Cisco Unified Border Element (SP Edition) Configuration Profile Examples

Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
http://www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

Customer Order Number: OL-23445-01

Cisco Unified Border Element (SP Edition) Configuration Guide: Unified Model

CONTENTS

Cisco Unified Border Element (SP Edition) Configuration Profile Examples

Introduction

This document is intended for Cisco Network Administrators who have experience with the Cisco Unified Border Element (SP Edition). This document provides configuration profile examples for configuring the Cisco Unified Border Element (SP Edition).

Complete configuration profile examples are provided. Individual segments of the configuration profile examples are explained individually.

The Cisco Unified Border Element (SP Edition) was formerly known as Session Border Controller (SBC). In this document, Cisco Unified Border Element (SP Edition) is the preferred term. However, SBC is used occasionally where necessary.

For more information on the Cisco Unified Border Element (SP) features, see the following documents:

- *Cisco Unified Border Element (SP Edition) Configuration Guide: Unified Model*
- *Cisco Unified Border Element (SP Edition) Configuration Guide: Distributed Model*

For more detailed information on the Cisco Unified Border Element (SP) commands, see the following documents:

- *Cisco Unified Border Element (SP Edition) Command Reference: Unified Model*
- *Cisco Unified Border Element (SP Edition) Command Reference: Distributed Model*

This document is compatible and current with the Cisco IOS XE 3.1S release.

Brief Overview of the Cisco Unified Border Element

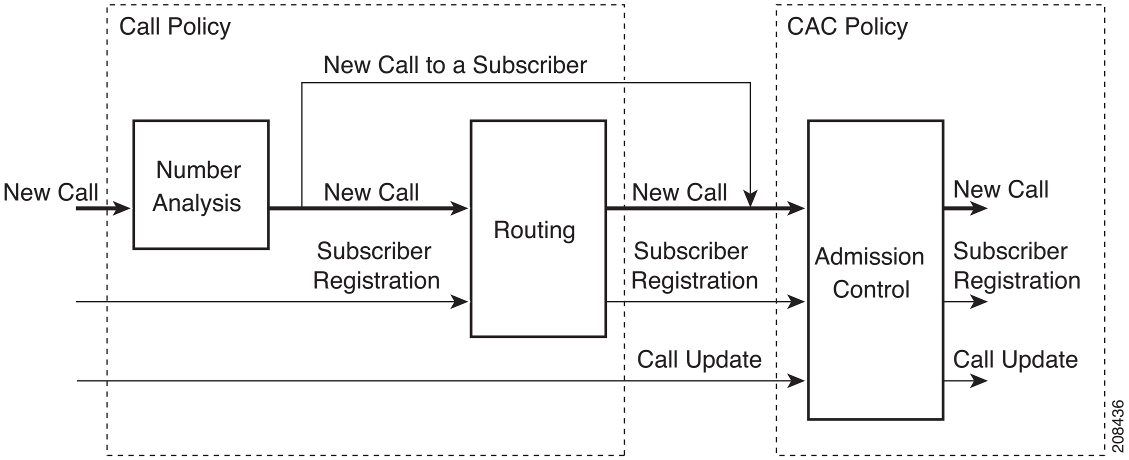
The Cisco Unified Border Element is used to create secure connections between different networks, and to establish and maintain the routing between these networks. Typically, Cisco Unified Border Element customer networks are based on SIP-dialed numbers.

The Cisco Unified Border Element provides secure transport of media, such as video and audio, from one network to another, using call policies and Call Admission Control (CAC) policies. These configurable policies allow customers to control the volume of calls per customer and to restrict certain types of calls.

The two primary elements of a Cisco Unified Border Element configuration are call policies and CAC policies. A call policy handles number analysis and routing. A CAC policy controls call admissions only.

Figure 1 shows the order in which number analysis, routing, and CAC occur during a new call.

Figure 1 Call Policy Set and CAC Policy



Common Components

The following components of the Cisco Unified Border Element are common to all of the configuration profile examples in this document.

Secure Media

The secure media segment provides secure transportation of unsignaled, encrypted data streams between two networks.

Secure media is disabled by default. To enable secure media, you configure it at the global level in the the SBC configuration. Once enabled, it applies to all calls.

When secure media is enabled, the Cisco Unified Border Element assumes that all endpoints can handle encrypted data streams regardless of the actual capabilities of the endpoints.

Secure media can apply to any of the following types of addresses:

- Physical address of an interface
- Logical address of an interface
- Service Virtual Interface (SVI) address

The following example shows how to enable secure media:

```
sbc MY_SBC
    sbe
    secure-media
    …
    …
```

All connections configured after the **secure-media** command are secure connections.

Adjacencies

The connection between a Cisco Unified Border Element and a customer, network, business, or service provider is called an adjacency. An adjacency configuration contains the local IP address and the remote IP address for the adjacency that provides the connection between a Cisco Unified Border Element and a customer, network, business, or service provider.

There are two types of adjacencies:

- Session Initiation Protocol (SIP) adjacency, which acts as a back-to-back user agent
- H.323, which acts as an H.323 gateway

Adjacencies can be grouped together in accounts. Accounts enable you define call policies and CAC polices based on customer.

A signaling address must be configured for each adjacency, and each signaling address must be paired with a signaling port. SBC uses the IP-address/port-number pair to receive signaling and control packets.

For a SIP adjacency, the signaling address is specified as an outbound proxy address to a remote device.

A signaling address can be any of the following types of addresses:

- Loopback address configured on the router
- Physical address of an interface
- Logical address of a subinterface
- Static Virtual Address (SVI)

The following examples show the adjacency configurations for Business-to-Business TelePresence Configuration Profile Example:

```
adjacency sip CUCM1
    vrf CUCM1
    header-profile inbound PASS-HEADERS
    header-profile outbound PASS-HEADERS
    method-profile inbound method1
    method-profile outbound method1
    option-profile ua inbound option1
    option-profile ua outbound option1
    preferred-transport tcp
    security trusted-unencrypted
    signaling-address ipv4 23.61.1.1
        statistics method summary
    signaling-port 5160
    remote-address ipv4 175.181.0.10 255.255.255.255
    signaling-peer 175.181.0.10
    signaling-peer-port 5160
    account CUCM1
    attach

adjacency sip CUCM2
    vrf CUCM2
    header-profile inbound PASS-HEADERS
    header-profile outbound PASS-HEADERS
    method-profile inbound method1
    method-profile outbound method1
    option-profile ua inbound option1
    option-profile ua outbound option1
    preferred-transport tcp
    security trusted-unencrypted
    signaling-address ipv4 23.61.2.1
    statistics method summary
```

```
signaling-port 5160
remote-address ipv4 175.182.0.12 255.255.255.255
signaling-peer 175.182.0.12
signaling-peer-port 5160
account CUCM2
attach
```

Note For examples of creating VRFs, see the "VRF Examples" section on page 111

Call Policies

A call policy is a set of rules that define how SBC responds to new call events. A call policy includes number analysis and routing.

A call policy set contains one or more tables, which contain entries, such as adjacency names, source numbers, and destination numbers. SBC uses these tables to match the fields in incoming and outgoing call packets with the entries in these tables. Based on these matches, SBC can perform the following tasks.

- Jump to another table
- Select the adjacencies
- Complete the call

Call Policy Configuration

This example shows how to configure a call policy with table entries and entry commands that connect 2 CUCM adjacencies: CUCM1 and CUCM2.

```
sbc MY_SBC
    sbe
    secure-media
        ….
        ….
        ….
    call-policy-set 1
        first-call-routing-table start-table
        rtg-src-adjacency-table start-table
        entry 1
            match-adjacency CUCM2
            dst-adjacency CUCM1
            action complete
        entry 2
            match-adjacency CUCM1
            dst-adjacency CUCM2
            action complete
        complete
    active-call-policy-set 1
```

Number Analysis

A number analysis call policy compares incoming and outgoing call numbers with numbers in a Cisco Unified Border Element table of valid telephone numbers.

SBC does number analysis by matching dialed numbers with the configured entries in a call policy entry table. A number analysis call policy is applied only to new call events. If the dialed number does not match any of the entries in the call policy, SBC rejects the call.

A number analysis call policy can perform the following functions:

- Number Validation
- Number Categorization
- Digit Manipulation

Number analysis is done by matching dialed numbers with valid numbers in the following types of call policy tables:

- dst-number—Tables of this type contain entries whose match values represent complete numbers of Destination. In such tables, an entry matches an event if the entire dialed digit string exactly matches the match value of the entry.
- dst-prefix—Tables of this type contain entries whose match values represent number prefixes of Destination. In such tables, an entry matches an event if there exists a subset of the dialed digit string, consisting of consecutive digits taken from the front of the dialed digit string, that exactly matches the match value of the entry.
- src-number—Tables of this type contain entries whose match values represent complete numbers of Source. In such tables, an entry matches an event if the entire source digit string exactly matches the match value of the entry.
- src-prefix—Tables of this type contain entries whose match values represent number prefixes of Source. In such tables, an entry matches an event if there exists a subset of the source digit string, consisting of consecutive digits taken from the front of the source digit string, that exactly matches the match value of the entry.

Note During number analysis, only the destination number can be modified. The source number cannot be modified. The source number can be modified during Routing.

The format of an entry in a call policy table is a limited-form, regular expression representing a string of dialed digits. The format syntax used is described in Table 1.

Table 1 Number Analysis Expressions

Expression	Description
X	Any numerical digit 0 – 9.
( )	The digit within the parentheses is optional. For example, (0)XXXX represents 0XXXX and XXXX.
[ ]	One of the digits within the square brackets is used. For example, [01]XXX represents 0XXX and 1XXX. A range of values can be represented within the square brackets. For example, [013-5]XXX represents 0XXX, 1XXX, 3XXX, 4XXX and 5XXX.
*	The * key on the telephone.
#	The # key on the telephone.
-	Digit delimiter
,	Digit delimiter
a-f/A-F	Hexadecimal digits

For more detailed information on number and prefix matching, see Chapter 12, “Implementing Cisco Unified Border Element (SP Edition) Policies” of the *Cisco Unified Border Element (SP Edition) Configuration Guide: Unified Model.*

Number Validation

A number validation call policy verifies whether the dialed number matches a valid telephone number in the call policy table. The following example shows the configuration of a call policy that does number validation:

```
sbc MY_SBC
    sbe
        call-policy-set 2
            first-number-analysis-table VALIDATE-DEST-PREFIX
            na-dst-prefix-table VALIDATE-DEST-PREFIX
            entry 1
                match-prefix 8XX
                action accept
                exit
            entry 2
                match-prefix 911
                action accept
                exit
            entry 3
                match-prefix 1XX
                action accept
                exit
            entry 4
                match-prefix X
                action reject
                exit
            complete
        active-call-policy-set 2
```

Number Categorization

With number categorization, call events can be placed into user-defined categories during processing. Events that are placed into categories can be referred to during the CAC policy stage. The following example shows the configuration of a call policy that does number categorization:

```
sbc MY_SBC
    sbe
        call-policy-set 3
            first-number-analysis-table VALIDATE-DEST-PREFIX
            na-dst-prefix-table VALIDATE-DEST-PREFIX
            entry 1
                match-prefix 8X
                category Non-emergency
                action accept
                exit
            entry 2
                match-prefix 1XX
                category Non-Emergency
                action accept
                exit
            entry 3
                match-prefix 911
                category Emergency
                action accept
                exit
            entry 4
                match-prefix X
                action reject
                exit
        complete
    active-call-policy-set 3
```

Digit Manipulation

Digit manipulation is the process of reformatting a call number into a canonical form, such as the E.164 format. In the following example, the **edit-dst del-prefix 1** command in entry 1 removes the leading 1 digit from the dialed number and deletes the entire string.

The following example shows the configuration of a call policy that does digit manipulation:

```
sbc MY_SBC
    sbe
        call-policy-set 4
            first-number-analysis-table VALIDATE-DEST-PREFIX
            na-dst-prefix-table VALIDATE-DEST-PREFIX
            entry 1
                match-prefix 8X
                category Non-emergency
                edit-dst del-prefix 1
                action accept
                exit
            entry 2
                match-prefix 1XX
                category Non-Emergency
                action accept
                exit
            entry 3
                match-prefix 911
                category Emergency
                action accept
                exit
            entry 4
                match-prefix X
                action reject
                exit
        complete
    active-call-policy-set 4
```

Routing

Routing is also handled in a call policy table. Routing is the process of determining the next-hop and VoIP-signaling entities, to which signaling requests are to be sent.

A routing call policy is applied to new call events and subscriber registration events.

A routing call policy is applied in two stages:

1. Digit manipulation
2. Selection of a destination adjacency (or group of adjacencies for load balancing)

You can configure routing rules using regular expressions to match entities such as:

- User name
- Domain name (that is part of a source or destination SIP URI)

The digits in a call number can be modified or replaced during the routing process.

Note If a new call event matches an existing subscriber registration, the new call is automatically routed to the source IP address and port of the existing subscriber registration. No configured policy is required for this. The configured policy does not effect the routing of such calls.

Note Routing call policies are not applied to call update events, such as update signaling messages. Call update events are automatically routed to the destination adjacency of the call.

The following configuration shows how to configure a routing call policy table for routing calls based on the prefix number of the call:

```
sbc MY_SBC
    sbe
        call-policy-set 5
        first-call-routing-table ROUTE-ON-DEST-NUM
        rtg-dst-address-table ROUTE-ON-DEST-NUM
        entry 1
            match-address 212
            prefix
            edit add-prefix 1
            dst-adjacency CUCM1
            action complete
            exit
        entry 2
            match-address 215
            prefix
            dst-adjacency CUCM1
             action complete
            entry 3
            match-address 732
            prefix
            dst-adjacency CUCM2
            action complete
            exit
        entry 4
            match-address 908
            prefix
            dst-adjacency CUCM2
            edit replace 609
            action complete
            exit
        complete
    active-call-policy-set 5
```

CAC Policies

Call Admission Control (CAC) policies determine whether a call event should be allowed or rejected, based on the limits that are configured in the CAC policy for a particular network.

The primary uses of a CAC policy are:

- Preventing DoS attacks
- Implementing service-level agreements (SLAs)

Preventing DoS Attacks

CAC policies are used to defend load-sensitive network elements against potentially harmful levels of load, such as DoS attacks and mass media phone-ins.

Implementing SLAs

CAC policies are used to police the SLAs between organizations and ensure that the network utilization levels are not exceeded.

A CAC policy can be applied to any type of call event. If an event is not granted by a CAC policy, the Cisco Unified Border Element rejects the call event and returns the appropriate error code.

Note Only call admission events are configured in CAC policies. Other call events, such as number analysis and routing are configured in call policies.

The following example shows how to configure a CAC policy to ignore the bandwidth field of media streams. Ignoring the bandwidth field allows the Cisco Unified Border Element to downgrade a media stream from Secure Real-Time Transport Protocol (SRTP) to Real-Time Transport Protocol (RTP).

```
sbc MY_SBC
    sbe
    secure-media
        ….
        ….
        ….
    cac-policy-set 1
        description Ignore the  bandwidth field in SDP
        first-cac-table BW
        first-cac-scope call
        cac-table BW
        table-type policy-set
        entry 1
            media bandwidth-field ignore
            action cac-complete
    active-cac-policy-set 1
```

SIP Profiles

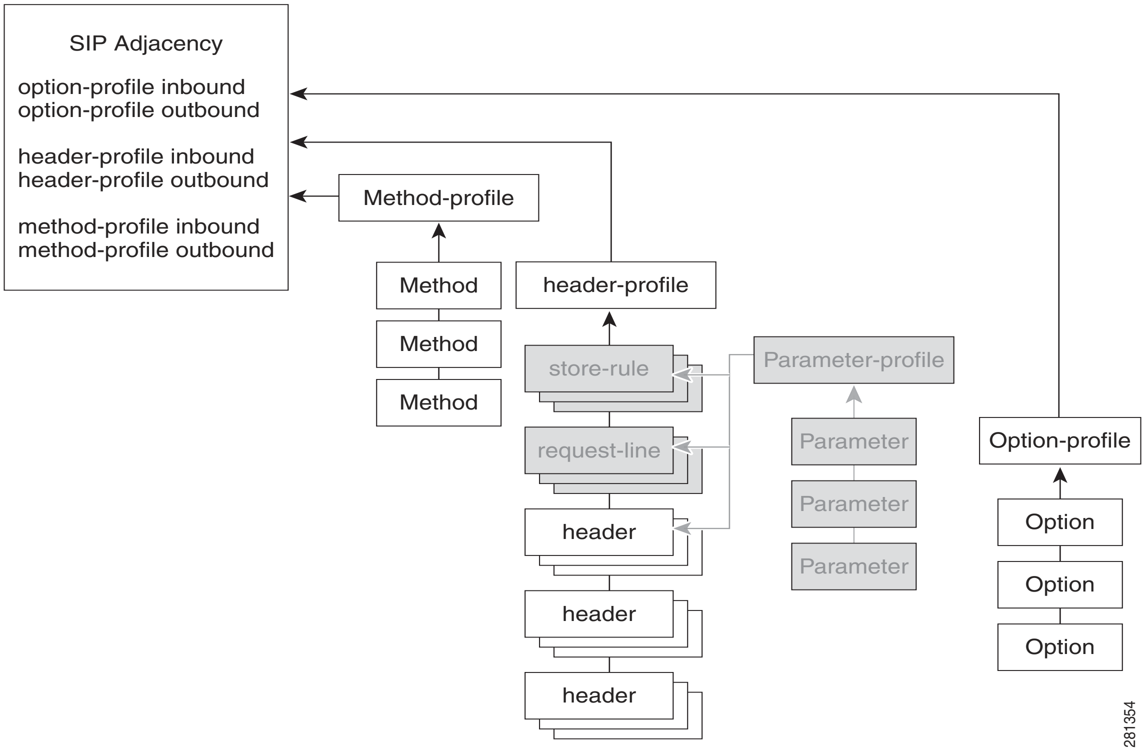
A SIP profile can be used to create a whitelist or a blacklist that contains a list headers or methods, and the actions to be performed on them. Whitelists are used to accept requests. Blacklists are used to reject requests.

The following types of SIP profiles are possible for use in whitelists or blacklists:

- Header profile
- Method profile
- Parameter profile
- Option profile

Figure 2 shows the various profiles and how they are attached to a SIP adjacency. Header-profiles can be associated with individual methods also, but in our example, the header-profile is associated directly to the SIP adjacency. Profiles must be associated to an ingress SIP adjacency and to an egress SIP adjacency.

Figure 2 Method, Header, Option Profiles Attached to an Adjacency



Note Parameter-profiles are associated directly to headers, but a parameter-profile is not used in the Telepresence example in this document. Thus, parameters are grayed out in Figure 2.

The Telepresence example in this document uses the following two whitelists and no blacklists:

- Method profile whitelist
- Header profile whitelist

Each header or method entry in the list may optionally be assigned one of the following actions:

- Pass
- Reject

Whitelists use only the pass action. Blacklists use only the reject action.

A header profile is a list of predefined headers that are passed or rejected using a whitelist or blacklist.

A method profile is a list of predefined methods that are passed or rejected using a whitelist or blacklist.

An option-profile is a list of predefined options that can be passed or rejected by placing it in a whitelist or blacklist. In our Telepresence example, the required Telepresence options, TIMER and REPLACES, are passed in the method-profile whitelist.

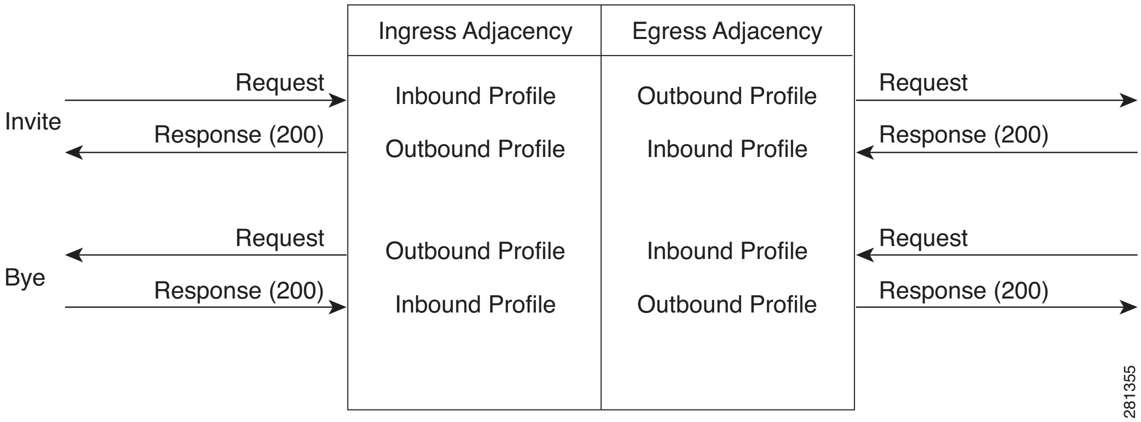
A whitelist is created using the **sip header-profile** command, adding the headers or methods as entries, and then assigning the pass action to each entry.

