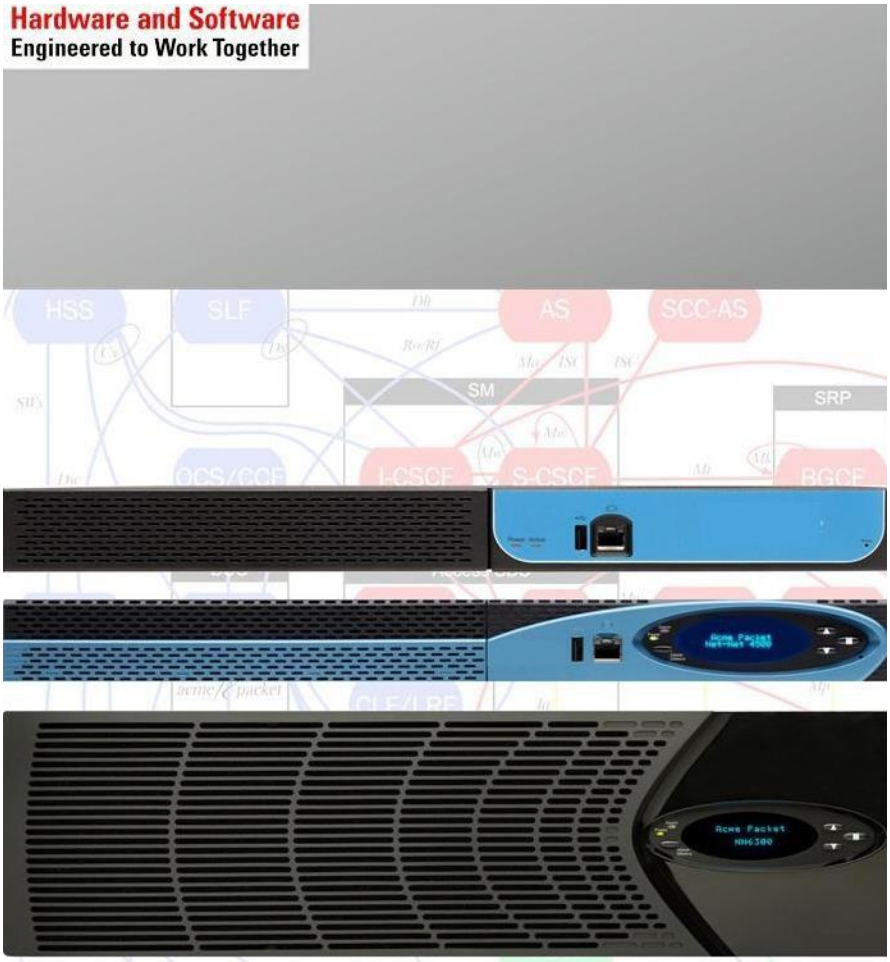

Oracle Enterprise Session Border Controller and SIPREC with Avaya Contact Recorder 12.1

Technical Application Note

ORACLE

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Table of Contents

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 Enterprise Session Border Controller.

Document Overview

Oracle Enterprise SBCs provide the ability to session record calls to an external call recorder. Avaya has a call recording product that is capable of supporting the SIPREC SIP call recording standard. This application note reviews a general topology design for Oracle ESBC with the Avaya call recording solution, redundancy, and SBC configuration.

Introduction

Audience

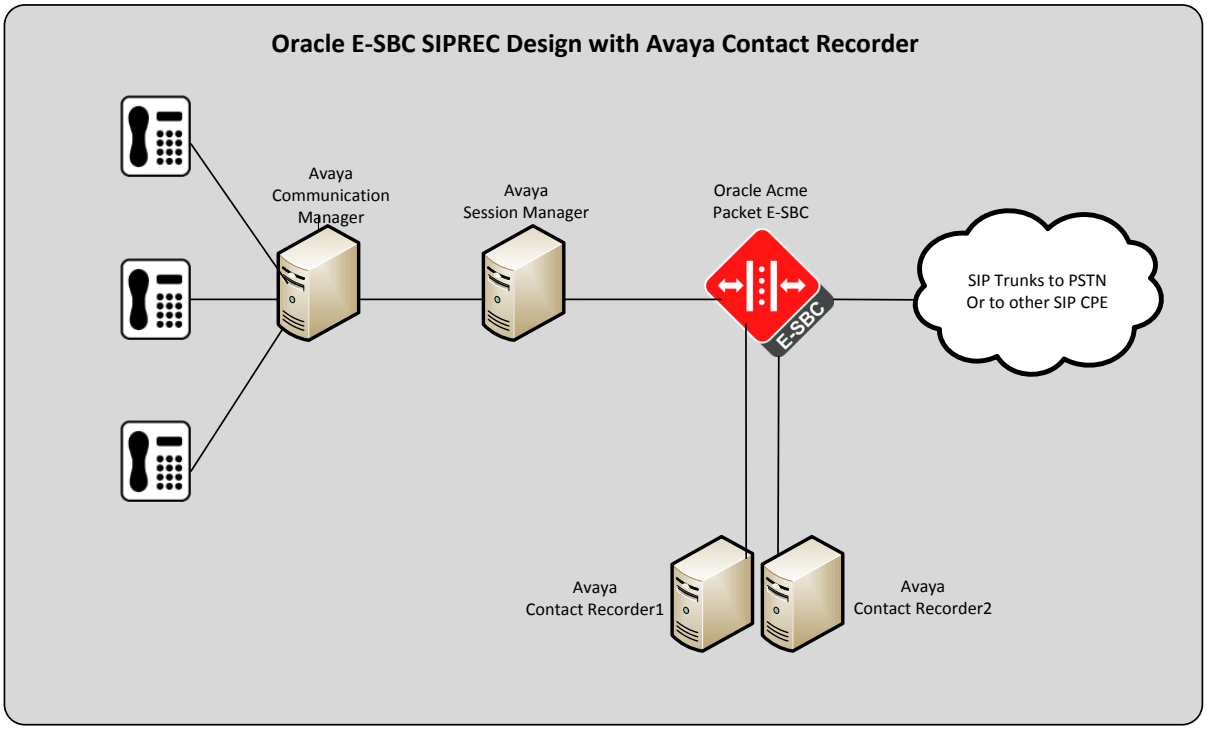
This is a technical document intended for telecommunications engineers with the purpose of configuring the Oracle Enterprise Session Border Controller and the Avaya CM/SM/ACR. There will be steps that require navigating the Acme Packet Command Line Interface (ACLI). Understanding the basic concepts of TCP/UDP, IP/Routing, and SIP/RTP are also necessary to complete the configuration and for troubleshooting, if necessary.

