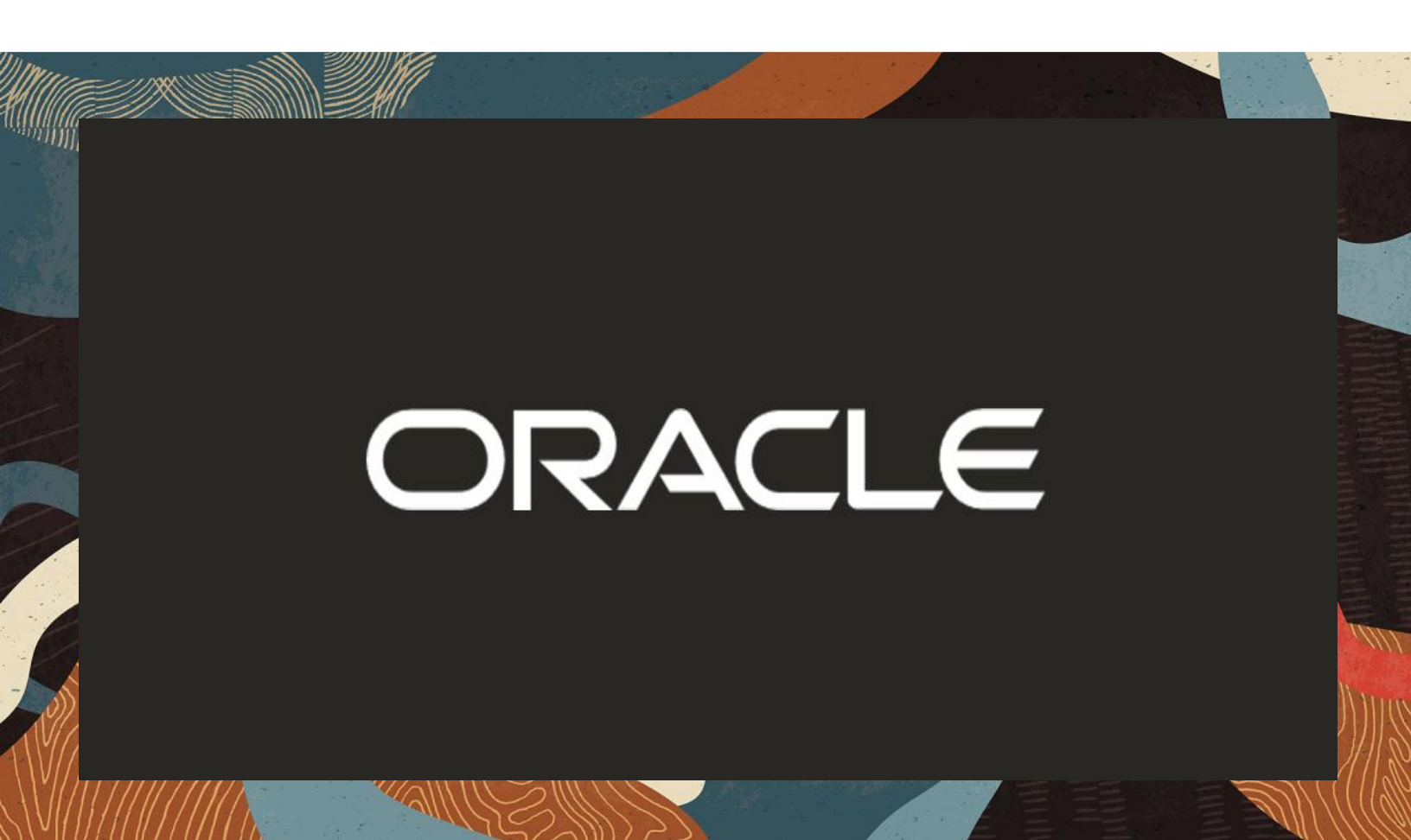




ORACLE

Oracle SBC with Local Media Optimization for Microsoft Teams Direct Routing

Technical Application Note

ORACLE

COMMUNICATIONS



Disclaimer

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

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1 Revision History

Version	Date Revised	Description of Changes
1.0	3/3/2020	Initial Publication
2.0	9/1/2020	• Replaced ACLI Config with GUI • Added Teams FQDN
3.0	11/16/2021	• Added Caveat
4.0	07/20/2024	• Removed Reference to ping-response parameter
5.0	10/31/2025	• Added Default Teams Realm • Removed Appendix A

2 Intended Audience

This document describes how to connect the Oracle SBC to Local Media Optimization in Media Bypass mode for Microsoft Teams Direct Routing. This paper is intended for IT or telephony professionals.

This Document assumes users have an existing environment with the Oracle SBC connected to Microsoft Teams Direct Routing Interface with Media Bypass Enabled. All the Tenant and Licensing requirements are in place and operational. Also, the information used below is for example only, and specific to Oracle's Test environment. All IP addresses, FQDN's and other information used in the example below cannot be used outside of this Oracle Communications test environment.

The initial implementation of the Oracle SBC with Microsoft Teams is outside the scope of this document. If users do not have an existing, operational setup and require information regarding the initial setup and configuration, please refer to the documentation at the link below or reach out to your Oracle Account Team.

https://www.oracle.com/a/otn/docs/msftteamsdirectroutingwithoraclesbc_v1.8_ga.pdf

3 Related Documentation:

3.1 Oracle SBC

https://www.oracle.com/a/otn/docs/msftteamsdirectroutingwithoraclesbc_v1.8_ga.pdf

<https://docs.oracle.com/en/industries/communications/enterprise-session-border-controller/9.3.0/configuration/esbc-configuration-guide.pdf>

<https://docs.oracle.com/en/industries/communications/session-border-controller/9.3.0/security/security-guide.pdf>

3.2 Microsoft

<https://docs.microsoft.com/en-us/microsoftteams/direct-routing-media-optimization-configure>

<https://docs.microsoft.com/en-us/microsoftteams/direct-routing-media-optimization>

<https://docs.microsoft.com/en-us/microsoftteams/cloud-voice-network-settings>

4 Validated Oracle Versions

This software release SCZ900+ with the configuration listed below can run on any of the following products:

- AP 1100
- AP 3900
- AP 3950
- AP 4600
- AP 4900
- AP 6350
- VME
- Public Cloud (OCI, AWS, Azure, GCP)

5 Test Bed Requirements

- Oracle SBC configured and paired with Microsoft Teams Direct Routing
- Regional Oracle SBC deployed and paired with PSTN Environment

6 Teams Tenant Configuration

Configuring your Teams Tenant for Local Media Optimization is outside the scope of this document. Please see the [related documentation](#) section of this guide for more information about how to setup your tenant to work with this feature.

7 About Teams Local Media Optimization

This feature was built jointly between Microsoft and SBC partners.

Local Media Optimization in Media Bypass mode for Direct Routing helps to better manage voice quality by letting enterprises:

- Control how the media traffic flows between the Teams clients and customer SBCs;
- Allowing media streams between the Teams clients and SBCs even if SBCs are behind the corporate firewalls with private IPs and not visible to Microsoft directly.

7.1 When call is established:

7.1.1 Microsoft provides:

- Information about which SBC must be used for the call in Request URI header;
- Information about how traffic should flow based on the configuration by tenant administrator (X-MS-MediaPath header)

7.1.2 SBC vendors:

- Based on information provided by Microsoft, the SBC supplies the correct IP address of a media termination point in SDP;
- Sends Re-Invite messages if the initially chosen media path is not optimal.
 - Please see [Default Teams Realm](#) for configuration options

8 Design

There are two design models created by Microsoft in partnership with Oracle Communications Global Business Unit which are applicable to most customer implementations. They are referred to as Europe Model and Asia Model.

8.1 Europe Model

Customer centralizes all trunks in “Europe” and creates the ability of media to flow between a central Oracle SBC and the users, based on the user location. If user is internal, media flows between the internal IP of the central Oracle SBC and Teams client. If user is external, media flows between the external IP of the Oracle SBC and Teams client.

8.2 Asia Model

Customer Implements a proxy Oracle SBC which is paired to Microsoft Direct Routing, which directs media between the Direct Routing interface and the downstream Oracle SBCs. The downstream Oracle SBCs are not directly visible (but they are paired via Set-CSOnlinePTNGateway command) to Direct Routing in APAC (Asia). Media always stays local when possible. External users have media between the client and the central, proxy Oracle SBC.

This document will outline how configure the Oracle SBC to be deployed in both Europe and Asia Models.

8.3 Europe Model

8.4 Network Parameters

The following information was used for configuring and testing the Oracle SBC deployed in Europe model:

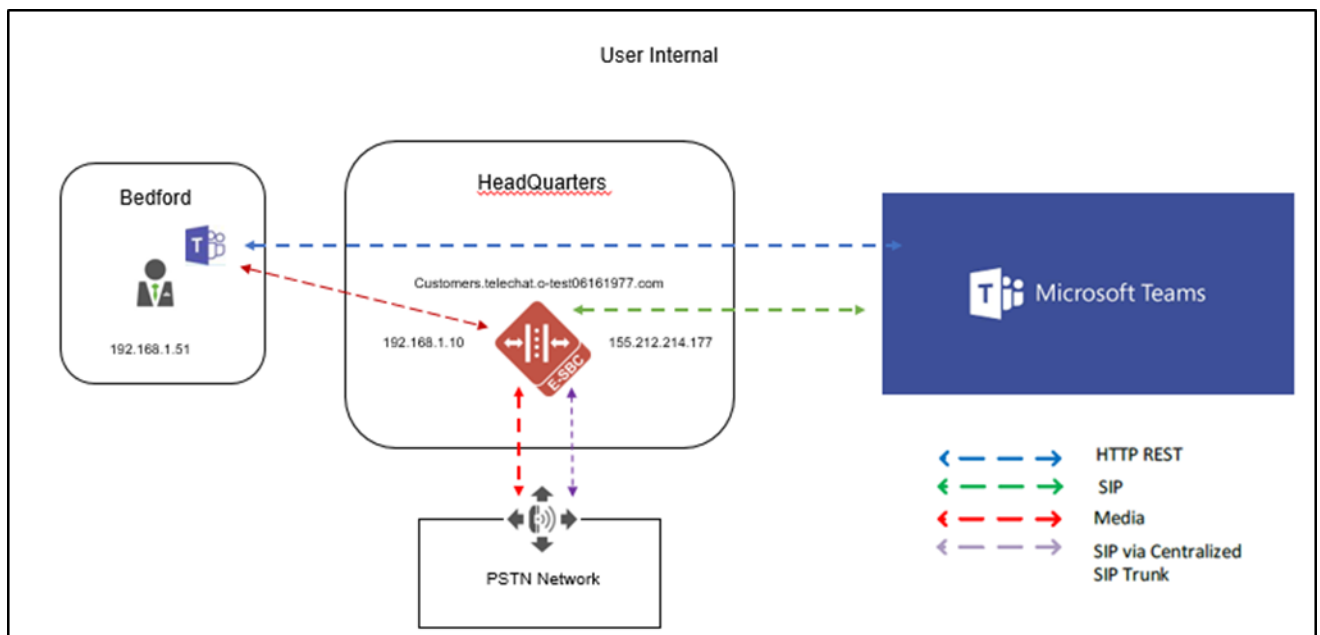
Location	Headquarters	Bedford
SBC FQDN	Customers.telechat.o-test06161977.com	N/A
Internal Subnet	N/A	192.168.1.0/24
External IP of SBC	155.212.214.177	N/A
External NAT for Internet	155.212.214.174	155.212.214.55
Internal IP of SBC	192.168.1.10	N/A

