

## CHANGE REQUEST

⌘ **23.228 CR 237** ⌘ rev **4** ⌘ Current version: **5.6.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

**Proposed change affects:** UICC apps  ME  Radio Access Network  Core Network

<b>Title:</b>	⌘ Handling of SDP manipulation issue in stage-2 specifications		
<b>Source:</b>	⌘ Dynamicsoft, Ericsson, Nokia, Vodafone group, AT&T Wireless, Telia, THREE		
<b>Work item code:</b>	⌘ IMS-CCR	<b>Date:</b>	⌘ 09/12/2002
<b>Category:</b>	⌘ <b>F</b>	<b>Release:</b>	⌘ Rel-5
	<i>Use <u>one</u> of the following categories:</i> <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .		<i>Use <u>one</u> of the following releases:</i> <b>2</b> (GSM Phase 2) <b>R96</b> (Release 1996) <b>R97</b> (Release 1997) <b>R98</b> (Release 1998) <b>R99</b> (Release 1999) <b>Rel-4</b> (Release 4) <b>Rel-5</b> (Release 5) <b>Rel-6</b> (Release 6)

<b>Reason for change:</b>	⌘ The end-to-end codec negotiation flows currently specified allow CSCFs to tamper with the SDP message bodies of session initiation and modification requests. Concerns have been raised with this function both in 3GPP from end-user experience perspective, and in the IETF from SIP protocol compliancy perspective. At the same time, the requirement of operators being able to police IMS session initiations and modifications passing through their network has to be fulfilled.
<b>Summary of change:</b>	⌘ The stage-2 end-to-end codec negotiation flows have been adjusted to ensure end-user friendly and IETF-compliant means of handling IMS sessions while allowing operators to police IMS session initiations and modifications passing through their network.
<b>Consequences if not approved:</b>	⌘ Conflicts with consistent end-user experience and IETF compliancy would remain. Fixing of these conflicts would be impossible in later releases due to backwards compatibility reasons.

<b>Clauses affected:</b>	⌘ 5.11.3, 5.11.3.1, 5.11.3.3										
<b>Other specs affected:</b>	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;"></td> </tr> <tr> <td style="text-align: center;"></td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"></td> <td style="text-align: center;">X</td> </tr> </table> Other core specifications Test specifications O&M Specifications	Y	N	X			X		X	⌘ 24.229	
Y	N										
X											
	X										
	X										
<b>Other comments:</b>	⌘ In order to allow future protocol development, the changes to the stage 3 in 24.229 are needed irrespective of this change. Failure to perform such stage 3 changes would revert long established practices first adopted in phase 1 GSM 04.08 and maintained ever since.										

## 5.11.3 Procedures for codec and media characteristics flow negotiations

This section gives information flows for:

- the procedures for determining the set of negotiated ~~characterities~~[characteristics](#) between the endpoints of a multi-media session, determining the initial media characteristics (including common codecs) to be used for the multi-media session, and
- the procedures for modifying a session within the existing resources reservation or with a new resources reservation (adding/deleting a media flow, changing media characteristics including codecs, changing bandwidth requirements) when the session is already established.