A method profile whitelist applies to an entire SIP message. Method-profile actions override default profile behavior.

A header profile whitelist applies only to single lines in a SIP message. A header-profile can match any part of the header, but it can only replace the entire header.

Profiles must be applied on both the inbound and outbound sides of each adjacency. Figure 3 shows the flow of profiles between adjacencies during a call.

Figure 3 Flow of Profiles During a Call



All headers are passed, stripped, or modified before they are processed by the Bye Reponse(200) on the ingress adjacency. All messages are passed, stripped, or modified after they are processed by the Bye Reponse(200) on the egress adjacency, before they are sent to the line.

Note For the header and method actions to be able to act on messages arriving on the ingress side, the headers and methods must first be passed from the inbound profile on the ingress side.

The following example shows how to attach whitelists to the inbound and outbound profiles.

```
adjacency sip CUCM1
    header-profile inbound PASS-HEADERS
    header-profile outbound PASS-HEADERS
    method-profile inbound method1
    method-profile outbound method1
    option-profile ua inbound option1
    option-profile ua outbound option1

adjacency sip CUCM2
    header-profile inbound PASS-HEADERS
    header-profile outbound PASS-HEADERS
    method-profile inbound method1
    method-profile outbound method1
    option-profile ua inbound option1
    option-profile ua outbound option1
```

A profile cannot be deleted while it is attached to any adjacency. You can see which adjacencies are using a profile by entering the following show commands:

- show sbc sbe sip method-profile
- show sbc sbe sip essential-methods

Header Profile

In the following header profile white list, all the listed headers are configured to be passed.

```
sbc MY_SBC
    sbe
    secure-media
        …
    sip header-profile PASS-HEADERS
        description "pass non-essential headers"
        header Allow entry 1
            action pass
        header Min-SE entry 1
            action pass
        header Reason entry 1
            action pass
        header SERVER entry 1
        action pass
        header DIVERSION entry 1
        action pass
        header Allow-Events entry 1
        action pass
        header Remote-Party-ID entry 1
        action pass
        header Session-Expires entry 1
        action pass
        header session-expiry entry 1
        action pass
        header RESOURCE-PRIORITY entry 1
        action pass
```

Table 2 provides a description of three of the PASS-HEADERS white list header entries.

Table 2 Description of Three Entries in the PASS-HEADERS White List

Header	Description
header SERVER entry	Contains information about the software used by the user agent server (UAS) to handle the request.
header DIVERSION entry	Allows implementation of feature logic based on who diverted the call.
header RESOURCE-PRIORITY entry	Helps prioritize access to SIP-signaled resources during periods of emergency-induced resource scarcity.

Method Profile

In the following method profile white list, the methods are configured with actions and the profile is configured with options:

```
sbc MY_SBC
    sbe
    secure-media

    sip method-profile method1
        description "pass default methods"
        pass-body
        method INFO
            action pass
        method OPTION
            action pass
        method UPDATE
            action pass
    sip option-profile option1
        description "pass default options plus TIMER"
        option TIMER
        option REPLACES
    …
```

Business-to-Business TelePresence Configuration Profile Example

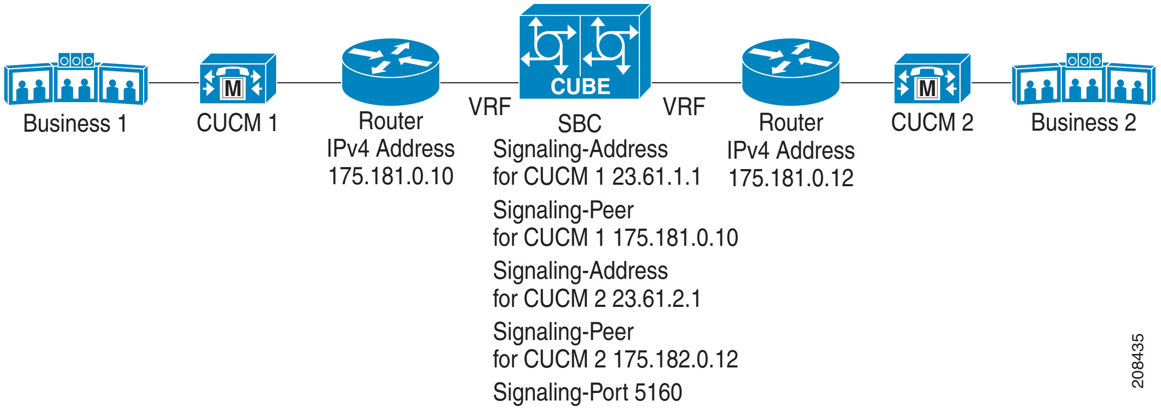
This section provides a complete example of a Business-to-Business TelePresence Configuration Profile in the following sections:

Business-to-Business TelePresence Configuration Profile Adjacencies

In a TelePresence application, the Cisco Unified Border Element can be used to create secure media connections between the networks of two separate businesses. In the following examples, the TelePresence equipment is attached to the network via a CUCM. CUCM1 and CUCM2 are configured as SIP endpoints.

Figure 4 shows the network diagram for these examples:

Figure 4 Business-to-Business TelePresence



Lua Script

If you are using Cisco TelePresence Release 1.8 or later, create and upload the srtp.lua script to the router. The function of this script is to convert SRTP in the inbound SDP to RTP and to convert RTP in the outbound SDP to SRTP. The contents of this script are as follows:

```
local avp="RTP/AVP"
local savp="RTP/SAVP"
local crypto="a=crypto:"
local xcrypto="a=xcrypto:"
local origRTP="a=origRTP"

function to_rtp_avp(msg)
  for m in msg.sdp.media_blocks:iter() do
    --check if SDP comes as SAVP
    local i,j = m.media_lines[1]:find(savp)
    if i then
      m.media_lines[1]:replace(savp,avp)
      for a in m:select_by_prefix(crypto):iter() do
        --MeLogger.info("replacing " .. crypto .. " line:" .. a.text .. "\n")
        a:replace(crypto,xcrypto)
      end
    else
      -- if not, mark it by adding an attribuite
      m:insert_child_last(MeSdpLine.new(origRTP))
    end
  end
end

function to_rtp_savp(msg)
  for m in msg.sdp.media_blocks:iter() do
    local i,j = m.media_lines[1]:find(avp)
    if i then
      -- if media stream is RTP
      -- this might be two cases
      --   1: sdp comes from wire as RTP. 2, sdp is changed by inbound editor to RTP

      -- check inbound sdp rtp marker
      local oRTP=m:select_by_prefix(origRTP)
      if oRTP:empty() then
        -- changed by inbound sdp editor as RTP
        m.media_lines[1]:replace(avp,savp)
        for a in msg.sdp:select_by_prefix(xcrypto):iter() do
          --MeLogger.info("replacing " .. xcrypto .. " line:" .. a.text .. "\n")
          a:replace(xcrypto,crypto)
        end
      else
        -- RTP comes from wire
        for l in oRTP:iter() do
          l:delete()
        end
      end
    end
  end
end

MeEditor.register("after_send","to_rtp_savp",to_rtp_savp)
MeEditor.register("before_receive","to_rtp_avp",to_rtp_avp)
```

Configuring the Script Set

The following example shows how to configure the script set. Perform this procedure only if you are using Cisco TelePresence Release 1.8 or later.

```
script-set 2 lua
    script srtp
      filename bootflash:srtp.lua
      load-order 100
      type full
    complete

   active-script-set 2
```

Configuring the Header Editor

The following example shows how to configure the header editor. Perform this procedure only if you are using Cisco TelePresence Release 1.8 or later.

```
sip header-editor tp-to-supported
    blacklist
    header x-supported entry 1
     action replace-name value "supported"
      condition status-code eq "200"
    header x-supported entry 2
     action replace-name value "supported"
      condition status-code eq "200"
    header x-supported entry 3
     action replace-name value "supported"
      condition status-code eq "200"
   sip header-editor tp-add-x-srtp-fb
    blacklist
    header srtp-fb entry 1
     action replace-name value "supported"
      condition status-code eq "200"
   sip header-editor tp-to-x-supported
    blacklist
    header srtp-fb entry 1
     action add-first-header value "X-cisco-srtp-fallback"
```

```
      condition header-name supported header-value regex-match
"^.*X-cisco-srtp-fallback.*$"
      condition status-code eq "200"
    header supported entry 1
     action replace-name value "x-supported"
      condition header-value not regex-match "^.*X-cisco-srtp-fallback.*$"
      condition status-code eq "200"
    header supported entry 2
     action replace-name value "x-supported"
      condition header-value not regex-match "^.*X-cisco-srtp-fallback.*$"
      condition status-code eq "200"
    header supported entry 3
     action replace-name value "x-supported"
      condition header-value not regex-match "^.*X-cisco-srtp-fallback.*$"
      condition status-code eq "200"
```

CUCM 1 Adjacency

The following example shows how to configure the CUCM adjacency for Business 1. Perform the configuration steps highlighted in bold font only if you are using Cisco TelePresence Release 1.8 or later.

```
adjacency sip CUCM1
    vrf CUCM1
    editor-type editor
    header-profile inbound PASS-HEADERS
    header-profile outbound PASS-HEADERS
    method-profile inbound method1
    method-profile outbound method1
    option-profile ua inbound option1
    option-profile ua outbound option1
    preferred-transport tcp
    security trusted-unencrypted
    signaling-address ipv4 23.61.1.1
        statistics method summary
    signaling-port 5160
    remote-address ipv4 175.181.0.10 255.255.255.255
    signaling-peer 175.181.0.10
    signaling-peer-port 5160
    header-editor outbound tp-add-x-srtp-fb
    editor-list before-receive
        editor 1 to_rtp_avp
     editor-list after-send
        editor 1 to_rtp_savp
    account CUCM1
    attach
```

CUCM 2 Adjacency

The following example shows how to configure the CUCM adjacency for Business 2:

```
adjacency sip CUCM2
    vrf CUCM2
    editor-type editor
```

```
header-profile inbound PASS-HEADERS
header-profile outbound PASS-HEADERS
method-profile inbound method1
method-profile outbound method1
option-profile ua inbound option1
option-profile ua outbound option1
preferred-transport tcp
security trusted-unencrypted
signaling-address ipv4 23.61.2.1
statistics method summary
signaling-port 5160
remote-address ipv4 175.182.0.12 255.255.255.255
signaling-peer 175.182.0.12
signaling-peer-port 5160
header-editor inbound tp-to-supported
 editor-list before-receive
    editor 1 to_rtp_avp
    editor 2 tp-to-x-supported
 editor-list after-send
    editor 1 to_rtp_savp
account CUCM2
attach
```

Business-to-Business TelePresence Configuration Profile (in Segments)

This TelePresence Configuration Profile example shows each segment of the example separated by a Heading describing the function of that segment.

Configuration Mode

```
configure terminal
```

SBC SBE Configuration Setup

```
sbc MY_SBC
    sbe
```

Media Characteristics (Security)

```
secure-media
…
…
```

White List, Pass Headers

```
sip header-profile PASS-HEADERS
    description pass non-essential headers
    header Allow entry 1
    action pass
    header Min-SE entry 1
    action pass
    header Reason entry 1
    action pass
    header SERVER entry 1
    action pass
    header DIVERSION entry 1
    action pass
    header Allow-Events entry 1
    action pass
    header Remote-Party-ID entry 1
    action pass
    header Session-Expires entry 1
    action pass
    header session-expiry entry 1
    action pass
    header RESOURCE-PRIORITY entry 1
    action pass
```

White List, Methods and Options

```
sip method-profile method1
    description pass default methods
    pass-body
    method INFO
    action as-profile
    method OPTION
    action pass
    method UPDATE
    action pass
    sip option-profile option1
    description pass default options plus timer
    option TIMER
    option REPLACES
```

Script Set Configuration

If you are using Cisco TelePresence Release 1.8 or later, perform this procedure.

```
script-set 2 lua
    script srtp
      filename bootflash:srtp.lua
      load-order 100
      type full
    complete



   active-script-set 2
```

Header Editor

If you are using Cisco TelePresence Release 1.8 or later, perform this procedure.

```
sip header-editor tp-to-supported
    blacklist
    header x-supported entry 1
     action replace-name value "supported"
      condition status-code eq "200"
    header x-supported entry 2
     action replace-name value "supported"
      condition status-code eq "200"
    header x-supported entry 3
     action replace-name value "supported"
      condition status-code eq "200"
   sip header-editor tp-add-x-srtp-fb
    blacklist
    header srtp-fb entry 1
     action replace-name value "supported"
      condition status-code eq "200"
   sip header-editor tp-to-x-supported
    blacklist
    header srtp-fb entry 1
     action add-first-header value "X-cisco-srtp-fallback"
      condition header-name supported header-value regex-match
"^.*X-cisco-srtp-fallback.*$"
      condition status-code eq "200"
    header supported entry 1
     action replace-name value "x-supported"
      condition header-value not regex-match "^.*X-cisco-srtp-fallback.*$"
      condition status-code eq "200"
    header supported entry 2
     action replace-name value "x-supported"
      condition header-value not regex-match "^.*X-cisco-srtp-fallback.*$"
      condition status-code eq "200"
    header supported entry 3
     action replace-name value "x-supported"
      condition header-value not regex-match "^.*X-cisco-srtp-fallback.*$"
      condition status-code eq "200"
```

CUCM Adjacency 1

If you are using Cisco TelePresence Release 1.8 or later, you must also perform the steps highlighted in bold. If you are using an earlier release of Cisco TelePresence, skip the steps highlighted in bold.

```
adjacency sip CUCM1
    vrf CUCM1
    editor-type editor
    header-profile inbound PASS-HEADERS
    header-profile outbound PASS-HEADERS
    method-profile inbound method1
    method-profile outbound method1
    option-profile ua inbound option1
    option-profile ua outbound option1
    preferred-transport tcp
    security trusted-unencrypted
    signaling-address ipv4 23.61.1.1
    statistics method summary
    signaling-port 5160
    remote-address ipv4 175.181.0.10 255.255.255.255
    signaling-peer 175.181.0.10
    signaling-peer-port 5160
    header-editor outbound tp-add-x-srtp-fb
     editor-list before-receive
        editor 1 to_rtp_avp
     editor-list after-send
        editor 1 to_rtp_savp
    account CUCM1
    attach
```

CUCM Adjacency 2

If you are using Cisco TelePresence Release 1.8 or later, you must also perform the steps highlighted in bold. If you are using an earlier release of Cisco TelePresence, skip the steps highlighted in bold.

```
adjacency sip CUCM2
    vrf CUCM2
    editor-type editor
    header-profile inbound PASS-HEADERS
    header-profile outbound PASS-HEADERS
    method-profile inbound method1
    method-profile outbound method1
    option-profile ua inbound option1
    option-profile ua outbound option1
    preferred-transport tcp
    security trusted-unencrypted
    signaling-address ipv4 23.61.2.1
    statistics method summary
    signaling-port 5160
    remote-address ipv4 175.182.0.12 255.255.255.255
    signaling-peer 175.182.0.12
    signaling-peer-port 5160
    header-editor inbound tp-to-supported
     editor-list before-receive
        editor 1 to_rtp_avp
        editor 2 tp-to-x-supported
     editor-list after-send
        editor 1 to_rtp_savp
    account CUCM2
    attach
```

Call Policy, CUCM Connection

```
call-policy-set 1
    first-call-routing-table start-table
    rtg-src-adjacency-table start-table
    entry 1
        match-adjacency CUCM2
        dst-adjacency CUCM1
        action complete
    entry 2
        match-adjacency CUCM1
        dst-adjacency CUCM2
        action complete
    complete
active-call-policy-set 1
```

Call Policy, Number Analysis Stage - Number Validation

```
call-policy-set 2
    first-number-analysis-table VALIDATE-DEST-PREFIX
    na-dst-prefix-table VALIDATE-DEST-PREFIX
    entry 1
        match-prefix 8XX
        action accept
        exit
    entry 2
        match-prefix 911
        action accept
        exit
    entry 3
        match-prefix 1XX
        action accept
        exit
    entry 4
        match-prefix X
        action reject
        exit
    complete
active-call-policy-set 2
```

Call Policy, Number Analysis Stage - Number Categorization

```
call-policy-set 3
    first-number-analysis-table VALIDATE-DEST-PREFIX
    na-dst-prefix-table VALIDATE-DEST-PREFIX
    entry 1
        match-prefix 8X
        category Non-emergency
        action accept
        exit
    entry 2
        match-prefix 1XX
        category Non-Emergency
        action accept
        exit
    entry 3
        match-prefix 911
        category Emergency
        action accept
        exit
    entry 4
        match-prefix X
        action reject
        exit
        complete
active-call-policy-set 3
```

Call Policy, Number Analysis Stage - Digit Manipulation

```
call-policy-set 4
    first-number-analysis-table VALIDATE-DEST-PREFIX
    na-dst-prefix-table VALIDATE-DEST-PREFIX
    entry 1
        match-prefix 8X
        category Non-emergency
        edit-dst del-prefix 1
        action accept
        exit
    entry 2
        match-prefix 1XX
        category Non-Emergency
        action accept
        exit
    entry 3
        match-prefix 911
        category Emergency
        action accept
        exit
        entry 4
        match-prefix X
        action reject
        exit
    complete
active-call-policy-set 4
```

Call Policy, Routing Stage - Destination Adjacency

```
call-policy-set 5
    first-call-routing-table ROUTE-ON-DEST-NUM
    rtg-dst-address-table ROUTE-ON-DEST-NUM
    entry 1
        match-address 212
        prefix
        edit add-prefix 1
        dst-adjacency CUCM1
        action complete
        exit
    entry 2
        match-address 215
        prefix
        dst-adjacency CUCM1
         action complete
        entry 3
        match-address 732
        prefix
        dst-adjacency CUCM2
        action complete
        exit
    entry 4
        match-address 908
        prefix
        dst-adjacency CUCM2
        edit replace 609
        action complete
        complete
        exit
active-call-policy-set 5
```

Call Admission Control, CAC Policy Media Bandwidth Field Ignore

```
cac-policy-set 1
    description Ignore the  bandwidth field in SDP
    first-cac-table BW
    first-cac-scope call
    cac-table BW
    table-type policy-set
    entry 1
        media bandwidth-field ignore
        action cac-complete
    complete
active-cac-policy-set 1
```

Show Command, Display Adjacencies

```
Router# show sbc MY_SBC sbe adjacencies

SBC Service “MY_SBC"
      Name                      Type    State        Description
      -----------------------------------------------------------
      CUCM1                     SIP     Attached
      CUCM2                     SIP     Attached
TPX-SBC#
```

Business-to-Business TelePresence Configuration Profile (for Copy and Paste)

This is a complete TelePresence Configuration Profile example that can be copied and pasted into the CLI of an ASR1000 running the Cisco Unified Border Element. Each segment is separated only by returns.

