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BCP – SRTP Configuration and Troubleshooting Guidelines for Oracle Enterprise SBC

Revision History

Version	*Author*	*Description of Changes*	*Date Revision Completed*
520-0043-00	Antonio Merenciano	Initial Release	Oct 21st,2010
520-0043-01	Anima Khindari	Added ETC NIU support information	July 27th, 2011
520-0043-02	Bhaskar Reddy Gaddam	Rebranded with latest release information	July 12th , 2018
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Status of this memo

Oracle SBC Best Current Practices are working documents of the Professional Services department of Oracle Corporation. Note that other groups may also distribute working documents as Best Current Practices.

Best Current Practices are working documents valid until explicitly obsoleted, and may be updated, replaced or obsoleted by other documents at any time. It is recommended to use Best Current Practices as reference material as well as to cite them in other works in progress.

Abstract

The use of the RFC 2119 keywords is an attempt to assign the correct requirement levels ("MUST", "SHOULD", "MAY", etc.).

This document defines a series of recommendations for Secure Real-time Transport Protocol (SRTP) configuration and troubleshooting on the Oracle SBC in a customer's production network. They should be used when either (a) deploying a new SBC, or (b) updating an existing configuration made before Best Current Practices were in place. When in conflict with Customer requirements or desires, the Customer's preference SHOULD take precedence.

Applicability

This document is applicable to Oracle Enterprise Session Border Controller Release S-Cz8.4.0

Table of Contents

1 Introduction

The Secure Real-time Transport Protocol (**SRTP**) provides encryption and authentication for the call content and call signaling streams. Authentication provides assurance that packets are from the purported source, and that the packets have not been tampered with during transmission. Encryption provides assurance that the call content and associated signaling has remained private during transmission. SRTP/SDES is supported on the Oracle Session Border Controller.

RTP and RTCP traffic are encrypted as described in RFC 3711: The Secure Real-time Transport Protocol (SRTP). The negotiation and establishment of keys and other cryptographic materials that support SRTP is described in RFC 4568: Session Description Protocol (SDP) Security Description for Media Streams. Cryptographic parameters are established with only a single message or in single round-trip exchange using the offer/answer model defined in RFC 3264: An Offer/Answer Model with the Session Description Protocol.

This document should be used as a base reference only, outlining procedures to configure SRTP on the SBC node from its base configuration. An Oracle Systems Engineer should be consulted with regards to specific concerns as they apply to customer specific SBC configurations.

This document is based on features available in Oracle Enterprise Session Border Controller Release Notes, Release S-Cz8.4.0 software release, unless noted otherwise, and refers to other Oracle documentation for configuration detail.
Configuration guides are available for download from (https://docs.oracle.com/). Please contact your Oracle Systems Engineer for Best Current Practice (BCP) documentation.

2 Intended Audience

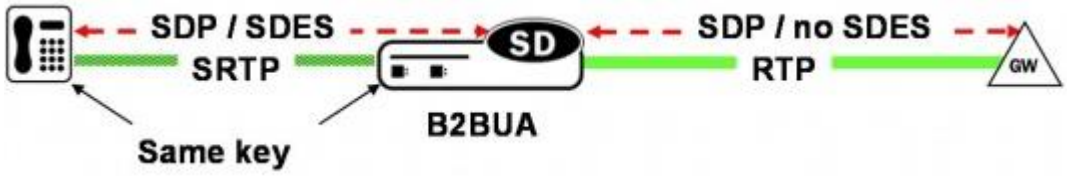
This document is intended for use by Oracle Systems Engineers, third party Systems Integrators, and end users of the Session Border Controller. It assumes that the reader is familiar with basic operations of the Session Border Controller, and has attended the following training course(s) (or has equivalent experience):

- https://docs.oracle.com/en/industries/communications/enterprise-session-border-controller/8.4.0/releasenotes/esbc_scz840_releasenotes.pdf
- https://docs.oracle.com/en/industries/communications/enterprise-session-border-controller/8.4.0/configuration/esbc_scz840_configuration.pdf
- https://docs.oracle.com/en/industries/communications/session-border-controller/8.4.0/security/sbc_scz840_security.pdf

3 SRTP Topologies

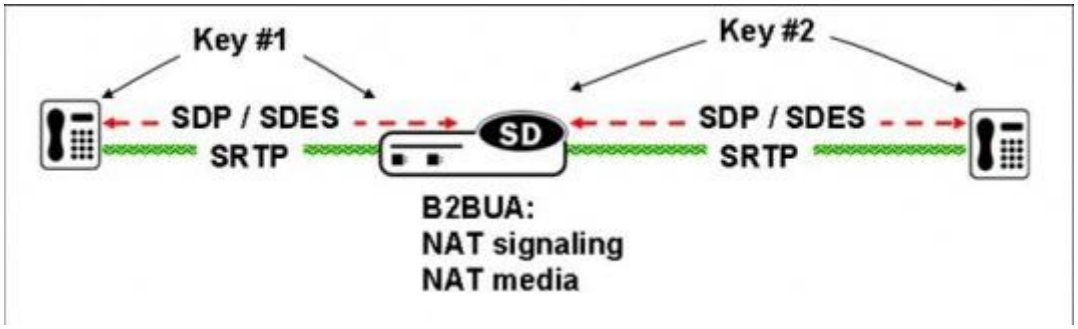
SRTP topologies can be categorised to three basic topologies:

- **Single Ended SRTP Termination**
  SRTP enabled on inbound interface, disabled on outbound interface (or vice versa)



If SRTP is enabled for the inbound realm/interface, the SBC will handle the request according to the capabilities defined in the SRTP configuration. If there is a crypto attribute in the offer, the SBC will attempt to parse the crypto attributes and parameters in the SDP. It accepts exactly one of the offered crypto attributes for a given media stream, if this is configured as a valid crypto-suite on the SBC If there is no crypto-suite configured on the SBC in the list of crypto-suites received, the SBC will reject the call with a "488 Not Acceptable Here" response.
Before the request is forwarded to the callee, the SBC allocates resources, updates the SDP with proper media addresses and ports, and the original crypto attribute is removed from the SDP.
Once the reply from the callee is received, SBC inserts the appropriate crypto attribute to form a new SDP, and forwards the response back to the caller. At this point, SRTP traffic is allowed between the caller and the SBC

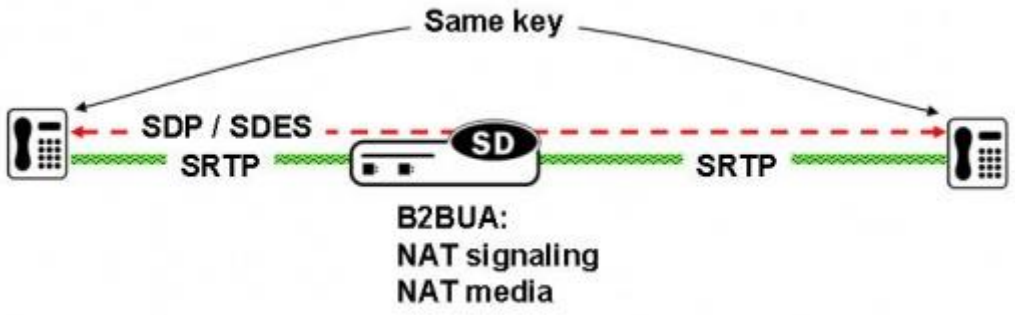
- **Back-to-back SRTP Termination**
  SRTP enabled on inbound interface, enabled on outbound interface. Separate crypto keys on either side..



Similarly to the "Single End SRTP Termination" case above, before the request is forwarded to the callee, the SBC allocates resources and updates the SDP with proper media addresses and ports, however, at this point, the original crypto attribute is replaced with one generated by the SBC
The construction of the crypto attribute in the SDP will be based on the configuration for the outbound realm/interface. Once the reply from the callee is received, the SBC could also accept or reject the "answer"

from the callee according to the configuration and the list of crypto-suites supported. If accepted, the SBC will replace the original crypto attribute from the callee with its own to form a new SDP. The new SDP is forwarded back to the caller. At this point, SRTP media sessions are established on both sides.

- **Pass-through SRTP**
  Crypto attribute is not intercepted, just forwarded, and the key negotiation is done end-to-end.



If the configuration specifies “pass-through” mode, the SBC will not intercept the crypto attribute exchange between the caller and the callee. The crypto attribute will be forwarded as it is from the caller to the callee and vice versa.The SBC simply modifies media IP addresses and ports to enable media anchoring (if configured), hence SRTP flows pass transparently through the SBC

4 Requirements

4.1 Hardware Requirements

On Oracle 4600/6100/6300/6350 platforms standard network interfaces (NIU) is required which allows the use of the encryption needed for SRTP. The Oracle 1100 and 3900 and VME SBCs use the software datapath (DPDK) and support software-based SRTP.

```
Contents of PHY0 IDPROM
        Assy, 2 Port 10GigE SFP and 4 Port GigE SFP
        Oracle Part Number:             7089186
        Oracle Rev:                     07
        Oracle FRU Part Number:         0000000
        Acme Packet Part Number:        002-0813-58-02
        Serial Number:                  181536000256
        Acme Packet FunctionalRev:      1.02
        BoardRev:                       02.00
        PCB Family Type:                Dual Port 10GigE and 4 Port 1GigE PHY
        ID:                             2 Port 10GigE SFP w/Encryption, ETC, TRANS & MGT and 4 Port GigE SFP
        Options:                        0
        Manufacturer:                   MiTAC China - MSL
        Week/Year:                      36/2015
        Sequence Number:                000256
```

SSM module is NOT a requirement for SRTP, although typically SRTP is deployed in conjunction with TLS for SIP. Therefore, TLS is used for encrypting signaling and SRTP is used for encrypting media.
In this case,then the SSM module is also required to run TLS.

```
# show security ssm
SSM (Security Service Module) V2 present.
```

If UDP/TCP is used for SIP, then SSM module is not a requirement.

4.2 Software Requirements

S-CX6.2.0 software image or higher is required to support SRTP termination on the SBC. It is always recommended to use the latest image available on the Oracle customer support portal (https:// support.us.oracle.com/).

4.3 Licenses Requirements

No additional licenses are required for the Oracle 6300/6350/6100/3900/4600/1100 to use SRTP.Oracle VME requires License for Software TLS and Software SRTP.

You can request license keys via the License Codes website at –

http://www.oracle.com/us/support/licensecodes/acme-packet/index.html

4.4 Bootloader requirements

Boot loader software loads the application to run on a platform.As such, boot loader software must be correct before system startup. Oracle Communications Session Delivery product distributions include and install the correct boot loader during application installation, meaning you need not consider boot loader version during first installation procedures.

Application software upgrades do not update boot loaders. For this reason, you need to verify this compatibility manually. The following topics provide information about identifying the need and performing the updates.

Stage3 Boot Loader

Every new software release includes a system software image and a Stage3 boot loader. Oracle recommends you update this boot loader with every software upgrade, as described in the Software Upgrade section. Be sure to perform this update before booting the new system image.

