Technical Specification Group Services and System Aspects ***TSGS#18(02)0776***

Meeting #18, New Orleans, U.S.A., 9-12 December 2002

Source: **TSG SA WG2**
Title: **CRs on 23.228**
Agenda Item: **7.2.3**

The following Change Requests (CRs) have been approved by TSG SA WG2 and are requested to be approved by TSG SA plenary #18.
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	Version in	REL	WI	S2 meeting
S2-023015	Clarification on charging concepts	23.228	203rev1	F	5.6.0	5	IMS-CCR	S2-27
S2-023016	Clarification on subclause 5.4.4	23.228	207rev1	F	5.6.0	5	IMS-CCR	S2-27
S2-023018	Clarification on MRFP reference point	23.228	204rev4	F	5.6.0	5	IMS-CCR	S2-27
S2-023019	Removal of duplicate text	23.228	210rev1	F	5.6.0	5	IMS-CCR	S2-27
S2-023056	Movement of service architecture	23.228	211rev1	F	5.6.0	5	IMS-CCR	S2-27
S2-023059	Description of “Service Profile”	23.228	213rev1	F	5.6.0	5	IMS	S2-27
S2-023074	Incorporating Messaging aspects to 23.228	23.228	217rev5	B	5.6.0	5	IMS2	S2-27
S2-023116	Correction to services concepts	23.228	216rev2	F	5.6.0	5	IMS-CCR	S2-27
S2-023267	PCF to PDF Changes	23.228	223	F	5.6.0	5	IMS-CCR	S2-28
S2-023271	Service Invocation	23.228	225	F	5.6.0	5	IMS-CCR	S2-28
S2-023309	Separation of media components in relation to forking	23.228	226	F	5.6.0	5	IMS-CCR	S2-28
S2-023313	P-CSCF at home or visited	23.228	230	F	5.6.0	5	IMS-CCR	S2-28
S2-023520	Cleanup and alignment to stage 3 of 23.228	23.228	229rev1	F	5.6.0	5	IMS-CCR	S2-28
S2-023521	Clean up of 23.228 in general to make the spec accurate	23.228	231rev1	F	5.6.0	5	IMS-CCR	S2-28
S2-023523	Clarification on the ISC interface	23.228	221rev1	F	5.6.0	5	IMS-CCR	S2-28
S2-023536	Number internationalisation clarification	23.228	227rev1	F	5.6.0	5	IMS-CCR	S2-28
S2-023537	Clarification on grouping of media components to PDP Contexts	23.228	236rev1	F	5.6.0	5	IMS-CCR	S2-28
S2-023539	Resource reservation	23.228	233rev1	F	5.6.0	5	IMS-CCR	S2-28
S2-023543	Local services	23.228	244	F	5.6.0	5	IMS-CCR	S2-28
S2-023546	S-CSCF re-assignment	23.228	228rev1	F	5.6.0	5	IMS-CCR	S2-28
S2-023547	Stripping of headers in the P-CSCF	23.228	232rev1	F	5.6.0	5	IMS-CCR	S2-28
S2-023548	Clarification on Network Configuration Hiding	23.228	235rev1	F	5.6.0	5	IMS-CCR	S2-28
S2-023542	Local services	23.228	241rev1	B	5.6.0	6	IMS2	S2-28
S2-023544	Clean-up of IMS emergency session requirement	23.228	242rev1	F	5.6.0	6	EMC1-PS	S2-28

3GPP TSG-SA2 Meeting #27
Beijing, China, 14 – 18 October

Tdoc S2 –023015

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **203** ⌘**rev** **1** ⌘ 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 ☒

Title:	⌘	Clarification on charging concepts
Source:	⌘	NEC Corporation
Work item code:	⌘	IMS-CCR
Date:	⌘	7/10/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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 one 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:	⌘	In the current clause 4.9 (charging concepts), there is misalignement about description on charging correlation. The charging correlation information is not described in 32.200 or 32.225. These description is described in 24.229 and 29.207. This causes readers confusion and misunderstanding.
Summary of change:	⌘	1. In 4.9, it is proposed to add a sentence stating that the charging correlation information is described in 24.229 and 29.207. 2. Other minor editorial changes are proposed.
Consequences if not approved:	⌘	Misalignment remains between 23.228 and other specifications.

Clauses affected:	⌘	2, 4.9

Other specs affected: ⌘	Y	N	
		X	Other core specifications
		X	Test specifications
		X	O&M Specifications

Other comments: ⌘

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Start of first change

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1] 3GPP TS 23.002: "Network Architecture".

[2] CCITT Recommendation E.164: "Numbering plan for the ISDN era".

[3] CCITT Recommendation Q.65: "Methodology – Stage 2 of the method for the characterisation of services supported by an ISDN".

[4] ITU Recommendation I.130: "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN"

[5] GSM 03.64: "Digital cellular telecommunication system (Phase 2+); Overall Description of the General Packet Radio Service (GPRS) Radio Interface; Stage 2".

[6] GSM 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".

[7] 3GPP TS 23.221: "Architectural Requirements".

[8] 3GPP TS 22.228: "Service requirements for the IP multimedia core network subsystem"

[9] 3GPP TS 23.207: "End-to-end QoS concept and architecture"

[10] 3GPP TS 24.228: "Signalling flows for the IP multimedia call control based on SIP and SDP"

[10a] 3GPP TS 24.229: " IP Multimedia Call Control based on SIP and SDP; Stage 3"

[11] 3GPP TS 25.301: "Radio interface protocol architecture"

[11a] 3GPP TS 29.207: " Policy control over Go interface "

[12] RFC 3261: "SIP: Session Initiation Protocol"

[13] RFC 2396: "Uniform Resource Identifiers (URI): Generic Syntax"

[14] RFC 2486: "The Network Access Identifier"

[15] RFC 2806: "URLs for Telephone Calls"

[16] RFC 2916: "E.164 number and DNS"

[16a] RFC 3041: "Privacy Extensions for Stateless Address Autoconfiguration in IPv6"

[17] ITU Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies"

[18] ITU Recommendation H.248: "Gateway control protocol"

[19] 3GPP TS 33.203: "Access Security for IP-based services"

[20] 3GPP TS 33.210: "Network Domain Security: IP network layer security "

[21] 3GPP TS 26.235: "Packet Switched Multimedia Applications; Default Codecs".

[22] 3GPP TR 22.941: " IP Based Multimedia Services Framework "

[23] 3GPP TS 23.060: “General Packet Radio Service (GPRS); Service description; Stage 2

[24] 3GPP TS 23.003: “Technical Specification Group Core Network; Numbering, addressing and identification”

[25] 3GPP TS 32.200: “Telecommunication management; Charging management; Charging principles”

[26] 3GPP TS 32.225: ” Telecommunication Management; Charging Management; Charging Data Description for IP Multimedia Subsystem”

[27] 3GPP TS 22.071: “Technical Specification Group Services and System Aspects,Location Services (LCS);Service description, Stage 1”

[28] 3GPP TS 23.271: “Technical Specification Group Services and System Aspects, Functional stage 2 description of LCS”

[29] 3GPP TS 23.078: “Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 3 - Stage 2”

End of first change

Start of secondchange

4.9 Charging Concepts

IM CN subsystem functional elements provide support for offline and online charging. This includes support for charging correlation, e.g. between IM CN subsystem and PS domain. The charging architecture, charging ~~concepts~~ principles and charging ~~information~~ data for IM CN subsystem are described in 3GPP TS 32.200 [25] and 3GPP TS 32.225 [26]. The charging correlation information between IM CN subsystem and PS domain are also described in 3GPP TS 24.229 [10a] and 3GPP TS 29.207 [11a].

End of second change

3GPP TSG-SA2 Meeting #28
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CHANGE REQUEST

⌘ **23.228** **CR** **235** ⌘**rev** **1** ⌘ Current version: **5.6.0** ⌘

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Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Clarification on Network Configuration Hiding
Source:	⌘	Alcatel, Ericsson, Hutchinson 3G, Nokia, Siemens, Vodafone Group
Work item code:	⌘	IMS-CCR
Date:	⌘	13/11/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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.

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R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	From the current text in 23.228 the role of network configuration hiding in the stage 2 specification is not clear. This is the source of misunderstandings and concerns, for example those expressed in the IETF liaison on the use of SIP.
Summary of change:	⌘	It is clearified that the I-CSCF (THIG) may be used to provide network configuration hiding.
Consequences if not approved:	⌘	Unclear status of network hiding in stage 2 specification, thus stage 2 specification remains a source of misunderstandings. Unresolved concerns from IETF.

Clauses affected:	⌘	4.2.3, 4.4, Annex C

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	

Other comments:	⌘	

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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 set of changes **********

4.2.3 Support of roaming users

The architecture shall be based on the principle that the service control for Home subscribed services for a roaming subscriber is in the Home network, e.g., the Serving-CSCF is located in the Home network.

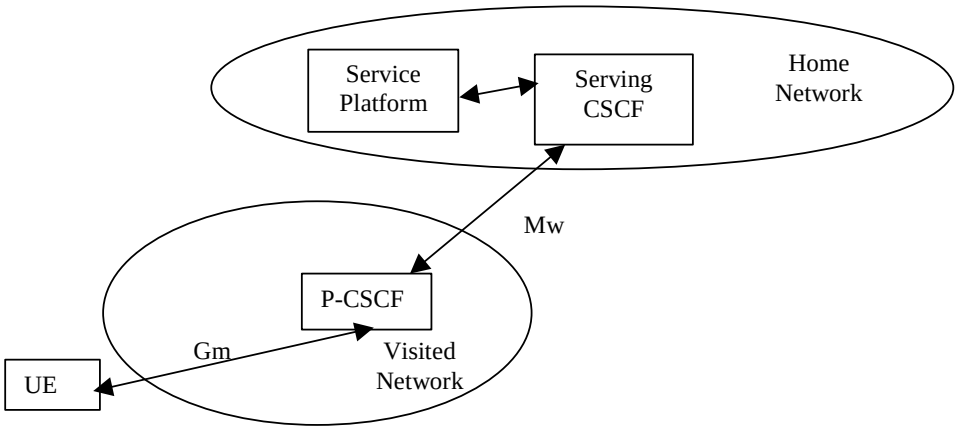

Figure 4-1: Service Platform in Home Network

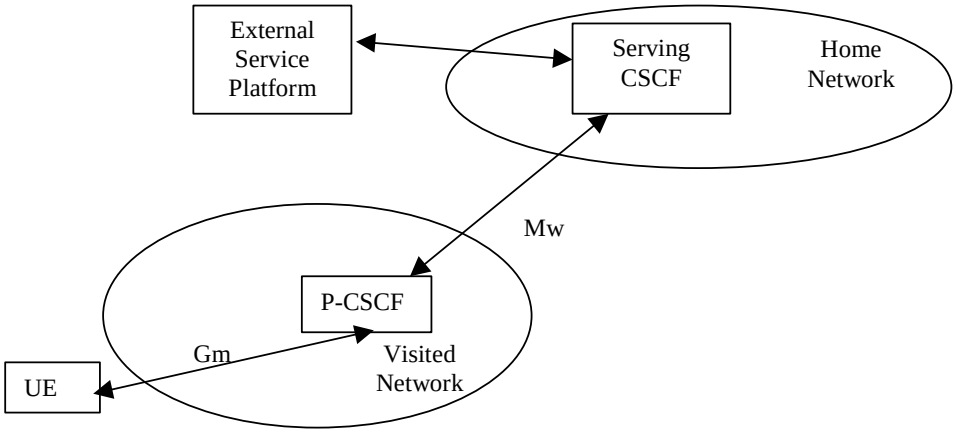

Figure 4-2: External Service Platform

There are two possible scenarios to provide services:

- via the service platform in the Home Network

- via an external service platform (e.g. third party or visited network)

The box representing the external service platform could be located in either the visited network or in the 3rd party platform. The standardised way for secure 3rd party access to IMS services is the OSA framework, see section 4.2.4.

The roles that the CSCF plays are described below.

- The Proxy-CSCF is located in the same network as the GGSN. The Proxy-CSCF shall enable the session control to be passed to the Serving-CSCF.

- The Serving-CSCF is located in the home network. The Serving-CSCF shall provide the service control.

A Proxy-CSCF shall be supported in both roaming and non-roaming case, even when the Serving-CSCF is located in the same IM CN SS.

Reassigning the Proxy-CSCF assigned during CSCF discovery is not a requirement in this release. Procedures to allow registration time Proxy-CSCF reassignment may be considered in future releases.

Network initiated Proxy-CSCF reassignment is not a requirement.

The use of additional CSCFs, that is Interrogating-CSCF(THIG)s, to be included in the SIP signalling path is optional. Such additional CSCFs may be used to shield the internal structure of a network from other networks. See also sub-clauses 4.4 and 4.6.2.1.

********** Next set of changes **********

4.4 Signalling concepts

A Single session control between the UE and CSCF. For Multi-Media type services delivered via the PS Domain within this architecture, a single session control protocol shall be used between the user equipment UE and the CSCF (over the Gm reference point).

Protocols over the Gm reference point. The single protocol applied between the UE and CSCF (over the Gm reference point) within this architecture will be based on SIP (as defined by RFC 3261 [12], other relevant RFC's, and additional enhancements required to support 3GPP's needs).

A Single session control on the Mw, Mm, Mg, Mi, Mj, Mk. A single session control protocol shall be used on the session control interfaces between:

- MGCF and CSCF (Mg),
- between CSCFs (Mw), and
- between a CSCF and external IP networks (Mm).
- Between CSCF and BGCF (Mi)
- Between BGCF and MGCF (Mj)
- Between BGCF and BGCF (Mk)

Protocols for the Mw, Mm, Mg, Mi, Mj, Mk. The single session control protocol applied to these interfaces will be based on SIP (as defined by RFC 3261 [12], other relevant RFC's, and additional enhancements required to support 3GPP´s needs).

UNI vs. NNI session control. The SIP based signalling interactions between CN elements may be different then SIP based signalling between the UE and the CSCF.

Based on operator preference, network configuration hiding may be applied. If network configuration hiding is applied, then the I-CSCF(THIG) shall be used in order to fulfil the requirements as identified in TS 22.228 [8]. It is used to ~~It is a requirement that it shall be possible to hide the network topology from other operators. It shall be possible to~~ restrict the following information from being passed outside of an operator's network: exact number of S-CSCFs, capabilities of S-CSCFs, or capacity of the network. A more detailed ~~explanation of this requirement~~motivation for such functionality is given in Annex C.

Restrict access from external networks. The signalling solution shall allow the operator to restrict access from external networks (application level).

Access to HSS. A network operator can control access to the HSS.

********** Next set of changes **********

Annex C (informative): Optional configuration independence between operator networks

The I-CSCF (THIG) functionality may be used ~~It is a requirement that it shall be possible~~ to hide the network topology from other operators. It shall be possible to restrict the following information from being passed outside of an operator's network: exact number of S-CSCFs, capabilities of S-CSCFs, or capacity of the network.

~~The details of the mechanism to fulfil this requirement are yet to be determined.~~ The specific mechanism chosen needs to take into account the following separate aspects ~~of this requirement~~:

Network management. In the case that network details (i.e. S-CSCF addresses) are visible by other external network elements, any (temporary or permanent) changes to the network topology need to be propagated to network elements outside of the operator's network. This is highly undesirable from a network management perspective.

Network scalability. Establishing security associations on a pair-wise basis among all CSCFs is likely to be unscalable. The security associations shall be independent of the number of network elements.

Competitivity aspects. The operational details of an operator's network are sensitive business information that operators are reluctant to share with their competitors. While there may be situations (partnerships or other business relations) where the sharing of such information is appropriate, the possibility should exist for an operator to determine whether or not the internals of its network need to be hidden.

Security aspects. Network element hiding may help to reduce the vulnerability of the overall system to external attacks (e.g. denial of service attacks). Further work is needed in this area.

********** End of all changes **********

3GPP TSG-SA2 Meeting #28
Bangkok, Thailand, 11th-15th November, 2002

Tdoc ⌘S2-023547

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CHANGE REQUEST

⌘ **23.228** **CR** **232** ⌘**rev** **1** ⌘ Current version: **5.6.0** ⌘

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Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Remove header stripping requirement from P-CSCF
Source:	⌘	Ericsson
Work item code:	⌘	IMS-CCR
Date:	⌘	25/10/02
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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 one 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:	⌘	-Currently stage 2 adds requirement that p-CSCF shall strip certain headers on SIP messages towards UE. This violates IETF-SIP principles (as highlighted in the LS from IETF-SIP-WG) and it does not achieve the necessary goals and introduces compatibility towards future and restricts current UE behavior.
Summary of change:	⌘	Remove header stripping but still allow operator policy to overwrite headers provided by the UE
Consequences if not approved:	⌘	Future compatibility, backward compatibility introduced now that will make IMS complex and IETF misalignment.

Clauses affected:	⌘	5.4.5			
		Y	**N**		
Other specs affected:	⌘	**X**		Other core specifications	⌘ 24.228, 24.229
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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**********First Modified section**********

5.4.5 Storing of session path information

There is a need to store the session path that is determined during the session initiation request in order to route the subsequent session requests through this determined path. This is needed in order to route these session requests through certain nodes, e.g. the ones performing Service Control. CSCFs are assumed to perform certain actions:

1. CSCFs (Proxy and Serving) store a certain part of the session path determined during session initiation. This allows CSCFs to generate requests that traverse all elements on a Route path.

2. ~~P-CSCF will remove the network generated contents of the Via and Record-Route headers of the SIP requests to be sent to the UE. This increases security and reduces SIP message sizes and thus transmission delay over the air interface.~~ The P-CSCF shall check correct usage of the header values. Should an UE build inaccurate header(s) in a SIP request, the P-CSCF may reject the request. If an operator policy requires enforcing the routes stored in P-CSCF, the P-CSCF shall overwrite the header(s) provided by the UE with the appropriate values.

3GPP TSG-SA2 Meeting #28
Bangkok, Thailand, 11th-15th November, 2002

Tdoc ⌘S2-023546

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **228** ⌘**rev** **1** ⌘ Current version: **5.6.0** ⌘

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Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	S-CSCF re-assignment
Source:	⌘	Ericsson, NEC
Work item code:	⌘	IMS-CCR
Date:	⌘	13/11/02
Category:	⌘	**F**
Release:	⌘	Rel-5

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Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	After discussion of S2-022876 in Beijing (SA2#27) based on LS responses between CN4 & SA2 there was some concensus that: - It must be possible to re-assign a S-CSCF when there are changes in the capabilities used to select it. For Release 5, the architecture ensures reassignment of the S-CSCF is possible for scenarios involving changes to a new S-CSCF when user registers due to changes in capabilities. Though the protocol shall be able to handle such scenarios independent of the cases handled in Rel5.
Summary of change:	⌘	A new section (5.1.2.3) is added describing the requirements associated to the re-assignment of the S-CSCF. The need to return the changed capabilities in Cx-Query is added to 5.2.2.3.
Consequences if not approved:	⌘	It will not be possible to re-assign a S-CSCF due to changes in the capabilities used for its selection or due to fails in the S-CSCF originally assigned.

Clauses affected:	⌘	5.1.2.3 (new), 5.2.2.3			
Other specs affected:	⌘	**Y** / **N**	Other core specifications	⌘	29.228
		X /	Other core specifications		
		/ **X**	Test specifications		
		/ **X**	O&M Specifications		
Other comments:	⌘				

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Beginning of modified section

5.1.2.2 Cancelling the Serving-CSCF assignment

Cancellation of the assigned Serving CSCF is either:

- Initiated from the Serving CSCF itself, e.g. due to timeout of the registration
- Performed as a result of an explicit deactivation/de-registration from the IMS. This is triggered by the UE.
- Performed due to a request from the HSS over the Cx interface, e.g. due to changes in the subscription.

5.1.2.3 Re-assignment of a Serving-CSCF

Re-assignment of a S-CSCF shall be possible in the following cases:

- The S-CSCF that was previously assigned is unavailable during registration.
- In the initial registration, when the S-CSCF has been allocated for the unregistered user
-

End of modified section

Beginning of modified section

5.2.2.3 Registration information flow – User not registered

The application level registration can be initiated after the registration to the access is performed, and after IP connectivity for the signalling has been gained from the access network. For the purpose of the registration information flows, the user is considered to be always roaming. For user roaming in their home network, the home network shall perform the role of the visited network elements and the home network elements.

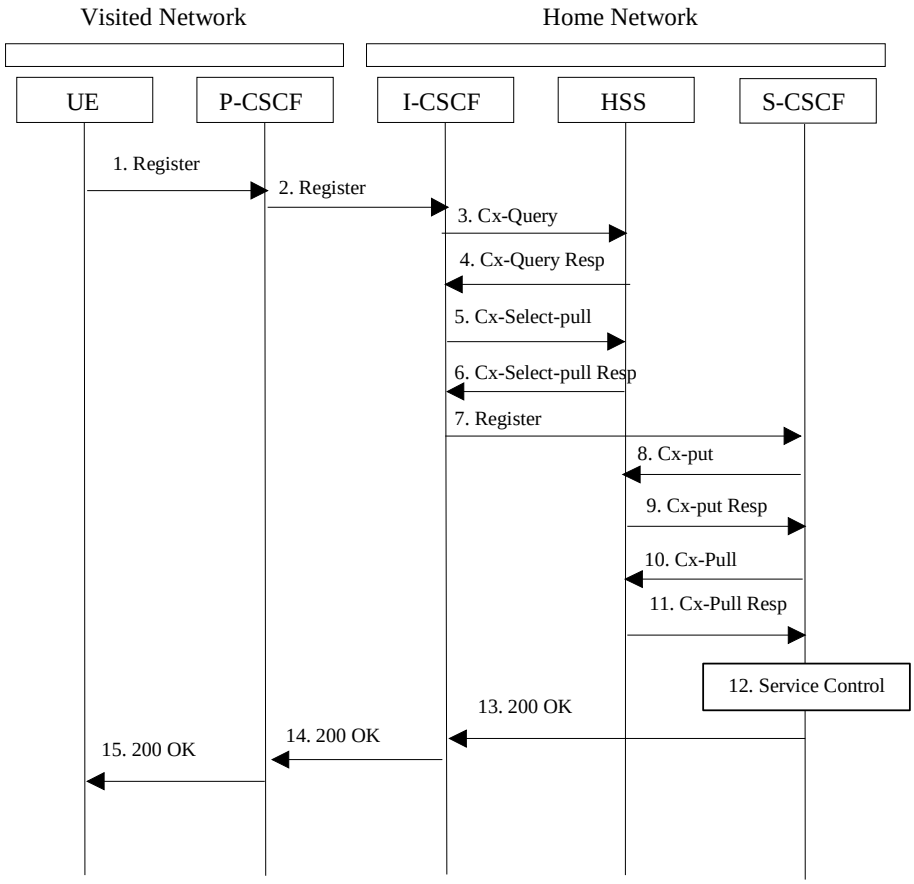

Figure 5.1: Registration – User not registered

1. After the UE has obtained a signalling channel through the access network, it can perform the IM registration. To do so, the UE sends the Register information flow to the proxy (public user identity, private user identity, home network domain name, UE IP address).

2. Upon receipt of the register information flow, the P-CSCF shall examine the "home domain name" to discover the entry point to the home network (i.e. the I-CSCF). The proxy shall send the Register information flow to the I-CSCF (P-CSCF address/name, public user identity, private user identity, P-CSCF network identifier, UE IP address). A name-address resolution mechanism is utilised in order to determine the address of the home network from the home domain name. The P-CSCF network identifier is a string that identifies at the home network, the network where the P-CSCF is located (e.g., the P-CSCF network identifier may be the domain name of the P-CSCF network).

3. The I-CSCF shall send the Cx-Query information flow to the HSS (public user identity, private user identity, P-CSCF network identifier).

   The HSS shall check whether the user is registered already. The HSS shall indicate whether the user is allowed to register in that P-CSCF network (identified by the P-CSCF network identifier) according to the User subscription and operator limitations/restrictions if any.

4. Cx-Query Resp is sent from the HSS to the I-CSCF. It shall contain the S-CSCF name, if it is known by the HSS, and, the S-CSCF capabilities, if it is necessary to select a new S-CSCF. When the response contains both S-CSCF name and capabilities the I-CSCF may perform a new assignment. When only capabilities are returned the I-CSCF will continue proceeding according to step 5. If the checking in HSS was not successful the Cx-Query Resp shall reject the registration attempt.

5. If the I-CSCF has not been provided with the name of the S-CSCF then the I-CSCF shall send Cx-Select-Pull (public user identity, private user identity) to the HSS to request the information related to the required S-CSCF capabilities which shall be input into the S-CSCF selection function.

6. On receipt of the Cx-Select-Pull, the HSS shall send Cx-Select-Pull Resp (required S-CSCF capabilities) to the I-CSCF.

7. The I-CSCF, using the name of the S-CSCF, shall determine the address of the S-CSCF through a name-address resolution mechanism. The I-CSCF also determines the name of a suitable home network contact point, possibly based on information received from the HSS. The home network contact point may either be the S-CSCF itself, or a suitable I-CSCF(THIG) in case network configuration hiding is desired. If an I-CSCF(THIG) is chosen as the home network contact point for implementing network configuration hiding, it may be distinct from the I-CSCF that appears in this registration flow, and it shall be capable of deriving the S-CSCF name from the home contact information. I-CSCF shall then send the register information flow (P-CSCF address/name, public user identity, private user identity, P-CSCF network identifier, UE IP address, I-CSCF(THIG) in case network configuration hiding is desired) to the selected S-CSCF. The home network contact point will be used by the P-CSCF to forward session initiation signalling to the home network.

8. The S-CSCF shall send Cx-Put (public user identity, private user identity, S-CSCF name) to the HSS. The HSS stores the S-CSCF name for that user.

9. The HSS shall send Cx-Put Resp to the S-CSCF to acknowledge the sending of Cx-Put.

10. On receipt of the Cx-Put Resp information flow, the S-CSCF shall send the Cx-Pull information flow (public user identity, private user identity) to the HSS in order to be able to download the relevant information from the user profile to the S-CSCF. The S-CSCF shall store the P-CSCF address/name, as supplied by the visited network. This represents the address/name that the home network forwards the subsequent terminating session signalling to for the UE.

11. The HSS shall return the information flow Cx-Pull Resp (user information) to the S-CSCF. The user information passed from the HSS to the S-CSCF shall include one or more names/addresses information which can be used to access the platform(s) used for service control while the user is registered at this S-CSCF. The S-CSCF shall store the information for the indicated user. In addition to the names/addresses information, security information may also be sent for use within the S-CSCF.

12. Based on the filter criteria, the S-CSCF shall send register information to the service control platform and perform whatever service control procedures are appropriate.

13. The S-CSCF shall return the 200 OK information flow (home network contact information) to the I-CSCF. If an I-CSCF is chosen as the home network contact point for implementing network configuration hiding, the I-CSCF shall encrypt the S-CSCF address in the home network contact information.

14. The I-CSCF shall send information flow 200 OK (home network contact information) to the P-CSCF. The I-CSCF shall release all registration information after sending information flow 200 OK.

15. The P-CSCF shall store the home network contact information, and shall send information flow 200 OK to the UE.

Note: The encryption mechanism for implementing network configuration hiding is specified in TS 33.203.

End of modified section

3GPP TSG-SA2 Meeting #28 ***Tdoc S2-023544***
Bangkok, Thailand, 11 – 15 November 2002

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **242** ⌘**rev** **1** ⌘ 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 [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Clean-up of IMS emergency session requirement
Source:	⌘	Nokia, Siemens
Work item code:	⌘	EMC1-PS
Date:	⌘	06/11/2002
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one 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 one 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:	⌘	Rel6 IMS should support IMS emergency sessions. Current specifications do not address bearer establishment procedures for emergency sessions. It is understood that emergency bearers should have a special treatment in the network therefore there should be an indication from UE that a bearer is used for an emergency session.
Summary of change:	⌘	The statement of IMS emergency sessions are not supported is removed. Basic emergency session establishment procedures have been added.
Consequences if not approved:	⌘	Misleading text in Rel6 specification and activation of PDP context may be rejected e.g. due to pre-paid. Ongoing emergency sessions may be released in the network.

Clauses affected:	⌘	5.13, 5.13.1 and two new clauses

	Y	N		
Other specs affected: ⌘		X	Other core specifications	⌘
		X	Test specifications	
		X	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.

5.13 IMS Emergency ~~s~~Sessions

This section presents the main procedures for the IMS emergency sessions.

5.13.1 Requirements for IMS Emergency Sessions

~~Emergency sessions via IMS are not supported in this release of the present document.~~ A CS capable UE shall use the CS domain for emergency services.

5.13.x Procedures for SIP Emergency Session Establishment

It shall be possible for the network to discriminate between emergency sessions and other sessions. This shall allow special treatment (e.g. with respect to filtering, higher priority, routing, QoS) of emergency sessions.

5.13.x Procedures for IMS Emergency Session Establishment

In order to establish an IMS emergency session the UE needs to have a PDP context to be used for IMS related signalling and optionally a secondary PDP context for the media related to the emergency session.

It shall be possible for the network to identify that a PDP context to be activated is for emergency use (signalling and media context). It allows to apply special treatment (e.g. with respect to filtering, higher priority, routing, QoS) of IMS emergency sessions.

If the UE is not attached to GPRS network, then it shall first perform a GPRS attach. It shall be possible for the network to discriminate between a normal Attach and an Attach for emergency use.

3GPP TSG-SA2 Meeting #28
Bangkok, Thailand, 11-15.11.2002

S2-023543

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CHANGE REQUEST

⌘ **23.228** **CR** **244** ⌘**rev** ⌘ 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 ☐

Title:	⌘	Removing the editor's note on stage-2 concepts for IMS Local services
Source:	⌘	Nokia, Siemens, Ericsson
Work item code:	⌘	IMS-CCR
Date:	⌘	11/11/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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 one 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:	⌘	Basic stage-2 concepts for providing IMS local services have already been developped within Rel5, and documented into 23.228. However, due to lack of completion of the stage-3 aspects, the function has been moved to Rel6. As a result, the concepts documented in the Rel5 version of 23.228 have been moved to an Editor's note.
Summary of change:	⌘	As an accompanying CR introduces the Local services concept to Rel6, the editor's note can now be removed from Rel5.
Consequences if not approved:	⌘	Editor's note would remain

Clauses affected:	⌘	4.2.2

Other specs affected: ⌘	Y	N	
		X	Other core specifications ⌘
		X	Test specifications
		X	O&M Specifications

Other comments:	⌘	An accompanying CR for Rel-6 is contained in CR#241 to add the local services concept. CR#241 and CR#244 are dependent on eachother.

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.