8.5 Europe scenario details

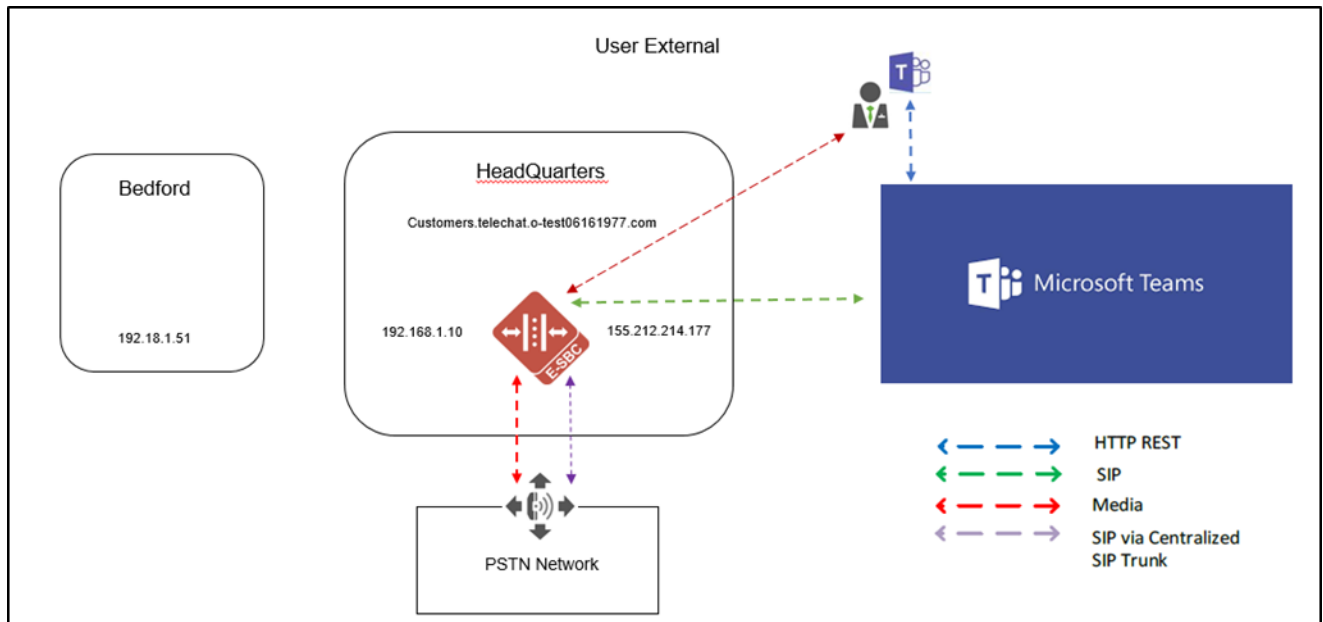
Customer administrator pairs one Oracle SBC (customers.telechat.o-test06161977.com) to Microsoft Teams Direct Routing. The SBC has a centralized trunk connected to it. When user is in internal network the Oracle SBC provides internal IP of the Oracle SBC for media. When user is outside of the corporate network, the Oracle SBC provides the external (public) IP of the Oracle SBC.

The following two diagrams depict the signaling and media flow based on the users location, internal or external:

8.5.1 Diagram 1



8.5.2 Diagram 2



9 Oracle SBC Configuration Europe Model

The following will outline the configuration changes needed on the Oracle SBC for Local Media Optimization. The software release required to allow the SBC to function properly with Microsoft Teams Local Media Optimization features enabled supports both GUI and ACLI. For the purposes of this document, all configuration additions and changes will be completed through the ORACLE SBC GUI.

Any configuration parameter not specifically listed below can remain at its existing value, or, at the ORACLE SBC's default value and does not require any changes.

This configuration will consist of both new elements to connect the SBC to the corporate internal network as well as changes to the existing configuration elements.

Please note: Some or all the information in the configuration example below will be different in your environment.

9.1 New Configuration elements

The following configuration will be added to the existing ORACLE SBC configuration. This additional configuration will be used to connect Media flows from the ORACLE SBC directly to users when located inside the Corporate or Internal network.

- Physical Interface
- Network Interface
- Realm Config
- Steering Pool

9.1.1 Phy-Interface

GUI Path: system/phy-interface

ACL Path: config t→system→phy-interface

- Name: M01
- Operation Type: Media
- Slot: 0
- Port: 1

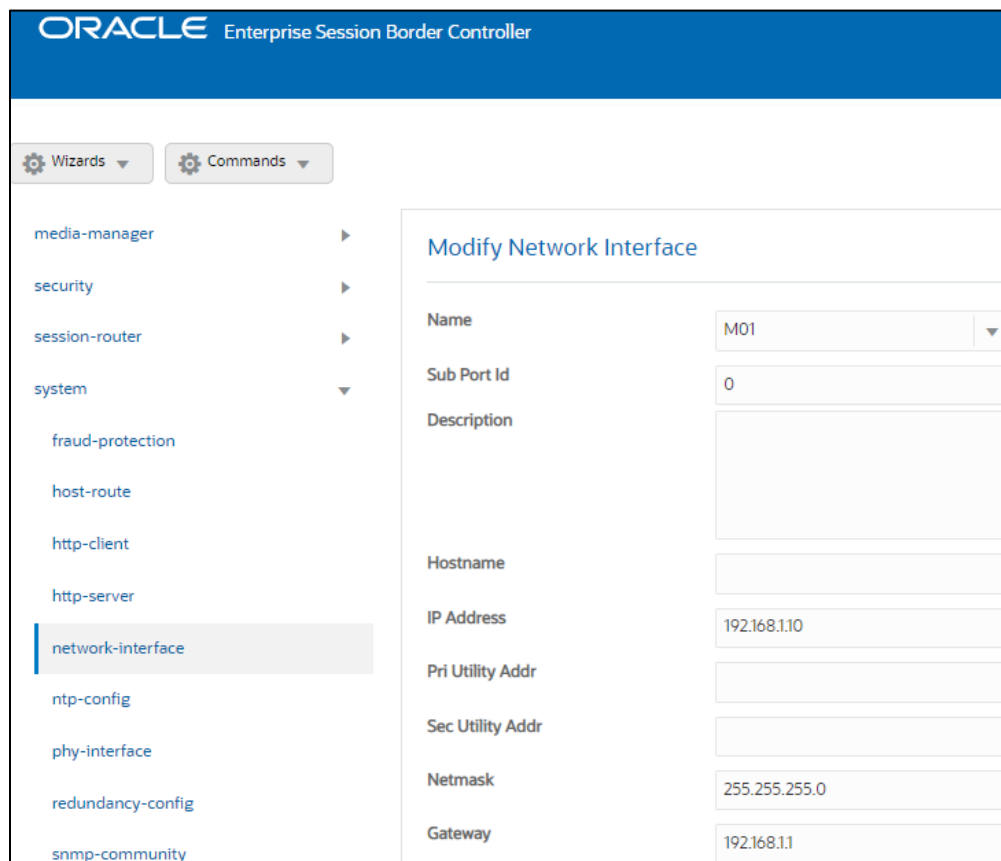
The screenshot displays the Oracle Enterprise Session Border Controller web interface. The top navigation bar is blue with the Oracle logo and the text 'Enterprise Session Border Controller'. Below the navigation bar, there are two tabs: 'Wizards' and 'Commands'. The left sidebar contains a list of configuration categories: media-manager, security, session-router, system, fraud-protection, host-route, http-client, http-server, network-interface, ntp-config, and phy-interface. The 'phy-interface' category is selected and highlighted. The main content area is titled 'Modify Phy Interface' and contains a form with the following fields: Name (M01), Operation Type (Media), Port (1), Slot (0), Virtual Mac (empty), Admin State (checked enable), Auto Negotiation (checked enable), Duplex Mode (FULL), and Speed (100).

9.1.2 Network Interface

GUI Path: system/network-interface

ACL Path: config t→system→network-interface

- Name: M01
- IP-Address: 192.168.1.10
- Netmask: 255.255.255.0
- Gateway: 192.168.1.1



ORACLE Enterprise Session Border Controller

Wizards Commands

media-manager
security
session-router
system
fraud-protection
host-route
http-client
http-server
network-interface
ntp-config
phy-interface
redundancy-config
snmp-community

Modify Network Interface

Name	M01
Sub Port Id	0
Description	
Hostname	
IP Address	192.168.1.10
Pri Utility Addr	
Sec Utility Addr	
Netmask	255.255.255.0
Gateway	192.168.1.1

9.1.3 New Teams Internal Realm

This realm should be configured as a mirror image of the existing realm facing Teams Direct Routing Interface. The only differences between this realm, and the Existing Teams Realm should be the

- Identifier
- Network-Interface
- user-site.

GUI Path: media manager/realm-config

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

- Identifier: Teams-Internal-Users
- Network-Interface: M01:0
- mm-in-realm: enabled
- media-security-policy: sdesPolicy
- rtcp-mux: enabled
- ice-profile: ice
- codec-policy: addCN
- user-site: Bedford

Notice the user-site is set to **Bedford**, which is matching our **NetworkSiteID** configured in Teams Tenant.

The screenshot shows the Oracle Enterprise Session Border Controller GUI. The left sidebar contains a navigation menu with the following items: media-manager, codec-policy, media-manager, media-policy, realm-config (highlighted), steering-pool, security, session-router, and system. The main panel is titled 'Modify Realm Config' and contains the following fields:

Field	Value
Identifier	Teams-Internal-Users
Description	
Addr Prefix	0.0.0.0
Network Interfaces	M01:0
Media Realm List	
Mm In Realm	☒ enable
Media Sec Policy	sdesPolicy
RTCP Mux	☒ enable
Ice Profile	ice
Codec Policy	addCN
Codec ManIP In Realm	☐ enable
Codec ManIP In Network	☒ enable
RTCP Policy	rtcpGen
User Site	Bedford

9.1.4 Steering Pool

GUI Path: media-manager/steering-pool

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

- Ip-address: 192.168.1.10
- Start-port: 10000
- End-port: 10999
- Realm-id: Teams-Internal-Users

ORACLE Enterprise Session Border Controller

Wizards Commands

media-manager
codec-policy
media-manager
media-policy
realm-config
steering-pool

Modify Steering Pool

IP Address	192.168.1.10
Start Port	10000
End Port	10999
Realm ID	Teams-Internal-Users

9.2 Changes to Existing Teams Realm

The following additions are required to the existing Teams Realm on the ORACLE SBC

GUI Path: media manager/realm config

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

- Media-Realm-List: Teams,Teams-Internal-Users
- User-Site: External
- Teams-fqdn: customers.telechat.o-test06161977.com
- Teams-fqdn-in-uri: enabled
- Sdp-inactive-only: enabled
- [Default Teams Realm](#) (optional, available in 930p9+)

ORACLE Enterprise Session Border Controller

Wizards Commands

media-manager
codec-policy
media-manager
media-policy
realm-config
steering-pool
security
session-router
system

Modify Realm Config

Identifier	Teams
Description	carrier tenant telechat.o-test06161977.com
Addr Prefix	0.0.0.0
Network Interfaces	M00:0.4
Media Realm List	Teams Teams-Internal-Users
Mm In Realm	☒ enable
RTCP Mux	☒ enable
Ice Profile	ice
Teams Fqdn	customers.telechat.o-test06161977.cor
Teams Fqdn In Uri	☒ enable
SDP Inactive Only	☒ enable
Codec Policy	addCN
Codec ManIP In Realm	☐ enable
Codec ManIP In Network	☒ enable
RTPC Policy	rtcpGen
User Site	External

You may notice in the realm output above, there are three additional parameters listed

- **Teams-fqdn**
- **Teams-fqdn-in-uri**
- **Sdp-inactive-only**

All of which are set to enabled or populated. Due to some additional interop requirements with Teams Local Media Optimization, these are required to be enabled for both Europe and Asia ORACLE SBC deployments on the realm facing Microsoft Teams direct routing or Proxy SBC.

