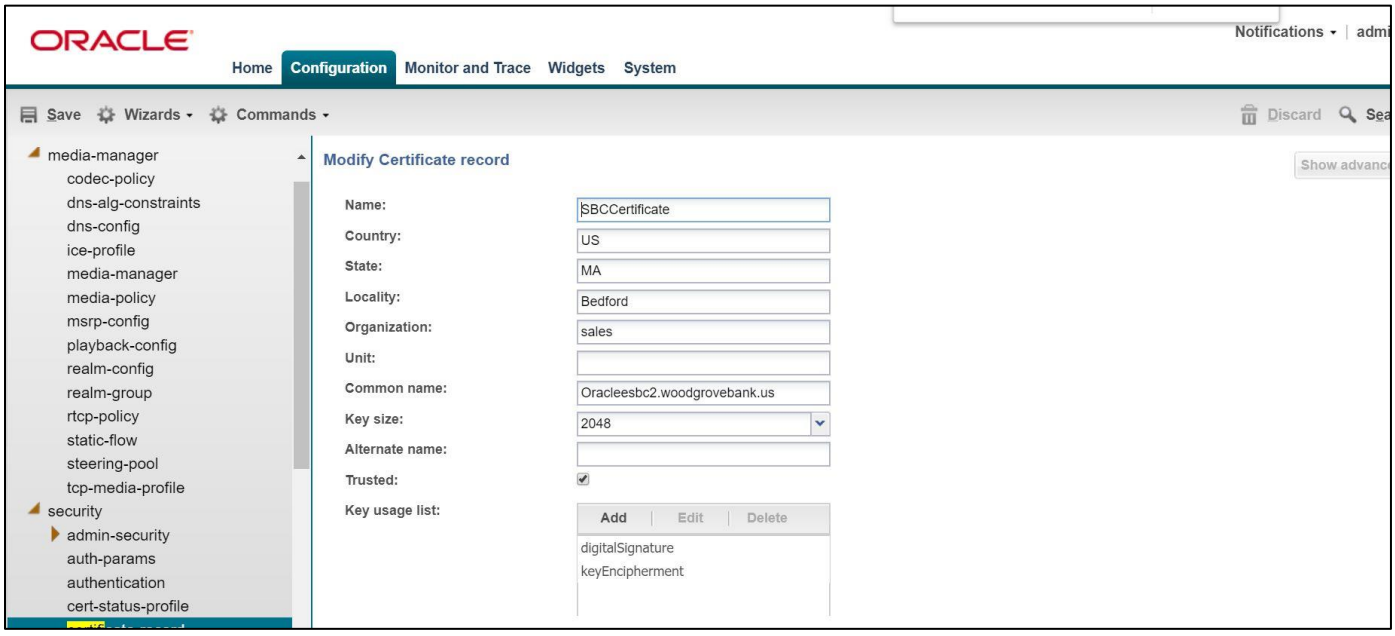
2. Generate a Certificate Signing Request (CSR) and obtain the certificate from a supported Certification Authority

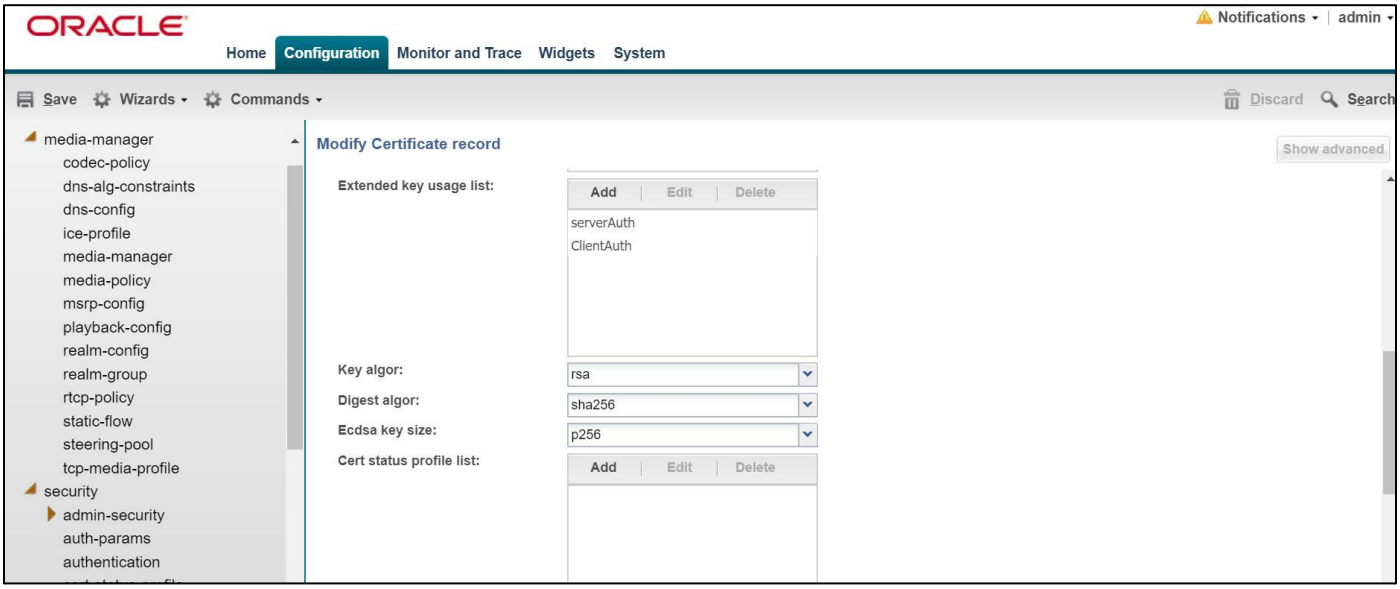
3. Deploy the SBC and Root/Intermediary certificates on the SBC

5.10 SBC Certificate Creation

5.10.1 Step 1 – Creating the SBC certificate record

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





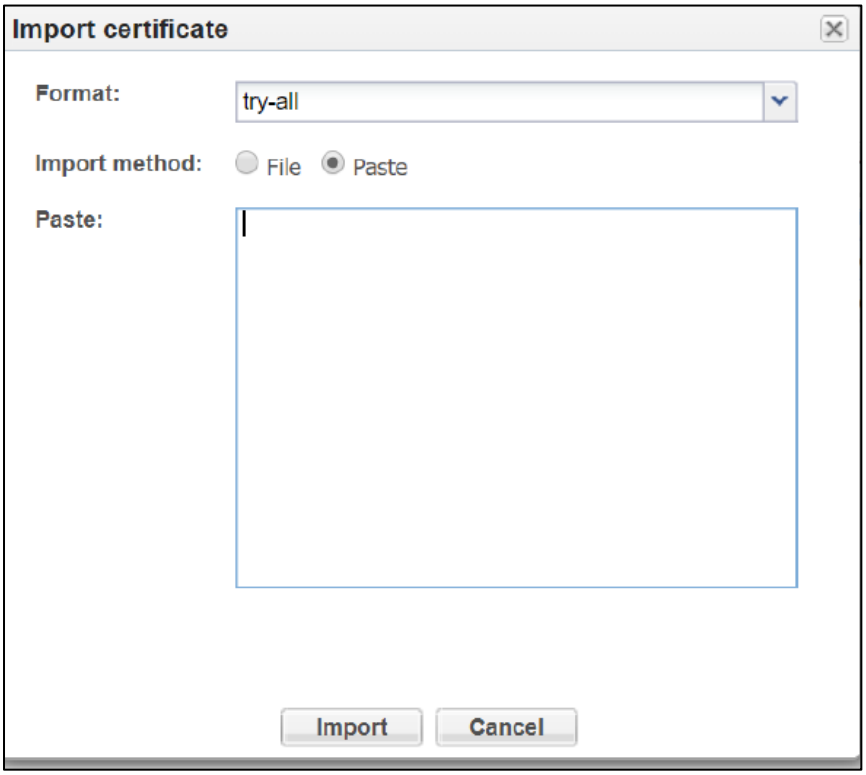
5.10.2 Step 2 – Generating a certificate signing request for SBC certificate

- Select the certificate and generate certificate on clicking the “Generate” command.
- Please copy/paste the text that gets printed on the screen as shown below and upload to your CA server for signature.

Also, note that a save/activate is required

5.10.3 Step 3 – Deploy the SBC certificate

Once certificate signing requests have been completed – import the signed certificate to the SBC.
Copy paste the certificate.
Once done, issue save/activate from the WebGUI



5.11 Root and Intermediate Certificates Creation

There are 3 more certificates that are required for direct routing.

-BaltimoreRoot: This certificate is always required for MS Teams.
This certificate can be downloaded from https://cacert.omniroot.com/bc2025.pem
The serial number of this certificate is 0x20000b9.
Note :The certificate should be in .pem format.

-DigiCertRoot

-DigiCertInter

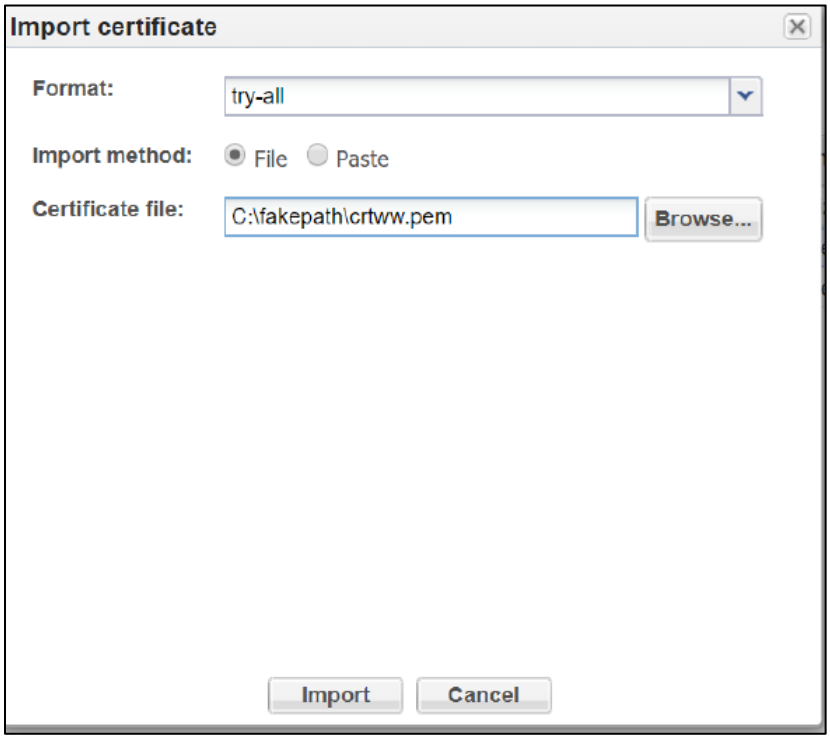
5.11.1 Step 1 - Creating the root and intermediate certificates on SBC

Go to security->Certificate Record and create the certificate with parameters as shown. . Modify the configuration according to the certificates in your environment.

Parameter	DigicertInter	BaltimoreRoot	DigiCertRoot
Common-name	DigiCert SHA2 Secure Server CA	Baltimore CyberTrust Root	DigiCert Global Root CA
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

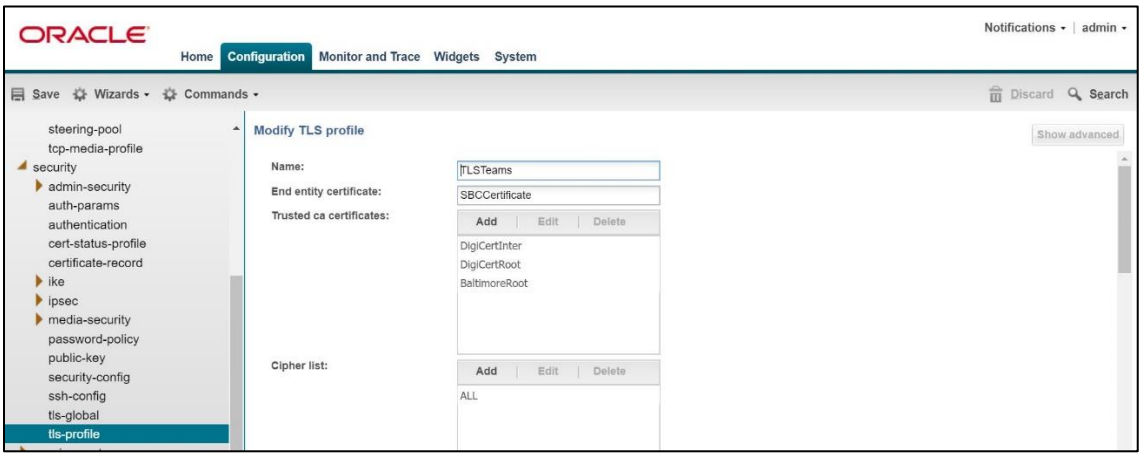
5.11.2 Step 2 - Deploying the Root and Intermediate certificates on SBC

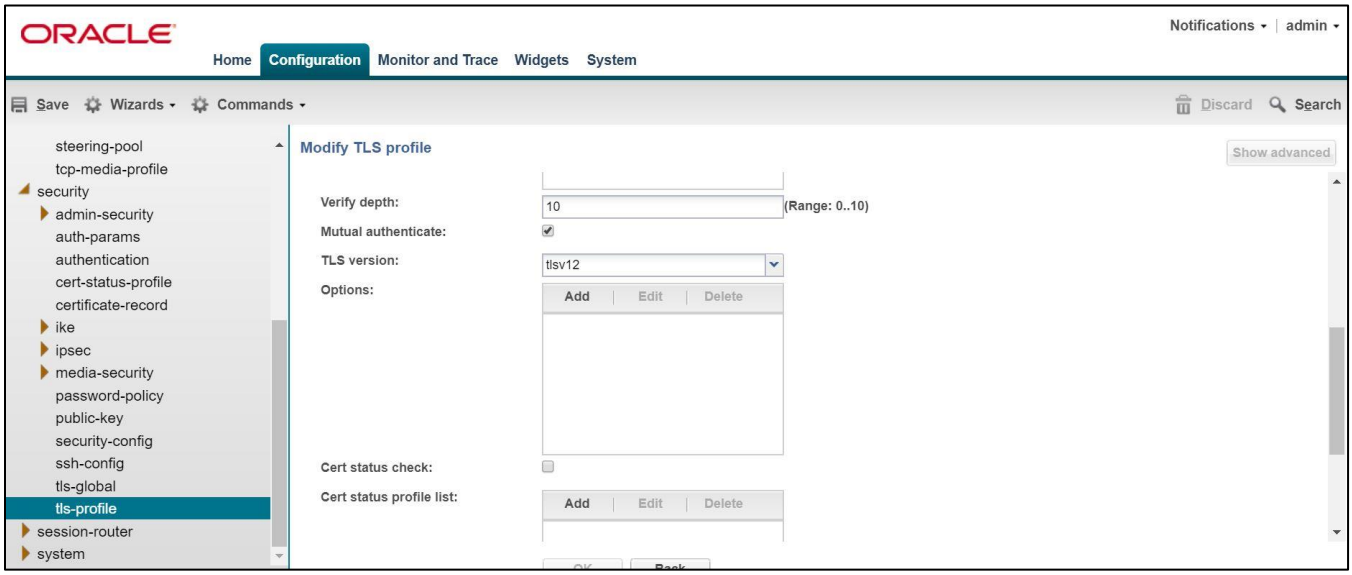
All the root and intermediate certificates have to imported to SBC.
The root and intermediate certificates can be imported into the SBC only in the .pem format.
Note: The BaltimoreRoot certificate downloaded in Step1 can be directly imported as shown.
Click on the certificate and select Import.
The below screen appears. Make sure your file is in .pem format and upload.



5.12 TLS-Profile

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

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admin-security
auth-params
authentication
cert-status-profile
certificate-record
ike
ipsec
media-security
password-policy
public-key
security-config
ssh-config
tls-global
tls-profile
session-router
system
Modify TLS profile
Show advanced
Verify depth:
10
(Range: 0..10)
Mutual authenticate:
TLS version:
tlsv12
Options:
Add
Edit
Delete
Cert status check:
Cert status profile list:
Add
Edit
Delete

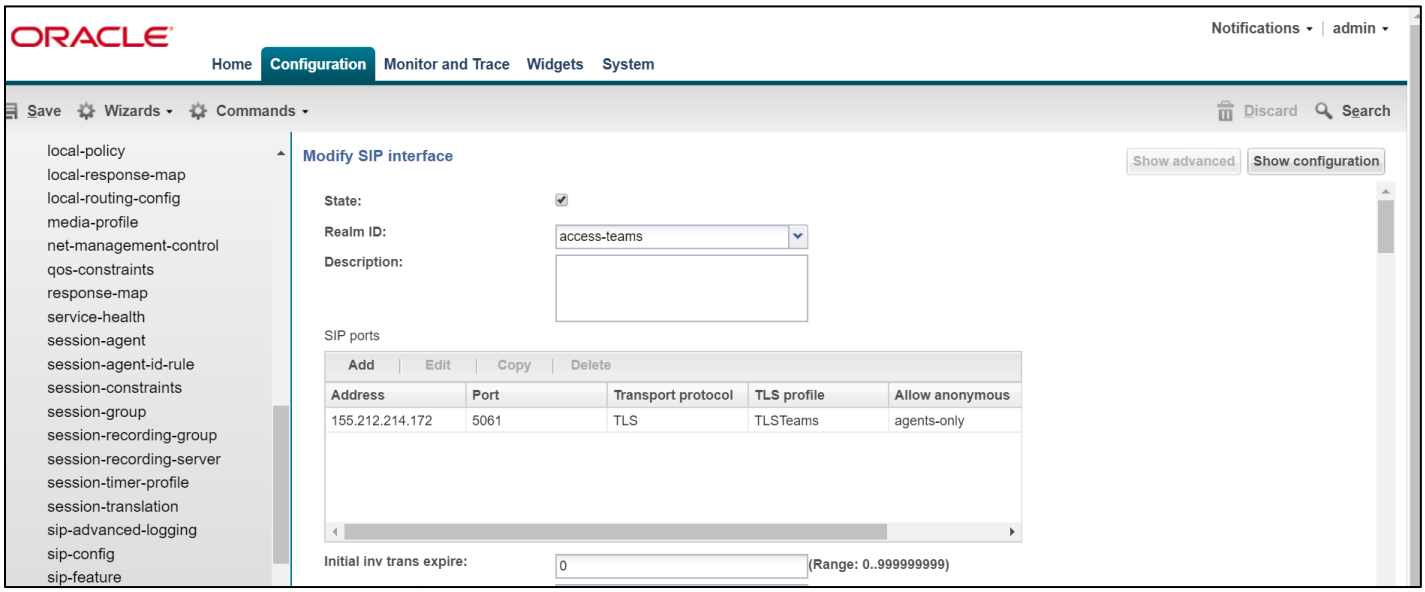
5.13 Creating a sip-interface to communicate with Microsoft Teams

Set the following configuration elements – ensure that the IP address allocated to the SIP interface is the FQDN resolvable address. i.e. if you issue command nslookup from another computer, “oracleesbc2.woodgrovebank.us” – it should resolve to 155.212.214.172.

Note that the IP should be publicly routable IP address. To configure sip-interface, Go to Session-Router->Sip-Interface.

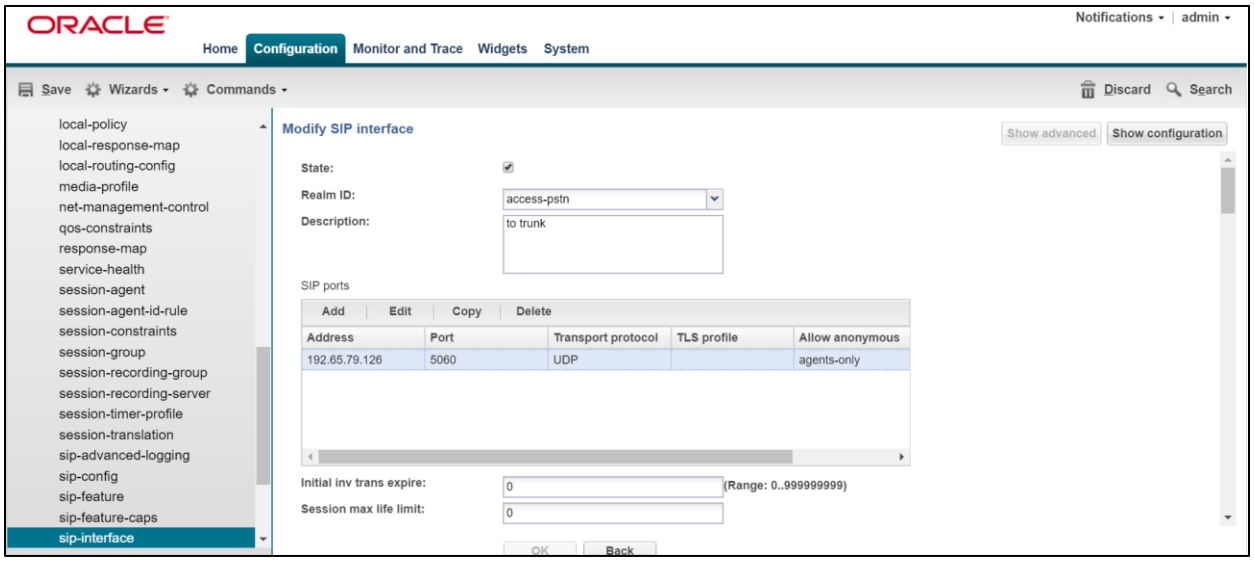
Note:

- -Tls-profile needs to match the name of the tls-profile previously created
- -Set allow-anonymous to agents-only to ensure traffic to this sip-interface only comes from Teams server.



5.14 Configure sip-interface to communicate with SIP Trunk

Similarly configure the sip-interface for sip-trunk, according to your environment.

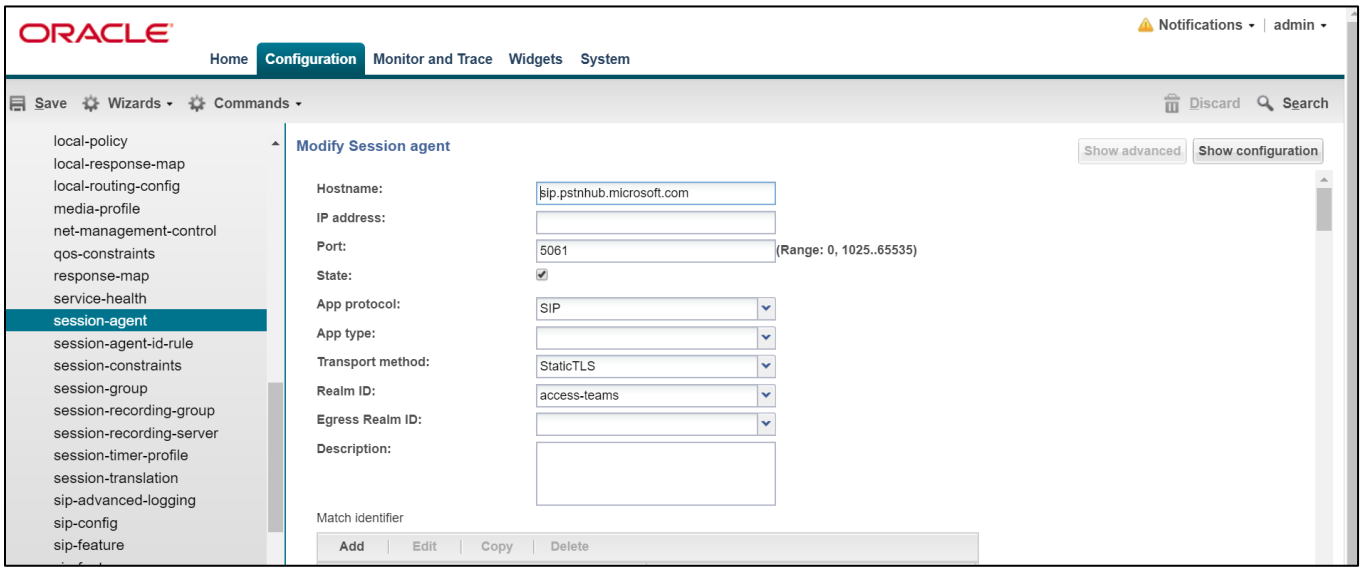


Once sip-interface is configured – the SBC is ready to accept traffic on the allocated IP address. Now configure where the SBC sends the outbound traffic.

5.15 Configure session-agent

Session-agents are config elements which are trusted agents who can send/receive traffic from the SBC with direct access to trusted data path. Configure the session-agent for Teams with the following parameters. Go to session-router->Session-Agent.

- hostname to “sip.pstnhub.microsoft.com”
- port 5061
- realm-id – needs to match the realm created for teams – in this case – “Access-teams”
- transport set to “StaticTLS”
- refer-call-transfer set to enabled
- ping-method – send OPTIONS message to Microsoft to check health
- ping-interval to 30 secs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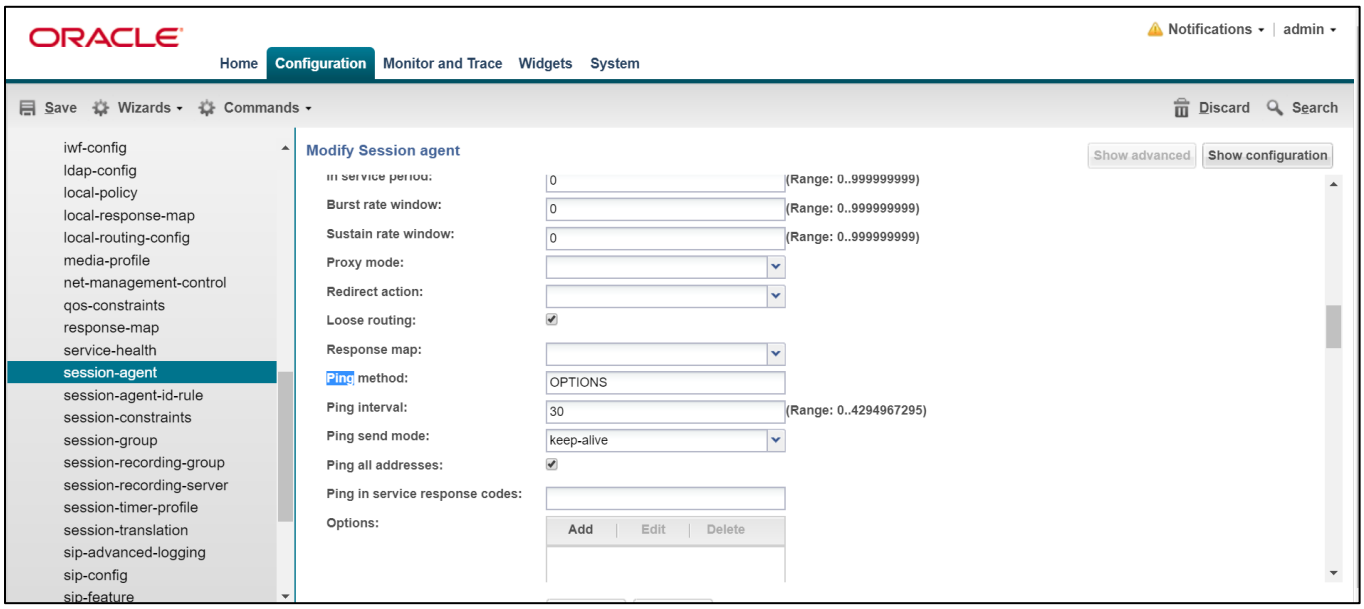
media-profile
net-management-control
qos-constraints
response-map
service-health
session-agent
session-agent-id-rule
session-constraints
session-group
session-recording-group
session-recording-server
session-timer-profile
session-translation
sip-advanced-logging
sip-config
sip-feature
Modify Session agent
Show advanced
Show configuration
Hostname:
sip.pstnhub.microsoft.com
IP address:
Port:
5061
(Range: 0, 1025..65535)
State:
App protocol:
SIP
App type:
Transport method:
StaticTLS
Realm ID:
access-teams
Egress Realm ID:
Description:
Match identifier
Add
Edit
Copy
Delete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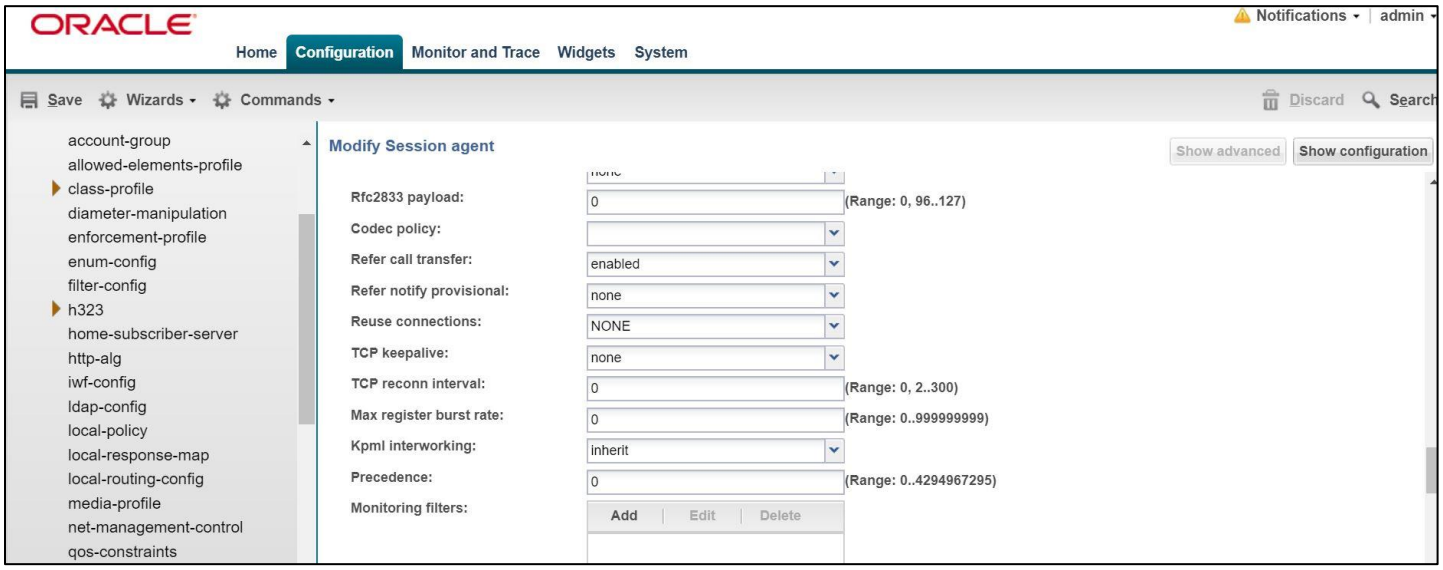
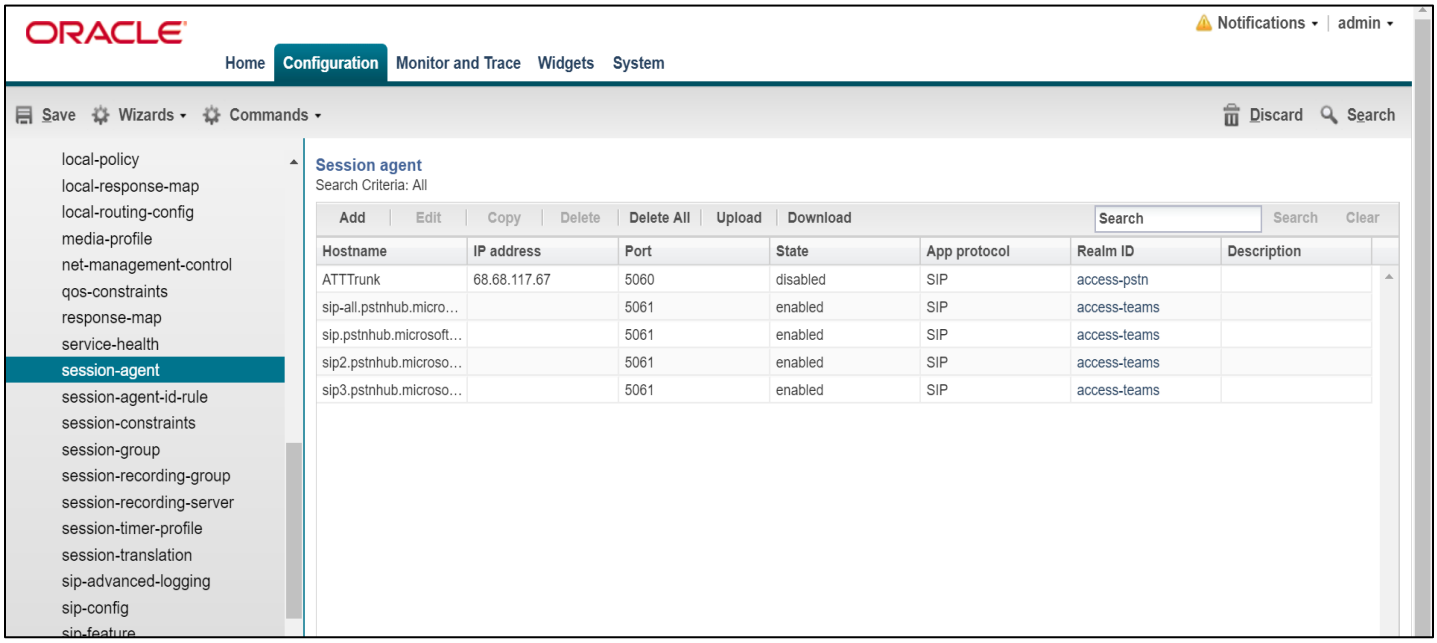
ldap-config
local-policy
local-response-map
local-routing-config
media-profile
net-management-control
qos-constraints
response-map
service-health
session-agent
session-agent-id-rule
session-constraints
session-group
session-recording-group
session-recording-server
session-timer-profile
session-translation
sip-advanced-logging
sip-config
sip-feature
Modify Session agent
Show advanced
Show configuration
0
(Range: 0..999999999)
Burst rate window:
0
(Range: 0..999999999)
Sustain rate window:
0
(Range: 0..999999999)
Proxy mode:
Redirect action:
Loose routing:
Response map:
Ping method:
OPTIONS
Ping interval:
30
(Range: 0..4294967295)
Ping send mode:
keep-alive
Ping all addresses:
Ping in service response codes:
Options:
Add
Edit
Delete



Follow above steps to create 2 more sessions for:

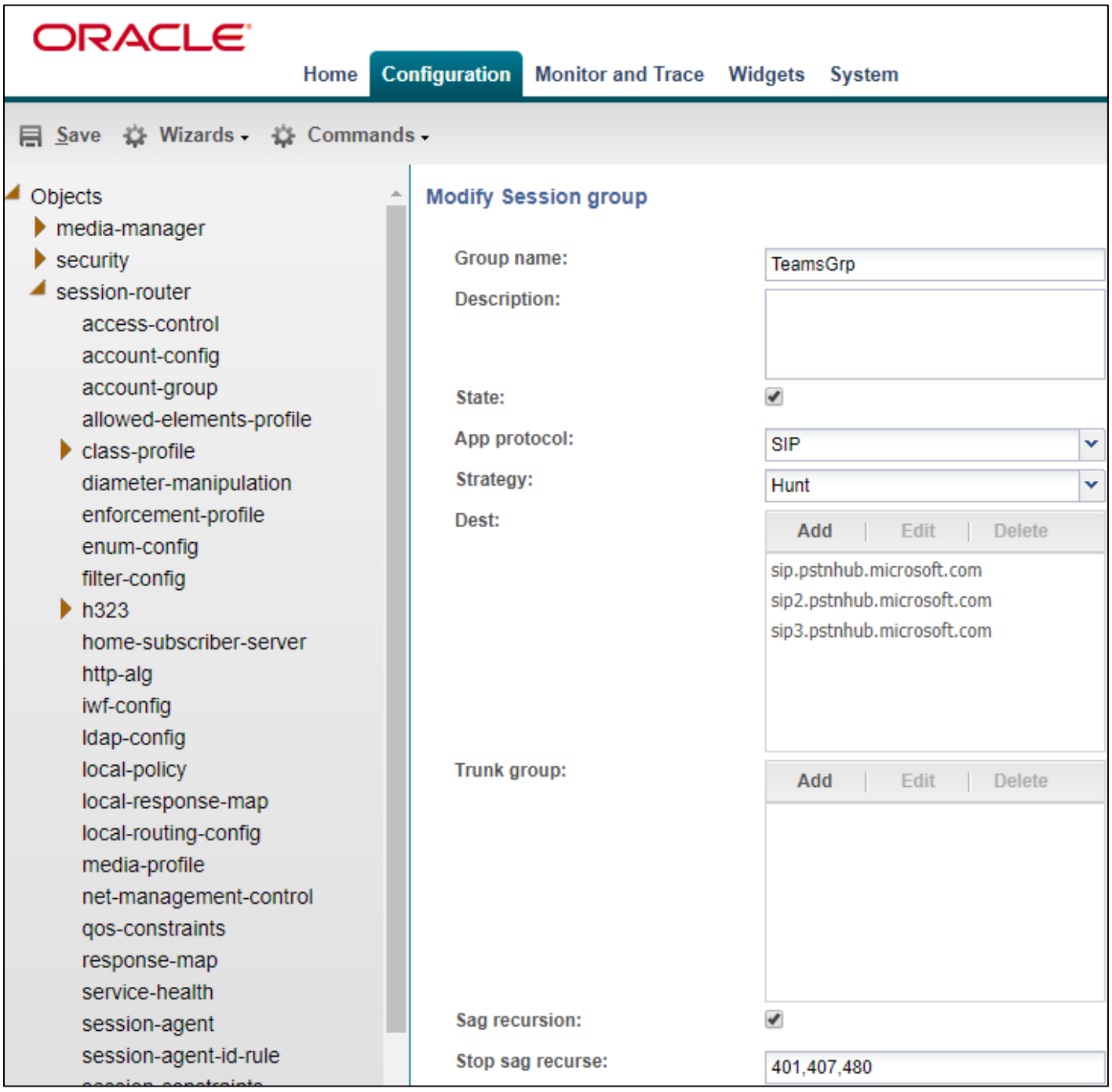
- sip2.pstnhub.microsoft.com
- sip3.pstnhub.microsoft.com
- sip-all.pstnhub.microsoft.com

Note: Please note that all signaling SHOULD only point to sip/sip2/sip3.pstnhub.microsoft.com – no signaling shoulbe sent to sip-all.pstnhub.microsoft.com FQDN. The sip-all.pstnhub.microsoft.com FQDN is only used for longer DNS TTL value



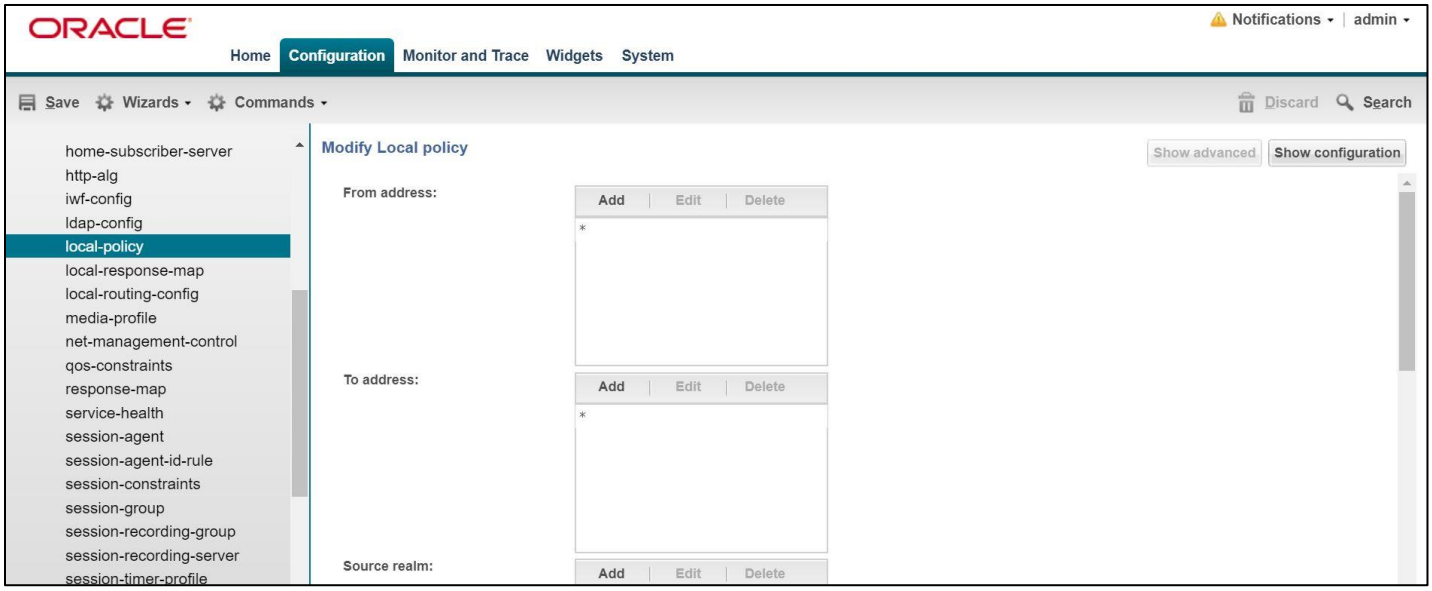
5.16 Create a Session Agent Group

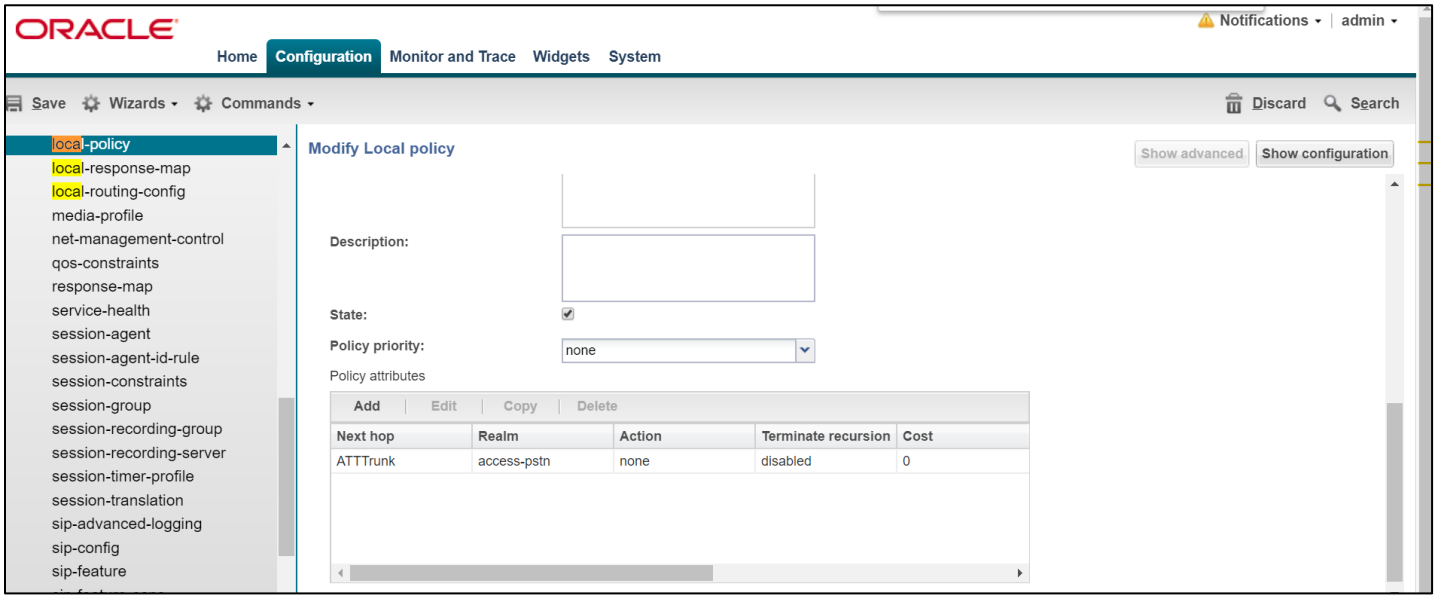
A session agent group allows the SBC to create a load balancing model. Go to Session-Router->Session-Group.