********** First and only set of changes **********

4.2.2 Void~~Support of Local Services in the IMS~~

~~[Editor's note: Local Services are not supported in Release 5 (decision from SA#15). However, in order not to create a Release 6 version of 23.228, the following text is kept in version 5 (to be deleted from version 5 as soon as a version 6 is created):~~

~~Visited network provided services offer an opportunity for revenue generation by allowing access to services of a local nature to visiting users (inbound roamers). There shall be a standardised means to access local services. The mechanism to access local services shall be exactly the same for home users and inbound roamers.~~

~~Access to local services shall be provided in the following manner~~

~~1. It shall be possible for the HPLMN to determine whether the roaming user is requesting a local service, or is "dialing" an address according to the local addressing plan. This shall be based upon an indication received from the UE. The same indication shall be used to access local services as well as to use the local addressing plan. This indication shall be included in the Request URI of the SIP Invite. 2. The P-CSCF shall route the session towards the S-CSCF as per the session origination procedures.~~

~~2. Processing the SIP URI (e.g. address analysis and potential modification such as translation into globally routable format) shall be performed by an Application Server in the subscriber's Home Network. The S-CSCF routes the session towards this Home Network Application Server based upon filter criteria which are triggered by the 'local indication' received from the UE.~~

~~3. The S-CSCF routes the session, via normal SIP routing, towards its destination (eg a server in the VPLMN). The ISC interface is not used as an inter-operator interface.~~

~~There shall be a standardised mechanism for the UE that is registered in the IM Subsystem, to receive and/or retrieve information about the available local services. It shall be possible to advertise local services to a registered UE independent of whether the UE has an active SIP session. Local services may be presented e.g. by directing the user to a web page.~~

~~Note: For users who have roamed, services relevant to the locality of the user may also be provided by the home network.~~

~~End of editor's note.]~~

3GPP TSG-SA2 Meeting #28
Bangkok, Thailand, 11-15.11.2002

S2-023542

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **241** ⌘**rev** **1** ⌘ 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 [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Re-introducing stage-2 concepts for IMS Local services
Source:	⌘	Nokia, Siemens, Ericsson
Work item code:	⌘	IMS2
Date:	⌘	11/11/2002
Category:	⌘	**B**
Release:	⌘	Rel-6

Use one 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 one 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:	⌘	Basic stage-2 concepts for providing IMS local services have already been developped within Rel5, and documented into 23.228. However, due to lack of completion of the stage-3 aspects, the function has been moved to Rel6. As a result, the concepts documented in the Rel5 version of 23.228 have been moved to an Editor's note.
Summary of change:	⌘	The IMS Local services concept is re-introduced to the normative section of the Rel6 version of 23.228.
Consequences if not approved:	⌘	

Clauses affected:	⌘	4.2.2

	Y	N			
Other specs affected:		X	Other core specifications	⌘	Y 24.229 & may be other specs
		X	Test specifications		
		X	O&M Specifications		

Other comments:	⌘	An accompanying CR for Rel-5 is contained in CR#244 to remove the editor's note with the complete content of clause 4.2.2

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.

********** First and only set of changes **********

4.2.2 Support of Local Services in the IMS

~~[Editor's note: Local Services are not supported in Release 5 (decision from SA#15). However, in order not to create a Release 6 version of 23.228, the following text is kept in version 5 (to be deleted from version 5 as soon as a version 6 is created):~~

Visited network provided services offer an opportunity for revenue generation by allowing access to services of a local nature to visiting users (inbound roamers). There shall be a standardised means to access local services. The mechanism to access local services shall be exactly the same for home users and inbound roamers.

Access to local services shall be provided in the following manner

1. It shall be possible for the HPLMN to determine whether the roaming user is requesting a local service, or is "dialing" an address according to the local addressing plan. This shall be based upon an indication received from the UE. The same indication shall be used to access local services as well as to use the local addressing plan. This indication shall be included in the Request URI of the SIP Invite.

2. The P-CSCF shall route the session towards the S-CSCF as per the session origination procedures.

3. Processing the SIP URI (e.g. address analysis and potential modification such as translation into globally routable format) shall be performed by an Application Server in the subscriber's Home Network. The S-CSCF routes the session towards this Home Network Application Server based upon filter criteria which are triggered by the 'local indication' received from the UE.

4. The S-CSCF routes the session, via normal SIP routing, towards its destination (eg a server in the VPLMN). The ISC interface is not used as an inter-operator interface.

There shall be a standardised mechanism for the UE that is registered in the IM Subsystem, to receive and/or retrieve information about the available local services. It shall be possible to advertise local services to a registered UE independent of whether the UE has an active SIP session. Local services may be presented e.g. by directing the user to a web page.

Note: For users who have roamed, services relevant to the locality of the user may also be provided by the home network.

~~End of editor's note.]~~

3GPP TSG-SA2 Meeting #28
Bangkok, Thailand, 11-15.11.2002

S2-023539

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **233** ⌘**rev** **1** ⌘ 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 ☒

Title:	⌘	Resource reservation
Source:	⌘	Nortel Networks, Lucent, Ericsson
Work item code:	⌘	IMS-CCR
Date:	⌘	11/11/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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 one 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: ⌘ It is acceptable in SIP for a UAC/UAS to indicate that preconditions are already met in the initial offer/answer exchange. This may be required in the case that no resource reservation is necessary.

In particular, at a PSTN gateway, resource reservation may often not be required since the maximum bandwidth required to any given TDM gateway can easily be calculated (based on the number of TDM ports).

Also, the UAC/UAS indicate separately whether they each require confirmation of pre-conditions. Even when there are pre-conditions, it may not be the case that both sides require confirmation. For example, in many cases the UAC may not need confirmation that resource reservation is complete at the UAS.

The current flows show mandatory messages for confirmation of pre-conditions, which may not be required. It should be clarified that these flows represent examples, for the case where confirmation of resource reservation is necessary.

Summary of change: ⌘ A note clarifying this optionality is added.

Consequences if not approved: ⌘ Mis-alignment between IMS and IETF specifications. Unnecessary messaging in cases where resource reservation is not required. Unnecessary deviation from IETF standard SIP.

Clauses affected: ⌘ 5.4.8

Other specs affected: ⌘

Y	N		
	X	Other core specifications	⌘
	X	Test specifications	
	X	O&M Specifications	

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 amended Section **********

5.4.8 QoS-Assured Preconditions

This section contains concepts for the relation between the resource reservation procedure and the procedure for end-to-end sessions.
A precondition as defined in SIP WG, is a set of constraints about the session which are introduced during the session initiation. The recipient of the session generates an answer, but does not alert the user or otherwise proceed with session establishment until the preconditions are met. This can be known through a local event (such as a confirmation of a resource reservation), or through a new set of constraints sent by the caller.

A "QoS-Assured" session will not complete until required resources have been allocated to the session. In a QoS-Assured session, the UE must succeed in establishing the QoS bearer for the media stream according to the QoS preconditions defined at the session level before it may indicate a successful response to complete the session and alert the other end point. The principles for when a UE shall regard QoS preconditions to be met are:

- A minimum requirement to meet the QoS preconditions defined for a media stream in a certain direction, is that a satisfactory PDP context is established at the local access for that direction.

- Segmented resource reservation is performed since the end points are responsible to make access network resource reservations via local mechanisms.

- The end points shall offer the resources it may want to support for the session and negotiate to an agreed set. Multiple negotiation steps may be needed in order to agree on a set of media for the session. The final agreed set is then updated between the end points.

- The action to take in case a UE fails to fulfil the pre-conditions (e.g. failure in establishment of an RSVP session) depends on the reason for failure. If the reason is lack of resources in the network (e.g. an admission control function in the network rejects the request for resources), the UE shall fail to complete the session. For other reasons (e.g. lack of RSVP host or proxy along the path) the action to take is local decision within the UE. It may for example 1) choose to fail to complete the session, 2) attempt to complete the session by no longer requiring some of the additional actions (e.g. fall back to satisfactory establishment of PDP context only).

The flows of sections 5.5, 5.6 and 5.7 depict the case where both UEs require confirmation from the other of the fulfilment of the pre-conditions. Other cases are possible according to the SIP specifications. For example, the pre-conditions may already be fulfilled (according to the principles above) when the INVITE is sent, or the UE may not require explicit confirmation from the other SIP endpoint when the pre-conditions are fulfilled. One example of such SIP endpoint is the MGCF used for PSTN interworking. In these cases, one or both of the reservation confirmation messages may not be sent.

********** End of Changes ********** *

3GPP TSG-SA2 Meeting #28
Bangkok, Thailand, 11-15.11.2002

S2-023537~~354~~

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **236** ⌘ **rev** **1** ⌘ 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 [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Clarification on grouping of media components to PDP Contexts
Source:	⌘	Nokia
Work item code:	⌘	IMS-CCR
Date:	⌘	11/11/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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 one 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:	⌘	Current specifications define a mechanism for the P-CSCF to control the separation of media components to separate PDP Contexts. This control is based on local policy of the visited IMS network operator. The main input for such policies is thought to be the bearer charging capabilities of the visited network, and the capabilities of available IMS terminals.
Summary of change:	⌘	The main input factors for determining media separation policies are clarified.
Consequences if not approved:	⌘	It would remain unclear what factors are expected to determine the media separation policy.

Clauses affected:	⌘	4.2.5.1

Other specs affected:	⌘	Y	N		⌘
			X	Other core specifications	
			X	Test specifications	
			X	O&M Specifications	

Other comments:	⌘	Clause 4.2.5.1 may be moved to another clause for the Rel6 version of 23.228 by separate CRs. If all these CRs are approved, the changes brought by this CR will have to be reflected in the new clause of the Rel6 version of 23.228.

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.

********** First and only set of changes **********

4.2.5.1 Relation of IMS media components and PDP contexts carrying IMS media

The relation between IMS media components and PDP contexts carrying IMS media is controlled by the IMS network on media component level in the following way:

The P-CSCF shall have the capability to indicate to the UE that a separate PDP Context is required for each IMS media component indicated.

- If the UE receives such an indication for a media component, it shall open a separate PDP Context for this media component. If the UE receives no such indication for a media component, the UE makes the decision whether to open a separate PDP Context or modify an existing PDP Context for this media component.

- The criteria and information for setting this indication is determined by local policy in the network where the P-CSCF is located.

Note: the bearer charging capabilities of the P-CSCF's network, and the capabilities of deployed UEs should be taken into account when defining such policies in the visited IMS network operator's domain.

- The IMS network shall have the capability to transfer the media component level indication described above to the UE. This media component level indication shall be transferred in SIP/SDP signaling upon session initiation and addition of media component(s) to active IMS sessions.

It is assumed that media components from different IMS sessions are not carried within the same PDP context.

All associated IP flows (such as e.g. RTP / RTCP flows) used by the UE to support a single media component are assumed to be carried within the same PDP context.

3GPP TSG-SA2 Meeting #28
Bangkok, Thailand, 11th-15th November, 2002

Tdoc ⌘S2-023536

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **227** ⌘**rev** **1** ⌘ 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 [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Number internationalisation clarification
Source:	⌘	Ericsson
Work item code:	⌘	IMS-CCR
Date:	⌘	13/11/02
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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 one 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:	⌘	-As Local services are not part of Release 5 within IMS, it leaves the E.164 number handling unclear/unspecified. So, this CR adds text for Release 5 of handling E.164 numbers based on the same principle as local services.
Summary of change:	⌘	Add clarification on how to populate and interpret E.164 numbers
Consequences if not approved:	⌘	Unspecified user identity based on E.164 number handling leading to different and/or missing behavior for IMS

Clauses affected:	⌘	New clause 4.3.3.x

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	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.

***************First Modified section***********************

4.3.3.3 Routing of SIP signalling within the IP multimedia subsystem

Routing of SIP signalling within the IMS shall use SIP URLs. E.164 [2] format public user identities shall not be used for routing within the IMS, and session requests based upon E.164 format public user identities will require conversion into SIP URL format for internal IMS usage.

4.3.3.x Handling of dialled number formats

When using a phone number as the dialled address, the UE can provide this number in the form of a SIP URI or a TEL URL. This phone number can be in the form of E.164 format (prefixed with a '+' sign), or a local format using local dialing plan and prefix. The IMS will interpret the phone number with a leading '+' to be fully defined international number.

Support for local services and local dialling plans are not specified in the present document.

***************End Modified section***********************

3GPP TSG-SA2 Meeting #28 ***Tdoc S2-023523***
Bangkok, Thailand,11-15 November , 2002

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **221** ⌘**rev** **1** ⌘ 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 ☒

Title:	⌘	Clarification on the ISC interface
Source:	⌘	NEC Corporation
Work item code:	⌘	IMS-CCR
Date:	⌘	5/11/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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 one 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:	⌘	The cuurent text in subclause 4.2.4(ISC interface) is unclear as follows. 1. It is not clear that SIP Application Server is provided as service specific AS or not. 2. It is not clear whether ISC interface conveys charging information only or charging data .
Summary of change:	⌘	It is proposed to change the text as shown above.
Consequences if not approved:	⌘	ISC interface remains unclear and causes implementation wrongly.

Clauses affected:	⌘	4.2.4

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	

Other comments:	⌘	

How to create CRs using this form:
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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.

Start of change

4.2.4 IP multimedia Subsystem Service Control Interface (ISC)

The ISC interface is between the Serving CSCF and the service platform(s).

An Application Server (AS) offering value added IM services resides either in the user's home network or in a third party location. The third party could be a network or simply a stand-alone AS.

The Serving-CSCF to AS interface is used to provide services residing in an AS. Two cases were identified:

- Serving-CSCF to an AS in Home Network.

- Serving-CSCF to an AS in External Network (e.g., Third Party or Visited)

Regarding the general provision of services in the IMS, the following statements shall guide the further development.

1. Besides the Cx interface the S-CSCF supports only one standardised protocol for service control, which delegates service execution to an “Application Server”.

2. The depicted functional architecture does not propose a specific physical implementation.

3. Scope of the SIP Application Server: the SIP Application Server may host and execute services. It is intended to allow the SIP Application Server to influence and impact the SIP session on behalf of the services and it uses the ISC interface to communicate with the S-CSCF. SIP Application Server may be provided as service specific Application Server.

4. The S-CSCF shall decide whether an Application Server is required to receive information related to an incoming SIP session request to ensure appropriate service handling.. The decision at the S-CSCF is based on (filter) information received from the HSS. This filter information is stored and conveyed on a per application server basis for each user. The name(s)/address(es) information of the application server(s) are received from the HSS.

5. The purpose of the IM SSF is to host the CAMEL network features (i.e. trigger detection points, CAMEL Service Switching Finite State Machine, etc) and to interface to CAP.

6. The IM SSF and the CAP interface support legacy services only.

7. Once the IM SSF, OSA SCS or SIP Application Server has been informed of a SIP session request by the S-CSCF, the IM SSF, OSA SCS or SIP Application Server shall ensure that the S-CSCF is made aware of any resulting activity by sending messages to the S-CSCF.

8. From the perspective of the S-CSCF, The “SIP Application server”, “OSA service capability server” and “IM-SSF” shall exhibit the same interface behaviour.

9. The application server may contain “service capability interaction manager” (SCIM) functionality and other application servers. The SCIM functionality is an application which performs the role of interaction management. The internal components are represented by the “dotted boxes” inside the SIP application server. The internal structure of the application server is outside the standards.
The Sh interface shall have sufficient functionality to enable this scenario.

10. When the name/address of more than one “application server” is transferred from the HSS, the S-CSCF shall contact the “application servers” in the order supplied by the HSS. The response from the first “application server” shall be used as the input to the second “application server”. Note that these multiple “application servers” may be any combination of the SIP Application server, OSA service capability server, or IM-SSF types.

11. The S-CSCF does not handle service interaction issues..

12. The S-CSCF does not provide authentication and security functionality for secure direct third party access to the IM subsystem. The OSA framework provides a standardized way for third party secure access to the IM subsystem.

12a. If a S-CSCF receives a SIP request on the ISC interface that was originated by an Application Server destined to a user served by that S-CSCF, then the S-CSCF shall treat the request as a terminating request to that user and provide the terminating request functionality as described in items 4 and 10 above. Both registered and unregistered terminating requests shall be supported.

More specifically the following requirements apply to the IMS Service control interface:

1. The ISC interface shall be able to convey charging information as per 3GPP TS 32.200[25] and 3GPP TS 32.225[26].

2. The protocol on the ISC interface shall allow the S-CSCF to differentiate between SIP requests on Mw, Mm and Mg interfaces and SIP Requests on the ISC interface.

The figure below depicts an overall view of how services can be provided.

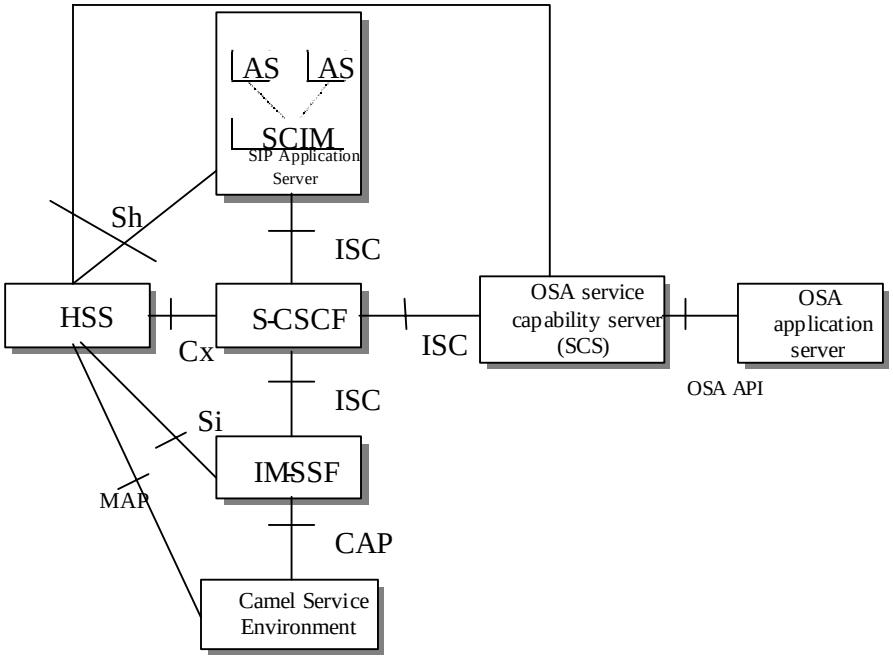

Figure 4.3: Functional architecture for the provision of service in the IMS

The protocol to be used on the ISC interface shall be SIP (as defined by RFC 3261 [12], other relevant RFC's, and additional enhancements introduced to support 3GPP´s needs on the Mw, Mm, Mg interfaces). On the ISC interface, extensions to SIP shall be avoided but are not expressly prohibited.

The notion of a "SIP leg" used throughout this specification is identical to the notion of a call leg which is the same as a SIP dialog defined by RFC 3261 [12]. The same SIP leg that is received by the S-CSCF on the Mw, Mm and Mg interfaces is sent on the ISC interface. The same SIP leg that is received by the S-CSCF on the ISC interface is sent on the Mw, Mm and Mg interfaces.

Concerning the relationship between the SIP legs of the ISC interface and the SIP legs of the Mw, Mm, and Mg interfaces the S-CSCF acts as a SIP proxy, as shown in Figures 4.a-4e below.

Figures 4.3a-4.3e below depict the possible high-level interactions envisioned between the S-CSCF and the Application Server.

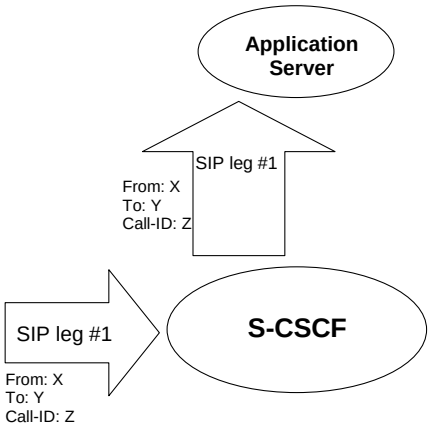

Figure 4.3a: Application Server acting as terminating UA, or redirect server

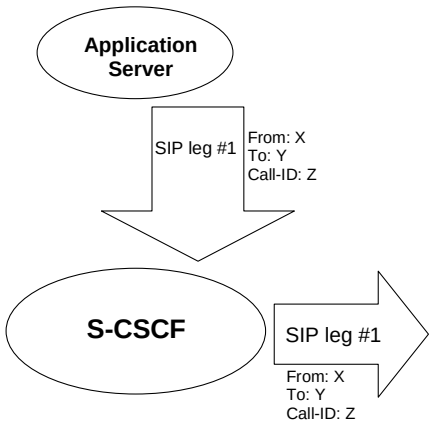

Figure 4.3b: Application Server acting as originating UA

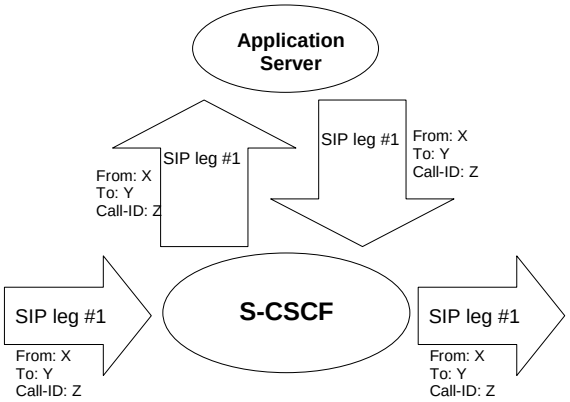

Figure 4.3c: Application Server acting as a SIP proxy

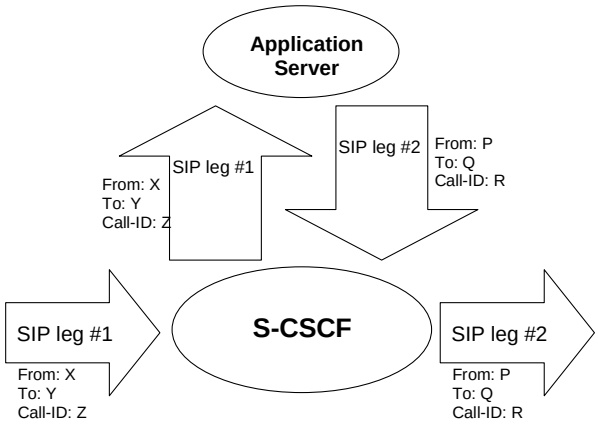

Figure 4.3d: Application Server performing 3rd party call control

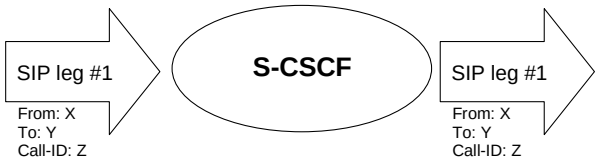

Figure 4.3e: A SIP leg is passed through the S-CSCF without Application Server involvement

4

End of change

3GPP TSG-SA2 Meeting #28
Bangkok, Thailand, 11th-15th November, 2002

Tdoc ⌘S2-023521

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **231** ⌘**rev** **1** ⌘ 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 ☒

Title:	⌘	Clean up of 23.228 in general to make the spec accurate
Source:	⌘	Ericsson
Work item code:	⌘	IMS-CCR
Date:	⌘	25/10/02
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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 one 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:	⌘	-Clean up to make 23.228 accurate and consistent. During the joint work (Ericsson, Lucent, Nokia, Nortel, Siemens) to update 23.228 for Rel-6 to ensure it is access agnostic, different companies found some inaccuracies/inconsistencies in Rel-5 spec. This CR combines most of the findings into a common 23.228 update.
Summary of change:	⌘	In section 4.2.1.2, include same reference as for CAMEL. In section 4.3.3.4, remove sentence about IMS data storage in ISIM, as this has been already clearly specified. Also the sentence does not make sense. In section 5.4.4, UMTS has been replaced by 3GPP In section 5.4.8, more precise terminology used and reference to IETF WG removed. In section 5.4.9, the word 'normal' is removed when refering to PS domain. In section 5.10.3.1, the reference is corrected as it was pointing to non-existant diagram.
Consequences if not approved:	⌘	Unclear/wrong stage 2 specification

Clauses affected:	⌘	4.2.1.2, 4.3.3.4, 5.4.8, 5.10.3.1, 5.4.4, 5.4.9

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	

Other comments:	⌘	

How to create CRs using this form:

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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 Modified section***********************

4.2.1 Virtual Home Environment (VHE)

4.2.1.1 Support of CAMEL

It shall be possible for an operator to offer access to services based on the CSE for its IM CN subsystem subscribers. It should be noted that there is no requirement for any operator to support CAMEL services for their IM CN subsystem subscribers or for inbound roamers.

For more information refer to section 4.2.4.

4.2.1.2 Support of OSA

It shall be possible for an operator to offer access to services based on OSA for its IM CN subsystem subscribers. This shall be supported by an OSA API between the Application Server (AS) and the network.

For more information refer to section 4.2.4.

***************Second Modified section***********************

4.3.3.4 Relationship of private and public user identities

The home network operator is responsible for the assignment of the private user identifier, and public user identifiers; other identities that are not defined by the operator may also exist.

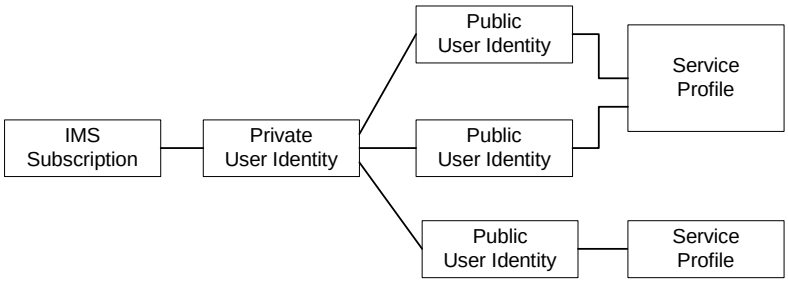

Figure 4.5: Relationship of the private user identity and public user identities

Each Public user identity is associated with one and only one Service Profile. Each service profile is associated with one or more Public user identities. The Service Profile is a collection of service and user related data. The Service Profile is independent from the Implicit Registration Set, e.g. IMPUs with different Service Profiles may belong to the same Implicit Registration Set.

All Service Profiles that share the same Private user identity are associated to the same S-CSCF. Later releases may allow different Service Profiles that share the same Private user identity to be associated with different S-CSCFs.

An ISIM application shall securely store the home domain name of the subscriber. It shall not be possible for the UE to modify the information from which the home domain name is derived.

If the UICC does not have an ISIM application, then, the home domain name shall be derived from the Mobile Country Code and Mobile Network Code fields of the USIM's IMSI. The format of the home domain name is specified in 3GPP TS 23.003 [24].

~~The storage location of the Private User Identity, Public User Identity and home domain name for a standalone SIP Client could be stored on the ISIM.~~

It is not a requirement for a user to be able to register on behalf of another user or for a device to be able to register on behalf of another device or for combinations of the above for the IM CN subsystem for this release.

***************Third Modified section***********************

5.4.4 Requirements for IP multi-media session control

In order for operators to be able to offer a "carrier-grade" IP multimedia service, and considering that the network cannot trust the UE to give correct references to be put in the CDR or to require bearers whose features (e.g. Bandwidth) are coherent with the media components negotiated through CSCFs, the following features shall be offered:

1. Both end points of the session shall be able to negotiate (according to service /UE settings,) which resources (i.e. which media components) need to be established before the destination party is alerted. The session signalling shall ensure that these resources (including ~~(UMTS)~~ IP-Connectivity Network resources and IP multimedia backbone resources) are made available or reserved before the destination UE rings.

   This should nevertheless not prevent the UE from offering to the end-user the choice of accepting or rejecting the components of the session before establishing the bearers.

2. Depending on regulatory requirements, the IP multimedia service shall be able to charge the originating party for the Access IP-connectivity service of both originating and destination side or when reverse charging applies to charge the terminating party for the Access IP-connectivity service of both originating and terminating side. This implies that it should be easy to correlate CDR held by Access IP-connectivity service (e.g. GPRS) with a session.

3. The session control function of IP multimedia network of an operator (CSCF) shall be able (according to operator choice) to have a strict control (e.g. on source /destination IP address, QoS) on the flows associated with session established through SIP entering the IP multimedia bearer network from Access IP-connectivity service. This does not mean that CSCF is the enforcement point (which actually is the Gateway between the Access IP-connectivity service and the IP multimedia network, i.e. the GGSN in GPRS~~UMTS~~ case) but that the CSCF may be the final decision point for this control.

4. The session control and bearer control mechanisms shall allow the session control to decide when user plane traffic between end-points of a SIP session may start/shall stop. This allows this traffic to start/stop in synchronisation with the start/stop of charging for a session.

5. The Access IP-connectivity service shall be able to notify the IP multimedia session control when Access IP-connectivity service has either modified or suspended or released the bearer(s) of an user associated with a session (because e.g. the user is no longer reachable).

6. The solution shall comply with the architectural rules relating to separation of bearer level, session control level, and service level expressed in 23.221[7].

***************Fourth Modified section***********************

5.4.8 QoS-Assured Preconditions

This section contains concepts for the relation between the resource reservation procedure and the procedure for end-to-end sessions.

A precondition ~~as defined in SIP WG,~~ is a set of constraints about the session, which are introduced during the session initiation. The recipient of the session generates an answer, but does not alert the user or otherwise proceed with session

establishment until the preconditions are met. This can be known through a local event (such as a confirmation of a resource reservation), or through a new set of constraints sent by the caller.

A "QoS-Assured" session will not complete until required resources have been allocated to the session. In a QoS-Assured session, the UE must succeed in establishing the QoS bearer for the media stream according to the QoS preconditions defined at the session level before it may indicate a successful response to complete the session and alert the other end point. The principles for when a UE shall regard QoS preconditions to be met are:

- A minimum requirement to meet the QoS preconditions defined for a media stream in a certain direction, is that an appropriate ~~satisfactory~~ PDP context is established at the local access for that direction.

- Segmented resource reservation is performed since the end points are responsible to make access network resource reservations via local mechanisms.

- The end points shall offer the resources it may want to support for the session and negotiate to an agreed set. Multiple negotiation steps may be needed in order to agree on a set of media for the session. The final agreed set is then updated between the end points.

- The action to take in case a UE fails to fulfil the pre-conditions (e.g. failure in establishment of an RSVP session) depends on the reason for failure. If the reason is lack of resources in the network (e.g. an admission control function in the network rejects the request for resources), the UE shall fail to complete the session. For other reasons (e.g. lack of RSVP host or proxy along the path) the action to take is local decision within the UE. It may for example 1) choose to fail to complete the session, 2) attempt to complete the session by no longer requiring some of the additional actions (e.g. fall back to ~~satisfactory~~ establishment of PDP context only).

***************Fifth Modified section***********************

5.4.9 Event and information distribution

The S-CSCF and Application Servers (SIP-AS, IM-SSF, OSA-SCS) shall be able to send service information messages to endpoints. This shall be done based on a SIP Request/Response information exchange containing the service information and/or a list of URI(s) pointing to the location of information represented in other media formats. The stimulus for initiating the service event related information message may come from e.g. a service logic residing in an application server.

In addition, the end points shall also be able to send information to each other. This information shall be delivered using SIP based messages. The corresponding SIP messages shall be forwarded along the IMS SIP signalling path. This includes the S-CSCF but may also include SIP application servers. The information may be related or unrelated to any ongoing session and/or may be independent of any session. Applicable mechanisms (for e.g. routing, security, charging, etc) defined for IMS SIP sessions shall also be applied for the SIP based messages delivering the end-point information. The length of the information transferred is restricted by the message size (e.g. the MTU), so fragmentation and re-assembly of the information is not required to be supported in the UE. This information may include e.g. text message, http url, etc.

This mechanism considers the following issues:

- The IMS has the capability to handle different kinds of media. That is, it is possible to provide information contained within several different media formats e.g. text, pictures or video.

- The UE's level of supporting service event related information and its exchange may depend on the UE's capabilities and configuration.

- A UE not participating in the service related information exchange shall not be effected by a service related information exchange possibly being performed with another UE of the session.

Note: The service event related information exchange may either take place in the context of a session, or independently outside the context of any existing session.

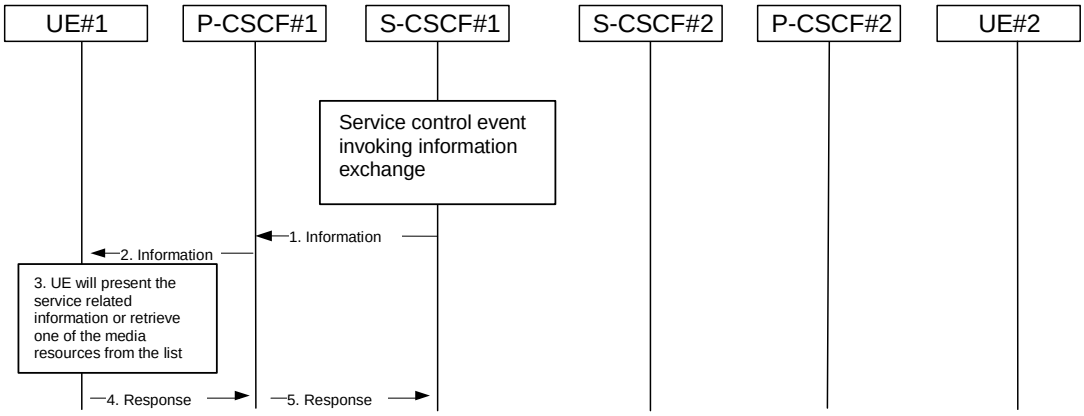

Figure 5.8: Providing service event related information to related endpoint

1. When a service event occurs that the S-CSCF or the Application Server wishes to inform an endpoint about, the S-CSCF or the Application Server generates a message request containing information to be presented to the user. The contents may include text describing the service event, a list of URI(s) or other service modification information.

