



SIP Trunking with Oracle Enterprise Session Border  
Controller with ECZ8.1 and Genesys SIP Server 8.1

Technical Application Note

## 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.....   | 2  |
| Document Overview .....  | 2  |
| Introduction .....   | 3  |
| Audience .....   | 3  |
| Requirements.....  | 3  |
| Architecture .....   | 4  |
| Lab Configuration.....   | 5  |
| Configuring the Oracle E-SBC.....  | 6  |
| In Scope.....  | 6  |
| Out of Scope.....  | 6  |
| What you will need .....   | 6  |
| Configuring the E-SBC .....  | 6  |
| Establish the serial connection to the Net-Net SBC.....  | 7  |
| SIP Trunking Configuration for the E-SBC .....   | 9  |
| SBC Configuration .....  | 10 |
| Enabling Remote worker (for remote workers registering into Genesys SIP server via the E-SBC)..... | 27 |
| Test Plan Executed .....   | 34 |
| Troubleshooting Tools .....  | 36 |
| Oracle Enterprise Operations Monitor .....   | 36 |
| Settings on EOM to display different call legs as a single report.....                             | 36 |
| Sample EOM report for a call between remote worker and Genesys client.....                         | 39 |
| Wireshark.....   | 40 |
| On the Oracle E-SBC.....   | 40 |
| Examining the log files .....  | 40 |
| Through the Web GUI .....  | 41 |
| Appendix A.....  | 41 |
| Accessing the ACLI .....   | 41 |
| ACLI Basics.....   | 41 |
| Configuration Elements .....   | 43 |
| Creating an Element.....   | 43 |
| Editing an Element.....  | 44 |
| Deleting an Element.....   | 44 |
| Configuration Versions.....  | 44 |
| Saving the Configuration.....  | 45 |
| Activating the Configuration .....   | 45 |

## **Intended Audience**

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

## **Document Overview**

SIP Server is the Genesys software component that provides an interface between your telephony hardware and the rest of the Genesys software components in your enterprise. It translates and keeps track of events and requests that come from, and are sent to the telephony device. SIP Server is a TCP/IP-based server that can also act as a messaging interface between SIP Server clients. It is the critical point in allowing your Genesys solution to facilitate and track the contacts that flow through your enterprise. This reduces the cost and complexity of extending an enterprise's telephony system outside its network borders. Oracle Enterprise Session Border Controllers (E-SBCs) play an important role in SIP trunking as they are used by many 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 Genesys SIP Server, E-SBCs and IP Trunking services are configured in the optimal manner.

## Introduction

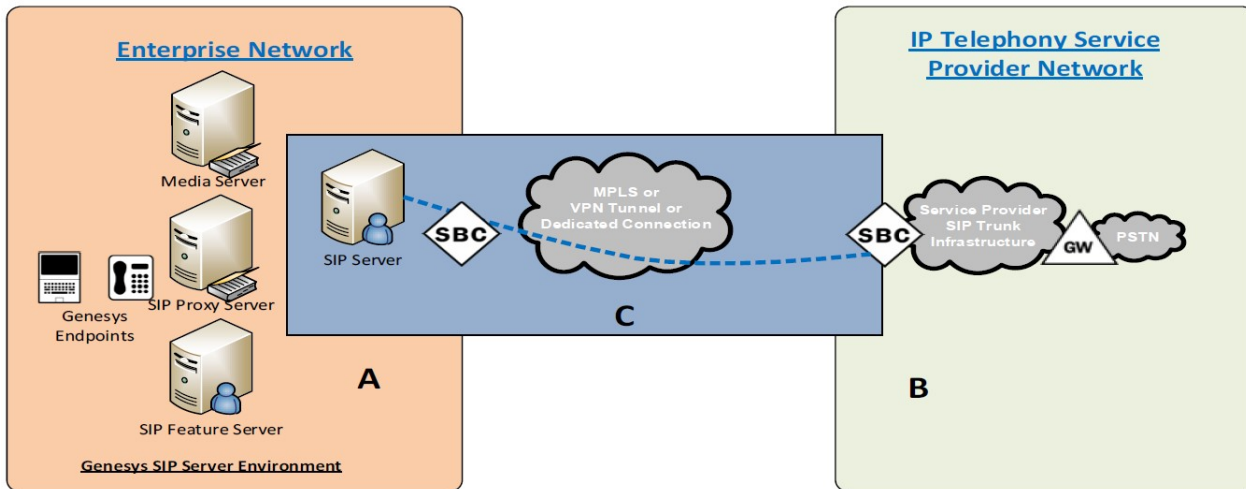
### Audience

This is a technical document intended for telecommunications engineers with the purpose of configuring the Oracle Enterprise Session Border Controller and the Genesys SIP Server. There will be steps that require navigating 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 Genesys SIP Server deployment, including Media Server, SIP Proxy and SIP Feature Server
- Genesys SIP Server, Version 8.1.1
- Genesys Media Server, Version 8.1.7
- Genesys SIP Proxy Server, Version 8.1.1
- Genesys SIP Feature Server, Version 8.1.2
- Oracle Enterprise Session Border Controller – All Acme Packet models including Virtual Machine Edition, 4600,1100,3900,6300,6350 platform running ECZ810p1.bz Note: the configuration running on the E-SBC is backward/forward compatible with any release in the 8.1.0 stream.

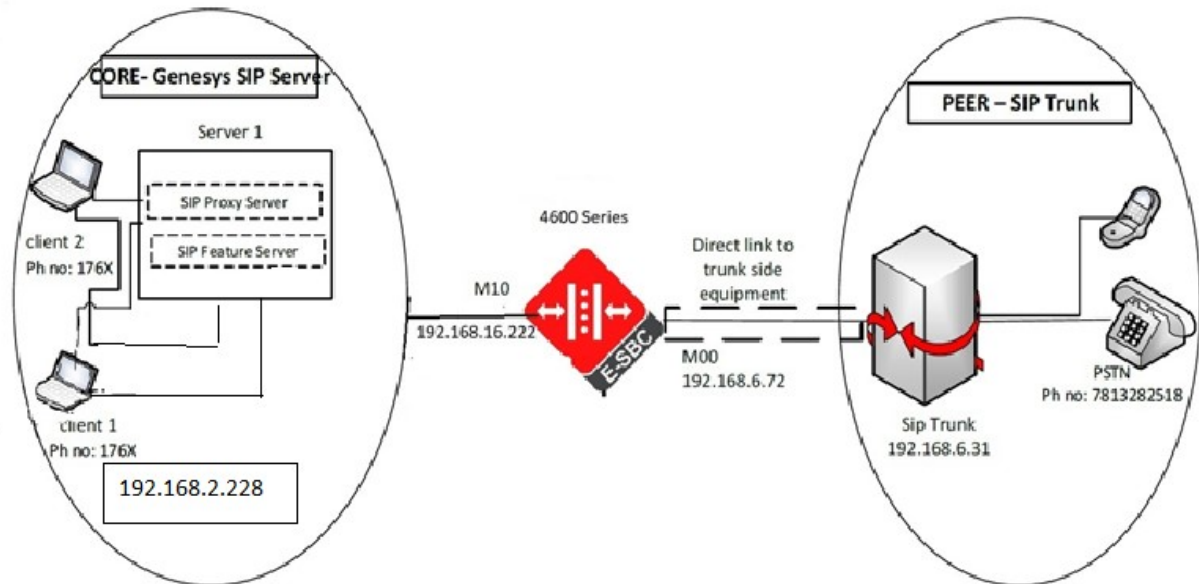
# Architecture



Area A represents the customer's on-premise infrastructure, which includes the SIP Server, SIP Proxy server, Media Server and SIP Feature Server. Area B represents the service provider infrastructure which provides PSTN service via the SIP trunk. Area C represents the integration of these two environments over an IP network. This could be, through a VPN tunnel over the Internet, an MPLS managed network, or even a dedicated physical connection. The Genesys SIP Server and the E-SBC are the edge components that form the boundary of the SIP trunk. The configuration, validation and troubleshooting of the E-SBC to work with the Genesys SIP Server will be described in this document

## Lab Configuration

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



## Configuring the Oracle E-SBC

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

### In Scope

The following guide configuring the E-SBC assumes that this is a newly deployed device dedicated to a single customer. If a service provider currently has the E-SBC deployed and is adding SIP Server customers, then please see the CLI Configuration Guide on [http://docs.oracle.com/cd/E56581\\_01/index.htm](http://docs.oracle.com/cd/E56581_01/index.htm) for a better understanding of the Command Line Interface (CLI).

Note that Oracle offers several models of E-SBCs. This document covers the setup for the Acme Packet 4600 platform running ECZ8.1.0 or later. If instructions are needed for other E-SBC models, please contact your Oracle representative.

### Out of Scope

- Configuration of Network management including SNMP and RADIUS

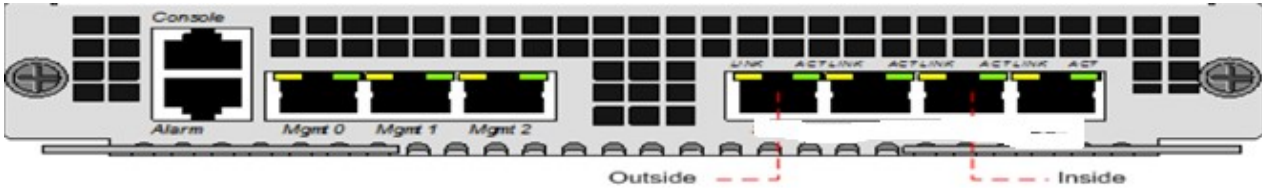
### What you will need

- 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 E-SBC
- IP address to be assigned to management interface (Wancom0) of the E-SBC - the Wancom0 management interface must be connected and configured to a management network separate from the service interfaces. Otherwise the E-SBC is subject to ARP overlap issues, loss of system access when the network is down, and compromising DDoS protection. Oracle does not support E-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 E-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

## Configuring the E-SBC

Once the Net-Net E-SBC is racked and the power cable connected, you are ready to set up physical network connectivity.





Plug the slot 0 port 0 named as M00 interface into your outside (gateway facing) network and the slot 1 port 0 named as M10 interface into your inside (mediation server-facing) network. Once connected, you are ready to power on and perform the following steps.

Note: The ACLI is case sensitive.

## Establish the serial connection to the Net-Net SBC

Confirm the Net-Net SD is powered off and connect the serial console cable to the Net-Net SD to 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

Start the Net-Net SD and confirm that you see the following output from the bootup sequence.

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

## Login to the Net-Net SD and enter the configuration mode

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

```
Password: acme
NN4600-100> enable
Password: packet
NN4600-100# configure terminal
NN4600-100 (configure)#
```

You are now in the Global Configuration mode.

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

To assign an IP address, one has to configure the bootparams on the Net-Net SD, by going to NN4600-100#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

```
NN4600-100#(configure)bootparam
= clear field; go to previous field; q = quit
boot device      : eth0
processor number : 0
host name        : acmesystem
file name        : /boot/ECZ810p1.bz --- >location where the software is loaded on the
SBC
inet on ethernet (e) : 172.18.255.52:ffffff80 > This is the ip
address of the management interface of the SBC, type the IP addre inet on backplane
(b)
host inet (h)
gateway inet (g)    : 172.18.0.1 > gateway address here
user (u)            : vxftp
ftp password (pw) (blank = use rsh) : vxftp
flags (f)
target name (tn)    : NN4600-100
startup script (s)
ss and mask in hex
```

## SIP Trunking Configuration for the E-SBC

The following section shows the E-SBC configuration required to work with Genesys SIP Server and the SIP trunk. The protocol used between the E-SBC and SIP server is UDP for signaling and RTP for media; the SIP trunk is configured for UDP in this interop testing.