Note If you are using Cisco TelePresence Release 1.8 or later, you must also perform the steps highlighted in bold. If you are using an earlier release of Cisco TelePresence, skip the steps highlighted in bold.

```
configure terminal

sbc MY_SBC
sbe
secure-media


sip header-profile PASS-HEADERS
description pass non-essential headers
header Allow entry 1
action pass
header Min-SE entry 1
action pass
header Reason entry 1
action pass
header SERVER entry 1
action pass
header DIVERSION entry 1
action pass
header Allow-Events entry 1
action pass
header Remote-Party-ID entry 1
action pass
header Session-Expires entry 1
action pass
header session-expiry entry 1
action pass
header RESOURCE-PRIORITY entry 1
action pass



sip method-profile method1
description pass default methods
pass-body
```

```
method INFO
action as-profile
method OPTION
action pass
method UPDATE
action pass
sip option-profile option1
description pass default options plus timer
option TIMER
option REPLACES

script-set 2 lua
script srtp
filename bootflash:srtp.lua
load-order 100
type full
complete

active-script-set 2

sip header-editor tp-to-supported
blacklist
header x-supported entry 1
action replace-name value "supported"
condition status-code eq "200"
header x-supported entry 2
action replace-name value "supported"
condition status-code eq "200"
header x-supported entry 3
action replace-name value "supported"
condition status-code eq "200"
sip header-editor tp-add-x-srtp-fb
blacklist
header srtp-fb entry 1
action replace-name value "supported"
condition status-code eq "200"
sip header-editor tp-to-x-supported
blacklist
header srtp-fb entry 1
action add-first-header value "X-cisco-srtp-fallback"
condition header-name supported header-value regex-match "^.*X-cisco-srtp-fallback.*$"
condition status-code eq "200"
header supported entry 1
action replace-name value "x-supported"
condition header-value not regex-match "^.*X-cisco-srtp-fallback.*$"
condition status-code eq "200"
header supported entry 2
action replace-name value "x-supported"
condition header-value not regex-match "^.*X-cisco-srtp-fallback.*$"
condition status-code eq "200"
header supported entry 3
action replace-name value "x-supported"
condition header-value not regex-match "^.*X-cisco-srtp-fallback.*$"
condition status-code eq "200"

adjacency sip CUCM1
vrf CUCM1
editor-type editor
header-profile inbound PASS-HEADERS
header-profile outbound PASS-HEADERS
method-profile inbound method1
method-profile outbound method1
option-profile ua inbound option1
option-profile ua outbound option1
```

```
preferred-transport tcp
security trusted-unencrypted
signaling-address ipv4 23.61.1.1
statistics method summary
signaling-port 5160
remote-address ipv4 175.181.0.10 255.255.255.255
signaling-peer 175.181.0.10
signaling-peer-port 5160
header-editor outbound tp-add-x-srtp-fb
editor-list before-receive
editor 1 to_rtp_avp
editor-list after-send
editor 1 to_rtp_savp
account CUCM1
attach

adjacency sip CUCM2
vrf CUCM2
editor-type editor
header-profile inbound PASS-HEADERS
header-profile outbound PASS-HEADERS
method-profile inbound method1
method-profile outbound method1
option-profile ua inbound option1
option-profile ua outbound option1
preferred-transport tcp
security trusted-unencrypted
signaling-address ipv4 23.61.2.1
statistics method summary
signaling-port 5160
remote-address ipv4 175.182.0.12 255.255.255.255
signaling-peer 175.182.0.12
signaling-peer-port 5160
header-editor inbound tp-to-supported
editor-list before-receive
editor 1 to_rtp_avp
editor 2 tp-to-x-supported
editor-list after-send
editor 1 to_rtp_savp
account CUCM2
attach



call-policy-set 1
first-call-routing-table start-table
rtg-src-adjacency-table start-table
entry 1
match-adjacency CUCM2
dst-adjacency CUCM1
action complete
entry 2
match-adjacency CUCM1
dst-adjacency CUCM2
action complete
complete
active-call-policy-set 1



call-policy-set 2
first-number-analysis-table VALIDATE-DEST-PREFIX
na-dst-prefix-table VALIDATE-DEST-PREFIX
entry 1
```

```
match-prefix 8XX
action accept
exit
entry 2
match-prefix 911
action accept
exit
entry 3
match-prefix 1XX
action accept
exit
entry 4
match-prefix X
action reject
exit
complete
active-call-policy-set 2



call-policy-set 3
first-number-analysis-table VALIDATE-DEST-PREFIX
na-dst-prefix-table VALIDATE-DEST-PREFIX
entry 1
match-prefix 8X
category Non-emergency
action accept
exit
entry 2
match-prefix 1XX
category Non-Emergency
action accept
exit
entry 3
match-prefix 911
category Emergency
action accept
exit
entry 4
match-prefix X
action reject
exit
complete
active-call-policy-set 3



call-policy-set 4
first-number-analysis-table VALIDATE-DEST-PREFIX
na-dst-prefix-table VALIDATE-DEST-PREFIX
entry 1
match-prefix 8X
category Non-emergency
edit-dst del-prefix 1
action accept
exit
entry 2
match-prefix 1XX
category Non-Emergency
action accept
exit
entry 3
match-prefix 911
category Emergency
```

```
action accept
exit
entry 4
match-prefix X
action reject
exit
complete
active-call-policy-set 4



call-policy-set 5
first-call-routing-table ROUTE-ON-DEST-NUM
rtg-dst-address-table ROUTE-ON-DEST-NUM
entry 1
match-address 212
prefix
edit add-prefix 1
dst-adjacency CUCM1
action complete
exit
entry 2
match-address 215
prefix
dst-adjacency CUCM1
 action complete
entry 3
match-address 732
prefix
dst-adjacency CUCM2
action complete
exit
entry 4
match-address 908
prefix
dst-adjacency CUCM2
edit replace 609
action complete
complete
exit
active-call-policy-set 5



cac-policy-set 1
description Ignore the  bandwidth field in SDP
first-cac-table BW
first-cac-scope call
cac-table BW
table-type policy-set
entry 1
media bandwidth-field ignore
action cac-complete
complete
active-cac-policy-set 1
```

Business-to-Business TelePresence Configuration Profile (with CLI Prompts)

This complete TelePresence Configuration Profile example shows the CLI prompts.

Note If you are using Cisco TelePresence Release 1.8 or later, you must also perform the steps highlighted in bold. If you are using an earlier release of Cisco TelePresence, skip the steps highlighted in bold.

```
Router# configure terminal
Router(config)# sbc MY_SBC
Router(config-sbc)# sbe
Router(config-sbc-sbe)# secure-media
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)# sip header-profile PASS-HEADERS
Router(config-sbc-sbe-sip-hdr)# description pass non-essential headers
Router(config-sbc-sbe-sip-hdr)# header Allow entry 1
Router(config-sbc-sbe-sip-hdr-ele)# action pass
Router(config-sbc-sbe-sip-hdr-ele-act)# header Min-SE entry 1
Router(config-sbc-sbe-sip-hdr-ele)# action pass
Router(config-sbc-sbe-sip-hdr-ele-act)# header Reason entry 1
Router(config-sbc-sbe-sip-hdr-ele)# action pass
Router(config-sbc-sbe-sip-hdr-ele-act)# header SERVER entry 1
Router(config-sbc-sbe-sip-hdr-ele)# action pass
Router(config-sbc-sbe-sip-hdr-ele-act)# header DIVERSION entry 1
Router(config-sbc-sbe-sip-hdr-ele)# action pass
Router(config-sbc-sbe-sip-hdr-ele-act)# header Allow-Events entry 1
Router(config-sbc-sbe-sip-hdr-ele)# action pass
Router(config-sbc-sbe-sip-hdr-ele-act)# header Remote-Party-ID entry 1
Router(config-sbc-sbe-sip-hdr-ele)# action pass
Router(config-sbc-sbe-sip-hdr-ele-act)# header Session-Expires entry 1
Router(config-sbc-sbe-sip-hdr-ele)# action pass
Router(config-sbc-sbe-sip-hdr-ele-act)# header session-expiry entry 1
Router(config-sbc-sbe-sip-hdr-ele)# action pass
Router(config-sbc-sbe-sip-hdr-ele-act)# $URCE-PRIORITY entry 1
Router(config-sbc-sbe-sip-hdr-ele)# action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#
Router(config-sbc-sbe-sip-hdr-ele-act)#
Router(config-sbc-sbe-sip-hdr-ele-act)#
Router(config-sbc-sbe-sip-hdr-ele-act)# sip method-profile method1
Router(config-sbc-sbe-sip-mth)# description pass default methods
Router(config-sbc-sbe-sip-mth)# pass-body
Router(config-sbc-sbe-sip-mth)# method INFO
Router(config-sbc-sbe-sip-mth-ele)# action as-profile
Router(config-sbc-sbe-sip-mth-ele)# method OPTION
Router(config-sbc-sbe-sip-mth-ele)# action pass
Router(config-sbc-sbe-sip-mth-ele)# method UPDATE
Router(config-sbc-sbe-sip-mth-ele)# action pass
Router(config-sbc-sbe-sip-mth-ele)# sip option-profile option1
Router(config-sbc-sbe-sip-opt)# $ pass default options plus timer
Router(config-sbc-sbe-sip-opt)# option TIMER
Router(config-sbc-sbe-sip-opt)# option REPLACES
Router(config-sbc-sbe-sip-opt)#
Router(config-sbc-sbe)# script-set 2 lua
Router(config-sbc-sbe-script-set)# script srtp
Router(config-sbc-sbe-scrpset-script)# filename bootflash:srtp.lua
Router(config-sbc-sbe-scrpset-script)# load-order 100
Router(config-sbc-sbe-scrpset-script)# type full
Router(config-sbc-sbe-script-set)# complete
Router(config-sbc-sbe)# active-script-set 2
Router(config-sbc-sbe)# sip header-editor tp-to-supported
Router(config-sbc-sbe)# blacklist
Router(config-sbc-sbe-sip-hdr)# header x-supported entry 1
Router(config-sbc-sbe-mep-hdr-ele)# action replace-name value "supported"
Router(config-sbc-sbe-sip-hdr-ele-act)# condition status-code eq "200"
Router(config-sbc-sbe-sip-hdr)# header x-supported entry 2
Router(config-sbc-sbe-mep-hdr-ele)# action replace-name value "supported"
Router(config-sbc-sbe-sip-hdr-ele-act)# condition status-code eq "200"
Router(config-sbc-sbe-sip-hdr)# header x-supported entry 3
Router(config-sbc-sbe-mep-hdr-ele)# action replace-name value "supported"
Router(config-sbc-sbe-sip-hdr-ele-act)# condition status-code eq "200"
Router(config-sbc-sbe)# sip header-editor tp-add-x-srtp-fb
Router(config-sbc-sbe)# blacklist
Router(config-sbc-sbe-sip-hdr)# header srtp-fb entry 1
Router(config-sbc-sbe-mep-hdr-ele)# action replace-name value "supported"
Router(config-sbc-sbe-sip-hdr-ele-act)# condition status-code eq "200"
Router(config-sbc-sbe)# sip header-editor tp-to-x-supported
    blacklist
Router(config-sbc-sbe-sip-hdr)# header srtp-fb entry 1
     action add-first-header value "X-cisco-srtp-fallback"
Router(config-sbc-sbe-sip-hdr-ele-act)# condition header-name supported header-value
regex-match "^.*X-cisco-srtp-fallback.*$"
      condition status-code eq "200"
Router(config-sbc-sbe-sip-hdr)# header supported entry 1
Router(config-sbc-sbe-mep-hdr-ele)# action replace-name value "x-supported"
Router(config-sbc-sbe-sip-hdr-ele-act)# condition header-value not regex-match
"^.*X-cisco-srtp-fallback.*$"
Router(config-sbc-sbe-sip-hdr-ele-act)# condition status-code eq "200"
Router(config-sbc-sbe-sip-hdr)# header supported entry 2
Router(config-sbc-sbe-mep-hdr-ele)# action replace-name value "x-supported"
Router(config-sbc-sbe-sip-hdr-ele-act)# condition header-value not regex-match
"^.*X-cisco-srtp-fallback.*$"
Router(config-sbc-sbe-sip-hdr-ele-act)# condition status-code eq "200"
Router(config-sbc-sbe-sip-hdr)# header supported entry 3
Router(config-sbc-sbe-mep-hdr-ele)# action replace-name value "x-supported"
Router(config-sbc-sbe-sip-hdr-ele-act)# condition header-value not regex-match
"^.*X-cisco-srtp-fallback.*$"
Router(config-sbc-sbe-sip-hdr-ele-act)# condition status-code eq "200"
Router(config-sbc-sbe-sip-opt)#
Router(config-sbc-sbe-sip-opt)#
Router(config-sbc-sbe-sip-opt)# adjacency sip CUCM1
Router(config-sbc-sbe-adj-sip)# vrf CUCM1
Router(config-sbc-sbe-sip)# editor-type editor
Router(config-sbc-sbe-adj-sip)# header-profile inbound PASS-HEADERS
Router(config-sbc-sbe-adj-sip)# header-profile outbound PASS-HEADERS
Router(config-sbc-sbe-adj-sip)# method-profile inbound method1
Router(config-sbc-sbe-adj-sip)# method-profile outbound method1
Router(config-sbc-sbe-adj-sip)# option-profile ua inbound option1
Router(config-sbc-sbe-adj-sip)# option-profile ua outbound option1
Router(config-sbc-sbe-adj-sip)# preferred-transport tcp
Router(config-sbc-sbe-adj-sip)# security trusted-unencrypted
Router(config-sbc-sbe-adj-sip)# signaling-address ipv4 23.61.1.1
Router(config-sbc-sbe-adj-sip)# statistics method summary
Router(config-sbc-sbe-adj-sip)# signaling-port 5160
Router(config-sbc-sbe-adj-sip)# $ess ipv4 175.181.0.10 255.255.255.255
Router(config-sbc-sbe-adj-sip)# signaling-peer 175.181.0.10
Router(config-sbc-sbe-adj-sip)# signaling-peer-port 5160
Router(config-sbc-sbe-adj-sip)# header-editor outbound tp-add-x-srtp-fb
Router(config-sbc-sbe-adj-sip)# editor-list before-receive
Router(config-sbc-sbe-adj-sip-ed)# editor 1 to_rtp_avp
Router(config-sbc-sbe-adj-sip)# editor-list after-send
Router(config-sbc-sbe-adj-sip-ed)# editor 1 to_rtp_savp
Router(config-sbc-sbe-adj-sip)# account CUCM1
Router(config-sbc-sbe-adj-sip)# attach
Router(config-sbc-sbe-adj-sip)#
Router(config-sbc-sbe-adj-sip)#
Router(config-sbc-sbe-adj-sip)#
Router(config-sbc-sbe-adj-sip)# adjacency sip CUCM2
Router(config-sbc-sbe-adj-sip)# vrf CUCM2
Router(config-sbc-sbe-sip)# editor-type editor
Router(config-sbc-sbe-adj-sip)# header-profile inbound PASS-HEADERS
Router(config-sbc-sbe-adj-sip)# header-profile outbound PASS-HEADERS
Router(config-sbc-sbe-adj-sip)# method-profile inbound method1
Router(config-sbc-sbe-adj-sip)# method-profile outbound method1
Router(config-sbc-sbe-adj-sip)# option-profile ua inbound option1
Router(config-sbc-sbe-adj-sip)# option-profile ua outbound option1
Router(config-sbc-sbe-adj-sip)# preferred-transport tcp
Router(config-sbc-sbe-adj-sip)# security trusted-unencrypted
Router(config-sbc-sbe-adj-sip)# signaling-address ipv4 23.61.2.1
Router(config-sbc-sbe-adj-sip)# statistics method summary
Router(config-sbc-sbe-adj-sip)# signaling-port 5160
Router(config-sbc-sbe-adj-sip)# $ess ipv4 175.182.0.12 255.255.255.255
Router(config-sbc-sbe-adj-sip)# signaling-peer 175.182.0.12
Router(config-sbc-sbe-adj-sip)# signaling-peer-port 5160
Router(config-sbc-sbe-adj-sip)# header-editor inbound tp-to-supported
Router(config-sbc-sbe-adj-sip)# editor-list before-receive
Router(config-sbc-sbe-adj-sip-ed)# editor 1 to_rtp_avp
Router(config-sbc-sbe-adj-sip-ed)# editor 2 tp-to-x-supported
Router(config-sbc-sbe-adj-sip)# editor-list after-send
Router(config-sbc-sbe-adj-sip-ed)# editor 1 to_rtp_savp
Router(config-sbc-sbe-adj-sip)# account CUCM2
Router(config-sbc-sbe-adj-sip)# attach
Router(config-sbc-sbe-adj-sip)#
Router(config-sbc-sbe-adj-sip)#
Router(config-sbc-sbe-adj-sip)#
Router(config-sbc-sbe-adj-sip)# call-policy-set 1
Router(config-sbc-sbe-rtgpolicy)# first-call-routing-table start-table
Router(config-sbc-sbe-rtgpolicy)# rtg-src-adjacency-table start-table
Router(config-sbc-sbe-rtgpolicy-rtgtable)# entry 1
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# match-adjacency CUCM2
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# dst-adjacency CUCM1
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# entry 2
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# match-adjacency CUCM1
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# dst-adjacency CUCM2
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# complete
Router(config-sbc-sbe-rtgpolicy)# active-call-policy-set 1
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)# call-policy-set 2
Router(config-sbc-sbe-rtgpolicy)# $-table VALIDATE-DEST-PREFIX
Router(config-sbc-sbe-rtgpolicy)# $ix-table VALIDATE-DEST-PREFIX
Router(config-sbc-sbe-rtgpolicy-natable)# entry 1
Router(config-sbc-sbe-rtgpolicy-natable-entry)# match-prefix 8XX
Router(config-sbc-sbe-rtgpolicy-natable-entry)# action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)# exit
Router(config-sbc-sbe-rtgpolicy-natable)# entry 2
Router(config-sbc-sbe-rtgpolicy-natable-entry)# match-prefix 911
Router(config-sbc-sbe-rtgpolicy-natable-entry)# action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)# exit
Router(config-sbc-sbe-rtgpolicy-natable)# entry 3
Router(config-sbc-sbe-rtgpolicy-natable-entry)# match-prefix 1XX
Router(config-sbc-sbe-rtgpolicy-natable-entry)# action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)# exit
Router(config-sbc-sbe-rtgpolicy-natable)# entry 4
Router(config-sbc-sbe-rtgpolicy-natable-entry)# match-prefix X
Router(config-sbc-sbe-rtgpolicy-natable-entry)# action reject
Router(config-sbc-sbe-rtgpolicy-natable-entry)# exit
Router(config-sbc-sbe-rtgpolicy-natable)# complete
Router(config-sbc-sbe-rtgpolicy)# active-call-policy-set 2
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)# call-policy-set 3
Router(config-sbc-sbe-rtgpolicy)# $-table VALIDATE-DEST-PREFIX
Router(config-sbc-sbe-rtgpolicy)# $ix-table VALIDATE-DEST-PREFIX
Router(config-sbc-sbe-rtgpolicy-natable)# entry 1
Router(config-sbc-sbe-rtgpolicy-natable-entry)# match-prefix 8X
Router(config-sbc-sbe-rtgpolicy-natable-entry)# category Non-emergency
Router(config-sbc-sbe-rtgpolicy-natable-entry)# action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)# exit
Router(config-sbc-sbe-rtgpolicy-natable)# entry 2
Router(config-sbc-sbe-rtgpolicy-natable-entry)# match-prefix 1XX
Router(config-sbc-sbe-rtgpolicy-natable-entry)# category Non-Emergency
Router(config-sbc-sbe-rtgpolicy-natable-entry)# action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)# exit
Router(config-sbc-sbe-rtgpolicy-natable)# entry 3
Router(config-sbc-sbe-rtgpolicy-natable-entry)# match-prefix 911
Router(config-sbc-sbe-rtgpolicy-natable-entry)# category Emergency
Router(config-sbc-sbe-rtgpolicy-natable-entry)# action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)# exit
Router(config-sbc-sbe-rtgpolicy-natable)# entry 4
Router(config-sbc-sbe-rtgpolicy-natable-entry)# match-prefix X
Router(config-sbc-sbe-rtgpolicy-natable-entry)# action reject
Router(config-sbc-sbe-rtgpolicy-natable-entry)# exit
Router(config-sbc-sbe-rtgpolicy-natable)# complete
Router(config-sbc-sbe-rtgpolicy)# active-call-policy-set 3
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)# call-policy-set 4
Router(config-sbc-sbe-rtgpolicy)# $-table VALIDATE-DEST-PREFIX
Router(config-sbc-sbe-rtgpolicy)# $ix-table VALIDATE-DEST-PREFIX
Router(config-sbc-sbe-rtgpolicy-natable)# entry 1
Router(config-sbc-sbe-rtgpolicy-natable-entry)# match-prefix 8X
Router(config-sbc-sbe-rtgpolicy-natable-entry)# category Non-emergency
Router(config-sbc-sbe-rtgpolicy-natable-entry)# edit-dst del-prefix 1
Router(config-sbc-sbe-rtgpolicy-natable-entry)# action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)# exit
Router(config-sbc-sbe-rtgpolicy-natable)# entry 2
Router(config-sbc-sbe-rtgpolicy-natable-entry)# match-prefix 1XX
Router(config-sbc-sbe-rtgpolicy-natable-entry)# category Non-Emergency
Router(config-sbc-sbe-rtgpolicy-natable-entry)# action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)# exit
Router(config-sbc-sbe-rtgpolicy-natable)# entry 3
Router(config-sbc-sbe-rtgpolicy-natable-entry)# match-prefix 911
Router(config-sbc-sbe-rtgpolicy-natable-entry)# category Emergency
Router(config-sbc-sbe-rtgpolicy-natable-entry)# action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)# exit
Router(config-sbc-sbe-rtgpolicy-natable)# entry 4
Router(config-sbc-sbe-rtgpolicy-natable-entry)# match-prefix X
Router(config-sbc-sbe-rtgpolicy-natable-entry)# action reject
Router(config-sbc-sbe-rtgpolicy-natable-entry)# exit
Router(config-sbc-sbe-rtgpolicy-natable)# complete
Router(config-sbc-sbe-rtgpolicy)# active-call-policy-set 4
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)# call-policy-set 5
Router(config-sbc-sbe-rtgpolicy)# $routing-table ROUTE-ON-DEST-NUM
Router(config-sbc-sbe-rtgpolicy)# $ress-table ROUTE-ON-DEST-NUM
Router(config-sbc-sbe-rtgpolicy-rtgtable)# entry 1
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# match-address 212
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# prefix
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# edit add-prefix 1
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# dst-adjacency CUCM1
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# exit
Router(config-sbc-sbe-rtgpolicy-rtgtable)# entry 2
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# match-address 215
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# prefix
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# dst-adjacency CUCM1
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# entry 3
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# match-address 732
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# prefix
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# dst-adjacency CUCM2
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# exit
Router(config-sbc-sbe-rtgpolicy-rtgtable)# entry 4
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# match-address 908
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# prefix
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# dst-adjacency CUCM2
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# edit replace 609
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# complete
Router(config-sbc-sbe-rtgpolicy)# exit
Router(config-sbc-sbe)# active-call-policy-set 5
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)# cac-policy-set 1
Router(config-sbc-sbe-cacpolicy)# $ Ignore the  bandwidth field in SDP
Router(config-sbc-sbe-cacpolicy)# first-cac-table BW
Router(config-sbc-sbe-cacpolicy)# first-cac-scope call
Router(config-sbc-sbe-cacpolicy)# cac-table BW
Router(config-sbc-sbe-cacpolicy-cactable)# table-type policy-set
Router(config-sbc-sbe-cacpolicy-cactable)# entry 1
Router(config-sbc-sbe-cacpolicy-cactable-entry)# $idth-field ignore
Router(config-sbc-sbe-cacpolicy-cactable-entry)# action cac-complete
Router(config-sbc-sbe-cacpolicy-cactable-entry)# complete
Router(config-sbc-sbe-cacpolicy)# active-cac-policy-set 1
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
```