2. P-CSCF forwards the message request.

3. UE presents the service-related information, to the extent that it conforms to its capabilities and configuration, to the user.

4. Possibly after interaction with the user, the UE will be able to include information in the response to the S-CSCF.

5. P-CSCF forwards the response.

Note 1: The UE may retrieve service event related information using ~~normal~~ PS Domain or IMS procedures.

Note 2: transport aspects of the information transfer described above may require further considerations.

***************Sixth Modified section***********************

5.10.3.1 Network initiated session release - P-CSCF initiated

The following flows show a Network initiated IM CN subsystem application (SIP) session release. It is assumed that the session is active and that the bearer was established directly between the two visited networks (the visited networks could be the Home network in either or both cases).

A bearer is removed e.g. triggered by a mobile power down, due to a previous loss of coverage, or accidental/malicious removal, etc. In this case the 'Indication of PDP Context Release' procedure will be performed (see 3GPP TS 23.207). The flow for this case is shown in Figure 5.26~~4~~.

In the event of loss of coverage, 3G TS 23.060 defines the Iu or RAB Release procedures. In case of PDP context with streaming or conversational class the maximum bitrate of the GTP tunnel between SGSN and GGSN is modified to 0 kbit/s. This is indicated to the P-CSCF / PCF by performing the 'PDP Context Modification' procedure (see 3GPP TS 23.207) as shown in Figure 5.25. For loss of coverage in case of other PDP contexts (background or interactive traffic class), the PDP context is preserved with no modifications.

Other network initiated session release scenarios are of course possible. In particular such scenarios initiated in the home network for administrative reasons might begin with an S-CSCF.

**********End Modified sections**********

3GPP TSG-SA2 Meeting #28
Bangkok, Thailand, 11th-15th November, 2002

Tdoc ⌘S2-023520

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **229** ⌘**rev** **1** ⌘ 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 [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Cleanup and alignment to stage 3 of 23.228
Source:	⌘	Ericsson
Work item code:	⌘	IMS-CCR
Date:	⌘	14/11/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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 one 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:	⌘	Cleanup of text and alignment to agreed stage 3 work
Summary of change:	⌘	This CR aligns the following issues to the agreed stage 3: • DTMF signalling is sent inband using RFC2833 The following issues are corrected: • IMPU is used but not defined, i.e. abbreviation not to be used • Temporary public user id is not necessarily barred • It is clarified that barring of IMPU applies to IMS non-registration procedures
Consequences if not approved:	⌘	Stage 2 and stage 3 is not aligned and stage 2 text may be misinterpreted.

Clauses affected:	⌘	4.3.3.2, 4.3.3.4, 5.2.1, 5.2.1a, 5.4.1

Other specs affected: ⌘	Y	N		⌘
		X	Other core specifications	
		X	Test specifications	
		X	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.

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

4.3.3.2 Public user identities

Every IM CN subsystem user shall have one or more public user identities [8]. The public user identity/identities are used by any user for requesting communications to other users. For example, this might be included on a business card.

- Both telecom numbering and Internet naming schemes can be used to address users depending on the Public User identities that the users have.
- The public user identity/identities shall take the form of SIP URL (as defined in RFC 3261 [12] and RFC2396 [13]) or the "tel:"-URL format [15]..
- An ISIM application shall securely store at least one Public User Identity (it shall not be possible for the UE to modify the Public User Identity), but it is not required that all additional Public User Identities be stored on the ISIM application.
- A Public User Identity shall be registered either explicitly or implicitly before the identity can be used to originate IMS sessions and IMS session unrelated procedures.
- A Public User Identity shall be registered either explicitly or implicitly before terminating IMS sessions and terminating IMS session unrelated procedures can be delivered to the UE of the user that the Public User Identity belongs to. Subscriber-specific services for unregistered users may nevertheless be executed as described in chapter 5.12.
- It shall be possible to register globally (i.e. through one single UE request) a user that has more than one public identity via a mechanism within the IP multimedia CN subsystem (e.g. by using an Implicit Registration Set). This shall not preclude the user from registering individually some of his/her public identities if needed.
- Public User Identitys are not authenticated by the network during registration.
- Public User Identities may be used to identify the user's information within the HSS (for example during mobile terminated session set-up).

If the UICC does not contain an ISIM application, then:

- A Temporary Public User identity shall be derived from the USIM's IMSI, and shall be used during initial SIP registration procedures. The Temporary public user identity shall take the form of a SIP URL (as defined in RFC 3261 [12] and RFC 2396 [13]). The format of the Temporary public user identity is specified in 3GPP TS 23.003 [24].

It is strongly recommended that the Temporary Public User Identity is set to barred for IMS non-registration procedures. The following applies if the Temporary Public User Identity is barred:

- A Temporary public user identity shall not be displayed to the user and shall not be used for public usage such as displaying on a business card. ~~It is strongly recommended that the Temporary Public User Identity is set to be barred. If the Temporary Public User Identity is barred:~~
- The Temporary Public User Identity shall only be used during the registration to ~~obtain~~ obtain implicitly registered Public User Identities.
- The implicitly registered public user identities shall be used for session handling, in other SIP messages and at subsequent registration processes.
- After the initial registration, the UE shall only use the implicitly registered Public User Identity(s).
- A Temporary public user identity shall only be available to the CSCF and HSS nodes.

Note that in case of Temporary Public Identity is used, the user can not initiate any sessions until the implicitly registered public identities are available in the UE.

4.3.3.3 Routing of SIP signalling within the IP multimedia subsystem

Routing of SIP signalling within the IMS shall use SIP URLs. E.164 [2] format public user identities shall not be used for routing within the IMS, and session requests based upon E.164 format public user identities will require conversion into SIP URL format for internal IMS usage.

4.3.3.4 Relationship of private and public user identities

The home network operator is responsible for the assignment of the private user identifier, and public user identifiers; other identities that are not defined by the operator may also exist.

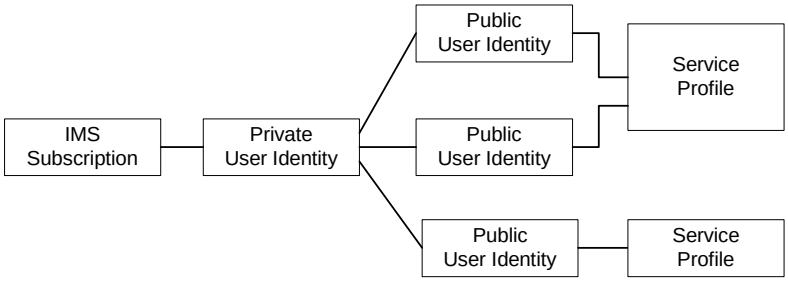

Figure 4.5: Relationship of the private user identity and public user identities

Each Public user identity is associated with one and only one Service Profile. Each service profile is associated with one or more Public user identities. The Service Profile is a collection of service and user related data. The Service Profile is independent from the Implicit Registration Set, e.g. Public user identities~~IMPUs~~ with different Service Profiles may belong to the same Implicit Registration Set.

All Service Profiles that share the same Private user identity are associated to the same S-CSCF. Later releases may allow different Service Profiles that share the same Private user identity to be associated with different S-CSCFs.

An ISIM application shall securely store the home domain name of the subscriber. It shall not be possible for the UE to modify the information from which the home domain name is derived.

If the UICC does not have an ISIM application, then, the home domain name shall be derived from the Mobile Country Code and Mobile Network Code fields of the USIM's IMSI. The format of the home domain name is specified in 3GPP TS 23.003 [24].

The storage location of the Private User Identity, Public User Identity and home domain name for a standalone SIP Client could be stored on the ISIM.

It is not a requirement for a user to be able to register on behalf of another user or for a device to be able to register on behalf of another device or for combinations of the above for the IM CN subsystem for this release.

4.3.4 Identification of network nodes

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

5.2.1 Requirements considered for registration

The following points are considered as requirements for the purpose of the registration procedures.

1. The architecture shall allow for the Serving-CSCFs to have different capabilities or access to different capabilities. E.g. a VPN CSCF or CSCFs in different stages of network upgrade.

2. The network operator shall not be required to reveal the internal network structure to another network. Association of the node names of the same type of entity and their capabilities and the number of nodes will be

kept within an operator's network. However disclosure of the internal architecture shall not be prevented on a per agreement basis.

3. A network shall not be required to expose the explicit IP addresses of the nodes within the network (excluding firewalls and border gateways).

4. It is desirable that the UE will use the same registration procedure(s) within its home and visited networks.

5. It is desirable that the procedures within the network(s) are transparent to the UE, when it register with the IM CN subsystem.

6. The Serving-CSCF understands a service profile and the address of the functionality of the Proxy-CSCF.

7. The HSS shall support the possibility to bar a public user identity from being used for IMS non-registration procedures~~communications~~. The S-CSCF shall enforce these barring rules for IMS. Examples of use for the barring function are as follows:

-Currently it is required that at least one public user identity shall be stored in the ISIM application. In case the user/operator wants to prevent this public user identity from being used for IMS communications, it shall be possible to do so in the network without affecting the ISIM application directly.

-In order to support pre-Rel 5 UICC accessing IMS services, a temporary public user identity is generated using IMSI. It is strongly recommended that the temporary public user identity be set to barred for IMS non-registration procedures.

8. When a Temporary Public Identity has been used to register an IMS user, the implicit registration will ensure that the UE, P-CSCF & S-CSCF have public user Identity(s) for all IMS procedures after the initial registration has been completed

9. It shall be possible to register multiple public identities via single IMS registration procedure from the UE.

5.2.1a Implicit Registration

When an user has a set of public user identities defined to be implicitly registered via single IMS registration of one of the public user identity's in that set, it is considered to be an Implicit Registration. No single public identity shall be considered as a master to the other public user identities. Figure 5.2.1a shows a simple diagram of implicit registration and public user identities. In order to support this function, it is required that:

- HSS has the set of public user identities that are part of implicit registration.
- Cx reference point between S-CSCF and HSS shall support download of all public user identities associated with the implicit registration, during registration of any of the single public user identities within the set.
- When one of the public user identities within the set is registered, all Public user identities~~IMPUs~~ associated with the implicit registration are registered at the same time.
- When one of the public user identities within the set is de-registered, all public user identities that have been implicitly registered are de-registered at the same time.
- Public user identities belonging to an implicit registration set may point to different service profiles; or some of these public user identities may point to the same service profile.
- When a public user identity belongs to an implicit registration set, it can not be registered or de-registered individually without the public user identity being removed from the implicit registration list.
- All IMS related registration timers should apply to the set of implicitly registered public user identities
- S-CSCF, P-CSCF and UE shall be notified of the set of public user identities belonging to the implicitly registered function. Session set up shall not be allowed for the implicitly registered public user identities until the entities are updated, except for the explicitly registered public user identity.
- When a public user identity is barred from IMS communications, only the HSS and S-CSCF shall have access to this public user identity,

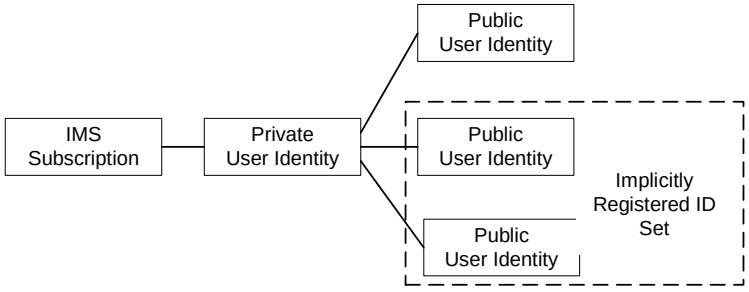

Figure 5.2.1a Relationship of public user identities when implicitly registered

5.2.1a.1 Implicit Registration for UE without ISIM

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

5.4.1 Bearer interworking concepts

Voice bearers from the IM CN subsystem need to be connected with the voice bearers of other networks. Elements such as Media Gateway Functions (MGW) are provided to support such bearer interworking. One of the functions of the MGW may be to support transcoding between a codec used by the UE in the IM CN subsystem and the codec being used in the network of the other party.

Default codecs to be supported within the UE are defined in [21]. The use of default codecs within the UE enables the IM CN subsystem to interwork with other networks on an end to end basis or through transcoding.

The IM CN subsystem is also able to interwork with the CS networks (e.g. PSTN, ISDN, CS domain of some PLMN) by supporting AMR to G.711 [17] transcoding in the IMS MGW element. Furthermore to allow interworking between users of the IM CN subsystem and IP multimedia fixed terminals and other codecs may (this is implementation dependent) be supported by the MGW.

In order to support existing network capabilities, it is required that a UE be able to send DTMF tone indications to the terminating end of a session using the bearer, i.e. inband signalling. ~~via the IMS. This can be done using SIP information.~~ An additional element for bearer interworking is the interworking of these DTMF tones between one network and another. This may involve the generation of tones on the bearer of one network based on out of band signaling on the other network. In such a case, the MGW shall provide the tone generation under the control of the MGCF.

5.4.2 Interworking with Internet

3GPP TSG-SA2 Meeting #28 ***Tdoc ⌘S2-023313***
Bangkok, Thailand, 11th-15th November, 2002

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **230** ⌘**rev** **-** ⌘ 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 ☒

Title:	⌘	P-CSCF at home or visited
Source:	⌘	Ericsson
Work item code:	⌘	IMS-CCR
Date:	⌘	25/10/02
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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 one 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:	⌘	- Current service architecture diagrams assume P-CSCF always in the visited network, which is incorrect as P-CSCF can be located at home or visited
Summary of change:	⌘	Update the diagrams to reflect accurate architecure scenarios. Also some clarification of text has been made.
Consequences if not approved:	⌘	.Stage 2 architecture diagram for services only provides configuration of P-CSCF in the visited network, which is incomplete & wrong

Clauses affected:	⌘	4.2.3

Other specs affected: ⌘	Y	N	
		X	Other core specifications ⌘
		X	Test specifications
		X	O&M Specifications

Other comments:	⌘	

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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.

**********Modified section**********

4.2.3 Support of roaming users

The architecture shall be based on the principle that the service control for Home subscribed services for a roaming subscriber is in the Home network, e.g., the Serving-CSCF is located in the Home network.

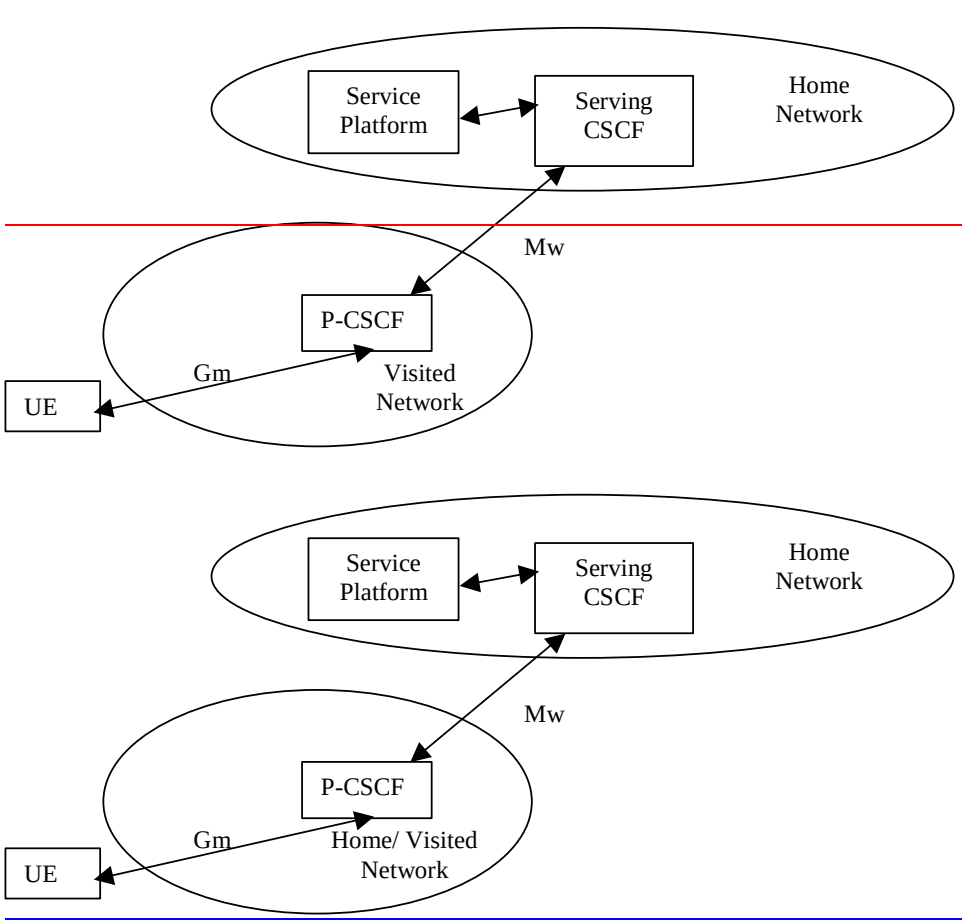
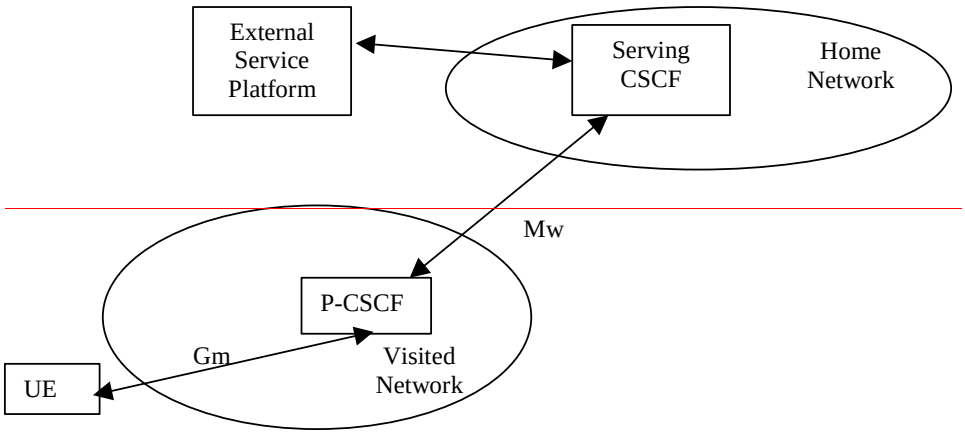


Figure 4-1: Service Platform in Home Network

~~**Figure 4-1: Service Platform in Home Network**~~



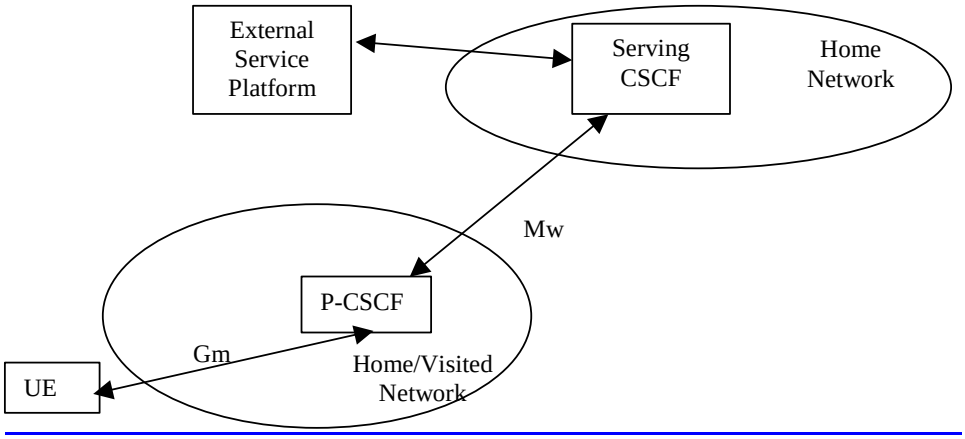


Figure 4-2: External Service Platform

There are two possible scenarios to provide services:

- via the service platform in the Home Network

- via an external service platform (e.g. third party or visited network)

The ~~box representing the~~ external service platform entity could be located in either the visited network or in the 3rd party platform. The standardised way for secure 3rd party access to IMS services is via the OSA framework, see section 4.2.4.

The roles that the CSCF plays are described below.

- The Proxy-CSCF is located in the same network as the GGSN. The Proxy-CSCF shall enable the session control to be passed to the Serving-CSCF.

- The Serving-CSCF is located in the home network. The Serving-CSCF shall provide the service control.

A Proxy-CSCF shall be supported in both roaming and non-roaming case, even when the Serving-CSCF is located in the same IM CN Subsystem~~S~~.

Reassigning the Proxy-CSCF assigned during CSCF discovery is not a requirement in this release. Procedures to allow registration time Proxy-CSCF reassignment may be considered in future releases.

Network initiated Proxy-CSCF reassignment is not a requirement.

The use of additional CSCFs, that is Interrogating-CSCFs, to be included in the SIP signalling path is optional. Such additional CSCFs may be used to shield the internal structure of a network from other networks.

3GPP TSG-SA2 Meeting #27
Bangkok, Thailand, 11th-15th November, 2002

Tdoc ⌘S2-023309

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **226** ⌘**rev** **-** ⌘ 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 [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Separation of media components in relation to forking
Source:	⌘	Ericsson, Siemens, Nokia
Work item code:	⌘	IMS-CCR
Date:	⌘	6/11/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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 one 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:	⌘	In SA2#27 tdoc S2-022878 showed that there are interaction problems when applying a policy to separate media components when forking is used. The meeting was in favour of the solution that the policy in the P-CSCF shall be static, i.e. the same policy shall be applied and maintained during a session.
Summary of change:	⌘	The policy of separation of media components is clarified and it is required that the P-CSCF shall apply and maintain the same policy during one session.
Consequences if not approved:	⌘	The resource reservation may fail, session set-up may be delayed, and/or media clipping may occur.

Clauses affected:	⌘	4.2.5.1

		Y	N			
Other specs affected:	⌘	Y		Other core specifications	⌘	24.229
			X	Test specifications		
			X	O&M Specifications		

Other comments:	⌘	

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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 **********

4.2.5.1 Relation of IMS media components and PDP contexts carrying IMS media

The relation between IMS media components and PDP contexts carrying IMS media is controlled by the IMS network on media component level in the following way:

The P-CSCF shall have the capability to indicate to the UE- that a separate PDP Context is required for each IMS media component indicated. The P-CSCF shall apply and maintain the same policy to separate specific media components into separate PDP Contexts during a session. If a media component is added during the session, the new decision on the separation for the media components shall not contradict any former decisions. For mobile originating sessions the P-CSCF shall apply the policy to the initial offer to ensure identical decisions for different answers, e.g. a media component not required to use a separate PDP Context initially, shall not later require a separate PDP Context (e.g. in case of subsequent answers received due to forking).

- If the UE receives such an indication for a media component, it shall open a separate PDP Context for this media component. If the UE receives no such indication for a media component, the UE makes the decision whether to open a separate PDP Context or modify an existing PDP Context for this media component.

- The criteria and information for setting this indication is determined by local policy in the network where the P-CSCF is located. The IMS network shall have the capability to transfer the media component level indication described above to the UE. This media component level indication shall be transferred in SIP/SDP signaling upon session initiation and addition of media component(s) to active IMS sessions.

It is assumed that media components from different IMS sessions are not carried within the same PDP context.

All associated IP flows (such as e.g. RTP / RTCP flows) used by the UE to support a single media component are assumed to be carried within the same PDP context.

4.2.6 QoS Requirements for IM CN subsystem signalling

3GPP TSG-SA2 Meeting #28
Bangkok, Thailand, November 11, 2002

Tdoc ⌘ S2-023271

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **225** ⌘**rev** **-** ⌘ 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 ☒

Title:	⌘	Service Invocation
Source:	⌘	Lucent Technologies
Work item code:	⌘	IMS-CCR
Date:	⌘	11.11.2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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.

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R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	Text within 23.228 and between 23.228 and 24.228 is inconsistent. It has been agreed that the S-CSCF does not do service control. Some text within 23.228 indicates that the S-CSCF provides or performs service control.
Summary of change:	⌘	Change several occurances of “provides/performs service control” to “invokes service control”
Consequences if not approved:	⌘	Inconsistencies between documents may lead to incorrect implementation.

Clauses affected:	⌘	4.2.3, 5.3.2.2.2, 5.5.1, 5.5.2, 5.5.3, 5.5.4, 5.6.1, 5.6.2, 5.7.1, 5.7.2, 5.9, 5.10.1, 5.10.2, 5.10.3.1.1, 5.10.3.1.2, 5.10.3.2, 5.11.3.4, 5.11.4.1, 5.11.4.2, 5.11.5.1, 5.11.5.2, 5.11.5.2a, 5.11.5.3, 5.11.5.4, 5.11.5.5, 5.11.5.6, 5.11.6.1, and 5.12.1

		Y	N			
Other specs affected:	⌘			Other core specifications	⌘	
				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.

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

4.2.3 Support of roaming users

The architecture shall be based on the principle that the service control for Home subscribed services for a roaming subscriber is in the Home network, e.g., the Serving-CSCF is located in the Home network.

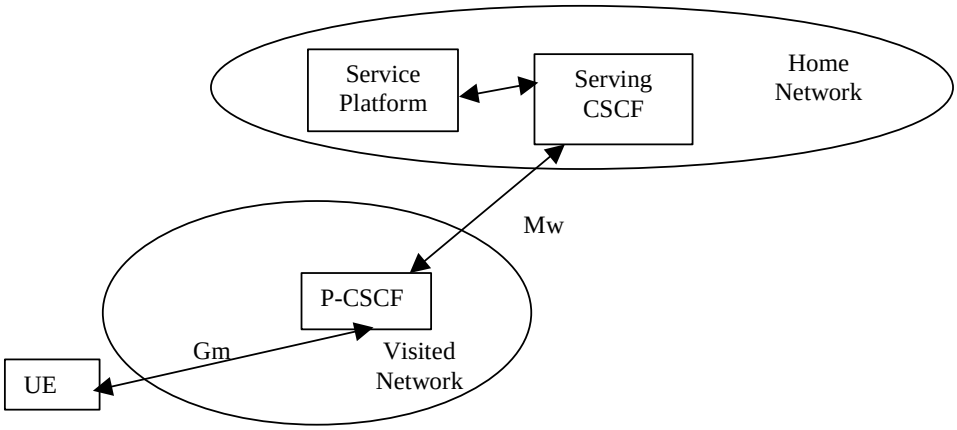


Figure 4-1: Service Platform in Home Network

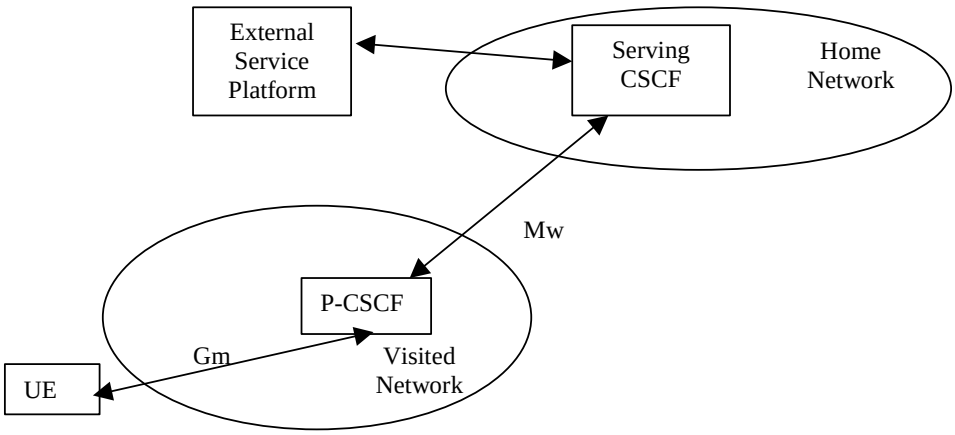


Figure 4-2: External Service Platform

There are two possible scenarios to provide services:

- via the service platform in the Home Network

- via an external service platform (e.g. third party or visited network)

The box representing the external service platform could be located in either the visited network or in the 3rd party platform. The standardised way for secure 3rd party access to IMS services is the OSA framework, see section 4.2.4.

The roles that the CSCF plays are described below.

- The Proxy-CSCF is located in the same network as the GGSN. The Proxy-CSCF shall enable the session control to be passed to the Serving-CSCF.

- The Serving-CSCF is located in the home network. The Serving-CSCF shall ~~provide~~ invoke ~~the~~ service control.

A Proxy-CSCF shall be supported in both roaming and non-roaming case, even when the Serving-CSCF is located in the same IM CN SS.

Reassigning the Proxy-CSCF assigned during CSCF discovery is not a requirement in this release. Procedures to allow registration time Proxy-CSCF reassignment may be considered in future releases.

Network initiated Proxy-CSCF reassignment is not a requirement.

The use of additional CSCFs, that is Interrogating-CSCFs, to be included in the SIP signalling path is optional. Such additional CSCFs may be used to shield the internal structure of a network from other networks.

**********Next Change**********

5.3.2.2.2 Network Initiated De-registration by S-CSCF

A service platform may determine a need to clear a user's SIP registration. This function initiates the de-registration procedure and resides in a service platform.

The following flow shows a service control initiated IMS terminal application (SIP) de-registration. The IP transport infrastructure (e.g., GGSN, SGSN) is not notified. If complete packet access is to be denied, a transport layer administrative mechanism would be used. This scenario does not address the administrative mechanisms used for updating any subscriber records, EIR records, access authorisation, etc. This scenario only addresses the specific action of clearing the SIP application registration that is currently in effect.

As determined by the operator, on-going sessions may be released by using network initiated session release procedures in Section 5.10.3.

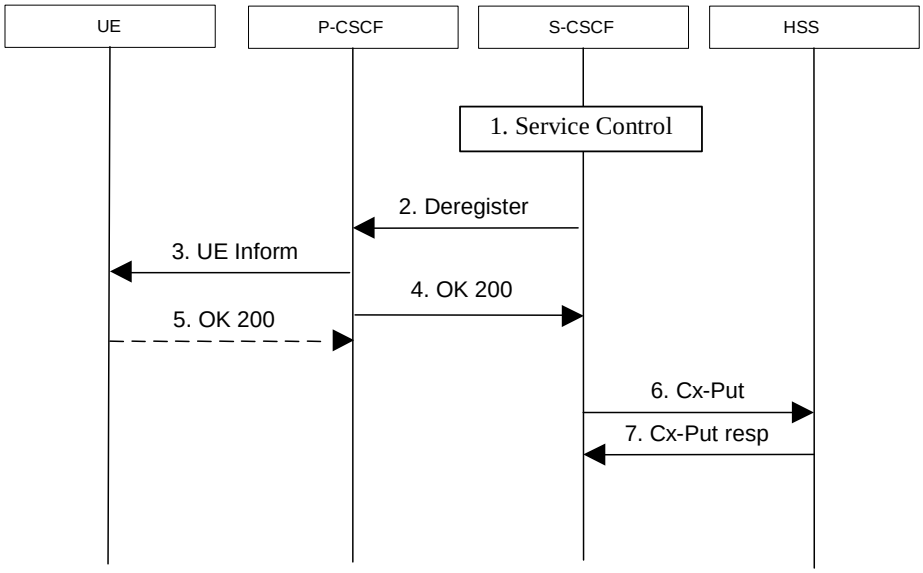


Figure 5.5a: Network initiated application de-registration, service platform

1. The S-CSCF receives de-registration information from the service platform and ~~performs~~ invokes whatever service control procedures are appropriate. This information may include the reason for the de-registration.

2. The S-CSCF issues a de-registration towards the P-CSCF for this user and updates its internal database to remove the user from being registered. The reason for the de-registration shall be included, if available.