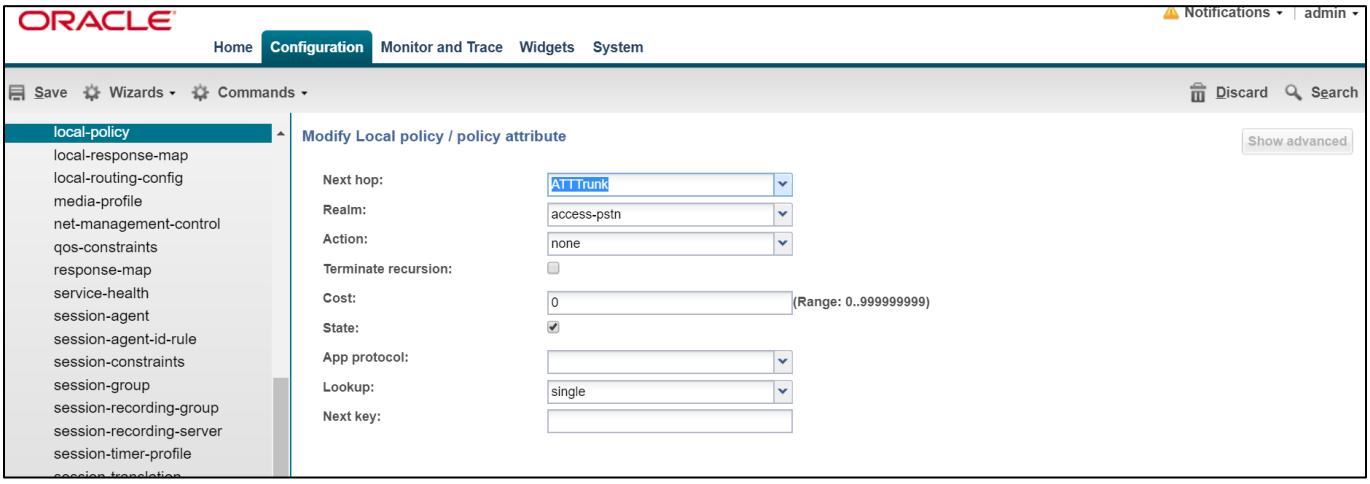


5.17 Configure local-policy

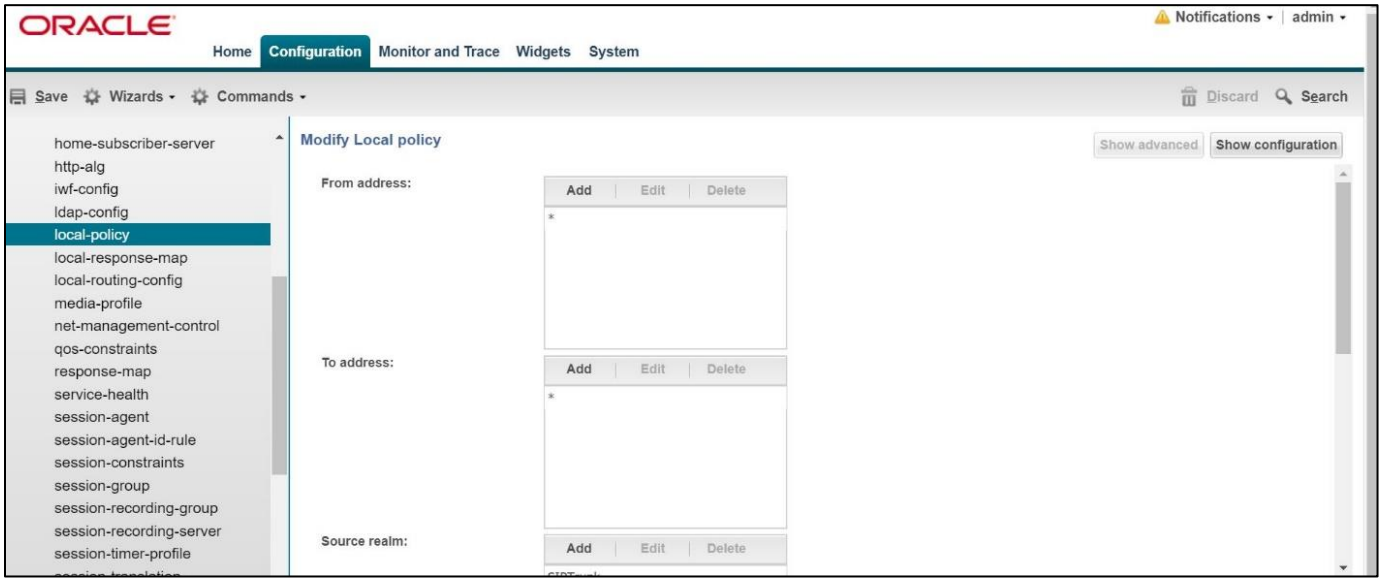
Local policy config allows for the SBC to route calls from one end of the network to the other based on routing criteria.to configure local-policy, go to Session-Router->local-policy. In order for inbound calls from Teams to be routed to a SIP Trunk following config is required:

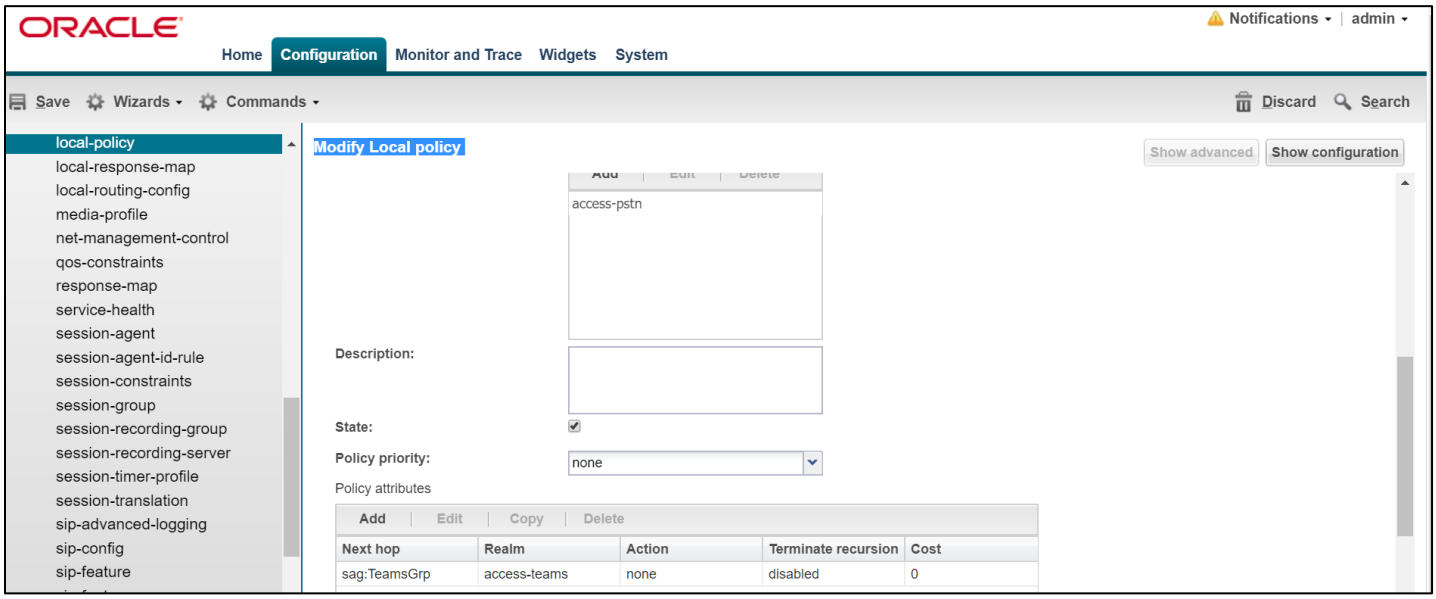


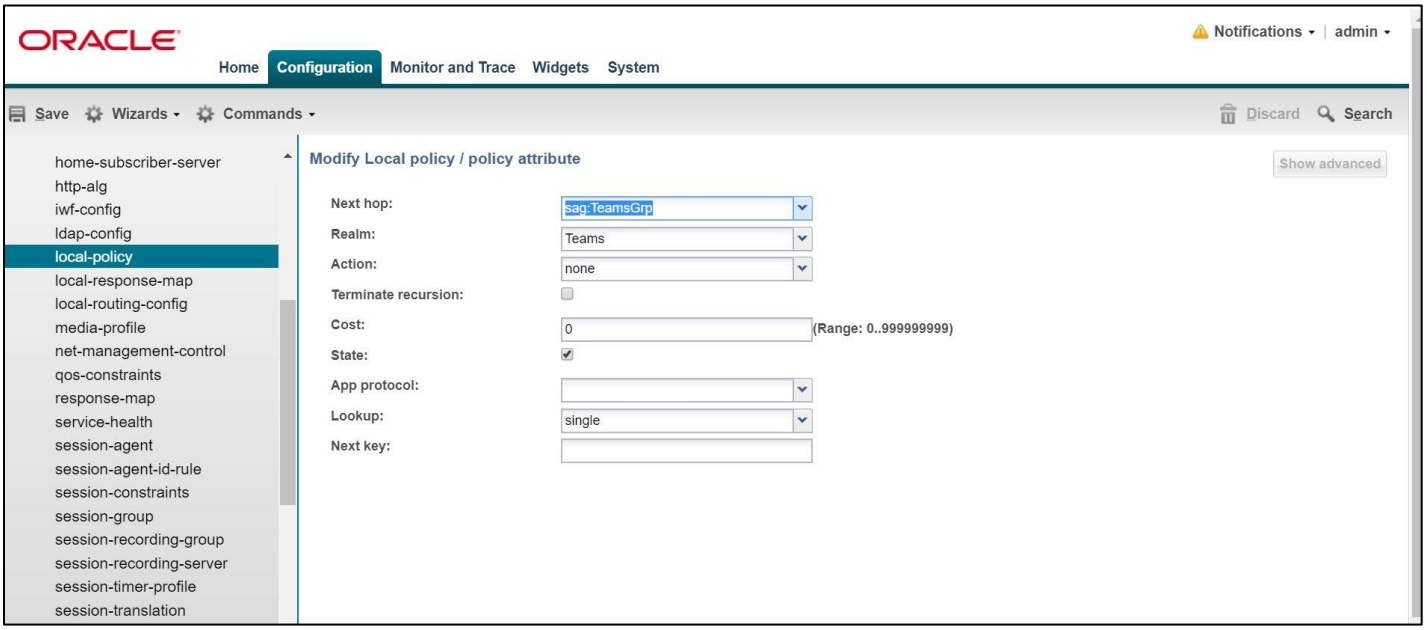




The above local policy config is allowing any DID from teams that lands on the SBC to be routed to ATT Trunk via realm access-pstn, where the next hop is the IP address of the ATT Trunk.
A second local policy is required to be configured to route outbound calls to Teams from access-pstn, configure it as follows:





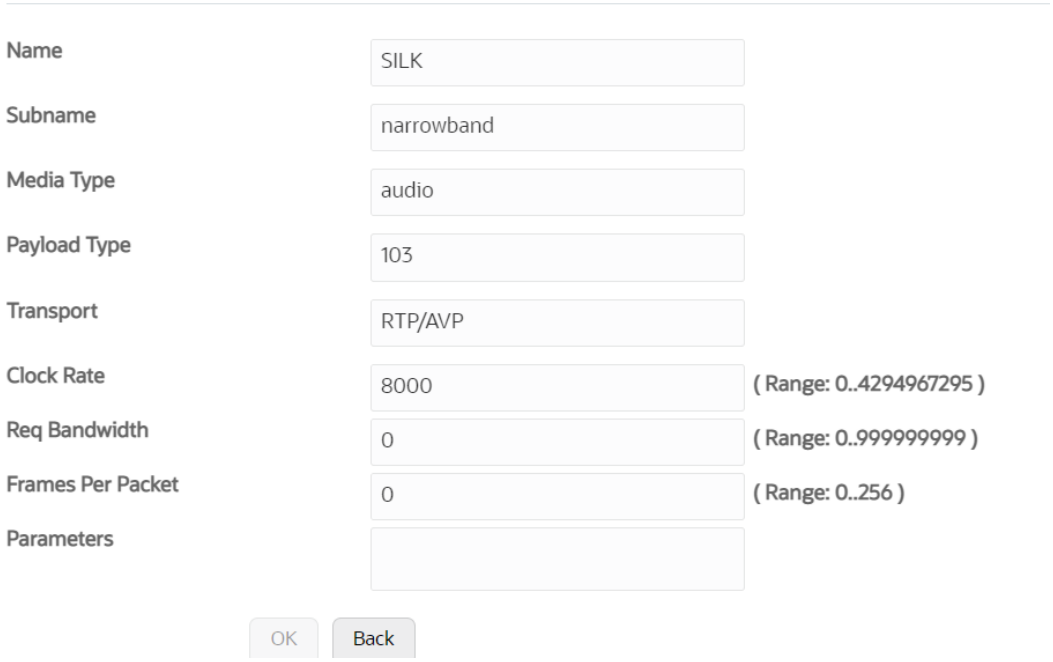


The above local policy will route calls from Access-pstn to access-teams if they match the routing criteria.

5.18 Configure Media Profile & Codec Policy

The Oracle® Session Border Controller (SBC) uses codec policies to describe how to manipulate SDP messages as they cross the SBC. The SBC bases its decision to transcode a call on codec policy configuration and the SDP. Each codec policy specifies a set of rules to be used for determining what codecs are retained, removed, and how they are ordered within SDP.

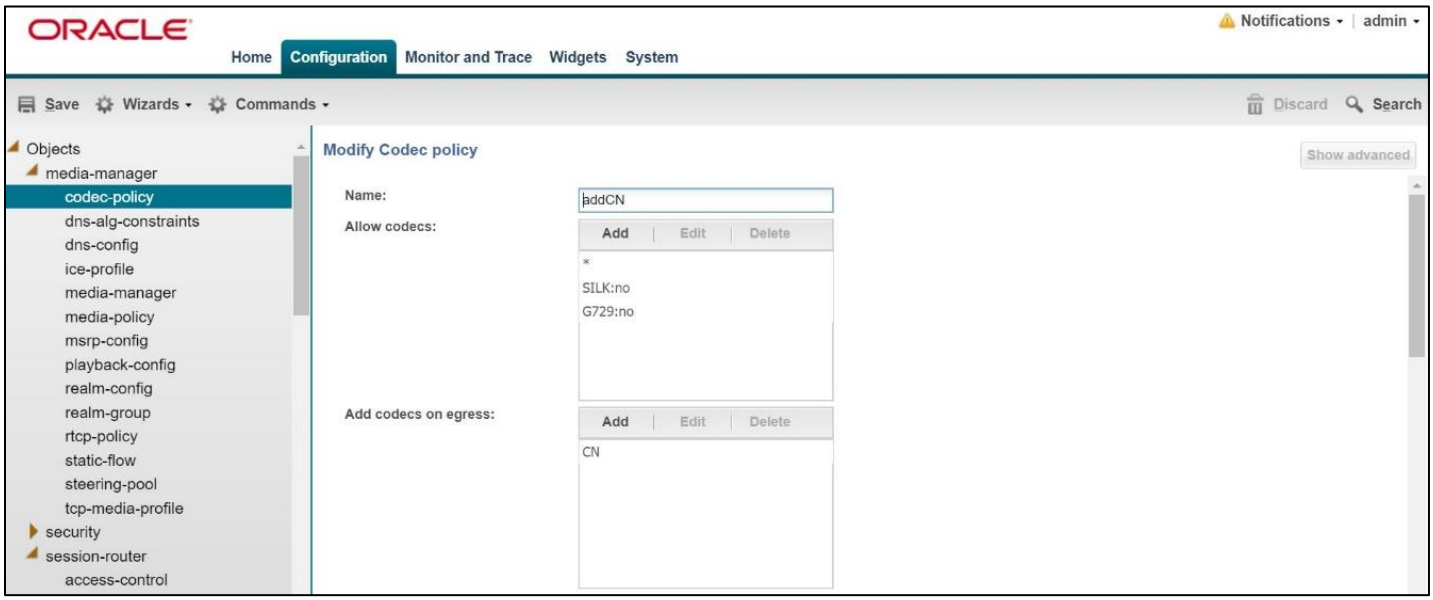
Note: this is an optional config – configure codec policy only if deemed required
Some SIP trunks may have issues with the codecs being offered by Microsoft teams, so following codec policy may be required in order for the calls to work flawlessly.
SILK offered by Microsoft teams is using a payload type which is different than usual. Configure the media-profile as shown below, go to Session-Router->Media-profile

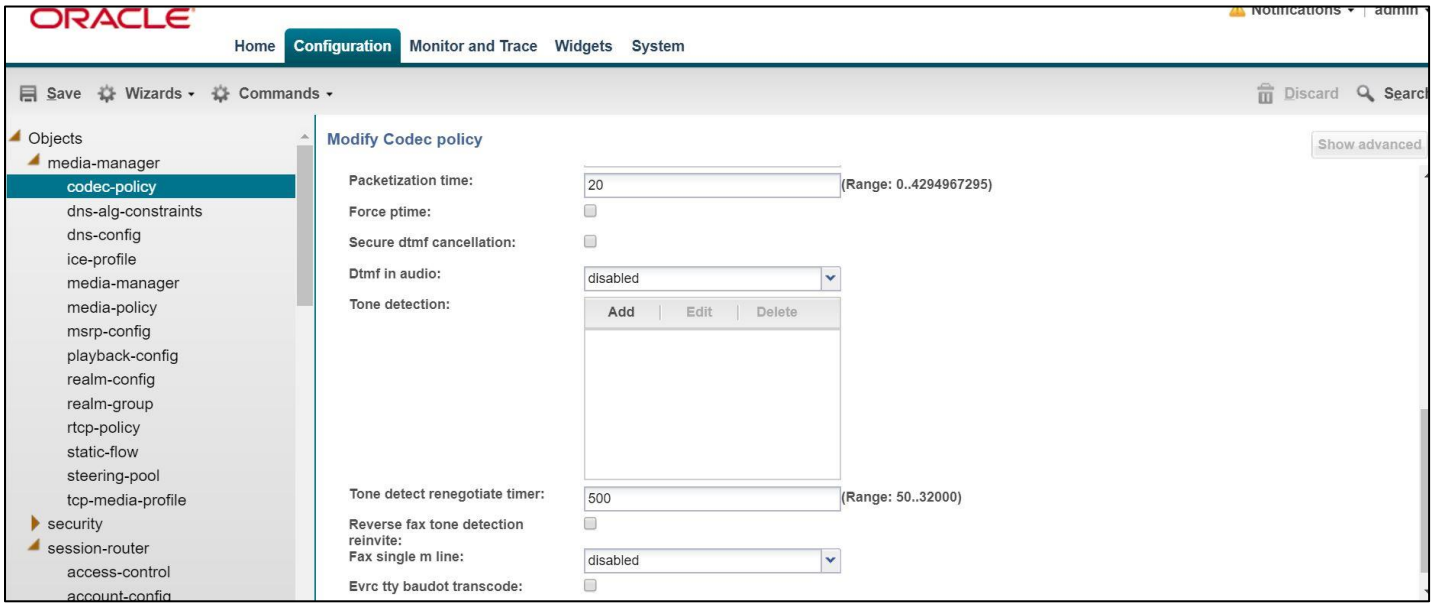


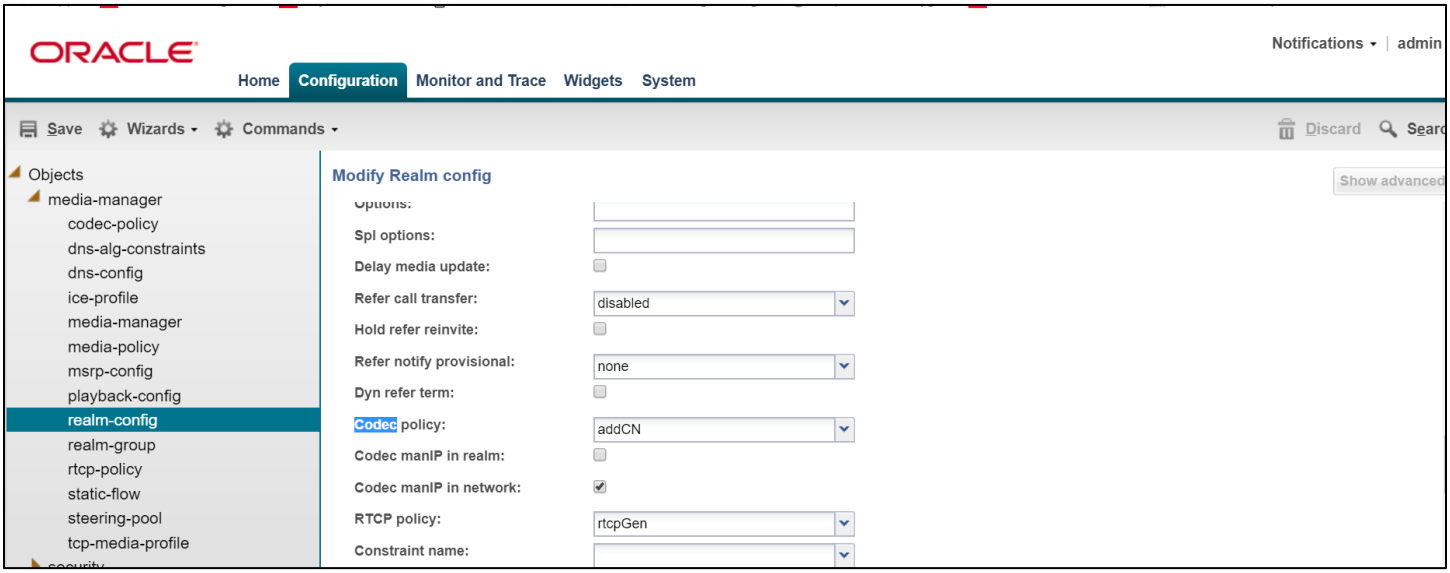
Configure media profiles for SILK codec like shown below

Parameters	SILK-1	SILK-2
Subname	narrowband	wideband
Payload-Type	103	104
Clock-rate	8000	16000

Create a codec-policy addCN, to add comfort noise towards Teams and apply it on the realm for Teams, Access-teams.







5.19 Configure sip-manipulations

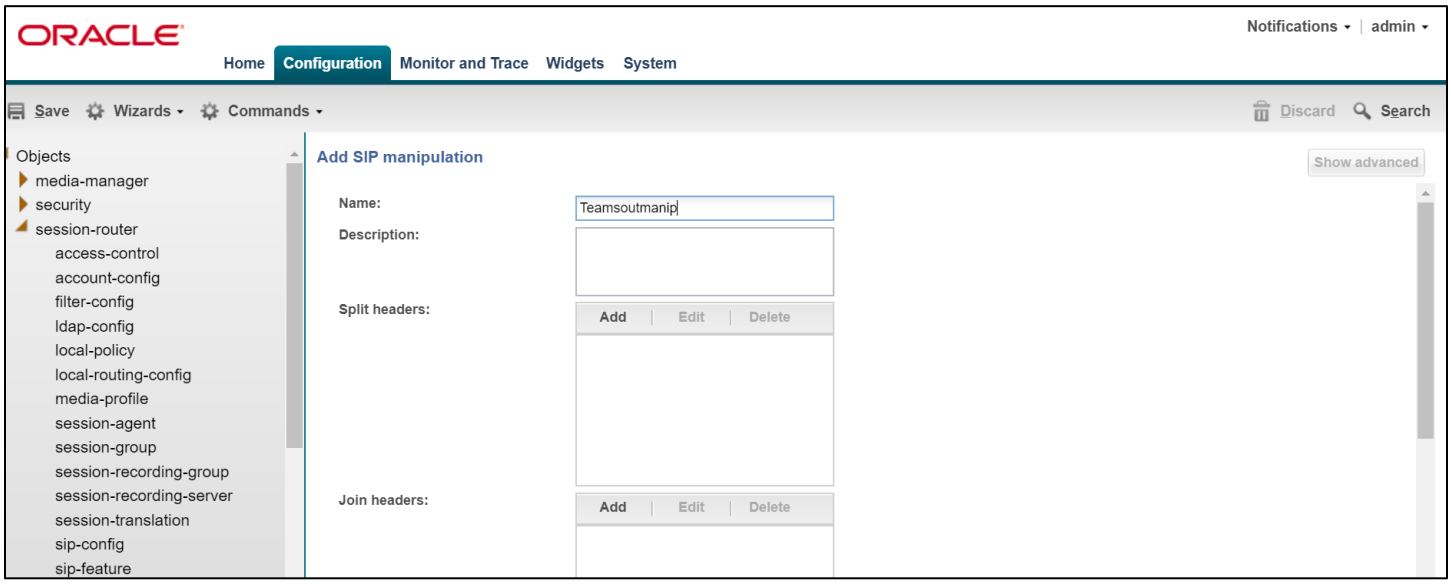
5.20 Teamsoutmanip

In order for calls to be presented to Microsoft teams or SIP trunk from the SBC – the SBC would require alterations to the SIP signaling natively created. Following are manipulations required on the SBC in order for to present signaling to Microsoft Teams:

- Countrycode– formats the Request-URI as per MS Teams standards
- Change_fromip_fqdn , Change_to_userandhost – changes the From and To header according to MS requirements
- Addcontactheaderinoptions – Add a new Contact header to OPTIONS message
- Recordroute – Add a new Record-Route header to OPTIONS message
- Alter_contact-changes the contact header as per MS Teams requirements
- Adduseragent – adds the SBC information in the User-Agent header,if the User-agent is not present already.
- Modifyuser – Modifies the SBC information in the User-Agent header,if the User-agent is present already.
- Reqsendonlytoinactive - Modifies the send only attribute of SDP to inactive in the request
- Replyrecvonlytoinactive - Modifies the recv only attribute of SDP to inactive in the reply

The following sip-manipulation called Teamsoutmanip is configured as out-manipulationid to make the changes mentioned above. To configure sip-manipulations, go to session-router->sip-manipulation

Note: If running the GA release, SCZ830m1p8A, please see Appendix D prior to configuring sip manipulations in your Oracle SBC. This appendix outlines how new features added to the GA release will help simplify your configuration by eliminating the need for most, if not all required sip manipulations.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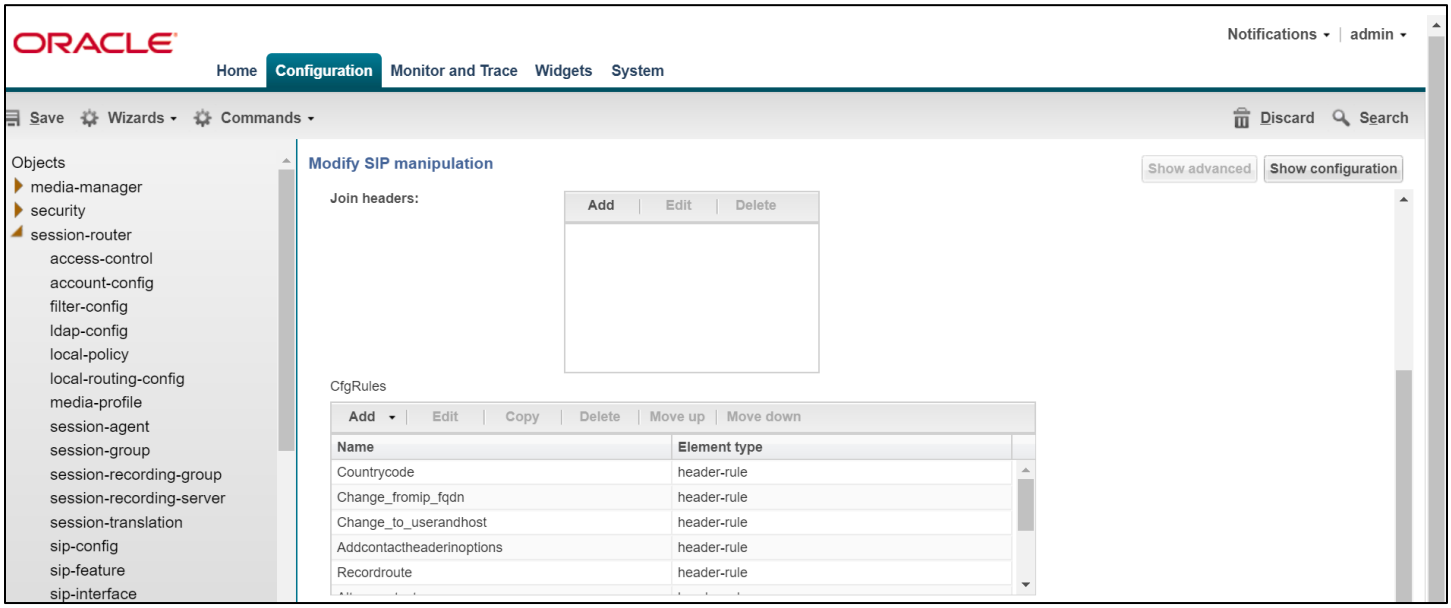
filter-config
ldap-config
local-policy
local-routing-config
media-profile
session-agent
session-group
session-recording-group
session-recording-server
session-translation
sip-config
sip-feature
Add SIP manipulation
Show advanced
Name:
Teamsoutmanip
Description:
Split headers:
Add
Edit
Delete
Join headers:
Add
Edit
Delete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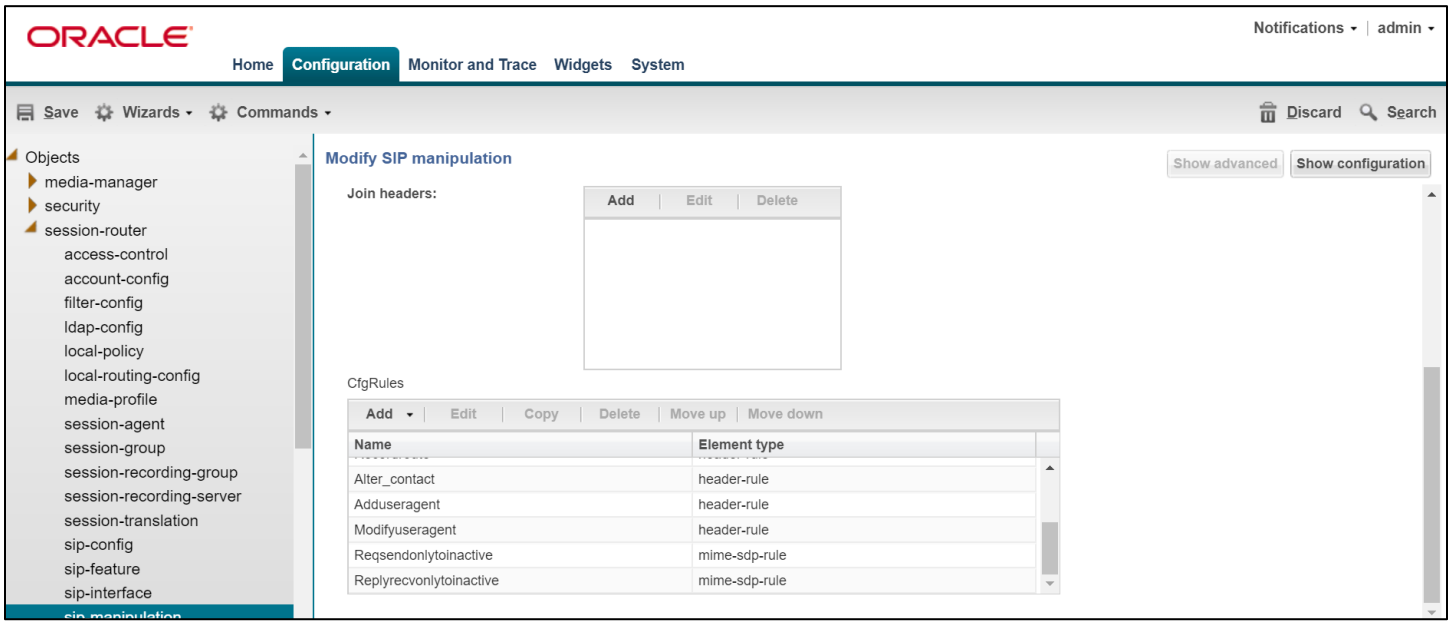
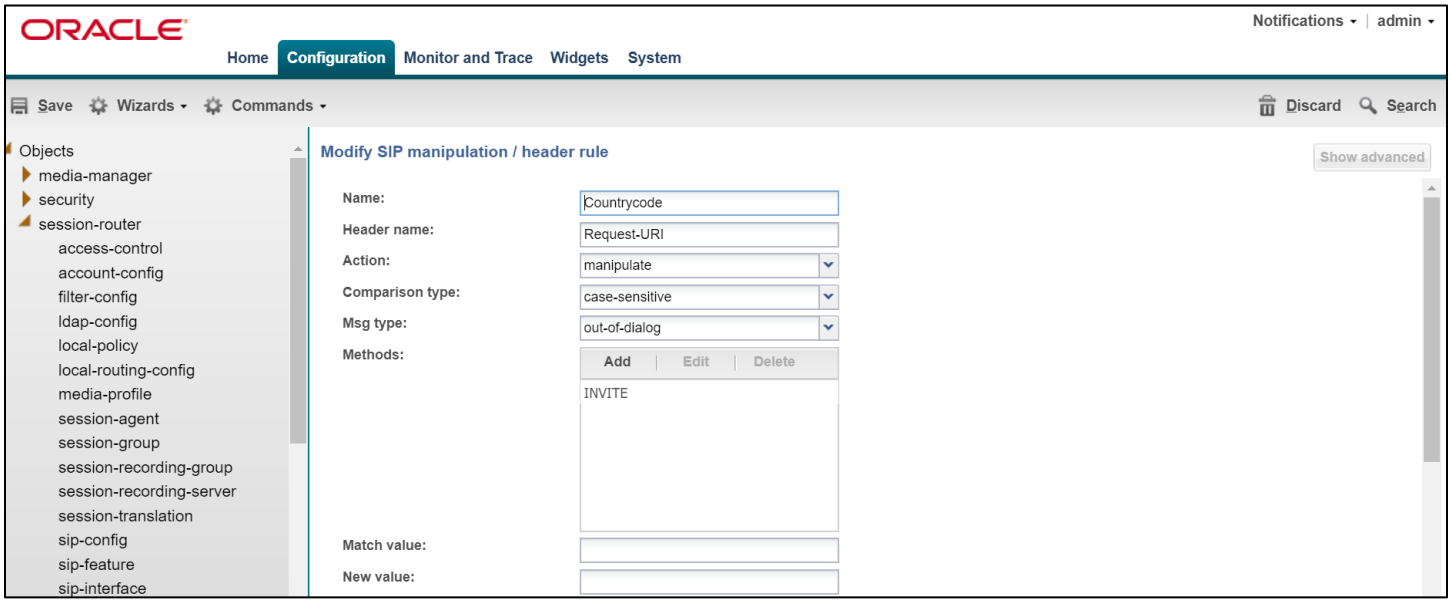
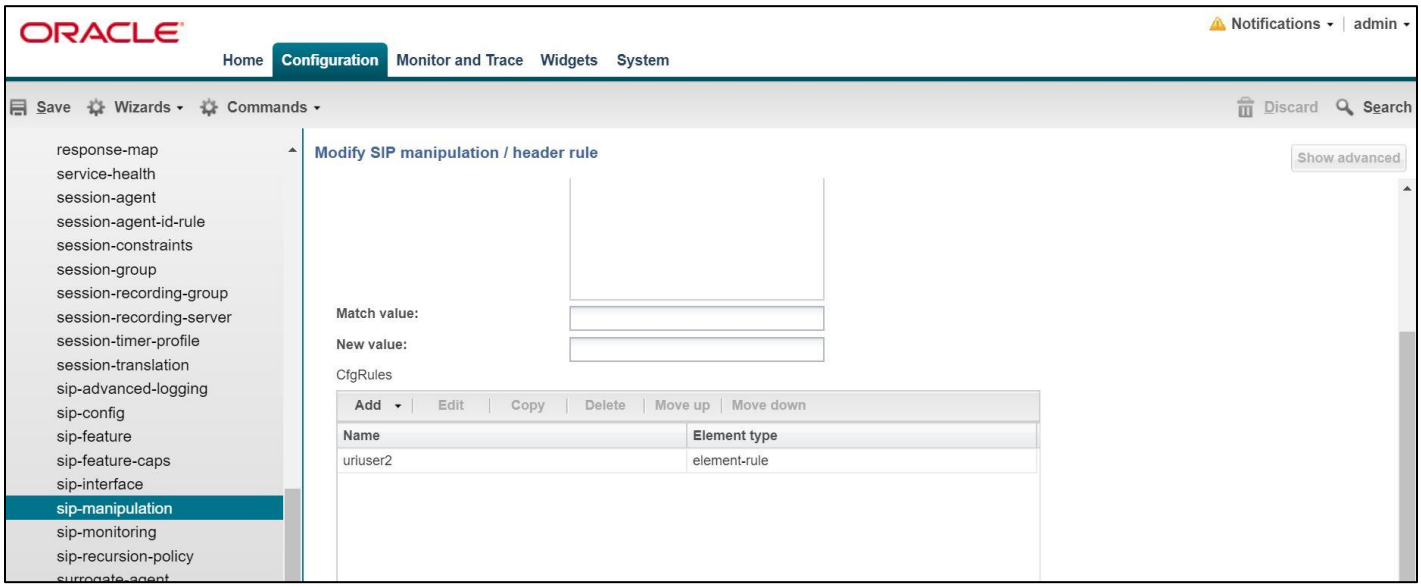
filter-config
ldap-config
local-policy
local-routing-config
media-profile
session-agent
session-group
session-recording-group
session-recording-server
session-translation
sip-config
sip-feature
sip-interface
Modify SIP manipulation
Show advanced
Show configuration
Join headers:
Add
Edit
Delete
CfgRules
Add
Edit
Copy
Delete
Move up
Move down
Name
Element type
Countrycode
header-rule
Change_fromip_fqdn
header-rule
Change_to_userandhost
header-rule
Addcontactheaderinoptions
header-rule
Recordroute
header-rule