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

We have configured a sip-manipulation - NATting configured for topology hiding purposes.

Here is the list of IP addresses used while testing

| <b>Component</b>  | <b>IP address</b> |
|---|-------------------|
| Genesys SIP Server  | 192.168.2.228     |
| PSTN trunk  | 192.168.6.31      |
| SIP interface/Network Interface IP address of Oracle SBC<br>[Core Realm IP address that connects to Genesys Server]           | 192.168.16.222    |
| SIP interface /Network Interface IP address of Oracle SBC<br>[PSTN Realm IP address that connects to PSTN trunk]              | 192.168.6.72      |
| SIP interface /Network Interface IP address of Oracle SBC used for<br>registering phones to the Genesys server via Oracle SBC | 192.168.6.20      |

Following is the complete SIP trunking configuration of the E-SBC

## SBC Configuration

```
capture-receiver
  state enabled
  address 192.168.2.228
  network-interface M10:0.4
  last-modified-by admin@console
  last-modified-date 2018-09-27 01:52:07
local-policy
  from-address *
  to-address *
  source-realm PSTN
  description
  activate-time
  deactivate-time
  state enabled
  policy-priority none
  policy-attribute
    next-hop 192.168.2.228
    realm core
    action none
    terminate-recursion disabled
    carrier
    start-time 0000
    end-time 2400
    days-of-week U-S
    cost 0
    state enabled
    app-protocol
    methods
    media-profiles
    lookup single
    next-key
    eloc-str-lkup disabled
    eloc-str-match
  last-modified-by admin@135.17.145.90
  last-modified-date 2018-09-28 13:43:47
local-policy
  from-address *
  to-address *
  source-realm core
  description
  activate-time
  deactivate-time
  state enabled
  policy-priority none
  policy-attribute
    next-hop 192.168.6.31
    realm PSTN
    action none
    terminate-recursion disabled
    carrier
    start-time 0000
    end-time 2400
    days-of-week U-S
    cost 0
```

|                                   |                     |
|-----------------------------------|---------------------|
| state                             | enabled             |
| app-protocol                      |                     |
| methods                           |                     |
| media-profiles                    |                     |
| lookup                            | single              |
| next-key                          |                     |
| eloc-str-lkup                     | disabled            |
| eloc-str-match                    |                     |
| last-modified-by                  | admin@135.17.145.90 |
| last-modified-date                | 2018-09-28 13:42:15 |
| media-manager                     |                     |
| <b>state</b>                      | <b>enabled</b>      |
| <b>latching</b>                   | <b>enabled</b>      |
| flow-time-limit                   | 86400               |
| initial-guard-timer               | 300                 |
| subsq-guard-timer                 | 300                 |
| tcp-flow-time-limit               | 86400               |
| tcp-initial-guard-timer           | 300                 |
| tcp-subsq-guard-timer             | 300                 |
| tcp-number-of-ports-per-flow      | 2                   |
| hnt-rtcp                          | disabled            |
| algd-log-level                    | NOTICE              |
| mbcd-log-level                    | NOTICE              |
| options                           |                     |
| red-flow-port                     | 1985                |
| red-mgcp-port                     | 1986                |
| red-max-trans                     | 10000               |
| red-sync-start-time               | 5000                |
| red-sync-comp-time                | 1000                |
| media-policing                    | enabled             |
| max-signaling-bandwidth           | 10000000            |
| max-untrusted-signaling           | 100                 |
| min-untrusted-signaling           | 30                  |
| tolerance-window                  | 30                  |
| untrusted-drop-threshold          | 0                   |
| trusted-drop-threshold            | 0                   |
| acl-monitor-window                | 30                  |
| trap-on-demote-to-deny            | disabled            |
| trap-on-demote-to-untrusted       | disabled            |
| syslog-on-demote-to-deny          | disabled            |
| syslog-on-demote-to-untrusted     | disabled            |
| rtcp-rate-limit                   | 0                   |
| anonymous-sdp                     | disabled            |
| arp-msg-bandwidth                 | 32000               |
| rfc2833-timestamp                 | disabled            |
| reactive-transcoding              | disabled            |
| default-2833-duration             | 100                 |
| rfc2833-end-pkts-only-for-non-sig | enabled             |
| translate-non-rfc2833-event       | disabled            |
| media-supervision-traps           | disabled            |
| dnsalg-server-failover            | disabled            |
| syslog-on-call-reject             | disabled            |
| xcode-fax-max-rate                | 14400               |
| last-modified-by                  | admin@135.17.145.2  |
| last-modified-date                | 2018-10-01 23:50:01 |
| network-interface                 |                     |
| <b>name</b>                       | <b>M00</b>          |
| <b>sub-port-id</b>                | <b>0</b>            |

```

description
hostname
ip-address                192.168.6.72
pri-utility-addr
sec-utility-addr
netmask                  255.255.255.0
gateway                  192.168.6.1
sec-gateway
gw-heartbeat
    state                    disabled
    heartbeat                0
    retry-count              0
    retry-timeout            1
    health-score             0
dns-ip-primary
dns-ip-backup1
dns-ip-backup2
dns-domain
dns-timeout                  11
dns-max-ttl                  86400
signaling-mtu                0
hip-ip-list              192.168.6.72
icmp-address             192.168.6.72
snmp-address
ssh-address
last-modified-by             admin@135.17.145.90
last-modified-date           2018-09-28 13:34:05
network-interface
name                     M10
sub-port-id              0
description
hostname
ip-address                192.168.16.222
pri-utility-addr
sec-utility-addr
netmask                  255.255.255.0
gateway                  192.168.16.1
sec-gateway
gw-heartbeat
    state                    disabled
    heartbeat                0
    retry-count              0
    retry-timeout            1
    health-score             0
dns-ip-primary           192.168.20.167
dns-ip-backup1           192.168.20.134
dns-ip-backup2
dns-domain               genesyslab.com
dns-timeout              11
dns-max-ttl              86400
signaling-mtu            0
hip-ip-list              192.168.16.222
icmp-address             192.168.16.222
snmp-address
ssh-address
last-modified-by             admin@135.17.145.90
last-modified-date           2018-09-28 11:41:43
phy-interface
name                     M00

```

|                            |                     |
|----------------------------|---------------------|
| <b>operation-type</b>      | <b>Media</b>        |
| <b>port</b>                | <b>0</b>            |
| <b>slot</b>                | <b>0</b>            |
| virtual-mac                |                     |
| admin-state                | enabled             |
| auto-negotiation           | enabled             |
| duplex-mode                | FULL                |
| speed                      | 100                 |
| wancom-health-score        | 50                  |
| overload-protection        | disabled            |
| last-modified-by           | admin@135.17.145.2  |
| last-modified-date         | 2018-10-01 23:47:27 |
| phy-interface              |                     |
| <b>name</b>                | <b>M10</b>          |
| <b>operation-type</b>      | <b>Media</b>        |
| <b>port</b>                | <b>0</b>            |
| <b>slot</b>                | <b>1</b>            |
| virtual-mac                |                     |
| admin-state                | enabled             |
| auto-negotiation           | enabled             |
| duplex-mode                | FULL                |
| speed                      | 100                 |
| wancom-health-score        | 50                  |
| overload-protection        | disabled            |
| last-modified-by           | admin@console       |
| last-modified-date         | 2018-09-20 00:18:59 |
| realm-config               |                     |
| <b>identifier</b>          | <b>PSTN</b>         |
| description                |                     |
| addr-prefix                | 0.0.0.0             |
| <b>network-interfaces</b>  | <b>M00:0</b>        |
| mm-in-realm                | enabled             |
| mm-in-network              | enabled             |
| mm-same-ip                 | enabled             |
| mm-in-system               | enabled             |
| bw-cac-non-mm              | disabled            |
| msm-release                | disabled            |
| qos-enable                 | disabled            |
| max-bandwidth              | 0                   |
| fallback-bandwidth         | 0                   |
| max-priority-bandwidth     | 0                   |
| max-latency                | 0                   |
| max-jitter                 | 0                   |
| max-packet-loss            | 0                   |
| observ-window-size         | 0                   |
| parent-realm               |                     |
| dns-realm                  |                     |
| media-policy               |                     |
| media-sec-policy           |                     |
| srtplib-msm-passthrough    | disabled            |
| class-profile              |                     |
| in-translationid           |                     |
| out-translationid          |                     |
| in-manipulationid          |                     |
| out-manipulationid         |                     |
| average-rate-limit         | 0                   |
| access-control-trust-level | none                |
| invalid-signal-threshold   | 0                   |
| maximum-signal-threshold   | 0                   |

|                                |               |
|--------------------------------|---------------|
| untrusted-signal-threshold     | 0             |
| nat-trust-threshold            | 0             |
| max-endpoints-per-nat          | 0             |
| nat-invalid-message-threshold  | 0             |
| wait-time-for-invalid-register | 0             |
| deny-period                    | 30            |
| session-max-life-limit         | 0             |
| cac-failure-threshold          | 0             |
| untrust-cac-failure-threshold  | 0             |
| ext-policy-svr                 |               |
| diam-e2-address-realm          |               |
| subscription-id-type           | END USER NONE |
| symmetric-latching             | disabled      |
| pai-strip                      | disabled      |
| trunk-context                  |               |
| device-id                      |               |
| early-media-allow              |               |
| enforcement-profile            |               |
| additional-prefixes            |               |
| restricted-latching            | none          |
| restriction-mask               | 32            |
| user-cac-mode                  | none          |
| user-cac-bandwidth             | 0             |
| user-cac-sessions              | 0             |
| icmp-detect-multiplier         | 0             |
| icmp-advertisement-interval    | 0             |
| icmp-target-ip                 |               |
| monthly-minutes                | 0             |
| options                        |               |
| spl-options                    |               |
| accounting-enable              | enabled       |
| net-management-control         | disabled      |
| delay-media-update             | disabled      |
| refer-call-transfer            | disabled      |
| hold-refer-reinvite            | disabled      |
| refer-notify-provisional       | none          |
| dyn-refer-term                 | disabled      |
| codec-policy                   |               |
| codec-manip-in-realm           | disabled      |
| codec-manip-in-network         | enabled       |
| rtcp-policy                    |               |
| constraint-name                |               |
| session-recording-server       |               |
| session-recording-required     | disabled      |
| manipulation-string            |               |
| manipulation-pattern           |               |
| stun-enable                    | disabled      |
| stun-server-ip                 | 0.0.0.0       |
| stun-server-port               | 3478          |
| stun-changed-ip                | 0.0.0.0       |
| stun-changed-port              | 3479          |
| sip-profile                    |               |
| flow-time-limit                | -1            |
| initial-guard-timer            | -1            |
| subsq-guard-timer              | -1            |
| tcp-flow-time-limit            | -1            |
| tcp-initial-guard-timer        | -1            |
| tcp-subsq-guard-timer          | -1            |
| sip-isup-profile               |               |



```

match-media-profiles
qos-constraint
block-rtcp                disabled
hide-egress-media-update  disabled
tcp-media-profile
monitoring-filters
node-functionality
default-location-string
alt-family-realm
pref-addr-type            none
sm-icsi-match-for-invite
sm-icsi-match-for-message
last-modified-by         admin@135.17.145.90
last-modified-date       2018-09-28 13:35:46