3. The P-CSCF informs the UE of the de-registration, and without modification forwards the reason for the de-registration, if available. Due to loss of contact with the mobile, it might be possible that the UE does not receive the information of the de registration.

4. The P-CSCF sends a response to the S-CSCF and updates its internal database to remove the user from being registered.

5. When possible, the UE sends a response to the P-CSCF to acknowledge the de-registration. A misbehaving UE or a UE that is out of P-CSCF coverage could not answer properly to the de-registration request. The P-CSCF should perform the de-registration in any case, e.g., after the timer for this request expires.

   If the UE does not perform automatic re-registration due to the de-registration the user shall be informed about the de-registration and of the reason, if available.

Note: Steps 4 and 5 may be done in parallel: the P-CSCF does not wait for an answer from the UE before answering to the S-CSCF

6. The S-CSCF sends an update to the HSS to remove itself as the registered S-CSCF for this user.

7. The HSS confirms the update.

Note: Another trusted/secured party may also initiate the de-registration, for example, by issuing a third party SIP registration with timer set to 0 via S-CSCF.

**********Next Change**********

5.5.1 (S-S#1) Different network operators performing origination and termination

The Serving-CSCF handling session origination performs an analysis of the destination address, and determines that it belongs to a subscriber of a different operator. The request is therefore forwarded (optionally through an an I-CSCF(THIG) within the originating operator's network) to a well-known entry point in the destination operator's network, the I-CSCF. The I-CSCF queries the HSS for current location information, and finds the user either located in the home service area, or roaming. The I-CSCF therefore forwards the request to the S-CSCF serving the destination user.

Origination sequences that share this common S-S procedure are:

MO#1 Mobile origination, roaming. The "Originating Network" of S-S#1 is therefore a visited network.

MO#2 Mobile origination, home. The "Originating Network" of S-S#1 is therefore the home network.

PSTN-O PSTN origination. The "Originating Network" of S-S#1 is the home network. The element labeled S-CSCF#1 is the MGCF of the PSTN-O procedure.

Termination sequences that share this common S-S procedure are:

MT#1 Mobile termination, roaming. The "Terminating Network" of S-S#1 is a visited network.

MT#2 Mobile termination, located in home service area. The "Terminating Network" of S-S#1 is the home network.

MT#3 Mobile termination, CS Domain roaming. The "Terminating Network" of S-S#1 is a CS domain network.

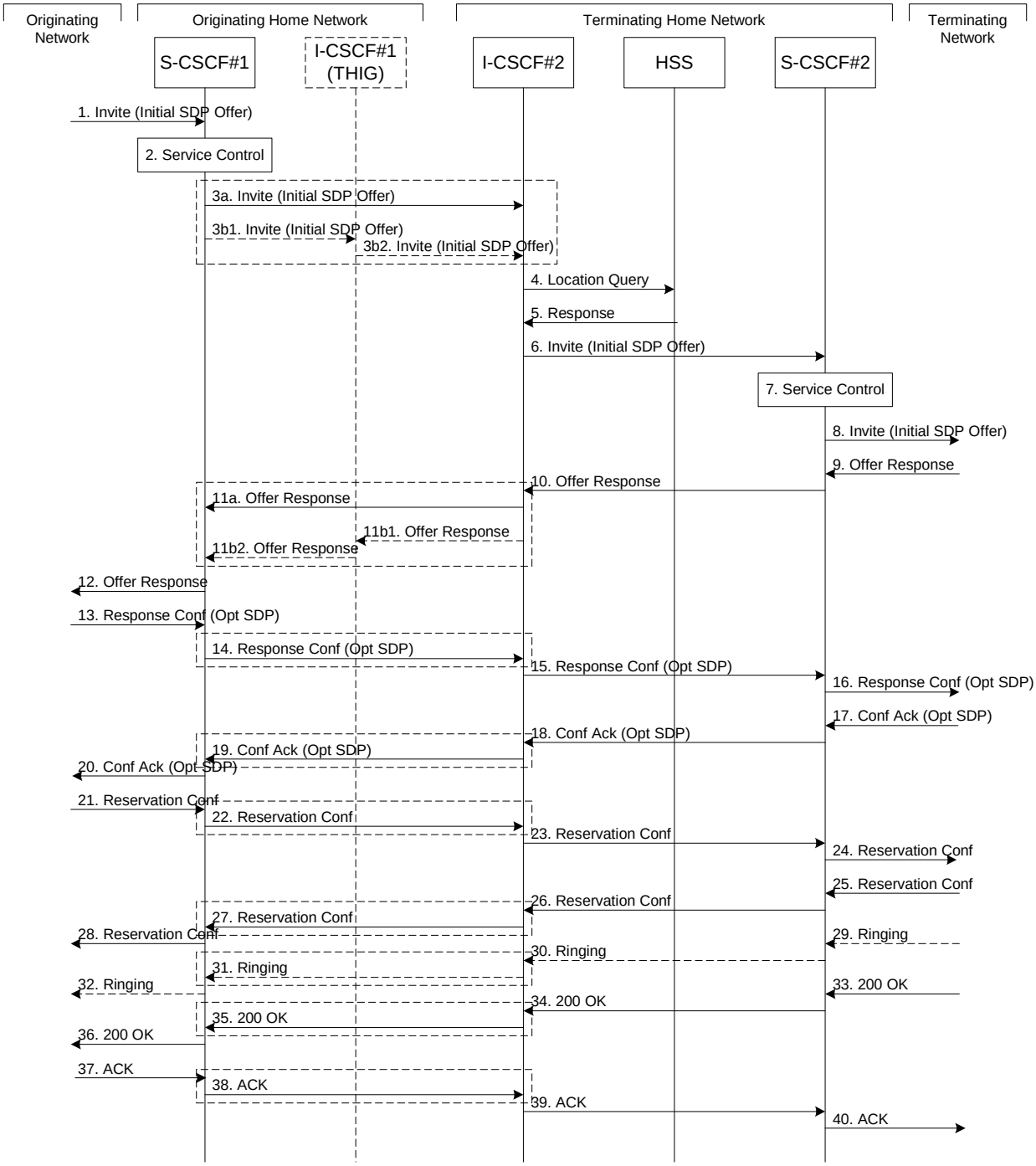


Figure 5.10: Serving to serving procedure - different operators

Procedure S-S#1 is as follows:

1. The SIP INVITE request is sent from the UE to S-CSCF#1 by the procedures of the originating flow. This message should contain the initial media description offer in the SDP.

2. S-CSCF#1 ~~performs~~ invokes whatever service control logic is appropriate for this session attempt.

3. S-CSCF#1 performs an analysis of the destination address, and determines the network operator to whom the subscriber belongs. For S-S#1, this flow is an inter-operator message to the I-CSCF entry point for the terminating user. If the originating operator desires to keep their internal configuration hidden, then S-CSCF#1

forwards the INVITE request through I-CSCF(THIG)#1 (choice (b)); otherwise S-CSCF#1 forwards the INVITE request directly to I-CSCF#2, the well-known entry point into the terminating user's network (choice (a)).

(3a) If the originating network operator does not desire to keep their network configuration hidden, the INVITE request is sent directly to I-CSCF#2.

(3b) If the originating network operator desires to keep their network configuration hidden, the INVITE request is forwarded through an I-CSCF(THIG) in the originating operator's network, I-CSCF(THIG)#1.

(3b1) The INVITE request is sent from S-CSCF#1 to I-CSCF(THIG)#1

(3b2) I-CSCF(THIG)#1 performs the configuration-hiding modifications to the request and forwards it to I-CSCF#2

4. I-CSCF#2 (at the border of the terminating user's network) may query the HSS for current location information. If I-CSCF#2 cannot determine, based on analysis of the destination number, that the HSS query will fail, then it will send "Cx-location-query" to the HSS to obtain the location information for the destination. If I-CSCF#2 can determine, based on analysis of the destination number, that the HSS query will fail, it will not send the "Cx-location-query" message, allocate a MGCF for a PSTN termination, and continue with step #6.

5. HSS responds with the address of the current Serving-CSCF for the terminating user.

6. I-CSCF#2 forwards the INVITE request to the S-CSCF (S-CSCF#2) that will handle the session termination.

7. S-CSCF#2 invokes~~performs~~ whatever service control logic is appropriate for this session setup attempt

8. The sequence continues with the message flows determined by the termination procedure.

9. The media stream capabilities of the destination are returned along the signalling path, as per the termination procedure.

10. S-CSCF#2 forwards the SDP to I-CSCF#2

11. I-CSCF#2 forwards the SDP to S-CSCF#1. Based on the choice made in step #3 above, this may be sent directly to S-CSCF#1 (11a) or may be sent through I-CSCF(THIG)#1 (11b1 and 11b2)

12. S-CSCF#1 forwards the SDP to the originator, as per the originating procedure.

13. The originator decides on the offered set of media streams, confirms receipt of the Offer Response with a Response Confirmation, and forwards this information to S-CSCF#1 by the origination procedures. The Response Confirmation may also contain SDP. This may be the same SDP as in the Offer Response received in Step 12 or a subset.

14-15. S-CSCF#1 forwards the offered SDP to S-CSCF#2. This may possibly be routed through I-CSCF#1and/or I-CSCF#2 depending on operator configuration of the I-CSCFs. Step 14 may be similar to Step 3 depending on whether or not configuration hiding is used.

16. S-CSCF#2 forwards the offered SDP to the terminating endpoint, as per the termination procedure

17-20 The terminating end point acknowledges the offer with answered SDP and passes through the session path to the originating end point. Step 19 may be similar to Step 11 depending on whether or not configuration hiding is being used.

21-24. Originating end point acknowledges successful resource reservation and the message is forwarded to the terminating end point. This may possibly be routed through I-CSCF#1and/or I-CSCF#2 depending on operator configuration of the I-CSCFs. Step 22 may be similar to Step 3 depending on whether or not configuration hiding is used.

25-28. Terminating end point acknowledges the response and this message is sent to the originating end point through the established session path. Step 27 may be similar to Step 11 depending on whether or not configuration hiding is being used.

29-32. Terminating end point then generates ringing and this message is sent to the originating end point through the established session path. Step 31 may be similar to Step 11 depending on whether or not configuration hiding is being used.

33-36. Terminating end point then sends 200 OK via the established session path to the originating end point. Step 35 may be similar to Step 11 depending on whether or not configuration hiding is being used.

37-40. Originating end point acknowledges the establishment of the session and sends to the terminating end point via the established session path. This may possibly be routed through I-CSCF#1and/or I-CSCF#2 depending on operator configuration of the I-CSCFs. Step 38 may be similar to Step 3 depending on whether or not configuration hiding is used.

5.5.2 (S-S#2) Single network operator performing origination and termination

The Serving-CSCF handling session origination performs an analysis of the destination address, and determines that it belongs to a subscriber of the same operator. The request is therefore forwarded to a local I-CSCF. The I-CSCF queries the HSS for current location information, and finds the user either located in the home service area, or roaming. The I-CSCF therefore forwards the request to the S-CSCF serving the destination user.

Origination sequences that share this common S-S procedure are:

MO#1 Mobile origination, roaming,. The “Originating Network” of S-S#2 is therefore a visited network.

MO#2 Mobile origination, home. The “Originating Network” of S-S#2 is therefore the home network.

PSTN-O PSTN origination. The “Originating Network” of S-S#2 is the home network. The element labelled S-CSCF#1 is the MGCF of the PSTN-O procedure.

Termination sequences that share this common S-S procedure are:

MT#1 Mobile termination, roaming, . The “Terminating Network” of S-S#2 is a visited network.

MT#2 Mobile termination, home. The “Terminating Network” of S-S#2 is the home network.

MT#3 Mobile termination, CS Domain roaming. The “Terminating Network” of S-S#2 is a CS domain network.

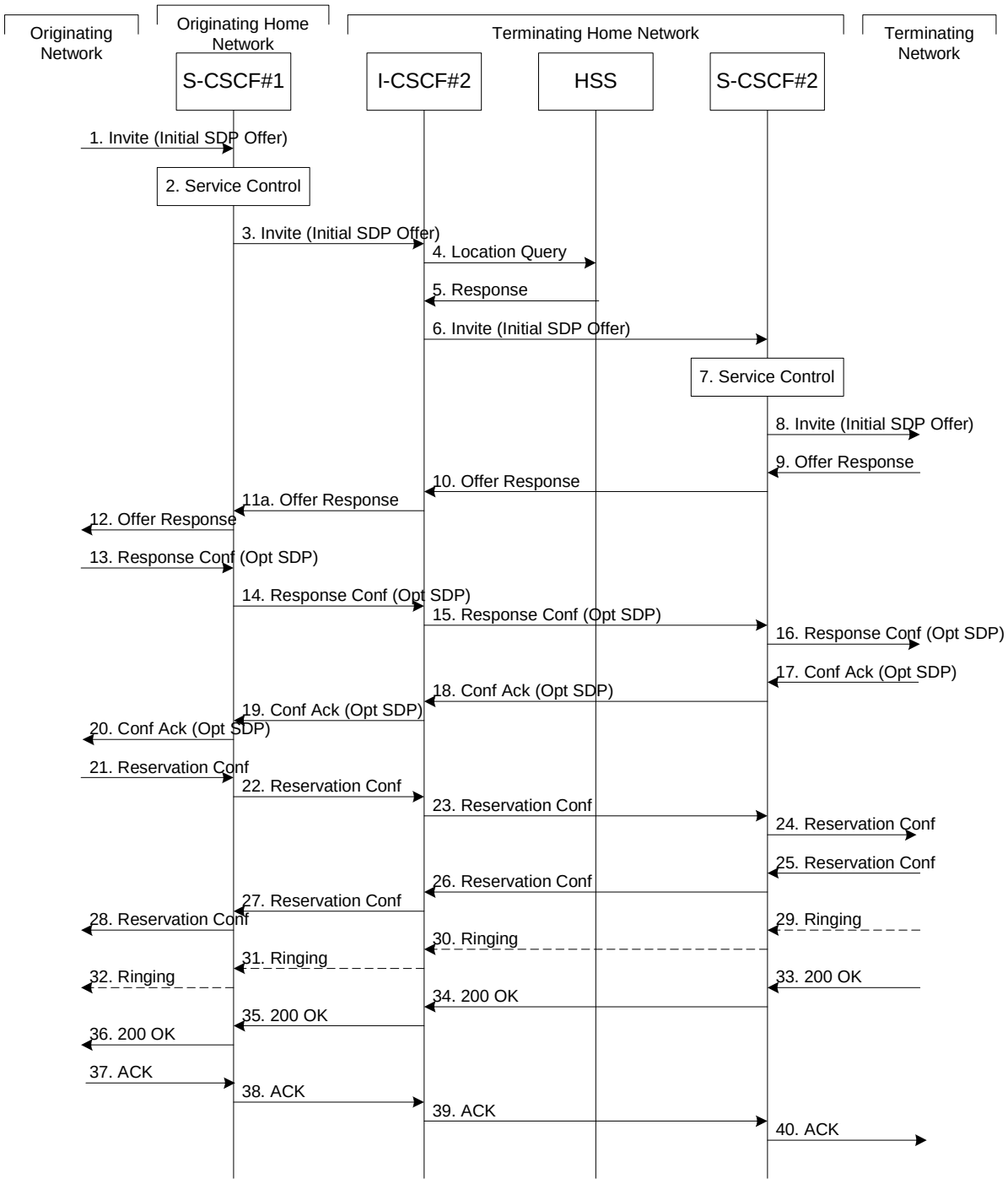


Figure 5.11: Serving to serving procedure - same operator

Procedure S-S#2 is as follows:

1. The SIP INVITE request is sent from the UE to S-CSCF#1 by the procedures of the originating flow. This message should contain the initial media description offer in the SDP.

2. S-CSCF#1 invokes~~performs~~ whatever service control logic is appropriate for this session setup attempt

3. S-CSCF#1 performs an analysis of the destination address, and determines the network operator to whom the subscriber belongs. Since it is local, the request is passed to a local I-CSCF.

4. I-CSCF may query the HSS for current location information. If I-CSCF cannot determine, based on analysis of the destination number, that the HSS query will fail, then it will send “Cx-location-query” to the HSS to obtain

the location information for the destination. If I-CSCF can determine, based on analysis of the destination number, that the HSS query will fail, it will not send the "Cx-location-query" message, allocate a MGCF for a PSTN termination, and continue with step #6.

5. HSS responds with the address of the current Serving-CSCF for the terminating user.

6. I-CSCF forwards the INVITE request to the S-CSCF (S-CSCF#2) that will handle the session termination.

7. S-CSCF#2 invokes~~performs~~ whatever service control logic is appropriate for this session setup attempt

8. The sequence continues with the message flows determined by the termination procedure.

9-12. The terminating end point responds with an answer to the offered SDP and this message is passed along the established session path.

13-16. The originator decides on the offered set of media streams, confirms receipt of the Offer Response with a Response Confirmation, and forwards this information to S-CSCF#1 by the origination procedures. This message is forwarded via the established session path to the terminating end point. The Response Confirmation may also contain SDP. This may be the same SDP as in the Offer Response received in Step 12 or a subset.

17-20. Terminating end point responds to the offered SDP and the response if forwarded to the originating end point via the established session path.

21-24. Originating end point sends successful resource reservation information towards the terminating end point via the established session path.

25-28. Terminating end point sends successful resource reservation acknowledgement towards the originating end point via the established session path

29-32. Terminating end point sends ringing message toward the originating end point via the established session path.

33-36. The SIP final response, 200-OK, is sent by the terminating endpoint over the signalling path. This is typically generated when the user has accepted the incoming session setup attempt. The message is sent to S-CSCF#2 per the termination procedure.

37-40. The originating endpoint sends the final acknowledgement to S-CSCF#1 by the origination procedures and it is then sent over the signalling path to the terminating end point.

5.5.3 (S-S#3) Session origination with PSTN termination in the same network as the S-CSCF.

The Serving-CSCF handling session origination performs an analysis of the destination address, and determines, with support of applications or other databases, that the session is destined to the PSTN. The request is therefore forwarded to a local BGCF. The BGCF determines that the MGCF should be in the same network, and selects a MGCF in that network. The request is then forwarded to the MGCF.

Origination sequences that share this common S-S procedure are:

MO#1 Mobile origination, roaming. The "Originating Network" of S-S#3 is therefore a visited network.

MO#2 Mobile origination, located in home service area. The "Originating Network" of S-S#3 is therefore the home network.

Termination sequences that share this common S-S procedure are:

PSTN-T PSTN termination. This occurs when the MGCF is selected to be in the same network as the S-CSCF.

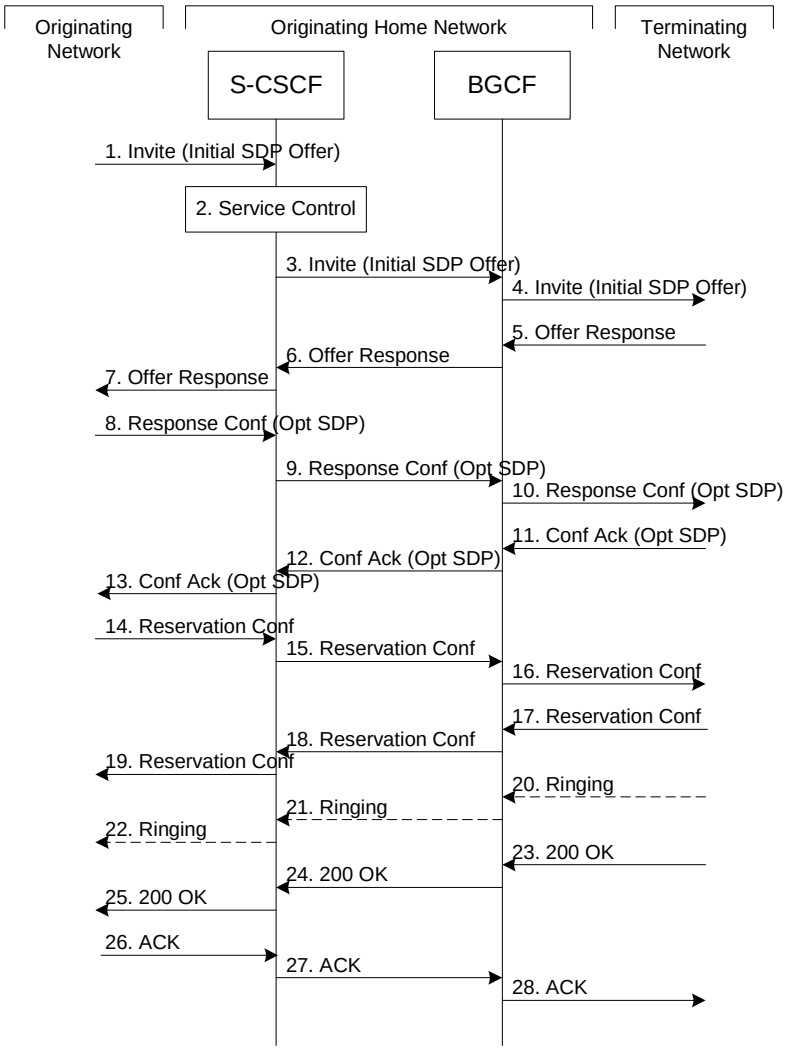


Figure 5.12: Serving to PSTN procedure - same operator

Procedure S-S#3 is as follows:

1. The SIP INVITE request is sent from the UE to S-CSCF#1 by the procedures of the originating flow. This message should contain the initial media description offer in the SDP.

2. S-CSCF#1 invokes~~performs~~ whatever service control logic is appropriate for this session setup attempt

3. S-CSCF#1 performs an analysis of the destination address. From the analysis of the destination address, S-CSCF#1 determines that this is for the PSTN, and passes the request to the BGCF.

4. The BGCF determines that the MGCF shall be in the same network, and hence proceeds to select an appropriate MGCF. The SIP INVITE request is forwarded to the MGCF. The PSTN terminating information flows are then followed.

5-7. The media stream capabilities of the destination are returned along the signalling path, as per the PSTN termination procedure.

8. The originator decides the offered set of media streams, confirms receipt of the Offer Response with a Response Confirmation, and forwards this information to S-CSCF#1 by the origination procedures. The Response Confirmation may also contain SDP. This may be the same SDP as in the Offer Response received in Step 7 or a subset.

9-10. S-CSCF#1 forwards the offered SDP to the terminating endpoint as per the PSTN terminating procedures via the established session path.

11-13. The terminating end point answers to the offered SDP and the message is passed through the established session path to the originating end point.

14-16. When the originating endpoint has completed the resource reservation procedures, it sends the successful resource reservation message to S-CSCF#1 by the origination procedures and it is passed to the terminating end point through the session path.

17-19. . The terminating endpoint acknowledges the result and the message is passed onto the originating end point via the session path.

20-22. Terminating end point generates ringing message and forwards it to BGCF which in tern forwards the message to SCSCF#1. S-CSCF#1 forwards the ringing message to the originator, per the origination procedure

23. When the destination party answers, the termination procedure results in a SIP 200-OK final response to the BGCF

24-25. The BGCF forwards this information to the S-CSCF#1 and then it is forwarded to the originating end point.

26. The 200-OK is returned to the originating endpoint, by the origination procedure from terminating end point.

27. The originating endpoint sends the final acknowledgement to S-CSCF#1 by the origination procedures.

28. S-CSCF#1 forwards this message to the terminating endpoint as per the PSTN terminating procedures.

5.5.4 (S-S#4) Session origination with PSTN termination in a different network from the S-CSCF.

The Serving-CSCF handling session origination performs an analysis of the destination address, and determines, with support of applications or other databases, that the session is destined to the PSTN. The request is therefore forwarded to a local BGCF. The BGCF determines that the PSTN interworking should occur in another network, and forwards this to a BGCF in the interworking network. The BGCF then selects a MGCF in that network. The request is then forwarded to the MGCF.

Origination sequences that share this common S-S procedure are:

MO#1 Mobile origination, roaming. The “Originating Network” of S-S#4 is therefore a visited network.

MO#2 Mobile origination, located in home service area. The “Originating Network” of S-S#4 is therefore the home network.

Termination sequences that share this common S-S procedure are:

PSTN-T PSTN termination. This occurs when the MGCF is selected to be in the same network as the S-CSCF.

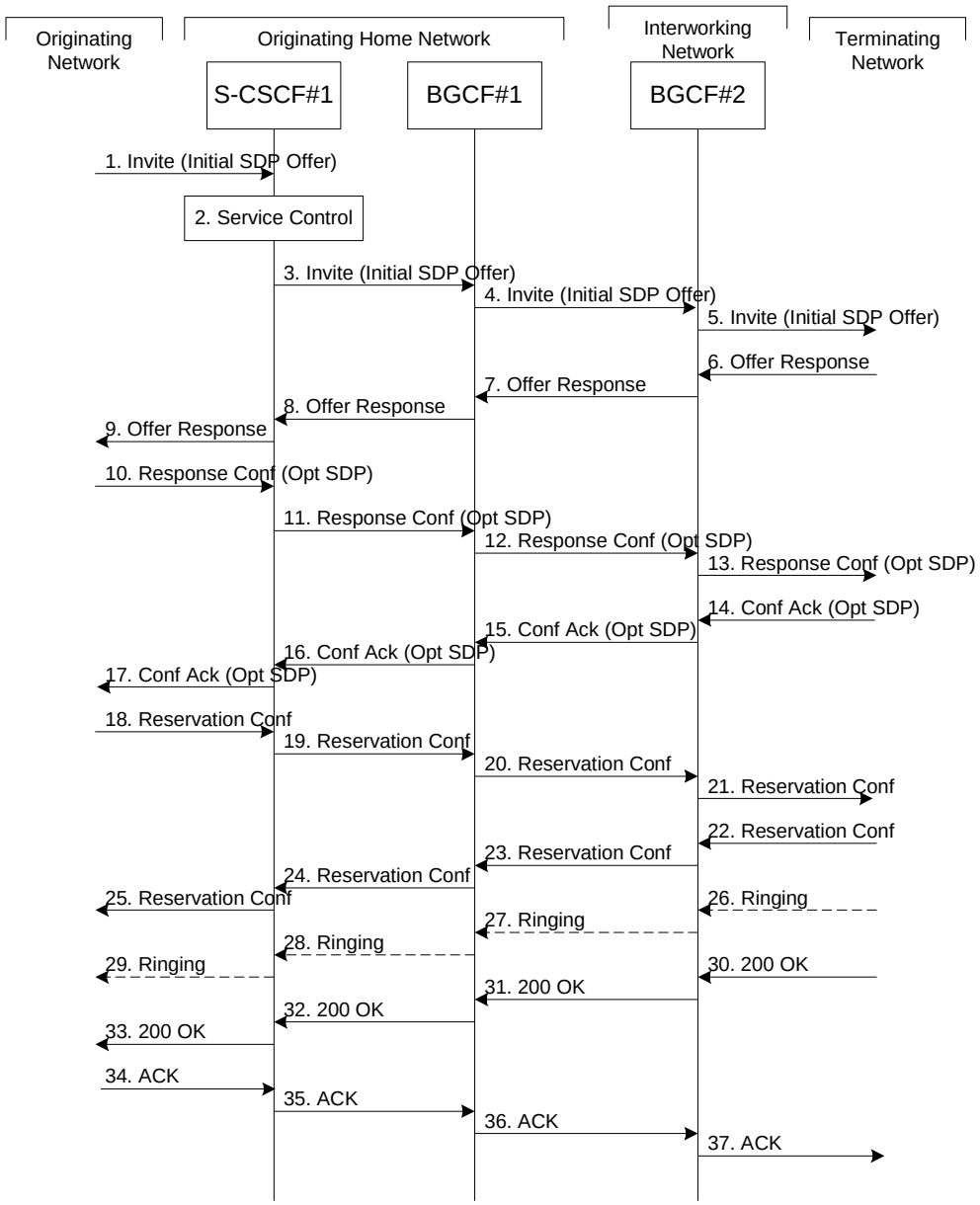


Figure 5.13: Serving to PSTN procedure - different operator

Procedure S-S#4 is as follows:

1. The SIP INVITE request is sent from the UE to S-CSCF#1 by the procedures of the originating flow. This message should contain the initial media description offer in the SDP.

2. S-CSCF#1 invokes~~performs~~ whatever service control logic is appropriate for this session setup attempt

3. S-CSCF#1 performs an analysis of the destination address. From the analysis of the destination address, S-CSCF#1 determines that this is for the PSTN, and passes the request to the BGCF#1.

4. The BGCF#1 determines that the PSTN interworking should occur in interworking network, and forwards the request on to BGCF#2. For the case that network hiding is required, the request is forwarded through an I-CSCF(THIG).

5. BGCF#2 determines that the MGCF shall be in the same network, and hence proceeds to select an appropriate MGCF. The SIP INVITE request is forwarded to the MGCF. The PSTN terminating information flows are then followed.

6-8. The media stream capabilities of the destination are returned along the signalling path, as per the PSTN termination procedure.

9. S-CSCF#1 forwards the SDP to the originator, as per the originating procedure.

10. The originator decides the offered set of media streams, confirms receipt of the Offer Response with a Response Confirmation, and forwards this information to S-CSCF#1 by the origination procedures. The Response Confirmation may also contain SDP. This may be the same SDP as in the Offer Response received in Step 12 or a subset.

11-13. S-CSCF#1 forwards the offered SDP to the terminating endpoint, as per the PSTN terminating procedure.

14-17. Terminating end point responds to the offer via the established session path towards the originating end point.

18-21.When the originating endpoint has completed the resource reservation procedures, it sends the successful resource reservation message to S-CSCF#1 by the origination procedures and it is forwarded to the terminating end point via established session path.

22-25. The terminating end point responds to the message towards the originating end point.

26-29. Terminating end point generates ringing message towards the originating end point.

30-33. Terminating end point sends 200 OK when the originating end answers the session.

34-37. Originating end point acknowledges the establishment of the session.

5.6 Origination procedures

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

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 is located in the same network as the GGSN, 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.

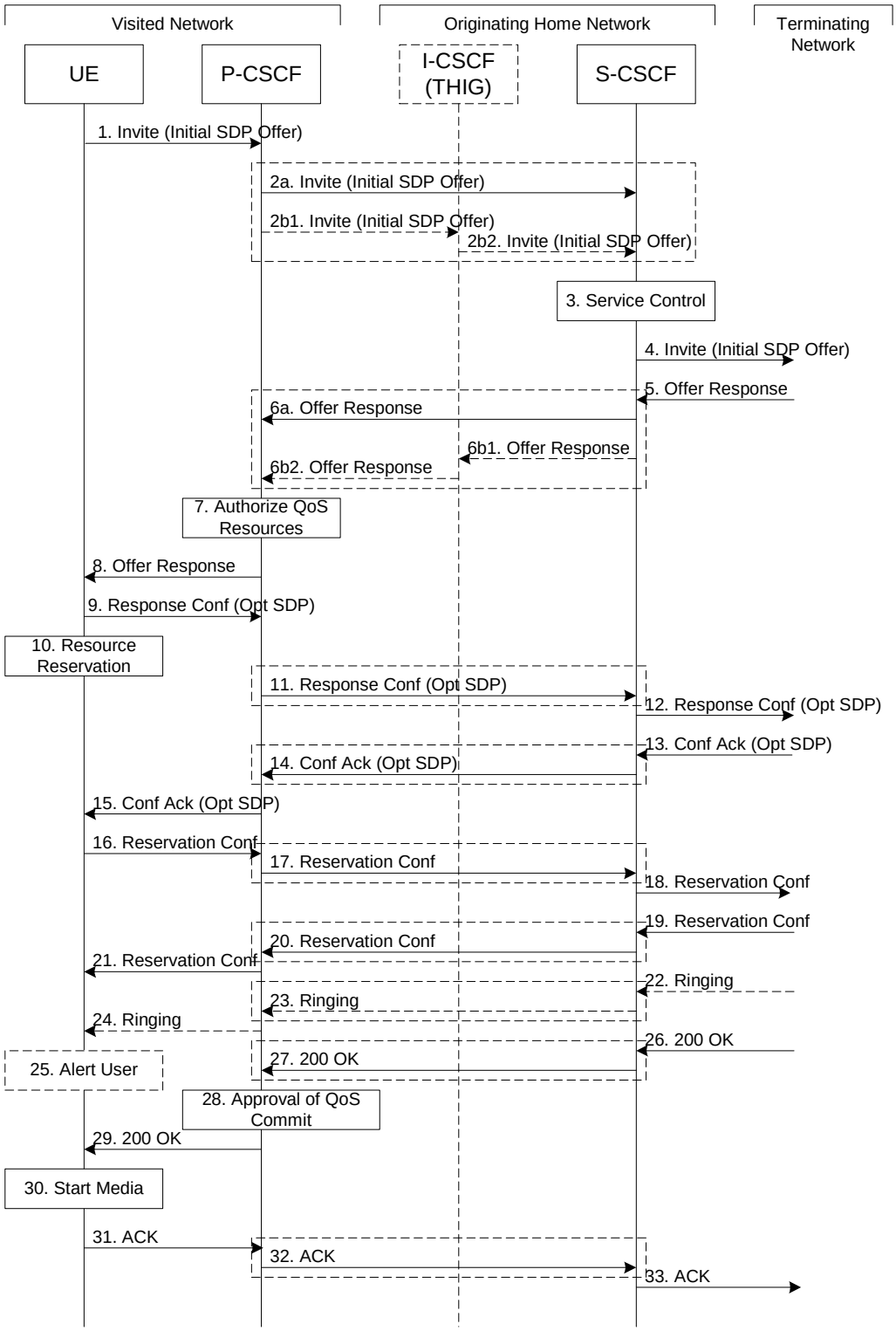


Figure 5.14: Mobile origination procedure - roaming

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~~performs~~ any origination service control 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 PCF.

