

Source: TSG SA WG2
Title: CRs on 23.228 (IMS stage 2)
Agenda Item: 7.2.3

The following Change Requests (CRs) have been revised by the request of SA#21 and are requested to be approved by TSG SA plenary #21.

Note: the source of all these CRs is now S2, even if the name of the originating company(ies) is still reflected on the cover page of all the attached CRs.

Tdoc #	Title	Spec	CR #	cat	Versi on in	REL	WI
SP-030538	IMS-SIP interworking	23.228	337r3	F	5.9.0	5	IMS-CCR
SP-030538	IMS-SIP interworking	23.228	336r2	B	6.2.0	6	IMS2

CHANGE REQUEST

⌘ **23.228 CR 336** ⌘ rev **2** ⌘ Current version: **6.2.0** ⌘

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

Title:	⌘ IMS-SIP interworking		
Source:	⌘ Ericsson, Nokia, Siemens		
Work item code:	⌘ IMS2	Date:	⌘ 24/09/2003
Category:	⌘ B	Release:	⌘ Rel-6
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900 .		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)

Reason for change:	⌘ CN3 (& CN1) has done comprehensive analysis on the interworking of IMS & SIP entities outside of IMS. TR 29.962 documents different architecture options on this issue and CN3 has asked SA2 to agree on the architecture for interworking. At SA2#33, architectural impacts were analysed and decision was taken to go forward with end-to-end flow based solution. This CR provides technical update to the specification to conform to the agreement.		
Summary of change:	⌘ Interworking principle based on end to end model applied for Internet and originating and terminating flows added to reflect the scenarios.		
Consequences if not approved:	⌘ There would be no standardized interworking with Internet/non-IMS SIP clients.		

Clauses affected:	⌘ 5.4.2, 5.4.10, and new sub-clauses added in 5.6 (new section is 5.6.4) & 5.7_ (new section is 5.7.4)										
Other specs Affected:	<table border="1" style="display: inline-table; border-collapse: collapse; text-align: center;"> <tr> <td>Y</td> <td>N</td> </tr> <tr> <td>X</td> <td></td> </tr> <tr> <td></td> <td>X</td> </tr> <tr> <td></td> <td>X</td> </tr> </table> Other core specifications Test specifications O&M Specifications	Y	N	X			X		X	⌘ 29.162	
Y	N										
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Other comments:	⌘										

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- 1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <ftp://ftp.3gpp.org/specs/> For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

*****First Change*****

5.4.2 Interworking with Internet

Depending on operator policy, the S-CSCF may forward the SIP request or response to another SIP server located within an ISP domain outside of the IM CN subsystem.

It is possible that the external SIP client does not support one or more of the SIP extensions required for IMS end points to set up IMS sessions (e.g. Preconditions, Update, 100Rel) as described in 3GPP TS 24.229 [10a], then the UE or other SIP user agents within the IMS should be able to fall back to SIP procedures, which allow interworking towards the external client. Depending on the home network operator policy, the network may restrict session initiation requests towards and from external SIP clients without the support of SIP extensions defined for IMS sessions.

*****Second Change*****

5.4.10 Overview of session flow procedures

This section contains the overview description and list of individual procedures for the end-to-end session flows.

For an IP Multi-Media Subsystem session, the session flow procedures are shown in the following diagram.

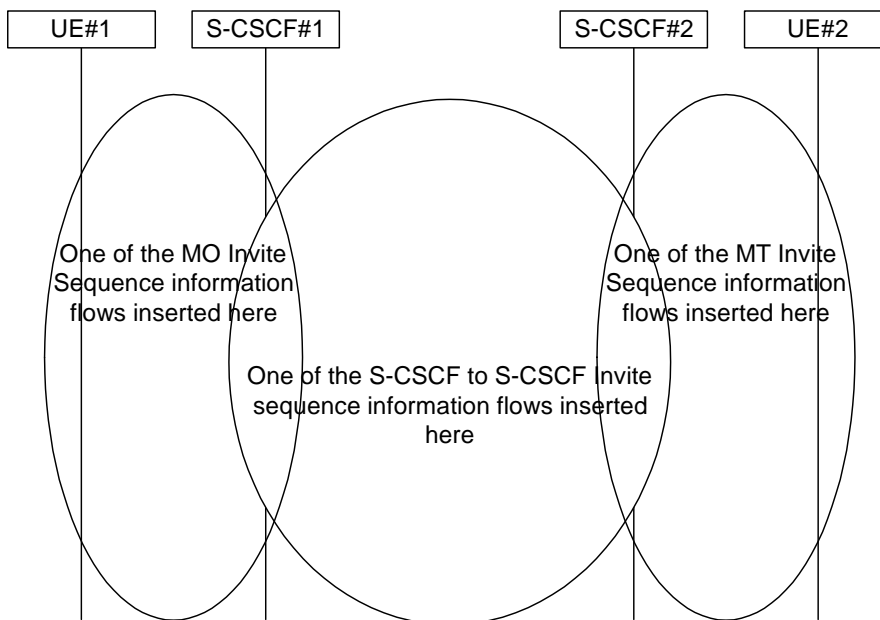


Figure 5.9: Overview of Session Flow Sections

The following procedures are defined:

For the origination sequence:

- (MO#1) Mobile origination, roaming
- (MO#2) Mobile origination, home

- (PSTN-O) PSTN origination

For the termination sequence:

- (MT#1) Mobile termination, roaming
- (MT#2) Mobile termination, home
- (MT#3) Mobile termination, CS Domain roaming
- (PSTN-T) PSTN termination

For Serving-CSCF/MGCF-to-Serving-CSCF/MGCF sequences:

- (S-S#1) Session origination and termination are served by different network operators,
- (S-S#2) Session origination and termination are served by the same operator.
- (S-S#3) Session origination with PSTN termination in the same network as the S-CSCF.
- (S-S#4) Session origination with PSTN termination in a different network to the S-CSCF

The media being offered and acknowledged to can take multiple negotiation steps or only one negotiation may be used. In these flows, a minimum of two negotiations has been shown. But the subsequent responses may not carry any media information and just confirm the initial media set agreement.

For example, for a non-roaming user initiating a session to another non-roaming user, each a subscriber of the same network operator, it is possible to construct a complete end-to-end session flow from the following procedures:

- (MO#2) Mobile origination, home
- (S-S#2) Single network operator,
- (MT#2) Mobile termination, home

There are a large number of end-to-end session flows defined by these procedures. They are built from combinations of origination, serving to serving, and termination procedures, as determined from the following table. For each row of the table, any one of the listed origination procedures can be combined with any one of the serving-serving procedures, which can be combined with any one of the termination procedures. In addition, several of the procedures give alternatives for network configuration hiding (the number of such alternatives is shown in parentheses).

Service control can occur at any point during a session, based on the filter criteria.

Note that the flows show service control only for the initial INVITE for originating and terminating party as an example.

*****Third Change*****

Table 5.2: Combinations of session procedures

Origination Procedure (pick one)	Serving-CSCF-to-Serving-CSCF Procedure (pick one)	Termination Procedure (pick one)
MO#1 Mobile origination, roaming, home control of services (2). MO#2 Mobile origination, located in home service area. PSTN-O PSTN origination.	S-S#1 Different network operators performing origination and termination, with home control of termination (2). S-S#2 Single network operator performing origination and termination, with home control of termination.	MT#1 Mobile termination, roaming, home control of services(2). MT#2 Mobile termination, located in home service area. MT#3 Mobile termination, CS Domain roaming.
MO#1 Mobile origination, roaming, home control of services (2). MO#2 Mobile origination, located in home service area.	S-S#3 PSTN termination in the same network as the S-CSCF. S-S#4 PSTN termination in different network than the S-CSCF	PSTN-T PSTN termination.

In addition, variants of MO#1, MO#2, MT#1 and MT#2 are supported for interworking with external SIP clients, which do not support the SIP extensions required for IMS end points. These variants are not used in combination with any other session procedure.

5.6 Origination procedures

This section presents the detailed application level flows to define the Procedures for session originations.

The flows presented in the section assume the use of service-based local policy.

The session origination procedures specify the signalling path between the UE initiating a session setup attempt and the Serving-CSCF that is assigned to perform the session origination service. This signalling path is determined at the time of UE registration, and remains fixed for the life of the registration.

A UE always has a proxy (P-CSCF) associated with it. This P-CSCF performs resource authorisation, and may have additional functions in handling of emergency sessions. The P-CSCF is determined by the CSCF discovery process, described in Section 5.1.1 (Local CSCF Discovery).

As a result of the registration procedure, the P-CSCF determines the next hop toward the Serving-CSCF. This next hop is to the S-CSCF in the home network (possibly through an I-CSCF(THIG) to hide the network configuration) (MO#1). These next-hop addresses could be IPv6 addresses, or could be names that are translated via DNS to an IPv6 address.

Sessions originated in the PSTN to a mobile destination are a special case of the Origination procedures. The MGCF uses H.248 [19] to control a Media Gateway, and communicates with the SS7 network. The MGCF initiates the SIP request, and subsequent nodes consider the signalling as if it came from a S-CSCF.

5.6.1 (MO#1) Mobile origination, roaming

This origination procedure applies to roaming users.

The UE is located in a visited network, and determines the P-CSCF via the CSCF discovery procedure described in section 5.1.1. The home network advertises either the S-CSCF or an I-CSCF as the entry point from the visited network.

When registration is complete, P-CSCF knows the name/address of the next hop in the signalling path toward the serving-CSCF, either I-CSCF(THIG) (if the home network wanted to hide their internal configuration) or S-CSCF (if there was no desire to hide the network configuration). I-CSCF, if it exists in the signalling path, knows the name/address of S-CSCF.