The Stage3 boot loader is generally backward compatible with previous releases, but Oracle recommends that the Stage3 boot loader be installed from the same Major/Minor version as the system image. It is not normally necessary to update the boot loader when installing a maintenance or patch release when the Major.Minor release is the same.For example, the same nnCZ830.boot can be used with nnECZ820, nnECZ810m1, and so forth system software. But it should be upgraded when installing nnCZ830 system software to match that Major. Minor release.

The boot loader file name corresponds to the software image filename. For example, if the software image filename is nnCZ830.64.bz, the corresponding Stage3 boot loader filename is nnCZ830.boot.

The Stage3 boot loader is compatible with previous releases.

Stage 3 boot loader upgrade procedure can be found in the Update the Stage 3 Bootloader section of this guide.

Note:

The SBC does not support uploading the boot loader by way of the Web GUI.

5 Design Aspects

Due to the flexibility in the configuration for different SRTP modes, it is needed to consider different aspects of the desired design for proper configuration. Here is a brief explanation on the elements needed for SRTP configuration. This is just a basic reference, the configuration of each element will depend on the desired design and will be described in the following sections.

5.1 Configuration Elements

Here is a brief explanation on the elements needed for SRTP configuration. This is just a basic reference, the configuration of each element will depend on the desired design and will be described in the following sections.

- Security → media-security → **sdes-profile**
- This is the first element to configure, where the algorithm and the cryptos to be used are configured.

  For sdes-profile, it is required to define the crypto-suites accepted, and also whether or not authentication and/or encryption are used for SRTP and if encryption is used for SRTCP. The "use-ingress-session-params" attribute is used to override previous parameters, specifying that the SBC will accept encryption/no-encryption, authentication/no-authentication in SRTP/SRTCP, using in the egress SDP the same session parameter that was received in the ingress SDP.
  Finally "egress-offer-format" is used to instruct the SBC on how to build the egress SDP in the case of both RTP and SRTP are supported at the same time. This is further explained in the next section.

```
# show running-config sdes-profile
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
    egress-offer-format                 same-as-ingress
    use-ingress-session-params          srtcp-encrypt
                                        srtp-auth
                                        srtp-encrypt
    mki                                 disabled
    key
    salt
```

- Security → media-security → **media-sec-policy**

  Media-sec-policy instructs the SBC how to handle the SDP received/sent under a realm (RTP, SRTP or any of them) and, if SRTP needs to be used, the sdes-profile that needs to be used.
  The media-sec-policy should be assigned to a realm under the realm-config configuration.

```
(media-sec-policy)# show
media-sec-policy
        name                                    msp1
        pass-through                            disabled
        inbound
                profile                                 sdes1
                mode                                    srtp
                protocol                                sdes
        outbound
                profile                                 sdes1
                mode                                    srtp
                protocol                                sdes
(media-sec-policy)#
```

5.2 Design Considerations

The intents of the design considerations explained here are to:

- Minimize interoperability issues by standardizing field configurations
- Provide guidelines for new users to the Session Border Controller
- Document when and why configuration elements should be changed from their default values
- Facilitate transition of customers from Systems Engineering to Technical Support by making configurations consistent (yielding predictable behavior)

Further, each design considers the following aspects:

- Flexibility: how resilient the configuration is, and how adaptable the configuration is (i.e. when turning up new connected networks)
- Scalability: minimizing redundant configuration objects and setting a templated foundation to allow overlay configuration with minimal disruption
- Compatibility: working with other popular devices in carriers' VoIP networks

The main aspects treated here focused on which traffic is desired under a realm, so each design needs to consider the following, previous to any configuration:

1. SIP Traffic: SIP over UDP/TCP (unsecured transport) or over TLS (secured transport protocol).
2. Media Traffic: media over RTP, media over SRTP or media over both RTP and SRTP allowed at the same time. This would differentiate the IP design, since:
   a. For media over RTP only or SRTP only, just one IP address will be used for them
   b. For media over both RTP/SRTP allowed at the same time, then the recommendation is to use two different IPs on the same network-interface. One will send RTP traffic and the other IP will be used for SRTP traffic. This should be considered for correct IP plan under the network.

5.2.1 Secured/Unsecured Network

By default, the SBC considers that SIP traffic, when SRTP is configured, should run over secured transport protocol, TLS. If this is not the case, the SBC needs to be instructed to allow SIP traffic over non-secured transport protocol (UDP/TCP).

```
sip-interface
        state                                   enabled
        realm-id                                access1
        description
        sip-port
                address                                 11.0.0.11
                port                                    5060
                transport-protocol                      UDP
                tls-profile
                allow-anonymous                         all
                ims-aka-profile
        carriers
…
        secured-network                 enabled
```

When secured-network is set to DISABLED under a sip-interface where SRTP is configured, the sip-interface will only allow SIP over TLS. If SIP is received over UDP/TCP, the SBC will reject the call with “488 Not Acceptable Here”.

When secured-network is set to ENABLED, the SBC understands the network is secured and it accepts SIP traffic on UDP/TCP.

5.2.2 Media traffic

Every realm under the configuration should be instructed to the type of media that should handle whether that be RTP only, SRTP only or both RTP and SRTP. For each realm, it can be differentiated between the inbound and outbound media type, giving the flexibility of having different protocols for inbound or for outbound.

The “mode” parameter under the media-sec-policy controls the media protocol defined for each inbound/outbound flow under a realm.

5.2.2.1 RTP Only

The “mode” parameter under the inbound/outbound section of the media-sec-policy should be set to RTP. In this case, no profile should be defined, and the protocol should be set to “None”.

```
(media-sec-policy)# show
media-sec-policy
        name                                    removeCrypto
        pass-through                            disabled
        inbound
                profile
                mode                                    rtp
                protocol                                none
        outbound
                profile
                mode                                    rtp
                protocol                                none
(media-sec-policy)#
```

This is mostly used in single ended SRTP termination configurations, where this media-sec-policy removes the SRTP component part from the SDP to offer/accept only SRTP. This media-sec-policy should be applied under the realm where only RTP is desired.

```
realm-config
        identifier                      backbone
        description
        addr-prefix                     0.0.0.0
        network-interfaces
                                        M10:0
…
        media-sec-policy                removeCrypto
…
```

In the case of RTP only, no sdes-profile is needed.

5.2.2.2 SRTP Only

The “mode” parameter under the media-sec-policy should be set to SRTP. The “profile” parameter should be set to the configured sdes-profile, and the protocol should be set to SDES.
In this case, only SRTP is accepted in the realm. An INVITE arriving to the realm without SRTP capabilities is rejected by the SBC with a “488 Not Acceptable Here”.

```
(media-sec-policy)# show
media-sec-policy
        name                                    SRTP1
        pass-through                            disabled
        inbound
                profile                                 sdes1
                mode                                    srtp
                protocol                                SDES
        outbound
                profile                                 sdes1
                mode                                    srtp
                protocol                                SDES
(media-sec-policy)#
```

Where “sdes1” is the configured sdes-profile used for this implementation.Here are the default sdes-profile is suggested, to be superseded only by specific customer requirements.

```
# show running-config sdes-profile
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
    egress-offer-format                 same-as-ingress
    use-ingress-session-params          srtcp-encrypt
                                        srtp-auth
                                        srtp-encrypt
    mki                                 disabled
    key
    salt
```

The media-sec-profile configured for SRTP should be applied under the desired realm.

```
realm-config
        identifier                      access1
        description
        addr-prefix                     0.0.0.0
        network-interfaces
                                        M00:0
…
        media-sec-policy                SRTP1
…
```

5.2.2.3 Both RTP/SRTP support

The “mode” under the media-sec-policy should be set to ANY. Also, the profile should be configured with the sdes-profile that would be used in case of SRTP and the protocol should be set to SDES.
When inbound mode=any, the SBC will accept SDP with only RTP description, SDP with only SRTP description and SDP with 2 m lines having both RTP and SRTP description.

When outbound mode=any, the SBC will insert an SDP with only RTP, only SRTP or with 2 m lines, supporting both RTP and SRTP, this is controlled under the sdes-profile:

(sdes-profile)# egress-offer-format

<enumeration> format of offer SDP in 'any' mode
{same-as-ingress | simultaneous-best-effort}

- Same-as-ingress: The SBC will use to build the egress SDP offer the mode received in the ingress realm. So if the SBC received only RTP in the ingress realm, it will insert only RTP in the egress SDP, and if it received only SRTP in the ingress SDP, it will set the egress SDP to only SRTP.
- Simultaneous-best-effort: The SBC will insert additional SRTP description in the SDP if the ingress SDP contained only RTP and vice-versa, so the resultant SDP should contain both RTP and SRTP media profiles contained in 2 different media lines in the SDP.

```
# show running-config sdes-profile
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
    egress-offer-format                 same-as-ingress
    use-ingress-session-params          srtcp-encrypt
                                        srtp-auth
                                        srtp-encrypt
    mki                                 disabled
    key
    salt
```

```
(media-sec-policy)# show
media-sec-policy
        name                                    SRTP1
        pass-through                            disabled
        inbound
                profile                                 sdes1
                mode                                    any
                protocol                                SDES
        outbound
                profile                                 sdes1
                mode                                    any
                protocol                                SDES
(media-sec-policy)#
```

And this media-sec-policy should be applied under the realm where RTP+SRTP are desired:

```
realm-config
        identifier                      access1
        description
        addr-prefix                     0.0.0.0
        network-interfaces
                                        M00:0
…
        media-sec-policy                SRTP1
…
```

6 Notes on the Reference Configurations

The intention of this document is not to provide a full set of configurations, as the flexibility of the SRTP configuration makes valid a high number of different possible configurations. The objective is to present some common and valid configurations that have been tested and verified in Oracle labs.

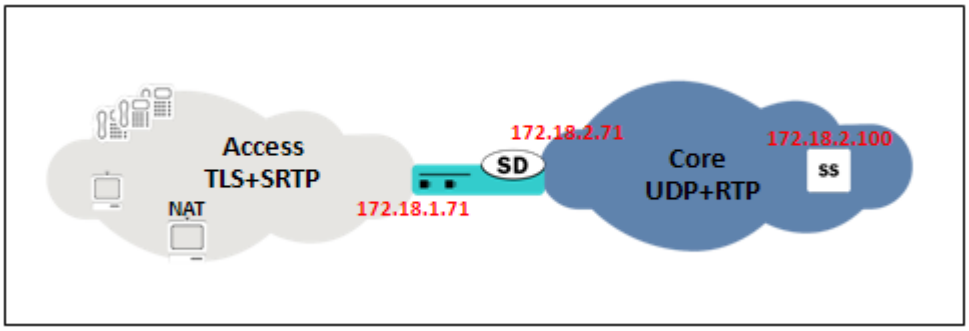
In the cases considered here, there is a considered "access" or "peer1A" network, in the 172.18.1.0/24 network, and a considered "core" or "peer1B" in the 172.18.2.0/24 network. In all cases SIP and media traffic runs on the same subnets.

To simplify the use of this BCP, no other elements are configured in this case, so no redundancy or DDoS prevention are configured in the configurations exposed. The configurations follow the guides of BCP for access (using policy based realm bridging) and peering scenarios. For TLS, it is assumed single-side authentication in all cases.

The configurations presented use SDES mechanism for SRTP encryption. No SRTP pass-through cases are presented here, as there is nothing required for the SBC to be transparent to the SRTP negotiation end-to-end.