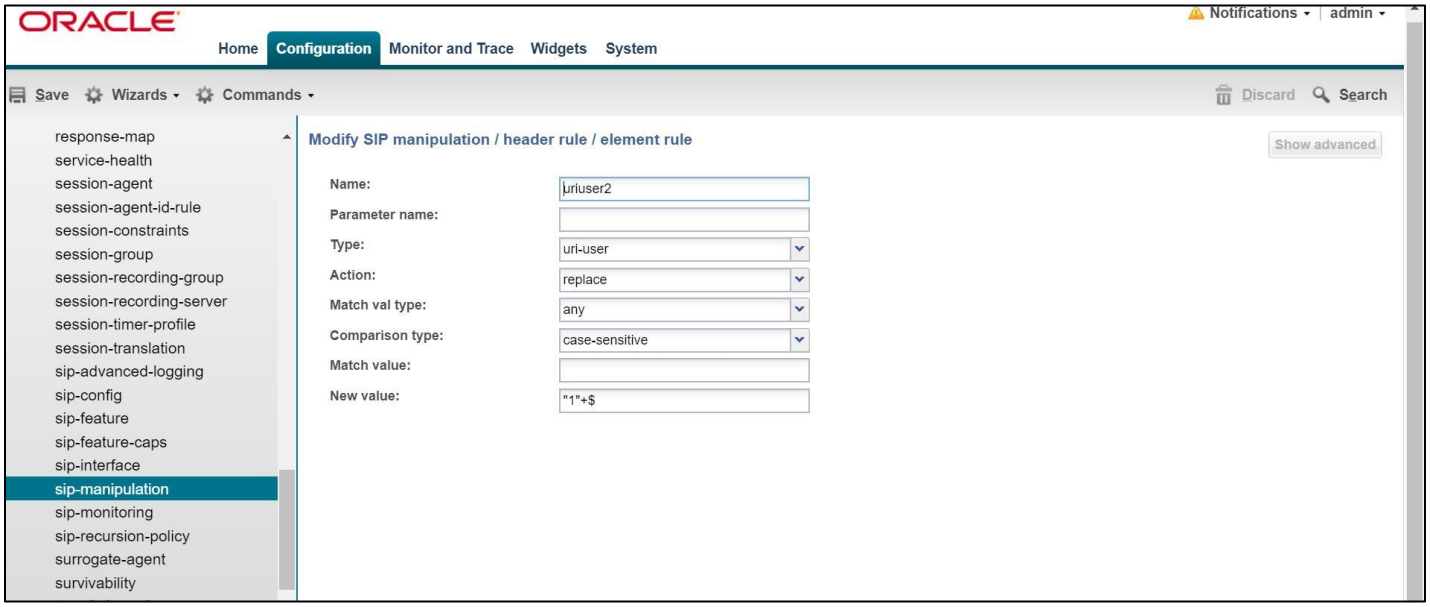


5.20.1 Countrycode Manipulation:

It is configured as a header rule in the sip-manipulation Teamsoutmanip shown above.



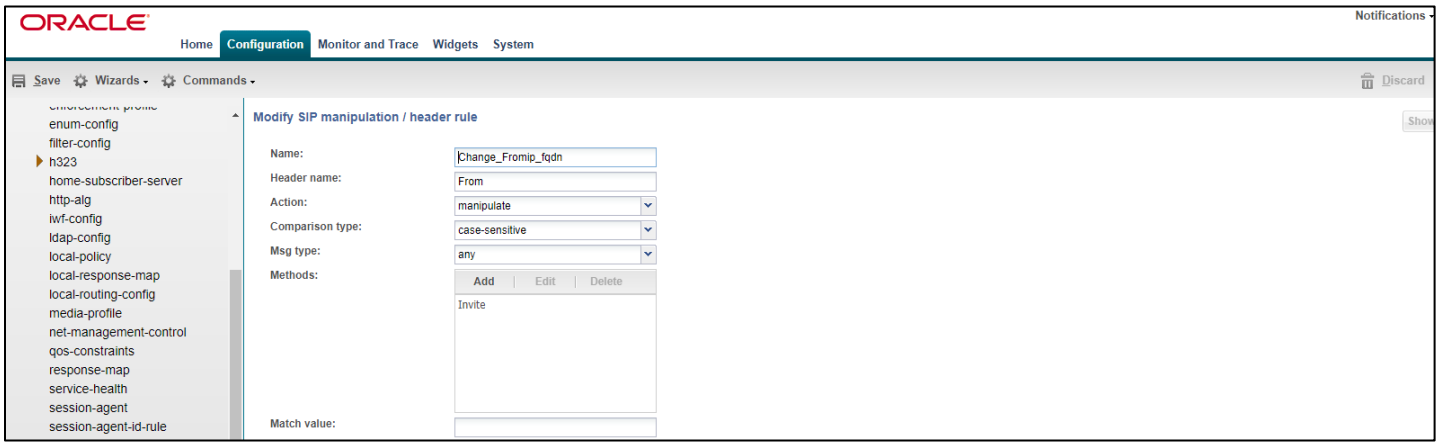


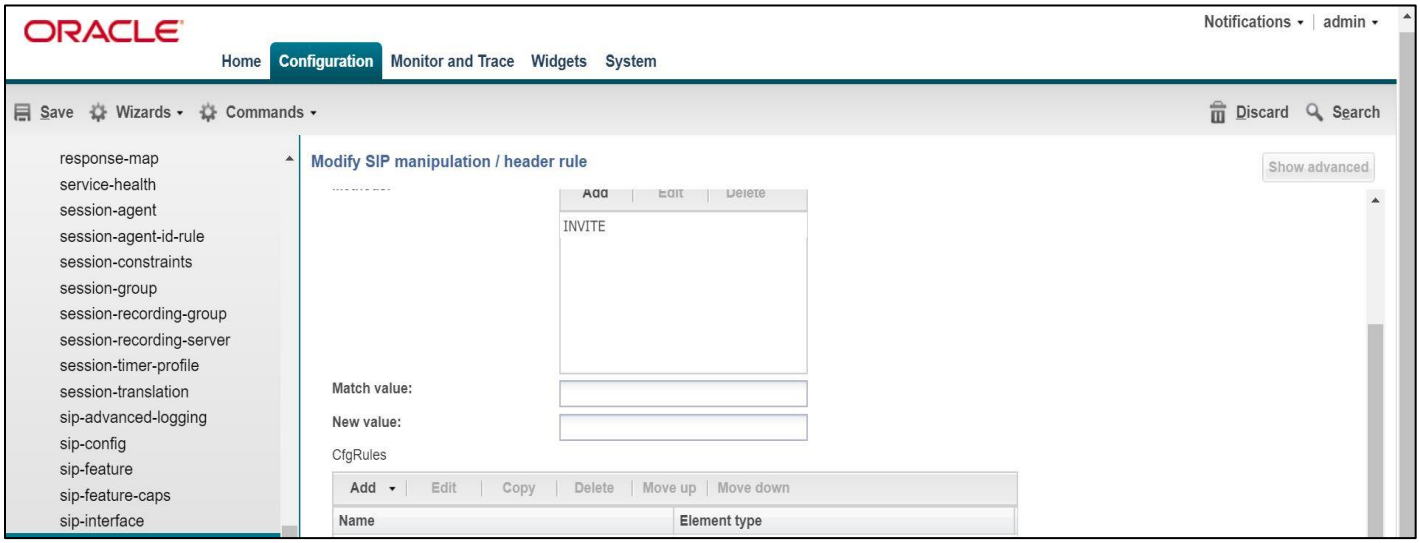


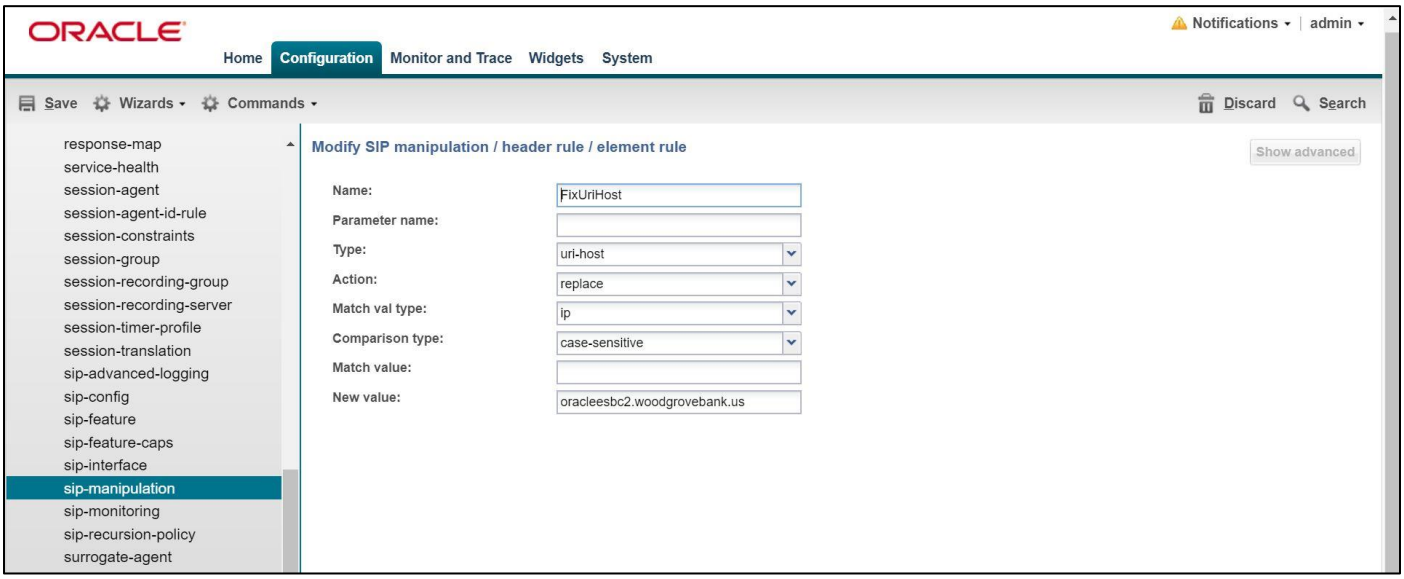
Here, the “1” added is the country code of United States. Similarly, country code can be added if necessary, for other countries.

5.20.2 Change_fromip_fqdn Manipulation:

It is configured as a header rule in the sip-manipulation Teamsoutmanip. Here the host uri is changed to oracleesbc2.woodgroovebank.us as shown below



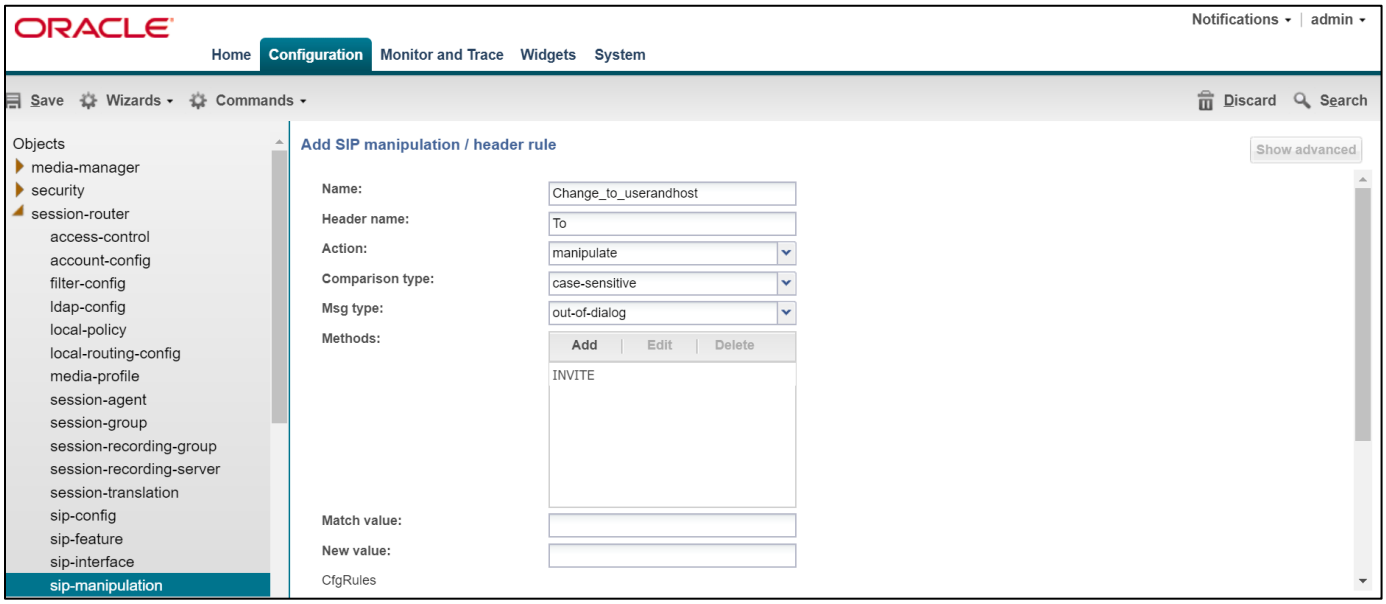


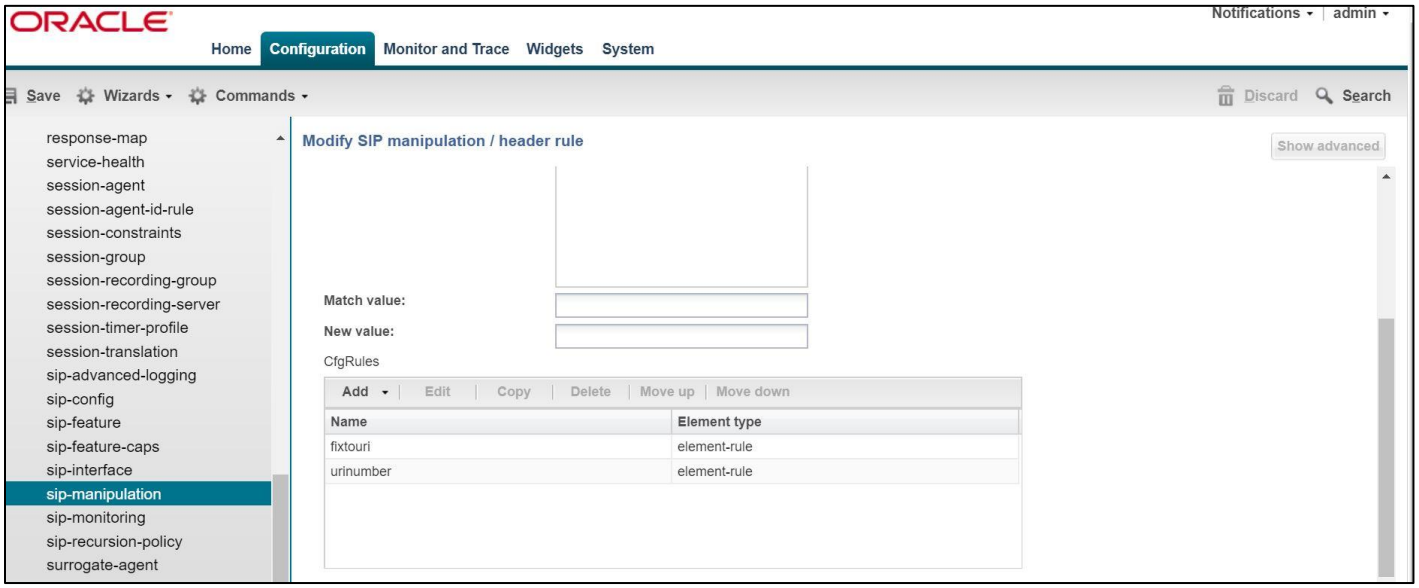


5.20.3 Change_to_userandhost Manipulation:

It is configured as a header rule in the sip-manipulation Teamsoutmanip. Here, two element rules are added.

- The host uri is changed according to MS Teams requirements.
- The phone number here is also changed, here “1” added is the country code of United States. Similarly, country code can be added if necessary, for other countries.

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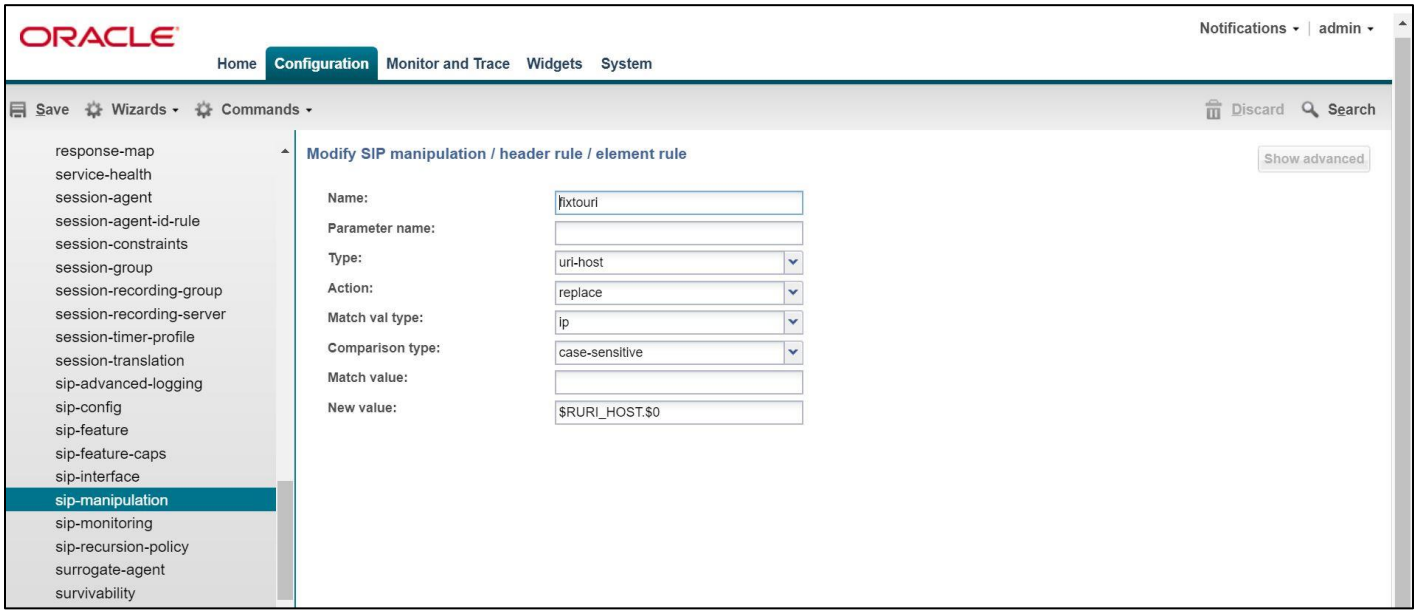
session-constraints
session-group
session-recording-group
session-recording-server
session-timer-profile
session-translation
sip-advanced-logging
sip-config
sip-feature
sip-feature-caps
sip-interface
sip-manipulation
sip-monitoring
sip-recursion-policy
surrogate-agent
Modify SIP manipulation / header rule
Show advanced
Match value:
New value:
CfgRules
Add
Edit
Copy
Delete
Move up
Move down
Name
Element type
fixtouri
element-rule
urinumber
element-rule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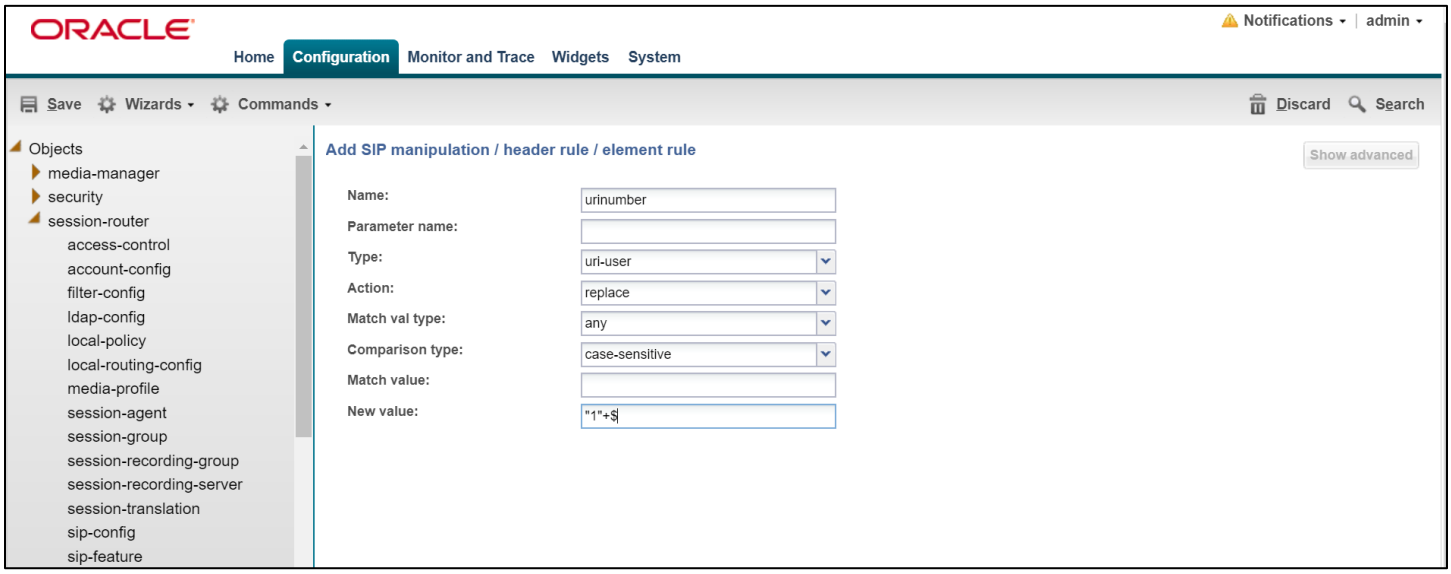
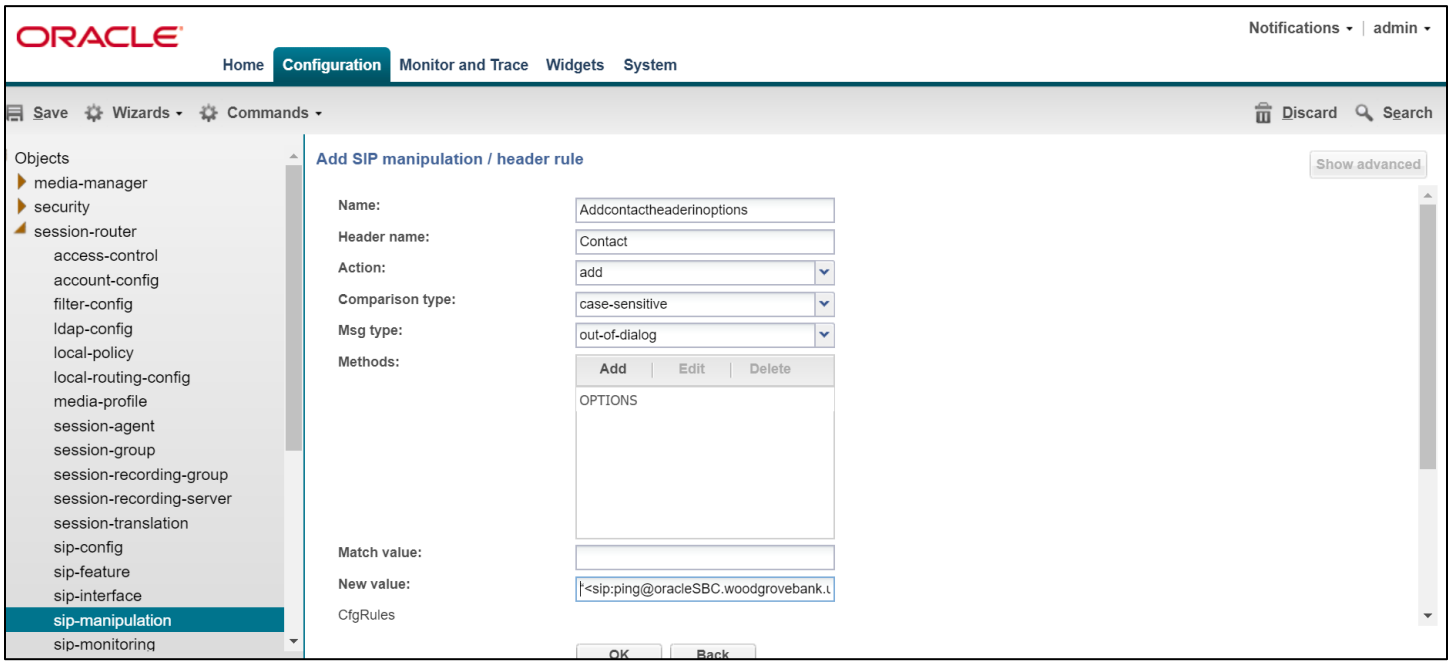
session-agent-id-rule
session-constraints
session-group
session-recording-group
session-recording-server
session-timer-profile
session-translation
sip-advanced-logging
sip-config
sip-feature
sip-feature-caps
sip-interface
sip-manipulation
sip-monitoring
sip-recursion-policy
surrogate-agent
survivability
Modify SIP manipulation / header rule / element rule
Show advanced
Name:
fixtouri
Parameter name:
Type:
uri-host
Action:
replace
Match val type:
ip
Comparison type:
case-sensitive
Match value:
New value:
$RURI_HOST.$0



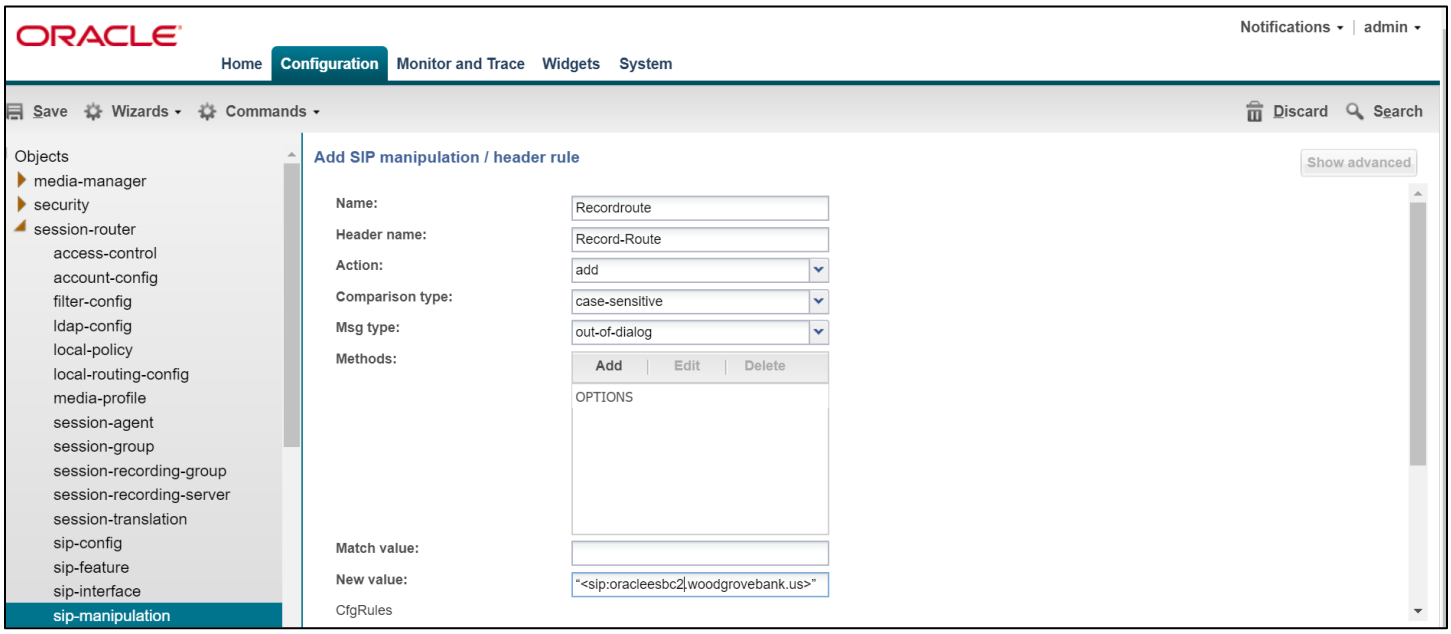
5.20.4 Addcontactheaderinoptions

It is configured as a header rule in the sip-manipulation Teamsoutmanip. Here the contact is changed to "<sip:ping@oracleSBC.woodgrovebank.us:5067;transport=tls>", according to MS Team requirements.



5.20.5 Recordroute

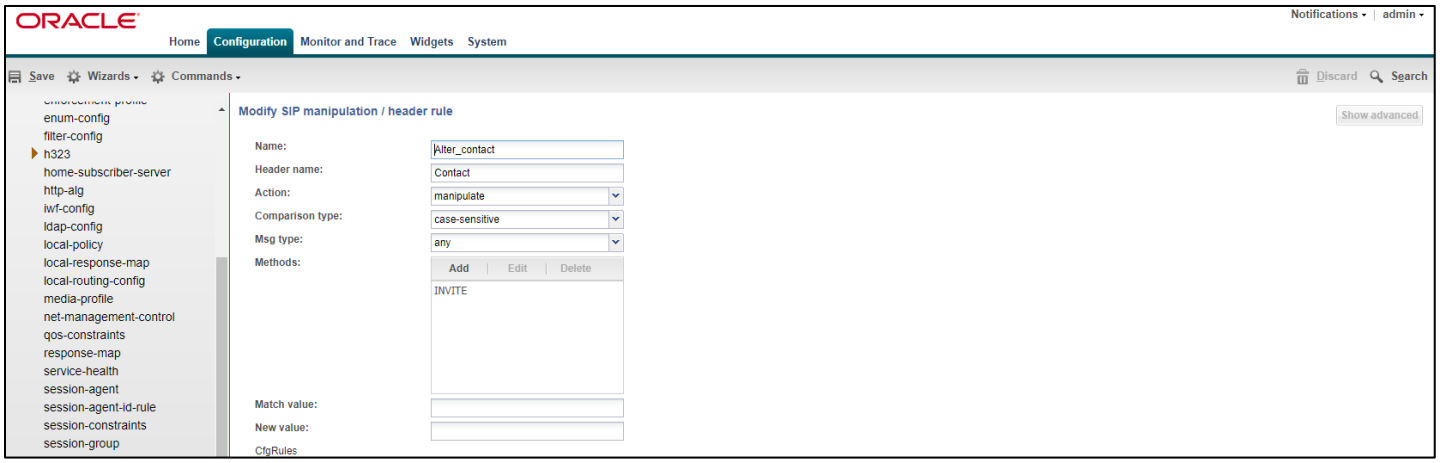
It is configured as a header rule in the sip-manipulation Teamsoutmanip. Here Record-route is added to the OPTIONS message “<sip:oracleesbc2.woodgrovebank.us>”

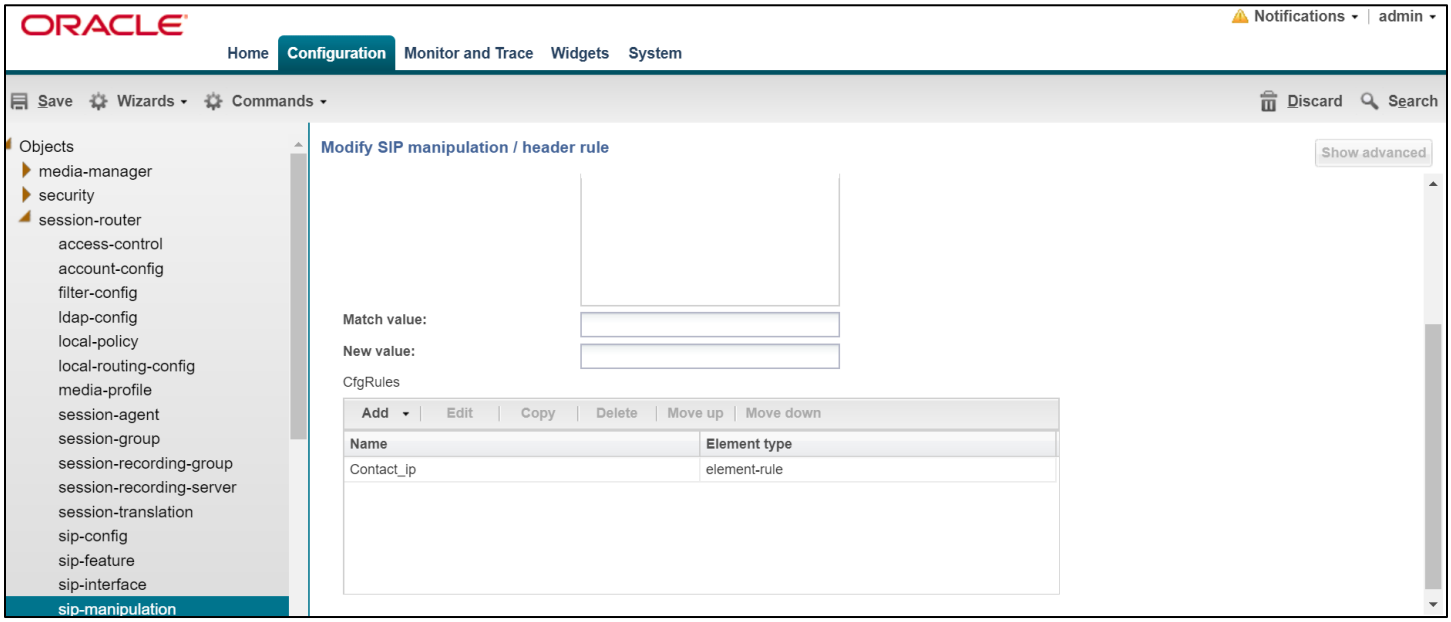


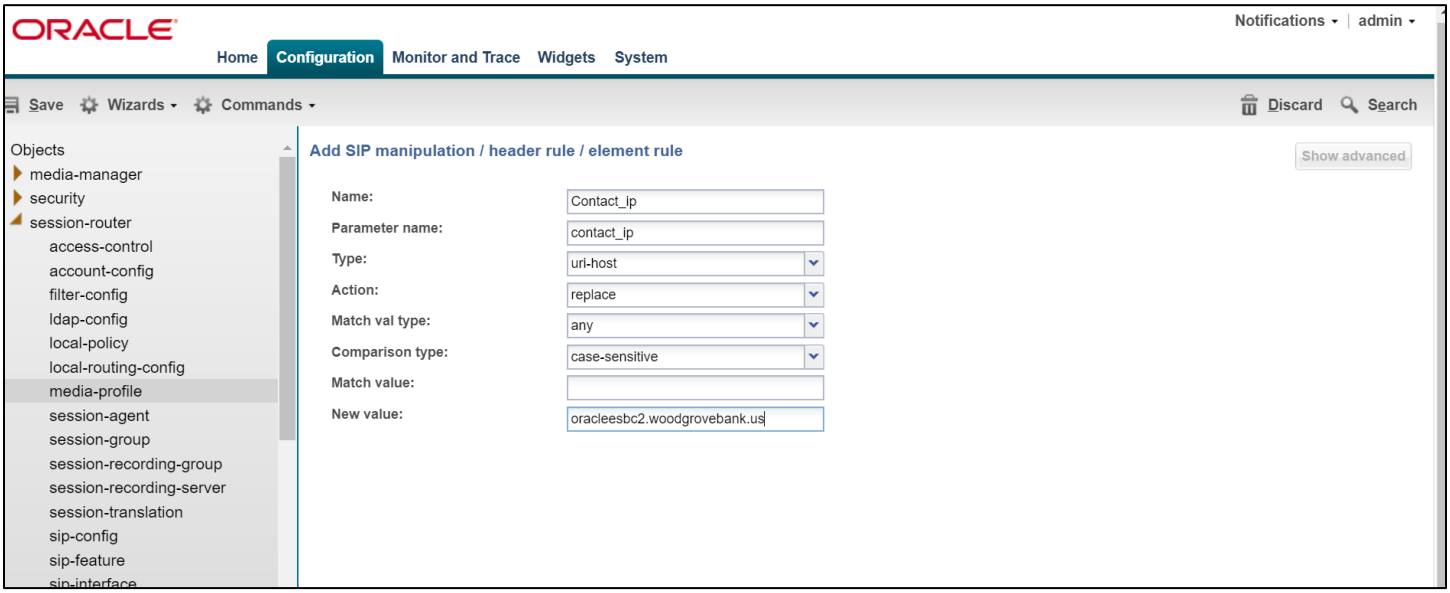
5.20.6 Alter_contact

It is configured as a header rule in the sip-manipulation Teamsoutmanip. The contact header is changed according to MS Team requirements. The following element rule is added

