ORACLE®
COMMUNICATIONS

ORACLE®

Oracle Enterprise Session Border Controller –
Acme Packet 4600 and Cisco Unified
Communications Manager 10.5 for Enterprise
SIP Trunking with NTT Communications

Technical Application Note

ORACLE®

Disclaimer

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

Table of Contents

Intended Audience

This document is intended for use by Oracle Systems Engineers, third party Systems Integrators, Oracle Enterprise customers and partners 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 4600 platform.

Document Overview

This Oracle technical application note outlines the recommended configurations for the Oracle enterprise session border controller AP-4600 for connecting NTT Communications SIP Trunking service to Cisco Unified Call Manager (CUCM) 10.5 customers. The solution contained within this document has been certified using Oracle's Acme Packet OS ECZ 7.5 software

Cisco Unified Call Manager provides industry-leading reliability, security, scalability, efficiency, and enterprise call and session management and is the core call control application of the collaboration portfolio. This reduces the cost and complexity of extending an enterprise's telephony system outside its network borders. Oracle Enterprise Session Border Controllers (SBCs) play an important role in SIP trunking as they are used by many ITSPs 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 CUCM 10.5, Oracle E-SBCs and IP Trunking services are configured in the optimal manner.

It should be noted that while this application note focuses on the optimal configurations for the Oracle ESBC in an enterprise CUCM 10.5 environment, the same SBC configuration model can also be used for other enterprise SIP trunking applications with a few tweaks to the configuration for required features. In addition, it should be noted that the SBC configuration provided in this guide focuses strictly on the CUCM Server associated parameters. Many SBC applications may have additional configuration requirements that are specific to individual customer requirements. 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 CUCM 10.5, please visit http://www.cisco.com/c/en/us/products/unified-communications/unified-communications-manager-version-10-5/index.html

Introduction

Audience

This is a technical document intended for telecommunications engineers with the purpose of configuring the Oracle Enterprise SBC and CUCM 10.5. There will be steps that require navigating the CUCM 10.5 server configuration 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 Cisco UCM 10.5

- Cisco hard phones connected/registered to the CUCM server

- Oracle Enterprise Session Border Controller (hereafter Oracle E-SBC) 4600 series running ECZ750.

- Oracle E-SBC having established SIP connectivity with CUCM on CPE side and NTT SIP trunk on PSTN side.

Architecture

The following reference architecture shows a logical view of the connectivity between CUCM and the SBC.
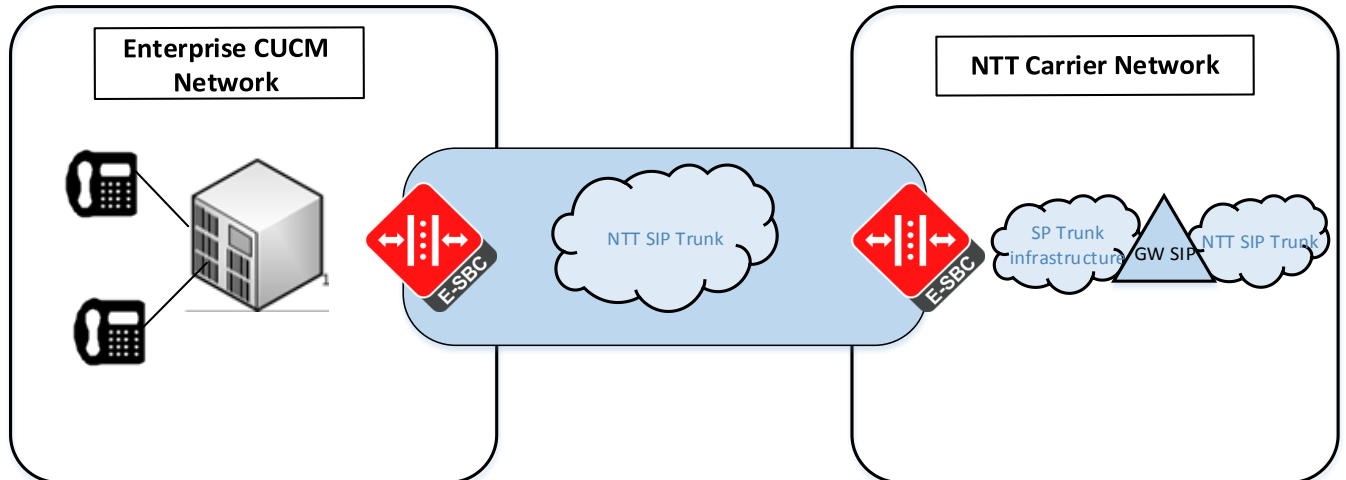
Area on the left is the customer's on premise infrastructure, which includes the CUCM with the enterprise phones systems. Area on the right represents the NTT communications infrastructure which provides PSTN service via the SIP trunk. The SBC provides integration of these two environments over an IP network and provides security, service reachability, interoperability/normalization of SIP messages over the IP network. The CUCM and E-SBC are the edge components that form the boundary of the SIP trunk.

As per the NTT network requirements, the customer devices are required to register and support authentication. The Oracle ESBC supports authentication and performs registration on behalf of the CUCM.

The configuration, validation and troubleshooting of these two is the focus of this document and will be described in two phases:

- Phase 1 – Configuring the Cisco Unified Call Manager v10.5
- Phase 2 – Configuring the Oracle E-SBC

Lab Configuration

The following diagram, similar to the Reference Architecture described earlier in this document, illustrates the lab environment created to facilitate certification testing.

CUCM 10.5

NTT SIP Trunk

815034252022

815034252023

10.232.50.89

s1p0
10.232.50.60

E-SBC

s0p0
192.168.1.120

192.168.1.170
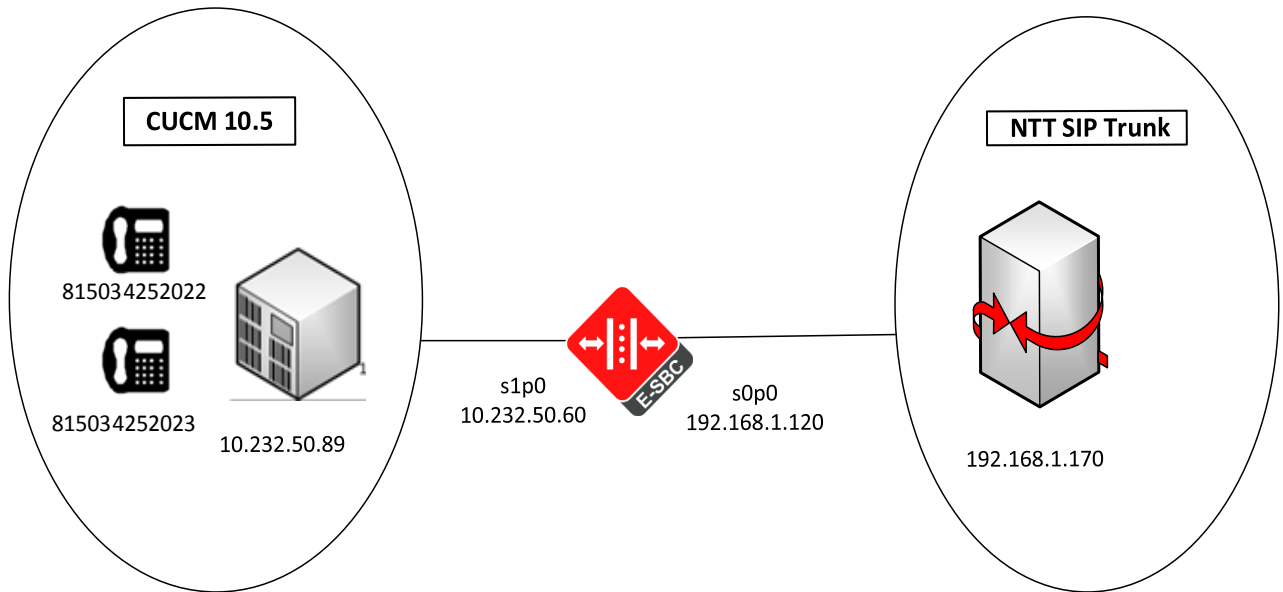
Phase 1 – Configuring the Cisco Unified Call Manager v10.5

The enterprise will have a fully functioning CUCM v10.5 installed and deployed for this certification.

There are a few parts for configuring CUCM v10.5 to be configured and connected to operate with the Oracle E-SBC:

- Creating a SIP profile in CUCM and enabling OPTIONS ping to pro-actively monitor the SIP connectivity with the SBC

- Adding the SBC as a trunk to the CUCM infrastructure

- Creating a route pattern in the CUCM configuration to utilize the configured SBC trunk and route calls from CUCM to the SBC

- Additional configuration to add Directory Numbers, Phones to register to the CUCM and enabling a DHCP server for assigning IP addresses to Cisco phones

- NTT communications requires G.729 for certain tests on the trunk side, configuration to support G.729 for the phones in CUCM

To add the SBC as a trunk in CUCM, we will need:

- IP address of the CUCM NIC facing SBC

- IP address and port of the sip interface of the SBC facing CUCM

- Access to the CUCM Web UI (http://ipaddress) and select Cisco Unified CM Administration from navigation drop down menu

Creating a SIP Profile in CUCM

To add a new SIP Profile in CUCM, login into the CUCM console, use the Device --- > Device settings --- > SIP Profile menu path in CUCM. Click on Add new and following are the settings, rest can be default:

SIP Profile Configuration

Save · Delete · Copy · Reset · Apply Config · Add New

☐ Reject Anonymous Outgoing Calls
☐ Send ILS Learned Destination Route String

SIP OPTIONS Ping

☑ Enable OPTIONS Ping to monitor destination status for Trunks with Service Type "None (Default)"

Ping Interval for In-service and Partially In-service Trunks (seconds)* — 60
Ping Interval for Out-of-service Trunks (seconds)* — 120
Ping Retry Timer (milliseconds)* — 500
Ping Retry Count* — 6

SDP Information

☐ Send send-receive SDP in mid-call INVITE
☐ Allow Presentation Sharing using BFCP
☐ Allow iX Application Media
☐ Allow multiple codecs in answer SDP

Adding the E-SBC as a trunk in CUCM

The following process details the steps to add the SBC as a trunk in CUCM Web UI

1. On the CUCM administration console (UI), maneuver to **Device --- > Trunk**. Click on New

2. Select SIP Trunk from the Trunk Type drop down menu and protocol will also be SIP

3. Let default of none be selected on the Trunk service type

4. Following 2 screenshots are the other settings to be configured on the Trunk, all other parameters set to default

Trunk Configuration

Save   Delete   Reset   Add New

Device Information

Product:	SIP Trunk
Device Protocol:	SIP
Trunk Service Type	None(Default)
Device Name*	NTT-Trunk
Description	
Device Pool*	Default
Common Device Configuration	< None >
Call Classification*	Use System Default
Media Resource Group List	< None >
Location*	Hub_None
AAR Group	< None >
Tunneled Protocol*	None
QSIG Variant*	No Changes
ASN.1 ROSE OID Encoding*	No Changes
Packet Capture Mode*	None
Packet Capture Duration	0

Trunk Configuration

Save   Delete   Reset   Add New

SIP Information

Destination

☐ Destination Address is an SRV

	Destination Address	Destination Address IPv6	Destination Port
1*	10.232.50.60		5060

MTP Preferred Originating Codec*	711ulaw
BLF Presence Group*	Standard Presence group
SIP Trunk Security Profile*	Non Secure SIP Trunk Profile
Rerouting Calling Search Space	< None >
Out-Of-Dialog Refer Calling Search Space	< None >
SUBSCRIBE Calling Search Space	< None >
SIP Profile*	NTT SIP Profile View Details
DTMF Signaling Method*	No Preference

Creating a route Pattern in CUCM

Route pattern in CUCM take the form of regular expressions to define specific routes and give flexibility in network design for dialing outbound calls from CUCM users to the PSTN via the E-SBC. A route pattern comprises a string of digits (an address) and a set of associated digit manipulations that route calls to a route list or a gateway/trunk. In CUCM administration console, use the Call Routing --- >Route/Hunt --- >Route Pattern menu path to configure route patterns. Follow the fields in the screenshots below:

Adding Devices/Phones and configuring Directory numbers

Cisco phones need to be added in CUCM by way of their MAC address and assigned to a specific user and then when powered on, they obtain an IP address in the CUCM topology with the subnet defined in CUCM administration console. Use the Device --- > Phone menu path to add new devices. One will need to define the template based on the device being configured, for example Cisco 9971 phone template as in the screenshots below. Also, some highlights of the configuration to add a user and configure a directory number (DN) to it in CUCM are shown below:

Creating & Assigning a Region and specifying use of G.729 codec in CUCM

ATT IP Flex Reach service certification covers AVPN transport and requires G.729 without annex b as choice of codec on the trunk side. CUCM 10.5 defaults to G.711 U law and therefore requires configuration to use G.729 codec. We can achieve this by the following steps:

- Specifying Audio codec preference

- Assigning it to a defined Region and

- finally assigning the region to the default Device Pool

In CUCM administration console, use the System --- >Region Information --- > Audio Codec Preference List and System --- >Region Information --- > Region menu path to configure these (Add new). Below screenshots provide an overview of the same:

Next, assign the above defined region to the Device Pool to complete the configuration (System --- >Device Pool)

The CUCM is now ready to send/receive calls and establish SIP connectivity with the Oracle E-SBC.