6.1 Single-Ended SRTP Termination on secured networks.

This is the typical access scenario where SRTP is deployed completely in the access network, allowing the users to use TLS for SIP and SRTP for media. In the core network, UDP is used for SIP and RTP is used for media.



The IP used for SIP and SRTP in the SBC in the access network is 172.18.1.71, and the IP used for SIP and RTP in the core network is 172.18.2.71. The SIP Registrar/Proxy in the core network is in 172.18.2.100.

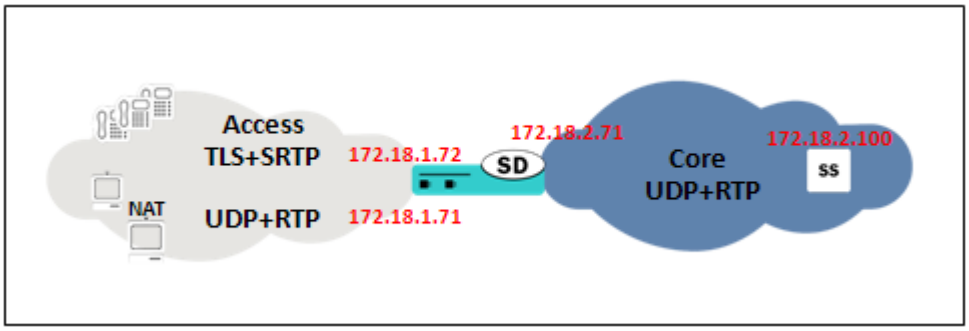
In this case, secured-network is set to DISABLED under the access sip-interface and ENABLED on the core sip-interface. Two media-sec-policies are created, one in the access network with mode=SRTP and one in the core with mode=RTP.

The sample configuration can be found in Appendix A

6.2 RTP and Single-Ended SRTP Termination on unsecured networks.

This is a very common architecture, where both RTP and SRTP endpoints reside in the access network, especially while in transition from RTP to SRTP. This means that both UDP/RTP and TLS/SRTP can be present in the access network. In the core network, UDP for SIP and RTP for media will be used.

In this case, in the access network we will use 172.18.1.71 for SIP traffic (UDP and TLS) and also for RTP traffic. 172.18.1.72 will be used for SRTP traffic. In the core network, 172.18.2.71 will be used for SIP and RTP. The SIP Proxy/Registrar uses 172.18.2.100.

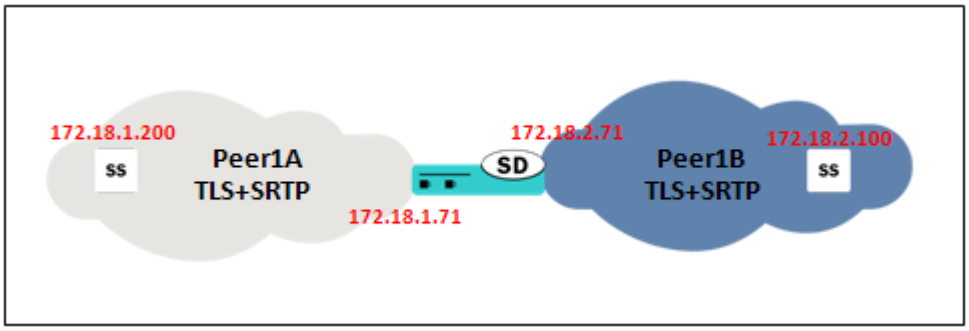


Secured-network parameter is set to ENABLED under the access sip-interface and ENABLED on the core sip-interface. Two media-sec-policies are created, one in the access network with mode=any and one in the core with mode=RTP. As in the access network both RTP and SRTP endpoints could be present, the egress-offer-format is set to simultaneous-best-effort.

The sample configuration can be found in Appendix B

6.3 Back-to-back SRTP Termination

Normally deployed in peering scenarios where SRTP is needed in both networks that the SBC is interconnecting. In that case, the Session Border Controller is doing SRTP termination so the SRTP key exchange is different in the two connected networks.



In the SBC, 172.18.1.71 will be used for SIP (TLS) and SRTP in the peer1A network, while 172.18.2.71 will be used in the 172.18.2.71.

The peer element sending traffic in the peer1A network will be in 172.18.1.200, while the peer element in the peer1B will be 172.18.2.100.

Secured-network is set to DISABLED under both sip-interfaces. Two media-sec-policies are created, one in the peer1A network with mode=SRTP and one in the peer1B with mode=SRTP, where each one is linked with a different SDES profile, to allow different cryptos between networks. Note that this is not required, and the same SDES profile could be used for both networks, the key exchange would keep different as the SBC would terminate the SRTP anyway, so configuring different SDES profiles would be only needed in the case where the crypto-suites supported in each network are different or have different characteristics.

7 Troubleshooting

A network capture taken on both access and core network should show RTP packets with the same sequence number, however, if SRTP termination is done in the SBC, the payload contained in RTP packets with the same sequence number will be different because of the encryption/unencryption done by the SBC.

To troubleshoot SRTP on the Session Border Controller, following commands can be used:

- "Show security srtp" commands show the security association created for SRTP encryption and its detailed information.
  - show security srtp <network_interface> debug/brief/detail/raw
    - Note there is a warning when these commands want to be run, as it should be done carefully in production systems:
      WARNING: This action might affect system performance and take a long time to finish.
      Are you sure [y/n]?:
  - Show security srtp status <network_interface>
  - Show security spd <network_interface>

```
# show security srtp sad M00 debug
WARNING: This action might affect system performance and take a long time to finish.
Are you sure [y/n]?: y
SRTP security-association-database for interface 'M00':
Displaying SA's that match the following criteria -
direction              : both
src-addr-prefix        : any
src-port               : any
dst-addr-prefix        : any
dst-port               : any
trans-proto            : ALL
Inbound:
destination-address    : 62.2.139.213
destination-port       : 10012
vlan-id                : 0
sal-index              : 2
sad-index              : 10
ssrc                   : 1514612894
encr-algo              : aes-128-ctr
auth-algo              : hmac-sha1
auth-tag-length        : 80
flags -
ms:  5489040, ls:      8
mtu                    : 1500
mki                    : 0
mki length             : 0
lifetime byte count -
ms: 0x      0, ls: 0x      0
packet count -
ms: 0x      0, ls: 0x    12F
roll over count        : 0
anti replay highest seq num : 11814
highest seq num        : 0
auth error count       : 0
anti replay count      : 0
mki mismatch count     : 0
```

```
ssrc mismatch count      : 1
```

```
# show security srtp sad M00 raw
WARNING: This action might affect system performance and take a long time to finish.
Are you sure [y/n]?: y
SRTP security-association-database for interface 'M00':
Displaying SA's that match the following criteria -
            direction              : both
            src-addr-prefix        : any
            src-port               : any
            dst-addr-prefix        : any
            dst-port               : any
            trans-proto            : ALL
Inbound:
 Index I                        VLN    P   <-- Masks -->  SAD  Next
       TP  Dest. IP Address    SPI   Pr  ID TS P V Pr VLN TS P V Index Link
 0000a 0 01 00000000 00000000 00000000 11 000 00 0 0 ff 000 00 0 0 0000a 00000
         00000000 d58b023e
 Index Flags MS Flags LS EX Flg  MTU SSRC     MKI      MKI Len  ROC
 0000a 05489040 00000008 00202a 05dc 5a47289e 00000000 00000000 00000000
      Master key:  f6 8e c5 af 6c af 96 72 64 78 04 97 14 44 c1 a9
      Master salt: 59 da 31 4d c2 3d 15 ca b6 3b 39 e1 27 2d
      E-IV:        59 da 31 4d 98 7a 3d 54 b6 3b 39 e1 27 2d 00 00
      HMAC ipad:   7a cc 93 f9 72 44 2d df ee df cc 89 3d a2 35 74 18 32 bb 25
      HMAC opad:   2b 6d cc 43 49 fa 65 8e 4a d2 03 50 90 00 9f 10 16 6d 1a 90
      Sequence Number   Anti-replay window (128 bits wide)
      00002f68          ffffffff ffffffff ffffffff ffffffff
      Life Byte Count  Packet Count     Auth Err Anti-replay Err
      0000000000000000 0000000000000271 00000000 00000000
      ICV Len HSN      MKI Mismatch SSRC Mismatch
      04      00000000 00000000     00000001
```

7.1 Debugging Info

Following is the list of commands to be used in order to get SRTP and ETC specific information.

1. show nat flow-info srtp statistics

This command will show the global statistics for all SRTP flows.

```
# show nat flow-info srtp statistics
PPM_ID_SRTP_E:
PPX Global Statistics
---------------------
       alloc_count             : 50
       dealloc_count           : 16
       input-packets           : 0
       output-packets          : 0
       sessions-count          : 2
       init-requests           : 4
       init-success            : 4
       init-fail               : 0
       modify-requests         : 0
       modify-success          : 0
       modify-fail             : 0
       delete-requests         : 2
```

```
        delete-success          : 2
        delete-fail             : 0
        query-requests          : 0
        query-success           : 0
        query-fail              : 0
        resources-error         : 0
        protect-fail            : 0
        unprotect-fail          : 0
        status-err              : 0
        bad-param               : 0
        alloc-fail              : 0
        dealloc-fail            : 0
        terminus                : 0
        auth-fail               : 0
        cipher-fail             : 0
        replay-fail             : 0
        replay-old              : 0
        algo-fail               : 0
        no-such-op              : 0
        no-ctx                  : 0
        cant-check              : 0
        key-expired             : 0
        nonce-bad               : 0
        read-failed             : 0
        write-failed            : 0
        parse-err               : 0
        encode-err              : 0
        pfkey-err               : 0
        mki-changed             : 0
        srtp-pkt-too-small      : 0
        srtcp-pkt-too-small     : 0

PPM_ID_SRTP_D:
PPX Global Statistics
---------------------
        alloc_count             : 50
        dealloc_count           : 16
        input-packets           : 0
        output-packets          : 0
        sessions-count          : 3
        init-requests           : 2
        init-success            : 2
        init-fail               : 0
        modify-requests         : 1
        modify-success          : 1
        modify-fail             : 0
        delete-requests         : 0
        delete-success          : 0
        delete-fail             : 0
        query-requests          : 0
        query-success           : 0
        query-fail              : 0
        resources-error         : 0
        protect-fail            : 0
        unprotect-fail          : 0
        status-err              : 0
        bad-param               : 0
        alloc-fail              : 0
        dealloc-fail            : 0
        terminus                : 0
        auth-fail               : 0
        cipher-fail             : 0
```

```
        replay-fail             : 0
        replay-old              : 0
        algo-fail               : 0
        no-such-op              : 0
        no-ctx                  : 0
        cant-check              : 0
        key-expired             : 0
        nonce-bad               : 0
        read-failed             : 0
        write-failed            : 0
        parse-err               : 0
        encode-err              : 0
        pfkey-err               : 0
        mki-changed             : 0
        srtp-pkt-too-small      : 0
        srtcp-pkt-too-small     : 0
```