9.2.1 Default Teams Realm

As of Oracle SBC release 9.3.0p9, a new enhancement is available in the realm configuration that allows users additional control over the SBC IP address presented to Microsoft Teams in the initial offer when the SBC is configured for Teams Local Media Optimization.

Users can now configure a default realm for media negotiation by setting the **default teams realm** parameter within the realm-config. This enhancement enables you to select whether the SBC advertises its external (public) or internal (private) IP address to Microsoft Teams, depending on the enterprise deployment scenario.

By default, the **default teams realm** parameter is set to the external value representing the Teams facing, public realm. In this configuration, the SBC advertises its public, Teams facing IP address when establishing calls. Now, you can specify the name of an internal realm in the **default teams realm** parameter. This causes the SBC to present the private (internal) IP address associated with the selected realm when establishing calls with Teams.

In the example below, we have selected the Teams-Internal-Users realm as the **default teams realm**.

The screenshot displays the Oracle Enterprise Session Border Controller configuration interface. The top header shows the system status: VME-SBC-182, 10.138.194.182, Active, SCZ9.3.0 Patch 9 (Build 336). The left sidebar lists configuration sections: media-manager, codec-policy, media-manager, media-policy, realm-config (selected), steering-pool, security, session-router, and system. The main content area is titled 'Modify Realm Config' and contains the following fields:

- Identifier: Teams
- Description: (empty text area)
- Network Interfaces: M00:0.4 x
- Media Realm List: Teams x, Teams-Internal-Users x
- Mm In Realm: ☒ enable
- QoS Enable: ☐ enable
- Media Policy: (empty dropdown)
- Nsep Media Policy: (empty dropdown)
- Teams Fqdn: customers.telechat.o-test06161977.com
- Teams Fqdn In Uri: ☒ enable
- Default Teams Realm: Teams-Internal-Users (highlighted by a red arrow)

The invite the SBC presents to Microsoft Teams appears as follows:

```

INVITE sip:+17813655802@sip.pstnhub.microsoft.com:5061;transport=tls SIP/2.0
Via: SIP/2.0/TLS 138.3.226.37:5061;branch=z9hG4bKnde0ae20e0vrv57stdv0.1
From: <sip:+19784341227@solutionslab.cgbuburlington.com:5060>;tag=45231431_c3356d0b_ec217cf4-3a3b-439f-8555-611a11d4d943
To: <sip:+17813655802@customers.telechat.o-test06161977.com;transport=tls>
CSeq: 592743 INVITE
Max-Forwards: 56
Call-ID: 5da89b6d5b64ff14a01f3d98f106f488@0.0.0.0
Contact: <sip:+19784341227@customers.telechat.o-test06161977.com:5061;transport=tls>;sip.ice
Allow: INVITE,ACK,CANCEL,BYE,OPTIONS,REFER,NOTIFY
Content-Type: application/sdp
Content-Length: 576
Supported: replaces
X-MS-SBC: Oracle/VM/9.3.0p9

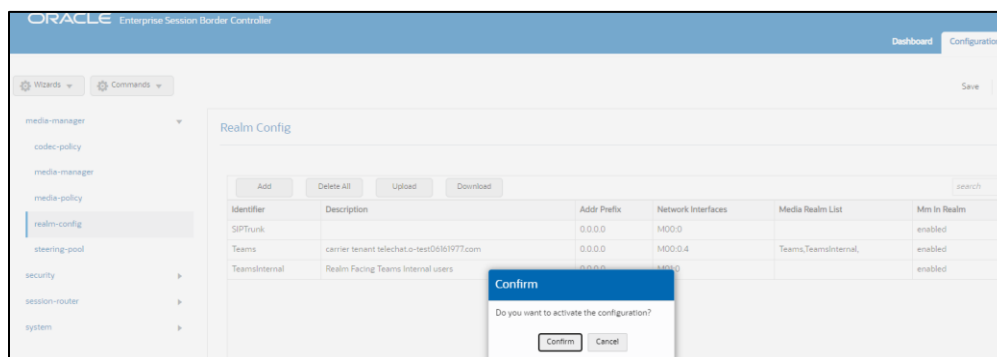
v=0
o=root 675063523 675063523 IN IP4 10.232.50.91
c=IN IP4 192.168.1.10
t=0 0
a=ice-lite
m=audio 10000 RTP/SAVP 0 8 101 13
.
.
.
a=crypto:1 AES_CM_128_HMAC_SHA1_32 inline:Lvomlg2ddWMLAICoLkm0nkbH+WbqKvZcRNg5u+kF|2^31
a=crypto:2 AES_CM_128_HMAC_SHA1_80 inline:TA5zZefz1mffNGkRhmH2OozihZcZUVAMnWD4F0/5|2^31
a=ice-pwd:QlsqzEdXwhQ1cOPT4Cifr
a=ice-ufrag:oJHx
a=candidate:1 1 UDP 2130706431 192.168.1.10 10000 typ host

```

Selecting the appropriate realm helps ensure efficient media routing and addresses common issues such as [race conditions](#).

9.3 Save and Activate Configuration

- After all changes are made, back out of configuration mode and **save** and **activate** your config:



- This concludes the configuration additions and changes for the Oracle SBC to interwork with Microsoft Teams Local Media Optimization enabled, Europe Model

10 Asia Model

10.1 Network Parameters

The following information was used for configuring and testing the Oracle SBC's deployed in Asia model:

Location	Headquarters (Proxy)	Bedford (Downstream)
SBC FQDN	Customers.telechat.o-test06161977.com	Sbc5.customers.telechat.o-test06161977.com
Internal Subnet	192.168.3.0/24	192.168.1.0/24
External IP of SBC	155.212.214.177	N/A
External NAT for Internet	155.212.214.174	155.212.214.55
Internal IP of SBC	192.168.3.10	192.168.1.10

Note: The FQDN assigned to the downstream SBC does not need to be resolvable to an ip address, as it has no direct connection to Teams Direct Routing Interface.

10.2 Asia scenario details

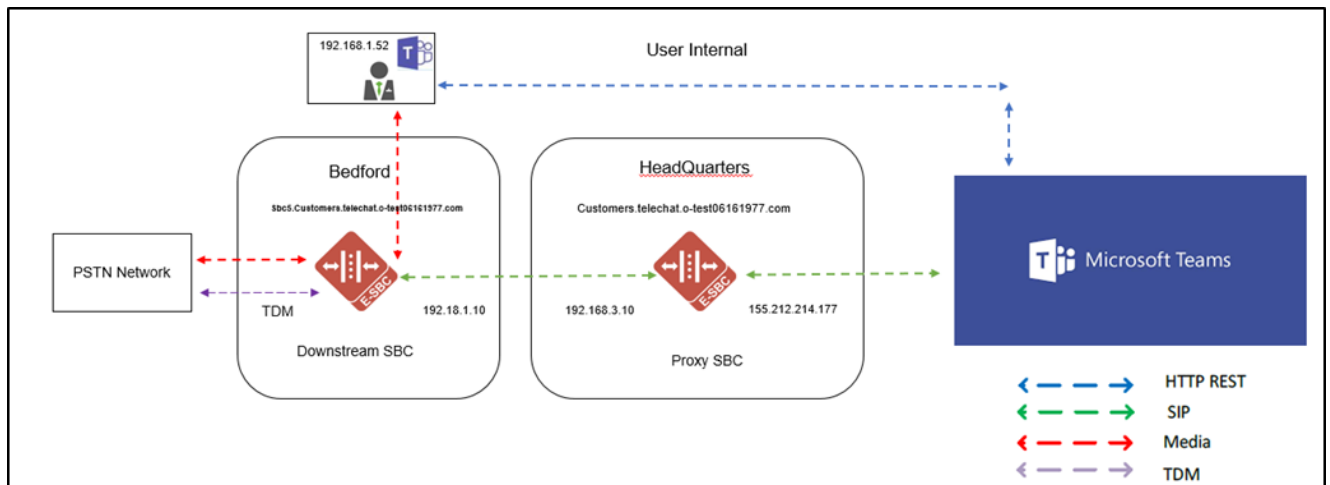
Customer administrator pairs one Oracle SBC (customers.telechat.o-test06161977.com), also called the Proxy ORACLE SBC to Microsoft Teams Direct Routing.

The administrator next added the downstream ORACLE SBC (sbc5.customers.telechat.o-test06161977.com) using PowerShell command New-CSOnlinePSTNGateway, indicating that the downstream ORACLE SBC can be reached via the proxy ORACLE SBC (customer.telechat.o-test06161977.com). The downstream SBC doesn't have public IPs to connect direct to Microsoft Teams Direct Routing, however it can be assigned to voice routes.

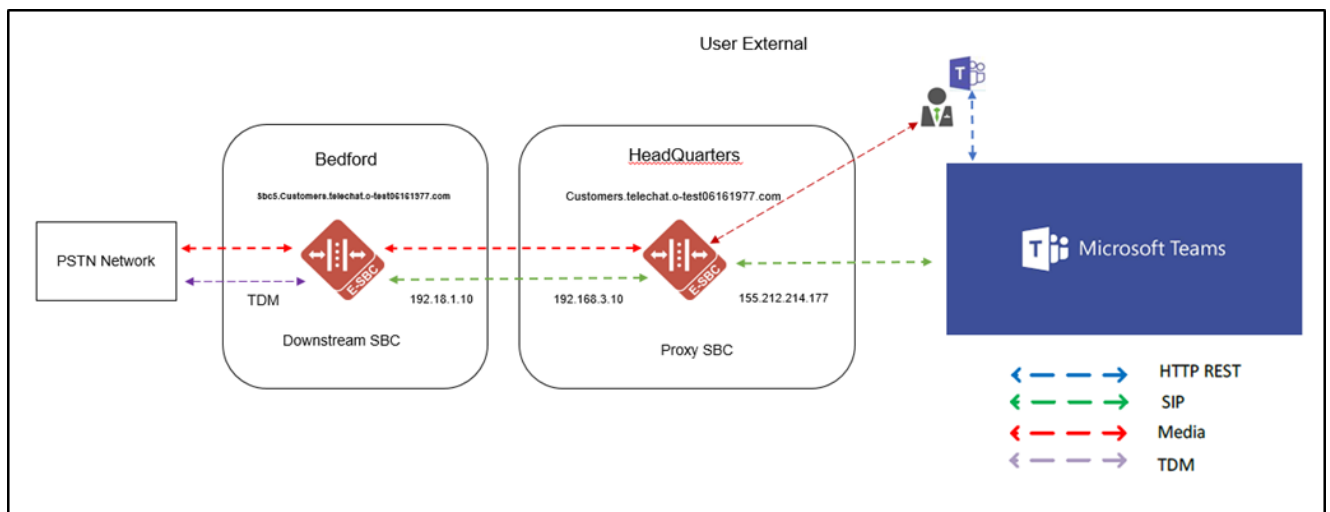
When a user is in an office where the downstream ORACLE SBC is, the media traffic flows between the user and the Downstream ORACLE SBC directly. If user is outside of the office (on a public internet or in a different office) the media flows from the user to the public IP of the Proxy ORACLE SBC, which proxies it to the downstream ORACLE SBC.

The following two diagrams depict the signaling and media flow based on the users location, internal or external:

10.2.1 Diagram 3



10.2.2 Diagram 4



11 Oracle SBC Configuration

For Asia Model, we'll be configuring two SBC's as depicted in diagram 3 and diagram 4 above. They will be referred to as Downstream SBC, and Proxy SBC.

Like Europe model above, we'll be using the Oracle SBC GUI to configure the SBC's.

Note: The software must be loaded on both the Downstream and Proxy Oracle SBC's to support Microsoft Teams Local Media Optimization.