Requirements

- Avaya Communication Manager – 6.3.0.124.0 or above
- Avaya Session Manager – 6.3.10.0.631008 or above
- Avaya Contact Recorder – ACR 12.1
- Oracle Enterprise Session Border Controller is running Net-Net OS ECZ640m5p2 Note: the configuration running on the SBC is backward/forward compatible with any release in the EC7.x stream.

Architecture

The following reference architecture shows a logical view of the connectivity between CM and the SBC.



Lab Configuration

Following are the IP addresses used for the Interoperability tests.

description	network-interface	realm	interface IP	sip-port
SBC Management Interfaces				
management	wancom0		192.168.1.22	
redundancy	wancom1 - pri		169.254.1.1	
	wancom1 - sec		169.254.1.2	
redundancy	wancom2 - pri		169.254.2.1	
	wancom2 - sec		169.254.2.2	
SBC Media/Signaling Interfaces				
media/signalling	s0p0:0	inside	172.16.1.34	5060
	s0p0:0 - pri		172.16.1.35	
	s0p0:0 - sec		172.16.1.36	
media/signalling	s1p0:0	outside	172.16.2.34	5060
	s1p0:0 - pri		172.16.2.35	
	s1p0:0 - sec		172.16.2.36	
media/signalling	s0p1	recorder	172.16.3.34	5060
	s0p1 - pri		172.16.3.35	
	s0p1 - sec		172.16.3.36	
SIP Recorders				
SIP Recorder1		recorder	172.16.3.5	5060
SIP Recorder2		recorder	172.16.3.6	5060
Session Agents				
Avaya SM		inside	10.1.1.10	5060
SIP Trunk 1		outside	10.2.2.10	5060
SIP Trunk 2		outside	10.2.2.11	5060

Configuring the Oracle Enterprise SBC

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

In Scope

The following guide configuring the Oracle SBC assumes that this is a newly deployed device dedicated to a single customer. If a service provider currently has the SBC deployed then please see the ACLI Configuration Guide on 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 SBC. This document covers the setup for the SD platform running Net-Net OS ECZ7.2.0 or later. If instructions are needed for other Oracle SBC models, please contact your Oracle representative.

Out of Scope

- Configuration of Network management including SNMP and RADIUS

What will you need

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

Configuring the SBC

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

```
Password: acme
SBC1> enable
Password: packet
SBC1# configure terminal
SBC1 (configure)#
```

You are now in the global configuration mode.

Initial Configuration – Assigning the management Interface an IP address

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

SBC1#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

```
SBC1#(configure)bootparam
'.' = clear field;  '-' = go to previous field;  q = quit
boot device             : eth0
processor number        : 0
host name               : acmesystem
file name               : /code/images/nnECZ720p2.64.bz --- >location
where the software is loaded on the SBC
inet on ethernet (e) : 192.168.1.22:ffffff80 --- > This is the ip address
of the management interface of the SBC, type the IP address and mask in hex
inet on backplane (b)   :
host inet (h)           :
gateway inet (g)        : 192.168.1.1 -> gateway address here
user (u)                : vxftp
ftp password (pw) (blank = use rsh)     : vxftp
flags (f)               :
target name (tn)        : SBC1 -> ACLI prompt name & HA outside name
startup script (s)      :
other (o)               :
```

The following section walks you through configuring the Oracle Communications Enterprise SBC. It is outside the scope of this document to include all of the configuration elements as it will differ in every deployment.

High Availability

For additional information on High Availability please see the enterprise SBC documentation for more information (http://www.oracle.com/technetwork/indexes/documentation/oracle-comms-acme-packet-2046907.html)

Physical and Interfaces wancom1 and 2 needs to be added to facilitate HA communication between the two HA pairs.

```
phy-interface
        name                                    wancom1
        operation-type                          Control
        port                                    1
        slot                                    0
        virtual-mac
        admin-state                             enabled
        auto-negotiation                        enabled
        duplex-mode
        speed
        wancom-health-score                     11
        overload-protection                     disabled
phy-interface
        name                                    wancom2
        operation-type                          Control
        port                                    2
        slot                                    0
        virtual-mac
        admin-state                             enabled
        auto-negotiation                        enabled
        duplex-mode
        speed
        wancom-health-score                     12
        overload-protection                     disabled
network-interface
        name                                    wancom1
        sub-port-id                             0
        description                             HA HEARTBEAT1
        hostname
        ip-address
        pri-utility-addr                        169.254.1.1
        sec-utility-addr                        169.254.1.2
        netmask                                 255.255.255.252
        gateway
        sec-gateway
        gw-heartbeat
                state                                   disabled
                heartbeat                               0
                retry-count                             0
                retry-timeout                           1
                health-sinside                            0
        dns-ip-primary
        dns-ip-backup1
        dns-ip-backup2
        dns-domain
        dns-timeout                             11
```

```
        hip-ip-list
        ftp-address
        icmp-address
        snmp-address
        telnet-address
        ssh-address
network-interface
        name                                    wancom2
        sub-port-id                             0
        description                             HA_HEARTBEAT2
        hostname
        ip-address
        pri-utility-addr                        169.254.2.1
        sec-utility-addr                        169.254.2.2
        netmask                                 255.255.255.252
        gateway
        sec-gateway
        gw-heartbeat
                state                                   disabled
                heartbeat                               0
                retry-count                             0
                retry-timeout                           1
                health-sinside                            0
        dns-ip-primary
        dns-ip-backup1
        dns-ip-backup2
        dns-domain
        dns-timeout                             11
        hip-ip-list
        ftp-address
        icmp-address
        snmp-address
        telnet-address
        ssh-address
```

```
redundancy-config
        becoming-standby-time                   360000
        outside
                name                                    SBC1
                type                                    Primary
                destination
                        address                                 169.254.1.1:9090
                        network-interface                       wancom1:0
                destination
                        address                                 169.254.2.1:9090
                        network-interface                       wancom2:0
        outside
                name                                    SBC2
                type                                    Secondary
                destination
                        address                                 169.254.1.2:9090
                        network-interface                       wancom1:0
                destination
                        address                                 169.254.2.2:9090
                        network-interface                       wancom2:0
```