2. show nat flow-info srtp by-addr 3.0.0.2 all

This command will show the crypto information details for a flow with the given source address. If "all" is used, the details for all the SRTP flows will be displayed. However, "all" does not display the statistics from the octeon srtp code.

```
# show nat flow-info srtp by-addr 3.0.0.2 all

Crypto Parameters 3.0.0.2:7001 -> 7.0.0.2:6058
==================

        Collapsed               : false
        SRTCP Only              : false
Crypto In
------------------
        destination-address     : 208.54.47.80
        destination-port        : 40000
        vlan-id                 : 632
        encr-algo               : aes-128-ctr
        auth-algo               : hmac-sha1
        auth-tag-length         : 32
                key index       : 0
                mki             : none
                roll-over-count : 0


---No Crypto Out---

PPM_ID_SRTP_D
PPX Statistics
--------------
Stream #1
        ssrc                    : 3879260980
        rtp-cipher-id           : AES-128-ICM
        rtp-auth-id             : HMAC-SHA1
        rtp-security-level      : Crypto + Auth
        rtp-total-packets       : 5423
        rtp-total-bytes         : 954448
        rtp-cipher-bytes        : 867680
        rtp-auth-bytes          : 932756
        rtcp-cipher-id          : AES-128-ICM
        rtcp-auth-id            : HMAC-SHA1
        rtcp-security-level     : Crypto + Auth
        rtcp-total-packets      : 0
        rtcp-total-bytes        : 0
        rtcp-cipher-bytes       : 0
```

```
      rtcp-auth-bytes         : 0
      key-lifetime            : 42949672954294961871
      direction               : Receiver

Crypto Parameters 3.0.0.2:7001 -> 7.0.0.2:6058
==================

      Collapsed               : false
      SRTCP Only              : true
Crypto In
------------------
      destination-address     : 208.54.47.80
      destination-port        : 40000
      vlan-id                 : 632
      encr-algo               : aes-128-ctr
      auth-algo               : hmac-sha1
      auth-tag-length         : 32
            key index         : 0
            mki               : none
            roll-over-count   : 0


---No Crypto Out---

PPM_ID_SRTP_D
PPX Statistics
--------------
Stream #1
      ssrc                    : 0
      rtp-cipher-id           : NULL
      rtp-auth-id             : NULL
      rtp-security-level      : None
      rtp-total-packets       : 0
      rtp-total-bytes         : 0
      rtp-cipher-bytes        : 0
      rtp-auth-bytes          : 0
      rtcp-cipher-id          : NULL
      rtcp-auth-id            : NULL
      rtcp-security-level     : None
      rtcp-total-packets      : 0
      rtcp-total-bytes        : 0
      rtcp-cipher-bytes       : 0
      rtcp-auth-bytes         : 0
      key-lifetime            : 0
      direction               : Unknown
```

3. show nat flow-info all

This command will show the crypto information for the SRTP flows. This command should not be executed in a production environment, since it dumps information of all the flows.

```
# show nat flow-info all
Output curtailed due to size.
. . . . . continued

-------------------------------------------------
SA_flow_key      : 7.0.0.2              SA_prefix : 32
DA_flow_key      : 10.176.28.218        DA_prefix : 32
SP_flow_key      : 6058                 SP_prefix : 16
DP_flow_key      : 40000                DP_prefix : 16
VLAN_flow_key    : 980
Protocol_flow_key : 17
Ingress_flow_key  : 1
```

```
Ingress Slot      : 1
Ingress Port      : 0
NAT IP Flow Type  : IPv4 to IPv4
XSA_data_entry    : 208.54.47.80
XDA_data_entry    : 3.0.0.2
XSP_data_entry    : 40000
XDP_data_entry    : 7001
Egress_data_entry : 0
Egress Slot       : 0
Egress Port       : 0
flow_action       : 0X1
optional_data     : 0
FPGA_handle       : 0x000000c1
assoc_FPGA_handle : 0x00000000
VLAN_data_entry   : 632
host_table_index  : 6
Switch ID         : 0x00000005
average-rate      : 0
weight            : 0x0
init_flow_guard   : 300
inact_flow_guard  : 300
max_flow_guard    : 86400
payload_type_2833 : 0
index_2833        : 0
pt_2833_egress    : 0
qos_vq_enabled    : 0
codec_type        : 0
HMU_handle        : 0
SRTP Crypto In    : NONE
SRTP Crypto Out   : AES_CM_128_HMAC_SHA1_32
-----------------------------------------------

   Input Link Parameters -  IFD Index: 0x5
   -----------------------------------------------
            IFD Byte Enable: false
            EPD Mode Enable: true
                  Retain: false
                ABJ Mode: true
              Disable Empty: false
            Ignore On Empty: false
                  TGID: 0x6
                 WRGID: 0x0
               TG Enable: true
              WRG Enable: false

   Output Link Parameters -  OFD Index: 0x5
   -----------------------------------------------
               shaped_flow: false
          latency_sensitive: false
                  pkt_mode: Packet Mode
        zero_min_credit_flow: false
            parent_pipe_num: 0x1
                    delta: 0x1
         flow_credit_min_exp: 0x0
         flow_credit_min_man: 0x0

IFD 0x00000005:       dropCount = 0x00000000


IFD 0x00000005:       acceptCount = 0x00001f35

-----------------------------------------------
```

4. show mbcd errors

This command will show counters for SRTP errors, including SRTP Flow Add Failed, SRTP Flow Delete Failed, and SRTP Flow Update Failed.

```
# show mbcd errors
22:29:33-160
MBC Errors/Events              ---- Lifetime ----
                        Recent      Total  PerMax
Client Errors                0          0       0
Client IPC Errors            0          0       0
Open Streams Failed          0          0       0
Drop Streams Failed          0          0       0
Exp Flow Events              1          1       1
Exp Flow Not Found           0          0       0
Transaction Timeouts         0          0       0

Server Errors                0          0       0
Server IPC Errors            0          0       0
Flow Add Failed              0          2       2
Flow Delete Failed           0          0       0
Flow Update Failed           0          0       0
Flow Latch Failed            0          0       0
Pending Flow Expired         0          0       0
ARP Wait Errors              0          0       0
Exp CAM Not Found            0          0       0
Drop Unknown Exp Flow        0          0       0
Drop/Exp Flow Missing        0          0       0
Exp Notify Failed            0          0       0
Unacknowledged Notify        0          0       0
Invalid Realm                0          0       0
No Ports Available           0          0       0
Insufficient Bandwidth       0          0       0
Stale Ports Reclaimed        0          0       0
Stale Flows Replaced         0          0       0
Telephone Events Gen         0          0       0
Pipe Alloc Errors            0          0       0
Pipe Write Errors            0          0       0
Not Found In Flows           0          0       0
SRTP Flow Add Failed         0          0       0
SRTP Flow Delete Faile       0          0       0
SRTP Flow Update Faile       0          0       0
SRTP Capacity Exceeded       0          0       0
```

5. show mbcd statistics

This command will show counters for number of active SRTP/SRTCP flows, as well as the number of SRTP Sessions maintained.

```
# show mbcd statistics
22:29:40-168
MBCD Status                 -- Period -- -------- Lifetime --------
                      Active    High   Total      Total  PerMax    High
Client Sessions            1       1       1          1       1       1
Client Trans               0       1       3          3       3       1
Contexts                   3       3       2          3       2       3
Flows                     14      14       3         14      11      14
Flow-Port                  2       2       2          2       2       2
Flow-NAT                  13      13       5         16      11      13
Flow-RTCP                  2       2       4          4       4       2
Flow-Hairpin               0       0       0          0       0       0
Flow-Released              0       0       0          0       0       0
MSM-Release                0       0       0          0       0       0
```

```
Rel-Port          0      0      0         0      0      0
Rel-Hairpin       0      0      0         0      0      0
NAT Entries       15     15     9         20     11     15
Free Ports        80000  80004  0         80004  80004  80004
Used Ports        4      4      4         4      4      4
Port Sorts        -      -      0         0      0
Queued Notify     0      0      0         0      0      0
MBC Trans         0      3      3         3      3      3
MBC Ignored       -      -      0         0      0
ARP Trans         0      0      0         0      0      0
Relatch NAT       0      0      0         0      0      0
Relatch RTCP      0      0      0         0      0      0
SRTP Only Flows   1      1      3         3      3      1
SRTCP Only Flow   3      3      3         3      3      3
SRTP Collapsed    0      0      0         0      0      0
SRTP Sessions     1      1      3         3      3      1

Flow Rate = 0.0
Load Rate = 0.0
```

6. show mbcd all

This command will show counters for number of active SRTP/SRTCP flows, as well as the number of SRTP Sessions maintained.

7. show sipd errors

This command will show the counter for number of SIP sessions that failed to setup due to problems related to SRTP signaling.

```
# show sipd errors
22:29:50-178
SIP Errors/Events          ---- Lifetime ----
                  Recent   Total  PerMax
SDP Offer Errors  0        0      0
SDP Answer Errors 0        0      0
Drop Media Errors 0        0      0
Transaction Errors 0       0      0
Application Errors 0       0      0
Media Exp Events  0        0      0
Early Media Exps  0        0      0
Exp Media Drops   0        0      0
Expired Sessions  0        0      0
Multiple OK Drops 0        0      0
Multiple OK Terms 0        0      0
Media Failure Drops 0      0      0
Non-ACK 2xx Drops 0        0      0
Invalid Requests  0        0      0
Invalid Responses 0        0      0
Invalid Messages  0        0      0
CAC Session Drop  0        0      0
Nsep User Exceeded 0       0      0
Nsep SA  Exceeded 0        0      0
CAC BW Drop       0        0      0
SRTP Errors       0        0      0
```

8. show security srtp sessions

This command will show the active srtp/srtcp sessions and the total allowed capacity of 10,000 sessions.

```
# show security srtp sessions
Capacity=10000
SRTP Sessions      -- Period -- ---- Lifetime ----
  Active   High   Total  Recent     Total  PerMax
     1     1      3      3          3      1
```

9. dump-etc-help

This command lists all the ETC related dump commands available on the system.

```
# dump-etc-help

      ETC Utility Help


dump-etc-crash                    - Dumps Octeon crash logs
dump-etc-wqe-err                  - Dumps Octeon WQE error logs
dump-etc-mem-stats                - Dumps Octeon memory stats
dump-etc-port-stats  <file> OR <reset> - Dumps Octeon port statistics
dump-etc-cmd-stats   <file> OR <reset> - Dumps Octeon command statistics
dump-etc-core-stats  <file> OR <reset> - Dumps Octeon core statistics
dump-etc-host-stats  <file> OR <reset> - Dumps Octeon host statistics
dump-etc-debug-stats <file> OR <reset> - Dumps Octeon debug statistics
dump-etc-ppm-stats   <file>       - Dumps Octeon ppm statistics
dump-etc-core-regs   <file>       - Dumps Octeon core registers
dump-etc-fpga        <file>       - Dumps Bender PHY FPGA statistics
dump-etc-stats                    - Dumps all of the Octeon stats
dump-etc-all                      - Dumps all of the above to file only


NOTE: If the file switch is chosen the utility will output to a file under /code
    The file name will be of the form 'command name.xz'. For example, a file
    dump-etc-cmd-stats.xz would be created if the command 'dump-etc-cmd-stats file' were
    to be entered.task done
```

10. dump-etc-all

This command dumps all of the octeon statistics to a file /ramdrv/dump-etc-all

11. show support-info

This command contains the following useful ETC related commands:

- show media host-stats
- show media host-stats
- show media classify
- dump-etc-stats
- ipt show all
- show ip connection
- show mbcd all

8 References

[1] Oracle Enterprise Session Border Controller ACLI Configuration Guide, Release S-Cz8.4.0 , June 2020

[2] Oracle Enterprise Session Border Controller Release Notes, Release S-Cz8.4.0 , June 2020..