11.1 Downstream SBC Configuration

This document will outline a full SBC configuration of the downstream SBC mainly focusing on the configuration elements needed for a successful connection between the Downstream SBC and the Proxy SBC. While examples will be provided for a basic setup on the PSTN side of the downstream SBC, Oracle recommends working with your PSTN provider and Oracle Consulting for proper setup and configuration.

11.2 Global Configuration Elements

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

- System-Config
- Media-manager-Config
- Sip-Config

11.2.1 System-Config

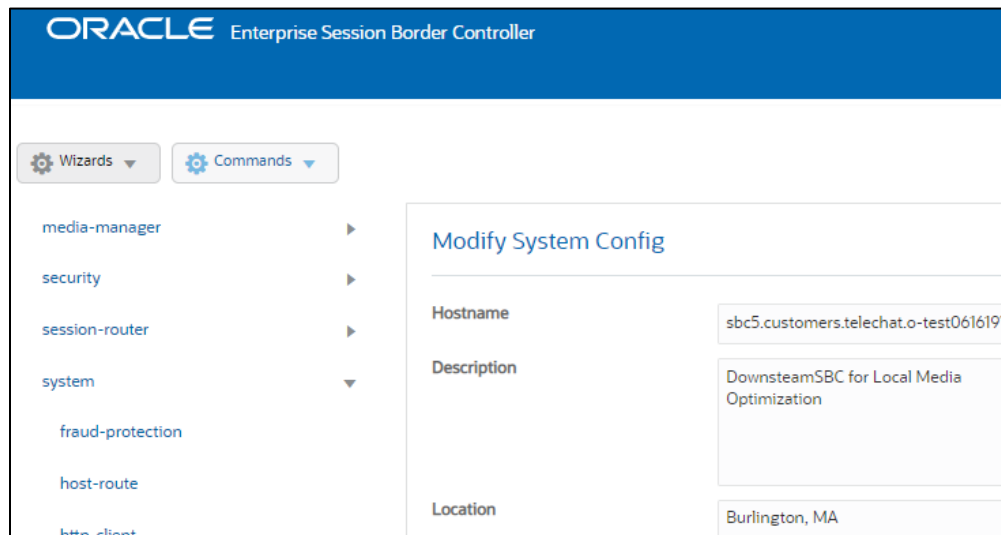
To configure system level functionality for the ORACLE SBC, you must first enable the system-config

GUI Path: system/system-config

ACL Path: config t→system→system-config

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

- Hostname
- Description
- Location



11.2.2 Media Manager

To configure media functionality on the SBC, you must first enable the global media manager. There are no required additions to the global media manger config, but it must be **selected** to be enabled, and the following options are recommended:

GUI Path: media-manger/media-manager

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

- Options+audio-allow-asymmetric-pt
- Options+xcodes-gratuitous-rtcp-report-generation (requires reboot to take affect)

ORACLE Enterprise Session Border Controller

Wizards Commands

media-manager
 codec-policy
 media-manager
 media-policy
 realm-config
 steering-pool
 security
 session-router
 system

Modify Media Manager

State ☒ enable

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 ☐ enable

Algd Log Level NOTICE

Mbcd Log Level NOTICE

Options

- audio-allow-asymmetric-pt
- xcode-gratuitous-rtcp-report-generation

11.2.3 Sip Config

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

GUI Path: session-router/sip-config

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

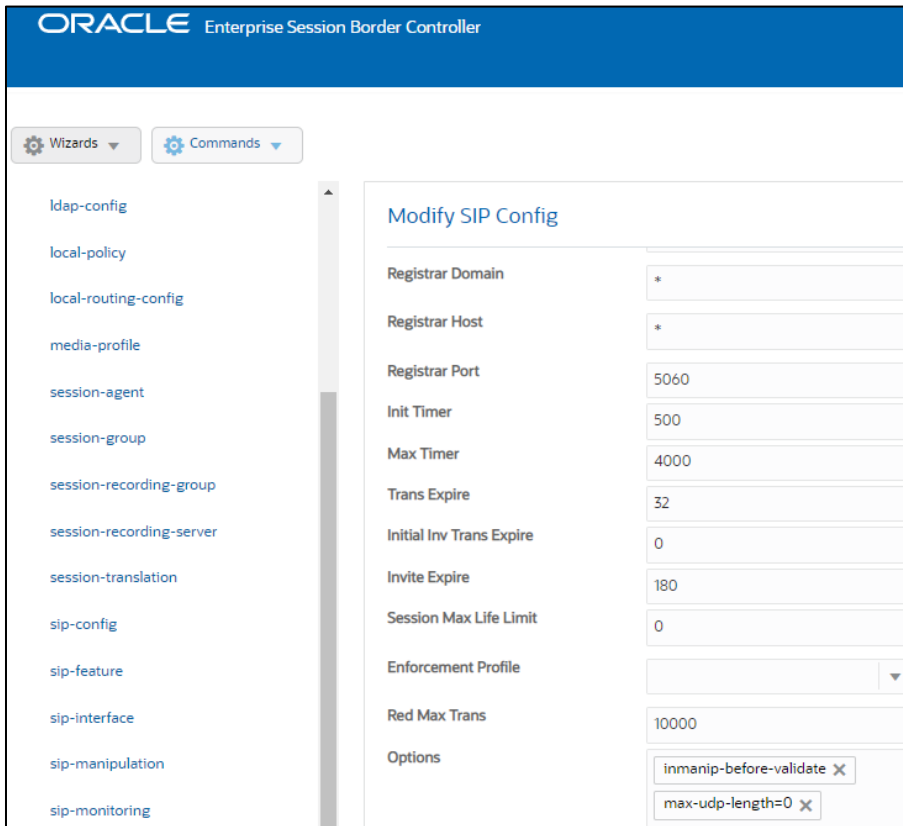
The following are recommended parameters under the global sip-config:

- Options +inmanip-before-validate
- Options +max-udp-length=0
- Options +resend-reinvite-491-lmo-internal-user=5

Note: This option should not be configured when the [default teams realm](#) parameter is set to an internal realm

For more information on the option “resend-reinvite-491-lmo-internal-user” please see chapter

[14.1 491 Request Pending from Microsoft](#)



11.3 Network Configuration

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

11.3.1 Physical Interfaces

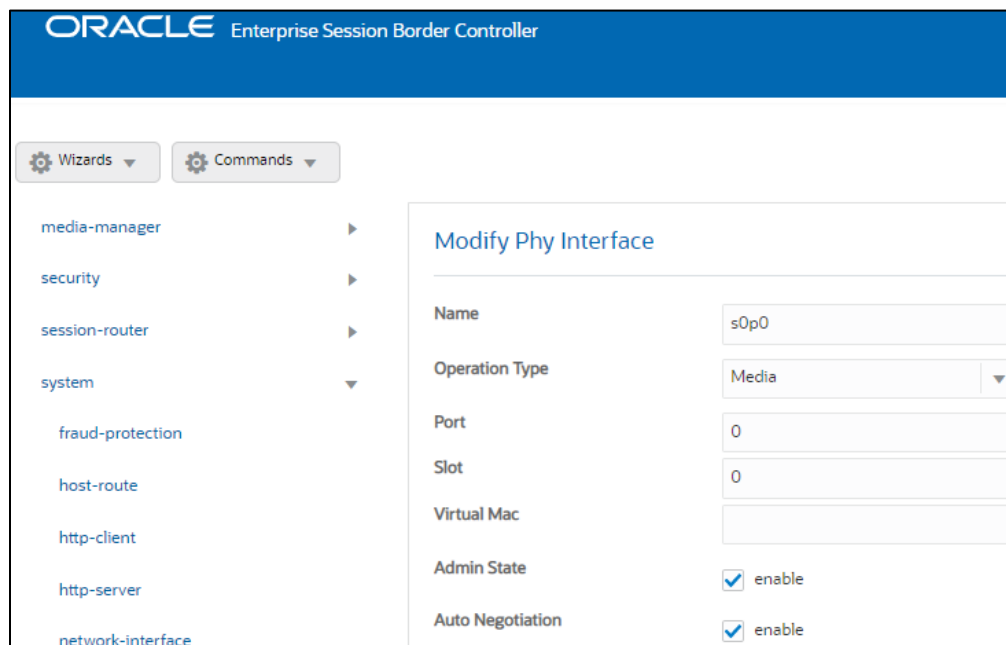
GUI Path: system/phy-interface

ACL Path: config t→system→phy-interface

- Use the following table as a configuration example:

Config Parameter	PSTN	ToProxySBC
Name	s0p0	s1p0
Operation Type	Media	Media
Slot	0	1
Port	0	0

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



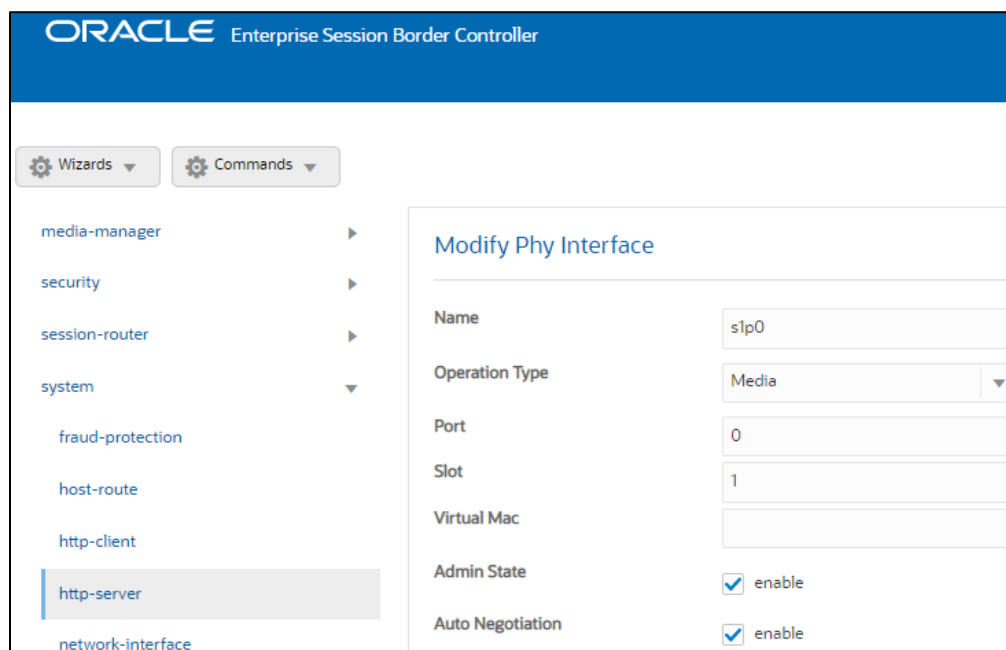
ORACLE Enterprise Session Border Controller

Wizards Commands

media-manager
security
session-router
system
fraud-protection
host-route
http-client
http-server
network-interface

Modify Phy Interface

Name	s0p0
Operation Type	Media
Port	0
Slot	0
Virtual Mac	
Admin State	☒ enable
Auto Negotiation	☒ enable



ORACLE Enterprise Session Border Controller

Wizards Commands

media-manager
security
session-router
system
fraud-protection
host-route
http-client
http-server
network-interface

Modify Phy Interface

Name	s1p0
Operation Type	Media
Port	0
Slot	1
Virtual Mac	
Admin State	☒ enable
Auto Negotiation	☒ enable

11.3.2 Network Interfaces

GUI Path: system/network-interface

ACL Path: config t→system→network-interface

- Use the following table as a configuration example: This is only an example. The addresses used in customer environments will be completely different from what is shown below.