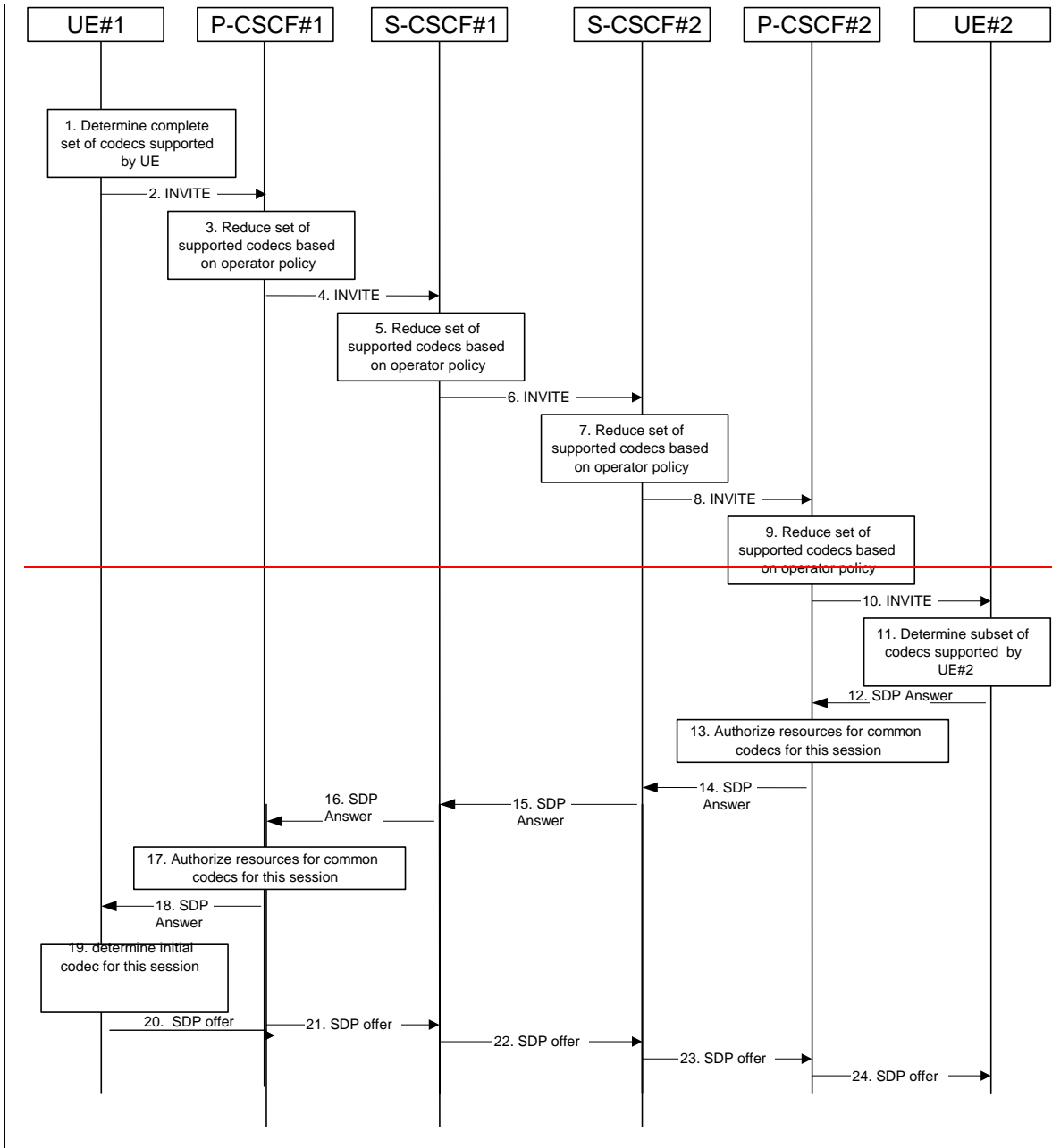
### 5.11.3.1 Codec and media characteristics flow negotiation during initial session establishment

