Late-to-Early Media Interworking

The late-to-early media interworking feature is supported for Session Initiation Protocol (SIP) calls. In order to interwork between a late media caller and an early media callee, Cisco Unified Border Element (SP Edition) sends an invite to the callee that includes a Session Description Protocol (SDP) offer of media. Two implementations of late-to-early media interworking are available:

- By default, SBC generates the SDP with a single media line that specifies codecs common to both the caller and the callee’s codec whitelists.
- SBC can also be configured with a media description using the `sip sdp-media-profile` command to generate a customized offer.

Cisco Unified Border Element (SP Edition) was formerly known as Integrated Session Border Controller and may be commonly referred to in this document as the session border controller (SBC).

For a complete description of the commands used in this chapter, refer to the Cisco Unified Border Element (SP Edition) Command Reference: Unified Model at:


For information about all Cisco IOS commands, use the Command Lookup Tool at http://tools.cisco.com/Support/CLILookup or a Cisco IOS master commands list.

Feature History for Late-to-Early Media Interworking

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cisco IOS XE Release 2.4</td>
<td>This feature was introduced on the Cisco IOS XR.</td>
</tr>
<tr>
<td>Cisco IOS XE Release 2.5</td>
<td>The customizable offer for late-to-early media interworking feature was introduced on the Cisco IOS XR.</td>
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</tbody>
</table>

Contents

This module contains the following sections:

- Restrictions for Late-to-Early Media Interworking Support, page 49-2
- Information about Late-to-Early Media Interworking, page 49-2
- Configuring Late-to-Early Media Interworking, page 49-4
- Configuration Examples for the Late-to-Early Media Interworking Feature, page 49-13
- Verification, page 49-17
Restrictions for Late-to-Early Media Interworking Support

The restrictions for late-to-early media interworking are:

- This feature applies only to SIP-to-SIP calls, it does not apply to SIP-to-H.323 interworking calls.
- This feature applies only to IPv4; you cannot use it with IPv6 addressing.
- If the caller refines the media chosen by the callee, this is sent back to the callee in a PRACK. However, if the callee attempts to refine the media again, the event is logged but it is not passed back to the caller.
- Because Cisco Unified Border Element (SP Edition) generates SDPs, any calls using this feature cannot use media bypass.
- Cisco Unified Border Element (SP Edition) only generates SDPs offering a single audio stream. If the caller and callee want to negotiate video, fax, or other media streams, they can renegotiate this after the call has been established.
- If the callee attempts to send early media either before or without sending a reliable 1XX INVITE, Cisco Unified Border Element (SP Edition) will drop that media. It will not reach the caller.
- The callee must not send unreliable 1XX INVITE responses because the caller would interpret them as an out-of-sequence SDP offer. For late-to-early interworking calls, Cisco Unified Border Element (SP Edition) sets 100rel as mandatory in order to forbid the callee from sending unreliable responses only if the caller side supports 100rel.
- Late-to-early media interworking must not be used with the Gq IMS interface. This interface does not provide Cisco Unified Border Element (SP Edition) with the local media address necessary to create an SDP offer (and will likely result in calls with incorrect media paths).

Information about Late-to-Early Media Interworking

This section includes the following topics:

- Late-to-Early Media Interworking Description, page 49-2
- Customizable Offer for Late-to-Early Media Interworking, page 49-3

Late-to-Early Media Interworking Description

Early Media is the ability of two user agents to communicate before a call is actually established. Early Media can flow when the caller makes a media proposal on the initial call setup request and the callee responds to the offer before the call is connected. Cisco Unified Border Element (SP Edition) provides interoperability between SIP devices that do not provide SDP on their INVITEs and SIP devices that require SDP on INVITEs they receive. This occurs when:

- An endpoint caller wants to negotiate media after the INVITE has been accepted (late media) and does not include an SDP offer on the initial INVITE
- The callee that expects an SDP offer on the initial INVITE, which it then answers with a 1XX response (early media).

The normal negotiation for media is for the caller to include an SDP offer on the initial INVITE and for the callee to accept with a 200 response. However, the following might occur:

- Late media is used by some endpoints, such as call agents that want to allow the callee to select the media used.
Early media is used by some more recent endpoints that need to support media flow before the call is accepted, such as a pre-call announcement or in-band tones from a Call Hold server.

In order to interwork between a late media caller and an early media callee, Cisco Unified Border Element (SP Edition) sends an invite to the callee that includes an SDP offer of media. Cisco Unified Border Element (SP Edition) then sends appropriate messages between the caller and callee, depending on the responses from each.

Cisco Unified Border Element (SP Edition) supports this interworking on a per-adjacency basis. You can configure each adjacency to require late-to-early media interworking for calls made to that adjacency and/or for calls made from that adjacency.

Customizable Offer for Late-to-Early Media Interworking

By default, SBC generates the SDP with a single media description that specifies codecs common to both the caller and callee’s codec whitelists.

The Customizable Offer for Late-to-Early Media Interworking feature provides customized SDPs with one or more media descriptions. You configure the media descriptions in named profiles (SDP media profiles) and associate the profiles to signals by including the profile name in a CAC policy.

To enable a customized offer for late-to-early media interworking:

- Enable late-to-early media interworking per adjacency, as described in the Configuring Late-to-Early Media Interworking Per Adjacency? section on page 49-4.
- Create a named SDP media profile containing one or more media description lines which will be inserted into the SDP when SBC is generating the INVITE. SBC will insert the media description lines into the SDP per the sequence number configured.
- Associate this sdp-media-profile with a cac-policy table entry.