```

```
realm-config
```

```

identifier           core
description         togenesys
addr-prefix         0.0.0.0
network-interfaces M10:0.4
mm-in-realm              enabled
mm-in-network            enabled
mm-same-ip               enabled
mm-in-system             enabled
bw-cac-non-mm            disabled
msm-release              disabled
qos-enable               disabled
max-bandwidth            0
fallback-bandwidth       0
max-priority-bandwidth   0
max-latency              0
max-jitter               0
max-packet-loss          0
observ-window-size       0
parent-realm
dns-realm
media-policy
media-sec-policy
srtp-msm-passthrough     disabled
class-profile
in-translationid
out-translationid
in-manipulationid
out-manipulationid
average-rate-limit       0
access-control-trust-level none
invalid-signal-threshold 0
maximum-signal-threshold 0
untrusted-signal-threshold 0
nat-trust-threshold      0
max-endpoints-per-nat    0
nat-invalid-message-threshold 0
wait-time-for-invalid-register 0
deny-period              30
session-max-life-limit   0
cac-failure-threshold    0
untrust-cac-failure-threshold 0
ext-policy-svr
diam-e2-address-realm
subscription-id-type     END_USER_NONE

```

|                             |                |
|-----------------------------|----------------|
| symmetric-latching          | disabled       |
| pai-strip                   | disabled       |
| trunk-context               |                |
| device-id                   |                |
| early-media-allow           |                |
| enforcement-profile         |                |
| additional-prefixes         |                |
| restricted-latching         | none           |
| restriction-mask            | 32             |
| user-cac-mode               | none           |
| user-cac-bandwidth          | 0              |
| user-cac-sessions           | 0              |
| icmp-detect-multiplier      | 0              |
| icmp-advertisement-interval | 0              |
| icmp-target-ip              |                |
| monthly-minutes             | 0              |
| options                     |                |
| spl-options                 |                |
| accounting-enable           | enabled        |
| net-management-control      | disabled       |
| delay-media-update          | disabled       |
| <b>refer-call-transfer</b>  | <b>enabled</b> |
| hold-refer-reinvite         | disabled       |
| refer-notify-provisional    | none           |
| dyn-refer-term              | disabled       |
| codec-policy                |                |
| codec-manip-in-realm        | disabled       |
| codec-manip-in-network      | enabled        |
| rtcp-policy                 |                |
| constraint-name             |                |
| session-recording-server    |                |
| session-recording-required  | disabled       |
| manipulation-string         |                |
| manipulation-pattern        |                |
| stun-enable                 | disabled       |
| stun-server-ip              | 0.0.0.0        |
| stun-server-port            | 3478           |
| stun-changed-ip             | 0.0.0.0        |
| stun-changed-port           | 3479           |
| sip-profile                 |                |
| flow-time-limit             | -1             |
| initial-guard-timer         | -1             |
| subsq-guard-timer           | -1             |
| tcp-flow-time-limit         | -1             |
| tcp-initial-guard-timer     | -1             |
| tcp-subsq-guard-timer       | -1             |
| sip-isup-profile            |                |
| match-media-profiles        |                |
| qos-constraint              |                |
| block-rtcp                  | disabled       |
| hide-egress-media-update    | disabled       |
| tcp-media-profile           |                |
| monitoring-filters          |                |
| node-functionality          |                |
| default-location-string     |                |
| alt-family-realm            |                |
| pref-addr-type              | none           |
| sm-icsi-match-for-invite    |                |
| sm-icsi-match-for-message   |                |

```

last-modified-by      admin@135.17.145.104
last-modified-date    2018-10-04 11:20:44
session-agent
  hostname           192.168.2.228
  ip-address         192.168.2.228
  port               23846
  state              enabled
  app-protocol         SIP
  app-type
  transport-method    UDP
  realm-id            core
  egress-realm-id
  description
  carriers
  allow-next-hop-lp    enabled
  associated-agents
  constraints          disabled
  max-sessions         0
  max-inbound-sessions 0
  max-outbound-sessions 0
  max-burst-rate       0
  max-inbound-burst-rate 0
  max-outbound-burst-rate 0
  max-sustain-rate     0
  max-inbound-sustain-rate 0
  max-outbound-sustain-rate 0
  min-seizures         5
  min-asr              0
  session-max-life-limit 0
  time-to-resume       0
  ttr-no-response     0
  in-service-period    0
  burst-rate-window    0
  sustain-rate-window  0
  req-uri-carrier-mode None
  proxy-mode
  redirect-action
  loose-routing        enabled
  send-media-session    enabled
  response-map
  ping-method
  ping-interval        0
  ping-send-mode       keep-alive
  ping-all-addresses   disabled
  ping-in-service-response-codes
  out-service-response-codes
  load-balance-dns-query hunt
  options
  spl-options
  media-profiles
  in-translationid
  out-translationid
  trust-me             disabled
  request-uri-headers
  stop-recurse
  local-response-map
  ping-to-user-part
  ping-from-user-part
  in-manipulationid

```

```

out-manipulationid
manipulation-string
manipulation-pattern
p-asserted-id
trunk-group
max-register-sustain-rate          0
early-media-allow
invalidate-registrations            disabled
rfc2833-mode                        none
rfc2833-payload                     0
codec-policy
enforcement-profile
refer-call-transfer                enabled
refer-notify-provisional            none
reuse-connections                   NONE
tcp-keepalive                       none
tcp-reconn-interval                0
max-register-burst-rate             0
register-burst-window               0
sip-profile
sip-isup-profile
kpml-interworking                   inherit
precedence                          0
monitoring-filters
session-recording-server
session-recording-required          disabled
hold-refer-reinvite                 disabled
send-tcp-fin                        disabled
sip-recursion-policy
sm-icsi-match-for-invite
sm-icsi-match-for-message
last-modified-by                    admin@135.17.145.104
last-modified-date                  2018-10-04 11:19:35
session-agent
hostname                          192.168.6.31
ip-address                        192.168.6.31
port                              5060
state                              enabled
app-protocol                      SIP
app-type
transport-method                    UDP
realm-id                            PSTN
egress-realm-id
description
carriers
allow-next-hop-lp                   enabled
associated-agents
constraints                          disabled
max-sessions                        0
max-inbound-sessions                0
max-outbound-sessions               0
max-burst-rate                      0
max-inbound-burst-rate              0
max-outbound-burst-rate             0
max-sustain-rate                    0
max-inbound-sustain-rate            0
max-outbound-sustain-rate           0
min-seizures                        5
min-asr                             0

```

|                                |            |
|--------------------------------|------------|
| session-max-life-limit         | 0          |
| time-to-resume                 | 0          |
| ttr-no-response                | 0          |
| in-service-period              | 0          |
| burst-rate-window              | 0          |
| sustain-rate-window            | 0          |
| req-uri-carrier-mode           | None       |
| proxy-mode                     |            |
| redirect-action                |            |
| loose-routing                  | enabled    |
| send-media-session             | enabled    |
| response-map                   |            |
| ping-method                    |            |
| ping-interval                  | 0          |
| ping-send-mode                 | keep-alive |
| ping-all-addresses             | disabled   |
| ping-in-service-response-codes |            |
| out-service-response-codes     |            |
| load-balance-dns-query         | hunt       |
| options                        |            |
| spl-options                    |            |
| media-profiles                 |            |
| in-translationid               |            |
| out-translationid              |            |
| trust-me                       | disabled   |
| request-uri-headers            |            |
| stop-recurse                   |            |
| local-response-map             |            |
| ping-to-user-part              |            |
| ping-from-user-part            |            |
| in-manipulationid              |            |
| out-manipulationid             |            |
| manipulation-string            |            |
| manipulation-pattern           |            |
| p-asserted-id                  |            |
| trunk-group                    |            |
| max-register-sustain-rate      | 0          |
| early-media-allow              |            |
| invalidate-registrations       | disabled   |
| rfc2833-mode                   | none       |
| rfc2833-payload                | 0          |
| codec-policy                   |            |
| enforcement-profile            |            |
| refer-call-transfer            | disabled   |
| refer-notify-provisional       | none       |
| reuse-connections              | NONE       |
| tcp-keepalive                  | none       |
| tcp-reconn-interval            | 0          |
| max-register-burst-rate        | 0          |
| register-burst-window          | 0          |
| sip-profile                    |            |
| sip-isup-profile               |            |
| kpml-interworking              | inherit    |
| precedence                     | 0          |
| monitoring-filters             |            |
| session-recording-server       |            |
| session-recording-required     | disabled   |
| hold-refer-reinvite            | disabled   |
| send-tcp-fin                   | disabled   |

```

sip-recursion-policy
sm-icsi-match-for-invite
sm-icsi-match-for-message
last-modified-by          admin@135.17.145.90
last-modified-date        2018-09-28 13:40:26
sip-config
  state                    enabled
  operation-mode           dialog
  dialog-transparency      enabled
  home-realm-id            core
  egress-realm-id
  auto-realm-id
  nat-mode                 None
  registrar-domain
  registrar-host
  registrar-port           5060
  register-service-route   always
  init-timer               500
  max-timer                 4000
  trans-expire             32
  initial-inv-trans-expire 0
  invite-expire            180
  session-max-life-limit   0
  inactive-dynamic-conn    32
  enforcement-profile
  pac-method
  pac-interval             10
  pac-strategy              PropDist
  pac-load-weight          1
  pac-session-weight       1
  pac-route-weight         1
  pac-callid-lifetime      600
  pac-user-lifetime        3600
  red-sip-port             1988
  red-max-trans            10000
  red-sync-start-time      5000
  red-sync-comp-time       1000
  options
  add-reason-header        disabled
  sip-message-len          4096
  enum-sag-match           disabled
  extra-method-stats       disabled
  extra-enum-stats         disabled
  rph-feature              disabled
  nsep-user-sessions-rate  0
  nsep-sa-sessions-rate    0
  registration-cache-limit 0
  register-use-to-for-lp    disabled
  refer-src-routing        disabled
  add-ucid-header          disabled
  proxy-sub-events
  allow-pani-for-trusted-only disabled
  atcf-stn-sr
  atcf-psi-dn
  atcf-route-to-sccas     disabled
  eatf-stn-sr
  pass-gruu-contact        disabled
  sag-lockup-on-redirect   disabled
  set-disconnect-time-on-bye disabled