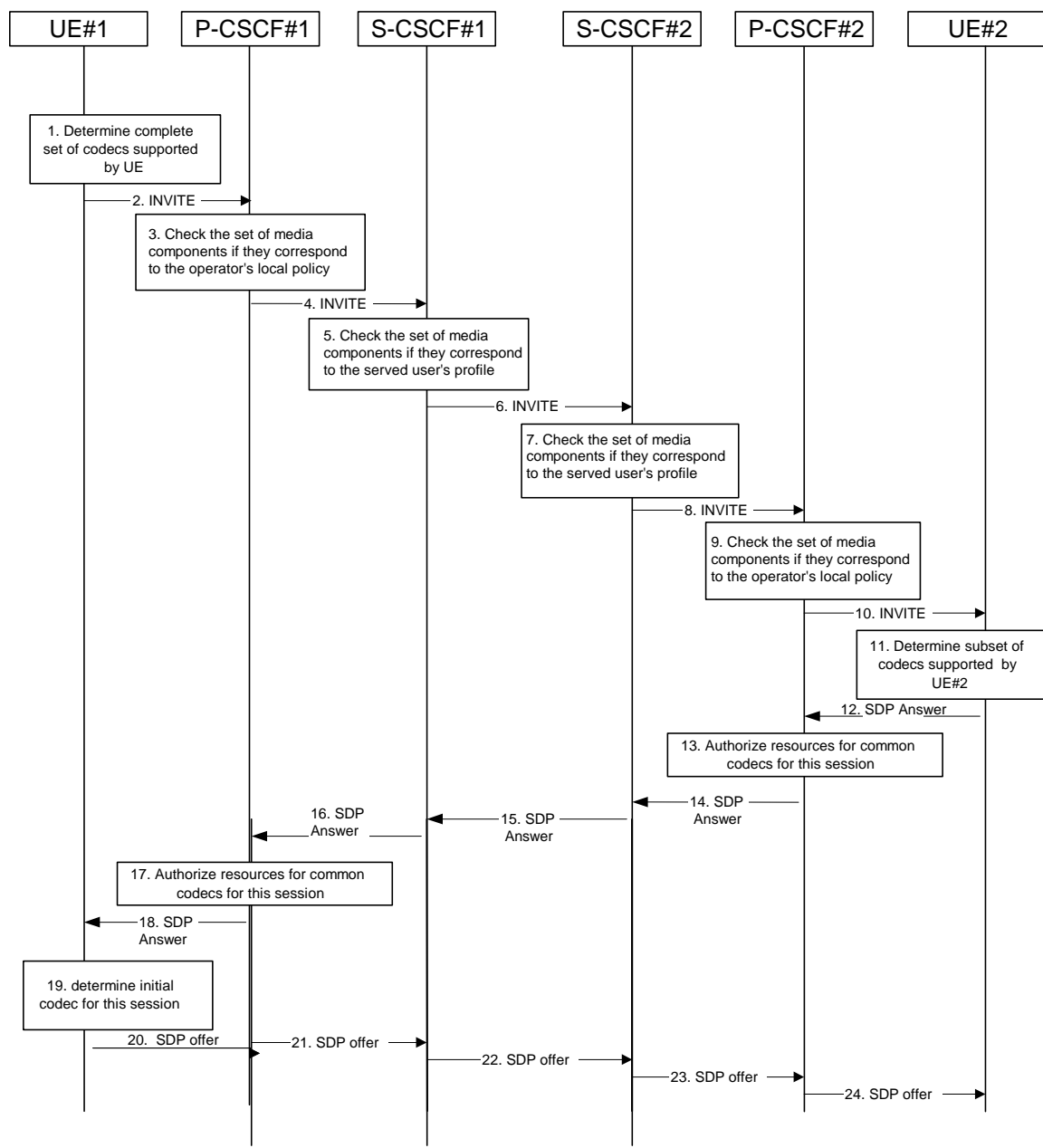
Initial session establishment in the IM CN subsystem must determine a negotiated set of media characteristics (including a common codec or set of common codecs for multi-media sessions) that will be used for the session. This is done through an end-to-end message exchange to determine the complete set of media characteristics, then the decision is made by the session initiator as to the initial set of media flows.

The session initiator includes an SDP in the SIP INVITE message that lists every media characteristics (including codecs) that the originator is willing to support for this session. When the message arrives at the destination endpoint, it responds with the media characteristics (e.g. common subset of codecs) that it is also willing to support for the session. Media authorisation is performed for these media characteristics. The session initiator, upon receiving the common subset, determines the media characteristics (including codecs) to be used initially.

The negotiation may take multiple media offered and answered between the end points until the media set is agreed upon.