[3] “RFC 3711, The Secure Real-time Transport Protocol (SRTP)"

[4] “RFC 4568, Session Description Protocol (SDP, Security Descriptions for Media Streams"

[5] “RFC 3264, An Offer/Answer Model with the Session Description Protocol (SDP)"

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APPENDIX A. Reference Configuration: Single-Ended SRTP Termination on secured networks

```
certificate-record
      name                    SDCert
      country                 US
      state                   MA
      locality                Burlington
      organization            Engineering
      unit
      common-name             172.18.1.71
      key-size                1024
      alternate-name
      trusted                 enabled
      key-usage-list
                              digitalSignature
                              keyEncipherment
      extended-key-usage-list
                              serverAuth
      options
      last-modified-by        admin@172.16.1.240
      last-modified-date      2010-09-07 12:14:20
local-policy
      from-address
                              *
      to-address
                              *
      source-realm
                              access
      description
      activate-time           N/A
      deactivate-time         N/A
      state                   enabled
      policy-priority         none
      last-modified-by        admin@172.16.1.240
      last-modified-date      2010-09-25 08:01:58
      policy-attribute
            next-hop          172.18.2.100
            realm             core
            action            none
            terminate-recursion     disabled
            carrier
            start-time        0000
            end-time          2400
            days-of-week      U-S
            cost              0
            app-protocol      SIP
            state             enabled
            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
        red-flow-port           1985
        red-mgcp-port           1986
        red-max-trans           10000
        red-sync-start-time     5000
        red-sync-comp-time      1000
        media-policing          enabled
        max-signaling-bandwidth 10000000
        max-untrusted-signaling 100
        min-untrusted-signaling 30
        app-signaling-bandwidth 0
        tolerance-window        30
        rtcp-rate-limit         0
        trap-on-demote-to-deny  enabled
        min-media-allocation    32000
        min-trusted-allocation  60000
        deny-allocation         32000
        anonymous-sdp           disabled
        arp-msg-bandwidth       32000
        fragment-msg-bandwidth  0
        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
        last-modified-by        admin@172.16.1.240
        last-modified-date      2010-08-03 11:50:27
network-interface
        name                    M00
        sub-port-id             0
        description
        hostname
        ip-address              172.18.1.71
        pri-utility-addr
        sec-utility-addr
        netmask                 255.255.255.0
        gateway                 172.18.1.1
        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
        hip-ip-list             172.18.1.71
        ftp-address
```

```
        icmp-address            172.18.1.71
        snmp-address
        telnet-address
        ssh-address
        last-modified-by        admin@172.16.1.240
        last-modified-date      2010-09-29 06:32:29
network-interface
        name                    M01
        sub-port-id             0
        description
        hostname
        ip-address              172.18.2.71
        pri-utility-addr
        sec-utility-addr
        netmask                 255.255.255.0
        gateway                 172.18.2.1
        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
        hip-ip-list             172.18.2.71
        ftp-address
        icmp-address            172.18.2.71
        snmp-address
        telnet-address
        ssh-address
        last-modified-by        admin@172.16.1.240
        last-modified-date      2010-09-29 06:33:52
phy-interface
        name                    M00
        operation-type          Media
        port                    0
        slot                    0
        virtual-mac
        admin-state             enabled
        auto-negotiation        enabled
        duplex-mode             FULL
        speed                   100
        overload-protection     disabled
        last-modified-by        admin@172.16.1.240
        last-modified-date      2010-08-03 11:00:33
phy-interface
        name                    M01
        operation-type          Media
        port                    0
        slot                    1
        virtual-mac
        admin-state             enabled
        auto-negotiation        enabled
        duplex-mode             FULL
        speed                   100
        overload-protection     disabled
        last-modified-by        admin@172.16.1.240
        last-modified-date      2010-09-29 06:32:01
```

```
realm-config
        identifier                      access
        description
        addr-prefix                     0.0.0.0
        network-interfaces
                                        M00:0
        mm-in-realm                     enabled
        mm-in-network                   enabled
        mm-same-ip                      enabled
        mm-in-system                    enabled
        bw-cac-non-mm                   disabled
        msm-release                     disabled
        qos-enable                      disabled
        generate-UDP-checksum           disabled
        max-bandwidth                   0
        fallback-bandwidth              0
        max-priority-bandwidth          0
        max-latency                     0
        max-jitter                      0
        max-packet-loss                 0
        observ-window-size              0
        parent-realm
        dns-realm
        media-policy
        media-sec-policy                SRTP
        in-translationid
        out-translationid
        in-manipulationid
        out-manipulationid
        manipulation-string
        manipulation-pattern
        class-profile
        average-rate-limit              0
        access-control-trust-level      none
        invalid-signal-threshold        0
        maximum-signal-threshold        0
        untrusted-signal-threshold      0
        nat-trust-threshold             0
        deny-period                     30
        ext-policy-svr
        symmetric-latching              disabled
        pai-strip                       disabled
        trunk-context
        early-media-allow
        enforcement-profile
        additional-prefixes
        restricted-latching             none
        restriction-mask                32
        accounting-enable               enabled
        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
        net-management-control          disabled
        delay-media-update              disabled
        refer-call-transfer             disabled
        dyn-refer-term                  disabled
        codec-policy
        codec-manip-in-realm            disabled
```

```
        constraint-name
        call-recording-server-id
        xnq-state                     xnq-unknown
        hairpin-id                    0
        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
        match-media-profiles
        qos-constraint
        sip-profile
        sip-isup-profile
        block-rtcp                    disabled
        hide-egress-media-update      disabled
        last-modified-by              admin@172.16.1.240
        last-modified-date            2010-09-08 11:20:12
realm-config
        identifier                    core
        description
        addr-prefix                   0.0.0.0
        network-interfaces
                                      M01:0
        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
        generate-UDP-checksum         disabled
        max-bandwidth                 0
        fallback-bandwidth            0
        max-priority-bandwidth        0
        max-latency                   0
        max-jitter                    0
        max-packet-loss               0
        observ-window-size            0
        parent-realm
        dns-realm
        media-policy
        media-sec-policy              removeCrypto
        in-translationid
        out-translationid
        in-manipulationid
        out-manipulationid
        manipulation-string
        manipulation-pattern
        class-profile
        average-rate-limit            0
        access-control-trust-level    none
        invalid-signal-threshold      0
        maximum-signal-threshold      0
        untrusted-signal-threshold    0
        nat-trust-threshold           0
        deny-period                   30
        ext-policy-svr
        symmetric-latching            disabled
        pai-strip                     disabled
        trunk-context
        early-media-allow
        enforcement-profile
```

```
        additional-prefixes
        restricted-latching           none
        restriction-mask              32
        accounting-enable             enabled
        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
        net-management-control        disabled
        delay-media-update            disabled
        refer-call-transfer           disabled
        dyn-refer-term                disabled
        codec-policy
        codec-manip-in-realm          disabled
        constraint-name
        call-recording-server-id
        xnq-state                     xnq-unknown
        hairpin-id                    0
        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
        match-media-profiles
        qos-constraint
        sip-profile
        sip-isup-profile
        block-rtcp                    disabled
        hide-egress-media-update      disabled
        last-modified-by              admin@172.16.1.240
        last-modified-date            2010-09-08 11:57:07
session-agent
        hostname                      172.18.2.100
        ip-address                    172.18.2.100
        port                          5070
        state                         enabled
        app-protocol                  SIP
        app-type
        transport-method              UDP
        realm-id                      core
        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                0
        ping-send-mode               keep-alive
        ping-all-addresses           disabled
        ping-in-service-response-codes
        out-service-response-codes
        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
        li-trust-me                  disabled
        in-manipulationid
        out-manipulationid
        manipulation-string
        manipulation-pattern
        p-asserted-id
        trunk-group
        max-register-sustain-rate    0
        early-media-allow
        invalidate-registrations     disabled
        rfc2833-mode                 none
        rfc2833-payload              0
        codec-policy
        enforcement-profile
        refer-call-transfer          disabled
        reuse-connections            NONE
        tcp-keepalive                none
        tcp-reconn-interval          0
        max-register-burst-rate      0
        register-burst-window        0
        sip-profile
        sip-isup-profile
        last-modified-by             admin@172.16.1.240
        last-modified-date           2010-09-25 08:01:12
sip-config
        state                        enabled
        operation-mode               dialog
        dialog-transparency          disabled
        home-realm-id                core
        egress-realm-id
        nat-mode                     None
        registrar-domain             *
        registrar-host               *
        registrar-port               5060
        register-service-route       always
        init-timer                   500
        max-timer                    4000
        trans-expire                 32
        invite-expire                180
```

```
        inactive-dynamic-conn       32
        enforcement-profile
        pac-method
        pac-interval                10
        pac-strategy                PropDist
        pac-load-weight             1
        pac-session-weight          1
        pac-route-weight            1
        pac-callid-lifetime         600
        pac-user-lifetime           3600
        red-sip-port                1988
        red-max-trans               10000
        red-sync-start-time         5000
        red-sync-comp-time          1000
        add-reason-header           disabled
        sip-message-len             4096
        enum-sag-match              disabled
        extra-method-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
        options
        refer-src-routing           disabled
        add-ucid-header             disabled
        pass-gruu-contact           disabled
        sag-lookup-on-redirect      disabled
        last-modified-by            admin@172.16.1.240
        last-modified-date          2010-09-25 10:16:17
sip-interface
        state                       enabled
        realm-id                    access
        description
        sip-port
                address             172.18.1.71
                port                5061
                transport-protocol  TLS
                tls-profile         SDCert
                allow-anonymous     registered
                ims-aka-profile
        carriers
        trans-expire                0
        invite-expire               0
        max-redirect-contacts       0
        proxy-mode
        redirect-action
        contact-mode                none
        nat-traversal               always
        nat-interval                30
        tcp-nat-interval            90
        registration-caching        enabled
        min-reg-expire              300
        registration-interval       3600
        route-to-registrar          enabled
        secured-network             disabled
        teluri-scheme               disabled
        uri-fqdn-domain
        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
        manipulation-string
        manipulation-pattern
        sip-ims-feature                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
        default-location-string
        charging-vector-mode           pass
        charging-function-address-mode pass
        ccf-address
        ecf-address
        term-tgrp-mode                 none
        implicit-service-route         disabled
        rfc2833-payload                101
        rfc2833-mode                   preferred
        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
        sip-profile
        sip-isup-profile
        last-modified-by               admin@172.16.1.240
        last-modified-date             2010-09-25 12:07:23
sip-interface
        state                          enabled
        realm-id                       core
        description
        sip-port
                address                172.18.2.71
                port                   5060
                transport-protocol     UDP
                tls-profile
                allow-anonymous        agents-only
                ims-aka-profile
        carriers
        trans-expire                   0
        invite-expire                  0
        max-redirect-contacts          0
        proxy-mode
        redirect-action
        contact-mode                   none
        nat-traversal                  none
        nat-interval                   30
        tcp-nat-interval               90
        registration-caching           disabled
        min-reg-expire                 300
```

```
        registration-interval       3600
        route-to-registrar          disabled
        secured-network             enabled
        teluri-scheme               disabled
        uri-fqdn-domain
        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
        manipulation-string
        manipulation-pattern
        sip-ims-feature             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
        default-location-string
        charging-vector-mode        pass
        charging-function-address-mode pass
        ccf-address
        ecf-address
        term-tgrp-mode              none
        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
        sip-profile
        sip-isup-profile
        last-modified-by            admin@172.16.1.240
        last-modified-date          2010-09-19 14:33:05
steering-pool
        ip-address                  172.18.1.71
        start-port                  20000
        end-port                    49999
        realm-id                    access
        network-interface
        last-modified-by            admin@172.16.1.240
        last-modified-date          2010-08-03 11:44:49
steering-pool
        ip-address                  172.18.2.71
        start-port                  20000
        end-port                    49999
        realm-id                    core
        network-interface
```

```
        last-modified-by             admin@172.16.1.240
        last-modified-date           2010-09-29 06:35:12
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
        call-trace                   disabled
        internal-trace               disabled
        log-filter                   all
        default-gateway              172.18.1.1
        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
        default-v6-gateway           ::
        ipv6-support                 disabled
        last-modified-by             admin@172.16.1.240
        last-modified-date           2010-09-10 12:25:16
tls-profile
        name                         SDCert
        end-entity-certificate       SDCert
        trusted-ca-certificates
        cipher-list
                                     ALL
        verify-depth                 10
        mutual-authenticate          disabled
        tls-version                  compatibility
        cert-status-check            disabled
        cert-status-profile-list
```

```
        last-modified-by                admin@172.16.1.240
        last-modified-date              2010-09-07 12:18:56
media-sec-policy
        name                    SRTP
        pass-through            disabled
        inbound
                profile                 sdes1
                mode                    srtp
                protocol                sdes
        outbound
                profile                 sdes1
                mode                    srtp
                protocol                sdes
        last-modified-by        admin@172.16.1.240
        last-modified-date      2010-09-08 11:17:33
media-sec-policy
        name                    removeCrypto
        pass-through            disabled
        inbound
                profile
                mode                    rtp
                protocol                none
        outbound
                profile
                mode                    rtp
                protocol                none
        last-modified-by        admin@172.16.1.240
        last-modified-date      2010-09-08 11:56:09
sdes-profile
                name                            sdes1
                crypto-list                     AES_CM_128_HMAC_SHA1_80
                srtp-auth                       enabled
                srtp-encrypt                    enabled
                srtcp-encrypt                   enabled
                egress-offer-format                     same-as-ingress
                use-ingress-session-params      srtcp-encrypt
                                                srtp-auth
                                        srtp-encrypt
        mki                             disabled
                key
                salt
                last-modified-by                admin@172.16.1.240
                last-modified-date              2010-09-25 08:18:51
```

