



Oracle Enterprise Session Border Controller,  
Microsoft Skype for Business and Exchange  
for Enterprise SIP Trunking

Technical Application Note



## Disclaimer

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## Intended Audience

This document is intended for use by Oracle personnel, third party Systems Integrators, and end users of the Oracle Enterprise Session Border Controller (E-SBC). It assumes that the reader is familiar with basic operations of the Oracle Enterprise Session Border Controller and the [verified platform](#).

## Document Overview

Microsoft Skype for Business offers the ability to connect to SIP based telephony trunks using an IP communication. This reduces the cost and complexity of extending an enterprise's telephony system outside its network borders. Oracle Enterprise Session Border Controllers (E-SBCs) play an important role in SIP trunking as they are used by many trunk providers and some enterprises as part of their SIP trunking infrastructure.

This application note has been prepared as a means of ensuring that SIP trunking between Microsoft Skype for Business servers, Oracle E-SBCs and IP Trunking services are configured in the optimal manner.

It should be noted that the E-SBC configuration provided in this guide focuses strictly on the Skype for Business Server associated parameters. Many E-SBC users may have additional configuration requirements that are specific to other applications. These configuration items are not covered in this guide. Please contact your Oracle representative with any questions pertaining to this topic.

For additional information on Skype for Business Server, please visit <http://www.skype.com/en/business/>.

## Introduction

### Audience

This is a technical document intended for telecommunications engineers with the purpose of configuring the Oracle Enterprise SBC and the Skype for Business Server. There will be steps that require navigating Microsoft Windows Server as well as the Acme Packet Command Line Interface (ACLI). Understanding the basic concepts of TCP/UDP, IP/Routing, and SIP/RTP are also necessary to complete the configuration and for troubleshooting, if necessary.

### Requirements

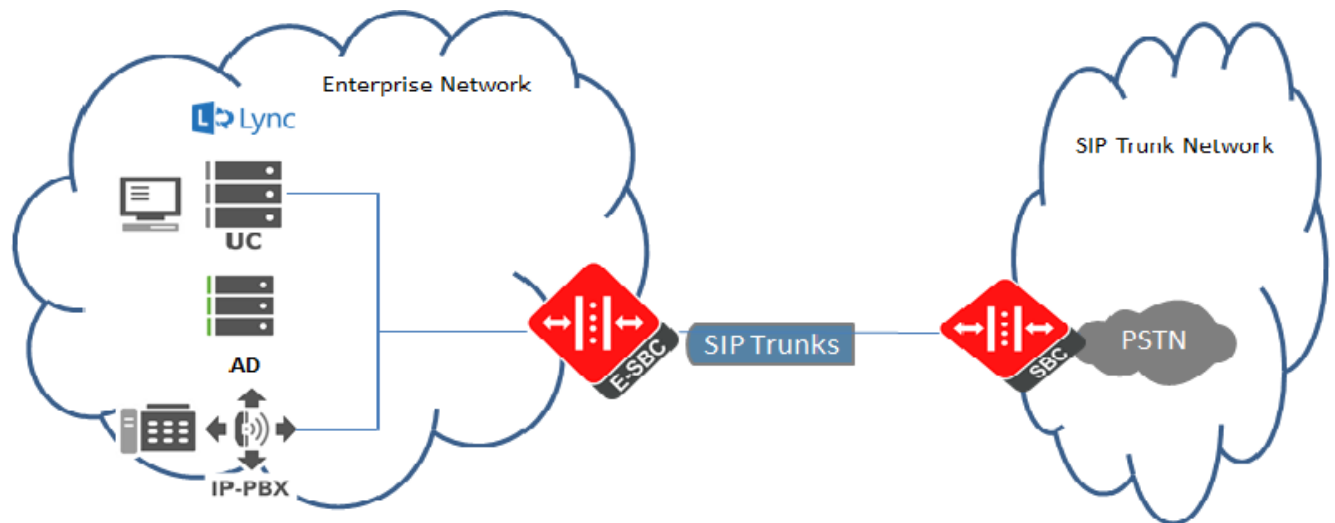
- Fully functioning Skype for Business Server deployment, including Active Directory and DNS
- A dedicated Mediation Server for the SIP trunking connection
- Microsoft Skype for Business 2015 – Version 6.0.93190.0
- Skype for Business 2015 client, Version 15.0.4753.1000
- Oracle Enterprise Session Border Controller [verified platform](#), running Net-Net OS ECZ750p2.64.bz. Note: the configuration running on the SBC is forward compatible with any release from 7.5.0 p2 stream.

### Oracle Verified Platforms

- AP4600

### Architecture

The following reference architecture shows a logical view of the connectivity between Skype for Business Server and the SBC.

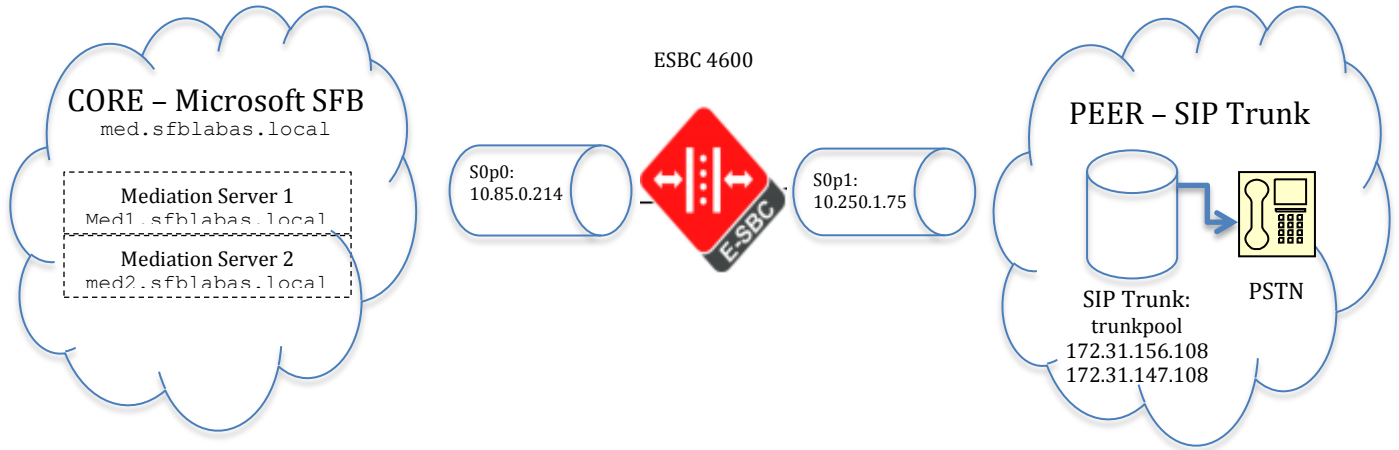


Area A represents the customer's on-premise infrastructure, which includes the Active Directory, DNS and Skype for Business Server systems. Area B represents the service provider infrastructure which provides PSTN service via the SIP trunk. Area C represents the integration of these two environments over an IP network. This could be, through a VPN tunnel over the Internet, an MPLS managed network, or even a dedicated physical connection. The SFB Mediation Server and the SBC are the edge components that form the boundary of the SIP trunk. The configuration, validation and troubleshooting of the areas B and C is the focus of this document and will be described in two phases:

- Phase 1 – Configure the Oracle SBC
- Phase 2 – Configure the Skype for Business Server
- Phase 3 – Configure the Exchange Server

## Lab Configuration

The following diagram, similar to the Reference Architecture described earlier in this document, illustrates the lab environment created to facilitate certification testing (IP addressing/Port below is only a reference, they can change per your network specification).



## Phase 1 – Configuring the Oracle Enterprise SBC

In this section we describe the steps for configuring an Oracle Enterprise SBC, formally known as an Acme Packet Net-Net Session Director (“SBC”), for use with Skype for Business Server in a SIP trunking scenario.

### In Scope

The following guide configuring the Oracle SBC assumes that this is a newly deployed device dedicated to a single customer. If a service provider currently has the SBC deployed and is adding SFB Server customers, then please see the ACLI Configuration Guide on [http://docs.oracle.com/cd/E61547\\_01/index.html](http://docs.oracle.com/cd/E61547_01/index.html) for a better understanding of the Command Line Interface (CLI).

Note that Oracle offers several models of SBC. This document covers the setup for the 4600 platform series running Net-Net OS ECZ7.5.0p2 or later. If instructions are needed for other Oracle SBC models, please contact your Oracle representative.

### Out of Scope

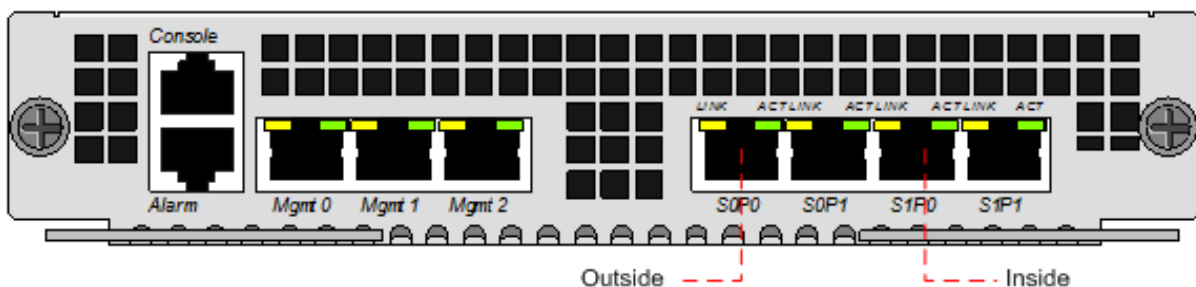
- Configuration of Network management including SNMP and RADIUS; and

### What will you need

- Serial Console cross over cable with RJ-45 connector
- Terminal emulation application such as PuTTY or HyperTerm
- Passwords for the User and Superuser modes on the Oracle SBC
- IP address to be assigned to management interface (Wancom0) of the SBC - the Wancom0 management interface must be connected and configured to a management network separate from the service interfaces. Otherwise the SBC is subject to ARP overlap issues, loss of system access when the network is down, and compromising DDoS protection. Oracle does not support SBC configurations with management and media/service interfaces on the same subnet.
- IP address of Mediation Server external facing NIC
- IP addresses to be used for the SBC internal and external facing ports (Service Interfaces)
- IP address of the next hop gateway in the service provider network
- IP address of the enterprise DNS server

## SBC- Getting Started

Once the Oracle SBC is racked and the power cable connected, you are ready to set up physical network connectivity. **Note: use the console port on the front of the SBC, not the one on the back.**



Plug the slot 0 port 0 (s0p0) interface into your outside (gateway facing) network and the slot 0 port 1 (s1p0) interface into your inside (SFB server-facing) network. Once connected, you are ready to power on and perform the following steps.

All commands are in bold, such as **configure terminal**; parameters in bold red such as **oraclesbc1** are parameters which are specific to an individual deployment. **Note:** The ACLI is case sensitive.

### Establish the serial connection and logging in the SBC

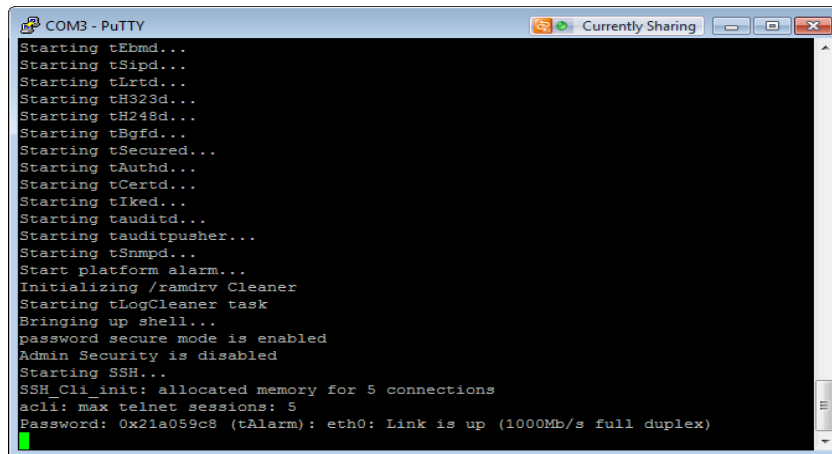
Confirm the SBC is powered off and connect one end of a straight-through Ethernet cable to the front console port (which is active by default) on the SBC and the other end to console adapter that ships with the SBC, connect the console adapter (a DB-9 adapter)



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 bootup sequence.



```
COM3 - PuTTY
Starting tEhmd...
Starting tSipd...
Starting tLtd...
Starting tH323d...
Starting tH248d...
Starting tBgfd...
Starting tSecured...
Starting tAuthd...
Starting tCertd...
Starting tIked...
Starting tauditd...
Starting tauditpusher...
Starting tSnmpd...
Start platform alarm...
Initializing /ramdrv Cleaner
Starting tLogCleaner task
Bringing up shell...
password secure mode is enabled
Admin Security is disabled
Starting SSH...
SSH_Cli_init: allocated memory for 5 connections
acli: max telnet sessions: 5
Password: 0x21a059c8 (tAlarm): eth0: Link is up (1000Mb/s full duplex)
```

Enter the following commands to login to the SBC and move to the configuration mode. Note that the default SBC password is “acme” and the default super user password is “packet”.

```
Password: acme
oraclesbc1> enable
Password: packet
oraclesbc1# configure terminal
oraclesbc1(configure)#
```

You are now in the global configuration mode.

### Initial Configuration – Assigning the management Interface an IP address

To assign an IP address, one has to configure the bootparams on the SBC by going to

oraclesbc1#configure terminal --- >bootparams

- Once you type “bootparam” you have to use “carriage return” key to navigate down
- A reboot is required if changes are made to the existing bootparams

```
ACMESYSTEM(configure)# bootparam

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

Boot File           : /boot/nnECZ750p2.64.bz
IP Address          : 192.65.79.44
VLAN                :
Netmask             : 255.255.255.224
Gateway            : 192.65.79.33
IPv6 Address        :
IPv6 Gateway        :
Host IP             : 0.0.0.0
FTP username        : vxftp
FTP password        : vxftp123
Flags               :
Target Name         : ACMESYSTEM
```

```
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.

## Configuring the SBC

The following section walks you through configuring the Oracle Enterprise SBC required to work with Skype for Business (SFB) and a SIP trunk. The information below is split into three sections:

- The transport protocol for signaling/media between SBC and SFB is TLS and SRTP – the SIP trunk used doesn't support these transport mechanisms, the SBC interworks TLS & SRTP to UDP & RTP.
- The transport protocol for signaling/media between SBC and SFB is TCP and RTP – the SIP trunk used doesn't support these transport mechanisms, the SBC interworks TCP to UDP for signaling traffic.
- A third section depicts only the IPv6 configuration which includes two sections:
  - TLS with SFB and IPv4 using UDP transport towards the trunk. *Note this configuration requires the "IPv4-v6 Interworking" license.*
  - TCP with SFB and IPv4 using UDP transport towards the trunk. *Note this configuration requires the "IPv4-v6 Interworking" license.*

It is outside the scope of this document to include all the interoperability working information as it will differ in every deployment.

## High Availability

The Mgmt1 and Mgmt2 (labeled wancom1 and wancom2 in the configuration) ports which are on the rear panel of the SBC are used for the purpose of High Availability on the 4600s. Crossover cables must be connected between these ports on the SBCs, i.e. Mgmt1 to Mgmt1 and Mgmt2 to Mgmt2. Please refer to the "High Availability Nodes" in the ACLI configuration guide for ECZ750 for more details.

We have also configured some options and sip-manipulations which are specific to any SFB deployment with the Oracle Communications SBC. They are explained below

## SIP PRACK interworking

In order to establish an early media session for outbound calls, Skype for Business gateway specification mandates the PSTN gateways to offer a reliable provisional response and for inbound calls offer INVITEs with a supported header. The SBC interworks the messaging and provide RFC 3262 PRACK interworking towards SFB and it is a mandatory configuration in all Oracle ESBC–Microsoft SFB deployments. The following need to be configured on ESBC

- Configure option 100rel-interworking on the sip-interface facing mediation server
- Configure a sip-feature to pass the 100rel in supported and require headers
- Configure a sip-manipulation (ForEarlyMedia) to add a Require:100rel header in incoming SIP INVITE from mediation server and delete the Supported:100rel header
- Configure a sip-manipulation (changeRSeq) for the SBC to manually increment RSeq from 1 to 2 on subsequent 183s from the mediation server – allowing the SBC to respond with a PRACK.

## SIP manipulations

Skype for Business typically sends mediation server FQDN in the Contact header with no username in the SIP URI which when the SBC forwards, is not acceptable by SIP trunk providers. The SBC therefore rewrites the Contact header to include the username appropriately. A sip-manipulation, ChangeContact, will need to be configured to change the format of the CONTACT header. Another sip-manipulation NATting is configured which is referenced in the NATandChangeContact rule which is mainly for NATting the To, From, and Request-URI headers and is applied on the out-manipulationid for both the sip-interfaces. Other sip-manipulations are also outlined in the configuration below.

SFB and SIP trunk carry their own SIP and SDP design – not always these implementation methods align, causing a lot of mismatch in SIP and SDP signaling and call flow. The ESBC helps resolve these issues with SIP manipulation feature. Here is a list of manipulations that were created to make SFB complaint to the SIP Trunk and vice versa.

1. Addpcmato183 --- Adds PCMA to a 183 response
2. ChangeContact --- Fixes the contact header offered by SFB before the message is sent to Trunk
3. Changeinactosendonly ---- SBC changes SDP from inactive to sendonly on INVITEs for hold (required to trigger audio playback from SIP Trunk)
4. Check183 --- Check the response to INVITE is 183 session progress
5. Modcline --- Check if the SDP contains IP of the mediation server – if it does, don't change 183 to 180
6. NATting --- NAT From & To header with correct IP information
7. OptionsResponseLocally --- Respond to OPTIONS locally on the SBC.
8. addPALonCallForwards --- Add P-Asserted-Identity header to INVITE on call transfers
9. convert183to180 --- Convert 183 to 180 for triggering early media
10. fix183sdp --- If PCMA is offered, fix the SDP with PCMA + PCMU
11. modcontact --- Modify contact for anonymous calls
12. outManipToSFB --- a few manipulations before message is delivered to SFB
13. replacemptimewithptime --- change maxptime to ptime
14. ForEarlyMedia --- To locally handle PRACK interworking
15. NATandChangeContact --- Manipulate few headers with correct IP information
16. addPAIRefers --- Add P-Asserted-Identity header to INVITE if the REFER message contains Referred-by header
17. storestatus – Add reason headers to non-local generated errors
18. convertAVPtoSAVP – convert AVP to SAVP when the SBC is configured for SRTP only, but SFB is set to optional

### Local REFER handling by the SBC

In event of transferring calls from a SFB client (calls could be initially placed between 2 SFB Clients, but then transferred out to PSTN), SFB has two OPTIONS:

- Transfer using re-INVITE approach
- Transfer using REFER method --- the info below is required when REFER based transfer is enabled.

Oracle E-SBC supports REFER method termination when received from SFB. After termination the ESBC uses the info in refer-to header and sends a newly generated INVITE towards the SFB Mediation server. SFB then processes the INVITE, authorizes the call transfer and sends a new INVITE (for calls transferred to PSTN) to the SBC or transfers call internally to the transferred SFB client

To handle the call transfer and refer scenarios – when SFB client 1 refers/transfers the call to SFB Client 2 or to a party on the PSTN, we will need two routes – to route to the two mediation servers depending on the referred party:

```

local-policy
  from-address          *
  to-address            medpool.sfbldm.local
  source-realm          SIP-Trunk
  description           For referred party header
  activate-time
  deactivate-time
  state                 enabled
  policy-priority       none
  policy-attribute
    next-hop            medpool.sfbldm.local
    realm                towards-sfb
    action               replace-uri
    terminate-recursion disabled
    carrier
    start-time          0000
  
```

```

end-time                2400
days-of-week           U-S
cost                    0
state                   enabled
app-protocol           SIP
methods
media-profiles
lookup                  single
next-key
eloc-str-lkup           disabled
eloc-str-match

```

### Ring-back tone during Transfers

During call transfer to a PSTN party, the transfer completes but the calling party does not hear a ring back tone during transfer. The INVITE Lync 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 for MoH and transfer scenarios for the calling party to be able to hear ringback or MoH when it is kept on hold. The SBC is able to signal appropriately towards the SIP trunk by changing the “a=inactive” SDP attribute in the INVITE to sendonly towards PSTN.

Sip manipulations are configured to make the necessary changes. The manipulation ForEarlyMedia is configured to change the SDP attribute from a=inactive to a=sendonly in the INVITEs sent to the calling party for transfer.

```

sip-manipulation
  name                Changeinactosendonly
  description         Change inactive to sendonly for transfer
  split-headers
  join-headers
  header-rule
    name              changeSDP
    header-name       Content-Type
    action            manipulate
    comparison-type   case-sensitive
    msg-type          request
    methods           INVITE
    match-value
    new-value
    element-rule
      name            inacttosendonly
      parameter-name  application/sdp
      type            mime
      action          find-replace-all
      match-val-type  any
      comparison-type pattern-rule
      match-value     a=inactive
      new-value       a=sendonly

```

We utilize the local playback feature of the SBC to play ring back tone during transfers. The ringback tone is played based on REFER termination. You must upload an audio file (in .raw format) to /code/media onto the ESBC for the media you want played during the transfer. A separate file is required for each different codec type, even if the media itself is the same.

The playback configuration is defined listing the media files that you want to play. The playback-config element is configured under media-manager.

```

playback-config
  name                transferrbt
  entry
    encoding          PCMU
    filename           US_ringbackPCMU.raw

```

```
bytes-per-sec
```

```
8000
```

The playback options can be applied to realms, sip-interfaces or session agents using the `spl-options` command.

```
oraclesbcl(session-router)# sip-interface
oraclesbcl(sip-interface)# sel
<realm-id>:
1: towards-sfb 192.168.2.225:5060
2: SIP-trunk 192.168.1.220:5060

selection: 1
oraclesbcl(sip-interface)# spl-options playback-on-refer="transferrbt"
oraclesbcl(sip-interface)# done
```

## SRTP OPTIONAL

SRTP optional configuration on the SBC is handled a bit differently than Microsoft SFB. Additional configurations need to be applied for Microsoft SFB and Oracle Enterprise SBC to work effectively. All configurations below are made from the sole perspective of the SBC.

### SBC Configured for SRTP optional

For inbound traffic originating from MS SFB to the SBC, the media-sec-policy is configured to allow both SRTP and RTP. In this scenario, whether the SFB is configured for RTP, SRTP, or OPTIONAL, we will defer to the top most m line to establish media. This is depicted by "any" below.

```
media-sec-policy
  name                sdespol
  pass-through        disabled
  options
  inbound
    profile            sdes1
    mode                any
    protocol            sdes
  outbound
    profile            sdes1
    mode                srtp
    protocol            sdes
```

Outbound traffic is handled differently. The SBC normally handles SRTPonly with two "m" lines, allowing the endpoint to choose between RTP and SRTP. The SFB instead supports `tcap`, adding an "m" line for RTP and SRTP populated under the `tcap` attribute. Since the SFB and SBC use two different approaches, the SBC applies only a single "m" line to the SDP body of an INVITE (no `tcap`) for outbound traffic originating from the SBC toward MS SFB. This can be seen below with the outbound rule of the media-sec-policy set to srtp:

```
media-sec-policy
  name                sdespol
  pass-through        disabled
  options
  inbound
    profile            sdes1
    mode                any
    protocol            sdes
  outbound
    profile            sdes1
```

```

mode          srtp
protocol      sdes

```

However, if a 488 is received from the SFB, we will re-offer based on a second local-policy policy attribute, child-realm, and media-sec-policy with RTPonly as seen in the configurations below:

```

local-policy
  from-address      *
  to-address        *
  source-realm      outside
  policy-attribute
    next-hop        Medpool.sfbldm.local
    realm           inside
    action          replace-uri
  policy-attribute
    next-hop        Medpool1.sfbldm.local
    realm           inside_rtponly
    action          replace-uri

realm-config
  identifier        inside_rtponly
  network-interfaces  inside:0.4
  parent-realm      inside
  media-sec-policy  rtponly

media-sec-policy
  name              rtponly
  pass-through      disabled
  options
  inbound
    profile
    mode            rtp
    protocol        none
  outbound
    profile
    mode            rtp
    protocol        none

```

### MS SFB Configured for SRTP OPTIONAL

When the MS SFB is configured for SRTP optional the SBC is then configured based on the security need (e.g. SRTPonly, RTPonly, or optional).

Example:

```

media-sec-policy
  name              sdespol
  inbound
    profile
    mode            srtp

```

```

protocol sdes
outbound
profile sdes1
mode srtp
protocol sdes

```

There is only one additional configuration needed when the SBC is configured for SRTPOnly and MS SFB is configured for SRTP optional. In this scenario the SBC must convert any incoming requests with a single m line containing only AVP to SAVP, since we do not key off TCAP headers and top most m line in the SDP body from the SFB is always configured with AVP.

```

sip-manipulation
  name convertAVPtoSAVP
  Description
  split-headers
  join-headers
  header-rule
    name changeSDP
    header-name content-type
    action manipulate
    comparison-type pattern-rule
    msg-type request
    methods INVITE
    match-value
    new-value
  element-rule
    name modifyMline
    parameter-name application/sdp
    type mime
    action find-replace-all
    match-val-type any
    comparison-type pattern-rule
    match-value (.*)(RTP/AVP)(.*)
    new-value $1+RTP/SAVP+$3

```

## SBC SFB Configurations

### IPv4 based signaling for communication between Skype for Business and Oracle ESBC

#### IPv4 with TLS/SRTP

Following is the complete TLS/SRTP configuration of the SBC:

```

certificate-record
  name ca-cert
  common-name sfblabas-DC-CA
certificate-record
  name sbc-cert2
  state TX
  locality Plano
  organization tekvizion
  unit labs
  common-name oraclesbc.sfblabas.local
certificate-record
  name sbc-pool-cert
  state TX
  locality Plano

```

```

organization      tekvizion
unit              labs
common-name       oraclepool.sfblabas.local
alternate-name    oraclesbc.sfblabas.local
codec-policy
  name            CN
  allow-codecs    * G729:no
  add-codecs-on-egress  CN
codec-policy
  name            G729
  allow-codecs    * G729:no
codec-policy
  name            noCNPolicy
  allow-codecs    * CN:no G722:no G7221:no SIREN:no
SILK:no RED:no AAL2-G726-32:no x-msrta:no
codec-policy
  name            xcode
  allow-codecs    *
local-policy
  from-address    *
  to-address      *
  source-realm    inside
  policy-attribute
    next-hop      sag:trunkPool
    realm         outside
local-policy
  from-address    *
  to-address      *
  source-realm    outside
  policy-attribute
    next-hop      med.sfblabas.local
    realm         inside
local-policy
  from-address    *
  to-address      med1.sfblabas.local
  source-realm    outside
  description     For Referred-Party Header
  policy-attribute
    next-hop      med1.sfblabas.local
    realm         inside
    action        replace-uri
    app-protocol  SIP
local-policy
  from-address    *
  to-address      med2.sfblabas.local
  source-realm    outside
  description     For Referred-Party Header
  policy-attribute
    next-hop      med2.sfblabas.local
    realm         inside
    action        replace-uri
    app-protocol  SIP
media-manager
  initial-guard-timer  86400
  options            xcode-gratuitous-rtcp-report-
generation

```



```

media-policy
  name
  tos-settings
    media-type          audio
    tos-value           0x2e
media-sec-policy
  name                  rtponly
media-sec-policy
  name                  sdespol
  inbound
    profile             sdes1
    mode                srtp
    protocol            sdes
  outbound
    profile             sdes1
    mode                srtp
    protocol            sdes
network-interface
  name                  inside
  description           LAN
  hostname              oraclepool.sfblabas.local
  ip-address            10.85.0.214
  netmask               255.255.0.0
  gateway               10.85.0.1
  dns-ip-primary        172.16.29.69
  dns-domain            sfblabas.local
  hip-ip-list           10.85.0.214
  icmp-address          10.85.0.214
network-interface
  name                  outside
  description           WAN
  ip-address            10.250.1.75
  netmask               255.255.255.192
  gateway               10.250.1.65
  hip-ip-list           10.250.1.75
  icmp-address          10.250.1.75
phy-interface
  name                  inside
  operation-type        Media
phy-interface
  name                  outside
  operation-type        Media
  port                  2
playback-config
  name                  transferrbt
  entry
    encoding            PCMU
    filename             US_ringbackPCMU.raw
realm-config
  identifier            inside
  network-interfaces    inside:0
  mm-in-realm           enabled
  media-sec-policy      sdespol
  refer-call-transfer   enabled
  codec-policy          G729
realm-config

```

```

    identifier
    network-interfaces
    mm-in-realm
    media-sec-policy
    symmetric-latching
    codec-policy
response-map
  name
  entries
    recv-code          183
    xmit-code          180
    reason              Ringing
response-map
  name
  entries
    recv-code          483
    xmit-code          200
    reason              OK
sdes-profile
  name
  use-ingress-session-params
sdes-profile
  name
  crypto-list
session-agent
  hostname
  ip-address
  port
  transport-method
  realm-id
  ping-method
  out-translationid
  refer-call-transfer
session-agent
  hostname
  ip-address
  realm-id
  ping-method
  ping-interval
  out-translationid
session-agent
  hostname
  ip-address
  realm-id
  ping-method
  ping-interval
  out-translationid
session-agent
  hostname
  port
  transport-method
  realm-id
  ping-method
  ping-interval
  out-translationid
    outside
    outside:0
    enabled
    rtponly
    enabled
    noCNPolicy
    change183to180
    change483to200
    SRTP
    srtcp-encrypt
    sdes1
    AES_CM_128_HMAC_SHA1_80
    AES_CM_128_HMAC_SHA1_32
    172.16.29.72
    172.16.29.72
    5067
    StaticTLS
    inside
    OPTIONS;hops=0
    E164Covertion
    enabled
    172.31.147.108
    172.31.147.108
    outside
    OPTIONS;hops=5
    30
    removeE164
    172.31.156.108
    172.31.156.108
    outside
    OPTIONS;hops=5
    30
    removeE164
    med.sfblabas.local
    5067
    StaticTLS
    inside
    OPTIONS;hops=0
    60
    E164Covertion

```

```

refer-call-transfer          enabled
session-group
  group-name                 trunkPool
  dest                       172.31.156.108
                             172.31.147.108
session-timer-profile
  name                       towardssfb
  session-expires            900
  request-refresher          none
session-translation
  id                         E164Covertion
  rules-calling              addPlus1
  rules-called               addPlus1
session-translation
  id                         removeE164
  rules-calling              removeplus1
  rules-called               removeplus1
sip-config
  home-realm-id              inside
  registrar-domain           *
  registrar-host             *
  registrar-port             5060
  options                    inmanip-before-validate
                             max-udp-length=0
  add-reason-header          enabled
sip-feature
  name                       Require
  require-mode-inbound       Pass
  require-mode-outbound      Pass
sip-interface
  realm-id                   inside
  sip-port
    address                  10.85.0.214
    port                     5061
    transport-protocol       TLS
    tls-profile               sfb-tls-profile
  options                    100rel-interworking
  spl-options                playback-on-refer="transferrbt"
  in-manipulationid          Check183
  out-manipulationid         NAT_IP_SFB
  session-timer-profile      towardssfb
sip-interface
  realm-id                   outside
  sip-port
    address                  10.250.1.75
    allow-anonymous          agents-only
  in-manipulationid          modClineHold
  out-manipulationid         NAT_IP
sip-manipulation
  name                       ChangeRecvOnlyToInactive
  header-rule
    name                     changeSDP
    header-name              Content-Type
    action                   manipulate
    msg-type                  reply
    methods                   INVITE

```

```

        element-rule
            name                               RecvOnlyToInactive
            parameter-name                     application/sdp
            type                               mime
            action                             find-replace-all
            comparison-type                    pattern-rule
            match-value                        a=recvonly
            new-value                          a=inactive

sip-manipulation
    name                                     Changeinactosendonly
    description                             Change inactive to sendonly for pstn
tran
    header-rule
        name                               changeSDP
        header-name                         Content-Type
        action                             manipulate
        msg-type                            request
        methods                             INVITE
        element-rule
            name                               inacttosendonly
            parameter-name                     application/sdp
            type                               mime
            action                             find-replace-all
            comparison-type                    pattern-rule
            match-value                        a=inactive
            new-value                          a=sendonly

sip-manipulation
    name                                     Changeinactosendrecv
    description                             Change inactive to sendrecv for pstn
tran
    header-rule
        name                               changeSDP
        header-name                         Content-Type
        action                             manipulate
        msg-type                            request
        methods                             INVITE
        element-rule
            name                               inacttosendrecv
            parameter-name                     application/sdp
            type                               mime
            action                             find-replace-all
            comparison-type                    pattern-rule
            match-value                        a=inactive
            new-value                          a=sendrecv

sip-manipulation
    name                                     Changesdpinactive
    header-rule
        name                               changeSDP
        header-name                         Content-Type
        action                             manipulate
        msg-type                            request
        methods                             INVITE
        element-rule
            name                               inacttosendonly
            parameter-name                     application/sdp
            type                               mime

```