Additionally primary and secondary interface IPs need to be added to the media/signaling network-interfaces

```
network-interface
        name                                    s0p0
        sub-port-id                             0
        description
        hostname
        ip-address                              172.16.1.34
        pri-utility-addr                        172.16.1.35
        sec-utility-addr                        172.16.1.36
        netmask                                 255.255.255.0
        gateway                                 172.16.1.1
        sec-gateway
        gw-heartbeat
                state                                   disabled
                heartbeat                               0
                retry-count                             0
                retry-timeout                           1
                health-sinside                            0
        dns-ip-primary
        dns-ip-backup1
        dns-ip-backup2
        dns-domain
        dns-timeout                             11
        signaling-mtu                           0
        hip-ip-list
        ftp-address
        icmp-address
        snmp-address
        telnet-address
        ssh-address
network-interface
        name                                    s1p0
        sub-port-id                             0
        description
        hostname
        ip-address                              172.16.2.34
        pri-utility-addr                        172.16.2.35
        sec-utility-addr                        172.16.2.36
        netmask                                 255.255.255.0
        gateway                                 172.16.2.1
        sec-gateway
        gw-heartbeat
                state                                   disabled
                heartbeat                               0
                retry-count                             0
                retry-timeout                           1
                health-sinside                            0
        dns-ip-primary
        dns-ip-backup1
        dns-ip-backup2
        dns-domain
        dns-timeout                             11
        signaling-mtu                           0
        hip-ip-list
        ftp-address
        icmp-address
        snmp-address
```

```
        telnet-address
        ssh-address
```

Media Manager

To ensure proper anchoring of media, media-manager should be globally enabled. The option unique-sdp-id should be added as well.

```
media-manager
        state                                   enabled
        latching                                enabled
        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                                 unique-sdp-id
```

Network Parameters

An atcp-idle-timer needs to be set to optimize with Avaya TCP settings.

```
network-parameters
        tcp-keepinit-timer                      75
        tcp-keepalive-count                     8
        tcp-keepalive-idle-timer                7200
        tcp-keepalive-interval-timer            75
        tcp-keepalive-mode                      0
        sctp-send-mode                          unordered
        sctp-rto-initial                        3000
        sctp-rto-max                            60000
        sctp-rto-min                            1000
        sctp-hb-interval                        30000
        sctp-max-burst                          4
        sctp-sack-timeout                       200
        sctp-assoc-max-retrans                  30
        sctp-path-max-retrans                   30
        options                                 atcp-idle-timer=900
```

Routing via Local Policy

For outbound calls the local-policy determines which trunk to forward the call based on the NPA of the request-URI. This is configured in the local policy of the “To”. For most configurations there will be only 1 inside and outside realm. For a single inside/outside realm configuration the local policy to and from would be set to “*”. Redundant trunk configurations will use a session-agent group.

```
local-policy
        from-address                            *
        to-address                              *
        source-realm                            inside
        description
```

```
        activate-time
        deactivate-time
        state                                   enabled
        policy-priority                         none
        policy-attribute
                next-hop                                SIP Trunk Grp01
                realm                                   outside
                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
local-policy
        from-address                            *
        to-address                              *
        source-realm                            outside
        description
        activate-time
        deactivate-time
        state                                   enabled
        policy-priority                         none
        policy-attribute
                next-hop                                10.1.1.10
                realm                                   inside
                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
```

Header manipulation rules

The From and To header URIs require updating to and from the Avaya SM. The following sip-manipulation changes the From uri-host to the source address of the SBC and the To uri-host to the destination IP.

```
    sip-manipulation
       name                                    SIPNAT
       description
```

```
        split-headers
        join-headers
        header-rule
                name                                    ModFrom
                header-name                             From
                action                                  manipulate
                comparison-type                         case-sensitive
                msg-type                                any
                methods
                match-value
                new-value
                element-rule
                        name                                    ModFromHost
                        parameter-name
                        type                                    uri-host
                        action                                  replace
                        match-val-type                          any
                        comparison-type                         case-sensitive
                        match-value
                        new-value                               $LOCAL IP
        header-rule
                name                                    ModTo
                header-name                             To
                action                                  manipulate
                comparison-type                         case-sensitive
                msg-type                                any
                methods
                match-value
                new-value
                element-rule
                        name                                    ModToHost
                        parameter-name
                        type                                    uri-host
                        action                                  replace
                        match-val-type                          any
                        comparison-type                         case-sensitive
                        match-value
                        new-value                               $REMOTE IP
```

Session Recording (SIPREC) Configuration

This session recording configuration is for SIPREC and uses a session recording group to hunt to two different Avaya session recorders. In the event of a failure of the first recorder the SBC will send recorded sessions to the second recorder. Additionally the SBC will maintain status of each recorder through the *ping-method* & *ping-interval* configuration attributes. For more information regarding Session recording please see the ACLI configuration guide page 535. (http://docs.oracle.com/cd/E61547_01/doc/esbc_ecz730_configuration.pdf)

```
session-recording-group
        name                                    SRSGRP01
        description
        strategy                                Hunt
        simultaneous-recording-servers          1
        session-recording-servers           SRS01
                                            SRS02
session-recording-server
```

```
        name                                    SRS01
        description
        realm                                   recorder
        mode                                    selective
        destination                             172.16.3.5
        port                                    5060
        transport-method                        StaticTCP
        ping-method                             OPTIONS
        ping-interval                           5
session-recording-server
        name                                    SRS02
        description
        realm                                   recorder
        mode                                    selective
        destination                             172.16.3.6
        port                                    5060
        transport-method                        StaticTCP
        ping-method                             OPTIONS
        ping-interval                           5
```

Recording for this SBC is triggered by traffic on the "inside" realm-config via the configuration attribute *session-recording-server*. Note – if the *session-recording-required* attribute is set to *enabled* and the session recorders are not available the SBC will reject the call.

```
realm-config
        identifier                              inside
        description                             Inside real to Avaya SM and CM
        addr-prefix                             0.0.0.0
        network-interfaces                      s0p0:0
…
        session-recording-server                SRSGRP01
        session-recording-required              disabled
```

The session recorders resides on a dedicated realm. The following configuration is required if a dedicated recorder realm is used.

```
network-interface
        name                                    s0p1
        sub-port-id                             0
        description                             Recording Interface
        hostname
        ip-address                              172.16.3.34
        pri-utility-addr                        172.16.3.35
        sec-utility-addr                        172.16.3.36
        netmask                                 255.255.255.0
        gateway                                 172.16.3.1
        sec-gateway
        gw-heartbeat
                state                                   enabled
                heartbeat                               10
                retry-count                             3
                retry-timeout                           1
                health-score                            30
        dns-ip-primary
        dns-ip-backup1
        dns-ip-backup2
        dns-domain
        dns-timeout                             11
        hip-ip-list
        ftp-address
```

```
        icmp-address
        snmp-address
        telnet-address
        ssh-address
```

```
realm-config
        identifier                              recorder
        description                             Recording Realm
        addr-prefix                             0.0.0.0
        network-interfaces                      s0p1:0
        mm-in-realm                             enabled
        mm-in-network                           enabled
...
```

```
steering-pool
        ip-address                              172.16.3.34
        start-port                              49152
        end-port                                65535
        realm-id                                recorder
        network-interface
```

```
sip-interface
        state                                   enabled
        realm-id                                recorder
        description
        sip-port
                address                                 172.16.3.34
                port                                    5060
                transport-protocol                      UDP
                tls-profile
                allow-anonymous                         all
                multi-home-addrs
        sip-port
                address                                 172.16.3.34
                port                                    5060
                transport-protocol                      TCP
                tls-profile
                allow-anonymous                         all
...
```