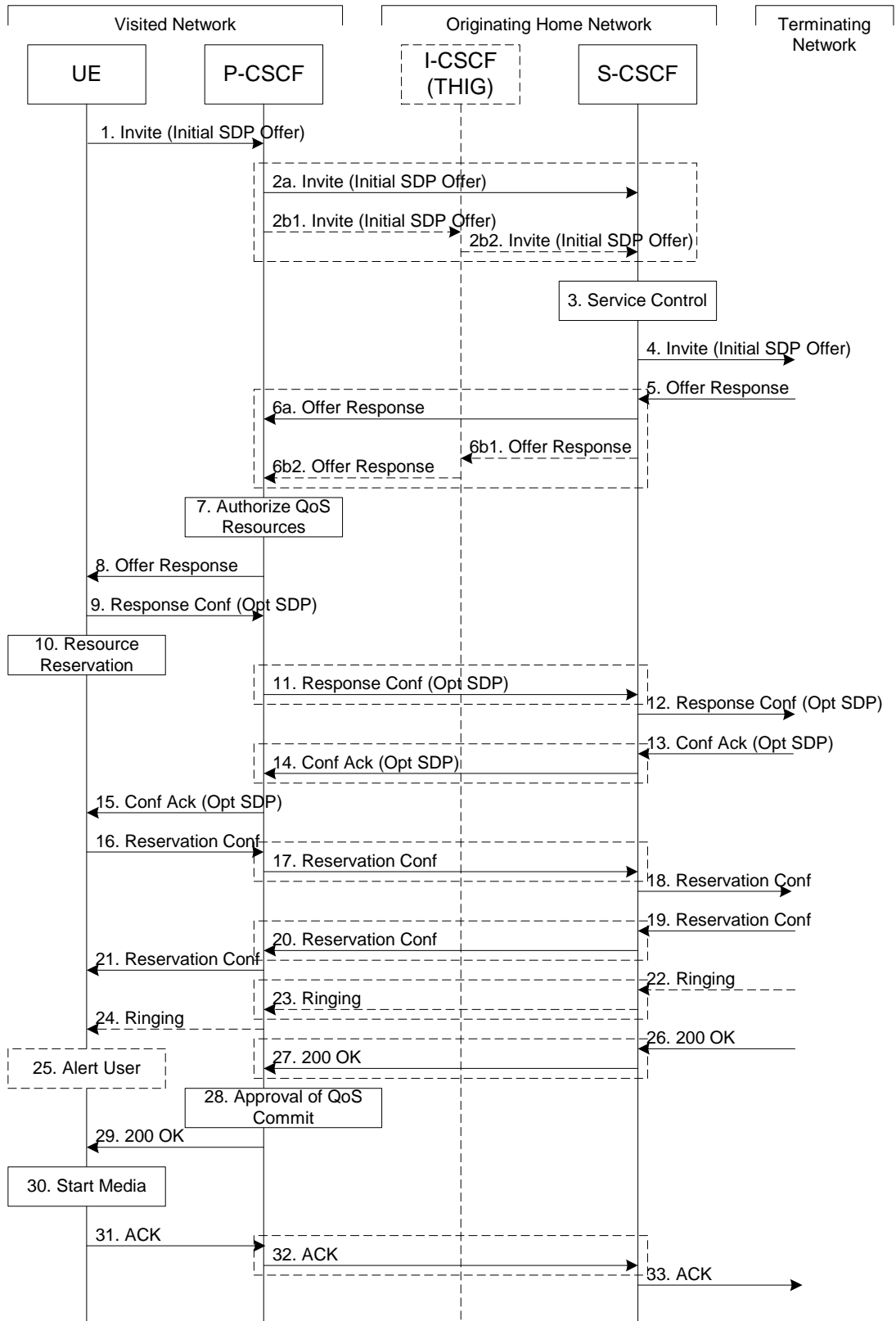


Figure 5.14: Mobile origination procedure - roaming

Procedure MO#1 is as follows:

1. UE sends the SIP INVITE request, containing an initial SDP, to the P-CSCF determined via the CSCF discovery mechanism. The initial SDP may represent one or more media for a multi-media session.
2. P-CSCF remembers (from the registration procedure) the next hop CSCF for this UE.

This next hop is either the S-CSCF that is serving the visiting UE (choice (a)), or an I-CSCF(THIG) within the home network that is performing the configuration hiding function for the home network operator (choice (b)).

(2a) If the home network operator does not desire to keep their network configuration hidden, the name/address of the S-CSCF was provided during registration, and the INVITE request is forwarded directly to the S-CSCF.

(2b) If the home network operator desires to keep their network configuration hidden, the name/address of an I-CSCF(THIG) in the home network was provided during registration, and the INVITE request is forwarded through this I-CSCF(THIG) to the S-CSCF.

(2b1) P-CSCF forwards the INVITE request to I-CSCF(THIG)

(2b2) I-CSCF(THIG) forwards the INVITE request to S-CSCF

3. S-CSCF validates the service profile, and invokes any origination service logic required for this user. This includes authorisation of the requested SDP based on the user's subscription for multi-media services.
4. S-CSCF forwards the request, as specified by the S-S procedures.
5. The media stream capabilities of the destination are returned along the signalling path, per the S-S procedures.
6. S-CSCF forwards the Offer Response message to P-CSCF. Based on the choice made in step #2 above, this may be sent directly to P-CSCF (6a) or may be sent through I-CSCF(THIG) (6b1 and 6b2).
7. P-CSCF authorises the resources necessary for this session. The Authorization-Token is generated by the PDF.
8. The Authorization-Token is included in the Offer Response message. P-CSCF forwards the message to the originating endpoint
9. UE decides the offered set of media streams for this session, confirms receipt of the Offer Response and sends the Response Confirmation to the P-CSCF. The Response Confirmation may also contain SDP. This may be the same SDP as in the Offer Response received in Step 8 or a subset. If new media are defined by this SDP, a new authorization (as in Step 7) will be done by the P-CSCF(PDF) following Step 14. The originating UE is free to continue to offer new media on this operation or on subsequent exchanges using the Update method. Each offer/answer exchange will cause the P-CSCF(PDF) to repeat the Authorization step (Step 7) again.
10. After determining the needed resources in step 8, UE initiates the reservation procedures for the resources needed for this session.
11. P-CSCF forwards the Response Confirmation to S-CSCF. This may possibly be routed through the I-CSCF depending on operator configuration of the I-CSCF. Step 11 may be similar to Step 2 depending on whether or not configuration hiding is used.
12. S-CSCF forwards this message to the terminating endpoint, as per the S-S procedure.
- 13-15. The terminating end point responds to the originating end with an acknowledgement. If Optional SDP is contained in the Response Confirmation, the Confirmation Acknowledge will also contain an SDP response. If the SDP has changed, the P-CSCF validates that the resources are allowed to be used. Step 14 may be similar to Step 6 depending on whether or not configuration hiding is used.
- 16-18. When the resource reservation is completed, UE sends the successful Resource Reservation message to the terminating endpoint, via the signalling path established by the INVITE message. The message is sent first to P-CSCF. Step 17 may be similar to Step 2 depending on whether or not configuration hiding is used.
- 19-21. The terminating end point responds to the originating end when successful resource reservation has occurred. If the SDP has changed, the P-CSCF authorizes that the resources are allowed to be used. Step 20 may be similar to Step 6 depending on whether or not configuration hiding is used.
- 22-24. Terminating end point may generate ringing and it is then forwarded via the session path to the UE.

- 25. UE indicates to the originating user that the destination is ringing
- 26. When the destination party answers, the terminating endpoint sends a SIP 200-OK final response, as specified by the termination procedures and the S-S procedures, to S-CSCF.
- 27. S-CSCF invokes whatever service logic is appropriate for the completed session setup.
- 27. S-CSCF sends a SIP 200-OK final response along the signalling path back to P-CSCF. Step 23 may be similar to Step 6 depending on whether or not configuration hiding is used.
- 28. P-CSCF indicates the resources reserved for this session should now be approved for use.
- 29. P-CSCF sends a SIP 200-OK final response to the session originator
- 30. UE starts the media flow(s) for this session
- 31-33. UE responds to the 200 OK with a SIP ACK message sent along the signalling path. Step 32 may be similar to Step 2 depending on whether or not configuration hiding is used.

5.6.2 (MO#2) Mobile origination, home

This origination procedure applies to users located in their home service area.

The UE is located in the home network, and determines the P-CSCF via the CSCF discovery procedure described in section 5.1.1. During registration, the home network allocates an S-CSCF in the home network.

When registration is complete, P-CSCF knows the name/address of S-CSCF.