Phase 2 – 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 Cisco Unified Call manager v10.5 in an NTT Communications SIP Trunk service.

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 CCM Server customers, then please see the ACLI Configuration Guide on 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 ECZ7.5.0 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.**
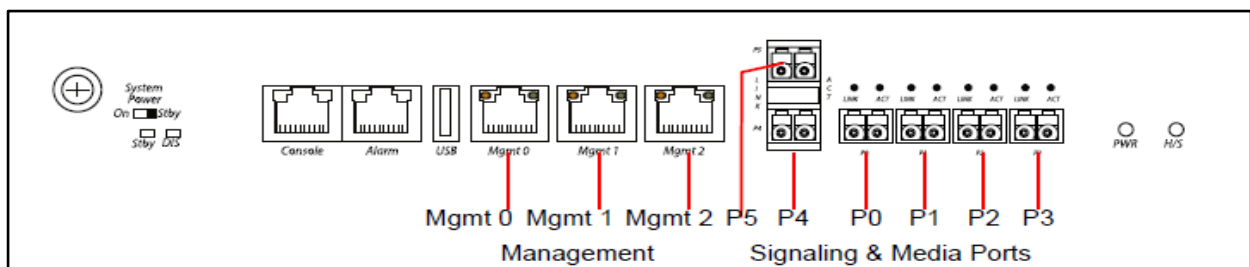
Plug the slot 0 port 0 (s0p0) interface into your outside (gateway facing) network and the slot 0 port 1 (s1p0) interface into your inside (CUCM server-facing) network. Once connected, perform you are ready to power on and perform the following steps.

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.

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/nnECZ750.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 Communications Enterprise SBC configuration required to work with CUCM v10.5 and NTT's SIP Trunk service. In the configuration, the transport protocol used between the SBC and CUCM server is TCP and the SIP trunk is configured for UDP in this certification testing.

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

Surrogate registration

NTT requires the customer PBX to register in order to originate calls support authentication. Since CUCM cannot perform the registration, Oracle ESBC performs surrogate registrations on behalf of the PBX.

The configuration for surrogate registration is as follows

```
surrogate-agent
        register-host                       ipvoice.jp
        register-user                       +81XXXXXXXXXX
        description
        realm-id                            CUCM
        state                               enabled
        customer-host
        customer-next-hop                   ipvoice.jp
        register-contact-host               192.168.1.120
        register-contact-user               +81XXXXXXXXXX
        password                            ******
        register-expires                    3600
        replace-contact                     disabled
        options
        route-to-registrar                  enabled
        aor-count                           1
        auth-user                           user
        max-register-attempts               3
        register-retry-time                 1800
        count-start                         1
        register-mode                       automatic
        triggered-inactivity-interval       30
        triggered-oos-response              503
```

The E-SBC provides authentication support required for the outgoing calls from CUCM. The auth-attribute configuration below is applied on the session-agent facing CUCM.

```
session-agent
        hostname                        10.232.50.89
        transport-method                StaticTCP
        realm-id                        CUCM
        ping-method                     OPTIONS
        ping-interval                   30
        auth-attributes
                auth-realm                      ipvoice.jp
                username                        user
                password                        ********
                in-dialog-methods               INVITE
```

SPLs required for NTT

As a part of the integration of the ESBC with NTT trunk, two SPLs, ocSurrogateRegister-1-4.pkg and ocNttMsgConverter-0-4.pkg were developed to include 5 features required to comply with the signaling requirements.

1. As a part of the surrogate registration, SBC is required to send a unique/random user-info portion in every REGISTER request that is sent to the NTT SIP trunk as well as outgoing INVITE messages for calls.

2. The ESBC is required to apply validity check to an incoming INVITE from the SIP trunk before sending out 100 TRYING and subsequent 1xx, 2xx messages to progress the call. It is expected that the incoming INVITE Request-URI user portion will contain the same randomized value that the E-SBC sent in the most recent REGISTER message to the trunk.

3. NTT regulation requires that the tag size of From/To headers in the SIP messages be under 32 bytes. The tags sent by CUCM in the originating SIP messages are large in size, approximately 51 bytes.

4. NTT specification also requires that the Rseq, Cseq, Session ID (in SDP) be under the value of 999900 and the SDP o line username character length be a maximum of 10 bytes. The E-SBC receives messages from Enterprise PBX – Cisco Unified Communications Manager with a large RSeq value in 18x messages which it forwards as is. Also, the SDP o line username is 19 bytes in length (generated by CUCM).

5. E-SBC is expected check RURI user portion of incoming CANCEL request for the AoR and compare it with the AoR specified in the Request-URI of the initial INVITE received.. If the value is different, E-SBC should respond with a 481 Call/Transaction Does Not Exist.

The SPL - **ocSurrogateRegister-1-6.pkg** was developed to implement the features 1 and 2. This SPL is enabled by configuring the spl-option **dyn-contact-start** on the sip-interface facing CUCM realm and **dyn-contact-method=randomseed** on the sip-interface facing the NTT trunk.

The SPL - **ocNttMsgConverter-0-3.pkg** was developed to implement the features 3, 4 and 5. This is enabled by configuring the spl-option **ocNttMsgConverterTagging=opposite** on the sip-interface facing CUCM realm and **ocNttMsgConverterTagging=enabled** on the sip-interface facing the NTT trunk.

Media policy

NTT requires that the TOS value for SIP and RTP be set to 5. The following media-policy is configured and applied on the realm-config towards NTT.

```
media-policy
        name                            NTT-Tos
        tos-settings
                media-type                      message
                media-sub-type                  sip
                tos-value                       0x05
        tos-settings
```

```
        media-type                            audio
        tos-value                             0x05
```

Number translations

NTT requires the telephone numbers in the From and To headers to be in E164 format. Since CUCM does not send the numbers in E164 format, we configure a translation rule to add + to the uri-users of the From and To headers of the INVITEs going to NTT and apply it on the realm towards NTT.

```
translation-rules
        id                            addforJP
        type                          add
        add-string                    +

session-translation
        id                            addJP
        rules-calling                 addforJP
        rules-called                  addforJP

realm-config
        identifier                    NTT-router
        network-interfaces            s0p1:0
        media-policy                  NTT-Tos
        out-translationid             addJP
```

A translation rule removeplus is configured to remove the plus from the telephone numbers in the From and To headers in the SIP messages being sent to CUCM and is applied on the realm towards CUCM.

```
translation-rules
        id                            removeplus
        type                          delete
        delete-string                 +

session-translation
        id                            DelJP
        rules-calling                 removeplus
        rules-called                  removeplus

realm-config
        identifier                    CUCM
        network-interfaces            s0p3:0
        out-translationid             DelJP
```

CUCM and NTT SIP trunk carry their own SIP and SDP design – not always these implementation methods align, causing a lot of mis-match in SIP and SDP signaling and call flow. The ESBC helps resolve these issues with SIP manipulation feature

We have configured a sip-manipulation to modify the signaling according to NTT specifications. This manipulation, named Changecontact (which is a nested manipulation) is applied as an out-manipulationid on the sip-interface towards NTT.

Below is a list of all the manipulations referenced by the ChangeContact sip-manipulation.

1. NATting – configured for topology-hiding.

2. ModToport – NTT requires all the To headers to contain the port number (for e.g. sip:+815034252023@ipvoice.jp:7060). This manipulation adds the port to the To header if it does not exist.
3. PAIandRPI --- To delete the Remote-Party-ID and P-Asserted-Identity headers sent by CUCM.
4. AddSBCinfo – To replace the CUCM related information in the User-Agent header with the SBC image version.
5. removecallinfo – To delete the Call-Info header received from CUCM..
6. AddSupportedinReg – To add a "Supported: path" header in REGISTER messages.
7. ModSupportedoutboundINVITE – To replace the value of Supported header in INVITE with 100rel,timer
8. ForREGISTER – To add the required authentication details in the REGISTERs sent to NTT trunk.
9. RemDateCiscoGuideallowevents – Delete Date, Cisco-Guid and Allow-Events headers received from CUCM.
10. ModMaxforwards – To modify the Max-Forwards header value to 70 and adds the header if it is not present.
11. deltransportUDP – To remove the 'transport' uri-parameter from the Contact header.
12. Modcontactuserinresponses – To add + to the uri-user in Contact header.
13. ModAllowheader – Modifies the Allow header value in INVITE and UPDATE to include the methods, INVITE,BYE,CANCEL,ACK,PRACK,UPDATE and adds the Allow header if it is not present.
14. DelReasonheader – To delete the Reason header in BYE.
15. ModUPDATEmessage – To modify the Supported header in UPDATEs to include only timer.
16. Addsupportedwithtimer – Adds a Supported: timer header to replies of INVITEs and UPDATEs.
17. DelExpiresinINVITE – To delete the Expires header from the INVITE.
18. forsessionexpirestoNTT – To modify the value in the Session-Expires header to 180
19. anonymouscall - To remove the '+' from the uri-user in the RURI and To headers
20. stripblines – To remove the unwanted lines from the SDP.

A sip-manipulation ToCUCM is configured as the out-manipulationid towards the CUCM. It refers to the following sip-manipulations.

1. NATting – configured for topology-hiding.

2. ModRURItoCUCM – To replace the random contact in the uri-user of the RURI with that of the To header
3. ModSupportedtowardsCUCM – To modify the Supported header to include the Allow method.
4. PAIandRPI --- To delete the Remote-Party-ID and P-Asserted-Identity headers sent by CUCM.

A sip-manipulation Forsurragent is configured as the out-manipulationid towards the CUCM. It refers to the following sip-manipulations.