```

        action find-replace-all
        comparison-type pattern-rule
        match-value a=sendrecv
        new-value a=inactive
sip-manipulation
  name Check183
  header-rule
    name check18x
    header-name @status-line
    action manipulate
    msg-type reply
    methods INVITE
    element-rule
      name is183
      type status-code
      action sip-manip
      match-value 183
      new-value ChkandDrop
    element-rule
      name is180
      type status-code
      action sip-manip
      match-value 180
      new-value ChkandDrop
    element-rule
      name is181
      type status-code
      action sip-manip
      match-value 181
      new-value ChkandDrop
  header-rule
    name PRACKrespones
    header-name From
    action sip-manip
    new-value PRACKResponseLocally
  header-rule
    name OPTIONSresponse
    header-name To
    action sip-manip
    new-value OPTIONSResponseLocally
  header-rule
    name removePAI
    header-name P-Asserted-Identity
    action delete
    msg-type request
    methods INVITE
  header-rule
    name changeSDP
    header-name From
    action sip-manip
    msg-type request
    methods INVITE
    new-value Changeinactosendonly
sip-manipulation
  name ChkandDrop
  header-rule

```

```

        name                               chkReq
        header-name                         Require
        action                              store
        msg-type                            reply
        methods                             INVITE
header-rule
        name                               drop18x
        header-name                         from
        action                              delete
        comparison-type                    boolean
        msg-type                            reply
        methods                             INVITE
        match-value                         !$chkReq
header-rule
        name                               callForEarlyMedia
        header-name                         from
        action                              sip-manip
        new-value                           ForEarlyMedia
sip-manipulation
        name                               ForEarlyMedia
header-rule
        name                               delSupported
        header-name                         Supported
        action                              delete
        match-value                         100rel
header-rule
        name                               addRequire
        header-name                         Require
        action                              add
        msg-type                            request
        methods                             INVITE
        new-value                           100rel
mime-sdp-rule
        name                               test
        msg-type                            reply
        methods                             INVITE
        action                              manipulate
        comparison-type                    pattern-rule
        sdp-media-rule
            name                           checkcline
            media-type                       audio
            action                           manipulate
            comparison-type                 boolean
        sdp-line-rule
            name                             detectc
            type                             c
            action                           sip-manip
            comparison-type                 pattern-rule
            match-value
^((?! (?! (172.16.29.71|172.16.29.72))))*$
            new-value                       changeRSeq
header-rule
        name                               Change183
        header-name                         From
        action                              sip-manip
        new-value                           if183

```

```

sip-manipulation
  name                               Modcline
  mime-sdp-rule
    name                             test
    msg-type                         reply
    methods                           INVITE
    comparison-type                   pattern-rule
    sdp-media-rule
      name                             checkcline
      media-type                       audio
      action                           manipulate
      comparison-type                   boolean
      sdp-line-rule
        name                           detectc
        type                             c
        action                           sip-manip
        comparison-type                 pattern-rule
        match-value                     IN IP4
10.64.3.199
      new-value                         ChangeRACK
sip-manipulation
  name                               Modclinesanaa
  mime-sdp-rule
    name                             test
    action                           manipulate
    comparison-type                   pattern-rule
    sdp-media-rule
      name                             checkcline
      media-type                       audio
      action                           manipulate
      comparison-type                   pattern-rule
      sdp-line-rule
        name                           detectc
        type                             c
        action                           sip-manip
        comparison-type                 pattern-rule
        new-value
convert183to180
  header-rule
    name                             checkcl
    header-name                       Content-Length
    action                             sip-manip
    match-value                        0
    new-value                          convert183to180
sip-manipulation
  name                               NAT_IP
  header-rule
    name                             fromTrunk
    header-name                       From
    action                             manipulate
    msg-type                           request
    methods                             INVITE
    element-rule
      name                             fromtrunk_er
      type                             uri-host
      action                             find-replace-all

```

```

new-value                                $LOCAL_IP

header-rule
  name                                    toTrunk
  header-name                             to
  action                                  manipulate
  msg-type                                 request
  methods                                  INVITE
  element-rule
    name                                    toTrunk_er
    type                                    uri-host
    action                                  find-replace-all
    new-value                               $REMOTE_IP

header-rule
  name                                    AlterRuri
  header-name                             Request-URI
  action                                  manipulate
  methods                                  INVITE
  element-rule
    name                                    alterRURI_er
    type                                    uri-host
    action                                  find-replace-all
    new-value                               $REMOTE_IP

header-rule
  name                                    storeHI
  header-name                             History-Info
  action                                  store
  msg-type                                 request
  methods                                  INVITE

header-rule
  name                                    delHI
  header-name                             History-Info
  action                                  delete
  msg-type                                 request
  methods                                  INVITE

header-rule
  name                                    addPAIifHistoryInfo
  header-name                             P-Asserted-Identity
  action                                  add
  comparison-type                         pattern-rule
  msg-type                                 request
  methods                                  INVITE
  match-value                             $storeHI
  new-value                               $storeHI.$0

header-rule
  name                                    alterPAI
  header-name                             P-Asserted-Identity
  action                                  manipulate
  msg-type                                 request
  methods                                  INVITE
  element-rule
    name                                    alterHost
    type                                    header-value
    action                                  find-replace-all
    comparison-type                       pattern-rule
    match-value                             (.*) (.*) (.*) (.*)
    new-value

```



```

$1+$LOCAL_IP+"user=phone>;index=1;"+"$3
  header-rule
    name                addDiv
    header-name          Diversion
    action               add
    comparison-type      boolean
    msg-type             request
    methods              INVITE
    match-value          $storeHI
    new-value            $storeHI.$0
  header-rule
    name                alterDiv
    header-name          Diversion
    action               manipulate
    msg-type             request
    methods              INVITE
    element-rule
      name              alterHost
      type              header-value
      action            find-replace-all
      comparison-type   pattern-rule
      match-value       (.*)@(.*);(.*)(,.*
      new-value
$1+$LOCAL_IP+"user=phone>;index=1;"+"$3
  header-rule
    name                forttransfer
    header-name          From
    action               sip-manip
    methods              INVITE
    new-value            addPAI
  header-rule
    name                removePrivacy
    header-name          Privacy
    action               delete
sip-manipulation
  name                  NAT_IP_SFB
  header-rule
    name                from
    header-name          from
    action               manipulate
    msg-type             request
    methods              INVITE
    element-rule
      name              from_er
      type              uri-host
      action            find-replace-all
      new-value
"oraclepool.sflabas.local"
  element-rule
    name                modanoncon
    type                uri-user
    action               replace
    comparison-type     pattern-rule
    match-value         \+lanonymous
    new-value            anonymous
  header-rule

```

```

name to
header-name to
action manipulate
msg-type request
methods INVITE
element-rule
  name to_er
  type uri-host
  action find-replace-all
  new-value "med.sfblabas.local"
element-rule
  name storeTo
  type uri-user
  action store
  comparison-type boolean
  match-value \+1
element-rule
  name removeplus1
  type uri-user
  action replace
  comparison-type pattern-rule
  match-value \+1$
  new-value ""
header-rule
  name contact
  header-name Contact
  action manipulate
  methods INVITE,PRACK
  element-rule
    name contact_er
    type uri-host
    action find-replace-all
    new-value
"oraclepool.sfblabas.local"
  header-rule
    name ruri
    header-name Request-URI
    action manipulate
    methods INVITE
    element-rule
      name ruri_er
      type uri-host
      action find-replace-all
      new-value med.sfblabas.local
    element-rule
      name removeplus1
      type uri-user
      action replace
      comparison-type pattern-rule
      match-value \+1$
      new-value ""
  header-rule
    name alterPRACK
    header-name Rack
    action manipulate
    comparison-type pattern-rule

```

```

msg-type request
methods PRACK
match-value (2 ) (.*)
new-value "1 "+$alterPRACK.$2
header-rule
name for183prack
header-name From
action sip-manip
new-value addreqrelto183
header-rule
name Modifyptime
header-name Content-type
action manipulate
element-rule
name changesdp
parameter-name application/sdp
type mime
action find-replace-all
match-value maxptime
new-value ptime
header-rule
name fixToPRACK
header-name To
action manipulate
msg-type request
methods PRACK
element-rule
name delTransport
parameter-name transport
type uri-param
action delete-element
element-rule
name delmsOpague
parameter-name ms-opaque
type uri-param
action delete-element
header-rule
name forttransferinvite
header-name From
action sip-manip
msg-type request
methods INVITE
new-value chkinviteforttransfer
mime-sdp-rule
name addCNattribute
msg-type request
methods INVITE
action manipulate
sdp-media-rule
name addattribute
media-type audio
action manipulate
sdp-line-rule
name manipMline
type m
action find-replace-

```

```

all
    match-value          (^audio.[0-
9]*.)([a-zA-Z]*/[a-zA-Z]*) (.*)
    new-value            $1+$2+$3+ " 13"
    sdp-line-rule
        name             addattribute
        type             a
        action           add
        new-value        "rtpmap:13
CN/8000"
    header-rule
        name             chanesdp
        header-name     From
        action          sip-manip
        comparison-type pattern-rule
        msg-type        reply
        methods         INVITE
        new-value        ChangeRecvOnlyToInactive
sip-manipulation
    name                 NAT_IP_SFB2
    header-rule
        name             from
        header-name     from
        action          manipulate
        msg-type        request
        methods         INVITE
        element-rule
            name         from_er
            type         uri-host
            action       find-replace-all
            new-value
"oraclepool.sfblabas.local"
    element-rule
        name             modanoncon
        type             uri-user
        action           replace
        comparison-type pattern-rule
        match-value     \+1anonymous
        new-value        anonymous
    header-rule
        name             to
        header-name     to
        action          manipulate
        msg-type        request
        methods         INVITE
        element-rule
            name         to_er
            type         uri-host
            action       find-replace-all
            new-value    "med.sfblabas.local"
    element-rule
        name             storeTo
        type             uri-user
        action           store
        comparison-type boolean
        match-value     \+1

```

```

        element-rule
            name                removeplus1
            type                uri-user
            action              replace
            comparison-type     pattern-rule
            match-value         \+1$
            new-value           ""
    header-rule
        name                    contact
        header-name             Contact
        action                  manipulate
        methods                 INVITE,PRACK
        element-rule
            name                contact_er
            type                uri-host
            action              find-replace-all
            new-value           ""
"oraclepool.sfbllabas.local"
    header-rule
        name                    ruri
        header-name             Request-URI
        action                  manipulate
        methods                 INVITE
        element-rule
            name                ruri_er
            type                uri-host
            action              find-replace-all
            new-value           med.sfbllabas.local
        element-rule
            name                removeplus1
            type                uri-user
            action              replace
            comparison-type     pattern-rule
            match-value         \+1$
            new-value           ""
    header-rule
        name                    alterPRACK
        header-name             Rack
        action                  manipulate
        comparison-type         pattern-rule
        msg-type                request
        methods                 PRACK
        match-value             (2 ) (.*)
        new-value               "1 "+$alterPRACK.$2
    header-rule
        name                    for183prack
        header-name             From
        action                  sip-manip
        new-value               addreqrelto183
    header-rule
        name                    Modifyptime
        header-name             Content-type
        action                  manipulate
        element-rule
            name                changesdp
            parameter-name      application/sdp

```

```

        type                               mime
        action                             find-replace-all
        match-value                         maxptime
        new-value                           ptime

header-rule
  name                                     fixToPRACK
  header-name                             To
  action                                  manipulate
  msg-type                                 request
  methods                                  PRACK
  element-rule
    name                                   delTransport
    parameter-name                         transport
    type                                    uri-param
    action                                  delete-element
  element-rule
    name                                   delmsOpaque
    parameter-name                         ms-opaque
    type                                    uri-param
    action                                  delete-element

header-rule
  name                                     forttransferinvite
  header-name                             From
  action                                  sip-manip
  msg-type                                 request
  methods                                  INVITE
  new-value                                chkinviteforttransfer

sip-manipulation
  name                                     OPTIONSResponseLocally
  header-rule
    name                                   rejectOPTIONS
    header-name                           request-uri
    action                                  reject
    msg-type                                request
    methods                                  OPTIONS
    new-value                               200

sip-manipulation
  name                                     PRACKResponseLocally
  header-rule
    name                                   rejectPRACK
    header-name                           request-uri
    action                                  reject
    msg-type                                request
    methods                                  PRACK
    new-value                               200

sip-manipulation
  name                                     addPAI
  header-rule
    name                                   CheckForReferredBy
    header-name                           Referred-By
    action                                  manipulate
    msg-type                                request
    methods                                  INVITE
    element-rule
      name                                   CheckforReferred
      type                                    uri-user

```

```

        action
        match-value
        store
        (\+1) (. *? \d*)

header-rule
    name
    header-name
    action
    comparison-type
    msg-type
    methods
    match-value
    $CheckForReferredBy.$CheckforReferred
    new-value
    "<sip:"+$CheckForReferredBy.$CheckforReferred.$2+"@"+$LOCAL_IP+>"
header-rule
    name
    header-name
    action
    RemoveReferredBy
    Referred-By
    delete

sip-manipulation
    name
    header-rule
        name
        header-name
        action
        msg-type
        methods
        addPAIRefers
        storeRB
        Referred-By
        store
        request
        INVITE
    header-rule
        name
        header-name
        action
        msg-type
        methods
        delRB
        Referred-By
        delete
        request
        INVITE
    header-rule
        name
        header-name
        action
        msg-type
        methods
        new-value
        addPAI
        P-Asserted-Identity
        add
        request
        INVITE
        $storeRB.$0
    header-rule
        name
        header-name
        action
        msg-type
        methods
        element-rule
            name
            type
            action
            comparison-type
            match-value
            new-value
        alterPAI
        P-Asserted-Identity
        manipulate
        request
        INVITE
        alterHost
        header-value
        find-replace-all
        pattern-rule
        (. *@) (. *; ) (. * ) ( , . * )
        $1+$LOCAL_IP

sip-manipulation
    name
    header-rule
        name
        header-name
    addreqrel
    delSupported
    Supported

```

```

        action delete
    header-rule
        name addRequire
        header-name Require
        action add
        new-value 100rel
sip-manipulation
    name addreqrelto183
    header-rule
        name check18x
        header-name @status-line
        action manipulate
        msg-type reply
        methods INVITE
        element-rule
            name is183
            type status-code
            action sip-manip
            match-value 183
            new-value addreqrel
sip-manipulation
    name changeRSeq
    header-rule
        name delRseq
        header-name RSeq
        comparison-type pattern-rule
        msg-type reply
        methods INVITE
        new-value ""
    header-rule
        name addRseq
        header-name RSeq
        action manipulate
        comparison-type pattern-rule
        msg-type reply
        methods INVITE
        match-value 1
        new-value 2
sip-manipulation
    name chkinvitefortransfer
    header-rule
        name chkRef
        header-name Referred-By
        action sip-manip
        msg-type request
        methods INVITE
        new-value Changeinactosendrecv
sip-manipulation
    name convert183to180
    header-rule
        name delSDP
        header-name Content-Type
        action manipulate
        comparison-type case-insensitive
        element-rule
            name modReasonPhrase

```



```

        parameter-name      *
        type                 reason-phrase
        action               replace
        comparison-type      case-insensitive
        match-value          Session Progress
        new-value            Ringing
    element-rule
        name                 del183SDP
        parameter-name       application/sdp
        type                 mime
        action               delete-element
header-rule
    name                     delContentType
    header-name              Content-Type
    action                   manipulate
    element-rule
        name                 delCT
        parameter-name       *
        type                 header-param
        action               delete-header
header-rule
    name                     change487to486
    header-name              @status-line
    action                   manipulate
    element-rule
        name                 modStatusCode
        type                 status-code
        action               replace
        match-value          183
        new-value            180
    element-rule
        name                 modReasonPhrase
        type                 reason-phrase
        action               replace
        comparison-type      case-insensitive
        new-value            Ringing
sip-manipulation
    name                     if183
    header-rule
        name                 if183hr
        header-name          @status-line
        action               manipulate
        comparison-type      pattern-rule
    element-rule
        name                 is183
        type                 status-code
        action               sip-manip
        comparison-type      pattern-rule
        match-value          183
        new-value            Modclinesanaa
sip-manipulation
    name                     modClineHold
    header-rule
        name                 modClineHold
        header-name          content-type
        action               manipulate

```

```

        comparison-type      pattern-rule
        msg-type              reply
        methods               INVITE
        element-rule
            name               modClineHold_er
            parameter-name     application/sdp
            type               mime
            action             find-replace-all
            comparison-type     pattern-rule
            match-value        (. *IN
IP4 ) (0.0.0.0) (.*)
            new-value          $1+$REMOTE_IP+$3
sip-monitoring
    monitoring-filters      *
steering-pool
    ip-address              10.250.1.75
    start-port               49532
    end-port                 65535
    realm-id                 outside
steering-pool
    ip-address              10.85.0.214
    start-port               49532
    end-port                 65535
    realm-id                 inside
system-config
    process-log-level       DEBUG
tls-global
    session-caching         enabled
tls-profile
    name                     sfb-tls-profile
    end-entity-certificate   sbc-pool-cert
    trusted-ca-certificates  ca-cert
    mutual-authenticate      enabled
translation-rules
    id                       addPlus1
    type                     add
    add-string                +1
translation-rules
    id                       removeplus1
    type                     delete
    delete-string            +1
web-server-config
Cloud-ESBC#

```

To configure TCP/RTP between SBC and Lync, two configuration elements need to be changed – the media-sec-policy should be removed from the realm-config elements and the ports of the Lync session agent needs to be modified.

```

realm-config
    identifier               inside
    network-interfaces       inside:0
    mm-in-realm              enabled
    media-sec-policy         sdespol
    refer-call-transfer      enabled
    codec-policy
media-sec-policy

```

```

realm-config
  identifier                               outside
  network-interfaces                       outside:0
  mm-in-realm                             enabled
  media-sec-policy                         rtponly
  symmetric-latching                       enabled
  codec-policy
  media-sec-policy
session-agent
  hostname                                 med.sfblabas.local
  port                                    5068
  transport-method                       StaticTCP
  realm-id                                 inside
  ping-method                              OPTIONS;hops=0
  ping-interval                            60
  out-translationid                        E164Covertion
  refer-call-transfer                       enabled

```

### IPv4 with TCP/RTP

The following section provides information on configuration required on the SBC to route TCP/RTP based calls to and from the Skype for Business environment.

```

capture-receiver
  state                                   enabled
  address                                 10.70.43.55
  network-interface                       inside:0
certificate-record
  name                                    ca-cert
  common-name                             sfblabas-DC-CA
certificate-record
  name                                    sbc-cert2
  state                                    TX
  locality                                 Plano
  organization                             tekvizion
  unit                                      labs
  common-name                              oraclesbc.sfblabas.local
certificate-record
  name                                    sbc-pool-cert
  state                                    TX
  locality                                 Plano
  organization                             tekvizion
  unit                                      labs
  common-name                              oraclepool.sfblabas.local
  alternate-name                           oraclesbc.sfblabas.local
codec-policy
  name                                    CN
  allow-codecs                             * G729:no
  add-codecs-on-egress                     CN
codec-policy
  name                                    G729
  allow-codecs                             * G729:no
codec-policy
  name                                    noCNPoicy
  allow-codecs                             * CN:no G722:no G7221:no SIREN:no SILK:no RED:no

```

```

AAL2-G726-32:no x-msrta:no
codec-policy
    name                               xcode
    allow-codecs                       *
local-policy
    from-address                       *
    to-address                         *
    source-realm                       inside
    policy-attribute
        next-hop                       sag:trunkPool
        realm                           outside
local-policy
    from-address                       *
    to-address                         *
    source-realm                       outside
    policy-attribute
        next-hop                       med.sfblabas.local
        realm                           inside
local-policy
    from-address                       *
    to-address                         med1.sfblabas.local
    source-realm                       outside
    description                         For Referred-Party Header
    policy-attribute
        next-hop                       med1.sfblabas.local
        realm                           inside
        action                         replace-uri
        app-protocol                   SIP
local-policy
    from-address                       *
    to-address                         med2.sfblabas.local
    source-realm                       outside
    description                         For Referred-Party Header
    policy-attribute
        next-hop                       med2.sfblabas.local
        realm                           inside
        action                         replace-uri
        app-protocol                   SIP
media-manager
    initial-guard-timer                86400
    options                             xcode-gratuitous-rtcp-report-generation
media-policy
    name                               dscp
    tos-settings
        media-type                     audio
        tos-value                      0x2e
media-sec-policy
    name                               rtponly
media-sec-policy
    name                               sdespol
    inbound
        profile                         sdes1
        mode                            srtp
        protocol                        sdes
    outbound
        profile                         sdes1

```

```

mode srtp
protocol sdes

network-interface
  name inside
  description LAN
  hostname oraclepool.sfblabas.local
  ip-address 10.85.0.214
  netmask 255.255.0.0
  gateway 10.85.0.1
  dns-ip-primary 172.16.29.69
  dns-domain sfblabas.local
  hip-ip-list 10.85.0.214
  icmp-address 10.85.0.214

network-interface
  name outside
  description WAN
  ip-address 10.250.1.75
  netmask 255.255.255.192
  gateway 10.250.1.65
  hip-ip-list 10.250.1.75
  icmp-address 10.250.1.75

phy-interface
  name inside
  operation-type Media

phy-interface
  name outside
  operation-type Media
  port 2

playback-config
  name transferrbt
  entry
    encoding PCMU
    filename US_ringbackPCMU.raw

realm-config
  identifier inside
  network-interfaces inside:0
  mm-in-realm enabled
  refer-call-transfer enabled
  codec-policy G729

realm-config
  identifier outside
  network-interfaces outside:0
  mm-in-realm enabled
  symmetric-latching enabled
  codec-policy noCNPoicy

response-map
  name change183to180
  entries
    rcv-code 183
    xmit-code 180
    reason Ringing

response-map
  name change483to200
  entries
    rcv-code 483
    xmit-code 200

```

```

reason
OK
sdes-profile
  name SRTP
  use-ingress-session-params srtcp-encrypt
sdes-profile
  name sdes1
  crypto-list AES_CM_128_HMAC_SHA1_80
  AES_CM_128_HMAC_SHA1_32
session-agent
  hostname 172.16.29.72
  ip-address 172.16.29.72
  transport-method StaticTCP
  realm-id inside
  ping-method OPTIONS;hops=0
  out-translationid E164Covertion
  refer-call-transfer enabled
session-agent
  hostname 172.31.147.108
  ip-address 172.31.147.108
  realm-id outside
  ping-method OPTIONS;hops=5
  ping-interval 30
  out-translationid removeE164
session-agent
  hostname 172.31.156.108
  ip-address 172.31.156.108
  realm-id outside
  ping-method OPTIONS;hops=5
  ping-interval 30
  out-translationid removeE164
session-agent
  hostname med.sfblabas.local
  transport-method StaticTCP
  realm-id inside
  ping-method OPTIONS;hops=0
  ping-interval 60
  out-translationid E164Covertion
  refer-call-transfer enabled
session-group
  group-name trunkPool
  dest 172.31.156.108
  172.31.147.108
session-timer-profile
  name towardssfb
  session-expires 900
  request-refresher none
session-translation
  id E164Covertion
  rules-calling addPlus1
  rules-called addPlus1
session-translation
  id removeE164
  rules-calling removeplus1
  rules-called removeplus1
sip-config
  home-realm-id inside

```

```

    registrar-domain          *
    registrar-host            *
    registrar-port            5060
    options                   inmanip-before-validate
                             max-udp-length=0
                             enabled
sip-feature
  name                       Require
  require-mode-inbound       Pass
  require-mode-outbound      Pass
sip-interface
  realm-id                   inside
  sip-port
    address                   10.85.0.214
    transport-protocol        TCP
  options                    100rel-interworking
  spl-options                 playback-on-refer="transferrbt"
  in-manipulationid          Check183
  out-manipulationid         NAT_IP_SFB
  session-timer-profile      towardssfb
sip-interface
  realm-id                   outside
  sip-port
    address                   10.250.1.75
    allow-anonymous           agents-only
  in-manipulationid          modClineHold
  out-manipulationid         NAT_IP
sip-manipulation
  name                       ChangeRecvOnlyToInactive
  header-rule
    name                      changeSDP
    header-name                Content-Type
    action                     manipulate
    msg-type                   reply
    methods                    INVITE
    element-rule
      name                     RecvOnlyToInactive
      parameter-name           application/sdp
      type                     mime
      action                   find-replace-all
      comparison-type          pattern-rule
      match-value              a=recvonly
      new-value                 a=inactive
sip-manipulation
  name                       Changeinactosendonly
  description                 Change inactive to sendonly for pstn tran
  header-rule
    name                      changeSDP
    header-name                Content-Type
    action                     manipulate
    msg-type                   request
    methods                    INVITE
    element-rule
      name                     inacttosendonly
      parameter-name           application/sdp
      type                     mime

```

```

        action                find-replace-all
        comparison-type       pattern-rule
        match-value           a=inactive
        new-value             a=sendonly

sip-manipulation
  name                       Changeinactosendrecv
  description                 Change inactive to sendrecv for pstn tran
  header-rule
    name                      changeSDP
    header-name               Content-Type
    action                    manipulate
    msg-type                  request
    methods                   INVITE
    element-rule
      name                    inacttosendrecv
      parameter-name          application/sdp
      type                    mime
      action                  find-replace-all
      comparison-type         pattern-rule
      match-value             a=inactive
      new-value               a=sendrecv

sip-manipulation
  name                       Check183
  header-rule
    name                      check18x
    header-name               @status-line
    action                    manipulate
    msg-type                  reply
    methods                   INVITE
    element-rule
      name                    is183
      type                    status-code
      action                  sip-manip
      match-value             183
      new-value               ChkandDrop
    element-rule
      name                    is180
      type                    status-code
      action                  sip-manip
      match-value             180
      new-value               ChkandDrop
    element-rule
      name                    is181
      type                    status-code
      action                  sip-manip
      match-value             181
      new-value               ChkandDrop

  header-rule
    name                      PRACKrespones
    header-name               From
    action                    sip-manip
    new-value                 PRACKResponseLocally

  header-rule
    name                      OPTIONSresponse
    header-name               To
    action                    sip-manip

```



```

        new-value                OPTIONSResponseLocally
header-rule
    name                         removePAI
    header-name                  P-Asserted-Identity
    action                       delete
    msg-type                     request
    methods                      INVITE
header-rule
    name                         changeSDP
    header-name                  From
    action                       sip-manip
    msg-type                     request
    methods                      INVITE
    new-value                    Changeinactosendonly
sip-manipulation
    name                         ChkandDrop
header-rule
    name                         chkReq
    header-name                  Require
    action                       store
    msg-type                     reply
    methods                      INVITE
header-rule
    name                         drop18x
    header-name                  from
    action                       delete
    comparison-type              boolean
    msg-type                     reply
    methods                      INVITE
    match-value                  !$chkReq
header-rule
    name                         callForEarlyMedia
    header-name                  from
    action                       sip-manip
    new-value                    ForEarlyMedia
sip-manipulation
    name                         ForEarlyMedia
header-rule
    name                         delSupported
    header-name                  Supported
    action                       delete
    match-value                  100rel
header-rule
    name                         addRequire
    header-name                  Require
    action                       add
    msg-type                     request
    methods                      INVITE
    new-value                    100rel
mime-sdp-rule
    name                         test
    msg-type                     reply
    methods                      INVITE
    action                       manipulate
    comparison-type              pattern-rule
    sdp-media-rule

```

```

        name
        media-type
        action
        comparison-type
        sdp-line-rule
            name
            type
            action
            comparison-type
            match-value
        ^(. (?!(172.16.29.71|172.16.29.72)))*$
            new-value
    header-rule
        name
        header-name
        action
        new-value
sip-manipulation
    name
    mime-sdp-rule
        name
        msg-type
        methods
        comparison-type
        sdp-media-rule
            name
            media-type
            action
            comparison-type
            sdp-line-rule
                name
                type
                action
                comparison-type
                match-value
                new-value
sip-manipulation
    name
    mime-sdp-rule
        name
        action
        comparison-type
        sdp-media-rule
            name
            media-type
            action
            comparison-type
            sdp-line-rule
                name
                type
                action
                comparison-type
                new-value
        header-rule
            name
            header-name
    checkcline
    audio
    manipulate
    boolean
    detectc
    c
    sip-manip
    pattern-rule
    changeRSeq
    Change183
    From
    sip-manip
    if183
    Modcline
    test
    reply
    INVITE
    pattern-rule
    checkcline
    audio
    manipulate
    boolean
    detectc
    c
    sip-manip
    pattern-rule
    IN IP4 10.64.3.199
    ChangeRACK
    Modclinesanaa
    test
    manipulate
    pattern-rule
    checkcline
    audio
    manipulate
    pattern-rule
    detectc
    c
    sip-manip
    pattern-rule
    convert183to180
    checkcl
    Content-Length

```

```

        action sip-manip
        match-value 0
        new-value convert183to180
sip-manipulation
  name NAT_IP
  header-rule
    name fromTrunk
    header-name From
    action manipulate
    msg-type request
    methods INVITE
    element-rule
      name fromtrunk_er
      type uri-host
      action find-replace-all
      new-value $LOCAL_IP
  header-rule
    name toTrunk
    header-name to
    action manipulate
    msg-type request
    methods INVITE
    element-rule
      name toTrunk_er
      type uri-host
      action find-replace-all
      new-value $REMOTE_IP
  header-rule
    name AlterRuri
    header-name Request-URI
    action manipulate
    methods INVITE
    element-rule
      name alterRURI_er
      type uri-host
      action find-replace-all
      new-value $REMOTE_IP
  header-rule
    name storeHI
    header-name History-Info
    action store
    msg-type request
    methods INVITE
  header-rule
    name delHI
    header-name History-Info
    action delete
    msg-type request
    methods INVITE
  header-rule
    name addPAIifHistoryInfo
    header-name P-Asserted-Identity
    action add
    comparison-type pattern-rule
    msg-type request
    methods INVITE

```

```

        match-value          $storeHI
        new-value            $storeHI.$0
    header-rule
        name                  alterPAI
        header-name           P-Asserted-Identity
        action                 manipulate
        msg-type               request
        methods                INVITE
        element-rule
            name                alterHost
            type                 header-value
            action               find-replace-all
            comparison-type      pattern-rule
            match-value          (.*)@(.*);(.*)(,.*
            new-value
$1+$LOCAL_IP+"user=phone>;index=1;"+$3
    header-rule
        name                  addDiv
        header-name           Diversion
        action                 add
        comparison-type        boolean
        msg-type               request
        methods                INVITE
        match-value            $storeHI
        new-value              $storeHI.$0
    header-rule
        name                  alterDiv
        header-name           Diversion
        action                 manipulate
        msg-type               request
        methods                INVITE
        element-rule
            name                alterHost
            type                 header-value
            action               find-replace-all
            comparison-type      pattern-rule
            match-value          (.*)@(.*);(.*)(,.*
            new-value
$1+$LOCAL_IP+"user=phone>;index=1;"+$3
    header-rule
        name                  forttransfer
        header-name           From
        action                 sip-manip
        methods                INVITE
        new-value              addPAI
    header-rule
        name                  removePrivacy
        header-name           Privacy
        action                 delete
sip-manipulation
    name                      NAT_IP_SFB
    header-rule
        name                  from
        header-name           from
        action                 manipulate
        msg-type               request

```

```

methods                               INVITE
element-rule
  name                                 from_er
  type                                 uri-host
  action                               find-replace-all
  new-value                            "oraclepool.sfbllabas.local"
element-rule
  name                                 modanoncon
  type                                 uri-user
  action                               replace
  comparison-type                      pattern-rule
  match-value                          \+1anonymous
  new-value                            anonymous
header-rule
  name                                 to
  header-name                          to
  action                               manipulate
  msg-type                             request
  methods                               INVITE
element-rule
  name                                 to_er
  type                                 uri-host
  action                               find-replace-all
  new-value                            "med.sfbllabas.local"
element-rule
  name                                 storeTo
  type                                 uri-user
  action                               store
  comparison-type                      boolean
  match-value                          \+1
element-rule
  name                                 removeplus1
  type                                 uri-user
  action                               replace
  comparison-type                      pattern-rule
  match-value                          \+1$
  new-value                            ""
header-rule
  name                                 contact
  header-name                          Contact
  action                               manipulate
  methods                               INVITE,PRACK
element-rule
  name                                 contact_er
  type                                 uri-host
  action                               find-replace-all
  new-value                            "oraclepool.sfbllabas.local"
header-rule
  name                                 ruri
  header-name                          Request-URI
  action                               manipulate
  methods                               INVITE
element-rule
  name                                 ruri_er
  type                                 uri-host
  action                               find-replace-all

```