```

|                                   |                        |
|-----------------------------------|------------------------|
| msrp-delayed-bye-timer            | 15                     |
| transcoding-realm                 |                        |
| transcoding-agents                |                        |
| create-dynamic-sa                 | disabled               |
| node-functionality                | P-CSCF                 |
| match-sip-instance                | disabled               |
| sa-routes-stats                   | disabled               |
| sa-routes-traps                   | disabled               |
| rx-sip-reason-mapping             | disabled               |
| add-ue-location-in-pani           | disabled               |
| hold-emergency-calls-for-loc-info | 0                      |
| retry-after-upon-offline          | 0                      |
| reg-reject-response-upon-offline  | 503                    |
| hold-invite-calls-for-loc-info    | 0                      |
| cache-loc-info-expire             | 32                     |
| msg-hold-for-loc-info             | 0                      |
| npli-upon-register                | disabled               |
| last-modified-by                  | admin@135.17.75.152    |
| last-modified-date                | 2018-10-15 15:17:06    |
| sip-feature                       |                        |
| <b>name</b>                       | <b>telephone-event</b> |
| <b>realm</b>                      | <b>PSTN</b>            |
| <b>support-mode-inbound</b>       | <b>Pass</b>            |
| require-mode-inbound              | Pass                   |
| proxy-require-mode-inbound        | Pass                   |
| support-mode-outbound             | Pass                   |
| require-mode-outbound             | Pass                   |
| proxy-require-mode-outbound       | Pass                   |
| last-modified-by                  | admin@console          |
| last-modified-date                | 2018-10-02 01:32:12    |
| sip-feature                       |                        |
| <b>name</b>                       | <b>telephone-event</b> |
| <b>realm</b>                      | <b>core</b>            |
| <b>support-mode-inbound</b>       | <b>Pass</b>            |
| <b>require-mode-inbound</b>       | <b>Pass</b>            |
| proxy-require-mode-inbound        | Pass                   |
| support-mode-outbound             | Pass                   |
| require-mode-outbound             | Pass                   |
| proxy-require-mode-outbound       | Pass                   |
| last-modified-by                  | admin@console          |
| last-modified-date                | 2018-10-02 01:31:39    |
| sip-interface                     |                        |
| <b>state</b>                      | <b>enabled</b>         |
| <b>realm-id</b>                   | <b>PSTN</b>            |
| <b>description</b>                |                        |
| <b>sip-port</b>                   |                        |
| <b>address</b>                    | <b>192.168.6.72</b>    |
| <b>port</b>                       | <b>5060</b>            |
| <b>transport-protocol</b>         | <b>UDP</b>             |
| tls-profile                       |                        |
| allow-anonymous                   | all                    |
| multi-home-addr                   |                        |
| ims-aka-profile                   |                        |
| carriers                          |                        |
| trans-expire                      | 0                      |
| initial-inv-trans-expire          | 0                      |
| invite-expire                     | 0                      |
| session-max-life-limit            | 0                      |
| max-redirect-contacts             | 0                      |

|                                |                            |
|--------------------------------|----------------------------|
| proxy-mode                     |                            |
| redirect-action                |                            |
| contact-mode                   | none                       |
| nat-traversal                  | none                       |
| nat-interval                   | 30                         |
| tcp-nat-interval               | 90                         |
| registration-caching           | disabled                   |
| min-reg-expire                 | 300                        |
| registration-interval          | 3600                       |
| route-to-registrar             | disabled                   |
| secured-network                | disabled                   |
| teluri-scheme                  | disabled                   |
| uri-fqdn-domain                |                            |
| options                        |                            |
| spl-options                    |                            |
| trust-mode                     | all                        |
| max-nat-interval               | 3600                       |
| nat-int-increment              | 10                         |
| nat-test-increment             | 30                         |
| sip-dynamic-hnt                | disabled                   |
| stop-recurse                   | 401,407                    |
| port-map-start                 | 0                          |
| port-map-end                   | 0                          |
| in-manipulationid              |                            |
| <b>out-manipulationid</b>      | <b>ACME_NAT_TO_FROM_IP</b> |
| sip-ims-feature                | disabled                   |
| sip-atcf-feature               | disabled                   |
| subscribe-reg-event            | disabled                   |
| operator-identifier            |                            |
| anonymous-priority             | none                       |
| max-incoming-conns             | 0                          |
| per-src-ip-max-incoming-conns  | 0                          |
| inactive-conn-timeout          | 0                          |
| untrusted-conn-timeout         | 0                          |
| network-id                     |                            |
| ext-policy-server              |                            |
| ldap-policy-server             |                            |
| default-location-string        |                            |
| term-tgrp-mode                 | none                       |
| charging-vector-mode           | pass                       |
| charging-function-address-mode | pass                       |
| ccf-address                    |                            |
| ecf-address                    |                            |
| implicit-service-route         | disabled                   |
| rfc2833-payload                | 101                        |
| rfc2833-mode                   | transparent                |
| constraint-name                |                            |
| response-map                   |                            |
| local-response-map             |                            |
| sec-agree-feature              | disabled                   |
| sec-agree-pref                 | ipsec3gpp                  |
| enforcement-profile            |                            |
| route-unauthorized-calls       |                            |
| tcp-keepalive                  | none                       |
| add-sdp-invite                 | disabled                   |
| add-sdp-in-msg                 |                            |
| p-early-media-header           | disabled                   |
| p-early-media-direction        |                            |
| add-sdp-profiles               |                            |



```

add-sdp-profiles-in-msg
manipulation-string
manipulation-pattern
sip-profile
sip-isup-profile
tcp-conn-dereg          0
tunnel-name
register-keep-alive     none
kpml-interworking       disabled
msrp-delay-egress-bye  disabled
send-380-response
pcscf-restoration
session-timer-profile
session-recording-server
session-recording-required disabled
service-tag
reg-cache-route         disabled
diversion-info-mapping-mode none
atcf-icsi-match
sip-recursion-policy
asymmetric-preconditions disabled
asymmetric-preconditions-mode send-with-nodelay
sm-icsi-match-for-invite
sm-icsi-match-for-message
last-modified-by        admin@135.17.145.2
last-modified-date      2018-10-02 10:57:38
sip-interface
  state                  enabled
  realm-id               core
  description            togenesys
  sip-port
    address              192.168.16.222
    port                 5060
    transport-protocol  UDP
    tls-profile
    allow-anonymous      all
    multi-home-addr
    ims-aka-profile
  carriers
  trans-expire           0
  initial-inv-trans-expire 0
  invite-expire          0
  session-max-life-limit  0
  max-redirect-contacts   0
  proxy-mode
  redirect-action
  contact-mode           none
  nat-traversal          none
  nat-interval           30
  tcp-nat-interval       90
  registration-caching   disabled
  min-reg-expire         300
  registration-interval  3600
  route-to-registrar     disabled
  secured-network        disabled
  teluri-scheme          disabled
  uri-fqdn-domain
  options
  spl-options

```

|                                |                            |
|--------------------------------|----------------------------|
| trust-mode                     | all                        |
| max-nat-interval               | 3600                       |
| nat-int-increment              | 10                         |
| nat-test-increment             | 30                         |
| sip-dynamic-hnt                | disabled                   |
| stop-recurse                   | 401,407                    |
| port-map-start                 | 0                          |
| port-map-end                   | 0                          |
| in-manipulationid              |                            |
| <b>out-manipulationid</b>      | <b>ACME_NAT_TO_FROM_IP</b> |
| sip-ims-feature                | disabled                   |
| sip-atcf-feature               | disabled                   |
| subscribe-reg-event            | disabled                   |
| operator-identifier            |                            |
| anonymous-priority             | none                       |
| max-incoming-conns             | 0                          |
| per-src-ip-max-incoming-conns  | 0                          |
| inactive-conn-timeout          | 0                          |
| untrusted-conn-timeout         | 0                          |
| network-id                     |                            |
| ext-policy-server              |                            |
| ldap-policy-server             |                            |
| default-location-string        |                            |
| term-tgrp-mode                 | none                       |
| charging-vector-mode           | pass                       |
| charging-function-address-mode | pass                       |
| ccf-address                    |                            |
| ecf-address                    |                            |
| implicit-service-route         | disabled                   |
| rfc2833-payload                | 101                        |
| rfc2833-mode                   | transparent                |
| constraint-name                |                            |
| response-map                   |                            |
| local-response-map             |                            |
| sec-agree-feature              | disabled                   |
| sec-agree-pref                 | ipsec3gpp                  |
| enforcement-profile            |                            |
| route-unauthorized-calls       |                            |
| tcp-keepalive                  | none                       |
| add-sdp-invite                 | disabled                   |
| add-sdp-in-msg                 |                            |
| p-early-media-header           | disabled                   |
| p-early-media-direction        |                            |
| add-sdp-profiles               |                            |
| add-sdp-profiles-in-msg        |                            |
| manipulation-string            |                            |
| manipulation-pattern           |                            |
| sip-profile                    |                            |
| sip-isup-profile               |                            |
| tcp-conn-dereg                 | 0                          |
| tunnel-name                    |                            |
| register-keep-alive            | none                       |
| kpml-interworking              | disabled                   |
| msrp-delay-egress-bye          | disabled                   |
| send-380-response              |                            |
| pcscf-restoration              |                            |
| session-timer-profile          |                            |
| session-recording-server       |                            |
| session-recording-required     | disabled                   |

```

service-tag
reg-cache-route                disabled
diversion-info-mapping-mode    none
atcf-icsi-match
sip-recursion-policy
asymmetric-preconditions      disabled
asymmetric-preconditions-mode  send-with-nodelay
sm-icsi-match-for-invite
sm-icsi-match-for-message
last-modified-by              admin@135.17.75.152
last-modified-date            2018-10-15 15:16:07

steering-pool
  ip-address                   192.168.16.222
  start-port                   50200
  end-port                     51200
  realm-id                     core
  network-interface            M10:0.4
  last-modified-by            admin@135.17.145.90
  last-modified-date          2018-09-28 11:45:33

steering-pool
  ip-address                   192.168.6.72
  start-port                   50200
  end-port                     51200
  realm-id                     PSTN
  network-interface            M00:0.4
  last-modified-by            admin@135.17.145.2
  last-modified-date          2018-10-02 00:42:43

system-config
hostname
description
location
mib-system-contact
mib-system-name
mib-system-location
acp-tls-profile
snmp-enabled                   enabled
enable-snmp-auth-traps        disabled
enable-snmp-syslog-notify     disabled
enable-snmp-monitor-traps     disabled
enable-env-monitor-traps      disabled
enable-mblk tracking          disabled
enable-l2-miss-report         enabled
snmp-syslog-his-table-length  1
snmp-syslog-level             WARNING
system-log-level              WARNING
process-log-level             NOTICE
process-log-ip-address        0.0.0.0
process-log-port              0
collect
  sample-interval             5
  push-interval               15
  boot-state                  disabled
  start-time                  now
  end-time                    never
  red-collect-state           disabled
  red-max-trans               1000
  red-sync-start-time         5000

```

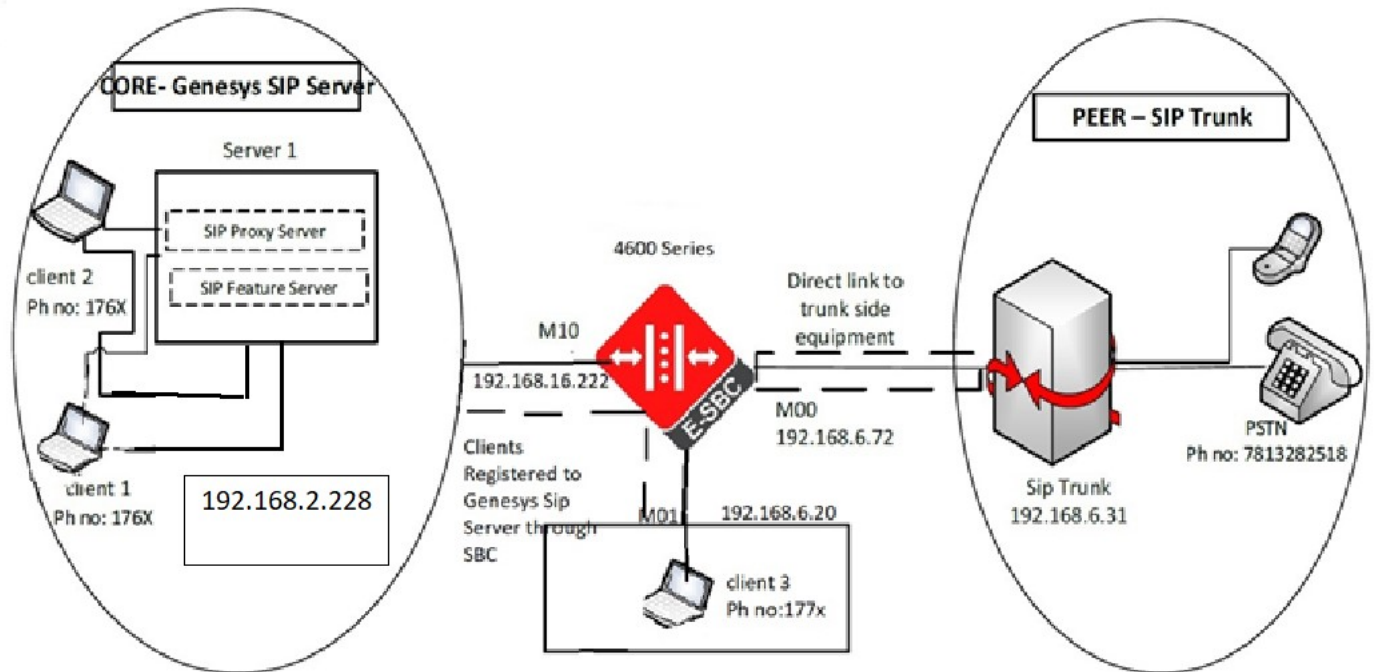
```

red-sync-comp-time 1000
push-success-trap-state disabled
comm-monitor
  state enabled
  sbc-grp-id 0
  tls-profile
  qos-enable enabled
  interim-qos-update disabled
  monitor-collector
    address 172.18.0.158 (IP address of the
EOM)
    port 4739
    network-interface wancom0:0
  options
call-trace disabled
internal-trace disabled
log-filter all
default-gateway 172.18.0.1
restart enabled
exceptions
telnet-timeout 0
console-timeout 0
remote-control enabled
cli-audit-trail enabled
source-routing enabled
cli-more disabled
terminal-height 24
debug-timeout 0
trap-event-lifetime 0
ids-syslog-facility -1
pko-rake-pkt 0
pko-rake-burst 0
options
default-v6-gateway ::
ipv6-signaling-mtu 1500
ipv4-signaling-mtu 1500
cleanup-time-of-day 00:00
snmp-engine-id-suffix
snmp-agent-mode v3
last-modified-by admin@135.17.145.2
last-modified-date 2018-10-01 23:51:08
NN4600-100#