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(PCF) 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(PCF) 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 occured. 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~~performs~~ whatever service control 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.

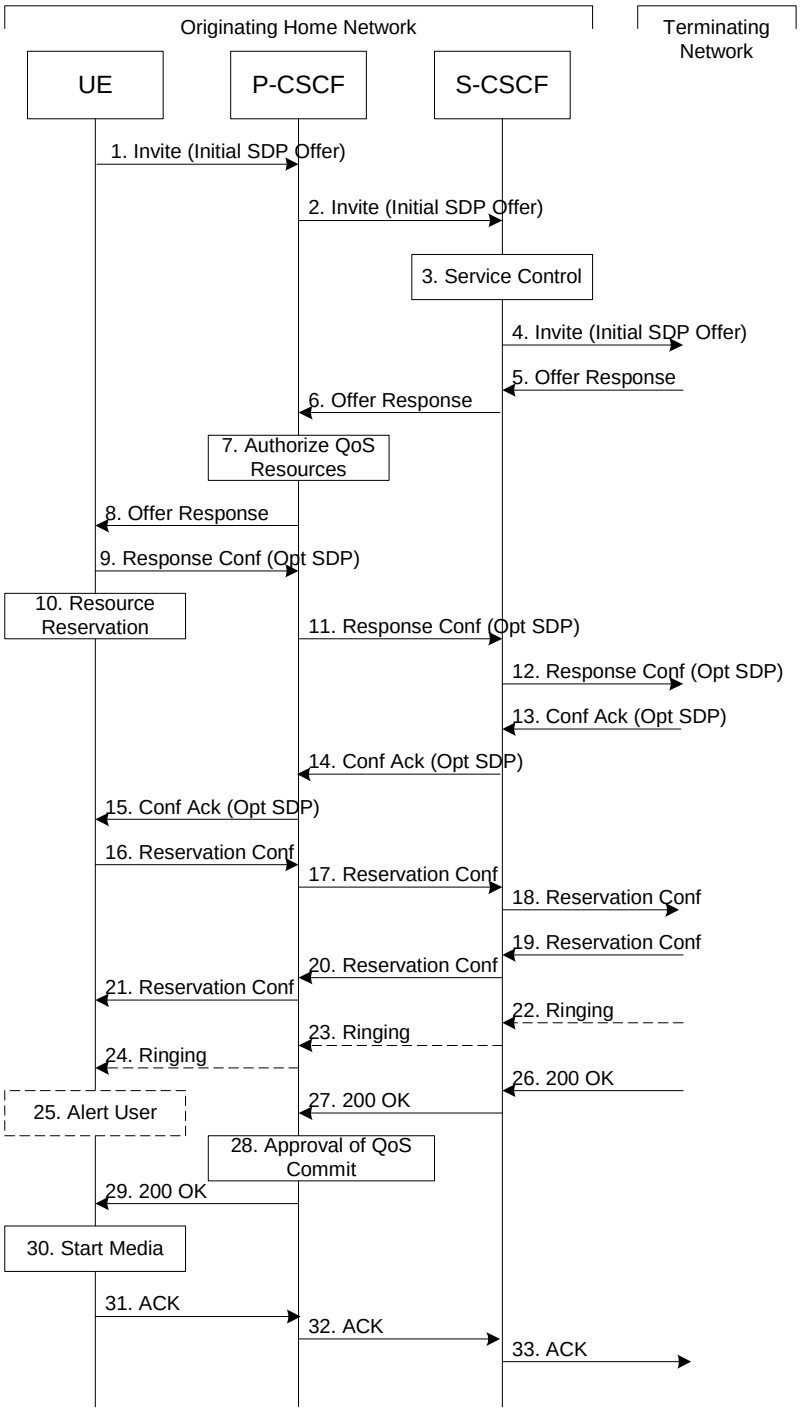


Figure 5.15: Mobile origination procedure - home

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~~performs~~ any origination service control 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 PCF.

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(PCF) 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(PCF) 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 occured. 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.

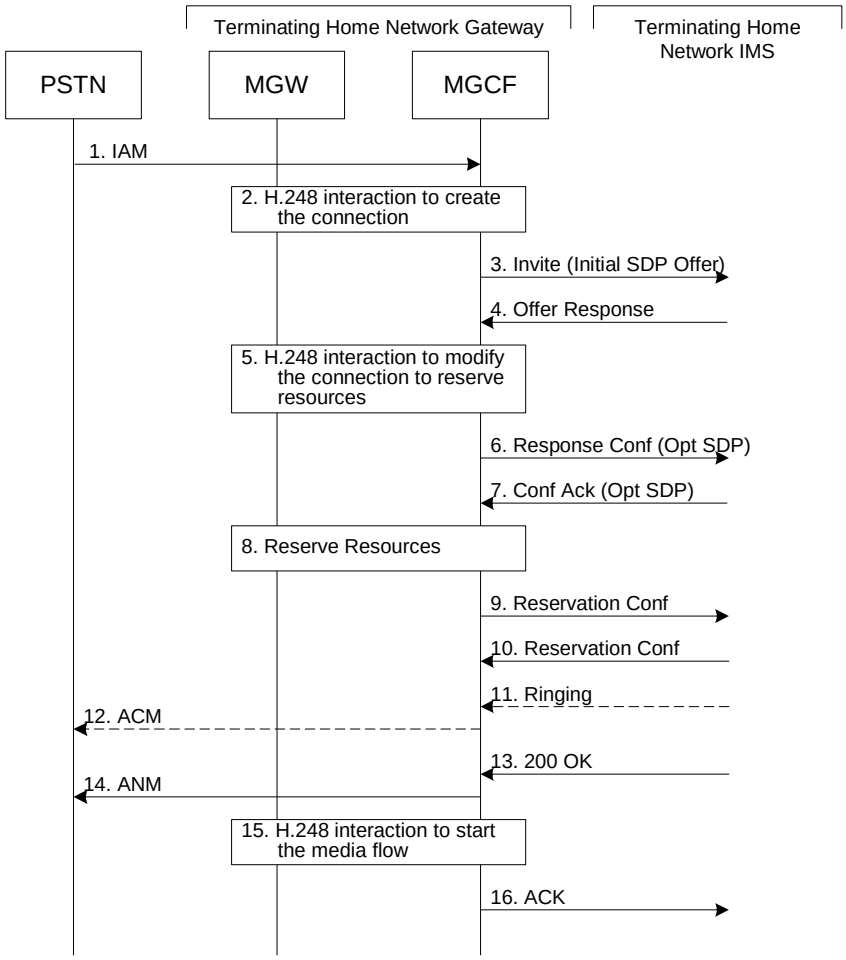


Figure 5.16: PSTN origination procedure

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-6directional

16. MGCF acknowledges the SIP final response with a SIP ACK message

5.7 Termination procedures

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

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 is located in the same network as the GGSN, and 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.

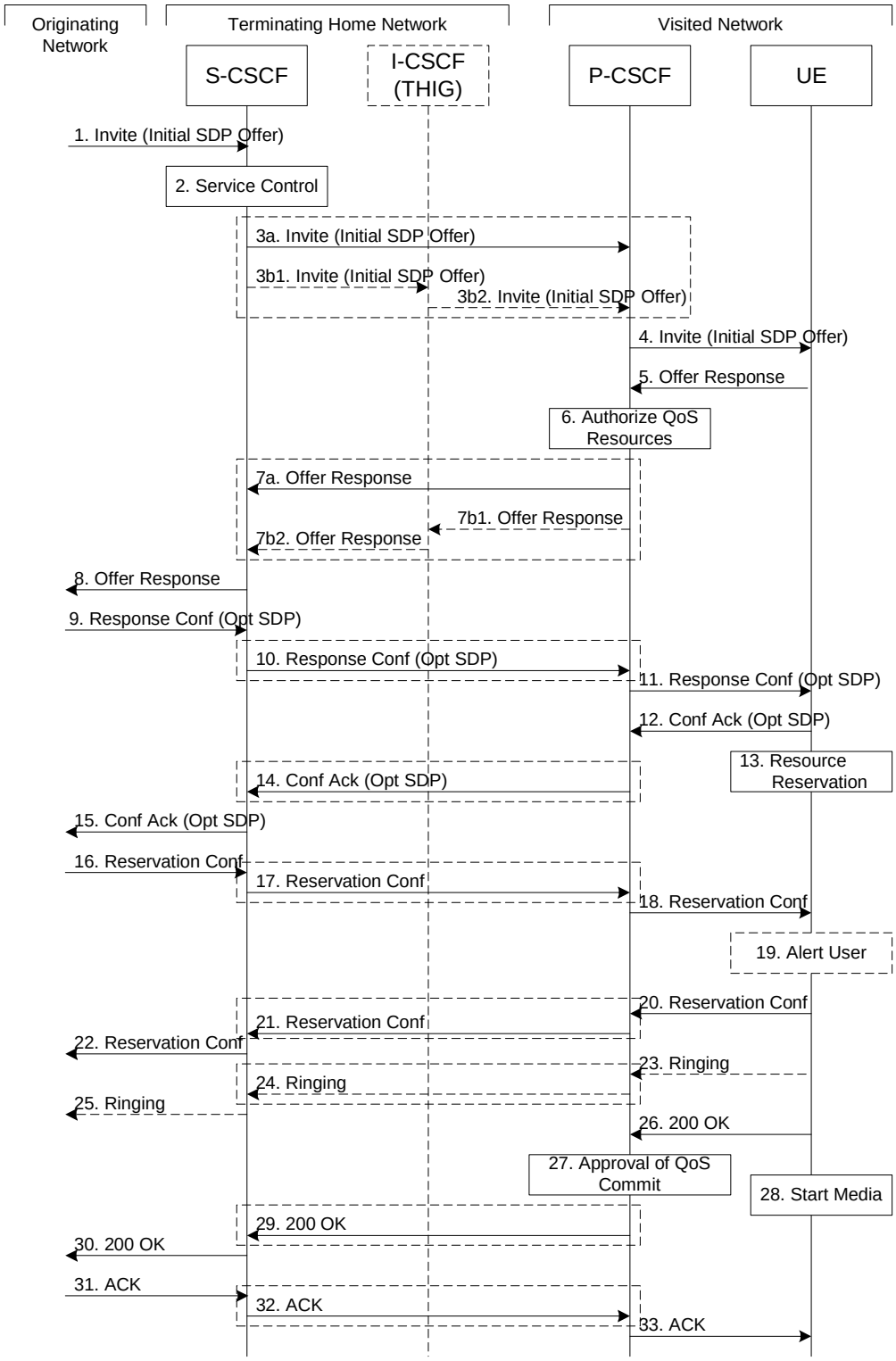


Figure 5.17: Mobile termination procedure - roaming

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~~performs~~ any termination service control 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 PCFand 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(PCF) 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(PCF) 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. PCSCF 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.

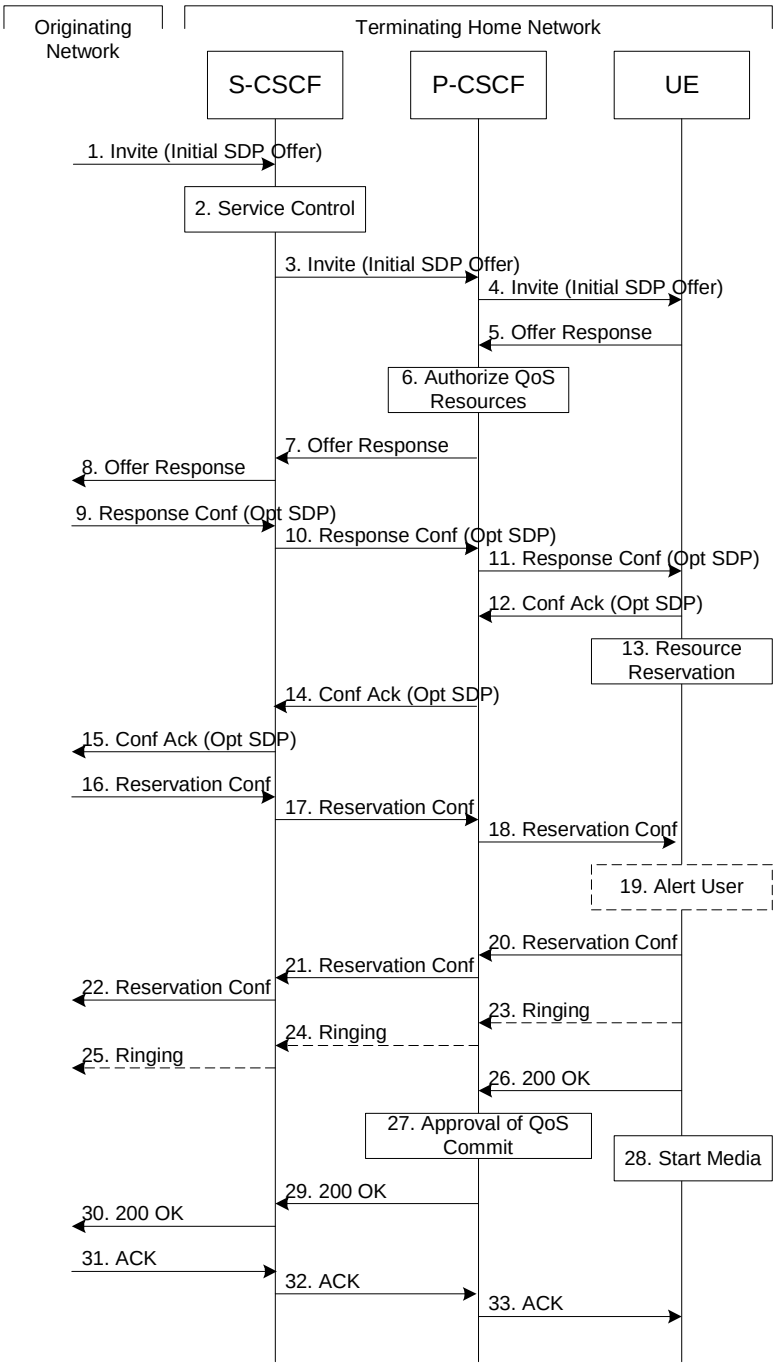


Figure 5.18: Mobile termination procedure - home

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~~performs~~ any termination service control 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 PCF 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(PCF) 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(PCF) 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..

**********Next Change**********

5.9 Routing of mid-session signalling

During the signalling exchanges that occur to establish an IM Session, the following elements must ensure future signalling messages related to this session are routed through them:

- P-CSCF serving the originating UE, in order to generate the CDR record in the roaming case, and to force release of the resources used for the session

- S-CSCF serving the originating UE, in order to invoke~~perform~~ any service control required at session setup completion, and to generate the CDR record at session termination
- S-CSCF serving the terminating UE, in order to ~~perform~~ invoke any service control required at session setup completion, and to generate the CDR record at session termination
- P-CSCF serving the terminating UE, in order to generate the CDR record in the roaming case, and to force release of the resources used for the session

Other CSCFs (e.g. I-CSCFs) may optionally request this as well, for example if they perform some function needed in handling mid-session changes or session clearing operations.

All signalling message from the UE related to IMS sessions shall be sent to the P-CSCF.

5.10 Session release procedures

This section provides scenarios showing SIP application session release. Note that these flows have avoided the strict use of specific SIP protocol message names. This is in an attempt to focus on the architectural aspects rather than the protocol. SIP is assumed to be the protocol used in these flows.

The session release procedures are necessary to ensure that the appropriate billing information is captured and to reduce the opportunity for theft of service by confirming that the bearers associated with a particular SIP session are deleted at the same time as the SIP control signalling and vice versa. Session release is specified for the following situations;

- Normal session termination resulting from an end user requesting termination of the session using session control signalling or deletion of the IP bearers associated with a session,
- Session termination resulting from network operator intervention,
- Loss of the session control bearer or IP bearer for the transport of the IMS signalling, and
- Loss of one or more radio connections which are used to transport the IMS signalling

As a design principle the session release procedures shall have a high degree of commonality in all situations to avoid complicating the implementation.

5.10.1 Mobile terminal initiated session release

The following flow shows a mobile terminal initiated IM CN subsystem application (SIP) session release. It is assumed that the session is active and that the bearer was established directly between the two visited networks (the visited networks could be the Home network in either or both cases).

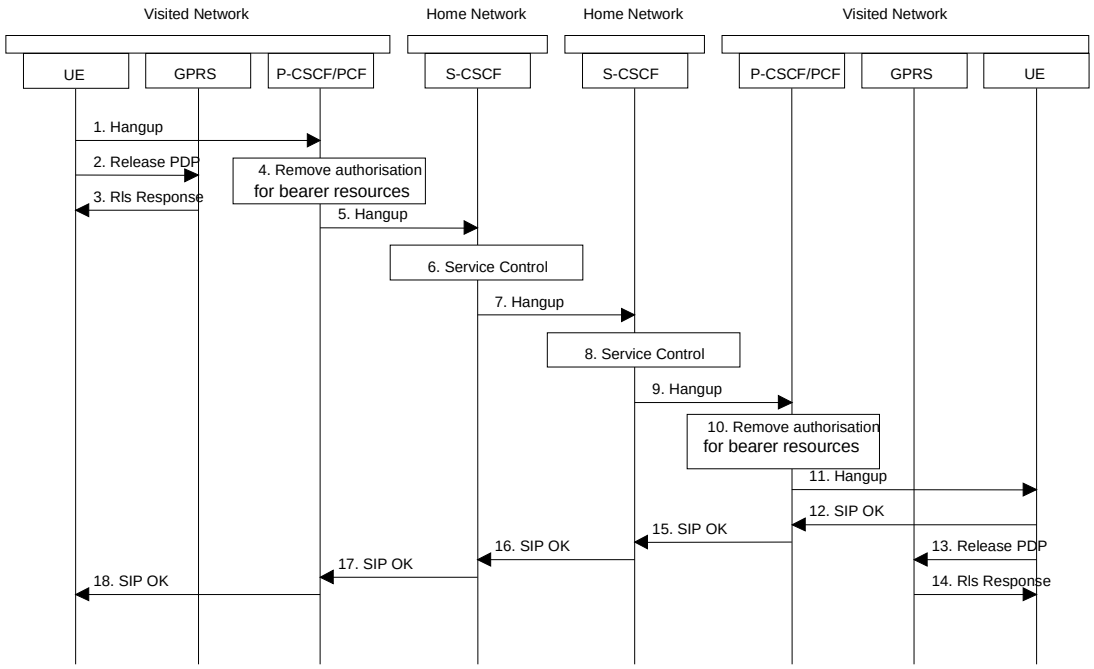


Figure 5.22: Mobile initiated session release

1. One mobile party hangs up, which generates a message (Bye message in SIP) from the UE to the P-CSCF.
2. Steps 2 and 3 may take place before or after Step 1 and in parallel with Step 4. The UE initiates the release of the bearer PDP context. The GPRS subsystem releases the PDP context. The IP network resources that had been reserved for the message receive path to the mobile for this session are now released. This is initiated from the GGSN. If RSVP was used to allocated resources, then the appropriate release messages for that protocol would invoked here.
3. The GPRS subsystem responds to the UE.
4. The P-CSCF/PCF removes the authorisation for resources that had previously been issued for this endpoint for this session. This step will also result in a release indication to the GPRS subsystem to confirm that the IP bearers associated with the session have been deleted
5. The P-CSCF sends a hangup to the S-CSCF of the releasing party.
6. The S-CSCF ~~performs~~ invokes whatever service control procedures are appropriate for this ending session.
7. The S-CSCF of the releasing party forwards the Hangup to the S-CSCF of the other party.
8. The S-CSCF invokes~~performs~~ whatever service control procedures are appropriate for this ending session.
9. The S-CSCF of the other party forwards the Hangup on to the P-CSCF.
10. The P-CSCF/PCF removes the authorisation for resources that had previously been issued for this endpoint for this session. This step also results in a release indication to the GPRS subsystem to confirm that the IP bearers associated with the UE#2 session have been deleted.
11. The P-CSCF forwards the Hangup on to the UE.
12. The mobile responds with an acknowledgement, the SIP OK message (number 200), that is sent back to the P-CSCF.
13. Steps 13 and 14 may be done in parallel with step 12. The Mobile initiates the release of the bearer PDP context.
14. The GPRS subsystem releases the PDP context. The IP network resources that were reserved for the message receive path to the mobile for this session are now released. This is initiated from the GGSN. If RSVP was used to allocated resources, then the appropriate release messages for that protocol would invoked here.
15. The SIP OK message is sent to the S-CSCF.

16. The S-CSCF of the other party forwards the OK to the S-CSCF of the releasing.
17. The S-CSCF of the releasing party forwards the OK to the P-CSCF of the releasing.
18. The P-CSCF of the releasing party forwards the OK to the UE.

5.10.2 PSTN initiated session release

The following flow shows a PSTN terminal initiated IM CN subsystem application (SIP) session release. It is assumed that the session is active and that the bearer was established to the PSTN from the Home Network (the visited network could be the Home network in this case).

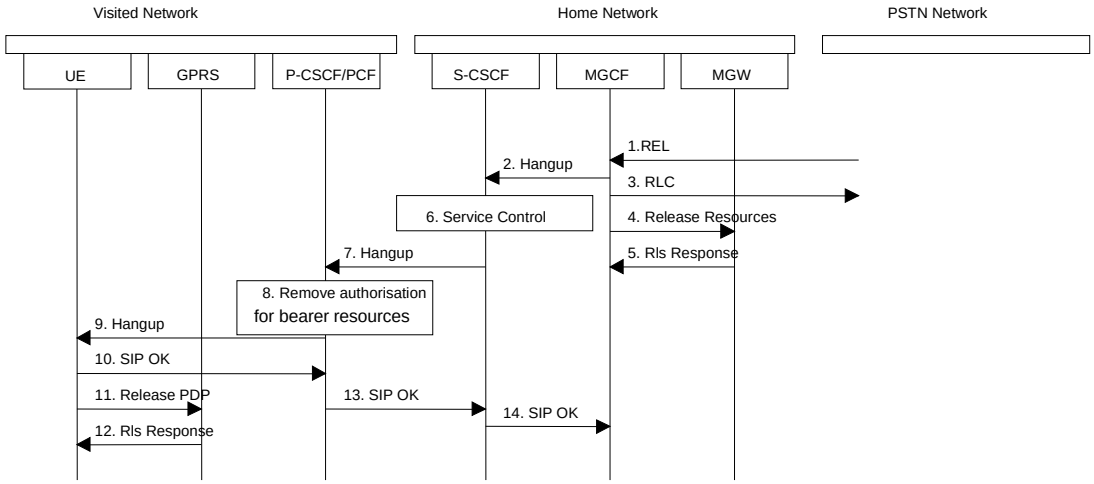


Figure 5.23: PSTN initiated session release

1. PSTN party hangs up, which generates an ISUP REL message to the MGCF.
2. The MGCF sends a Hangup (Bye message in SIP) to the S-CSCF to notify the mobile that the far end party has disconnected.
3. Step 3 may be done in parallel with Step 2. Depending on the GSTN network type Step 3 may need to wait until after step 14. The MGCF notes the reception of the REL and acknowledges it with an RLC. This is consistent with the ISUP protocol.
4. The MGCF requests the MGW to release the vocoder and ISUP trunk using the H.248/MEGACO Transaction Request (subtract). This also results in disconnecting the two parties in the H.248 context. The IP network resources that were reserved for the message receive path to the PSTN for this session are now released. This is initiated from the MGW. If RSVP was used to allocated resources, then the appropriate release messages for that protocol would be invoked here.
5. The MGW sends an acknowledgement to the MGCF upon completion of step 6.
6. The S-CSCF invokes~~performs~~ whatever service control procedures are appropriate for this ending session.
7. The S-CSCF forwards the Hangup to the P-CSCF.
8. The P-CSCF/PCF removes the authorisation for resources that had previously been issued for this endpoint for this session. This step also results in a release indication to the GPRS subsystem to confirm that the IP bearers associated with the UE#2 session have been deleted.
9. The P-CSCF forwards the Hangup to the UE.
10. The mobile responds with an acknowledgement, the SIP OK message (number 200), which is sent back to the P-CSCF.
11. Steps 11and 12 may be done in parallel with step 10. The Mobile initiates the release of the bearer PDP context.

12. The GPRS subsystem releases the PDP context. The IP network resources that had been reserved for the message receive path to the mobile for this session are now released. This is initiated from the GGSN. If RSVP was used to allocated resources, then the appropriate release messages for that protocol would invoked here.

13. The SIP OK message is sent to the S-CSCF.

14. The S-CSCF forwards the message to the MGCF.

5.10.3 Network initiated session release

5.10.3.0 Deletion of PDP context used to transport IMS SIP signalling

It is possible that the GPRS subsystem deletes the PDP context used to transport IMS SIP signalling (e.g. due to routing area update, overload situations).

In this case the UE shall initiate a procedure to re-establish a PDP context to transport IMS SIP signalling. If there are any IMS related PDP contexts active the re-establishment of the PDP context to transport IMS signalling shall be perfomed by using the Secondary PDP Context Activation Procedure as defined in TS 23.060 [23]. If re-establishment fails then the UE shall de-activate all other IMS related PDP context(s).

5.10.3.1 Network initiated session release - P-CSCF initiated

The following flows show a Network initiated IM CN subsystem application (SIP) session release. It is assumed that the session is active and that the bearer was established directly between the two visited networks (the visited networks could be the Home network in either or both cases).

A bearer is removed e.g. triggered by a mobile power down, due to a previous loss of coverage, or accidental/malicious removal, etc. In this case the 'Indication of PDP Context Release' procedure will be performed (see 3GPP TS 23.207). The flow for this case is shown in Figure 5.24.

In the event of loss of coverage, 3G TS 23.060 defines the Iu or RAB Release procedures. In case of PDP context with streaming or conversational class the maximum bitrate of the GTP tunnel between SGSN and GGSN is modified to 0 kbit/s. This is indicated to the P-CSCF / PCF by performing the 'PDP Context Modification' procedure (see 3GPP TS 23.207) as shown in Figure 5.25. For loss of coverage in case of other PDP contexts (background or interactive traffic class), the PDP context is preserved with no modifications.

Other network initiated session release scenarios are of course possible. In particular such scenarios initiated in the home network for administrative reasons might begin with an S-CSCF.

5.10.3.1.1 Network initiated session release - P-CSCF initiated - removal of PDP context

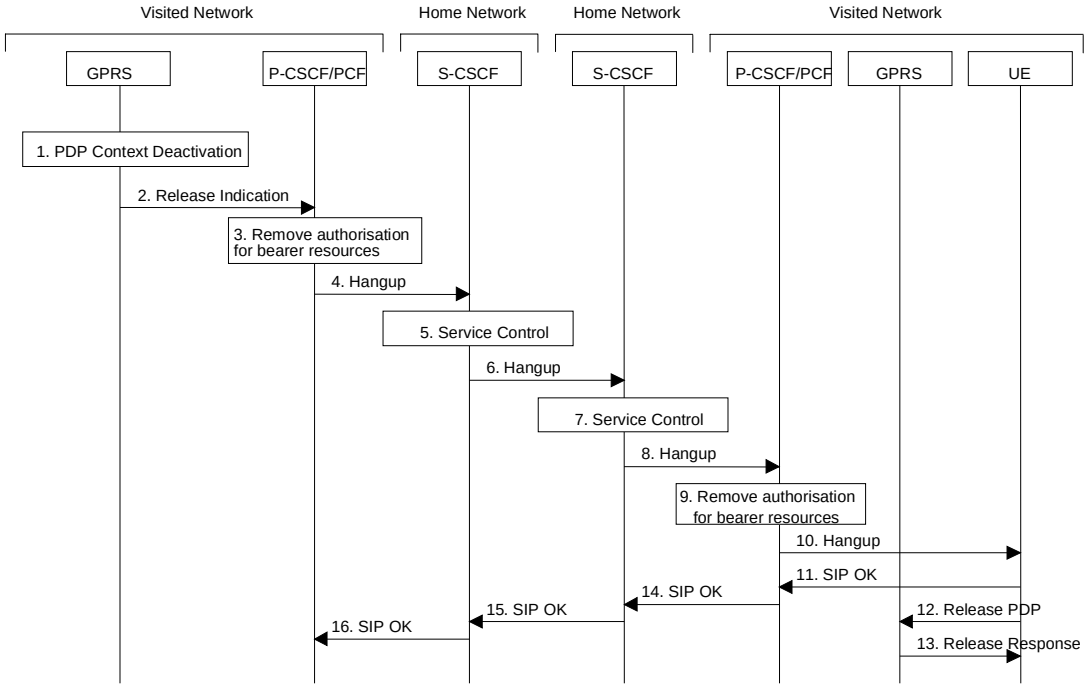


Figure 5.26: Network initiated session release - P-CSCF initiated - removal of PDP context

1. A bearer related to the session is terminated, for example, triggered by a mobile power down, etc. This is noted by the GPRS subsystem.
2. If a request state was created in the PCF at PDP context activation, the GGSN shall send a release indication to the P-CSCF/PCF for the disconnected bearer. The P-CSCF might also note the release due to a SIP Session Timeout.
3. The P-CSCF/PCF removes the authorisation for resources related to the bearer that had previously been issued for this endpoint for this session.

The following steps are only performed in case the P-CSCF/PCF has decided to terminate the session.

4. The P-CSCF generates a Hangup (Bye message in SIP) to the S-CSCF of the releasing party (e.g. if all PDP contexts related to the same IMS session are deleted). It is noted that this message should be able to carry a cause value to indicate the reason for the generation of the hangup.
5. The S-CSCF invokes~~performs~~ whatever service control procedures are appropriate for this ending session.
6. The S-CSCF of the releasing party forwards the Hangup to the S-CSCF of the other party.
7. The S-CSCF invokes~~performs~~ whatever service control procedures are appropriate for this ending session.
8. The S-CSCF of the other party forwards the Hangup on to the P-CSCF.
9. The P-CSCF/PCF removes the authorisation for resources that had previously been issued for this endpoint for this session. This step also results in a release indication to the GPRS subsystem to confirm that the IP bearers associated with the session have been deleted for UE#2.
10. The P-CSCF forwards the Hangup on to the UE.
11. The mobile responds with an acknowledgement, the SIP OK message (number 200), which is sent back to the P-CSCF.
12. Steps 12 and 13 may be done in parallel with step 11. The Mobile initiates the release of the bearer PDP context.

13. The GPRS subsystem releases the PDP context. The IP network resources that had been reserved for the message receive path to the mobile for this session are now released. This is initiated from the GGSN. If RSVP was used to allocated resources, then the appropriate release messages for that protocol would invoked here.

