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# Oracle Enterprise Session Border Controller and Microsoft Lync 2013 with Bell Canada Enterprise SIP Trunking

Technical Application Note

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## 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

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

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

# Introduction

## Audience

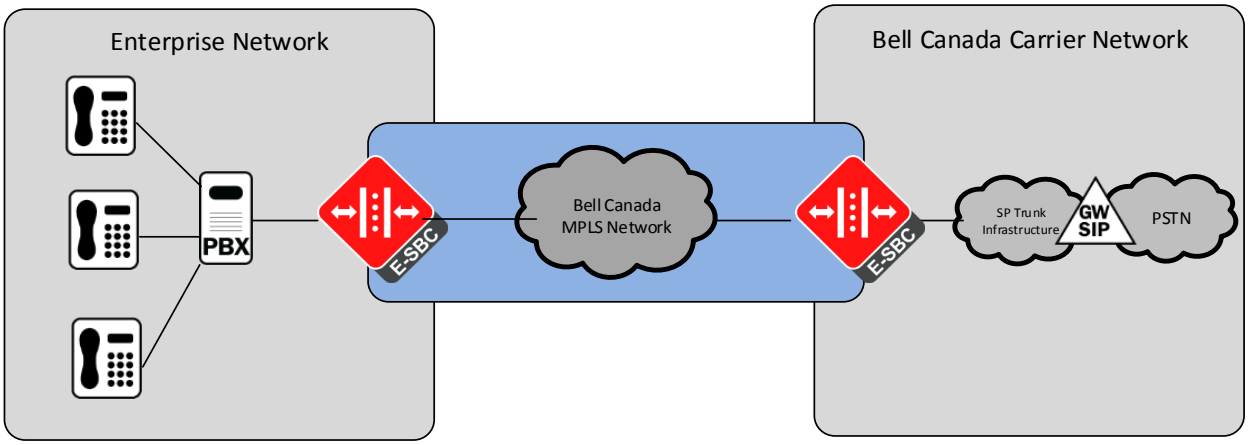
This is a technical document intended for telecommunications engineers with the purpose of configuring the Oracle Enterprise Session Border Controller and Microsoft Lync. There will be steps that require navigating the Command Line Interface (ACLI). Understanding the basic concepts of TCP/UDP, IP/Routing,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

## Requirements

- Microsoft Lync 2013 – cumulative update 5.0.8308.577
- Oracle Enterprise Session Border Controller is running ECZ7.3.0 Patch 2 (Build 75)
    - Note: the configuration running on the E-SBC is backward/forward compatible with any release in the 7.3.0 stream.
- Bell Canada trunk based customers with dedicated data connectivity to Bell Canada.

## Architecture

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



## Lab Configuration

Following are the IP addresses used for the Interoperability tests. The IPs below are specific to lab setup at Oracle, the IPs in production will be vastly different from network addresses listed below.

| Description | network-interface | realm | interface IP | Host Name | sip-port |
|---|---|---|---|---|---|
| SBC interfaces | | | | | |
| management | wancom0 | | 192.168.1.22 | | |
| Redundancy | wancom1 | | 169.254.1.1 | | |
| Redundancy | wancom2 | | 169.254.2.1 | | |
| media/signaling | s0p0:0 | inside | 172.16.153.34 | lync-acme-sbc.pelab.com | 5067 |
| media/signaling | s1p0:0 | outside | 172.16.154.35 | | 5067 |
| Session-Agents | | | | | |
| Lync Mediation Server 1 | | inside | 172.16.149.38 | fe0101.pelab.com | 5066 |
| Lync Mediation Server 2 | | inside | 172.16.149.39 | fe0102.pelab.com | 5066 |
| Lync Mediation Server 3 | | inside | 172.16.149.40 | fe0103.pelab.com | 5066 |
| Bell trunk | | outside | 10.27.56.7 | | 5060 |

## Configuring the Oracle Enterprise Session Border Controller

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

## In Scope

The following guide configuring the Oracle E-SBC assumes that this is a newly deployed device dedicated to a single customer. If a service provider currently has the E-SBC deployed 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 E-SBC. This document covers the setup for the E-SBC platform running ECZ7.3.0 or later. If instructions are needed for other Oracle E-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 Super user modes on the Oracle E-SBC
- IP address to be assigned to management interface (Wancom0) of the E-SBC - the Wancom0 management interface must be connected and configured to a management network separate from the service interfaces. Otherwise the E-SBC is subject to ARP overlap issues, loss of system access when the network is down, and compromising DDoS protection. Oracle does not support E-SBC configurations with management and media/service interfaces on the same subnet.
- IP address of CM external facing NIC
- IP addresses to be used for the E-SBC internal and external facing ports (Service Interfaces)
- IP address of the next hop gateway in the service provider network

## Configuring the E-SBC

Enter the following commands to login to the E-SBC and move to the configuration mode. Note that the default E-
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 E-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 peer name
startup script (s)        :
other (o)                 :
```

## Configuring the E-SBC

The following section walks you through configuring the Oracle E-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)

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

```
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
```

```
redundancy-config
      becoming-standby-time         360000
      peer
            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
      peer
```

```
        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               Outside/Untrusted
    hostname
    ip-address              172.16.153.34
    pri-utility-addr          172.16.153.2
    sec-utility-addr          172.16.153.3
    netmask                 255.255.255.0
    gateway                 172.16.153.1
    sec-gateway
    gw-heartbeat
        state                 disabled
        heartbeat                0
        retry-count              0
        retry-timeout              1
        health-score             0
    dns-ip-primary
    dns-ip-backup1
    dns-ip-backup2
    dns-domain
    dns-timeout              11
    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               Inside/Trusted
    hostname
    ip-address              172.16.154.35
    pri-utility-addr          172.16.154.2
```

```
    sec-utility-addr          172.16.154.3
    netmask                   255.255.255.0
    gateway                   172.16.154.1
    sec-gateway
    gw-heartbeat
        state                 disabled
        heartbeat             0
        retry-count           0
        retry-timeout         1
        health-score          0
    dns-ip-primary
    dns-ip-backup1
    dns-ip-backup2
    dns-domain
    dns-timeout               11
    signaling-mtu             0
    hip-ip-list
    ftp-address
    icmp-address
    snmp-address
    telnet-address
    ssh-address
```

### 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              outside
    description
    activate-time
    deactivate-time
    state                     enabled
    policy-priority           none
    policy-attribute
        next-hop              SAG:med-grp-1
        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            SIP
        methods
        media-profiles
        lookup                  single
        next-key
        eloc-str-lkup           disabled
        eloc-str-match
local-policy
    from-address                *
    to-address                  *
    source-realm                inside
    description
    activate-time
    deactivate-time
    state                       enabled
    policy-priority             none
    policy-attribute
        next-hop                SAG:med-grp-1
        realm                   peer
        action                  none
        terminate-recursion     disabled
        carrier
        start-time              0000
        end-time                2400
        days-of-week            U-S
        cost                    0
        state                   enabled
        app-protocol            SIP
        methods
        media-profiles
        lookup                  single
        next-key
        eloc-str-lkup           disabled
        eloc-str-match
```

```
session-group
      group-name                  med-grp-1
      description                 Lync Mediation server group
      state                     enabled
      app-protocol                SIP
      strategy                  Hunt
      dest                      fe0101.pelab.com
                              fe0102.pelab.com
                              fe0103.pelab.com
      trunk-group
      sag-recursion               disabled
      stop-sag-recurse            401,407
```