```

## Enabling Remote worker (for remote workers registering into Genesys SIP server via the E-SBC)

A section of the testing also included remote endpoints that register through the E-SBC to the SIP server (Test cases 29-32). This would require the following access configuration to be configured on the E-SBC in addition to the SIP trunking config mentioned above.



We add another physical interface (M01), network interface (M01:0), a realm and a sip interface solely for registration purposes. This network interface has an ip address where all the remote endpoints would be registering to.

```

local-policy
  from-address          *
  to-address            *
  source-realm          access
  description
  activate-time
  deactivate-time
  state                 enabled
  policy-priority       none
  policy-attribute
    next-hop            192.168.2.228
    realm                core
    action               none
    terminate-recursion disabled
    carrier
    start-time           0000
    end-time             2400
    days-of-week         U-S
    cost                 0
  
```

```

state enabled
app-protocol SIP
methods
media-profiles
lookup single
next-key
eloc-str-lkup disabled
eloc-str-match
last-modified-by admin@console
last-modified-date 2018-10-02 11:41:52
network-interface
name M01
sub-port-id 0
description
hostname
ip-address 192.168.6.20
pri-utility-addr
sec-utility-addr
netmask 255.255.255.0
gateway 192.168.6.1
sec-gateway
gw-heartbeat
state disabled
heartbeat 0
retry-count 0
retry-timeout 1
health-score 0
dns-ip-primary
dns-ip-backup1
dns-ip-backup2
dns-domain
dns-timeout 11
dns-max-ttl 86400
signaling-mtu 0
hip-ip-list 192.168.6.20
icmp-address 192.168.6.20
snmp-address
ssh-address
last-modified-by admin@console
last-modified-date 2018-09-20 00:36:37
realm-config
identifier access
description toPSTN
addr-prefix 0.0.0.0
network-interfaces M01:0.4
mm-in-realm enabled
mm-in-network enabled
mm-same-ip enabled
mm-in-system enabled
bw-cac-non-mm disabled
msm-release disabled
qos-enable disabled
max-bandwidth 0
fallback-bandwidth 0
max-priority-bandwidth 0
max-latency 0
max-jitter 0
max-packet-loss 0

```

|                                |               |
|--------------------------------|---------------|
| observ-window-size             | 0             |
| parent-realm                   |               |
| dns-realm                      |               |
| media-policy                   |               |
| media-sec-policy               |               |
| srtplib-msm-passthrough        | disabled      |
| class-profile                  |               |
| in-translationid               |               |
| out-translationid              |               |
| in-manipulationid              |               |
| out-manipulationid             |               |
| average-rate-limit             | 0             |
| access-control-trust-level     | none          |
| invalid-signal-threshold       | 0             |
| maximum-signal-threshold       | 0             |
| untrusted-signal-threshold     | 0             |
| nat-trust-threshold            | 0             |
| max-endpoints-per-nat          | 0             |
| nat-invalid-message-threshold  | 0             |
| wait-time-for-invalid-register | 0             |
| deny-period                    | 30            |
| session-max-life-limit         | 0             |
| cac-failure-threshold          | 0             |
| untrust-cac-failure-threshold  | 0             |
| ext-policy-svr                 |               |
| diam-e2-address-realm          |               |
| subscription-id-type           | END USER NONE |
| symmetric-latching             | disabled      |
| pai-strip                      | disabled      |
| trunk-context                  |               |
| device-id                      |               |
| early-media-allow              |               |
| enforcement-profile            |               |
| additional-prefixes            |               |
| restricted-latching            | none          |
| restriction-mask               | 32            |
| user-cac-mode                  | none          |
| user-cac-bandwidth             | 0             |
| user-cac-sessions              | 0             |
| icmp-detect-multiplier         | 0             |
| icmp-advertisement-interval    | 0             |
| icmp-target-ip                 |               |
| monthly-minutes                | 0             |
| options                        |               |
| spl-options                    |               |
| accounting-enable              | enabled       |
| net-management-control         | disabled      |
| delay-media-update             | disabled      |
| refer-call-transfer            | disabled      |
| hold-refer-reinvite            | disabled      |
| refer-notify-provisional       | none          |
| dyn-refer-term                 | disabled      |
| codec-policy                   |               |
| codec-manip-in-realm           | disabled      |
| codec-manip-in-network         | enabled       |
| rtcp-policy                    |               |
| constraint-name                |               |
| session-recording-server       |               |
| session-recording-required     | disabled      |

```

manipulation-string
manipulation-pattern
stun-enable                disabled
stun-server-ip             0.0.0.0
stun-server-port           3478
stun-changed-ip            0.0.0.0
stun-changed-port          3479
sip-profile
flow-time-limit            -1
initial-guard-timer        -1
subsq-guard-timer          -1
tcp-flow-time-limit        -1
tcp-initial-guard-timer    -1
tcp-subsq-guard-timer      -1
sip-isup-profile
match-media-profiles
qos-constraint
block-rtcp                 disabled
hide-egress-media-update   disabled
tcp-media-profile
monitoring-filters
node-functionality
default-location-string
alt-family-realm
pref-addr-type             none
sm-icsi-match-for-invite
sm-icsi-match-for-message
last-modified-by           admin@135.17.145.2
last-modified-date         2018-10-01 23:55:28

sip-config
state                      enabled
operation-mode              dialog
dialog-transparency         enabled
home-realm-id               core
egress-realm-id
auto-realm-id
nat-mode                    None
registrar-domain            *
registrar-host              *
registrar-port              5060
register-service-route       always
init-timer                  500
max-timer                   4000
trans-expire                32
initial-inv-trans-expire    0
invite-expire                180
session-max-life-limit      0
inactive-dynamic-conn       32
enforcement-profile
pac-method
pac-interval                10
pac-strategy                 PropDist
pac-load-weight              1
pac-session-weight           1
pac-route-weight             1
pac-callid-lifetime          600
pac-user-lifetime            3600
red-sip-port                 1988

```



|                                   |   |
|-----------------------------------|---|
| red-max-trans                     | 10000   |
| red-sync-start-time               | 5000  |
| red-sync-comp-time                | 1000  |
| options                           | forward-reg-callid-change<br>max-udp-length=0 |
| add-reason-header                 | disabled                                      |
| sip-message-len                   | 4096  |
| enum-sag-match                    | disabled                                      |
| extra-method-stats                | disabled                                      |
| extra-enum-stats                  | disabled                                      |
| rph-feature                       | disabled                                      |
| nsep-user-sessions-rate           | 0   |
| nsep-sa-sessions-rate             | 0   |
| registration-cache-limit          | 0   |
| register-use-to-for-lp            | disabled                                      |
| refer-src-routing                 | disabled                                      |
| add-ucid-header                   | disabled                                      |
| proxy-sub-events                  |   |
| allow-pani-for-trusted-only       | disabled                                      |
| atcf-stn-sr                       |   |
| atcf-psi-dn                       |   |
| atcf-route-to-sccas               | disabled                                      |
| eatf-stn-sr                       |   |
| pass-gruu-contact                 | disabled                                      |
| sag-lookup-on-redirect            | disabled                                      |
| set-disconnect-time-on-bye        | disabled                                      |
| msrp-delayed-bye-timer            | 15  |
| transcoding-realm                 |   |
| transcoding-agents                |   |
| create-dynamic-sa                 | disabled                                      |
| node-functionality                | P-CSCF  |
| match-sip-instance                | disabled                                      |
| sa-routes-stats                   | disabled                                      |
| sa-routes-traps                   | disabled                                      |
| rx-sip-reason-mapping             | disabled                                      |
| add-ue-location-in-pani           | disabled                                      |
| hold-emergency-calls-for-loc-info | 0   |
| retry-after-upon-offline          | 0   |
| reg-reject-response-upon-offline  | 503   |
| hold-invite-calls-for-loc-info    | 0   |
| cache-loc-info-expire             | 32  |
| msg-hold-for-loc-info             | 0   |
| npli-upon-register                | disabled                                      |
| last-modified-by                  | admin@135.17.75.152                           |
| last-modified-date                | 2018-10-15 15:17:06                           |
| sip-interface                     |   |
| state                             | enabled                                       |
| realm-id                          | access  |
| description                       | connectiotoPSTN                               |
| sip-port                          |   |
| address                           | 192.168.6.20                                  |
| port                              | 5060  |
| transport-protocol                | UDP   |
| tls-profile                       |   |
| allow-anonymous                   | registered                                    |
| multi-home-addr                   |   |
| ims-aka-profile                   |   |
| carriers                          |   |
| trans-expire                      | 0   |

|                                |                |
|--------------------------------|----------------|
| initial-inv-trans-expire       | 0              |
| invite-expire                  | 0              |
| session-max-life-limit         | 0              |
| max-redirect-contacts          | 0              |
| proxy-mode                     |                |
| redirect-action                |                |
| contact-mode                   | none           |
| nat-traversal                  | always         |
| nat-interval                   | 30             |
| tcp-nat-interval               | 90             |
| <b>registration-caching</b>    | <b>enabled</b> |
| <b>min-reg-expire</b>          | <b>300</b>     |
| <b>registration-interval</b>   | <b>3600</b>    |
| <b>route-to-registrar</b>      | <b>enabled</b> |
| secured-network                | disabled       |
| teluri-scheme                  | disabled       |
| uri-fqdn-domain                |                |
| options                        |                |
| spl-options                    |                |
| trust-mode                     | all            |
| max-nat-interval               | 3600           |
| nat-int-increment              | 10             |
| nat-test-increment             | 30             |
| sip-dynamic-hnt                | disabled       |
| stop-recurse                   | 401,407        |
| port-map-start                 | 0              |
| port-map-end                   | 0              |
| in-manipulationid              |                |
| out-manipulationid             |                |
| sip-ims-feature                | disabled       |
| sip-atcf-feature               | disabled       |
| subscribe-reg-event            | disabled       |
| operator-identifier            |                |
| anonymous-priority             | none           |
| max-incoming-conns             | 0              |
| per-src-ip-max-incoming-conns  | 0              |
| inactive-conn-timeout          | 0              |
| untrusted-conn-timeout         | 0              |
| network-id                     |                |
| ext-policy-server              |                |
| ldap-policy-server             |                |
| default-location-string        |                |
| term-tgrp-mode                 | none           |
| charging-vector-mode           | pass           |
| charging-function-address-mode | pass           |
| ccf-address                    |                |
| ecf-address                    |                |
| implicit-service-route         | disabled       |
| rfc2833-payload                | 101            |
| rfc2833-mode                   | transparent    |
| constraint-name                |                |
| response-map                   |                |
| local-response-map             |                |
| sec-agree-feature              | disabled       |
| sec-agree-pref                 | ipsec3gpp      |
| enforcement-profile            |                |
| route-unauthorized-calls       |                |
| tcp-keepalive                  | none           |
| add-sdp-invite                 | disabled       |