14. The SIP OK message is sent to the S-CSCF.

15. The S-CSCF of the other party forwards the OK to the S-CSCF of the releasing party.

16. The S-CSCF of the releasing party forwards the OK to the P-CSCF of the releasing party.

5.10.3.1.2 P-CSCF initiated session release after loss of radio coverage

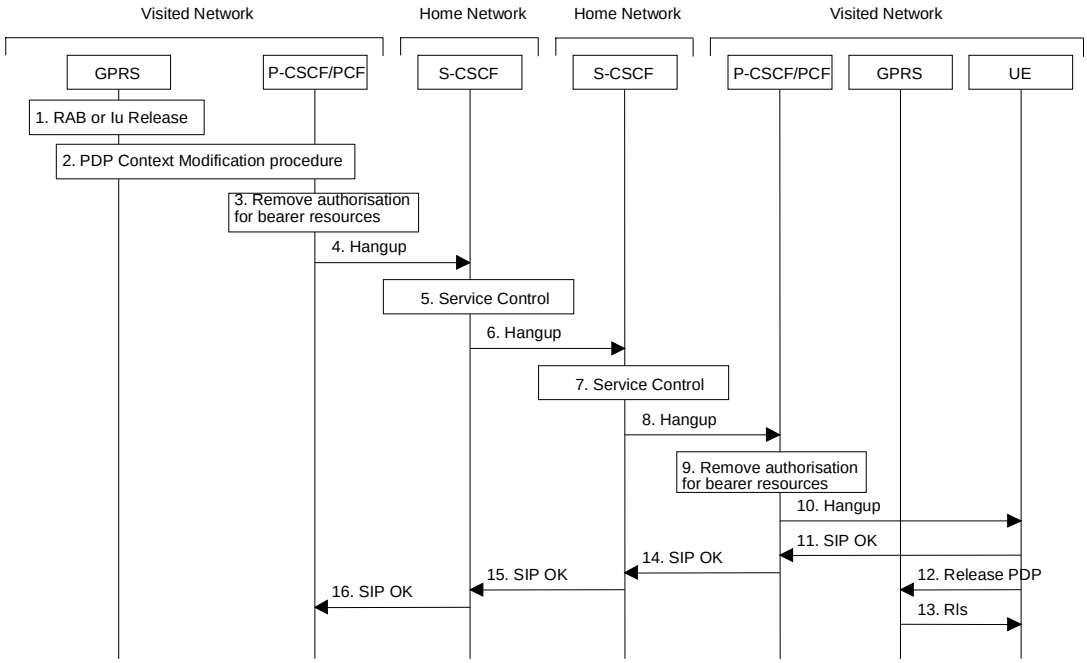


Figure 5.26a: P-CSCF initiated session release after loss of radio coverage

- 1. In the event of loss of radio coverage the Iu connection or RAB(s) are released. In case of PDP context with streaming or conversational class the maximum bitrate of the GTP tunnel between SGSN and GGSN is modified to 0 kbit/s by PDP Context Modification procedures. For PDP contexts using background or interactive traffic class, the PDP context is preserved with no modifications.

- 2. If a request state was created in the PCF at PDP context activation, the GGSN shall initiate the PDP context modification procedure by sending a modify indication to the P-CSCF/PCF for the affected bearers in order to indicate the change of the maximum bitrate to 0 kbit/s. The P-CSCF/PCF shall accept this modification.

3. It is optional for the P-CSCF/PCF to deactivate the affected bearer(s) and additionally IP bearers related to the affected session (e.g. a chat session could still be allowed). For these IP bearers the P-CSCF/PCF performs 'Revoke Authorization for UMTS and IP Resources' procedure (see 3GPP TS 23.207). If the P-CSCF decides to terminate the session then the P-CSCF/PCF removes the authorisation for resources that had previously been issued for this endpoint for this session.

The following steps are only performed in case the P-CSCF/PCF has decided to terminate the session.

4. The P-CSCF generates a Hangup (Bye message in SIP) to the S-CSCF of the releasing party. It is noted that this message should be able to carry a cause value to indicate the reason for the generation of the hangup.

5. The S-CSCF invokes~~performs~~ whatever service control procedures are appropriate for this ending session.

6. The S-CSCF of the releasing party forwards the Hangup to the S-CSCF of the other party.

7. The S-CSCF invokes~~performs~~ whatever service control procedures are appropriate for this ending session.

8. The S-CSCF of the other party forwards the Hangup on to the P-CSCF.

9. The P-CSCF/PCF removes the authorisation for resources that had previously been issued for this endpoint for this session. This step also results in a release indication to the GPRS subsystem to confirm that the IP bearers associated with the session have been deleted for UE#2.

10. The P-CSCF forwards the Hangup on to the UE.

11. The mobile responds with an acknowledgement, the SIP OK message (number 200), which is sent back to the P-CSCF.

12. Steps 12 and 13 may be done in parallel with step 11. The Mobile initiates the release of the bearer PDP context.

13. The GPRS subsystem releases the PDP context. The IP network resources that had been reserved for the message receive path to the mobile for this session are now released. This is initiated from the GGSN. If RSVP was used to allocated resources, then the appropriate release messages for that protocol would invoked here.

14. The SIP OK message is sent to the S-CSCF.

15. The S-CSCF of the other party forwards the OK to the S-CSCF of the releasing party.

16. The S-CSCF of the releasing party forwards the OK to the P-CSCF of the releasing party.

5.10.3.2 Network initiated session release - S-CSCF Initiated

The following flow shows a network-initiated IM CN subsystem application session release, where the release is initiated by the S-CSCF. This can occur in various service scenarios, e.g. administrative, or prepaid.

The procedures for clearing a session, when initiated by an S-CSCF, are as shown in the following information flow.

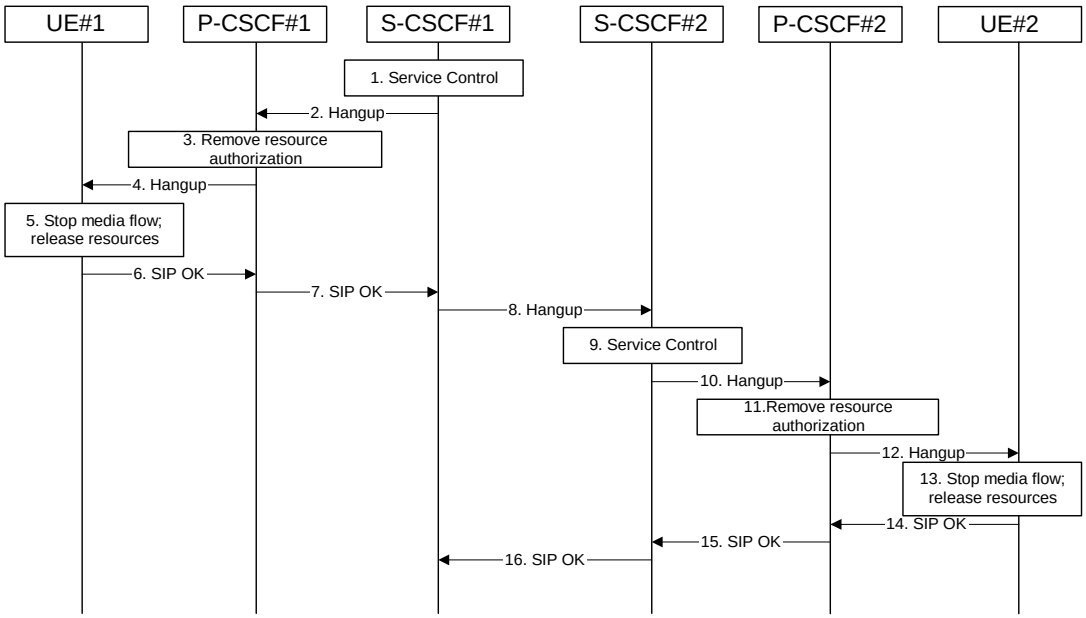


Figure 5.27: Network initiated session release - S-CSCF initiated

Information flow procedures are as follows:

1. S-CSCF#1 decides the session should be terminated, due to administrative reasons or due to service expiration.

2. S-CSCF#1 sends a Hangup message to P-CSCF#1

3. SCF#1 removes the authorisation for resources that had previously been issued for this endpoint for this session. This step also results in a release indication to the GPRS subsystem to confirm that the IP bearers associated with the session have been deleted for UE#1.

4. SCF#1 forwards the Hangup message to UE#1.

5. UE#1 stops sending the media stream to the remote endpoint, and releases the resources used for the session.

6. UE#1 responds with a SIP-OK message to its proxy, P-CSCF#1.
7. P-CSCF#1 forwards the SIP-OK message to S-CSCF#1.
8. S-CSCF#1 sends a Hangup message to S-CSCF#2. This is done at the same time as flow#2
9. S-CSCF#2 invokes~~performs~~ whatever service control procedures are appropriate for this ending session.
10. S-CSCF#2 forwards the Hangup message to P-CSCF#2.
11. P-CSCF#2 removes the authorisation for resources that had previously been issued for this endpoint for this session. This step also results in a release indication to the GPRS subsystem to confirm that the IP bearers associated with the session have been deleted for UE#2.
12. P-CSCF#2 forwards the Hangup message to UE#2.
13. UE#2 stops sending the media stream to the remote endpoint, and releases the resources used for the session.
14. UE#2 acknowledges receipt of the Hangup message with a SIP-OK final response, send to P-CSCF#2.
15. P-CSCF#2 forwards the SIP-OK final response to S-CSCF#2.
16. S-CSCF#2 forwards the SIP-OK final response to S-CSCF#1.

**********Next Change**********

5.11.3.4 Sample MM session flow - addition of another media

For this end-to-end session flow, we assume the originator is a UE located within the service area of the network operator to whom the UE is subscribed. The UE has already established an IM CN session and is generating an invite to add another media (e.g., video to a voice call) to the already established session. Note that the invite to add media to an existing session could be originated by either end. The invite, and subsequent flows, are assumed to follow the path determined when the initial session was established. Any I-CSCFs that were included in the initial session would be included in this session.

The originating party addresses a destination that is a subscriber of the same network operator.

The destination party is a UE located within the service area of the network operator to which it is subscribed.

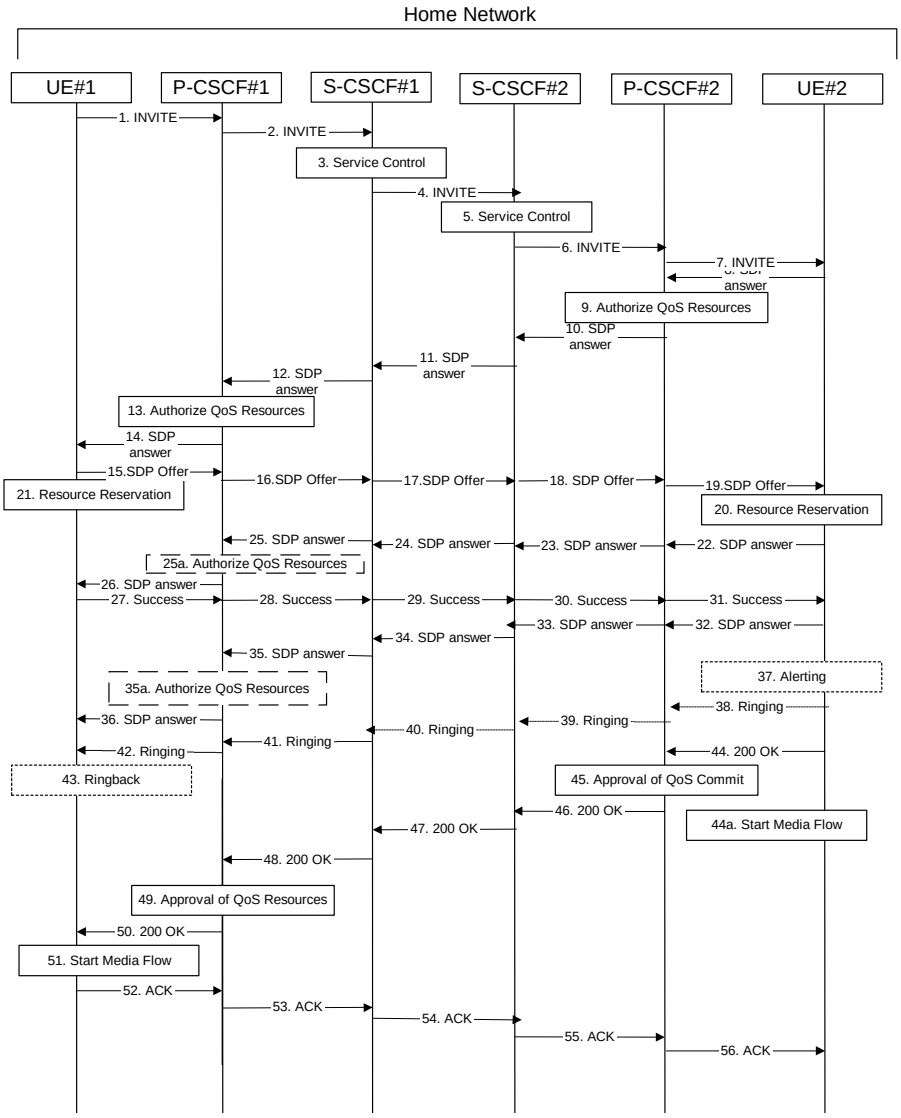


Figure 5.33: Multimedia session flow - addition of another media

Step-by-step processing of this end-to-end session flow is as follows:

1. UE#1 sends a SIP INVITE request, containing new SDP for the new media and including the original SDP, to P-CSCF#1, which was obtained from the CSCF discovery procedures.

2. P-CSCF#1 forwards the INVITE to the next hop name/address, as determined from the registration procedures. In this case the next hop is S-CSCF#1 within the same operator's network.

3. S-CSCF#1 validates the service profile, and invokes~~performs~~ whatever service control logic is appropriate for this session attempt.

4. S-CSCF#1 recognises that this invite applies to an existing session. It therefore forwards the INVITE along the existing path to S-CSCF#2.

5. S-CSCF#2 validates the service profile, and invokes~~performs~~ whatever service control logic is appropriate for this session attempt.

6. S-CSCF#2 remembers (from the registration procedure) the next hop CSCF for this UE. It forwards the INVITE to P-CSCF#2 in the home network.

7. P-CSCF#2 remembers (from the registration procedure) the address of UE#2 and forwards the INVITE to UE#2.

8. UE#2 returns the media stream capabilities of the destination to the session originator, along the signalling path established by the INVITE message.

9. P-CSCF#2 authorises the QoS resources required for this additional media.

10. P-CSCF#2 forwards the SDP to S-CSCF#2.

11. S-CSCF#2 forwards the SDP to S-CSCF#1.

12. S-CSCF#1 forwards the SDP message to P-CSCF#1.

13. P-CSCF#1 authorises the additional resources necessary for this new media.

14. P-CSCF#1 forwards the SDP message to the originating endpoint, UE#1.

15-19. The originator decides the offered set of media streams for this media addition, and sends the offered SDP to P-CSCF#1.

20. UE#2 initiates the resource reservation procedures for the resources necessary for this additional media.

21. After determining the offered set of media streams for this additional media, step #15 above, UE#1 initiates the reservation procedures for the additional resources needed for this new media.

22-25. When UE#2 has successfully reserved the needed resources, it sends the “reservation successful” message to UE#2 along the signaling path established by the INVITE message. The message is sent first to P-CSCF#1.

25a. P-CSCF#1 authorises any additional media for the proposed SDP.

26. P-CSCF#1 forwards the message to UE#1.

27-31. UE#1 sends the final agreed SDP to UE#2 via the established path.

32-35. UE#2 responds to the offered final media.

35a. P-CSCF#1 authorises the media agreed.

36. The response is forwarded to UE#1.

37.UE#2 may optionally delay the session establishment in order to alert the user to the incoming additional media.

38. If UE#2 performs alerting, it sends a ringing indication to the originator via the signalling path. The message is sent first to P-CSCF#2.

39. P-CSCF#2 forwards the ringing message to S-CSCF#2.

40. S-CSCF#2 invokes~~performs~~ whatever service control is appropriate for this ringing flow.

41. S-CSCF#2 forwards the message to S-CSCF#1.

32. 41. S-CSCF#1 forwards the message to P-CSCF#1.

42. P-CSCF#1 forwards the message to UE#1.

43. UE#1 indicates to the originator that the media addition is being delayed due to alerting. Typically this involves playing a ringback sequence.

44. When the destination party accepts the additional media, UE#2 sends a SIP 200-OK final response along the signalling path back to the originator. The message is sent first to P-CSCF#2.

44a. After sending the 200-OK, UE#2 may initiate the new media flow(s).

45. P-CSCF#2 approves the commitment of the QoS resources for this additional media.

. 46. P-CSCF#2 forwards the final response to S-CSCF#2.

47. S-CSCF#2 forwards the final response to S-CSCF#1.

48. S-CSCF#1 forwards the final response to P-CSCF#1.

9. P-CSCF#1 approves the commitment of the QoS resources for this additional media.

50. P-CSCF#1 forwards the final response to UE#1.

51. UE#1 starts the media flow(s) for this additional media.

52. UE#1 responds to the final response with a SIP ACK message, which is passed to the destination via the signalling path. The message is sent first to P-CSCF#1.

53. P-CSCF#1 forwards the ACK to S-CSCF#1

54. S-CSCF#1 forwards the ACK to S-CSCF#2.

55. S-CSCF#2 forwards the ACK to P-CSCF#2.

56. P-CSCF#2 forwards the ACK to UE#2.

5.11.4 Procedures for providing or blocking identity

Identity is composed of a public user identity and an optional display name:

- The public user identity is used by any user for requesting communications to other users (see section 4.3.3.2).
- The display name is the user's name if available, an indication of privacy or unavailability otherwise. The display name is a text string which may identify the subscriber, the user or the terminal.

This section gives information flows for the procedures for providing the authenticated public user identity and the optional display Name information of the originating party to theterminating party. It also describes the mechanisms for blocking the display of public user identity and optional display name if requested by the originating party.

5.11.4.1 Procedures for providing the authenticated identity of the originating party

Authentication of the subscriber is performed during the registration procedures, as described in section 5.2.2.3. As a result of the registration procedures, one or several public user identity(ies) of the originating party is/are stored in P-CSCF#1. This is shown in the sub-procedure represented in the following information flow in step 1.

When UE#1 attempts to initiate a new session, it includes a public user identity in the INVITE request. P-CSCF#1 verifies that it is present and correct before passing the request to S-CSCF#1.

In the following call flow, it is assumed that no privacy has been required by UE#1.If thepublic user identity supplied by UE#1 in the INVITE request is incorrect, the P-CSCF may reject the request, or may overwrite with the correct URL.

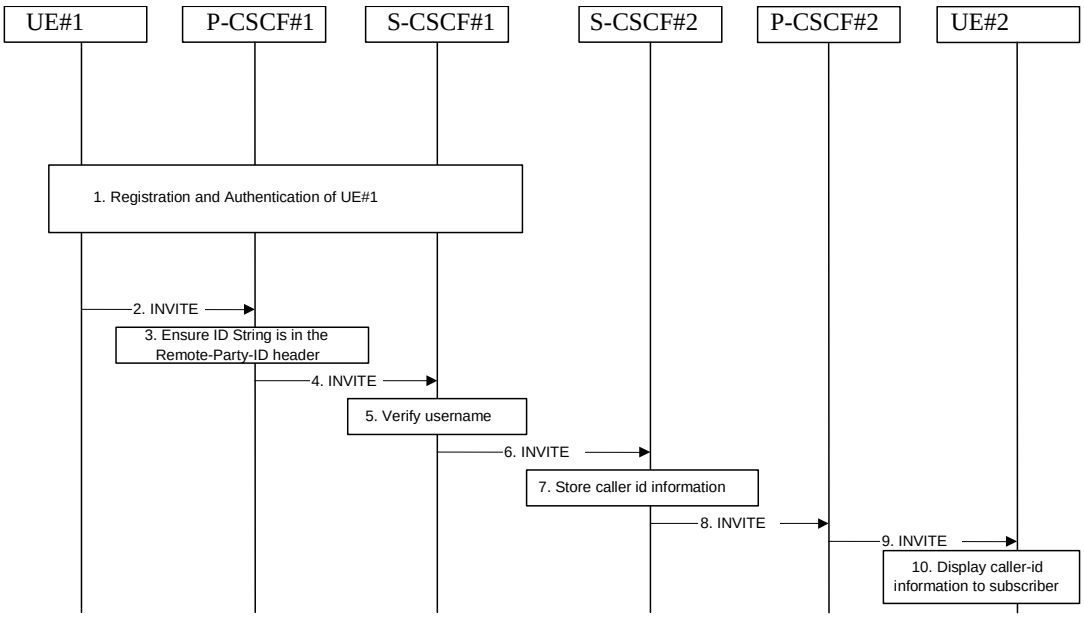


Figure 5.34: Providing the authenticated Identity of the originating party

The detailed procedure is as follows:

1. Registration and authentication of UE#1 is performed.
2. UE#1 initiates a new multi-media session, by sending an INVITE request to P-CSCF#1. This INVITE request includes a public user identity, and may include a display name that may identify the specific person using the UE.
3. P-CSCF#1 checks the public user identity of the originating party, and replaces it (or rejects the request) if it is incorrect.
4. P-CSCF#1 forwards the INVITE request, with the verified public user identity , to S-CSCF#1.
5. S-CSCF#1 invokes~~performs~~ whatever service control logic is appropriate for this session set up attempt to check in particular that no identity restriction is active.6. S-CSCF#1 forwards the INVITE request, with verified public user identity and display name of the originting party if present, to S-CSCF#2.
8. S-CSCF#2 forwards the INVITE request to P-CSCF#2.
9. P-CSCF#2 forwards the INVITE request to UE#2.
10. UE#2 displays the public user identity and the display name information (i.e. user-name if available, indication of privacy or unavailability otherwise) to the terminating party.

5.11.4.2 Procedures for blocking the identity of the originating party

Regulatory agencies, as well as subscribers, may require the ability of an originating party to block the display of their identity either permanently or on a session by session basis. This is a function performed by the destination P-CSCF. In this way, the terminating party is still able to do a session-return, session-trace, transfer, or any other supplementary service.

In this call flow, it is assumed that privacy has been required by UE#1 on public user identity (i.e. ‘id’ privacy) .

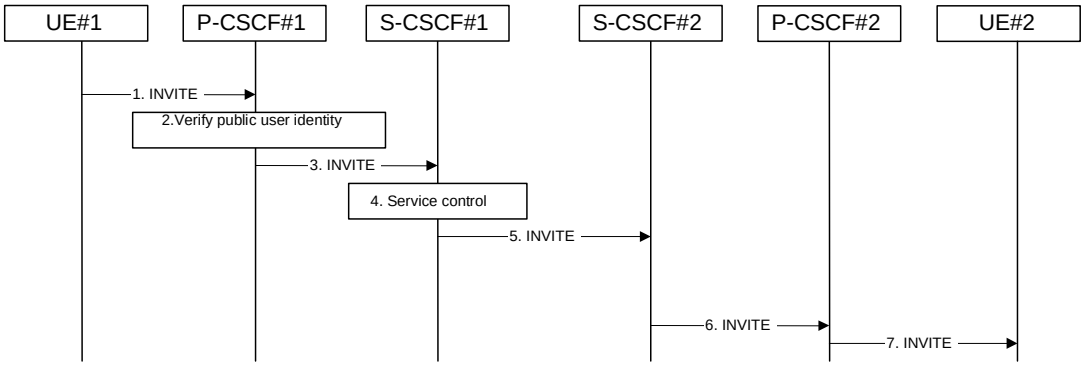


Figure 5.35: Blocking the identity of the originating party

The detailed procedure is as follows:

1. UE#1 initiates a new multi-media session, by sending an INVITE request to P-CSCF#1. This INVITE request includes public user identity, and may include a display name that may identify the specific person using the UE. Also included in this INVITE message is an indication that the identity of the originating party shall not be revealed to the destination.

2. P-CSCF#1 checks the public user identity of the originating party, and replaces it (or rejects the request) if it is incorrect.

3. P-CSCF#1 forwards the INVITE request, with the verified public user identity , to S-CSCF#1.

4. S-CSCF#1 invokes~~performs~~ whatever service control logic is appropriate for this session set up attempt. Based on the subscriber's profile, S-CSCF#1 may insert an indication in the INVITE message that the identity of the originating party shall not be revealed to the terminating party. S-CSCF#1 may insert an indication to block the IP address of UE#1 too and may remove other information from the messaging which may identify the caller to the terminating party.5. S-CSCF#1 forwards the INVITE request, with verified public user identity, and with user-name of the originating party if present, to S-CSCF#2.

6. If the terminating party has an override functionality in S-CSCF#2/Application Server in the terminating network removes the indication of privacy from the message.

7. S-CSCF#2 forwards the INVITE request to P-CSCF#2.

8. If privacy of the user identity is required, P-CSCF#2 removes the public user identity from the message before forwarding the INVITE request to UE#2.

5.11.5 Session Redirection Procedures

This section gives information flows for the procedures for performing session redirection. The decision to redirect a session to a different destination may be made for different reasons by a number of different functional elements, and at different points in the establishment of the session.

Three cases of session redirection prior to bearer establishment are presented, and one case of session redirection after bearer establishment.

These cases enable the typical services of "Session Forward Unconditional", "Session Forward Busy", "Session Forward Variable", "Selective Session Forwarding", and "Session Forward No Answer", though it is important to recognise that the implementation is significantly different from the counterparts in the CS domain.

5.11.5.1 Session Redirection initiated by S-CSCF to IMS

One of the functional elements in a basic session flow that may initiate a redirection is the S-CSCF of the destination user. The user profile information obtained from the HSS by the 'Cx-pull' during registration may contain complex logic and triggers causing session redirection. S-CSCF#2 sends the SIP INVITE request to the I-CSCF for the new destination (I-CSCF#F in the diagram), who forwards it to S-CSCF#F, who forwards it to the new destination.

In cases when the destination user is not currently registered in the IM CN subsystem, the I-CSCF may assign a temporary S-CSCF to invoke~~perform~~ the service control on behalf of the intended destination. This temporary S-CSCF takes the role of S-CSCF#2 in the following information flow.

The service implemented by this information flow is typically “Session Forward Unconditional”, “Session Forward Variable” or “Selective Session Forwarding”. S-CSCF#2 may also make use of knowledge of current sessions in progress at the UE, and implement “Session Forwarding Busy” in this way.

This is shown in the following information flow:

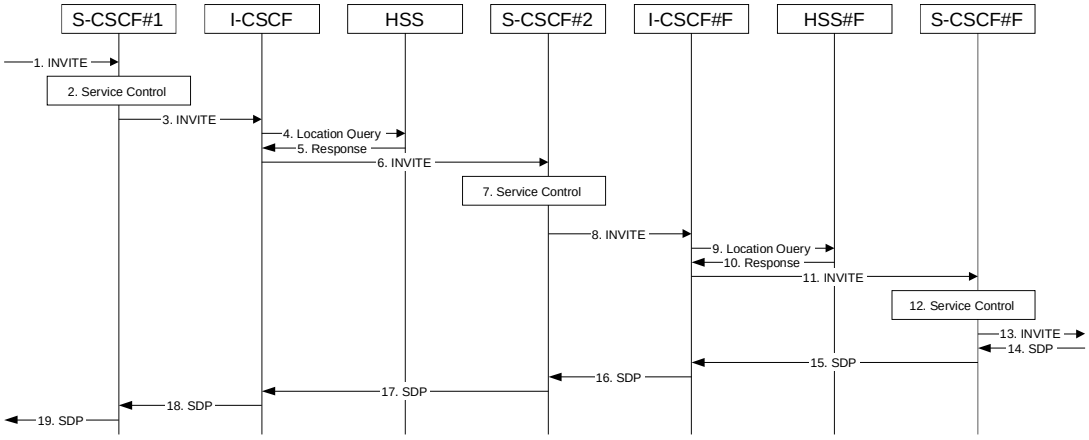


Figure 5.36: Session redirection initiated by S-CSCF to IMS

Step-by-step processing is as follows:

1. The SIP INVITE request is sent from the UE to S-CSCF#1 by the procedures of the originating flow.
2. S-CSCF#1 ~~performs~~ invokes whatever service control logic is appropriate for this session setup attempt.
3. S-CSCF#1 performs an analysis of the destination address, and determines the network operator to whom the destination subscriber belongs. The INVITE message is sent to an I-CSCF for that operator, and may optionally go through an I-CSCF(THIG) if S-CSCF#1 is in a different operator’s network than I-CSCF.
4. I-CSCF queries the HSS for current location information of the destination user.
5. HSS responds with the address of the current Serving CSCF (S-CSCF#2) for the terminating user.
6. I-CSCF forwards the INVITE request to S-CSCF#2, who will handle the session termination.
7. S-CSCF#2 invokes~~performs~~ whatever service control logic is appropriate for this session setup attempt. As a result of this service control logic, S-CSCF#2 determines that the session should be redirected to a new destination URL within the IP Multimedia Subsystem. Based on operator policy and the user profile, S-CSCF#2 may restrict the media streams allowed in the redirected session.
8. S-CSCF#2 sends a SIP INVITE request to an I-CSCF (I-CSCF#F) for the network operator to whom the forwarded destination subscribes. This INVITE request may optionally go through an I-CSCF(THIG) if S-CSCF#2 is in a different operator’s network than I-CSCF#F.
9. I-CSCF#F queries the HSS (HSS#F) for current location information of the destination user.
10. HSS#F responds with the address of the current Serving CSCF (S-CSCF#F) for the terminating user.
11. I-CSCF forwards the INVITE request to S-CSCF#F, who will handle the session termination.
12. S-CSCF#F invokes~~performs~~ whatever service control logic is appropriate for this session setup attempt
13. S-CSCF#F forwards the INVITE toward the destination UE, according to the procedures of the terminating flow.
14. The destination UE responds with the SDP message, and the session establishment proceeds normally.

5.11.5.2 Session Redirection to PSTN Termination (S-CSCF #2 forwards INVITE)

The S-CSCF of the destination user (S-CSCF#2) may determine that the session is to be redirected to a PSTN Termination; e.g. CS-domain endpoint, or to the PSTN. For session redirection to PSTN termination where the S-CSCF of the called party (S-CSCF#2) wishes to remain in the path of SIP signalling, the S-CSCF forwards the INVITE to a BGCF. Then the BGCF (in the local network or in another network) will forward the INVITE to a MGCF, which will forward towards the destination according to the termination flow.

In cases when the destination user is not currently registered in the IM CN subsystem, the I-CSCF may assign a temporary S-CSCF to ~~perform~~ invoke the service control on behalf of the intended destination. This temporary S-CSCF takes the role of S-CSCF#2 in the following information flow.