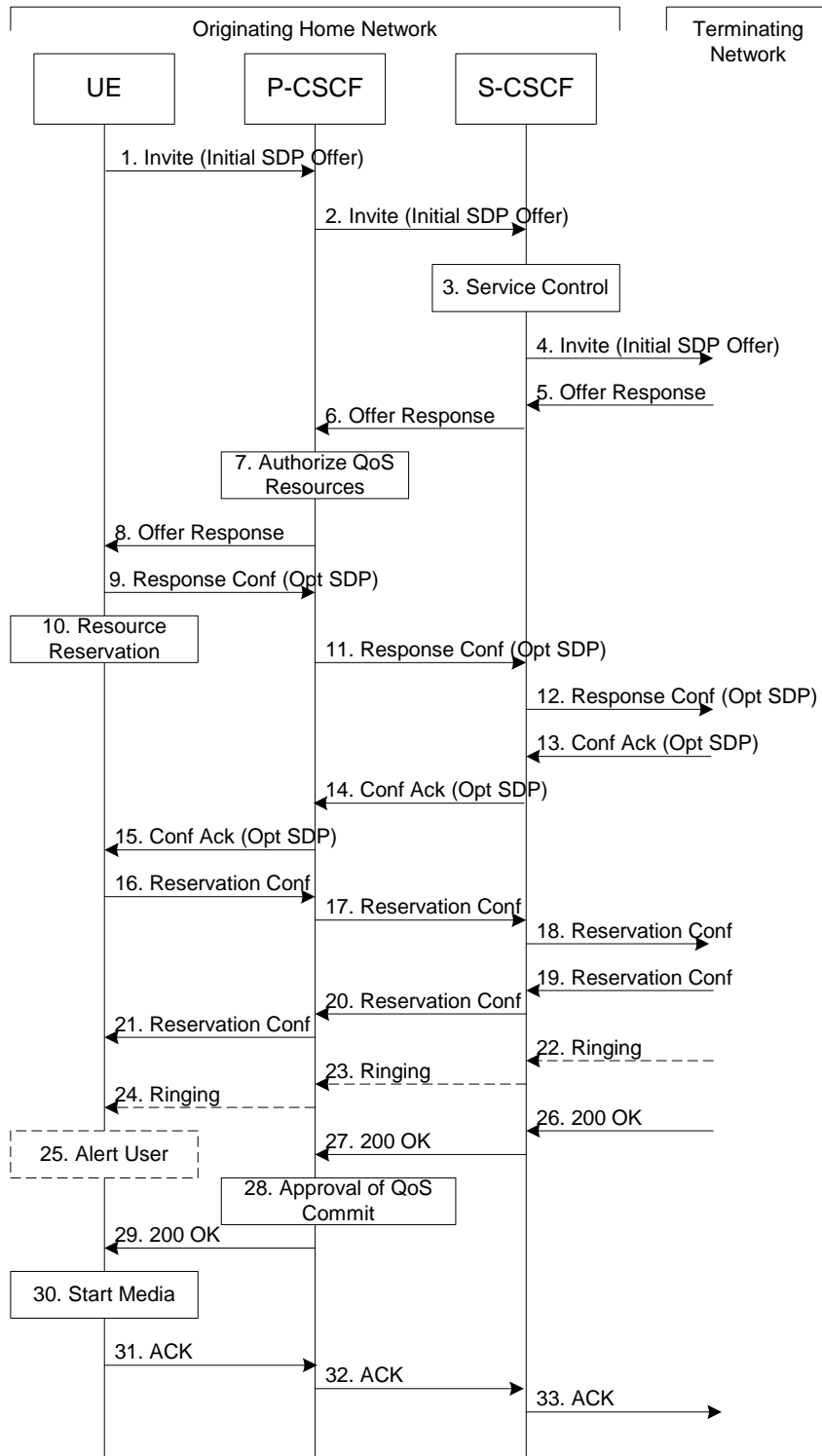


Figure 5.15: Mobile origination procedure - home

Procedure MO#2 is as follows:

1. UE#1 sends the SIP INVITE request, containing an initial SDP, to the P-CSCF determined via the CSCF discovery mechanism. The initial SDP may represent one or more media for a multi-media session.
2. P-CSCF remembers (from the registration procedure) the next hop CSCF for this UE. In this case it forwards the INVITE to the S-CSCF in the home network.
3. S-CSCF validates the service profile, and invokes any origination service logic required for this user. This includes authorisation of the requested SDP based on the user's subscription for multi-media services.

4. S-CSCF forwards the request, as specified by the S-S procedures.
5. The media stream capabilities of the destination are returned along the signalling path, per the S-S procedures.
6. S-CSCF forwards the Offer Response message to P-CSCF
7. P-CSCF authorises the resources necessary for this session. The Authorization-Token is generated by the PDF.
8. The Authorization-Token is included in the Offer Response message. P-CSCF forwards the message to the originating endpoint.
9. UE decides the offered set of media streams for this session, confirms receipt of the Offer Response and sends the Response Confirmation to P-CSCF. The Response Confirmation may also contain SDP. This may be the same SDP as in the Offer Response received in Step 8 or a subset. If new media are defined by this SDP, a new authorization (as in Step 7) will be done by the P-CSCF(PDF) following Step 14. The originating UE is free to continue to offer new media on this operation or on subsequent exchanges using the Update method. Each offer/answer exchange will cause the P-CSCF(PDF) to repeat the Authorization step (Step 7) again.
10. UE initiates resource reservation for the offered media.
11. P-CSCF forwards this message to S-CSCF
12. S-CSCF forwards this message to the terminating endpoint, as per the S-S procedure.
- 13-14. The terminating end point responds to the originating end with an acknowledgement. If Optional SDP is contained in the Response Confirmation, the Confirmation Acknowledge will also contain an SDP response. If the SDP has changed, the PCSCF authorises the media.
15. PCSCF forwards the answered media towards the UE.
- 16-18. When the resource reservation is completed, UE sends the successful Resource Reservation message to the terminating endpoint, via the signalling path established by the INVITE message. The message is sent first to P-CSCF.
- 19-21. The terminating end point responds to the originating end when successful resource reservation has occurred. If the SDP has changed, the P-CSCF again authorizes that the resources are allowed to be used.
- 22-24. The destination UE may optionally perform alerting. If so, it signals this to the originating party by a provisional response indicating Ringing. This message is sent to S-CSCF per the S-S procedure. It is sent from there toward the originating end along the signalling path.
25. UE indicates to the originating user that the destination is ringing.
- 26-27. When the destination party answers, the terminating endpoint sends a SIP 200-OK final response along the signalling path to the originating end, as specified by the termination procedures and the S-S procedures, to S-CSCF.
28. P-CSCF indicates the resources reserved for this session should now be approved for use.
29. P-CSCF passes the 200-OK response back to UE
30. UE starts the media flow(s) for this session.
- 31-33. UE responds to the 200 OK with an ACK message which is sent to P-CSCF and passed along the signalling path to the terminating end.

5.6.3 (PSTN-O) PSTN origination

The MGCF in the IM CN subsystem is a SIP endpoint that initiates requests on behalf of the PSTN and Media Gateway. The subsequent nodes consider the signalling as if it came from a S-CSCF. The MGCF incorporates the network security functionality of the S-CSCF. This MGCF does not invoke Service Control, as this may be carried out in the GSTN or at the terminating S-CSCF. This origination procedure can be used for any of the S-S procedures.

Due to routing of sessions within the PSTN, this origination procedure will only occur in the home network of the destination subscriber. However due to cases of session forwarding and electronic surveillance, the destination of the session through the IM CN subsystem may actually be another PSTN termination.

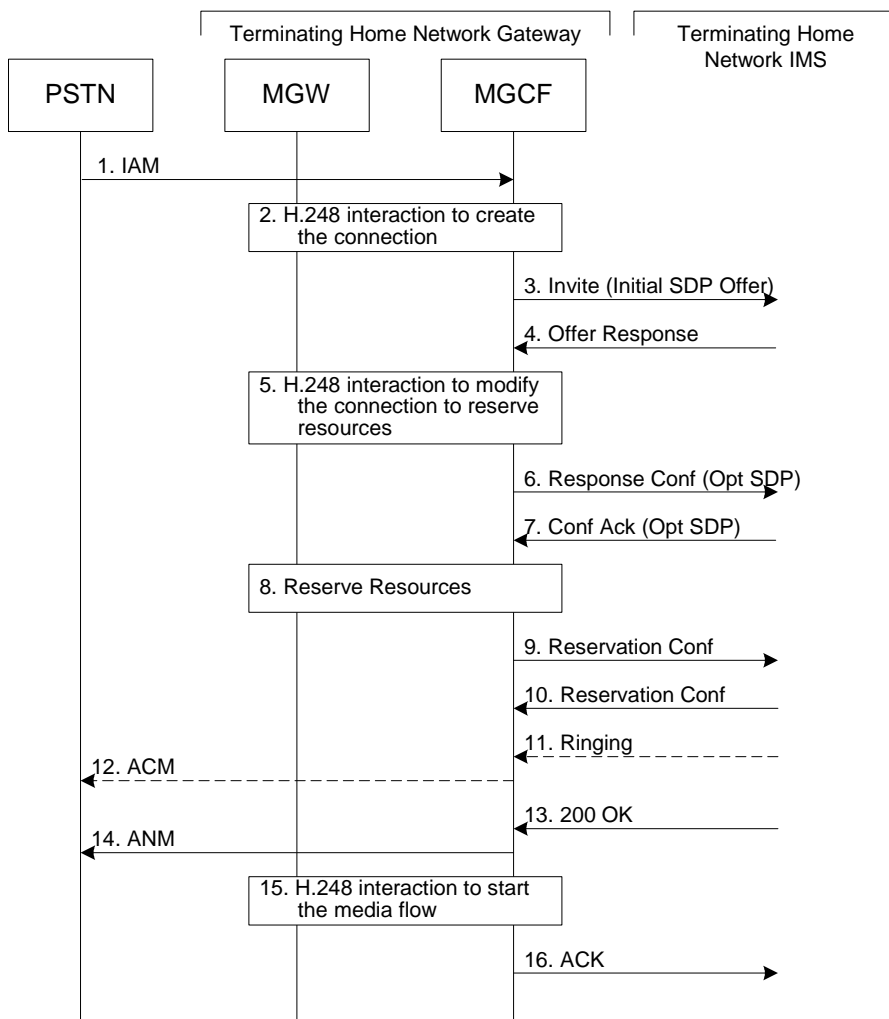


Figure 5.16: PSTN origination procedure

The PSTN Origination procedure is as follows:

1. The PSTN establishes a bearer path to the MGW, and signals to the MGCF with a IAM message, giving the trunk identity and destination information
2. The MGCF initiates a H.248 command, to seize the trunk and an IP port.
3. The MGCF initiates a SIP INVITE request, containing an initial SDP, as per the proper S-S procedure.
4. The media stream capabilities of the destination are returned along the signalling path, per the S-S procedures.
5. MGCF initiates a H.248 command to modify the connection parameters and instruct the MGW to reserve the resources needed for the session.
6. MGCF decides the offered set of media streams for this session, confirms receipt of the Offer Response and sends the Response Confirmation per the S-S procedures.
7. Terminating end point responds to the Response Confirmation. If Optional SDP is contained in the Response Confirmation, the Confirmation Acknowledge will also contain an SDP response.
8. MGW reserves the resources needed for the session
9. When the resource reservation is completed, MGCF sends the successful Resource Reservation message to the terminating endpoint, per the S-S procedures.
10. Terminating end point responds to the successful media resource reservation.