## Header manipulation rules required for the Bell Canada Trunk

The HMRs update the host portion of the URI to the Bell trunk IP for Request-URI and To headers. The host portion of the URI is updated with the E-SBC outside sip-interface IP for From, P-Asserted-Identity and Contact so that the E-SBC presents its interface IP to the next hop.

```
header-rule
        name                    UpdateRequest
        header-name                request-uri
        action                  manipulate
        comparison-type                case-sensitive
        msg-type                any
        methods
        match-value
        new-value
        element-rule
            name                    Update_URI_Host
            parameter-name
            type                    uri-host
            action                  replace
            match-val-type                any
            comparison-type                 case-sensitive
            match-value
            new-value                   lab.ca
        element-rule
            name                    Rmv_User
            parameter-name                  user
            type                    uri-param
            action                  delete-element
            match-val-type                any
            comparison-type                 case-sensitive
            match-value
            new-value
        element-rule
            name                    Rmv_Port
            parameter-name
            type                    uri-port
            action                  delete-element
            match-val-type                any
            comparison-type                 case-sensitive
            match-value
            new-value
    header-rule
        name                    save_PAI
        header-name                P-Asserted-Identity
        action                  store
        comparison-type                case-sensitive
        msg-type                any
        methods
        match-value
        new-value
    header-rule
        name                    Updt_PAI
```

```
        header-name                     P-Asserted-Identity
        action                      add
        comparison-type                   boolean
        msg-type                    any
        methods                     INVITE
        match-value                   !$save_PAI
        new-value                   <sip: 613xxxxxxx@domain-name;user=phone>
    header-rule
        name                        Updt_RURI
        header-name                     request-uri
        action                      manipulate
        comparison-type                   case-sensitive
        msg-type                    any
        methods
        match-value
        new-value
        element-rule
            name                        Udpt_URI_Host
            parameter-name
            type                    uri-host
            action                  replace
            match-val-type                any
            comparison-type                 case-sensitive
            match-value
            new-value                   domain-name
    header-rule
        name                        Updt_To
        header-name                     To
        action                      manipulate
        comparison-type                   case-sensitive
        msg-type                    any
        methods
        match-value
        new-value
        element-rule
            name                        UPdt_URI_host
            parameter-name
            type                    uri-host
            action                  replace
            match-val-type                any
            comparison-type                 case-sensitive
            match-value
            new-value                   lab.ca
        element-rule
            name                        Rmv_User
            parameter-name                  user
            type                    uri-param
            action                  delete-element
            match-val-type                any
            comparison-type                 case-sensitive
            match-value
            new-value
```

```
header-rule
     name                    Updt_From
     header-name                From
     action                  manipulate
     comparison-type            case-sensitive
     msg-type                any
     methods
     match-value
     new-value
     element-rule
          name                    Updt_URI_host
          parameter-name
          type                    uri-host
          action                  replace
          match-val-type             any
          comparison-type            case-sensitive
          match-value
          new-value                  domain-name
     element-rule
          name                    Rmv_Epid
          parameter-name             epid
          type                    header-param
          action                  delete-element
          match-val-type             any
          comparison-type            case-sensitive
          match-value
          new-value
     element-rule
          name                    Rmv_UriParam_User
          parameter-name             user
          type                    uri-param
          action                  none
          match-val-type             any
          comparison-type            case-sensitive
          match-value
          new-value
     element-rule
          name                    Rmv_UriUser_Param_contx
          parameter-name             phone-context
          type                    uri-user-param
          action                  delete-element
          match-val-type             any
          comparison-type            case-sensitive
          match-value
          new-value
header-rule
     name                    Updt_Contact
     header-name                Contact
     action                  manipulate
     comparison-type            case-sensitive
     msg-type                any
     methods
```

```
        match-value
        new-value
        element-rule
            name                    Updt_URI_Host
            parameter-name
            type                    uri-host
            action                  replace
            match-val-type              any
            comparison-type               case-sensitive
            match-value
            new-value                 $LOCAL_IP
        element-rule
            name                    Del_MSOpaque
            parameter-name              ms-opaque
            type                    uri-param
            action                  delete-element
            match-val-type              any
            comparison-type               case-sensitive
            match-value
            new-value
        element-rule
            name                    Add_tgrp
            parameter-name              tgrp
            type                    uri-user-param
            action                  add
            match-val-type              any
            comparison-type               case-sensitive
            match-value
            new-value                 ABC_123456_CA
        element-rule
            name                    Add_trunk_context
            parameter-name              trunk-context
            type                    uri-user-param
            action                  add
            match-val-type              any
            comparison-type               case-sensitive
            match-value
            new-value                 lab.ca
        element-rule
            name                    Rmv_MSOpaque
            parameter-name              ms-opaque
            type                    uri-param
            action                  delete-element
            match-val-type              any
            comparison-type               case-sensitive
            match-value
            new-value
    header-rule
        name                  Max_Forward_0
        header-name               Max-Forwards
        action                manipulate
        comparison-type             pattern-rule
```

```
        msg-type                request
        methods                 OPTIONS
        match-value
        new-value               0
    header-rule
        name                    Rmv_UserAgent_Hdr
        header-name             user-agent
        action                  delete
        comparison-type         case-sensitive
        msg-type                any
        methods
        match-value
        new-value
```

### Header manipulation rules to support privacy calling

Lync does not support privacy calling. The E-SBC can help support privacy calling through header manipulation rules. The Lync Administrator needs to support the appropriate *-code in the dial-plan. In the provided example *67 provides privacy. If the SBC detects *67 as a prefix in the request URI, the SBC will apply RFC3323 (A Privacy Mechanism for the Session Initiation Protocol).

```
    header-rule
        name                    CheckPrivacy
        header-name             request-uri
        action                  store
        comparison-type         case-sensitive
        msg-type                any
        methods                 INVITE
        match-value
        new-value
        element-rule
            name                CheckStar67
            parameter-name
            type                uri-user
            action              store
            match-val-type      any
            comparison-type     pattern-rule
            match-value         \*67\d+
            new-value
    header-rule
        name                    AddPrivacyHdr
        header-name             Privacy
        action                  add
        comparison-type         boolean
        msg-type                request
        methods                 INVITE
        match-value             $CheckPrivacy.$CheckStar67
        new-value               id
    header-rule
        name                    updateRURI
        header-name             request-uri
        action                  manipulate
```

```
        comparison-type          pattern-rule
        msg-type                 request
        methods                  INVITE
        match-value
        new-value
        element-rule
            name                 updateRURIUser
            parameter-name
            type                 uri-user
            action               replace
            match-val-type       any
            comparison-type      pattern-rule
            match-value          \*67(.*)
            new-value            $1
    header-rule
        name                     updateTO
        header-name              To
        action                   manipulate
        comparison-type          pattern-rule
        msg-type                 request
        methods                  INVITE
        match-value
        new-value
        element-rule
            name                 updateTOUsr
            parameter-name
            type                 uri-user
            action               replace
            match-val-type       any
            comparison-type      pattern-rule
            match-value          \*67(.*)
            new-value            $1
    header-rule
        name                     StoreFromTag
        header-name              From
        action                   store
        comparison-type          case-sensitive
        msg-type                 request
        methods                  INVITE
        match-value
        new-value
        element-rule
            name                 storeTag
            parameter-name       tag
            type                 header-param
            action               store
            match-val-type       any
            comparison-type      case-sensitive
            match-value
            new-value
    header-rule
        name                     ChgFromPrivacy
```

```
            header-name                  From
            action                       manipulate
            comparison-type                boolean
            msg-type                     request
            methods                      INVITE
            match-value                    $CheckPrivacy.$CheckStar67
            new-value                    "\"Anonymous\" <sip:anonymous@anonymous.invalid>;
tag="+$StoreFromTag.$storeTag.$0
```

### Bell Canada Trunk Authentication Handling

Bell Canada forces authentication challenges on INVITEs. The Oracle Communications Enterprise Session Boarder Controller supports auth challenges. The SBC will respond to any auth challenges for SIP methods that are configured. The auth configuration need to be configured on the inside realm session-agent(s).

```
session-agent
      hostname                     fe0101.pelab.com
      ip-address                   172.16.149.38
      port                      5067
      state                     enabled
      app-protocol                 SIP
      app-type
      transport-method                StaticTLS
      realm-id                   inside
...
      monitoring-filters
      auth-attributes
            auth-realm                 lab.ca
            username                   ABC_123456_CA
            password                   ********
            in-dialog-methods              INVITE
      session-recording-server
      session-recording-required       disabled
```

### SRTP Configuration

SRTP provides encrypted audio streams to/from Lync to the Oracle Enterprise Session Boarder Controller. For more information regarding SRTP configuration procedures please review the Enterprise Session Border Controller Configuration Guide.

```
sdes-profile
      name                     sdes1
      crypto-list                AES_CM_128_HMAC_SHA1_80
                              AES_CM_128_HMAC_SHA1_32
      srtp-auth                  enabled
      srtp-encrypt                 enabled
      srtcp-encrypt                enabled
```

```
    mki                         disabled
    egress-offer-format         simultaneous-best-effort
    use-ingress-session-params
    options
    key
    salt
```

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

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

```
realm-config
    identifier                  inside
    description
    addr-prefix                 0.0.0.0
    network-interfaces          s0p0:0
    mm-in-realm                 disabled
    mm-in-network               enabled
```

```
    mm-same-ip                  enabled
    mm-in-system                enabled
...
    media-policy
    media-sec-policy            sdespolicy
    srtp-msm-passthrough        disabled
```

```
realm-config
    identifier                  outside
    description
    addr-prefix                 0.0.0.0
    network-interfaces          s0p1:0
    mm-in-realm                 disabled
    mm-in-network               enabled
    mm-same-ip                  enabled
    mm-in-system                enabled
...
    media-policy
    media-sec-policy            rtponly
    srtp-msm-passthrough        disabled
```