Configuration Parameter	PSTN	ToProxySBC
Name	s0p0	s1p0
Hostname		Sbc5.customers.telechat.o- test06161977.com
IP Address	155.212.214.174	192.168.1.10
Netmask	255.255.255.0	255.255.255.0
Gateway	155.212.214.1	192.168.1.1
DNS Primary IP		
DNS Domain		

ORACLE Enterprise Session Border Controller

Wizards

Commands

media-manager

security

session-router

system

fraud-protection

host-route

http-client

http-server

network-interface

ntp-config

phy-interface

redundancy-config

snmp-community

Modify Network Interface

Name

s0p0

Sub Port Id

0

Description

Hostname

IP Address

155.212.214.174

Pri Utility Addr

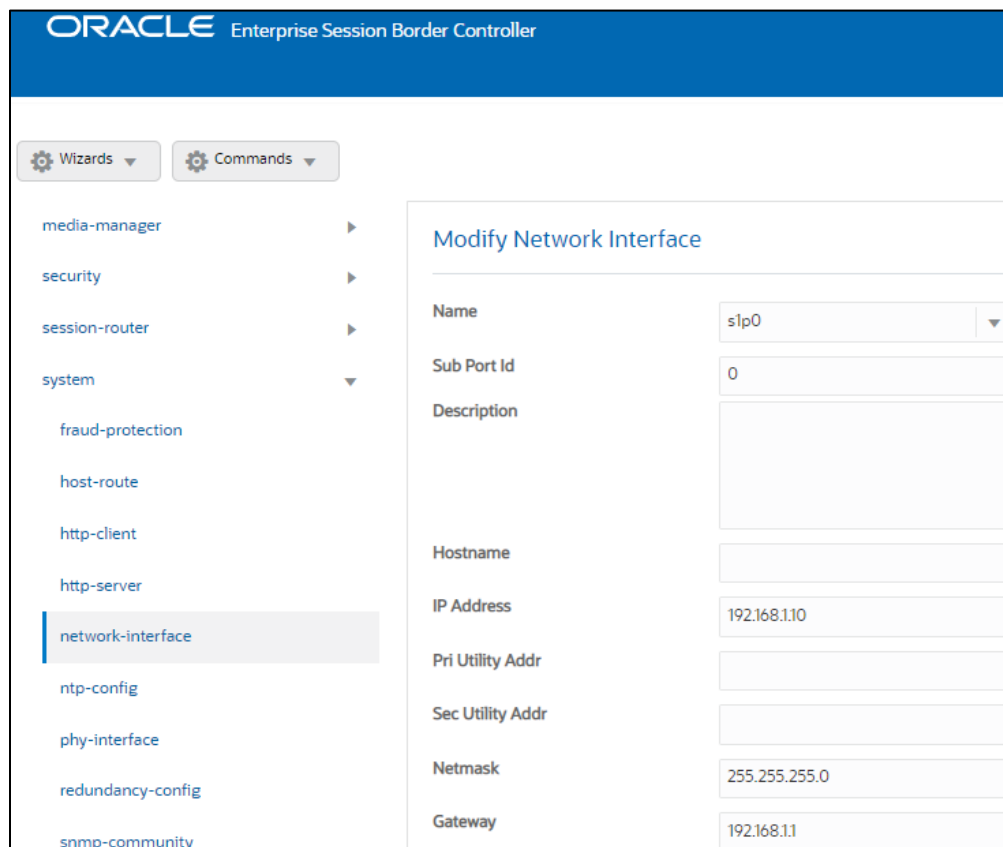
Sec Utility Addr

Netmask

255.255.255.0

Gateway

155.212.214.1



ORACLE Enterprise Session Border Controller

Wizards ▾ Commands ▾

- media-manager ▶
- security ▶
- session-router ▶
- system ▾
 - fraud-protection
 - host-route
 - http-client
 - http-server
 - network-interface**
 - ntp-config
 - phy-interface
 - redundancy-config
 - snmp-community

Modify Network Interface

Name	slp0 ▾
Sub Port Id	0
Description	
Hostname	
IP Address	192.168.1.10
Pri Utility Addr	
Sec Utility Addr	
Netmask	255.255.255.0
Gateway	192.168.1.1

11.4 Media Security Configuration

This section outlines how to configure support for media security between the ORACLE SBC and the Proxy SBC

11.4.1 Sdes-profile

This is the first element to be configured for media security, where the algorithm and the crypto's to be used are configured.

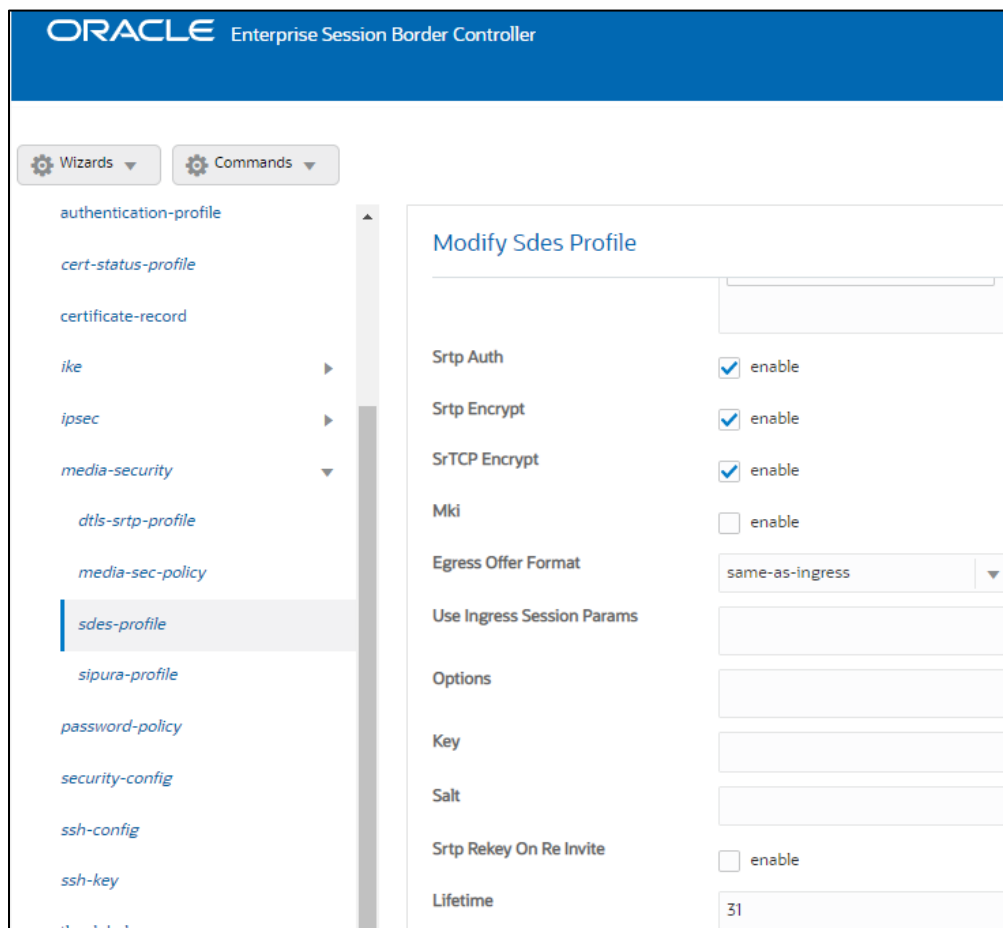
The only crypto-suite option supported by Microsoft is **AES_CM_128_HMAC_SHA1_80** and must be included in the crypto list.

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

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

The following two configuration parameters are required to be changed from default:

- Name: SDES
- Lifetime: 31



Note: The lifetime parameter set to a value of 31 is required if utilizing Media Bypass on Microsoft Teams

11.4.2 Media Security Policy

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

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

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

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

Wizards

Commands

authentication-profile

cert-status-profile

certificate-record

ike

ipsec

media-security

dtls-srtp-profile

media-sec-policy

sdes-profile

sipura-profile

password-policy

security-config

ssh-config

ssh-key

Modify Media Sec Policy

Name

sdesPolicy

Pass Through

☐ enable

Options

Inbound

Profile

SDES

Mode

srtp

Protocol

sdes

Hide Egress Media Update

☐ enable

Outbound

Profile

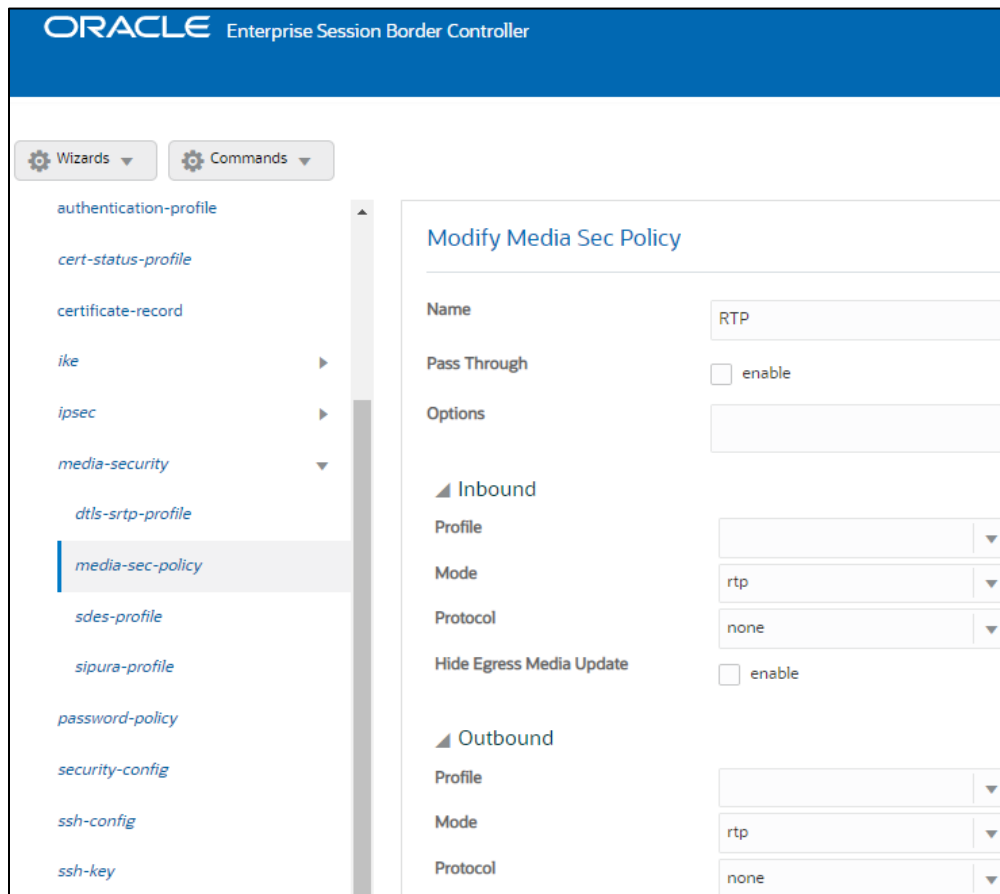
SDES

Mode

srtp

Protocol

sdes



Notice the profile under the secure media security policy with name of **sdesPolicy** above. This is where the sdes-profile configured previously is assigned.

11.5 Transcoding Configuration

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

11.5.1 Media Profile

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

Since CN offered by Microsoft teams is using a payload type which is different than usual, the ORACLE SBC supports this by configuring media profile on the SBC.