Once the session is established, the procedures of section 5.11.3.2 may be used by either endpoint to change to a different media characteristic (e.g. codec) that was included in the initial session description, and for which no additional resources are required for media transport. The procedures of section 5.11.3.3 may be used by either endpoint to change the session, which requires resources beyond those allocated to the existing session.





**Figure 5.30: Codec negotiation during initial session establishment**

The detailed procedure is as follows:

1. UE#1 inserts the codec(s) to a SDP payload. The inserted codec(s) shall reflect the UE#1's terminal capabilities and user preferences for the session- capable of supporting for this session. It builds a SDP containing bandwidth requirements and characteristics of each, and assigns local port numbers for each possible media flow. Multiple media flows may be offered, and for each media flow (m= line in SDP), there may be multiple codec choices offered.
2. UE#1 sends the initial INVITE message to P-CSCF#1 containing this SDP
3. ~~P-CSCF#1 examines the media parameters, and removes any choices that the network operator decides based on local policy, not to allow on the network.~~ P-CSCF#1 examines the media parameters. If P-CSCF#1 finds media parameters that local policy does not allow to be used within an IMS session, it rejects the session initiation attempt. This rejection shall contain sufficient information for the originating UE to re-attempt session initiation with media parameters that are allowed by local policy of P-CSCF#1's network according to the procedures specified in RFC 3261 [12]. In this flow described in Figure 5.30 above the P-CSCF#1 allows the initial session initiation attempt to continue.
4. P-CSCF#1 forwards the INVITE message to S-CSCF#1

5. ~~S-CSCF#1 examines the media parameters, and removes any choices that the user does not have authority to request. As part of the S-CSCF session processing an 'application server' may be involved. When an 'application server' is involved the application server may also examine the media parameters and revise the session description.~~ S-CSCF#1 examines the media parameters. If S-CSCF#1 finds media parameters that local policy or the originating user's subscriber profile does not allow to be used within an IMS session, it rejects the session initiation attempt. This rejection shall contain sufficient information for the originating UE to re-attempt session initiation with media parameters that are allowed by the originating user's subscriber profile and by local policy of S-CSCF#1's network according to the procedures specified in RFC 3261 [12].  
In this flow described in Figure 5.30 above the S-CSCF#1 allows the initial session initiation attempt to continue.
6. S-CSCF#1 forwards the INVITE, through the S-S Session Flow Procedures, to S-CSCF#2
7. ~~S-CSCF#2 examines the media parameters, and removes any choices that the destination user does not have authority to request. As part of the S-CSCF session processing an 'application server' may be involved. When an 'application server' is involved the application server may also examine the media parameters and revise the session description.~~ S-CSCF#2 examines the media parameters. If S-CSCF#2 finds media parameters that local policy or the terminating user's subscriber profile does not allow to be used within an IMS session, it rejects the session initiation attempt. This rejection shall contain sufficient information for the originating UE to re-attempt session initiation with media parameters that are allowed by the terminating user's subscriber profile and by local policy of S-CSCF#2's network according to the procedures specified in RFC 3261 [12].  
In this flow described in Figure 5.30 above the S-CSCF#2 allows the initial session initiation attempt to continue.
8. S-CSCF#2 forwards the INVITE message to P-CSCF#2.
9. ~~P-CSCF#2 examines the media parameters, and removes any that the network operator decides, based on local policy, not to allow on the network.~~ P-CSCF#2 examines the media parameters. If P-CSCF#2 finds media parameters that local policy does not allow to be used within an IMS session, it rejects the session initiation attempt. This rejection shall contain sufficient information for the originating UE to re-attempt session initiation with media parameters that are allowed by local policy of P-CSCF#2's network according to the procedures specified in RFC 3261 [12].  
In this flow described in Figure 5.30 above the P-CSCF#2 allows the initial session initiation attempt to continue.

The Authorization-Token is generated by the PCF.