- Changing the uri according to include the SBC uri (oracleesbc2.woodgrovebank.us)

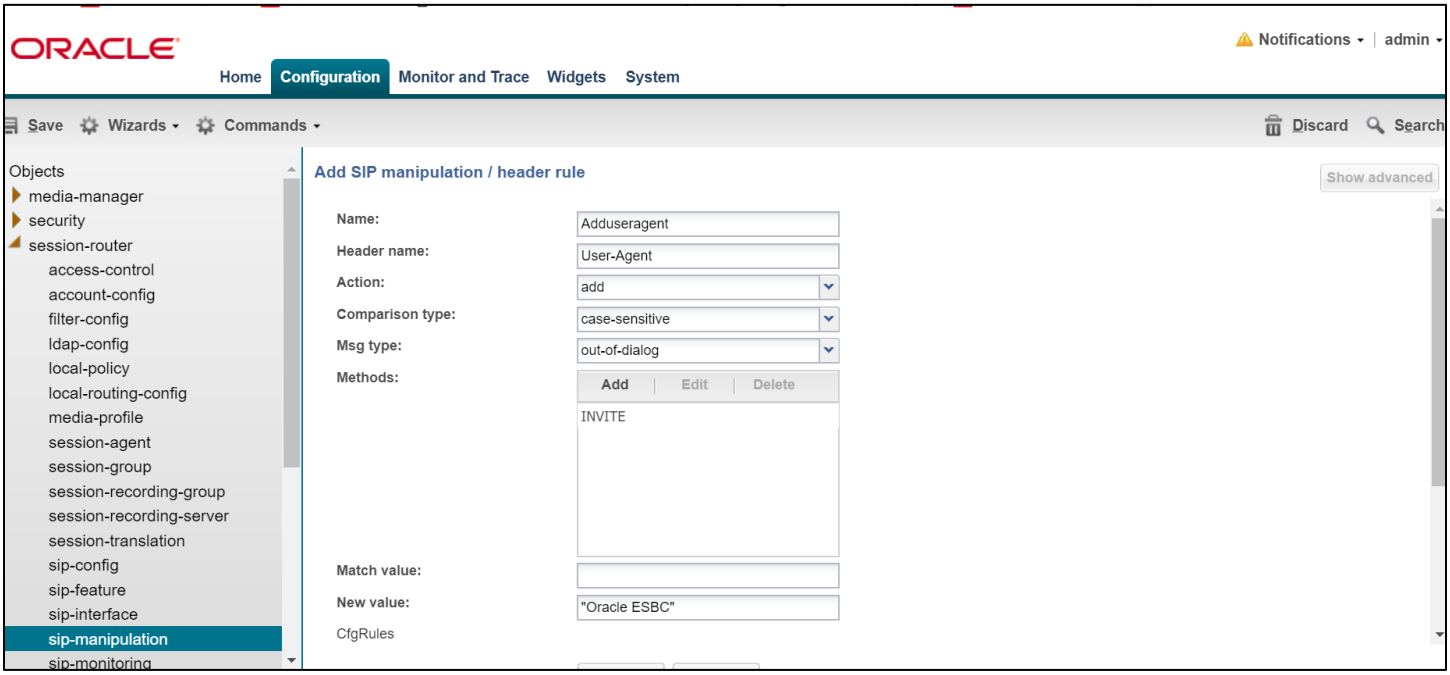






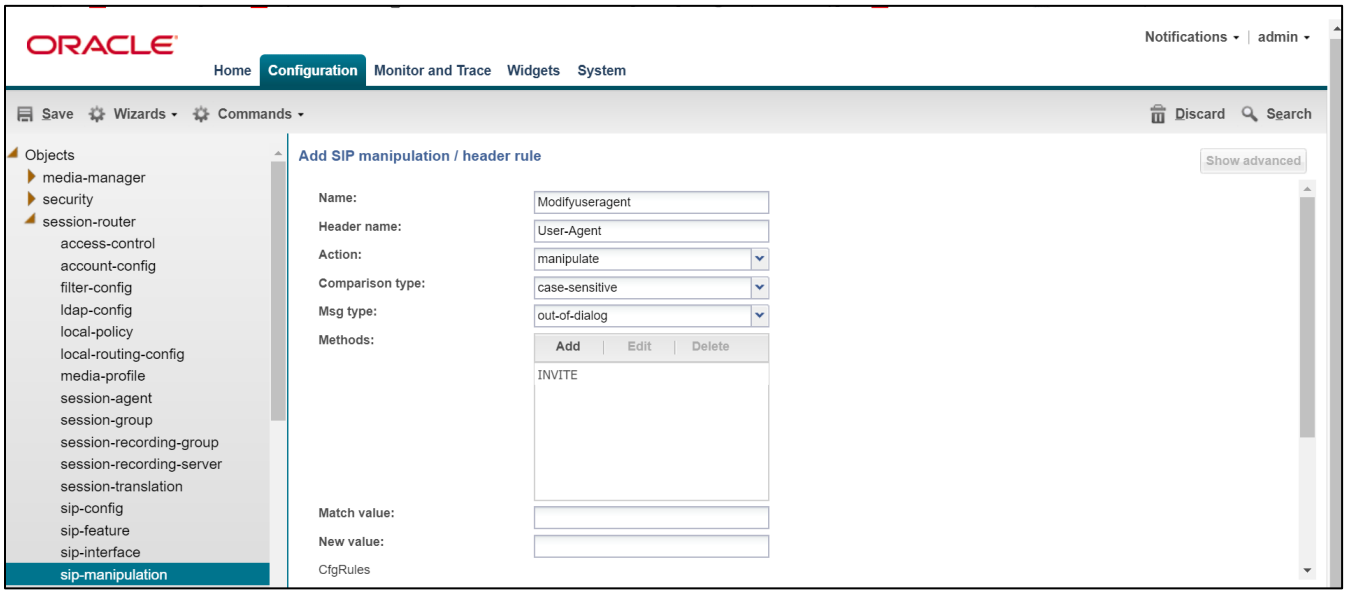
5.20.7 Adduseragent

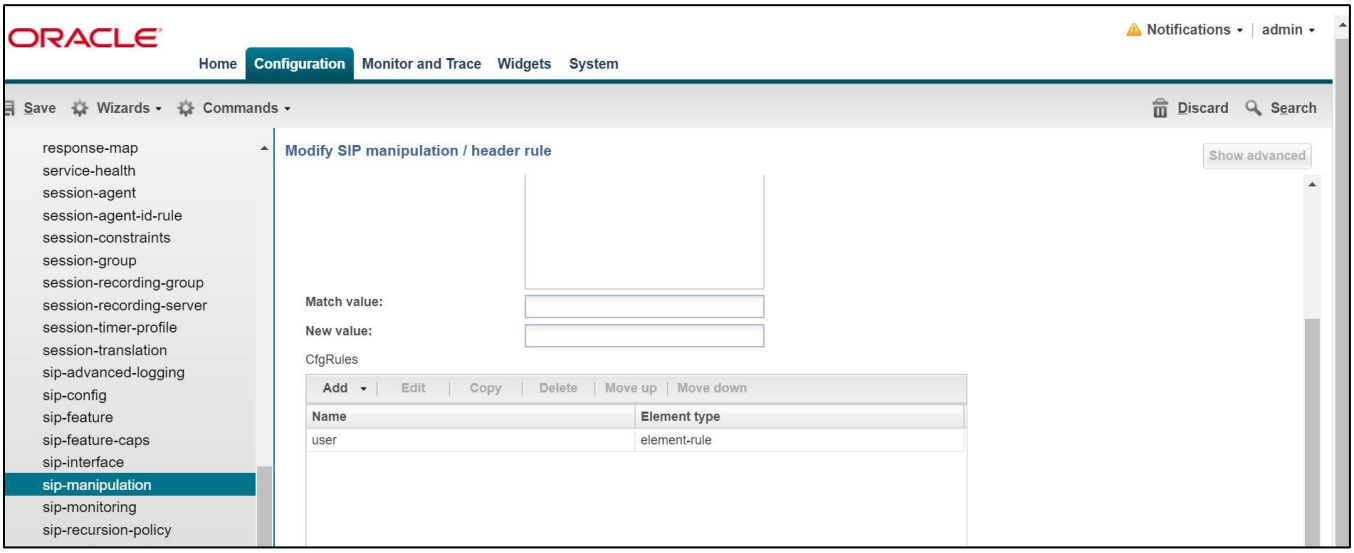
It is configured as a header rule in the sip-manipulation Teamsoutmanip. It adds the user agent to the Invite message, if it is already not present in the invite from Siptrunk.

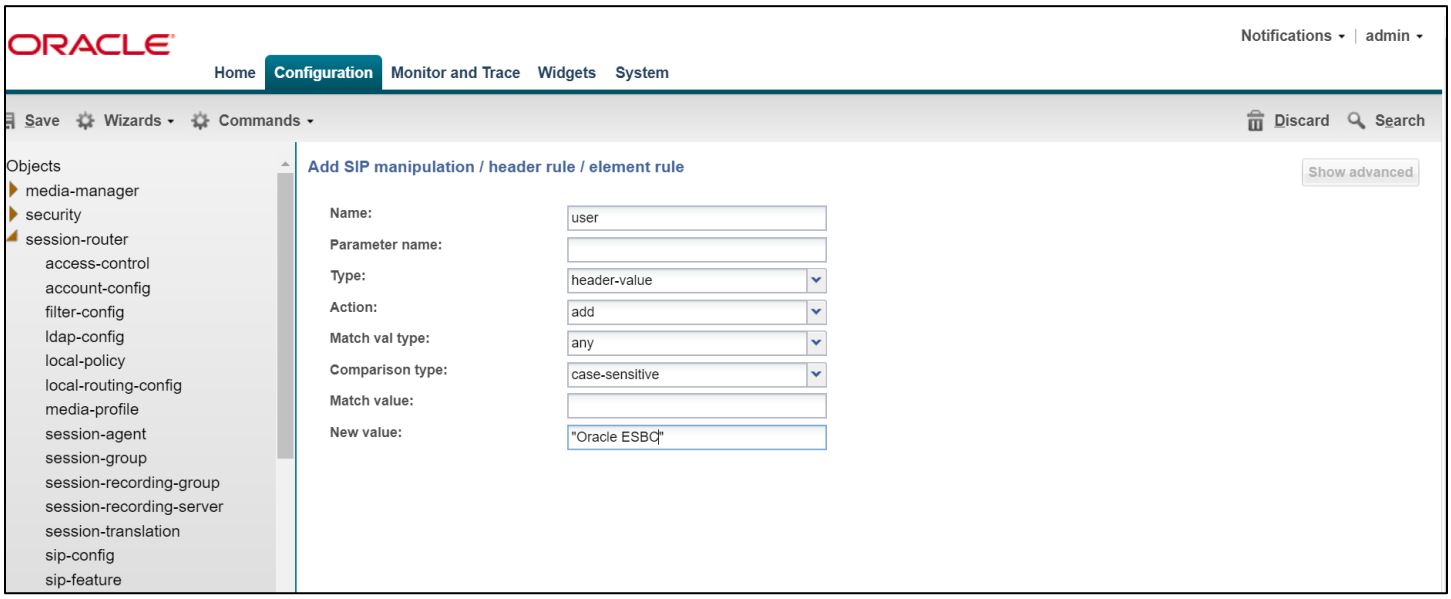


5.20.8 Modifyuseragent

It is configured as a header rule in the sip-manipulation Teamsoutmanip. It modifies the user agent to the Invite message, according to MS Teams requirements.







For configuring the following rules in Teamsoutmanip, click on the hyperlink below.

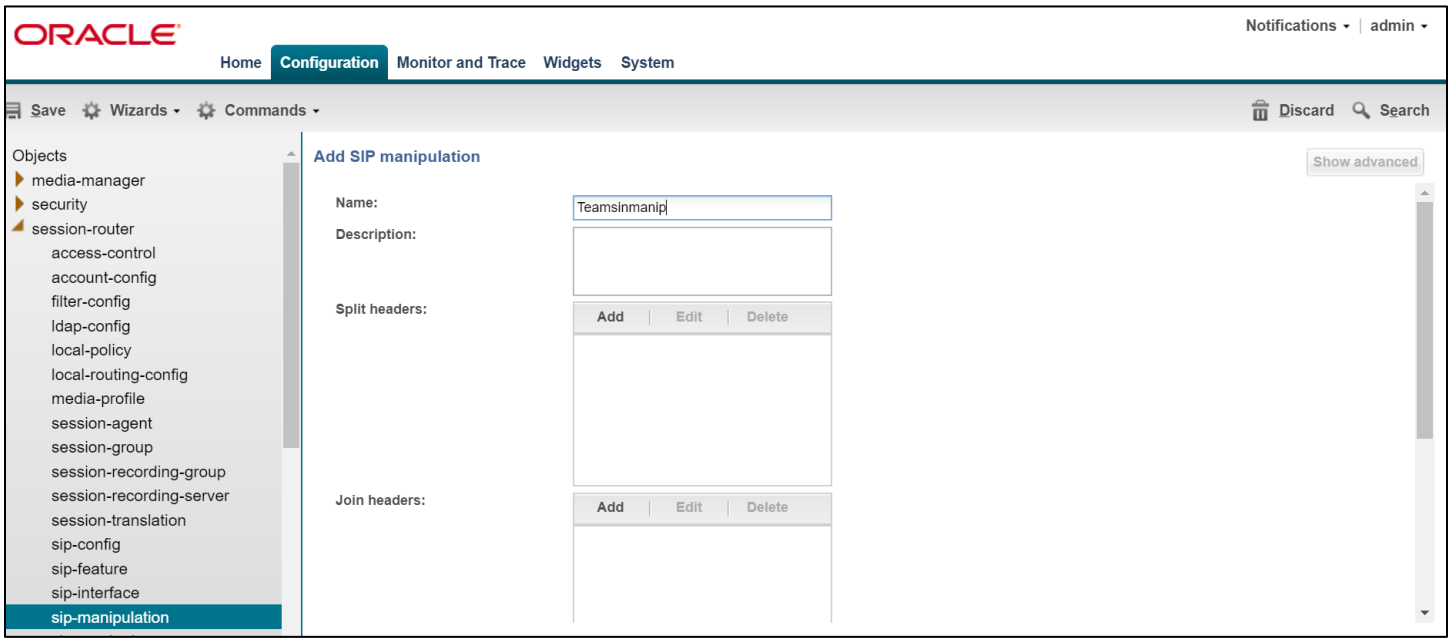
- Reqsendonlytoinactive
- Replyrecvonlytoinactive

5.21 Teamsinmanip

The following manipulation is configured to handle the SIP messages received inbound from Teams, Teamsinmanip.

- Respondoptions – to handle the OPTIONS locally
- Reqinactivetosendonly – replaces the inactive SDP attribute to sendonly in the request
- Replyinactivetorecvonly - replaces the inactive SDP attribute to recvonly in the reply
- Change183to180 –Changes 183 Session in Progress to 180 Ringing for ringback requirements

Note: If running the GA release, SCZ830m1p8A, please see Appendix D prior to configuring sip manipulations in your Oracle SBC. This appendix outlines how new features added to the GA release will help simplify your configuration by eliminating the need for most, if not all required sip manipulations.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access-control
account-config
filter-config
ldap-config
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
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Show advanced
Name:
Teamsinmanip
Description:
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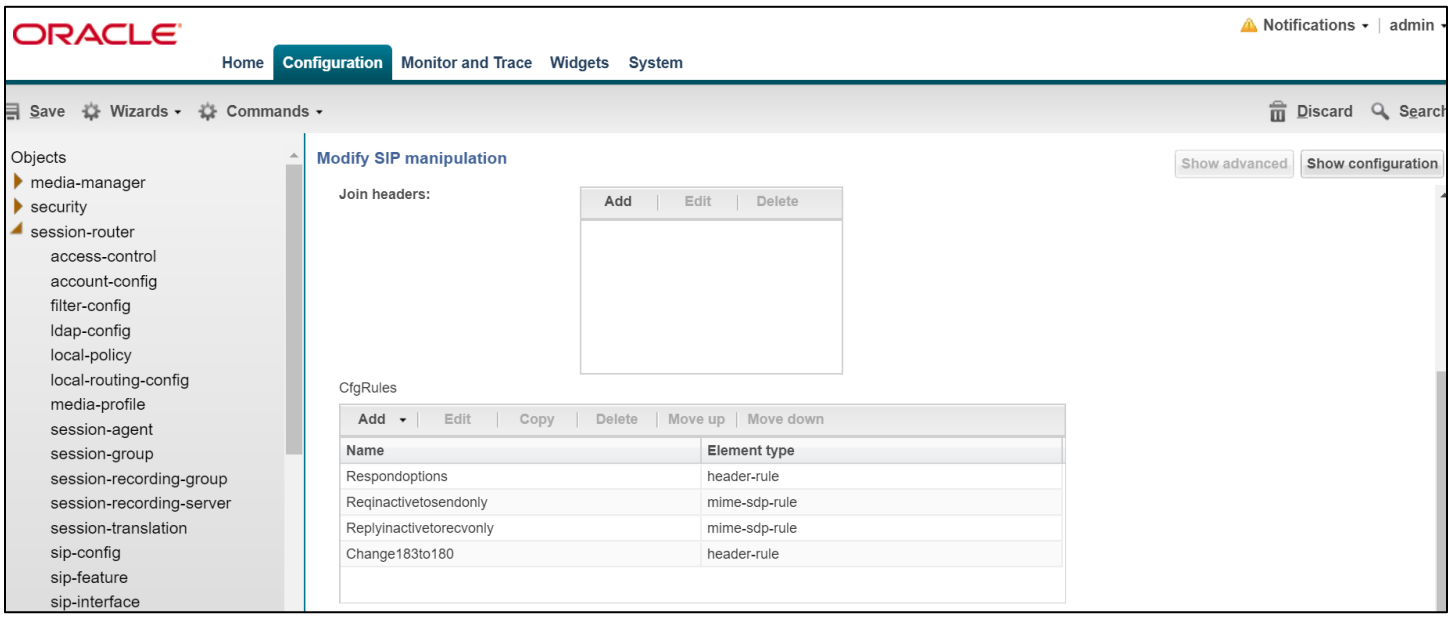
Add
Edit
Delete
Join headers:
Add
Edit
Delete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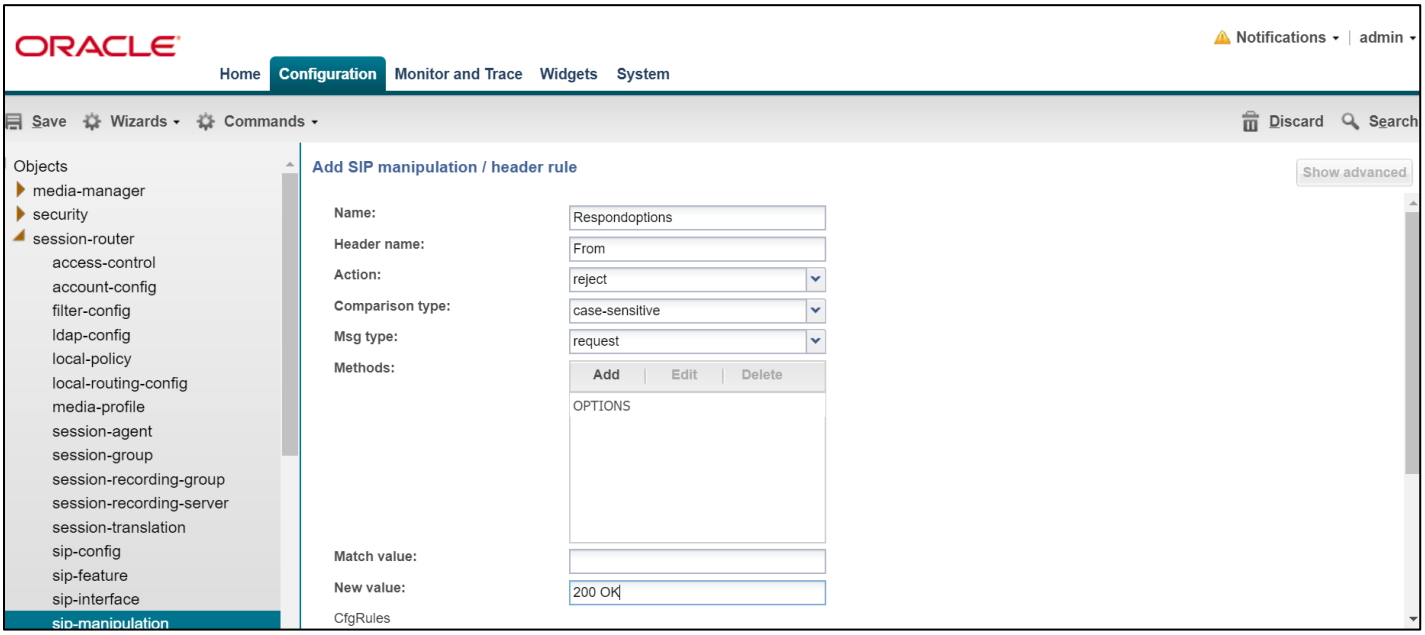
local-policy
local-routing-config
media-profile
session-agent
session-group
session-recording-group
session-recording-server
session-translation
sip-config
sip-feature
sip-interface
Modify SIP manipulation
Show advanced
Show configuration
Join headers:
Add
Edit
Delete
CfgRules
Add
Edit
Copy
Delete
Move up
Move down
Name
Element type
Respondoptions
header-rule
Reqinactivetosendonly
mime-sdp-rule
Replyinactivetorecvonly
mime-sdp-rule
Change183to180
header-rule

5.21.1 Respondoptions

It is configured as a header-rule rule in the sip-manipulation Teamsinmanip. This handles the options locally.



Please click on the hyperlink for the following rules applied on the Teamsinmanip manipulation.

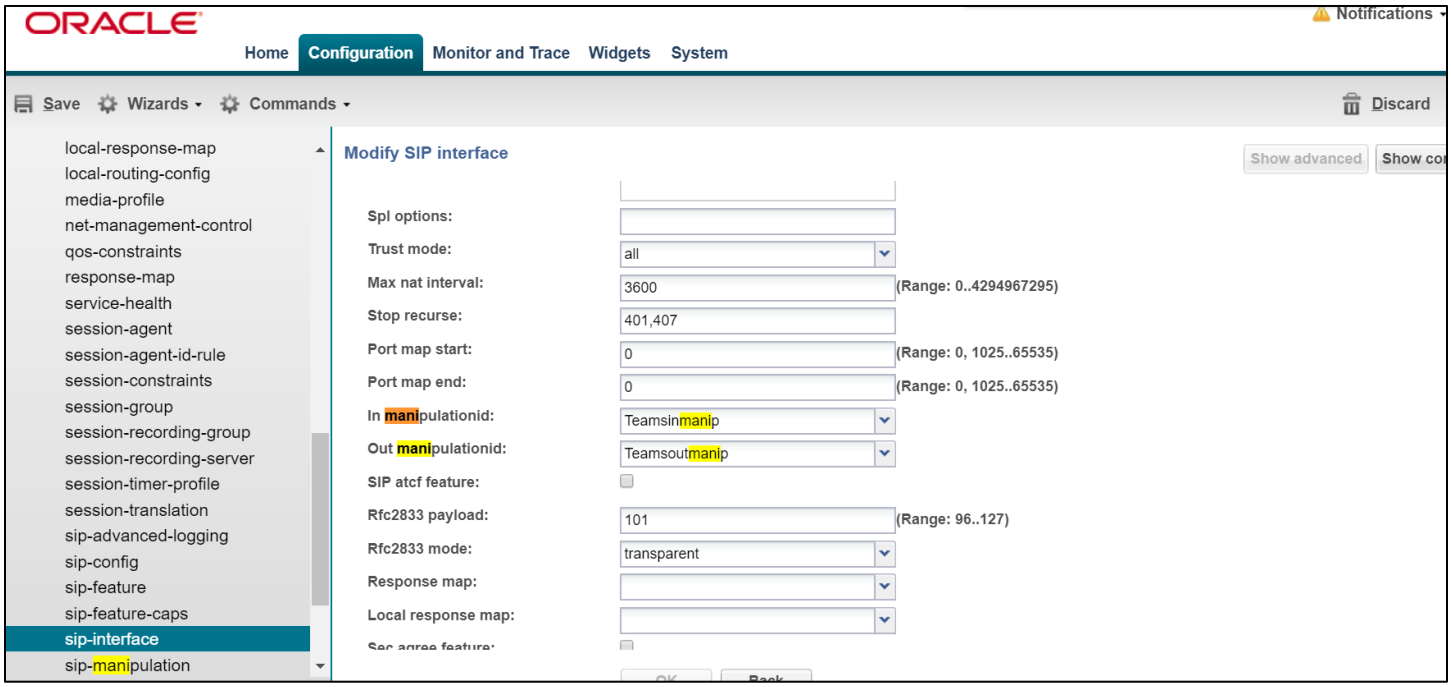
“Change183to180”

Reqinactivetosendonly

Reqinactivetorecvonly

5.22 Applying the teams SIP manipulations to Teams SIP Interface

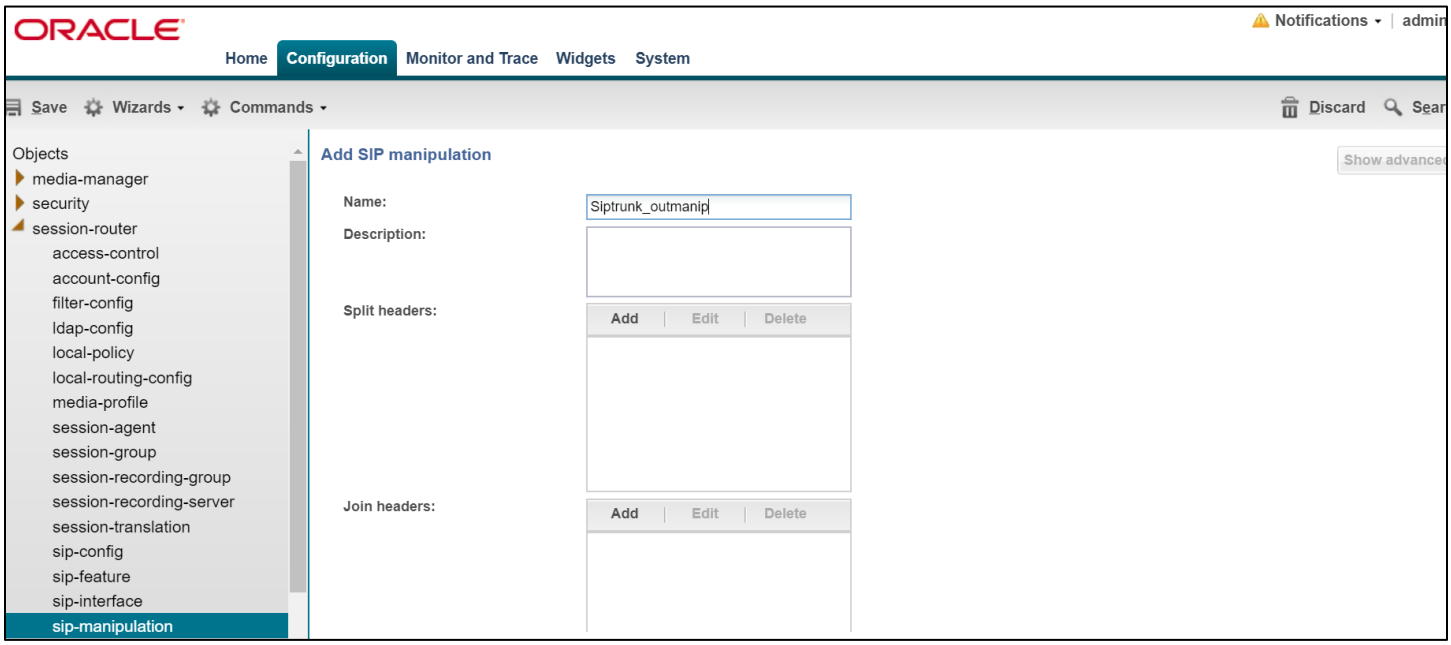
Apply the above sip manipulations to sip-interface as shown below.

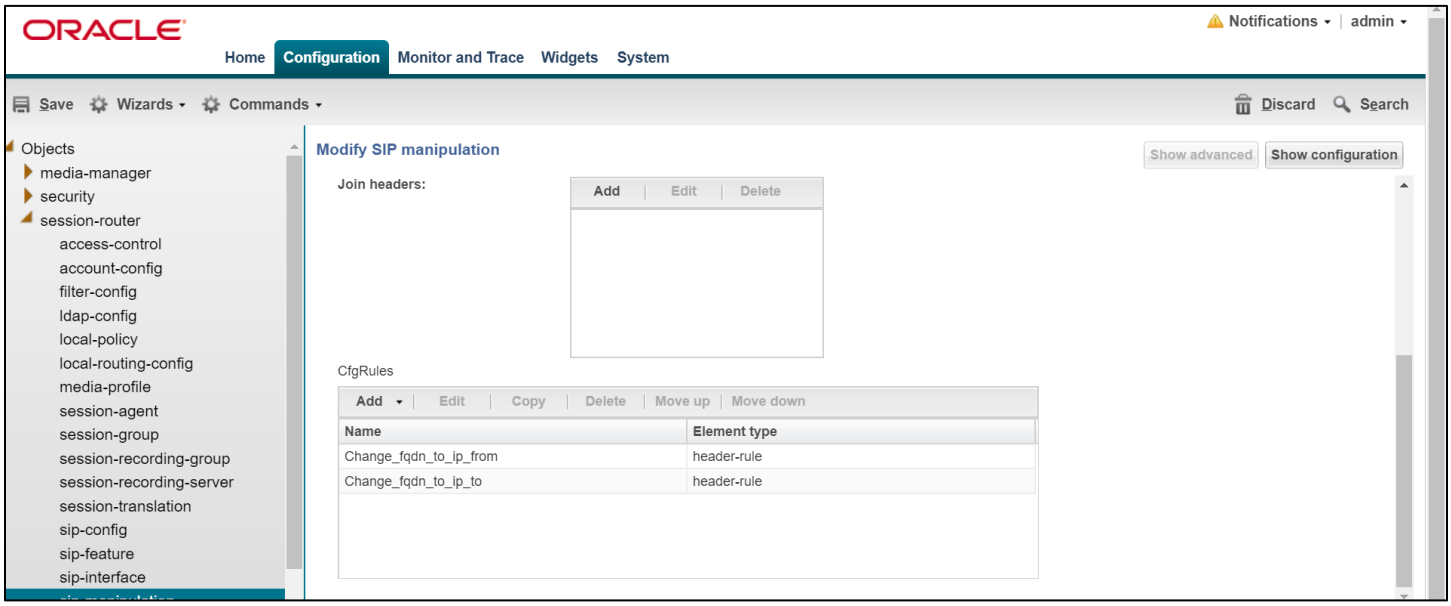


5.23 Siptrunk_outmanip

We configure the manipulation Siptrunk_outmanip to modify the SIP messages going to the SIP Trunk as below

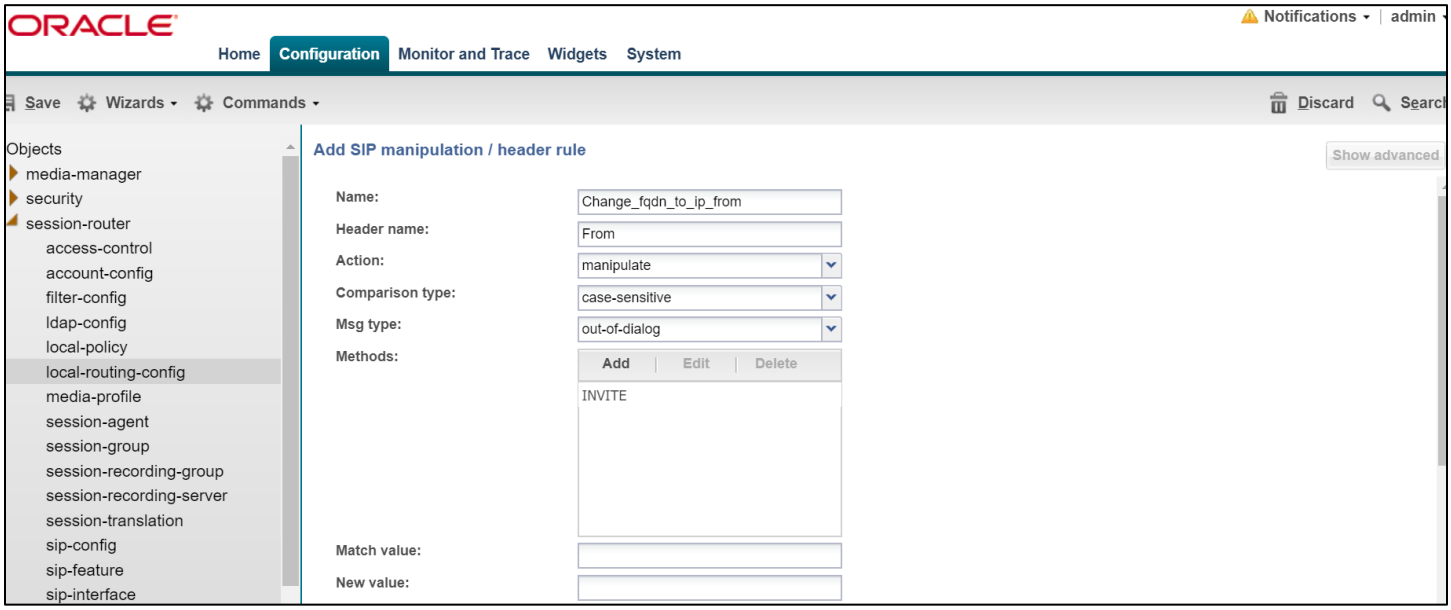
- Change_fqdn_to_ip_from to replace the uri-host of the From header with the SBC's local ip.
- Change_fqdn_to_ip_to to replace the uri-host of the To header with the ip –address of the Trunk device.

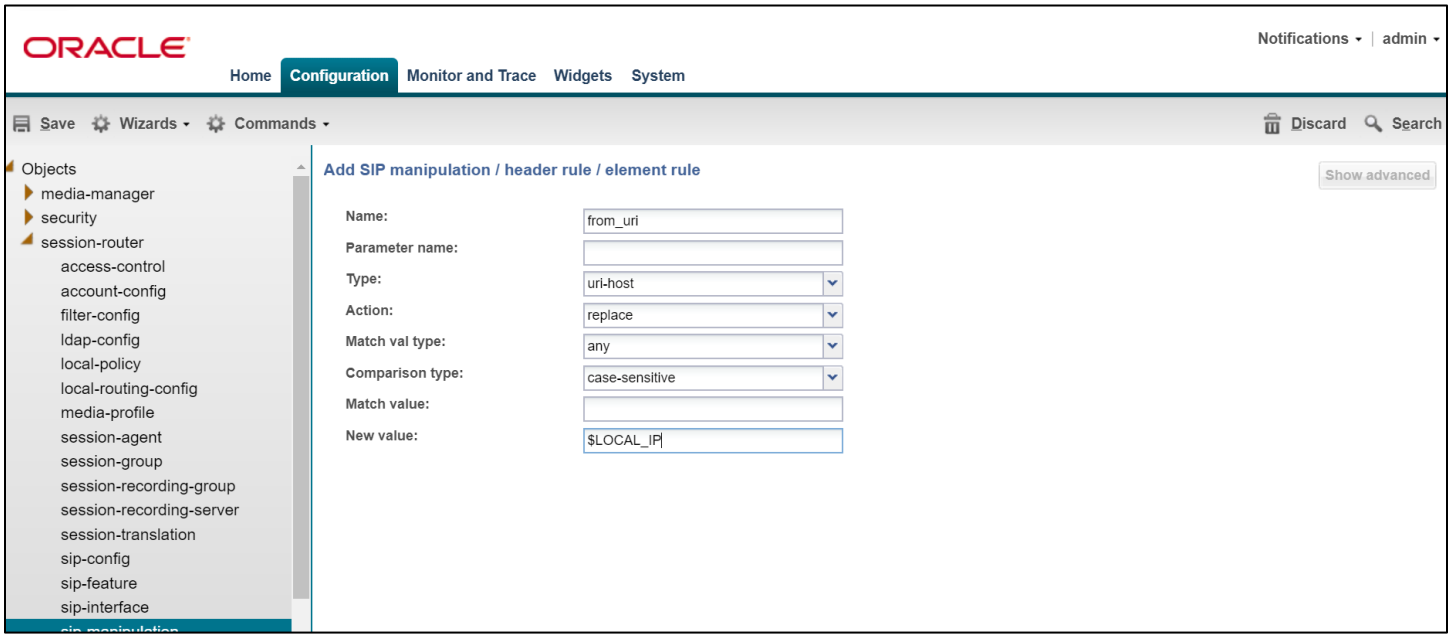




5.23.1 Change_fqdn_to_ip_from

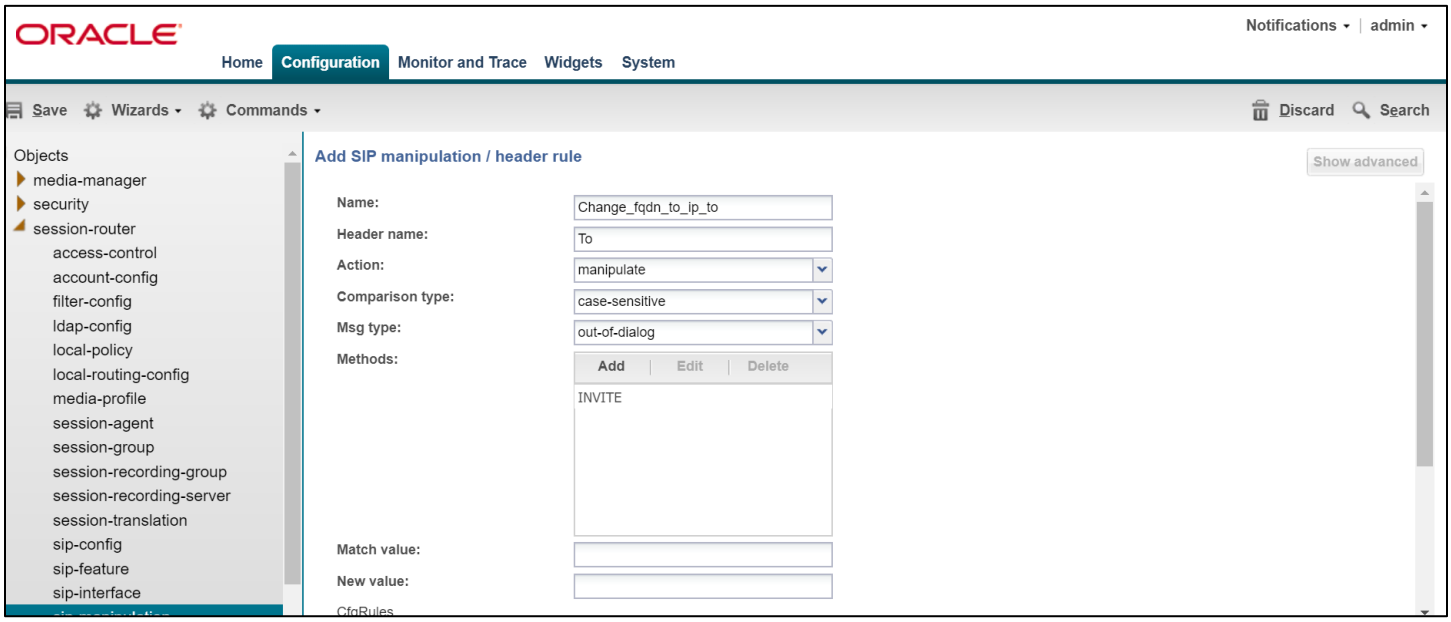
It is applied as a header rule in Siptrunk_outmanip, to replace the uri-host of the From header with the SBC's local ip.