Individual Subscriber Configuration Profile Example

This section provides a complete example of an Individual Subscriber Configuration Profile in the following sections:

- Individual Subscriber Configuration Profile Adjacencies
- Individual Subscriber Configuration Profile (in Segments
- Individual Subscriber Configuration Profile (for Copy and Paste)
- Individual Subscriber Configuration Profile (with CLI Prompts)

Individual Subscriber Configuration Profile Adjacencies

The User Network Interface (UNI) feature of the Cisco Unified Border Element provides individual subscribers with secure connections to service provider networks.

For a UNI, the adjacencies are the signaling peers for the Cisco Unified Border Element. In this example, the adjacencies are the softswitch of the service provider and the IP DSLAM. (See Figure 5.)

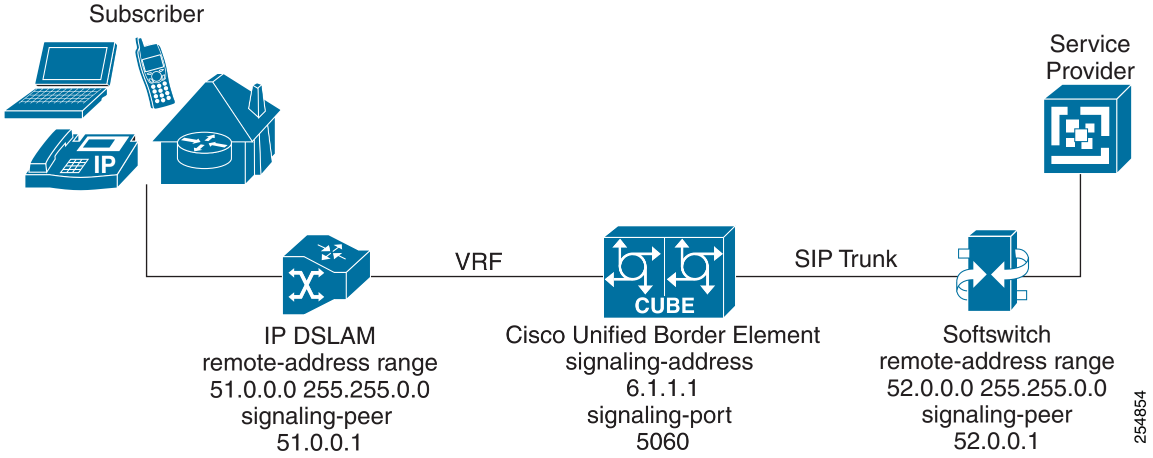
The Cisco Unified Border Element routes messages from the IP DSLAM to the softswitch of the service provider.

The following components are configured on UNI adjacencies:

- SIP trunk between the Cisco Unified Border Element and the softswitch of the service provider
- VRF between the Cisco Unified Border Element and the IP DSLAM
- Registration of subscribers with the softswitch

Figure 5 shows a subscriber connected to the softswitch of a service provider via an IP DSLAM and how the Cisco Unified Border Element provides a secure connection between the subscriber and the service provider. The softswitch and the IP DSLAM are the signaling peers for the Cisco Unified Border Element.

Figure 5 User Network Interface (UNI)



In subscriber adjacency, the signaling peer is the IP DSLAM and the remote-address is the range of IP addresses that are allowed for the IP DSLAM. The **registration outgoing timer** command enables softswitch shielding and sets the timeout period during which the Cisco Unified Border Element has to send outgoing register messages to the softswitch.

Subscriber Adjacency

```
adjacency sip subscribers
    vrf subscribers
    inherit profile preset-access
    signaling-address ipv4 6.1.1.1
    signaling-port 5060
    remote-address ipv4 51.0.0.0 255.255.0.0
    signaling-peer 51.0.0.1
    registration outgoing timer 3600
    registration rewrite-register
    account subscribers
    attach
```

In the softswitch adjacency, the signaling peer is the softswitch and the remote-address is the range of IP addresses that are allowed for the softswitch. The **registration contact username rewrite** command allows the contact username in a SIP REGISTER request to be changed or rewritten.

Softswitch Adjacency

```
adjacency sip softswitch
    vrf softswitch
    inherit profile preset-core
    signaling-address ipv4  6.1.1.1
    signaling-port 5060
    remote-address ipv4 52.0.0.0 255.255.255.255
    signaling-peer 52.0.0.1
    registration contact username rewrite
    account softswitch
    attach
```

Individual Subscriber Configuration Profile (in Segments

This Individual Subscriber Configuration Profile example shows each segment of the example separated by a Heading describing the function of that segment.

Configuration Mode

```
config t
```

SBC SBE Configuration Setup

```
sbc MY_SBC
    sbe
```

Media Characteristics (Security)

```
secure-media
…
…
```

White List, Pass Headers

```
sip header-profile PASS-HEADERS
    description pass non-essential headers
    header Allow entry 1
    action pass
    header Min-SE entry 1
    action pass
    header Reason entry 1
    action pass
    header SERVER entry 1
    action pass
    header DIVERSION entry 1
    action pass
    header Allow-Events entry 1
    action pass
    header Remote-Party-ID entry 1
    action pass
    header Session-Expires entry 1
    action pass
    header session-expiry entry 1
    action pass
    header RESOURCE-PRIORITY entry 1
    action pass
```

White List, Methods and Options

```
sip method-profile method1
    description pass default methods
    pass-body
    method INFO
    action as-profile
    method OPTION
    action pass
    method UPDATE
    action pass
    sip option-profile option1
    description pass default options plus timer
    option TIMER
    option REPLACES
```

Subscriber Adjacency

```
adjacency sip subscribers
    vrf subscribers
    inherit profile preset-access
    signaling-address ipv4 6.1.1.1
    signaling-port 5060
    remote-address ipv4 51.0.0.0 255.255.0.0
    signaling-peer 51.0.0.1
    registration outgoing timer 3600
    registration rewrite-register
    account subscribers
    attach
```

Softswitch Adjacency

```
adjacency sip softswitch
    vrf softswitch
    inherit profile preset-core
    signaling-address ipv4  6.1.1.1
    signaling-port 5060
    remote-address ipv4 52.0.0.0 255.255.255.255
    signaling-peer 52.0.0.1
    registration contact username rewrite
    account softswitch
    attach
```

Call Policy, Subscriber to Softswitch Connection

```
call-policy-set 1
    first-call-routing-table start-table
    rtg-src-adjacency-table start-table
    entry 1
        match-adjacency softswitch
        dst-adjacency subscribers
        action complete
    entry 2
        match-adjacency subscribers
        dst-adjacency softswitch
        action complete
    complete
active-call-policy-set 1
```

Call Policy, Number Analysis Stage - Number Validation

```
call-policy-set 2
    first-number-analysis-table VALIDATE-DEST-PREFIX
    na-dst-prefix-table VALIDATE-DEST-PREFIX
    entry 1
        match-prefix 8XX
        action accept
        exit
    entry 2
        match-prefix 911
        action accept
        exit
    entry 3
        match-prefix 1XX
        action accept
        exit
    entry 4
        match-prefix X
        action reject
        exit
    complete
active-call-policy-set 2
```

Call Policy, Number Analysis Stage - Number Categorization

```
call-policy-set 3
    first-number-analysis-table VALIDATE-DEST-PREFIX
    na-dst-prefix-table VALIDATE-DEST-PREFIX
    entry 1
        match-prefix 8X
        category Non-emergency
        action accept
        exit
    entry 2
        match-prefix 1XX
        category Non-Emergency
        action accept
        exit
    entry 3
        match-prefix 911
        category Emergency
        action accept
        exit
    entry 4
        match-prefix X
        action reject
        exit
        complete
active-call-policy-set 3
```

Call Policy, Number Analysis Stage - Digit Manipulation

```
call-policy-set 4
    first-number-analysis-table VALIDATE-DEST-PREFIX
    na-dst-prefix-table VALIDATE-DEST-PREFIX
    entry 1
        match-prefix 8X
        category Non-emergency
        edit-dst del-prefix 1
        action accept
        exit
    entry 2
        match-prefix 1XX
        category Non-Emergency
        action accept
        exit
    entry 3
        match-prefix 911
        category Emergency
        action accept
        exit
        entry 4
        match-prefix X
        action reject
        exit
    complete
active-call-policy-set 4
```

Call Policy, Routing Stage - Destination Adjacency

```
call-policy-set 5
    first-call-routing-table ROUTE-ON-DEST-NUM
    rtg-dst-address-table ROUTE-ON-DEST-NUM
    entry 1
        match-address 212
        prefix
        edit add-prefix 1
        dst-adjacency subscribers
        action complete
        exit
    entry 2
        match-address 215
        prefix
        dst-adjacency subscribers
         action complete
        entry 3
        match-address 732
        prefix
        dst-adjacency softswitch
        action complete
        exit
    entry 4
        match-address 908
        prefix
        dst-adjacency softswitch
        edit replace 609
        action complete
        complete
        exit
active-call-policy-set 5
```

Call Admission Control, CAC Policy Media Bandwidth Field Ignore

```
cac-policy-set 1
    description Ignore the  bandwidth field in SDP
    first-cac-table BW
    first-cac-scope call
    cac-table BW
    table-type policy-set
    entry 1
        media bandwidth-field ignore
        action cac-complete
    complete
active-cac-policy-set 1
```

Show Command, Display Adjacencies

```
Router# show sbc MY_SBC sbe adjacencies

SBC Service “MY_SBC"
      Name                      Type    State       Description
      -----------------------------------------------------------
      subscribers                     SIP     Attached
      softswitch                     SIP     Attached
TPX-SBC#
```

Individual Subscriber Configuration Profile (for Copy and Paste)

This is a complete Individual Subscriber Configuration Profile example that can be copied and pasted into the CLI of an ASR1000 running the Cisco Unified Border Element. Each segment is separated only by returns.

```
config t

sbc MY_SBC
sbe
secure-media


sip header-profile PASS-HEADERS
description pass non-essential headers
header Allow entry 1
action pass
header Min-SE entry 1
action pass
header Reason entry 1
action pass
header SERVER entry 1
action pass
header DIVERSION entry 1
action pass
header Allow-Events entry 1
action pass
header Remote-Party-ID entry 1
action pass
header Session-Expires entry 1
action pass
header session-expiry entry 1
action pass
header RESOURCE-PRIORITY entry 1
action pass



sip method-profile method1
description pass default methods
pass-body
method INFO
action as-profile
method OPTION
action pass
method UPDATE
action pass
sip option-profile option1
description pass default options plus timer
option TIMER
option REPLACES



adjacency sip subscribers
vrf subscribers
inherit profile preset-access
signaling-address ipv4 6.1.1.1
signaling-port 5060
remote-address ipv4 51.0.0.0 255.255.0.0
signaling-peer 51.0.0.1
registration outgoing timer 3600
registration rewrite-register
```

```
account subscribers
attach



adjacency sip softswitch
vrf softswitch
inherit profile preset-core
signaling-address ipv4  6.1.1.1
signaling-port 5060
remote-address ipv4 52.0.0.0 255.255.255.255
signaling-peer 52.0.0.1
registration contact username rewrite
account softswitch
attach



call-policy-set 1
first-call-routing-table start-table
rtg-src-adjacency-table start-table
entry 1
match-adjacency softswitch
dst-adjacency subscribers
action complete
entry 2
match-adjacency subscribers
dst-adjacency softswitch
action complete
complete
active-call-policy-set 1



call-policy-set 2
first-number-analysis-table VALIDATE-DEST-PREFIX
na-dst-prefix-table VALIDATE-DEST-PREFIX
entry 1
match-prefix 8XX
action accept
exit
entry 2
match-prefix 911
action accept
exit
entry 3
match-prefix 1XX
action accept
exit
entry 4
match-prefix X
action reject
exit
complete
active-call-policy-set 2



call-policy-set 3
first-number-analysis-table VALIDATE-DEST-PREFIX
na-dst-prefix-table VALIDATE-DEST-PREFIX
entry 1
match-prefix 8X
category Non-emergency
```

```
action accept
exit
entry 2
match-prefix 1XX
category Non-Emergency
action accept
exit
entry 3
match-prefix 911
category Emergency
action accept
exit
entry 4
match-prefix X
action reject
exit
complete
active-call-policy-set 3



call-policy-set 4
first-number-analysis-table VALIDATE-DEST-PREFIX
na-dst-prefix-table VALIDATE-DEST-PREFIX
entry 1
match-prefix 8X
category Non-emergency
edit-dst del-prefix 1
action accept
exit
entry 2
match-prefix 1XX
category Non-Emergency
action accept
exit
entry 3
match-prefix 911
category Emergency
action accept
exit
entry 4
match-prefix X
action reject
exit
complete
active-call-policy-set 4



call-policy-set 5
first-call-routing-table ROUTE-ON-DEST-NUM
rtg-dst-address-table ROUTE-ON-DEST-NUM
entry 1
match-address 212
prefix
edit add-prefix 1
dst-adjacency subscribers
action complete
exit
entry 2
match-address 215
prefix
dst-adjacency subscribers
action complete
```

```
entry 3
match-address 732
prefix
dst-adjacency softswitch
action complete
exit
entry 4
match-address 908
prefix
dst-adjacency softswitch
edit replace 609
action complete
complete
exit
active-call-policy-set 5



cac-policy-set 1
description Ignore the  bandwidth field in SDP
first-cac-table BW
first-cac-scope call
cac-table BW
table-type policy-set
entry 1
media bandwidth-field ignore
action cac-complete
complete
active-cac-policy-set 1
```

Individual Subscriber Configuration Profile (with CLI Prompts)