Universal Call Identification SPL Configuration

UCID header support is required for SIPREC integration of E-SBC, ACR and CM. Oracle E-SBCs support UCID through a SPL script that is included in all Enterprise SBC software. In this configuration the UCID is applied SIP messages to and from the Avaya Session Manager via the session-agent configuration element.

```
session-agent
        hostname                                10.1.1.10
        ip-address                              10.1.1.10
        port                                    5060
...
       spl-options                             UCID-App-ID=0023,replace-
ucid,convert-to=Avaya
```

```
spl-config
        spl-options
        plugins
                state                                   enabled
                name                                    UniversalCallId.5.spl
```

Webserver Configuration

A webserver is available on all Enterprise versions of Oracle/Acme Packet SBCs. The Webserver can be used to provide tracing, configuration and dashboard info. For tracing info, 2 parts must be configured. 1) The webserver must be enabled. 2) Tracing filters must be applied.

```
web-server-config
        state                                   enabled
        inactivity-timeout                      5
        http-state                              enabled
        http-port                               80
        https-state                             disabled
        https-port                              443
        tls-profile
```

```
sip-monitoring
        match-any-filter                        disabled
        state                                   enabled
        short-session-duration                  0
        monitoring-filters                      *
        trigger-window                          30
```

Test Plan

The following is the high-level test plan that was applied to the SIPREC integration of ACR and the Oracle ESBC

Test Cases

Inbound Trunk Side Direct to Agent		
	to agent	pass
	with agent hold	pass
	with farside hold	pass
	with agent hold/unhold	pass
	with consult	pass
	with Transfer	pass
	with conference	pass
	with call join	pass
	using PCMA	pass
	using PCMU	pass
Inbound Trunk Side to CDN		
	to agent	pass
	with agent hold	pass
	with farside hold	pass
	with agent hold/unhold	pass
	with consult	pass
	with Transfer	pass
	with conference	pass
	with call join	pass
	using PCMU	pass
Outbound from agent to trunkside		
	to agent	pass
	with agent hold	pass
	with farside hold	pass
	with agent hold/unhold	pass
	with consult	pass
	with Transfer	pass
	with conference	pass
	with call join	pass
	using PCMA	pass
	using PCMU	pass
Outbound Predictive Dialer (POM)		
	from POM	pass
	with agent hold	pass
	with farside hold	pass
	with agent hold/unhold	pass
	with consult	pass
	with Transfer to POM agent	pass
	with conference to POM agent	pass
	with Transfer to non-POM agent	pass
	with conference to non-POM agent	pass
	using PCMU	pass
Scalability		
	Hunt (recordings made on correct ACR)	pass
	Round Robin (recordings made on correct ACR)	pass
Survivability		
	ACR Slave fails recording occurs on master	pass
	ACR Slave restarted - recording should resume on slave	pass
	ACR master fails	pass
	ACR master restarted after failure	pass

Troubleshooting Tools

Wireshark

Wireshark is also a network protocol analyzer which is freely downloadable from www.wireshark.org.

On the Oracle ESBC

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

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

At the SBC Console:

```
SBC1# reset sipd
SBC1# notify sipd debug
SBC1#
enabled SIP Debugging
SBC1# notify all rotate-logs
```

Examining the log files

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

```
C:\Documents and Settings\user>ftp 192.168.1.22
Connected to 192.168.85.55.
220 SBC1 server (VxWorks 6.4) ready. User (192.168.1.22:(none)): user
331 Password required for user. Password: acme
230 User user logged in.
ftp> cd /opt/logs
250 CWD command successful. ftp> get sipmsg.log
200 PORT command successful.
150 Opening ASCII mode data connection for '/opt/logs/sipmsg.log' (3353
bytes).
226 Transfer complete.
ftp: 3447 bytes received in 0.00Seconds 3447000.00Kbytes/sec. ftp> get
log.sipd
200 PORT command successful.
150 Opening ASCII mode data connection for '/opt/logs/log.sipd' (204681
bytes).
226 Transfer complete.
ftp: 206823 bytes received in 0.11Seconds 1897.46Kbytes/sec
```