1. NATting – configured for topology-hiding.

2. ModRURItoCUCM – To replace the random contact in the uri-user of the RURI with that of the To header
3. ModSupportedinINVITE – To delete the Supported headers if the value matches Geolocation and X-cisco-srtp-fallback

SBC Configuration

Following is the complete configuration of the SBC:

```
local-policy
      from-address                   *
      to-address                     *
      source-realm                   CUCM
      policy-attribute
            next-hop                       ipvoice.jp
            realm                          NTT-router
            app-protocol                   SIP
local-policy
      from-address                   *
      to-address                     *
      source-realm                   NTT-router
      policy-attribute
            next-hop                       10.232.50.89
            realm                          CUCM
            action                         replace-uri
            app-protocol                   SIP
media-manager
media-policy
      name                           NTT-Tos
      tos-settings
            media-type                     message
            media-sub-type                 sip
            tos-value                      0x05
      tos-settings
            media-type                     audio
            tos-value                      0x05
media-profile
      name                           PCMA
      payload-type                   8
media-profile
      name                           PCMU
      payload-type                   0
network-interface
      name                           s0p1
      description
      ip-address                     192.168.1.120
      netmask                        255.255.255.0
      gateway                        192.68.1.1
      hip-ip-list                    192.168.1.120
      icmp-address                   192.168.1.120
      ssh-address
network-interface
      name                           s0p3
      ip-address                     10.232.50.60
      netmask                        255.255.255.0
      gateway                        10.232.50.89
      hip-ip-list                    10.232.50.60
      ftp-address                    10.232.50.60
      icmp-address                   10.232.50.60
      ssh-address                    10.232.50.60
phy-interface
      name                           s0p0
      operation-type                 Media
      admin-state                    disabled
phy-interface
```

```
        name                            s0p1
        operation-type                  Media
        port                            1
phy-interface
        name                            s0p2
        operation-type                  Media
        port                            2
        admin-state                     disabled
phy-interface
        name                            s0p3
        operation-type                  Media
        port                            3
realm-config
        identifier                      CUCM
        network-interfaces              s0p3:0
        out-translationid               DelJP
        spl-options                     dyn-contact-start,ocNttMsgConverterTagging=opposite
realm-config
        identifier                      NTT-router
        network-interfaces              s0p1:0
        media-policy                    NTT-Tos
        out-translationid               addJP
        spl-options                     ocNttMsgConverterTagging=enabled,dyn-contact-
method=randomseed
        codec-policy                    offonlyPCMUtoNTT
session-agent
        hostname                        10.232.50.89
        transport-method                StaticTCP
        realm-id                        CUCM
        ping-method                     OPTIONS
        ping-interval                   30
        auth-attributes
                auth-realm                      ipvoice.jp
                username                        user
                password                        ********
                in-dialog-methods               INVITE
session-agent
        hostname                        ipvoice.jp
        ip-address                      192.168.1.170
        port                            7060
        realm-id                        NTT-router
session-translation
        id                              DelJP
        rules-calling                   removeplus
        rules-called                    removeplus
session-translation
        id                              addJP
        rules-calling                   addforJP
        rules-called                    addforJP
sip-config
        home-realm-id                   CUCM
        registrar-domain                *
        registrar-host                  *
        registrar-port                  5060
        options                         force-unregistration
                                        max-udp-length=0
sip-interface
        realm-id                        CUCM
        sip-port
                address                         10.232.50.60
```

```
                    transport-protocol                        TCP
                    allow-anonymous                           agents-only
            registration-caching                  enabled
            in-manipulationid                     Forsurragent
            out-manipulationid                    ToCUCM
sip-interface
            realm-id                              NTT-router
            sip-port
                    address                                   192.168.1.120
                    allow-anonymous                           registered
            out-manipulationid                    Changecontact
sip-manipulation
            name                                  AddSBCinfo
            header-rule
                    name                                      Addproductinfo
                    header-name                               User-Agent
                    action                                    add
                    msg-type                                  request
                    methods                                   REGISTER
                    new-value                                 OracleE\-SBC/ECZ750
            header-rule
                    name                                      Moduseragentforcall
                    header-name                               User-Agent
                    action                                    manipulate
                    comparison-type                           pattern-rule
                    msg-type                                  request
                    methods                                   ACK,BYE,INVITE,PRACK,UPDATE
                    element-rule
                            name                                      Modvalue
                            type                                      header-value
                            action                                    replace
                            comparison-type                           pattern-rule
                            match-value                               ^Cisco(.*)
                            new-value                                 OracleE\-SBC/ECZ750
            header-rule
                    name                                      ChecServerheaderinbye
                    header-name                               Server
                    action                                    manipulate
                    comparison-type                           pattern-rule
                    methods                                   BYE,INVITE
                    element-rule
                            name                                      Modvalue
                            type                                      header-value
                            action                                    replace
                            comparison-type                           pattern-rule
                            match-value                               ^Cisco(.*)
                            new-value                                 OracleE\-SBC/ECZ750
            header-rule
                    name                                      delserverheader
                    header-name                               Server
                    action                                    delete
                    methods                                   BYE,INVITE,PRACK,UPDATE
sip-manipulation
            name                                  AddSupportedinReg
            header-rule
                    name                                      Addtheheader
                    header-name                               Supported
                    action                                    add
                    msg-type                                  request
                    methods                                   REGISTER
```

```
             new-value                        path
sip-manipulation
      name                           Addsupportedwithtimer
      header-rule
             name                           Addsupported
             header-name                     Supported
             action                          add
             msg-type                        reply
             methods                         INVITE,UPDATE
             new-value                       timer
sip-manipulation
      name                           Changecontact
      header-rule
             name                           forprivacy
             header-name                     From
             action                          sip-manip
             new-value                       NATting
      header-rule
             name                           forPAIandRPI
             header-name                     From
             action                          sip-manip
             new-value                       PAIandRPI
      header-rule
             name                           forUAinfo
             header-name                     From
             action                          sip-manip
             new-value                       AddSBCinfo
      header-rule
             name                           Toremovecallinfo
             header-name                     From
             action                          sip-manip
             new-value                       removecallinfo
      header-rule
             name                           forregsupport
             header-name                     From
             action                          sip-manip
             new-value                       AddSupportedinReg
      header-rule
             name                           outboundinvite
             header-name                     From
             action                          sip-manip
             new-value                       ModSupportedoutboundINVITE
      header-rule
             name                           regrule
             header-name                     From
             action                          sip-manip
             new-value                       ForREGISTER
      header-rule
             name                           fordateciscoguidalloweventsdel
             header-name                     From
             action                          sip-manip
             new-value                       RemDateCiscoGuideallowevents
      header-rule
             name                           formaxforwards
             header-name                     From
             action                          sip-manip
             new-value                       ModMaxforwards
      header-rule
             name                           fortransportudp
             header-name                     From
```

```
                action                              sip-manip
                new-value                           deltransportUDP
        header-rule
                name                                forplusinresponse
                header-name                         From
                action                              sip-manip
                new-value                           Modcontactuserinresponses
        header-rule
                name                                formodallowheader
                header-name                         From
                action                              sip-manip
                new-value                           ModAllowheader
        header-rule
                name                                forreasonheader
                header-name                         From
                action                              sip-manip
                new-value                           DelReasonheader
        header-rule
                name                                forupdatemessage
                header-name                         From
                action                              sip-manip
                new-value                           ModUPDATEmessage
        header-rule
                name                                fortimerinsupported
                header-name                         From
                action                              sip-manip
                new-value                           Addsupportedwithtimer
        header-rule
                name                                DeleteexpiresinINVITE
                header-name                         From
                action                              sip-manip
                new-value                           DelExpiresinINVITE
        header-rule
                name                                forSEtoNTT
                header-name                         From
                action                              sip-manip
                new-value                           forsessionexpirestoNTT
        header-rule
                name                                foranonymouscall
                header-name                         From
                action                              sip-manip
                new-value                           anonymouscall
        header-rule
                name                                remblines
                header-name                         From
                action                              sip-manip
                new-value                           stripblines
sip-manipulation
        name                            DelExpiresinINVITE
        header-rule
                name                                delexpires
                header-name                         Expires
                action                              delete
                msg-type                            request
                methods                             INVITE
sip-manipulation
        name                            DelReasonheader
        header-rule
                name                                delreason
                header-name                         Reason
```

```
                action                                     delete
                msg-type                                   request
                methods                                    BYE
sip-manipulation
        name                            ForREGISTER
        header-rule
                name                               Delroute
                header-name                        Route
                action                             delete
                msg-type                           request
                methods                            REGISTER
        header-rule
                name                               Delauthparams
                header-name                        Authorization
                action                             manipulate
                msg-type                           request
                methods                            REGISTER
                element-rule
                        name                               storevalue
                        type                               header-value
                        action                             store
                        comparison-type                    pattern-rule
                        match-value                        (.+)(, auth-params=sha1-credential)
                element-rule
                        name                               delparam
                        type                               header-value
                        action                             replace
                        comparison-type                    pattern-rule
                        new-value                          $Delauthparams.$storevalue.$1
        header-rule
                name                               addContentlength
                header-name                        Content-Length
                action                             add
                msg-type                           request
                methods                            REGISTER
                new-value                          0
        header-rule
                name                               delexpires
                header-name                        Expires
                action                             delete
                msg-type                           request
                methods                            REGISTER
        header-rule
                name                               adduserphoneinFrom
                header-name                        From
                action                             manipulate
                msg-type                           request
                methods                            INVITE,REGISTER
                element-rule
                        name                               adduserphone
                        parameter-name                     user
                        type                               uri-param
                        action                             add
                        new-value                          phone
        header-rule
                name                               adduserphoneinTo
                header-name                        To
                action                             manipulate
                msg-type                           request
                methods                            INVITE,REGISTER
```

```
                element-rule
                        name                                    adduserphonto
                        parameter-name                          user
                        type                                    uri-param
                        action                                  add
                        new-value                               phone
        header-rule
                name                                    adduserphoneinRURIINVITE
                header-name                             Request-URI
                action                                  manipulate
                msg-type                                request
                methods                                 INVITE
                element-rule
                        name                                    adduserequalphone
                        parameter-name                          user
                        type                                    uri-param
                        action                                  add
                        new-value                               phone
        header-rule
                name                                    Forinvitedelauthparams
                header-name                             Proxy-Authorization
                action                                  manipulate
                msg-type                                request
                methods                                 INVITE
                element-rule
                        name                                    storethevalue
                        type                                    header-value
                        action                                  store
                        comparison-type                         pattern-rule
                        match-value                             (.+)(, auth-params=sha1-credential)
                element-rule
                        name                                    delparam
                        type                                    header-value
                        action                                  replace
                        comparison-type                         pattern-rule
                        new-value
$Forinvitedelauthparams.$storethevalue.$1
        header-rule
                name                                    addopaqueinReg
                header-name                             Authorization
                action                                  manipulate
                comparison-type                         pattern-rule
                msg-type                                request
                methods                                 REGISTER
                element-rule
                        name                                    storeentireheader
                        type                                    header-value
                        action                                  store
                        comparison-type                         pattern-rule
                        match-value                             (.+)(, algorithm=MD5)
                element-rule
                        name                                    addopaqueparam
                        parameter-name                          opaque
                        type                                    header-value
                        action                                  replace
                        comparison-type                         pattern-rule
                        new-value
$addopaqueinReg.$storeentireheader.$1+$addopaqueinReg.$storeentireheader.$2+,+opaque=\"\"
        header-rule
                name                                    addopaqueinINVITE
```

```
        header-name                             Proxy-authorization
        action                                  manipulate
        msg-type                                request
        methods                                 INVITE
        element-rule
                name                                    Checkheader
                type                                    header-value
                action                                  store
                comparison-type                         pattern-rule
                match-value                             (.+)(, algorithm=MD5)
        element-rule
                name                                    addopaqueinheader
                type                                    header-value
                action                                  replace
                comparison-type                         pattern-rule
                new-value
$addopaqueinINVITE.$Checkheader.$1+$addopaqueinINVITE.$Checkheader.$2+,+opaque=\"\"
sip-manipulation
        name                            Forsurragent
        header-rule
                name                            forsupportedinINVITE
                header-name                     From
                action                          sip-manip
                new-value                       ModSupportedinINVITE
        header-rule
                name                            ChangeFrom
                header-name                     From
                action                          manipulate
                msg-type                        request
                methods                         INVITE
                element-rule
                        name                            NTT_from_user
                        parameter-name                  From
                        type                            uri-user
                        action                          replace
                        new-value                       815034252021
sip-manipulation
        name                            ModAllowheader
        header-rule
                name                            CheckAllowheader
                header-name                     Allow
                action                          manipulate
                methods                         INVITE,UPDATE
                element-rule
                        name                                    Storeheadervalue
                        type                                    header-value
                        action                                  store
                        comparison-type                         pattern-rule
                        match-value                             .*
                element-rule
                        name                                    Modallow
                        type                                    header-value
                        action                                  replace
                        new-value                               INVITE,BYE,CANCEL,ACK,PRACK,UPDATE
        header-rule
                name                            Checkallowandifnotaddit
                header-name                     Allow
                action                          add
                comparison-type                 boolean
                msg-type                        request
```

```
            methods                             UPDATE
            match-value                         !$CheckAllowheader.$Storeheadervalue
            element-rule
                    name                                addheadervalue
                    type                                header-value
                    action                              add
                    new-value                           INVITE,BYE,CANCEL,ACK,PRACK,UPDATE
sip-manipulation
        name                            ModMaxforwards
        description                     Look for Max-Forwards header, change it to 70 and if
not present, add it
        header-rule
                name                            CheckMaxforwards
                header-name                     Max-Forwards
                action                          manipulate
                methods                         ACK,BYE,INVITE,PRACK,UPDATE
                element-rule
                        name                                storevalue
                        type                                header-value
                        action                              store
                        comparison-type                     pattern-rule
                element-rule
                        name                                add70
                        type                                header-value
                        action                              find-replace-all
                        comparison-type                     pattern-rule
                        new-value                           70
        header-rule
                name                            Addmaxforwardsifnotpresent
                header-name                     Max-Forwards
                action                          add
                comparison-type                 boolean
                msg-type                        reply
                methods                         ACK,BYE,INVITE,PRACK,UPDATE
                match-value                     !$CheckMaxforwards.$storevalue
                element-rule
                        name                                addvalue
                        type                                header-value
                        action                              add
                        new-value                           70
sip-manipulation
        name                    ModRURItoCUCM
        header-rule