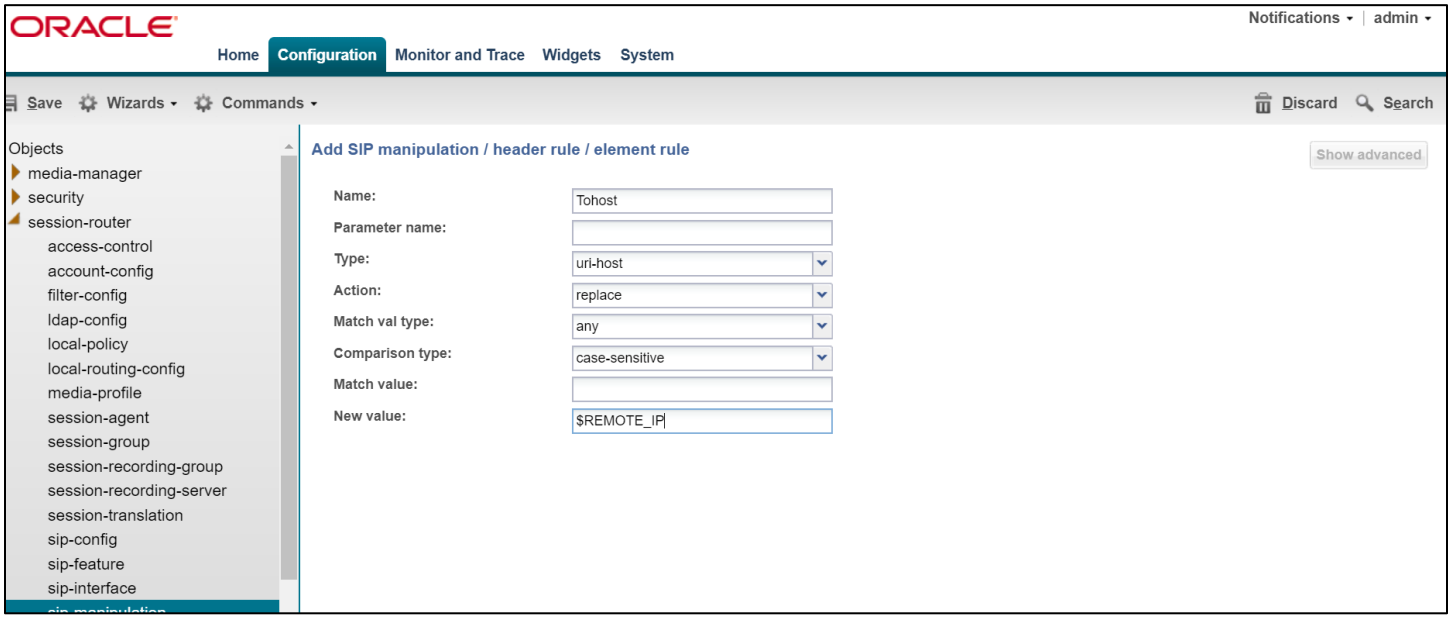




5.23.2 Change_fqdn_to_ip_to

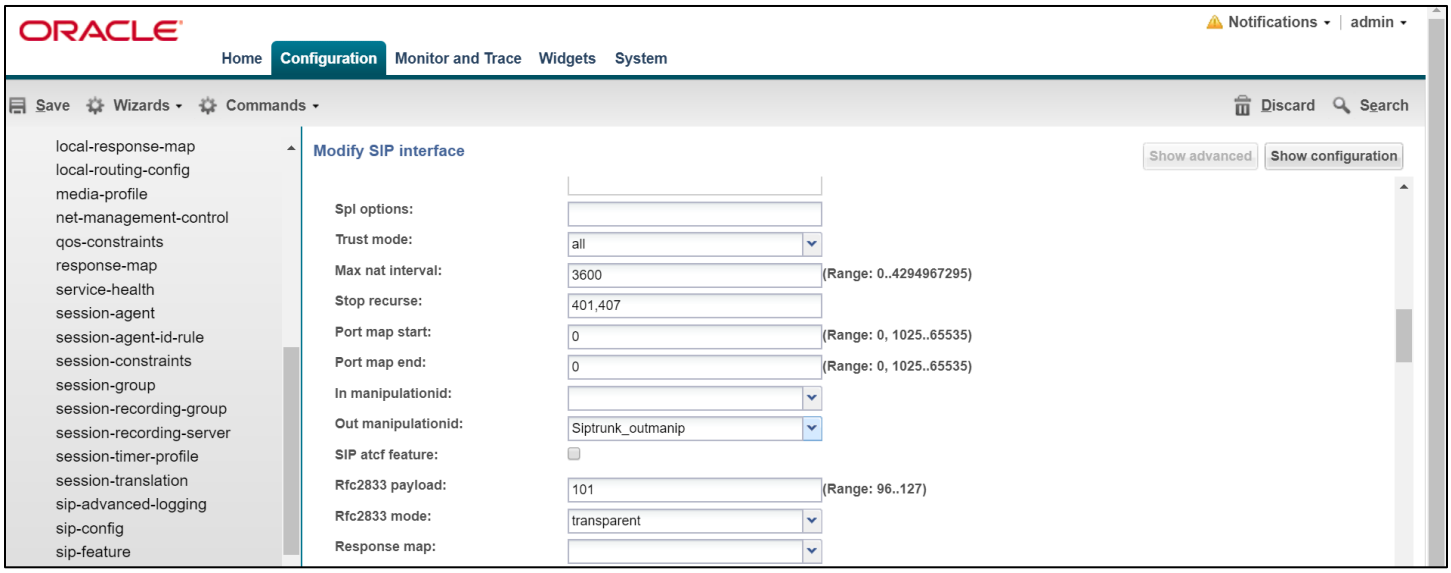
It is applied as a header rule in Siptrunk_outmanip, to replace the uri-host of the To header with the ip –address of the Trunk device





5.24 Applying the trunk side SIP manipulations to Trunk SIP Interface

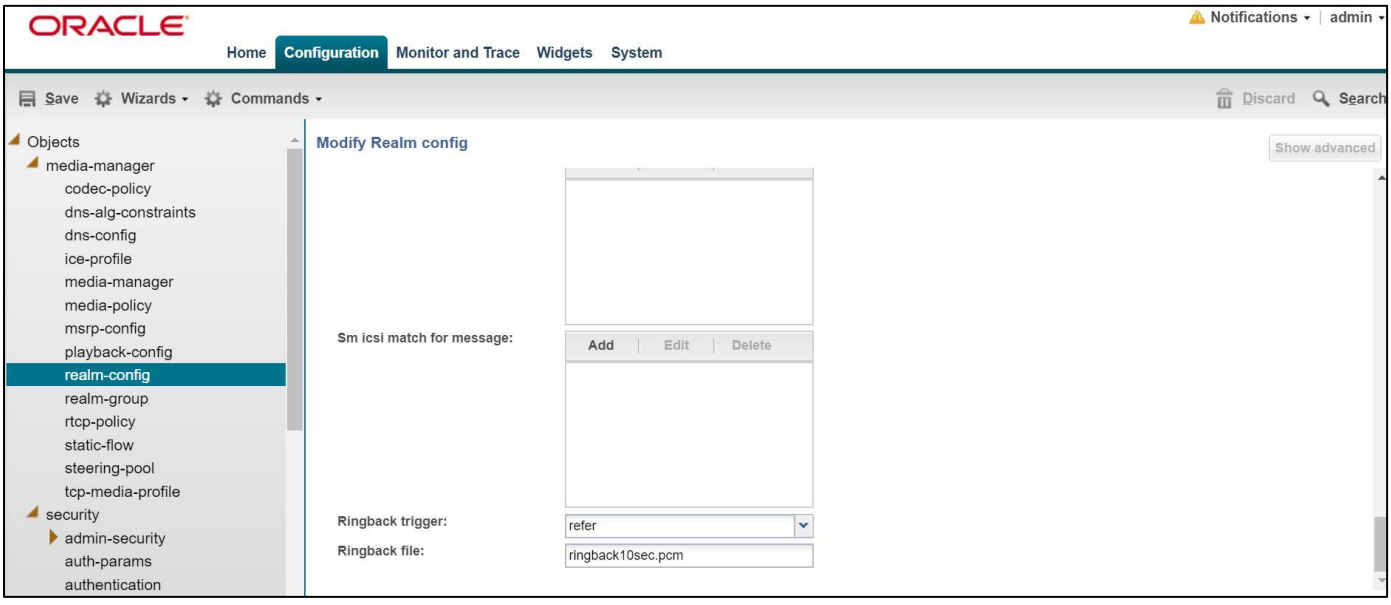
The Siptrunk_outmanip sip-manipulation is applied as the out-manipulationid in the sip-interface facing SIP Trunk



6 Ringback Configuration

6.1 Ringback on Transfers

During a call transfer, the calling party does not hear a ring back tone during the process of transfer. We utilize the local playback feature of the SBC to play ring back tone during transfers. The ringback tone is triggered on receiving SIP REFER. You must upload a media playback file to /code/media on the SBC. This file must be in raw media binary format. This ringback trigger and ringback file to be played are configured on the realm facing the trunk.

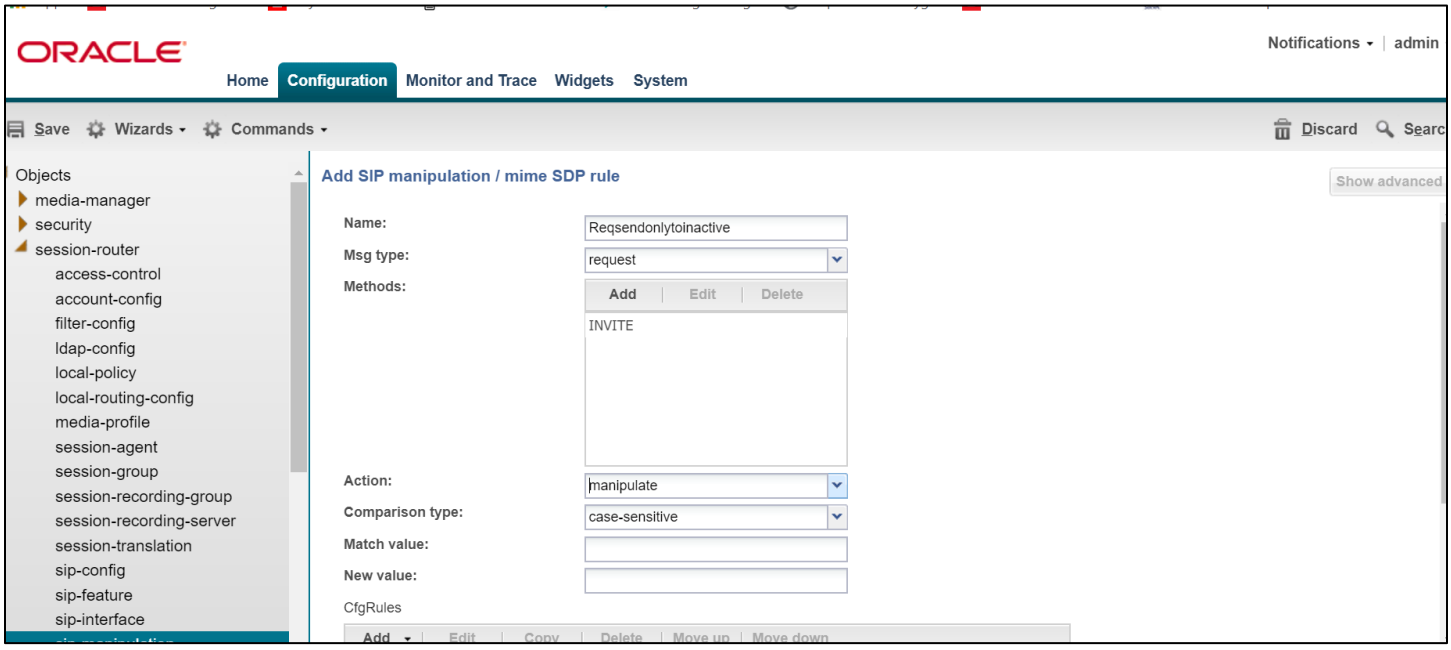


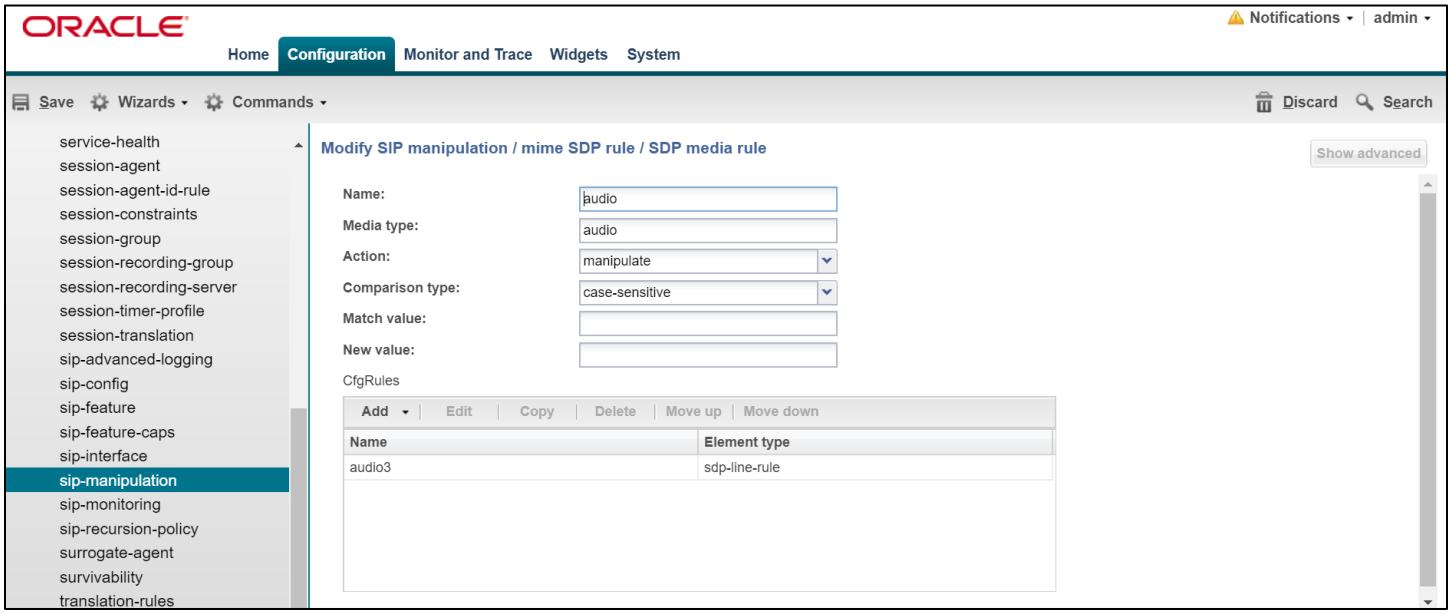
In addition to the ringback trigger configuration above, SDP manipulations are needed in order to play the ringback tone towards the PSTN caller. The INVITE MS Teams sends to the SBC to initiate the transfer contains the SDP attribute, a=inactive which is forwarded to the trunk and as a result of which the SBC cannot play the ring back tone to the original PSTN caller (while call is being transferred). A sendonly attribute is required by the calling party to be able to hear ringback.

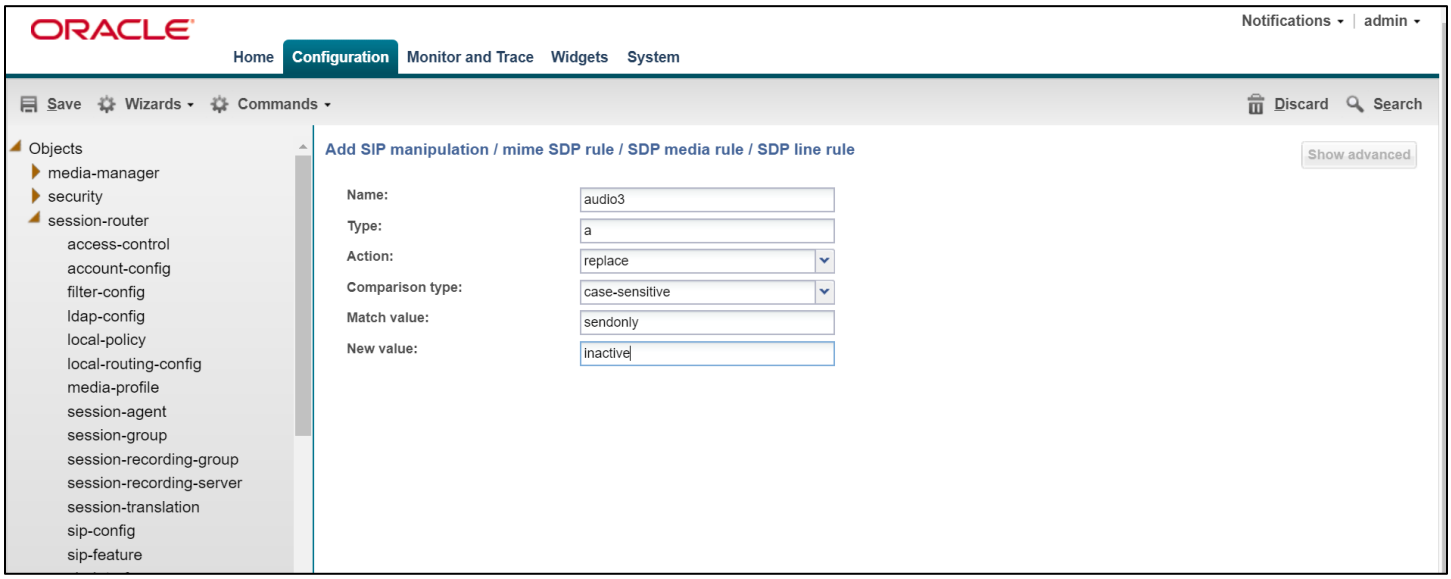
The SBC is able to signal appropriately towards the SIP trunk by changing the a=inactive SDP attribute in the INVITE to a=sendonly towards PSTN. We configure sdp-mime rule under the sip-manipulation Teamsinmanip to change a=inactive to sendonly in the INVITE received from Teams. (Here the MsgType is Request).Similarly we configure the msgtype as Reply and convert the a=inactive to a=recvonly ,so that inactive is not sent towards PSTN.

The 200 OK response received from the trunk contains a=recvonly in the SDP. Since Teams is expecting an a=inactive in the 200 OK for the INVITE, we configure the following sdp-mime under the sip-manipulation – Teamsoutmanip, to convert the a=recvonly to a=inactive in the 200 OK being sent to Teams for the msgtype “Request”. Here also we change the a=recvonly to a=inactive for the msgtype “reply” so that recvonly is not sent towards teams.

Manipulation	Msg Type	Match-Value	New-Value
Teamsinmanip	request	inactive	sendonly
Teamsinmanip	reply	inactive	recvonly
Teamsoutmanip	request	sendonly	inactive
Teamsoutmanip	reply	recvonly	inactive

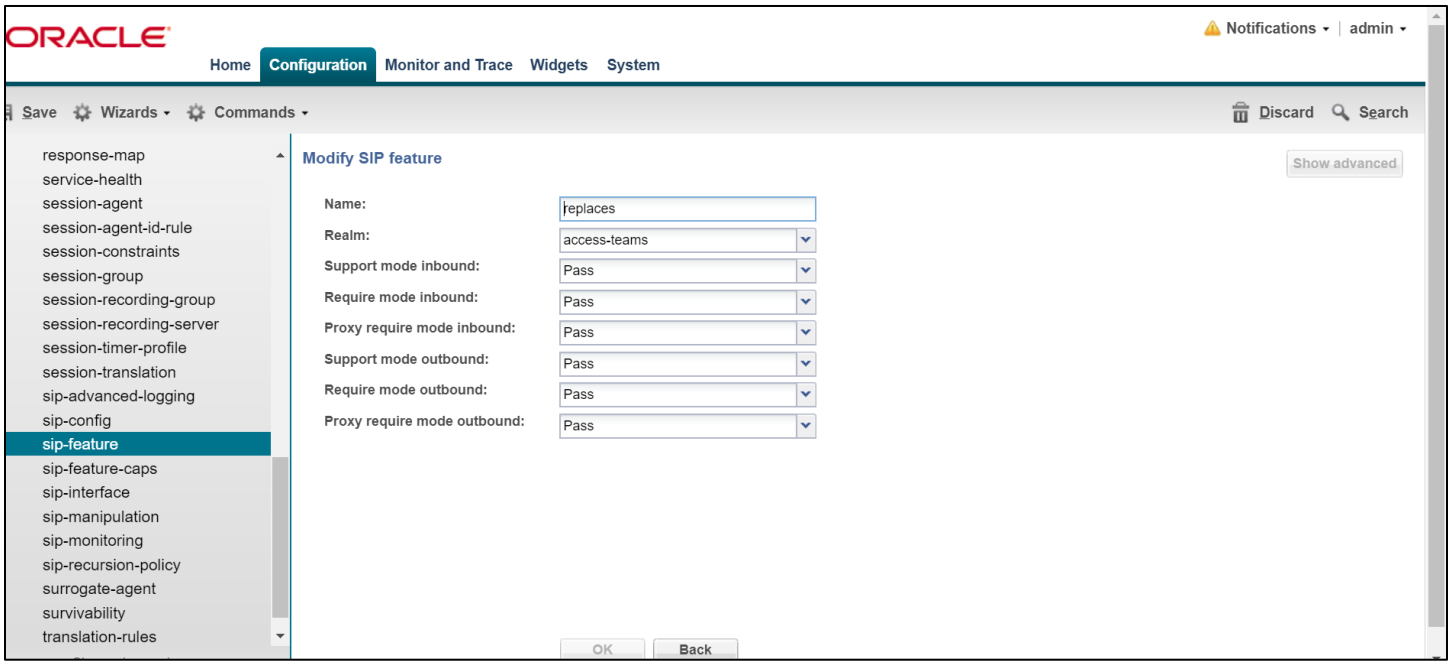



ORACLE
Notifications
admin
Home
Configuration
Monitor and Trace
Widgets
System
Save
Wizards
Commands
Discard
Search
service-health
session-agent
session-agent-id-rule
session-constraints
session-group
session-recording-group
session-recording-server
session-timer-profile
session-translation
sip-advanced-logging
sip-config
sip-feature
sip-feature-caps
sip-interface
sip-manipulation
sip-monitoring
sip-recursion-policy
surrogate-agent
survivability
translation-rules
Modify SIP manipulation / mime SDP rule / SDP media rule
Show advanced
Name:
audio
Media type:
audio
Action:
manipulate
Comparison type:
case-sensitive
Match value:
New value:
CfgRules
Add
Edit
Copy
Delete
Move up
Move down
Name
Element type
audio3
sdp-line-rule


ORACLE
Notifications
admin
Home
Configuration
Monitor and Trace
Widgets
System
Save
Wizards
Commands
Discard
Search
Objects
media-manager
security
session-router
access-control
account-config
filter-config
ldap-config
local-policy
local-routing-config
media-profile
session-agent
session-group
session-recording-group
session-recording-server
session-translation
sip-config
sip-feature
Add SIP manipulation / mime SDP rule / SDP media rule / SDP line rule
Show advanced
Name:
audio3
Type:
a
Action:
replace
Comparison type:
case-sensitive
Match value:
sendonly
New value:
inactive

6.2 Consultative transfer configuration

The following sip-feature needs to be configured to enable support for the replaces to enable successful consultative transfer.



Configure the following sip-profile and apply to the Teams sip interface.

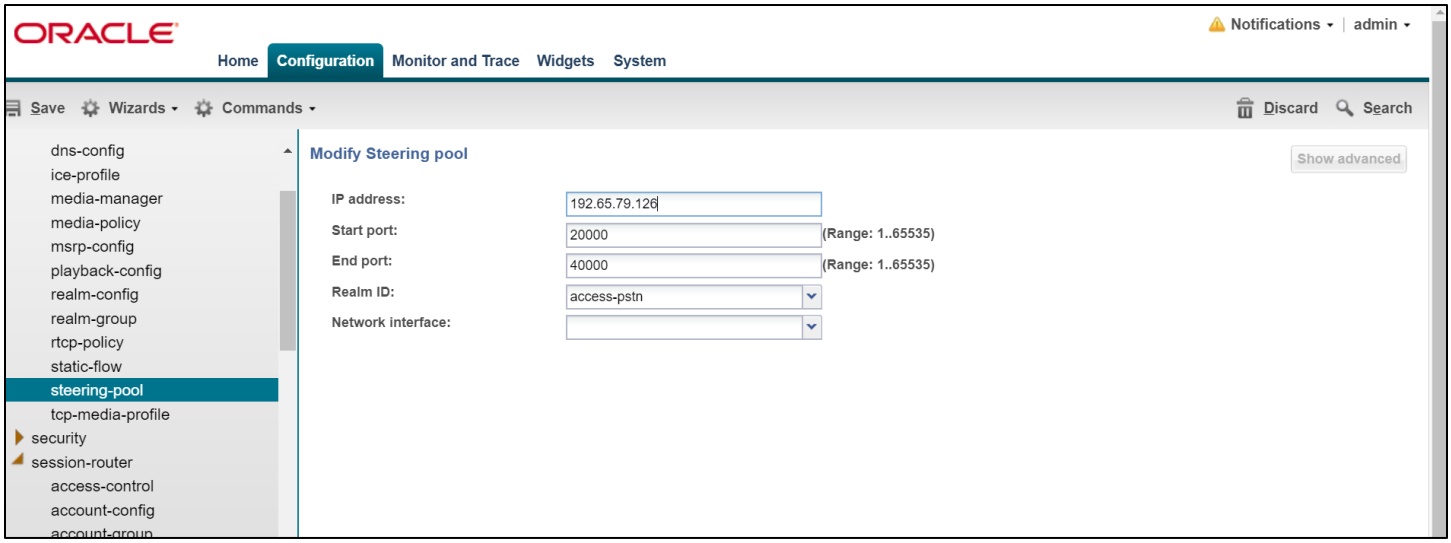
Note:The sip-profile element is available only through te CLI now.the GUI will be enhanced to support this in later releases.
To access the sip-profile element go to configure terminal->session-router->sip-profile

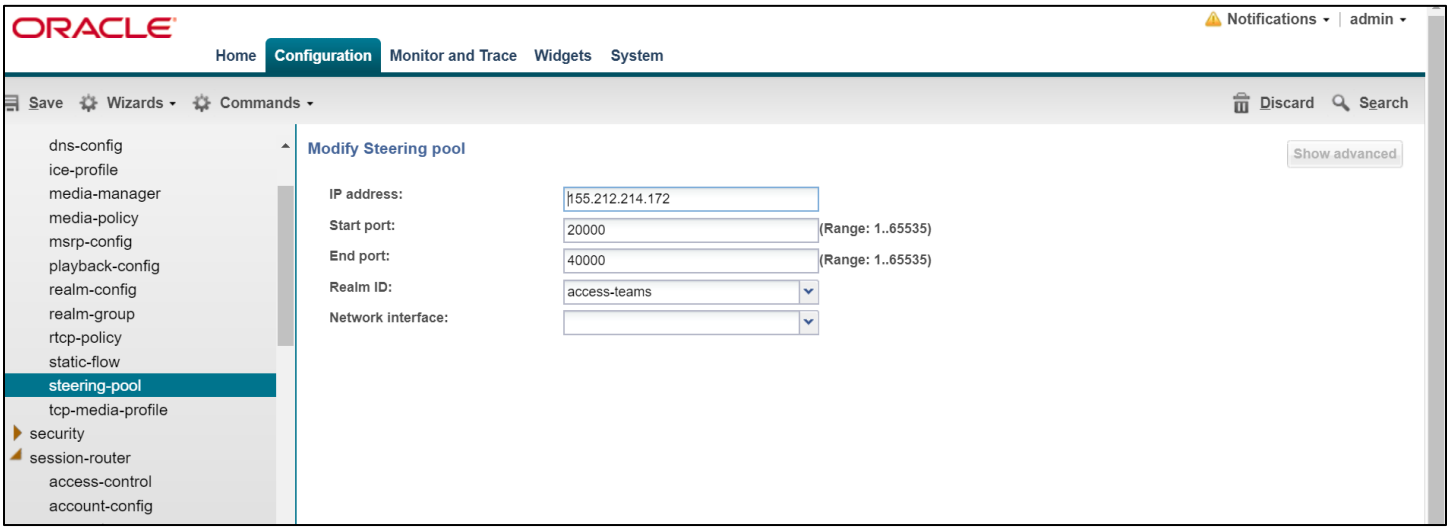
```
sip-profile

    name                              foreplace
    redirection                       inherit
    ingress-conditional-cac-admit     inherit
    egress-conditional-cac-admit      inherit
    forked-cac-bw                     inherit
    cnam-lookup-server
    cnam-lookup-dir                   egress
    cnam-unavailable-ptype
    cnam-unavailable-utype
    replace-dialogs                   enabled
```

6.3 Configure steering pool

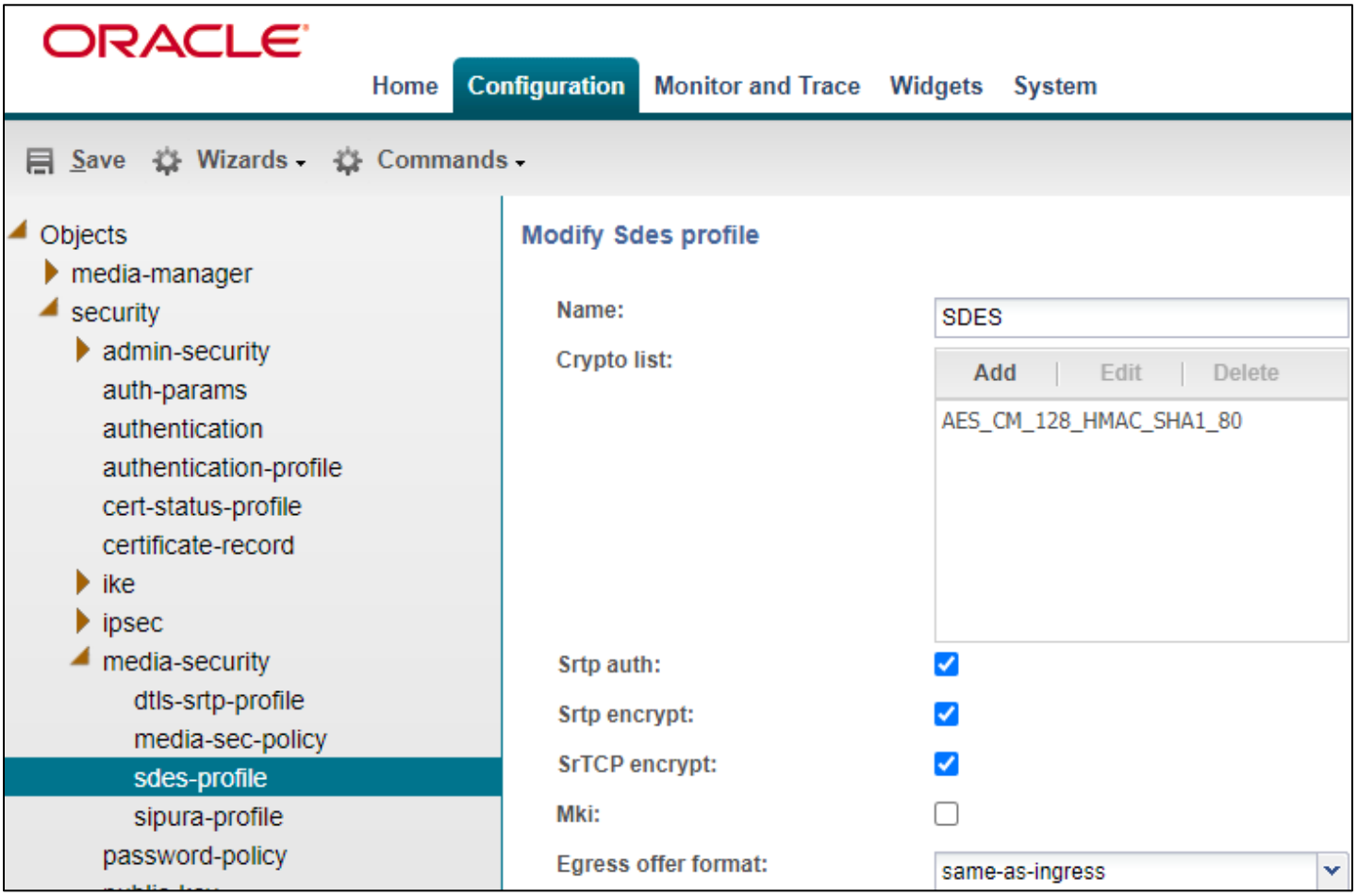
Steering-pool configs allows configuration to assign IP address(es), ports & a realm.

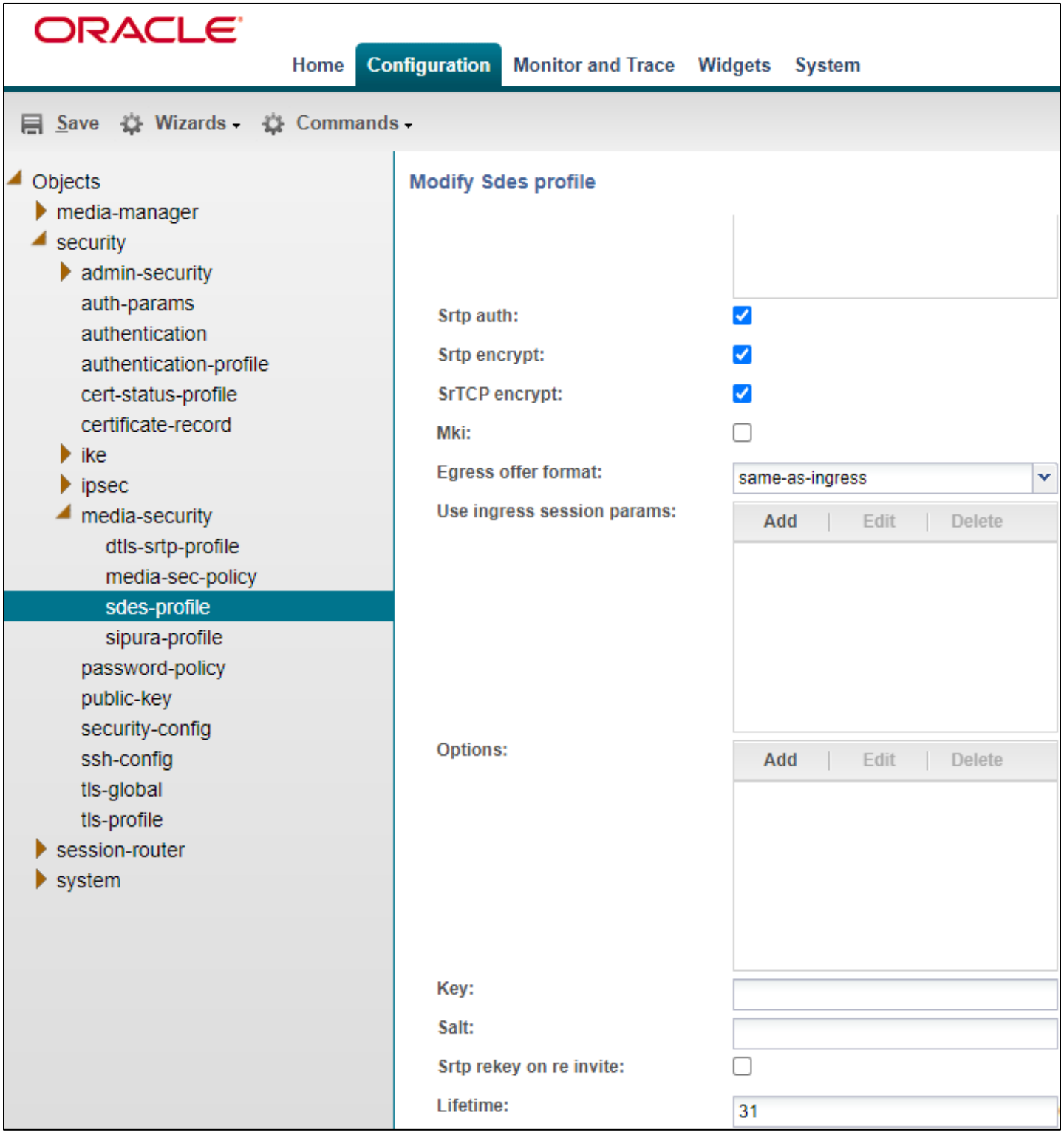




6.4 Configure SDES profile

Create a SDES profile as shown below – Microsoft only supports AES_CM_128_HMAC_SHA1_80 encryption. Navigate to media-manager -* security -* sdes-profile.