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

Through the Web GUI

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

Appendix A

Full SBC Configuration

```
local-policy
        from-address                            *
        to-address                              *
        source-realm                            inside
        description
        activate-time
        deactivate-time
        state                                   enabled
        policy-priority                         none
        policy-attribute
                next-hop                                SIP Trunk Grp01
                realm                                   outside
                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
local-policy
        from-address                            *
        to-address                              *
        source-realm                            outside
        description
        activate-time
        deactivate-time
        state                                   enabled
        policy-priority                         none
        policy-attribute
                next-hop                                10.1.1.10
                realm                                   inside
                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
media-manager
        state                                   enabled
        latching                                enabled
        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                                 unique-sdp-id
        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-untrusted-packet-rate               50000
        max-trusted-packet-rate                 50000
        max-arp-packet-rate                     1000
        tolerance-window                        30
        trap-on-demote-to-deny                  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
        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
network-interface
        name                                    s0p0
        sub-port-id                             0
        description                             Inside Netowrk Interface
        hostname
        ip-address                              172.16.1.34
        pri-utility-addr                        172.16.1.35
        sec-utility-addr                        172.16.1.36
        netmask                                 255.255.255.0
        gateway                                 172.16.1.1
        sec-gateway
        gw-heartbeat
                state                                   enabled
                heartbeat                               10
                retry-count                             3
                retry-timeout                           1
```

```
                health-score                            30
        dns-ip-primary
        dns-ip-backup1
        dns-ip-backup2
        dns-domain
        dns-timeout                             11
        hip-ip-list
        ftp-address
        icmp-address
        snmp-address
        telnet-address
        ssh-address
network-interface
        name                                    s0p1
        sub-port-id                             0
        description                             Recording Interface
        hostname
        ip-address                              172.16.3.34
        pri-utility-addr                        172.16.3.35
        sec-utility-addr                        172.16.3.36
        netmask                                 255.255.255.0
        gateway                                 172.16.3.1
        sec-gateway
        gw-heartbeat
                state                                   enabled
                heartbeat                               10
                retry-count                             3
                retry-timeout                           1
                health-score                            30
        dns-ip-primary
        dns-ip-backup1
        dns-ip-backup2
        dns-domain
        dns-timeout                             11
        hip-ip-list
        ftp-address
        icmp-address
        snmp-address
        telnet-address
        ssh-address
network-interface
        name                                    s1p0
        sub-port-id                             0
        description
        hostname
        ip-address                              172.16.2.34
        pri-utility-addr                        172.16.2.35
        sec-utility-addr                        172.16.2.36
        netmask                                 255.255.255.0
        gateway                                 172.16.2.1
        sec-gateway
        gw-heartbeat
                state                                   enabled
                heartbeat                               10
                retry-count                             3
                retry-timeout                           1
```

```
                health-score                            30
        dns-ip-primary
        dns-ip-backup1
        dns-ip-backup2
        dns-domain
        dns-timeout                             11
        hip-ip-list
        ftp-address
        icmp-address
        snmp-address
        telnet-address
        ssh-address
network-interface
        name                                    wancom1
        sub-port-id                             0
        description                             HA HEARTBEAT1
        hostname
        ip-address
        pri-utility-addr                        169.254.1.1
        sec-utility-addr                        169.254.1.2
        netmask                                 255.255.255.252
        gateway
        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
        hip-ip-list
        ftp-address
        icmp-address
        snmp-address
        telnet-address
        ssh-address
network-interface
        name                                    wancom2
        sub-port-id                             0
        description                             HA HEARTBEAT2
        hostname
        ip-address
        pri-utility-addr                        169.254.2.1
        sec-utility-addr                        169.254.2.2
        netmask                                 255.255.255.252
        gateway
        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
        hip-ip-list
        ftp-address
        icmp-address
        snmp-address
        telnet-address
        ssh-address
network-parameters
        tcp-keepinit-timer                      75
        tcp-keepalive-count                     8
        tcp-keepalive-idle-timer                7200
        tcp-keepalive-interval-timer            75
        tcp-keepalive-mode                      0
        sctp-send-mode                          unordered
        sctp-rto-initial                        3000
        sctp-rto-max                            60000
        sctp-rto-min                            1000
        sctp-hb-interval                        30000
        sctp-max-burst                          4
        sctp-sack-timeout                       200
        sctp-assoc-max-retrans                  30
        sctp-path-max-retrans                   30
        options                                 atcp-idle-timer=900
ntp-config
        server                                  10.10.10.101
phy-interface
        name                                    s0p0
        operation-type                          Media
        port                                    0
        slot                                    0
        virtual-mac                             00:50:56:8d:56:a9
        admin-state                             enabled
        auto-negotiation                        enabled
        duplex-mode                             FULL
        speed                                   100
        wancom-health-score                     50
        overload-protection                     disabled
phy-interface
        name                                    s0p1
        operation-type                          Media
        port                                    1
        slot                                    0
        virtual-mac
        admin-state                             enabled
        auto-negotiation                        enabled
        duplex-mode
        speed
        wancom-health-score                     50
        overload-protection                     disabled
phy-interface
        name                                    s1p0
```

```
        operation-type                  Media
        port                            0
        slot                            1
        virtual-mac                     00:50:56:8d:56:aa
        admin-state                     enabled
        auto-negotiation                enabled
        duplex-mode                     FULL
        speed                           100
        wancom-health-score             50
        overload-protection             disabled
phy-interface
        name                            wancom1
        operation-type                  Control
        port                            1
        slot                            0
        virtual-mac
        admin-state                     enabled
        auto-negotiation                enabled
        duplex-mode
        speed
        wancom-health-score             11
        overload-protection             disabled
phy-interface
        name                            wancom2
        operation-type                  Control
        port                            2
        slot                            0
        virtual-mac
        admin-state                     enabled
        auto-negotiation                enabled
        duplex-mode
        speed
        wancom-health-score             12
        overload-protection             disabled
realm-config
        identifier                      inside
        description                     Inside real to Avaya SM and CM
        addr-prefix                     0.0.0.0
        network-interfaces              s0p0:0
        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
        generate-UDP-checksum           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
        deny-period                             30
        cac-failure-threshold                   0
        untrust-cac-failure-threshold           0
        ext-policy-svr
        diam-e2-address-realm
        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
        refer-notify-provisional                none
        dyn-refer-term                          disabled
        codec-policy
        codec-manip-in-realm                    disabled
        constraint-name
        session-recording-server                SRSGRP01
        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
```

```
        sip-isup-profile
        match-media-profiles
        qos-constraint
        block-rtcp                          disabled
        monitoring-filters
realm-config
        identifier                          outside
        description                         Outside Realm to SIP Trunks
        addr-prefix                         0.0.0.0
        network-interfaces                  s1p0:0
        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
        generate-UDP-checksum               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
        deny-period                         30
        cac-failure-threshold               0
        untrust-cac-failure-threshold       0
        ext-policy-svr
        diam-e2-address-realm
        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
        refer-notify-provisional              none
        dyn-refer-term                        disabled
        codec-policy
        codec-manip-in-realm                  disabled
        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
        sip-isup-profile
        match-media-profiles
        qos-constraint
        block-rtcp                            disabled
        monitoring-filters
realm-config
        identifier                            recorder
        description                           Recording Realm
        addr-prefix                           0.0.0.0
        network-interfaces                    s0p1:0
        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
        generate-UDP-checksum                 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
deny-period                             30
cac-failure-threshold                   0
untrust-cac-failure-threshold           0
ext-policy-svr
diam-e2-address-realm
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
refer-notify-provisional                none
dyn-refer-term                          disabled
codec-policy
codec-manip-in-realm                    disabled
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
sip-isup-profile
match-media-profiles
```

```
        qos-constraint
        block-rtcp                              disabled
        monitoring-filters
redundancy-config
        state                                   enabled
        log-level                               INFO
        health-threshold                        75
        emergency-threshold                     50
        port                                    9090
        advertisement-time                      500
        percent-drift                           210
        initial-time                            1250
        becoming-standby-time                   180000
        becoming-active-time                    100
        cfg-port                                1987
        cfg-max-trans                           10000
        cfg-sync-start-time                     5000
        cfg-sync-comp-time                      1000
        gateway-heartbeat-interval              0
        gateway-heartbeat-retry                 0
        gateway-heartbeat-timeout               1
        gateway-heartbeat-health                0
        media-if-peercheck-time                 0
        peer
                name                                    SBC1
                state                                   enabled
                type                                    Primary
                destination
                        address                                 169.254.1.1:9090
                        network-interface                       wancom1:0
                destination
                        address                                 169.254.2.1:9090
                        network-interface                       wancom2:0
        peer
                name                                    SBC2
                state                                   enabled
                type                                    Secondary
                destination
                        address                                 169.254.1.2:9090
                        network-interface                       wancom1:0
                destination
                        address                                 169.254.2.2:9090
                        network-interface                       wancom2:0
session-agent
        hostname                                10.2.2.10
        ip-address                              10.2.2.10
        port                                    5060
        state                                   enabled
        app-protocol                            SIP
        app-type
        transport-method                        UDP
        realm-id                                outside
        egress-realm-id
        description                             SIP Trunk to Telco
        carriers
        allow-next-hop-lp                       enabled
```

```
        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
        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                             OPTIONS;hops=66
        ping-interval                           120
        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                       SIPNAT
        out-manipulationid                      SIPNAT
        manipulation-string
        manipulation-pattern
        p-asserted-id
        trunk-group
        max-register-sustain-rate               0
        early-media-allow                       none
        invalidate-registrations                disabled
        rfc2833-mode                            none
        rfc2833-payload                         0
        codec-policy
        enforcement-profile
        refer-call-transfer                     disabled
        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
        monitoring-filters
        session-recording-server