                name                            CheckToheader
                header-name                     To
                action                          manipulate
                msg-type                        request
                methods                         INVITE
                element-rule
                        name                                storeTouriuser
                        type                                uri-user
                        action                              store
                        comparison-type                     pattern-rule
        header-rule
                name                            ModRURIuser
                header-name                     Request-URI
                action                          manipulate
                msg-type                        request
                methods                         INVITE
                element-rule
```

```
                        name                              replaceuserinfo
                        type                              uri-user
                        action                            replace
                        new-value                         $CheckToheader.$storeTouriuser.$0
sip-manipulation
        name                            ModSupportedinINVITE
        header-rule
                name                              Checkciscosupported
                header-name                       Supported
                action                            delete
                comparison-type                   pattern-rule
                methods                           INVITE,UPDATE
                match-value                       X-cisco-srtp(.*)
        header-rule
                name                              Checkgeosupported
                header-name                       Supported
                action                            delete
                methods                           INVITE,UPDATE
                match-value                       Geolocation
sip-manipulation
        name                            ModSupportedoutboundINVITE
        header-rule
                name                              CheckSupported
                header-name                       Supported
                action                            manipulate
                comparison-type                   pattern-rule
                msg-type                          request
                methods                           INVITE
                element-rule
                        name                              Storevalue
                        type                              header-value
                        action                            store
                        comparison-type                   pattern-rule
                element-rule
                        name                              add100rel
                        type                              header-value
                        action                            find-replace-all
                        comparison-type                   pattern-rule
                        new-value                         100rel,timer
        header-rule
                name                              delsupportedin200
                header-name                       Supported
                action                            delete
                msg-type                          reply
                methods                           INVITE
                match-value                       replaces
sip-manipulation
        name                            ModSupportedtowardsCUCM
        header-rule
                name                              CheckSupported
                header-name                       Supported
                action                            manipulate
                comparison-type                   pattern-rule
                methods                           INVITE
                element-rule
                        name                              Storevalue
                        type                              header-value
                        action                            store
                        comparison-type                   pattern-rule
                element-rule
```

```
                    name                                    isupdate
                    type                                    header-value
                    action                                  replace
                    comparison-type                         pattern-rule
                    new-value
$CheckSupported.$Storevalue.$0+,+UPDATE
sip-manipulation
        name                            ModToheader
        header-rule
                name                                    CheckToheader
                header-name                             To
                action                                  manipulate
                methods                                 ACK,UPDATE
                element-rule
                        name                                    Storevalue
                        type                                    uri-port
                        action                                  store
                        comparison-type                         pattern-rule
                        match-value                             .*
        header-rule
                name                                    CheckdoubleportsinTo
                header-name                             To
                action                                  manipulate
                comparison-type                         boolean
                methods                                 ACK,UPDATE
                match-value                             $CheckToheader.$Storevalue
                element-rule
                        name                                    ChangeTovalue
                        type                                    uri-port
                        action                                  replace
                        new-value                               7060
sip-manipulation
        name                            ModToport
        header-rule
                name                                    CheckToport
                header-name                             To
                action                                  manipulate
                element-rule
                        name                                    Storeport
                        type                                    uri-port
                        action                                  store
                        match-value                             7060
        header-rule
                name                                    CheckdoubleportsinTo
                header-name                             To
                action                                  manipulate
                comparison-type                         boolean
                match-value                             !$CheckToport.$Storeport
                element-rule
                        name                                    ChangeToval
                        type                                    uri-port
                        action                                  add
                        new-value                               7060
sip-manipulation
        name                            ModUPDATEmessage
        header-rule
                name                                    ModSupportedheader
                header-name                             Supported
                action                                  manipulate
                comparison-type                         pattern-rule
```

```
            msg-type                            request
            methods                             UPDATE
            element-rule
                    name                                keeptimeronly
                    type                                header-value
                    action                              replace
                    comparison-type                     pattern-rule
                    new-value                           timer
sip-manipulation
        name                            Modcontactuserinresponses
        header-rule
                name                            Modtheuser
                header-name                     Contact
                action                          manipulate
                msg-type                        reply
                methods                         INVITE,UPDATE
                element-rule
                        name                                Checkuser
                        type                                uri-user
                        action                              store
                        comparison-type                     pattern-rule
                element-rule
                        name                                addplussign
                        type                                uri-user
                        action                              replace
                        new-value                           \++$Modtheuser.$Checkuser.$0
sip-manipulation
        name                            NATting
        header-rule
                name                            From
                header-name                     From
                action                          manipulate
                element-rule
                        name                                From_header
                        type                                uri-host
                        action                              replace
                        new-value                           ipvoice.jp
        header-rule
                name                            To
                header-name                     To
                action                          manipulate
                element-rule
                        name                                To
                        type                                uri-host
                        action                              replace
                        new-value                           ipvoice.jp
                element-rule
                        name                                Toport
                        type                                uri-port
                        action                              sip-manip
                        new-value                           ModToport
sip-manipulation
        name                            PAIandRPI
        header-rule
                name                            delRPI
                header-name                     Remote-Party-ID
                action                          delete
                methods                         INVITE,UPDATE
        header-rule
                name                            delPAI
```

```
                header-name                       P-Asserted-Identity
                action                            delete
                methods                           BYE,INVITE,UPDATE
sip-manipulation
        name                          RemDateCiscoGuideallowevents
        header-rule
                name                              delDate
                header-name                       Date
                action                            delete
                methods                           ACK,BYE,INVITE,PRACK,UPDATE
        header-rule
                name                              delCiscoGuid
                header-name                       Cisco-Guid
                action                            delete
                methods                           ACK,BYE,INVITE,PRACK,UPDATE
        header-rule
                name                              delAllowevents
                header-name                       Allow-Events
                action                            delete
                methods                           ACK,BYE,INVITE,PRACK,UPDATE
sip-manipulation
        name                          StripSDPfromPRACK
        header-rule
                name                              delSDPfromPRACK
                header-name                       Content-Type
                action                            manipulate
                msg-type                          request
                methods                           PRACK
                element-rule
                        name                              delpracksdp
                        parameter-name                    application/sdp
                        type                              mime
                        action                            delete-element
        header-rule
                name                              ChangeCLlength
                header-name                       Content-Length
                action                            manipulate
                comparison-type                   boolean
                msg-type                          request
                methods                           PRACK
                match-value                       $delSDPfromPRACK.$delpracksdp
                element-rule
                        name                              Changelegnthto0
                        type                              header-value
                        action                            replace
                        new-value                         0
sip-manipulation
        name                          ToCUCM
        header-rule
                name                              ForNAT_IP
                header-name                       From
                action                            sip-manip
                new-value                         Topohiding
        header-rule
                name                              forRURI
                header-name                       From
                action                            sip-manip
                new-value                         ModRURItoCUCM
        header-rule
                name                              ForupdatetoCUCM
```

```
            header-name                           From
            action                                sip-manip
            new-value                             ModSupportedtowardsCUCM
sip-manipulation
      name                              Topohiding
      header-rule
            name                                  From
            header-name                           From
            action                                manipulate
            element-rule
                  name                                  From_header
                  type                                  uri-host
                  action                                replace
                  new-value                             $LOCAL_IP
      header-rule
            name                                  To
            header-name                           To
            action                                manipulate
            element-rule
                  name                                  To
                  type                                  uri-host
                  action                                replace
                  new-value                             $REMOTE_IP
sip-manipulation
      name                              anonymouscall
      header-rule
            name                                  changeRURI
            header-name                           Request-URI
            action                                manipulate
            msg-type                              request
            methods                               INVITE
            element-rule
                  name                                  storeuser
                  type                                  uri-user
                  action                                store
                  comparison-type                       pattern-rule
                  match-value                           ^\+184(.*$)
            element-rule
                  name                                  striptheplus
                  type                                  uri-user
                  action                                replace
                  comparison-type                       boolean
                  match-value                           $changeRURI.$storeuser
                  new-value                             $ORIGINAL-^"+"
      header-rule
            name                                  addphonecontext
            header-name                           Request-URI
            action                                manipulate
            comparison-type                       boolean
            msg-type                              request
            methods                               INVITE
            match-value                           $changeRURI.$storeuser.$0
            element-rule
                  name                                  addtheparam
                  parameter-name                        phone-context
                  type                                  uri-user-param
                  action                                add
                  new-value                             \+81
      header-rule
            name                                  ModToheader
```

```
                    header-name                          To
                    action                               manipulate
                    comparison-type                      pattern-rule
                    msg-type                             request
                    methods                              INVITE
                    element-rule
                            name                                    storetheuser
                            type                                    uri-user
                            action                                  store
                            comparison-type                         pattern-rule
                            match-value                             ^\+184(.*$)
                    element-rule
                            name                                    Striptheplusfromuriuser
                            type                                    uri-user
                            action                                  replace
                            comparison-type                         boolean
                            match-value                             $ModToheader.$storetheuser
                            new-value                               $ORIGINAL-^"+"
            header-rule
                    name                                 addphonecontextinTo
                    header-name                          To
                    action                               manipulate
                    comparison-type                      boolean
                    msg-type                             request
                    methods                              INVITE
                    match-value                          $ModToheader.$storetheuser.$0
                    element-rule
                            name                                    addpc
                            parameter-name                          phone-context
                            type                                    uri-user-param
                            action                                  add
                            new-value                               \+81
sip-manipulation
        name                            deltransportUDP
        header-rule
                    name                                 Remtransportudp
                    header-name                          Contact
                    action                               manipulate
                    methods                              INVITE,UPDATE
                    element-rule
                            name                                    delparam
                            parameter-name                          transport
                            type                                    uri-param
                            action                                  delete-element
sip-manipulation
        name                            drop100
        header-rule
                    name                                 checkRURI
                    header-name                          Request-URI
                    action                               manipulate
                    msg-type                             reply
                    methods                              INVITE
                    element-rule
                            name                                    storemsgcode
                            type                                    status-code
                            action                                  store
                            comparison-type                         pattern-rule
                            match-value                             100
                    element-rule
                            name                                    dropthemessage
```

```
                      type                              header-value
                      action                            reject
                      match-value                       $checkRURI.$storemsgcode.$0
sip-manipulation
        name                              forsessionexpirestoNTT
        header-rule
                name                              adduacforSE
                header-name                       Session-Expires
                action                            manipulate
                comparison-type                   pattern-rule
                msg-type                          request
                methods                           INVITE
                element-rule
                        name                              storesevalue
                        type                              header-value
                        action                            store
                        comparison-type                   pattern-rule
                        match-value                       (.*)
                element-rule
                        name                              addrefresheruac
                        type                              header-value
                        action                            replace
                        comparison-type                   pattern-rule
                        new-value                         180+;+refresher=uac
sip-manipulation
        name                              prackwork
        header-rule
                name                              delsupported
                header-name                       Supported
                action                            delete
                msg-type                          request
                methods                           INVITE
        header-rule
                name                              addrequireinINVITE
                header-name                       Require
                action                            add
                msg-type                          request
                methods                           INVITE
                new-value                         100rel
sip-manipulation
        name                              remove2ports
        header-rule
                name                              Removedoubleport
                header-name                       To
                action                            manipulate
                methods                           ACK,PRACK,UPDATE
                element-rule
                        name                              To
                        type                              uri-host
                        action                            replace
                        new-value                         ipvoice.jp
sip-manipulation
        name                              removecallinfo
        header-rule
                name                              Stripcallinfo
                header-name                       Call-Info
                action                            delete
                methods                           INVITE,UPDATE
sip-manipulation
        name                              stripblines
```

```
        header-rule
                name                                        blinefix
                header-name                                 Content-Type
                action                                      manipulate
                element-rule
                        name                                        removeb1
                        parameter-name                              application/sdp
                        type                                        mime
                        action                                      find-replace-all
                        comparison-type                             pattern-rule
                        match-value                                 b=TIAS:64000\r\n
                element-rule
                        name                                        removeb2
                        parameter-name                              application/sdp
                        type                                        mime
                        action                                      find-replace-all
                        comparison-type                             pattern-rule
                        match-value                                 b=AS:64\r\n
                element-rule
                        name                                        removemaxptime
                        parameter-name                              application/sdp
                        type                                        mime
                        action                                      find-replace-all
                        comparison-type                             pattern-rule
                        match-value                                 a=maxptime:20\r\n
sip-monitoring
        match-any-filter                  enabled
spl-config
        plugins
                name                              ocSurrogateRegister-1-5.pkg
        plugins
                name                              ocNttMsgConverter-0-3.pkg
steering-pool
        ip-address                       192.168.1.120
        start-port                       41000
        end-port                         45000
        realm-id                         NTT-router
steering-pool
        ip-address                       10.232.50.60
        start-port                       35000
        end-port                         37000
        realm-id                         CUCM
surrogate-agent
        register-host                    ipvoice.jp
        register-user                    +81XXXXXXXXXX
        realm-id                         CUCM
        customer-next-hop                ipvoice.jp
        register-contact-host            192.168.1.120
        register-contact-user            +81XXXXXXXXXX
        password                         *********
        register-expires                 3600
        auth-user                        user
        register-retry-time              1800
system-config
        process-log-level                DEBUG
        default-gateway                  192.168.1.115
translation-rules
        id                               addforJP
        type                             add
```

```
        add-string                           +
translation-rules
        id                                   removeplus
        type                                 delete
        delete-string                        +
web-server-config
```