GUI Path: session-router/media-profile

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

Configure the following media profile to support Comfort Noise:

ORACLE Enterprise Session Border Controller

Wizards Commands

- 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

Modify Media Profile

Name	CN
Subname	wideband
Media Type	audio
Payload Type	118
Transport	RTP/AVP
Clock Rate	16000
Req Bandwidth	0
Frames Per Packet	0
Parameters	
As Bandwidth	0

11.5.2 Codec Policies

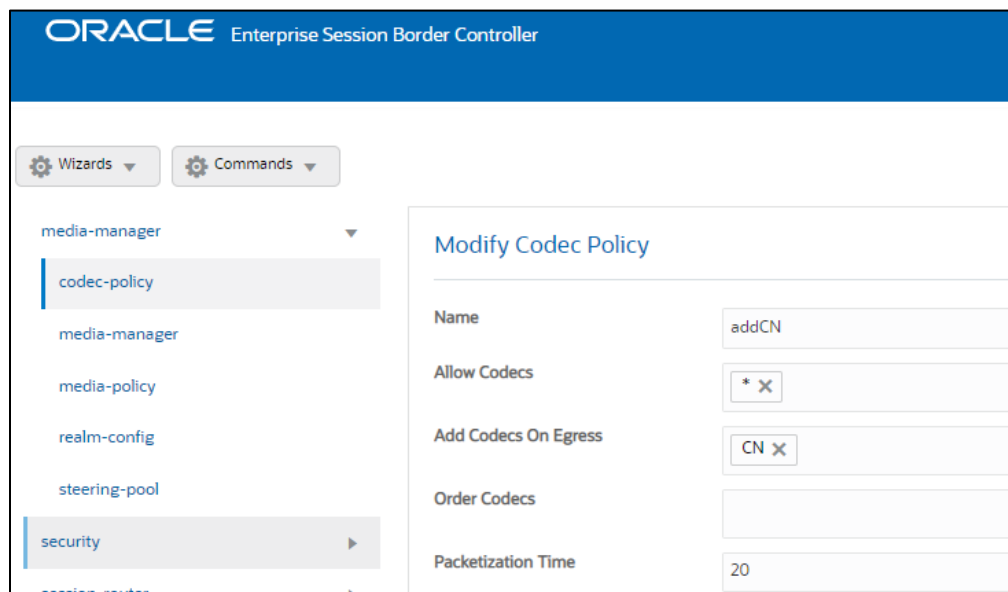
Codec policies are sets of rules that specify the manipulations to be performed on SDP offers allowing the ORACLE SBC the ability to add, strip, and reorder codecs for SIP sessions.

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

GUI Path: media-manager/codec-policy

ACL Path: config t → media-mangaer → codec-policy

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



ORACLE Enterprise Session Border Controller

Wizards Commands

media-manager

codec-policy

media-manager

media-policy

realm-config

steering-pool

security

session-router

Modify Codec Policy

Name: addCN

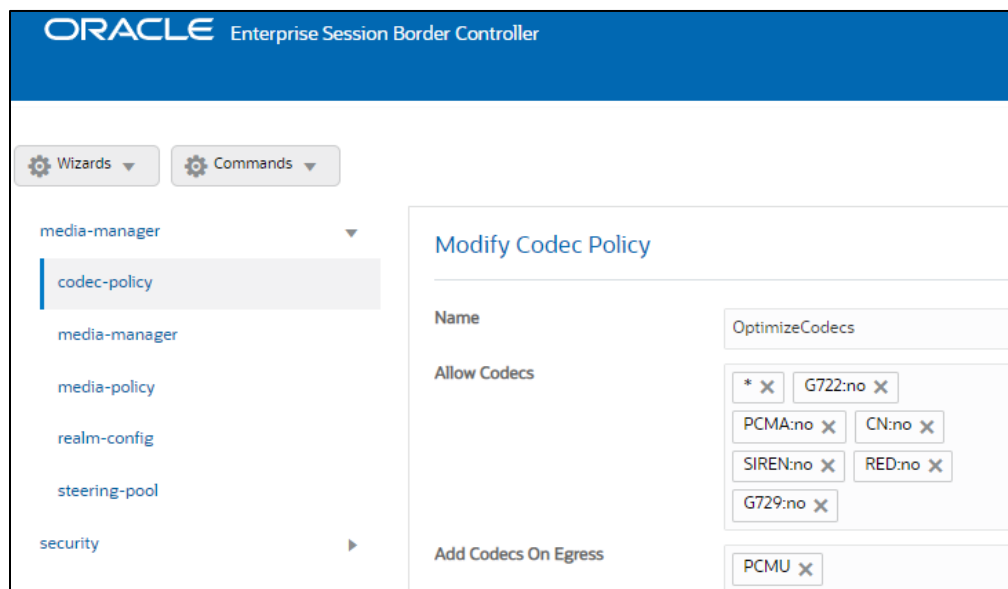
Allow Codecs: *

Add Codecs On Egress: CN

Order Codecs:

Packetization Time: 20

Create another codec-policy, **addCN**, to allow the SBC to generate Comfort Noise packets towards Teams



ORACLE Enterprise Session Border Controller

Wizards Commands

media-manager

codec-policy

media-manager

media-policy

realm-config

steering-pool

security

session-router

Modify Codec Policy

Name: OptimizeCodecs

Allow Codecs: *, G722:no, PCMA:no, CN:no, SIREN:no, RED:no, G729:no

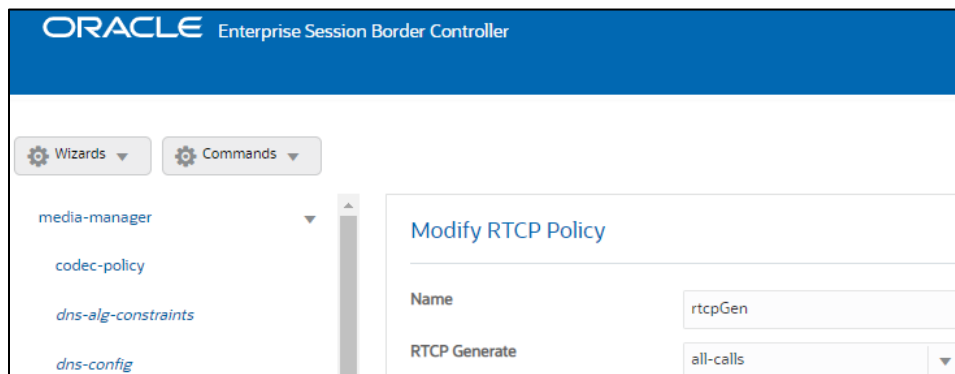
Add Codecs On Egress: PCMU

11.5.3 RTCP Policy

The following RTCP policy needs to be configured for the ORACLE SBC to generate RTCP sender reports. The [media manger](#) options config, xcode-gratuitous-rtcp-report-generation, allows the SBC to generate receiver reports

GUI Path: media-manager/rtcp-policy

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

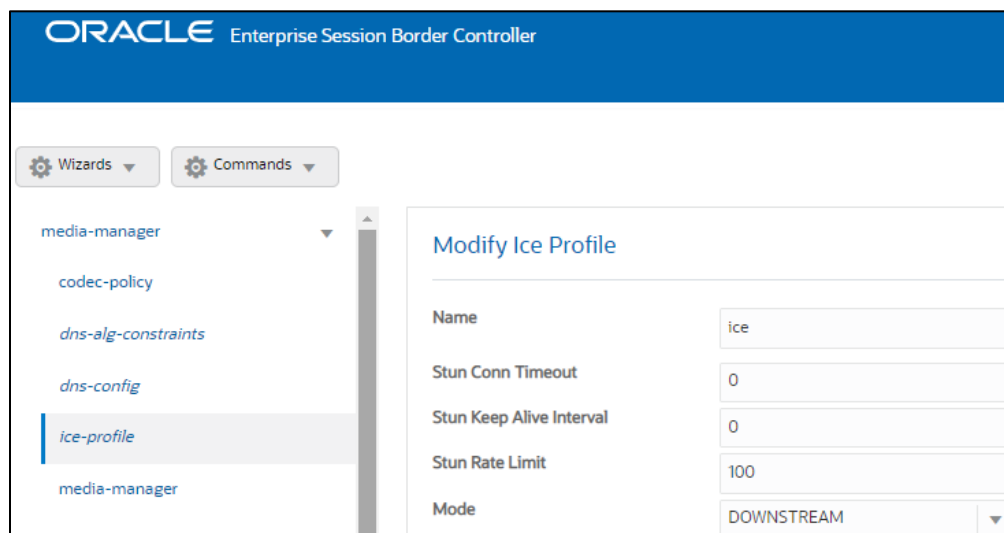


11.5.4 Ice Profile

SBC supports ICE-Lite. This configuration is required to support MSTEams media-bypass.

GUI Path: media-manager/ice-profile

ACL Path: config t→media-manger→ice-profile



Note: The mode in the ice profile must be set to DOWNSTREAM on the Downstream SBC to support Local Media Optimization.

11.5.5 Realm Config

In this example, we are configuring two realms as listed below:

- ToProxySBC Realm
 - This is a standalone realm configured on the Downstream ORACLE SBC facing the Proxy SBC.
- PSTN Realm
 - This is a standalone realm facing PSTN.

GUI Path: media-manger/realm-config

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

Use the following table as a configuration example for the two realms.

Config Parameter	ToProxySBC	PSTN
Identifier	Teams-Proxy-SBC	PSTN
Network-Interface	s1p0:0	s0p0:0
mm-in-realm	Enabled	Enabled
media-sec-policy	sdesPolicy	RTP
rtcp-mux	enabled	
ice-profile	ice	
Teams-fqdn	sbcs5.customers.telechat.o-test06161977.com	
teams-fqdn-in-uri	enabled	
sdp-inactive-only	enabled	
codec-policy	addCN	OptimizeCodecs
rtcp-policy	rtcpGen	

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

- Network interface
- Media security policy
- Ice profile (Only required with Media Bypass set to enabled in Direct Routing Interface)
- Codec policy
- Rtcp policy

11.5.6 Steering Pools

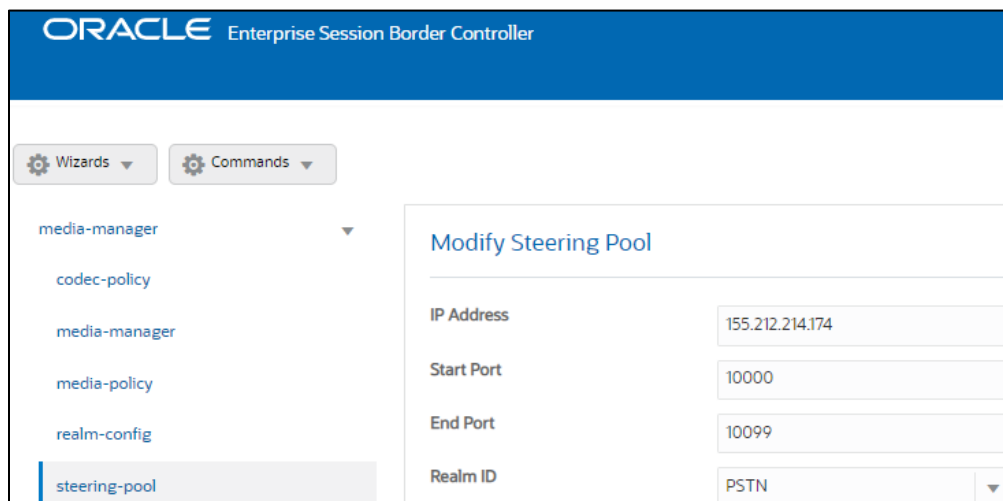
Steering pools define sets of ports that are used for steering media flows through the ORACLE SBC.

These selected ports are used to modify the SDP to cause receiving session agents to direct their media toward this system.

We configure one steering pool for PSTN and one for ToProxySBC Realms.