```

        new-value                                med.sfbllabas.local
    element-rule
        name                                    removeplus1
        type                                    uri-user
        action                                   replace
        comparison-type                         pattern-rule
        match-value                             \+1$
        new-value                               ""
header-rule
    name                                        alterPRACK
    header-name                                 Rack
    action                                     manipulate
    comparison-type                             pattern-rule
    msg-type                                    request
    methods                                    PRACK
    match-value                                (2 ) (.*)
    new-value                                  "1 "+$alterPRACK.$2
header-rule
    name                                        for183prack
    header-name                                 From
    action                                     sip-manip
    new-value                                  addreqrelto183
header-rule
    name                                        Modifyptime
    header-name                                 Content-type
    action                                     manipulate
        element-rule
            name                                changesdp
            parameter-name                       application/sdp
            type                                  mime
            action                               find-replace-all
            match-value                           maxptime
            new-value                             ptime
header-rule
    name                                        fixToPRACK
    header-name                                 To
    action                                     manipulate
    msg-type                                    request
    methods                                    PRACK
        element-rule
            name                                delTransport
            parameter-name                       transport
            type                                  uri-param
            action                               delete-element
        element-rule
            name                                delmsOpague
            parameter-name                       ms-opaque
            type                                  uri-param
            action                               delete-element
header-rule
    name                                        fortransferinvite
    header-name                                 From
    action                                     sip-manip
    msg-type                                    request
    methods                                    INVITE
    new-value                                  chkinvitefortransfer

```

```

mime-sdp-rule
  name                               addCNattribute
  msg-type                           request
  methods                             INVITE
  action                              manipulate
  sdp-media-rule
    name                               addattribute
    media-type                         audio
    action                             manipulate
    sdp-line-rule
      name                             manipMline
      type                             m
      action                           find-replace-all
      match-value                      (^audio.[0-9]*.) ([a-zA-
Z]*/[a-zA-Z]*) (.*)
      new-value                        $1+$2+$3+ " 13"
    sdp-line-rule
      name                             addattribute
      type                             a
      action                           add
      new-value                        "rtpmap:13 CN/8000"

header-rule
  name                               chanesdp
  header-name                        From
  action                              sip-manip
  comparison-type                    pattern-rule
  msg-type                            reply
  methods                             INVITE
  new-value                          ChangeRecvOnlyToInactive

sip-manipulation
  name                               NAT_IP_SFB2
  header-rule
    name                               from
    header-name                       from
    action                             manipulate
    msg-type                           request
    methods                             INVITE
    element-rule
      name                             from_er
      type                             uri-host
      action                           find-replace-all
      new-value                        "oraclepool.sfblabas.local"
    element-rule
      name                             modanoncon
      type                             uri-user
      action                           replace
      comparison-type                  pattern-rule
      match-value                      \+1anonymous
      new-value                        anonymous

header-rule
  name                               to
  header-name                       to
  action                             manipulate
  msg-type                           request
  methods                             INVITE
  element-rule

```

```

        name                to_er
        type                uri-host
        action              find-replace-all
        new-value           "med.sfblabas.local"
    element-rule
        name                storeTo
        type                uri-user
        action              store
        comparison-type     boolean
        match-value         \+1
    element-rule
        name                removeplus1
        type                uri-user
        action              replace
        comparison-type     pattern-rule
        match-value         \+1$
        new-value           ""
header-rule
    name                    contact
    header-name             Contact
    action                  manipulate
    methods                 INVITE, PRACK
    element-rule
        name                contact_er
        type                uri-host
        action              find-replace-all
        new-value           "oraclepool.sfblabas.local"
header-rule
    name                    ruri
    header-name             Request-URI
    action                  manipulate
    methods                 INVITE
    element-rule
        name                ruri_er
        type                uri-host
        action              find-replace-all
        new-value           med.sfblabas.local
    element-rule
        name                removeplus1
        type                uri-user
        action              replace
        comparison-type     pattern-rule
        match-value         \+1$
        new-value           ""
header-rule
    name                    alterPRACK
    header-name             Rack
    action                  manipulate
    comparison-type         pattern-rule
    msg-type                request
    methods                 PRACK
    match-value             (2 )(.*)
    new-value               "1 "+$alterPRACK.$2
header-rule
    name                    for183prack
    header-name             From

```



```

        action sip-manip
        new-value addreqrelto183
header-rule
    name Modifyptime
    header-name Content-type
    action manipulate
    element-rule
        name changesdp
        parameter-name application/sdp
        type mime
        action find-replace-all
        match-value maxptime
        new-value ptime
header-rule
    name fixToPRACK
    header-name To
    action manipulate
    msg-type request
    methods PRACK
    element-rule
        name delTransport
        parameter-name transport
        type uri-param
        action delete-element
    element-rule
        name delmsOpague
        parameter-name ms-opaque
        type uri-param
        action delete-element
header-rule
    name forttransferinvite
    header-name From
    action sip-manip
    msg-type request
    methods INVITE
    new-value chkinviteforttransfer
sip-manipulation
    name OPTIONSResponseLocally
    header-rule
        name rejectOPTIONS
        header-name request-uri
        action reject
        msg-type request
        methods OPTIONS
        new-value 200
sip-manipulation
    name PRACKResponseLocally
    header-rule
        name rejectPRACK
        header-name request-uri
        action reject
        msg-type request
        methods PRACK
        new-value 200
sip-manipulation
    name addPAI

```

```

header-rule
    name                CheckForReferredBy
    header-name         Referred-By
    action              manipulate
    msg-type            request
    methods              INVITE
    element-rule
        name            CheckforReferred
        type            uri-user
        action          store
        match-value     (\+1) (. * ? \d *)

header-rule
    name                Add_P_Asserted_ID_new
    header-name         P-Asserted-Identity
    action              add
    comparison-type     boolean
    msg-type            request
    methods              INVITE
    match-value         $CheckForReferredBy.$CheckforReferred
    new-value

"<sip: "+$CheckForReferredBy.$CheckforReferred.$2+"@"+$LOCAL_IP+">"
header-rule
    name                RemoveReferredBy
    header-name         Referred-By
    action              delete

sip-manipulation
    name                addPAIRefers
    header-rule
        name            storeRB
        header-name     Referred-By
        action          store
        msg-type        request
        methods          INVITE
    header-rule
        name            delRB
        header-name     Referred-By
        action          delete
        msg-type        request
        methods          INVITE
    header-rule
        name            addPAI
        header-name     P-Asserted-Identity
        action          add
        msg-type        request
        methods          INVITE
        new-value       $storeRB.$0
    header-rule
        name            alterPAI
        header-name     P-Asserted-Identity
        action          manipulate
        msg-type        request
        methods          INVITE
        element-rule
            name        alterHost
            type        header-value
            action      find-replace-all

```

```

        comparison-type      pattern-rule
        match-value          (.*)@(.*;)(.*) (,.* )
        new-value            $1+$LOCAL_IP

sip-manipulation
  name                      addreqrel
  header-rule
    name                    delSupported
    header-name             Supported
    action                  delete
  header-rule
    name                    addRequire
    header-name             Require
    action                  add
    new-value               100rel

sip-manipulation
  name                      addreqrelto183
  header-rule
    name                    check18x
    header-name             @status-line
    action                  manipulate
    msg-type                reply
    methods                 INVITE
  element-rule
    name                    is183
    type                   status-code
    action                  sip-manip
    match-value             183
    new-value               addreqrel

sip-manipulation
  name                      changeRSeq
  header-rule
    name                    delRseq
    header-name             RSeq
    comparison-type        pattern-rule
    msg-type                reply
    methods                 INVITE
    new-value               ""
  header-rule
    name                    addRseq
    header-name             RSeq
    action                  manipulate
    comparison-type        pattern-rule
    msg-type                reply
    methods                 INVITE
    match-value            1
    new-value               2

sip-manipulation
  name                      chkinvitefortransfer
  header-rule
    name                    chkRef
    header-name             Referred-By
    action                  sip-manip
    msg-type                request
    methods                 INVITE
    new-value               Changeinactosendrecv

sip-manipulation

```

```

name convert183to180
header-rule
  name
  header-name
  action
  comparison-type
  element-rule
    name
    parameter-name
    type
    action
    comparison-type
    match-value
    new-value
  element-rule
    name
    parameter-name
    type
    action
header-rule
  name
  header-name
  action
  element-rule
    name
    parameter-name
    type
    action
header-rule
  name
  header-name
  action
  element-rule
    name
    type
    action
    match-value
    new-value
  element-rule
    name
    type
    action
    comparison-type
    new-value
sip-manipulation
  name
  header-rule
    name
    header-name
    action
    comparison-type
    element-rule
      name
      type
      action
      comparison-type

```

```

delSDP
Content-Type
manipulate
case-insensitive
modReasonPhrase
*
reason-phrase
replace
case-insensitive
Session Progress
Ringing
del183SDP
application/sdp
mime
delete-element
delContentType
Content-Type
manipulate
delCT
*
header-param
delete-header
change487to486
@status-line
manipulate
modStatusCode
status-code
replace
183
180
modReasonPhrase
reason-phrase
replace
case-insensitive
Ringing
if183
if183hr
@status-line
manipulate
pattern-rule
is183
status-code
sip-manip
pattern-rule

```

```

match-value 183
new-value Modclinesanaa

sip-manipulation
  name modClineHold
  header-rule
    name modClineHold
    header-name content-type
    action manipulate
    comparison-type pattern-rule
    msg-type reply
    methods INVITE
    element-rule
      name modClineHold_er
      parameter-name application/sdp
      type mime
      action find-replace-all
      comparison-type pattern-rule
      match-value (.*IN IP4 )(0.0.0.0)(.*)
      new-value $1+$REMOTE_IP+$3

sip-monitoring
  monitoring-filters *

steering-pool
  ip-address 10.250.1.75
  start-port 49532
  end-port 65535
  realm-id outside

steering-pool
  ip-address 10.85.0.214
  start-port 49532
  end-port 65535
  realm-id inside

system-config
  process-log-level DEBUG

tls-global
  session-caching enabled

tls-profile
  name sfb-tls-profile
  end-entity-certificate sbc-pool-cert
  trusted-ca-certificates ca-cert
  mutual-authenticate enabled

translation-rules
  id addPlus1
  type add
  add-string +1

translation-rules
  id removeplus1
  type delete
  delete-string +1

web-server-config
Cloud-ESBC#

```

## IPv6 based signaling for communication between Skype for Business and Oracle ESBC

### IPv6 with TLS/SRTP

**\*\*\* Note: SBC requires IPv6-IPv4 interworking license in order for this to work**

```
certificate-record
  name ca-cert
  common-name sfblabas-DC-CA
certificate-record
  name cert-ipv6
  state TX
  locality Plano
  organization tekvizion
  unit labs
  common-name oraclepool.sfblabas.local
  alternate-name oraclesbc.sfblabas.local
  key-usage-list digitalSignature
certificate-record
  name sbc-cert2
  state TX
  locality Plano
  organization tekvizion
  unit labs
  common-name oraclesbc.sfblabas.local
certificate-record
  name sbc-pool-cert
  state TX
  locality Plano
  organization tekvizion
  unit labs
  common-name oraclepool.sfblabas.local
  alternate-name oraclesbc.sfblabas.local
codec-policy
  name CNPolicy
  allow-codecs * G729:no
  add-codecs-on-egress CN
codec-policy
  name noCNPolicy
  allow-codecs * CN:no G722:no G7221:no SIREN:no SILK:no RED:no
AAL2-G726-32:no x-msrta:no
codec-policy
  name xcode
  allow-codecs *
local-policy
  from-address *
  to-address *
  source-realm inside
  policy-attribute
    next-hop sag:trunkPool
    realm outside
local-policy
  from-address *
  to-address *
  source-realm outside
  policy-attribute
    next-hop med.sfblabas.local
    realm inside
local-policy
  from-address *
  to-address med1.sfblabas.local
  source-realm outside
  description For Referred-Party Header
  policy-attribute
    next-hop med1.sfblabas.local
    realm inside
    action replace-uri
    app-protocol SIP
```

```

local-policy
  from-address *
  to-address med2.sfblabas.local
  source-realm outside
  description For Referred-Party Header
  policy-attribute
    next-hop med2.sfblabas.local
    realm inside
    action replace-uri
    app-protocol SIP
media-manager
  initial-guard-timer 86400
  options xcode-gratuitous-rtcp-report-generation
media-policy
  name dscp
  tos-settings
    media-type audio
    tos-value 0x2e
media-sec-policy
  name rtponly
media-sec-policy
  name sdespol
  inbound
    profile sdes1
    mode srtp
    protocol sdes
  outbound
    profile sdes1
    mode srtp
    protocol sdes
network-interface
  name inside
  description LAN
  hostname oraclepool.sfblabas.local
  ip-address 2620:96:c000:1::21/64
  netmask ffff:ffff:ffff:ffff::
  gateway 2620:96:c000:1::1
  dns-ip-primary 2620:96:c000:8:8120:5799:fc75:29ad
  dns-domain sfblabas.local
  signaling-mtu 1476
  hip-ip-list 2620:96:c000:1::21
  icmp-address 2620:96:c000:1::21
network-interface
  name outside
  description WAN
  ip-address 10.250.1.75
  netmask 255.255.255.192
  gateway 10.250.1.65
  hip-ip-list 10.250.1.75
  icmp-address 10.250.1.75
phy-interface
  name inside
  operation-type Media
phy-interface
  name outside
  operation-type Media
  port 2
playback-config
  name transferrbt
  entry
    encoding PCMU
    filename US_ringbackPCMU.raw
realm-config
  identifier inside
  network-interfaces inside:0
  mm-in-realm enabled
  refer-call-transfer enabled
  codec-policy noCNPpolicy

```

```

realm-config
  identifier                outside
  network-interfaces        outside:0
  mm-in-realm               enabled
  media-sec-policy          rtponly
  codec-policy              noCNPolicy
response-map
  name                      change183to180
  entries
    recv-code               184
    xmit-code               180
    reason                  Ringing
sdes-profile
  name                      SRTP
  use-ingress-session-params srtcp-encrypt
sdes-profile
  name                      sdes1
  use-ingress-session-params srtcp-encrypt
session-agent
  hostname                  172.31.147.108
  ip-address                172.31.147.108
  realm-id                  outside
  ping-method               OPTIONS;hops=0
  ping-interval             60
  out-translationid        removeE164
session-agent
  hostname                  172.31.156.108
  ip-address                172.31.156.108
  realm-id                  outside
  ping-method               OPTIONS;hops=0
  ping-interval             60
  out-translationid        removeE164
session-agent
  hostname                  med.sfblabas.local
  transport-method          StaticTCP
  realm-id                  inside
  ping-method               OPTIONS;hops=0
  ping-interval             60
  load-balance-dns-query    round-robin
  out-translationid        E164Covertion
  refer-call-transfer       enabled
session-group
  group-name                trunkPool
  dest                      172.31.156.108
                          172.31.147.108
session-timer-profile
  name                      towardssfb
  session-expires           900
  request-refresher         none
session-translation
  id                        E164Covertion
  rules-calling             addPlus1
  rules-called              addPlus1
session-translation
  id                        removeE164
  rules-calling             removeplus1
  rules-called              removeplus1
sip-config
  home-realm-id             inside
  registrar-domain         *
  registrar-host           *
  registrar-port           5060
  options                   inmanip-before-validate
                          max-udp-length=0
sip-feature
  name                      Require
  require-mode-inbound     Pass
  require-mode-outbound    Pass

```



```

sip-interface
  realm-id
  sip-port
    address
    transport-protocol
  options
  spl-options
  in-manipulationid
  out-manipulationid
  session-timer-profile
sip-interface
  realm-id
  sip-port
    address
    allow-anonymous
  in-manipulationid
  out-manipulationid
sip-manipulation
  name
  header-rule
    name
    header-name
    action
    element-rule
      name
      type
      action
  header-rule
    name
    header-name
    action
    element-rule
      name
      type
      action
      new-value
$StoreFromnumber.$StoreFromnumber_er.$0
sip-manipulation
  name
  description
  header-rule
    name
    header-name
    action
    msg-type
    methods
    element-rule
      name
      parameter-name
      type
      action
      comparison-type
      match-value
      new-value
sip-manipulation
  name
  header-rule
    name
    header-name
    action
    msg-type
    methods
    element-rule
      name
      parameter-name
      type
      action
      comparison-type

```

```

inside
  2620:96:c000:1::21
  TCP
  100rel-interworking
  playback-on-refer="transferrbt"
  Check183
  NAT_IP_SFB
  towardssfb
outside
  10.250.1.75
  agents-only
  modClineHold
  NAT_IP
ChangeContact
  StoreFromnumber
  From
  manipulate
  StoreFromnumber_er
  uri-user-only
  store
  ChangeContact
  Contact
  manipulate
  ChangeContact_er
  uri-user
  add
Changecodec
  Change inactive to sendonly for pstn tran
  changeSDP
  Content-Type
  manipulate
  request
  INVITE
  inacttosendonly
  application/sdp
  mime
  find-replace-all
  pattern-rule
  a=inactive
  a=sendonly
Changeinactosendrecv
  changeSDP
  Content-Type
  manipulate
  request
  INVITE
  inacttosendrecv
  application/sdp
  mime
  find-replace-all
  pattern-rule

```

```

match-value a=inactive
new-value a=sendrecv

sip-manipulation
  name Check183
  header-rule
    name check18x
    header-name @status-line
    action manipulate
    msg-type reply
    methods INVITE
    element-rule
      name is183
      type status-code
      action sip-manip
      match-value 183
      new-value ChkandDrop
    element-rule
      name is180
      type status-code
      action sip-manip
      match-value 180
      new-value ChkandDrop
  header-rule
    name PRACKrespones
    header-name From
    action sip-manip
    new-value PRACKResponseLocally
  header-rule
    name OPTIONSresponse
    header-name From
    action sip-manip
    new-value OPTIONSResponseLocally
  header-rule
    name chanesdp
    header-name From
    action sip-manip
    msg-type request
    methods INVITE
    new-value Changeinactosendrecv

sip-manipulation
  name ChkandDrop
  header-rule
    name chkReq
    header-name Require
    action store
    msg-type reply
    methods INVITE
  header-rule
    name drop18x
    header-name from
    action delete
    comparison-type boolean
    msg-type reply
    methods INVITE
    match-value !$chkReq
  header-rule
    name callForEarlyMedia
    header-name from
    action sip-manip
    new-value ForEarlyMedia

sip-manipulation
  name ForEarlyMedia
  header-rule
    name delSupported
    header-name Supported
    action delete
    match-value 100rel
  header-rule

```

```

        name                addRequire
        header-name         Require
        action              add
        msg-type            request
        methods             INVITE
        new-value           100rel
mime-sdp-rule
    name                    test
    msg-type                reply
    methods                 INVITE
    action                  manipulate
    comparison-type         pattern-rule
sdp-media-rule
    name                    checkcline
    media-type              audio
    action                  manipulate
    comparison-type         boolean
sdp-line-rule
    name                    detectc
    type                    c
    action                  sip-manip
    comparison-type         pattern-rule
    match-value             (?!(2620:96:c000:8:2804:df4f:c91c:8b0) or ?!(2620:96:c000:8:791d:6a4:e016:d2a9))
    new-value               changeRSeq
header-rule
    name                    Change183
    header-name             From
    action                  sip-manip
    new-value               if183
sip-manipulation
    name                    Modcline
mime-sdp-rule
    name                    test
    msg-type                reply
    methods                 INVITE
    comparison-type         pattern-rule
sdp-media-rule
    name                    checkcline
    media-type              audio
    action                  manipulate
    comparison-type         boolean
sdp-line-rule
    name                    detectc
    type                    c
    action                  sip-manip
    comparison-type         pattern-rule
    match-value             IN IP4 10.64.3.199
    new-value               ChangeRACK
header-rule
    name                    addCN
    header-name             Content-type
    action                  manipulate
    msg-type                request
    methods                 INVITE
element-rule
    name                    addCNattribute
    parameter-name          application/sdp
    type                    mime
    action                  add
    new-value               "a=rtpmap:13 CN/8000"
sip-manipulation
    name                    Modclinesanaa
mime-sdp-rule
    name                    test
    action                  manipulate
    comparison-type         pattern-rule
sdp-media-rule

```

```

name
media-type
action
comparison-type
sdp-line-rule
name
type
action
comparison-type
new-value
checkcline
audio
manipulate
pattern-rule
detectc
c
sip-manip
pattern-rule
convert183to180
header-rule
name
header-name
action
match-value
new-value
checkcl
Content-Length
sip-manip
0
convert183to180
sip-manipulation
name
header-rule
name
header-name
action
msg-type
methods
element-rule
name
type
action
new-value
NAT IP
fromTrunk
From
manipulate
request
INVITE
fromtrunk_er
uri-host
find-replace-all
$LOCAL_IP
header-rule
name
header-name
action
msg-type
methods
element-rule
name
type
action
new-value
toTrunk
to
manipulate
request
INVITE
toTrunk_er
uri-host
find-replace-all
$REMOTE_IP
header-rule
name
header-name
action
methods
element-rule
name
type
action
new-value
AlterRuri
Request-URI
manipulate
INVITE
alterRURI_er
uri-host
find-replace-all
$REMOTE_IP
header-rule
name
header-name
action
msg-type
methods
storeHI
History-Info
store
request
INVITE
header-rule
name
header-name
action
msg-type
methods
delHI
History-Info
delete
request
INVITE
header-rule
name
header-name
action
comparison-type
msg-type
addPAIifHistoryInfo
P-Asserted-Identity
add
pattern-rule
request

```

```

        methods                INVITE
        match-value            $storeHI
        new-value              $storeHI.$0
    header-rule
        name                    alterPAI
        header-name             P-Asserted-Identity
        action                   manipulate
        msg-type                 request
        methods                  INVITE
        element-rule
            name                 alterHost
            type                  header-value
            action                find-replace-all
            comparison-type       pattern-rule
            match-value           (.*)@(.*;)(.*) (,.**)
            new-value
$1+$LOCAL_IP+"user=phone>;index=1;"+"$3
    header-rule
        name                    addDiv
        header-name             Diversion
        action                   add
        comparison-type         boolean
        msg-type                 request
        methods                  INVITE
        match-value             $storeHI
        new-value               $storeHI.$0
    header-rule
        name                    alterDiv
        header-name             Diversion
        action                   manipulate
        msg-type                 request
        methods                  INVITE
        element-rule
            name                 alterHost
            type                  header-value
            action                find-replace-all
            comparison-type       pattern-rule
            match-value           (.*)@(.*;)(.*) (,.**)
            new-value
$1+$LOCAL_IP+"user=phone>;index=1;"+"$3
    header-rule
        name                    forttransfer
        header-name             From
        action                   sip-manip
        methods                  INVITE
        new-value               addPAI
    header-rule
        name                    modcontact
        header-name             From
        action                   sip-manip
        new-value               ChangeContact
    header-rule
        name                    delPrivacy
        header-name             privacy
        action                   delete
        msg-type                 request
        methods                  INVITE
sip-manipulation
    name                        NAT IP SFB
    header-rule
        name                    from
        header-name             from
        action                   manipulate
        msg-type                 request
        methods                  INVITE
        element-rule
            name                 from_er
            type                  uri-host

```

```

        action                find-replace-all
        new-value              "oraclepool.sfblabas.local"
    element-rule
        name                   modanoncon
        type                   uri-user
        action                 replace
        comparison-type        pattern-rule
        match-value            \+lanonymous
        new-value              anonymous
header-rule
    name                       to
    header-name                to
    action                     manipulate
    msg-type                   request
    methods                    INVITE
    element-rule
        name                   to_er
        type                   uri-host
        action                 find-replace-all
        new-value              "med.sfblabas.local"
    element-rule
        name                   storeTo
        type                   uri-user
        action                 store
        comparison-type        boolean
        match-value            \+1
    element-rule
        name                   removeplus1
        type                   uri-user
        action                 replace
        comparison-type        pattern-rule
        match-value            \+1$
        new-value              ""
header-rule
    name                       contact
    header-name                Contact
    action                     manipulate
    methods                    INVITE,PRACK
    element-rule
        name                   contact_er
        type                   uri-host
        action                 find-replace-all
        new-value              "oraclepool.sfblabas.local"
header-rule
    name                       ruri
    header-name                Request-URI
    action                     manipulate
    methods                    INVITE
    element-rule
        name                   ruri_er
        type                   uri-host
        action                 find-replace-all
        new-value              med.sfblabas.local
    element-rule
        name                   removeplus1
        type                   uri-user
        action                 replace
        comparison-type        pattern-rule
        match-value            \+1$
        new-value              ""
header-rule
    name                       alterPRACK
    header-name                Rack
    action                     manipulate
    comparison-type            pattern-rule
    msg-type                   request
    methods                    PRACK
    match-value                (2 )(.*)

```

```

        new-value                "1 "+$alterPRACK.$2
header-rule
  name                          for183prack
  header-name                   From
  action                         sip-manip
  new-value                     addreqrelto183
header-rule
  name                          Modifyptime
  header-name                   Content-type
  action                         manipulate
  element-rule
    name                        changesdp
    parameter-name              application/sdp
    type                         mime
    action                       find-replace-all
    match-value                 maxptime
    new-value                   ptime
mime-sdp-rule
  name                          cline
  msg-type                      reply
  action                         manipulate
  comparison-type               pattern-rule
  sdp-session-rule
    name                        con
    action                       manipulate
    comparison-type             pattern-rule
  sdp-line-rule
    name                        conl
    type                         c
    action                       find-replace-all
    comparison-type             pattern-rule
    match-value                 (IN IP6
anonymous.invalid)
  new-value                     "IN IP6 ::"
  header-rule
    name                        forttransferinvite
    header-name                 From
    action                      sip-manip
    msg-type                    request
    methods                     INVITE
    new-value                   chkinviteforttransfer
  header-rule
    name                        chanesdp
    header-name                 From
    action                      sip-manip
    msg-type                    reply
    methods                     INVITE
    new-value                   changesdpinactive
sip-manipulation
  name                          NAT_IP_SFB_old
  header-rule
    name                        from
    header-name                 from
    action                      manipulate
    methods                     INVITE
  element-rule
    name                        from_er
    type                         uri-host
    action                       find-replace-all
    new-value                   "oraclepool.sfblabas.local"
  element-rule
    name                        modanoncon
    type                         uri-user
    action                       replace
    comparison-type             pattern-rule
    match-value                 \+lanonymous
    new-value                   anonymous
header-rule

```

```

name to
header-name to
action to
methods manipulate
element-rule INVITE
    name to_er
    type uri-host
    action find-replace-all
    new-value "med.sfbllabas.local"
element-rule
    name storeTo
    type uri-user
    action store
    comparison-type boolean
    match-value \+1
element-rule
    name removeplus1
    type uri-user
    action replace
    comparison-type pattern-rule
    match-value \+1$
    new-value ""
header-rule
    name contact
    header-name Contact
    action manipulate
    methods INVITE,PRACK
    element-rule
        name contact_er
        type uri-host
        action find-replace-all
        new-value "oraclepool.sfbllabas.local"
header-rule
    name ruri
    header-name Request-URI
    action manipulate
    methods INVITE
    element-rule
        name ruri_er
        type uri-host
        action find-replace-all
        new-value med.sfbllabas.local
    element-rule
        name removeplus1
        type uri-user
        action replace
        comparison-type pattern-rule
        match-value \+1$
        new-value ""
header-rule
    name alterPRACK
    header-name Rack
    action manipulate
    comparison-type pattern-rule
    msg-type request
    methods PRACK
    match-value (2 )(.*)
    new-value "1 "+$alterPRACK.$2
header-rule
    name for183prack
    header-name From
    action sip-manip
    new-value addreqrelto183
header-rule
    name Modifyptime
    header-name Content-type
    action manipulate
    element-rule

```



```

        name
        parameter-name
        type
        action
        match-value
        new-value
        changesdp
        application/sdp
        mime
        find-replace-all
        maxptime
        ptime

sip-manipulation
  name
  header-rule
    name
    header-name
    action
    msg-type
    methods
    new-value
  OPTIONSResponseLocally
    rejectOPTIONS
    request-uri
    reject
    request
    OPTIONS
    200

sip-manipulation
  name
  header-rule
    name
    header-name
    action
    msg-type
    methods
    new-value
  PRACKResponseLocally
    rejectPRACK
    request-uri
    reject
    request
    PRACK
    200: OK

sip-manipulation
  name
  header-rule
    name
    header-name
    action
    msg-type
    methods
    element-rule
      name
      type
      action
      match-value
    header-rule
      name
      header-name
      action
      comparison-type
      msg-type
      methods
      match-value
      new-value
  addPAI
    CheckForReferredBy
    Referred-By
    manipulate
    request
    INVITE
    CheckforReferred
    uri-user
    store
    (\+1) (.*\d*)
    Add_P_Asserted_ID_new
    P-Asserted-Identity
    add
    boolean
    request
    INVITE
    $CheckForReferredBy.$CheckforReferred
"<sip:"+$CheckForReferredBy.$CheckforReferred.$2+"@"+$LOCAL_IP+>"
  header-rule
    name
    header-name
    action
  RemoveReferredBy
  Referred-By
  delete

sip-manipulation
  name
  header-rule
    name
    header-name
    action
    msg-type
    methods
  header-rule
    name
    header-name
    action
    msg-type
    methods
  header-rule
    name
    header-name
  addPAIRefers
  storeRB
  Referred-By
  store
  request
  INVITE
  delRB
  Referred-By
  delete
  request
  INVITE
  addPAI
  P-Asserted-Identity

```

```

        action                add
        msg-type              request
        methods               INVITE
        new-value              $storeRB.$0
sip-manipulation
  name
  header-rule
    name
    header-name
    action
  header-rule
    name
    header-name
    action
    new-value
sip-manipulation
  name
  header-rule
    name
    header-name
    action
    msg-type
    methods
    element-rule
      name
      type
      action
      match-value
      new-value
sip-manipulation
  name
  header-rule
    name
    header-name
    comparison-type
    msg-type
    methods
    new-value
  header-rule
    name
    header-name
    action
    comparison-type
    msg-type
    methods
    match-value
    new-value
sip-manipulation
  name
  header-rule
    name
    header-name
    action
    msg-type
    methods
    element-rule
      name
      parameter-name
      type
      action
      comparison-type
      match-value
      new-value
sip-manipulation
  name
  header-rule
    name
    header-name

```

```

add
request
INVITE
$storeRB.$0

addreqrel
delSupported
Supported
delete
addRequire
Require
add
100rel

addreqrelto183
check18x
@status-line
manipulate
reply
INVITE
is183
status-code
sip-manip
183
addreqrel

changeRSeq
delRseq
RSeq
pattern-rule
reply
INVITE
""
addRseq
RSeq
manipulate
pattern-rule
reply
INVITE
1
2

changesdpinactive
changeSDP
Content-Type
manipulate
reply
INVITE
inacttosendonly
application/sdp
mime
find-replace-all
pattern-rule
a=sendrecv
a=inactive

chkinvitefortransfer
chkRef
Referred-By

```

```

        action                sip-manip
        msg-type              request
        methods               INVITE
        new-value              Changeinactosendrecv
sip-manipulation
  name                       convert183to180
  header-rule
    name                     delSDP
    header-name              Content-Type
    action                   manipulate
    comparison-type          case-insensitive
    element-rule
      name                   modReasonPhrase
      parameter-name         *
      type                   reason-phrase
      action                 replace
      comparison-type         case-insensitive
      match-value             Session Progress
      new-value               Ringing
    element-rule
      name                   del183SDP
      parameter-name         application/sdp
      type                   mime
      action                 delete-element
  header-rule
    name                     delContentType
    header-name              Content-Type
    action                   manipulate
    element-rule
      name                   delCT
      parameter-name         *
      type                   header-param
      action                 delete-header
  header-rule
    name                     change487to486
    header-name              @status-line
    action                   manipulate
    element-rule
      name                   modStatusCode
      type                   status-code
      action                 replace
      match-value             183
      new-value               180
    element-rule
      name                   modReasonPhrase
      type                   reason-phrase
      action                 replace
      comparison-type         case-insensitive
      new-value               Ringing
sip-manipulation
  name                       if183
  header-rule
    name                     if183hr
    header-name              @status-line
    action                   manipulate
    comparison-type          pattern-rule
    element-rule
      name                   is183
      type                   status-code
      action                 sip-manip
      comparison-type         pattern-rule
      match-value             183
      new-value               Modclinesanaa
sip-manipulation
  name                       modClineHold
  header-rule
    name                     modClineHold
    header-name              content-type

```