10. The Authorization-Token is included in the INVITE message. P-CSCF#2 forwards the INVITE message to UE#2
11. UE#2 determines the complete set of codecs that it is capable of supporting for this session. It determines the intersection with those appearing in the SDP in the INVITE message. For each media flow that is not supported, UE#2 inserts a SDP entry for media (m= line) with port=0. For each media flow that is supported, UE#2 inserts a SDP entry with an assigned port and with the codecs in common with those in the SDP from UE#1.
12. UE#2 returns the SDP listing common media flows and codecs to P-CSCF#2
13. P-CSCF#2 authorises the QoS resources for the remaining media flows and codec choices.
14. P-CSCF#2 forwards the SDP response to S-CSCF#2.
15. S-CSCF#2 forwards the SDP response to S-CSCF#1
16. S-CSCF#1 forwards the SDP response to P-CSCF#1
17. P-CSCF#1 authorises the QoS resources for the remaining media flows and codec choices. The Authorization-Token is generated by the PCF.
18. The Authorization-Token is included in the SDP message. P-CSCF#1 forwards the SDP response to UE#1
19. UE#1 determines which media flows should be used for this session, and which codecs should be used for each of those media flows. If there was more than one media flow, or if there was more than one choice of codec for a media flow, then UE#1 need to renegotiate the codecs by sending another offer to reduce codec to one with the UE#2.

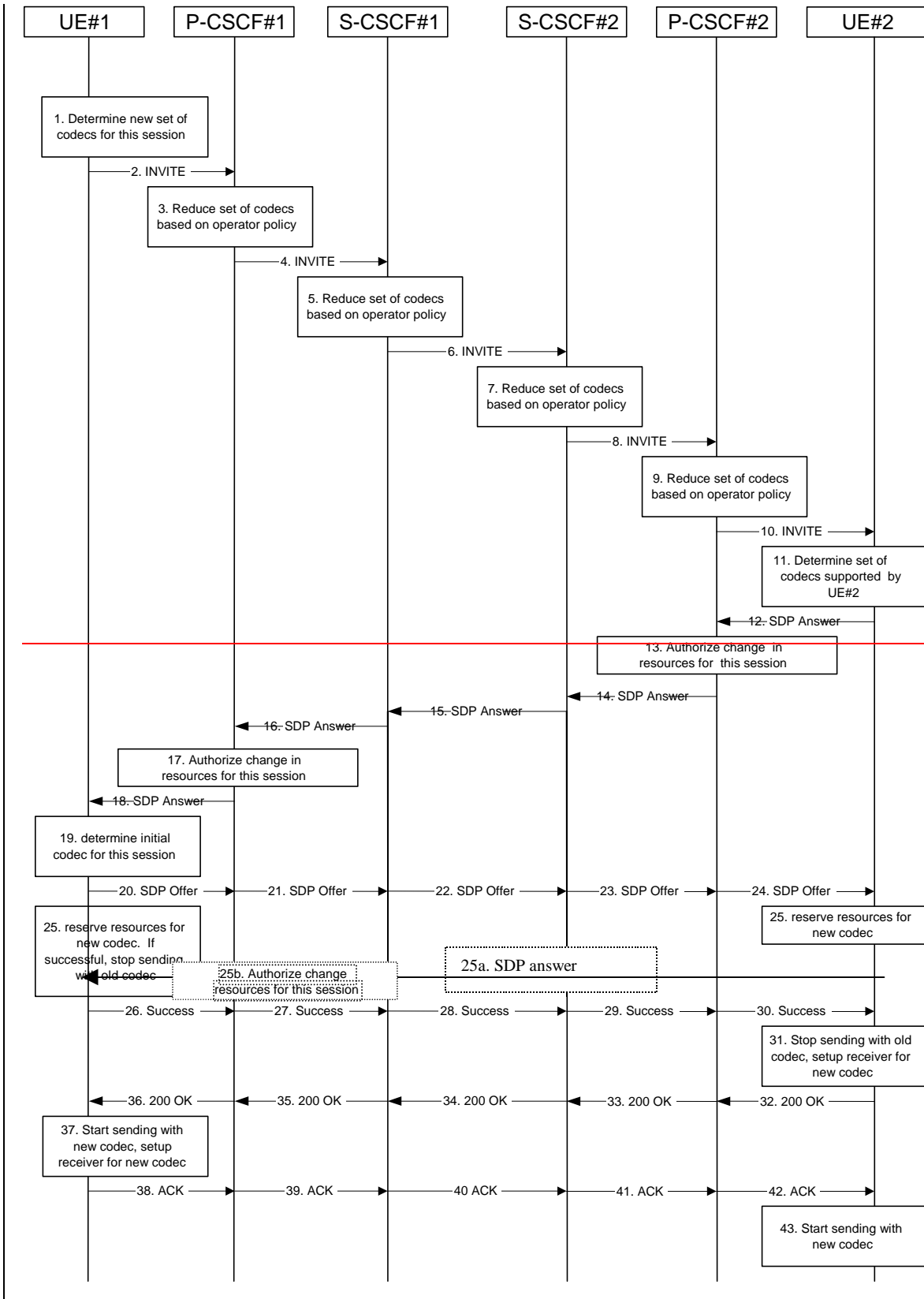
20-24. UE#2 sends the “Offered SDP” message to UE#1, along the signalling path established by the INVITE request