|                               |                     |
|-------------------------------|---------------------|
| add-sdp-in-msg                |                     |
| p-early-media-header          | disabled            |
| p-early-media-direction       |                     |
| add-sdp-profiles              |                     |
| add-sdp-profiles-in-msg       |                     |
| manipulation-string           |                     |
| manipulation-pattern          |                     |
| sip-profile                   |                     |
| sip-isup-profile              |                     |
| tcp-conn-dereg                | 0                   |
| tunnel-name                   |                     |
| register-keep-alive           | none                |
| kpml-interworking             | disabled            |
| msrp-delay-egress-bye         | disabled            |
| send-380-response             |                     |
| pcscf-restoration             |                     |
| session-timer-profile         |                     |
| session-recording-server      |                     |
| session-recording-required    | disabled            |
| service-tag                   |                     |
| reg-cache-route               | disabled            |
| diversion-info-mapping-mode   | none                |
| atcf-icsi-match               |                     |
| sip-recursion-policy          |                     |
| asymmetric-preconditions      | disabled            |
| asymmetric-preconditions-mode | send-with-nodelay   |
| sm-icsi-match-for-invite      |                     |
| sm-icsi-match-for-message     |                     |
| last-modified-by              | admin@135.17.145.2  |
| last-modified-date            | 2018-10-02 11:36:18 |
| phy-interface                 |                     |
| name                          | M01                 |
| operation-type                | Media               |
| port                          | 1                   |
| slot                          | 0                   |
| virtual-mac                   |                     |
| admin-state                   | enabled             |
| auto-negotiation              | enabled             |
| duplex-mode                   | FULL                |
| speed                         | 100                 |
| wancom-health-score           | 50                  |
| overload-protection           | disabled            |
| last-modified-by              | admin@console       |
| last-modified-date            | 2018-09-20 00:19:59 |
| steering-pool                 |                     |
| ip-address                    | 192.168.6.20        |
| start-port                    | 40000               |
| end-port                      | 50000               |
| realm-id                      | access              |
| network-interface             | M01:0.4             |
| last-modified-by              | admin@console       |
| last-modified-date            | 2018-09-20 01:06:13 |

A basic configuration on the E-SBC to route calls to and from Genesys server environment is now complete. The following sections highlight some of the useful tips to configure the E-SBC in order to successfully resolve and overcome interoperability challenges in a SIP trunking environment between the Genesys SIP Server and Service provider network. It is outside the scope of this document to include all the interoperability working information as it will differ in every deployment.

## Test Plan Executed

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

| #                         | Scenario  | Supported |
|---------------------------|---|-----------|
| 1                         | Inbound Call to Agent released by caller                                | Yes       |
| 2                         | Inbound Call to Agent released by agent                                 | Yes       |
| 3                         | Inbound Calls rejected  | Yes       |
| 4                         | Inbound Call abandoned  | Yes       |
| 5                         | Inbound Call to Route Point with Treatment                              | Yes       |
| 6                         | Interruptible Treatment   | Yes       |
| 7                         | NR (Collect Digit) Treatment  | Yes       |
| 8                         | Inbound Call routed by using 302 out of SIP Server signaling path       | Yes       |
| 9                         | 1PCC Outbound Call from SIP Endpoint to external destination            | Yes       |
| 10                        | 3PCC Outbound Call to external destination                              | Yes       |
| 11                        | 1PCC Outbound Call Abandoned  | Yes       |
| 12                        | Caller is put on hold and retrieved by using RFC 2543 method            | Yes       |
| 13                        | T-Lib-Initiated Hold/Retrieve Call with MOH using RFC 3264 method       | Yes       |
| 14                        | 3PCC 2 Step Transfer to internal destination by using re-INVITE method  | Yes       |
| 15                        | 3PCC Alternate from consult call to main call                           | Yes       |
| 16                        | 1PCC Unattended (Blind) transfer using REFER                            | Yes       |
| 17                        | 1PCC Attended Transfer to external destination                          | Yes       |
| 18                        | 3PCC Two Step Conference to external party                              | Yes       |
| 19                        | 3PCC (same as 1PCC) Single-Step Transfer to another agent               | Yes       |
| 20                        | 3PCC Single Step Transfer to external destination using REFER           | Yes       |
| 21                        | 3PCC Single Step Transfer to internal busy destination using REFER      | Yes       |
| 22                        | Early Media for Inbound Call to Route Point with Treatment              | Yes       |
| 23                        | Early Media for Inbound Call with Early Media for Routed toAgent        | Yes       |
| 24                        | Inbound call routed outbound (Remote Agent) using INVITE without SDP    | Yes       |
| 25                        | Call Progress Detection   | Yes       |
| 26                        | Out of Service detection; checking MGW live status                      | Yes       |
| 27                        | SIP Authentication for outbound calls                                   | No        |
| 28                        | SIP Authentication for incoming calls                                   | No        |
| <b>ESBC-Specific Test</b> |   |           |
| 29                        | T-Lib-Initiated Answer/Hold/Retrieve Call for Remote SIP endpoint which | Yes       |
| 30                        | 3PCC Outbound Call from Remote SIP endpoint to external destination     | Yes       |
| 31                        | 3PCC Two Step Transfer from Remote SIP endpoint to internal destination | Yes       |
| 32                        | 1PCC Attended Transfer from Remote SIP endpoint to external destination | Yes       |

The summary of the test plan is as follows

| Total Test Cases | Pass | Fail | Not Supported | Pending |
|------------------|------|------|---------------|---------|
| 32               | 30   | 0    | 2             | 0       |

The following features are supported with the E-SBC and Gensys SIP server.

| -1.1'.A_L-i  |           |
|--|-----------|
| General Features Supported By E-SBC                                | Supported |
| Inbound Calls - Standard   | Yes       |
| Inbound Calls - Contact Center/Routed                              | Yes       |
| Outbound Calls - Standard  | Yes       |
| Outbound Calls - Automated Dialer Campaign, CPD by Genesys         | Yes       |
| Remote Agent, not REGISTERed to SIP Server                         | Yes       |
| Call Qualification & Parking                                       | Yes       |
| GVP - Advanced NR (VXML, TTS, ASR, etc), Conferencing, &more       | Yes       |
| Technical Features   | Supported |
| "Single Site"  | Yes       |
| "m ultisite"   | Yes       |
| SIP Business Continuity  | Yes       |
| Transfer with re-INVITE  | Yes       |
| Transfer with 3xx  | Yes       |
| Transfer with REFER  | Yes       |
| Ad Hoc Conference  | Yes       |
| SIP Authentication   | No        |
| SIP Over TLS   | Yes       |
| SRTP   | Yes       |
| Service Monitoring   | Yes       |
| SIP Server High Availability - with Virtual IPAddress              | Yes       |
| SIP Trunk/E-SBC/Gateway High Availability - with Virtual IPAddress | Yes       |
| SIP Trunk/E-SBC/Gateway High Availability — List of IPAddresses    | N/T       |
| SIP Server High Availability - DNS-based Redundancy with SIP Proxy | N/T       |
| SIP Trunk/E-SBC/Gateway High Availability - DNS-based Redundancy   | N/T       |
| Audio Codec Support  | Yes       |
| Video Support  | N/T       |
| E-SBC-Specific   | Supported |
| Inbound & Outbound Calls   | Yes       |
| SIP Agent 3PCC Control   | Yes       |
| Remote Agent - Transfer with REFER (SIP Phone via E-SBC)           | Yes       |
| Transfer with REFER  | Yes       |
| Transfer with re-INVITE  | Yes       |

## 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 Oracle E-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.

### Oracle Enterprise Operations Monitor

The Oracle EOM can be used to monitor call flows and analyze sip messages. Please follow the step-by-step procedure in [https://docs.oracle.com/communications/E99929\\_01/doc.41/e99931/toc.htm](https://docs.oracle.com/communications/E99929_01/doc.41/e99931/toc.htm) guide to install EOM.

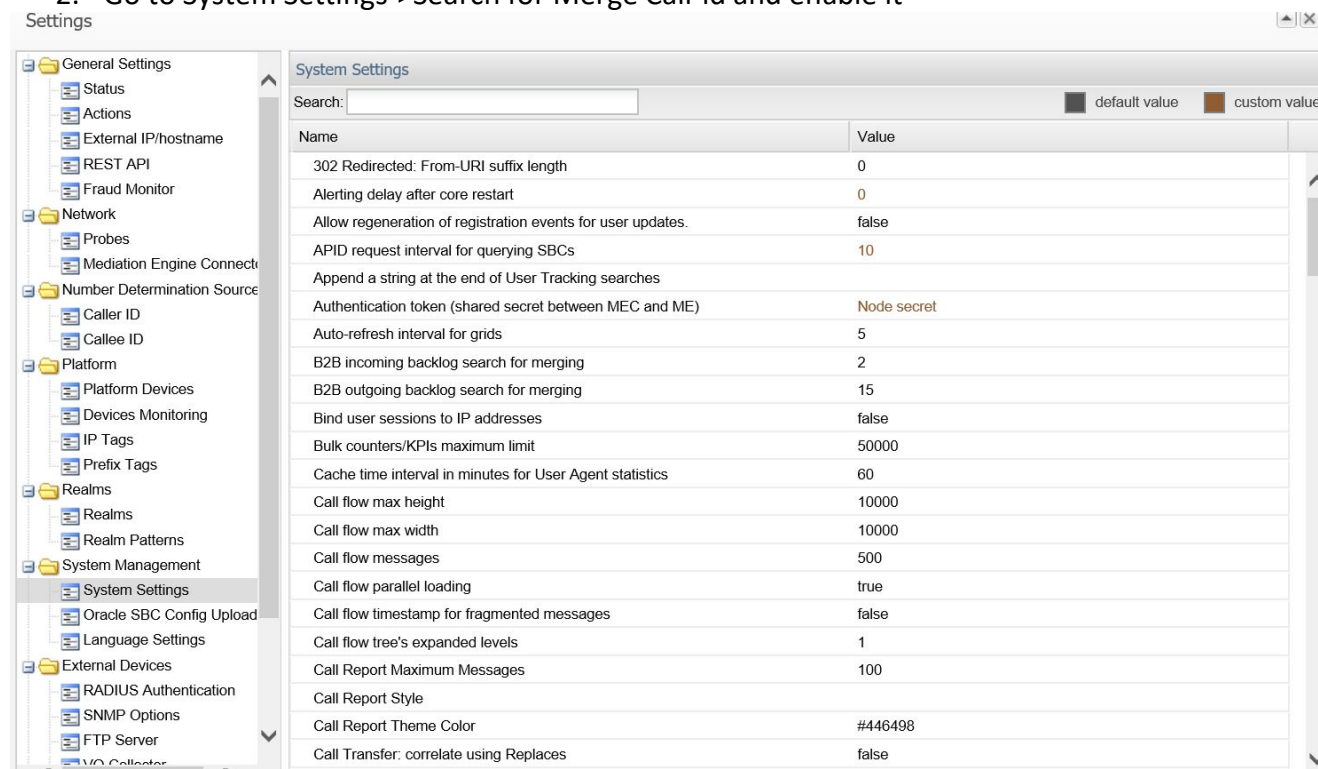
Here the ESBC acts as a probe, that mirrors messages towards the EOM. Follow the below steps so that SBC acts as a probe,

- Change the state of comm-monitor to enabled in system->system-config->comm-monitor.
- Configure the IP address of the Oracle EOM in system->system-config->comm-monitor->monitor-collector. The EOM uses default port of 4739
- Make sure that the connection is established in the SBC by show comm-monitor.
- Check whether the ESBC IP(here mgmt. IP) is displayed and the connection status is OK in the admin->Settings->Probes ,page of EOM.