SIPP based testing

Architecture

In addition to the trunk based test cases, the testing also included an exhaustive list of test cases that utilized SIPP scripts. These tests simulates corner case behavior either by CUCM or the NTT SIP trunk. The configuration for this part of testing is slightly different from the trunk based test configuration. The architecture diagram below shows the setup utilized for SIPP testing.
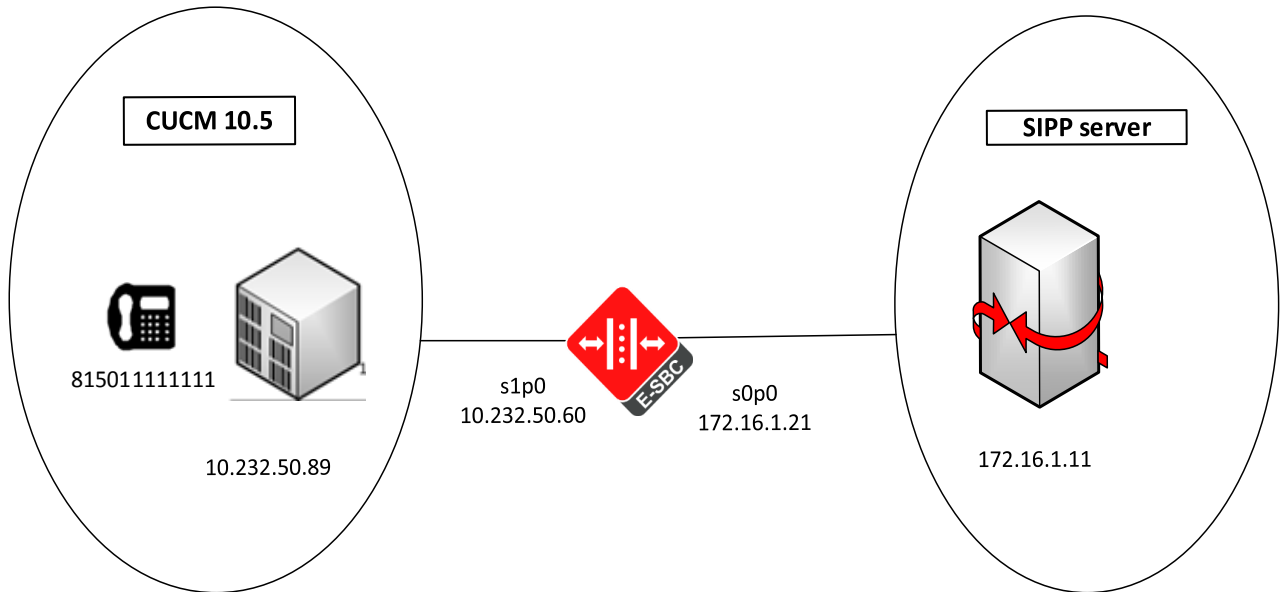
The ESBC configurations have been included in this guide. The configuration consists of sip-manipulations that are required for specific test cases.

For any questions regarding the configuration or the test cases, please contact your Oracle sales representative.