### TLS Configuration

TLS provides encrypted SIP signaling between the Oracle Communications E-SBC and Lync 2013. TLS requires the exchange of certificates. The Lync administrator will need to provide the local domain controller root certificate. Likewise the CSR created on the E-SBC will need to be signed by the domain controller certificate authority that the mediation servers are associated with. The signed certificate will then need to be imported back into the SBC. For more information regarding TLS configuration procedures please review the Enterprise Session Border Controller Configuration Guide.

```
certificate-record
    name                        ESBCCert1
    country                     US
    state                       MA
    locality                    Burlington
    organization                Engineering
    unit
    common-name                 lync-acme-sbc.pelab.com
    key-size                    2048
    alternate-name
    trusted                     enabled
```

```
    key-usage-list                digitalSignature
                                  keyEncipherment
    extended-key-usage-list       serverAuth
    options
```

```
certificate-record
    name                          MediationRoot
    country                       US
    state                         MA
    locality                      Burlington
    organization                  Engineering
    unit
    common-name                   selab-DOMAINCONTROL-CA
    key-size                      2048
    alternate-name
    trusted                       enabled
    key-usage-list                digitalSignature
                                  keyEncipherment
    extended-key-usage-list       serverAuth
    options
```

```
tls-profile
    name                          Core
    end-entity-certificate        ESBCCert1
    trusted-ca-certificates       MediationRoot
    cipher-list                   ALL
    verify-depth                  10
    mutual-authenticate           enabled
    tls-version                   compatibility
    options
    cert-status-check             disabled
    cert-status-profile-list
    ignore-dead-responder         disabled
    allow-self-signed-cert        disabled
```

```
sip-interface
    state                         enabled
    realm-id                      inside
    description
    sip-port
```

```
        address                 172.16.153.34
        port                    5066
        transport-protocol      TLS
        tls-profile             Core
        allow-anonymous         agents-only
        multi-home-addrs
        ims-aka-profile
```

```
session-agent
    hostname                fe0101.pelab.com
    ip-address              172.16.149.38
    port                    5067
    state                   enabled
    app-protocol            SIP
    app-type
    transport-method        StaticTLS
…
```

### Webserver Configuration

A webserver is available on all Enterprise versions of Oracle E-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

Caveats and out of scope items: Fax was not tested because the Lab CM did not have an analog card to test these capability there for Fax is considered out of scope for this testing.

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

| ID | Test Case Title | Status |
|---|---|---|
| **1000** | Section 1 | |
| 1100 | **SIP Connectivity** | |
| 1101 | Validate syntax of OPTIONS messages sent to service provider | **P** |
| 1102 | Validate syntax of OPTIONS messages sent from service provider | **P** |
| 1103 | Validate in service reponse codes to OPTIONS messages from provider | **P** |
| 1104 | Validate in service reponse codes to OPTIONS messages to provider | **P** |
| 1105 | Validate OPTIONS messages are not sent more than once every 10 seconds to provider | **P** |
| **2000** | Section 2 | |
| 2100 | **Initial Calls To/From External Phones** | |
| 2101 | Inbound call from an external phone to an enterprise extension. Hang-up at called party (enterprise extension). Wait for calling party to disconnect. Validate proper SIP header syntax, ringback tone, two-way audio and proper call clearance | **p** |
| 2102 | Inbound call from an external phone to an enterprise extension. Hang-up at calling party (PSTN phone). Wait for called party to disconnect. Validate proper SIP header syntax, ringback tone, two-way audio and proper call clearance | **p** |
| 2103 | Outbound call from an enterprise extension to an external phone. Hang-up at called party (PSTN phone). Wait for calling party to disconnect. Make sure originating party is properly identified (Diversion/History-Info, PAI or From- in that order), using exactly 10 digits for the user part and the domain matching this TN's "PBX" (to which its TG is assigned). Also validate "tgrp/trunk-context" in Contact, if doing explicit TG selection (usually for Toll-bypass). Validate ringback tone, two-way audio and proper call clearance | **P** |
| 2104 | Outbound call from an enterprise extension to an external phone. Hang-up at calling party (enterprise extension). Wait for called party to disconnect. Make sure originating party is properly identified (Diversion/History-Info, PAI or From- in that order), using exactly 10 digits for the user part and the domain matching this TN's "PBX" (to which its TG is assigned). Also validate "tgrp/trunk-context" in Contact, if doing explicit TG selection (usually for Toll-bypass). Validate ringback tone, two-way audio and proper call clearance | **p** |
| 2105 | Trunk Group Selection: test absense of explicit trunk group selection | **p** |
| 2106 | Trunk Group Selection: testtrunk group selection with tgrp tag | **p** |
| 2107 | Trunk Group Selection: testtrunk group selection with otg tag | **p** |

| | | |
|---|---|---|
| **3000** | Section 3 | |
| 3100 | **Incomplete Call Attempts** | |
| 3101 | Inbound call from an external phone to an enterprise extension. Hang-up before far-end answers. | **p** |
| 3102 | Outbound call from an enterprise extension to an external phone. Hang-up before far-end answers. | **p** |
| 3103 | No Answer of inbound call from an external phone to an enterprise extension. (No explicit rules on CPE. Let extension ring.) | **p** |
| 3107 | Inbound call from an external phone to an unassigned enterprise extension. | **p** |
| 3108 | Outbound call from an enterprise extension to an invalid external number (Note that this also happens to test CPE support for early media) | **p** |
| **4000** | Section 4 | |
| 4100 | **Codec Support and Negotiation with Hard Phones** | |
| 4101 | Whenever the CPE sends out SDP, the Content-Type must be "application/sdp" | **p** |
| **5000** | Section 5 | |
| 5100 | **Voicemail and DTMF Tone Support** | |
| 5101 | Inbound call from an external phone to an enterprise extension, transfer to voicemail. Leave a message. | **p** |
| 5102 | Inbound call from an external phone to an enterprise extension, let ring for close to 2 minutes, then transfer to voicemail. Leave a message. | **p** |
| 5103 | Login to enterprise voicemail and retrieve message from 5102. | **p** |
| 5104 | Outbound call to an external number, transfer to voicemail. (Ex. Call office or cell phone with voicemail). Leave a message. | **p** |
| 5105 | Login to external voicemail and retrieve message from 5104. | **p** |
| 5108 | RFC2833 DTMF sent from the CPE outbound to an external device are recognised by the recieving equipment | **p** |
| 5109 | RFC2833 DTMF sent from an external device inbound to the CPE are recognised by the recieving equipment | **p** |
| **6000** | Section 6 | |
| 6100 | **PSTN Numbering Plans** | |
| 6101 | Inbound Call | **p** |
| 6102 | Outbound Toll-Free Call | **p** |
| 6103 | Outbound Local Call | **p** |
| 6104 | Outbound International Calls (011)961-865-0650 | **p** |
| 6105 | Operator call (0) | **p** |
| 6106 | Operator Assisted Calls (e.g. 0+10 digits in US) | **p** |
| 6107 | Validation of e.164 handling on DID | **p** |
| 6108 | Validation number plan format is correct across all headers according to interop spec | **p** |
| 6109 | Operator Assisted International Call (e.g. 0+1 8 to 35 digits) | **p** |

| | | |
|---|---|---|
| 6110 | Casual Dial: 101+xxxx+NDC call (from 13 to 40 digits) | **p** |
| 6111 | n11 call (e.g. 211) | **p** |
| 6112 | 911 call | **p** |
| 6113 | 1-xxx-555-1212 call | **p** |
| 6114 | 310-xxxx call | **p** |
| 6115 | 1-700-xxx-xxxx call | **p** |
| 6116 | (Optional) 1-900-xxx-xxxx call | **p** |
| 6117 | (Optional) 1-976 -xxx-xxxx call | **p** |
| 6118 | Operator-assisted long-distance call (00) | **p** |
| **7000** | Section 7 - Calling Name and Number Presentation | |
| 7100 | **Static ONND** | |
| 7101 | Outbound call with Static ONND - using only the From header and a pre-provisioned number (with user=phone) | **p** |
| 7102 | Outbound call with Static ONND - using the P-Asserted-Identify header and a pre-provisioned number (with user=phone) | **p** |
| 7103 | Outbound call with Static ONND - using explicit trunk group selection (with user=phone) | **p** |
| 7104 | Outbound call with Static ONND - using the Diversion header without PAI (with user=phone) | **p** |
| 7105 | Outbound call with Static ONND - using the Diversion header (valid Bell number) with PAI (with user=phone) | **p** |
| 7106 | Outbound call with Static ONND - using the Diversion header (external number) with PAI (with user=phone and implicit trunk group selection) | **p** |
| 7107 | Outbound call with Static ONND - using the Diversion header (external number) with PAI (with user=phone and explicit trunk group selection) | **p** |
| 7108 | Validate proper syntax used in PAI, PPI, From and Diversion for CNAM/CLID display on outbound calls | **p** |
| 7200 | **Dynamic ONND** | |
| 7201 | Outbound call with Dynamic ONND - using the From header (without user=phone) | **p** |
| 7202 | Outbound call with Dynamic ONND - using the P-Asserted-Identify header (without user=phone) | **p** |
| 7203 | Outbound call with Dynamic ONND - using the Diversion header (with user=phone ) without PAI and using a valid Bell SIP Trunking number in both the Diversion and From | **p** |
| 7204 | Outbound call with Dynamic ONND - using the Diversion header (with user=phone ) without PAI and using an external number in either the Diversion or From | **p** |
| 7205 | Outbound call with Dynamic ONND - using the Diversion header (with user=phone) with PAI and using a valid Bell SIP Trunking number in both the Diversion and PAI | **p** |