This complete Individual Subscriber Configuration Profile example shows the CLI prompts.

```
Router#
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#
Router(config)#sbc MY_SBC
Router(config-sbc)#sbe
Router(config-sbc-sbe)#secure-media
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#sip header-profile PASS-HEADERS
Router(config-sbc-sbe-sip-hdr)#description pass non-essential headers
Router(config-sbc-sbe-sip-hdr)#header Allow entry 1
Router(config-sbc-sbe-sip-hdr-ele)#action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#header Min-SE entry 1
Router(config-sbc-sbe-sip-hdr-ele)#action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#header Reason entry 1
Router(config-sbc-sbe-sip-hdr-ele)#action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#header SERVER entry 1
Router(config-sbc-sbe-sip-hdr-ele)#action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#header DIVERSION entry 1
Router(config-sbc-sbe-sip-hdr-ele)#action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#header Allow-Events entry 1
Router(config-sbc-sbe-sip-hdr-ele)#action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#header Remote-Party-ID entry 1
Router(config-sbc-sbe-sip-hdr-ele)#action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#header Session-Expires entry 1
Router(config-sbc-sbe-sip-hdr-ele)#action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#header session-expiry entry 1
Router(config-sbc-sbe-sip-hdr-ele)#action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#$URCE-PRIORITY entry 1
Router(config-sbc-sbe-sip-hdr-ele)#action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#
Router(config-sbc-sbe-sip-hdr-ele-act)#
Router(config-sbc-sbe-sip-hdr-ele-act)#
Router(config-sbc-sbe-sip-hdr-ele-act)#sip method-profile method1
Router(config-sbc-sbe-sip-mth)#description pass default methods
Router(config-sbc-sbe-sip-mth)#pass-body
Router(config-sbc-sbe-sip-mth)#method INFO
Router(config-sbc-sbe-sip-mth-ele)#action as-profile
Router(config-sbc-sbe-sip-mth-ele)#method OPTION
Router(config-sbc-sbe-sip-mth-ele)#action pass
Router(config-sbc-sbe-sip-mth-ele)#method UPDATE
Router(config-sbc-sbe-sip-mth-ele)#action pass
Router(config-sbc-sbe-sip-mth-ele)#sip option-profile option1
Router(config-sbc-sbe-sip-opt)#$ pass default options plus timer
Router(config-sbc-sbe-sip-opt)#option TIMER
Router(config-sbc-sbe-sip-opt)#option REPLACES
Router(config-sbc-sbe-sip-opt)#
Router(config-sbc-sbe-sip-opt)#
Router(config-sbc-sbe-sip-opt)#
Router(config-sbc-sbe-sip-opt)#adjacency sip subscribers
Router(config-sbc-sbe-adj-sip)#vrf subscribers
Router(config-sbc-sbe-adj-sip)#inherit profile preset-access
Router(config-sbc-sbe-adj-sip)#signaling-address ipv4 6.1.1.1
Router(config-sbc-sbe-adj-sip)#signaling-port 5060
Router(config-sbc-sbe-adj-sip)#$ess ipv4 51.0.0.0 255.255.0.0
Router(config-sbc-sbe-adj-sip)#signaling-peer 51.0.0.1
Router(config-sbc-sbe-adj-sip)#registration outgoing timer 3600
Router(config-sbc-sbe-adj-sip)#registration rewrite-register
Router(config-sbc-sbe-adj-sip)#account subscribers
Router(config-sbc-sbe-adj-sip)#attach
Router(config-sbc-sbe-adj-sip)#
Router(config-sbc-sbe-adj-sip)#
Router(config-sbc-sbe-adj-sip)#
Router(config-sbc-sbe-adj-sip)#adjacency sip softswitch
Router(config-sbc-sbe-adj-sip)#vrf softswitch
Router(config-sbc-sbe-adj-sip)#inherit profile preset-core
Router(config-sbc-sbe-adj-sip)#signaling-address ipv4  6.1.1.1
Router(config-sbc-sbe-adj-sip)#signaling-port 5060
Router(config-sbc-sbe-adj-sip)#$ess ipv4 52.0.0.0 255.255.255.255
Router(config-sbc-sbe-adj-sip)#signaling-peer 52.0.0.1
Router(config-sbc-sbe-adj-sip)#registration contact username rewrite
Router(config-sbc-sbe-adj-sip)#account softswitch
Router(config-sbc-sbe-adj-sip)#attach
Router(config-sbc-sbe-adj-sip)#
Router(config-sbc-sbe-adj-sip)#
Router(config-sbc-sbe-adj-sip)#
Router(config-sbc-sbe-adj-sip)#call-policy-set 1
Router(config-sbc-sbe-rtgpolicy)#first-call-routing-table start-table
Router(config-sbc-sbe-rtgpolicy)#rtg-src-adjacency-table start-table
Router(config-sbc-sbe-rtgpolicy-rtgtable)#entry 1
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#$ency softswitch
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#$cy subscribers
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#entry 2
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#$ency subscribers
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#$cy softswitch
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#complete
Router(config-sbc-sbe-rtgpolicy)#active-call-policy-set 1
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#call-policy-set 2
Router(config-sbc-sbe-rtgpolicy)#$-table VALIDATE-DEST-PREFIX
Router(config-sbc-sbe-rtgpolicy)#$ix-table VALIDATE-DEST-PREFIX
Router(config-sbc-sbe-rtgpolicy-natable)#entry 1
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix 8XX
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#entry 2
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix 911
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#entry 3
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix 1XX
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#entry 4
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix X
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action reject
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#complete
Router(config-sbc-sbe-rtgpolicy)#active-call-policy-set 2
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#call-policy-set 3
Router(config-sbc-sbe-rtgpolicy)#$-table VALIDATE-DEST-PREFIX
Router(config-sbc-sbe-rtgpolicy)#$ix-table VALIDATE-DEST-PREFIX
Router(config-sbc-sbe-rtgpolicy-natable)#entry 1
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix 8X
Router(config-sbc-sbe-rtgpolicy-natable-entry)#category Non-emergency
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#entry 2
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix 1XX
Router(config-sbc-sbe-rtgpolicy-natable-entry)#category Non-Emergency
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#entry 3
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix 911
Router(config-sbc-sbe-rtgpolicy-natable-entry)#category Emergency
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#entry 4
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix X
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action reject
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#complete
Router(config-sbc-sbe-rtgpolicy)#active-call-policy-set 3
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#call-policy-set 4
Router(config-sbc-sbe-rtgpolicy)#$-table VALIDATE-DEST-PREFIX
Router(config-sbc-sbe-rtgpolicy)#$ix-table VALIDATE-DEST-PREFIX
Router(config-sbc-sbe-rtgpolicy-natable)#entry 1
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix 8X
Router(config-sbc-sbe-rtgpolicy-natable-entry)#category Non-emergency
Router(config-sbc-sbe-rtgpolicy-natable-entry)#edit-dst del-prefix 1
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#entry 2
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix 1XX
Router(config-sbc-sbe-rtgpolicy-natable-entry)#category Non-Emergency
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#entry 3
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix 911
Router(config-sbc-sbe-rtgpolicy-natable-entry)#category Emergency
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#entry 4
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix X
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action reject
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#complete
Router(config-sbc-sbe-rtgpolicy)#active-call-policy-set 4
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#call-policy-set 5
Router(config-sbc-sbe-rtgpolicy)#$routing-table ROUTE-ON-DEST-NUM
Router(config-sbc-sbe-rtgpolicy)#$ress-table ROUTE-ON-DEST-NUM
Router(config-sbc-sbe-rtgpolicy-rtgtable)#entry 1
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#match-address 212
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#prefix
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#edit add-prefix 1
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#$cy subscribers
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-rtgtable)#entry 2
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#match-address 215
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#prefix
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#$cy subscribers
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#entry 3
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#match-address 732
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#prefix
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#$cy softswitch
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-rtgtable)#entry 4
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#match-address 908
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#prefix
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#$cy softswitch
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#edit replace 609
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#complete
Router(config-sbc-sbe-rtgpolicy)#exit
Router(config-sbc-sbe)#active-call-policy-set 5
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#cac-policy-set 1
Router(config-sbc-sbe-cacpolicy)#$ Ignore the  bandwidth field in SDP
Router(config-sbc-sbe-cacpolicy)#first-cac-table BW
Router(config-sbc-sbe-cacpolicy)#first-cac-scope call
Router(config-sbc-sbe-cacpolicy)#cac-table BW
Router(config-sbc-sbe-cacpolicy-cactable)#table-type policy-set
Router(config-sbc-sbe-cacpolicy-cactable)#entry 1
Router(config-sbc-sbe-cacpolicy-cactable-entry)#$idth-field ignore
Router(config-sbc-sbe-cacpolicy-cactable-entry)#action cac-complete
Router(config-sbc-sbe-cacpolicy-cactable-entry)#complete
Router(config-sbc-sbe-cacpolicy)#active-cac-policy-set 1
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
```

Network to Network Interface Configuration Profile Example

This section provides a complete example of a Network to Network Interface Configuration Profile in the following sections:

- Network to Network Interface Configuration Profile Adjacencies
- Network to Network Interface Configuration Profile (in Segments)
- Network to Network Interface Configuration Profile (for Copy and Paste)
- Network to Network Interface Configuration Profile (with CLI Prompts)

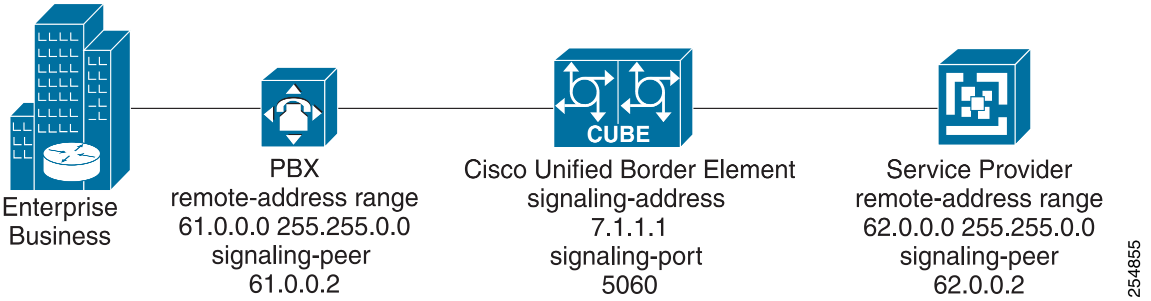
Network to Network Interface Configuration Profile Adjacencies

The Network to Network Interface (NNI) feature of the Cisco Unified Border Element provides the ability to create and maintain a secure connection between two different service provider networks or between a service provider network and an enterprise business. The connection between two different networks is a SIP trunk.

In this NNI example, the signaling peers for the Cisco Unified Border Element are the PBX and the service provider. (See Figure 6.)

Figure 6 shows the NNI for these examples.

Figure 6 Network to Network Interface (NNI)



In this example, the signaling-peer address is the IP address of the PBX.

PBX Adjacency

```
adjacency sip pbx
    vrf pbx
    inherit profile preset-core
    signaling-address ipv4 7.1.1.1
    signaling-port 5060
    remote-address ipv4 61.0.0.0 255.255.0.0
    signaling-peer 61.0.0.2
    account pbx
    attach
```

In this example, signaling-peer address is IP address of the service provider.

Service Provider Adjacency

```
    adjacency sip service_provider
        vrf service_provider
        inherit profile preset-peer
        signaling-address ipv4 7.1.1.1
        signaling-port 5060
        remote-address ipv4 62.0.0.0 255.255.0.0
        signaling-peer 62.0.0.2
        account service_provider
        attach
```

Network to Network Interface Configuration Profile (in Segments)

This Network to Network Interface Configuration Profile example shows each segment of the example separated by a Heading describing the function of that segment.

Configuration Mode

```
config t
```

SBC SBE Configuration Setup

```
sbc MY_SBC
    sbe
```

Media Characteristics (Security)

```
secure-media
…
…
```

White List, Pass Headers

```
sip header-profile PASS-HEADERS
    description pass non-essential headers
    header Allow entry 1
    action pass
    header Min-SE entry 1
    action pass
    header Reason entry 1
    action pass
    header SERVER entry 1
    action pass
    header DIVERSION entry 1
    action pass
    header Allow-Events entry 1
    action pass
    header Remote-Party-ID entry 1
    action pass
    header Session-Expires entry 1
    action pass
    header session-expiry entry 1
    action pass
    header RESOURCE-PRIORITY entry 1
    action pass
```

White List, Methods and Options

```
sip method-profile method1
    description pass default methods
    pass-body
    method INFO
    action as-profile
    method OPTION
    action pass
    method UPDATE
    action pass
    sip option-profile option1
    description pass default options plus timer
    option TIMER
    option REPLACES
```

PBX Adjacency

```
adjacency sip pbx
    vrf pbx
    header-profile inbound PASS-HEADERS
    header-profile outbound PASS-HEADERS
    method-profile inbound method1
    method-profile outbound method1
    option-profile ua inbound option1
    option-profile ua outbound option1
    preferred-transport tcp
    security trusted-unencrypted
    signaling-address ipv4 23.61.1.1
    statistics method summary
    signaling-port 5160
    remote-address ipv4 175.181.0.10 255.255.255.255
    signaling-peer 175.181.0.10
    signaling-peer-port 5160
    account pbx
    attach
```

Service Provider Adjacency

```
adjacency sip service_provider
    vrf service_provider
    header-profile inbound PASS-HEADERS
    header-profile outbound PASS-HEADERS
    method-profile inbound method1
    method-profile outbound method1
    option-profile ua inbound option1
    option-profile ua outbound option1
    preferred-transport tcp
    security trusted-unencrypted
    signaling-address ipv4 23.61.2.1
    statistics method summary
    signaling-port 5160
    remote-address ipv4 175.182.0.12 255.255.255.255
    signaling-peer 175.182.0.12
    signaling-peer-port 5160
    account service_provider
    attach
```

Call Policy, PBX to Service Provider Connection

```
call-policy-set 1
    first-call-routing-table start-table
    rtg-src-adjacency-table start-table
    entry 1
        match-adjacency service_provider
        dst-adjacency pbx
        action complete
    entry 2
        match-adjacency pbx
        dst-adjacency service_provider
        action complete
    complete
active-call-policy-set 1
```

Call Policy, Number Analysis Stage - Number Validation

```
call-policy-set 2
    first-number-analysis-table VALIDATE-DEST-PREFIX
    na-dst-prefix-table VALIDATE-DEST-PREFIX
    entry 1
        match-prefix 8XX
        action accept
        exit
    entry 2
        match-prefix 911
        action accept
        exit
    entry 3
        match-prefix 1XX
        action accept
        exit
    entry 4
        match-prefix X
        action reject
        exit
    complete
active-call-policy-set 2
```

Call Policy, Number Analysis Stage - Number Categorization

```
call-policy-set 3
    first-number-analysis-table VALIDATE-DEST-PREFIX
    na-dst-prefix-table VALIDATE-DEST-PREFIX
    entry 1
        match-prefix 8X
        category Non-emergency
        action accept
        exit
    entry 2
        match-prefix 1XX
        category Non-Emergency
        action accept
        exit
    entry 3
        match-prefix 911
        category Emergency
        action accept
        exit
    entry 4
        match-prefix X
        action reject
        exit
        complete
active-call-policy-set 3
```

Call Policy, Number Analysis Stage - Digit Manipulation

```
call-policy-set 4
    first-number-analysis-table VALIDATE-DEST-PREFIX
    na-dst-prefix-table VALIDATE-DEST-PREFIX
    entry 1
        match-prefix 8X
        category Non-emergency
        edit-dst del-prefix 1
        action accept
        exit
    entry 2
        match-prefix 1XX
        category Non-Emergency
        action accept
        exit
    entry 3
        match-prefix 911
        category Emergency
        action accept
        exit
        entry 4
        match-prefix X
        action reject
        exit
    complete
active-call-policy-set 4
```

Call Policy, Routing Stage - Destination Adjacency

```
call-policy-set 5
    first-call-routing-table ROUTE-ON-DEST-NUM
    rtg-dst-address-table ROUTE-ON-DEST-NUM
    entry 1
        match-address 212
        prefix
        edit add-prefix 1
        dst-adjacency pbx
        action complete
        exit
    entry 2
        match-address 215
        prefix
        dst-adjacency pbx
         action complete
        entry 3
        match-address 732
        prefix
        dst-adjacency service_provider
        action complete
        exit
    entry 4
        match-address 908
        prefix
        dst-adjacency service_provider
        edit replace 609
        action complete
        complete
        exit
active-call-policy-set 5
```

Call Admission Control, CAC Policy Media Bandwidth Field Ignore

```
cac-policy-set 1
    description Ignore the  bandwidth field in SDP
    first-cac-table BW
    first-cac-scope call
    cac-table BW
    table-type policy-set
    entry 1
        media bandwidth-field ignore
        action cac-complete
    complete
active-cac-policy-set 1
```

Show Command, Display Adjacencies

```
Router# show sbc MY_SBC sbe adjacencies

SBC Service “MY_SBC"
      Name                      Type    State        Description
      -----------------------------------------------------------
      pbx                       SIP     Attached
      service provider          SIP     Attached
TPX-SBC#
```

Network to Network Interface Configuration Profile (for Copy and Paste)

This is a complete Network to Network Interface Configuration Profile example that can be copied and pasted into the CLI of an ASR1000 running the Cisco Unified Border Element. Each segment is separated only by returns.

```
config t

sbc MY_SBC
sbe
secure-media


sip header-profile PASS-HEADERS
description pass non-essential headers
header Allow entry 1
action pass
header Min-SE entry 1
action pass
header Reason entry 1
action pass
header SERVER entry 1
action pass
header DIVERSION entry 1
action pass
header Allow-Events entry 1
action pass
header Remote-Party-ID entry 1
action pass
header Session-Expires entry 1
action pass
header session-expiry entry 1
action pass
header RESOURCE-PRIORITY entry 1
action pass



sip method-profile method1
description pass default methods
pass-body
method INFO
action as-profile
method OPTION
action pass
method UPDATE
action pass
sip option-profile option1
description pass default options plus timer
option TIMER
option REPLACES



adjacency sip pbx
vrf pbx
header-profile inbound PASS-HEADERS
header-profile outbound PASS-HEADERS
method-profile inbound method1
method-profile outbound method1
option-profile ua inbound option1
option-profile ua outbound option1
preferred-transport tcp
```

```
security trusted-unencrypted
signaling-address ipv4 23.61.1.1
statistics method summary
signaling-port 5160
remote-address ipv4 175.181.0.10 255.255.255.255
signaling-peer 175.181.0.10
signaling-peer-port 5160
account pbx
attach


adjacency sip service_provider
vrf service_provider
header-profile inbound PASS-HEADERS
header-profile outbound PASS-HEADERS
method-profile inbound method1
method-profile outbound method1
option-profile ua inbound option1
option-profile ua outbound option1
preferred-transport tcp
security trusted-unencrypted
signaling-address ipv4 23.61.2.1
statistics method summary
signaling-port 5160
remote-address ipv4 175.182.0.12 255.255.255.255
signaling-peer 175.182.0.12
signaling-peer-port 5160
account service_provider
attach


call-policy-set 1
first-call-routing-table start-table
rtg-src-adjacency-table start-table
entry 1
match-adjacency service_provider
dst-adjacency pbx
action complete
entry 2
match-adjacency pbx
dst-adjacency service_provider
action complete
complete
active-call-policy-set 1


call-policy-set 2
first-number-analysis-table VALIDATE-DEST-PREFIX
na-dst-prefix-table VALIDATE-DEST-PREFIX
entry 1
match-prefix 8XX
action accept
exit
entry 2
match-prefix 911
action accept
exit
entry 3
match-prefix 1XX
action accept
exit
```

```
entry 4
match-prefix X
action reject
exit
complete
active-call-policy-set 2



call-policy-set 3
first-number-analysis-table VALIDATE-DEST-PREFIX
na-dst-prefix-table VALIDATE-DEST-PREFIX
entry 1
match-prefix 8X
category Non-emergency
action accept
exit
entry 2
match-prefix 1XX
category Non-Emergency
action accept
exit
entry 3
match-prefix 911
category Emergency
action accept
exit
entry 4
match-prefix X
action reject
exit
complete
active-call-policy-set 3



call-policy-set 4
first-number-analysis-table VALIDATE-DEST-PREFIX
na-dst-prefix-table VALIDATE-DEST-PREFIX
entry 1
match-prefix 8X
category Non-emergency
edit-dst del-prefix 1
action accept
exit
entry 2
match-prefix 1XX
category Non-Emergency
action accept
exit
entry 3
match-prefix 911
category Emergency
action accept
exit
entry 4
match-prefix X
action reject
exit
complete
active-call-policy-set 4
```

```
call-policy-set 5
first-call-routing-table ROUTE-ON-DEST-NUM
rtg-dst-address-table ROUTE-ON-DEST-NUM
entry 1
match-address 212
prefix
edit add-prefix 1
dst-adjacency pbx
action complete
exit
entry 2
match-address 215
prefix
dst-adjacency pbx
 action complete
entry 3
match-address 732
prefix
dst-adjacency service_provider
action complete
exit
entry 4
match-address 908
prefix
dst-adjacency service_provider
edit replace 609
action complete
complete
exit
active-call-policy-set 5



cac-policy-set 1
description Ignore the  bandwidth field in SDP
first-cac-table BW
first-cac-scope call
cac-table BW
table-type policy-set
entry 1
media bandwidth-field ignore
action cac-complete
complete
active-cac-policy-set 1
```

Network to Network Interface Configuration Profile (with CLI Prompts)