APPENDIX B. Reference Configuration: RTP and Single-Ended SRTP Termination on unsecured networks

```
certificate-record
      name                    SDCert
      country                 US
      state                   MA
      locality                Burlington
      organization            Engineering
      unit
      common-name               172.18.1.71
      key-size                1024
      alternate-name
      trusted                 enabled
      key-usage-list
                              digitalSignature
                              keyEncipherment
      extended-key-usage-list
                              serverAuth
      options
      last-modified-by        admin@172.16.1.240
      last-modified-date      2010-09-07 12:14:20
local-policy
      from-address
                              *
      to-address
                              *
      source-realm
                              access
      description
      activate-time           N/A
      deactivate-time         N/A
      state                   enabled
      policy-priority         none
      last-modified-by        admin@172.16.1.240
      last-modified-date      2010-09-25 08:01:58
      policy-attribute
            next-hop            172.18.2.100
            realm               core
            action              none
            terminate-recursion       disabled
            carrier
            start-time          0000
            end-time            2400
            days-of-week          U-S
            cost                0
            app-protocol          SIP
            state               enabled
            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
        red-flow-port           1985
        red-mgcp-port           1986
        red-max-trans           10000
        red-sync-start-time     5000
        red-sync-comp-time      1000
        media-policing          enabled
        max-signaling-bandwidth 10000000
        max-untrusted-signaling 100
        min-untrusted-signaling 30
        app-signaling-bandwidth 0
        tolerance-window        30
        rtcp-rate-limit         0
        trap-on-demote-to-deny  enabled
        min-media-allocation    32000
        min-trusted-allocation  60000
        deny-allocation         32000
        anonymous-sdp           disabled
        arp-msg-bandwidth       32000
        fragment-msg-bandwidth  0
        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
        last-modified-by        admin@172.16.1.240
        last-modified-date      2010-08-03 11:50:27
network-interface
        name                    M00
        sub-port-id             0
        description
        hostname
        ip-address              172.18.1.71
        pri-utility-addr
        sec-utility-addr
        netmask                 255.255.255.0
        gateway                 172.18.1.1
        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
        hip-ip-list             172.18.1.71
        ftp-address
```

```
        icmp-address            172.18.1.71
        snmp-address
        telnet-address
        ssh-address
        last-modified-by        admin@172.16.1.240
        last-modified-date      2010-09-29 06:32:29
network-interface
        name                    M01
        sub-port-id             0
        description
        hostname
        ip-address              172.18.2.71
        pri-utility-addr
        sec-utility-addr
        netmask                 255.255.255.0
        gateway                 172.18.2.1
        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
        hip-ip-list             172.18.2.71
        ftp-address
        icmp-address            172.18.2.71
        snmp-address
        telnet-address
        ssh-address
        last-modified-by        admin@172.16.1.240
        last-modified-date      2010-09-29 06:33:52
phy-interface
        name                    M00
        operation-type          Media
        port                    0
        slot                    0
        virtual-mac
        admin-state             enabled
        auto-negotiation        enabled
        duplex-mode             FULL
        speed                   100
        overload-protection     disabled
        last-modified-by        admin@172.16.1.240
        last-modified-date      2010-08-03 11:00:33
phy-interface
        name                    M01
        operation-type          Media
        port                    0
        slot                    1
        virtual-mac
        admin-state             enabled
        auto-negotiation        enabled
        duplex-mode             FULL
        speed                   100
        overload-protection     disabled
        last-modified-by        admin@172.16.1.240
        last-modified-date      2010-09-29 06:32:01
```

```
realm-config
        identifier                      access
        description
        addr-prefix                     0.0.0.0
        network-interfaces
                                        M00:0
        mm-in-realm                     enabled
        mm-in-network                   enabled
        mm-same-ip                      enabled
        mm-in-system                    enabled
        bw-cac-non-mm                   disabled
        msm-release                     disabled
        qos-enable                      disabled
        generate-UDP-checksum           disabled
        max-bandwidth                   0
        fallback-bandwidth              0
        max-priority-bandwidth          0
        max-latency                     0
        max-jitter                      0
        max-packet-loss                 0
        observ-window-size              0
        parent-realm
        dns-realm
        media-policy
        media-sec-policy                SRTP
        in-translationid
        out-translationid
        in-manipulationid
        out-manipulationid
        manipulation-string
        manipulation-pattern
        class-profile
        average-rate-limit              0
        access-control-trust-level      none
        invalid-signal-threshold        0
        maximum-signal-threshold        0
        untrusted-signal-threshold      0
        nat-trust-threshold             0
        deny-period                     30
        ext-policy-svr
        symmetric-latching              disabled
        pai-strip                       disabled
        trunk-context
        early-media-allow
        enforcement-profile
        additional-prefixes
        restricted-latching             none
        restriction-mask                32
        accounting-enable               enabled
        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
        net-management-control          disabled
        delay-media-update              disabled
        refer-call-transfer             disabled
        dyn-refer-term                  disabled
        codec-policy
        codec-manip-in-realm            disabled
```

```
        constraint-name
        call-recording-server-id
        xnq-state                     xnq-unknown
        hairpin-id                    0
        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
        match-media-profiles
        qos-constraint
        sip-profile
        sip-isup-profile
        block-rtcp                    disabled
        hide-egress-media-update      disabled
        last-modified-by              admin@172.16.1.240
        last-modified-date            2010-09-08 11:20:12
realm-config
        identifier                    core
        description
        addr-prefix                   0.0.0.0
        network-interfaces
                                      M01:0
        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
        generate-UDP-checksum         disabled
        max-bandwidth                 0
        fallback-bandwidth            0
        max-priority-bandwidth        0
        max-latency                   0
        max-jitter                    0
        max-packet-loss               0
        observ-window-size            0
        parent-realm
        dns-realm
        media-policy
        media-sec-policy              removeCrypto
        in-translationid
        out-translationid
        in-manipulationid
        out-manipulationid
        manipulation-string
        manipulation-pattern
        class-profile
        average-rate-limit            0
        access-control-trust-level    none
        invalid-signal-threshold      0
        maximum-signal-threshold      0
        untrusted-signal-threshold    0
        nat-trust-threshold           0
        deny-period                   30
        ext-policy-svr
        symmetric-latching            disabled
        pai-strip                     disabled
        trunk-context
        early-media-allow
        enforcement-profile
```

```
        additional-prefixes
        restricted-latching           none
        restriction-mask              32
        accounting-enable             enabled
        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
        net-management-control        disabled
        delay-media-update            disabled
        refer-call-transfer           disabled
        dyn-refer-term                disabled
        codec-policy
        codec-manip-in-realm          disabled
        constraint-name
        call-recording-server-id
        xnq-state                     xnq-unknown
        hairpin-id                    0
        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
        match-media-profiles
        qos-constraint
        sip-profile
        sip-isup-profile
        block-rtcp                    disabled
        hide-egress-media-update      disabled
        last-modified-by              admin@172.16.1.240
        last-modified-date            2010-09-08 11:57:07
session-agent
        hostname                      172.18.2.100
        ip-address                    172.18.2.100
        port                          5070
        state                         enabled
        app-protocol                  SIP
        app-type
        transport-method              UDP
        realm-id                      core
        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                0
        ping-send-mode               keep-alive
        ping-all-addresses           disabled
        ping-in-service-response-codes
        out-service-response-codes
        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
        li-trust-me                  disabled
        in-manipulationid
        out-manipulationid
        manipulation-string
        manipulation-pattern
        p-asserted-id
        trunk-group
        max-register-sustain-rate    0
        early-media-allow
        invalidate-registrations     disabled
        rfc2833-mode                 none
        rfc2833-payload              0
        codec-policy
        enforcement-profile
        refer-call-transfer          disabled
        reuse-connections            NONE
        tcp-keepalive                none
        tcp-reconn-interval          0
        max-register-burst-rate      0
        register-burst-window        0
        sip-profile
        sip-isup-profile
        last-modified-by             admin@172.16.1.240
        last-modified-date           2010-09-25 08:01:12
sip-config
        state                        enabled
        operation-mode               dialog
        dialog-transparency          disabled
        home-realm-id                core
        egress-realm-id
        nat-mode                     None
        registrar-domain             *
        registrar-host               *
        registrar-port               5060
        register-service-route       always
        init-timer                   500
        max-timer                    4000
        trans-expire                 32
        invite-expire                180
```

```
        inactive-dynamic-conn       32
        enforcement-profile
        pac-method
        pac-interval                10
        pac-strategy                PropDist
        pac-load-weight             1
        pac-session-weight          1
        pac-route-weight            1
        pac-callid-lifetime         600
        pac-user-lifetime           3600
        red-sip-port                1988
        red-max-trans               10000
        red-sync-start-time         5000
        red-sync-comp-time          1000
        add-reason-header           disabled
        sip-message-len             4096
        enum-sag-match              disabled
        extra-method-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
        options
        refer-src-routing           disabled
        add-ucid-header             disabled
        pass-gruu-contact           disabled
        sag-lookup-on-redirect      disabled
        last-modified-by            admin@172.16.1.240
        last-modified-date          2010-09-25 10:16:17
sip-interface
        state                       enabled
        realm-id                    access
        description
        sip-port
                address             172.18.1.71
                port                5061
                transport-protocol  TLS
                tls-profile         SDCert
                allow-anonymous     registered
                ims-aka-profile
        sip-port
                address             172.18.1.71
                port                5060
                transport-protocol  UDP
                tls-profile
                allow-anonymous     registered
                ims-aka-profile

        carriers
        trans-expire                0
        invite-expire               0
        max-redirect-contacts       0
        proxy-mode
        redirect-action
        contact-mode                none
        nat-traversal               always
        nat-interval                30
        tcp-nat-interval            90
        registration-caching        enabled
        min-reg-expire              300
        registration-interval       3600
```

```
        route-to-registrar          enabled
        secured-network             enabled
        teluri-scheme               disabled
        uri-fqdn-domain
        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
        manipulation-string
        manipulation-pattern
        sip-ims-feature             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
        default-location-string
        charging-vector-mode        pass
        charging-function-address-mode pass
        ccf-address
        ecf-address
        term-tgrp-mode              none
        implicit-service-route      disabled
        rfc2833-payload             101
        rfc2833-mode                preferred
        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
        sip-profile
        sip-isup-profile
        last-modified-by            admin@172.16.1.240
        last-modified-date          2010-09-25 12:07:23
sip-interface
        state                       enabled
        realm-id                    core
        description
        sip-port
                address             172.18.2.71
                port                5060
                transport-protocol  UDP
                tls-profile
                allow-anonymous     agents-only
                ims-aka-profile
        carriers
        trans-expire                0
        invite-expire               0
        max-redirect-contacts       0
```

```
        proxy-mode
        redirect-action
        contact-mode            none
        nat-traversal           none
        nat-interval            30
        tcp-nat-interval        90
        registration-caching    disabled
        min-reg-expire          300
        registration-interval   3600
        route-to-registrar      disabled
        secured-network         enabled
        teluri-scheme           disabled
        uri-fqdn-domain
        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
        manipulation-string
        manipulation-pattern
        sip-ims-feature         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
        default-location-string
        charging-vector-mode    pass
        charging-function-address-mode pass
        ccf-address
        ecf-address
        term-tgrp-mode          none
        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
        sip-profile
        sip-isup-profile
        last-modified-by        admin@172.16.1.240
        last-modified-date      2010-09-19 14:33:05
steering-pool
        ip-address              172.18.1.71
        start-port              20000
        end-port                49999
        realm-id                access
        network-interface
```

```
        last-modified-by            admin@172.16.1.240
        last-modified-date          2010-08-03 11:44:49
steering-pool
        ip-address                  172.18.2.71
        start-port                  20000
        end-port                    49999
        realm-id                    core
        network-interface
        last-modified-by            admin@172.16.1.240
        last-modified-date          2010-09-29 06:35:12
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
        call-trace                  disabled
        internal-trace              disabled
        log-filter                  all
        default-gateway             172.18.1.1
        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
        default-v6-gateway          ::
        ipv6-support                disabled
        last-modified-by            admin@172.16.1.240
        last-modified-date          2010-09-10 12:25:16
tls-profile
        name                        SDCert
        end-entity-certificate      SDCert
```

```
        trusted-ca-certificates
        cipher-list
                                ALL
        verify-depth                10
        mutual-authenticate         disabled
        tls-version                 compatibility
        cert-status-check           disabled
        cert-status-profile-list
        last-modified-by            admin@172.16.1.240
        last-modified-date          2010-09-07 12:18:56

media-sec-policy
        name                    SRTP
        pass-through            disabled
        inbound
                profile         sdes1
                mode            any
                protocol        sdes
        outbound
                profile         sdes1
                mode            any
                protocol        sdes
        last-modified-by        admin@172.16.1.240
        last-modified-date      2010-09-08 11:17:33
media-sec-policy
        name                    removeCrypto
        pass-through            disabled
        inbound
                profile
                mode            rtp
                protocol        none
        outbound
                profile
                mode            rtp
                protocol        none
        last-modified-by        admin@172.16.1.240
        last-modified-date      2010-09-08 11:56:09
sdes-profile
                name                            sdes1
                crypto-list                     AES_CM_128_HMAC_SHA1_80
                srtp-auth                       enabled
                srtp-encrypt                    enabled
                srtcp-encrypt                   enabled
                egress-offer-format                     simultaneous-best-effort
                use-ingress-session-params      srtcp-encrypt
                                                srtp-auth
                                        srtp-encrypt
        mki                             disabled
                key
                salt
                last-modified-by                admin@172.16.1.240
                last-modified-date              2010-09-25 08:18:51
```