| | | |
|---|---|---|
| 7206 | Outbound call with Dynamic ONND - using the Diversion header (with user=phone) with PAI and using an external number in the Diversion | **p** |
| 7207 | Outbound call with Dynamic ONND to party A, transfer via tromboning to party B | **p** |
| 7209 | Validate proper syntax used in PAI, PPI, From and Diversion for CNAM/CLID display on outbound calls | **p** |
| 7300 | **Private and Unknown Calls** | |
| 7301 | Place an outbound private call. Validate privacy header syntax and interworking on outbound private call against Bell spec and document differences. | **p** |
| 7302 | Place an inbound private call. Validate privacy header syntax and interworking on inbound private call against Bell spec and document differences. CPE must respect the privacy header. | **p** |
| 7303 | Validate handling of incoming unknown calls | **p** |
| 7304 | Validate handling of incoming calls when not subscribed to Calling Line ID Delivery | **p** |
| | | |
| **8000** | Section 8 | |
| 8100 | **Supplementary Features – Call Hold** | |
| 8101 | Inbound Call – PBX Hold and Resume (No music) – Short Hold Duration | **p** |
| 8102 | Inbound Call – PBX Hold and Resume (With music) – Short Hold Duration | **p** |
| 8103 | Outbound Call – PBX Hold and Resume No music) – Short Hold Duration | **p** |
| 8104 | Outbound Call – PBX Hold and Resume (With music) – Short Hold Duration | **p** |
| 8105 | Inbound Call – PSTN Hold and Resume (No music) – Short Hold Duration | **p** |
| 8106 | Inbound Call – PSTN Hold and Resume (With music) – Short Hold Duration | **p** |
| 8107 | Outbound Call – PSTN Hold and Resume (No music) – Short Hold Duration | **p** |
| 8108 | Outbound Call – PSTN Hold and Resume (With music) – Short Hold Duration | **p** |
| 8109 | Inbound Call - PBX Hold and Resume (No music) – Long Hold Duration that exceeds the SIP session timers (~10 min) | **p** |
| 8110 | Inbound Call - PBX Hold and Resume (With music) – Long Hold Duration that exceeds the SIP session timers (~10 min) | **p** |
| 8111 | Outbound Call - PBX Hold and Resume (No music) – Long Hold Duration that exceeds the SIP session timers (~10 min) | **p** |
| 8112 | Outbound Call - PBX Hold and Resume (With music) – Long Hold Duration that exceeds the SIP session timers (~10 min) | **p** |
| 8113 | Inbound Call - PSTN Hold and Resume (No music) – Long Hold Duration that exceeds the SIP session timers (~10 min) | **p** |
| 8115 | Outbound Call - PSTN Hold and Resume (No music) – Long Hold Duration that exceeds the SIP session timers (~10 min) | **p** |
| 8200 | **Supplementary Features – Call Forward** | |

| | | |
|---|---|---|
| 8203 | Call Forwarding (All) to External Number (Off-net) - Tromboning | **p** |
| 8206 | Call Forwarding (No Answer) to External Number (Off-net) – Tromboning | **p** |
| 8209 | Call Forwarding (Busy) to External Number (Off-net) – Tromboning | **p** |
| 8300 | **Supplementary Features – Call Transfer, Conference** | |
| 8302 | Blind Call Transfer of inbound call: Transfer to External Number (Tromboning) | **p** |
| 8304 | Blind Call Transfer of inbound call: Transfer to Internal Number (Tromboning) | **p** |
| 8306 | Blind Call Transfer of outbound call: Transfer to External Number (Tromboning) | **p** |
| 8308 | Blind Call Transfer of outbound call: Transfer to Internal Number (Tromboning) | **p** |
| 8309 | Attended Transfer of inbound call: Transfer to External Number (Tromboning) | **p** |
| 8310 | Attended Transfer of inbound call: Transfer to Internal Number (Tromboning) | **p** |
| 8311 | Attended Transfer of outbound call: Transfer to External Number (Tromboning) | **p** |
| 8312 | Attended Transfer of outbound call: Transfer to Internal Number (Tromboning) | **p** |
| **9000** | Section 9 | |
| 9100 | **Failover** | |
| 9101 | Validate handling of ICMP unreachable messages on a new call, by pointing CPE primary IP to unreachable IP | **p** |
| 9102 | Validate handling of bell SBC silently discarding packets on a new call, by pointing to 207.236.202.114:50505 | **p** |
| 9103 | Validate handling of SIP 503 responses on a new call, by pointing to 207.236.202.114:50503 | **p** |
| 9104 | Validate Handling of out service response codes to OPTIONS pings, out of service codes are anything other then 200 and 483 by pointing to 207.236.202.114:50504 | **p** |
| 9105 | Validate traffic to CPE from multiple Bell IPs in order to simulate SBC failover. Requires Bell participation. | |
| **11000** | Section 11 | |
| 11100 | **Miscellaneous** | |
| 11101 | Validate handling of multiple concurrent calls for the same number | **p** |
| 11102 | Long duration calls- Inbound | **p** |
| 11103 | Long duration calls- Outbound | **p** |
| 11104 | Outgoing call with wrong DID number or wrong PBX domain. | **p** |
| 11106 | Validate handling of session audits every 5 or 10 min (UPDATE or re-INVITE) | **p** |
| 11107 | Validate handling of CPE-initiated session audits | **p** |