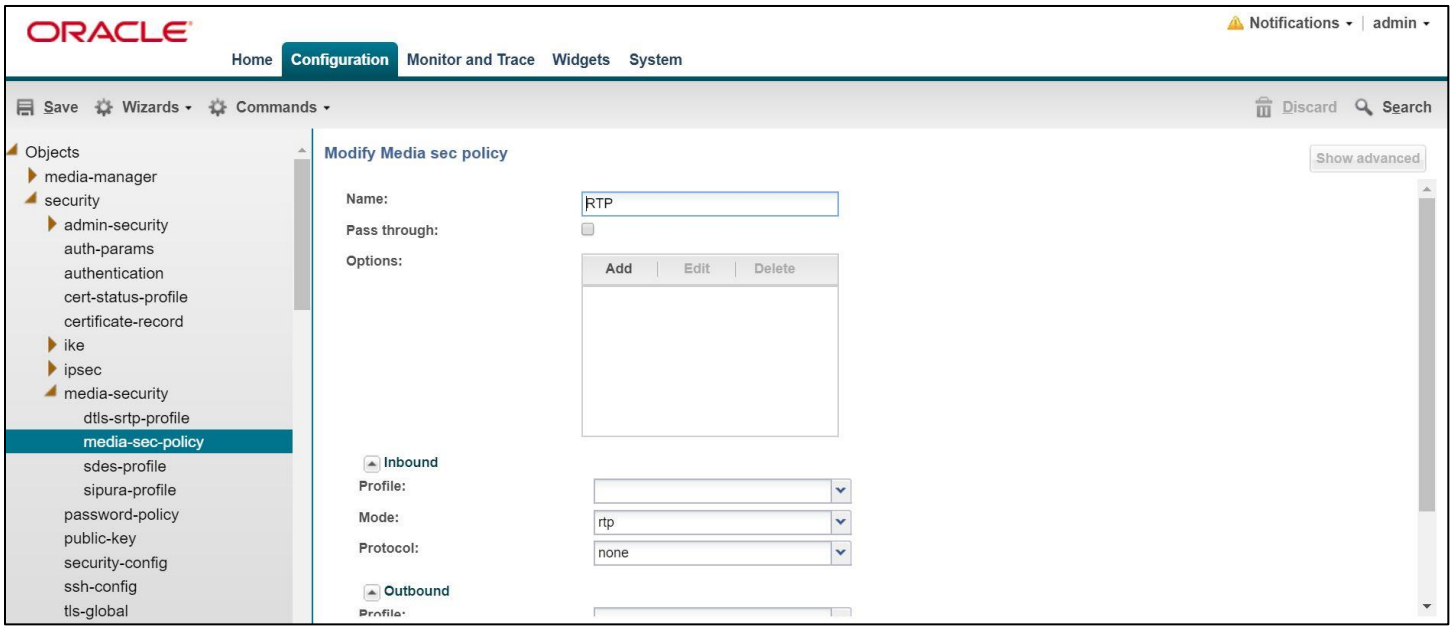


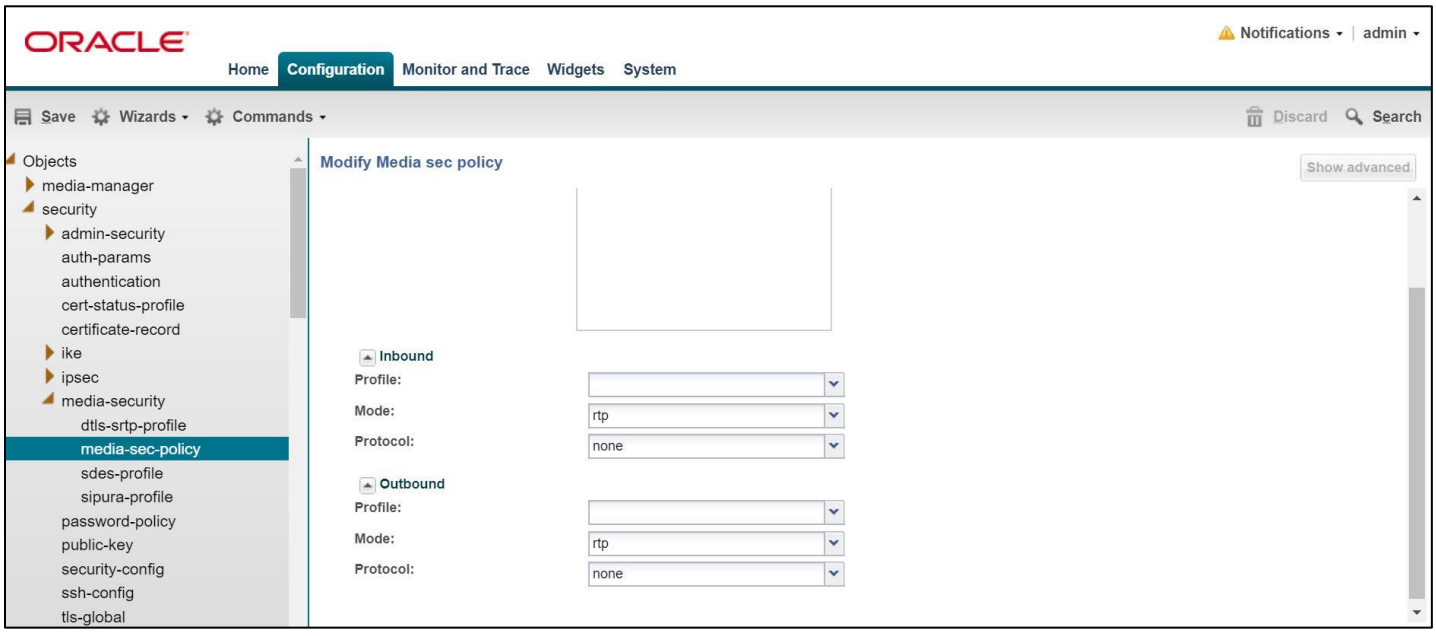


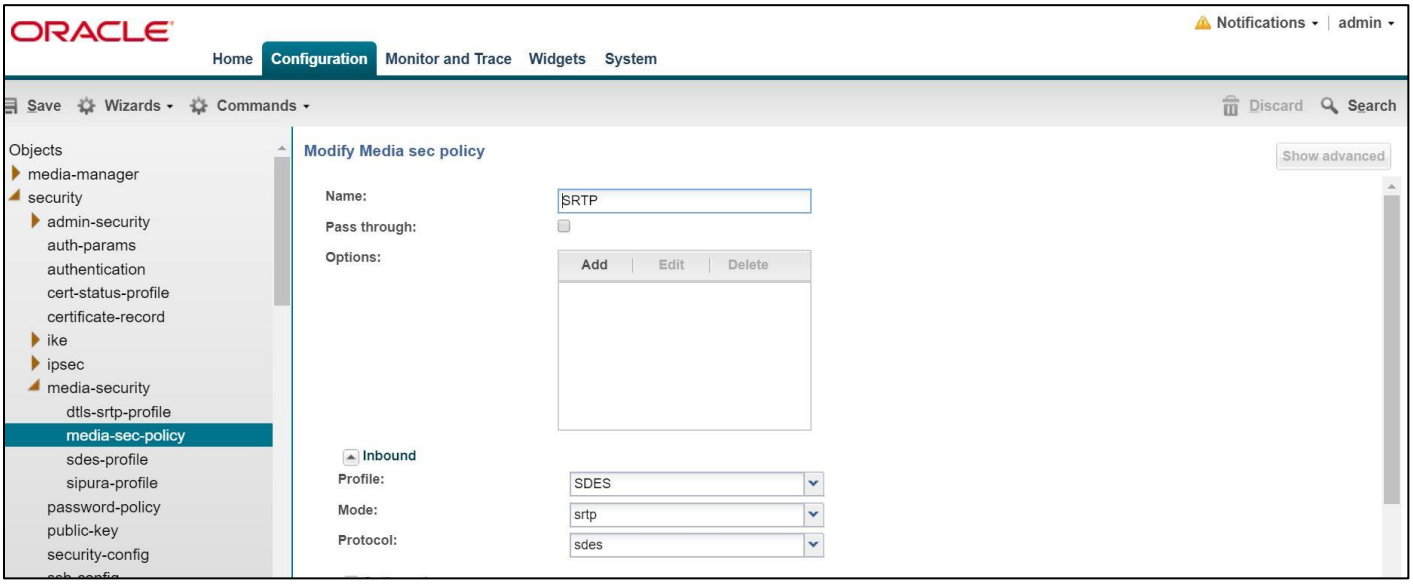
Please make sure to include the lifetime value of 31 in the SDES profile as shown above.

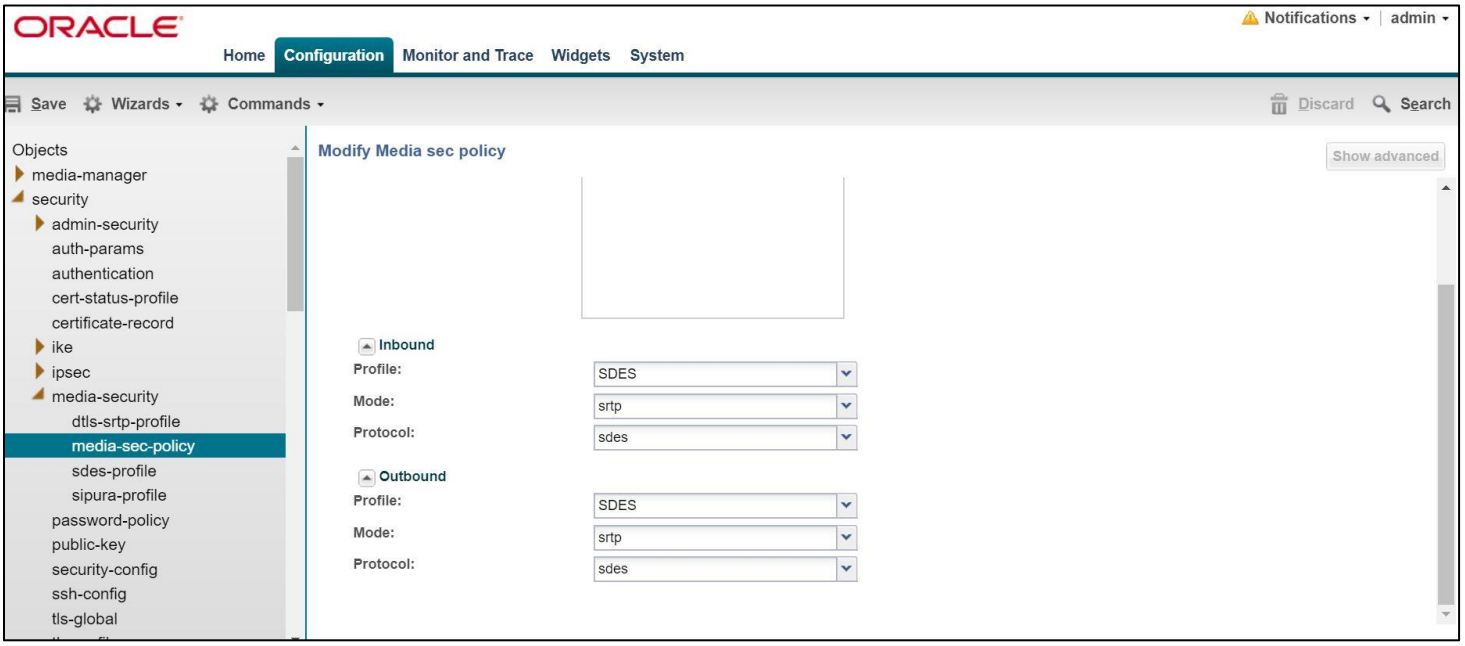
6.5 Media-sec-policy

A media-sec-policy configuration creates a policy to allocate media security rule and apply it to the realm configuration.

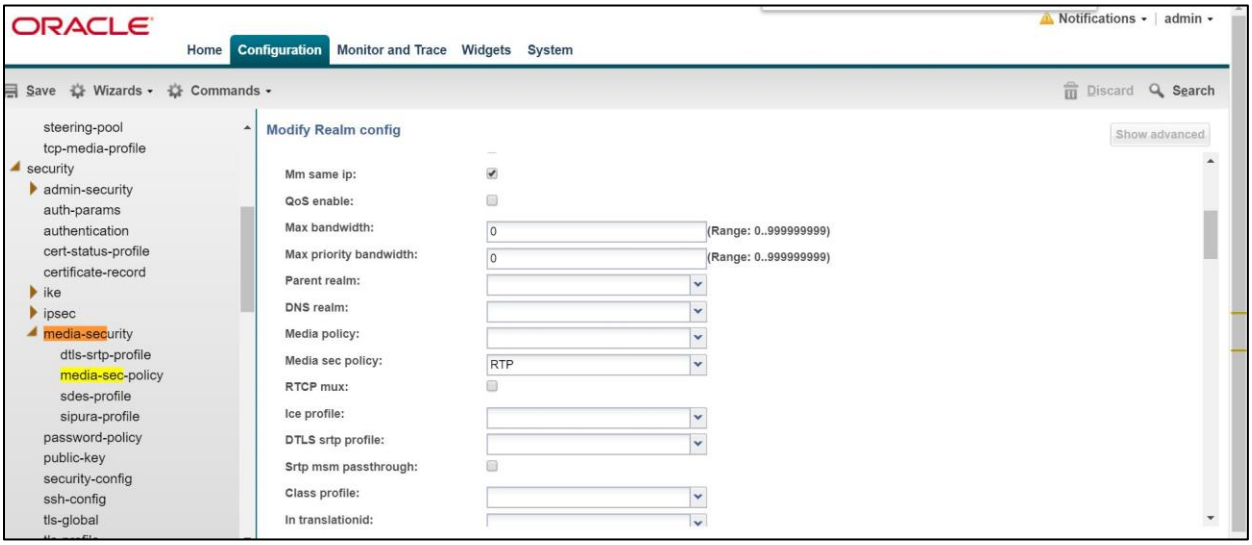






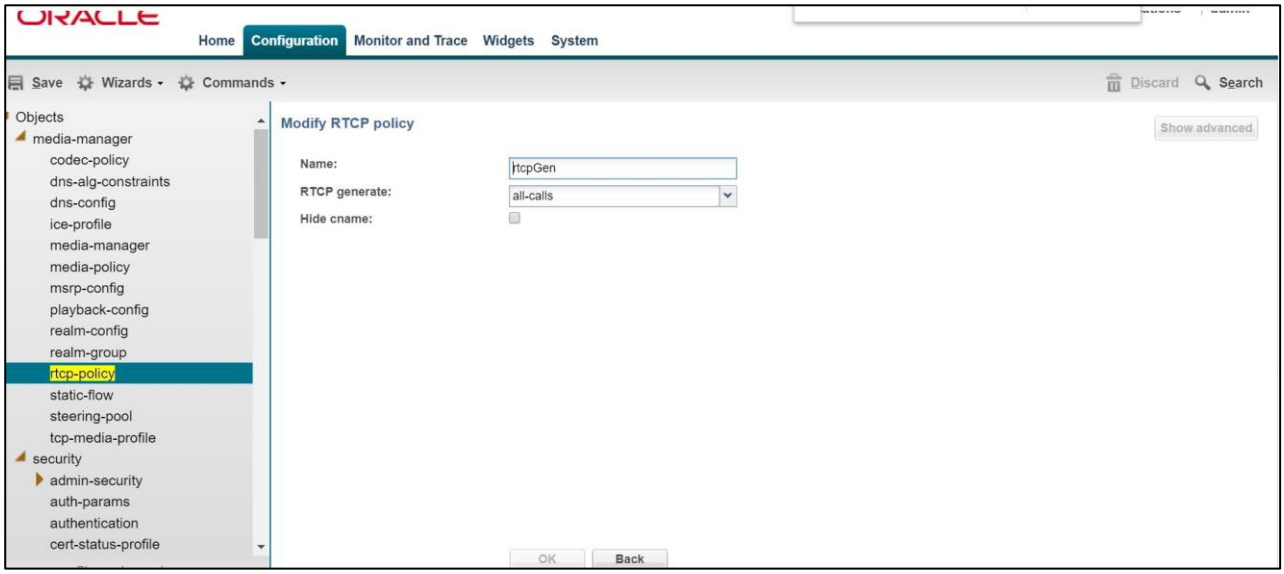


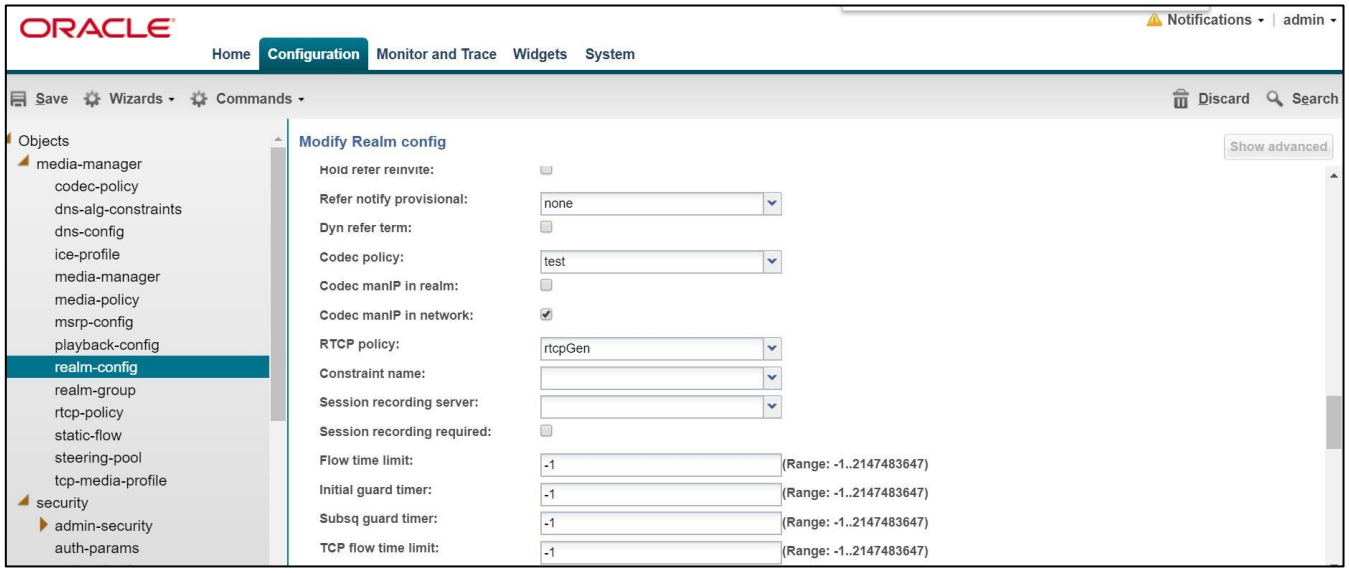
The RTP media-sec-policy is applied on the Access-pstn realm and SRTP media-sec-policy is applied on the Access-teams realm,as shown below.



6.6 Configure RTCP Policy

The following RTCP policy needs to configured to generate RTCP reports towards Teams. It is applied on the realm facing Teams. It can be enabled on the realm - Access-teams.Go to Media-manager->rtcp-policy to configure rtcp-policy.





7 Existing SBC configuration

If the SBC being used with Microsoft Teams is an existing SBC with functional configuration with a SIP trunk, following configuration elements are required:

- New realm-config
- Configuring a certificate for SBC Interface
- TLS-Profile
- Enable DNS
- New sip-interface
- New session-agent
- New-Session-Agent-Group
- New steering-pools
- New Local-policy
- Media-profile
- Codec-policy
- SDES Profile
- Media-sec-Policy
- Sip-manipulations
- Ice-profile
- RTCP policy
- Ringback configuration

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

8 Configuration for Emergency Calling

As part of Oracle's continued partnership with Microsoft, the Oracle Communications Session Border Controller is fully certified with Microsoft Teams Direct Routing for E911 compatibility as well as an Elin Capable Gateway.

https://docs.microsoft.com/en-us/microsoftteams/direct-routing-border-controllers

For more information on how to configure emergency services in your Microsoft Teams Tenant, please refer to the documentation at the link below.

https://docs.microsoft.com/en-us/microsoftteams/what-are-emergency-locations-addresses-and-call-routing

https://docs.microsoft.com/en-us/microsoftteams/configure-dynamic-emergency-calling

https://docs.microsoft.com/en-us/microsoftteams/direct-routing-configure#configure-voice-routing

The following will outline how to configure your Oracle SBC to handle E911 from Microsoft Teams, as well as setting up Oracle SBC Elin Gateway configuration.

8.1 E911

Note: This is a configuration example, and would be an additional configuration added to what is outlined throughout this document.

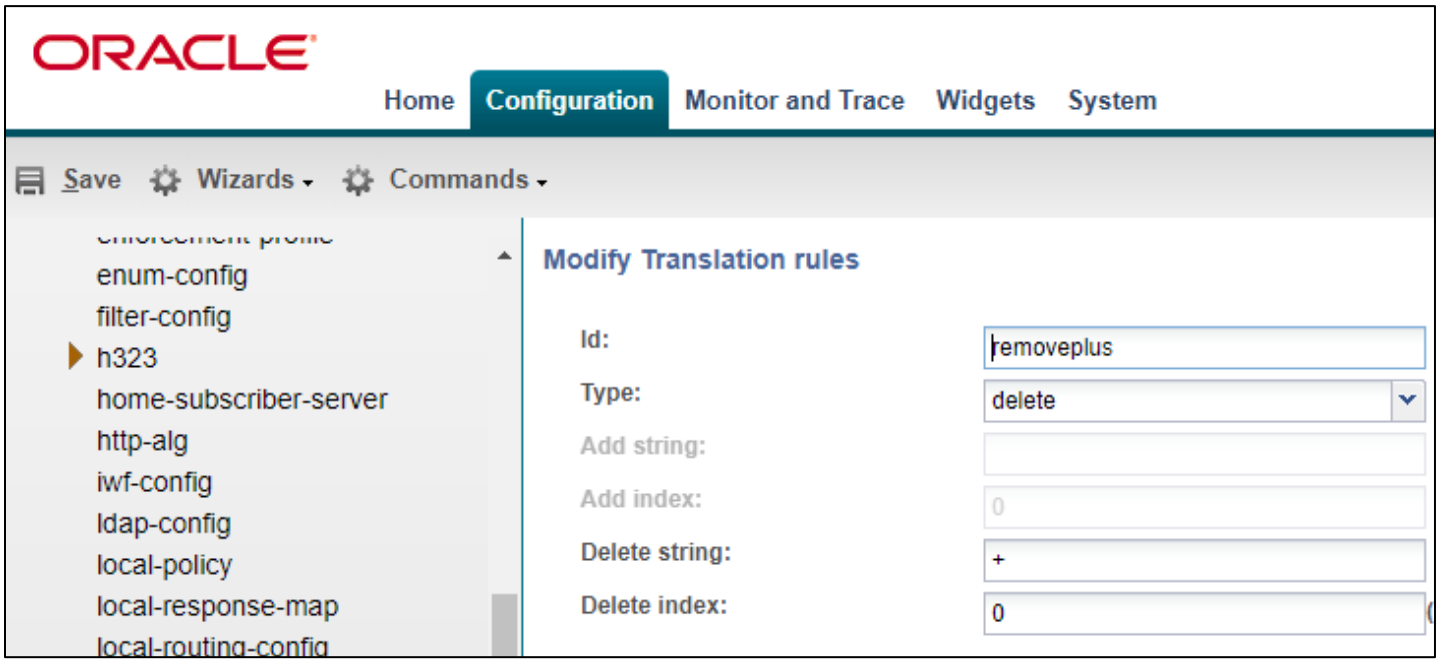
8.1.1 Session Translations Config

At the time of testing, MSFT Teams sends 911 with a leading plus (+). We recommend removing that leading + on ingress so ensure the call is not considered international and rejected. We do this via a session translation rule, which in turn gets assigned to the Teams facing Realm on the SBC. If you already have a session translation assigned to this Realm, you can add the translation rule to the list in that session translation:

8.1.2 Translation Rule

GUI Path: session-router/translation-rule

ACLI Path: config t→session-router→translation-rule



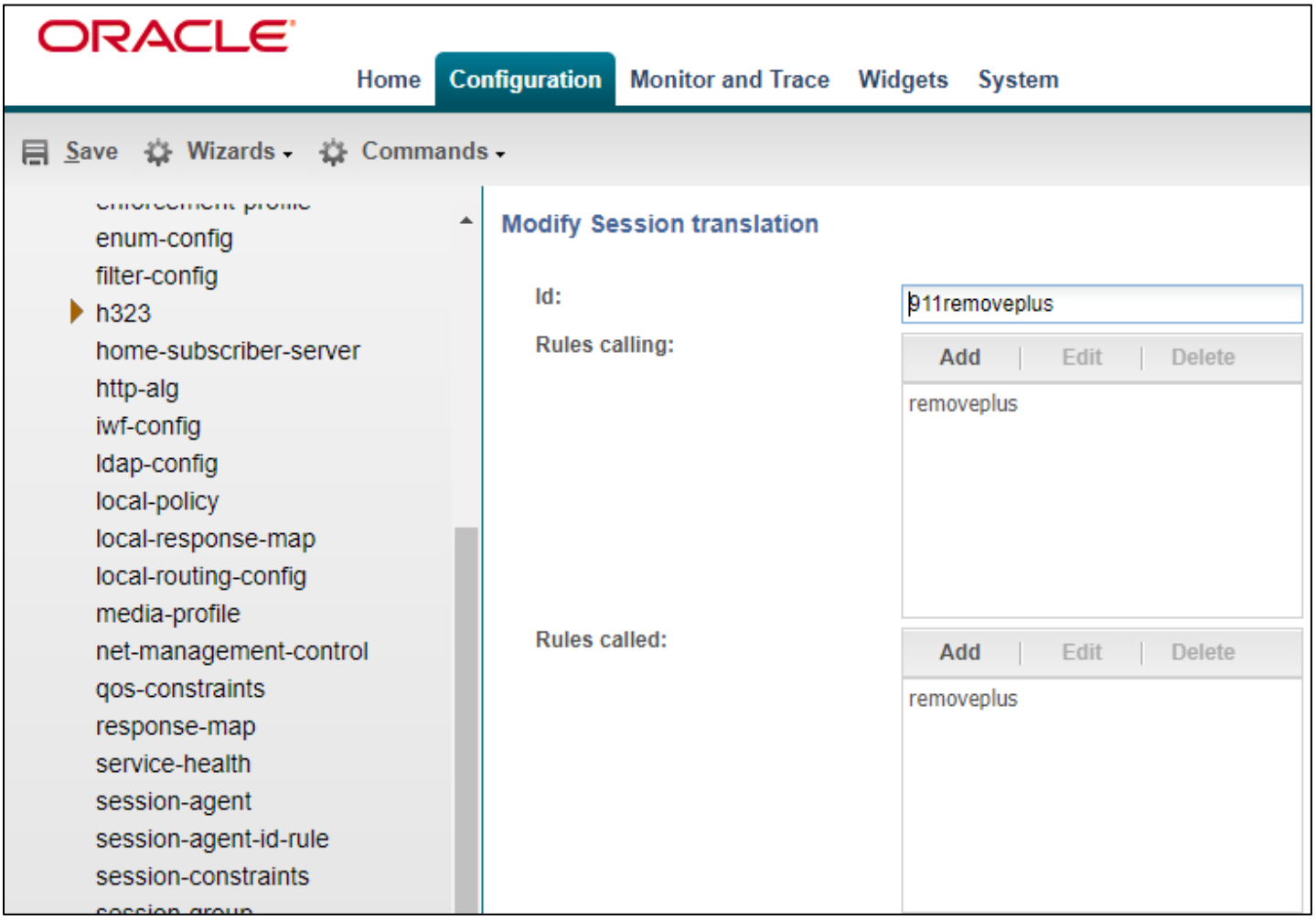
- Hit Ok at the bottom

Next, the translation rule needs to be assigned to a session translation before it can be added to the Teams facing Realm:

8.1.3 Session Translation

GUI Path: session-router/session-translation

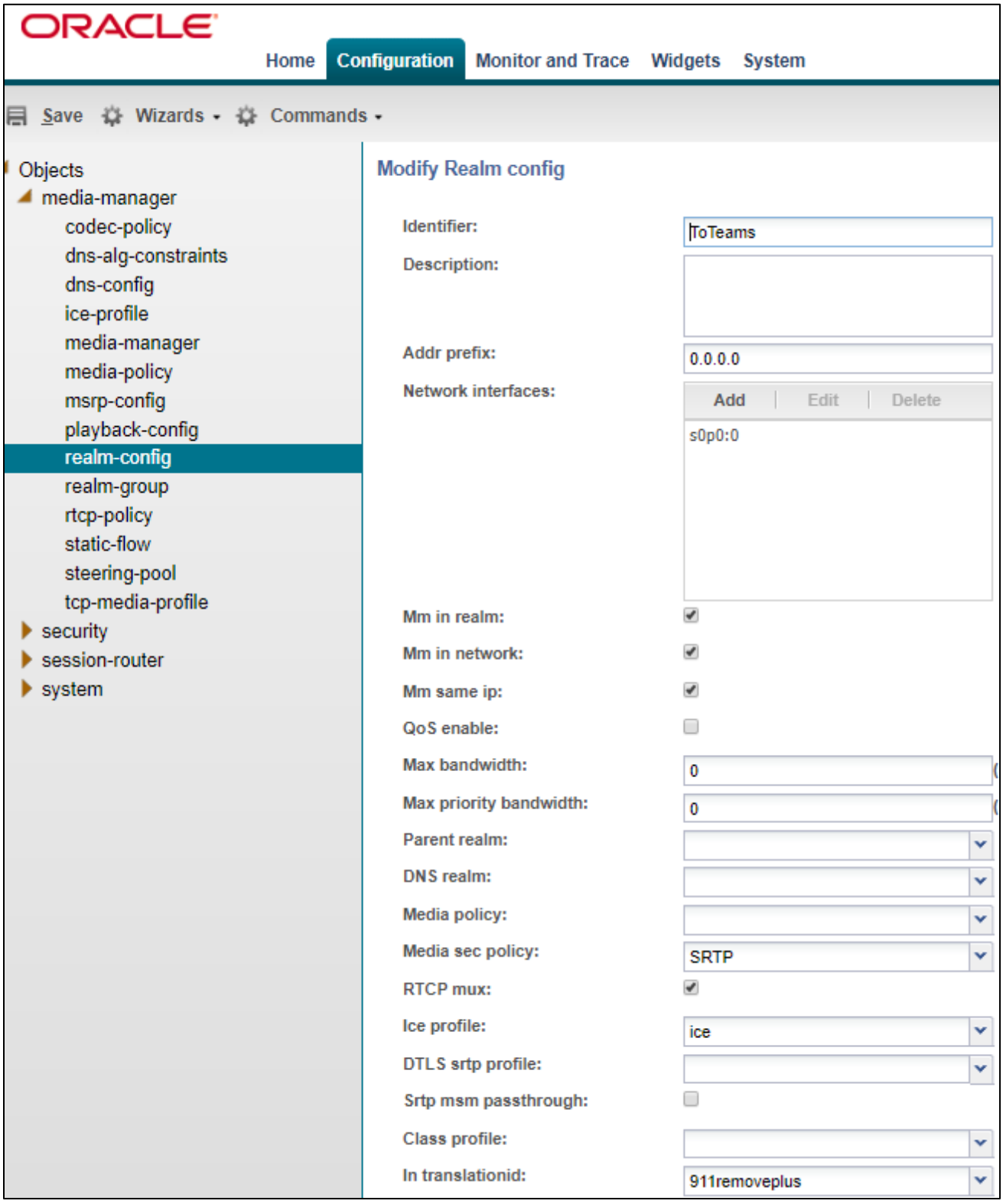
ACLI Path: config t→session-router→session-translation



As you can see above, the translation rule we configured is added as both rules calling and rules called in the session translation. Now we assign the session translation to the Realm as the in-translation-id:

8.1.4 Translation Added to Realm

GUI Path: media-manager/realm-config



8.1.5 Emergency Session Handling

The Oracle® Enterprise Session Border Controller provides a mechanism to handle emergency sessions from non-allowed endpoints/agents. An endpoint is designated as non-allowed if it fails the admission control criteria specified by the allow-anonymous parameter in the Sip Inerface/SIP Ports configuration element. To enable this feature, you will need to configure the following:

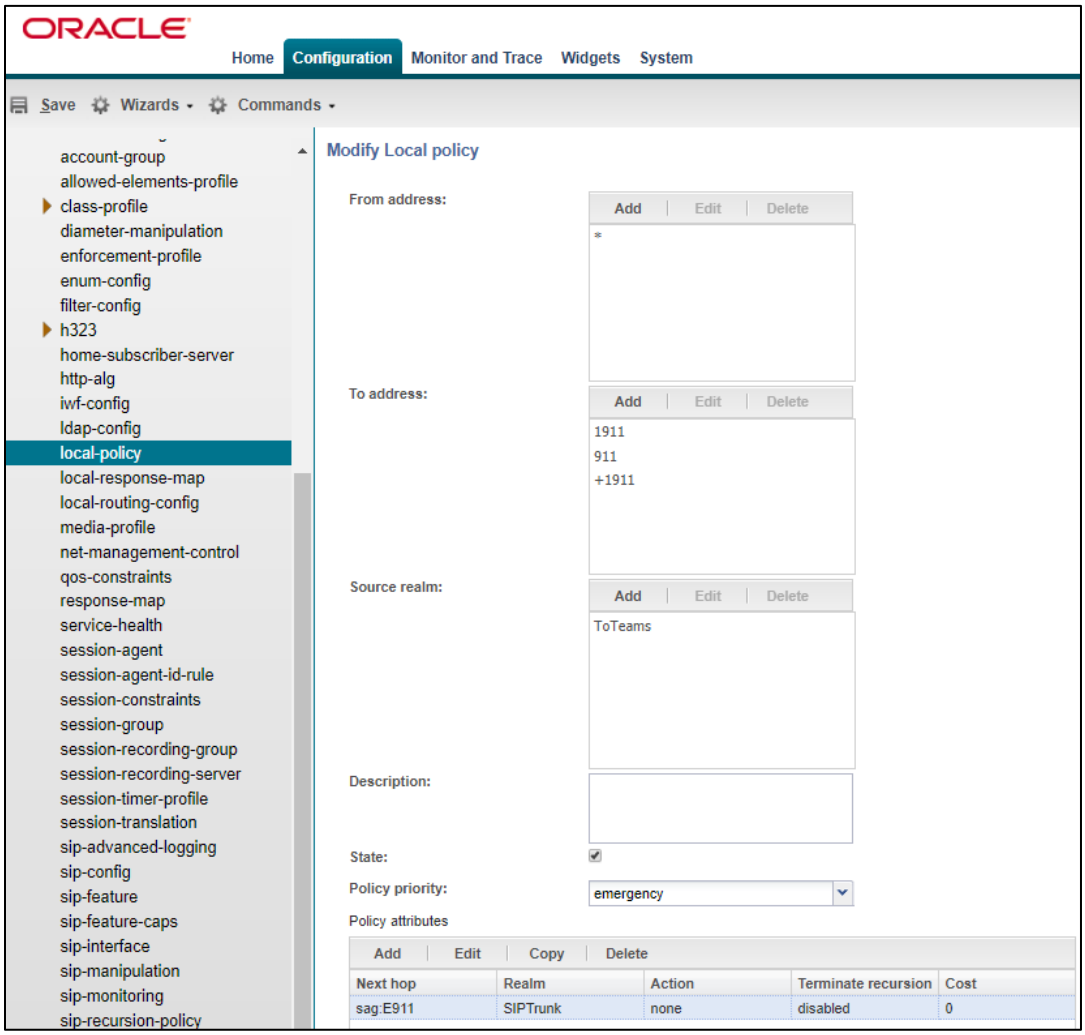
- Local Policy to Match and Route emergency calls to correct destination with policy priority set to emergency
- Enable anonymous-priority on Ingress Sip Interface

Note: This is just a configuration example. This note assumes any session agents or session group for PSAP has already been configured:

8.1.6 Local Policy Route for Emergency Calls

GUI Path: session-router/local-policy

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



You would also configure a policy attribute to route emergency calls to their proper destination. In this example, we have created a SAG called e911 as the destination for all emergency calls. For instructions on how to configure Session Agents or Session Groups, please click the links for examples.

Next, we'll enable anonymous-priority field in Sip-Interface:

8.1.7 Sip Interface Priority

GUI Path: Currently, this field is not available through GUI, and must be configured through ACLI

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

```
sip-interface
      state                    enabled
      realm-id                   ToTeams
      description
      sip-port
            address                  192.168.1.10
            port                   5061
            transport-protocol             TLS
            tls-profile              TLSTeams
            allow-anonymous                agents-only
            multi-home-addrs
            ims-aka-profile
      uri-fqdn-domain
      options
      spl-options
      trust-mode                 all
      max-nat-interval             3600
      nat-int-increment            10
      nat-test-increment           30
      sip-dynamic-hnt              disabled
      stop-recurse               401,407
      port-map-start               0
      port-map-end                 0
      in-manipulationid              RespondOPTIONS
      out-manipulationid
      sip-ims-feature              disabled
      sip-atcf-feature             disabled
      subscribe-reg-event            disabled
      operator-identifier
      anonymous-priority             emergency
```

For more information on how this feature works, please see the SCZ830 Configuration Guide, Page 4-185.

8.1.8 Net-Management Control

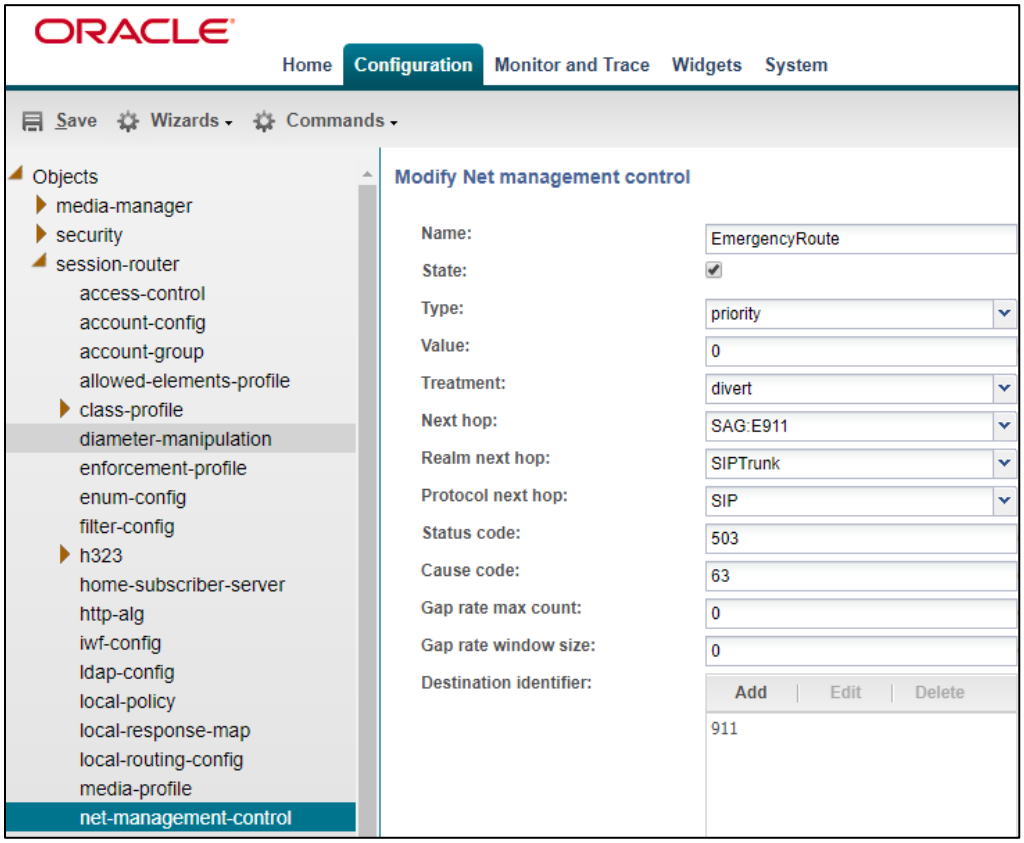
The Oracle Communications Session Border Controller supports network management controls for multimedia traffic specifically for static call gapping and 911 exemption handling. These controls limit the volume or rate of traffic for a specific set of dialed numbers or dialed number prefixes (destination codes).