```

        action
        comparison-type
        msg-type
        methods
        element-rule
            name
            parameter-name
            type
            action
            comparison-type
            match-value
            new-value
mime-sdp-rule
    name
    msg-type
    methods
    action
    sdp-media-rule
        name
        media-type
        action
        sdp-line-rule
            name
            type
            action
            new-value
header-rule
    name
    header-name
    action
    msg-type
    methods
    element-rule
        name
        parameter-name
        type
        action
        comparison-type
        match-value
        new-value
sip-monitoring
    monitoring-filters
steering-pool
    ip-address
    start-port
    end-port
    realm-id
steering-pool
    ip-address
    start-port
    end-port
    realm-id
system-config
    process-log-level
    default-gateway
tls-global
    session-caching
tls-profile
    name
    end-entity-certificate
    trusted-ca-certificates
    mutual-authenticate
translation-rules
    id
    type
    add-string
translation-rules
    id
        manipulate
        pattern-rule
        reply
        INVITE
            modClineHold_er
            application/sdp
            mime
            find-replace-all
            pattern-rule
            (. *IN IP4 ) (0.0.0.0) (.*)
            $1+$REMOTE_IP+$3
            addCNattribute
            request
            INVITE
            manipulate
                addattribute
                audio
                add
                    addCN
                    a
                    add
                    "rtpmap:13 CN/8000"
            changeSDP
            Content-Type
            manipulate
            reply
            INVITE
                inacttosendonly
                application/sdp
                mime
                find-replace-all
                pattern-rule
                a=inactive
                a=recvonly
        *
        10.250.1.75
        49532
        65535
        outside
        2620:96:c000:1::21
        49532
        65535
        inside
        DEBUG
        enabled
        sfb-tls-profile
        cert-ipv6
        ca-cert
        enabled
        addPlus1
        add
        +1
        removeplus1

```

```

type delete
delete-string +1
web-server-config
Cloud-ESBC#

```

## SBC Exchange configurations

### IPv4 based signaling for communication between On-Prem Exchange and ESBC

#### IPv4 with TCP/RTP

```

certificate-record
  name ca-cert
  common-name sfblabas-DC-CA
certificate-record
  name cert-ipv6
  state TX
  locality Plano
  organization tekvision
  unit labs
  common-name oraclepool.sfblabas.local
  alternate-name oraclesbc.sfblabas.local
  key-usage-list digitalSignature
certificate-record
  name sbc-cert2
  state TX
  locality Plano
  organization tekvision
  unit labs
  common-name oraclesbc.sfblabas.local
certificate-record
  name sbc-exchange
  state TX
  locality Plano
  organization tekvision
  unit labs
  common-name ccedge.tekvisionlabs.com
certificate-record
  name sbc-pool-cert
  state TX
  locality Plano
  organization tekvision
  unit labs
  common-name oraclepool.sfblabas.local
  alternate-name oraclesbc.sfblabas.local
codec-policy
  name CNPolicy
  allow-codecs * G729:no
  add-codecs-on-egress CN
codec-policy
  name PCMU
  allow-codecs PCMU telephone-event
  add-codecs-on-egress PCMU
codec-policy
  name noCNPolicy
  allow-codecs * CN:no G722:no G7221:no SIREN:no SILK:no RED:no
AAL2-G726-32:no x-msrta:no
codec-policy
  name noG729
  allow-codecs * G729:no
codec-policy
  name xcode
  allow-codecs *
local-policy
  from-address *
  to-address 9725980094
  +1972598009

```

```

+9725980094
source-realm           inside
description            For Referred-Party Header
policy-attribute
    next-hop           172.16.29.56
    realm              inside
    action             replace-uri
local-policy
    from-address       172.16.29.56
    to-address         *
    source-realm       inside
    policy-attribute
        next-hop           SKVEXCHANGE2016.sfbblabskv.local
        realm             inside
local-policy
    from-address       172.16.29.67
    to-address         *
    source-realm       inside
    policy-attribute
        next-hop           172.16.29.56
        realm             inside
local-policy
    from-address       *
    to-address         *
    source-realm       outside
    policy-attribute
        next-hop           SKVEXCHANGE2016.sfbblabskv.local
        realm             inside
media-manager
media-policy
    name               dscp
    tos-settings
        media-type       audio
        tos-value        0x2e
media-sec-policy
    name               rtponly
media-sec-policy
    name               sdespol
    inbound
        profile          sdes1
        mode             srtp
        protocol         sdes
    outbound
        profile          sdes1
        mode             srtp
        protocol         sdes
network-interface
    name               inside
    description        LAN
    hostname           oraclepool.sfbblabas.local
    ip-address         10.85.0.214
    netmask            255.255.0.0
    gateway            10.85.0.1
    dns-ip-primary     172.16.29.69
    dns-domain         sfbblabas.local
    signaling-mtu      1476
    hip-ip-list        10.85.0.214
    icmp-address       10.85.0.214
network-interface
    name               outside
    description        WAN
    ip-address         10.250.1.75
    netmask            255.255.255.192
    gateway            10.250.1.65
    hip-ip-list        10.250.1.75
    icmp-address       10.250.1.75
phy-interface
    name               inside

```

```

operation-type Media
phy-interface
  name outside
  operation-type Media
  port 2
playback-config
  name transferrbt
  entry
    encoding PCMU
    filename US_ringbackPCMU.raw
  entry
    encoding G722
    filename US_ringbackPCMU.raw
realm-config
  identifier inside
  network-interfaces inside:0
  mm-in-realm enabled
  mm-same-ip disabled
  delay-media-update enabled
  refer-call-transfer enabled
  hold-refer-reinvite enabled
  codec-policy PCMU
  codec-manip-in-realm enabled
realm-config
  identifier outside
  network-interfaces outside:0
  codec-policy noCNPolicy
response-map
  name change183to180
  entries
    rcv-code 183
    xmit-code 180
    reason Ringing
sdes-profile
  name SRTP
  use-ingress-session-params srtcp-encrypt
sdes-profile
  name sdes1
  use-ingress-session-params srtcp-encrypt
session-agent
  hostname 172.16.29.56
  ip-address 172.16.29.56
  transport-method UDP+TCP
  realm-id inside
  description CUCM
  ping-method OPTIONS;hops=0
  ping-interval 60
  out-translationid removeE164
  out-manipulationid NAT_IP_CUCM
session-agent
  hostname SKVEXCHANGE2016.sfbblabskv.local
  ip-address 172.16.29.67
  transport-method StaticTCP
  realm-id inside
  ping-method OPTIONS;hops=0
  ping-interval 60
  load-balance-dns-query round-robin
  out-translationid E164Covertion
  out-manipulationid NAT_IP_SFB
  refer-call-transfer enabled
session-agent
  hostname e3a46007-31cb-4529-b8cc-
1e59b97ebdbd.um.outlook.com
  transport-method StaticTCP
  realm-id inside
  ping-method OPTIONS;hops=0
  ping-interval 30
  load-balance-dns-query round-robin

```

```

    out-translationid          E164Covertion
session-timer-profile
  name                        towardssfb
  session-expires             900
  request-refresher           none
session-translation
  id                          E164Covertion
  rules-calling                addPlus1
  rules-called                 addPlus1
session-translation
  id                          removeE164
  rules-calling                removeplus1
  rules-called                 removeplus1
sip-config
  home-realm-id                inside
  registrar-domain             *
  registrar-host                *
  registrar-port                5060
  options                       inmanip-before-validate
                                max-udp-length=0
sip-feature
  name                        Require
  require-mode-inbound         Pass
  require-mode-outbound        Pass
sip-interface
  realm-id                     inside
  sip-port
    address                    10.85.0.214
    transport-protocol          TCP
  spl-options                  playback-on-refer="transferrbt"
  in-manipulationid            Check183
  out-manipulationid           NAT_IP_SFB
sip-interface
  realm-id                     outside
  sip-port
    address                    10.250.1.75
    allow-anonymous             agents-only
  out-manipulationid           NAT_IP
sip-manipulation
  name                        ChangeRecvOnlyToInactive
  header-rule
    name                       changeSDP
    header-name                 Content-Type
    action                      manipulate
    msg-type                    reply
    methods                     INVITE
    element-rule
      name                      RecvOnlyToInactive
      parameter-name            application/sdp
      type                      mime
      action                    find-replace-all
      comparison-type           pattern-rule
      match-value               a=recvonly
      new-value                 a=inactive
sip-manipulation
  name                        Changeinactosendonly
  description                  Change inactive to sendonly for pstn tran
  header-rule
    name                       changeSDP
    header-name                 Content-Type
    action                      manipulate
    msg-type                    request
    methods                     INVITE
    element-rule
      name                      inacttosendonly
      parameter-name            application/sdp
      type                      mime
      action                    find-replace-all

```



```

comparison-type      pattern-rule
match-value          a=inactive
new-value            a=sendonly

sip-manipulation
  name                Check183
  header-rule
    name              check18x
    header-name       @status-line
    action             manipulate
    msg-type          reply
    methods            INVITE
    element-rule
      name            is183
      type            status-code
      action           sip-manip
      match-value     183
      new-value       ChkandDrop
    element-rule
      name            is180
      type            status-code
      action           sip-manip
      match-value     180
      new-value       ChkandDrop
  header-rule
    name              forttransfer
    header-name       From
    action             sip-manip
    msg-type          request
    new-value         Changeinactosendonly
  header-rule
    name              PRACKrespones
    header-name       From
    new-value         PRACKResponseLocally

sip-manipulation
  name                ChkandDrop
  header-rule
    name              chkReq
    header-name       Require
    action             store
    msg-type          reply
    methods            INVITE
  header-rule
    name              drop18x
    header-name       from
    action             delete
    comparison-type   boolean
    msg-type          reply
    methods            INVITE
    match-value       !$chkReq
  header-rule
    name              callForEarlyMedia
    header-name       from
    action             sip-manip
    new-value         ForEarlyMedia

sip-manipulation
  name                ForEarlyMedia
  header-rule
    name              delSupported
    header-name       Supported
    action             delete
    match-value       100rel
  header-rule
    name              addRequire
    header-name       Require
    action             add
    msg-type          request
    methods            INVITE
    new-value         100rel

```

```

mime-sdp-rule
  name
  msg-type
  methods
  action
  comparison-type
  sdp-media-rule
    name
    media-type
    action
    comparison-type
    sdp-line-rule
      name
      type
      action
      comparison-type
      match-value
      new-value
  test
  reply
  INVITE
  manipulate
  pattern-rule
  checkcline
  audio
  manipulate
  boolean
  detectc
  c
  sip-manip
  pattern-rule
  (?!(172.16.29.83))
  changeRSeq

header-rule
  name
  header-name
  action
  new-value
  Change183
  From
  sip-manip
  if183

sip-manipulation
  name
  mime-sdp-rule
    name
    msg-type
    methods
    comparison-type
    sdp-media-rule
      name
      media-type
      action
      comparison-type
      sdp-line-rule
        name
        type
        action
        comparison-type
        match-value
        new-value
  Modcline
  test
  reply
  INVITE
  pattern-rule
  checkcline
  audio
  manipulate
  boolean
  detectc
  c
  sip-manip
  pattern-rule
  IN IP4 10.64.3.199
  ChangeRACK

sip-manipulation
  name
  mime-sdp-rule
    name
    action
    comparison-type
    sdp-media-rule
      name
      media-type
      action
      comparison-type
      sdp-line-rule
        name
        type
        action
        comparison-type
        new-value
  Modclinesanaa
  test
  manipulate
  pattern-rule
  checkcline
  audio
  manipulate
  pattern-rule
  detectc
  c
  sip-manip
  pattern-rule
  convert183to180

header-rule
  name
  header-name
  action
  match-value
  new-value
  checkcl
  Content-Length
  sip-manip
  0
  convert183to180

sip-manipulation
  name
  header-rule
  NAT_IP

```

```

name fromTrunk
header-name From
action manipulate
msg-type request
methods INVITE
element-rule
  name fromtrunk_er
  type uri-host
  action find-replace-all
  new-value $LOCAL_IP
header-rule
  name toTrunk
  header-name to
  action manipulate
  msg-type request
  methods INVITE
  element-rule
    name toTrunk_er
    type uri-host
    action find-replace-all
    new-value $REMOTE_IP
header-rule
  name AlterRuri
  header-name Request-URI
  action manipulate
  methods INVITE
  element-rule
    name alterRURI_er
    type uri-host
    action find-replace-all
    new-value $REMOTE_IP
header-rule
  name storeHI
  header-name History-Info
  action store
  msg-type request
  methods INVITE
header-rule
  name delHI
  header-name History-Info
  action delete
  msg-type request
  methods INVITE
header-rule
  name addDiv
  header-name Diversion
  action add
  comparison-type boolean
  msg-type request
  methods INVITE
  match-value $storeHI
  new-value $storeHI.$0
header-rule
  name alterDiv
  header-name Diversion
  action manipulate
  msg-type request
  methods INVITE
  element-rule
    name alterHost
    type header-value
    action find-replace-all
    match-value (.*) (.*) (;.*@) (.*) (>*)
    new-value
$1+$LOCAL_IP";user=phone>;index=1"+$3+$LOCAL_IP";user=phone">"+$5
header-rule
  name addltodiv
  header-name Diversion

```

```

        action                manipulate
        methods               INVITE
        element-rule
            name               user
            type               uri-user
            action             replace
            comparison-type    pattern-rule
            match-value        (.*)
            new-value          "+1"+$ORIGINAL
sip-manipulation
    name                      NAT_IP_CUCM
    header-rule
        name                  from
        header-name           from
        action                manipulate
        msg-type              request
        methods               INVITE
        element-rule
            name               from_er
            type               uri-host
            action             find-replace-all
            new-value          "oraclepool.sfblabas.local"
        element-rule
            name               modanoncon
            type               uri-user
            action             replace
            comparison-type    pattern-rule
            match-value        \+lanonymous
            new-value          anonymous
    header-rule
        name                  to
        header-name           to
        action                manipulate
        msg-type              request
        methods               INVITE
        element-rule
            name               to_er
            type               uri-host
            action             find-replace-all
            new-value          $REMOTE_IP
        element-rule
            name               storeTo
            type               uri-user
            action             store
            comparison-type    boolean
            match-value        \+1
        element-rule
            name               removeplus1
            type               uri-user
            action             replace
            comparison-type    pattern-rule
            match-value        \+1$
            new-value          ""
        element-rule
            name               modTo
            type               uri-user
            action             replace
            comparison-type    pattern-rule
            match-value        ((\+1) (\+1\d+))
            new-value          $3
    header-rule
        name                  contact
        header-name           Contact
        action                manipulate
        methods               INVITE,PRACK
        element-rule
            name               contact_er
            type               uri-host

```

```

        action find-replace-all
        new-value "oraclepool.sfbllabas.local"
header-rule
    name ruri
    header-name Request-URI
    action manipulate
    methods INVITE
    element-rule
        name ruri er
        type uri-host
        action find-replace-all
        new-value $REMOTE_IP
    element-rule
        name removeplus1
        type uri-user
        action replace
        comparison-type pattern-rule
        match-value \+1$
        new-value ""
    element-rule
        name removeextral
        type uri-user
        action replace
        comparison-type pattern-rule
        match-value ((\+1) (\+1\d+))
        new-value $3
header-rule
    name alterPRACK
    header-name Rack
    action manipulate
    comparison-type pattern-rule
    msg-type request
    methods PRACK
    match-value (2 )(.*)
    new-value "1 "+$alterPRACK.$2
header-rule
    name for183prack
    header-name From
    action sip-manip
    new-value addreqrelto183
header-rule
    name Modifyptime
    header-name Content-type
    action manipulate
    element-rule
        name changesdp
        parameter-name application/sdp
        type mime
        action find-replace-all
        match-value maxptime
        new-value ptime
header-rule
    name addltoDiv
    header-name Diversion
    action manipulate
    methods INVITE
    element-rule
        name user
        type uri-user
        action replace
        comparison-type pattern-rule
        match-value (.*)
        new-value "+1"+$ORIGINAL
header-rule
    name notifyruri
    header-name Request-URI
    action manipulate
    methods NOTIFY

```

```

        element-rule
            name
            type
            action
            comparison-type
            match-value
            new-value
                removeplus1notify
                uri-user
                replace
                pattern-rule
                ^(\+1)(.*)
                $2
mime-sdp-rule
    name
    msg-type
    action
    comparison-type
    sdp-session-rule
        name
        action
        comparison-type
        sdp-line-rule
            name
            type
            action
            comparison-type
            match-value
                cline
                reply
                manipulate
                pattern-rule
                con
                manipulate
                pattern-rule
                con1
                c
                find-replace-all
                pattern-rule
                (IN IP6
anonymous.invalid)
                new-value
                "IN IP6 ::"
sip-manipulation
    name
    header-rule
        name
        header-name
        action
        msg-type
        methods
        element-rule
            name
            type
            action
            new-value
                NAT_IP_SFB
                from
                from
                manipulate
                request
                INVITE
                from er
                uri-host
                find-replace-all
                "oraclepool.sfbllabas.local"
        element-rule
            name
            type
            action
            comparison-type
            match-value
            new-value
                modanoncon
                uri-user
                replace
                pattern-rule
                \+1anonymous
                anonymous
    header-rule
        name
        header-name
        action
        msg-type
        methods
        element-rule
            name
            type
            action
            new-value
                to
                to
                manipulate
                request
                INVITE
                to_er
                uri-host
                find-replace-all
"SKVEXCHANGE2016.sfbllabskv.local"
        element-rule
            name
            type
            action
            comparison-type
            match-value
                storeTo
                uri-user
                store
                boolean
                \+1
        element-rule
            name
            type
            action
            comparison-type
            match-value
                removeplus1
                uri-user
                replace
                pattern-rule
                \+1$

```

```

        new-value                ""
    element-rule
        name                      modTo
        type                      uri-user
        action                    replace
        comparison-type          pattern-rule
        match-value              ((\+1) (\+1\d+))
        new-value                $3
header-rule
    name                          contact
    header-name                  Contact
    action                      manipulate
    methods                     INVITE,PRACK
    element-rule
        name                      contact_er
        type                      uri-host
        action                    find-replace-all
        new-value                "oraclepool.sfbllabas.local"
header-rule
    name                          ruri
    header-name                  Request-URI
    action                      manipulate
    methods                     INVITE
    element-rule
        name                      ruri_er
        type                      uri-host
        action                    find-replace-all
        new-value                "SKVEXCHANGE2016.sfbllabskv.local"
    element-rule
        name                      removeplus1
        type                      uri-user
        action                    replace
        comparison-type          pattern-rule
        match-value              \+1$
        new-value                ""
    element-rule
        name                      removeextral
        type                      uri-user
        action                    replace
        comparison-type          pattern-rule
        match-value              ((\+1) (\+1\d+))
        new-value                $3
header-rule
    name                          alterPRACK
    header-name                  Rack
    action                      manipulate
    comparison-type             pattern-rule
    msg-type                    request
    methods                     PRACK
    match-value                 (2 )(.*)
    new-value                   "1 "+$alterPRACK.$2
header-rule
    name                          for183prack
    header-name                  From
    action                      sip-manip
    new-value                   addreqrelto183
header-rule
    name                          Modifyptime
    header-name                  Content-type
    action                      manipulate
    element-rule
        name                      changesdp
        parameter-name            application/sdp
        type                      mime
        action                    find-replace-all
        match-value              maxptime
        new-value                ptime

```

```

mime-sdp-rule
  name
  msg-type
  action
  comparison-type
  sdp-session-rule
    name
    action
    comparison-type
    sdp-line-rule
      name
      type
      action
      comparison-type
      match-value
anonymous.invalid)
  new-value
header-rule
  name
  header-name
  action
  methods
  element-rule
    name
    type
    action
    comparison-type
    match-value
    new-value
header-rule
  name
  header-name
  action
  methods
  element-rule
    name
    type
    action
    comparison-type
    match-value
    new-value
mime-sdp-rule
  name
  msg-type
  methods
  action
  sdp-media-rule
    name
    media-type
    action
    sdp-line-rule
      name
      type
      action
      match-value
Z]*/[a-zA-Z]*) (.*)
  new-value
  sdp-line-rule
    name
    type
    action
    new-value
header-rule
  name
  header-name
  action
  comparison-type
  msg-type
  cline
  reply
  manipulate
  pattern-rule
  con
  manipulate
  pattern-rule
  conl
  c
  find-replace-all
  pattern-rule
  (IN IP6
  "IN IP6 ::"
  addltodiv
  Diversion
  manipulate
  INVITE
  user
  uri-user
  replace
  pattern-rule
  (.*)
  "+1"+$ORIGINAL
  notifyruri
  Request-URI
  manipulate
  NOTIFY
  removepluslnotify
  uri-user
  replace
  pattern-rule
  ^(\+1)(.*)
  $2
  addCNattribute
  request
  INVITE
  manipulate
  addattribute
  audio
  manipulate
  manipMline
  m
  find-replace-all
  (^audio.[0-9]*.)([a-zA-
  $1+$2+$3+" 13"
  addattribute
  a
  add
  "rtpmap:13 CN/8000"
  chanesdp
  From
  sip-manip
  pattern-rule
  reply

```



```

        methods                INVITE
        new-value               ChangeRecvOnlyToInactive
sip-manipulation
  name                         NAT_IP_SFB_old
  header-rule
    name                       from
    header-name                 from
    action                      manipulate
    methods                    INVITE
    element-rule
      name                      from_er
      type                      uri-host
      action                    find-replace-all
      new-value                 "oraclepool.sfblabas.local"
    element-rule
      name                      modanoncon
      type                      uri-user
      action                    replace
      comparison-type           pattern-rule
      match-value               \+1anonymous
      new-value                 anonymous
  header-rule
    name                       to
    header-name                 to
    action                      manipulate
    methods                    INVITE
    element-rule
      name                      to_er
      type                      uri-host
      action                    find-replace-all
      new-value                 "med.sfblabas.local"
    element-rule
      name                      storeTo
      type                      uri-user
      action                    store
      comparison-type           boolean
      match-value               \+1
    element-rule
      name                      removeplus1
      type                      uri-user
      action                    replace
      comparison-type           pattern-rule
      match-value               \+1$
      new-value                 ""
  header-rule
    name                       contact
    header-name                 Contact
    action                      manipulate
    methods                    INVITE,PRACK
    element-rule
      name                      contact_er
      type                      uri-host
      action                    find-replace-all
      new-value                 "oraclepool.sfblabas.local"
  header-rule
    name                       ruri
    header-name                 Request-URI
    action                      manipulate
    methods                    INVITE
    element-rule
      name                      ruri_er
      type                      uri-host
      action                    find-replace-all
      new-value                 med.sfblabas.local
    element-rule
      name                      removeplus1
      type                      uri-user
      action                    replace

```

```

        comparison-type      pattern-rule
        match-value          \+1$
        new-value            ""

header-rule
  name                      alterPRACK
  header-name              Rack
  action                   manipulate
  comparison-type          pattern-rule
  msg-type                 request
  methods                  PRACK
  match-value              (2 )(.*)
  new-value                 "1 "+$alterPRACK.$2

header-rule
  name                      for183prack
  header-name              From
  action                   sip-manip
  new-value                 addreqrelto183

header-rule
  name                      Modifyptime
  header-name              Content-type
  action                   manipulate
  element-rule
    name                    changesdp
    parameter-name          application/sdp
    type                    mime
    action                  find-replace-all
    match-value             maxptime
    new-value               ptime

sip-manipulation
  name                      PRACKResponseLocally
  header-rule
    name                    rejectPRACK
    header-name             request-uri
    action                  reject
    msg-type                request
    methods                 PRACK
    new-value               200: OK

sip-manipulation
  name                      addreqrel
  header-rule
    name                    delSupported
    header-name             Supported
    action                  delete
  header-rule
    name                    addRequire
    header-name             Require
    action                  add
    new-value               100rel

sip-manipulation
  name                      addreqrelto183
  header-rule
    name                    check18x
    header-name             @status-line
    action                  manipulate
    msg-type                reply
    methods                 INVITE
  element-rule
    name                    is183
    type                    status-code
    action                  sip-manip
    match-value             183
    new-value               addreqrel

sip-manipulation
  name                      changerSeq
  header-rule
    name                    delRseq
    header-name             RSeq
    comparison-type          pattern-rule

```

```

msg-type      reply
methods      INVITE
new-value    ""
header-rule
  name        addRseq
  header-name RSeq
  action      manipulate
  comparison-type pattern-rule
  msg-type    reply
  methods     INVITE
  match-value 1
  new-value   2
sip-manipulation
  name        convert183to180
  header-rule
    name      delSDP
    header-name Content-Type
    action    manipulate
    comparison-type case-insensitive
    element-rule
      name      modReasonPhrase
      parameter-name *
      type      reason-phrase
      action    replace
      comparison-type case-insensitive
      match-value Session Progress
      new-value Ringing
    element-rule
      name      del183SDP
      parameter-name application/sdp
      type      mime
      action    delete-element
  header-rule
    name      delContentType
    header-name Content-Type
    action    manipulate
    element-rule
      name      delCT
      parameter-name *
      type      header-param
      action    delete-header
  header-rule
    name      change487to486
    header-name @status-line
    action    manipulate
    element-rule
      name      modStatusCode
      type      status-code
      action    replace
      match-value 183
      new-value  180
    element-rule
      name      modReasonPhrase
      type      reason-phrase
      action    replace
      comparison-type case-insensitive
      new-value Ringing
sip-manipulation
  name        if183
  header-rule
    name      if183hr
    header-name @status-line
    action    manipulate
    comparison-type pattern-rule
    element-rule
      name      is183
      type      status-code
      action    sip-manip

```

```

comparison-type      pattern-rule
match-value          183
new-value            Modclinesanaa

sip-monitoring
  monitoring-filters *
steering-pool
  ip-address         10.250.1.75
  start-port         49532
  end-port           65535
  realm-id           outside
steering-pool
  ip-address         10.85.0.214
  start-port         49532
  end-port           65535
  realm-id           inside
system-config
  process-log-level  DEBUG
  default-gateway
tls-global
  session-caching    enabled
tls-profile
  name               sfb-tls-profile
  end-entity-certificate cert-ipv6
  trusted-ca-certificates ca-cert
  mutual-authenticate enabled
translation-rules
  id                 addPlus1
  type               add
  add-string         +1
translation-rules
  id                 removeplus1
  type               delete
  delete-string     +1
web-server-config
Cloud-ESBC#

```

## IPv4 based signaling for communication between Online Exchange and ESBC

### IPv4 with TLS/SRTP

```

certificate-record
  name               Baltimore
  common-name        Baltimore CyberTrust Root
certificate-record
  name               ca-cert
  common-name        sfblabas-DC-CA
certificate-record
  name               cert-ipv6
  state              TX
  locality            Plano
  organization        tekvizion
  unit                labs
  common-name         oraclepool.sfblabas.local
  alternate-name      oraclesbc.sfblabas.local
  key-usage-list     digitalSignature
certificate-record
  name               exchange_addTrust_root
  country             SE
  organization        AddTrust AB
  common-name         AddTrust External CA Roott
certificate-record
  name               root_DOM_Auth
  country             GB
  state              Greater Manchester
  locality            Salford
  organization        COMODO CA Limited
  common-name         COMODO RSA Domain Validation Secure Server CA

```

```

certificate-record
  name                root_RSA_Auth
  country              GB
  state                Greater Manchester
  locality             Salford
  organization         COMODO CA Limited
  common-name         COMODO RSA Certification Authority
certificate-record
  name                sbc-cert2
  state                TX
  locality             Plano
  organization         tekvizion
  unit                 labs
  common-name         oraclesbc.sfblabas.local
certificate-record
  name                sbc-exchange
  state                TX
  locality             Plano
  organization         tekvizion
  unit                 labs
  common-name         ccedge.tekvizionlabs.com
certificate-record
  name                sbc-exchangeonline
  state                TX
  locality             Plano
  organization         tekvizion
  unit                 labs
  common-name         ccedge.tekvizionlabs.com
certificate-record
  name                sbc-pool-cert
  state                TX
  locality             Plano
  organization         tekvizion
  unit                 labs
  common-name         oraclepool.sfblabas.local
  alternate-name     oraclesbc.sfblabas.local
codec-policy
  name                CNPolicy
  allow-codecs        * G729:no
  add-codecs-on-egress CN
codec-policy
  name                noCNPolicy
  allow-codecs        * CN:no G722:no G7221:no SIREN:no SILK:no RED:no
AAL2-G726-32:no x-msrta:no
codec-policy
  name                noG729
  allow-codecs        G729:no
codec-policy
  name                xcode
  allow-codecs        *
local-policy
  from-address        *
  to-address          *
  source-realm        inside
  policy-attribute
    next-hop          172.16.29.56
    realm              outside
local-policy
  from-address        *
  to-address          *
  source-realm        outside
  policy-attribute
    next-hop          e3a46007-31cb-4529-b8cc-
1e59b97ebdbd.um.outlook.com
  realm              inside
local-policy
  from-address        *
  to-address          10.64.4.185

```

```

source-realm          outside
description           For Referred-Party Header
policy-attribute
    next-hop          10.64.4.185
    realm             outside
    action            replace-uri
    app-protocol      SIP
local-policy
    from-address      *
    to-address        ccedge.tekvizionlabs.com
    source-realm      outside
    description       For Referred-Party Header
    policy-attribute
        next-hop      172.16.29.56
        realm         outside
        action        replace-uri
        app-protocol  SIP
media-manager
media-policy
    name              dscp
    tos-settings
        media-type    audio
        tos-value     0x2e
media-sec-policy
    name              rtponly
media-sec-policy
    name              sdespol
    inbound
        profile       sdes1
        mode          srtplib
        protocol      sdes
    outbound
        profile       sdes1
        mode          srtplib
        protocol      sdes
network-interface
    name              inside
    description       LAN
    hostname          ccedge.tekvizionlabs.com
    ip-address        192.65.79.188
    netmask           255.255.255.128
    gateway           192.65.79.129
    dns-ip-primary    8.8.8.8
    dns-domain        um.outlook.com
    hip-ip-list       192.65.79.188
    icmp-address      192.65.79.188
network-interface
    name              outside
    description       WAN
    ip-address        10.250.1.75
    netmask           255.255.255.192
    gateway           10.250.1.65
    hip-ip-list       10.250.1.75
    icmp-address      10.250.1.75
    ssh-address       10.250.1.75
phy-interface
    name              inside
    operation-type    Media
phy-interface
    name              outside
    operation-type    Media
    port              2
playback-config
    name              transferrbt
    entry
        encoding      PCMU
        filename       US_ringbackPCMU.raw
realm-config

```

```

    identifier
    network-interfaces
    mm-in-realm
    media-policy
    media-sec-policy
    refer-call-transfer
    codec-policy
realm-config
    identifier
    network-interfaces
    mm-in-realm
    media-sec-policy
    codec-policy
response-map
    name
    entries
        recv-code
        xmit-code
        reason
sdes-profile
    name
    use-ingress-session-params
sdes-profile
    name
    use-ingress-session-params
session-agent
    hostname
    ip-address
    realm-id
    description
session-agent
    hostname
    ip-address
    realm-id
    description
    ping-method
    ping-interval
    out-translationid
    refer-notify-provisional
session-agent
    hostname
1e59b97ebdbd.um.outlook.com
    port
    transport-method
    realm-id
    ping-method
    ping-interval
    load-balance-dns-query
    out-translationid
    refer-call-transfer
    refer-notify-provisional
session-agent
    hostname
    transport-method
    realm-id
    ping-method
    ping-interval
    load-balance-dns-query
    out-translationid
    refer-call-transfer
session-timer-profile
    name
    session-expires
    request-refresher
session-translation
    id
    rules-calling
    rules-called
    identifier
    network-interfaces
    mm-in-realm
    media-policy
    media-sec-policy
    refer-call-transfer
    codec-policy
    outside
    outside:0
    enabled
    dscp
    sdespol
    enabled
    noG729
    outside
    outside:0
    enabled
    rtponly
    noCNPolicy
    change183to180
    183
    180
    Ringing
    SRTP
    srtcp-encrypt
    sdes1
    srtcp-encrypt
    10.64.4.185
    10.64.4.185
    outside
    Fax machine
    172.16.29.56
    172.16.29.56
    outside
    CUCM
    OPTIONS;hops=0
    30
    removeE164
    all
    e3a46007-31cb-4529-b8cc-
    5061
    StaticTLS
    inside
    OPTIONS;hops=0
    5
    round-robin
    E164Covertion
    enabled
    all
    exchange2016.sfbblabcp.local
    StaticTCP
    inside
    OPTIONS;hops=0
    30
    round-robin
    E164Covertion
    enabled
    towardssfb
    900
    none
    E164Covertion
    addPlus1
    addPlus1

```