        session-recording-required              disabled
        send-tcp-fin                            disabled
session-agent
        hostname                                10.2.2.11
        ip-address                              10.2.2.11
        port                                    5060
        state                                   enabled
        app-protocol                            SIP
        app-type
        transport-method                        UDP
        realm-id                                outside
        egress-realm-id
        description                             SIP Trunk to Telco
        carriers
        allow-next-hop-lp                       enabled
        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
        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                             OPTIONS;hops=66
        ping-interval                           120
        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                       SIPNAT
        out-manipulationid                      SIPNAT
        manipulation-string
        manipulation-pattern
        p-asserted-id
        trunk-group
        max-register-sustain-rate               0
        early-media-allow                       none
        invalidate-registrations                disabled
        rfc2833-mode                            none
        rfc2833-payload                         0
        codec-policy
        enforcement-profile
        refer-call-transfer                     disabled
        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
        monitoring-filters
        session-recording-server
        session-recording-required              disabled
        send-tcp-fin                            disabled
session-agent
        hostname                                10.1.1.10
        ip-address                              10.1.1.10
        port                                    5060
        state                                   enabled
        app-protocol                            SIP
        app-type
        transport-method                        StaticTCP
        realm-id                                inside
        egress-realm-id
        description                             Avaya SM
        carriers
        allow-next-hop-lp                       enabled
        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
        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                           OPTIONS;hops=66
        ping-interval                         120
        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                           UCID-App-ID=0023,replace-
ucid,convert-to=Avaya
        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                     SIPNAT
        out-manipulationid                    SIPNAT
        manipulation-string
        manipulation-pattern
        p-asserted-id
        trunk-group
        max-register-sustain-rate             0
        early-media-allow                     none
        invalidate-registrations              disabled
        rfc2833-mode                          none
        rfc2833-payload                       0
        codec-policy
        enforcement-profile
        refer-call-transfer                   disabled
        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
```

```
        monitoring-filters
        session-recording-server                SRSGRP01
        session-recording-required              disabled
        send-tcp-fin                            disabled
session-agent-group
        group-name                              SIP Trunk Grp01
        description
        state                                   enabled
        app-protocol                            SIP
        strategy                                RoundRobin
        dest                                  10.2.2.10
                                              10.2.2.11
        trunk-group
        sag-recursion                           disabled
        stop-sag-recurse                        401,407
        last-modified-by
        last-modified-date
session-recording-group
        name                                    SRSGRP01
        description
        strategy                                Hunt
        simultaneous-recording-servers          1
        session-recording-servers             SRS01
                                              SRS02
session-recording-server
        name                                    SRS01
        description
        realm                                   recorder
        mode                                    selective
        destination                             172.16.3.5
        port                                    5060
        transport-method                        StaticTCP
        ping-method                             OPTIONS
        ping-interval                           5
session-recording-server
        name                                    SRS02
        description
        realm                                   recorder
        mode                                    selective
        destination                             172.16.3.6
        port                                    5060
        transport-method                        StaticTCP
        ping-method                             OPTIONS
        ping-interval                           5
sip-config
        state                                   enabled
        operation-mode                          dialog
        dialog-transparency                     enabled
        home-realm-id                           inside
        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
        invite-expire                       180
        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
        registration-cache-limit            0
        register-use-to-for-lp              disabled
        refer-src-routing                   disabled
        add-ucid-header                     enabled
        proxy-sub-events
        allow-pani-for-trusted-only         disabled
        pass-gruu-contact                   disabled
        sag-lookup-on-redirect              disabled
        set-disconnect-time-on-bye          disabled
sip-interface
        state                               enabled
        realm-id                            inside
        description
        sip-port
                address                             172.16.1.34
                port                                5060
                transport-protocol                  TCP
                tls-profile
                allow-anonymous                     all
                multi-home-addrs
        sip-port
                address                             172.16.1.34
                port                                5060
                transport-protocol                  UDP
                tls-profile
                allow-anonymous                     all
                multi-home-addrs
        carriers
        trans-expire                        0
        invite-expire                       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
        in-manipulationid
        out-manipulationid
        sip-ims-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
        ims-aka-feature                         disabled
        enforcement-profile
        route-unauthorized-calls
        tcp-keepalive                           none
        add-sdp-invite                          disabled
        add-sdp-profiles
        manipulation-string
        manipulation-pattern
        sip-profile
        sip-isup-profile
        tcp-conn-dereg                          0
        tunnel-name
```

```
        register-keep-alive                     none
        kpml-interworking                       disabled
        session-recording-server
        session-recording-required              disabled
        service-tag
sip-interface
        state                                   enabled
        realm-id                                outside
        description
        sip-port
                address                                 172.16.2.34
                port                                    5060
                transport-protocol                      UDP
                tls-profile
                allow-anonymous                         all
                multi-home-addrs
        carriers
        trans-expire                            0
        invite-expire                           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
        in-manipulationid
        out-manipulationid
        sip-ims-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
        ims-aka-feature                         disabled
        enforcement-profile
        route-unauthorized-calls
        tcp-keepalive                           none
        add-sdp-invite                          disabled
        add-sdp-profiles
        manipulation-string
        manipulation-pattern
        sip-profile
        sip-isup-profile
        tcp-conn-dereg                          0
        tunnel-name
        register-keep-alive                     none
        kpml-interworking                       disabled
        session-recording-server
        session-recording-required              disabled
        service-tag
sip-interface
        state                                   enabled
        realm-id                                recorder
        description
        sip-port
                address                                 172.16.3.34
                port                                    5060
                transport-protocol                      UDP
                tls-profile
                allow-anonymous                         all
                multi-home-addrs
        sip-port
                address                                 172.16.3.34
                port                                    5060
                transport-protocol                      TCP
                tls-profile
                allow-anonymous                         all
                multi-home-addrs
        carriers
        trans-expire                            0
        invite-expire                           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
        in-manipulationid
        out-manipulationid
        sip-ims-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
        ims-aka-feature                         disabled
        enforcement-profile
        route-unauthorized-calls
        tcp-keepalive                           none
        add-sdp-invite                          disabled
        add-sdp-profiles
        manipulation-string
        manipulation-pattern
        sip-profile
        sip-isup-profile
        tcp-conn-dereg                          0
        tunnel-name
        register-keep-alive                     none
        kpml-interworking                       disabled
        session-recording-server
        session-recording-required              disabled
        service-tag
```

```
sip-manipulation
        name                                    SIPNAT
        description
        split-headers
        join-headers
        header-rule
                name                                    ModFrom
                header-name                             From
                action                                  manipulate
                comparison-type                         case-sensitive
                msg-type                                any
                methods
                match-value
                new-value
                element-rule
                        name                                    ModFromHost
                        parameter-name
                        type                                    uri-host
                        action                                  replace
                        match-val-type                          any
                        comparison-type                         case-sensitive
                        match-value
                        new-value                               $LOCAL IP
        header-rule
                name                                    ModTo
                header-name                             To
                action                                  manipulate
                comparison-type                         case-sensitive
                msg-type                                any
                methods
                match-value
                new-value
                element-rule
                        name                                    ModToHost
                        parameter-name
                        type                                    uri-host
                        action                                  replace
                        match-val-type                          any
                        comparison-type                         case-sensitive
                        match-value
                        new-value                               $REMOTE IP
sip-monitoring
        match-any-filter                        disabled
        state                                   enabled
        monitoring-filters                      test
        trigger-window                          0
spl-config
        spl-options
        plugins
                state                                   enabled
                name                                    UniversalCallId.5.spl
steering-pool
        ip-address                              172.16.3.34
        start-port                              49152
        end-port                                65535
        realm-id                                recorder
```

```
        network-interface
steering-pool
        ip-address                              172.16.2.34
        start-port                              2048
        end-port                                3329
        realm-id                                outside
        network-interface
steering-pool
        ip-address                              172.16.1.34
        start-port                              1030
        end-port                                2001
        realm-id                                inside
        network-interface
system-config
        hostname                                SBC1
        description
        location
        mib-system-contact
        mib-system-name
        mib-system-location
        snmp-enabled                            enabled
        enable-snmp-auth-traps                  disabled
        enable-snmp-syslog-notify               disabled
        enable-snmp-monitor-traps               disabled
        enable-env-monitor-traps                disabled
        snmp-syslog-his-table-length            1
        snmp-syslog-level                       WARNING
        system-log-level                        WARNING
        process-log-level                       DEBUG
        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                                   disabled
                sbc-grp-id                              0
                tls-profile
                qos-enable                              enabled
        call-trace                              enabled
        internal-trace                          enabled
        log-filter                              all
        default-gateway                         192.168.1.1
        restart                                 enabled
        exceptions
        telnet-timeout                          0
        console-timeout                         0
        remote-control                          enabled
```

```
        cli-audit-trail                         enabled
        link-redundancy-state                   disabled
        source-routing                          enabled
        cli-more                                disabled
        terminal-height                         24
        debug-timeout                           0
        trap-event-lifetime                     0
        ids-syslog-facility                     -1
        options
        ipv4-signaling-mtu                      1500
        cleanup-time-of-day                     00:00
        snmp-engine-id-suffix
        snmp-agent-mode                         v1v2
web-server-config
        state                                   enabled
        inactivity-timeout                      5
        http-state                              enabled
        http-port                               80
        https-state                             disabled
        https-port                              443
        tls-profile
```