This complete Network to Network Interface Configuration Profile example shows the CLI prompts.

```
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#
Router(config)#sbc MY_SBC
Router(config-sbc)#sbe
Router(config-sbc-sbe)#secure-media
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#sip header-profile PASS-HEADERS
Router(config-sbc-sbe-sip-hdr)#description pass non-essential headers
Router(config-sbc-sbe-sip-hdr)#header Allow entry 1
Router(config-sbc-sbe-sip-hdr-ele)#action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#header Min-SE entry 1
Router(config-sbc-sbe-sip-hdr-ele)#action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#header Reason entry 1
Router(config-sbc-sbe-sip-hdr-ele)#action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#header SERVER entry 1
Router(config-sbc-sbe-sip-hdr-ele)#action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#header DIVERSION entry 1
Router(config-sbc-sbe-sip-hdr-ele)#action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#header Allow-Events entry 1
Router(config-sbc-sbe-sip-hdr-ele)#action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#header Remote-Party-ID entry 1
Router(config-sbc-sbe-sip-hdr-ele)#action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#header Session-Expires entry 1
Router(config-sbc-sbe-sip-hdr-ele)#action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#header session-expiry entry 1
Router(config-sbc-sbe-sip-hdr-ele)#action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#$URCE-PRIORITY entry 1
Router(config-sbc-sbe-sip-hdr-ele)#action pass
Router(config-sbc-sbe-sip-hdr-ele-act)#
Router(config-sbc-sbe-sip-hdr-ele-act)#
Router(config-sbc-sbe-sip-hdr-ele-act)#
Router(config-sbc-sbe-sip-hdr-ele-act)#sip method-profile method1
Router(config-sbc-sbe-sip-mth)#description pass default methods
Router(config-sbc-sbe-sip-mth)#pass-body
Router(config-sbc-sbe-sip-mth)#method INFO
Router(config-sbc-sbe-sip-mth-ele)#action as-profile
Router(config-sbc-sbe-sip-mth-ele)#method OPTION
Router(config-sbc-sbe-sip-mth-ele)#action pass
Router(config-sbc-sbe-sip-mth-ele)#method UPDATE
Router(config-sbc-sbe-sip-mth-ele)#action pass
Router(config-sbc-sbe-sip-mth-ele)#sip option-profile option1
Router(config-sbc-sbe-sip-opt)#$ pass default options plus timer
Router(config-sbc-sbe-sip-opt)#option TIMER
Router(config-sbc-sbe-sip-opt)#option REPLACES
Router(config-sbc-sbe-sip-opt)#
Router(config-sbc-sbe-sip-opt)#
Router(config-sbc-sbe-sip-opt)#
Router(config-sbc-sbe-sip-opt)#adjacency sip pbx
Router(config-sbc-sbe-adj-sip)#vrf pbx
Router(config-sbc-sbe-adj-sip)#header-profile inbound PASS-HEADERS
Router(config-sbc-sbe-adj-sip)#header-profile outbound PASS-HEADERS
Router(config-sbc-sbe-adj-sip)#method-profile inbound method1
Router(config-sbc-sbe-adj-sip)#method-profile outbound method1
Router(config-sbc-sbe-adj-sip)#option-profile ua inbound option1
Router(config-sbc-sbe-adj-sip)#option-profile ua outbound option1
Router(config-sbc-sbe-adj-sip)#preferred-transport tcp
Router(config-sbc-sbe-adj-sip)#security trusted-unencrypted
Router(config-sbc-sbe-adj-sip)#signaling-address ipv4 23.61.1.1
Router(config-sbc-sbe-adj-sip)#statistics method summary
Router(config-sbc-sbe-adj-sip)#signaling-port 5160
Router(config-sbc-sbe-adj-sip)#$ess ipv4 175.181.0.10 255.255.255.255
Router(config-sbc-sbe-adj-sip)#signaling-peer 175.181.0.10
Router(config-sbc-sbe-adj-sip)#signaling-peer-port 5160
Router(config-sbc-sbe-adj-sip)#account pbx
Router(config-sbc-sbe-adj-sip)#attach
Router(config-sbc-sbe-adj-sip)#
Router(config-sbc-sbe-adj-sip)#
Router(config-sbc-sbe-adj-sip)#
Router(config-sbc-sbe-adj-sip)#adjacency sip service_provider
Router(config-sbc-sbe-adj-sip)#vrf service_provider
Router(config-sbc-sbe-adj-sip)#header-profile inbound PASS-HEADERS
Router(config-sbc-sbe-adj-sip)#header-profile outbound PASS-HEADERS
Router(config-sbc-sbe-adj-sip)#method-profile inbound method1
Router(config-sbc-sbe-adj-sip)#method-profile outbound method1
Router(config-sbc-sbe-adj-sip)#option-profile ua inbound option1
Router(config-sbc-sbe-adj-sip)#option-profile ua outbound option1
Router(config-sbc-sbe-adj-sip)#preferred-transport tcp
Router(config-sbc-sbe-adj-sip)#security trusted-unencrypted
Router(config-sbc-sbe-adj-sip)#signaling-address ipv4 23.61.2.1
Router(config-sbc-sbe-adj-sip)#statistics method summary
Router(config-sbc-sbe-adj-sip)#signaling-port 5160
Router(config-sbc-sbe-adj-sip)#$ess ipv4 175.182.0.12 255.255.255.255
Router(config-sbc-sbe-adj-sip)#signaling-peer 175.182.0.12
Router(config-sbc-sbe-adj-sip)#signaling-peer-port 5160
Router(config-sbc-sbe-adj-sip)#account service_provider
Router(config-sbc-sbe-adj-sip)#attach
Router(config-sbc-sbe-adj-sip)#
Router(config-sbc-sbe-adj-sip)#
Router(config-sbc-sbe-adj-sip)#
Router(config-sbc-sbe-adj-sip)#call-policy-set 1
Router(config-sbc-sbe-rtgpolicy)#first-call-routing-table start-table
Router(config-sbc-sbe-rtgpolicy)#rtg-src-adjacency-table start-table
Router(config-sbc-sbe-rtgpolicy-rtgtable)#entry 1
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#$ency service_provider
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#dst-adjacency pbx
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#entry 2
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#match-adjacency pbx
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#$cy service_provider
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#complete
Router(config-sbc-sbe-rtgpolicy)#active-call-policy-set 1
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#call-policy-set 2
Router(config-sbc-sbe-rtgpolicy)#$-table VALIDATE-DEST-PREFIX
Router(config-sbc-sbe-rtgpolicy)#$ix-table VALIDATE-DEST-PREFIX
Router(config-sbc-sbe-rtgpolicy-natable)#entry 1
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix 8XX
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#entry 2
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix 911
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#entry 3
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix 1XX
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#entry 4
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix X
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action reject
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#complete
Router(config-sbc-sbe-rtgpolicy)#active-call-policy-set 2
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#call-policy-set 3
Router(config-sbc-sbe-rtgpolicy)#$-table VALIDATE-DEST-PREFIX
Router(config-sbc-sbe-rtgpolicy)#$ix-table VALIDATE-DEST-PREFIX
Router(config-sbc-sbe-rtgpolicy-natable)#entry 1
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix 8X
Router(config-sbc-sbe-rtgpolicy-natable-entry)#category Non-emergency
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#entry 2
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix 1XX
Router(config-sbc-sbe-rtgpolicy-natable-entry)#category Non-Emergency
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#entry 3
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix 911
Router(config-sbc-sbe-rtgpolicy-natable-entry)#category Emergency
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#entry 4
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix X
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action reject
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#complete
Router(config-sbc-sbe-rtgpolicy)#active-call-policy-set 3
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#call-policy-set 4
Router(config-sbc-sbe-rtgpolicy)#$-table VALIDATE-DEST-PREFIX
Router(config-sbc-sbe-rtgpolicy)#$ix-table VALIDATE-DEST-PREFIX
Router(config-sbc-sbe-rtgpolicy-natable)#entry 1
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix 8X
Router(config-sbc-sbe-rtgpolicy-natable-entry)#category Non-emergency
Router(config-sbc-sbe-rtgpolicy-natable-entry)#edit-dst del-prefix 1
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#entry 2
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix 1XX
Router(config-sbc-sbe-rtgpolicy-natable-entry)#category Non-Emergency
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#entry 3
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix 911
Router(config-sbc-sbe-rtgpolicy-natable-entry)#category Emergency
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action accept
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#entry 4
Router(config-sbc-sbe-rtgpolicy-natable-entry)#match-prefix X
Router(config-sbc-sbe-rtgpolicy-natable-entry)#action reject
Router(config-sbc-sbe-rtgpolicy-natable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-natable)#complete
Router(config-sbc-sbe-rtgpolicy)#active-call-policy-set 4
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#call-policy-set 5
Router(config-sbc-sbe-rtgpolicy)#$routing-table ROUTE-ON-DEST-NUM
Router(config-sbc-sbe-rtgpolicy)#$ress-table ROUTE-ON-DEST-NUM
Router(config-sbc-sbe-rtgpolicy-rtgtable)#entry 1
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#match-address 212
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#prefix
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#edit add-prefix 1
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#dst-adjacency pbx
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-rtgtable)#entry 2
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#match-address 215
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#prefix
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#dst-adjacency pbx
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#entry 3
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#match-address 732
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#prefix
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#$cy service_provider
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#exit
Router(config-sbc-sbe-rtgpolicy-rtgtable)#entry 4
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#match-address 908
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#prefix
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#$cy service_provider
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#edit replace 609
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)#complete
Router(config-sbc-sbe-rtgpolicy)#exit
Router(config-sbc-sbe)#active-call-policy-set 5
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#
Router(config-sbc-sbe)#cac-policy-set 1
Router(config-sbc-sbe-cacpolicy)#$ Ignore the  bandwidth field in SDP
Router(config-sbc-sbe-cacpolicy)#first-cac-table BW
Router(config-sbc-sbe-cacpolicy)#first-cac-scope call
Router(config-sbc-sbe-cacpolicy)#cac-table BW
Router(config-sbc-sbe-cacpolicy-cactable)#table-type policy-set
Router(config-sbc-sbe-cacpolicy-cactable)#entry 1
Router(config-sbc-sbe-cacpolicy-cactable-entry)#$idth-field ignore
Router(config-sbc-sbe-cacpolicy-cactable-entry)#action cac-complete
Router(config-sbc-sbe-cacpolicy-cactable-entry)#complete
Router(config-sbc-sbe-cacpolicy)#active-cac-policy-set 1
Router(config-sbc-sbe)#
```

CUBE Transcoding on the SPA DSP Voice Card

CUBE (SBC) transcoding can be done using the SPA DSP services on the SPA DSP card. The SPA DSP card contains digital signal processors and related hardware that provide voice transcoding capability for service providers and enterprise businesses.

Transcoding is the process of translating one type of media stream or codec into another type of media stream or codec. For example, PCMU into G.726-32.

Transcoding is triggered by a response from the callee endpoint, indicating that none of the codecs in the initial request are acceptable. Responses that trigger transcoding are as follows:

- 415 – Unsupported media type (SIP)
- 488 – Not acceptable here (SIP)
- 65 – Bearer Capability not implemented disconnect cause value (H.323)

When transcoding is triggered, the SBE places a transcoder in the media path between the incoming and outgoing DBEs. The SBE then sends a new request to the callee, with a new codec type generated by the transcoder. The SBE may have to iterate through the list of codecs until it finds one that the callee accepts. Once a codec is found that is accepted by the callee, the call is connected and media transmission begins.

This example shows how to configure CUBE Transcoding on the SPA DSP Voice Card. Each segment of the example is explained below.

Transcoding Configuration

In the transcoding segment of the example, the **voice-card** command specifies the slot number of the SPA DSP voice card and enters the voice card interface configuration mode.

The **dspfarm profile** command enables the DSP farm service for the specified DSP farm profile, enables transcoding, and enters DSP farm profile configuration mode. After the **dspfarm profile** command, the valid codecs are listed. The codec list must contain codecs that the SBE is hard-coded to recognize.

Interface Configuration

The interface segment configure the SBC interface, establishes 23.30.1.101 as the primary address, and configures two secondary addresses.

SBC SBE Configuration

Configures the SBC, SBE, and associates the dspfarm profile.

Adjacency Configuration

Configures the Nav_A and Nav_B adjacencies.

Call Policy: Adjacency Connection

Establishes the connection between the Nav_A and Nav_B adjacencies.

CAC Table: Codec Enforcement

(Optional) Enforces which codecs each side of the call is allowed to use.

Transcoding CUBE on the SPA DSP Voice Card (in Segments)

Transcoding Configuration

```
voice-card 1/0
    no dspfarm
    dsp services dspfarm
    exit
    dspfarm profile 20 transcode
        codec g711ulaw
        codec g711alaw
        codec g729r8
        codec g729ar8
        codec g729br8
        codec g729abr8
        codec pass-through
    rsvp
    maximum sessions 5
    associate application sbc
    exit
```

Interface Configuration

```
interface SBC1
    ip address 23.30.1.1 255.255.255.255 secondary
    ip address 23.30.1.10 255.255.255.0 secondary
    ip address 23.30.1.101 255.255.255.0
    exit
```

SBC SBE Configuration

```
sbc My_SBC
    sbe
        associate dspfarm profile 20
```

Adjacency 1 Configuration

```
adjacency sip Nav_A
    inherit profile preset-access
    preferred-transport udp
    signaling-address ipv4 23.30.1.1
    statistics method summary
    signaling-port 5060
    remote-address ipv4 23.31.0.0 255.255.0.0
    signaling-peer 23.31.1.2
    attach
    exit
```

Adjacency 2 Configuration

```
adjacency sip Nav_B
    nat force-off
    preferred-transport udp
    signaling-address ipv4 23.30.1.1
    statistics method summary
    signaling-port 5060
    remote-address ipv4 23.32.0.0 255.255.0.0
    signaling-peer 23.32.1.2
    account Nav_B
    attach
    exit
```

Call Policy: Establish Connection Between Adjacencies

```
call-policy-set 1
    first-call-routing-table ROUTE-ON-DEST-NUMB
    rtg-dst-address-table ROUTE-ON-DEST-NUMB
    entry 1
        action complete
        dst-adjacency Nav_A
        match-address 91939 digits
        prefix
    entry 2
        action complete
        dst-adjacency Nav_B
        match-address 40852 digits
        prefix
    complete
    call-policy-set default 1
    media-address ipv4 23.30.1.10
    port-range 10000 64000 any
    activate
    exit
```

CAC Table: Enforce Codecs for Caller and Callee

```
cac-policy-set 1
    first-cac-table Transcode
    first-cac-scope dst-adjacency
    cac-table Transcode
    table-type policy-set
    entry 1
        cac-scope call
        caller-codec-list sideA
        callee-codec-list sideB
    cac-policy-set global 1
        codec list sideA
        codec PCMA
        codec list sideB
        codec G729
        exit
```

Transcoding CUBE on the SPA DSP Voice Card (for Copy and Paste)

```
voice-card 1/0
    no dspfarm
    dsp services dspfarm
    exit
    dspfarm profile 20 transcode
        codec g711ulaw
        codec g711alaw
        codec g729r8
        codec g729ar8
        codec g729br8
        codec g729abr8
        codec pass-through
    rsvp
    maximum sessions 5
    associate application sbc
    exit


interface SBC1
    ip address 23.30.1.1 255.255.255.255 secondary
    ip address 23.30.1.10 255.255.255.0 secondary
    ip address 23.30.1.101 255.255.255.0
    exit


sbc My_SBC
    sbe
    associate dspfarm profile 20


adjacency sip Nav_A
    inherit profile preset-access
    preferred-transport udp
    signaling-address ipv4 23.30.1.1
    statistics method summary
    signaling-port 5060
    remote-address ipv4 23.31.0.0 255.255.0.0
    signaling-peer 23.31.1.2
    attach
    exit


adjacency sip Nav_B
    nat force-off
    preferred-transport udp
    signaling-address ipv4 23.30.1.1
    statistics method summary
    signaling-port 5060
    remote-address ipv4 23.32.0.0 255.255.0.0
    signaling-peer 23.32.1.2
    account Nav_B
    attach
    exit


call-policy-set 1
    first-call-routing-table ROUTE-ON-DEST-NUMB
    rtg-dst-address-table ROUTE-ON-DEST-NUMB
    entry 1
        action complete
        dst-adjacency Nav_A
        match-address 91939 digits
        prefix
    entry 2
        action complete
        dst-adjacency Nav_B
        match-address 40852 digits
        prefix
    complete
    call-policy-set default 1
    media-address ipv4 23.30.1.10
    port-range 10000 64000 any
    activate
    exit
```

```
cac-policy-set 1
    first-cac-table Transcode
    first-cac-scope dst-adjacency
    cac-table Transcode
     table-type policy-set
     entry 1
        cac-scope call
        caller-codec-list sideA
        callee-codec-list sideB
    cac-policy-set global 1
        codec list sideA
        codec PCMA
        codec list sideB
        codec G729
        exit
```

Transcoding CUBE on the SPA DSP Voice Card (with CLI Prompts)

```
Router# config t
Router(config)# voice-card 0/0
Router(config-voicecard)# dsp services dspfarm
Router(config-voicecard)# exit
Router(config)# dspfarm profile 20 transcode
Router(config-dspfarm-profile)# codec g711ulaw
Router(config-dspfarm-profile)# codec g711alaw
Router(config-dspfarm-profile)# codec g729r8
Router(config-dspfarm-profile)# codec g729ar8
Router(config-dspfarm-profile)# codec g729br8
Router(config-dspfarm-profile)# codec g729abr8
Router(config-dspfarm-profile)# codec pass-through
Router(config-dspfarm-profile)# rsvp
Router(config-dspfarm-profile)# maximum sessions 5
Router(config-dspfarm-profile)# associate application sbc
Router(config-dspfarm-profile)# no shutdown
Router(config-dspfarm-profile)# exit


Router(config)# interface SBC1
Router(config-int)# ip address 23.30.1.1 255.255.255.255 secondary
Router(config-int)# ip address 23.30.1.10 255.255.255.0 secondary
Router(config-int)# ip address 23.30.1.101 255.255.255.0
Router(config-int)# exit


Router(config)# sbc My_SBC
Router(config-sbc)# sbe


Router(config-sbc-sbe)# adjacency sip Nav_A
Router(config-sbc-sbe-adj-sip)# inherit profile preset-access
Router(config-sbc-sbe-adj-sip)# preferred-transport udp
Router(config-sbc-sbe-adj-sip)# signaling-address ipv4 23.30.1.1
Router(config-sbc-sbe-adj-sip)# statistics method summary
Router(config-sbc-sbe-adj-sip)# signaling-port 5060
Router(config-sbc-sbe-adj-sip)# $address ipv4 23.31.0.0 255.255.0.0
Router(config-sbc-sbe-adj-sip)# signaling-peer 23.31.1.2
Router(config-sbc-sbe-adj-sip)# attach
Router(config-sbc-sbe-adj-sip)# exit


Router(config-sbc-sbe)# adjacency sip Nav_B
Router(config-sbc-sbe-adj-sip)# nat force-off
Router(config-sbc-sbe-adj-sip)# preferred-transport udp
Router(config-sbc-sbe-adj-sip)# signaling-address ipv4 23.30.1.1
Router(config-sbc-sbe-adj-sip)# statistics method summary
Router(config-sbc-sbe-adj-sip)# signaling-port 5060
Router(config-sbc-sbe-adj-sip)# remote-address ipv4 23.32.0.0 255.255.0.0
Router(config-sbc-sbe-adj-sip)# signaling-peer 23.32.1.2
Router(config-sbc-sbe-adj-sip)# account Nav_B
Router(config-sbc-sbe-adj-sip)# attach
Router(config-sbc-sbe-adj-sip)# exit


Router(config-sbc-sbe)# call-policy-set 1
Router(config-sbc-sbe-rtgpolicy)# first-call-routing-table ROUTE-ON-DEST-NUMB
Router(config-sbc-sbe-rtgpolicy)# rtg-dst-address-table ROUTE-ON-DEST-NUMB
Router(config-sbc-sbe-rtgpolicy-rtgtable)# entry 1
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# dst-adjacency Nav_A
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# match-address 91939 digits
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# prefix
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# entry 2
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# dst-adjacency Nav_B
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# match-address 40852 digits
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# prefix
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# complete
Router(config-sbc-sbe-rtgpolicy)# call-policy-set default 1
Router(config-sbc-sbe)# media-address ipv4 23.30.1.10
Router(config-sbc-sbe)# exit
Router(config-sbc)# port-range 10000 64000 any
Router(config-sbc)# activate
Router(config-sbc)#
```

```
Router(config-sbc)#
Router(config-sbc)# sbe
Router(config-sbc-sbe)# cac-policy-set 1
Router(config-sbc-sbe-cacpolicy)# first-cac-table Transcode
Router(config-sbc-sbe-cacpolicy)# first-cac-scope dst-adjacency
Router(config-sbc-sbe-cacpolicy)# cac-table Transcode
Router(config-sbc-sbe-cacpolicy-cactable)# table-type policy-set
Router(config-sbc-sbe-cacpolicy-cactable)# entry 1
Router(config-sbc-sbe-cacpolicy-cactable-entry)# cac-scope call
Router(config-sbc-sbe-cacpolicy-cactable-entry)# caller-codec-list sideA
Router(config-sbc-sbe-cacpolicy-cactable-entry)# callee-codec-list sideB
Router(config-sbc-sbe-cacpolicy-cactable-entry)# cac-policy-set global 1
Router(config-sbc-sbe)# codec list sideA
Router(config-sbc-sbe-codec-list)# codec PCMA
Router(config-sbc-sbe-codec-list)# codec list sideB
Router(config-sbc-sbe-codec-list)# codec G729
Router(config-sbc-sbe-codec-list)# exit
```

Transcoding CUBE in VDBE mode on SPA DSP Voice Card

The following example shows how to configure CUBE transcoding in Virtual Data Border Element (VDBE) mode on the SPA DSP Voice Card. The VDBE is a resource partition within the DBE and functions as a media gateway. Each VDBE is controlled by a separate SBE using the H.248 (Megaco) protocol. VDBE is used only in distributed model of CUBE.

Transcoding Configuration

The Transcoding Configuration is the same as the other examples in this module.

SBC DBE Configuration

This segment configures the H.248 (Megaco) protocol, including the H.248 timers and controllers.

The control-address is the IP address of CUBE (SBC).

The remote-address is the IP address of the media gateway (VDBE).