11. The destination endpoint may optionally perform alerting. If so, it signals this to the originating party by a provisional response indicating Ringing. This message is sent to MGCF per the S-S procedure.
12. If alerting is being performed, the MGCF forwards an ACM message to PSTN
13. When the destination party answers, the terminating and S-S procedures result in a SIP 200-OK final response being sent to MGCF
14. MGCF forwards an ANM message to to the PSTN
15. MGCF initiates a H.248 command to alter the connection at MGW to make it bi-directional
16. MGCF acknowledges the SIP final response with a SIP ACK message

5.6.4 Mobile Origination procedure towards an external SIP client

This clause describes the IMS originating session setup procedures towards external SIP clients that don't support the required IMS SIP extensions.

In this scenario, the UE originates an IMS session requiring the support for precondition capabilities towards an external SIP entity that does not support those capabilities. Based on the response indicating no support, the UE re-initiates the session by resetting the requirements and announcing its own support only. The UE sets all the media components to inactive until the media information has been negotiated at a later stage of the session. When both parties have agreed to the session and media parameters and the UE has established resources for the media, the UE initiates session modification setting the status of the media components to active and is thus enabling the media transfer to start. Below figures 5.16.a, 5.16.b and 5.16.c together illustrate session flows for one possible originating session establishment towards a non-IMS client in an external network with QoS authorisation and service based local policy support. In this example the external SIP client does not support the Precondition extension of SIP.

For illustration purposes these session flows show the case of a non-roaming origination. This flow is a variant of MO#2 defined in clause 5.6.2. The same principles apply in roaming cases, i.e. analogous variants of MO#1 defined in clause 5.6.1 are also supported for interworking with SIP clients that do not support the required IMS procedures.

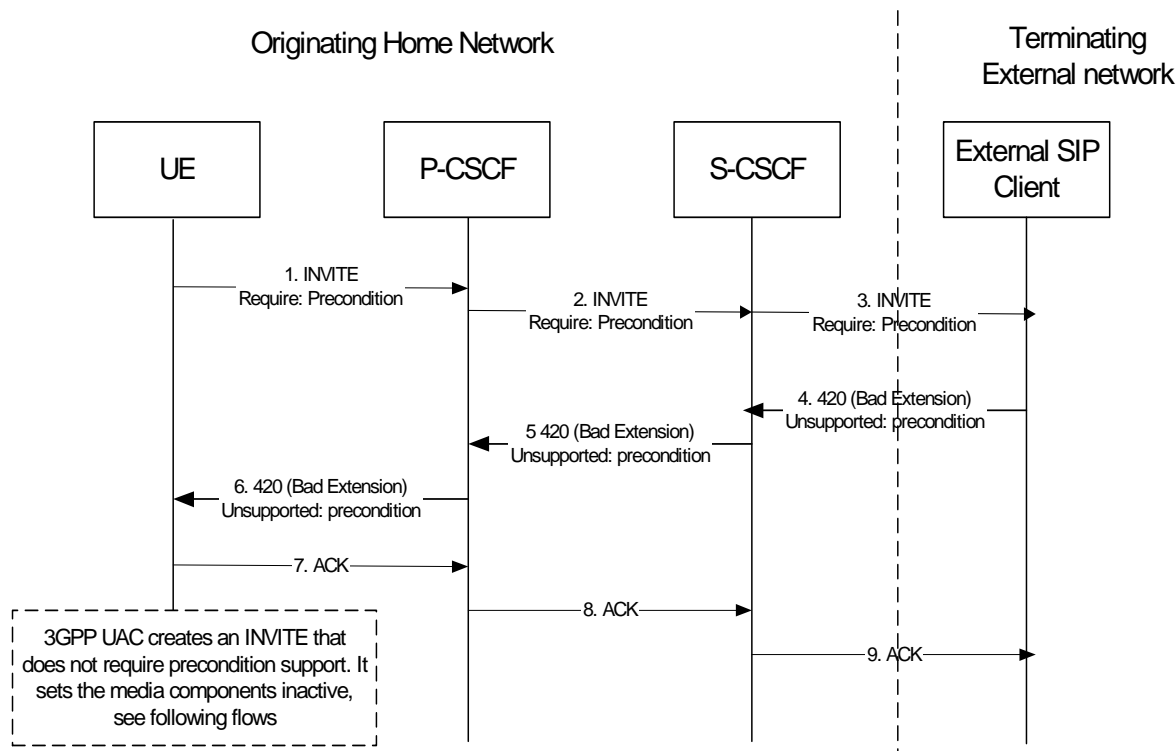


Figure 5.16a. Originating session towards external SIP client, detection phase

The Originating IMS session detection phase is as follows:

1-3. The UE initiates an IMS session towards an external SIP client, and requires support for precondition capabilities in the session initiation.

4-6. The terminating party informs the UE that the precondition capability is not supported by the receiving entity.

7-9. Acknowledgement to the response is sent through the session path and the session setup procedure is terminated.

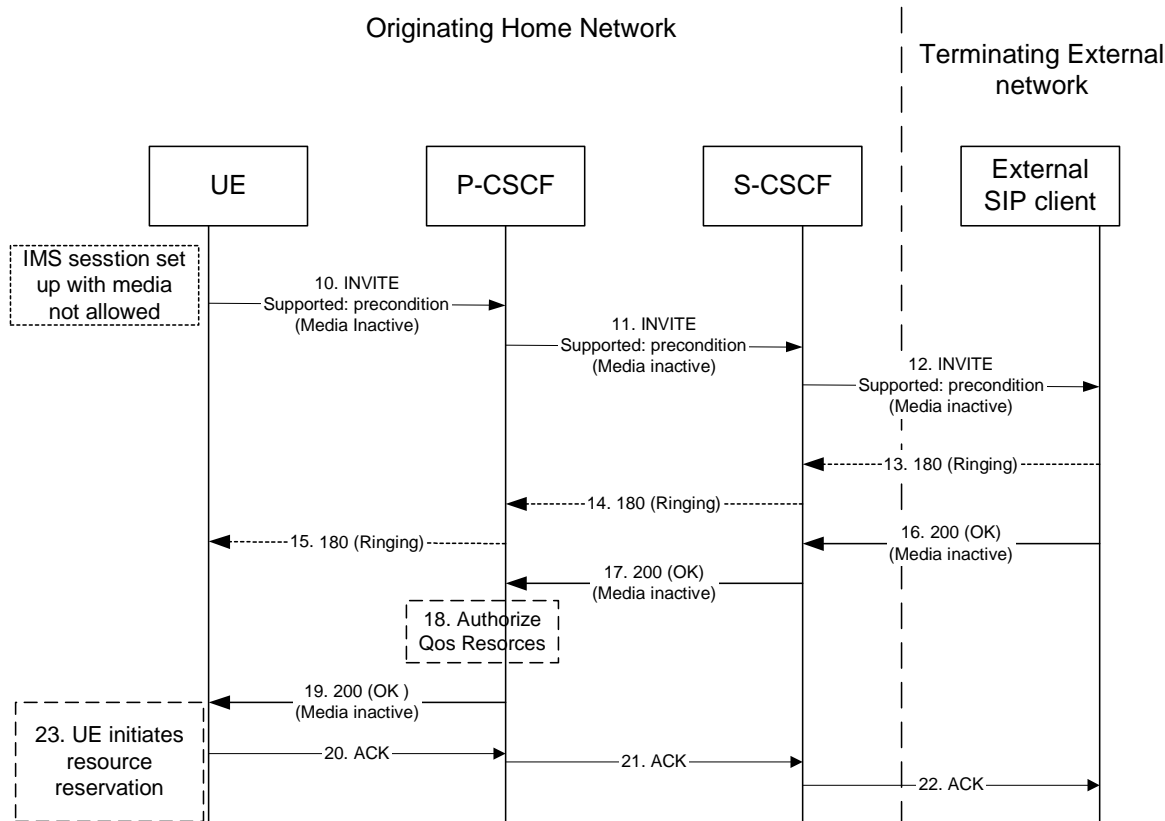


Figure 5.16b. Originating session towards external SIP client, re-initiate session set up not requiring precondition capabilities and with inactive media

At this point, the UE IMS client may choose to retry setting up the session. For that purpose it initiates a new INVITE message, which indicates the support of the precondition capability (rather than the requirement of the precondition capability) and sets all media components to inactive state, as shown in figure 5.16b & 5.16c.

10-12. UE initiates a new IMS session indicating the support of the precondition capability and setting all media components to inactive state.

13-15. Ringing from the terminating party is sent through the session path towards the originating UE.

16-17. Acknowledgement of the session and media parameters are sent from the terminating side to the P-CSCF.

18. The P-CSCF/PDF may at this point authorise the resources being negotiated.

19. The acknowledgement of the session and media parameters forwarded towards the originating UE.

20-22. The session is established, but media transfer is not allowed yet.