Appendix B

Accessing the ACLI

Access to the ACLI is provided by:

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

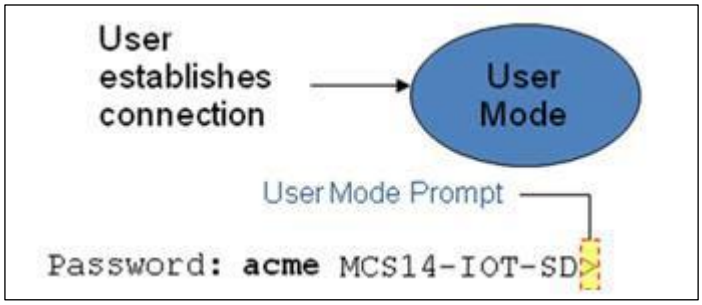
Initial connectivity will be through the serial console port. At a minimum, this is how to configure the management (eth0) interface on the SBC.

ACLI Basics

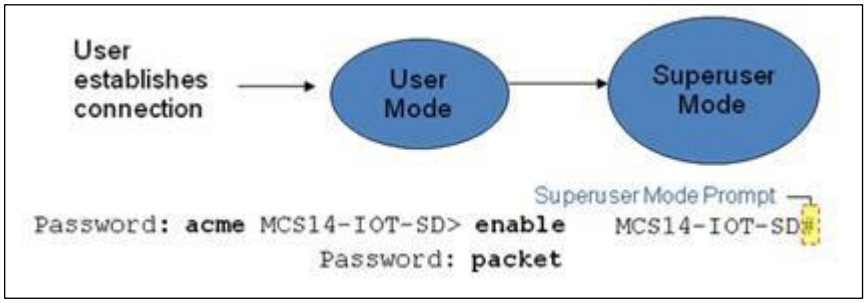
There are two password protected modes of operation within the ACLI, User mode and Superuser mode.