Transcoding CUBE in VDBE mode on SPA DSP Voice Card (in Segments)

Transcoding Configuration

```
voice-card 1/0
no dspfarm
dsp services dspfarm
exit
dspfarm profile 20 transcode
codec g711ulaw
codec g711alaw
codec g729r8
codec g729ar8
codec g729br8
codec g729abr8
codec pass-through
rsvp
maximum sessions 5
associate application sbc
```

SBC DBE Configuration

```
sbc My_SBC dbe
    associate dspfarm profile 20
    vdbe global
        h248-inactivity-duration 3000
        no h248-media-alert-event
        tmax-timer 30
        package segment seg-timer-value 5000
        h248-association-timeout
        transaction-pending 10
        h248-preserve-gates
        local-port 2944
        control-address h248 ipv4 23.52.1.2
        control-dscp af11 marker-dscp af12 pdr-coefficient 300
        controller h248 1
            remote-address ipv4 23.52.1.3
            attach-controllers
            exit
        deactivation-mode abort
        exit
    location-id 1
    media-address pool ipv4 23.53.1.1 23.53.1.10
        port-range 10000 59000 any
    media-timeout 10
    activate
    exit
```

Transcoding CUBE in VDBE mode on SPA DSP Voice Card (for Copy and Paste)

Transcoding Configuration

```
voice-card 1/0
no dspfarm
dsp services dspfarm
exit
dspfarm profile 20 transcode
codec g711ulaw
codec g711alaw
codec g729r8
codec g729ar8
codec g729br8
codec g729abr8
codec pass-through
rsvp
maximum sessions 5
associate application sbc
```

SBC DBE Configuration

```
sbc My_SBC dbe
    associate dspfarm profile 20
    vdbe global
        h248-inactivity-duration 3000
        no h248-media-alert-event
        tmax-timer 30
        package segment seg-timer-value 5000
        h248-association-timeout
        transaction-pending 10
        h248-preserve-gates
        local-port 2944
        control-address h248 ipv4 23.52.1.2
        control-dscp af11 marker-dscp af12 pdr-coefficient 300
        controller h248 1
            remote-address ipv4 23.52.1.3
            attach-controllers
            exit
        deactivation-mode abort
        exit
    location-id 1
    media-address pool ipv4 23.53.1.1 23.53.1.10
        port-range 10000 59000 any
    media-timeout 10
    activate
    exit
```

Transcoding CUBE in VDBE mode on SPA DSP Voice Card (with CLI Prompts)

Transcoding Configuration

```
Router(config)# voice-card 1/0
Router(config-voicecard)# no dspfarm
Router(config-voicecard)# dsp services dspfarm
Router(config-voicecard)# exit
Router(config)# dspfarm profile 20 transcode
Router(config-dspfarm-profile)# codec g711ulaw
Router(config-dspfarm-profile)# codec g711alaw
Router(config-dspfarm-profile)# codec g729r8
Router(config-dspfarm-profile)# codec g729ar8
Router(config-dspfarm-profile)# codec g729br8
Router(config-dspfarm-profile)# codec g729abr8
Router(config-dspfarm-profile)# codec pass-through
Router(config-dspfarm-profile)# vrsvp
Router(config-dspfarm-profile)# maximum sessions 5
Router(config-dspfarm-profile)# associate application sbc
```

SBC DBE Configuration

```
Router(config)# sbc My_SBC dbe
Router(config-sbc-dbe)# associate dspfarm profile 20
Router(config-sbc-dbe)# vdbe global
Router(config-sbc-dbe-vdbe)# h248-inactivity-duration 3000
Router(config-sbc-dbe-vdbe)# no h248-media-alert-event
Router(config-sbc-dbe-vdbe)# tmax-timer 30
Router(config-sbc-dbe-vdbe)# package segment seg-timer-value 5000
Router(config-sbc-dbe-vdbe)# h248-association-timeout
Router(config-sbc-dbe-vdbe)# transaction-pending 10
Router(config-sbc-dbe-vdbe)# h248-preserve-gates
Router(config-sbc-dbe-vdbe)# local-port 2944
Router(config-sbc-dbe-vdbe)# control-address h248 ipv4 23.52.1.2
Router(config-sbc-dbe-vdbe)# control-dscp af11 marker-dscp af12 pdr-coefficient 300
Router(config-sbc-dbe-vdbe)# controller h248 1
Router(config-sbc-dbe-vdbe-h248)# remote-address ipv4 23.52.1.3
Router(config-sbc-dbe-vdbe-h248)# attach-controllers
Router(config-sbc-dbe-vdbe-h248)# exit
Router(config-sbc-dbe-vdbe)# deactivation-mode abort
Router(config-sbc-dbe-vdbe)# exit
Router(config-sbc-dbe)# location-id 1
Router(config-sbc-dbe)# media-address pool ipv4 23.53.1.1 23.53.1.10
PE43_ASR-1002(config-sbc-dbe)# port-range 10000 59000 any
PE43_ASR-1002(config-sbc-dbe)# media-timeout 10
PE43_ASR-1002(config-sbc-dbe)# activate
PE43_ASR-1002(config-sbc-dbe)# exit
```

Show Commands for Verifying Transcoding

The following show commands are available to verify your transcoding configurations.

Verify Profile is Associated

Use the **show dspfarm profile** command to verify that the DSPFARM Profile is associated.

```
Router# show dspfarm profile

Dspfarm Profile Configuration

 Profile ID = 1, Service = TRANSCODING, Resource ID = 1
 Profile Description :
 Profile Service Mode : Non Secure
 Profile Admin State : UP
 Profile Operation State : ACTIVE
 Application : SBC   Status : ASSOCIATED
 Resource Provider : FLEX_DSPRM   Status : UP
 Number of Resource Configured : 700
 Number of Resource Available : 700
 Codec Configuration
 Codec : g711alaw, Maximum Packetization Period : 30
 Codec : g711ulaw, Maximum Packetization Period : 30
 Codec : g729ar8, Maximum Packetization Period : 60
```

Verify Active Call

Use the **show sbc sbe calls** command to verify that the DSPFARM Profile is associated.

```
Router# show sbc snow sbe calls

SBC Service "snow"
  Call           State        Src Adjacency        Dest Adjacency
  ---------------------------------------------------------------
  13319             Active             Nav_A               Nav_B
```

Verify DSP Status

Use the **show dspfarm dsp active** command to verify DSP Status.

```
Router# show dspfarm dsp active

SLOT DSP VERSION  STATUS CHNL USE   TYPE    RSC_ID BRIDGE_ID PKTS_TXED PKTS_RXED
2    1   26.2.0   UP     1    USED  xcode   1      0x3         0         5
2    1   26.2.0   UP     1    USED  xcode   1      0x4         0         0
Total number of DSPFARM DSP channel(s) 1
```

Verify DSP Statistics

Use the **show dspfarm dsp stats** command to verify DSP Statistics.

```
Router# show dspfarm dsp stats 3

Gathering total stats...

Bridge-id=0x3 Call-id=0x2
tx_pak_side_a=3053518848 tx_silence_pak_side_a=0 tx_dur_side_a=1748172800
voice_tx_dur_side_a=1748172800 rtp_time_stamp_side_a=1336854017 rx_pak_side_a=46849
rx_silence_pak_side_a=0 rx_dur_side_a=1915944960 voice_rx_dur_side_a=1915944960
passthrough_rx_side_a=0 passthrough_discard_side_a=0 num_out_of_seq_side_a=0
num_bad_head_side_a=0 num_pak_late_side_a=0 num_pak_early_side_a=50331648
rx_delay_side_a=973078528 prec_conc_dur_side_a=0 silence_conc_dur_side_a=0
buf_over_dur_side_a=167772160 end_errors_side_a=0
tx_pak_side_b=3053518848 tx_silence_pak_side_b=0 tx_dur_side_b=1748172800
voice_tx_dur_side_b=1748172800 rtp_time_stamp_side_b=3215836673 rx_pak_side_b=46849
rx_silence_pak_side_b=0 rx_dur_side_b=1915944960 voice_rx_dur_side_b=1915944960
passthrough_rx_side_b=0 passthrough_discard_side_b=0 num_out_of_seq_side_b=0
num_bad_head_side_b=0 num_pak_late_side_b=0 num_pak_early_side_b=83886080
rx_delay_side_b=1006632960 prec_conc_dur_side_b=0 silence_conc_dur_side_b=0
buf_over_dur_side_b=167772160 end_errors_side_b=0
```

Verify DSP Resources are Freed from Active List

Use the **show dspfarm dsp active** command to verify that DSP resources are freed from the active list.

```
Router# show dspfarm dsp active

SLOT DSP VERSION  STATUS CHNL USE   TYPE    RSC_ID BRIDGE_ID PKTS_TXED PKTS_RXED
Total number of DSPFARM DSP channel(s) 0
```

To validate packet delay/jitter/loss using Wireshark, you may need to configure the **vad off override** command, in the dspfarm profile in the transcoding configuration segment, to prevent comfort noise generation, which is active by default. This is dependent on the type of media stream in use. For example, if the media stream contains many long gaps of silence, comfort noise may be generated and total amount of RTP packets may vary.

```
. . .
dspfarm profile 20 transcode
codec . . .
codec . . .
vad off override
associate application sbc
. . .
```

Verify Call Statistics

Use the **show sbc sbe call-stats global** command to verify call statistics.

```
Router# show sbc snow sbe call-stats global current5min
SBC Service "snow"
Statistics for the current 5 mins for global counters
Call count totals:
  Total call attempts =                                              1
  Total active calls =                                               1
  Total active IPv6 calls =                                          0
  Total activating calls =                                           0
  Total de-activating calls =                                        0
  Total IMS rx active calls =                                        0
  Total IMS rx call renegotiation attempts =                         0
  Total SRTP-RTP interworked calls =                                 0
  Total active calls not using SRTP =                                1
  Total transcoded calls =                                           1
  Total transrated calls =                                           0

General call failure counters:
  Total call setup failures =                                        0
  Total active call failures =                                       0
  Total failed call attempts =                                       0
  Total failed calls due to update failure =                         0
  Total failed calls due to resource failure =                       0
  Total failed calls due to congestion =                             0
  Total failed calls due to media failure =                          0
  Total failed calls due to signaling failure =                      0
  Total failed calls due to IMS rx setup failure =                   0
  Total failed calls due to IMS rx renegotiation failure =           0
  Total failed calls due to RTP disallowed on call leg =             0
  Total failed calls due to SRTP disallowed on call leg =            0
Policy control failures:
  Call setups failed due to NA =                                     0
  Call setups failed due to RTG =                                    0
  Call setups failed due to CAC =                                    0
  CAC fails due to number of calls limit =                           0
  CAC fails due to call rate limit =                                 0
  CAC fails due to bandwidth limit =                                 0
  CAC fails due to number of media channels limit =                  0
  CAC fails due to number of media update limit =                    0
  CAC message drops due to mid call message rate limit =             0
  CAC message drops due to out of call message rate limit =          0
```

Verify Media-Flow Status

Use the **show sbc dbe media-flow-stats summary** command to verify call statistics.

```
Router# show sbc My_SBC dbe media-flow-stats summary

SBC Service "test"
    Context ID 28               Stream ID 1
    Side A:             Name ip/385    Media Flowing:  Yes
      Local Address/Port:  143.5.4.1/10108
      Remote Address/Port: 143.10.1.1/10156
      Status:              InService
    Side B:             Name ip/386    Media Flowing:  Yes
      Local Address/Port:  143.5.4.1/10110
      Remote Address/Port: 143.11.1.1/10156
      Status:              InService
    Context ID 29               Stream ID 1
```

CUBE Transcoding on an MGX or VXSM WAN Switch

CUBE (SBC) transcoding can be done using the DSP farm on an MGX or VXSM WAN switch as a transcoder via the H.248 protocol.

Transcoding is the process of translating one type of media stream or codec into another type of media stream or codec. For example, PCMU into G.726-32.

Transcoding is triggered by a response from the callee endpoint, indicating that none of the codecs in the initial request are acceptable. Responses that trigger transcoding are as follows:

- 415 – Unsupported media type (SIP)
- 488 – Not acceptable here (SIP)
- 65 – Bearer Capability not implemented disconnect cause value (H.323)

When transcoding is triggered, the SBE places a transcoder in the media path between the incoming and outgoing DBEs. The SBE then sends a new request to the callee, with a new codec type generated by the transcoder. The SBE may have to iterate through the list of codecs until it finds one that the callee accepts. Once a codec is found that is accepted by the callee, the call is connected and media transmission begins.

This example shows how to configure CUBE Transcoding on an MGX or VXSM WAN switch. Each segment of the example is explained below.

SBC SBE Configuration

Configures the SBC and SBE.

Media Gateway Configuration

Configures an MGX WAN switch as the media gateway as follows:

- **media-gateway** – Configures the IP address of the MGX WAN switch media gateway.
- **codecs** – Configures the codecs supported by the media gateway.
- **transcoder** – Configures this media gateway as a transcoder.
- **control address h248 index** – Configures the IPv4, H.248 control address of this transcoder.
- **transport udp** – Configures UDP as the transport for the H.248 signaling.
- **ipv4** – Configures the IP address of the SBC.

Adjacency Configuration

Configures the Nav_A and Nav_B adjacencies.

Call Policy: Adjacency Connection

Establishes the connection between the Nav_A and Nav_B adjacencies.

CAC Table: Codec Enforcement

(Optional) Enforces which codecs each side of the call is allowed to use.

Transcoding CUBE on the MGX (in Segments)

SBC Configuration

```
sbc My_SBC
  sbe
```

MGX as Media Gateway Configuration

```
media-gateway ipv4 10.0.181.2
    codecs m=audio 1234 RTP/AVP 0 8,a=rtpmap:0 PCMU/8000,a=rtpmap:8 PCMA/8000
    transcoder
    control address h248 index 1
    transport udp
    ipv4 23.30.1.1 - SBC ip address
```

Adjacency 1 Configuration

```
   adjacency sip Nav_A
    inherit profile preset-access
    preferred-transport udp
    signaling-address ipv4 23.30.1.1
    statistics method summary
    signaling-port 5060
    remote-address ipv4 23.31.0.0 255.255.0.0
    signaling-peer 23.31.1.2
    attach
```

Adjacency 2 Configuration

```
adjacency sip Nav_B
    nat force-off
    preferred-transport udp
    signaling-address ipv4 23.30.1.1
    statistics method summary
    signaling-port 5060
    remote-address ipv4 23.32.0.0 255.255.0.0
    signaling-peer 23.32.1.2
    account Nav_B
    attach
```

Call Policy: Adjacency Connection

```
  call-policy-set 1
    first-call-routing-table ROUTE-ON-DEST-NUMB
    rtg-dst-address-table ROUTE-ON-DEST-NUMB
     entry 1
      action complete
      dst-adjacency Nav_A
      match-address 91939 digits
      prefix
     entry 2
      action complete
      dst-adjacency Nav_B
      match-address 40852 digits
      prefix
    complete
  call-policy-set default 1
  media-address ipv4 23.30.1.10
  port-range 10000 64000 any
  activate
```

CAC Policy: Codec Enforcement

```
cac-policy-set 1
    first-cac-table Transcode
    first-cac-scope dst-adjacency
    cac-table Transcode
     table-type policy-set
     entry 1
      cac-scope call
      caller-codec-list sideA
      callee-codec-list sideB
      action cac-complete
    complete
   cac-policy-set global 1
<…>
   codec list sideA
    codec PCMA
   codec list sideB
    codec G729
```

Transcoding CUBE on the MGX (for Copy and Paste)

```
sbc My_SBC
  sbe

media-gateway ipv4 10.0.181.2
    codecs m=audio 1234 RTP/AVP 0 8,a=rtpmap:0 PCMU/8000,a=rtpmap:8 PCMA/8000
    transcoder
    control address h248 index 1
    transport udp
    ipv4 23.30.1.1 - SBC ip address

adjacency sip Nav_A
    inherit profile preset-access
    preferred-transport udp
    signaling-address ipv4 23.30.1.1
    statistics method summary
    signaling-port 5060
    remote-address ipv4 23.31.0.0 255.255.0.0
    signaling-peer 23.31.1.2
    attach

adjacency sip Nav_B
    nat force-off
    preferred-transport udp
    signaling-address ipv4 23.30.1.1
    statistics method summary
    signaling-port 5060
    remote-address ipv4 23.32.0.0 255.255.0.0
    signaling-peer 23.32.1.2
    account Nav_B
    attach

call-policy-set 1
    first-call-routing-table ROUTE-ON-DEST-NUMB
    rtg-dst-address-table ROUTE-ON-DEST-NUMB
    entry 1
        action complete
        dst-adjacency Nav_A
        match-address 91939 digits
        prefix
    entry 2
        action complete
        dst-adjacency Nav_B
        match-address 40852 digits
        prefix
    complete
    call-policy-set default 1
    media-address ipv4 23.30.1.10
    port-range 10000 64000 any
    activate


cac-policy-set 1
    first-cac-table Transcode
    first-cac-scope dst-adjacency
    cac-table Transcode
    table-type policy-set
    entry 1
        cac-scope call
        caller-codec-list sideA
        callee-codec-list sideB
        action cac-complete
```

```
complete
cac-policy-set global 1
codec list sideA
    codec PCMA
    codec list sideB
    codec G729
```

Transcoding CUBE on the MGX (with CLI Prompts)

```
Router# config t
Router(config)# sbc My_SBC
Router(config-sbc)# sbe


PE25_ASR-1004(config-sbc-sbe)# media-gateway ipv4 10.0.181.2
PE25_ASR-1004(config-sbc-sbe-mg)# codecs m=audio 1234 RTP/AVP 0 8,a=rtpmap:0
PCMU/8000,a=rtpmap:8 PCMA/8000
PE25_ASR-1004(config-sbc-sbe-mg-codecs)# transcoder
PE25_ASR-1004(config-sbc-sbe-mg-codecs)# control address h248 index 1
PE25_ASR-1004(config-sbc-sbe-ctrl-h248)# transport udp
PE25_ASR-1004(config-sbc-sbe-ctrl-h248)# ipv4 23.30.1.1
PE25_ASR-1004(config-sbc-sbe-ctrl-h248)# exit


Router(config-sbc-sbe)# adjacency sip Nav_A
Router(config-sbc-sbe-adj-sip)# inherit profile preset-access
Router(config-sbc-sbe-adj-sip)# preferred-transport udp
Router(config-sbc-sbe-adj-sip)# signaling-address ipv4 23.30.1.1
Router(config-sbc-sbe-adj-sip)# statistics method summary
Router(config-sbc-sbe-adj-sip)# signaling-port 5060
Router(config-sbc-sbe-adj-sip)# remote-address ipv4 23.31.0.0 255.255.0.0
Router(config-sbc-sbe-adj-sip)# signaling-peer 23.31.1.2
Router(config-sbc-sbe-adj-sip)# attach
Router(config-sbc-sbe-adj-sip)# exit

Router(config-sbc-sbe)# adjacency sip Nav_B
Router(config-sbc-sbe-adj-sip)# nat force-off
Router(config-sbc-sbe-adj-sip)# preferred-transport udp
Router(config-sbc-sbe-adj-sip)# signaling-address ipv4 23.30.1.1
Router(config-sbc-sbe-adj-sip)# statistics method summary
Router(config-sbc-sbe-adj-sip)# signaling-port 5060
Router(config-sbc-sbe-adj-sip)# remote-address ipv4 23.32.0.0 255.255.0.0
Router(config-sbc-sbe-adj-sip)# signaling-peer 23.32.1.2
Router(config-sbc-sbe-adj-sip)# account Nav_B
Router(config-sbc-sbe-adj-sip)# attach
Router(config-sbc-sbe-adj-sip)# exit

Router(config-sbc-sbe)# call-policy-set 1
Router(config-sbc-sbe-rtgpolicy)# first-call-routing-table ROUTE-ON-DEST-NUMB
Router(config-sbc-sbe-rtgpolicy)# rtg-dst-address-table ROUTE-ON-DEST-NUMB
Router(config-sbc-sbe-rtgpolicy)#entry 1
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# dst-adjacency Nav_A
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# match-address 91939 digits
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# prefix
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# entry 2
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# action complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# dst-adjacency Nav_B
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# match-address 40852 digits
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# prefix
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# complete
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# call-policy-set default 1
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# media-address ipv4 23.30.1.10
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# port-range 10000 64000 any
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# activate
Router(config-sbc-sbe-rtgpolicy-rtgtable-entry)# exit


Router(config-sbc-sbe)# cac-policy-set 1
Router(config-sbc-sbe-cacpolicy)# first-cac-table Transcode
Router(config-sbc-sbe-cacpolicy)# first-cac-scope dst-adjacency
Router(config-sbc-sbe-cacpolicy)# cac-table Transcode
Router(config-sbc-sbe-cacpolicy-cactable)# table-type policy-set
Router(config-sbc-sbe-cacpolicy-cactable)# entry 1
Router(config-sbc-sbe-cacpolicy-cactable-entry)# cac-scope call
Router(config-sbc-sbe-cacpolicy-cactable-entry)# caller-codec-list sideA
Router(config-sbc-sbe-cacpolicy-cactable-entry)# callee-codec-list sideB
Router(config-sbc-sbe-cacpolicy-cactable-entry)# action cac-complete
Router(config-sbc-sbe-cacpolicy-cactable-entry)# complete
Router(config-sbc-sbe-cacpolicy-cactable-entry)# cac-policy-set global 1
Router(config-sbc-sbe)# codec list sideA
Router(config-sbc-sbe-codec-list)# codec PCMA
Router(config-sbc-sbe-codec-list)# codec list sideB
Router(config-sbc-sbe-codec-list)# codec G729
Router(config-sbc-sbe-codec-list)# exit
```