APPENDIX C. Reference Configuration: Back-to-Back SRTP Termination

```
certificate-record
      name                    SDCert
      country                 US
      state                   MA
      locality                Burlington
      organization            Engineering
      unit
      common-name             172.18.1.71
      key-size                1024
      alternate-name
      trusted                 enabled
      key-usage-list
                              digitalSignature
                              keyEncipherment
      extended-key-usage-list
                              serverAuth
      options
      last-modified-by        admin@172.16.1.240
      last-modified-date      2010-09-07 12:14:20
certificate-record
      name                    SDCertII
      country                 US
      state                   MA
      locality                Burlington
      organization            Engineering
      unit
      common-name             172.18.2.71
      key-size                1024
      alternate-name
      trusted                 enabled
      key-usage-list
                              digitalSignature
                              keyEncipherment
      extended-key-usage-list
                              serverAuth
      options
      last-modified-by        admin@172.16.1.240
      last-modified-date      2010-09-07 12:14:20
local-policy
      from-address
                              *
      to-address
                              *
      source-realm
                              peer1A
      description
      activate-time           N/A
      deactivate-time         N/A
      state                   enabled
      policy-priority         none
      last-modified-by        admin@172.16.1.240
      last-modified-date      2010-09-25 08:01:58
      policy-attribute
            next-hop          172.18.2.100
```

```
            realm                   peer1B
            action                  none
            terminate-recursion         disabled
            carrier
            start-time              0000
            end-time                2400
            days-of-week              U-S
            cost                    0
            app-protocol              SIP
            state                   enabled
            methods
            media-profiles
            lookup                  single
            next-key
            eloc-str-lkup             disabled
            eloc-str-match
local-policy
      from-address
                        *
      to-address
                        *
      source-realm
                        peer1B
      description
      activate-time             N/A
      deactivate-time           N/A
      state                   enabled
      policy-priority           none
      last-modified-by          admin@172.16.1.240
      last-modified-date        2010-09-25 08:01:58
      policy-attribute
            next-hop                172.18.1.200
            realm                   peer1A
            action                  none
            terminate-recursion         disabled
            carrier
            start-time              0000
            end-time                2400
            days-of-week              U-S
            cost                    0
            app-protocol              SIP
            state                   enabled
            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
      red-flow-port             1985
```

```
        red-mgcp-port            1986
        red-max-trans            10000
        red-sync-start-time      5000
        red-sync-comp-time       1000
        media-policing           enabled
        max-signaling-bandwidth  10000000
        max-untrusted-signaling  100
        min-untrusted-signaling  30
        app-signaling-bandwidth  0
        tolerance-window         30
        rtcp-rate-limit          0
        trap-on-demote-to-deny   enabled
        min-media-allocation     32000
        min-trusted-allocation   60000
        deny-allocation          32000
        anonymous-sdp            disabled
        arp-msg-bandwidth        32000
        fragment-msg-bandwidth   0
        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
        last-modified-by         admin@172.16.1.240
        last-modified-date       2010-08-03 11:50:27
network-interface
        name                     M00
        sub-port-id              0
        description
        hostname
        ip-address               172.18.1.71
        pri-utility-addr
        sec-utility-addr
        netmask                  255.255.255.0
        gateway                  172.18.1.1
        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
        hip-ip-list              172.18.1.71
        ftp-address
        icmp-address             172.18.1.71
        snmp-address
        telnet-address
        ssh-address
        last-modified-by         admin@172.16.1.240
        last-modified-date       2010-09-29 06:32:29
network-interface
        name                     M01
        sub-port-id              0
        description
        hostname
        ip-address               172.18.2.71
```

```
        pri-utility-addr
        sec-utility-addr
        netmask                 255.255.255.0
        gateway                 172.18.2.1
        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
        hip-ip-list             172.18.2.71
        ftp-address
        icmp-address            172.18.2.71
        snmp-address
        telnet-address
        ssh-address
        last-modified-by        admin@172.16.1.240
        last-modified-date      2010-09-29 06:33:52
phy-interface
        name                    M00
        operation-type          Media
        port                    0
        slot                    0
        virtual-mac
        admin-state             enabled
        auto-negotiation        enabled
        duplex-mode             FULL
        speed                   100
        overload-protection     disabled
        last-modified-by        admin@172.16.1.240
        last-modified-date      2010-08-03 11:00:33
phy-interface
        name                    M01
        operation-type          Media
        port                    0
        slot                    1
        virtual-mac
        admin-state             enabled
        auto-negotiation        enabled
        duplex-mode             FULL
        speed                   100
        overload-protection     disabled
        last-modified-by        admin@172.16.1.240
        last-modified-date      2010-09-29 06:32:01
realm-config
        identifier              peer1A
        description
        addr-prefix             0.0.0.0
        network-interfaces
                                M00:0
        mm-in-realm             enabled
        mm-in-network           enabled
        mm-same-ip              enabled
        mm-in-system            enabled
        bw-cac-non-mm           disabled
        msm-release             disabled
```

```
    qos-enable                  disabled
    generate-UDP-checksum       disabled
    max-bandwidth               0
    fallback-bandwidth          0
    max-priority-bandwidth      0
    max-latency                 0
    max-jitter                  0
    max-packet-loss             0
    observ-window-size          0
    parent-realm
    dns-realm
    media-policy
    media-sec-policy            SRTPA
    in-translationid
    out-translationid
    in-manipulationid
    out-manipulationid
    manipulation-string
    manipulation-pattern
    class-profile
    average-rate-limit          0
    access-control-trust-level  none
    invalid-signal-threshold    0
    maximum-signal-threshold    0
    untrusted-signal-threshold  0
    nat-trust-threshold         0
    deny-period                 30
    ext-policy-svr
    symmetric-latching          disabled
    pai-strip                   disabled
    trunk-context
    early-media-allow
    enforcement-profile
    additional-prefixes
    restricted-latching         none
    restriction-mask            32
    accounting-enable           enabled
    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
    net-management-control      disabled
    delay-media-update          disabled
    refer-call-transfer         disabled
    dyn-refer-term              disabled
    codec-policy
    codec-manip-in-realm        disabled
    constraint-name
    call-recording-server-id
    xnq-state                   xnq-unknown
    hairpin-id                  0
    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
    match-media-profiles
    qos-constraint
    sip-profile
```

```
        sip-isup-profile
        block-rtcp                    disabled
        hide-egress-media-update      disabled
        last-modified-by              admin@172.16.1.240
        last-modified-date            2010-09-08 11:20:12
realm-config
        identifier                    peer1B
        description
        addr-prefix                   0.0.0.0
        network-interfaces
                                      M01:0
        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
        generate-UDP-checksum         disabled
        max-bandwidth                 0
        fallback-bandwidth            0
        max-priority-bandwidth        0
        max-latency                   0
        max-jitter                    0
        max-packet-loss               0
        observ-window-size            0
        parent-realm
        dns-realm
        media-policy
        media-sec-policy              SRTPB
        in-translationid
        out-translationid
        in-manipulationid
        out-manipulationid
        manipulation-string
        manipulation-pattern
        class-profile
        average-rate-limit            0
        access-control-trust-level    none
        invalid-signal-threshold      0
        maximum-signal-threshold      0
        untrusted-signal-threshold    0
        nat-trust-threshold           0
        deny-period                   30
        ext-policy-svr
        symmetric-latching            disabled
        pai-strip                     disabled
        trunk-context
        early-media-allow
        enforcement-profile
        additional-prefixes
        restricted-latching           none
        restriction-mask              32
        accounting-enable             enabled
        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
        net-management-control        disabled
```

```
        delay-media-update            disabled
        refer-call-transfer           disabled
        dyn-refer-term                disabled
        codec-policy
        codec-manip-in-realm          disabled
        constraint-name
        call-recording-server-id
        xnq-state                     xnq-unknown
        hairpin-id                    0
        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
        match-media-profiles
        qos-constraint
        sip-profile
        sip-isup-profile
        block-rtcp                    disabled
        hide-egress-media-update      disabled
        last-modified-by              admin@172.16.1.240
        last-modified-date            2010-09-08 11:57:07
session-agent
        hostname                      172.18.2.100
        ip-address                    172.18.2.100
        port                          5060
        state                         enabled
        app-protocol                  SIP
        app-type
        transport-method              TLS
        realm-id                      peer1B
        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                 0
        ping-send-mode                keep-alive
        ping-all-addresses            disabled
```

```
        ping-in-service-response-codes