When a call requires late-to-early interworking, if the CAC policy entry for that call contains a valid SDP media profile name, then SBC generates a customized SDP. In the absence of such an association, SBC generates the default SDP. In the customized case, SBC inserts the media description lines in the media profile in the SDP when it generates the INVITE. Each entry in the media profile includes a sequence number, which controls the ordering of the lines in the generated SDP.

Rules for Media Lines in SDP Media Profiles

A section of SDP is configured as an entry in the SDP Media profile. An entry can have one or many media description lines. The format of an SDP Media profile is:

```
entry number
    media-line index "media_description"
    media-line index "media_description"
    exit
```

For example:

```
entry 1
    media-line 1 "m=audio 0 RTP/AVP 0"
    media-line 2 "a=rtpmap:0 PCMU/8000"
    exit
```

If more than one media description is created in the same profile, all of the entries are used to generate the same output SDP, in ascending order by entry number.
The `media_description` argument must be enclosed in quotes (" "). The value inside the quotes must be syntactically valid SDP as defined in RFC 2327. The following rules apply:

- An SDP entry must contain exactly one m-line. The m-line must appear first in the entry. The m-line port must be zero. SBC replaces the zero with the appropriate port.
- An SDP entry must not contain a c-line.

The Cisco command line interface handles the contents of `media_description` as a string value. It does not check the syntax of the configured information. If the syntax is incorrect, outbound offers by the SBC are rejected.

### Configuring Late-to-Early Media Interworking

This section describes the following configuration scenarios for Late-to-Early Media Interworking:

- Configuring Late-to-Early Media Interworking Per Adjacency, page 49-4
- Configuring Customized Offers for Late-to-Early Media Interworking, page 49-11

### Configuring Late-to-Early Media Interworking Per Adjacency

This task shows how to configure late-to-early media interworking per adjacency.

**Note**

The `caller` and `callee` commands have been used in this procedure. In some scenarios, the `branch` command can be used as an alternative to the `caller` and `callee` command pair. The `branch` command has been introduced in Release 3.5.0. See the “Configuring Directed Nonlimiting CAC Policies” section on page 7-37 for information about this command.

### SUMMARY STEPS

1. configure terminal
2. sbc service-name
3. sbe
4. adjacency sip adjacency-name
5. nat force-off
6. preferred-transport udp
7. redirect-mode pass-through
8. authentication nonce timeout value
9. signaling-address ipv4
10. signaling-port
11. remote-address ipv4
12. signaling-peer
13. signaling-peer-port
14. dbe-location-id
15. account
16. reg-min-expiry
17. media-late-to-early-iw {incoming | outgoing}
18. attach
19. exit
20. exit
21. sip inherit profile
22. cac-policy-set
23. first-cac-table
24. first-cac-scope
25. averaging-period
26. cac-table
27. table-type limit list of limit tables
28. entry
29. match-value
30. action cac-complete
31. max-bandwidth
32. max-updates
33. max-channels
34. early-media-type
35. early-media-timeout
36. codec-restrict-to-list
37. caller-codec-list
38. callee-privacy
39. caller-privacy
40. exit
41. exit
42. complete
43. exit
44. active-cac-policy-set
## Configuring Late-to-Early Media Interworking

### DETAILED STEPS

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
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</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td><strong>configure terminal</strong></td>
</tr>
<tr>
<td><strong>Enables global configuration mode.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td>Router# configure terminal</td>
<td></td>
</tr>
</tbody>
</table>

| **Step 2** | **sbc service-name** |
| **Enters the submode for configuring the method profile.** |
| **Example:** | 
| Router(config)# sbc mySBC |

| **Step 3** | **sbe** |
| **Enters the mode of an SBE entity within an SBC service.** |
| **Example:** | 
| Router(config-sbc)# sbe |

| **Step 4** | **adjacency sip adjacency-name** |
| **Configures an adjacency.** |
| **Example:** | 
| Router(config-sbc-sbe)# adjacency sip sipGW |

| **Step 5** | **nat force-off** |
| **Configures a SIP adjacency to assume that all endpoints are behind a NAT device.** |
| **Example:** | 
| Router(config-sbe-adj-sip)# nat force-off |

| **Step 6** | **preferred-transport udp** |
| **Sets the preferred transport protocol for SIP signaling on an adjacency.** |
| **Example:** | 
| Router(config-sbc-sbe-adj-sip)# preferred-transport udp |

| **Step 7** | **redirect-mode pass-through** |
| **Configures the behavior of SBC on receipt of a 3xx response to an invite from the SIP adjacency.** |
| **Example:** | 
| Router(config-sbc-sbe-adj-sip)# redirect-mode recurse |

| **Step 8** | **authentication nonce timeout value** |
| **Configures the authentication nonce timeout for a SIP adjacency.** |
| **Example:** | 
| Router(config-sbe-adj-sip)# authentication nonce timeout 10 |

| **Step 9** | **signaling-address ipv4** |
| **Defines the local IPv4 signaling address of a SIP adjacency.** |
| **Example:** | 
| Router(config-sbc-sbe-adj-sip)# signaling-address ipv4 10.10.10.10 |
## Chapter 49  Late-to-Early Media Interworking