## Troubleshooting Tools

### Wireshark

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

### On the Oracle E-SBC

The Oracle E-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 E-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 E-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 E-SBC Configuration

```
certificate-record
      name                    ESBCCert1
      country                 US
      state                   MA
      locality                Burlington
      organization                Engineering
      unit
      common-name                 lync-acme-sbc.pelab.com
      key-size                2048
      alternate-name
      trusted                 enabled
      key-usage-list              digitalSignature
                              keyEncipherment
      extended-key-usage-list         serverAuth
      options
certificate-record
      name                    MediationRoot
      country                 US
      state                   MA
      locality                Burlington
      organization                Engineering
      unit
      common-name                 selab-DOMAINCONTROL-CA
      key-size                2048
      alternate-name
      trusted                 enabled
      key-usage-list              digitalSignature
                              keyEncipherment
      extended-key-usage-list         serverAuth
      options
local-policy
```

```
    from-address                *
    to-address                  *
    source-realm                inside
    description
    activate-time
    deactivate-time
    state                       enabled
    policy-priority             none
    policy-attribute
        next-hop                10.27.56.7
        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                SAG:med-grp-1
        realm                   inside
        action                  replace-uri
        terminate-recursion             disabled
```

```
        carrier
        start-time              0000
        end-time                2400
        days-of-week            U-S
        cost                    0
        state                   enabled
        app-protocol            SIP
        methods
        media-profiles
        lookup                  single
        next-key
        eloc-str-lkup           disabled
        eloc-str-match
local-policy
    from-address                *
    to-address                  fe0101.pelab.com
    source-realm                outside
    description
    activate-time
    deactivate-time
    state                       enabled
    policy-priority             none
    policy-attribute
        next-hop                fe0101.pelab.com
        realm                   inside
        action                  replace-uri
        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                  fe0102.pelab.com
    source-realm                outside
    description
    activate-time
    deactivate-time
    state                       enabled
    policy-priority             none
    policy-attribute
        next-hop                fe0102.pelab.com
        realm                   inside
        action                  replace-uri
        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                  fe0103.pelab.com
    source-realm                outside
    description
    activate-time
    deactivate-time
    state                       enabled
    policy-priority             none
    policy-attribute
        next-hop                fe0103.pelab.com
        realm                   inside
        action                  replace-uri
```

```
        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
    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
    trap-on-demote-to-untrusted      disabled
```

```
      syslog-on-demote-to-deny             disabled
      syslog-on-demote-to-untrusted        disabled
      rtcp-rate-limit                      0
      anonymous-sdp                        disabled
      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
media-sec-policy
      name                         rtponly
      pass-through                 disabled
      options
      inbound
            profile
            mode                   rtp
            protocol               none
      outbound
            profile
            mode                   rtp
            protocol               none
media-sec-policy
      name                         sdespolicy
      pass-through                 disabled
      options
      inbound
            profile                sdes1
            mode                   srtp
            protocol               sdes
      outbound
            profile                sdes1
            mode                   srtp
            protocol               sdes
network-interface
      name                         s0p0
      sub-port-id                  0
      description                  Outside/Untrusted
      hostname
```

```
    ip-address                  172.16.153.34
    pri-utility-addr             172.16.153.2
    sec-utility-addr             172.16.153.3
    netmask                     255.255.255.0
    gateway                     172.16.153.1
    sec-gateway
    gw-heartbeat
        state                    disabled
        heartbeat                   0
        retry-count                 0
        retry-timeout               1
        health-score                0
    dns-ip-primary
    dns-ip-backup1
    dns-ip-backup2
    dns-domain
    dns-timeout                 11
    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                Inside/Trusted
    hostname
    ip-address                 172.16.154.35
    pri-utility-addr             172.16.154.2
    sec-utility-addr             172.16.154.3
    netmask                     255.255.255.0
    gateway                     172.16.154.1
    sec-gateway
    gw-heartbeat
        state                    disabled
        heartbeat                   0
        retry-count                 0
        retry-timeout               1
```

```
        health-score                0
    dns-ip-primary
    dns-ip-backup1
    dns-ip-backup2
    dns-domain
    dns-timeout                 11
    signaling-mtu               0
    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
    server
phy-interface
    name                  s0p0
    operation-type          Media
    port                  0
    slot                  0
    virtual-mac
    admin-state           enabled
    auto-negotiation        enabled
    duplex-mode           FULL
    speed                 100
```

```
        wancom-health-score                50
        overload-protection                disabled
phy-interface
        name                               s1p0
        operation-type                     Media
        port                               0
        slot                               1
        virtual-mac
        admin-state                        enabled
        auto-negotiation                   enabled
        duplex-mode                        FULL
        speed                              100
        wancom-health-score                50
        overload-protection                disabled
realm-config
        identifier                         inside
        description
        addr-prefix                        0.0.0.0
        network-interfaces                 s0p0:0
        mm-in-realm                        disabled
        mm-in-network                      enabled
        mm-same-ip                         enabled
        mm-in-system                       enabled
        bw-cac-non-mm                      disabled
        msm-release                        disabled
        qos-enable                         disabled
        max-bandwidth                      0
        fallback-bandwidth                 0
        max-priority-bandwidth             0
        max-latency                        0
        max-jitter                         0
        max-packet-loss                    0
        observ-window-size                 0
        parent-realm
        dns-realm
        media-policy
        media-sec-policy                   sdespolicy
        srtp-msm-passthrough               disabled
        class-profile
        in-translationid
```

```
out-translationid
in-manipulationid
out-manipulationid
average-rate-limit                0
access-control-trust-level          none
invalid-signal-threshold          0
maximum-signal-threshold            0
untrusted-signal-threshold          0
nat-trust-threshold               0
max-endpoints-per-nat               0
nat-invalid-message-threshold       0
wait-time-for-invalid-register      0
deny-period                     30
cac-failure-threshold             0
untrust-cac-failure-threshold       0
ext-policy-svr
diam-e2-address-realm
subscription-id-type              END_USER_NONE
symmetric-latching                disabled
pai-strip                     disabled
trunk-context
device-id
early-media-allow
enforcement-profile
additional-prefixes
restricted-latching               none
restriction-mask                  32
user-cac-mode                     none
user-cac-bandwidth                  0
user-cac-sessions                 0
icmp-detect-multiplier              0
icmp-advertisement-interval         0
icmp-target-ip
monthly-minutes                   0
options
spl-options
accounting-enable                 enabled
net-management-control              disabled
delay-media-update                disabled
refer-call-transfer               disabled
```

```
        refer-notify-provisional            none
        dyn-refer-term                      disabled
        codec-policy
        codec-manip-in-realm                disabled
        codec-manip-in-network              enabled
        rtcp-policy
        constraint-name
        session-recording-server
        session-recording-required          disabled
        manipulation-string
        manipulation-pattern
        stun-enable                         disabled
        stun-server-ip                      0.0.0.0
        stun-server-port                    3478
        stun-changed-ip                     0.0.0.0
        stun-changed-port                   3479
        sip-profile
        sip-isup-profile
        match-media-profiles
        qos-constraint
        block-rtcp                          disabled
        hide-egress-media-update            disabled
        tcp-media-profile
        monitoring-filters
        node-functionality
        default-location-string
        alt-family-realm
        pref-addr-type                      none
realm-config
        identifier                          outside
        description
        addr-prefix                         0.0.0.0
        network-interfaces                  s0p1:0
        mm-in-realm                         disabled
        mm-in-network                       enabled
        mm-same-ip                          enabled
        mm-in-system                        enabled
        bw-cac-non-mm                       disabled
        msm-release                         disabled
        qos-enable                          disabled
```

```
max-bandwidth                    0
fallback-bandwidth               0
max-priority-bandwidth           0
max-latency                      0
max-jitter                       0
max-packet-loss                  0
observ-window-size               0
parent-realm
dns-realm
media-policy
media-sec-policy                 rtponly
srtp-msm-passthrough             disabled
class-profile
in-translationid