GUI Path: media-manger/steering-pool

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



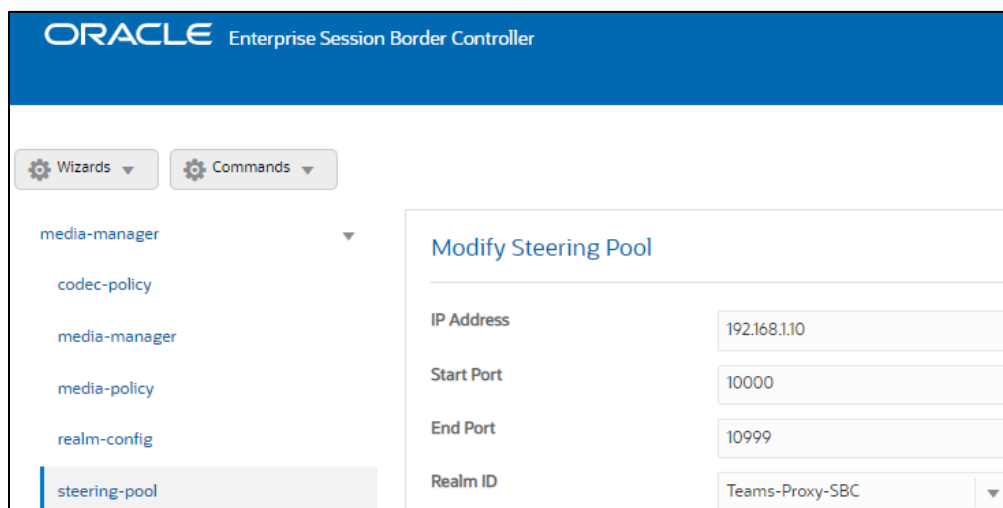
ORACLE Enterprise Session Border Controller

Wizards Commands

media-manager
codec-policy
media-manager
media-policy
realm-config
steering-pool

Modify Steering Pool

IP Address	155.212.214.174
Start Port	10000
End Port	10099
Realm ID	PSTN



ORACLE Enterprise Session Border Controller

Wizards Commands

media-manager
codec-policy
media-manager
media-policy
realm-config
steering-pool

Modify Steering Pool

IP Address	192.168.1.10
Start Port	10000
End Port	10999
Realm ID	Teams-Proxy-SBC

11.6 Sip Configuration

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

11.6.1 SIP Profile

A sip profile needs to be configured and assigned to the ToProxySBC sip interface.

GUI Path: session-router/sip-profile

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

ORACLE Enterprise Session Border Controller

Wizards Commands

session-router

session-timer-profile

session-translation

sip-advanced-logging

sip-config

sip-feature

sip-feature-caps

sip-interface

sip-manipulation

sip-monitoring

sip-nat

sip-profile

sip-q850-man

Modify SIP Profile

Name: forreplaces

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

11.6.2 Sip Interface

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

Configure two sip interfaces, one associated with PSTN Realm, and the other associated with ToProxySBC Realm

GUI Path: session-router/sip-interface

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

Use the table below as an example to Configure:

Config Parameter	ToProxySBC	PSTN
Realm ID	Teams-Proxy-SBC	PSTN
secured-network	enabled	
Sip-profile	forreplaces	
Sip Port Config Parameter	Sip Trunk	Teams
Address	192.168.1.10	155.212.214.174
Port	5060	5060
Transport protocol	TCP	UDP
Allow anonymous	agents-only	agents-only

Note: If you are not using TLS to secure the connection between the Downstream SBC and the Proxy SBC, you must enable the Secured-network parameter on the Downstream SBC Sip Interface Facing the Proxy SBC in order for the SBC's to successfully negotiate SRTP. If you are not using TLS, and this param is set to its default value of disabled, the SBC will reject request offering SRTP with a 488 Not Allowed response.

11.6.3 Session Agents

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

GUI Path: session-router/session-agent

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

We are using two Session Agents in this example configuration, One for PSTN side, the other for Proxy SBC.

Use the table below as an example to configure both:

Config parameter	Session Agent for PSTN	Session Agent for Proxy SBC
Hostname	68.68.117.67	192.168.3.10
IP Address	68.68.117.67	192.168.3.10
Port	5060	5060
Transport method	UDP+TCP	StaticTCP
Realm ID	PSTN	ToProxySBC
Ping Method	OPTIONS	OPTIONS
Ping Interval	30	30
Refer Call Transfer		enabled

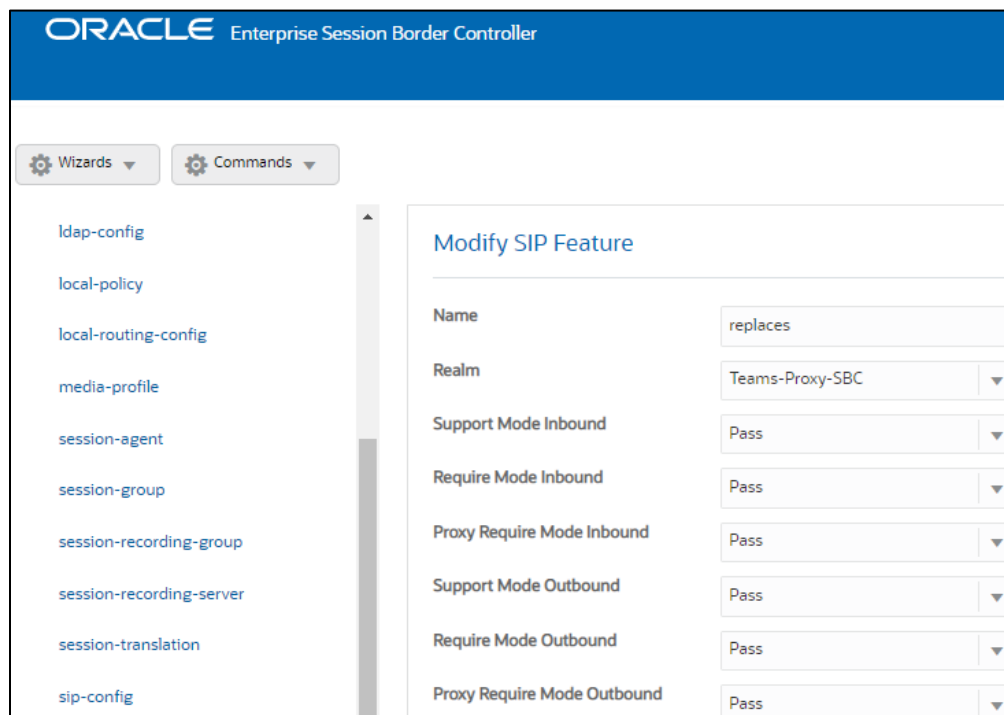
*Note: **Refer-Call-Transfer** must be enabled on either the session agent or the realm facing the Proxy ORACLE SBC. In Asia Model, the Downstream SBC must handle all call transfers.*

11.6.4 Sip Feature

The following sip feature needs to be added to the Configuration of the SBC to enable support for the replaces, allowing for successful consultative transfer:

GUI Path: session-router/sip-feature

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



11.7 Routing Configuration

This section outlines how to configure the ORACLE SBC to route traffic to and from The Proxy SBC which is directly interfacing with Microsoft Teams Direct Routing Interface.

11.7.1 Local Policy Configuration

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

GUI Path: session-router/local-policy

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

In order to route traffic to and from The Proxy ORACLE SBC and PSTN, the following local-policies will need to be configured.

From PSTN to Proxy SBC:

The screenshot shows the Oracle Enterprise Session Border Controller interface. The left sidebar lists various configuration sections, with 'local-policy' selected. The main panel is titled 'Modify Local Policy'. It contains several input fields: 'From Address' and 'To Address' both set to '* X', 'Source Realm' set to 'SIPTrunk X', and 'Description' is empty. The 'State' is checked and labeled 'enable'. 'Policy Priority' is set to 'none'. Below these fields is a 'Policy Attributes' table with one row.

Next Hop	Realm	Action
192.168.3.10	Teams-Proxy-SBC	none

From Proxy SBC to PSTN:

The screenshot shows the Oracle Enterprise Session Border Controller interface. The left sidebar lists various configuration sections, with 'local-policy' selected. The main panel is titled 'Modify Local Policy'. It contains several input fields: 'From Address' and 'To Address' both set to '* X', 'Source Realm' set to 'Teams-Proxy-SBC X', and 'Description' is empty. The 'State' is checked and labeled 'enable'. 'Policy Priority' is set to 'none'. Below these fields is a 'Policy Attributes' table with one row.

Next Hop	Realm	Action	Termination
68.68.117.67	SIPTrunk	none	disable



This concludes the Downstream ORACLE SBC configuration. At this point, you can back out of the configuration mode and perform a [Save and Activate Configuration](#)

12 Proxy SBC Configuration

Like Europe model outlined above, this note assumes there is at least one ORACLE SBC that is currently interfacing with Teams Direct Routing. In Asia scenario, that SBC will become the Proxy SBC in our example. With that being said, the Proxy SBC configuration outlined below will be limited to the necessary additions and changes required for the ORACLE SBC to work properly with Teams Local Media Optimization. If you do not have an existing ORACLE SBC configured and working with Teams, please refer to the following document and reach out to your Oracle Representatives for assistance with setup if required.

https://www.oracle.com/a/otn/docs/msftteamsdirectroutingwithoraclesbc_v1.8_ga.pdf

12.1 Configuration Changes

The following ORACLE SBC configuration elements facing Microsoft Teams Direct Routing require changes to support Local Media Optimization feature.

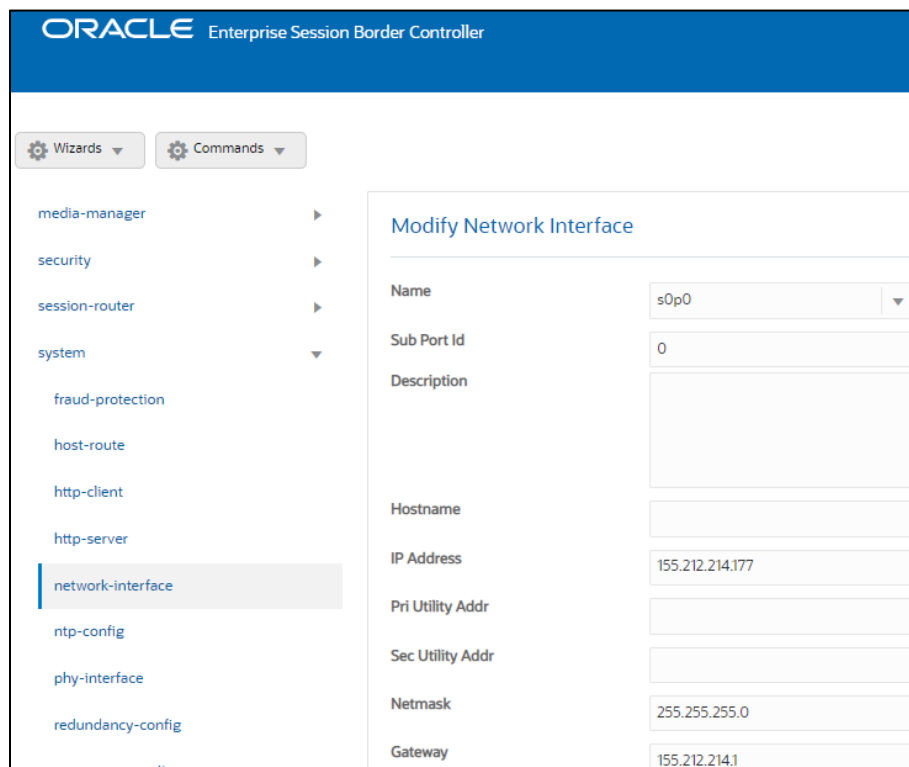
- Network-Interface
- Realm-Config
- Ice-Profile
- 3 Session Agents configured for Microsoft Teams

12.1.1 Network Interface

The Proxy SBC FQDN, (eg.customers.telechat.o-test06161977.com), needs to be added to the hostname field of the network interface assigned to the Teams facing realm if it is not already there:

GUI Path: system/network-interface

Acli Path: config t→system→network-interface



ORACLE Enterprise Session Border Controller

Wizards Commands

media-manager

security

session-router

system

fraud-protection

host-route

http-client

http-server

network-interface

ntp-config

phy-interface

redundancy-config

smp-community

Modify Network Interface

Name	s0p0
Sub Port Id	0
Description	
Hostname	
IP Address	155.212.214.177
Pri Utility Addr	
Sec Utility Addr	
Netmask	255.255.255.0
Gateway	155.212.214.1

12.1.2 Realm Config

The following need to be enabled on the Realm configured facing Microsoft Teams:

- Teams-fqdn
- teams-fqdn-in-uri: enabled
- sdp-inactive-only: enabled
- [Default Teams Realm](#) (optional as of 930p9 release)

As mentioned previously in this guide, there is a new setting on the realm config, **default teams realm**, that allows users to configure a default realm for media negotiation. This enhancement enables you to select whether the SBC advertises its external (public) or internal (private) IP address to Microsoft Teams, depending on the enterprise deployment scenario. For more information, please see [9.2.1: Default Teams Realm](#).