### Configuring Late-to-Early Media Interworking

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<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 10</strong> signaling-port signaling-port</td>
<td>Defines the local port of signaling address of a SIP adjacency.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td>Router(config-sbc-sbe-adj-sip)# signaling-port 5000</td>
<td></td>
</tr>
<tr>
<td><strong>Step 11</strong> remote-address ipv4</td>
<td>Configures a SIP adjacency to restrict the set of remote signaling peers that can be contacted over the adjacency to those with the given IP address prefix.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td>Router(config-sbc-sbe-adj-sip)# remote-address ipv4 36.36.36.20 255.255.255.0</td>
<td></td>
</tr>
<tr>
<td><strong>Step 12</strong> signaling-peer</td>
<td>Configures a SIP adjacency to use the given remote signaling-peer.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td>Router(config-sbc-sbe-adj-sip)# signaling-peer gk andrew</td>
<td></td>
</tr>
<tr>
<td><strong>Step 13</strong> signaling-peer-port</td>
<td>Configures a SIP adjacency to use the given remote signaling-peer’s port.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td>Router(config-sbc-sbe-adj-sip)# signaling-peer-port 123</td>
<td></td>
</tr>
<tr>
<td><strong>Step 14</strong> dbe-location-id</td>
<td>Configures an adjacency to use a given media gateway DBE location when routing media.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td>Router(config-sbc-sbe-adj-sip)# dbe-location-id 1</td>
<td></td>
</tr>
<tr>
<td><strong>Step 15</strong> account</td>
<td>Defines a SIP adjacency account on an SBE.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td>Router(config-sbc-sbe-adj-sip)# account isp42</td>
<td></td>
</tr>
<tr>
<td><strong>Step 16</strong> reg-min-expiry</td>
<td>Configures the minimum registration period in seconds on the SIP adjacency.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td>Router(config-sbc-sbe-adj-sip)# reg-min-expiry 300</td>
<td></td>
</tr>
<tr>
<td><strong>Step 17</strong> media-late-to-early-iw (incoming</td>
<td>outgoing)</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td>Router(config-sbe-adj-sip)# media-late-to-early-iw incoming</td>
<td></td>
</tr>
<tr>
<td><strong>Step 18</strong> attach</td>
<td>Attaches an adjacency to an account on an SBE.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td>Router(config-sbc-sbe-adj-sip)# attach</td>
<td></td>
</tr>
</tbody>
</table>
### Command or Action

**Step 19**  
exit

**Example:**  
Router(config-sbc-sbe-adj-sip)# exit

**Purpose:**  
Exits the current configuration mode.

**Step 20**  
exit

**Example:**  
Router(config-sbc-sbe-adj)# exit

**Purpose:**  
Exits the current configuration mode.

**Step 21**  
sip inherit profile

**Example:**  
Router(config-sbc-sbe)# sip inherit profile preset-p-cscf-access

**Purpose:**  
Configures a global inherit profile.

**Step 22**  
cac-policy-set

**Example:**  
Router(config-sbc-sbe)# cac-policy-set 1

**Purpose:**  
Enters the submode of CAC policy set configuration within an SBE entity.

**Step 23**  
first-cac-table

**Example:**  
Router(config-sbc-sbe-cacpolicy)#
first-cac-table RootCacTable

**Purpose:**  
Configures the name of the first policy table to process when performing the admission control stage of policy.

**Step 24**  
first-cac-scope

**Example:**  
Router(config-sbc-sbe-cacpolicy)#
first-cac-scope src-adjacency

**Purpose:**  
Configures the scope at which to begin defining limits when performing the admission control stage of policy.