out-translationid
in-manipulationid
out-manipulationid
average-rate-limit               0
access-control-trust-level       none
invalid-signal-threshold         0
maximum-signal-threshold         0
untrusted-signal-threshold       0
nat-trust-threshold              0
max-endpoints-per-nat            0
nat-invalid-message-threshold    0
wait-time-for-invalid-register   0
deny-period                      30
cac-failure-threshold            0
untrust-cac-failure-threshold    0
ext-policy-svr
diam-e2-address-realm
subscription-id-type             END_USER_NONE
symmetric-latching               disabled
pai-strip                        disabled
trunk-context
device-id
early-media-allow
enforcement-profile
additional-prefixes
restricted-latching              none
```

```
restriction-mask                32
user-cac-mode                   none
user-cac-bandwidth              0
user-cac-sessions               0
icmp-detect-multiplier          0
icmp-advertisement-interval     0
icmp-target-ip
monthly-minutes                 0
options
spl-options
accounting-enable               enabled
net-management-control          disabled
delay-media-update              disabled
refer-call-transfer             disabled
refer-notify-provisional        none
dyn-refer-term                  disabled
codec-policy
codec-manip-in-realm            disabled
codec-manip-in-network          enabled
rtcp-policy
constraint-name
session-recording-server
session-recording-required      disabled
manipulation-string
manipulation-pattern
stun-enable                     disabled
stun-server-ip                  0.0.0.0
stun-server-port                3478
stun-changed-ip                 0.0.0.0
stun-changed-port               3479
sip-profile
sip-isup-profile
match-media-profiles
qos-constraint
block-rtcp                      disabled
hide-egress-media-update        disabled
tcp-media-profile
monitoring-filters
node-functionality
default-location-string
```

```
        alt-family-realm
        pref-addr-type                  none
        last-modified-by                admin@192.168.20.104
        last-modified-date              2015-07-24 02:16:49
sdes-profile
        name                    sdes1
        crypto-list                     AES_CM_128_HMAC_SHA1_80
                                AES_CM_128_HMAC_SHA1_32
        srtp-auth                       enabled
        srtp-encrypt                    enabled
        srtcp-encrypt                   enabled
        mki                     disabled
        egress-offer-format             simultaneous-best-effort
        use-ingress-session-params
        options
        key
        salt
session-agent
        hostname                        10.27.56.7
        ip-address                      10.27.56.7
        port                    5060
        state                   enabled
        app-protocol                    SIP
        app-type
        transport-method                UDP
        realm-id                outside
        egress-realm-id
        description
        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
ping-interval                   90
ping-send-mode                  keep-alive
ping-all-addresses              disabled
ping-in-service-response-codes
out-service-response-codes
load-balance-dns-query          hunt
options
spl-options
media-profiles
in-translationid
out-translationid
trust-me                        disabled
request-uri-headers
stop-recurse
local-response-map
ping-to-user-part
ping-from-user-part
in-manipulationid
out-manipulationid              To_Bell
manipulation-string
manipulation-pattern
p-asserted-id
trunk-group
max-register-sustain-rate       0
early-media-allow
invalidate-registrations        disabled
```

```
        rfc2833-mode                    none
        rfc2833-payload                 0
        codec-policy
        enforcement-profile
        refer-call-transfer             disabled
        refer-notify-provisional        none
        reuse-connections               NONE
        tcp-keepalive                   none
        tcp-reconn-interval             0
        max-register-burst-rate         0
        register-burst-window           0
        sip-profile
        sip-isup-profile
        kpml-interworking               inherit
        monitoring-filters
        session-recording-server
        session-recording-required      disabled
session-agent
        hostname                        fe0101.pelab.com
        ip-address                      172.16.149.38
        port                            5067
        state                           enabled
        app-protocol                    SIP
        app-type
        transport-method                StaticTLS
        realm-id                        inside
        egress-realm-id
        description
        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
ping-interval                   60
ping-send-mode                  keep-alive
ping-all-addresses              disabled
ping-in-service-response-codes
out-service-response-codes
load-balance-dns-query          hunt
options
spl-options
media-profiles
in-translationid
out-translationid
trust-me                        disabled
request-uri-headers
stop-recurse
local-response-map
ping-to-user-part
ping-from-user-part
in-manipulationid
out-manipulationid
manipulation-string
manipulation-pattern
p-asserted-id
trunk-group
max-register-sustain-rate       0
early-media-allow
invalidate-registrations        disabled
```

```
        rfc2833-mode                    none
        rfc2833-payload                 0
        codec-policy
        enforcement-profile
        refer-call-transfer             enabled
        refer-notify-provisional        none
        reuse-connections               NONE
        tcp-keepalive                   none
        tcp-reconn-interval             0
        max-register-burst-rate         0
        register-burst-window           0
        sip-profile
        sip-isup-profile
        kpml-interworking               inherit
        monitoring-filters
        auth-attributes
            auth-realm                  lab.ca
            username                    ABC_123456_CA
            password                    ********
            in-dialog-methods           INVITE
        session-recording-server
        session-recording-required      disabled
session-agent
        hostname                        fe0102.pelab.com
        ip-address                      172.16.149.39
        port                            5067
        state                           enabled
        app-protocol                    SIP
        app-type
        transport-method                StaticTLS
        realm-id                        inside
        egress-realm-id
        description
        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
ping-interval                       60
ping-send-mode                      keep-alive
ping-all-addresses                  disabled
ping-in-service-response-codes
out-service-response-codes
load-balance-dns-query              hunt
options
spl-options
media-profiles
in-translationid
out-translationid
trust-me                            disabled
request-uri-headers
stop-recurse
local-response-map
ping-to-user-part
ping-from-user-part
in-manipulationid
out-manipulationid
manipulation-string
manipulation-pattern
```

```
        p-asserted-id
        trunk-group
        max-register-sustain-rate          0
        early-media-allow
        invalidate-registrations           disabled
        rfc2833-mode                       none
        rfc2833-payload                    0
        codec-policy
        enforcement-profile
        refer-call-transfer                enabled
        refer-notify-provisional           none
        reuse-connections                  NONE
        tcp-keepalive                      none
        tcp-reconn-interval                0
        max-register-burst-rate            0
        register-burst-window              0
        sip-profile
        sip-isup-profile
        kpml-interworking                  inherit
        monitoring-filters
        auth-attributes
            auth-realm                     lab.ca
            username                       ABC_123456_CA
            password                       ********
            in-dialog-methods                  INVITE
        session-recording-server
        session-recording-required         disabled
session-agent
        hostname                       fe0103.pelab.com
        ip-address                     172.16.149.40
        port                           5067
        state                          enabled
        app-protocol                       SIP
        app-type
        transport-method                   StaticTLS
        realm-id                       inside
        egress-realm-id
        description
        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
ping-interval                  60
ping-send-mode                 keep-alive
ping-all-addresses             disabled
ping-in-service-response-codes
out-service-response-codes
load-balance-dns-query         hunt
options
spl-options
media-profiles
in-translationid
out-translationid
trust-me                       disabled
request-uri-headers
stop-recurse
local-response-map
ping-to-user-part
```

```
    ping-from-user-part
    in-manipulationid
    out-manipulationid
    manipulation-string
    manipulation-pattern
    p-asserted-id
    trunk-group
    max-register-sustain-rate          0
    early-media-allow
    invalidate-registrations           disabled
    rfc2833-mode                       none
    rfc2833-payload                    0
    codec-policy
    enforcement-profile
    refer-call-transfer                enabled
    refer-notify-provisional           none
    reuse-connections                  NONE
    tcp-keepalive                      none
    tcp-reconn-interval                0
    max-register-burst-rate            0
    register-burst-window              0
    sip-profile
    sip-isup-profile
    kpml-interworking                  inherit
    monitoring-filters
    auth-attributes
        auth-realm                     lab.ca
        username                       ABC_123456_CA
        password                       ********
        in-dialog-methods                  INVITE
    session-recording-server
    session-recording-required         disabled
session-group
    group-name                         med-grp-1
    description                        Lync Mediation server group
    state                              enabled
    app-protocol                       SIP
    strategy                           Hunt
    dest                               fe0101.pelab.com
                                       fe0102.pelab.com
```

```
                              fe0103.pelab.com
      trunk-group
      sag-recursion                disabled
      stop-sag-recurse              401,407
      last-modified-by              admin@172.21.0.93
      last-modified-date             2015-05-14 19:51:34
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               0
      register-service-route          always
      init-timer                  500
      max-timer                    4000
      trans-expire                 32
      initial-inv-trans-expire        0
      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                    max-udp-length=0
      add-reason-header              disabled
      sip-message-len              4096
```

```
        enum-sag-match                  disabled
        extra-method-stats              disabled