SBC Configuration

```
codec-policy
        name                            TC1283
        allow-codecs                    PCMU
codec-policy
        name                            toCUCM
        allow-codecs                    *
        order-codecs                    PCMU *
local-policy
        from-address                    *
        to-address                      *
        source-realm                    CUCM
        policy-attribute
                next-hop                        ntt.com
                realm                           NTT-router
                app-protocol                    SIP
local-policy
        from-address                    *
        to-address                      *
        source-realm                    NTT-router
        policy-attribute
                next-hop                        10.232.50.89
                realm                           CUCM
                app-protocol                    SIP
media-manager
media-policy
        name                            NTT-Tos
        tos-settings
                media-type                      message
                media-sub-type                  sip
                tos-value                       0x05
media-profile
        name                            PCMA
        payload-type                    8
media-profile
        name                            PCMU
        payload-type                    0
network-interface
        name                            s0p1
        description                     to SIPp
        ip-address                      172.16.1.21
        netmask                         255.255.255.0
        gateway                         172.16.1.15
        hip-ip-list                     172.16.1.21
        icmp-address                    172.16.1.21
        ssh-address                     172.16.1.21
network-interface
        name                            s0p3
        ip-address                      10.232.50.60
        netmask                         255.255.255.0
        gateway                         10.232.50.89
        hip-ip-list                     10.232.50.60
        ftp-address                     10.232.50.60
        icmp-address                    10.232.50.60
        ssh-address                     10.232.50.60
phy-interface
        name                            s0p1
        operation-type                  Media
```

```
        port                            1
phy-interface
        name                            s0p3
        operation-type                  Media
        port                            3
realm-config
        identifier                      CUCM
        network-interfaces              s0p3:0
        out-translationid              DelJP
        spl-options                     dyn-contact-start,ocNttMsgConverterTagging=opposite
        codec-policy                    toCUCM
realm-config
        identifier                      NTT-router
        network-interfaces              s0p1:0
        media-policy                    NTT-Tos
        out-translationid              add81forJP
        spl-options                     ocNttMsgConverterTagging=enabled,dyn-contact-
method=randomseed
session-agent
        hostname                        10.232.50.89
        transport-method                StaticTCP
        realm-id                        CUCM
        auth-attributes
                auth-realm                      ntt.com
                username                        user
                password                        ********
                in-dialog-methods               INVITE
session-agent
        hostname                        ntt.com
        ip-address                      172.16.1.11
        port                            7060
        realm-id                        NTT-router
session-translation
        id                              DelJP
        rules-calling                   remove81
        rules-called                    remove81
session-translation
        id                              add81forJP
        rules-calling                   addforJP
        rules-called                    addforJP
sip-config
        home-realm-id                   CUCM
        registrar-domain                *
        registrar-host                  *
        registrar-port                  5060
        options                         inmanip-before-validate
                                        max-udp-length=0
sip-interface
        realm-id                        CUCM
        sip-port
                address                         10.232.50.60
                transport-protocol              TCP
                allow-anonymous                 agents-only
        registration-caching            enabled
        in-manipulationid               Forsurragent
        out-manipulationid              ToCUCM
sip-interface
        realm-id                        NTT-router
        sip-port
                address                         172.16.1.21
```

```
               allow-anonymous                          registered
       registration-caching                enabled
       options                             dropresponse=698
       stop-recurse                        401,407,580
       in-manipulationid                   inboundNTT
       out-manipulationid                  Changecontact
sip-manipulation
       name                                AddSBCinfo
       header-rule
               name                                Addproductinfo
               header-name                         User-Agent
               action                              add
               msg-type                            request
               methods                             REGISTER
               new-value                           OracleE\-SBC/ECZ750
       header-rule
               name                                Moduseragentforcall
               header-name                         User-Agent
               action                              manipulate
               comparison-type                     pattern-rule
               msg-type                            request
               methods                             ACK,BYE,INVITE,PRACK,UPDATE
               element-rule
                       name                                Modvalue
                       type                                header-value
                       action                              replace
                       comparison-type                     pattern-rule
                       match-value                         ^Cisco(.*)
                       new-value                           OracleE\-SBC/ECZ750
       header-rule
               name                                ChecServerheaderinbye
               header-name                         Server
               action                              manipulate
               comparison-type                     pattern-rule
               methods                             BYE,INVITE
               element-rule
                       name                                Modvalue
                       type                                header-value
                       action                              replace
                       comparison-type                     pattern-rule
                       match-value                         ^Cisco(.*)
                       new-value                           OracleE\-SBC/ECZ730m1p1
       header-rule
               name                                delserverheader
               header-name                         Server
               action                              delete
               methods                             BYE,INVITE,PRACK,UPDATE
sip-manipulation
       name                                AddSupportedinReg
       header-rule
               name                                Addtheheader
               header-name                         Supported
               action                              add
               msg-type                            request
               methods                             REGISTER
               new-value                           path
sip-manipulation
       name                                Addsupportedwithtimer
       header-rule
               name                                Addsupported
```

```
                header-name                             Supported
                action                                  add
                msg-type                                reply
                methods                                 INVITE,UPDATE
                new-value                               timer
sip-manipulation
        name                             Change100to699
        header-rule
                name                                    check100
                header-name                             @status-line
                action                                  store
                comparison-type                         pattern-rule
                element-rule
                        name                                    is100
                        type                                    status-code
                        action                                  store
                        comparison-type                         pattern-rule
                        match-value                             100
        header-rule
                name                                    change100to699
                header-name                             @status-line
                action                                  manipulate
                comparison-type                         boolean
                msg-type                                reply
                methods                                 INVITE
                match-value                             $check100.$is100
                element-rule
                        name                                    modstatuscode
                        type                                    status-code
                        action                                  replace
                        new-value                               699
                element-rule
                        name                                    delreasonphrase
                        type                                    reason-phrase
                        action                                  find-replace-all
sip-manipulation
        name                                  Changecontact
        header-rule
                name                                    forprivacy
                header-name                             From
                action                                  sip-manip
                new-value                               NATting
        header-rule
                name                                    forPAIandRPI
                header-name                             From
                action                                  sip-manip
                new-value                               PAIandRPI
        header-rule
                name                                    forUAinfo
                header-name                             From
                action                                  sip-manip
                new-value                               AddSBCinfo
        header-rule
                name                                    Toremovecallinfo
                header-name                             From
                action                                  sip-manip
                new-value                               removecallinfo
        header-rule
                name                                    forregsupport
                header-name                             From
```

```
                action                                      sip-manip
                new-value                                   AddSupportedinReg
        header-rule
                name                                        outboundinvite
                header-name                                 From
                action                                      sip-manip
                new-value                                   ModSupportedoutboundINVITE
        header-rule
                name                                        regrule
                header-name                                 From
                action                                      sip-manip
                new-value                                   ForREGISTER
        header-rule
                name                                        fordateciscoguidallloweventsdel
                header-name                                 From
                action                                      sip-manip
                new-value                                   RemDateCiscoGuideallowevents
        header-rule
                name                                        formaxforwards
                header-name                                 From
                action                                      sip-manip
                new-value                                   ModMaxforwards
        header-rule
                name                                        fortransportudp
                header-name                                 From
                action                                      sip-manip
                new-value                                   deltransportUDP
        header-rule
                name                                        forplusinresponse
                header-name                                 From
                action                                      sip-manip
                new-value                                   Modcontactuserinresponses
        header-rule
                name                                        formodallowheader
                header-name                                 From
                action                                      sip-manip
                new-value                                   ModAllowheader
        header-rule
                name                                        forreasonheader
                header-name                                 From
                action                                      sip-manip
                new-value                                   DelReasonheader
        header-rule
                name                                        forupdatemessage
                header-name                                 From
                action                                      sip-manip
                new-value                                   ModUPDATEmessage
        header-rule
                name                                        fortimerinsupported
                header-name                                 From
                action                                      sip-manip
                new-value                                   Addsupportedwithtimer
        header-rule
                name                                        DeleteexpiresinINVITE
                header-name                                 From
                action                                      sip-manip
                new-value                                   DelExpiresinINVITE
        header-rule
                name                                        forSEtoNTT
                header-name                                 From
```

```
              action                          sip-manip
              new-value                       forsessionexpirestoNTT
       header-rule
              name                            foranonymouscall
              header-name                     From
              action                          sip-manip
              new-value                       anonymouscall
sip-manipulation
       name                           DelExpiresinINVITE
       header-rule
              name                            delexpires
              header-name                     Expires
              action                          delete
              msg-type                        request
              methods                         INVITE
sip-manipulation
       name                           DelReasonheader
       header-rule
              name                            delreason
              header-name                     Reason
              action                          delete
              msg-type                        request
              methods                         BYE
sip-manipulation
       name                           ForREGISTER
       header-rule
              name                            Delroute
              header-name                     Route
              action                          delete
              msg-type                        request
              methods                         REGISTER
       header-rule
              name                            Delauthparams
              header-name                     Authorization
              action                          manipulate
              msg-type                        request
              methods                         REGISTER
              element-rule
                     name                            storevalue
                     type                            header-value
                     action                          store
                     comparison-type                 pattern-rule
                     match-value                     (.+)(, auth-params=sha1-credential)
              element-rule
                     name                            delparam
                     type                            header-value
                     action                          replace
                     comparison-type                 pattern-rule
                     new-value                       $Delauthparams.$storevalue.$1
       header-rule
              name                            addContentlength
              header-name                     Content-Length
              action                          add
              msg-type                        request
              methods                         REGISTER
              new-value                       0
       header-rule
              name                            delexpires
              header-name                     Expires
              action                          delete
```

```
              msg-type                         request
              methods                          REGISTER
      header-rule
              name                             adduserphoneinFrom
              header-name                      From
              action                           manipulate
              msg-type                         request
              methods                          INVITE,REGISTER
              element-rule
                      name                             adduserphone
                      parameter-name                   user
                      type                             uri-param
                      action                           add
                      new-value                        phone
      header-rule
              name                             adduserphoneinTo
              header-name                      To
              action                           manipulate
              msg-type                         request
              methods                          INVITE,REGISTER
              element-rule
                      name                             adduserphonto
                      parameter-name                   user
                      type                             uri-param
                      action                           add
                      new-value                        phone
      header-rule
              name                             adduserphoneinRURIINVITE
              header-name                      Request-URI
              action                           manipulate
              msg-type                         request
              methods                          INVITE
              element-rule
                      name                             adduserequalphone
                      parameter-name                   user
                      type                             uri-param
                      action                           add
                      new-value                        phone
      header-rule
              name                             Forinvitedelauthparams
              header-name                      Proxy-Authorization
              action                           manipulate
              msg-type                         request
              methods                          INVITE
              element-rule
                      name                             storethevalue
                      type                             header-value
                      action                           store
                      comparison-type                  pattern-rule
                      match-value                      (.+)(, auth-params=sha1-credential)
              element-rule
                      name                             delparam
                      type                             header-value
                      action                           replace
                      comparison-type                  pattern-rule
                      new-value
$Forinvitedelauthparams.$storethevalue.$1
      header-rule
              name                             addopaqueinReg
              header-name                      Authorization
```

```
                action                                   manipulate
                comparison-type                          pattern-rule
                msg-type                                 request
                methods                                  REGISTER
                element-rule
                        name                                     storeentireheader
                        type                                     header-value
                        action                                   store
                        comparison-type                          pattern-rule
                        match-value                              (.+)(, algorithm=MD5)
                element-rule
                        name                                     addopaqueparam
                        parameter-name                           opaque
                        type                                     header-value
                        action                                   replace
                        comparison-type                          pattern-rule
                        new-value
$addopaqueinReg.$storeentireheader.$1+$addopaqueinReg.$storeentireheader.$2+,+opaque=\"\"
        header-rule
                name                                     addopaqueinINVITE
                header-name                              Proxy-authorization
                action                                   manipulate
                msg-type                                 request
                methods                                  INVITE
                element-rule
                        name                                     Checkheader
                        type                                     header-value
                        action                                   store
                        comparison-type                          pattern-rule
                        match-value                              (.+)(, algorithm=MD5)
                element-rule
                        name                                     addopaqueinheader
                        type                                     header-value
                        action                                   replace
                        comparison-type                          pattern-rule
                        new-value
$addopaqueinINVITE.$Checkheader.$1+$addopaqueinINVITE.$Checkheader.$2+,+opaque=\"\"
sip-manipulation
        name                                     Forsurragent
        header-rule
                name                                     forsupportedinINVITE
                header-name                              From
                action                                   sip-manip
                new-value                                ModSupportedinINVITE
        header-rule
                name                                     ChangeFrom
                header-name                              From
                action                                   manipulate
                msg-type                                 request
                methods                                  INVITE
                element-rule
                        name                                     NTT_from_user
                        parameter-name                           From
                        type                                     uri-user
                        action                                   replace
                        new-value                                815034252021
sip-manipulation
        name                                     ModAllowheader
        header-rule
                name                                     CheckAllowheader
```

```
                header-name                           Allow
                action                                manipulate
                methods                               INVITE,UPDATE
                element-rule
                        name                              Storeheadervalue
                        type                              header-value
                        action                            store
                        comparison-type                   pattern-rule
                        match-value                       .*
                element-rule
                        name                              Modallow
                        type                              header-value
                        action                            replace
                        new-value                         INVITE,BYE,CANCEL,ACK,PRACK,UPDATE
        header-rule
                name                                  Checkallowandifnotaddit
                header-name                           Allow
                action                                add
                comparison-type                       boolean
                msg-type                              request
                methods                               UPDATE
                match-value                           !$CheckAllowheader.$Storeheadervalue
                element-rule
                        name                              addheadervalue
                        type                              header-value
                        action                            add
                        new-value                         INVITE,BYE,CANCEL,ACK,PRACK,UPDATE
sip-manipulation
        name                                  ModMaxforwards
        description                           Look for Max-Forwards header, change it to 70 and if
not present, add it
        header-rule
                name                                  CheckMaxforwards
                header-name                           Max-Forwards
                action                                manipulate
                methods                               ACK,BYE,INVITE,PRACK,UPDATE
                element-rule
                        name                              storevalue
                        type                              header-value
                        action                            store
                        comparison-type                   pattern-rule
                element-rule
                        name                              add70
                        type                              header-value
                        action                            find-replace-all
                        comparison-type                   pattern-rule
                        new-value                         70
        header-rule
                name                                  Addmaxforwardsifnotpresent
                header-name                           Max-Forwards
                action                                add
                comparison-type                       boolean
                msg-type                              reply
                methods                               ACK,BYE,INVITE,PRACK,UPDATE
                match-value                           !$CheckMaxforwards.$storevalue
                element-rule
                        name                              addvalue
                        type                              header-value
                        action                            add
                        new-value                         70
```

```
sip-manipulation
      name                              ModRURItoCUCM
      header-rule
            name                              CheckToheader
            header-name                       To
            action                            manipulate
            msg-type                          request
            methods                           INVITE
            element-rule
                  name                              storeTouriuser
                  type                              uri-user
                  action                            store
                  comparison-type                   pattern-rule
      header-rule
            name                              ModRURIuser
            header-name                       Request-URI
            action                            manipulate
            msg-type                          request
            methods                           INVITE
            element-rule
                  name                              replaceuserinfo
                  type                              uri-user
                  action                            replace
                  new-value                         $CheckToheader.$storeTouriuser.$0
sip-manipulation
      name                              ModSupportedinINVITE
      header-rule
            name                              Checkciscosupported
            header-name                       Supported
            action                            delete
            comparison-type                   pattern-rule
            methods                           INVITE,UPDATE
            match-value                       X-cisco-srtp(.*)
      header-rule
            name                              Checkgeosupported
            header-name                       Supported
            action                            delete
            methods                           INVITE,UPDATE
            match-value                       Geolocation
sip-manipulation
      name                              ModSupportedoutboundINVITE
      header-rule
            name                              CheckSupported
            header-name                       Supported
            action                            manipulate
            comparison-type                   pattern-rule
            msg-type                          request
            methods                           INVITE
            element-rule
                  name                              Storevalue
                  type                              header-value
                  action                            store
                  comparison-type                   pattern-rule
            element-rule
                  name                              add100rel
                  type                              header-value
                  action                            find-replace-all
                  comparison-type                   pattern-rule
                  new-value                         100rel,timer
      header-rule
```

```
                name                                 delsupportedin200
                header-name                          Supported
                action                               delete
                msg-type                             reply
                methods                              INVITE
                match-value                          replaces
sip-manipulation
        name                              ModSupportedtowardsCUCM
        header-rule
                name                                 CheckSupported
                header-name                          Supported
                action                               manipulate
                comparison-type                      pattern-rule