**Step 25**  
averaging-period

**Example:**  
Router(config-sbc-sbe-cacpolicy)#
averaging-period 5

**Purpose:**  
Configures the size of the averaging period used by CAC for its rate calculations.

**Step 26**  
cac-table

**Example:**  
Router(config-sbc-sbe-cacpolicy)#
cac-table
MyCacTable

**Purpose:**  
Creates or configures an admission control table.

**Step 27**  
table-type limit list of limit tables

**Example:**  
Router(config-sbc-sbe-cacpolicy-cactable)#
table-type limit call-priority

**Purpose:**  
Configures a CAC Limit table type.
### Command or Action

<table>
<thead>
<tr>
<th>Step</th>
<th>Command/Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 28</td>
<td>entry num</td>
<td>Creates or modifies an entry in a table.</td>
</tr>
<tr>
<td>Example:</td>
<td>Router(config-sbc-sbe-cacpolicy-caetable)# entry 1</td>
<td></td>
</tr>
<tr>
<td>Step 29</td>
<td>match-value value-keyword</td>
<td>Configures the match-value of an entry in an admission control table. Use the ? to see a list of valid keywords.</td>
</tr>
<tr>
<td>Example:</td>
<td>Router(config-sbc-sbe-cacpolicy-caetable-entry)# match-value routine</td>
<td></td>
</tr>
<tr>
<td>Step 30</td>
<td>action cac-complete</td>
<td>Specifies that when an event matches, this CAC policy is complete.</td>
</tr>
<tr>
<td>Example:</td>
<td>Router(config-sbc-sbe-cacpolicy-caetable-entry)# action cac-complete</td>
<td></td>
</tr>
<tr>
<td>Step 31</td>
<td>max-bandwidth</td>
<td>Configures the maximum bandwidth for an entry in an admission control table.</td>
</tr>
<tr>
<td>Example:</td>
<td>Router(config-sbc-sbe-cacpolicy-caetable-entry)# max-bandwidth 6000000</td>
<td></td>
</tr>
<tr>
<td>Step 32</td>
<td>max-updates</td>
<td>Configures the maximum call updates for an entry in an admission control table.</td>
</tr>
<tr>
<td>Example:</td>
<td>Router(config-sbc-sbe-cacpolicy-caetable-entry)# max-updates 500</td>
<td></td>
</tr>
<tr>
<td>Step 33</td>
<td>max-channels</td>
<td>Configures the maximum number of channels for an entry in an admission control table.</td>
</tr>
<tr>
<td>Example:</td>
<td>Router(config-sbc-sbe-cacpolicy-caetable-entry)# max-channels 50</td>
<td></td>
</tr>
<tr>
<td>Step 34</td>
<td>early-media-type (backward-half-duplex</td>
<td>Configures the direction of early media to allow for an entry in a call admission control table.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>forward-half-duplex</td>
</tr>
<tr>
<td>Example:</td>
<td>Router(config-sbc-sbe-cacpolicy-caetable-entry)# early-media-type full-duplex</td>
<td></td>
</tr>
<tr>
<td>Step 35</td>
<td>early-media-timeout</td>
<td>Configures the amount of time for which to allow early-media before a call is established.</td>
</tr>
<tr>
<td>Example:</td>
<td>Router(config-sbc-sbe-cacpolicy-caetable-entry)# early-media-timeout 90</td>
<td></td>
</tr>
<tr>
<td>Step 36</td>
<td>codec-restrict-to-list</td>
<td>Configures the CAC to restrict the codecs used in signaling a call to the set of codecs given in the named list.</td>
</tr>
<tr>
<td>Example:</td>
<td>Router(config-sbc-sbe-cacpolicy-caetable-entry)# codec-restrict-to-list my_codecs</td>
<td></td>
</tr>
</tbody>
</table>
### Configuring Late-to-Early Media Interworking

<table>
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<th>Step</th>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>caller-codec-list</td>
<td>Lists the codecs which the caller leg of a call is allowed to use.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Router(config-sbc-sbe-cacpolicy-cactable-entry) # caller-codec-list test</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>callee-privacy</td>
<td>Configures the level of privacy processing to perform on messages sent from callee to caller.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Router(config-sbc-sbe-cacpolicy-cactable-entry) # callee-privacy always</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>caller-privacy</td>
<td>Configures the level of privacy processing to perform on messages sent from caller to callee.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Router(config-sbc-sbe-cacpolicy-cactable-entry) # caller-privacy always</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>exit</td>
<td>Exits the current configuration mode.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Router(config-sbc-sbe-cacpolicy-cactable-entry) # exit</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>exit</td>
<td>Exits the current configuration mode.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Router(config-sbc-sbe-cacpolicy-cactable)# exit</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>complete</td>
<td>Completes the CAC-policy or call-policy set after committing the full set.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Router(config-sbc-sbe-cacpolicy)# complete</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>exit</td>
<td>Exits the current configuration mode.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Router(config-sbc-sbe-cacpolicy)# exit</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>active-cac-policy-set</td>
<td>Sets the active CAC-policy-set within an SBE entity.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Router(config-sbc-sbe-cacpolicy-set)# active-cac-policy-set 1</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>show sbc sbc-name sbe sip essential-methods</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Router(config-sbc-sbe)# show sbc mysbc sbe sip essential-methods</td>
<td></td>
</tr>
</tbody>
</table>
Configuring Customized Offers for Late-to-Early Media Interworking

Prerequisites

Before performing this task, configure late-to-early media interworking per adjacency.

SUMMARY STEPS

1. configure terminal
2. sbc service-name
3. sbe
4. sip sdp-media-profile profile-name
5. entry entry-num
6. media-line index "media_description"
7. (Optional) Repeat the previous step with a different index to add more media lines to this entry.
8. exit
9. (Optional) Repeat Steps 6 through 9 with a different entry-num in Step 6 to add another entry to this profile.
10. exit
11. exit
12. cac-policy-set policy-set-id
13. cac-table cac-table-name
14. entry entry-number
15. sip sdp-media-profile profile-name
16. Ctrl Z
17. show sbc sbc-name sbe sip sdp-media-profile profile-name

DETAILED STEPS

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
</tr>
<tr>
<td>configure terminal</td>
<td>Enables global configuration mode.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td>Router# configure terminal</td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
</tr>
<tr>
<td>sbc service-name</td>
<td>Enters the submode for configuring the method profile.</td>
</tr>
<tr>
<td>Example:</td>
<td>Use the service-name argument to define the name of the service.</td>
</tr>
<tr>
<td>Router(config)# sbc mysbc</td>
<td></td>
</tr>
<tr>
<td>Step 3</td>
<td></td>
</tr>
<tr>
<td>sbe</td>
<td>Enters the mode of an SBE entity within an SBC service.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td>Router(config-sbc)# sbe</td>
<td></td>
</tr>
</tbody>
</table>
### Configuring Late-to-Early Media Interworking