```

session-translation
  id removeE164
  rules-calling removeplus1
  rules-called removeplus1
sip-config
  home-realm-id inside
  registrar-domain *
  registrar-host *
  registrar-port 5060
  options inmanip-before-validate
  max-udp-length=0
sip-feature
  name Require
  require-mode-inbound Pass
  require-mode-outbound Pass
sip-interface
  realm-id inside
  sip-port
    address 192.65.79.188
    port 5061
    transport-protocol TLS
    tls-profile exchange_tls
    allow-anonymous agents-only
  spl-options playback-on-refer="transferrbt"
  in-manipulationid Check183
  out-manipulationid NAT_IP_SFB
  session-timer-profile towardssfb
sip-interface
  realm-id outside
  sip-port
    address 10.250.1.75
    allow-anonymous agents-only
  out-manipulationid NAT_IP
sip-manipulation
  name Changeinactosendonly
  description Change inactive to sendonly for pstn tran
  header-rule
    name changeSDP
    header-name Content-Type
    action manipulate
    msg-type request
    methods INVITE
    element-rule
      name inacttosendonly
      parameter-name application/sdp
      type mime
      action find-replace-all
      comparison-type pattern-rule
      match-value a=inactive
      new-value a=sendonly
sip-manipulation
  name Check183
  header-rule
    name check18x
    header-name @status-line
    action manipulate
    msg-type reply
    methods INVITE
    element-rule
      name is183
      type status-code
      action sip-manip
      match-value 183
      new-value ChkandDrop
    element-rule
      name is180
      type status-code
      action sip-manip

```



```

        match-value      180
        new-value        ChkandDrop
header-rule
    name                 forttransfer
    header-name          From
    action               sip-manip
    msg-type             request
    new-value            Changeinactosendonly
header-rule
    name                 PRACKrespones
    header-name          From
    new-value            PRACKResponseLocally
sip-manipulation
    name                 ChkandDrop
header-rule
    name                 chkReq
    header-name          Require
    action               store
    msg-type             reply
    methods              INVITE
header-rule
    name                 drop18x
    header-name          from
    action               delete
    comparison-type      boolean
    msg-type             reply
    methods              INVITE
    match-value          !$chkReq
header-rule
    name                 callForEarlyMedia
    header-name          from
    action               sip-manip
    new-value            ForEarlyMedia
sip-manipulation
    name                 ForEarlyMedia
header-rule
    name                 delSupported
    header-name          Supported
    action               delete
    match-value          100rel
header-rule
    name                 addRequire
    header-name          Require
    action               add
    msg-type             request
    methods              INVITE
    new-value            100rel
mime-sdp-rule
    name                 test
    msg-type             reply
    methods              INVITE
    action               manipulate
    comparison-type      pattern-rule
    sdp-media-rule
        name                 checkcline
        media-type          audio
        action               manipulate
        comparison-type      boolean
    sdp-line-rule
        name                 detectc
        type                 c
        action               sip-manip
        comparison-type      pattern-rule
        match-value          (?!(172.16.29.83))
        new-value            changeRSeq
header-rule
    name                 Change183
    header-name          From

```

```

        action sip-manip
        new-value if183
sip-manipulation
  name
  header-rule
    name ForNOTIFY
    header-name From
    action From
    methods manipulate
    element-rule NOTIFY
      name removeplus1_from
      type uri-user
      action replace
      comparison-type pattern-rule
      match-value (.*)
      new-value $ORIGINAL-^"+1"
  header-rule
    name To
    header-name To
    action To
    methods manipulate
    element-rule NOTIFY
      name removeplus1_to
      type uri-user
      action replace
      comparison-type pattern-rule
      match-value (.*)
      new-value $ORIGINAL-^"+1"
  header-rule
    name Contact
    header-name Contact
    action Contact
    methods manipulate
    element-rule NOTIFY
      name removeplus1_con
      type uri-user
      action replace
      comparison-type pattern-rule
      match-value (.*)
      new-value $ORIGINAL-^"+1"
  header-rule
    name notifyruri
    header-name Request-URI
    action Request-URI
    methods manipulate
    element-rule NOTIFY
      name removeplus1_ruri
      type uri-user
      action replace
      comparison-type pattern-rule
      match-value (.*)
      new-value $ORIGINAL-^"+1"
sip-manipulation
  name
  mime-sdp-rule
    name Modcline
    msg-type test
    methods reply
    comparison-type INVITE
    sdp-media-rule
      name
      media-type
      action
      comparison-type
      sdp-line-rule
        name
        type
        action
        name detectc
        type c
        action sip-manip

```

```

comparison-type      pattern-rule
match-value          IN IP4 10.64.3.199
new-value            ChangeRACK

sip-manipulation
  name               Modclinesanaa
  mime-sdp-rule
    name
    action
    comparison-type  test
    sdp-media-rule  manipulate
      name           pattern-rule
      media-type     checkcline
      action         audio
      comparison-type  manipulate
      sdp-line-rule  pattern-rule
        name         detectc
        type          c
        action       sip-manip
        comparison-type  pattern-rule
        new-value    convert183to180

  header-rule
    name
    header-name      checkcl
    action            Content-Length
    match-value      sip-manip
    new-value        0
    convert183to180

sip-manipulation
  name               NAT_IP
  header-rule
    name
    header-name      fromTrunk
    action            From
    methods           manipulate
    element-rule
      name
      type            fromtrunk_er
      action          uri-host
      new-value      find-replace-all
      $LOCAL_IP

  header-rule
    name
    header-name      toTrunk
    action            to
    methods           manipulate
    element-rule
      name
      type            toTrunk_er
      action          uri-host
      new-value      find-replace-all
      $REMOTE_IP

  header-rule
    name
    header-name      AlterRuri
    action            Request-URI
    methods           manipulate
    element-rule
      name
      type            alterRURI_er
      action          uri-host
      new-value      find-replace-all
      $REMOTE_IP

  header-rule
    name
    header-name      storeHI
    action            History-Info
    msg-type          store
    methods           request
    INVITE

  header-rule
    name
    header-name      delHI
    action            History-Info
    delete

```

```

        msg-type          request
        methods           INVITE
header-rule
    name                 addDiv
    header-name          Diversion
    action               add
    comparison-type      boolean
    msg-type             request
    methods              INVITE
    match-value          $storeHI
    new-value            $storeHI.$0
header-rule
    name                 alterDiv
    header-name          Diversion
    action               manipulate
    msg-type             request
    methods              INVITE
    element-rule
        name             alterHost
        type              header-value
        action            find-replace-all
        match-value       (*.*) (*.*) (*.*) (*.*) (>*)
        new-value         $1+$LOCAL_IP";user=phone>;index=1"+$3+$LOCAL_IP";user=phone">"+$5
header-rule
    name                 addltodiv
    header-name          Diversion
    action               manipulate
    methods              INVITE
    element-rule
        name             user
        type              uri-user
        action            replace
        comparison-type   pattern-rule
        match-value       (.*)
        new-value         "+1"+$ORIGINAL
header-rule
    name                 modNOTIFY
    header-name          From
    action               sip-manip
    new-value            ForNOTIFY
header-rule
    name                 referto
    header-name          Refer-To
    action               manipulate
    element-rule
        name             removeplus1_rt
        type              uri-user
        action            replace
        comparison-type   pattern-rule
        match-value       (.*)
        new-value         $ORIGINAL-^"+1"
    element-rule
        name             host_rt
        type              uri-host
        action            replace
        new-value         $REMOTE_IP
header-rule
    name                 referby
    header-name          Referred-By
    action               manipulate
    element-rule
        name             removeplus1_rb
        type              uri-user
        action            replace
        comparison-type   pattern-rule
        match-value       (.*)
        new-value         $ORIGINAL-^"+1"

```

```

        element-rule
            name                host_rb
            type                uri-host
            action              replace
            new-value           $LOCAL_IP
    header-rule
        name                    referPAI
        header-name             P-Asserted-Identity
        action                  manipulate
        element-rule
            name                removeplus1_pai
            type                uri-user
            action              replace
            comparison-type     pattern-rule
            match-value         (.*)
            new-value           $ORIGINAL-^"+1"
sip-manipulation
    name                       NAT IP SFB
    header-rule
        name                    from
        header-name             from
        action                  manipulate
        methods                 INVITE
        element-rule
            name                from_er
            type                uri-host
            action              find-replace-all
            new-value           "ccedge.tekvisionlabs.com"
        element-rule
            name                modanoncon
            type                uri-user
            action              replace
            comparison-type     pattern-rule
            match-value         \+1anonymous
            new-value           anonymous
    header-rule
        name                    to
        header-name             to
        action                  manipulate
        methods                 INVITE
        element-rule
            name                to_er
            type                uri-host
            action              find-replace-all
            new-value           "e3a46007-31cb-4529-b8cc-
1e59b97ebdbd.um.outlook.com"
        element-rule
            name                storeTo
            type                uri-user
            action              store
            comparison-type     boolean
            match-value         \+1
        element-rule
            name                removeplus1
            type                uri-user
            action              replace
            comparison-type     pattern-rule
            match-value         \+1$
            new-value           ""
        element-rule
            name                modTo
            type                uri-user
            action              replace
            comparison-type     pattern-rule
            match-value         ((\+1) (\+1\d+))
            new-value           $3
    header-rule
        name                    contact

```

```

header-name      Contact
action           manipulate
methods         INVITE,PRACK
element-rule
  name           contact_er
  type           uri-host
  action         find-replace-all
  new-value     "ccedge.tekvizionlabs.com"
element-rule
  name           user
  type           uri-user
  action         replace
  comparison-type pattern-rule
  match-value   (.*)
  new-value     "+1"+$ORIGINAL
header-rule
  name           ruri
  header-name   Request-URI
  action         manipulate
  methods       INVITE
  element-rule
    name        ruri_er
    type        uri-host
    action      find-replace-all
    new-value   "e3a46007-31cb-4529-b8cc-
1e59b97ebdbd.um.outlook.com"
  element-rule
    name        removeplus1
    type        uri-user
    action      replace
    comparison-type pattern-rule
    match-value \+1$
    new-value   ""
  element-rule
    name        removeextral
    type        uri-user
    action      replace
    comparison-type pattern-rule
    match-value ((\+1) (\+1\d+))
    new-value   $3
header-rule
  name           alterPRACK
  header-name   Rack
  action         manipulate
  comparison-type pattern-rule
  msg-type      request
  methods       PRACK
  match-value   (2 )(.*)
  new-value     "1 "+$alterPRACK.$2
header-rule
  name           for183prack
  header-name   From
  action         sip-manip
  new-value     addreqrelto183
header-rule
  name           Modifyptime
  header-name   Content-type
  action         manipulate
  element-rule
    name        changesdp
    parameter-name application/sdp
    type        mime
    action      find-replace-all
    match-value maxptime
    new-value   ptime
mime-sdp-rule
  name           cline
  msg-type      reply

```

```

action
comparison-type
sdp-session-rule
    name
    action
    comparison-type
    sdp-line-rule
        name
        type
        action
        comparison-type
        match-value
anonymous.invalid)
    new-value
header-rule
    name
    header-name
    action
    methods
    element-rule
        name
        type
        action
        comparison-type
        match-value
        new-value
header-rule
    name
    header-name
    action
    methods
    element-rule
        name
        type
        action
        new-value
mime-sdp-rule
    name
    msg-type
    methods
    action
    sdp-media-rule
        name
        media-type
        action
        sdp-line-rule
            name
            type
            action
            match-value
Z]*/[a-zA-Z]*) (.*)
    new-value
    sdp-line-rule
        name
        type
        action
        new-value
sip-manipulation
    name
    header-rule
        name
        header-name
        action
        methods
        element-rule
            name
            type
            action
            new-value
manipulate
pattern-rule
    con
    manipulate
    pattern-rule
        conl
        c
        find-replace-all
        pattern-rule
        (IN IP6
        "IN IP6 ::"
addltodiv
Diversion
manipulate
INVITE
    user
    uri-user
    replace
    pattern-rule
    (.*)
    "+1"+$ORIGINAL
diversion
Diversion
manipulate
INVITE
    diversion
    uri-host
    replace
    ccedge.tekvizionlabs.com
addCNattribute
request
INVITE
manipulate
    addattribute
    audio
    manipulate
        manipMline
        m
        find-replace-all
        (^audio.[0-9]*.) ([a-zA-
        $1+$2+$3+" 13"
    addattribute
    a
    add
    "rtpmap:13 CN/8000"
NAT IP SFB old
    from
    from
    manipulate
    INVITE
    from_er
    uri-host
    find-replace-all

```

```

        new-value                "oraclepool.sfbllabas.local"
    element-rule
        name                      modanoncon
        type                      uri-user
        action                    replace
        comparison-type          pattern-rule
        match-value              \+lanonymous
        new-value                anonymous
header-rule
    name                          to
    header-name                   to
    action                       manipulate
    methods                      INVITE
    element-rule
        name                      to_er
        type                      uri-host
        action                    find-replace-all
        new-value                "med.sfbllabas.local"
    element-rule
        name                      storeTo
        type                      uri-user
        action                    store
        comparison-type          boolean
        match-value              \+1
    element-rule
        name                      removeplus1
        type                      uri-user
        action                    replace
        comparison-type          pattern-rule
        match-value              \+1$
        new-value                ""
header-rule
    name                          contact
    header-name                   Contact
    action                       manipulate
    methods                      INVITE,PRACK
    element-rule
        name                      contact_er
        type                      uri-host
        action                    find-replace-all
        new-value                "oraclepool.sfbllabas.local"
header-rule
    name                          ruri
    header-name                   Request-URI
    action                       manipulate
    methods                      INVITE
    element-rule
        name                      ruri_er
        type                      uri-host
        action                    find-replace-all
        new-value                med.sfbllabas.local
    element-rule
        name                      removeplus1
        type                      uri-user
        action                    replace
        comparison-type          pattern-rule
        match-value              \+1$
        new-value                ""
header-rule
    name                          alterPRACK
    header-name                   Rack
    action                       manipulate
    comparison-type              pattern-rule
    msg-type                    request
    methods                      PRACK
    match-value                  (2 )(.*)
    new-value                    "1 "+$alterPRACK.$2
header-rule

```



```

        name                for183prack
        header-name         From
        action              sip-manip
        new-value           addreqrelto183
    header-rule
        name                Modifyptime
        header-name         Content-type
        action              manipulate
        element-rule
            name            changesdp
            parameter-name  application/sdp
            type            mime
            action          find-replace-all
            match-value     maxptime
            new-value       ptime
sip-manipulation
    name                    PRACKResponseLocally
    header-rule
        name                rejectPRACK
        header-name         request-uri
        action              reject
        msg-type            request
        methods             PRACK
        new-value           200: OK
sip-manipulation
    name                    addreqrel
    header-rule
        name                delSupported
        header-name         Supported
        action              delete
    header-rule
        name                addRequire
        header-name         Require
        action              add
        new-value           100rel
sip-manipulation
    name                    addreqrelto183
    header-rule
        name                check18x
        header-name         @status-line
        action              manipulate
        msg-type            reply
        methods             INVITE
        element-rule
            name            is183
            type            status-code
            action          sip-manip
            match-value     183
            new-value       addreqrel
sip-manipulation
    name                    changeRSeq
    header-rule
        name                delRseq
        header-name         RSeq
        comparison-type     pattern-rule
        msg-type            reply
        methods             INVITE
        new-value           ""
    header-rule
        name                addRseq
        header-name         RSeq
        action              manipulate
        comparison-type     pattern-rule
        msg-type            reply
        methods             INVITE
        match-value        1
        new-value           2
sip-manipulation

```

```

name convert183to180
header-rule
  name
  header-rule
    name delSDP
    header-name Content-Type
    action manipulate
    comparison-type case-insensitive
    element-rule
      name
      parameter-name modReasonPhrase
      type *
      action reason-phrase
      comparison-type replace
      match-value case-insensitive
      new-value Session Progress
    element-rule
      name Ringing
      parameter-name del183SDP
      type application/sdp
      action mime
      delete-element delete-element

header-rule
  name
  header-name
  action delContentType
  element-rule
    name Content-Type
    parameter-name
    type manipulate
    action delete-header

header-rule
  name
  header-name
  action
  element-rule
    name
    parameter-name
    type
    action
    match-value
    new-value
    element-rule
      name
      type
      action
      comparison-type
      new-value
      modReasonPhrase
      reason-phrase
      replace
      case-insensitive
      Ringing

sip-manipulation
  name
  header-rule
    name
    header-name
    action
    comparison-type
    element-rule
      name
      type
      action
      comparison-type
      match-value
      new-value
      change487to486
      @status-line
      manipulate
      modStatusCode
      status-code
      replace
      183
      180
      modReasonPhrase
      reason-phrase
      replace
      case-insensitive
      Ringing

sip-manipulation
  name
  header-rule
    name
    header-name
    action
    comparison-type
    element-rule
      name
      type
      action
      comparison-type
      match-value
      new-value
      if183
      if183hr
      @status-line
      manipulate
      pattern-rule
      is183
      status-code
      sip-manip
      pattern-rule
      183
      Modclinesanaa

sip-monitoring
  monitoring-filters *

steering-pool
  ip-address
  start-port
  end-port
  realm-id
  steering-pool
  ip-address
  start-port
  10.250.1.75
  49532
  65535
  outside
  192.65.79.188
  49532

```