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

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



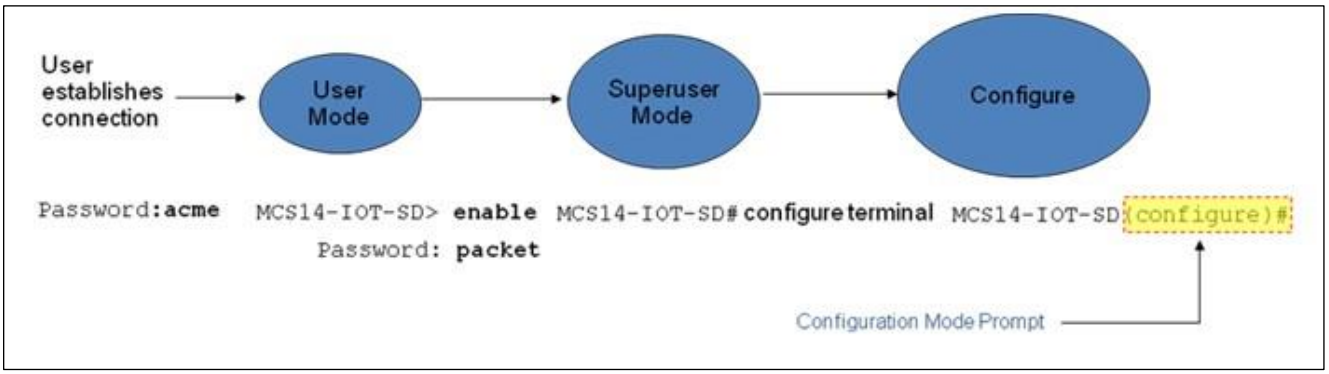
The Superuser mode allows for access to all system commands for operation, maintenance, and administration. This mode is identified by the pound sign (#) in the prompt after the target name. To enter the Superuser mode, issue the enable command in the User mode.



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

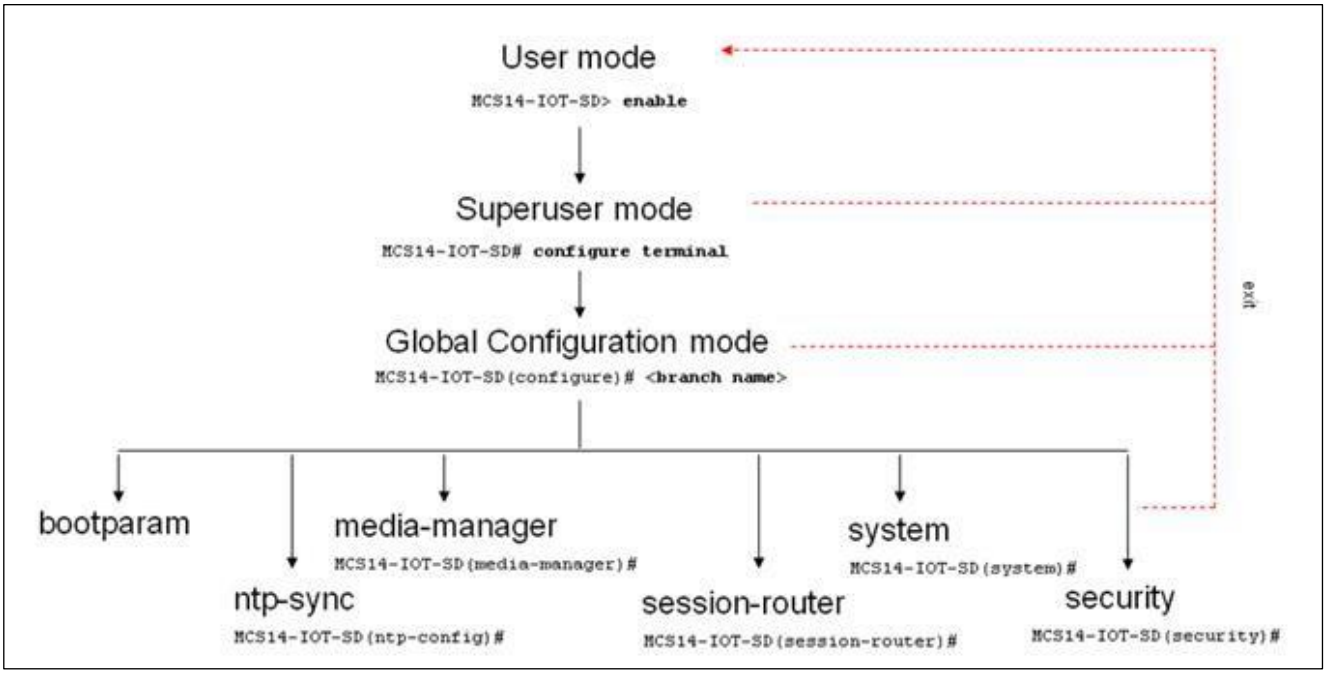
You must enter the Configuration mode to configure elements. For example, you can access the configuration branches and configuration elements for signaling and media configurations. To enter the Configuration mode, issue the **`configure terminal`** command in the Superuser mode.

Configuration mode is identified by the word configure in parenthesis followed by the pound sign (#) in the prompt after the target name, for example, **`SBC1`** **(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 inet –The IP address of external server where image file resides.
- user and ftp password – Used to boot from the external FTP server.
- gateway inet – The gateway IP address for reaching the external server, if the server is located in a different network.

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

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

The security branch provides access to security configuration.

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

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

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

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

Configuration Elements

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

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

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

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

- SIP-ports - are children of the sip-interface element
- outsides – are children of the redundancy element
- destinations – are children of the outside element

Creating an Element

1. To create a single-instance element, you go to the appropriate level in the ACLI path and enter its parameters. There is no need to specify a unique identifier property because a single-instance element is a global element and there is only one instance of this element.
2. When creating a multiple-instance element, you must specify a unique identifier for each instance of the element.
3. It is important to check the parameters of the element you are configuring before committing the changes. You do this by issuing the **`show`** command before issuing the **`done`** command. The parameters that you did not configure are filled with either default values or left empty.
4. On completion, you must issue the **`done`** command. The done command causes the configuration to be echoed to the screen and commits the changes to the volatile memory. It is a good idea to review this output to ensure that your configurations are correct.
5. Issue the **`exit`** command to exit the selected element.

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

Editing an Element

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

1. Enter the element that you will edit at the correct level of the ACLI path.

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

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

Deleting an Element

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

To delete a single-instance element,

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

To delete a multiple-instance element,

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

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

Configuration Versions

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

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

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

Saving the Configuration

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

Because the saved configuration has not been activated yet, changes in configuration will not take effect. On reboot, the last activated configuration (i.e., the last running configuration) will be loaded. At this stage, the saved configuration is different from the running configuration.

Because the saved configuration is stored in non-volatile memory, it can be accessed and activated at later time.

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

```
SBC1 # 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'.
SBC1
```

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.

```
SBC1# activate-config Activate-Config
received, processing. waiting 120000 for
request to finish Request to 'ACTIVATE-
CONFIG' has Finished, Activate Complete
SBC1#
```