23. The UE starts the resource reservation for the media.

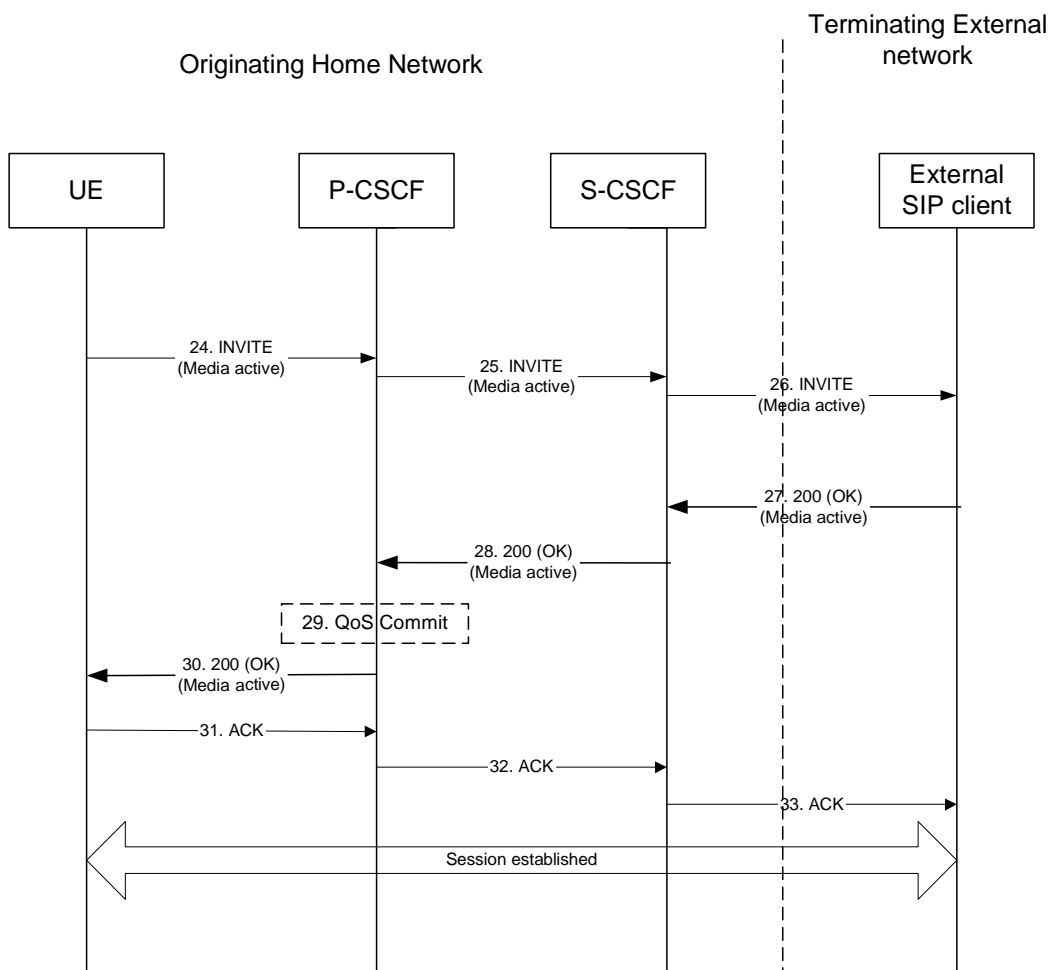


Figure 5.16c. Continuation of originating session towards external SIP client, session set up with active media

Once the session parameters have been agreed and the UE has successfully reserved resources for the media components, the session set-up continues by setting the media components to active, as shown in session flow 5.16c.

24-26. UE initiates activation of media by initiating an INVITE procedure towards the terminating party.

27-28. The terminating party accepts media activation, and corresponding signaling is passed back towards the originating party along the session path.

29. The P-CSCF/PDF receives the acceptance of media activation. At this point, the P-CSCF/PDF may commit/approve the resources that have been authorised for the session

30.The P-CSCF/PDF forwards the signaling message to the originating UE indicating that the session setup can continue and activation of media is performed.

31-33. The Session establishment is then acknowledged through the session path.

At this point in time, the session is established between the two parties.

5.7 Termination procedures

This section presents the detailed application level flows to define the Procedures for session terminations.

The flows presented in the section assume the use of service-based local policy.

The session termination procedures specify the signalling path between the Serving-CSCF assigned to perform the session termination service and the UE. This signalling path is determined at the time of UE registration, and remains fixed for the life of the registration. This signalling path is the reverse of the session initiation signalling path of Section

5.6. Therefore there is a one-to-one correspondence between the origination procedures of section 5.6 and the termination procedures of this section.

A UE always has a proxy (P-CSCF) associated with it. This P-CSCF performs resource authorisation for the sessions to the UE. The P-CSCF is determined by the CSCF discovery process, described in Section 5.1.1 (Local CSCF Discovery).

As a result of the registration procedure, the P-CSCF knows the address of the UE. The assigned S-CSCF, knows the name/address of the P-CSCF (procedure MT#3, and MT#4, depending on the location of S-CSCF and P-CSCF). If the network operator owning the S-CSCF wants to keep their configuration private, the S-CSCF will have chosen an I-CSCF(THIG) who will perform the configuration hiding and pass messages to the P-CSCF (procedure MT#1).

Sessions destined to the PSTN are a special case of the Termination procedures. The MGCF uses H.248 to control a Media Gateway, and communicates with the SS7 network. The MGCF receives and processes SIP requests, and subsequent nodes consider the signalling as if it came from a S-CSCF.

5.7.1 (MT#1) Mobile termination, roaming

This termination procedure applies to roaming users.

The UE is located in a visited network, and determines the P-CSCF via the CSCF discovery procedure described in section 5.1.1. The home network advertises either the S-CSCF, or an I-CSCF(THIG), as the entry point from the visited network.

When registration is complete, S-CSCF knows the name/address of its next hop in the signalling path, either I-CSCF or P-CSCF, I-CSCF (if it exists) knows the name/address of P-CSCF, and P-CSCF knows the name/address of the UE.

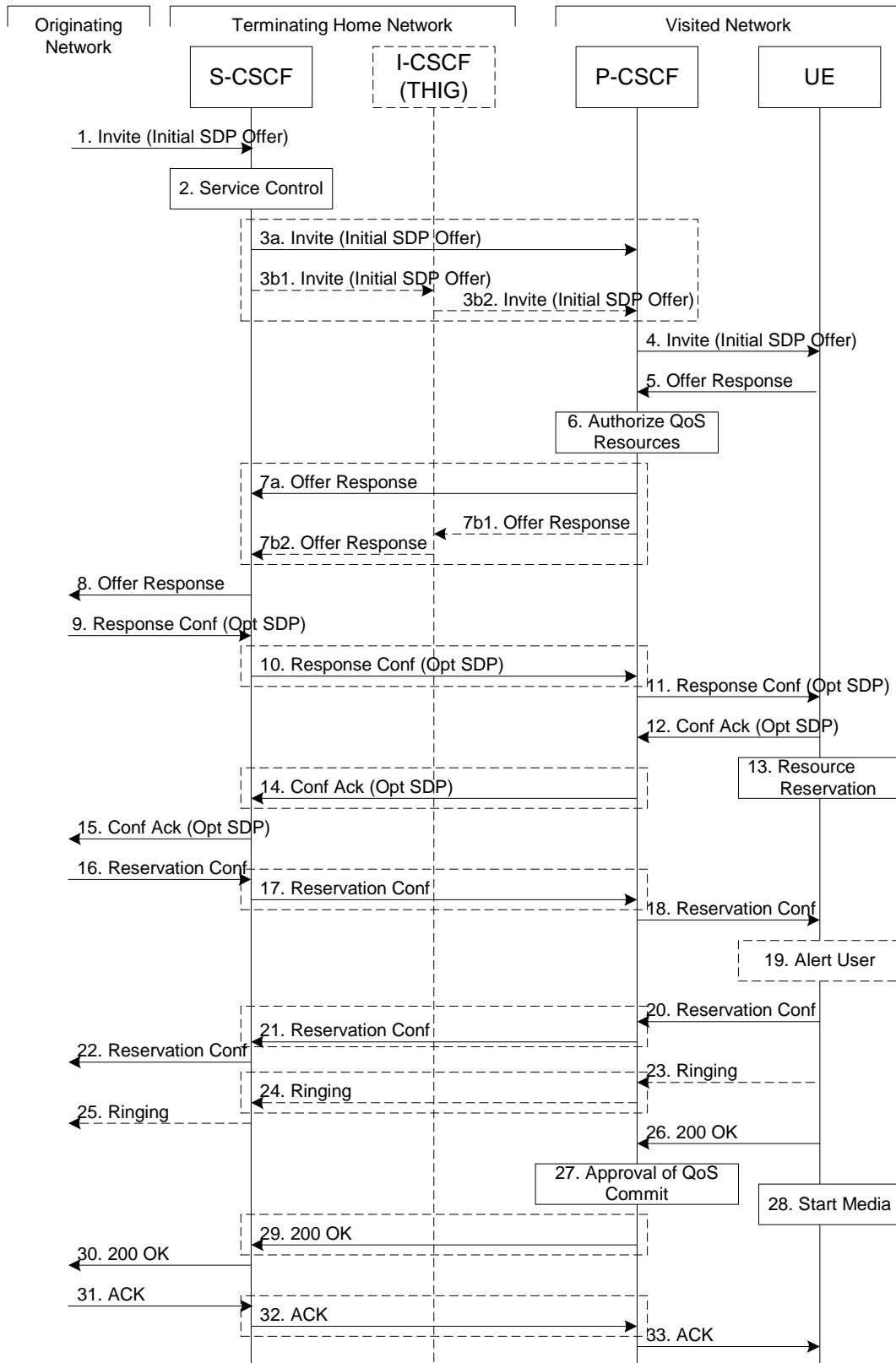


Figure 5.17: Mobile termination procedure - roaming

Procedure MT#1 is as follows:

1. The originating party sends the SIP INVITE request, containing an initial SDP, via one of the origination procedures, and via one of the Inter-Serving procedures, to the Serving-CSCF for the terminating users.
2. S-CSCF validates the service profile, and invokes any termination service logic required for this user. This includes authorisation of the requested SDP based on the user's subscription for multi-media services.

3. S-CSCF remembers (from the registration procedure) the next hop CSCF for this UE. It forwards the INVITE to the P-CSCF in the visited network, possibly through an I-CSCF.

This next hop is either the P-CSCF that is serving the visiting UE (choice (a)), or an I-CSCF(THIG) within the home network that is performing the configuration hiding function for the home network operator (choice (b)).