```

        end-port                65535
        realm-id                inside
system-config
        process-log-level      DEBUG
        default-gateway
tls-global
        session-caching        enabled
tls-profile
        name                    exchange tls
        end-entity-certificate  sbc-exchangeonline
        trusted-ca-certificates exchange_addTrust_root
                                root_RSA_Auth
                                root_DOM_Auth
                                Baltimore
        mutual-authenticate    enabled
        tls-version            tlsv1
tls-profile
        name                    sfb-tls-profile
        end-entity-certificate  cert-ipv6
        trusted-ca-certificates ca-cert
        mutual-authenticate    enabled
translation-rules
        id                      addPlus1
        type                    add
        add-string              +1
translation-rules
        id                      removeplus1
        type                    delete
        delete-string           +1
web-server-config
Cloud-ESBC#

```

## Phase 2 – Configuring the Skype for Business server

The enterprise will have a fully functioning Lync Server infrastructure with Enterprise Voice deployed and a Mediation Server dedicated to this installation. If there is no Mediation Server present for this purpose, one will have to be deployed.

There are two parts for configuring SFB Server to operate with the Oracle SBC:

- Adding the SBC as a PSTN gateway to the SFB Server infrastructure
- Creating a route within the SFB Server infrastructure to utilize the SIP trunk connected through the SBC.

To add the PSTN gateway, we will need:

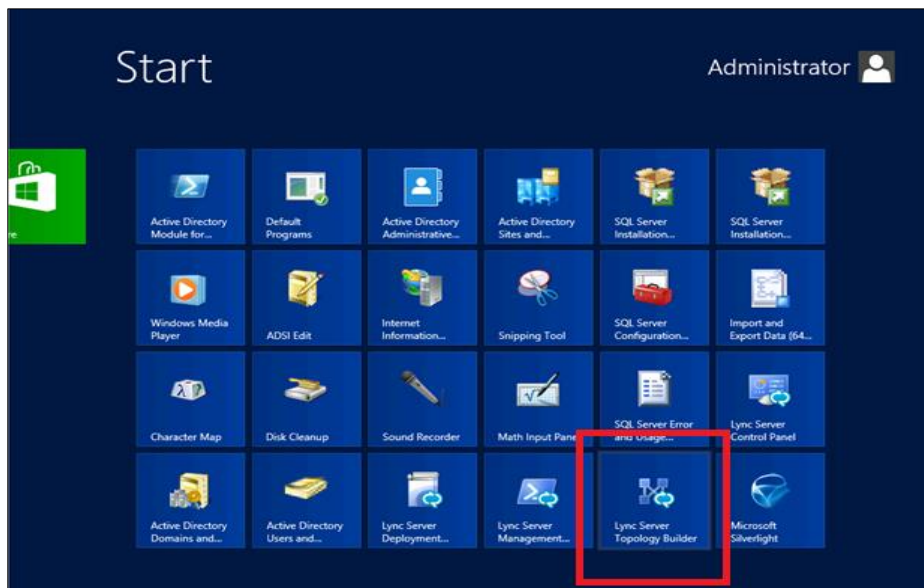
- IP addresses of the external facing NICs of the Mediation Servers
- IP address of the sip interface of the SBC facing the Mediation servers
- Rights to administer Lync Server Topology Builder
- Access to the Lync Server Topology Builder

**Note:** This section of the Application note only walks you through adding Oracle E-SBC to Microsoft's Skype for Business config, The assumption is that Microsoft's Skype for Business application is already installed and 100% functional.

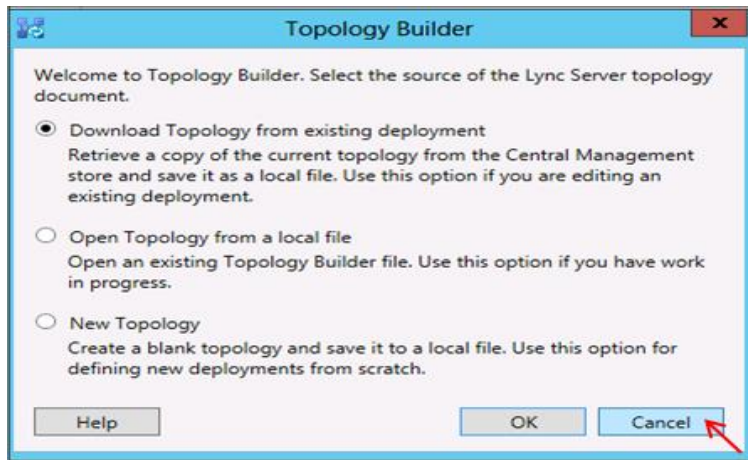
### Adding the SBC as a PSTN gateway

The following process details the steps to add the SBC as the PSTN gateway

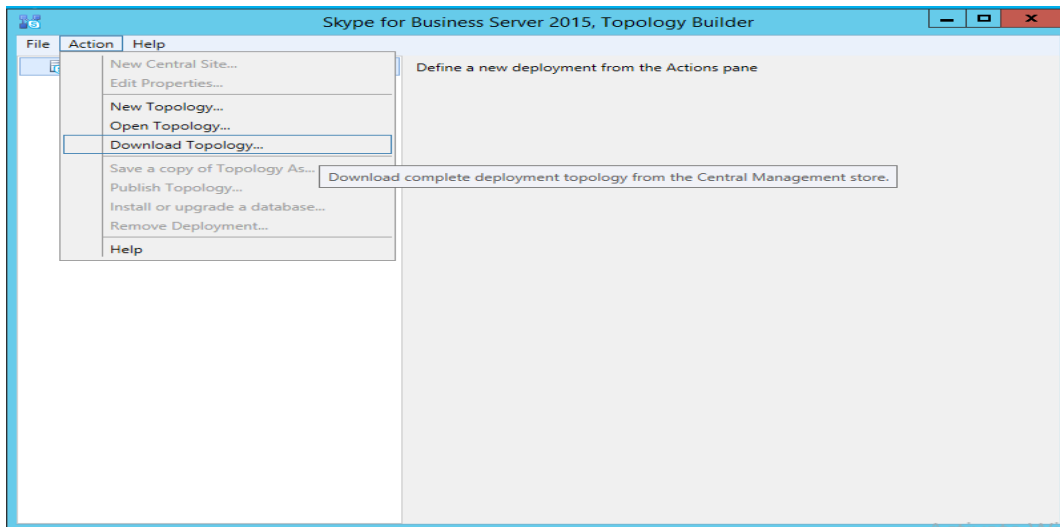
1. On the server where the Topology Builder is located, start the console.
2. From the **Start** bar, select **Lync Server Topology Builder**.



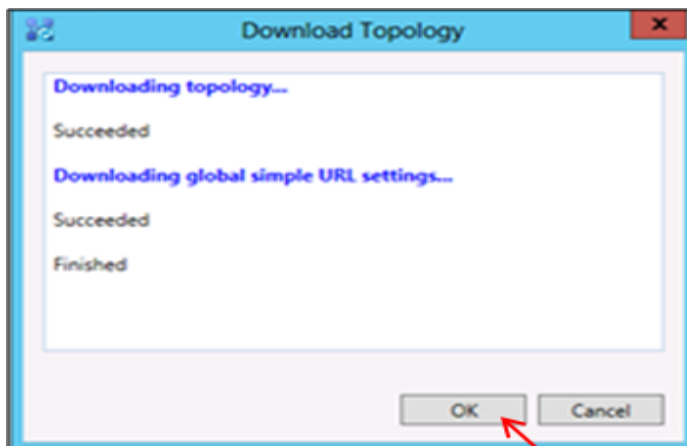
- The opening screen of the Topology builder will be displayed. Click on the **Cancel** button.



- The Topology Builder window will now be displayed. Click on **Action** and select **Download Topology**.

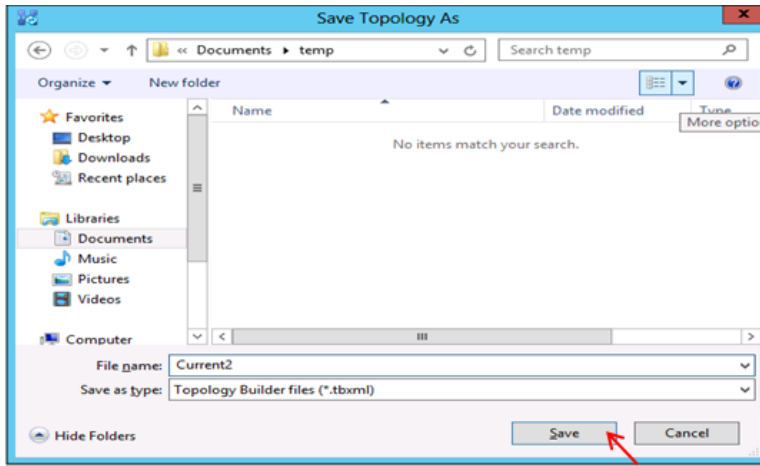


- You will then see a screen showing that you have successfully imported the topology. Click the **Ok** button.

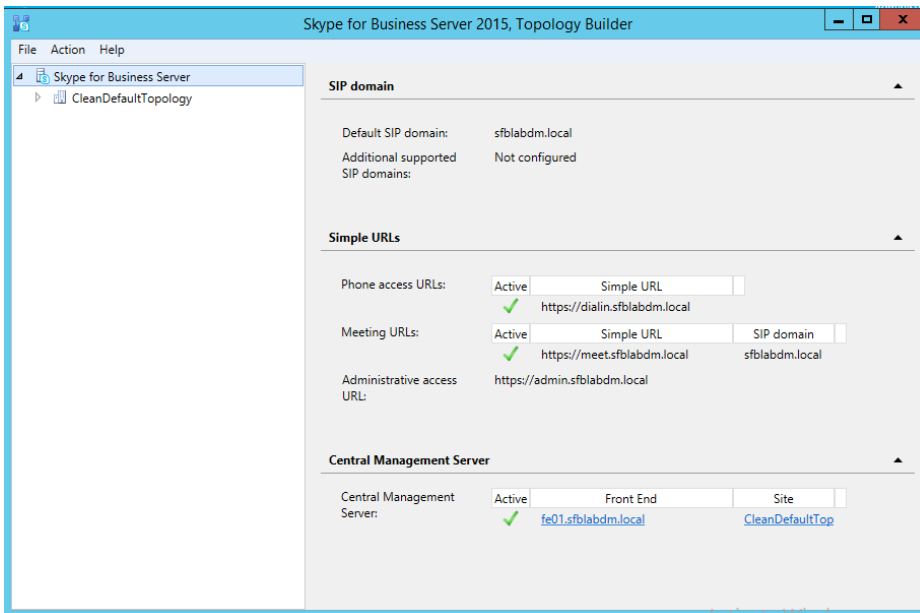


- Next you will be prompted to save the topology which you have imported. You should revision the name or number of the topology according to the standards used within the enterprise. Click the **Save** button

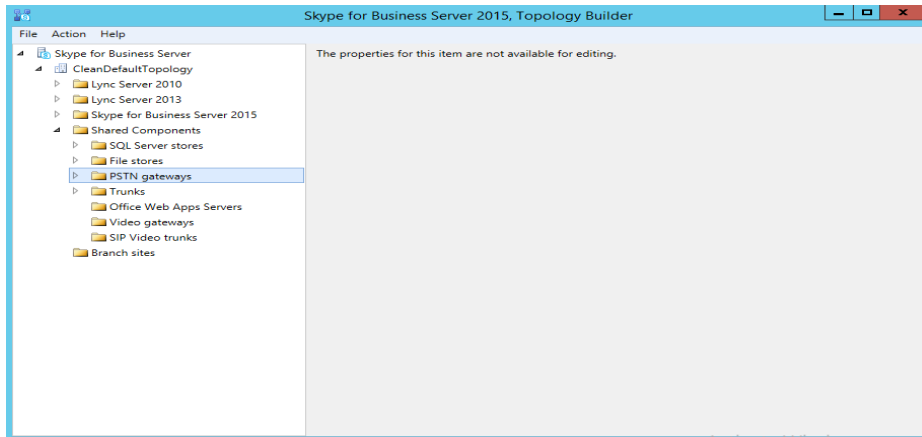
Note: This keeps track of topology changes and, if desired, will allow you to fall back from any changes you make during this installation



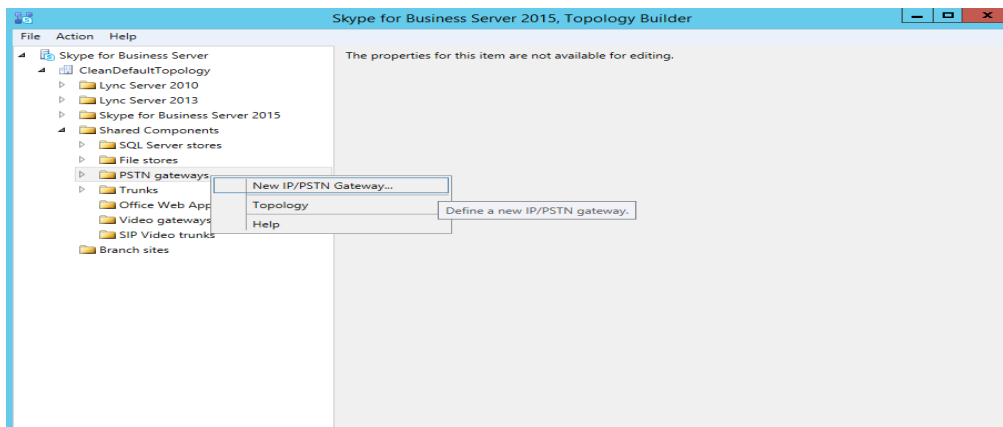
- You will now see the topology builder screen with the enterprise's topology imported.



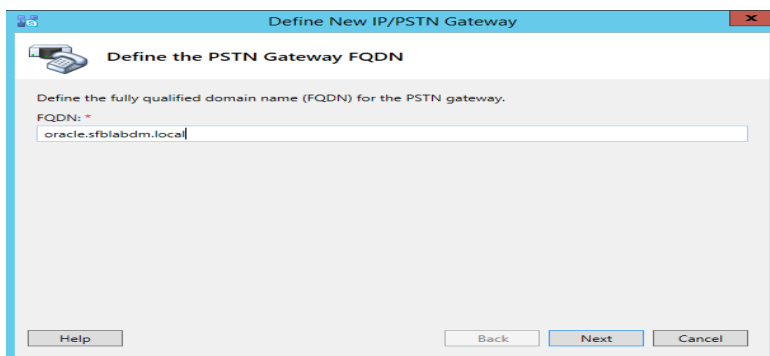
8. In the upper left hand corner, expand the site in which the PSTN gateway will be added. In our case, the site is **Bedford**. Then click on the **PSTN Gateways**



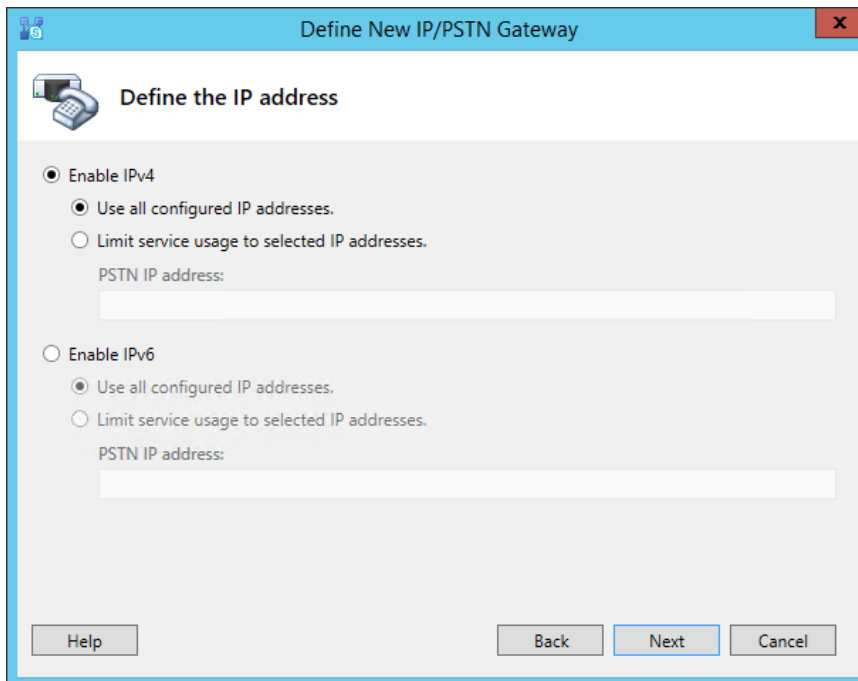
9. Right click on **PSTN gateways** and select **New IP/PSTN Gateway**.



10. In the **Define New IP/PSTN Gateway** window, enter the ip address of the SIP interface of the SBC in the **FQDN** text box and click **Next**.

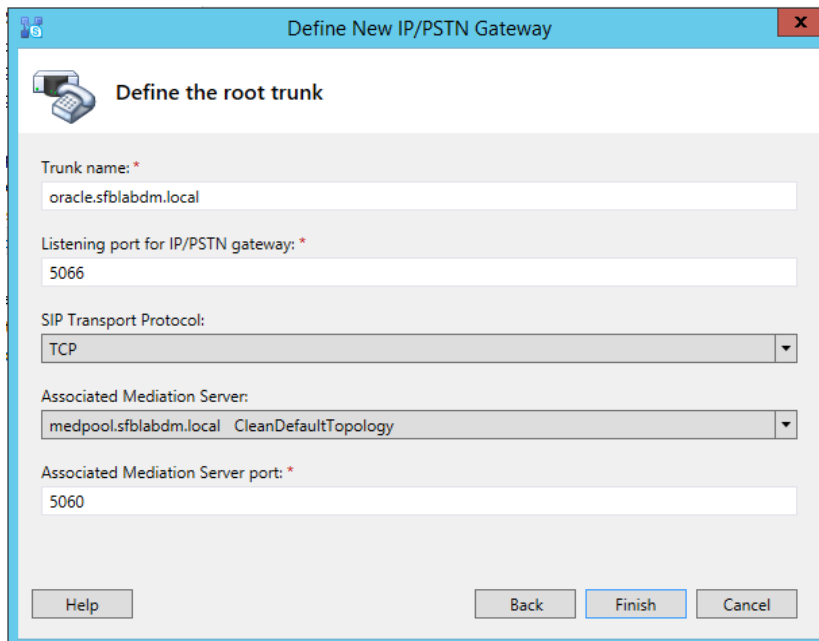


11. Select **Enable IPv4** in the **Define the IP address** section and click **Next**.



The screenshot shows a dialog box titled "Define New IP/PSTN Gateway" with a sub-section "Define the IP address". It contains two main options: "Enable IPv4" and "Enable IPv6". Under "Enable IPv4", there are two radio buttons: "Use all configured IP addresses." (which is selected) and "Limit service usage to selected IP addresses." Below this is a text field labeled "PSTN IP address:". The "Enable IPv6" section has identical options and a text field. At the bottom, there are buttons for "Help", "Back", "Next" (highlighted in blue), and "Cancel".

12. In the next section, enter the ip address of the SBC's sip interface under **Trunk name**. Configure the **Listening port for IP/PSTN gateway** as 5068, TCP as the **SIP Transport Protocol** and click **Finish**.



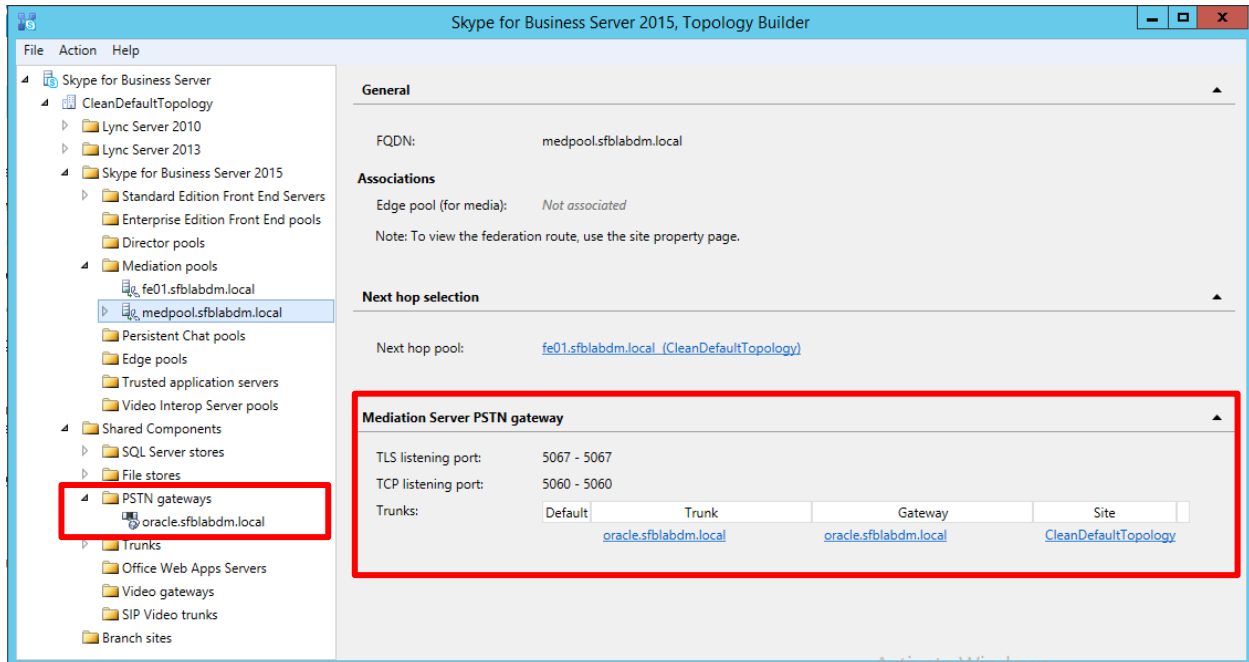
The screenshot shows the same dialog box, now in the "Define the root trunk" section. It contains several fields: "Trunk name:" with the value "oracle.sflabldm.local"; "Listening port for IP/PSTN gateway:" with the value "5068"; "SIP Transport Protocol:" with a dropdown menu set to "TCP"; "Associated Mediation Server:" with a dropdown menu set to "medpool.sflabldm.local CleanDefaultTopology"; and "Associated Mediation Server port:" with the value "5060". At the bottom, there are buttons for "Help", "Back", "Finish" (highlighted in blue), and "Cancel".



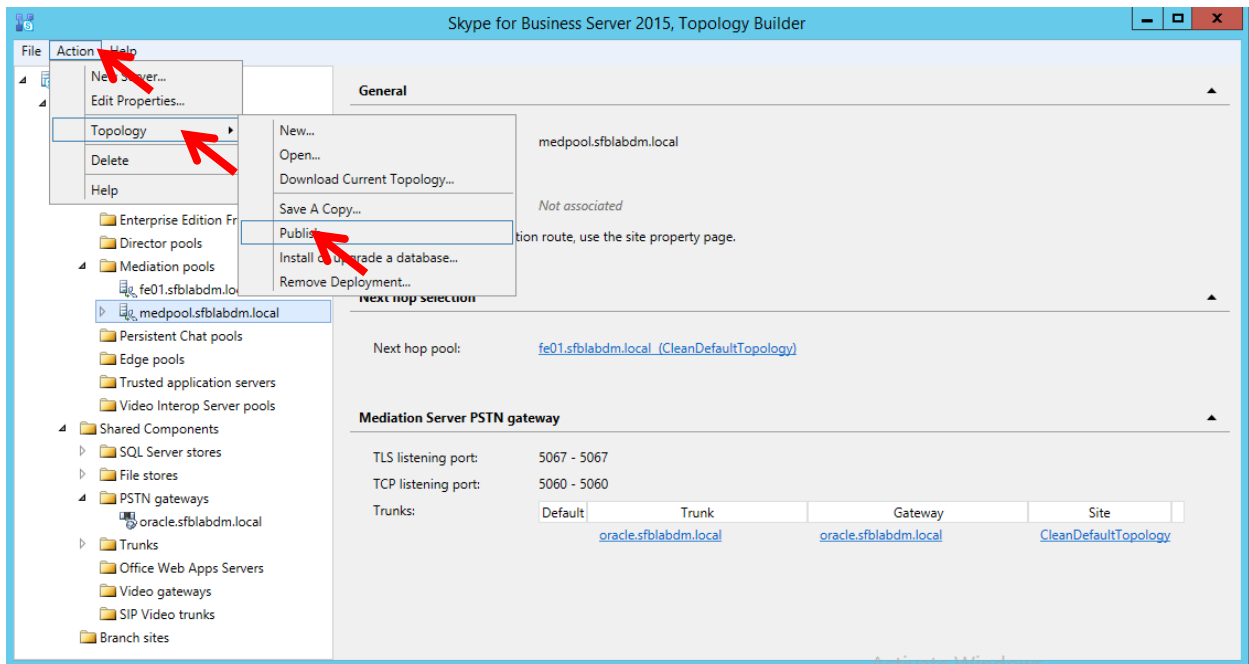
13. The PSTN gateway for the Lync server has been added. It will be listed under **PSTN gateways**.

Expand the **Mediation Pool** list and click on the Mediation Server to be utilized. In our example the Mediation Server is **medpool.sflabldm.local**.

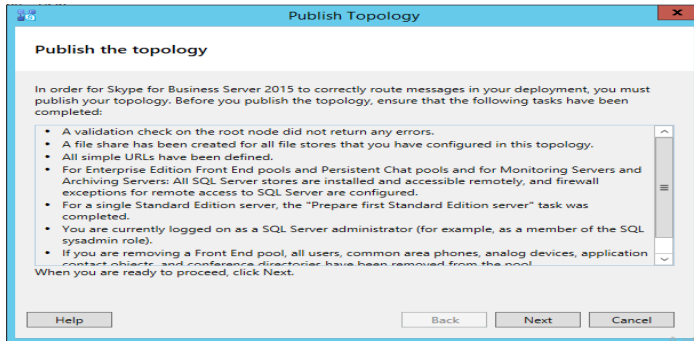
You will see that the PSTN gateway is associated with the Mediation server.



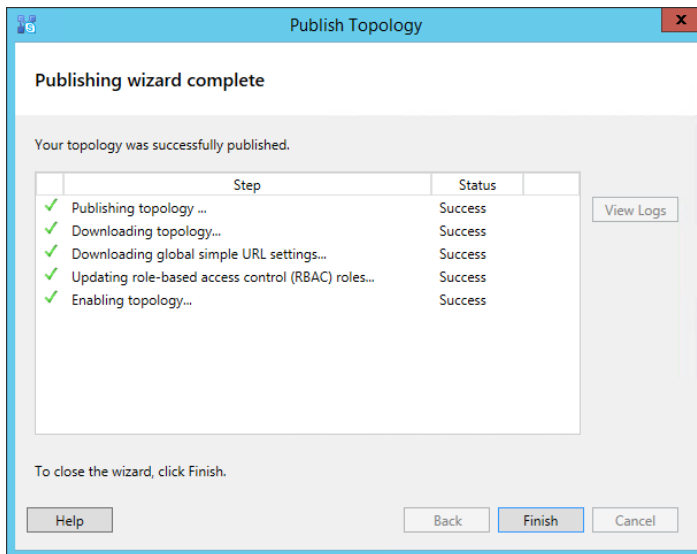
14. In the upper right hand corner of your screen under **Actions** select **Topology** then select **Publish**.



You will now see the **Publish Topology** window. Click on the **Next** button



You will now be at a window showing the databases associated with site. Click **Next**.



15. When complete you should see a window from Topology Builder stating that your topology was successfully published. Click the **Finish** button.

16. You will be at the Topology Builder main window, expand your site and double check that your PSTN entries are correct and that the appropriate Mediation Server has the PSTN gateway associated.

## Creating a route within the Skype Server infrastructure

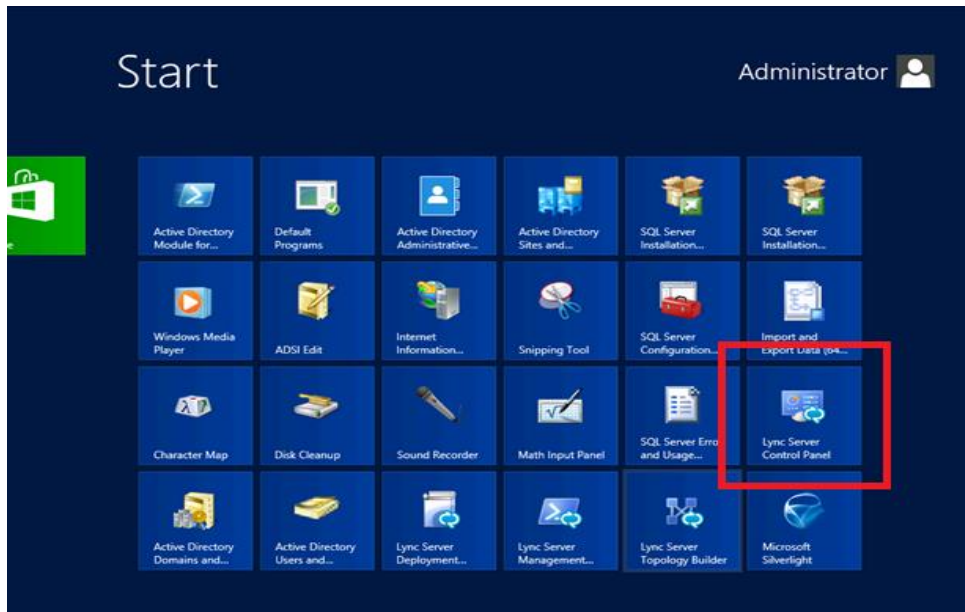
In order for the Lync Server Enterprise Voice clients to utilize the SIP trunking infrastructure that has been put in place, a route will need to be created to allow direction to this egress. Routes specify how Lync Server handles calls placed by enterprise voice users. When a user places a call, the server, if necessary, normalizes the phone number to the E.164 format and then attempts to match that phone number to a SIP Uniform Resource Identifier (URI). If the server is unable to make a match, it applies outgoing call routing logic based on the number. That logic is defined in the form of a separate voice route for each set of target phone numbers listed in the location profile for a locale. For this document we are only describing how to set up a route. Other aspects which apply to Lync Server Enterprise Voice deployments such as dial plans, voice policies, and PSTN usages are not covered.

To add the route we will need:

- Rights to administer Lync Server Control Panel
  - Membership in the CS Administrator Active Directory Group
- Access to the Lync Server Control Panel

The following process details the steps to create the route:

1. From the **Start** bar, select **Lync Server Control Panel**.

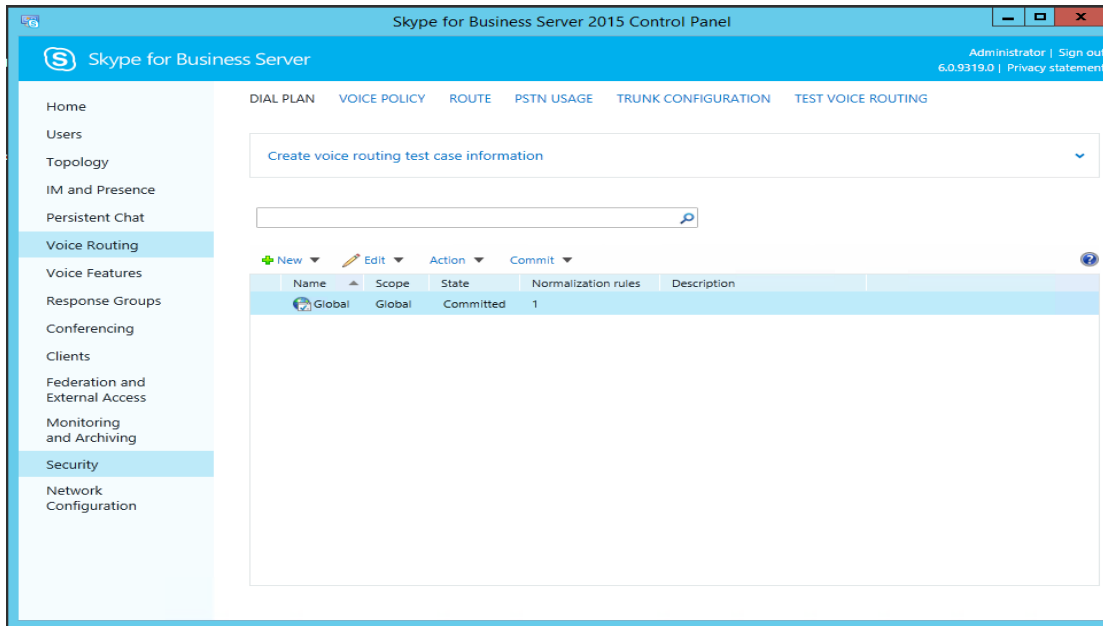


You will be prompted for credential, enter your domain username and password.

2. Once logged in, you will now be at the "Welcome Screen". On the left hand side of the window, click on **Voice Routing**.



3. The **Dial Plan** tab in the **Voice Routing** section will be displayed. On the content area toolbar, click **+New**.

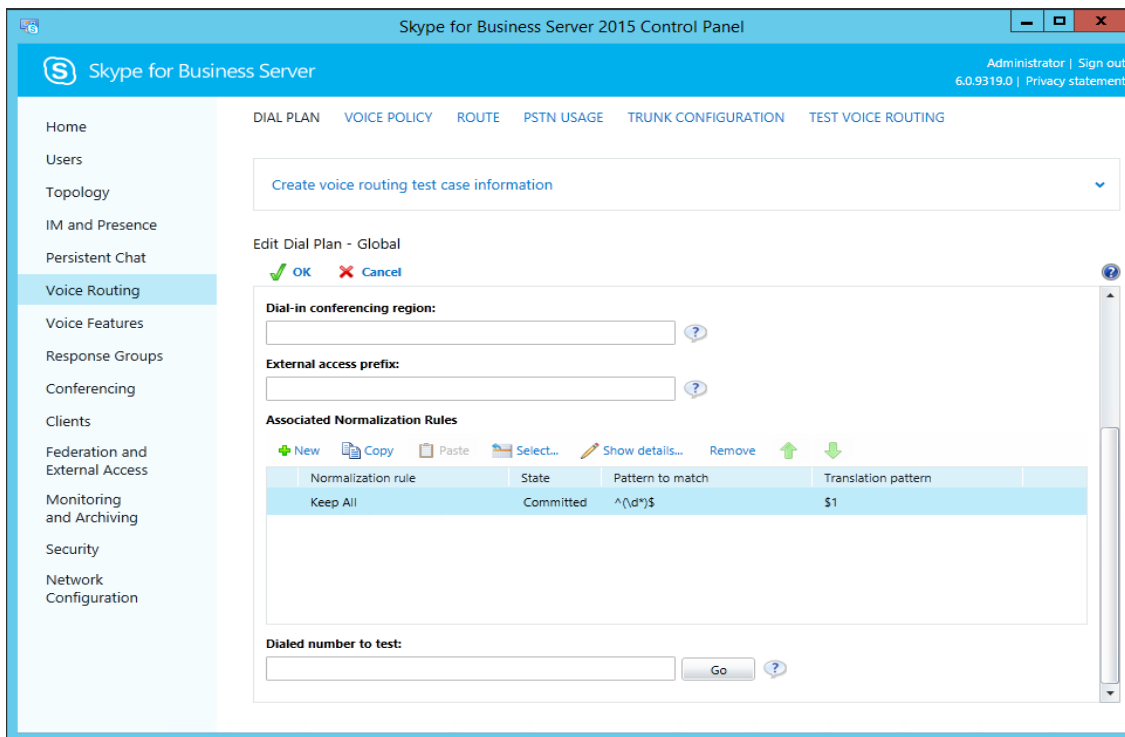


4. Next you build a Dial Plan and a translation rule for the phone numbers you want this route to handle. You have to create two separate dial plans for US and EMEA.

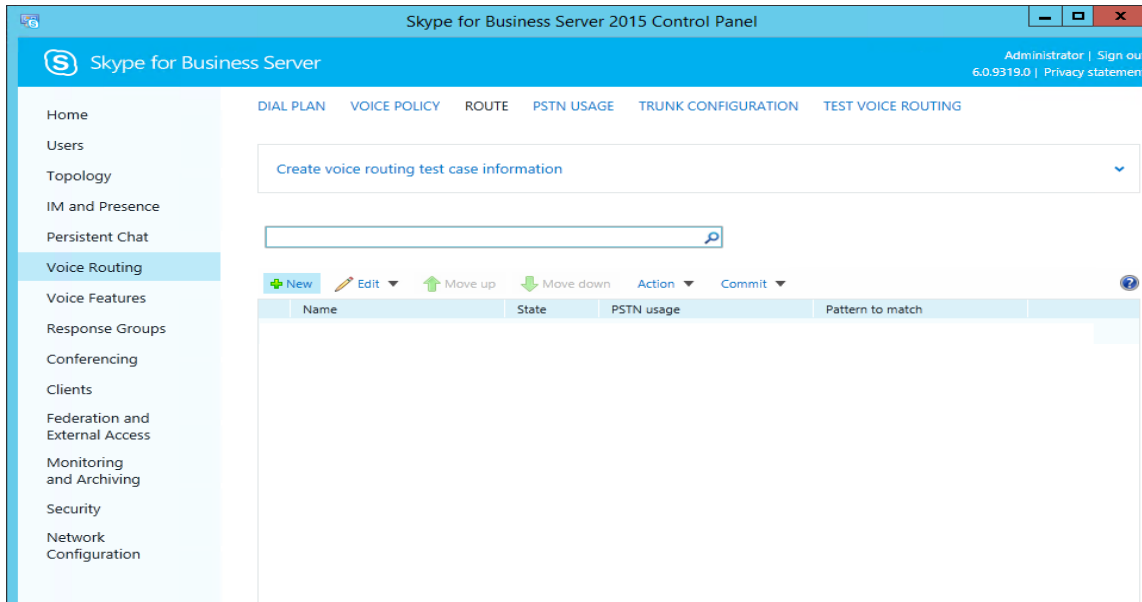
**US Dial-plan**

Match this pattern:  $\text{^\(d*\)$}$

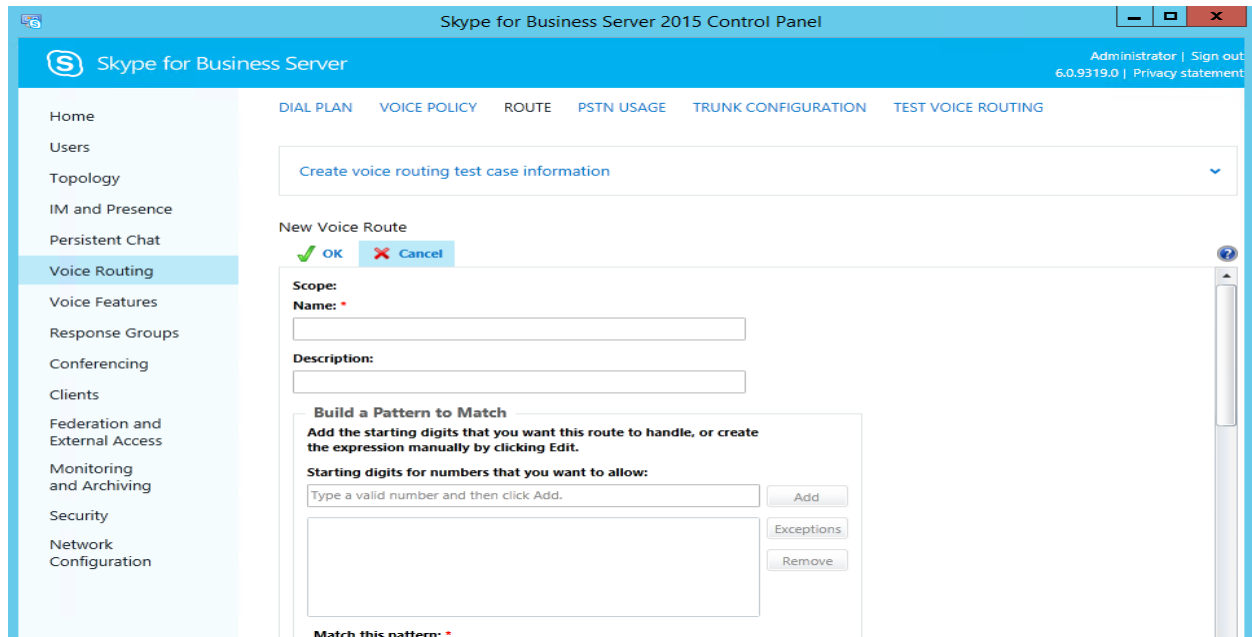
Translation rule: \$1



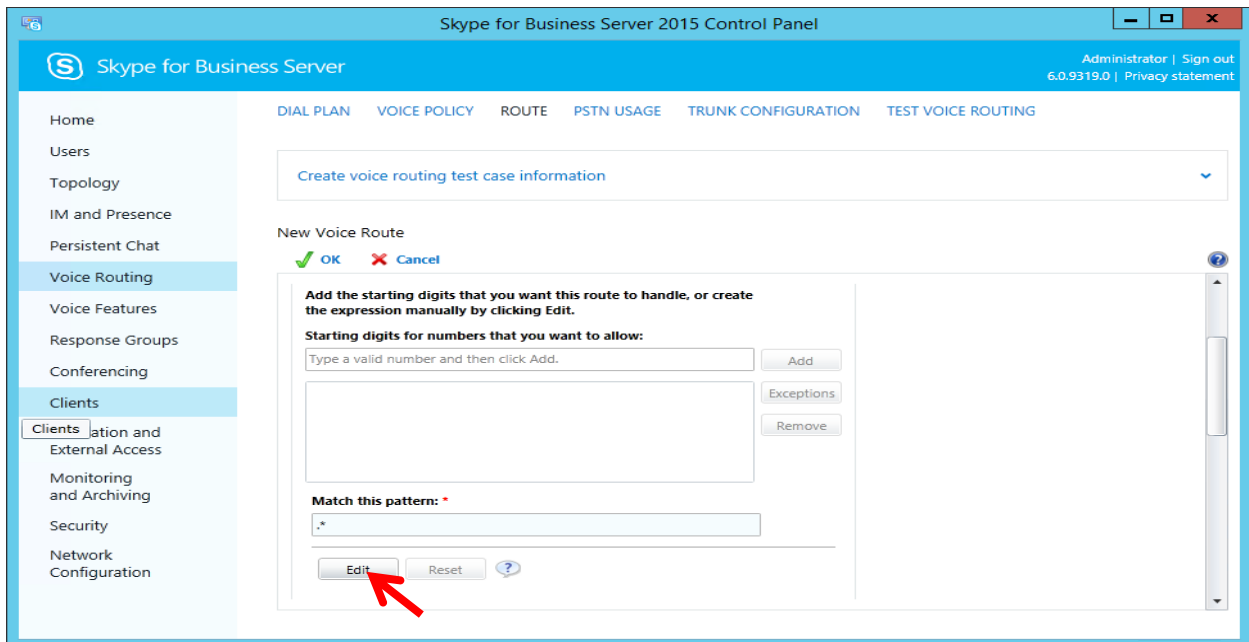
5. On the top row of the tabs, select **Route**. On the content area toolbar, click **+New**.



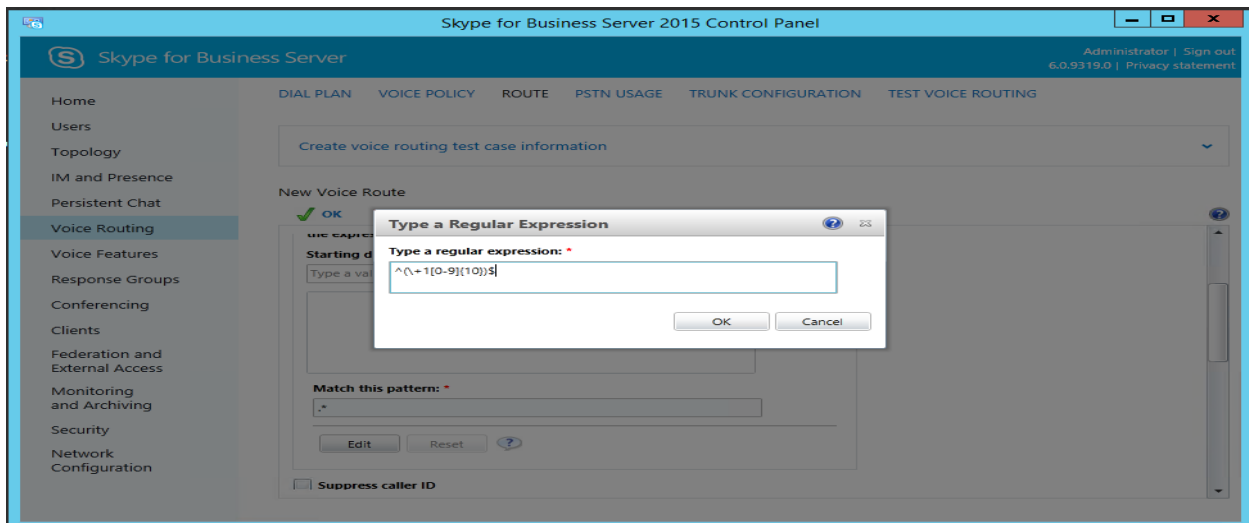
6. On the **New Voice Route** page, in the **Name** field, enter the name you have selected for the Route. In our example, it is US route.



7. Next you build a Pattern Match for the phone numbers you want this route to handle. Click **Edit**.



8. Enter the pattern for US - `^\(+1[0-9]{10})$` and click **OK**.



9. Next you want to associate the Voice Route with the **Trunk** you have just created. Scroll down to **Associated Trunks**, click on the **Add** button.

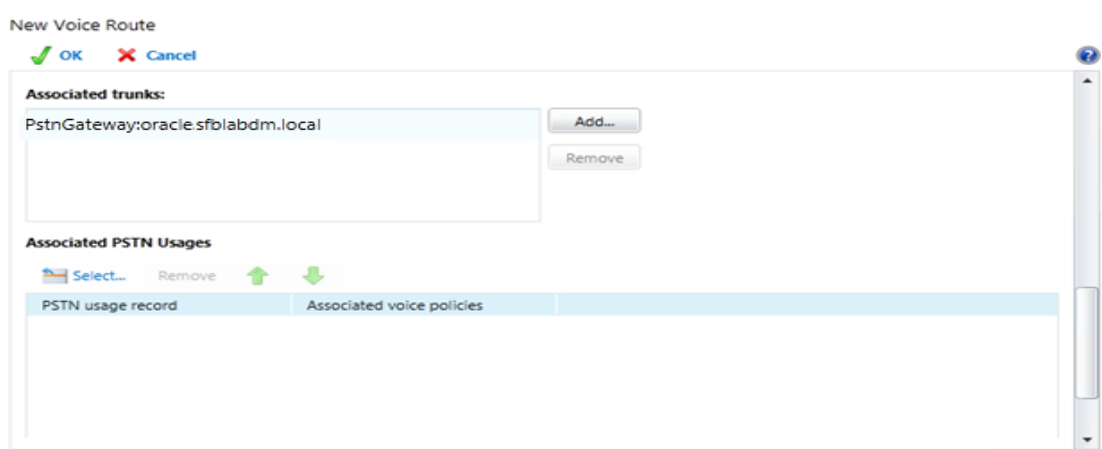
The screenshot shows the 'New Voice Route' configuration page in the Skype for Business Server management console. The left-hand navigation pane is visible, with 'Voice Routing' selected. The main content area has tabs for 'DIAL PLAN', 'VOICE POLICY', 'ROUTE', 'PSTN USAGE', 'TRUNK CONFIGURATION', and 'TEST VOICE ROUTING'. Below the tabs is a text input field for 'Create voice routing test case information'. The 'New Voice Route' section includes a green checkmark and 'OK' button, and a red 'X' and 'Cancel' button. A 'Match this pattern:' field contains the regular expression '^(\+1[0-9]{10})\$'. Below this are 'Edit', 'Reset', and a help icon buttons. There is a checkbox for 'Suppress caller ID' and an 'Alternate caller ID:' text field. At the bottom, the 'Associated trunks:' section has an empty list area with 'Add...' and 'Remove' buttons.

10. You will now be at a window showing available Trunks to associate your Voice Route. Click on the PSTN gateway that you just created and then click the **OK** button.

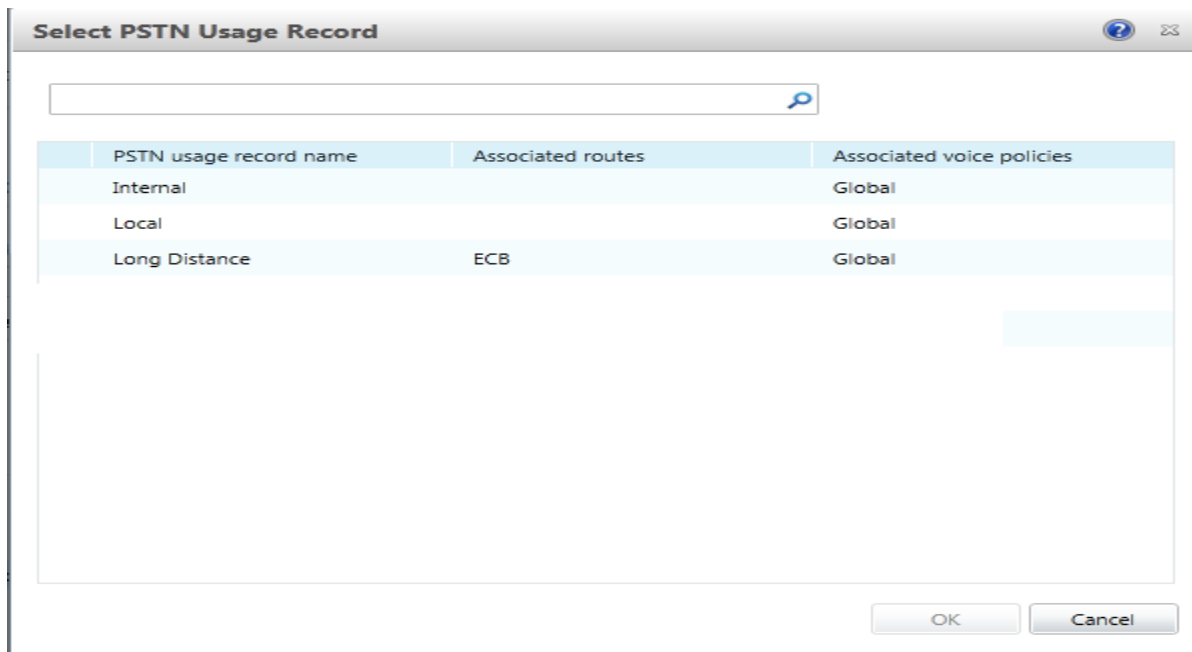
The screenshot shows a 'Select Trunk' dialog box with a search bar at the top. Below the search bar is a table with two columns: 'Service' and 'Site'. The table contains one entry: 'PstnGateway:oracle.sfb1abdm.local' under 'Service' and 'CleanDefaultTopology' under 'Site'. At the bottom of the dialog are 'OK' and 'Cancel' buttons.

Service	Site
PstnGateway:oracle.sfb1abdm.local	CleanDefaultTopology

- You can now see that you have associated your trunk with the route you created. An appropriate PSTN usage record will need to be assigned as well. In our example, we use one that was already created in the enterprise. Click on the **Select** button under **Associated PSTN Usages**.

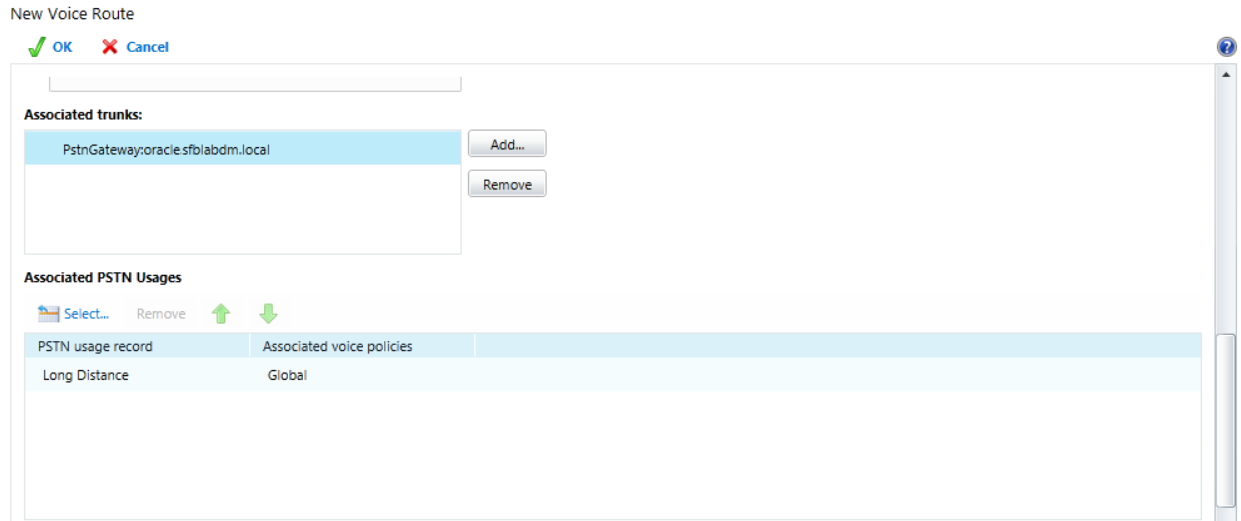


- In the **Select PSTN Usage Record** window displayed, select the appropriate PSTN Usage Record and click **OK**.

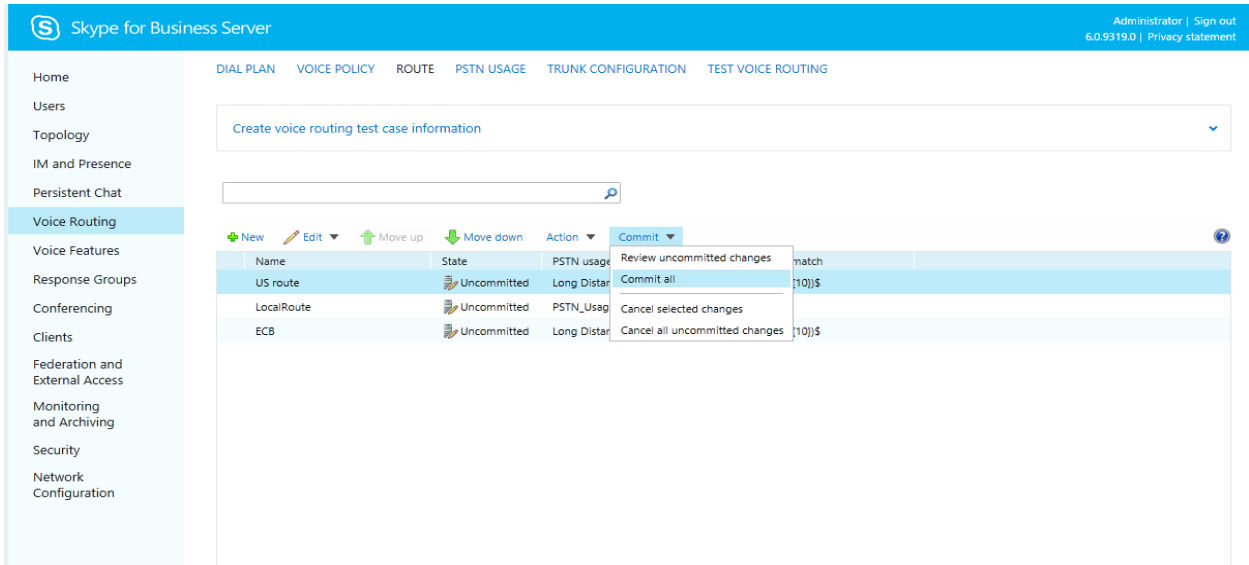




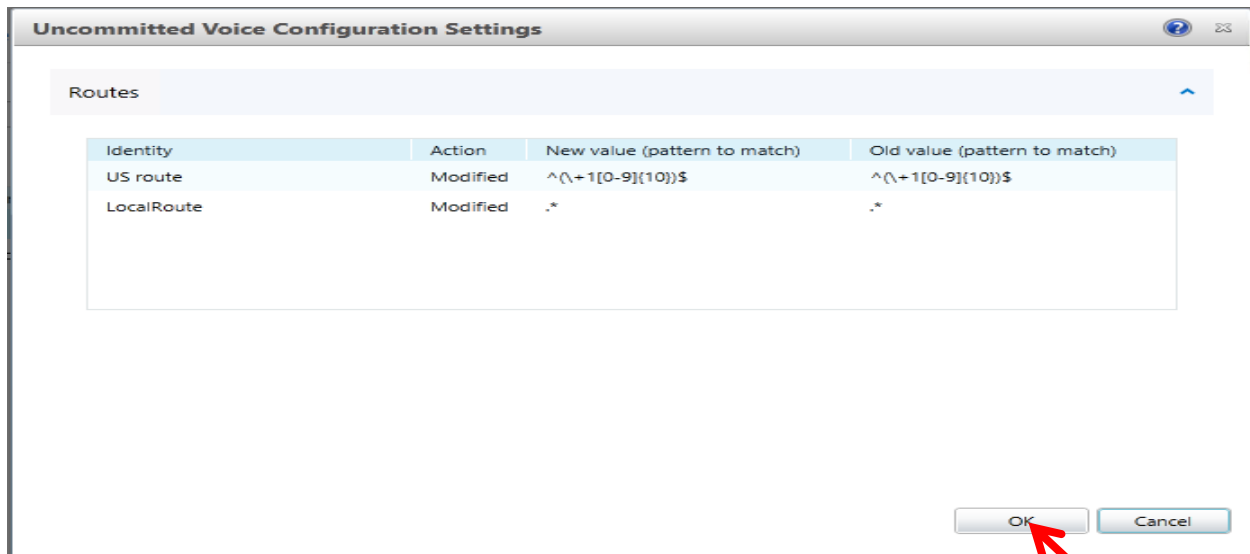
- You will now see the Associated PSTN Usages which you have added. Click the **OK** button at the top of the **New Voice Route** screen.



- You will now be at the Routes page showing the US route. Click the **Commit** drop-down menu, and then **Commit All**.



15. On the Uncommitted Voice Configuration Settings window, click OK.



If there are no errors, the new Voice Route has now been successfully created and the state will show as **Committed**.

### Additional Steps

There are other aspects to a Lync Server Enterprise Voice deployment such as

Site, local, and global dial plans

Voice Policies

Assigning Voice Policies to users

PSTN usage policies

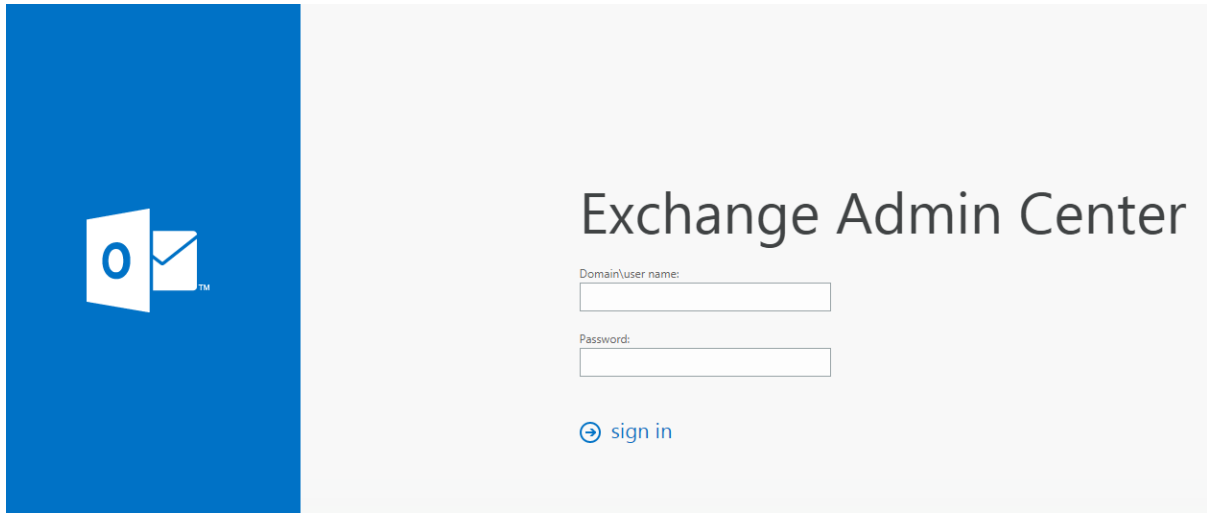
Refer to MSDN technet for relevant information.

## Phase 3 – Configuring Exchange for Oracle SBC

The enterprise will have a fully functioning Exchange Server infrastructure deployed. If no such infrastructure is available, one will have to be deployed.

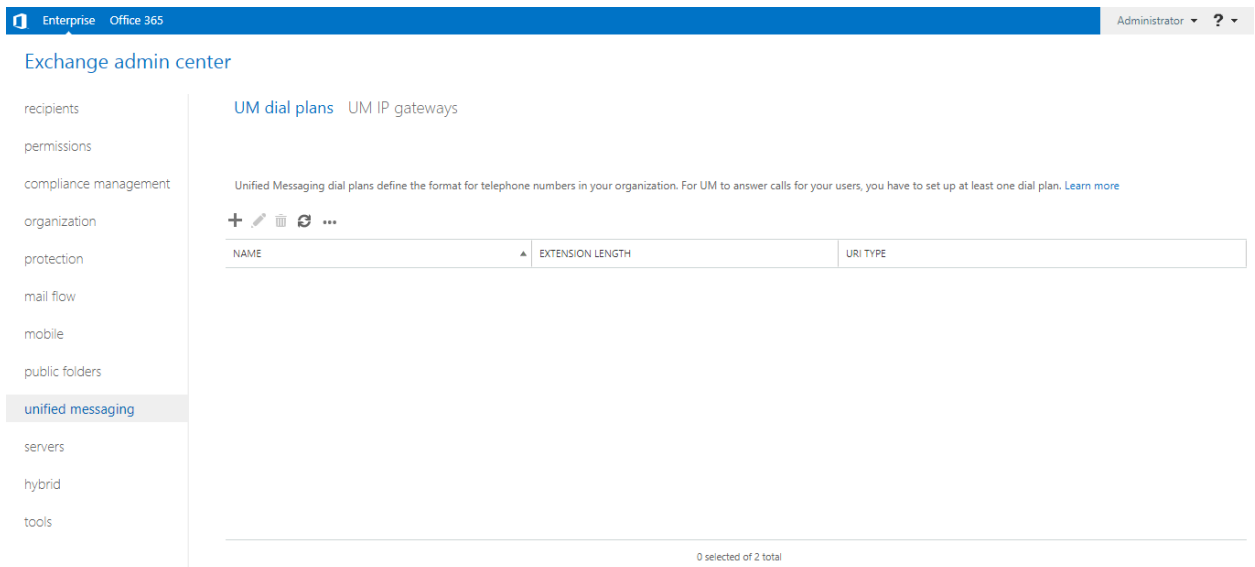
### Login to Exchange Control Panel

1. Open the Exchange control panel by entering the IP of the Exchange server on the web browser
2. Login to the Exchange control panel



### Dial Plan

1. Creating a UM dial plan
  - a. Navigate unified messaging and then select UM dial plans
  - b. Click add (+) button



- c. Configure dial plan as depicted and save.

### new UM dial plan

Use UM dial plans to manage the UM features for a group of users who are enabled for voice mail.  
[Learn more](#)

\*Name:

\*Extension length (digits):

\*Dial plan type:

\*VoIP security mode:

\*Audio language:

\*Country/Region code:

After you click Save, select this dial plan and click Edit to configure dial codes, Outlook Voice Access, voice mail settings, ...

d. Re-select the UM dial plan created and click edit

Enterprise Office 365 Administrator ?

### Exchange admin center

- recipients
- permissions
- compliance management
- organization
- protection
- mail flow
- mobile
- public folders
- unified messaging**
- servers
- hybrid
- tools

UM dial plans UM IP gateways

Unified Messaging dial plans define the format for telephone numbers in your organization. For UM to answer calls for your users, you have to set up at least one dial plan. [Learn more](#)

NAME	EXTENSION LENGTH	URI TYPE
dialplan1	4	Telephone extension

1 selected of 3 total

- e. Click configure button on the dial plan selected

dialplan1

Configure settings for this dial plan, including UM mailbox policies, auto attendants, and hunt groups.

**UM Dial Plan**

Name: dialplan1  
 Dial plan type: Telephone extension  
 Extension length (digits): 4

To configure dial codes, Outlook Voice Access, voice mail settings, and dialing rules for this dial plan, click Configure.

[configure](#)

**UM Mailbox Policies**

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NAME	MINIMUM PIN LENGTH
dialplan1 Default Policy	6

1 selected of 1 total

dialplan1

**general**

dial codes

Outlook Voice Access

settings

dialing rules

dialing authorization

transfer & search

UM dial plans are groups of users who are enabled for UM. They share common settings for greetings, prompts, audio language, and dialing codes for incoming and outgoing calls.

Name: dialplan1  
 Extension length (digits): 4  
 Dial plan type: Telephone extension  
 Audio language: English (United States)

VoIP security mode:

## Outlook Voice Access

1. Naviage to Outlook Voice Access and enter a voicemail Voicemail pilot number in the Outlook voice access number text box.

dialplan1

general  
dial codes  
▶ Outlook Voice Access  
settings  
dialing rules  
dialing authorization  
transfer & search

Add greetings and access numbers for Outlook Voice Access.

Welcome greeting:  
Default greeting

Informational announcement:  
<None>

Allow announcement to be interrupted

Outlook Voice Access numbers:

+

## Unified Messaging: Creating UM IP Gateway for the SBC

1. Navigate to Unified Messaging and select UM IP gateways
  - a. Click on the Add button to add the UM IP Gateway

Enterprise Office 365 Administrator ?

Exchange admin center

recipients  
permissions  
compliance management  
organization  
protection  
mail flow  
mobile  
public folders  
unified messaging  
servers  
hybrid  
tools

UM dial plans UM IP gateways

A UM IP gateway links UM to the physical IP gateway device or session border controller (SBC) so it can handle calls from your physical telephone system. [Learn more](#)

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NAME	ADDRESS	STATUS	OUTGOING CALLS ALLOWED	MESSAGE WAITING INDICATOR
------	---------	--------	------------------------	---------------------------

0 selected of 2 total

- b. Enter the SBC address and associate the dial plan created.

new UM IP gateway

UM IP gateways represent a physical session border controller (SBC), IP gateway, or IP PBX in Active Directory. You have to configure a UM IP gateway before UM can accept calls from the device.

\*Name:

\*Address:

UM dial plan:

Enterprise Office 365 Administrator ?

Exchange admin center

- recipients
- permissions
- compliance management
- organization
- protection
- mail flow
- mobile
- public folders
- unified messaging**
- servers
- hybrid
- tools

UM dial plans UM IP gateways

A UM IP gateway links UM to the physical IP gateway device or session border controller (SBC) so it can handle calls from your physical telephone system. [Learn more](#)

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NAME	ADDRESS	STATUS	OUTGOING CALLS ALLOWED	MESSAGE WAITING INDICATOR
Gateway to SBC	10.85.0.214	Enabled	Yes	On

0 selected of 3 total

## Recipients: Enabling Voicemail

1. Navigate Recipients select mailboxes
  - a. Select User and click on enable for unified messaging on the right under Phone and Voice Features  
*Enabling UM for USER will allow incoming calls to deposit voice mail.*

Enterprise Office 365 Administrator ?

### Exchange admin center

- recipients
- permissions
- compliance management
- organization
- protection
- mail flow
- mobile
- public folders
- unified messaging
- servers
- hybrid
- tools

mailboxes groups resources contacts shared migration

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DISPLAY NAME	MAILBOX TYPE	EMAIL ADDRESS
Administrator	User	Administrator@sflabskv.local

1 selected of 6 total

Title:  
 Office:  
 Work phone:  
 Phone and Voice Features  
 Unified Messaging: Disabled  
[Enable](#)  
 Mobile Devices  
[Disable Exchange ActiveSync](#)  
[Disable OWA for Devices](#)  
[View details](#)  
 In-Place Archive  
 Archiving: Disabled  
[Enable](#)

## Test Plan Executed

Following is the test plan executed against this setup and results have been documented below.

### IPv4/TCP

Test Case ID	Required	Automated	Description	M/A	Pass/Fail	Comments
<b>Test Case ID</b>						
408347	Y	Y	Skype for Business Client receives a call from PSTN End Point with G.711 A-law and/or G.711 U-law codecs	M	PASS	
408351	Y	Y	PSTN End Point places a call from Skype for Business Client on hold for 15 minutes and then resumes	M	PASS	
408348	Y	Y	PSTN End Point1 calls Skype for Business Client that forwards the call to PSTN End Point2	M	PASS	
408352	Y	Y	PSTN End Point calls Skype for	M	PASS	



			Business Client1 that performs Blind Transfer to Skype for Business Client2 with REFER			
408349	Y	N	PSTN End Point1 calls Skype for Business Client that escalates the call to a conference by inviting PSTN End Point2	M	PASS	
408350	Y	N	Device fails over incoming call to Mediation Server2 when Mediation Server1 sends 503 Service Unavailable response	M	PASS	
<b>Basic Inbound Calls</b>						
408083	Y	N	Skype for Business Client1 calls PSTN End Point, Skype for Business Client1 parks the call and retrieves it on Skype for Business Client2	M	PASS	
408070	Y	Y	PSTN End Point calls Skype for Business Client and hangs up while Skype for Business Client is still ringing	M	PASS	
408084	Y	N	PSTN End Point calls Skype for Business Client that later parks the call but does not retrieve it	M	PASS	

408111	Y	N	PSTN End Point1 calls Skype for Business Client that is set to simultaneous ring to IVR number on a PSTN endpoint	M	PASS	
408080	Y	N	Device is able to process 414 Request-URI Too Long response from the Mediation Server.	A	PASS	Executed with LIT tool.
<b>Basic Outbound Calls</b>						
408065	Y	Y	Device is capable of handling non-E.164 numbers in the outbound Request URI.	M	PASS	
408085	Y	Y	Device establishes call to Skype for Business Client with configured value of ptime	M	PASS	
408063	Y	Y	Device generates 603 Decline response for a call rejected by PSTN End Point	A	PASS	
408078	Y	Y	Device handles call from Mediation Server with an alias name in the FROM header	A	PASS	Executed with LIT tool.
408075	Y	Y	Device is able to disconnect a call that is forked to Skype for Business Clients set to 'Do not disturb'	M	PASS	
408087	Y	Y	Device negotiates Comfort Noise in a call from Skype for Business Client	M	PASS	

			to PSTN End Point			
408073	Y	Y	Device processes call from Skype for Business Client with E.164 number in FROM Header URI.	M	PASS	
408088	Y	Y	Device sends Comfort Noise packets to Skype for Business Client when a call is muted	M	PASS	
408071	Y	Y	Device processes phone-context in Request and To URI from Skype for Business Client	A	PASS	Executed with LIT tool.
408076	Y	Y	Device sends single media description line for a call from PSTN End Point to Skype for Business Client	M	PASS	
408066	Y	Y	Skype for Business Client calls PSTN End Point and hangs up before receiving 200 OK from Device	M	PASS	