        out-service-response-codes
        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
        li-trust-me             disabled
        in-manipulationid
        out-manipulationid
        manipulation-string
        manipulation-pattern
        p-asserted-id
        trunk-group
        max-register-sustain-rate       0
        early-media-allow
        invalidate-registrations        disabled
        rfc2833-mode            none
        rfc2833-payload         0
        codec-policy
        enforcement-profile
        refer-call-transfer     disabled
        reuse-connections       NONE
        tcp-keepalive           none
        tcp-reconn-interval     0
        max-register-burst-rate         0
        register-burst-window           0
        sip-profile
        sip-isup-profile
        last-modified-by        admin@172.16.1.240
        last-modified-date      2010-09-25 08:01:12
session-agent
        hostname                172.18.1.200
        ip-address              172.18.1.200
        port                    5060
        state                   enabled
        app-protocol            SIP
        app-type
        transport-method        TLS
        realm-id                peer1A
        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               0
        ping-send-mode              keep-alive
        ping-all-addresses          disabled
        ping-in-service-response-codes
        out-service-response-codes
        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
        li-trust-me                 disabled
        in-manipulationid
        out-manipulationid
        manipulation-string
        manipulation-pattern
        p-asserted-id
        trunk-group
        max-register-sustain-rate   0
        early-media-allow
        invalidate-registrations    disabled
        rfc2833-mode                none
        rfc2833-payload             0
        codec-policy
        enforcement-profile
        refer-call-transfer         disabled
        reuse-connections           NONE
        tcp-keepalive               none
        tcp-reconn-interval         0
        max-register-burst-rate     0
        register-burst-window       0
        sip-profile
        sip-isup-profile
        last-modified-by            admin@172.16.1.240
        last-modified-date          2010-09-25 08:01:12
sip-config
        state                       enabled
        operation-mode              dialog
        dialog-transparency         disabled
        home-realm-id               peer1B
        egress-realm-id
        nat-mode                    None
        registrar-domain            *
        registrar-host              *
        registrar-port              5060
        register-service-route      always
        init-timer                  500
        max-timer                   4000
        trans-expire                32
```

```
        invite-expire            180
        inactive-dynamic-conn    32
        enforcement-profile
        pac-method
        pac-interval             10
        pac-strategy             PropDist
        pac-load-weight          1
        pac-session-weight       1
        pac-route-weight         1
        pac-callid-lifetime      600
        pac-user-lifetime        3600
        red-sip-port             1988
        red-max-trans            10000
        red-sync-start-time      5000
        red-sync-comp-time       1000
        add-reason-header        disabled
        sip-message-len          4096
        enum-sag-match           disabled
        extra-method-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
        options
        refer-src-routing        disabled
        add-ucid-header          disabled
        pass-gruu-contact        disabled
        sag-lookup-on-redirect   disabled
        last-modified-by         admin@172.16.1.240
        last-modified-date       2010-09-25 10:16:17
sip-interface
        state                    enabled
        realm-id                 peer1A
        description
        sip-port
                address          172.18.1.71
                port             5061
                transport-protocol TLS
                tls-profile      SDCert
                allow-anonymous  agents-only
                ims-aka-profile
        carriers
        trans-expire             0
        invite-expire            0
        max-redirect-contacts    0
        proxy-mode
        redirect-action
        contact-mode             none
        nat-traversal            none
        nat-interval             30
        tcp-nat-interval         90
        registration-caching     disabled
        min-reg-expire           300
        registration-interval    3600
        route-to-registrar       disabled
        secured-network          disabled
        teluri-scheme            disabled
        uri-fqdn-domain
        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
        manipulation-string
        manipulation-pattern
        sip-ims-feature             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
        default-location-string
        charging-vector-mode        pass
        charging-function-address-mode pass
        ccf-address
        ecf-address
        term-tgrp-mode              none
        implicit-service-route      disabled
        rfc2833-payload             101
        rfc2833-mode                preferred
        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
        sip-profile
        sip-isup-profile
        last-modified-by            admin@172.16.1.240
        last-modified-date          2010-09-25 12:07:23
sip-interface
        state                       enabled
        realm-id                    peer1B
        description
        sip-port
                address             172.18.2.71
                port                5061
                transport-protocol  TLS
                tls-profile         SDCertII
                allow-anonymous     agents-only
                ims-aka-profile
        carriers
        trans-expire                0
        invite-expire               0
        max-redirect-contacts       0
        proxy-mode
        redirect-action
        contact-mode                none
        nat-traversal               none
        nat-interval                30
        tcp-nat-interval            90
        registration-caching        disabled
```

```
        min-reg-expire            300
        registration-interval     3600
        route-to-registrar        disabled
        secured-network           disabled
        teluri-scheme             disabled
        uri-fqdn-domain
        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
        manipulation-string
        manipulation-pattern
        sip-ims-feature           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
        default-location-string
        charging-vector-mode      pass
        charging-function-address-mode pass
        ccf-address
        ecf-address
        term-tgrp-mode            none
        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
        sip-profile
        sip-isup-profile
        last-modified-by          admin@172.16.1.240
        last-modified-date        2010-09-19 14:33:05
steering-pool
        ip-address                172.18.1.71
        start-port                20000
        end-port                  49999
        realm-id                  peer1A
        network-interface
        last-modified-by          admin@172.16.1.240
        last-modified-date        2010-08-03 11:44:49
steering-pool
        ip-address                172.18.2.71
        start-port                20000
        end-port                  49999
        realm-id                  peer1B
```

```
        network-interface
        last-modified-by            admin@172.16.1.240
        last-modified-date          2010-09-29 06:35:12
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
        call-trace                  disabled
        internal-trace              disabled
        log-filter                  all
        default-gateway             172.18.1.1
        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
        default-v6-gateway          ::
        ipv6-support                disabled
        last-modified-by            admin@172.16.1.240
        last-modified-date          2010-09-10 12:25:16
tls-profile
        name                        SDCert
        end-entity-certificate      SDCert
        trusted-ca-certificates
        cipher-list
                                ALL
        verify-depth                10
        mutual-authenticate         disabled
        tls-version                 compatibility
        cert-status-check           disabled
```

```
        cert-status-profile-list
        last-modified-by            admin@172.16.1.240
        last-modified-date          2010-09-07 12:18:56
tls-profile
        name                        SDCertII
        end-entity-certificate      SDCertII
        trusted-ca-certificates
        cipher-list
                                    ALL
        verify-depth                10
        mutual-authenticate         disabled
        tls-version                 compatibility
        cert-status-check           disabled
        cert-status-profile-list
        last-modified-by            admin@172.16.1.240
        last-modified-date          2010-09-07 12:18:56
media-sec-policy
        name                        SRTPA
        pass-through                disabled
        inbound
                profile             sdes1
                mode                srtp
                protocol            sdes
        outbound
                profile             sdes1
                mode                srtp
                protocol            sdes
        last-modified-by            admin@172.16.1.240
        last-modified-date          2010-09-08 11:17:33
media-sec-policy
        name                        SRTPB
        pass-through                disabled
        inbound
                profile             sdes2
                mode                srtp
                protocol            sdes
        outbound
                profile             sdes2
                mode                srtp
                protocol            sdes
        last-modified-by            admin@172.16.1.240
        last-modified-date          2010-09-08 11:17:33
sdes-profile
                name                        sdes1
                crypto-list                 AES_CM_128_HMAC_SHA1_80
                srtp-auth                   enabled
                srtp-encrypt                enabled
                srtcp-encrypt               enabled
                egress-offer-format                 same-as-ingress
                use-ingress-session-params  srtcp-encrypt
                                            srtp-auth
                                        srtp-encrypt
        mki                         disabled
                key
                salt
                last-modified-by            admin@172.16.1.240
                last-modified-date          2010-09-25 08:18:51
sdes-profile
                name                        sdes2
                crypto-list                 AES_CM_128_HMAC_SHA1_32
                srtp-auth                   enabled
                srtp-encrypt                enabled
```

```
        srtcp-encrypt                   enabled
        egress-offer-format                     same-as-ingress
        use-ingress-session-params srtcp-encrypt
                                   srtp-auth
                                   srtp-encrypt
mki                                disabled
        key
        salt
        last-modified-by           admin@172.16.1.240
        last-modified-date         2010-09-25 08:18:51
```