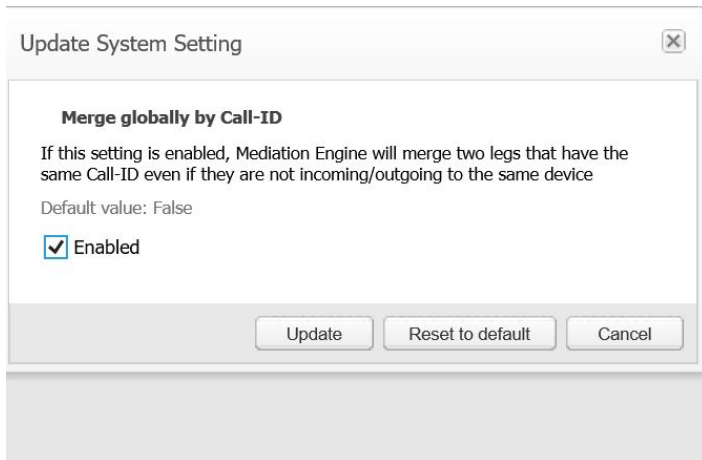
### Settings on EOM to display different call legs as a single report

To make sure that the different call legs are displayed as a single report, follow the below instructions

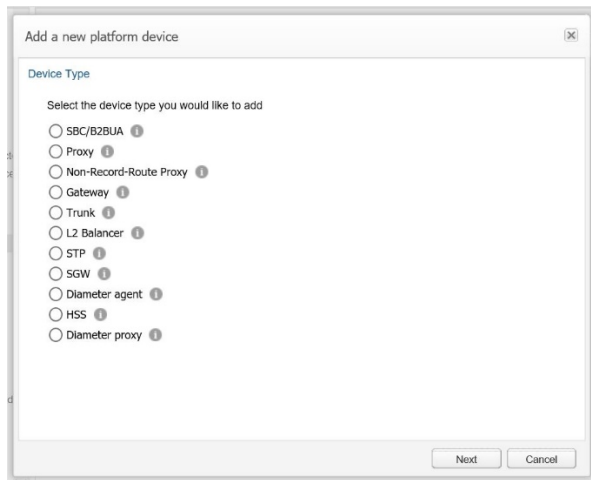
1. Click on the user (admin in this example) in the top right corner, then click on Settings.
2. Go to System Settings->Search for Merge Call-id and enable it



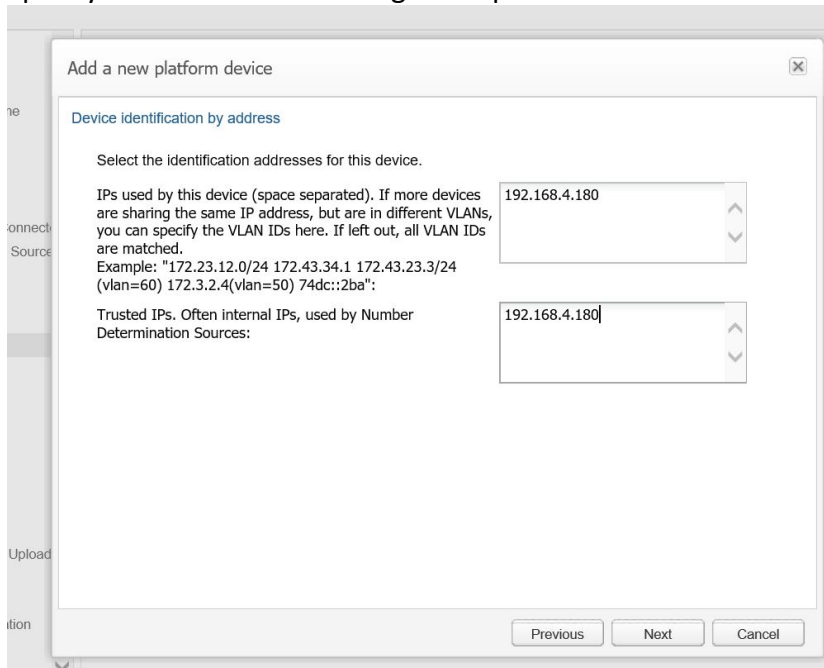
| Name  | Value       |
|---|-------------|
| 302 Redirected: From-URI suffix length                      | 0           |
| Alerting delay after core restart                           | 0           |
| Allow regeneration of registration events for user updates. | false       |
| APIID request interval for querying SBCs                    | 10          |
| Append a string at the end of User Tracking searches        |             |
| Authentication token (shared secret between MEC and ME)     | Node secret |
| Auto-refresh interval for grids                             | 5           |
| B2B incoming backlog search for merging                     | 2           |
| B2B outgoing backlog search for merging                     | 15          |
| Bind user sessions to IP addresses                          | false       |
| Bulk counters/KPIs maximum limit                            | 50000       |
| Cache time interval in minutes for User Agent statistics    | 60          |
| Call flow max height  | 10000       |
| Call flow max width   | 10000       |
| Call flow messages  | 500         |
| Call flow parallel loading                                  | true        |
| Call flow timestamp for fragmented messages                 | false       |
| Call flow tree's expanded levels                            | 1           |
| Call Report Maximum Messages                                | 100         |
| Call Report Style   |             |
| Call Report Theme Color                                     | #446498     |
| Call Transfer: correlate using Replaces                     | false       |



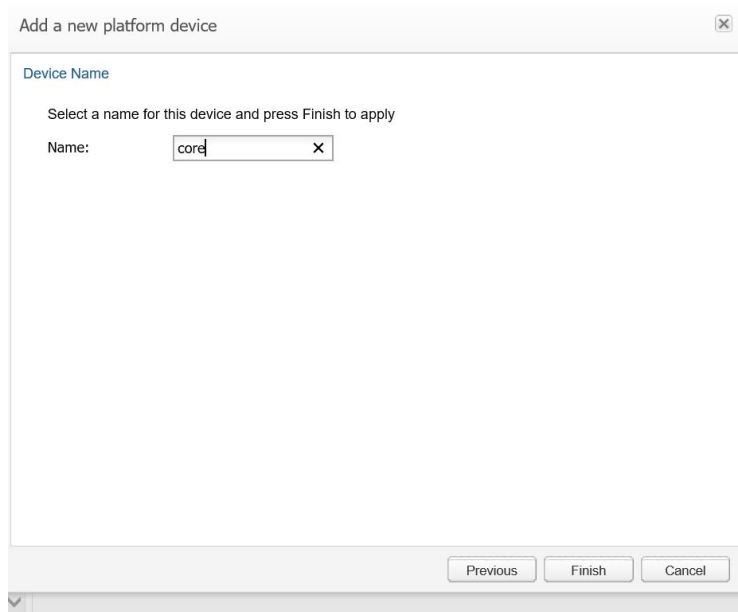
3. Go to Platform devices and add all the components in the call flow, one by one as follows.
4. By default, always choose the SBC option.
- 5.



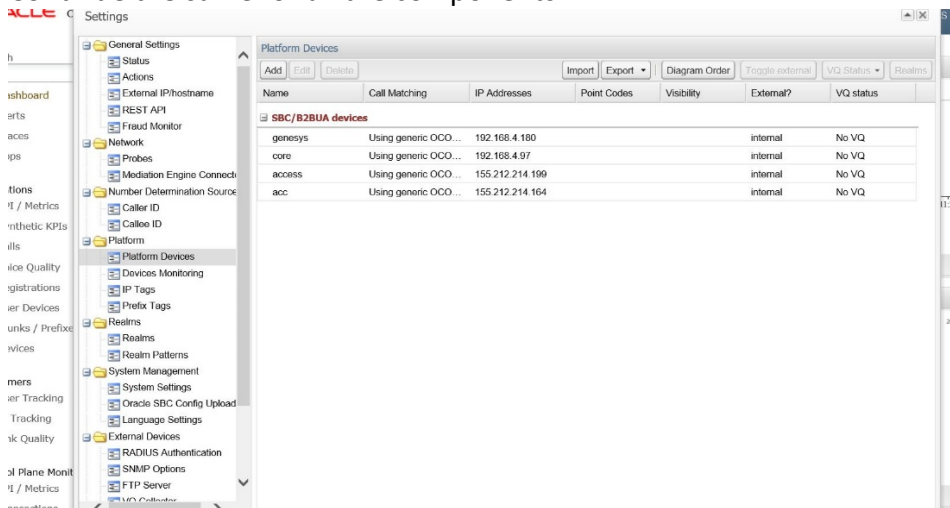
6. Specify the IP address of a single component involved in the call



7. Mention the name of component



8. Continue the same for all the components.



9. After this make a call. The call is displayed in Recent calls section

10. Right click on the call and select Message flow. Here you will be able to see all the messages in the call. The report can be downloaded also for future use.