408062	Y	Y	Skype for Business Client calls PSTN End Point with a call duration longer than 32 seconds	M	PASS	
408077	Y	Y	Skype for Business Client calls an IVR number and navigates through the IVR menu after call connection.	M	PASS	

408074	Y	Y	Skype for Business Client response to PSTN End Point is delayed due to network delay	A	PASS	Executed with LIT tool.
408072	Y	Y	Skype for Business Client sends INVITE with E.164 number and extension in Request and To URI	A	PASS	Executed with LIT tool.
408082	Y	Y	PSTN End Point calls Skype for Business Client1, Skype for Business Client1 parks the call and retrieves it on Skype for Business Client2	M	PASS	
408081	Y	Y	Mediation Server renegotiates an existing voice session with a different IP address	A	PASS	Executed with LIT tool.
408069	Y	Y	PSTN End Point can disconnect an established call originated by the Skype for Business Client	M	PASS	
408068	Y	Y	PSTN End Point can disconnect an established call to Skype for Business Client	M	PASS	
408067	Y	Y	PSTN End Point displays Skype for Business Client Caller ID for Outbound Call	M	PASS	
<b>Codecs</b>						
408101	Y	Y	Device offers	M	PASS	

			DTMF payload type in the range of 96-127 to Mediation Server			
408092	Y	Y	Skype for Business Client is able to establish a call with PSTN End Point using G.711 A-law codec	M	PASS	
408086	Y	Y	Skype for Business Client makes a call to PSTN End Point with G.711 A-law and/or G.711 U-law codecs	M	PASS	
408114	Y	Y	Skype for Business Client makes a call to PSTN End Point with G.711 U-law codec	M	PASS	
408119	Y	Y	Skype for Business Client receives a call from PSTN End Point with G.711 U-law codecs	M	PASS	
408090	Y	Y	PSTN End Point is able to establish a call with Skype for Business Client using G.711 A-law codec	M	PASS	
<b>Early Media</b>						
408112	Y	Y	Device sends PRACK for reliable Early Media for a call from PSTN End Point to Skype for Business Client	M	PASS	
408064	Y	Y	Skype for Business Client calls IVR number	M	PASS	

			and navigates through the IVR menu before call Connection			
408106	Y	Y	Skype for Business Client hears Early Media for a call to PSTN End Point	M	PASS	
<b>RTP-RTCP</b>						
408104	Y	Y	Device does not change the SSRC of an established inbound RTP session	M	PASS	
408100	Y	Y	Device does not change the SSRC of an established outbound RTP session	M	PASS	
408093	Y	Y	Device is capable of handling multiple provisional responses with SDP (Multiple Forking)	M	PASS	
408103	Y	Y	Device may send RTCP sender and receiver reports	M	PASS	
408097	Y	Y	Device sends RTCP packets when Skype for Business Client places call on hold	M	PASS	
408128	Y	Y	Device sends RTCP packets while playing music on hold	M	PASS	
<b>Simultaneous Ringing</b>						
408109	Y	Y	Device disconnects a forked call if PSTN End Point hangs up while phones are ringing	M	PASS	

408079	Y	Y	PSTN End Point1 calls Skype for Business Client that is set to simultaneous ring to Skype for Business Client and PSTN End Point2 answers	M	PASS	
Device Initiated Hold						
408225	Y	Y	PSTN End Point places a call to Skype for Business Client on hold for 15 minutes and then resumes (Media Bypass OFF)	M	PASS	
MOH						
408231	Y	Y	Skype for Business Client plays music when it holds call from PSTN End Point to Skype for Business Client	M	PASS	
Server Initiated Hold						
408234	Y	Y	Skype for Business Client places a call from PSTN End Point on hold for 15 minutes and then resumes	M	PASS	
408229	Y	Y	Skype for Business Client places a call to PSTN End Point on hold and resumes after 12 minutes	M	PASS	
408227	Y	Y	Skype for Business Client resumes call to PSTN End Point after playing	M	PASS	

			music on hold for 15 minutes			
<b>Call Forward Unconditional</b>						
408207	Y	Y	PSTN End Point1 calls Skype for Business Client that forwards all calls to PSTN End Point2 when Media Bypass OFF.	M	PASS	
<b>Blind Transfer</b>						
408258	Y	Y	Device generates INVITE with Replaces and Referred-By headers when it receives a REFER request	M	PASS	
408254	Y	Y	Device includes REFER in ALLOW header in INVITE sent to Mediation Server	M	PASS	
408259	Y	Y	Device maintains the original session when rejecting a call transfer with REFER	M	PASS	
408257	Y	Y	Device supports Hairpin Elimination for Blind Transfer with REFER	M	PASS	
408255	Y	Y	PSTN End Point1 calls Skype for Business Client and Skype for Business Client Blinds Transfers the call to PSTN End Point2	M	PASS	
<b>Consultative transfer</b>						



408263	Y	Y	Device does not drop the call when Consultative Transfer by Skype for Business Client to second PSTN End Point fails	M	PASS	
408264	Y	Y	Device supports Hairpin Elimination for Consultative Transfer with REFER	M	PASS	
408261	Y	Y	PSTN End Point1 calls Skype for Business Client and Skype for Business Client Consultative Transfers to PSTN End Point2	M	PASS	
<b>Conference</b>						
408213	Y	N	Skype for Business Client1 calls Skype for Business Client2 and escalates the call to a conference, inviting PSTN End Point and later removing it	M	PASS	
408214	Y	N	PSTN End Point establishes a call with the Conference Auto Attendant	M	PASS	
<b>Load Balancing</b>						
408309	Y	N	Device distributes new calls among DNS configured Mediation Servers	M	PASS	
408311	Y	N	Device honors TTL when distributing new calls among DNS	M	PASS	

			configured Mediation Servers			
<b>Failover and Routing</b>						
408286	Y	Y	Device responds to OPTIONS as keep alive to Mediation Server over TCP	M	PASS	
408289	Y	N	Device resumes sending calls to Mediation Server when it starts receiving OPTIONS response from that Mediation Server	M	PASS	
408287	Y	Y	Device sends periodic OPTIONS message as keep alive to Mediation Server	M	PASS	
408291	Y	N	PSTN End Point establishes a call with Skype for Business Client when interface of Mediation Server1 goes down	M	PASS	
408293	Y	N	Device fails over incoming call to a second Mediation Server when the first Mediation Server does not respond	M	PASS	
408306	Y	N	Device utilizes failover and does not offer new calls to a failed Mediation Server	M	PASS	
<b>Anonymous Caller Representation</b>						
408058	Y	Y	PSTN End Point calls Skype for Business Client with Caller ID set	M	PASS	

			to 'Anonymous' on Device			
<b>Mapping and Error handling</b>						
408321	Y	Y	Device disconnects call when Mediation Server sends 408 Request Timeout for call from PSTN End Point	A	PASS	Executed with LIT tool.
408327	Y	Y	Device disconnects call when Mediation Server sends 501 Not Implemented for call from PSTN End Point	A	PASS	Executed with LIT tool.
408328	Y	Y	Device disconnects call when Mediation Server sends 606 Not Acceptable for call from PSTN End Point	A	PASS	Executed with LIT tool.
408325	Y	Y	Device generates 486 Busy Here response from a busy PSTN End Point	A	PASS	
408324	Y	Y	Device handles call from Skype for Business Client to a user that does not exist in the domain	A	PASS	Executed with LIT tool.
408326	Y	Y	Device processes 486 Busy Here response from a busy Skype for Business Client	A	PASS	
408317	Y	Y	Device processes 488 Not Acceptable Here response for unsupported codec from	A	PASS	

			Mediation Server			
408323	Y	Y	Device processes 603 Decline response from Skype for Business Client	A	PASS	
408329	Y	Y	Device responds with 488 Not Acceptable Here when Mediation Server offers a codec unsupported on the device	A	PASS	
408315	Y	Y	Device sends 414 Request-URI Too Long when unable to handle very long Request URI	A	PASS	Executed with LIT tool.
438961	Y	Y	Reason headers are included for all 4xx, 5xx and 6xx responses	M	PASS	
438951	Y	N	Reason headers are included for all BYE requests	M	PASS	
438956	Y	N	Reason headers are included for all CANCEL requests	M	PASS	
<b>Media QoS Marking Remediation</b>						
466206	Y	N	Inbound Call QoS Remediation	M	PASS	
466207	Y	N	Outbound Call QoS Remediation	M	PASS	

#### IPv4/TLS

Test Case ID	Required	Automated	Description	M/A	Pass/Fail	Comments
<b>Basic Calls</b>						
408282	Y	N	Device accepts Mediation Server 'pool' certificate for a secure call	M	PASS	

428361	Y	N	Device offers Device pool certificate for a secure call	M	PASS	
<b>Basic Inbound Calls</b>						
408127	Y	Y	Device adds at least one "crypto" attribute for each media description line in the SDP	M	PASS	
408117	Y	Y	Device handles 488 Not Acceptable Here response from the Mediation Server operating in RTP only mode	M	PASS	
408124	Y	Y	Device sends Crypto attributes in SDP for call from PSTN End Point to Skype for Business Client	M	FAIL	MKI length, SRTP and SRTCP packet life timer are absent in the Crypto attribute
408118	Y	Y	Device sends its own FQDN in contact header for TLS call from Skype for Business Client to PSTN End Point	M	PASS	
408115	Y	Y	Mediation Server that requires SRTP rejects call from Device that supports RTP only	M	PASS	
408125	Y	Y	PSTN End Point calls Skype for Business Client with security enabled and Skype for Business Client later hangs up	M	PASS	
<b>Basic Outbound calls</b>						

408089	Y	N	Device sends Comfort Noise packets to Skype for Business Client when secure call is muted	M	PASS	
408116	Y	Y	Device that supports SRTP only rejects call from Skype for Business Client that supports RTP Only	M	PASS	
408099	Y	Y	Device with RTP only setting rejects call from Skype for Business Client that requires SRTP	M	PASS	
433140	Y	N	Skype for Business Client makes a secure call to an IVR and pastes a string of conference ID digits which are recognized by the Device and IVR	M	PASS	
408098	Y	Y	Skype for Business Client makes a secure call to an IVR number and navigates through the IVR menu after receiving 200 OK from Device	M	PASS	
Early Media						
408113	Y	Y	Device sends PRACK for reliable Early Media for call from PSTN End Point to Skype for Business Client with SRTP Optional	M	PASS	
RTP-RTCP						

408126	Y	Y	Device does not change the SSRC of an established inbound SRTP session	M	PASS	
408123	Y	Y	Device does not change the SSRC of an established outbound SRTP session	M	PASS	
408105	Y	N	Device sends SRTCP sender and receiver reports for a secure call	M	PASS	
TLS/SRTP						
408110	Y	Y	Device disconnects a forked secure call if PSTN End Point hangs up while phones are ringing	M	PASS	
408094	Y	Y	Device handles multiple SRTP streams for a secure call to Skype for Business Client	M	PASS	
408107	Y	Y	Skype for Business Client hears Early Media for a secure call to PSTN End Point	M	PASS	
408108	Y	Y	Skype for Business Client hears Early Media for a secure call to PSTN End Point when Media Bypass OFF	M	PASS	
408129	Y	Y	Skype for Business Client makes a secure call to PSTN End Point	M	PASS	
408122	Y	Y	Skype for Business Client makes a secure call to PSTN End Point	M	PASS	

			and PSTN End Point later hangs up			
408130	Y	Y	Skype for Business Client makes a secure call to PSTN End Point with call duration more than 32 seconds and SRTP set to Optional	M	PASS	
428537	Y	N	Skype for Business Client places a secure call to PSTN End Point and call is up for more than 30 minutes with session timer enabled on Device	M	PASS	
439173	Y	N	Skype for Business Client places a secure call to PSTN End Point and call is up for more than 30 minutes with session timer enabled on Device (Media Bypass OFF)	M	PASS	
408091	Y	Y	PSTN End Point is able to establish a secure call with Skype for Business Client using G.711 A-law codec	M	PASS	
408120	Y	Y	Skype for Business Client receives a secure call with G.711 U-law codec with Media Bypass OFF	M	PASS	
<b>Hold-Resume</b>						
408235	Y	Y	PSTN End Point places a secure	M	PASS	



			call from Skype for Business Client on hold and then resumes			
408224	Y	Y	PSTN End Point places a secure call to Skype for Business Client on hold and resumes after 15 minutes	M	PASS	
<b>Server Initiated Hold</b>						
428506	Y	N	Skype for Business Client places secure call to PSTN End Point on hold after 30 minutes and then resumes	M	PASS	
439169	Y	N	Skype for Business Client places secure call to PSTN End Point on hold after 30 minutes and then resumes (Media Bypass OFF)	M	PASS	
<b>Call forward</b>						
408206	Y	Y	PSTN End Point1 makes a secure call to Skype for Business Client that forwards the call to PSTN End Point2 with Media Bypass OFF	M	PASS	
408205	Y	Y	PSTN End Point1 makes a secure call to Skype for Business Client that has call forwarded to PSTN End Point2	M	PASS	
<b>Transfer</b>						
408260	Y	Y	Device supports Hairpin Elimination for	M	PASS	

			secure Blind Transfer with REFER			
408256	Y	Y	PSTN End Point1 makes a secure call to Skype for Business Client and Skype for Business Client Blinds Transfers the call to PSTN End Point2	M	PASS	
<b>Consultative transfer</b>						
408265	Y	Y	Device supports Hairpin Elimination for secure Consultative Transfer with REFER	M	PASS	
408262	Y	Y	PSTN End Point1 makes a secure call to Skype for Business Client and Skype for Business Client Consultative Transfers to PSTN End Point2	M	PASS	
<b>Failover and Routing</b>						
408288	Y	Y	Device responds to OPTIONS as keep alive to Mediation Server over TLS	M	PASS	
408285	Y	N	Device uses load balancing to distribute secure inbound calls among Mediation Servers in a cluster	M	PASS	
<b>Mapping and Routing</b>						
408322	Y	Y	Device processes 603 Decline from Skype for Business	M	PASS	

			Client for a secure call			
--	--	--	--------------------------	--	--	--

### IPv6/TCP/TLS

Test Case ID	Required	Automated	Description	M/A	Pass/Fail	Comments
<b>Basic Inbound Calls</b>						
408162	Y	Y	Device sends PRACK for reliable Early Media for a call from PSTN End Point to Skype for Business Client. (Media Bypass OFF) (IPv6)	M	PASS	
408153	Y	Y	PSTN End Point calls Skype for Business Client1, Skype for Business Client1 parks the call and retrieves it on Skype for Business Client2. (Media Bypass OFF) (IPv6)	M	PASS	
408148	Y	Y	PSTN End Point1 calls Skype for Business Client that is set to simultaneous ring to Skype for Business Client and PSTN End Point2 answers. (Media Bypass OFF) (IPv6)	M	PASS	
408155	Y	N	PSTN End Point calls Skype for Business Client that later parks the call but does not retrieve it. (Media Bypass	M	PASS	

			OFF) (IPv6)			
<b>RTP-RTCP</b>						
408164	Y	Y	Device may send RTCP sender and receiver reports. (Media Bypass OFF) (IPv6)	M	PASS	
408166	Y	N	Device sends SRTCP sender and receiver reports for a secure call. (Media Bypass OFF) (IPv6)	M	PASS	
<b>Simultaneous Ringing</b>						
408159	Y	Y	Device disconnects a forked call if PSTN End Point hangs up while phones are ringing. (Media Bypass OFF) (IPv6)	M	PASS	
<b>TLS/SRTP</b>						
408160	Y	Y	Device disconnects a forked secure call if PSTN End Point hangs up while phones are ringing. (Media Bypass OFF) (IPv6)	M	PASS	
<b>Blind Transfer</b>						
408273	Y	N	PSTN End Point calls Skype for Business Client1 that performs Blind Transfer to Skype for Business Client2 with REFER. (Media Bypass OFF) (IPv6)	M	PASS	
408268	Y	Y	PSTN End Point1	M	PASS	

			makes a secure call to Skype for Business Client and Skype for Business Client Blinds Transfers the call to PSTN End Point2. (Media Bypass OFF) (IPv6)			
<b>Consultative transfer</b>						
408275	Y	Y	PSTN End Point1 makes a secure call to Skype for Business Client and Skype for Business Client Consultative Transfers to PSTN End Point2. (Media Bypass OFF) (IPv6)	M	PASS	
<b>Conference</b>						
408216	Y	N	Skype for Business Client1 calls Skype for Business Client2 and escalates the call to a conference, inviting PSTN End Point and later removing it. (Media Bypass OFF) (IPv6)	M	PASS	

#### Exchange Unified Messaging (On-Premise)

Test Case ID	Required	Automated	Description	M/A	Pass/Fail	Comments
<b>Mailbox and Voicemail</b>						
465403	Y	N	Mailbox login from public phone (On-Premises)	M	PASS	
465404	Y	N	Mailbox navigation using VUI (On-Premises)	M	PASS	
465405	Y	N	Mailbox	M	PASS	

			navigation using TUI (On-Premises)			
465406	Y	N	Leave Voicemail from an internal extension (On-Premises)	M	PASS	
465407	Y	N	Leave Voicemail from an external extension (On-Premises)	M	PASS	
465408	Y	N	Inbound call handled by Auto Attendant (On-Premises)	M	PASS	
<b>Outlook Web Access (OWA) Play-On-Phone Feature</b>						
465417	Y	N	Voicemail using OWA's Play-On-Phone feature to an external extension (On-Premises)	M	PASS	
465416	Y	N	Voicemail using OWA's Play-On-Phone feature to a user's extension (On-Premises)	M	PASS	
<b>Call Transfer with Directory Search</b>						
465410	Y	N	Call transferred to search target (On-Premises)	M	PASS	
465411	Y	N	Call transferred to search target busy voicemail (On-Premises)	M	PASS	
465412	Y	N	Call transferred to search target no-answer voicemail (On-Premises)	M	PASS	
465413	Y	N	Call transferred to search default target (On-Premises)	M	PASS	
<b>FAX</b>						
465683	Y	N	Device supports FAX (On-Premises)	M	PASS	

Message Waiting Indicator (MWI)						
465792	Y	N	MWI Lamp on PBX phone lights up (On-Premises)	M	PASS	
465793	Y	N	MWI Lamp on PBX phone turns off (On-Premises)	M	PASS	
SIP Diversion Headers						
465798	Y	N	Check Voicemail Button (On-Premises)	M	PASS	Since it is a direct call from the user to his mailbox, SIP INVITE will not contain Diversion information
465799	Y	N	Call Forward to other UM-Enabled user (On-Premises)	M	PASS	The scenario was executed as follows: External user calling IP PBX extension 1 who Call Forward All Calls to PBX extension 2 and reached external user reached PBX extension 2's mailbox

#### Exchange Unified Messaging (On-Line)

Test Case ID	Required	Automated	Description	M/A	Pass/Fail	Comments
Mailbox and Voicemail						
465693	Y	N	Mailbox login	M	PASS	

			from public phone (On-Line)			
465694	Y	N	Mailbox navigation using VUI (On-Line)	M	PASS	
465695	Y	N	Mailbox navigation using TUI (On-Line)	M	PASS	
465696	Y	N	Leave Voicemail from an internal extension (On-Line)	M	PASS	
465697	Y	N	Leave Voicemail from an external extension (On-Line)	M	PASS	
465698	Y	N	Inbound call handled by Auto Attendant (On-Line)	M	PASS	
<b>Outlook Web Access (OWA) Play-On-Phone Feature</b>						
465706	Y	N	Voicemail using OWA's Play-On-Phone feature to an external extension (On-Line)	M	PASS	
465705	Y	N	Voicemail using OWA's Play-On-Phone feature to a user's extension (On-Line)	M	PASS	
<b>Call Transfer with Directory Search</b>						
465700	Y	N	Call transferred to search target (On-Line)	M	PASS	
465701	Y	N	Call transferred to search target busy voicemail (On-Line)	M	PASS	
465702	Y	N	Call transferred to search target no-answer voicemail (On-Line)	M	PASS	



465703	Y	N	Call transferred to search default target (On-Line)	M	PASS	
FAX						
465708	Y	N	Device supports FAX (On-Line)	M	PASS	
SIP Diversion Headers						
465801	Y	N	Check Voicemail Button (On-Line)	M	PASS	Since it is a direct call from the user to his mailbox, there is no Diversion information
465802	Y	N	Call Forward to other UM-Enabled user (On-Line)	M	PASS	The scenario was executed as follows: External user calling IP PBX extension 1 who Call Forward All Calls to PBX extension 2 and reached external user reached PBX extension 2's mailbox



## Troubleshooting Tools

If you find that you are not able to complete calls or have problems with the test cases, there are a few tools available for Windows Server, Lync Server, and the Oracle SBC like logging and tracing which may be of assistance. In this section we will provide a list of tools which you can use to aid in troubleshooting any issues you may encounter.

Since we are concerned with communication between the Lync Server mediation server and the SBC we will focus on the troubleshooting tools to use between those devices if calls are not working or tests are not passing.

### Microsoft Network Monitor (NetMon)

NetMon is a network protocol analyzer which is freely downloadable from Microsoft. It can be found at [www.microsoft.com/downloads](http://www.microsoft.com/downloads). NetMon could be installed on the Lync Server mediation server, the Lync Server Standard Edition server, or Enterprise Edition front end server.

### Wireshark

Wireshark is also a network protocol analyzer which is freely downloadable from [www.wireshark.org](http://www.wireshark.org). Wireshark could be installed on the Lync Server mediation server, the Lync Server Standard Edition server, or MCS Enterprise Edition front end server.

### Eventviewer

There are several locations in the event viewer where you can find valuable information to aid in troubleshooting issues with your deployment.

With the requirement that there is a completely functioning Lync Server with Enterprise Voice deployment in place, there are only a few areas in which one would use the Event Viewer for troubleshooting:

- The Enterprise Voice client;
- The Lync Server Front End server;
- A Lync Server Standard Edition Server; and
- A Lync Server Mediation Server.

### On the Oracle SBC 4600 Series

The Oracle SBC provides a rich set of statistical counters available from the ACLI, as well as log file output with configurable detail. The follow sections detail enabling, adjusting and accessing those interfaces.

#### Resetting the statistical counters, enabling logging and restarting the log files.

At the SBC Console:

```
oraclesbc1# reset sipd
oraclesbc1# notify sipd debug
oraclesbc1#
enabled SIP Debugging
oraclesbc1# notify all rotate-logs
```

### Examining the log files

**Note:** You will FTP to the management interface of the SBC with the username user and user mode password (the default is "acme").

```
C:\Documents and Settings\user>ftp 192.168.5.24
Connected to 192.168.85.55.
220 oraclesbc1FTP server (VxWorks 6.4) ready.
User (192.168.85.55:(none)): user
331 Password required for user.
Password: acme
```

```
230 User user logged in.
ftp> cd /ramdrv/logs
250 CWD command successful.
ftp> get sipmsg.log
200 PORT command successful.
150 Opening ASCII mode data connection for '/ramdrv/logs/sipmsg.log' (3353
bytes).
226 Transfer complete.
ftp: 3447 bytes received in 0.00Seconds 3447000.00Kbytes/sec.
ftp> get log.sipd
200 PORT command successful.
150 Opening ASCII mode data connection for '/ramdrv/logs/log.sipd' (204681
bytes).
226 Transfer complete.
ftp: 206823 bytes received in 0.11Seconds 1897.46Kbytes/sec.
ftp> bye
221 Goodbye.
```

You may now examine the log files with the text editor of your choice.

### Through the Web GUI

You can also check the display results of filtered SIP session data from the Oracle Enterprise Session Border Controller, and provides traces in a common log format for local viewing or for exporting to your PC. Please check the “Monitor and Trace” section (page 145) of the Web GUI User Guide available at [http://docs.oracle.com/cd/E56581\\_01/index.htm](http://docs.oracle.com/cd/E56581_01/index.htm)

### Telnet

Since we are working within an architecture which uses bound TCP listening ports for functionality, the simplest form of troubleshooting can be seeing if the devices are listening on a particular port, as well as confirming that there is nothing blocking them such as firewalls. Ensure that you have a TELNET client available on a workstation as well as on the Lync Server mediation server.

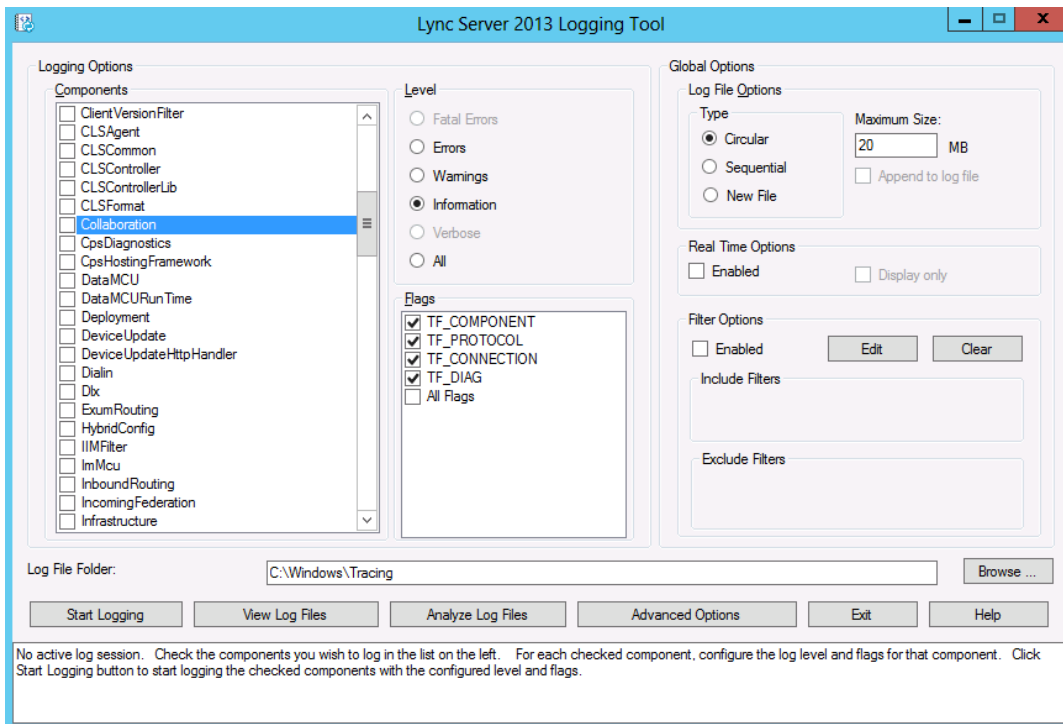
The Lync Server mediation server will listen on TCP port 5067 by default for SIP signaling. In our example we are listening on 5060 on the PSTN facing NIC. From the Standard Edition pool or Enterprise Edition pool the Mediation Server would be listening on port 5061. Tests may include:

- Client to pool server: `telnet <servername> 5061`
- Pool server to Mediation Server: `telnet <servername> 5061`

## On the Lync Server

### Lync Server Logging Tool

The Skype for Business Logging Tool provides internal traces and messaging between different Skype for Business elements like Front-end, Mediation server, Lync Clients, etc. File name is OCSRReskit.msi. Once installed, it can be accessed from any one of the Lync Server servers by running Start/Microsoft Skype for Business/Lync Server Logging Tool.



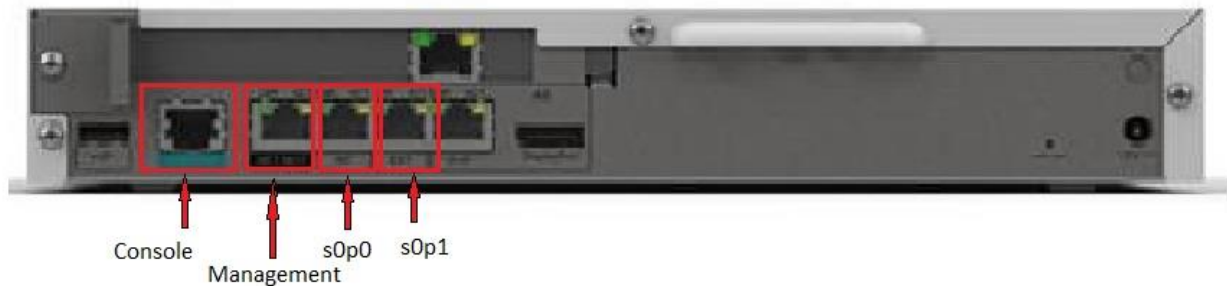
## Appendix A

### Accessing the ACLI

Access to the ACLI is provided by:

- The serial console connection;
- TELNET, which is enabled by default but may be disabled; and
- SSH, this must be explicitly configured.

Initial connectivity will be through the serial console port. At a minimum, this is how to configure the management (eth0) interface on the SBC.

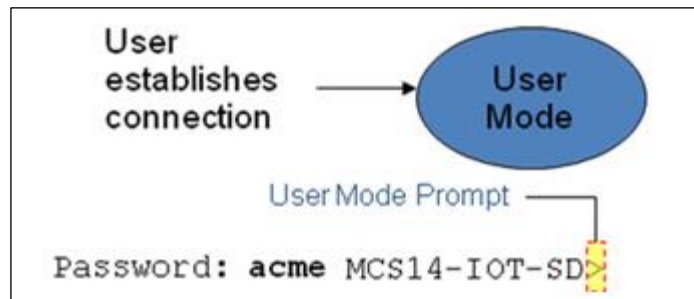


### ACLI Basics

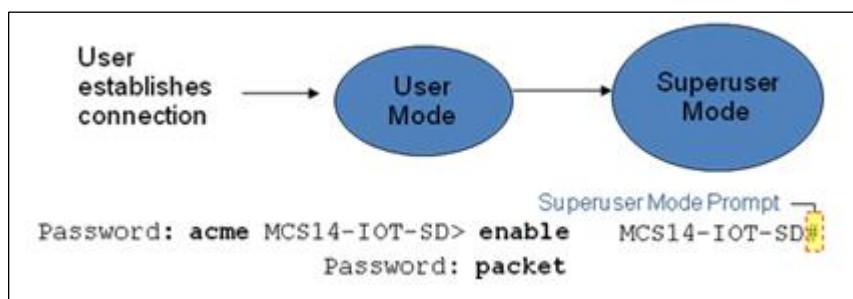
There are two password protected modes of operation within the ACLI, User mode and Superuser mode.

When you establish a connection to the SBC, the prompt for the User mode password appears. The default password is acme.

User mode consists of a restricted set of basic monitoring commands and is identified by the greater than sign (>) in the system prompt after the target name. You cannot perform configuration and maintenance from this mode.



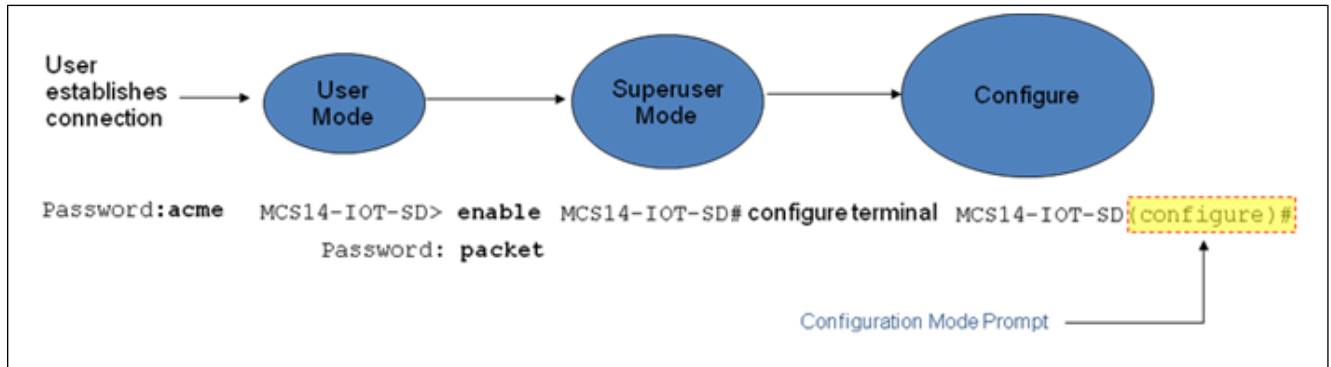
The Superuser mode allows for access to all system commands for operation, maintenance, and administration. This mode is identified by the pound sign (#) in the prompt after the target name. To enter the Superuser mode, issue the enable command in the User mode.



From the Superuser mode, you can perform monitoring and administrative tasks; however you cannot configure any elements. To return to User mode, issue the exit command.

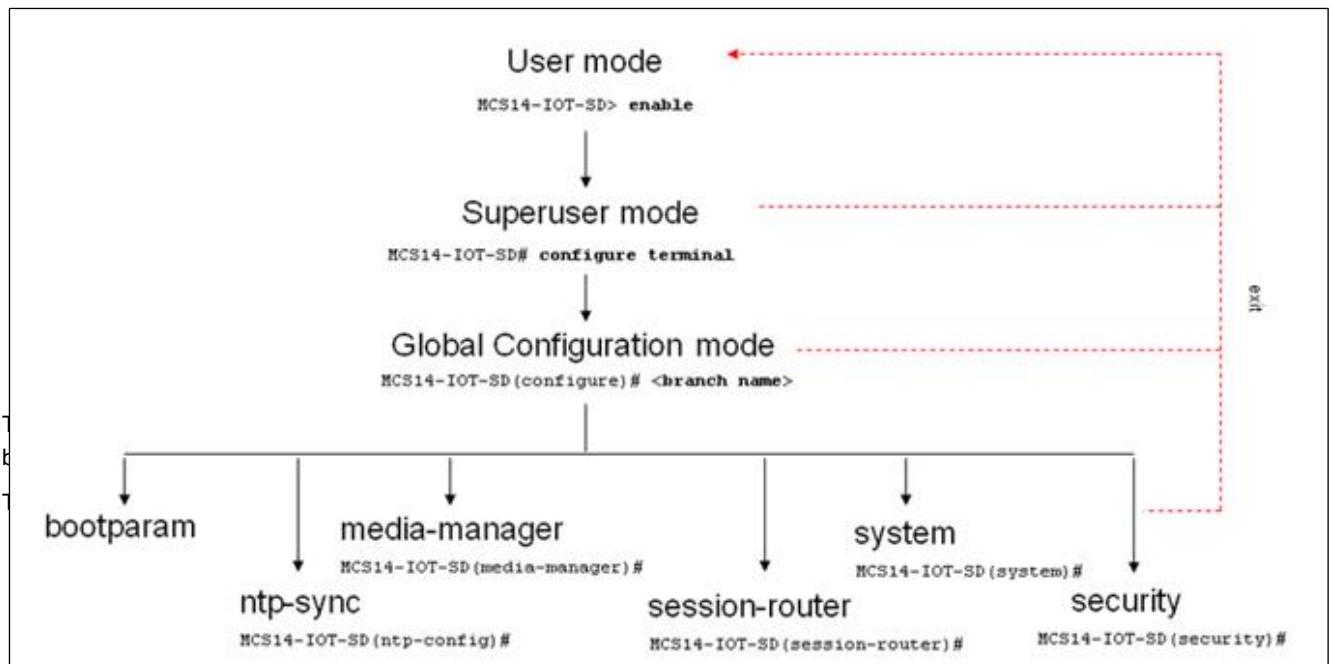
You must enter the Configuration mode to configure elements. For example, you can access the configuration branches and configuration elements for signaling and media configurations. To enter the Configuration mode, issue the `configure terminal` command in the Superuser mode.

Configuration mode is identified by the word `configure` in parenthesis followed by the pound sign (#) in the prompt after the target name, for example, `oraclesbc1(configure)#`. To return to the Superuser mode, issue the `exit` command.



In the configuration mode, there are six configuration branches:

- bootparam;
- ntp-sync;
- media-manager;
- session-router;
- system; and
- security.



- file name – The boot path and the image file.
- inet on ethernet – The IP address and subnet mask (in hex) of the management port of the SD.
- host inet –The IP address of external server where image file resides.
- user and ftp password – Used to boot from the external FTP server.
- gateway inet – The gateway IP address for reaching the external server, if the server is located in a different network.

```

'.' = clear field; '-' = go to previous field; q = quit
boot device           : eth0
processor number      : 0
host name             :
file name            : /tffs0/nnSCX620.gz
inet on ethernet (e) : 10.0.3.11:ffff0000
inet on backplane (b) :
host inet (h)        : 10.0.3.100
gateway inet (g)     : 10.0.0.1
user (u)             : anonymous
ftp password (pw) (blank = rsh) : anonymous
flags (f)            : 0x8
target name (tn)     : MCS14-IOT-SD
startup script (s)   :
other (o)

```

The ntp-sync branch provides access to ntp server configuration commands for synchronizing the SBC time and date.

The security branch provides access to security configuration.

The system branch provides access to basic configuration elements as system-config, snmp-community, redundancy, physical interfaces, network interfaces, etc.

The session-router branch provides access to signaling and routing related elements, including H323-config, sip-config, ivf-config, local-policy, sip-manipulation, session-agent, etc.

The media-manager branch provides access to media-related elements, including realms, steering pools, dns-config, media-manager, and so forth.

You will use media-manager, session-router, and system branches for most of your working configuration.

## Configuration Elements

The configuration branches contain the configuration elements. Each configurable object is referred to as an element. Each element consists of a number of configurable parameters.

Some elements are single-instance elements, meaning that there is only one of that type of the element - for example, the global system configuration and redundancy configuration.

Some elements are multiple-instance elements. There may be one or more of the elements of any given type. For example, physical and network interfaces.

Some elements (both single and multiple instance) have sub-elements. For example:

- SIP-ports - are children of the sip-interface element
- peers – are children of the redundancy element
- destinations – are children of the peer element

## Creating an Element

1. To create a single-instance element, you go to the appropriate level in the ACLI path and enter its parameters. There is no need to specify a unique identifier property because a single-instance element is a global element and there is only one instance of this element.



2. When creating a multiple-instance element, you must specify a unique identifier for each instance of the element.
3. It is important to check the parameters of the element you are configuring before committing the changes. You do this by issuing the `show` command before issuing the `done` command. The parameters that you did not configure are filled with either default values or left empty.
4. On completion, you must issue the `done` command. The `done` command causes the configuration to be echoed to the screen and commits the changes to the volatile memory. It is a good idea to review this output to ensure that your configurations are correct.
5. Issue the `exit` command to exit the selected element.

Note that the configurations at this point are not permanently saved yet. If the SBC reboots, your configurations will be lost.

## Editing an Element

The procedure of editing an element is similar to creating an element, except that you must select the element that you will edit before editing it.

1. Enter the element that you will edit at the correct level of the ACLI path.
2. Select the element that you will edit, and view it before editing it.  
The `select` command loads the element to the volatile memory for editing. The `show` command allows you to view the element to ensure that it is the right one that you want to edit.
3. Once you are sure that the element you selected is the right one for editing, edit the parameter one by one. The new value you provide will overwrite the old value.
4. It is important to check the properties of the element you are configuring before committing it to the volatile memory. You do this by issuing the `show` command before issuing the `done` command.
5. On completion, you must issue the `done` command.
6. Issue the `exit` command to exit the selected element.

Note that the configurations at this point are not permanently saved yet. If the SBC reboots, your configurations will be lost.

## Deleting an Element

The `no` command deletes an element from the configuration in editing.

To delete a single-instance element,

1. Enter the `no` command from within the path for that specific element
2. Issue the `exit` command.

To delete a multiple-instance element,

1. Enter the `no` command from within the path for that particular element.  
The key field prompt, such as `<name>:<sub-port-id>`, appears.
2. Use the `<Enter>` key to display a list of the existing configured elements.
3. Enter the number corresponding to the element you wish to delete.
4. Issue the `select` command to view the list of elements to confirm that the element was removed.

Note that the configuration changes at this point are not permanently saved yet. If the SBC reboots, your configurations will be lost.

## Configuration Versions

At any time, three versions of the configuration can exist on the SBC: the edited configuration, the saved configuration, and the running configuration.

- The **edited configuration** – this is the version that you are making changes to. This version of the configuration is stored in the SBC's volatile memory and will be lost on a reboot.  
To view the editing configuration, issue the `show configuration` command.

- The **saved configuration** – on issuing the `save-config` command, the edited configuration is copied into the non-volatile memory on the SBC and becomes the saved configuration. Because the saved configuration has not been activated yet, the changes in the configuration will not take effect. On reboot, the last activated configuration (i.e., the last running configuration) will be loaded, not the saved configuration.
- The **running configuration** is the saved then activated configuration. On issuing the `activate-config` command, the saved configuration is copied from the non-volatile memory to the volatile memory. The saved configuration is activated and becomes the running configuration. Although most of the configurations can take effect once being activated without reboot, some configurations require a reboot for the changes to take effect.  
To view the running configuration, issue command `show running-config`.

## Saving the Configuration

The `save-config` command stores the edited configuration persistently.

Because the saved configuration has not been activated yet, changes in configuration will not take effect. On reboot, the last activated configuration (i.e., the last running configuration) will be loaded. At this stage, the saved configuration is different from the running configuration. Because the saved configuration is stored in non-volatile memory, it can be accessed and activated at later time.

```
oraclesbcl # save-config
Save-Config received, processing.
waiting 1200 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'.
```

## Activating the Configuration


On issuing the `activate-config` command, the saved configuration is copied from the non-volatile memory to the volatile memory. The saved configuration is activated and becomes the running configuration.

Some configuration changes are service affecting when activated. For these configurations, the SBC warns that the change could have an impact on service with the configuration elements that will potentially be service affecting. You may decide whether or not to continue with applying these changes immediately or to apply them at a later time.

```
oraclesbcl# activate-config
Activate-Config received, processing.
waiting 120000 for request to finish
Request to 'ACTIVATE-CONFIG' has Finished,
Activate Complete
```



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**Oracle Corporation, World Headquarters**

500 Oracle Parkway  
Redwood Shores, CA 94065, USA

**Worldwide Inquiries**

Phone: +1.650.506.7000  
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## Integrated Cloud Applications & Platform Services

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