(3a) If the home network operator does not desire to keep their network configuration hidden, the INVITE request is forwarded directly to the P-CSCF.

(3b) If the home network operator desires to keep their network configuration hidden, the INVITE request is forwarded through an I-CSCF(THIG) to the P-CSCF.

(3b1) S-CSCF forwards the INVITE request to I-CSCF(THIG)

(3b2) I-CSCF(THIG) forwards the INVITE request to P-CSCF

4. The Authorization-Token is generated by the PDF and included in the INVITE message. P-CSCF remembers (from the registration procedure) the UE address, and forwards the INVITE to the UE.
5. UE determines the subset of the media flows proposed by the originating endpoint that it supports, and responds with an Offer Response message back to the originator. The SDP may represent one or more media for a multi-media session. This response is sent to P-CSCF.
6. P-CSCF authorises the resources necessary for this session.
7. P-CSCF forwards the Offer Response message to S-CSCF. Based on the choice made in step #3 above, this may be sent directly to S-CSCF (7a) or may be sent through I-CSCF(THIG) (7b1 and 7b2).
8. S-CSCF forwards the Offer Response message to the originator, per the S-S procedure.
9. The originating endpoint sends a Response Confirmation via the S-S procedure, to S-CSCF. The Response Confirmation may also contain SDP. This may be the same SDP as in the Offer Response sent in Step 8 or a subset. If new media are defined by this SDP, a new authorization (as in Step 6) will be done by the P-CSCF(PDF) following Step 12. The originating UE is free to continue to offer new media on this operation or on subsequent exchanges using the Update method. Each offer/answer exchange will cause the P-CSCF(PDF) to repeat the Authorization step (Step 6) again.
10. S-CSCF forwards the Response Confirmation to P-CSCF. This may possibly be routed through the I-CSCF depending on operator configuration of the I-CSCF. Step 10 may be similar to Step 3 depending on whether or not configuration hiding is used.
11. P-CSCF forwards the Response Confirmation to UE.
12. UE responds to the Response Confirmation with an acknowledgement. If Optional SDP is contained in the Response Confirmation, the Confirmation Ack will also contain an SDP response. If the SDP has changed, the P-CSCF authorizes that the resources are allowed to be used.
13. UE initiates the reservation procedures for the resources needed for this session.
- 14-15. P-CSCF forwards the Confirmation Ack to the S-CSCF and then to the originating end point via session path. Step 14 may be similar to Step 7 depending on whether or not configuration hiding is used.
- 16-18. When the originating endpoint has completed its resource reservation, it sends the successful Resource Reservation message to S-CSCF, via the S-S procedures. The S-CSCF forwards the message toward the terminating endpoint along the signalling path. Step 17 may be similar to Step 3 depending on whether or not configuration hiding is used.
19. UE#2 alerts the destination user of an incoming session setup attempt.
- 20-22. UE#2 responds to the successful resource reservation towards the originating end point. Step 21 may be similar to Step 7 depending on whether or not configuration hiding is used.
- 23-25. UE may alert the user and wait for an indication from the user before completing the session setup. If so, it indicates this to the originating party by a provisional response indicating Ringing. This message is sent to P-CSCF and along the signalling path to the originating end. Step 24 may be similar to Step 7 depending on whether or not configuration hiding is used.

- 26. When the destination party answers, the UE sends a SIP 200-OK final response to P-CSCF.
- 27. P-CSCF indicates the resources reserved for this session should now be committed.
- 28. UE starts the media flow(s) for this session
- 29-30. P-CSCF sends a SIP 200-OK final response along the signalling path back to the S-CSCF
Step 29 may be similar to Step 7 depending on whether or not configuration hiding is used.
- 31-33. The originating party responds to the 200-OK final response with a SIP ACK message that is sent to S-CSCF via the S-S procedure and forwarded to the terminating end along the signalling path. Step 32 may be similar to Step 3 depending on whether or not configuration hiding is used.

5.7.2 (MT#2) Mobile termination, home

This termination procedure applies to users located in their home service area.

The UE is located in the home network, and determines the P-CSCF via the CSCF discovery procedures described in section 5.1.1.

When registration is complete, S-CSCF knows the name/address of P-CSCF, and P-CSCF knows the name/address of the UE.

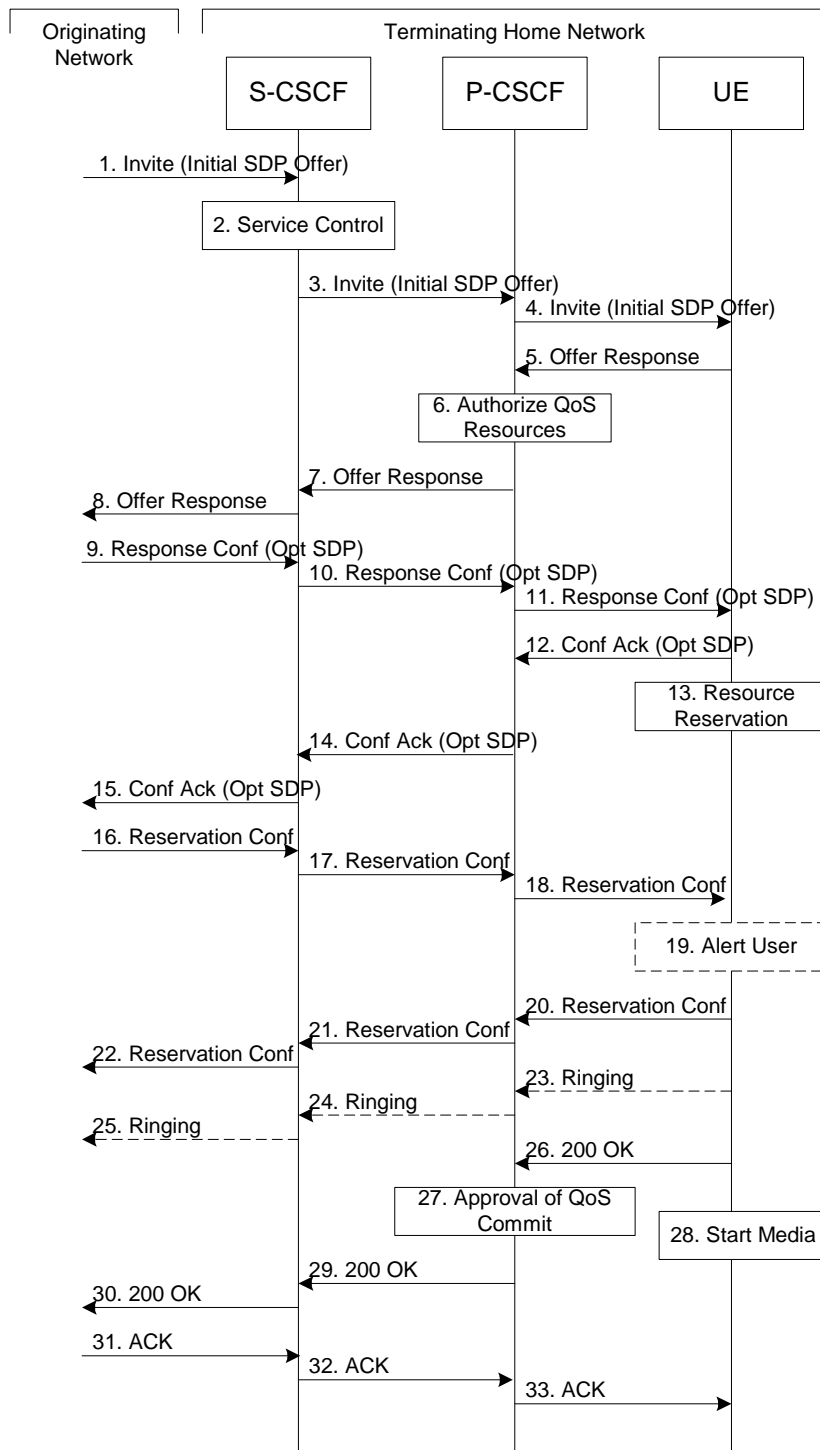


Figure 5.18: Mobile termination procedure - home

Procedure MT#2 is as follows:

1. UE#1 sends the SIP INVITE request, containing an initial SDP, via one of the origination procedures, and via one of the Serving to Serving-CSCF procedures, to the Serving-CSCF for the terminating user.
2. S-CSCF validates the service profile, and invokes any termination service logic required for this user. This includes authorisation of the requested SDP based on the user's subscription for multi-media services.
3. S-CSCF remembers (from the registration procedure) the next hop CSCF for this UE. It forwards the INVITE to the P-CSCF in the home network.