        extra-enum-stats                disabled
        rph-feature                     disabled
        nsep-user-sessions-rate         0
        nsep-sa-sessions-rate           0
        registration-cache-limit        0
        register-use-to-for-lp          disabled
        refer-src-routing               disabled
        add-ucid-header                 disabled
        proxy-sub-events
        allow-pani-for-trusted-only     disabled
        atcf-stn-sr
        atcf-psi-dn
        atcf-route-to-sccas             disabled
        eatf-stn-sr
        pass-gruu-contact               disabled
        sag-lookup-on-redirect          disabled
        set-disconnect-time-on-bye      disabled
        msrp-delayed-bye-timer          15
        transcoding-realm
        transcoding-agents
        create-dynamic-sa               disabled
        node-functionality              P-CSCF
        last-modified-by                admin@172.21.0.93
        last-modified-date              2015-05-29 20:46:50
sip-interface
        state                   enabled
        realm-id                inside
        description
        sip-port
                address                 172.16.153.34
                port                    5066
                transport-protocol      TLS
                tls-profile             Core
                allow-anonymous         agents-only
                multi-home-addrs
                ims-aka-profile
        carriers
        trans-expire            0
```

```
initial-inv-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
port-map-start                   0
port-map-end                     0
in-manipulationid
out-manipulationid
sip-ims-feature                  disabled
sip-atcf-feature                disabled
subscribe-reg-event                 disabled
operator-identifier
anonymous-priority                  none
max-incoming-conns               0
per-src-ip-max-incoming-conns       0
inactive-conn-timeout               0
untrusted-conn-timeout              0
network-id
ext-policy-server
ldap-policy-server
```

```
        default-location-string
        term-tgrp-mode                  none
        charging-vector-mode            pass
        charging-function-address-mode  pass
        ccf-address
        ecf-address
        implicit-service-route          disabled
        rfc2833-payload                 101
        rfc2833-mode                    transparent
        constraint-name
        response-map
        local-response-map
        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
        msrp-delay-egress-bye           disabled
        send-380-response
        pcscf-restoration
        session-timer-profile
        session-recording-server
        session-recording-required      disabled
        service-tag
sip-interface
        state                   enabled
        realm-id                outside
        description
        sip-port
            address             172.16.154.35
            port                5060
```

```
        transport-protocol              UDP
        tls-profile
        allow-anonymous                 all
        multi-home-addrs
        ims-aka-profile
    sip-port
        address                     172.16.154.35
        port                        5061
        transport-protocol              TLS
        tls-profile                 Outside
        allow-anonymous                 agents-only
        multi-home-addrs
        ims-aka-profile
    carriers
    trans-expire                    0
    initial-inv-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
    port-map-start                  0
```

```
port-map-end                    0
in-manipulationid
out-manipulationid
sip-ims-feature                 disabled
sip-atcf-feature                disabled
subscribe-reg-event             disabled
operator-identifier
anonymous-priority              none
max-incoming-conns              0
per-src-ip-max-incoming-conns   0
inactive-conn-timeout           0
untrusted-conn-timeout          0
network-id
ext-policy-server
ldap-policy-server
default-location-string
term-tgrp-mode                  none
charging-vector-mode            pass
charging-function-address-mode  pass
ccf-address
ecf-address
implicit-service-route          disabled
rfc2833-payload                 101
rfc2833-mode                    transparent
constraint-name
response-map
local-response-map
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
    msrp-delay-egress-bye            disabled
    send-380-response
    pcscf-restoration
    session-timer-profile
    session-recording-server
    session-recording-required       disabled
    service-tag
sip-manipulation
    name                         From_Lync
    description
    split-headers
    join-headers
    header-rule
        name                     OPTIONS_Fix
        header-name                  Max-Forwards
        action                   find-replace-all
        comparison-type              case-sensitive
        msg-type                 request
        methods                  OPTIONS
        match-value
        new-value                0
    header-rule
        name                     CheckPrivacy
        header-name                  request-uri
        action                   store
        comparison-type              case-sensitive
        msg-type                 any
        methods                  INVITE
        match-value
        new-value
        element-rule
            name                     CheckStar67
            parameter-name
            type                 uri-user
            action               store
            match-val-type           any
            comparison-type          pattern-rule
            match-value              \*67\d+
            new-value
```

```
header-rule
      name                    AddPrivacyHdr
      header-name                Privacy
      action                  add
      comparison-type               boolean
      msg-type                request
      methods                 INVITE
      match-value                $CheckPrivacy.$CheckStar67
      new-value                  id
header-rule
      name                    updateRURI
      header-name                request-uri
      action                  manipulate
      comparison-type               pattern-rule
      msg-type                request
      methods                 INVITE
      match-value
      new-value
      element-rule
            name                     updateRURIUser
            parameter-name
            type                  uri-user
            action                   replace
            match-val-type                any
            comparison-type                  pattern-rule
            match-value                \*67(.*)
            new-value                  $1
header-rule
      name                    updateTO
      header-name                To
      action                  manipulate
      comparison-type               pattern-rule
      msg-type                request
      methods                 INVITE
      match-value
      new-value
      element-rule
            name                     updateTOUsr
            parameter-name
            type                  uri-user
```

```
            action                  replace
            match-val-type          any
            comparison-type         pattern-rule
            match-value             \*67(.*)
            new-value               $1
    header-rule
        name                    StoreFromTag
        header-name             From
        action                  store
        comparison-type         case-sensitive
        msg-type                request
        methods                 INVITE
        match-value
        new-value
        element-rule
            name                storeTag
            parameter-name          tag
            type                header-param
            action              store
            match-val-type          any
            comparison-type         case-sensitive
            match-value
            new-value
    header-rule
        name                    ChgFromPrivacy
        header-name             From
        action                  manipulate
        comparison-type         boolean
        msg-type                request
        methods                 INVITE
        match-value             $CheckPrivacy.$CheckStar67
        new-value               "\"Anonymous\"
<sip:anonymous@anonymous.invalid>; tag="+$StoreFromTag.$storeTag.$0

sip-manipulation
    name                    To_Bell
    description
    split-headers
    join-headers
  header-rule
        name                UpdateRequest
```

```
        header-name                 request-uri
        action                  manipulate
        comparison-type             case-sensitive
        msg-type                any
        methods
        match-value
        new-value
        element-rule
            name                    Update_URI_Host
            parameter-name
            type                uri-host
            action              replace
            match-val-type          any
            comparison-type             case-sensitive
            match-value
            new-value               lab.ca
        element-rule
            name                    Rmv_User
            parameter-name              user
            type                uri-param
            action              delete-element
            match-val-type          any
            comparison-type             case-sensitive
            match-value
            new-value
        element-rule
            name                    Rmv_Port
            parameter-name
            type                uri-port
            action              delete-element
            match-val-type          any
            comparison-type             case-sensitive
            match-value
            new-value
    header-rule
        name                save_PAI
        header-name             P-Asserted-Identity
        action              store
        comparison-type             case-sensitive
        msg-type                any
```

```
        methods
        match-value
        new-value
    header-rule
        name                    Updt_PAI
        header-name                 P-Asserted-Identity
        action                  add
        comparison-type             boolean
        msg-type                any
        methods                 INVITE
        match-value               !$save_PAI
        new-value                 <sip: 613xxxxxxx@domain-name;user=phone>
    header-rule
        name                    Updt_RURI
        header-name                 request-uri
        action                  manipulate
        comparison-type             case-sensitive
        msg-type                any
        methods
        match-value
        new-value
        element-rule
            name                    Udpt_URI_Host
            parameter-name
            type                  uri-host
            action                replace
            match-val-type              any
            comparison-type               case-sensitive
            match-value
            new-value                 domain-name
    header-rule
        name                    Updt_To
        header-name                 To
        action                  manipulate
        comparison-type             case-sensitive
        msg-type                any
        methods
        match-value
        new-value
        element-rule
```

```