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 4</strong> sip sdp-media-profile profile-name</td>
<td>Configures an SDP media profile for a customized offer. Enter into SIP SDP media profile configuration mode.</td>
</tr>
<tr>
<td><strong>Example:</strong> Router(config-sbc-sbe)# sip sdp-media-profile profile1</td>
<td></td>
</tr>
<tr>
<td><strong>Step 5</strong> entry sequence-num</td>
<td>Enters the submode for adding a section of media description to the profile. A section, or entry, can contain one or more media description lines.</td>
</tr>
<tr>
<td><strong>Example:</strong> Router(config-sbc-sbe-sip-sdp-media)# entry 1</td>
<td></td>
</tr>
<tr>
<td><strong>Step 6</strong> media-line index &quot;media_description&quot;</td>
<td>Adds a media description line to the entry. Quotation marks must surround the media description. See <code>$paranum&gt;Rules for Media Lines in SDP Media Profiles? section on page 49-3.</code></td>
</tr>
<tr>
<td><strong>Example:</strong> Router(config-sbc-sbe-sip-sdp-media-ele)# media-line 1 &quot;m=audio 0 RTP/AVP 0&quot;</td>
<td></td>
</tr>
<tr>
<td><strong>Step 7</strong> (Optional) Repeat the previous step with a different index to add more media lines to this entry.</td>
<td>Adds additional media descriptions to the entry. The index controls the ordering of the media descriptions.</td>
</tr>
<tr>
<td><strong>Example:</strong> Router(config-sbc-sbe-sip-sdp-media-ele)# media-line 2 &quot;a=rtpmap:12 H264/90000&quot;</td>
<td></td>
</tr>
<tr>
<td><strong>Step 8</strong> exit</td>
<td>Exits the current configuration mode.</td>
</tr>
<tr>
<td><strong>Example:</strong> Router(config-sbc-sbe-sip-sdp-media-ele)# exit</td>
<td></td>
</tr>
<tr>
<td><strong>Step 9</strong> (Optional) Repeat Steps 5 through 8 with a different entry-num in Step 5.</td>
<td>Adds another entry to this profile.</td>
</tr>
<tr>
<td><strong>Example:</strong> Router(config-sbc-sbe-sip-sdp-media-ele)# entry 2 Router(config-sbc-sbe-sip-sdp-media-ele)# media-line 1 &quot;m=audio 0 RTP/AVP 0&quot; Router(config-sbc-sbe-sip-sdp-media-ele)# media-line 2 &quot;a=rtpmap:0 PCMU/8000&quot; Router(config-sbc-sbe-sip-sdp-media-ele)# exit</td>
<td></td>
</tr>
<tr>
<td><strong>Step 10</strong> exit</td>
<td>Exits the current configuration mode.</td>
</tr>
<tr>
<td><strong>Example:</strong> Router(config-sbc-sbe-sip-sdp-media)# exit</td>
<td></td>
</tr>
<tr>
<td><strong>Step 11</strong> exit</td>
<td>Exits the current configuration mode.</td>
</tr>
<tr>
<td><strong>Example:</strong> Router(config-sbc-sbe-sip)# exit</td>
<td></td>
</tr>
<tr>
<td><strong>Step 12</strong> cac-policy-set policy-set-id</td>
<td>Enters the submode to make a change to a previously configured CAC policy set. Changes are not permitted to the active policy set.</td>
</tr>
<tr>
<td><strong>Example:</strong> Router(config-sbc-sbe)# cac-policy-set 1</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 49  Late-to-Early Media Interworking

Configuration Examples for the Late-to-Early Media Interworking Feature

This section includes the following examples:

- Example: Late-to-Early Media Interworking, page 49-13
- Example: Customized Offer for Late-to-Early Media Interworking, page 49-16

Example: Late-to-Early Media Interworking

The following example shows a configuration of the Late-to-Early Media Interworking feature.

Note

The `caller` and `callee` commands have been used in this procedure. In some scenarios, the `branch` command can be used as an alternative to the `caller` and `callee` command pair. The `branch` command has been introduced in Release 3.5.0. See the “Configuring Directed Nonlimiting CAC Policies” section on page 7-37 for information about this command.