Handling of redirection to a PSTN Termination where the S-CSCF#2 forwards the INVITE is shown in the figure 5.37:

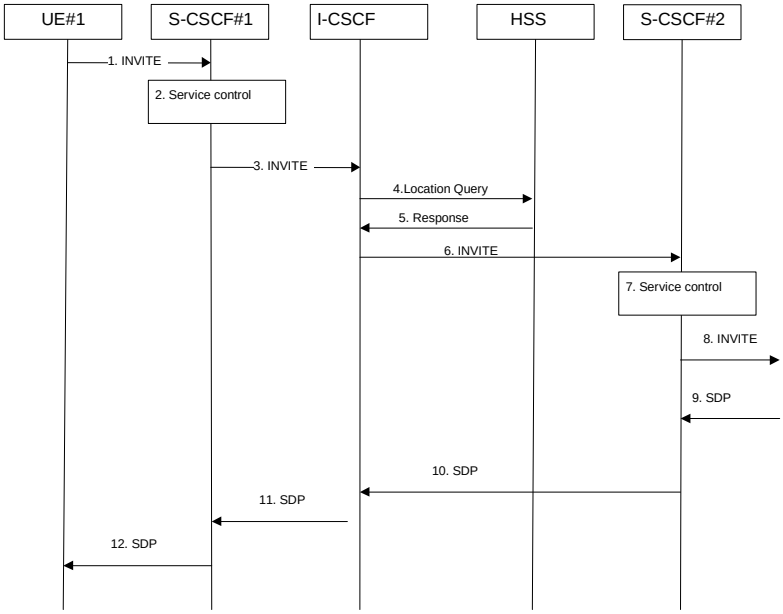


Figure 5.37: Session redirection to PSTN Termination (S-CSCF #2 forwards INVITE)

Step-by-step processing is as follows:

1. The SIP INVITE request is sent from the UE #1 to S-CSCF#1 by the procedures of the originating flow.
2. S-CSCF#1 performs whatever service control logic is appropriate for this session setup attempt.
3. S-CSCF#1 performs an analysis of the destination address, and determines the network operator to whom the subscriber belongs. The INVITE message is sent to an I-CSCF for that operator, and may optionally go through an I-CSCF(THIG) if S-CSCF#1 is in a different operator's network than I-CSCF.
4. I-CSCF queries the HSS for current location information of the destination user.
5. HSS responds with the address of the current Serving CSCF (S-CSCF#2) for the terminating user.
6. I-CSCF forwards the INVITE request to S-CSCF#2, who will handle the session termination.
7. S-CSCF#2 ~~performs~~ invokes whatever service control logic is appropriate for this session setup attempt. As a result of this service control logic, S-CSCF#2 determines that the session should be redirected to a PSTN termination. . S-CSCF#2 determines that it wishes to remain in the path of the SIP signalling.
8. S-CSCF#2 forwards the INVITE using the Serving to Serving procedures S-S#3 or S-S#4. The PSTN terminating flows are then followed.
9. The destination responds with the SDP message, and the session establshment proceeds normally.

5.11.5.2a Session Redirection to PSTN Termination (REDIRECT to originating UE#1)

The S-CSCF of the destination user (S-CSCF#2) may determine that the session is to be redirected to a PSTN Termination; e.g. CS-domain endpoint, or to the PSTN. For session redirection to PSTN termination where the S-CSCF of the called party (S-CSCF#2) wishes to use the SIP REDIRECT method, the S-CSCF#2 will pass the new destination information (the PSTN Termination information) to the originator (UE#1). The originator (UE#1) can then initiate a new session to the redirected to destination denoted by S-CSCF#2.

Handling of redirection to a PSTN Termination where the S-CSCF#2 REDIRECTS to the originating UE#1 is shown in the figure 5.37a:

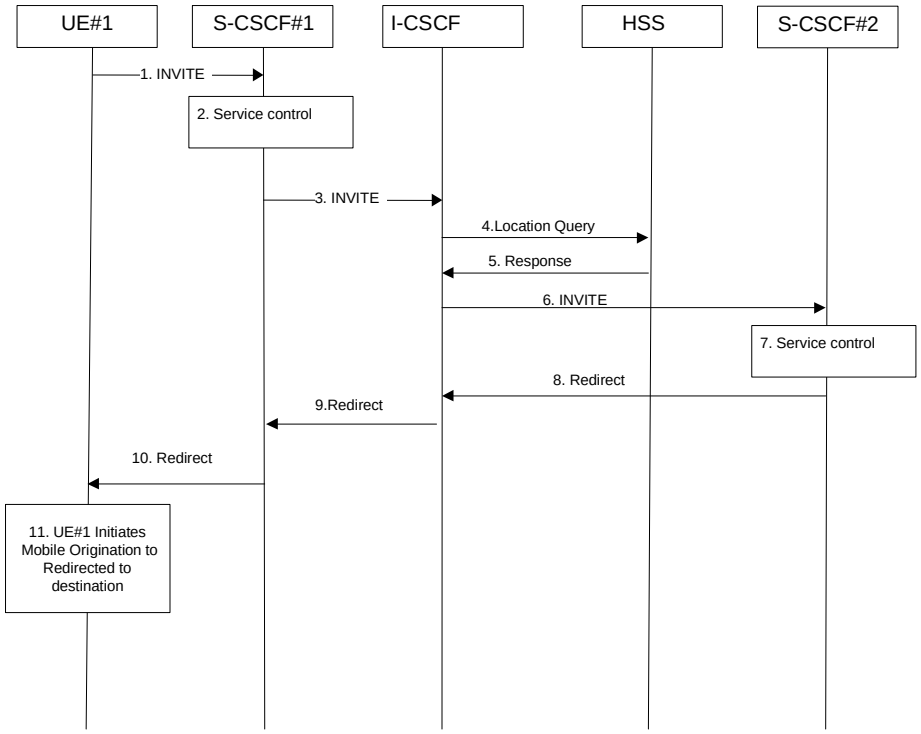


Figure 5.37a: Session redirection to PSTN Termination (REDIRECT to originating UE#1)

Step-by-step processing is as follows:

1. The SIP INVITE request is sent from the UE#1 to S-CSCF#1 by the procedures of the originating flow.
2. S-CSCF#1 invokes~~performs~~ whatever service control logic is appropriate for this session setup attempt.
3. S-CSCF#1 performs an analysis of the destination address, and determines the network operator to whom the subscriber belongs. The INVITE message is sent to an I-CSCF for that operator, and may optionally go through an I-CSCF(THIG) if S-CSCF#1 is in a different operator's network than I-CSCF.
4. I-CSCF queries the HSS for current location information of the destination user.
5. HSS responds with the address of the current Serving CSCF (S-CSCF#2) for the terminating user.
6. I-CSCF forwards the INVITE request to S-CSCF#2, who will handle the session termination.
7. S-CSCF#2 invokes~~performs~~ whatever service control logic is appropriate for this session setup attempt. As a result of this service control logic, S-CSCF#2 determines that the session should be redirected to a PSTN termination.
   S-CSCF#2 determines that it wishes to use the SIP REDIRECT method to pass the redirection destination information (the 'redirected-to PSTN Termination' information) to the originator (UE#1).
8. S-CSCF#2 sends a SIP Redirect response to I-CSCF with the redirection destination.

9. I-CSCF sends a Redirect response to S-CSCF#1, containing the redirection destination.

10. S-CSCF#2 forwards the Redirect response to UE#1, containing the redirection destination

UE#1 initiates a session to the 'redirected-to PSTN Termination' according to the mobile origination procedures supported in the UE (e.g. CS, IMS).

5.11.5.3 Session Redirection initiated by S-CSCF to general endpoint (REDIRECT to originating UE#1)

The S-CSCF in the scenario above may determine that the session is to be redirected to an endpoint outside the IP MultiMedia System and outside the CS-domain. Examples of these destinations include web pages, email addresses, etc. It recognizes this situation by the redirected URL being other than a sip: or tel: URL.

In cases when the destination subscriber is not currently registered in the IM CN subsystem, the I-CSCF may assign a temporary S-CSCF to ~~perform~~ invoke the service control on behalf of the intended destination. This temporary S-CSCF takes the role of S-CSCF#2 in the following information flow.

Handling of redirection to a general URL is shown in the following information flow:

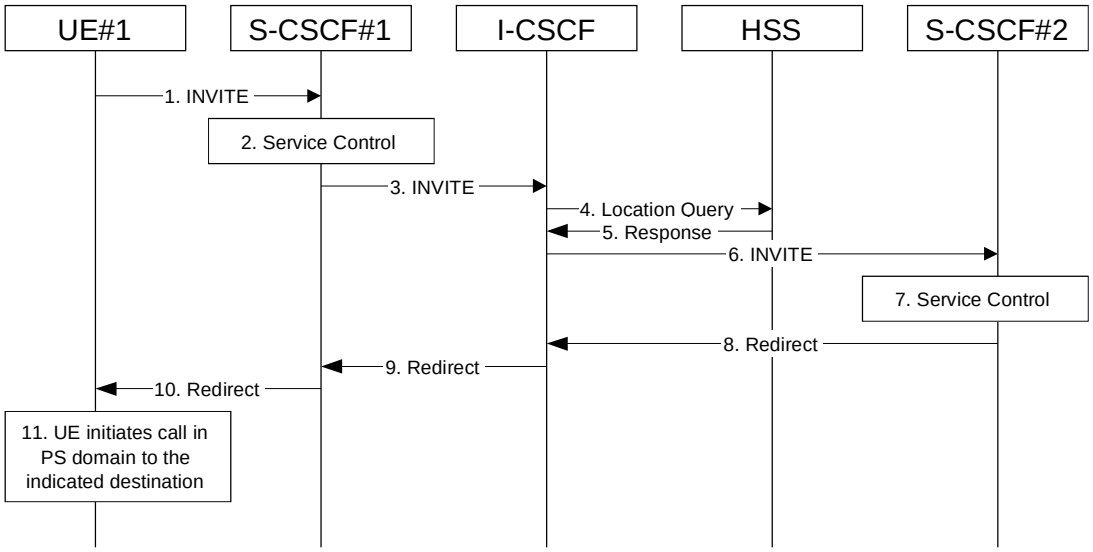


Figure 5.38: Session redirection initiated by S-CSCF to general endpoint

Step-by-step processing is as follows:

1. The SIP INVITE request is sent from the UE to S-CSCF#1 by the procedures of the originating flow.

2. S-CSCF#1 ~~performs~~ invokes whatever service control logic is appropriate for this session setup attempt.

3. S-CSCF#1 performs an analysis of the destination address, and determines the network operator to whom the subscriber belongs. The INVITE message is sent to an I-CSCF for that operator, and may optionally go through an I-CSCF(THIG) if S-CSCF#1 is in a different operator's network than I-CSCF.

4. I-CSCF queries the HSS for current location information of the destination user.

5. HSS responds with the address of the current Serving CSCF (S-CSCF#2) for the terminating user.

6. I-CSCF forwards the INVITE request to S-CSCF#2, who will handle the session termination.

7. S-CSCF#2 invokes~~performs~~ whatever service control logic is appropriate for this session setup attempt. As a result of this service control logic, S-CSCF#2 determines that the session should be redirected to a new destination URL outside the IMS and outside the CS domain, i.e. other than a sip: or tel: URL.

8. S-CSCF#2 sends a SIP Redirect response back to I-CSCF, with redirection destination being the general URL.

9. I-CSCF sends a Redirect response back to S-CSCF#1, containing the redirection destination.

10. S-CSCF#1 forwards the Redirect response back to UE#1.

11. UE#1 initiates the session to the indicated destination.

5.11.5.4 Session Redirection initiated by P-CSCF

One of the functional elements in a basic session flow that may initiate a redirection is the P-CSCF of the destination user. In handling of an incoming session setup attempt, the P-CSCF normally sends the INVITE request to the destination UE, and retransmits it as necessary until obtaining an acknowledgement indicating reception by the UE.

In cases when the destination user is not currently reachable in the IM CN subsystem (due to such factors as roaming outside the service area or loss of battery, but the registration has not yet expired), the P-CSCF may initiate a redirection of the session. The P-CSCF informs the S-CSCF of this redirection, without specifying the new location; S-CSCF determines the new destination and performs according to sections 1, 2, or 3 above, based on the type of destination.

This is shown in the following information flow:

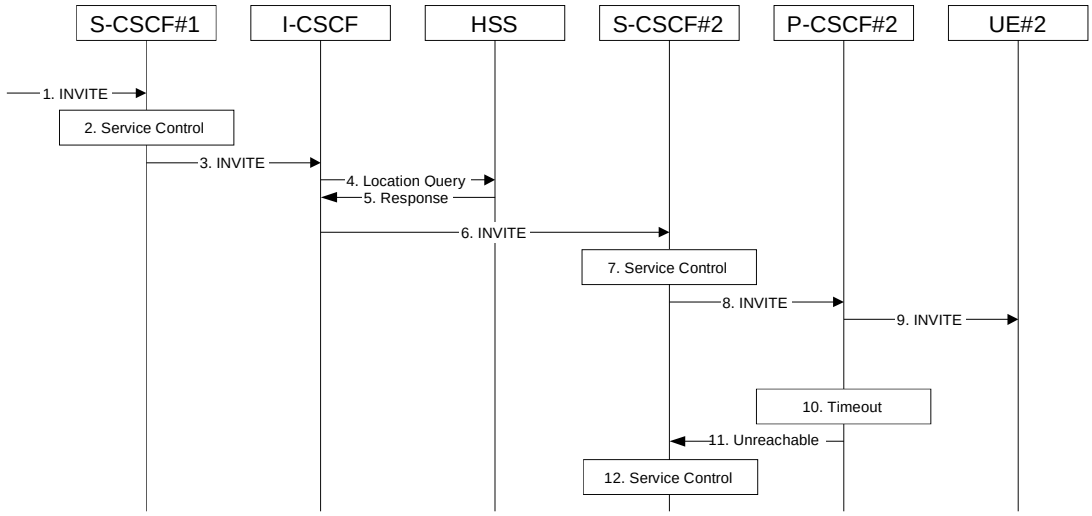


Figure 5.39: Session redirection initiated by P-CSCF

Step-by-step processing is as follows:

1. The SIP INVITE request is sent from the UE to S-CSCF#1 by the procedures of the originating flow.
2. S-CSCF#1 invokes~~performs~~ whatever service control logic is appropriate for this session setup attempt.
3. S-CSCF#1 performs an analysis of the destination address, and determines the network operator to whom the subscriber belongs. The INVITE message is sent to an I-CSCF for that operator, and may optionally go through an I-CSCF(THIG) if S-CSCF#1 is in a different operator's network than I-CSCF.
4. I-CSCF queries the HSS for current location information of the destination user.
5. HSS responds with the address of the current Serving CSCF (S-CSCF#2) for the terminating user.
6. I-CSCF forwards the INVITE request to S-CSCF#2, who will handle the session termination.
7. S-CSCF#2 invokes~~performs~~ whatever service control logic is appropriate for this session setup attempt.
8. S-CSCF#2 forwards the INVITE request to P-CSCF#2
9. P-CSCF#2 forwards the INVITE request to UE#2
10. Timeout expires in P-CSCF waiting for a response from UE#2. P-CSCF therefore assumes UE#2 is unreachable.
11. P-CSCF#2 generates an Unavailable response, without including a new destination, and sends the message to S-CSCF#2.

12. S-CSCF#2 invokesperforms whatever service control is appropriate for this session redirection. If the user does not subscribe to session redirection service, or did not supply a forwarding destination, S-CSCF#2 may terminate the session setup attempt with a failure response. Otherwise, S-CSCF#2 supplies a new destination URL, which may be a phone number, an email address, a web page, or anything else that can be expressed as a URL. Processing continues according to subsections 1, 2, or 3 above, based on the type of destination URL.

5.11.5.5 Session Redirection initiated by UE

The next functional element in a basic session flow that may initiate a redirection is the UE of the destination user. The UE may implement customer-specific feature processing, and base its decision to redirect this session on such things as identity of caller, current sessions in progress, other applications currently being accessed, etc. UE sends the SIP Redirect response to its P-CSCF, who forwards back along the signalling path to S-CSCF#1, who initiates a session to the new destination.

The service implemented by this information flow is typically “Session Forward Busy”, “Session Forward Variable” or “Selective Session Forwarding”.

This is shown in the following information flow:

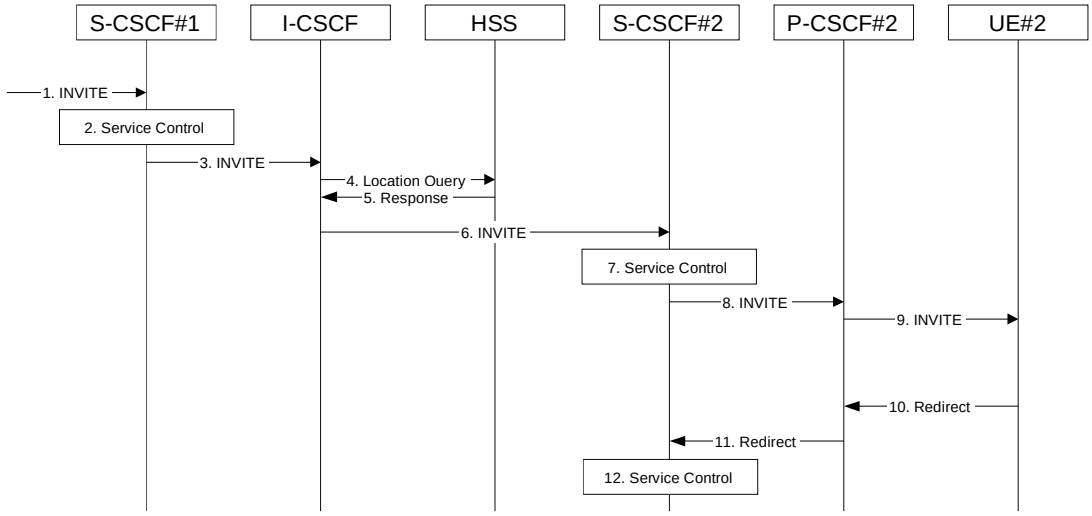


Figure 5.40: Session redirection initiated by UE

Step-by-step processing is as follows:

1. The SIP INVITE request is sent from the UE to S-CSCF#1 by the procedures of the originating flow.
2. S-CSCF#1 invokesperforms whatever service control logic is appropriate for this session setup attempt.
3. S-CSCF#1 performs an analysis of the destination address, and determines the network operator to whom the subscriber belongs. The INVITE message is sent to an I-CSCF for that operator, and may optionally go through an I-CSCF(THIG) if S-CSCF#1 is in a different operator’s network than I-CSCF.
4. I-CSCF queries the HSS for current location information of the destination user.
5. HSS responds with the address of the current Serving CSCF (S-CSCF#2) for the terminating user.
6. I-CSCF forwards the INVITE request to S-CSCF#2, who will handle the session termination.
7. S-CSCF#2 invokesperforms whatever service control logic is appropriate for this session setup attempt.
8. S-CSCF#2 forwards the INVITE request to P-CSCF#2
9. P-CSCF#2 forwards the INVITE request to UE#2
10. UE#2 determines that this session should be redirected, and optionally supplies the new destination URL. This new destination URL may be a phone number, an email address, a web page, or anything else that can be expressed as a URL. The Redirect response is sent to P-CSCF#2

11. P-CSCF#2 forwards the Redirect response to S-CSCF#2.

12. S-CSCF#2 invokes~~performs~~ whatever service control is appropriate for this session redirection. If UE#2 does not subscribe to session redirection service, or did not supply a new destination URL, S-CSCF#2 may supply one or may terminate the session setup attempt with a failure response. The new destination URL may be a phone number, an email address, a web page, or anything else that can be expressed as a URL. The procedures of subsection 1, 2, or 3 given above are followed, based on the type of URL.

5.11.5.6 Session Redirection initiated by originating UE#1 after Bearer Establishment (REDIRECT to originating UE#1)

The UE of the destination user may request the session be redirected after a customer-specified ringing interval. The UE may also implement customer-specific feature processing, and base its decision to redirect this session on such things as identity of caller, current sessions in progress, other applications currently being accessed, etc. UE sends the SIP Redirect response to its P-CSCF, who forwards back along the signaling path to the originating endpoint, who initiates a session to the new destination.

The service implemented by this information flow is typically “Session Forward No Answer”.

Redirect to another IMS endpoint (e.g. a sip: URL) is shown in the following information flow:

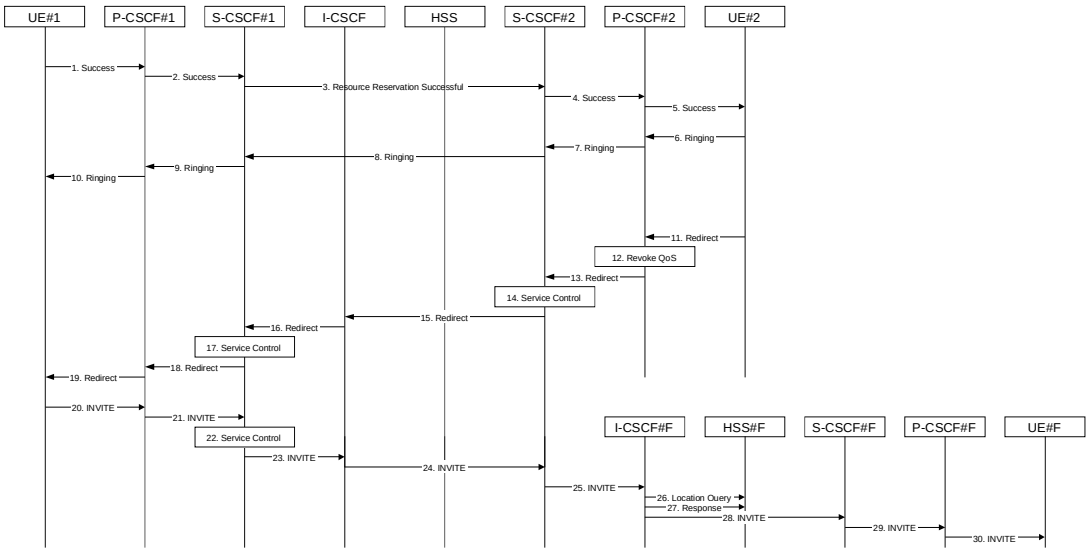


Figure 5.41: Session redirection after bearer establishment

Step-by-step processing is as follows:

1-10. Normal handling of a basic session establishment, up through establishment of the bearer channel and alerting of the destination user or by a previous session redirection after bearer establishment procedure.

11. Based on a timeout or other indications, UE#2 decides the current session should be redirected to a new destination URL. This new destination URL may be a phone number, an email address, a web page, or anything else that can be expressed as a URL. The Redirect response is sent to P-CSCF#2.

12. P-CSCF#2 shall revoke any authorisation for QoS for the current session.

13. P-CSCF#2 forwards the Redirect response to S-CSCF#2.

14. S-CSCF#2 invokes~~performs~~ whatever service control is appropriate for this session redirection. If UE#2 does not subscribe to session redirection service, or did not supply a new destination URL, S-CSCF#2 may supply one or may terminate the session setup attempt with a failure response. The new destination URL may be a phone number, an email address, a web page, or anything else that can be expressed as a URL. S-CSCF#2 generates a private URL, addressed to itself, containing the new destination.

15. S-CSCF#2 sends a SIP Redirect response back to I-CSCF, containing the private URL addressed to S-CSCF#2.

16. I-CSCF sends a Redirect response back to S-CSCF#1, containing the redirection destination.

17. S-CSCF#1 checks the number of redirections that have occurred for this session setup attempt, and if excessive, aborts the session. S-CSCF#1 stores the new destination information, generates a private URL addressed to itself pointing to the stored information, and generates a modified Redirect response with the private URL.

18. S-CSCF#1 sends the modified Redirect response to P-CSCF#1

19. P-CSCF#1 shall revoke any authorisation for QoS for the current session and sends the Redirect response to UE#1.

20. UE#1 initiates a new INVITE request to the address provided in the Redirect response. The new INVITE request is sent to P-CSCF#1

21. P-CSCF#1 forwards the INVITE request to S-CSCF#1

22. S-CSCF#1 retrieves the destination information saved in step #17, and invokes~~performs~~ whatever other service control is appropriate for this new session setup attempt.

23. S-CSCF#1 determines the network operator of the new destination address. The INVITE message is sent to I-CSCF#2, the I-CSCF for S-CSCF#2.

24. I-CSCF forwards the INVITE to S-CSCF#2

25. S-CSCF#2 decodes the private URL, determines the network operator of the new destination, and sends the INVITE request to the I-CSCF for that network operator.

26. The remainder of this session completes as normal.

5.11.6 Session Transfer Procedures

This section gives information flows for the procedures for performing session transfers. This is presented in two steps: first a basic primitive that can be used by endpoints to cause a multi-media session to be transferred, and second the procedures by which this primitive can be used to implement some well-known session-transfer services.

5.11.6.1 Refer operation

The refer primitive is an information flow indicating a “Refer” operation, which includes a component element “Refer-To” and a component element “Referred-By”. An information flow illustrating this is as follows:

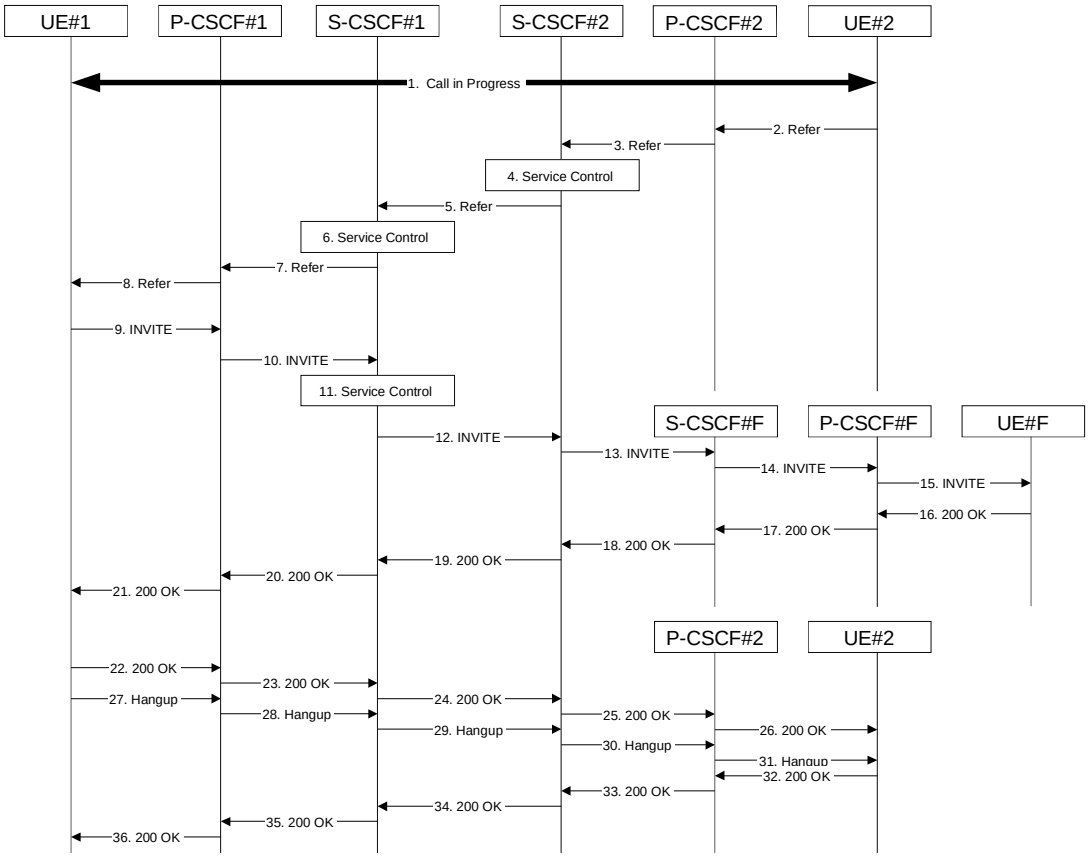


Figure 5.42: Refer operation

Step-by-step description of the information flow:

1. A multi-media session is assumed to already exist between UE#1 and UE#2, established either as a basic session or by one of the supplemental services described in this section.

2. UE#2 sends the Refer command to P-CSCF#2, containing “Refer-To” UE#F and “Referred-By” UE#2.

3. P-CSCF#2 forwards the message to S-CSCF#2

4. S-CSCF#2 invokes~~performs~~ whatever service control is appropriate for this request. If UE#2 does not subscribe to a transfer service, the request is rejected. S-CSCF#2 generates a private URL, addressed to itself, with the new destination informationand the billing information that will be needed for the new session. It replaces the “Refer-To” value in the request with the private URL.

5. S-CSCF#2 forwards the updated message to S-CSCF#1

6. S-CSCF#1 invokes~~performs~~ whatever service control is appropriate for this request. It stores the “Refer-To” and “Referred-By” information and replaces it with private URLs, so that UE#1 will not know the identity of UE#2 or UE#F.

7. S-CSCF#1 forwards the updated message to P-CSCF#1

8. P-CSCF#1 forwards the message to UE#1

9. UE#1 initiates a new multi-media session to the destination given by the “Refer-To”, which is a private URL pointing to S-CSCF#1.

10. P-CSCF#1 forwards the INVITE request to S-CSCF#1

11. S-CSCF#1 retrieves the destination information for the new session, and invokes~~performs~~ whatever service control is appropriate for this new session.

12. S-CSCF#1 determines the network operator addressed by the destination URL, and forwards the INVITE to S-CSCF#2 (or I-CSCF#2, the public entry point for S-CSCF#2).

13. S-CSCF#2 decodes the private URL destination, and determines the final destination of the new session. It determines the network operator addressed by the destination URL. The request is then forwarded onward to S-CSCF#F as in a normal session establishment

14. S-CSCF#F invokes~~performs~~ whatever service control is appropriate for this new session, and forwards the request to P-CSCF#F

15. P-CSCF#F forwards the request to UE#F

16-21. The normal session establishment continues through bearer establishment, optional alerting, and reaches the point when the new session is accepted by UE#F. UE#F then sends the 200-OK final response to P-CSCF#F, which is forwarded through S-CSCF#F, S-CSCF#2, S-CSCF#1, P-CSCF#1, to UE#1. At this point a new session is successfully established between UE#1 and UE#F.

22-26. The Refer request was successful, and UE#1 sends a 200-OK final response to UE#2. This response is sent through P-CSCF#1, S-CSCF#1, S-CSCF#2, P-CSCF#2, and to UE#2.

27-31. UE#1 clears the original session with UE#2 by sending the BYE message. This message is routed through P-CSCF#1, S-CSCF#1, S-CSCF#2, P-CSCF#2, to UE#2.

32-36. UE#2 acknowledges the BYE and terminates the original session. It responds with the 200-OK response, routed through P-CSCF#2, S-CSCF#2, S-CSCF#1, P-CSCF#1, to UE#1.

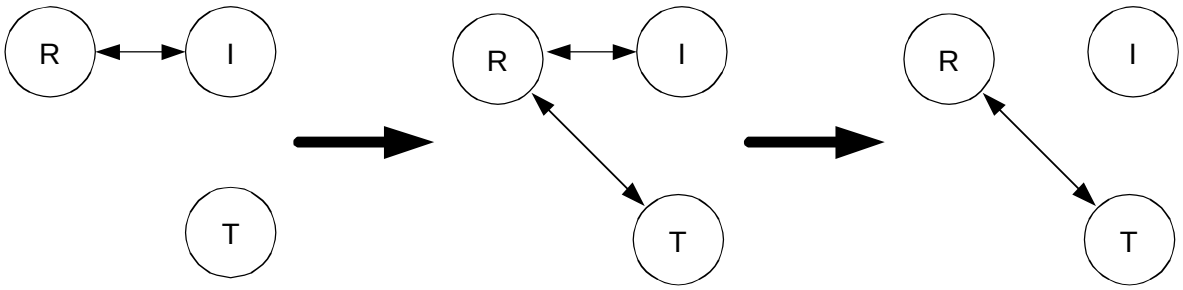
5.11.6.2 Application to Session Transfer Services

This section shows how the Refer primitive given above can be used to provide common session-transfer services.

5.11.6.2.1 Blind Transfer and Assured Transfer

A Blind Transfer starts with an existing session, established between the Initiator (I) and the Recipient (R). In a typical case, this session was actually initiated by R. In the end it is desired that the Recipient has a session with the Target (T).

From the starting configuration, shown in the leftmost diagram, I sends a Refer message to R, who then initiates a session with the Target (T), as shown in the middle diagram. Immediately after sending the Refer message to R, I issues the BYE message to terminate its connection with R. The end configuration is shown in the rightmost diagram.

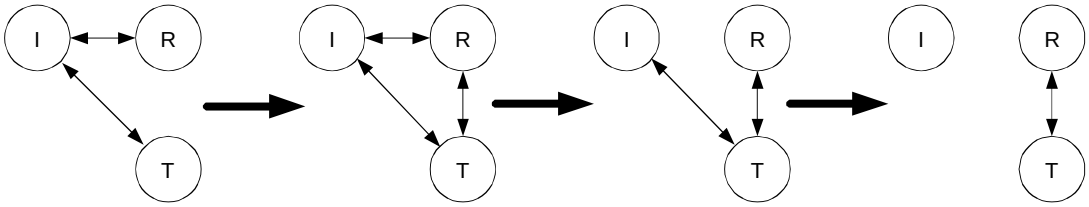


An Assured Transfer is identical to the above, except that I waits until the Refer successfully completes before issuing the BYE message to terminate its connection with R. If the new session from R to T were to fail, R would still have a session with I.