            name                    UPdt_URI_host
            parameter-name
            type                    uri-host
            action                  replace
            match-val-type          any
            comparison-type         case-sensitive
            match-value
            new-value               lab.ca
        element-rule
            name                    Rmv_User
            parameter-name          user
            type                    uri-param
            action                  delete-element
            match-val-type          any
            comparison-type         case-sensitive
            match-value
            new-value
    header-rule
        name                    Updt_From
        header-name             From
        action                  manipulate
        comparison-type         case-sensitive
        msg-type                any
        methods
        match-value
        new-value
        element-rule
            name                    Updt_URI_host
            parameter-name
            type                    uri-host
            action                  replace
            match-val-type          any
            comparison-type         case-sensitive
            match-value
            new-value               domain-name
        element-rule
            name                    Rmv_Epid
            parameter-name          epid
            type                    header-param
            action                  delete-element
```

```
            match-val-type              any
            comparison-type               case-sensitive
            match-value
            new-value
        element-rule
            name                        Rmv_UriParam_User
            parameter-name                user
            type                      uri-param
            action                     none
            match-val-type              any
            comparison-type               case-sensitive
            match-value
            new-value
        element-rule
            name                        Rmv_UriUser_Param_contx
            parameter-name                phone-context
            type                      uri-user-param
            action                     delete-element
            match-val-type              any
            comparison-type               case-sensitive
            match-value
            new-value
    header-rule
        name                      Updt_Contact
        header-name                 Contact
        action                    manipulate
        comparison-type             case-sensitive
        msg-type                  any
        methods
        match-value
        new-value
        element-rule
            name                        Updt_URI_Host
            parameter-name
            type                      uri-host
            action                     replace
            match-val-type              any
            comparison-type               case-sensitive
            match-value
            new-value                   $LOCAL_IP
```

```
        element-rule
            name                    Del_MSOpaque
            parameter-name              ms-opaque
            type                    uri-param
            action                  delete-element
            match-val-type              any
            comparison-type             case-sensitive
            match-value
            new-value
        element-rule
            name                    Add_tgrp
            parameter-name              tgrp
            type                    uri-user-param
            action                  add
            match-val-type              any
            comparison-type             case-sensitive
            match-value
            new-value                   ABC_123456_CA
        element-rule
            name                    Add_trunk_context
            parameter-name              trunk-context
            type                    uri-user-param
            action                  add
            match-val-type              any
            comparison-type             case-sensitive
            match-value
            new-value                   lab.ca
        element-rule
            name                    Rmv_MSOpaque
            parameter-name              ms-opaque
            type                    uri-param
            action                  delete-element
            match-val-type              any
            comparison-type             case-sensitive
            match-value
            new-value
    header-rule
        name                    Max_Forward_0
        header-name                 Max-Forwards
        action                  manipulate
```

```
        comparison-type                pattern-rule
        msg-type                       request
        methods                        OPTIONS
        match-value
        new-value                      0
    header-rule
        name                           Rmv_UserAgent_Hdr
        header-name                    user-agent
        action                         delete
        comparison-type                case-sensitive
        msg-type                       any
        methods
        match-value
        new-value
sip-monitoring
    match-any-filter                   disabled
    state                          enabled
    short-session-duration             0
    monitoring-filters                 *
    trigger-window                     30
steering-pool
    ip-address                     172.16.153.34
    start-port                     40000
    end-port                       60000
    realm-id                       inside
    network-interface
steering-pool
    ip-address                     172.16.154.35
    start-port                     49152
    end-port                       57500
    realm-id                       outside
    network-interface
system-config
    hostname
    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                   NOTICE
process-log-ip-address              0.0.0.0
process-log-port                    0
collect
      sample-interval               5
      push-interval                 15
      boot-state                    disabled
      start-time                    now
      end-time                      never
      red-collect-state             disabled
      red-max-trans                 1000
      red-sync-start-time           5000
      red-sync-comp-time            1000
      push-success-trap-state       disabled
comm-monitor
      state                         disabled
      sbc-grp-id                    0
      tls-profile
      qos-enable                    enabled
call-trace                          disabled
internal-trace                      disabled
log-filter                          all
default-gateway                     172.16.0.254
restart                             enabled
exceptions
telnet-timeout                      0
console-timeout                     0
remote-control                      enabled
cli-audit-trail                     enabled
link-redundancy-state               disabled
source-routing                      disabled
cli-more                            disabled
terminal-height                     24
```

```
      debug-timeout                  0
      trap-event-lifetime            0
      ids-syslog-facility            -1
      options
      default-v6-gateway             ::
      ipv6-signaling-mtu             1500
      ipv4-signaling-mtu             1500
      cleanup-time-of-day            00:00
      snmp-engine-id-suffix
      snmp-agent-mode                v1v2
tls-profile
      name                       Core
      end-entity-certificate         ESBCCert1
      trusted-ca-certificates        MediationRoot
      cipher-list                ALL
      verify-depth               10
      mutual-authenticate            disabled
      tls-version                compatibility
      options
      cert-status-check              disabled
      cert-status-profile-list
      ignore-dead-responder          disabled
      allow-self-signed-cert         disabled
      last-modified-by               admin@192.168.20.105
      last-modified-date             2015-07-29 18:45:51
tls-profile
      name                       Outside
      end-entity-certificate         ESBCCert1
      trusted-ca-certificates        ESBCCert1
      cipher-list                ALL
      verify-depth               10
      mutual-authenticate            disabled
      tls-version                compatibility
      options
      cert-status-check              disabled
      cert-status-profile-list
      ignore-dead-responder          disabled
      allow-self-signed-cert         disabled
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

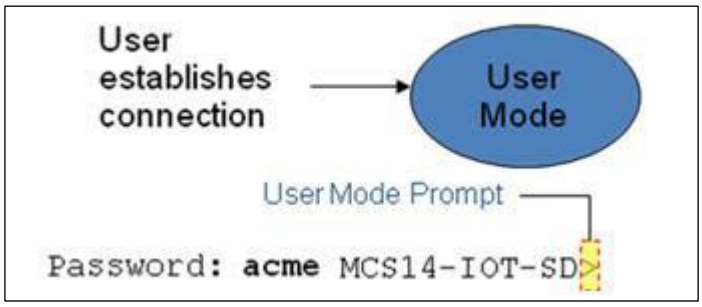
Access to the ACLI is provided by:

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

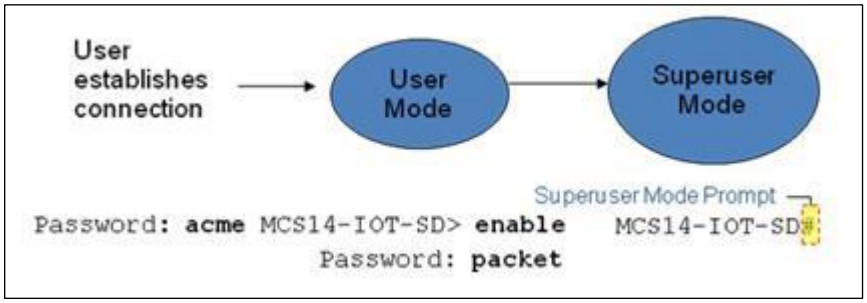
Initial connectivity will be through the serial console port. At a minimum, this is how to configure the management (eth0) interface on the E-SBC.

### 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 E-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.



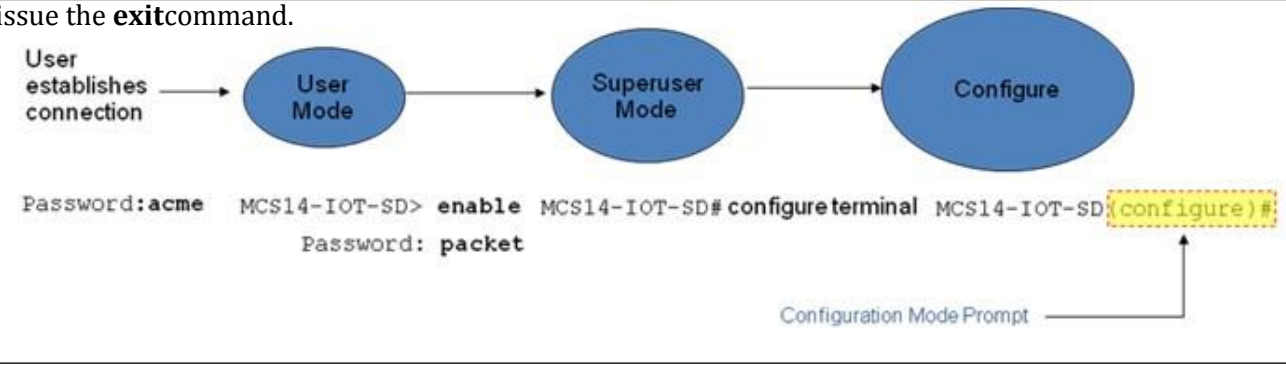
The Superuser mode allows for access to all system commands for operation, maintenance, and administration. This mode is identified by the pound sign (#) in the prompt after the target name. To enter the Superuser mode, issue the enable command in the User mode.




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.

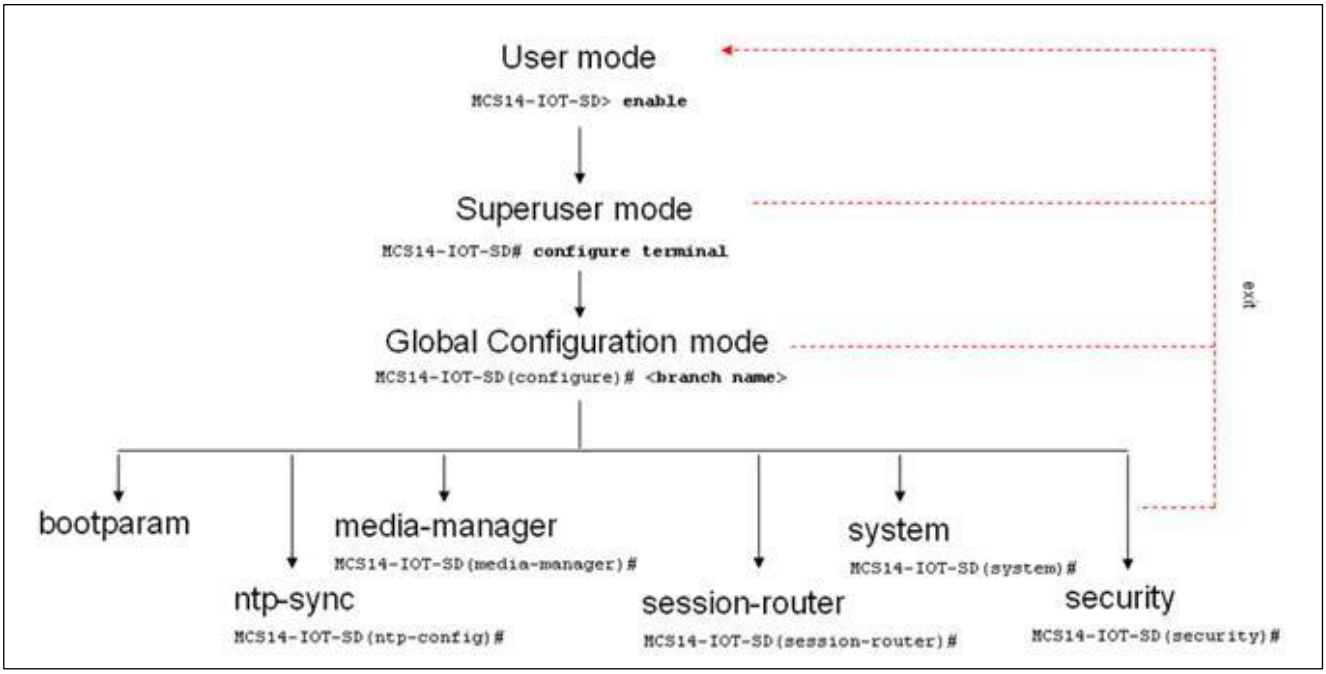
You must enter the Configuration mode to configure elements. For example, you can access the configuration branches and configuration elements for signaling and media configurations. To enter the Configuration mode, issue the **configure terminal** command in the Superuser mode.

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 E-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 E-SBC time and date. The security branch provides access to security configuration.
- The system branch provides access to basic configuration elements as system-config, snmp-community, redundancy, physical interfaces, network interfaces, etc.
- The session-router branch provides access to signaling and routing related elements, including H323-config, sip-config, iwf-config, local-policy, sip-manipulation, session-agent, etc.
- The media-manager branch provides access to media-related elements, including realms, steering pools, dns-config, media- manager, and so forth.
- You will use media-manager, session-router, and system branches for most of your working configuration.

## Configuration Elements

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

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

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

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

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

## Creating an Element

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

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

### Configuration Versions

At any time, three versions of the configuration can exist on the E-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 E-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 E-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 E-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 E-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#
```

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