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 13 cac-table <code>cac-table-name</code></td>
<td>Enters the submode to make a change to a previously configured admission control table.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td>Router(config-sbc-sbe-cacpolicy)# cac-table MyCacTable</td>
<td></td>
</tr>
<tr>
<td>Step 14 entry <code>entry-number</code></td>
<td>Enters the submode to modify an entry in an admission control table.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td>Router(config-sbc-sbe-cacpolicy-cactable)# entry 1</td>
<td></td>
</tr>
<tr>
<td>Step 15 sip sdp-media-profile <code>profile-name</code></td>
<td>Associates an SDP media profile with an admission control table entry.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td>Router(config-sbc-sbe-cacpolicy-cactable-entry)#sip sdp-media-profile profile1</td>
<td></td>
</tr>
<tr>
<td>Step 16 Ctrl Z</td>
<td>Returns to user EXEC mode.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td>Router(config-sbc-sbe-cacpolicy-cactable)# Ctrl Z</td>
<td></td>
</tr>
<tr>
<td>Step 17 show sbc <code>sbc-name</code> sbc <code>sbe</code> sip sdp-media-profile <code>profile-name</code></td>
<td>Shows the contents of the profile. It is important to check the contents of the profile to make sure it is syntactically valid SDP as defined in RFC 2327. The command line interface does not check the syntax of the <code>media_description</code> arguments.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td>Router# show sbc test sbc sip sdp-media-profile profile1</td>
<td></td>
</tr>
</tbody>
</table>
Router(config)# sbc mySbc
Router(config-sbc)# sbe
Router(config-sbc-sbe)# adjacency sip SIPP-1
Router(config-sbe-adj-sip)# nat force-off
Router(config-sbe-adj-sip)# preferred-transport udp
Router(config-sbe-adj-sip)# redirect-mode pass-through
Router(config-sbe-adj-sip)# authentication nonce timeout 300
Router(config-sbe-adj-sip)# signaling-address ipv4 201.201.201.20
Router(config-sbe-adj-sip)# signaling-port 5060
Router(config-sbe-adj-sip)# signaling-peer-port 5060
Router(config-sbe-adj-sip)# dbe-location-id 4294967295
Router(config-sbe-adj-sip)# account SIPP-1
Router(config-sbe-adj-sip)# reg-min-expiry 3000
Router(config-sbe-adj-sip)# media-late-to-early-lw incoming
Router(config-sbe-adj-sip)# attach
Router(config-sbe-adj-sip)# exit
Router(config-sbe-adj)# exit
Router(config-sbc-sbe)# adjacency sip SIPP-2
Router(config-sbe-adj-sip)# nat force-off
Router(config-sbe-adj-sip)# preferred-transport udp
Router(config-sbe-adj-sip)# redirect-mode pass-through
Router(config-sbe-adj-sip)# authentication nonce timeout 300
Router(config-sbe-adj-sip)# signaling-address ipv4 201.201.201.20
Router(config-sbe-adj-sip)# signaling-port 5060
Router(config-sbe-adj-sip)# remote-address ipv4 201.201.201.11 255.255.255.255
Router(config-sbe-adj-sip)# signaling-peer 201.201.201.11
Router(config-sbe-adj-sip)# signaling-peer-port 5060
Router(config-sbe-adj-sip)# dbe-location-id 4294967295
Router(config-sbe-adj-sip)# account SIPP-2
Router(config-sbe-adj-sip)# reg-min-expiry 3000
Router(config-sbe-adj-sip)# media-late-to-early-lw outgoing
Router(config-sbe-adj-sip)# attach
Router(config-sbe-adj-sip)# exit
Router(config-sbe-adj)# exit
Router(config-sbc-sbe)# sip inherit profile preset-core
Router(config-sbc-sbe)# cac-policy-set 1
Router(config-sbc-sbe-cacpolicy)# first-cac-table table
Router(config-sbc-sbe-cacpolicy)# first-cac-scope call
Router(config-sbc-sbe-cacpolicy)# averaging-period 60
Router(config-sbc-sbe-cacpolicy)# cac-table table
Router(config-sbc-sbe-cacpolicy-cactable)# table-type limit adjacency
Router(config-sbc-sbe-cacpolicy-cactable)# entry 1
Router(config-sbc-sbe-cacpolicy-cactable-entry)# match-value SIPP-1
Router(config-sbc-sbe-cacpolicy-cactable-entry)# action cac-complete
Router(config-sbc-sbe-cacpolicy-cactable-entry)# max-bandwidth 64009 Gbps
Router(config-sbc-sbe-cacpolicy-cactable-entry)# max-updates 4294967295
Router(config-sbc-sbe-cacpolicy-cactable-entry)# max-channels 4294967295
Router(config-sbc-sbe-cacpolicy-cactable-entry)# early-media-type full-duplex
Router(config-sbc-sbe-cacpolicy-cactable-entry)# early-media-timeout 0
Router(config-sbc-sbe-cacpolicy-cactable-entry)# codec-restrict-to-list allowed_caller
Router(config-sbc-sbe-cacpolicy-cactable-entry)# caller-codec-list allowed_caller
Router(config-sbc-sbe-cacpolicy-cactable-entry)# callee-privacy never
Router(config-sbc-sbe-cacpolicy-cactable-entry)# caller-privacy never
Router(config-sbc-sbe-cacpolicy-cactable-entry)# entry 2
Router(config-sbc-sbe-cacpolicy-cactable-entry)# match-value SIPP-2
Router(config-sbc-sbe-cacpolicy-cactable-entry)# action cac-complete
Router(config-sbc-sbe-cacpolicy-cactable-entry)# max-bandwidth 64009 Gbps
Router(config-sbc-sbe-cacpolicy-cactable-entry)# max-updates 4294967295
Router(config-sbc-sbe-cacpolicy-cactable-entry)# max-channels 4294967295
Router(config-sbc-sbe-cacpolicy-cactable-entry)# early-media-type full-duplex
Router(config-sbc-sbe-cacpolicy-cactable-entry)# early-media-timeout 0
Router(config-sbc-sbe-cacpolicy-cactable-entry)# codec-restrict-to-list allowed
Router (config-sbc-sbe-cacpolicy-cactable-entry)# callee-codec-list allowed
Router (config-sbc-sbe-cacpolicy-cactable-entry)# callee-privacy never
Router (config-sbc-sbe-cacpolicy-cactable-entry)# caller-privacy never
Router (config-sbc-sbe-cacpolicy-cactable-entry)# exit
Router (config-sbc-sbe-cacpolicy)# complete
Router (config-sbc-sbe-cacpolicy)# exit
Router (config-sbc-sbe)# active-cac-policy-set 1
Router (config-sbc-sbe)# retry-limit 3
Router (config-sbc-sbe)# 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-entry)# entry 1
Router (config-sbc-sbe-rtgpolicy-entry)# action complete
Router (config-sbc-sbe-rtgpolicy-entry)# dst-adjacency SIPP-1
Router (config-sbc-sbe-rtgpolicy-entry)# match-adjacency SIPP-2
Router (config-sbc-sbe-rtgpolicy-entry)# exit
Router (config-sbc-sbe-rtgpolicy)# entry 2
Router (config-sbc-sbe-rtgpolicy)# action complete
Router (config-sbc-sbe-rtgpolicy)# dst-adjacency SIPP-2
Router (config-sbc-sbe-rtgpolicy)# match-adjacency SIPP-1
Router (config-sbc-sbe-rtgpolicy)# exit
Router (config-sbc-sbe)# complete
Router (config-sbc-sbe)# exit
Router (config-sbc-sbe)# active-call-policy-set 1
Router (config-sbc-sbe)# sip max-connections 2
Router (config-sbc-sbe)# sip timer
Router (config-sbc-sbe-tmr)# tcp-idle-timeout 120000
Router (config-sbc-sbe-tmr)# tls-idle-timeout 3600000
Router (config-sbc-sbe-tmr)# udp-response-linger-period 32000
Router (config-sbc-sbe-tmr)# udp-first-retransmit-interval 500
Router (config-sbc-sbe-tmr)# udp-max-retransmit-interval 4000
Router (config-sbc-sbe-tmr)# invite-timeout 180
Router (config-sbc-sbe-tmr)# exit
Router (config-sbc-sbe)# codec-list allowed
Router (config-sbc-sbe-codec-list)# description allowed codecs
Router (config-sbc-sbe-codec-list)# codec PCMA
Router (config-sbc-sbe-codec-list)# codec PCMU
Router (config-sbc-sbe-codec-list)# exit
Router (config-sbc-sbe)# codec-list allowed_caller
Router (config-sbc-sbe-codec-list)# description caller
Router (config-sbc-sbe-codec-list)# codec PCMA
Router (config-sbc-sbe-codec-list)# exit
Router (config-sbc-sbe)# h323
Router (config-sbc-sbe-h323)# ras timeout arq 5000
Router (config-sbc-sbe-h323)# ras retry arq 2
Router (config-sbc-sbe-h323)# ras timeout brq 3000
Router (config-sbc-sbe-h323)# ras retry brq 2
Router (config-sbc-sbe-h323)# ras timeout drq 3000
Router (config-sbc-sbe-h323)# ras retry drq 2
Router (config-sbc-sbe-h323)# ras timeout grq 5000
Router (config-sbc-sbe-h323)# ras retry grq 2
Router (config-sbc-sbe-h323)# ras timeout rrq 3000
Router (config-sbc-sbe-h323)# ras retry rrq 2
Router (config-sbc-sbe-h323)# ras rrq ttl 60
Router (config-sbc-sbe-h323)# ras timeout urq 3000
Router (config-sbc-sbe-h323)# ras retry urq 1
Router (config-sbc-sbe-h323)# h225 timeout proceeding 10000
Router (config-sbc-sbe-h323)# h225 timeout establishment 180000
Router (config-sbc-sbe-h323)# h225 timeout setup 4000
Router (config-sbc-sbe-h323)# exit
Router (config-sbc-sbe)# h323
Router (config-sbc-sbe-h323)# adjacency timeout 30000
Router (config-sbc-sbe-h323)# exit
Example: Customized Offer for Late-to-Early Media Interworking