                methods                              INVITE
                element-rule
                        name                                 Storevalue
                        type                                 header-value
                        action                               store
                        comparison-type                      pattern-rule
                element-rule
                        name                                 isupdate
                        type                                 header-value
                        action                               replace
                        comparison-type                      pattern-rule
                        new-value
$CheckSupported.$Storevalue.$0+,+UPDATE
sip-manipulation
        name                              ModToport
        header-rule
                name                                 CheckToport
                header-name                          To
                action                               manipulate
                comparison-type                      pattern-rule
                match-value                          sip:*
                element-rule
                        name                                 Storeport
                        type                                 uri-port
                        action                               store
                        match-value                          7060
        header-rule
                name                                 CheckdoubleportsinTo
                header-name                          To
                action                               manipulate
                comparison-type                      boolean
                match-value                          !$CheckToport.$Storeport
                element-rule
                        name                                 ChangeToval
                        type                                 uri-port
                        action                               add
                        new-value                            7060
sip-manipulation
        name                              ModTotel
        header-rule
                name                                 CheckTotel
                header-name                          To
                action                               manipulate
                comparison-type                      pattern-rule
                match-value                          tel:*
                element-rule
                        name                                 delport
```

```
                        type                              uri-port
                        action                            replace
                        match-value                       7060
sip-manipulation
        name                             ModUPDATEmessage
        header-rule
                name                             ModSupportedheader
                header-name                      Supported
                action                           manipulate
                comparison-type                  pattern-rule
                msg-type                         request
                methods                          UPDATE
                element-rule
                        name                              keeptimeronly
                        type                              header-value
                        action                            replace
                        comparison-type                   pattern-rule
                        new-value                         timer
sip-manipulation
        name                             Modcontactuserinresponses
        header-rule
                name                             Modtheuser
                header-name                      Contact
                action                           manipulate
                msg-type                         reply
                methods                          INVITE,UPDATE
                element-rule
                        name                              Checkuser
                        type                              uri-user
                        action                            store
                        comparison-type                   pattern-rule
                element-rule
                        name                              addplussign
                        type                              uri-user
                        action                            replace
                        new-value                         \++$Modtheuser.$Checkuser.$0
sip-manipulation
        name                             NATting
        header-rule
                name                             From
                header-name                      From
                action                           manipulate
                element-rule
                        name                              From_header
                        type                              uri-host
                        action                            replace
                        new-value                         ntt.com
        header-rule
                name                             To
                header-name                      To
                action                           manipulate
                comparison-type                  pattern-rule
                match-value                      sip:*
                element-rule
                        name                              To
                        type                              uri-host
                        action                            replace
                        new-value                         ntt.com
                element-rule
                        name                              Toport
```

```
                    type                              uri-port
                    action                            sip-manip
                    new-value                         ModToport
sip-manipulation
        name                            PAIandRPI
        header-rule
                name                            delRPI
                header-name                     Remote-Party-ID
                action                          delete
                methods                         INVITE,UPDATE
        header-rule
                name                            delPAI
                header-name                     P-Asserted-Identity
                action                          delete
                methods                         BYE,INVITE,UPDATE
sip-manipulation
        name                            RemDateCiscoGuideallowevents
        header-rule
                name                            delDate
                header-name                     Date
                action                          delete
                methods                         ACK,BYE,INVITE,PRACK,UPDATE
        header-rule
                name                            delCiscoGuid
                header-name                     Cisco-Guid
                action                          delete
                methods                         ACK,BYE,INVITE,PRACK,UPDATE
        header-rule
                name                            delAllowevents
                header-name                     Allow-Events
                action                          delete
                methods                         ACK,BYE,INVITE,PRACK,UPDATE
sip-manipulation
        name                            TC1282
        mime-sdp-rule
                name                            rejip6
                msg-type                        request
                action                          manipulate
                sdp-session-rule
                        name                            test_ip6
                        action                          manipulate
                        sdp-line-rule
                                name                            checkip6
                                type                            o
                                action                          reject
                                comparison-type                 pattern-rule
                                match-value                     ^([0-9]{10}) ([0-9]{10}) ([0-
9]{10}) (IN IP6 .*)$
                                new-value                       "403:Not Acceptable Protocol"
sip-manipulation
        name                            TC1283
        mime-sdp-rule
                name                            rejcodec
                msg-type                        request
                action                          manipulate
                sdp-media-rule
                        name                            test_m
                        media-type                      audio
                        action                          manipulate
                        sdp-line-rule
```

```
                                    name                                change_payload
                                    type                                m
                                    action                              reject
                                    comparison-type                     pattern-rule
                                    match-value                         ^(audio)( [0-9]{4,5})( RTP/AVP
9 15 18 4)$
                                    new-value                           "403:Codecs Not Allowed"
sip-manipulation
        name                            TC1284
        mime-sdp-rule
                name                                rejudp
                msg-type                            request
                action                              manipulate
                sdp-media-rule
                        name                                test_udp
                        media-type                          audio
                        action                              manipulate
                        sdp-line-rule
                                name                                check_payload
                                type                                m
                                action                              reject
                                comparison-type                     pattern-rule
                                match-value                         ^(audio)( [0-9]{4,5})( UDP 0)$
                                new-value                           "403:Not Acceptable Media"
sip-manipulation
        name                            ToCUCM
        header-rule
                name                                ForNAT_IP
                header-name                         From
                action                              sip-manip
                new-value                           Topohiding
        header-rule
                name                                forRURI
                header-name                         From
                action                              sip-manip
                new-value                           ModRURItoCUCM
        header-rule
                name                                ForupdatetoCUCM
                header-name                         From
                action                              sip-manip
                new-value                           ModSupportedtowardsCUCM
sip-manipulation
        name                            Topohiding
        header-rule
                name                                From
                header-name                         From
                action                              manipulate
                element-rule
                        name                                From_header
                        type                                uri-host
                        action                              replace
                        new-value                           $LOCAL_IP
        header-rule
                name                                To
                header-name                         To
                action                              manipulate
                element-rule
                        name                                To
                        type                                uri-host
                        action                              replace
```

```
               new-value                               $REMOTE_IP
sip-manipulation
        name                            anonymouscall
        header-rule
                name                             changeRURI
                header-name                      Request-URI
                action                           manipulate
                msg-type                         request
                methods                          INVITE
                element-rule
                        name                             storeuser
                        type                             uri-user
                        action                           store
                        comparison-type                  pattern-rule
                        match-value                      ^\+184(.*$)
                element-rule
                        name                             striptheplus
                        type                             uri-user
                        action                           replace
                        comparison-type                  boolean
                        match-value                      $changeRURI.$storeuser
                        new-value                        $ORIGINAL-^"+"
        header-rule
                name                             addphonecontext
                header-name                      Request-URI
                action                           manipulate
                comparison-type                  boolean
                msg-type                         request
                methods                          INVITE
                match-value                      $changeRURI.$storeuser.$0
                element-rule
                        name                             addtheparam
                        parameter-name                   phone-context
                        type                             uri-user-param
                        action                           add
                        new-value                        \+81
        header-rule
                name                             ModToheader
                header-name                      To
                action                           manipulate
                comparison-type                  pattern-rule
                msg-type                         request
                methods                          INVITE
                element-rule
                        name                             storetheuser
                        type                             uri-user
                        action                           store
                        comparison-type                  pattern-rule
                        match-value                      ^\+184(.*$)
                element-rule
                        name                             Striptheplusfromuriuser
                        type                             uri-user
                        action                           replace
                        comparison-type                  boolean
                        match-value                      $ModToheader.$storetheuser
                        new-value                        $ORIGINAL-^"+"
        header-rule
                name                             addphonecontextinTo
                header-name                      To
                action                           manipulate
```

```
                comparison-type                        boolean
                msg-type                               request
                methods                                INVITE
                match-value                            $ModToheader.$storetheuser.$0
                element-rule
                        name                                   addpc
                        parameter-name                         phone-context
                        type                                   uri-user-param
                        action                                 add
                        new-value                              \+81
sip-manipulation
        name                            changeforPCPID
        header-rule
                name                                   modforPCPID
                header-name                            To
                action                                 manipulate
                comparison-type                        pattern-rule
                msg-type                               out-of-dialog
                methods                                INVITE
                element-rule
                        name                                   modToer
                        type                                   uri-user
                        action                                 replace
                        comparison-type                        pattern-rule
                        match-value                            !($TO_USER.$0 == $PCPID_USER.$0)
                        new-value                              $PCPID_USER.$0
sip-manipulation
        name                            checkPCPID
        header-rule
                name                                   StorePCPIDuser
                header-name                            P-Called-Party-ID
                action                                 manipulate
                comparison-type                        pattern-rule
                element-rule
                        name                                   Storeuser
                        type                                   header-value
                        action                                 sip-manip
                        comparison-type                        pattern-rule
                        new-value                              changeforPCPID
sip-manipulation
        name                            checkTotag
        header-rule
                name                                   storeTotag
                header-name                            To
                action                                 store
                comparison-type                        pattern-rule
                match-value                            sip:*
                element-rule
                        name                                   Storetag
                        parameter-name                         tag
                        type                                   header-param
                        action                                 store
        header-rule
                name                                   checkTotag
                header-name                            To
                action                                 manipulate
                comparison-type                        boolean
                match-value                            $storeTotag.$Storetag
                element-rule
                        name                                   reinv
```

```
                      parameter-name                                tag
                      type                                          header-param
                      action                                        sip-manip
                      new-value                                     rejectreinv
sip-manipulation
        name                                checkforBYE
        header-rule
                name                                storeBYE
                header-name                         To
                action                              manipulate
                comparison-type                     pattern-rule
                methods                             BYE
                element-rule
                        name                                storetheuser
                        type                                uri-user
                        action                              store
                        comparison-type                     pattern-rule
        header-rule
                name                                checkBYE
                header-name                         Request-URI
                action                              manipulate
                comparison-type                     pattern-rule
                methods                             BYE
                element-rule
                        name                                checkBYERURI
                        type                                uri-user
                        action                              reject
                        comparison-type                     boolean
                        match-value                         !$storeBYE.$storetheuser
                        new-value                           404:Not Found
sip-manipulation
        name                                convertresp
        header-rule
                name                                change503to580
                header-name                         @status-line
                action                              manipulate
                msg-type                            reply
                element-rule
                        name                                modStatusCode
                        type                                status-code
                        action                              replace
                        comparison-type                     pattern-rule
                        match-value                         (503|403)
                        new-value                           580
sip-manipulation
        name                                deltransportUDP
        header-rule
                name                                Remtransportudp
                header-name                         Contact
                action                              manipulate
                methods                             INVITE,UPDATE
                element-rule
                        name                                delparam
                        parameter-name                      transport
                        type                                uri-param
                        action                              delete-element
sip-manipulation
        name                                drop100
        header-rule
                name                                checkRURI
```

```
                header-name                         Request-URI
                action                              manipulate
                msg-type                            reply
                methods                             INVITE
                element-rule
                        name                                storemsgcode
                        type                                status-code
                        action                              store
                        comparison-type                     pattern-rule
                        match-value                         100
                element-rule
                        name                                dropthemessage
                        type                                header-value
                        action                              reject
                        match-value                         $checkRURI.$storemsgcode.$0
sip-manipulation
        name                            dropACK
        header-rule
                name                                rejectACK
                header-name                         To
                action                              reject
                comparison-type                     pattern-rule
                msg-type                            request
                methods                             ACK
                match-value                         !($RURI_USER.$0 == $TO_USER.$0)
                new-value                           "698:Match Not Found"
sip-manipulation
        name                            forsessionexpirestoNTT
        header-rule
                name                                adduacforSE
                header-name                         Session-Expires
                action                              manipulate
                comparison-type                     pattern-rule
                msg-type                            request
                methods                             INVITE
                element-rule
                        name                                storesevalue
                        type                                header-value
                        action                              store
                        comparison-type                     pattern-rule
                        match-value                         (.*)
                element-rule
                        name                                addrefresheruac
                        type                                header-value
                        action                              replace
                        comparison-type                     pattern-rule
                        new-value                           180+;+refresher=uac
sip-manipulation
        name                            inboundNTT
        header-rule
                name                                changeToperPCPID
                header-name                         From
                action                              sip-manip
                methods                             INVITE
                new-value                           checkPCPID
        header-rule
                name                                TC1282hr
                header-name                         From
                action                              sip-manip
                methods                             INVITE
```

```
                new-value                          TC1282
        header-rule
                name                               TC1283hr
                header-name                        From
                action                             sip-manip
                msg-type                           request
                new-value                          TC1283
        header-rule
                name                               TC1284hr
                header-name                        From
                action                             sip-manip
                methods                            INVITE
                new-value                          TC1284
        header-rule
                name                               rejPRACK
                header-name                        From
                action                             sip-manip
                methods                            BYE,PRACK
                new-value                          rejectPRACK
        header-rule
                name                               tc2215reinv
                header-name                        From
                action                             sip-manip
                msg-type                           request
                new-value                          checkTotag
        header-rule
                name                               stoprecurseforreg
                header-name                        From
                action                             sip-manip
                msg-type                           reply
                new-value                          regrecurse
        header-rule
                name                               hmrforack
                header-name                        From
                action                             sip-manip
                msg-type                           request
                methods                            ACK
                new-value                          dropACK
sip-manipulation
        name                            prackwork
        header-rule
                name                               delsupported
                header-name                        Supported
                action                             delete
                msg-type                           request
                methods                            INVITE
        header-rule
                name                               addrequireinINVITE
                header-name                        Require
                action                             add
                msg-type                           request
                methods                            INVITE
                new-value                          100rel
sip-manipulation
        name                            regrecurse
        header-rule
                name                               checkcseq
                header-name                        CSeq
                action                             sip-manip
                comparison-type                    pattern-rule
```

```
              msg-type                              reply
              match-value                           ([0-9]{1} REGISTER)
              new-value                             convertresp
sip-manipulation
        name                                rejectPRACK
        header-rule
              name                                  rejectPRACK
              header-name                           To
              action                                reject
              comparison-type                       pattern-rule
              msg-type                              request
              methods                               BYE,PRACK
              match-value                           !($RURI_USER.$0 == $TO_USER.$0)
              new-value                             "481:Call/Transaction Does Not Exist"
sip-manipulation
        name                                rejectreinv
        header-rule
              name                                  rejectreinv
              header-name                           To
              action                                reject
              comparison-type                       pattern-rule
              msg-type                              request
              methods                               INVITE
              match-value                           !($RURI_USER.$0 == $TO_USER.$0)
              new-value                             "404:Not found"
sip-manipulation
        name                                removecallinfo
        header-rule
              name                                  Stripcallinfo
              header-name                           Call-Info
              action                                delete
              methods                               INVITE,UPDATE
sip-monitoring
        match-any-filter                    enabled
spl-config
        spl-options                         log-sip-msg
        plugins
              name                                  ocSurrogateRegister-1-6.pkg
        plugins
              name                                  ocNttMsgConverter-0-3.pkg
steering-pool
        ip-address                          10.232.50.60
        start-port                          35000
        end-port                            37000
        realm-id                            CUCM
steering-pool
        ip-address                          172.16.1.21
        start-port                          41000
        end-port                            45000
        realm-id                            NTT-router
surrogate-agent
        register-host                       ntt.com
        register-user                       +81XXXXXXXXX
        realm-id                            CUCM
        customer-next-hop                   ntt.com
        register-contact-host               172.16.1.21
        register-contact-user               +81XXXXXXXXX
        password                            ********
        register-expires                    3600
```

```
        auth-user                        user
        register-retry-time              1800
system-config
        process-log-level                DEBUG
        comm-monitor
                state                            enabled
                sbc-grp-id                         5
        default-gateway                  172.16.1.15
translation-rules
        id                               addforJP
        type                             add
        add-string                       +
translation-rules
        id                               remove81
        type                             delete
        delete-string                    +
web-server-config
```