4. The Authorization-Token is generated by the PDF and included in the INVITE message. P-CSCF remembers (from the registration procedure) the UE address, and forwards the INVITE to the UE.
5. UE determines the subset of the media flows proposed by the originating endpoint that it supports, and responds with an Offer Response message back to the originator. The SDP may represent one or more media for a multi-media session. This response is sent to P-CSCF.
6. P-CSCF authorises the resources necessary for this session.
7. P-CSCF forwards the Offer Response message to S-CSCF.
8. S-CSCF forwards the Offer Response message to the originator, per the S-S procedure.
9. The originating endpoint sends a Response Confirmation via the S-S procedure, to S-CSCF. The Response Confirmation may also contain SDP. This may be the same SDP as in the Offer Response sent in Step 8 or a subset. If new media are defined by this SDP, a new authorization (as in Step 6) will be done by the P-CSCF(PDF) following Step 12. The originating UE is free to continue to offer new media on this operation or on subsequent exchanges using the Update method. Each offer/answer exchange will cause the P-CSCF(PDF) to repeat the Authorization step (Step 6) again.
10. S-CSCF forwards the Response Confirmation to P-CSCF.
11. P-CSCF forwards the Response Confirmation to UE.
12. UE responds to the Response Confirmation with an acknowledgement. If Optional SDP is contained in the Response Confirmation, the Confirmation Ack will also contain an SDP response. If the SDP has changed, the P-CSCF authorizes that the resources are allowed to be used.
13. UE initiates the reservation procedures for the resources needed for this session.
- 14-15. The response is forwarded to the originating end point.
- 16-18. When the originating endpoint has completed its resource reservation, it sends the successful Resource Reservation message to S-CSCF, via the S-S procedures. The S-CSCF forwards the message toward the terminating endpoint along the signalling path.
19. UE#2 alerts the destination user of an incoming session setup attempt.
- 20-22. UE#2 responds to the successful resource reservation and the message is forwarded to the originating end.
- 23-25. UE may alert the user and wait for an indication from the user before completing the session. If so, it indicates this to the originating party by a provisional response indicating Ringing. This message is sent to P-CSCF and along the signalling path to the originating end.
26. When the destination party answers, UE sends a SIP 200-OK final response to P-CSCF.
27. P-CSCF indicates the resources reserved for this session should now be committed.
28. UE starts the media flow(s) for this session.
- 29-30. P-CSCF forwards the 200-OK to S-CSCF, following the signaling path.
- 31-33. The session originator responds to the 200-OK by sending the ACK message to S-CSCF via the S-S procedure and it is forwarded to the terminating end along the signalling path..

5.7.2a (MT#3) Mobile termination, CS Domain roaming

This termination procedure applies to a user registered for CS services, either in the home network or in a visited network. The user has both IMS and CS subscriptions but is unregistered for IMS services

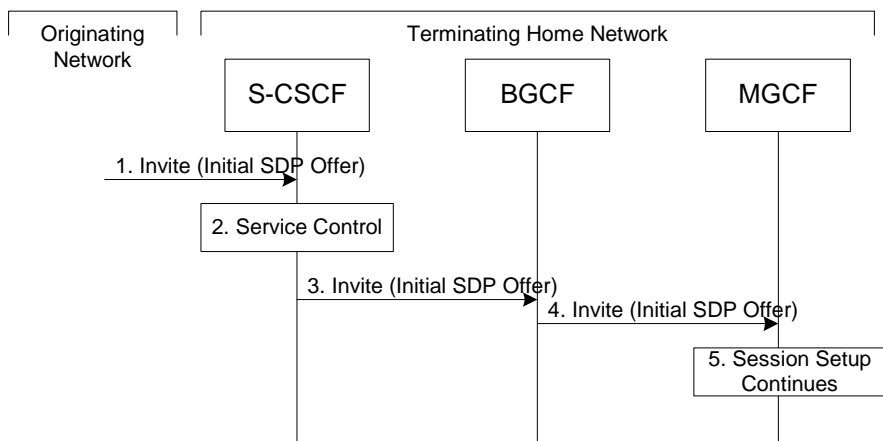


Figure 5.18a: Mobile Terminating procedures to a user that is unregistered for IMS services but is registered for CS services

1. In case the terminating user does not have an S-CSCF allocated, the session attempt is routed according to the section 5.12.1 (Mobile Terminating procedures to unregistered IMS user that has services related to unregistered state).
2. S-CSCF invokes service control appropriate for this session setup attempt, which may result in e.g. re-routing the session to a messaging service, or continued routing towards the user’s CS domain termination address (e.g. E.164).
3. S-CSCF performs whatever further actions are appropriate for this session setup attempt. In case of routing towards the user’s CS domain termination address, the S-CSCF performs an analysis of this address. From the analysis of the destination address, S-CSCF determines that this is for the CS domain, and passes the request to the BGCF.
4. The BGCF forwards the SIP INVITE message to the appropriate MGCF in the home network, or to a BGCF in another network. This depends on the PSTN interworking configuration of the IMS network. Eventually, the session initiation arrives to an MGCF.
5. Normal session setup continues according to PSTN-T flow as described in Section 5.7.3

5.7.3 (PSTN-T) PSTN termination

The MGCF in the IM CN subsystem is a SIP endpoint that initiates and receives requests on behalf of the PSTN and Media Gateway (MGW). Other nodes consider the signalling as if it came from a S-CSCF. The MGCF incorporates the network security functionality of the S-CSCF.

PSTN termination may be done in the same operator’s network as the S-CSCF of the session originator. Therefore, the location of the MGCF/MGW are given only as “Terminating Network” rather than “Home Network” or “Visited Network.”

Further, agreements between network operators may allow PSTN termination in a network other than the originator’s visited network or home network. This may be done, for example, to avoid long distance or international tariffs.

This termination procedure can be used for any of the inter-serving procedures, in place of the S-CSCF.

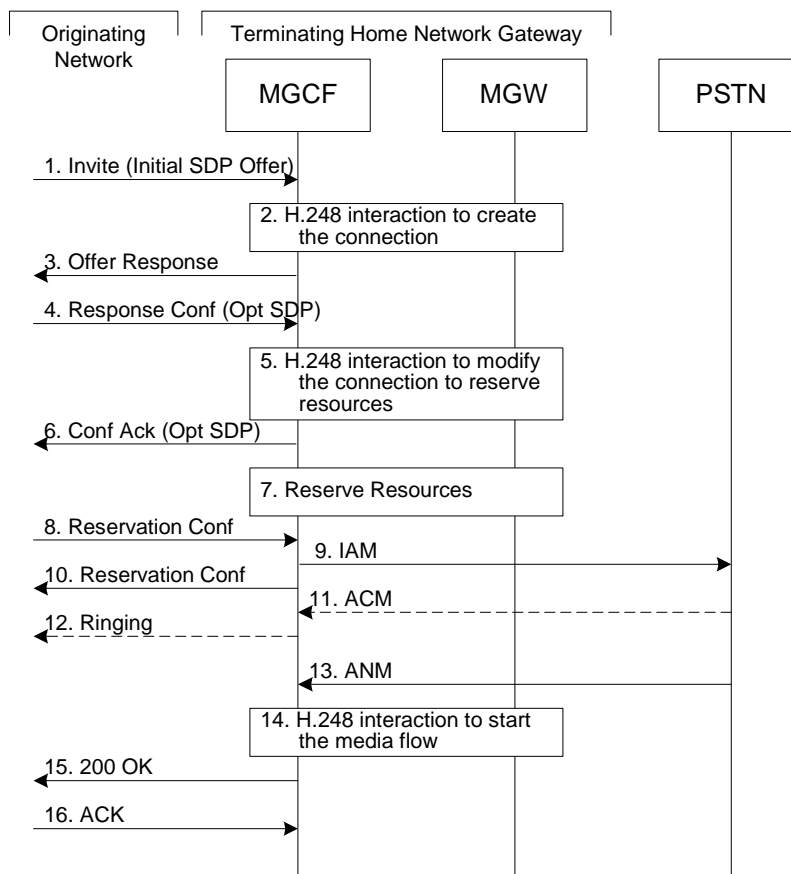


Figure 5.19: PSTN termination procedure

The PSTN termination procedure is as follows:

1. MGCF receives an INVITE request, containing an initial SDP, through one of the origination procedures and via one of the inter-serving procedures.
2. MGCF initiates a H.248 interaction to pick an outgoing channel and determine media capabilities of the MGW.
3. MGCF determines the subset of the media flows proposed by the originating endpoint that it supports, and responds with an Offer Response message back to the originator. This response is sent via the S-S procedure.
4. The originating endpoint sends a Response Confirmation. The Response Confirmation may also contain SDP. This may be the same SDP as in the Offer Response sent in Step 3 or a subset. The originating UE is free to continue to offer new media on this operation or on subsequent exchanges using the Update method.
5. MGCF initiates a H.248 interaction to modify the connection established in step #2 and instruct MGW to reserve the resources necessary for the media streams.
6. MGCF responds to the offered media towards the originating party.
7. MGW reserved the resources necessary for the media streams.
8. When the originating endpoint has completed its resource reservation, it sends the successful Resource Reservation message to MGCF, via the S-S procedures.
9. MGCF sends an IAM message to the PSTN
10. MGCF sends response to the successful resource reservation towards originating end.
11. The PSTN establishes the path to the destination. It may optionally alert the destination user before completing the session. If so, it responds with an ACM message.
12. If the PSTN is alerting the destination user, MGCF indicates this to the originating party by a provisional response indicating Ringing. This message is sent via the S-S procedures.

- 13. When the destination party answers, the PSTN sends an ANM message to MGCF
- 14. MGCF initiates a H.248 interaction to make the connection in the MGW bi-directional.
- 15. MGCF sends a SIP 200-OK final response along the signalling path back to the session originator
- 16. The Originating party acknowledges the final response with a SIP ACK message

5.7.4 Mobile Termination from an external SIP client

This clause describes the terminating session setup procedures from an external SIP client that doesn't support the required IMS SIP extensions, towards an IMS UE.

An incoming SIP request may arrive, where the UE detects that the originating party does not support the IMS SIP extensions described in 3GPP TS 24.229 [10a]. In case the external SIP client does not support the Precondition extension of SIP, the UE continues to setup the session without activating media transfer until the session parameters have been negotiated and accepted. Session flows 5.19a and 5.19b show an example of an end-to-end session setup in such a case.

For illustration purposes these session flows show the case of a non-roaming termination. This flow is a variant of MT#2 defined in clause 5.7.2. The same principles apply in roaming cases, i.e. analogous variants of MT#1 defined in clause 5.7.1 are also supported for interworking with SIP clients that do not support the required IMS procedures.