GUI Path: media-manger/realm-config

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

ORACLE Enterprise Session Border Controller

Wizards Commands

media-manager
codec-policy
media-manager
media-policy
realm-config
steering-pool
security
session-router
system

Modify Realm Config

QoS Enable	☒ enable
Max Bandwidth	0
Max Priority Bandwidth	0
Parent Realm	
DNS Realm	
Media Policy	
Media Sec Policy	sdesPolicy
RTCP Mux	☒ enable
Ice Profile	ice
Teams Fqdn	customers.telechat.o-test06161977.cor
Teams Fqdn In Uri	☒ enable
SDP Inactive Only	☒ enable

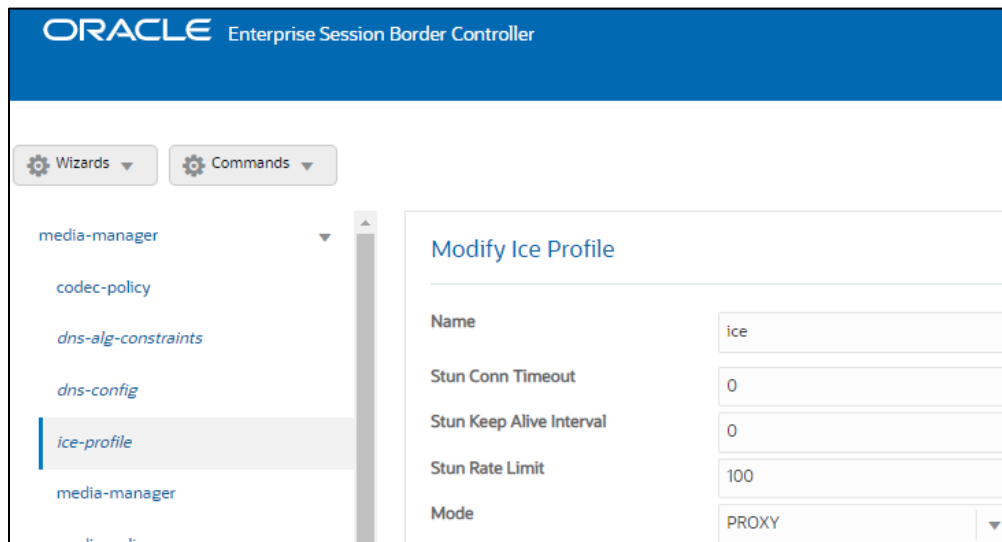
Note: Check to see if the field “refer-call-transfer” is enabled in the Teams Realm. If it is, that too must be disabled. In Asia Model, the Downstream SBC will handle call transfers.

12.1.3 Ice Profile

Set the mode parameter on the existing ice profile to Proxy

GUI Path: media-manger/ice-profile

ACLI Path: config t→media-manger→ice-profile



12.1.4 Session Agent

In an existing ORACLE SBC configuration, there should be three session agents configured for Microsoft Teams, they are:

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

Change the following on each agent.

- Refer-Call-Transfer: from enabled to disabled on each of the three agents.

GUI Path: session-router/session-agent

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

ORACLE Enterprise Session Border Controller

Wizards Commands

response-map
rph-policy
rph-profile
service-health
session-agent
session-agent-id-rule
session-constraints
session-group
session-recording-group
session-recording-server
session-router
session-timer-profile
session-translation
sip-advanced-logging
sip-config

Modify Session Agent

Local Response Map	
Ping Response	☒ enable
In Manipulationid	
Out Manipulationid	
Manipulation String	
Manipulation Pattern	
Trunk Group	
Max Register Sustain Rate	0
Invalidate Registrations	☐ enable
Rfc2833 Mode	none
Rfc2833 Payload	0
Codec Policy	
Refer Call Transfer	disabled

12.2 Proxy ORACLE SBC Configuration for Downstream ORACLE SBC

This section describes how to configure the Proxy SBC to communicate with the Downstream SBC. The following may be required:

- Physical Interface
- Network Interface
- Realm
- Steering Pool
- Sip Interface
- Session agent
- Local Policies for routing

12.2.1 Physical Interface

GUI Path: system/phy-interface

ACLI Path: config t→system→phy-interface

Set the following:

- Name
- Operation Type
- Slot
- Port

phy-interface	
name	M10
operation-type	Media
slot	1
port	0

12.2.2 Network Interface

ACLI Path: config t→system→network-interface

Configure the following

- Name
- Ip-address
- Netmask
- Gateway

network-interface	
name	M10
ip-address	192.168.3.10
netmask	255.255.255.0
gateway	192.168.3.1

12.2.3 Realm Config

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

Set the following for the Realm facing Downstream SBC:

- Identifier
- Network-interface
- mm-in-realm

- media-sec-policy (this will be the same security policy assigned to your realm Facing Teams)
- codec-policy (we recommend using the same codec policy assigned to your Teams facing Realm)

realm-config	
identifier	ToDownstreamSBC
network-interfaces	M10:0
mm-in-realm	enabled
media-sec-policy	sdesPolicy
codec-policy	addCN

12.2.4 Steering Pool

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

Set the following in the Steering Pool Configuration

- Ip-address
- Realm-ID
- Start-port
- End-Port

steering-pool	
ip-address	192.168.3.10
start-port	10000
end-port	10999
realm-id	ToDownstreamSBC

12.2.5 Sip Interface

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

Set the following Under Sip-interface Config

- Realm-id

Sip-Port:

- Address
- Port
- Transport-protocol
- Allow-anonymous.

sip-interface	
realm-id	ToDownstreamSBC
sip-port	
address	192.168.3.10
port	5060
transport-protocol	TCP
allow-anonymous	agents-only

12.2.6 Session-Agent

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

Configure the following for the Downstream SBC Session agent.

- Hostname
- IP-address
- Port
- Transport-method
- Realm-ID
- Ping-method

session-agent	
hostname	sbc5.customers.telechat.o-test06161977.com
ip-address	192.168.1.10
port	5061
transport-method	StaticTCP
realm-id	ToDownstreamSBC
ping-method	OPTIONS
ping-response	enabled

12.2.7 Local Policy

For the purposes of this example configuration, we'll configure two local policies. One to route Sip Traffic from the Downstream SBC to Teams Direct Routing, the other to route SIP traffic from Teams Direct Routing to the Downstream SBC.

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

Configure the following for each local policy

- To-address
- From-address
- Source-realm

Policy-attributes

- Next-hop
- Realm

local-policy	
from-address	*
to-address	*
source-realm	Teams
policy-attribute	
next-hop	192.168.1.10
realm	TeamsLocationTesting
local-policy	
from-address	*
to-address	*
source-realm	ToDownstreamSBC
policy-attribute	
next-hop	SAG:TeamsGrp
realm	Teams

This concludes the basic configuration for the Proxy ORACLE SBC. You can now exit configuration mode and [Save and Activate Configuration](#)

13 Caveat

13.1 491 Request Pending from Microsoft

There is a new hidden option that has been added to release nnSCZ840p8, “resend-reinvite-491-lmo-internal-user”. This option has been created to address a race condition that may appear in some environments between the Oracle SBC and Microsoft Teams Direct Routing interface when a user is internal.

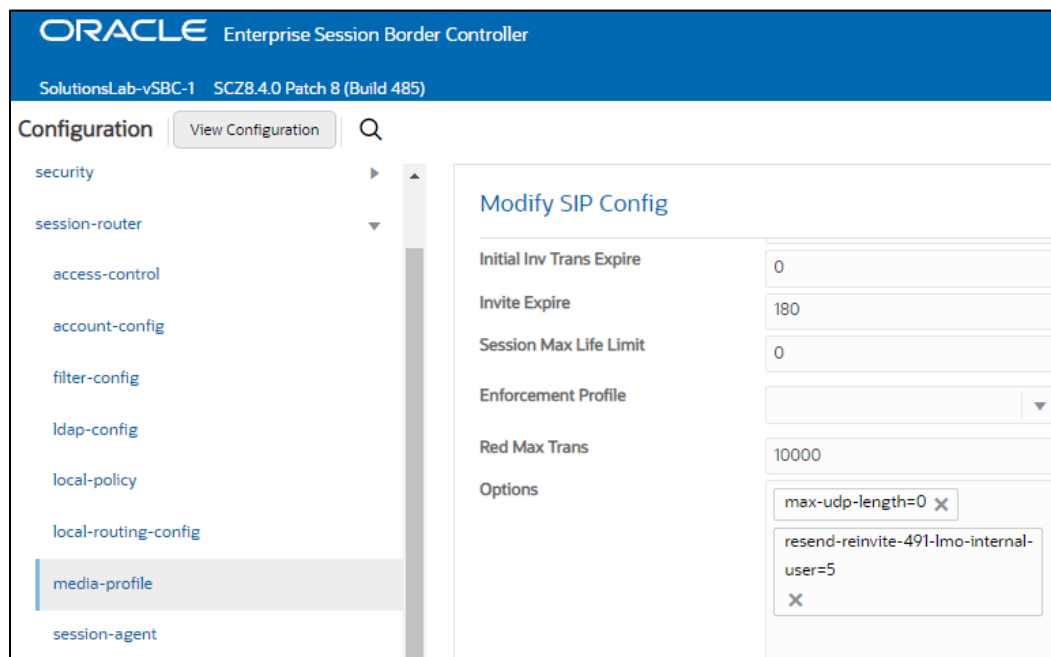
The purpose of this configuration option, “resend-reinvite-491-lmo-internal-user”, is to resend the Re-Invite generated by the Oracle SBC towards Microsoft Teams when Microsoft Teams sends a “491 Request Pending” response to that initial Re-Invite. The SBC only generates a Re-Invite towards Microsoft Teams on inbound calls to Teams when a user is internal.

In a single SBC deployment, i.e....[Europe Model](#), this option is applied to the global sip configuration of that SBC.

In a multiple SBC deployment, i.e....[Asia Model](#), this option will be added to the global sip config of the downstream or local SBC.

Use the example below to add this option to the Oracle SBC’s configuration.

*Please note: This option should **NOT** be enabled if you have set the [default teams realm](#) parameter to an internal realm.*



- Click OK at the bottom, then [Save and Activate Configuration](#)

14 Troubleshooting

If you experience any issues with configuration, or with service after Local Media Optimization has been enabled on both the Oracle SBC's and your Microsoft Teams Tenant, please reach out to your Oracle Sales Consultant for assistance and direction with your issue.



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Integrated Cloud Applications & Platform Services

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