To enable network management controls on your Oracle Communications Session Border Controller, you set up the net-management-control configuration and then enable the application of those rules on a per-realm basis. Each network management control rule has a unique name, in addition to information about the destination (IP address, FQDN, or destination number or prefix), how to perform network management (control type), whether to reject or divert the call, the next hop for routing, and information about status/cause codes. For more information about Network Management Controls, please refer to the Configuration Guide, Chapter 11.

GUI Path: session-router/net-management-control

ACLI Path: config t→session-router→net-management-control

Use the below example to configure net-management-control and assign it to the Teams realm. Please note, net-management-control Realm parameter is not available through the GUI, so it must be assigned via ACLI to the appropriate realm.



Note: Net-Management-Controls do not adhere to any constraints configured on your SBC due to the emergency nature of the call flows handled by this element.

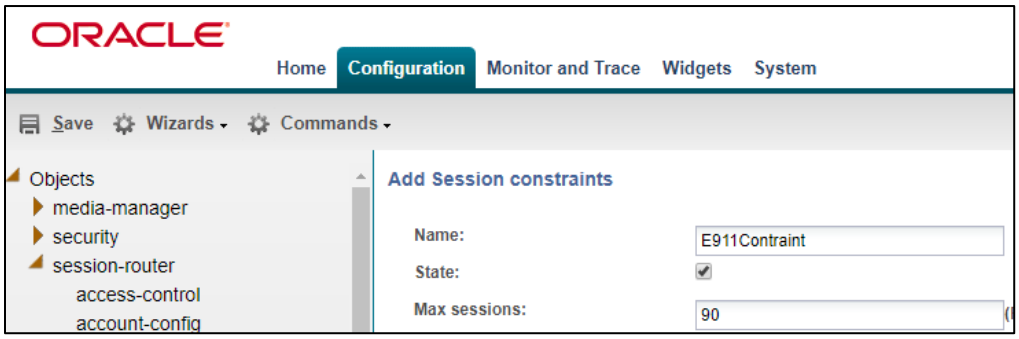
8.1.9 Session Constraints for E911

In order for the SBC to have the ability to handle emergency calls in high volume environment, we recommend configuring and applying session constraints for each realm on your SBC to allow a small portion of your licensed sessions to be allocated to emergency calls.

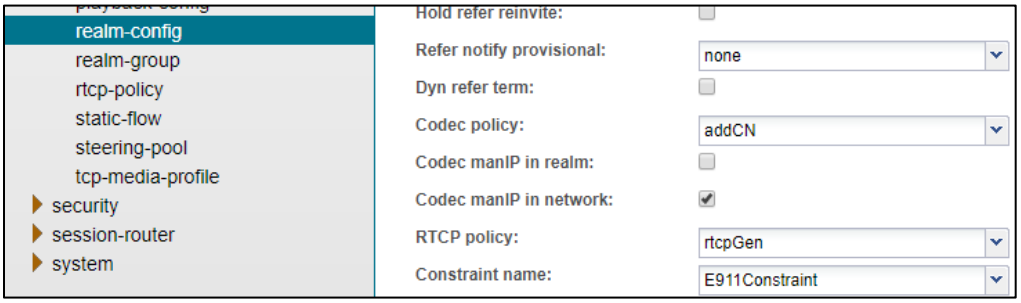
The below example is a very basic constraint setup limiting the number of calls allowed to traverse a realm. For the purposes of this example, we assume there are 100 licensed sessions on the SBC, so we'll limit the number of calls on the realms to 90, leaving 10 licensed session for emergency calls. Again, as noted above, when net management controls are configured to handle emergency traffic, constraints do not apply to those calls.

GUI Path: session-router/session-constraits

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



And now we apply this constraint to realms:



8.2 Elin Gateway

The Oracle® Enterprise Session Border Controller supports E911 ELIN for Teams-enabled Enterprises using the ELIN_Gateway SPL option. Enable this option in the global SPL configuration. The Oracle® Enterprise Session Border Controller supports up to 300 ELIN numbers simultaneously and it can reuse numbers allowing a greater number of emergency calls

For more information about the SBC's Emergency Location Identification Number (ELIN) Gateway Support, please refer to the 830 Configuration Guide, Page 19-25

GUI Path: system/spl-config

ACLI Path: config t→system→spl-config

The only entry required to Enable support for Elin Gateway is:

Elin-Gateway=<value>

Valid Values are either 30 or 60. This determines how long (minutes) the SBC will retain the mapping in memory. Default value is 30. For the purposes of testing, we increased that value to 60 minutes, as shown in the example below.

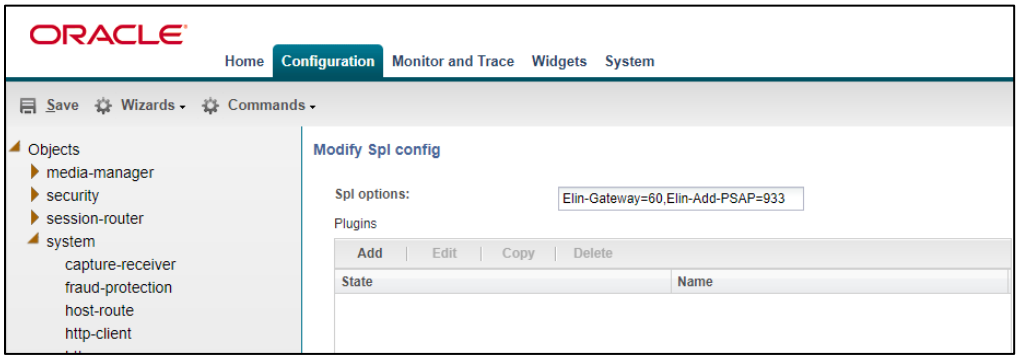
An optional configuration parameter:

Elin-Add-PSAP=<value>

Where <value> is one or more PSAP numbers, For multiple numbers, place the numbers within quotes, separate the numbers with a comma, and use no spaces. A single number does not require enclosure in quotes.

Examples: Elin-Add-PSAP=999 and Elin-AddPSAP="999,000,114"

By Default, Oracle delivers the SBC preconfigured with the 911 and 112 Public Safety Answering Point (PSAP) callback numbers



8.2.1 Sip-Manipulation for Teams ELIN

By Default, the Oracle SBC with Elin SPL enabled, looks at the <NAM> field in the metadata of an Invite to extract the ELIN numbers and the FROM User uri for mapping. Since Microsoft Teams sends the ELIN information in an <Elin> field, and to avoid any issues due to ani masking on the Teams side, we have created the following sip-manipulation rule to move the information in the <Elin> field to the <Nam> field, and we replace the User part of the FROM header with the user part of the PAI. The manipulation gets assigned to either the Teams Realm or Sip Interface, and assures proper Elin mapping in the SBC.

Note: If there is an existing Sip Manipulation rule already assigned as the in-manipulation-id on either the realm or sip interface, these rules would need to be added to that existing manipulation.

GUI Path: session-router/sip-manipulation

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

While this can be configured via the GUI, we are using the ACLI output to provide and example config for ease of viewing:

```
sip-manipulation
    name                        ELIN_Support
    description
    split-headers
    join-headers
        header-rule
        name                    StoreElin
        header-name                 Content-Type
        action                  store
        comparison-type             case-sensitive
        msg-type                request
        methods                 Invite
        match-value
        new-value
        element-rule
            name                    storeelin
            parameter-name              application/pidf+xml
            type                mime
            action              store
            match-val-type              any
            comparison-type             pattern-rule
            match-value             (<ELIN>)(.*)(</ELIN>)
            new-value
    header-rule
        name                    ReplaceNam
        header-name                 Content-Type
        action                  manipulate
        comparison-type             case-sensitive
        msg-type                request
        methods                 Invite
        match-value
        new-value
        element-rule
            name                    changenam
            parameter-name              application/pidf+xml
            type                mime
            action              find-replace-all
            match-val-type              any
            comparison-type             pattern-rule
            match-value             (<NAM>)(.*)(</NAM>)
            new-value               $1+$StoreElin.$storeelin.$2+$3

          header-rule
        name                    PAItoFrom
        header-name                 From
        action                  manipulate
        comparison-type             case-sensitive
        msg-type                request
        methods                 INVITE
        match-value
        new-value

        element-rule
            name                    changeuser
            parameter-name
            type                uri-user
            action              replace
```

match-val-type	**any**
comparison-type	**pattern-rule**
match-value	
new-value	**$PAI_USER.$0**

9 Appendix A

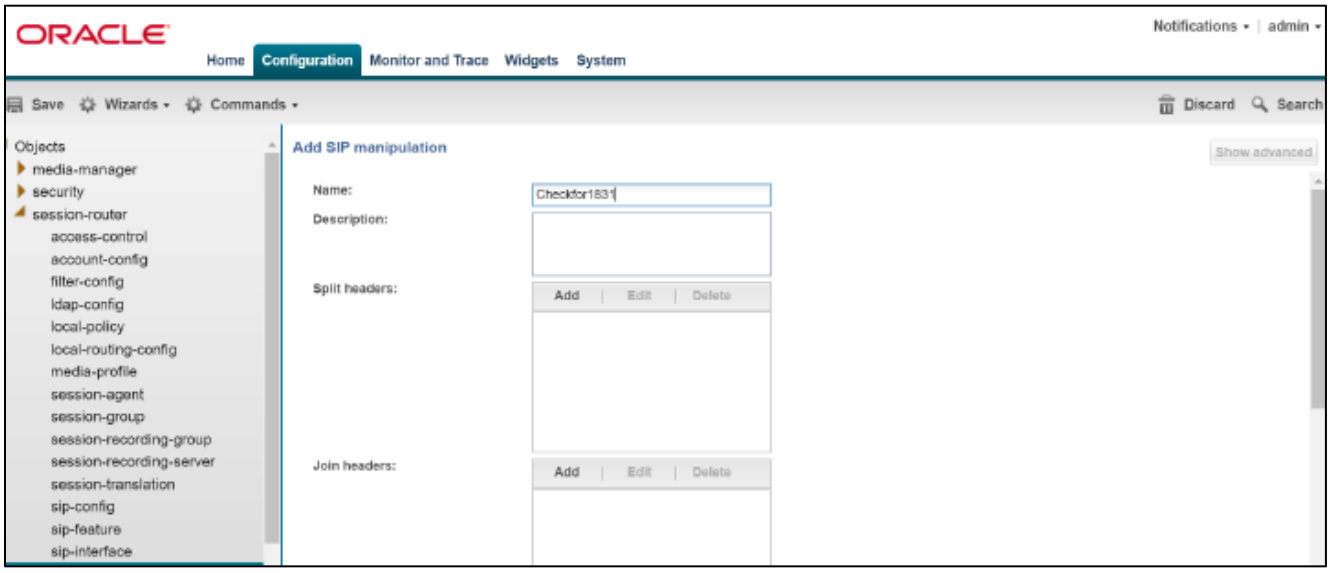
9.1 Ringback on inbound calls to Teams and early media

In certain deployments, a PSTN caller may experience silence on an inbound call into Teams in place of a ringback tone. When Teams receives an INVITE, after signaling 183 with SDP, Teams does not play ringback and expects the SBC to signal appropriately to the SIP Trunk provider and play local ringback. To signal the trunk to play the ringback, the SBC presents 180 Ringing to the trunk instead of the 183 Session Progress received from Teams.

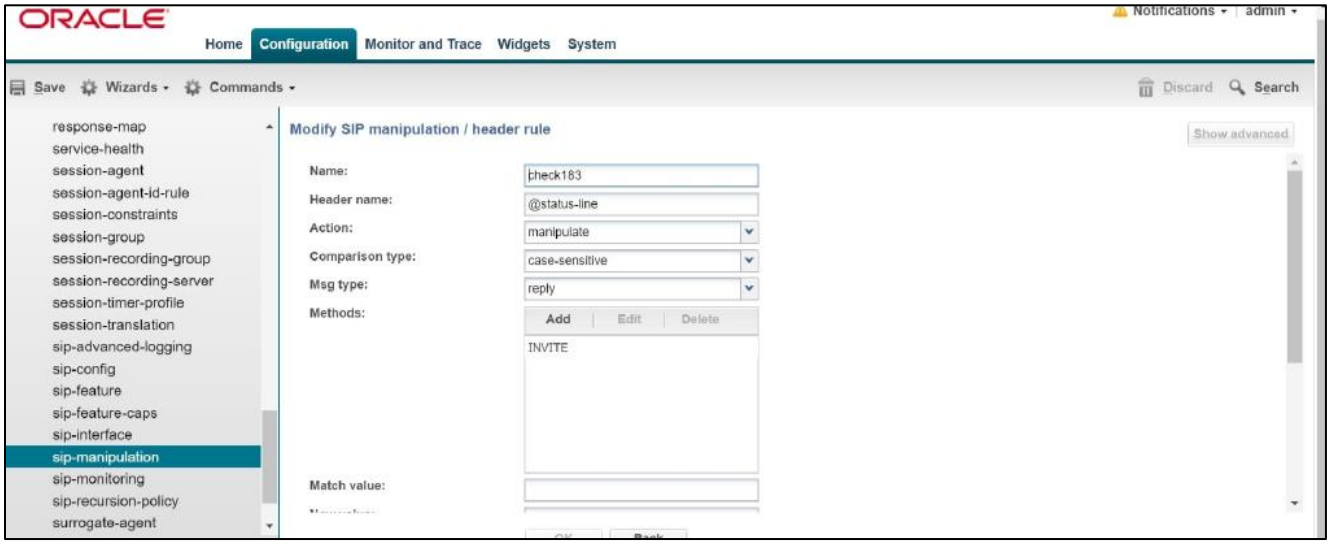
In order to accommodate the 183 with SDP messages that signal early media in cases of simultaneous ringing set to IVR, we inspect the SDP of the 183s received before converting them to 180 Ringing messages. If the SDP of the 183 does not contain the IP address of SBC (which is the case when Teams clients have simultaneous ringing set to IVRs), we strip the SDP from the 183 and convert it to a 180 Ringing message and forward it to the trunk. This is achieved through the following sip-manipulation.

Apply this in the SIP Manipulation Teamsinmanip.

Note: If running the GA release, SCZ830m1p8A, please see Appendix D prior to configuring sip manipulations in your Oracle SBC. This appendix outlines how new features added to the GA release will help simplify your configuration by eliminating the need for most, if not all required sip manipulations.




response-map
service-health
session-agent
session-agent-id-rule
session-constraints
session-group
session-recording-group
session-recording-server
session-timer-profile
session-translation
sip-advanced-logging
sip-config
sip-feature
sip-feature-caps
sip-interface
sip-manipulation
sip-monitoring
sip-recursion-policy
surrogate-agent
Modify SIP manipulation
Show advanced
Show configuration
CfgRules
Add
Edit
Copy
Delete
Move up
Move down
Name
Element type
check183
header-rule
lf183
mime-sdp-rule
deletesdp
mime-sdp-rule
change183t0180
header-rule
OK
Back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session-recording-server
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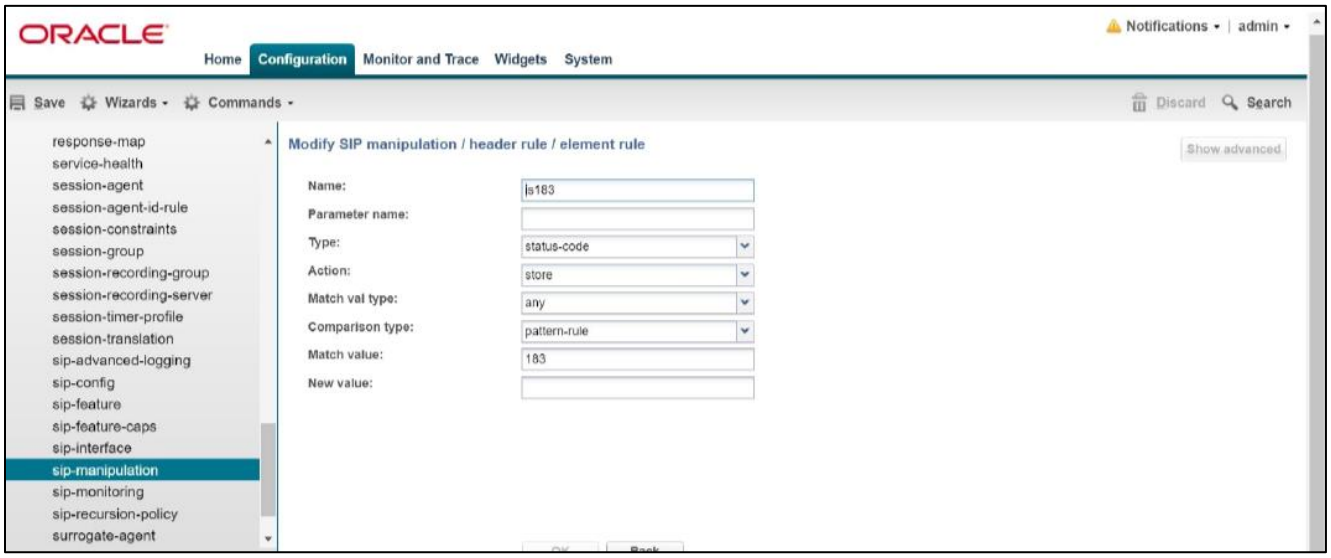
session-translation
sip-advanced-logging
sip-config
sip-feature
sip-feature-caps
sip-interface
sip-manipulation
sip-monitoring
sip-recursion-policy
surrogate-agent
Modify SIP manipulation / header rule
Show advanced
Name:
check183
Header name:
@status-line
Action:
manipulate
Comparison type:
case-sensitive
Msg type:
reply
Methods:
Add
Edit
Delete
INVITE
Match value: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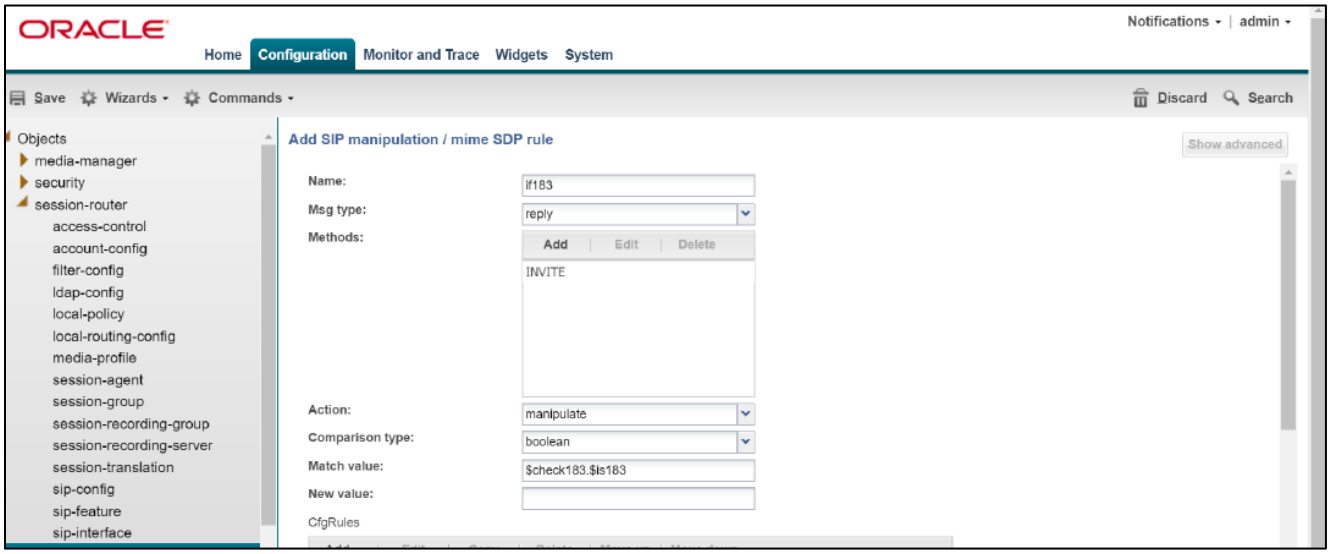
session-recording-group
session-recording-server
session-timer-profile
session-translation
sip-advanced-logging
sip-config
sip-feature
sip-feature-caps
sip-interface
sip-manipulation
sip-monitoring
sip-recursion-policy
surrogate-agent
Modify SIP manipulation / header rule / element rule
Show advanced
Name:
is183
Parameter name:
Type:
status-code
Action:
store
Match val type:
any
Comparison type:
pattern-rule
Match value:
183
New value: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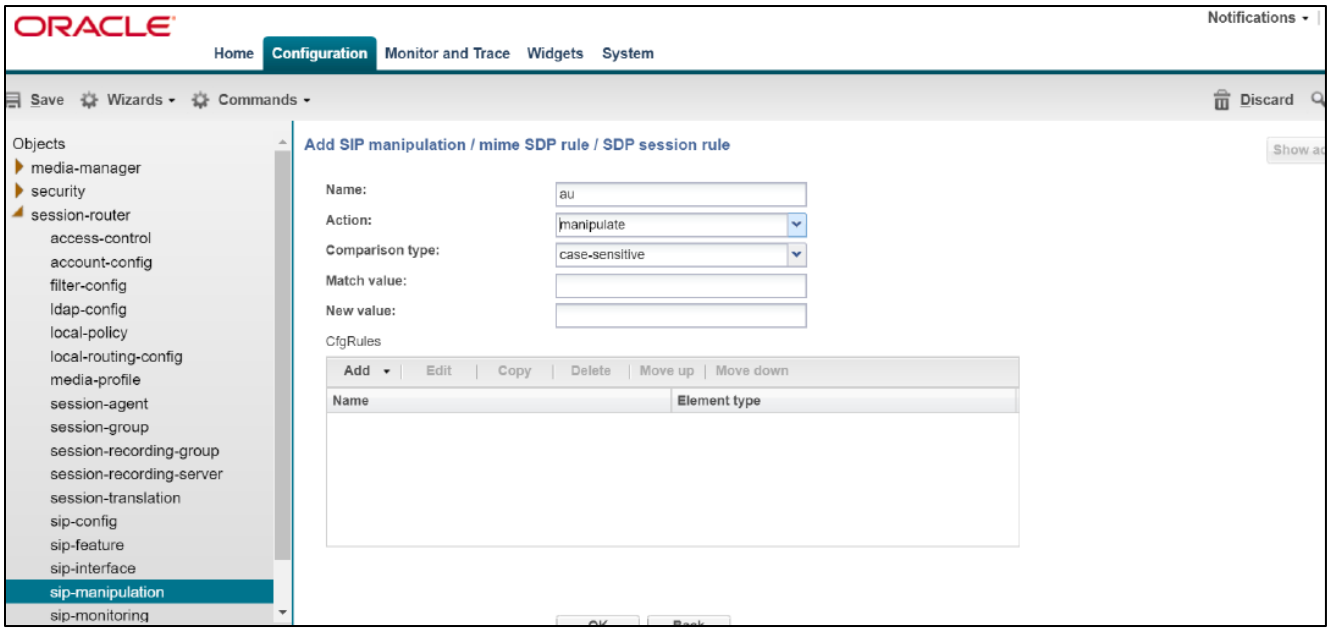
filter-config
ldap-config
local-policy
local-routing-config
media-profile
session-agent
session-group
session-recording-group
session-recording-server
session-translation
sip-config
sip-feature
sip-interface
Add SIP manipulation / mime SDP rule
Show advanced
Name:
lf183
Msg type:
reply
Methods:
Add
Edit
Delete
INVITE
Action:
manipulate
Comparison type:
boolean
Match value:
$check183.$is183
New value:
CfgRules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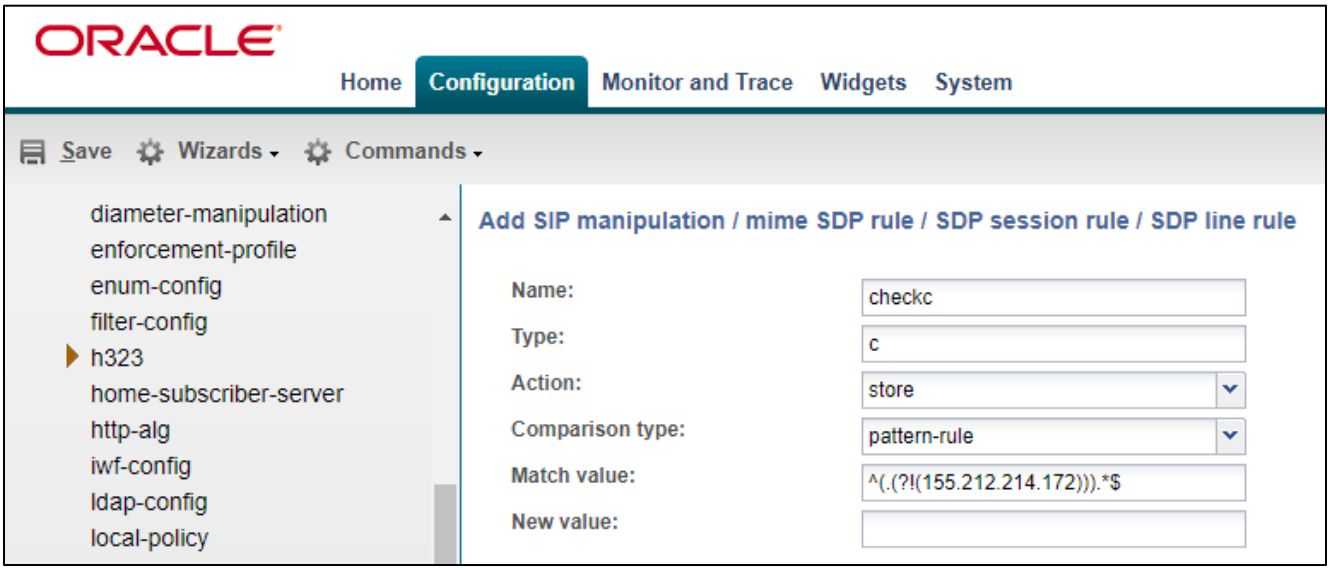
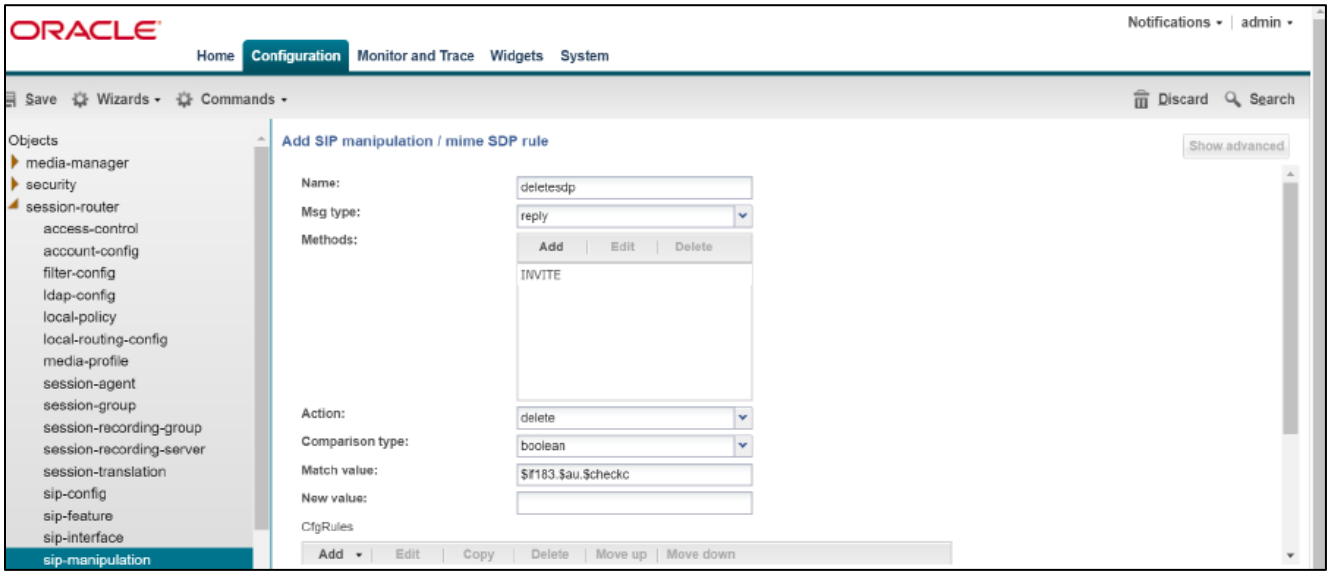
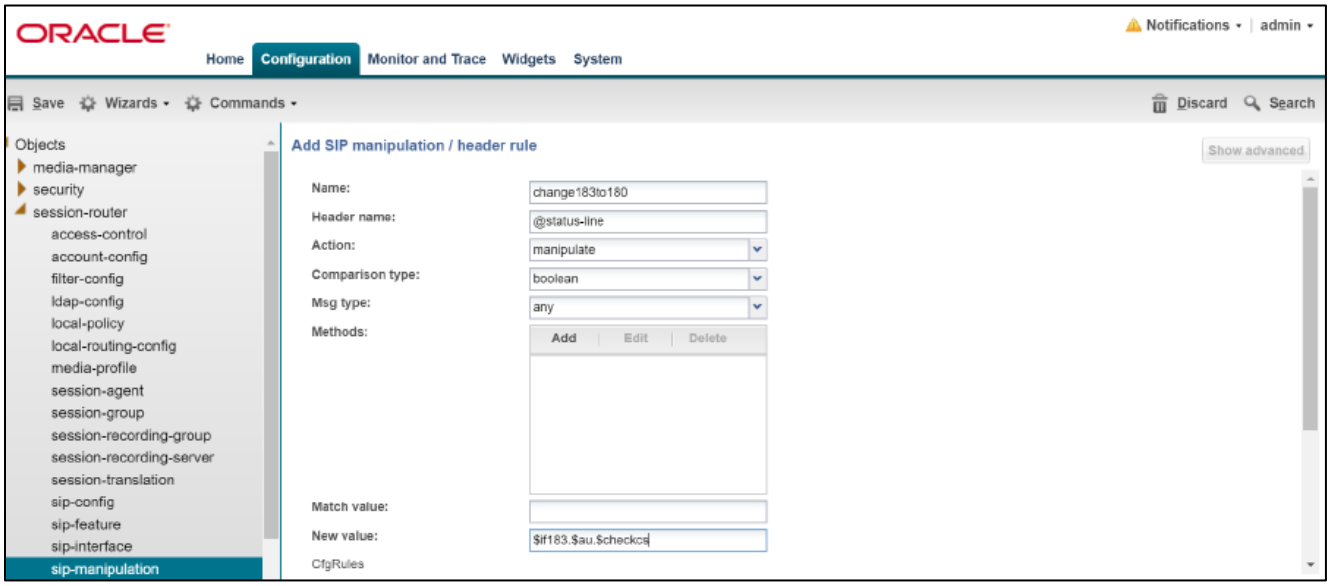
ldap-config
local-policy
local-routing-config
media-profile
session-agent
session-group
session-recording-group
session-recording-server
session-translation
sip-config
sip-feature
sip-interface
sip-manipulation
sip-monitoring
Add SIP manipulation / mime SDP rule / SDP session rule
Name:
au
Action:
manipulate
Comparison type:
case-sensitive
Match value:
New value:
CfgRules
Add
Edit
Copy
Delete
Move up
Move down
Name
Element type

Here apply the IP of SIP-Interface facing your MS-Teams.



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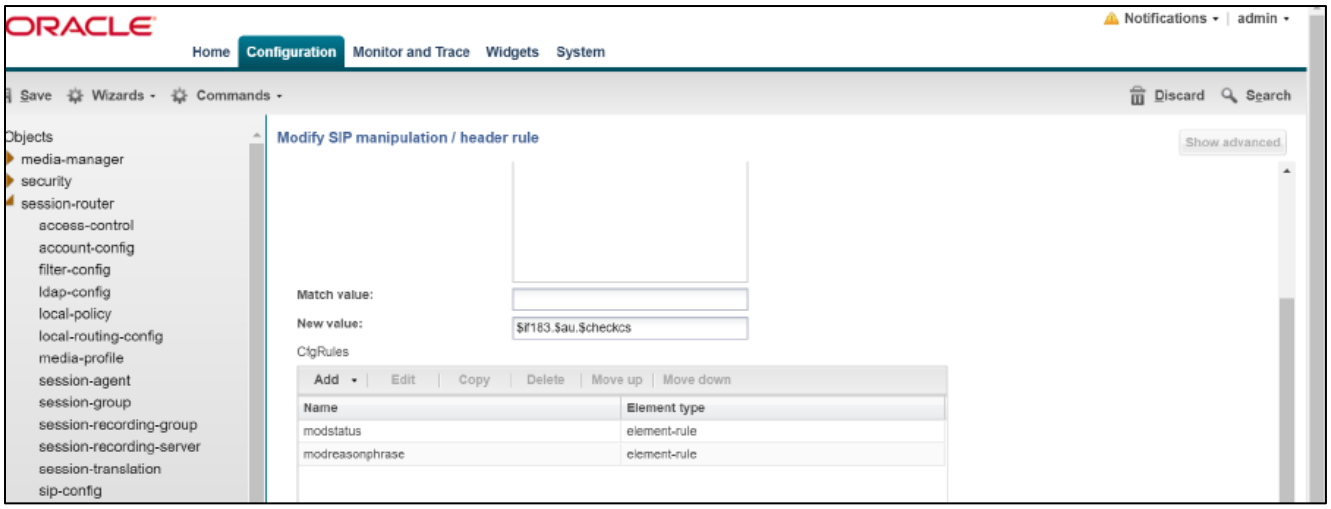
local-routing-config
media-profile
session-agent
session-group
session-recording-group
session-recording-server
session-translation
sip-config
sip-feature
sip-interface
sip-manipulation
Add SIP manipulation / header rule
Show advanced
Name:
change183to180
Header name:
@status-line
Action:
manipulate
Comparison type:
boolean
Msg type:
any
Methods:
Add
Edit
Delete
Match value:
New value:
$if183.$au.$checkcs
CfgRules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media-profile
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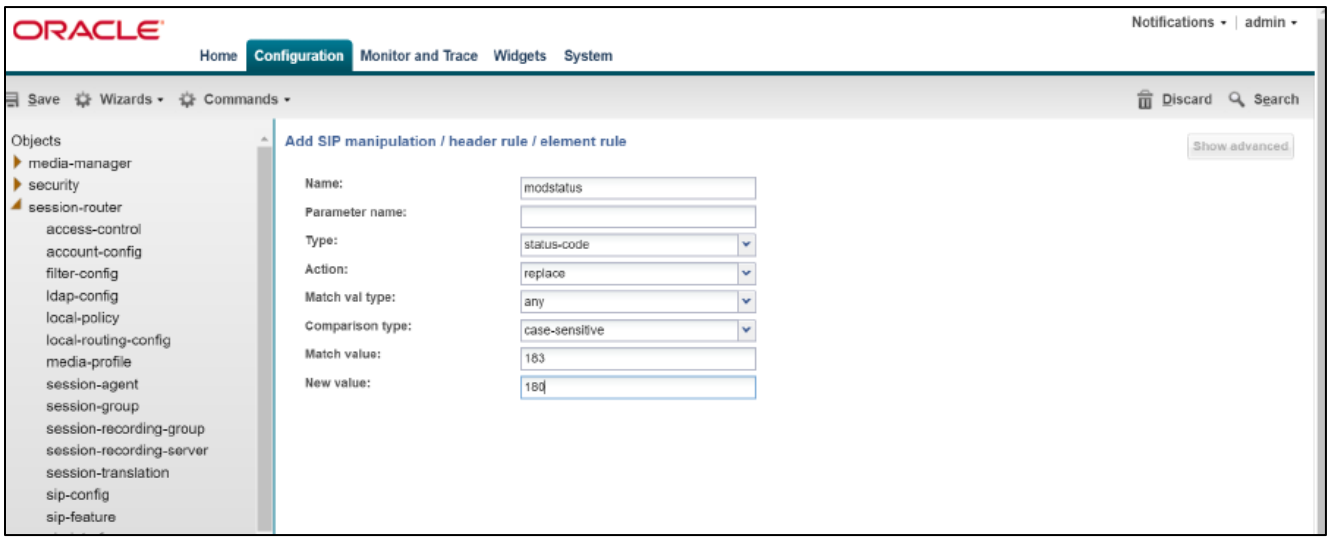
session-group
session-recording-group
session-recording-server
session-translation
sip-config
Modify SIP manipulation / header rule
Show advanced
Match value:
New value:
$if183.$au.$checkcs
CfgRules
Add
Edit
Copy
Delete
Move up
Move down
Name
Element type
modstatus
element-rule
modreasonphrase
element-rule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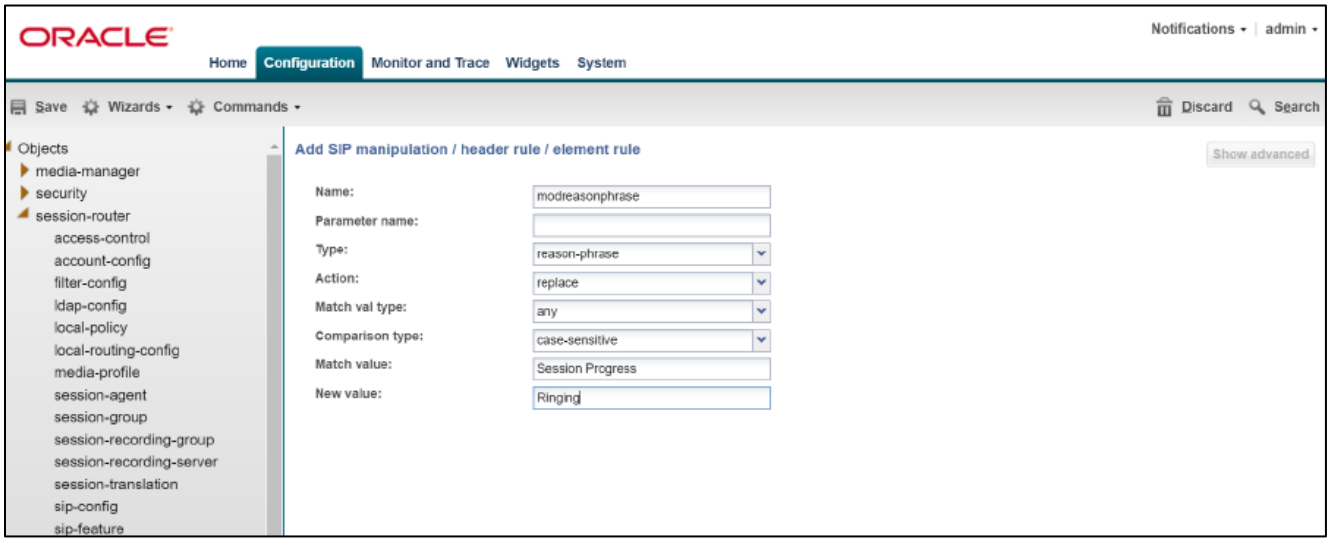
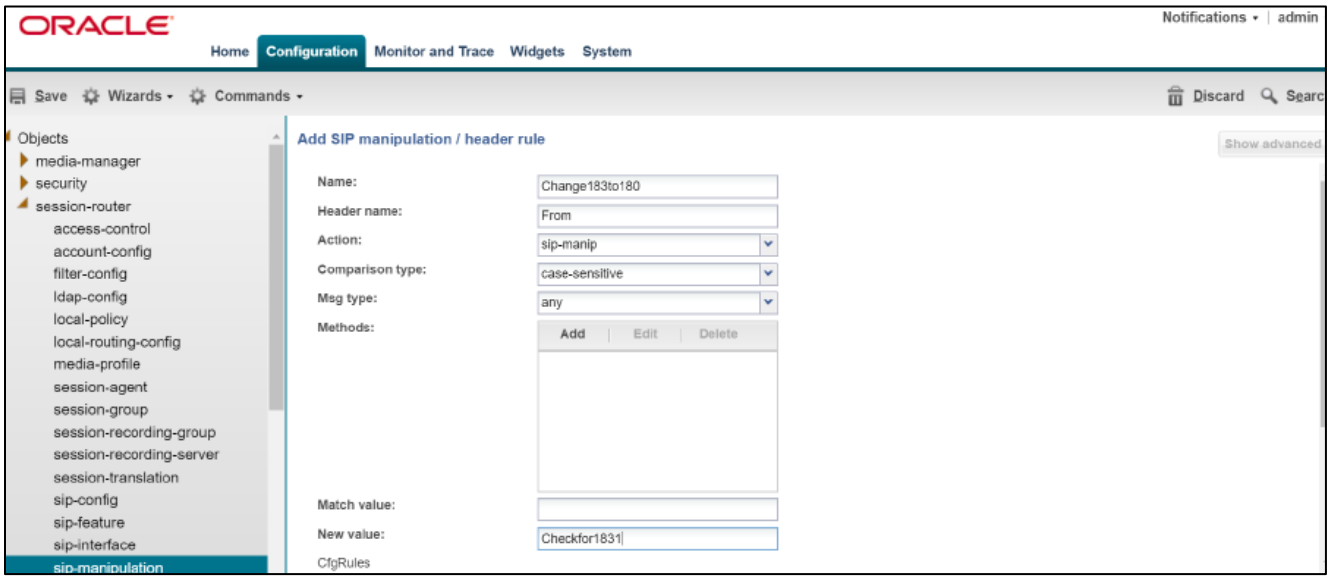
local-policy
local-routing-config
media-profile
session-agent
session-group
session-recording-group
session-recording-server
session-translation
sip-config
sip-feature
Add SIP manipulation / header rule / element rule
Show advanced
Name:
modstatus
Parameter name:
Type:
status-code
Action:
replace
Match val type:
any
Comparison type:
case-sensitive
Match value:
183
New value:
180



Apply this in [Teamsinmanip] by creating a rule as shown below.