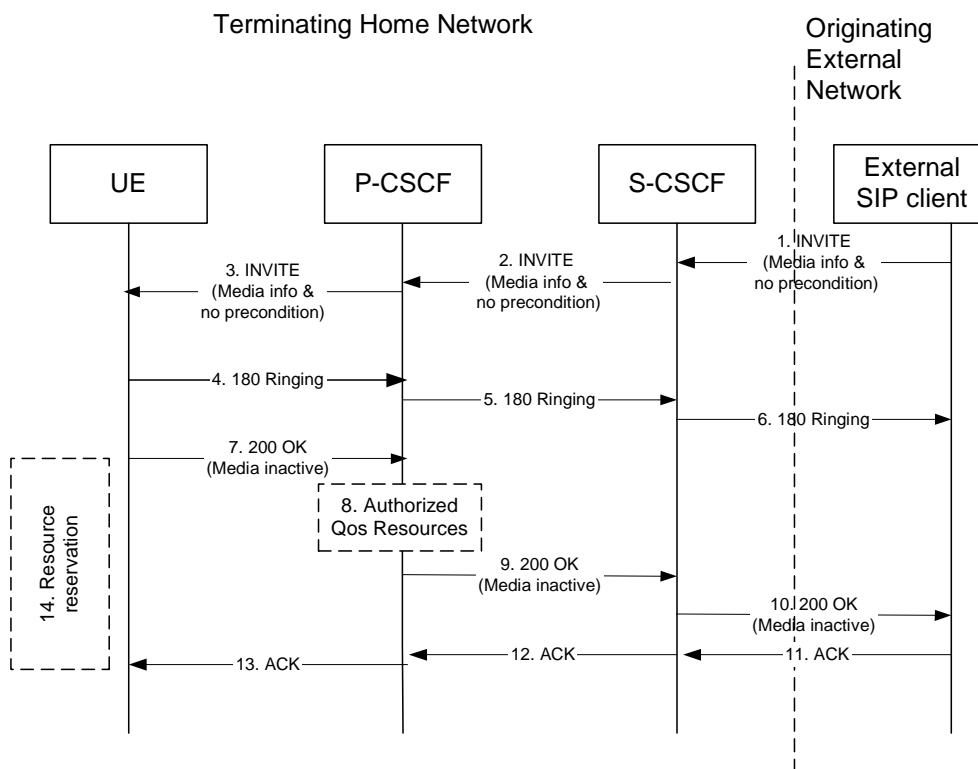


Figure 5.19a. Terminating session from external SIP client, detection & initial setup with media not allowed

1-3. A session arrives at the UE in the IMS network with media information but without requiring precondition capability.

4-6. Ringing information is sent end to end towards the originating party.

7-10. The UE begins the resource reservation according to the session and media parameters. The P-CSCF/PDF may authorise the media parameters being negotiated and the originating party is notified of the session setup details with all media components set to inactive.

11-13. The originating party acknowledges the session.

14. When the UE has completed the resource reservation procedures, the UE continues with the session setup according to flow 5.19b. The UE sets the media components to active state.

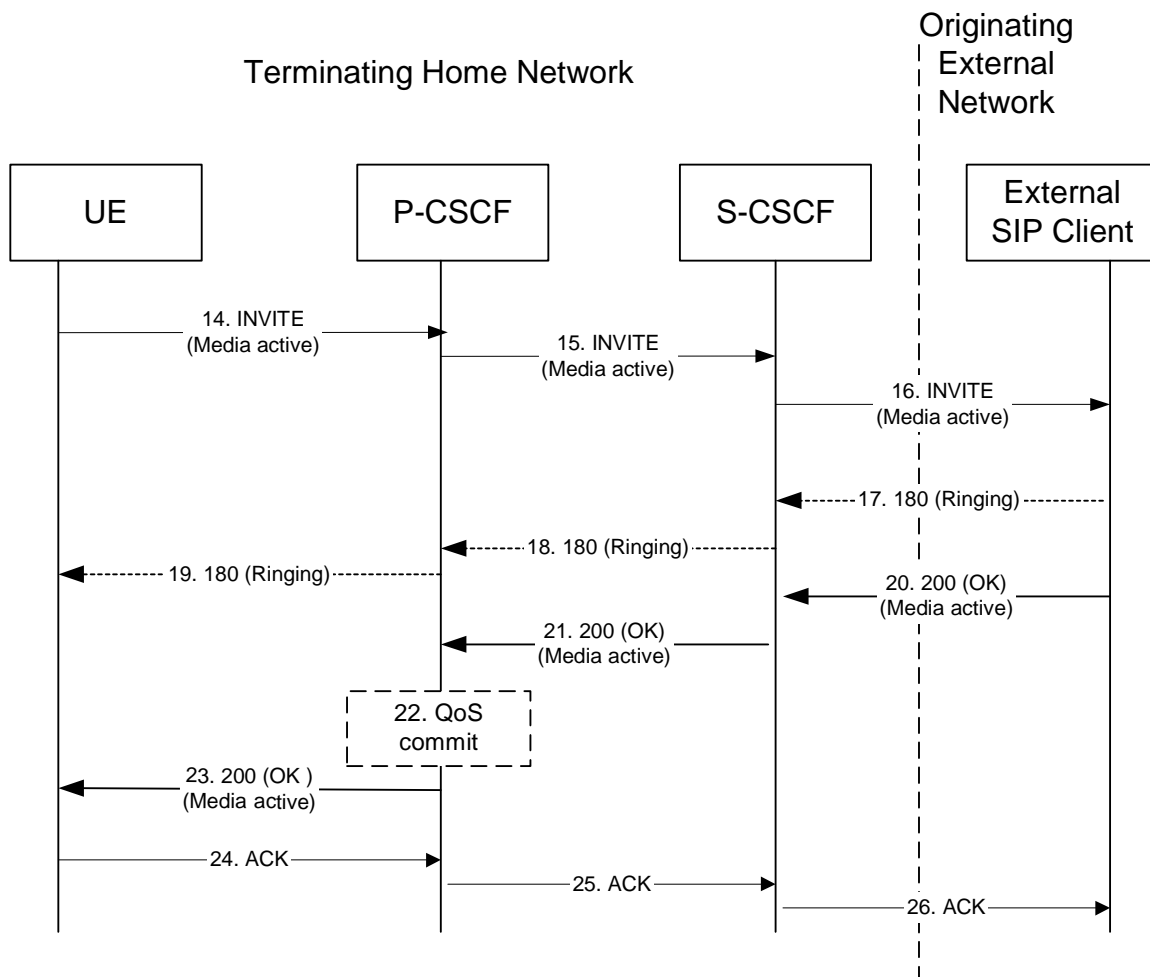


Figure 5.19b. Continuation of terminating session from external SIP client, session setup with active media

14-16. By sending a re-INVITE indicating the support for the precondition capability, the terminating UE initiates setting of media components to active.

17-19. Ringing Information may be sent from an external SIP entity (in this case the originating party) through the session path towards the terminating UE.

20-23. The originating SIP client accepts the re-INVITE with the active media streams. In step 22, The P-CSCF/PDF may commit/approve the resources authorised for the session.

24-26. Session is acknowledged end-to-end.

CHANGE REQUEST

23.228 CR 337 # rev 3 # Current version: 5.9.0

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

Title:	# IMS-SIP interworking		
Source:	# Ericsson		
Work item code:	# IMS-CCR	Date:	# 24/09/2003
Category:	# F	Release:	# Rel-5
	Use <u>one</u> of the following categories:		Use <u>one</u> of the following releases:
	F (correction)	R96	(GSM Phase 2) (Release 1996)
	A (corresponds to a correction in an earlier release)	R97	(Release 1997)
	B (addition of feature),	R98	(Release 1998)
	C (functional modification of feature)	R99	(Release 1999)
	D (editorial modification)	Rel-4	(Release 4)
	Detailed explanations of the above categories can be found in 3GPP TR 21.900 .	Rel-5	(Release 5)
		Rel-6	(Release 6)

Reason for change:	# CN3 (& CN1) has done comprehensive analysis on the interworking of IMS & SIP entites outside of IMS. TR 29.962 documents different architecture options on this issue and CN3 has asked SA2 to agree on the archtiecture for interworking. At SA2#33, architectural impacts were analysed and decision taken to go forward with end-to-end flow based solution. This CR provides technical update to the specification to conform to the agreement, speciafically in case of -interoperability towards Rel 5. This CR does not change the functional behaviour of Release 5 IMS, it only provides a recommendation to take into account the interoperability issue from Release 6. It provides a possible mechanism so the the user does not have ambiguous experience in IMS when roaming between Rel 5 and Rel 6 networks.
Summary of change:	# Provides a recommendation to handle compatibility of interworking towards Rel5.
Consequences if not approved:	# Interworking with Internet/non-IMS SIP clients will not be possible in a backward compatible way.

Clauses affected:	# 5.4.2										
Other specs Affected:	<table border="1" style="display: inline-table; border-collapse: collapse; text-align: center;"> <tr><td>Y</td><td>N</td></tr> <tr><td>Y</td><td></td></tr> <tr><td></td><td>N</td></tr> <tr><td></td><td>N</td></tr> </table>	Y	N	Y			N		N	Other core specifications	# 24.229
Y	N										
Y											
	N										
	N										
		Test specifications									
		O&M Specifications									
Other comments:	#										

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at <http://www.3gpp.org/specs/CR.htm>. Below is a brief summary:

- 1) Fill out the above form. The symbols above marked ☒ contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <ftp://ftp.3gpp.org/specs/> For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

5.4.2 Interworking with Internet

Depending on operator policy, the S-CSCF may forward the SIP request or response to another SIP server located within an ISP domain outside of the IM CN subsystem.

It is possible that a remote SIP client does not support IMS required capabilities such as “Preconditions”, “Update” and “100rel” as described in 3GPP TS 24.229. If the remote SIP client does not support these capabilities, then the same session may be re-initiated by relaxing the requirements on the capabilities (by setting them to the status of desired) following the principle set by RFC 3261 [12]. However, general mechanisms for interworking between the IM CN subsystem and SIP servers/clients on the Internet are not specified in this Release.

The home network may impose restriction on session initiation without the IMS required capabilities.