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. 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. 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

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 the 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**

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.
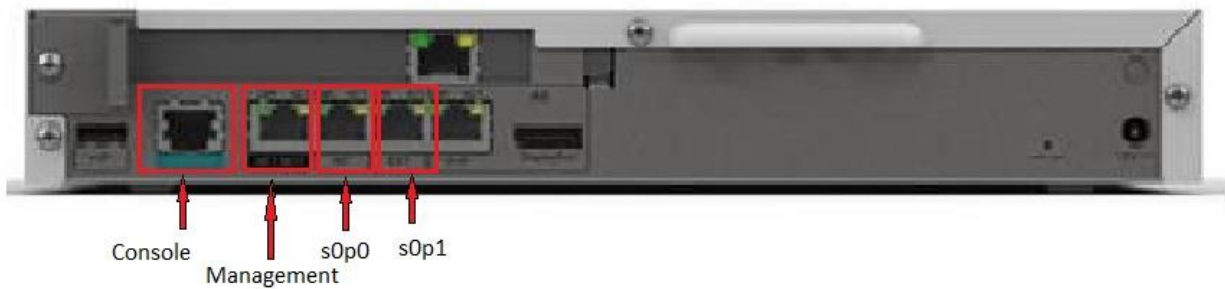
ACLI Basics

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.
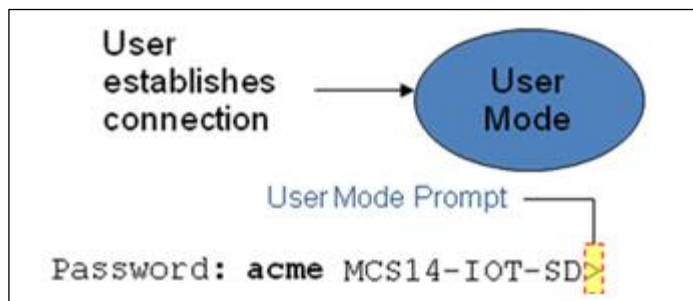
The Superuser mode allows for access to all system commands for operation, maintenance, and administration. This mode is identified by the pound sign (#) in the prompt after the target name. To enter the Superuser mode, issue the enable command in the User mode.
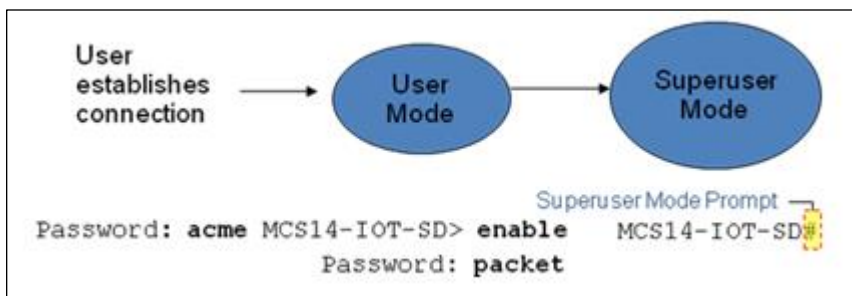
From the Superuser mode, you can perform monitoring and administrative tasks; however you cannot configure any elements. To return to User mode, issue the exit command.

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.
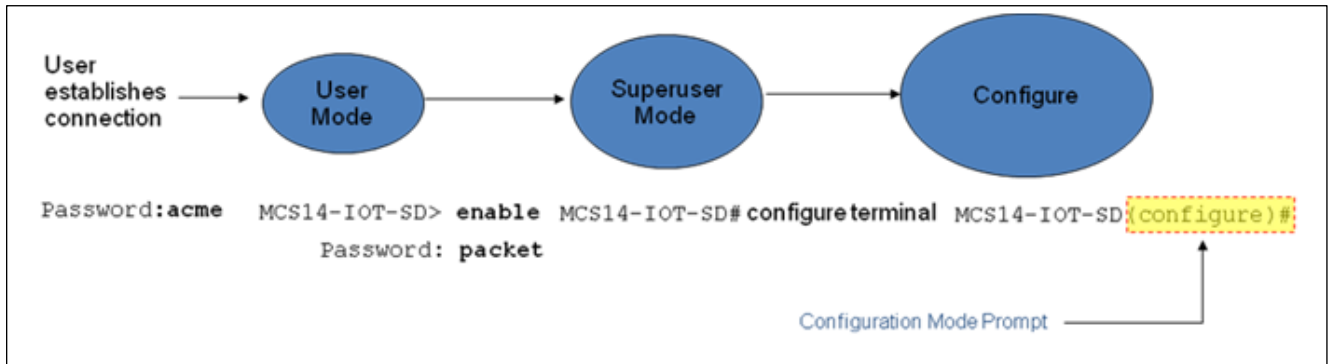
In the configuration mode, there are six configuration branches:

- bootparam;
- ntp-sync;
- media-manager;
- session-router;
- system; and
- security.
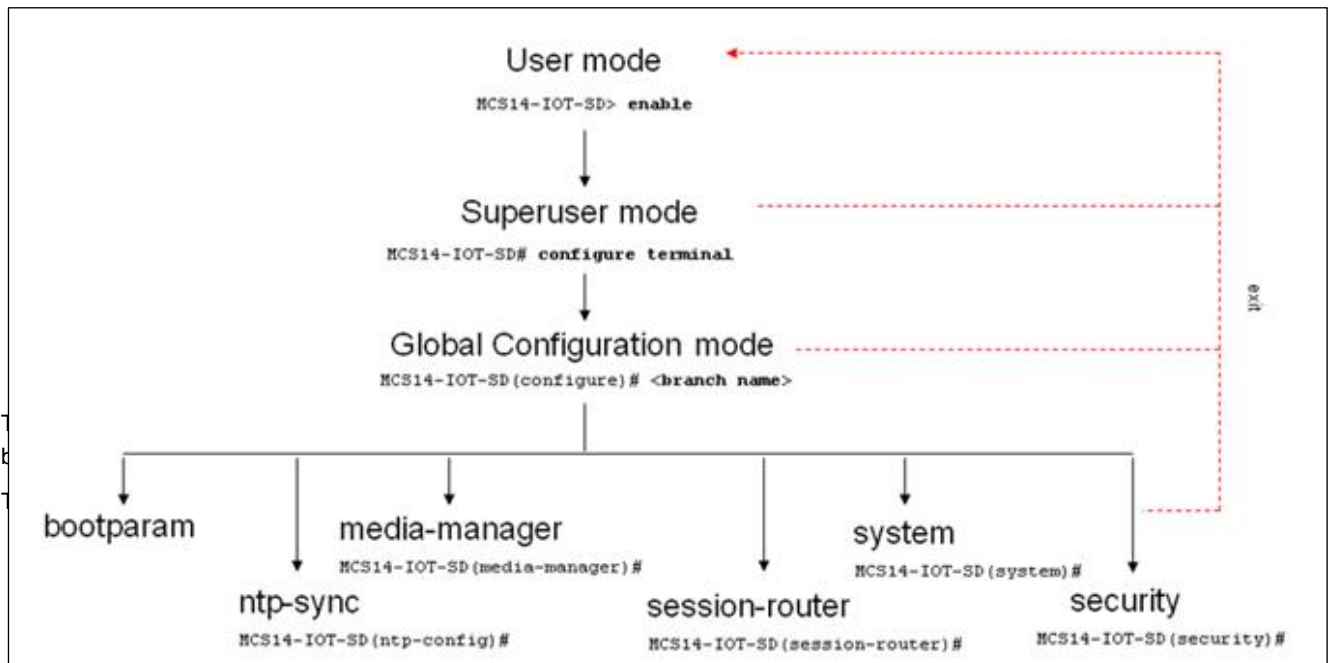
- host inet –The IP address of external server where image file resides.

- 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, iwf-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.

Upon issuing the **save-config** command, the SBC displays a reminder on screen stating that you must use the **activate-config** command if you want the configurations to be updated.

```
oraclesbc1 # 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'.
oraclesbc1 #
```

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.

```
oraclesbc1# activate-config
Activate-Config received, processing.
waiting 120000 for request to finish
Request to 'ACTIVATE-CONFIG' has Finished,
Activate Complete
oraclesbc1#
```