The following example configures a customized media description and assigns it to a CAC policy.

```
Router(config)# sbc test
Router(config-sbc)# sbe
Router(config-sbc-sbe)# sip sd-media-profile MediaProfile
Router(config-sbc-sbe-sip-sdp-media)# entry 1
Router(config-sbc-sbe-sip-sdp-media-ele)# media-line 1 "m=audio 0 RTP/AVP 31"
Router(config-sbc-sbe-sip-sdp-media-ele)# media-line 2 "a=aaa:testing"
Router(config-sbc-sbe-sip-sdp-media-ele)# Ctrl Z
Router# show sbc test sbe sip sd-media-profile MediaProfile
SDP media profile "MediaProfile"
Elements:
  Sequence Number : 1
  media-line 1 : m=audio 0 RTP/AVP 31
  media-line 2 : a=aaa:testing

Not in use by any CAC table entries
```

```
Router# configure terminal
Router(config)# sbc test
Router(config-sbc)# sbe
Router(config-sbc-sbe)# cac-policy-set 1
Router(config-sbc-sbe-cacpolicy)# cac-table testpolicytable
Router(config-sbc-sbe-cacpolicy-cactable)# sip sd-media-profile MediaProfile
Router(config-sbc-sbe-cacpolicy-cactable-entry)# sip sd-media-profile MediaProfile
Router(config-sbc-sbe-cacpolicy-cactable-entry)# Ctrl Z
Router# show sbc test sbe sip sd-media-profile MediaProfile
SDP media profile "MediaProfile"
Elements:
  Sequence Number : 1
  media-line 1 : m=audio 0 RTP/AVP 31
  media-line 2 : a=aaa:testing

In use by CAC table testpolicytable, entry 1
```
Verification

Use the commands listed in Table 49-1 to verify operation.

Table 49-1 Commands to Verify Operation

<table>
<thead>
<tr>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>show sbc sbc-name sbe cac-policy-set id table name entries</td>
<td>Lists a summary of the CAC policy tables associated with the given policy set.</td>
</tr>
<tr>
<td>show sbc sbc-name sbe adjacencies</td>
<td>Lists the adjacencies configured on SBEs.</td>
</tr>
<tr>
<td>show sbc sbc-name sbe sdp-profiles</td>
<td>Lists the SIP SDP media profiles defined under a named SBE and indicates whether they are currently associated with a CAC policy.</td>
</tr>
<tr>
<td>show sbc sbc-name sbe sip sdp-media-profile [profile-name]</td>
<td>Lists the SIP SDP media profiles defined under a named SBE and indicates whether they are currently associated with a CAC policy, or, if you include a profile name, shows the contents of the named profile.</td>
</tr>
</tbody>
</table>

The following example shows adjacencies.