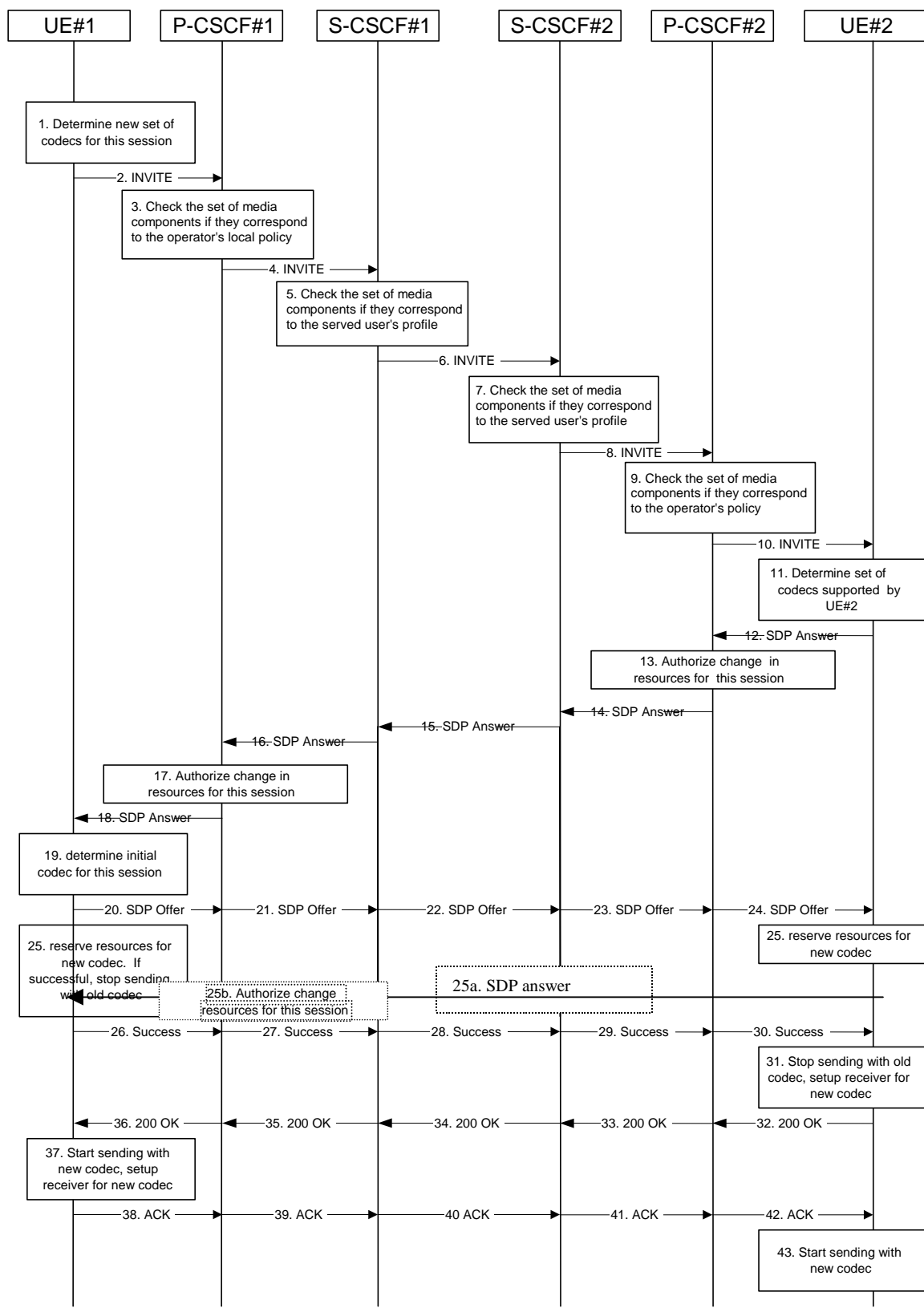
The remainder of the multi-media session completes identically to a single media/single codec session, if the negotiation results in a single codec per media.