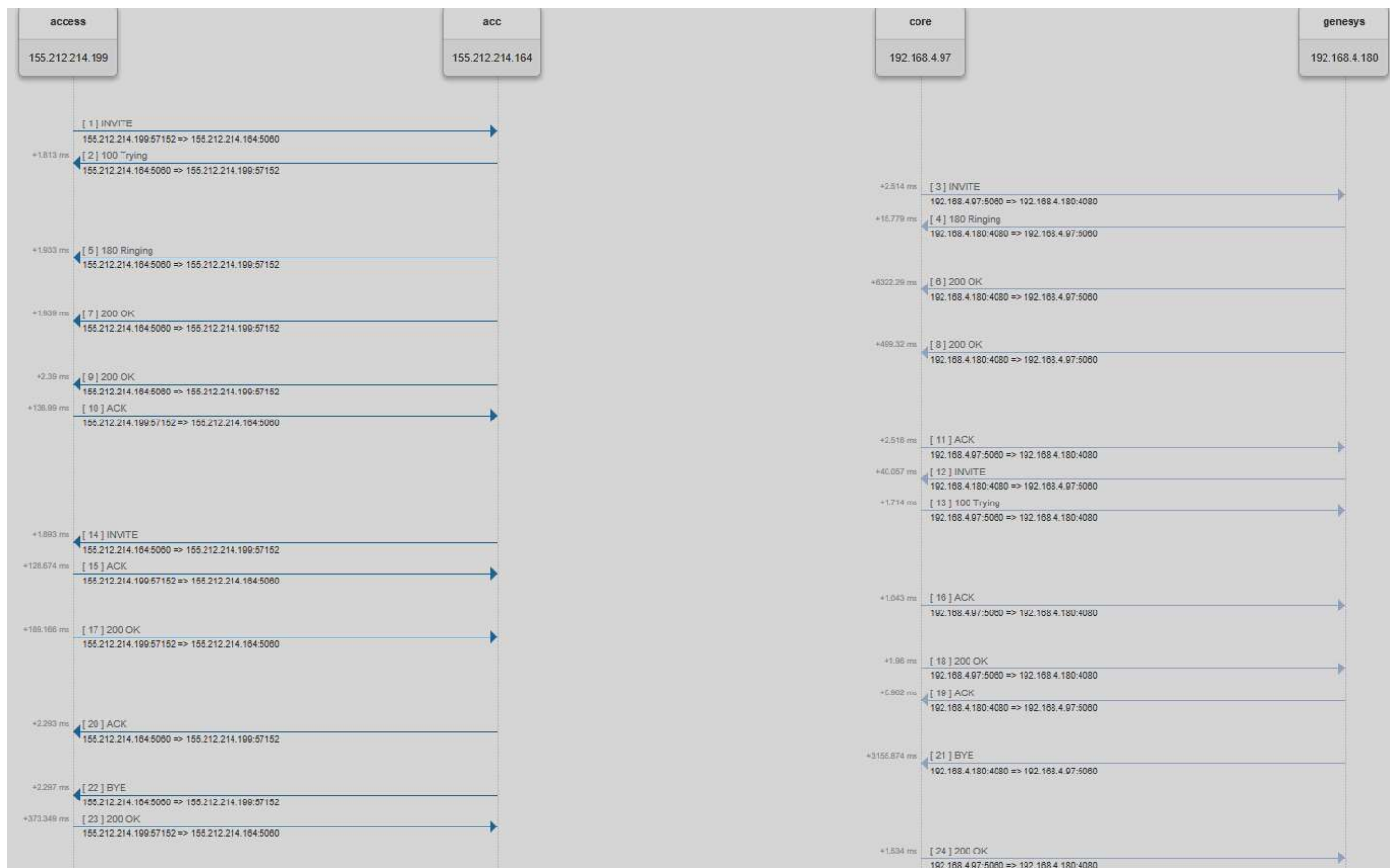


## Sample EOM report for a call between remote worker and Genesys client

Here is the list of the components and IP addresses used in the call.

| Component   | IP address      |
|---|-----------------|
| Genesys SIP Server  | 192.168.4.180   |
| SIP interface/Network Interface IP address of Oracle SBC<br>[Core Realm IP address that connects to Genesys Server]           | 192.168.4.97    |
| SIP interface /Network Interface IP address of Oracle SBC used for<br>registering phones to the Genesys server via Oracle SBC | 155.212.214.164 |
| Xlite Phone registered to Genesys server through our SBC  | 155.212.214.199 |

This sample call report is downloaded from the EOM. The remote worker (9234567890) calls a client registered with genesis server (7101)



## Wireshark

Wireshark is a network protocol analyzer which is freely downloadable from

[www.wireshark.org](http://www.wireshark.org).

## On the Oracle E-SBC

The Oracle SBC provide a rich set of statistical counters available from the CLI, 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 console:

```
NN4600-100# reset sipd
NN4600-100# notify sipd debug
NN4600-100#
enabled SIP Debugging
NN4600-100# notify all rotate-logs
```

## Examining the log files

**Note:** You will SFTP to the management interface of the ESBC or SBC with the username user and user mode password (the default is “acme”).

```
C:\Documents and Settings\user>sftp 192.168.5.24
Connected to 192.168.85.55.
220 NN4600-100SFTP server (VxWorks 6.4) ready.
User (192.168.85.55:(none)): user
331 Password required for user.
Password: acme
230 User user logged in.
sftp> cd /ramdrv/logs
250 CWD command successful.
sftp> get sipmsg.log
200 PORT command successful.
150 Opening ASCII mode data connection for '/ramdrv/logs/sipmsg.log' (3353
bytes).
226 Transfer complete.
sftp: 3447 bytes received in 0.00Seconds 3447000.00Kbytes/sec.
sftp> get log.sipd
200 PORT command successful.
150 Opening ASCII mode data connection for '/ramdrv/logs/log.sipd' (204681
bytes).
sftp: 206823 bytes received in 0.11Seconds 1897.46Kbytes/sec.
sftp> bye
221 Goodbye.
226 Transfer complete.
```

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 E-SBC and ESBC, and provide traces in a common log format for local viewing or for exporting to your PC. Please check the “Monitor and Trace SIP Messages” section (page 140) of the E-SBC Web GUI User Guide available at [http://docs.oracle.com/cd/E56581\\_01/index.htm](http://docs.oracle.com/cd/E56581_01/index.htm). For the ESBC, see the “Monitor and Trace” section (page 95) of the User’s Guide available at [http://docs.oracle.com/cd/E55725\\_01/index.htm](http://docs.oracle.com/cd/E55725_01/index.htm).

## Appendix A

### Accessing the ACLI

Access to the ACLI is provided by:

- The serial console connection;
- SSH.

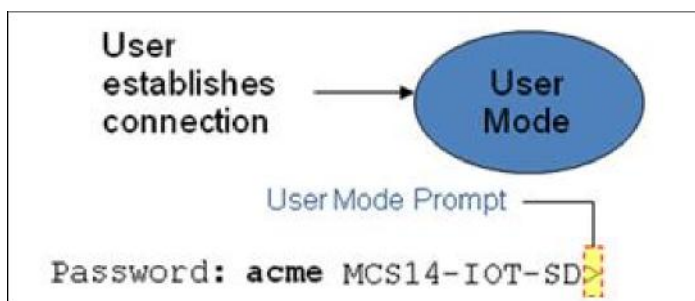
Initial connectivity will be through the serial console port. At a minimum, this is how to configure the management (eth0) interface on the SBC.

### ACLI Basics

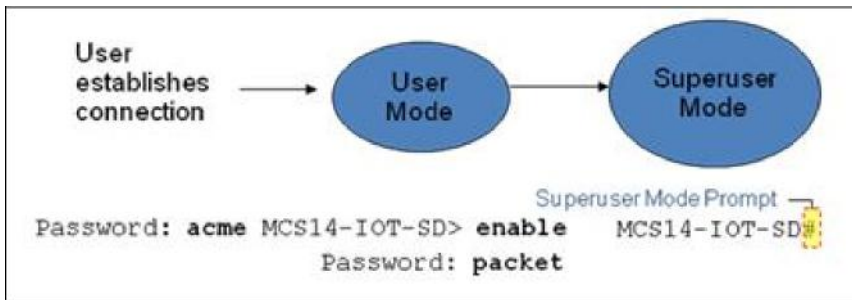
There are two password protected modes of operation within the ACLI, User mode and Superuser mode.

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.



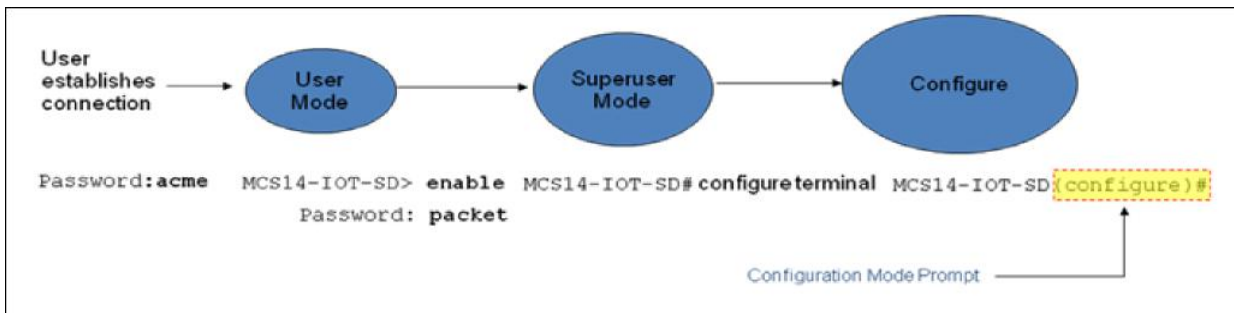
The Superuser mode allows for access to all system commands for operation, maintenance, and administration. This mode is identified by the pound sign (#) in the prompt after the target name. To enter the Superuser mode, issue the enable command in the User mode.



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.

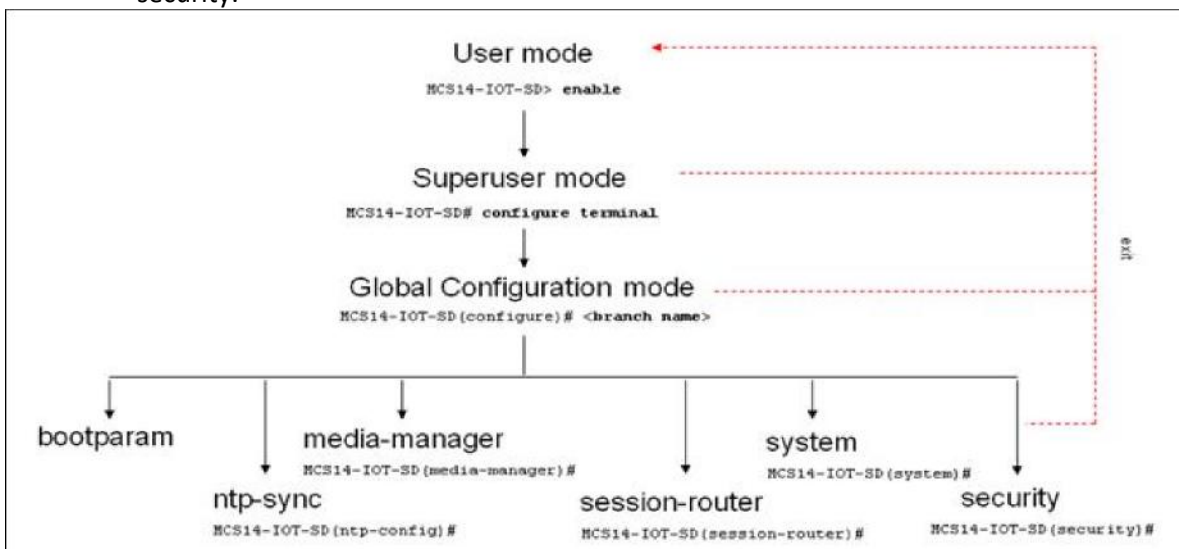
You must enter the Configuration mode to configure elements. For example, you can access the configuration branches and configuration elements for signaling and media configurations. To enter the Configuration mode, issue the configure terminal command in the Superuser mode.

Configuration mode is identified by the word configure in parenthesis followed by the pound sign (#) in the prompt after the target name, for example, NN4600-100(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.



The ntp-sync and bootparams branches are flat branches (i.e., they do not have elements inside the branches). The rest of the branches have several elements under each of the branches.

The bootparam branch provides access to SBC boot parameters. Key boot parameters include:

- boot device — The global management port, usually eth0
- file name — The boot path and the image file.
- inet on ethernet — The IP address and subnet mask (in hex) of the management port of the SD
- host het -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.

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.

6. Enter the element that you will edit at the correct level of the ACLI path.
7. Select the element that you will edit, and view it before editing it.
8. The select command loads the element to the volatile memory for editing. The show command
9. allows you to view the element to ensure that it is the right one that you want to edit.
10. 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.
11. 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.
12. On completion, you must issue the done command.
13. 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,

14. Enter the no command from within the path for that specific element
15. Issue the exit command.

To delete a multiple-instance element,

16. Enter the no command from within the path for that particular element. The key field prompt, such as <name>:<sub-port-id>, appears.
17. Use the <Enter> key to display a list of the existing configured elements.
18. Enter the number corresponding to the element you wish to delete.
19. 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.

```

NN4600-100 # 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'.
NN4600-100 #

```

## 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.

```

NN4600-100# activate-config
Activate-Config received, processing.
waiting 120000 for request to finish
Request to 'ACTIVATE-CONFIG' has Finished,
Activate Complete
NN4600-100#

```



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## Integrated Cloud Applications & Platform Services

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