Router# show sbc test sbe adjacencies asrlk-1 de

SBC Service "test"
Adacency asrlk-1 (SIP)
  Status: Attached
  Signaling address: 22.22.22.5060, VRF Admin
  Signaling-peer: 33.33.33.5060
  Remote address: 33.33.33.3 255.255.255.255
  Force next hop: No
  Account:
    Group: None
    In header profile: Default
    Out header profile: Default
    In method profile: Default
    Out method profile: Default
    In UA option prof: Default
    Out UA option prof: Default
    In proxy opt prof: Default
    Out proxy opt prof: Default
    Priority set name: None
    Local-id: None
    Rewrite REGISTER: Off
    Target address: None
    NAT Status: Auto Detect
    Reg-min-expiry: 3000 seconds
    Fast-register: Enabled
    Fast-register-int: 30 seconds
    Authenticated mode: None
    Authenticated realm: None
    Auth. nonce life time: 300 seconds
    IMS visited NetID: None
    Inherit profile: Default
    Force next hop: No
    Home network Id: None
    UnEncrypt key data: None
    SIPI passthrough: No
### Chapter 49  Late-to-Early Media Interworking

<table>
<thead>
<tr>
<th>Verification</th>
</tr>
</thead>
</table>

Rewrite from domain: Yes  
Rewrite to header: Yes  
Media passthrough: No  
Hunting Triggers: Global Triggers  
Redirect mode: Pass-through  
Security: Untrusted  
Outbound-flood-rate: None  
Ping-enabled: No  
Signaling Peer Status: Not Tested  
media-late-to-early-iw: incoming

```
Router# show sbc test sbe adjacencies asr1k-2 de

SBC Service "test"
Adjacency asr1k-2 (SIP)
Status: Attached
Signaling address: 22.22.22.2:5061, VRF Admin
Signaling-peer: 44.44.44.4:5061
Remote address: 44.44.44.4 255.255.255.255
Force next hop: No
Account: None
Group: None
In header profile: Default
Out header profile: Default
In method profile: Default
Out method profile: Default
In UA option prof: Default
Out UA option prof: Default
In proxy opt prof: Default
Out proxy opt prof: Default
Priority set name: None
Local-id: None
Rewrite REGISTER: Off
Target address: None
NAT Status: Auto Detect
Reg-min-expiry: 3000 seconds
Fast-register: Enabled
Fast-register-int: 30 seconds
Authenticated mode: None
Authenticated realm: None
Auth. nonce life time: 300 seconds
IMS visited NetID: None
Inherit profile: Default
Force next hop: No
Home network Id: None
UnEncrypt key data: None
SIPI passthrough: No
Rewrite from domain: Yes
Rewrite to header: Yes
Media passthrough: No
Hunting Triggers: Global Triggers
Redirect mode: Pass-through
Security: Untrusted
Outbound-flood-rate: None
Ping-enabled: No
Signaling Peer Status: Not Tested
media-late-to-early-iw: outgoing
```

The following command lists a summary of the CAC policy tables associated with the given policy set:

```
Router# show sbc test sbe cac-policy-set 1 table table entry 1
```

SBC Service "test"
Policy set 1 table table entry 1
Match value SIPP-1
Action CAC policy complete
Max updates Unlimited
Max bandwidth Unlimited
Max channels Unlimited
Transcoder Allowed
Caller privacy setting Never hide
Callee privacy setting Never hide
Early media Allowed
Early media direction Both
Early media timeout 0
Caller voice QoS profile default
Caller video QoS profile default
Caller sig QoS profile default
Callee voice QoS profile default
Callee video QoS profile default
Callee sig QoS profile default
Restrict codecs to list allowed_caller
Restrict caller codecs to list default
Restrict callee codecs to list default
Media bypass Allowed
Number of calls rejected by this entry 0

Router# show sbc test sbe cac-policy-set 1 table table entry 2

SBC Service "test"
Policy set 1 table table entry 2
Match value SIPP-2
Action CAC policy complete
Max updates Unlimited
Max bandwidth Unlimited
Max channels Unlimited
Transcoder Allowed
Caller privacy setting Never hide
Callee privacy setting Never hide
Early media Allowed
Early media direction Both
Early media timeout 0
Caller voice QoS profile default
Caller video QoS profile default
Caller sig QoS profile default
Callee voice QoS profile default
Callee video QoS profile default
Callee sig QoS profile default
Restrict codecs to list allowed
Restrict caller codecs to list default
Restrict callee codecs to list default
Media bypass Allowed
Number of calls rejected by this entry 0

Router#

The following example shows a list of SDP media profiles configured under an SBC service:

Router# show sbc test sbe sip sdp-media-profile
SDP Media profiles for SBC service 'test'

<table>
<thead>
<tr>
<th>Name</th>
<th>In use</th>
</tr>
</thead>
<tbody>
<tr>
<td>MediaProfile</td>
<td>Yes</td>
</tr>
</tbody>
</table>

The following example shows the contents of a named SDP media profile:

Router# show sbc test sbe sip sdp-media-profile MediaProfile
SDP media profile 'MediaProfile'
Elements:
  Sequence Number : 1
  media-Line 1 : m=audio 0 RTP/AVP 31
  media-Line 2 : a=aaa:testing

In use by CAC table testpolicytable, entry 1