Verify Media Gateway Associations

```
Router# show sbc My_SBC sbe media-gateway-associations

SBC Service "My_SBC"
  Media gateway 10.0.181.2:2951
    Gateway Protocol   = megaco
    Transport Protocol = UDP^M
    Local Address      =23.30.1.1:2944

                Sent            Received        Failed          Retried
    Requests            55               2               0               0
    Replies              2              55      -                        0
```

Show Commands for CUBE

This section provides examples of the following SBC **show** commands that can be used to verify SBC configurations:

For descriptions of the various fields of the display outputs, see *Cisco Unified Border Element (SP Edition) Command Reference: Unified Model*, which is available at:

http://www.cisco.com/en/US/docs/ios/sbc/command/reference/sbcu_book.html

Display Adjacency States

The **show sbc sbe adjacencies** command displays the state of the adjacencies that are configured on SBEs, as shown in the following example:

```
Router# show sbc MY_SBC sbe adjacencies

SBC Service “MY_SBC"
      Name                      Type    State        Description
      -----------------------------------------------------------
      CUCM1                     SIP     Attached
      CUCM2                     SIP     Attached
Router#
```

Display Active Calls

The **show sbc sbe calls** command displays a list of active calls, as shown in the following example:

```
Router# show sbc MY_SBC sbe calls

SBC Service “MY_SBC"
  Call          State         Type     Src Adjacency      Dest Adjacency
  ---------------------------------------------------------------------
    78       Active     Audio             CUCM2               CUCM1
Router#
```

Display Call Details

The **show sbc sbe call** command displays various details about calls in process. In the following example, the details are for six branches of a call:

```
Router# show sbc MY_SBC sbe call 6 branches

SBC Service “MY_SBC“
Call: 78
State: Active
Type: Audio

Branch
Capabilities   Calling Number Called Number  Billing ID                                            DTMF
1              22222                         4C17E116202020203939383300000000000000000000009BMedia(RFC2833)
2                             003072211111   4C17E116202020203939383300000000000000000000009CMedia(RFC2833)
```

Display Call Statistics

The **show sbc sbe call-stats** command displays a list of the statistics for all the calls for a specified duration, as shown in the following example:

```
Router# show sbc MY_SBC sbe call-stats

SBC Service ''global''
Active calls: 0
Active Ipv6 calls: 0
Activating calls = 0
Deactivating calls = 0
Total call attempts = 8
Failed call attempts = 8
Successful call attempts = 0
Call routing failed = 8
Call resources failed = 0
Call media failed = 0
Call signaling failed = 0
Active call failures = 0
Congestion failures = 0
Policy control failures:
Total call setup failures = 8
Total call update failures = 0
Call setup failed due to NA = 0
Call setup failed due to rtg = 8
Call setup failed due to CAC = 0
CAC fails due to num call lim = 0
CAC fails due to call rate lim = 0
CAC fails due to num media channels lim = 0
CAC fails due to num media updates lim = 0
CAC fails due to bandwidth lim = 0
CAC fails due to in-call rate lim = 0
CAC fails due to out-call rate lim = 0
```

Display SIP Statistics

The **show sbc sbe sip statistics** command displays the aggregated SIP statistics handled by SBC, as shown in the following example:

```
Router# show sbc global sbe sip statistics

SIP Statistics
--------------
Total SIP Transactions: 6
In Out
---------- ----------
Total SIP Requests 4 4
Total SIP Responses 3 5
SIP Request Messages:
SIP INVITEs 2 2
SIP ACKs 1 1
SIP BYEs 1 1
SIP CANCELs 0 0
SIP OPTIONS 0 0
SIP REGISTERs 0 0
SIP SUBSCRIBEs 0 0
SIP REFERs 0 0
SIP NOTIFY 0 0
SIP Response Classes:
SIP Info (1xx) 1 3
SIP Success (2xx) 2 2
SIP Redirects (3xx) 0 0
SIP Client Errors (4xx) 0 0
SIP Server Errors (5xx) 0 0
SIP Global Errors (6xx) 0 0
Internally Generated SIP Response Classes:
SIP Info (1xx) 0
SIP Success (2xx) 0
SIP Redirects (3xx) 0
SIP Client Errors (4xx) 0
SIP Server Errors (5xx) 0
SIP Global Errors (6xx) 0
Transaction Manager (TM) Internal Statistics:
Request/Response Congestion Failures = 0
Current Transactions awaiting response = 0
Free Buffers in TM inbound pool = 1200
Free Buffers in TM outbound pool = 20000
TM Congestion Level (uncongested = 0) = 0
Congestion Queue - Packets Accepted = 0
Congestion Queue - Packets Rejected = 0
Congestion Queue - Length = 0
Congestion Queue - Time Since Reset(ms)= 904270
Congestion Queue - Oldest Pkt Age (ms) = 0
Congestion Queue - Max Pkt Delay (ms) = 0
Control Block (CB) utilization:
Server Location NAPTR CBs = 0
Server Location SRV CBs = 0
Server Location address CBs = 2
Server Location Cache CBs = 0
Server Location Alias CBs = 0
Call CBs = 0
UA Dialog CBs = 0
UA INVITE Dialog CBs = 0
UA Subscription CBs = 0
SBC-673
Proxy Forking CBs = 0
Proxy Dialog CBs = 0
Proxy Proto Dialog CBs = 0
Proxy Server Transaction CBs = 0
Proxy Client Transaction CBs = 0
Transaction CBs = 0
Response CBs = 0
Extension Method CBs = 0
Status Code CBs = 0
```

Display Overall Media Statistics

The show **sbc dbe media-stats** command displays the statistics about media streams that have been processed, as shown in the following example:

```
Router# show sbc mySbc dbe media-stats
SBC Service "mySbc"
Max Term per Context = 68
Available Bandwidth = Unlimited
Available Flows = 9998
Available Packet Rate = 999800 (packets/second)
Active Media Flows = 0
Peak Media Flows = 0
Total Media Flows = 1
Active Signaling Flows = 0
Peak Signaling Flows = 0
Total Signaling Flows = 1
SBC Packets Received = 0
SBC Octets Received = 0
SBC Packets Sent = 0
SBC Octets Sent = 0
SBC Packets Discarded = 0
SBC Octets Discarded = 0
No Media Count = 0
```

Display Collected Media Flow Statistics

The **show sbc dbe media-flow-statsf** command displays conformance and failure statistics for a media flow, as shown in the following example:

```
Router# show sbc global dbe media-flow-stats

SBC Service "global"
Media Flow:
Context ID: 6
Stream ID: 2
State of Media Flow: Allocated
Call Established Time: 16:54:29 UTC Feb 20 2008
Flow Priority: Unspecified
Side A:
Name mycompany/voice/gn/0/1/0/1/ac/3
Reserved Bandwidth: 12600 (bytes/second)
Status OutofService
VRF Name: Global
VLAN Tags(Priorities): 0(0), 0(0)
Local Address: 202.50.2.1
Local Port: 10002
Remote Address: 10.10.127.22
Remote Port: 17384
Packets Received: 0
Packets Sent: 0
Packets Discarded: 0
Data Received: 0 (bytes)
Data Sent: 0 (bytes)
Data Discarded: 0 (bytes)
GM Discarded Packets: 0
Time To Recovery: Not known
RTCP Packets Sent: Not known
RTCP Packets Received: Not known
RTCP Packets Lost: Not known
DTMF Interworking: No
Media Flowing: No
Unexpected SrcAddr Packets: No
Billing ID: 000000000000000000000000000000000000000000000000
Media directions allowed: inactive
Max Burst size: 3250 (bytes) <===== additional fields for side A
Delay variation tolerance: 0 (ms)
SDP string: m=audio $ RTP/AVP 0
Graceful deactivation: No
DiffServ Code Point: 0
Media Loss Event: No
NAT Latch Event: No
Side B:
Name mycompany/voice/gn/0/2/0/1/bb/4
Reserved Bandwidth: 12600 (bytes/second)
Status OutofService
VRF Name: Global
VLAN Tags(Priorities): 0(0), 0(0)
Local Address: 202.50.2.1
Local Port: 10004
Remote Address: 200.0.0.1
Remote Port: 19384
Packets Received: 0
Packets Sent: 0
Packets Discarded: 0
Data Received: 0 (bytes)
Data Sent: 0 (bytes)
Data Discarded: 0 (bytes)
```

```
GM Discarded Packets: 0
Time To Recovery: Not known
RTCP Packets Sent: Not known
RTCP Packets Received: Not known
RTCP Packets Lost: Not known
DTMF Interworking: No
Media Flowing: No
Unexpected SrcAddr Packets: No
Billing ID: 000000000000000000000000000000000000000000000000
Media directions allowed: inactive
Max Burst size: 3250 (bytes) <===== additional fields for Side B
Delay variation tolerance: 0 (ms)
SDP string: m=audio $ RTP/AVP 0
Graceful deactivation: No
DiffServ Code Point: 0
Media Loss Event: No
NAT Latch Event: No
```

Display Global List of Media Statistics

The **show sbc dbe forwarder-stats** command displays global conformance and failure statistics, as shown in the following example:

```
Router# show sbc global dbe forwarder-stats
IOSd MPF Stub Message statistics
--------------------------------
Total global PMI messages received = 1
Total global PMI messages transmitted = 1
Total call PMI messages received = 0
Total call PMI messages transmitted = 0
Total global PMI message handling failures = 0
Total call PMI message handling failures = 0
Total global TDL messages received = 1
Total global TDL messages transmitted = 1
Total call TDL messages received = 0
Total call TDL messages transmitted = 0
Total global TDL message handling failures = 0
Total call TDL message handling failures = 0
Total packets injected = 0
Total packets punted = 0
Total injected packets dropped = 0
Total punted packets dropped = 0
Total global message timeouts = 0
Total call message timeouts = 0
Call ID database is NOT Initialised
IOSd MPF Stub Call statistics
-----------------------------
Number of currently in-use Calls = 0
High-water number of in-use Calls = 0
Maximum number of in-use Calls supported = 0
SBC Media Forwarder Statistics
------------------------------
Summary information:
Total packets received = 28416
Total packets forwarded = 14336
Total packets dropped = 14080
Total packets punted = 0
Incoming packets diverted to SBC subsystem = 0
Outgoing packets inserted by SBC subsystem = 0
Detailed breakdown of statistics:
Dropped packets:
IP TTL expired = 0
No associated flow = 0
Wrong source for flow = 0
Ingress flow receive disabled = 0
Egress flow send disabled = 0
Not conforming to flowspec = 14080
Badly formed RTP = 0
Badly formed RTCP = 0
Excessive RTCP packet rate = 0
Borrowed for outgoing DTMF = 0
Unknown destination address = 0
Misdirected = 0
Feature disabled = 0
Reprocess limit exceeded = 0
Punted packets:
H.248 control packets = not implemented
Packets containing options = 0
Fragmented packets = 0
Unexpected IP protocol = 0
Packets from invalid port range = 0
```

```
Punted packets dropped through rate limiting = 0
Packets colored with configured DSCP = 0
Diverted DTMF packets dropped:
Excessive DTMF packet rate = 0
Bad UDP checksum = 0
Diverted packet queue full = not implemented
Other = not implemented
Inserted packets dropped:
Flow inactive or disabled = 0
No outgoing packet buffer available = 0
Outgoing Queue full = 0
Other = 0
Generated event information:
Number of media UP events = 0
Number of media DOWN events = 0
Number of unexpected source events = 0
Platform specific statistics:
Packets learn source address = 0
Packets Learn source address timed out = 0
Packets conformed = 1982
Packets violated = 18
Packets exceed = 0
Packets RTCP receive = 0
SBC Media Forwarder statistics can wrap after
approximately 18 quintillion packets. For more accurate
statistics on completed calls, please use
show sbc ... dbe media-stats
```

Display Platform Software Status Control Processor

The **show platform software status control-processor brief** command displays information about the usage of the route processor, as shown in the following example:

```
Router# show platform software status control-processor brief

Load Average
 Slot  Status  1-Min  5-Min 15-Min
  RP0 Healthy   0.02   0.10   0.08
  RP1 Healthy   0.00   0.13   0.09
 ESP0 Healthy   0.00   0.15   0.10
 ESP1 Healthy   0.01   0.18   0.13
 SIP0 Healthy   0.00   0.06   0.04

Memory (kB)
 Slot  Status    Total     Used (Pct)     Free (Pct) Committed (Pct)
  RP0 Healthy  8133924  1804132 (22%)  6329792 (77%)   5132856 (63%)
  RP1 Healthy  8133924  1758800 (21%)  6375124 (78%)   5130308 (63%)
 ESP0 Healthy  2022288   552424 (26%)  1469864 (70%)   2464260 (117%)
 ESP1 Healthy  2022288   552616 (26%)  1469672 (70%)   2464680 (117%)
 SIP0 Healthy   478904   331268 (63%)   147636 (28%)    271072 (51%)

CPU Utilization
 Slot  CPU   User System   Nice   Idle    IRQ   SIRQ IOwait
  RP0    0   0.19   0.29   0.00  99.40   0.00   0.09   0.00
         1   0.00   0.00   0.00 100.00   0.00   0.00   0.00
  RP1    0   0.20   0.60   0.00  99.19   0.00   0.00   0.00
         1   0.10   1.20   0.00  98.70   0.00   0.00   0.00
 ESP0    0   1.60   2.70   0.00  95.69   0.00   0.00   0.00
 ESP1    0   0.20   0.10   0.00  99.69   0.00   0.00   0.00
 SIP0    0   1.60   2.00   0.00  96.40   0.00   0.00   0.00
```

Other Useful Show Commands

General

```
show clock
show version
show running-config
```

DBE

```
show sbc dbe address
show sbc dbe controllers
show sbc dbe forwarder-stats
show sbc dbe media-flow-stats
show sbc dbe media-stats
show sbc dbe signaling-flow-stats
show sbc dbe history
```

SBE

```
show sbc sbe sip stats
show sbc sbe call-rate-stats
show sbc sbe calls
show sbc sbe adjacency
show sbc sbe call-stats-currenthour
show sbc sbe policy-failure-stats currenthour
```

VRF Examples

The following examples show how to create VRFs for the examples in this document. In each VRF example, a VRF instance is created and then an interface in the VRF space is created for each entity in the communication loop. An OSPF is configured for the VRF to enable routing exchanges between the two entities. You can verify the configuration by using the **show ip route vrf** command.

VRF for Telepresence

CUCM1

```
vrf definition CUCM1 // Create a VRF instance
 !
 address-family ipv4
 exit-address-family

 address-family ipv6
 exit-address-family
!
interface SBC24 // Create an interface in the VRF space
 vrf forwarding CUCM1
 ip address 6.1.1.1 255.255.255.0 // Set the SIP adjacency address

interface GigabitEthernet0/0/0.101 // Set the VLAN identifier to 101
 vrf forwarding CUCM1
 encapsulation dot1Q 2301
 ip address 180.23.1.2 255.255.255.0
!
router ospf 2301 vrf CUCM1 // Create an OSPF instance for the CUCM1 VRF
 router-id 23.23.23.1
 network 6.1.1.0 0.0.0.255 area 1
 network 180.23.1.0 0.0.0.255 area 0
!
```

CUCM2

```
vrf definition CUCM2 // Create a VRF instance
 !
 address-family ipv4
 exit-address-family

 address-family ipv6
 exit-address-family
!
interface SBC25 // Create an interface in the VRF space
 vrf forwarding CUCM2
 ip address 6.1.2.1 255.255.255.0 // Set the SIP adjacency address

interface GigabitEthernet0/0/1.101 // Set the VLAN identifier to 101
 vrf forwarding CUCM2
 encapsulation dot1Q 2302
 ip address 180.23.2.2 255.255.255.0
!
router ospf 2302 vrf CUCM2 // Create an OSPF instance for the CUCM2 VRF
 router-id 23.23.23.2
 network 6.1.2.0 0.0.0.255 area 1
 network 180.23.2.0 0.0.0.255 area 0
!
```

Verify the Configuration

```
show ip route vrf vrf-name // Display routing table details for the VRF
```

VRF for Individual Subscribers

Subscribers

```
vrf definition subscribers // Create a VRF instance
 !
 address-family ipv4
 exit-address-family

 address-family ipv6
 exit-address-family
!
interface SBC24 // Create an interface in the VRF space
 vrf forwarding subscribers
 ip address 6.1.1.1 255.255.255.0 // Set the SIP adjacency address

interface GigabitEthernet0/0/0.101 // Set the VLAN identifier to 101
 vrf forwarding subscribers
 encapsulation dot1Q 2301
 ip address 180.23.1.2 255.255.255.0
!
router ospf 2301 vrf subscribers // Create an OSPF instance for the subscribers VRF
 router-id 23.23.23.1
 network 6.1.1.0 0.0.0.255 area 1
 network 180.23.1.0 0.0.0.255 area 0
!
```

Softswitch

```
vrf definition softswitch // Create a VRF instance
 !
 address-family ipv4
 exit-address-family

 address-family ipv6
 exit-address-family
!
interface SBC25 // Create an interface in the VRF space
 vrf forwarding softswitch
 ip address 6.1.2.1 255.255.255.0 // Set the SIP adjacency address

interface GigabitEthernet0/0/1.101 // Set the VLAN identifier to 101
 vrf forwarding softswitch
 encapsulation dot1Q 2302
 ip address 180.23.2.2 255.255.255.0
!
router ospf 2302 vrf softswitch // Create an OSPF instance for the softswitch VRF
 router-id 23.23.23.2
 network 6.1.2.0 0.0.0.255 area 1
 network 180.23.2.0 0.0.0.255 area 0
!
```

Verify the Configuration

```
show ip route vrf vrf-name // Display routing table details for the VRF
```

VRF for Network to Network Interface

PBX

```
vrf definition pbx // Create a VRF instance
 !
 address-family ipv4
 exit-address-family

 address-family ipv6
 exit-address-family
!
interface SBC24 // Create an interface in the VRF space
 vrf forwarding pbx
 ip address 6.1.1.1 255.255.255.0 // Set the SIP adjacency address

interface GigabitEthernet0/0/0.101 // Set the VLAN identifier to 101
 vrf forwarding pbx
 encapsulation dot1Q 2301
 ip address 180.23.1.2 255.255.255.0
!
router ospf 2301 vrf pbx // Create an OSPF instance for the pbx VRF
 router-id 23.23.23.1
 network 6.1.1.0 0.0.0.255 area 1
 network 180.23.1.0 0.0.0.255 area 0
!
```

Service Provider

```
vrf definition service_provider // Create a VRF instance
 !
 address-family ipv4
 exit-address-family

 address-family ipv6
 exit-address-family
!
interface SBC25 // Create an interface in the VRF space
 vrf forwarding service_provider
 ip address 6.1.2.1 255.255.255.0 // Set the SIP adjacency address

interface GigabitEthernet0/0/1.101 // Set the VLAN identifier to 101
 vrf forwarding service_provider
 encapsulation dot1Q 2302
 ip address 180.23.2.2 255.255.255.0
!
router ospf 2302 vrf service_provider // Create an OSPF instance for the service_provider
                                      // VRF
 router-id 23.23.23.2
 network 6.1.2.0 0.0.0.255 area 1
 network 180.23.2.0 0.0.0.255 area 0
```

Verify the Configuration

```
show ip route vrf vrf-name // Display routing table details for the VRF
```