\*\*\*\*\* Second set of changes \*\*\*\*\*

### 5.11.3.3 Codec or media characteristics flow change requiring new resources and/or authorisation

After the multi-media session is established, it is possible for either endpoint to change the set of media flows or media characteristics (e.g. codecs) for media flow(s). If the change requires different resources beyond those previously reserved, then it is necessary to perform the resource reservation and bearer establishment procedures. If the reservation request fails for whatever reason, the original multi-media session remains in progress.





**Figure 5.32: Codec or media flow change - new reservation**

The detailed procedure is as follows:

1. UE#1 inserts the revised set of codecs to a SDP payload. The inserted codec(s) shall reflect the UE#1's terminal capabilities and user preferences for the session. It builds a SDP containing bandwidth requirements and characteristics of each, and assigns local port numbers for each possible media flow. Multiple media flows may be offered, and for each media flow (m= line in SDP), there may be multiple codec choices offered.
2. UE#1 sends an INVITE message to P-CSCF#1 containing this SDP



3. ~~P-CSCF#1 examines the media parameters, and removes any choices that the network operator decides, based on local policy, not to allow on the network.~~ P-CSCF#1 examines the media parameters. If P-CSCF#1 finds media parameters that local policy does not allow to be used within an IMS session, it rejects the session modification attempt. This rejection shall contain sufficient information for the originating UE to re-attempt session modification with media parameters that are allowed by local policy of P-CSCF#1's network according to the procedures specified in RFC 3261 [12]. In this flow described in Figure 5.32 above the P-CSCF#1 allows the initial session modification attempt to continue.
4. P-CSCF#1 forwards the INVITE message to S-CSCF#1
5. ~~S-CSCF#1 examines the media parameters, and removes any choices that the user does not have authority to request. As part of the S-CSCF session processing an 'application server' may be involved. When an 'application server' is involved the application server may also examine the media parameters and revise the session description.~~ S-CSCF#1 examines the media parameters. If S-CSCF#1 finds media parameters that local policy or the originating user's subscriber profile does not allow to be used within an IMS session, it rejects the session modification attempt. This rejection shall contain sufficient information for the originating UE to re-attempt session modification with media parameters that are allowed by the originating user's subscriber profile and by local policy of S-CSCF#1's network according to the procedures specified in RFC 3261 [12]. In this flow described in Figure 5.32 above the S-CSCF#1 allows the initial session modification attempt to continue.
6. S-CSCF#1 forwards the INVITE, through the S-S Session Flow Procedures, to S-CSCF#2
7. ~~S-CSCF#2 examines the media parameters, and removes any choices that the destination user does not have authority to request. As part of the S-CSCF session processing an 'application server' may be involved. When an 'application server' is involved the application server may also examine the media parameters and revise the session description.~~ S-CSCF#2 examines the media parameters. If S-CSCF#2 finds media parameters that local policy or the terminating user's subscriber profile does not allow to be used within an IMS session, it rejects the session modification attempt. This rejection shall contain sufficient information for the originating UE to re-attempt session modification with media parameters that are allowed by the terminating user's subscriber profile and by local policy of S-CSCF#2's network according to the procedures specified in RFC 3261 [12]. In this flow described in Figure 5.32 above the S-CSCF#2 allows the initial session modification attempt to continue.