10 Appendix B

10.1 DDoS Prevention for Peering Environments

The Oracle Session Border Controller (SBC) family of products are designed to increase security when deploying Voice over IP (VoIP) or Unified Communications (UC) solutions. Properly configured, Oracle's SBC family helps protect IT assets, safeguard confidential information, and mitigate risks—all while ensuring the high service levels which users expect from the corporate phone system and the public telephone network.

Please note, DDOS values are specific to platform and environment. For more detailed information please refer to the Oracle Communications SBC Security Guide.

https://docs.oracle.com/cd/F12246_01/doc/sbc_scz830_security.pdf

However. While specific values are environment specific, there are some basic security parameters that can be implemented on the SBC that will help secure your setup.

1. On all public facing interfaces, create Access-Controls to only allow sip traffic from trusted IP's with a trust level of high

2. Set the access control trust level on public facing realms to HIGH

3. Modify the minimum and maximum untrusted signaling bandwidth parameters in the global media manger to minimize the throughput untrusted traffic has to work with.

The below examples of Access Control and Realm Trust level would be configured on and associated with the Realm facing Microsoft Teams. This model can be followed for any of the public facing interfaces, ie..Sip Trunk, etc….

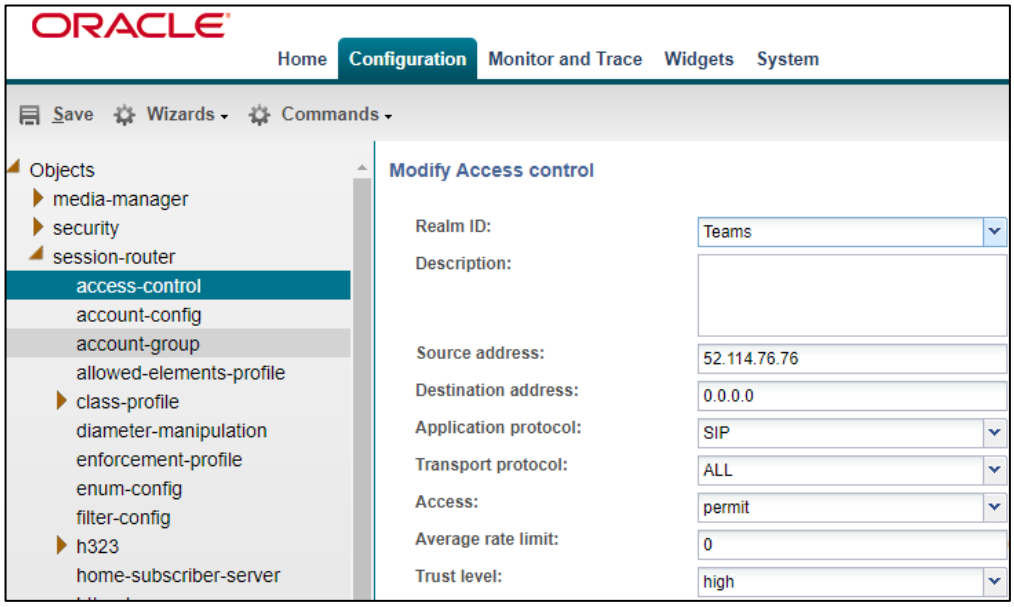
10.1.1 Access Control

GUI Path: session-router/access-control

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

The below example is for one of the possible six IP addresses MSFT will be sending and receiving SIP traffic to and from.

Use this example to create ACL's for all MSFT Teams IP addresses.



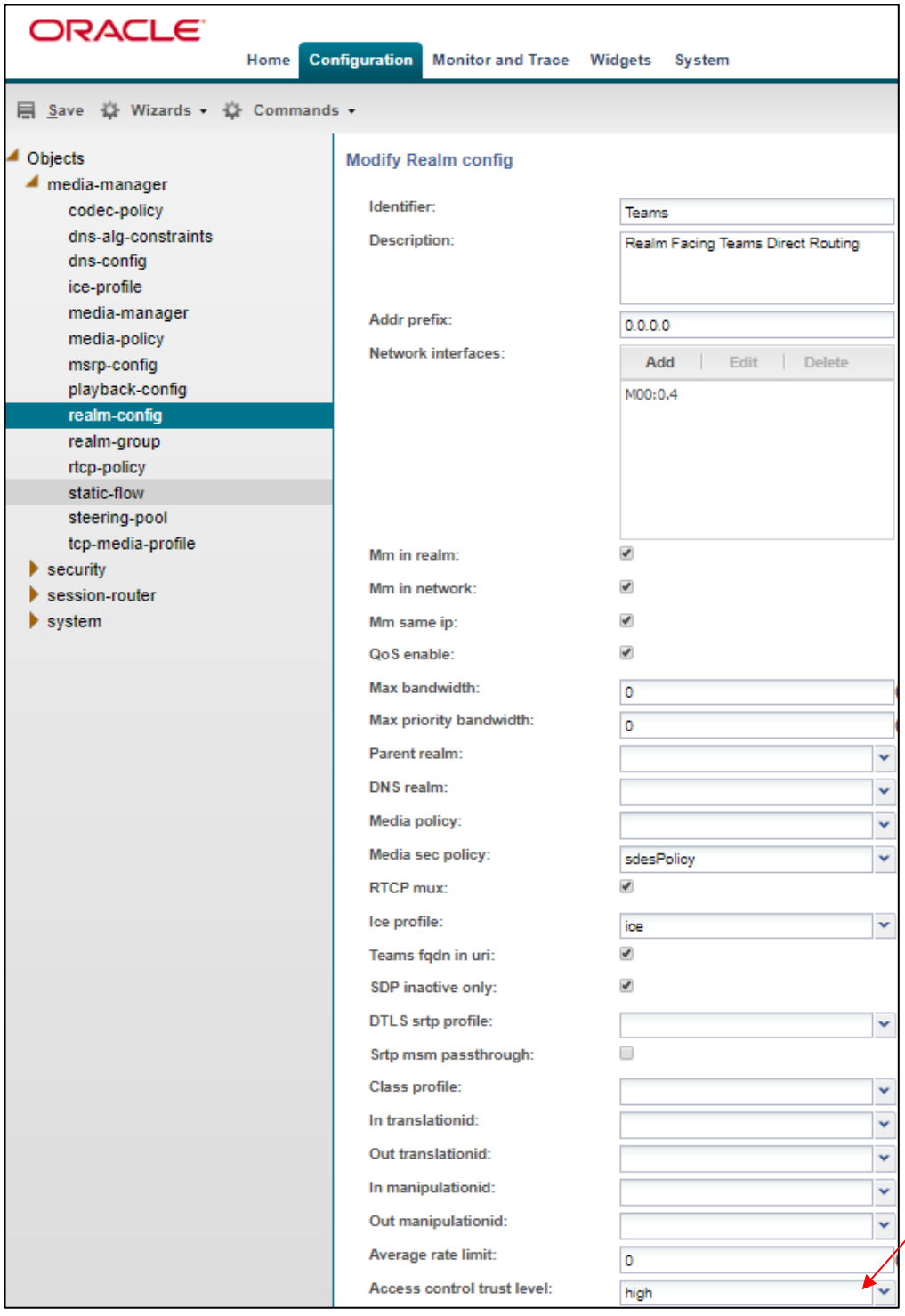
As an alternative, the destination address can also be set to the SIP interface IP address associated with the realm.

10.1.2 Realm Config

GUI Path: media-manager/realm-config

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

In the example below, notice the access control trust level matches the trust level of the ACL configured above. When these two fields match, it creates an implicit deny on this realm, so only SIP traffic from IP addresses configured as ACL's with matching trust level to the realm will be allowed to send traffic to your SBC. For more information on how trust level setting in ACL's and realms effect traffic, please refer to the SCZ830 Security Guide, Page 3-10

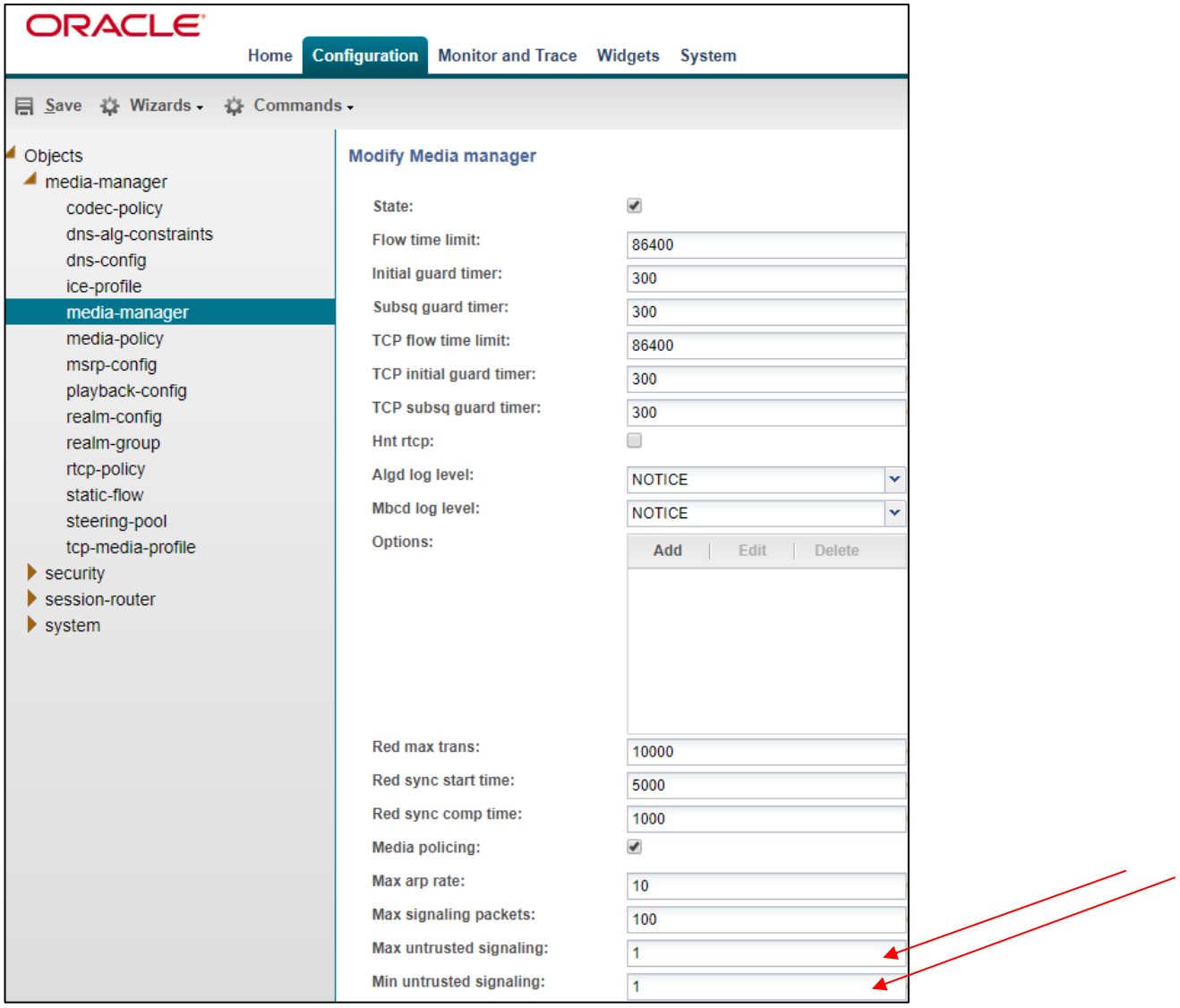


10.1.3 Global Media Manger

In the global Media Manger configuration, set the max and min untrusted signaling values to 1

GUI Path: media-manger/media-manger

ACLI Path: config t→media-manger→media-manger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dns-alg-constraints
dns-config
ice-profile
media-manager
media-policy
msrp-config
playback-config
realm-config
realm-group
rtcp-policy
static-flow
steering-pool
tcp-media-profile
security
session-router
system
Modify Media manager
State:
Flow time limit: 86400
Initial guard timer: 300
Subsq guard timer: 300
TCP flow time limit: 86400
TCP initial guard timer: 300
TCP subsq guard timer: 300
Hnt rtcp:
Algd log level: NOTICE
Mbcd log level: NOTICE
Options:
Add
Edit
Delete
Red max trans: 10000
Red sync start time: 5000
Red sync comp time: 1000
Media policing:
Max arp rate: 10
Max signaling packets: 100
Max untrusted signaling: 1
Min untrusted signaling: 1

11 Appendix C

11.1 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.

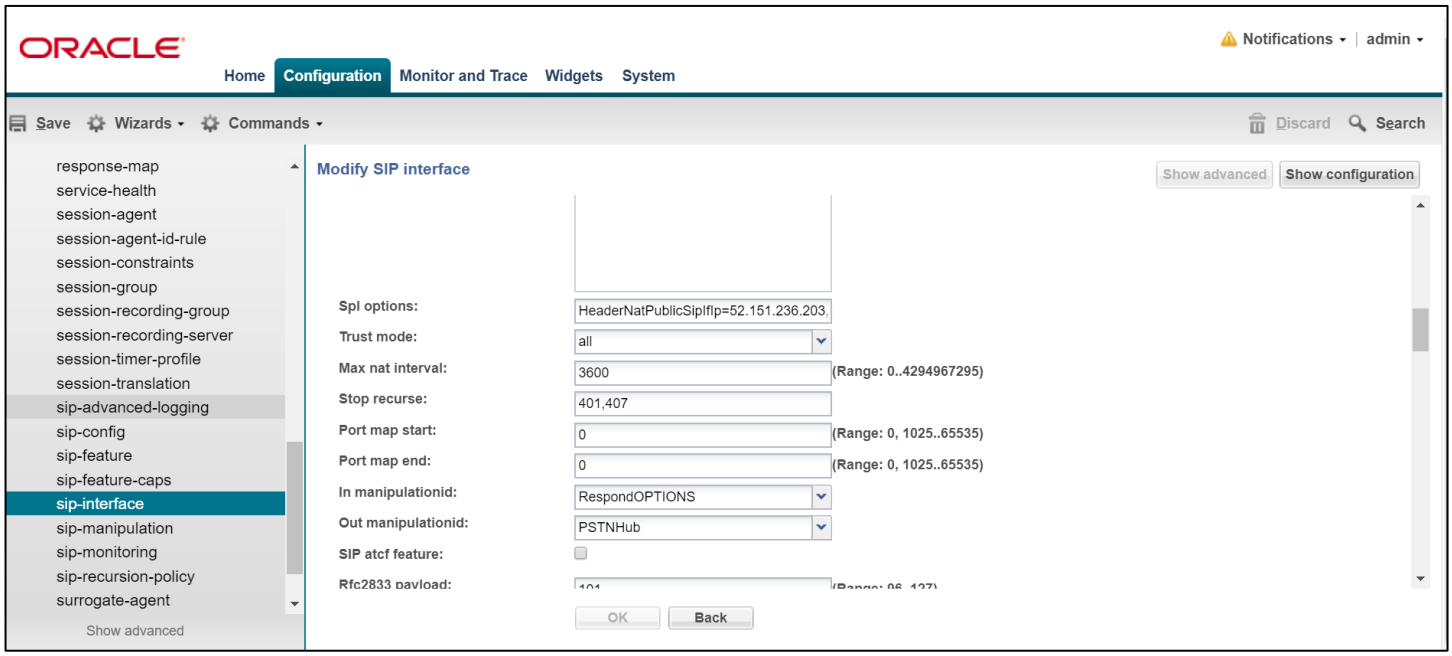
- The private IP address must be the same as the SIP Interface IP address.
- The public IP address must be the public IP address of the NAT device

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



Similarly configure the PSTN side as well.

12 Appendix D

12.1 Sip Manipulation Replacement

To simplify the ORACLE SBC configuration, the ORACLE SBC GA Release, SCZ830m1p8A, (available for download through My Oracle Support Portal, https://support.oracle.com/portal/, or via Oracle Software Delivery Cloud (https://edelivery.oracle.com/), contains three additional SBC configuration parameters not found in prior releases.

The purpose of these four parameters is to replace a majority of the Sip Manipulation rules required to be configured in the ORACLE SBC in order to properly interface with Microsoft Teams Direct Routing.

12.1.1 Teams Facing Realm

The first three parameters are found under the realm-config, and would be enabled in Realms facing Microsoft Teams. They are:

- **Teams-FQDN**
- **Teams FQDN in URI**
- **SDP inactive only**

12.1.2 Teams FQDN

This is where you will add the SBC's FQDN required to interface with Microsoft Teams Direct routing interface.

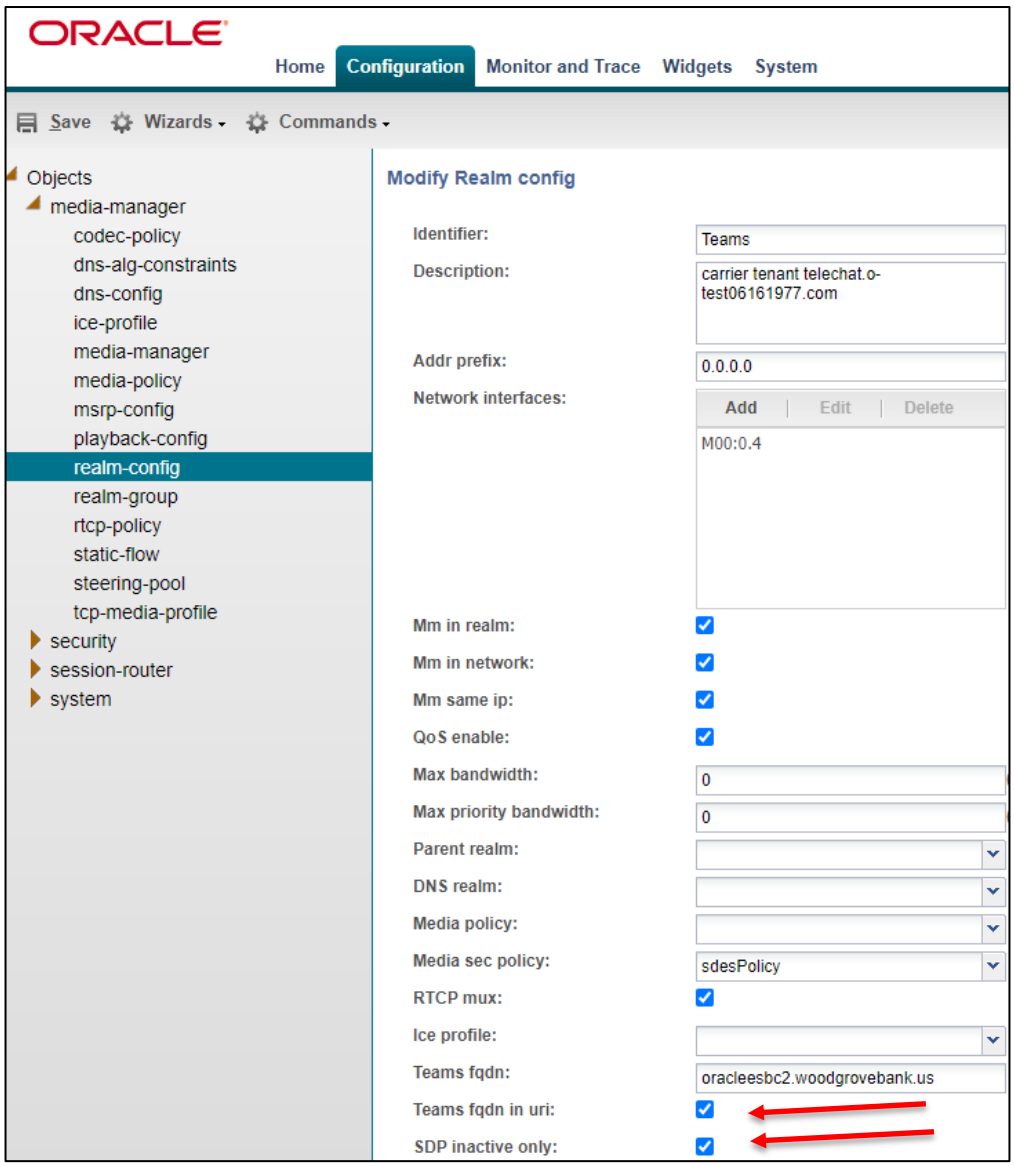
12.1.3 Teams FQDN in URI

When enabled, this parameter takes the FQDN configured under hostname of the Teams FQDN, and inserts that into the Contact and FROM headers of Invites generated by the SBC towards Teams, as well as the Contact header in all final responses which satisfies the Microsoft Teams requirement outlined in the Important Information Section of this document. This also adds a new "X-MS-SBC" Header to both Invite and OPTIONS Requests, which takes the place of the User-Agent header currently being added via Sip Manipulation. Lastly, SBC will add a Contact Header to outgoing SIP Options Pings, also containing the FQDN of the SBC listed under the hostname field of the network interface, and with the Contact Header added to OPTION Requests generated by the SBC, Record Route is no longer required.

12.1.4 SDP inactive only

When enabled on Teams facing realm(s), this will modify the following SDP attributes in both requests and responses to and from Microsoft Teams:

Message Type	Match Value	New Value
request	inactive	sendonly
reply	inactive	recvonly
request	sendonly	inactive
reply	recvonly	inactive



Please note, if the Teams FQDN field under realm-config is not populated with the Oracle SBC's FQDN, it will default back to the hostname parameter of the Network Interface.

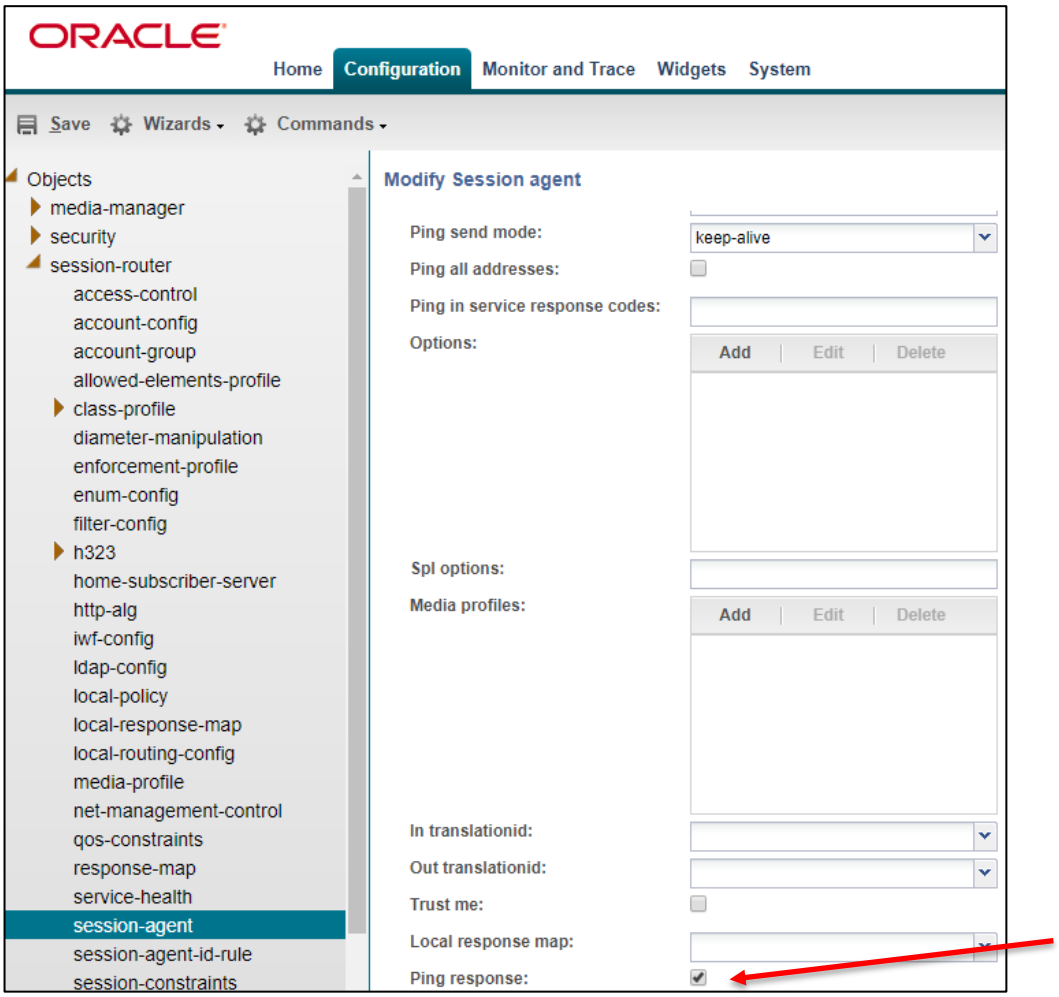
12.1.5 Teams Session Agents

The third parameter is found under the session agent configuration element and will be enabled on all three session agents configured for microsoft teams. Its called

ping response

12.1.6 Ping Response

When enabled, the SBC responds with a 200OK to all Sip Options Pings it receives from trusted agents. This takes the place of the current Sip Manipulation, RepondOptions.



13 Important Note:

Due to planned upgrades to Microsoft Teams Direct Routing, it is now a requirement for SBC's to present their FQDN in the host URI of the Contact Header in all final responses sent to Microsoft Teams. In order to accommodate this, changes to the configuration of your SBC may be needed. By default, the SBC add's the sip interface IP address to the host-uri of the Contact header in all responses. In order to change the host part of the Contact header from IP to FQDN, we'll utilize the Oracle SBC's sip-manipulation feature.

For SBC's running a release prior to SCZ830M1P8A, you should already have a TeamsOutManipulation that contains a header rule that modifies the host part of the Contact header in Requests toward Microsoft Teams. A simple change may be needed to this header rule to ensure we are meeting this new requirement. Please make sure the **Msg type** in this rule is set to **ANY** as outlined in this guide. This allows the SBC to modify the Contact Host in both requests and responses, satisfying this change. For an example, please see Alter_contact.

For SBC's running release SCZ830m1p8A or later, and have enabled the new features outlined in AppendixD, the host-uri of the Contact of all responses towards Microsoft Teams will contain the SBC's FQDN in the host-uri of the Contact Header, so no change will be needed.

14 ACLI Running Config

14.1 Show running-config short

```
NN3900-101# sh con sh
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
certificate-record
      name                        SBCCertificate
      locality                    Bedford
      organization                   sales
      common-name                       Oracleesbc2.woodgrovebank.us
      extended-key-usage-list              serverAuth
                                  ClientAuth
codec-policy
      name                        addCN
      allow-codecs                    * SILK:no G729:no
      add-codecs-on-egress                  CN

codec-policy
      name                        test
      allow-codecs                    SILK::wideband SILK::narrowband
      add-codecs-on-egress                  SILK::wideband SILK::narrowband

local-policy
      from-address                     *
      to-address                     *
      source-realm                     access-pstn
      policy-attribute
            next-hop                      sag:TeamsGrp
            realm                       access-teams
local-policy
      from-address                     *
      to-address                     *
      source-realm                     access-teams
      policy-attribute
            next-hop                      ATTTrunk
            realm                       access-pstn
media-manager
      mbcd-log-level                   NOTICE
      options                       audio-allow-asymmetric-pt
                                  xcode-gratuitous-rtcp-report-generation
media-profile
      name                        CN
      subname                       wideband
      payload-type                   118
      clock-rate                   16000
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                            SRTP
        inbound
                profile                         SDES
                mode                            srtp
                protocol                         sdes
        outbound
                profile                         SDES
                mode                            srtp
                protocol                         sdes
network-interface
        name                            s0p0
        hostname                          oracleesbc2.woodgrovebank.us
        ip-address                        192.65.72.196
        netmask                           255.255.255.0
        gateway                           192.65.72.1
          hip-ip-list                   192.65.72.196
        icmp-address                        192.65.72.196

network-interface
        name                            s0p1
        hostname                          oracleesbc2.woodgrovebank.us
        ip-address                        155.212.214.172
        netmask                           255.255.255.0
        gateway                           155.212.214.172
        dns-ip-primary                      8.8.8.8
        dns-domain                        woodgrovebank.us

phy-interface
        name                            s0p0
        operation-type                      Media
phy-interface
        name                            s0p1
        operation-type                      Media
        port                          1

realm-config
        identifier                      access-pstn
        network-interfaces                  s0p0:0.4
        mm-in-realm                       enabled
        media-sec-policy                    RTP
        out-translationid                 removeE164
        access-control-trust-level            high
        hide-egress-media-update                enabled
        ringback-trigger                  refer
        ringback-file                   ringback10sec.pcm
```

```
realm-config
      identifier                    access-teams
      network-interfaces                 s0p0:0.4
      mm-in-realm                   enabled
      media-sec-policy                SRTP
      codec-policy                  addCN
      rtcp-policy                 rtcpGen
      hide-egress-media-update              enabled
rtcp-policy
      name                          rtcpGen
      rtcp-generate                   all-calls
sdes-profile
      name                          SDES
session-agent
      hostname                      ATTTrunk
      ip-address                    68.68.117.67
      state                       enabled
      realm-id                    access-pstn
      ping-method                     OPTIONS
      ping-interval                 60
session-agent
      hostname                        sip-all.pstnhub.microsoft.com
      port                        5061
      transport-method                  StaticTLS
      realm-id                    access-teams
      ping-interval                 30
      refer-call-transfer             enabled
       ping-all-addresses               enabled

session-agent
      hostname                        sip.pstnhub.microsoft.com
      port                        5061
      transport-method                  StaticTLS
      realm-id                    access-teams
      ping-method                     OPTIONS
      ping-interval                 30
      refer-call-transfer             enabled
session-agent
      hostname                        sip2.pstnhub.microsoft.com
      port                        5061
      transport-method                  StaticTLS
      realm-id                    access-teams
      ping-method                     OPTIONS
      ping-interval                 30
      refer-call-transfer             enabled
session-agent
      hostname                        sip3.pstnhub.microsoft.com
      port                        5061
      transport-method                  StaticTLS
      realm-id                    access-teams
      ping-method                     OPTIONS
      ping-interval                 30
      refer-call-transfer             enabled
session-group
      group-name                      TeamsGrp
      strategy                    HUNT
      dest                        sip.pstnhub.microsoft.com
```

```
                                sip2.pstnhub.microsoft.com
                                sip3.pstnhub.microsoft.com
        sag-recursion                   enabled
        stop-sag-recurse                401,407,480
sip-config
        home-realm-id                   access-pstn
        options                         inmanip-before-validate
                                max-udp-length=0
        extra-method-stats              enabled
sip-feature
        name                            replaces
        realm                           access-teams
        require-mode-inbound            Pass
        require-mode-outbound           Pass

sip-interface
        state                           enabled
        realm-id                        access-pstn
        description                     to trunk
        sip-port
                address                 192.65.72.196
                allow-anonymous         agents-only
        in-manipulationid
        out-manipulationid              Siptrunk_outmanip
sip-interface
        realm-id                        access-teams
        sip-port
                address                 155.212.214.172
                port                    5061
                transport-protocol      TLS
                tls-profile             TLSTeams
                allow-anonymous         agents-only
        nat-traversal                   always
        nat-interval                    3600
        registration-caching            enabled
        in-manipulationid               Teamsinmanip
        out-manipulationid              Teamsoutmanip
        sip-profile                     foreplace

sip-manipulation
        name                            Siptrunk_outmanip
header-rule
                name                    change_fqdn_to_ip_from
                header-name             From
                action                  manipulate
                msg-type                request
                methods                 INVITE
                element-rule
                        name            from_uri
                        type            uri-host
                        action          replace
                        new-value       $LOCAL_IP
        header-rule
                name                    change_fqdn_to_ip_to
                header-name             to
                action                  manipulate
                msg-type                request
```

```
            methods                         INVITE
            element-rule
                name                         urihost
                type                        uri-host
                action                       replace
                new-value                      $REMOTE_IP
sip-manipulation
      name                          Teamsinmanip
      header-rule
            name                        Respondoptions
            header-name                      From
            action                      reject
            msg-type                      request
            methods                       OPTIONS
            new-value                     200 OK

mime-sdp-rule
            name                        Reqinactivetosendonly
            msg-type                      request
            methods                       INVITE
            action                      manipulate
            sdp-media-rule
                name                       audio
                media-type                    audio
                action                     manipulate
                sdp-line-rule
                    name                        audio1
                    type                       a
                    action                      replace
                    match-value                    inactive
                    new-value                     sendonly
      mime-sdp-rule
            name                        Replyinactivetorecvonly
            msg-type                      reply
            methods                       INVITE
            action                      manipulate
            sdp-media-rule
                name                       audio
                media-type                    audio
                action                     manipulate
                sdp-line-rule
                    name                        audio1
                    type                       a
                    action                      replace
                    match-value                    inactive
                    new-value                     recvonly
sip-manipulation
      name                          Teamsoutmanip
      header-rule
            name                        Countrycode
            header-name                      Request-URI
            action                      manipulate
            msg-type                      request
            methods                       INVITE
            element-rule
                name                         uriuser2
                type                        uri-user
```

```
            action                  replace
            new-value                 "1"+$
      header-rule
            name                  Change_fromip_fqdn
            header-name               To
            action                manipulate
            msg-type                request
            methods                 INVITE
            element-rule
                  name                fixtouri
                  type              uri-host
                  action              replace
                  match-val-type          ip
                  new-value             $RURI_HOST.$0
            element-rule
                  name                urinumber
                  type              uri-user
                  action              replace
                  new-value             "1"+$
      header-rule
            name                  Change_to_userandhost
            header-name               From
            action                manipulate
            msg-type                request
            methods                 INVITE
            element-rule
                  name                FixUriHost
                  type              uri-host
                  action              replace
                  match-val-type          ip
                  new-value           oracleesbc2.woodgrovebank.us
      header-rule
            name                  Addcontactheaderinoptions
            header-name               Contact
            action                add
            msg-type                request
            methods                 OPTIONS
            new-value
"<sip:ping@oracleesbc2.woodgrovebank.us:5067;transport=tls>"
      header-rule
            name                  Recordroute
            header-name               Record-Route
            action                add
            msg-type                request
            methods                 OPTIONS
            new-value               "<sip:oracleesbc2.woodgrovebank.us>"
      header-rule
            name                  Alter_contact
            header-name               Contact
            action                manipulate
            msg-type                any
            methods                 INVITE
            element-rule
                  name                Contact_IP
                  parameter-name            Contact_IP
                  type              uri-host
                  action              replace
```

```
                new-value                     oracleesbc2.woodgrovebank.us

        header-rule
                name                        Adduseragent
                header-name                    User-Agent
                action                      add
                msg-type                     request
                methods                      INVITE
                new-value                    "Oracle ESBC"
        header-rule
                name                        Modifyuser
                header-name                    User-Agent
                action                     manipulate
                msg-type                     request
                methods                      INVITE
                element-rule
                        name                    user
                        type                   header-value
                        action                  add
                        new-value                 "Oracle ESBC"
mime-sdp-rule
                name                        Reqsendonlytoinactive
                msg-type                     request
                methods                      INVITE
                action                     manipulate
                sdp-media-rule
                        name                   audio
                        media-type                audio
                        action                 manipulate
                        sdp-line-rule
                                name                    audio3
                                type                   a
                                action                  replace
                                match-value                sendonly
                                new-value                 inactive
        mime-sdp-rule
                name                        Reprecvonlytoinactive
                msg-type                     reply
                methods                      INVITE
                action                     manipulate
                sdp-media-rule
                        name                   audio
                        media-type                audio
                        action                 manipulate
                        sdp-line-rule
                                name                    audio3
                                type                   a
                                action                  replace
                                match-value                recvonly
                                new-value                 inactive
sip-monitoring
        match-any-filter                enabled
        monitoring-filters               *
sip-profile
        name                          foreplace
        replace-dialogs                  enabled
```

```
steering-pool
      ip-address                155.212.214.172
      start-port                20000
      end-port                  40000
      realm-id                  access-teams
steering-pool
      ip-address                192.65.72.196
      start-port                20000
      end-port                  40000
      realm-id                  access-pstn
system-config
      system-log-level          Notice
      process-log-level         Notice
      default-gateway           172.18.0.1
tls-global
      session-caching           enabled
tls-profile
      name                      TLSTeams
      end-entity-certificate    SBCCertificate
      trusted-ca-certificates   BaltimoreRoot
      cipher-list               DEFAULT
      mutual-authenticate       enabled
web-server-config
      inactivity-timeout        0
      http-interface-list
```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