8. S-CSCF#3 forwards the INVITE message to P-CSCF#2.
9. ~~P-CSCF#2 examines the media flows and the codec choices, and removes any that the destination network operator decides, based on local policy, not to allow on the network.~~ P-CSCF#2 examines the media parameters. If P-CSCF#2 finds media parameters that local policy does not allow to be used within an IMS session, it rejects the session modification attempt. This rejection shall contain sufficient information for the originating UE to re-attempt session modification with media parameters that are allowed by local policy of P-CSCF#2's network according to the procedures specified in RFC 3261 [12]. In this flow described in Figure 5.32 above the P-CSCF#2 allows the initial session modification attempt to continue.
10. P-CSCF#2 forwards the INVITE message to UE#2
11. UE#2 determines the complete set of codecs that it is capable of supporting for this session. It determines the intersection with those appearing in the SDP in the INVITE message. For each media flow that is not supported, UE#2 inserts a SDP entry for media (m= line) with port=0. For each media flow that is supported, UE#2 inserts a SDP entry with an assigned port and with the codecs in common with those in the SDP from UE#1.
12. UE#2 returns the SDP listing common media flows and codecs to P-CSCF#2. It may additionally provide more codecs than originally offered and then the offered set need to be renegotiated.
13. P-CSCF#2 increases the authorisation for the QoS resources, if needed, for the remaining media flows and codec choices.
14. P-CSCF#2 forwards the SDP response to S-CSCF#2.
15. S-CSCF#2 forwards the SDP response to S-CSCF#1
16. S-CSCF#1 forwards the SDP response to P-CSCF#1

17. P-CSCF#1 increases the authorisation for the QoS resources, if needed, for the remaining media flows and codec choices.
18. P-CSCF#1 forwards the SDP response to UE#1
19. UE#1 determines which media flows should be used for this session, and which codecs should be used for each of those media flows. If there was more than one media flow, or if there was more than one choice of codec for a media flow, then UE#1 must include an SDP in the response message by including SDP to UE#2.
- 20-24. UE#1 sends the offered SDP message to UE#2, including the SDP from step #19 if needed.
25. UE#1 and UE#2 reserve the resources needed for the added or changed media flows. If the reservation is successfully completed by UE#1, it stops transmitting any deleted media streams.
- 25a. If UE#1 has sent an updated offer of SDP in steps 20-24, then UE#2 responds to the offer.
- 25b. P-CSCF#1 authorises the offered SDP sent by UE#2,
- 26-30. UE#1 sends the successful Resource Reservation Successful message with final SDP to UE#2, via the signalling path through the CSCFs.
31. UE#2 stops sending the media streams to be deleted, and initialises its media receivers for the new codec.
- 32-36. UE#2 sends the 200-OK final response to UE#1, along the signalling path
37. UE#1 starts sending media using the new codecs. UE#1 also releases any excess resources no longer needed.
- 38-40. UE#1 sends the SIP final acknowledgement, ACK, to UE#2 along the signalling path
43. UE#2 starts sending media using the new codecs. UE#2 also releases any excess resources no longer needed