5.11.6.2.2 Consultative Transfer

A Consultative Transfer again starts with an existing session, established from the Initiator (I) to the Recipient (R). The Initiator first consults with the Target (T), then decides to transfer the original session to T.

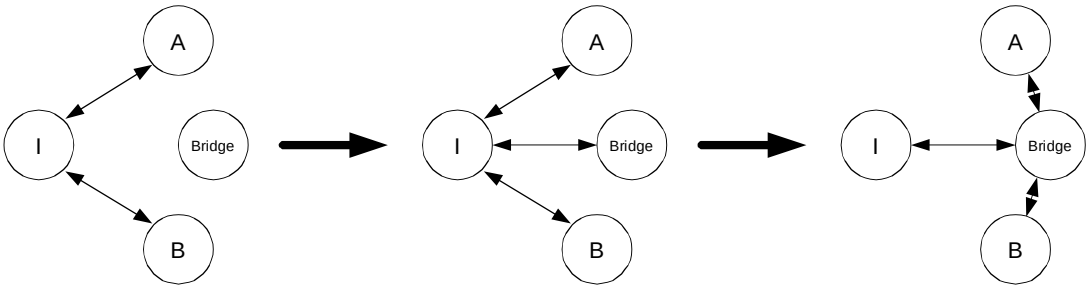
From the starting configuration, as shown in the leftmost diagram in the previous section, I places the session with R on hold and establishes a new session with T. This is shown in the leftmost diagram below. I then sends a Refer message to T, causing T to establish a session with R. This is shown in the second diagram. When the Refer operation completes, I clears its two active sessions, first with R (leaving the configuration as shown in the third diagram) then with T. The end configuration is shown in the rightmost diagram.



5.11.6.2.3 Three-way Session

A three-way session starts with an existing session, between the Initiator (I) and party (A). The initiator places this session on hold, and establishes a second session with party (B). The initiator then decides to create an ad-hoc conference of all three parties.

From the point where the initiator decides to create the ad-hoc conference, shown in the leftmost diagram below, the initiator establishes another session with a third-party conference bridge service. This is shown in the center diagram. The initiator then transfers both of the existing sessions, I->A and I->B, to the bridge, ending in the configuration shown in the rightmost diagram.



The conference bridge service is in control of the termination sequence. On termination of one of the three sessions, it may either terminate the other two sessions by use of the session clearing procedures of section 5.11, or may utilize the procedures of subsection 1 above to transfer one of the remaining endpoints to the other, resulting in a simple two-party session.

5.12 Mobile Terminating call procedures to unregistered Public User Identities

This section describes information flows for the procedures of Mobile Terminating call flows for unregistered IMS Public User Identities. The detection of an unregistered Public User Identity is done in HSS and if this Public User Identity has services related to unregistered state, a S-CSCF is selected for the unregistered Public User Identity. S-CSCF performs whatever further actions are appropriate for the call attempt to the unregistered IMS Public User Identity.

Two basic examples for "services related to unregistered" are call redirection to CS domain and voice mailbox service. Call redirection to CS domain is supported to cover the cases when the UE is not registered in IMS but can be reached via the CS domain. Then, a temporary S-CSCF is selected and performs whatever further actions are appropriate for the call attempt.

The principle established in sub-clause 4.3.3.4, where the public user identifiers for the same profile are allocated to the same S-CSCF, is followed.

5.12.1 Mobile Terminating call procedures to unregistered Public User Identity that has services related to unregistered state

In Figure 5.43 below the Public User Identity is unregistered for IMS and the Public User Identity has services related to unregistered state. In this case, the HSS responds back to I-CSCF with an indication that I-CSCF should select S-CSCF for this MT call to the unregistered Public User Identity of the user or provide the I-CSCF with the previously allocated S-CSCF name. Before S-CSCF selection, I-CSCF shall query HSS for the information related to the required S-CSCF capabilities. I-CSCF selects a S-CSCF to ~~perform~~ invoke service control and I-CSCF routes the call further to the selected destination. If the S-CSCF does not have the relevant information from the user profile then the S-CSCF

shall download the relevant information from HSS before it ~~performs~~ invokes service control and any further actions in the call attempt. The service implemented by this information flow could be e.g. “Call Forward Unconditional.”

This is shown by the information flow in Figure 5.43:

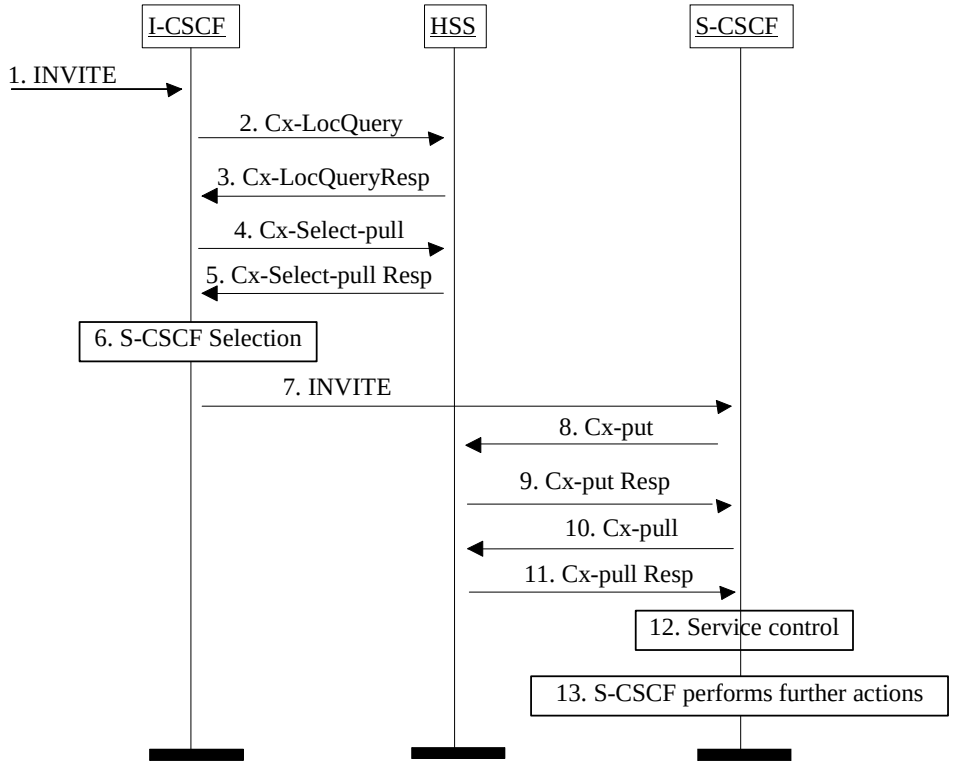


Figure 5.43: Mobile Terminating call procedures to unregistered IMS Public User Identity that has services related to unregistered state

1. I-CSCF receives an INVITE message.
2. I-CSCF queries the HSS for current location information.
3. HSS either responds with an indication that the Public User Identity is unregistered for IMS and I-CSCF should select a S-CSCF for the unregistered Public User Identity of the user or provides the I-CSCF with the previously allocated S-CSCF name for that user.
4. If the I-CSCF has not been provided with the location of the S-CSCF, the I-CSCF may send Cx-Select-Pull (unregistered, Public User Identity) to the HSS to request the information related to the required S-CSCF capabilities which shall be input into the S-CSCF selection function. This query is optional.
5. The HSS shall send Cx-Select-Pull Resp (required S-CSCF capabilities) to the I-CSCF.
6. If the I-CSCF has not been provided with the location of the S-CSCF, the I-CSCF selects an S-CSCF for the unregistered Public User Identity of the user.
7. I-CSCF forwards the INVITE request to the S-CSCF.
8. The S-CSCF sends Cx-Put (Public User Identity, S-CSCF name) to the HSS. When multiple and separately addressable HSSs have been deployed by the network operator, then the S-CSCF needs to query the SLF to resolve the HSS. The HSS stores the S-CSCF name for unregistered Public User Identities of that user. This will result in all terminating traffic for unregistered Public User Identities of that user being routed to this particular S-CSCF until the registration period expires or the user attaches the Public User Identity to the network. Note: Optionally the S-CSCF can omit the Cx-Put request if it has the relevant information from the user profile.
9. The HSS shall send Cx-Put Resp to the I-CSCF to acknowledge the sending of Cx-Put.

10. If the relevant information is not available, the S-CSCF shall send the Cx-Pull information flow (Public User Identity) towards the HSS in order to be able to download the relevant information of the service profile to the S-CSCF.

11. The HSS shall return the information flow Cx-Pull Resp (user information) to the S-CSCF. The S-CSCF shall store it for that indicated Public User Identity.

12. S-CSCF invokes~~performs~~ whatever service control is appropriate for this call attempt.

13. S-CSCF performs whatever further actions are appropriate for this call attempt (in the case where the S-CSCF decides to redirect the session towards CS domain, the Mobile Termination Procedure MT#3 (section 5.7.2a) applies).

The S-CSCF may deregister the Public User Identity at any time (e.g. according to operator network engineering requirements) by issuing a Cx-Put2 (Public User Identity, clear S-CSCF name) clearing the S-CSCF name stored in the HSS. If S-CSCF name stored by the HSS does not match the name of the S-CSCF that originated the Cx-Put2 then the HSS will acknowledge the clearing request but take no further action.

3GPP TSG-SA2 Meeting #28
Bangkok, Thailand, November 11, 2002

Tdoc ⌘ S2-023267

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **223** ⌘ **rev** **-** ⌘ 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 ☒

Title:	⌘	PCF to PDF Changes
Source:	⌘	Lucent Technologies
Work item code:	⌘	IMS-CCR
Date:	⌘	11.11.2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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 one 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:	⌘	It was agreed to use the Policy Decision Function teminology for compatibiltiy with other access networks.
Summary of change:	⌘	Replace the term Policy Control Function with Policy Decision Function throughout the document.
Consequences if not approved:	⌘	Confusion between the 3GPP and other architectures.

Clauses affected:	⌘	3.3, 4.6.1, 5.4.6.3, 5.4.7, 5.4.7.1, 5.4.7.1a, 5.4.7.2, 5.4.7.3, 5.4.7.4, 5.4.7.5, 5.4.7.6, 5.4.7.7, 5.6.1, 5.6.2, 5.7.1, 5.7.2, 5.10.1, 5.10.2, 5.10.3.1.1, 5.10.3.1.2, and 5.11.3.1			
		Y	**N**		
Other specs affected:	⌘	**X**		Other core specifications	⌘ 23.002, 23.207, 24.228, 24.229, 29.207, 29.208
				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.

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

3.3 Abbreviations

For the purposes of the present document the following abbreviations apply. Additional applicable abbreviations can be found in GSM 01.04 [1].

AMR	Adaptive Multi-rate
API	Application Program Interface
AS	Application Server
BCSM	Basic Call State Model
BG	Border Gateway
BGCF	Breakout Gateway Control Function
BS	Bearer Service
CAMEL	Customised Application Mobile Enhanced Logic
CAP	Camel Application Part
CDR	Charging DataRecord
CN	Core Network
CS	Circuit Switched
CSCF	Call Session Control Function
CSE	CAMEL Service Environment
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
ENUM	E.164 Number
GGSN	Gateway GPRS Support Node
GMLC	Gateway Mobile Location Centre
HSS	Home Subscriber Server
I-CSCF	Interrogating-CSCF
IETF	Internet Engineering Task Force
IM	IP Multimedia
IM CN SS	IP Multimedia Core Network Subsystem
IMS	IP Multimedia Core Network Subsystem
IMSI	International Mobile Subscriber Identifier
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISDN	Integrated Services Digital Network
ISIM	IMS SIM
ISP	Internet Service Provider
ISUP	ISDN User Part
MAP	Mobile Application Part
MGCF	Media Gateway Control Function
MGF	Media Gateway Function
NAI	Network Access Identifier
OSA	Open Services Architecture
P-CSCF	Proxy-CSCF
~~PCF~~PDF	~~Policy Control Function~~Policy Decision Function
PDN	Packet Data Network
PDP	Packet Data Protocol e.g., IP
PEF	Policy Enforcement Function
PLMN	Public Land Mobile Network
PSTN	Public Switched Telephone Network
QoS	Quality of Service
RAB	Radio Access Bearer
RFC	Request for Comments
SCS	Service Capability Server
S-CSCF	Serving-CSCF
SGSN	Serving GPRS Support Node
SLF	Subscription Locator Function
SSF	Service Switching Function

SS7	Signalling System 7
SIM	Subscriber Identity Module
SIP	Session Initiation Protocol
SGW	Signalling Gateway
THIG	Topology Hiding Inter-network Gateway
UE	User Equipment
UMTS	Universal Mobile Telecommunications System
URL	Universal Resource Locator
USIM	UMTS SIM

**********Next Change**********

4.6 Roles of Session Control Functions

The CSCF may take on various roles as used in the IP multimedia subsystem. The following sections describe these various roles.

4.6.1 Proxy-CSCF

The Proxy-CSCF (P-CSCF) is the first contact point within the IM CN subsystem. Its address is discovered by UEs following PDP context activation, using the mechanism described in section “Procedures related to Local CSCF Discovery ”. The P-CSCF behaves like a Proxy (as defined in RFC 3261 [12] or subsequent versions), i.e. it accepts requests and services them internally or forwards them on. The P-CSCF shall not modify the Request URI in the SIP INVITE message. The P-CSCF may behave as a User Agent (as defined in the RFC 3261 [12] or subsequent versions), i.e. in abnormal conditions it may terminate and independently generate SIP transactions.

The ~~Policy Control Function~~Policy Decision Function (~~PCF~~PDF) is a logical entity of the P-CSCF. If the ~~PCF~~PDF is implemented in a separate physical node, the interface between the ~~PCF~~PDF and the P-CSCF is not standardised.

The functions performed by the P-CSCF are:

- Forward the SIP register request received from the UE to an I-CSCF determined using the home domain name, as provided by the UE.
- Forward SIP messages received from the UE to the SIP server (e.g. S-CSCF) whose name the P-CSCF has received as a result of the registration procedure.
- Forward the SIP request or response to the UE.

Detect and handle an emergency session establishment request as per error handling procedures defined by stage-3.

- Generation of CDRs.
- Maintain a Security Association between itself and each UE, as defined in TS 33.203 [19].
- Should perform SIP message compression/decompression.
- Authorisation of bearer resources and QoS management. For details see TS 23.207 [9].

**********Next Change**********

5.4.6.3 Mechanism for bearer establishment

In order to fulfil the above requirements, it is needed that the destination user can be pre-alerted before the bearer establishment and negotiation and PDP context activation has taken place. This gives room for the destination user to choose the media streams and codecs required before an expensive resource (as the air interface is) is established.

Figure 5.7 shows the mechanism for the bearer establishment in which the pre-alerting occurs before the initial bearer creation procedures are performed. Furthermore, a user interaction may also occur after the initial bearers are created as

shown in figure 5.7. If the session originator receives multiple provisional responses for the same session indicating that the session has been forked in the network, the UE may choose to process a pre-configured number of responses. In the case of multiple responses, the resources requested by the UE shall be the “logical OR” (i.e. least upper bound) of the resources indicated in the multiple responses to avoid allocation of unnecessary resources. The UE shall never request more resources then was originally proposed in the Original INVITE.

The "Other x-CSCFs" entity in figure 5.7 comprises several CSCFs: I-CSCF and S-CSCFs. For the sake of simplicity only the GGSNs are presented from the UMTS access network and the ~~Policy Control Function~~Policy Decision Functions have been omitted from the diagram.

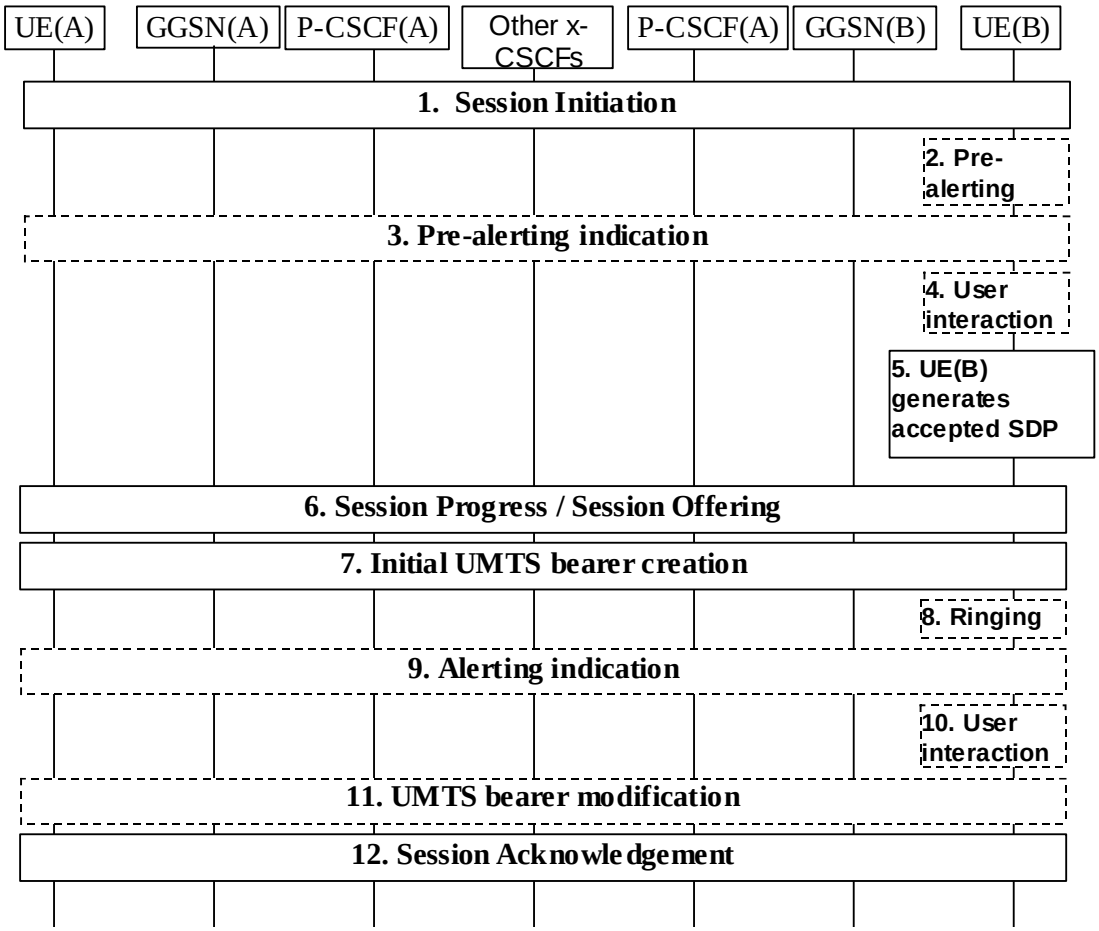


Figure 5.7: Bearer establishment showing optional pre-alerting

1. UE(A) starts a Session Initiation procedure to UE(B) that includes an SDP proposal.

The steps 2-4 are optional and may depend on terminal implementation and/or terminal pre-configured settings.

2. The user at UE(B) is pre-alerted.
3. An indication of the pre-alerting may be sent towards UE(A).
4. User at UE(B) will then interact and express his/her wishes regarding the actual session.
5. UE(B) generates accepted SDP based on terminal settings, terminal pre-configured profiles and optionally the user's wishes.
6. The accepted SDP is forwarded to UE(A) in the payload of a reliable SIP response.

7. Initial bearer creation procedure is performed. During this bearer creation step the resources in the UE(A)'s and UE(B)'s access network are reserved with PDP context procedures. Bearer resources in external networks may also be reserved at this point.

The steps 8-10 are also optional and may be skipped.

8. Terminal at UE(B) starts ringing.
9. The alerting indication is sent towards UE(A).
10. User at UE(B) may interact and express his/her wishes regarding the actual session.
11. UE(A) and UE(B) may perform bearer modification procedure at this point, if the initial bearers reserved in step 7 and the wishes of user at UE(B) are different. During this bearer modification step the resources in the UE(A)'s and UE(B)'s access network may be modified by modifying the PDP context, and the resource reservation in the external network may also be modified.
12. Session initiation procedure is acknowledged.

5.4.6.4 Session progress indication to the originating UE

The pre-alerting or alerting indications returned to the originating UE shall enable the

originating UE to inform the calling user of the session progress prior to the arrival of the incoming media (for example the originating UE may synthesise ringing locally).

5.4.7 Interaction between QoS and session signalling

At PDP context setup the user shall have access to either GPRS without service-based local policy, or GPRS with service-based local policy. It is operator choice whether to offer both or only one of these alternatives for accessing the IM Subsystem.

For the GPRS without service-based local policy case, the bearer is established according to the user's subscription, local operator's IP bearer resource based policy, local operator's admission control function and GPRS roaming agreements. The establishment of the PDP context bearer shall use the PDP context activation procedure specified in TS 23.060.

For the GPRS with service-based local policy case, Service-Based Local Policy decisions (e.g., authorisation and control) are also applied to the bearer.

The description in this subsection is applicable for the case when service-based local policy is employed.

The GGSN contains a Policy Enforcement Function (PEF) that has the capability of policing packet flow into the IP network, and restricting the set of IP destinations that may be reached from/through a PDP context according to a packet classifier. This service-based policy 'gate' function has an external control interface that allows it to be selectively 'opened' or 'closed' on the basis of IP destination address and port. When open, the gate allows packets to pass through (to the destination specified in the classifier) and when closed, no packets are allowed to pass through. The control is performed by a ~~PCF~~PDF, which is a logical entity of the P-CSCF. (Note: If the ~~PCF~~PDF is implemented in a separate physical node, the interface between the ~~PCF~~PDF and the P-CSCF is not standardised).

There are eight interactions defined for service-based local policy:

1. Authorize QoS Resources.
2. Resource Reservation with Service-based Local Policy.
3. Approval of QoS Commit for resources authorised in (1), e.g. 'open' the 'gate'.
4. Removal of QoS Commit for resources authorised in (1), e.g. 'close' the 'gate'.
5. Revoke Authorisation for GPRS and IP resources.
6. Indication of PDP Context Release from the GGSN to the ~~PCF~~PDF.
7. Authorization of PDP Context Modification
8. Indication of PDP Context Modification from the GGSN to the ~~PCF~~PDF.

These requirements and functional description of these interactions are explained further in the following sections. The complete specification of the interface between the ~~Policy Control Function~~Policy Decision Function and the Policy Enforcement Function is contained in TS 23.207.

5.4.7.1 Authorize QoS Resources

The Authorize QoS Resources procedure is used during an establishment of a SIP session. The P-CSCF(~~PCF~~PDF) shall use the SDP contained in the SIP signaling to calculate the proper authorisation. The ~~PCF~~PDF authorizes the required QoS resources.

The authorisation shall include binding information, which shall also be provided by the UE to the GGSN in the allocation request, which enables accurate matching of requests and authorisations. The binding information includes an Authorisation Token sent by the P-CSCF to the UE during SIP signaling, and one or more Flow Identifiers, which are used, by the UE, GGSN and ~~PCF~~PDF to uniquely identify the media component(s). If forking has occurred, the P-CSCF will re-use the same Authorisation Token in all subsequent provisional responses belonging to the same session. If the least upper bound of the requested resources is changed due to a subsequently received response then an update of the authorised resources is performed.

The authorisation shall be expressed in terms of the IP resources to be authorised and shall include limits on IP packet flows, and may include restrictions on IP destination address and port.

5.4.7.1a Resource Reservation with Service-based Local Policy

The GGSN serves as the Policy Enforcement Point that implements the policy decisions for performing admission control and authorising the GPRS and IP BS QoS Resource request, and policing IP flows entering the external IP network.

Authorisation of GPRS and IP QoS Resources shall be required for access to the IP Multimedia Subsystem. The GGSN shall determine the need for authorisation, possibly based on provisioning and/or based on the APN of the PDP context.

Resource Reservation shall be initiated by the UE, and shall take place only after successful authorisation of QoS resources by the ~~PCF~~PDF. Resource reservation requests from the UE shall contain the binding information. The use of this binding information enables the GGSN to correctly match the reservation request to the corresponding authorisation. The authorisation shall be 'Pulled' from the ~~PCF~~PDF by the GGSN when the reservation request is received from the UE. When a UE combines multiple media flows onto a single PDP context, all of the binding information related to those media flows shall be provided in the resource reservation request.

With a request for GPRS QoS resources, the GGSN shall verify the request is less than the sum of the authorised IP resources (within the error tolerance of the conversion mechanism) for all of the combined media flows. With a request for IP QoS resources, the GGSN shall verify the request is less than the authorised IP resources.

The request for GPRS QoS resources may be signaled independently from the request for IP QoS resources by the UE. At the GPRS BS Level, the PDP Context activation shall be used for QoS signaling. At the IP BS Level, RSVP may be used for QoS signaling.

5.4.7.2 Approval of QoS Commit

The ~~PCF~~PDF makes policy decisions and provides an indication to the GGSN that the user is now allowed to use the allocated QoS resources for per-session authorisations unless this was done based on service based local policy at the time of the Resource Reservation procedure. If there is more than one response for the same session, indicating that the session has been forked in the network, the ~~PCF~~PDF may authorise the “logical OR” of the resources requested in the responses. When the session established indication has been received, if the ~~PCF~~PDF earlier have authorised the "logical OR" of the resources then the ~~PCF~~PDF will modify the authorisation and commit to resources according to the session established indication.

The GGSN enforces the policy decisions. The GGSN may restrict any use of the GPRS resources prior to this indication from the ~~PCF~~PDF. The GGSN shall restrict any use of the IP resources prior to this indication from the ~~PCF~~PDF, e.g. by open the gate and enabling the use of resources for the media flow. Based on local policy, GPRS and/or IP resources may beallowed to be used by the user at the time they are authorised by the ~~PCF~~PDF.

5.4.7.3 Removal of QoS Commit

The ~~PCF~~PDF makes policy decisions and provides an indication to the GGSN about revoking the user's capacity to use the allocated QoS resources for per-session authorisations. Removal of QoS Commit for GPRS and IP resources shall be sent as a separate decision to the GGSN corresponding to the previous "Approval of QoS commit" request.

The GGSN enforces the policy decisions. The GGSN may restrict any use of the GPRS resources after this indication from the ~~PCF~~PDF. The GGSN shall restrict any use of the IP resources after this indication from the ~~PCF~~PDF, e.g. by closing the gate and blocking the media flow.

5.4.7.4 Revoke Authorisation for GPRS and IP Resources

At IP multimedia session release, the UE should deactivate the PDP context(s) used for the IP multimedia session. In various cases, such as loss of signal from the mobile, the UE will be unable to perform this release itself. The ~~Policy Control Function~~Policy Decision Function provides indication to the GGSN when the resources previous authorised, and possibly allocated by the UE, are to be released. The GGSNshall deactivate the PDP context used for the IP multimedia session.

5.4.7.5 Indication of PDP Context release

Any release of a PDP Context that was established based on authorisation from the ~~PCF~~PDF shall be reported to the ~~PCF~~PDF by the GGSN.

This indication may be used by the ~~PCF~~PDF to initiate a session release towards the remote endpoint.

5.4.7.6 Authorization of PDP Context modification

When a PDP Context is modified such that the requested QoS falls outside of the limits that were authorized at PDP context activation(or last modification) or such that new binding information is received then the GGSN shall verify the authorization of this PDP context modification.

If the GGSN does not have sufficient information to authorize the PDP context modification request, the GGSN shall send an authorization request to the ~~PCF~~PDF.

5.4.7.7 Indication of PDP Context modification

When a PDP Context is modified such that the maximum bit rate (downlink and uplink) is downgraded to 0 kbit/s or changed from 0 kbit/s to a value that falls within the limits that were authorized at PDP context activation(or last modification)then the GGSN shall report this to the ~~PCF~~PDF.

This indication may be used by the ~~PCF~~PDF to initiate a session release towards the remote endpoint.

**********Next Change**********

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.

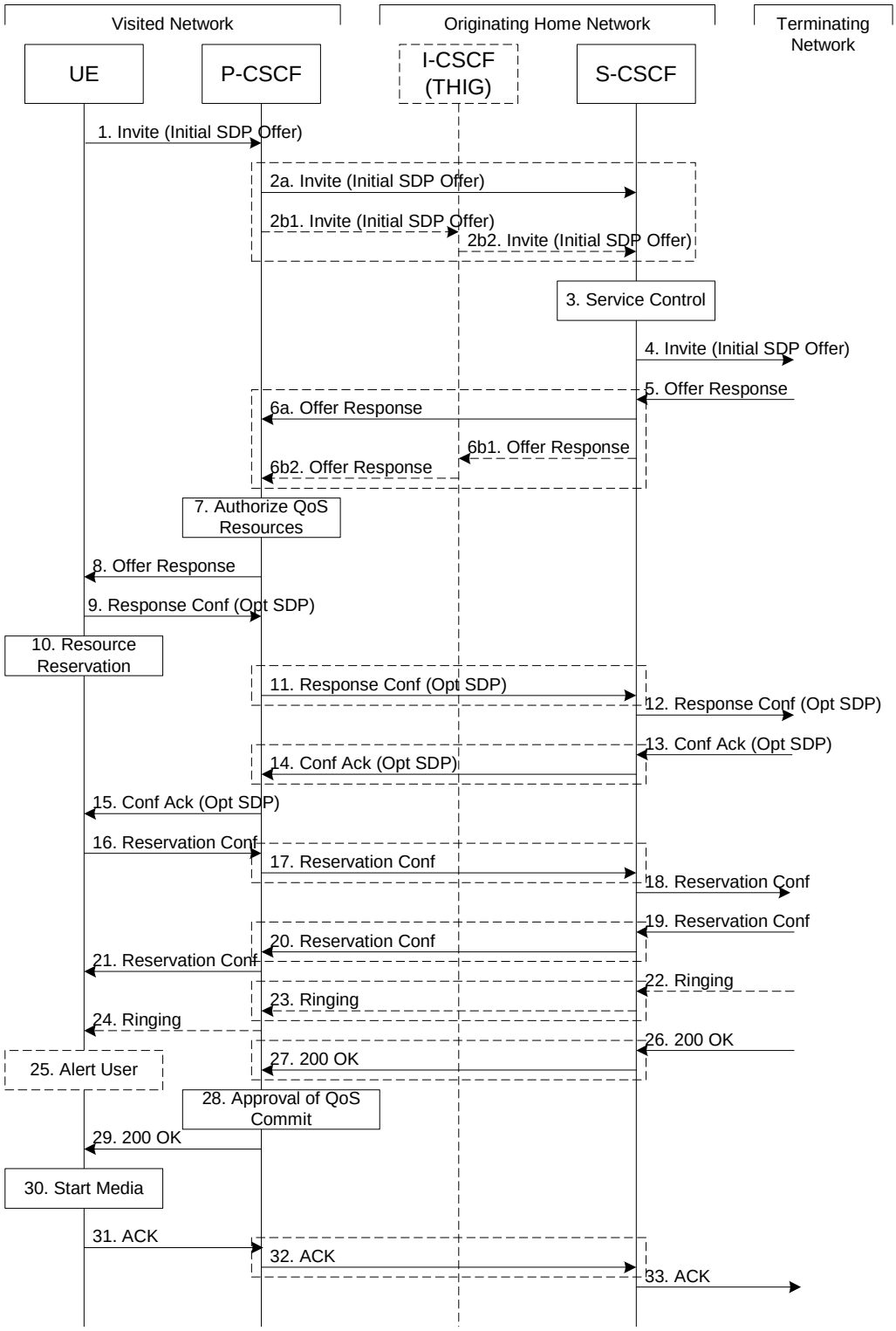


Figure 5.14: Mobile origination procedure - roaming

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 performs any origination service control 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 ~~PCF~~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(~~PCF~~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(~~PCF~~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 occured. 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 performs whatever service control 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.

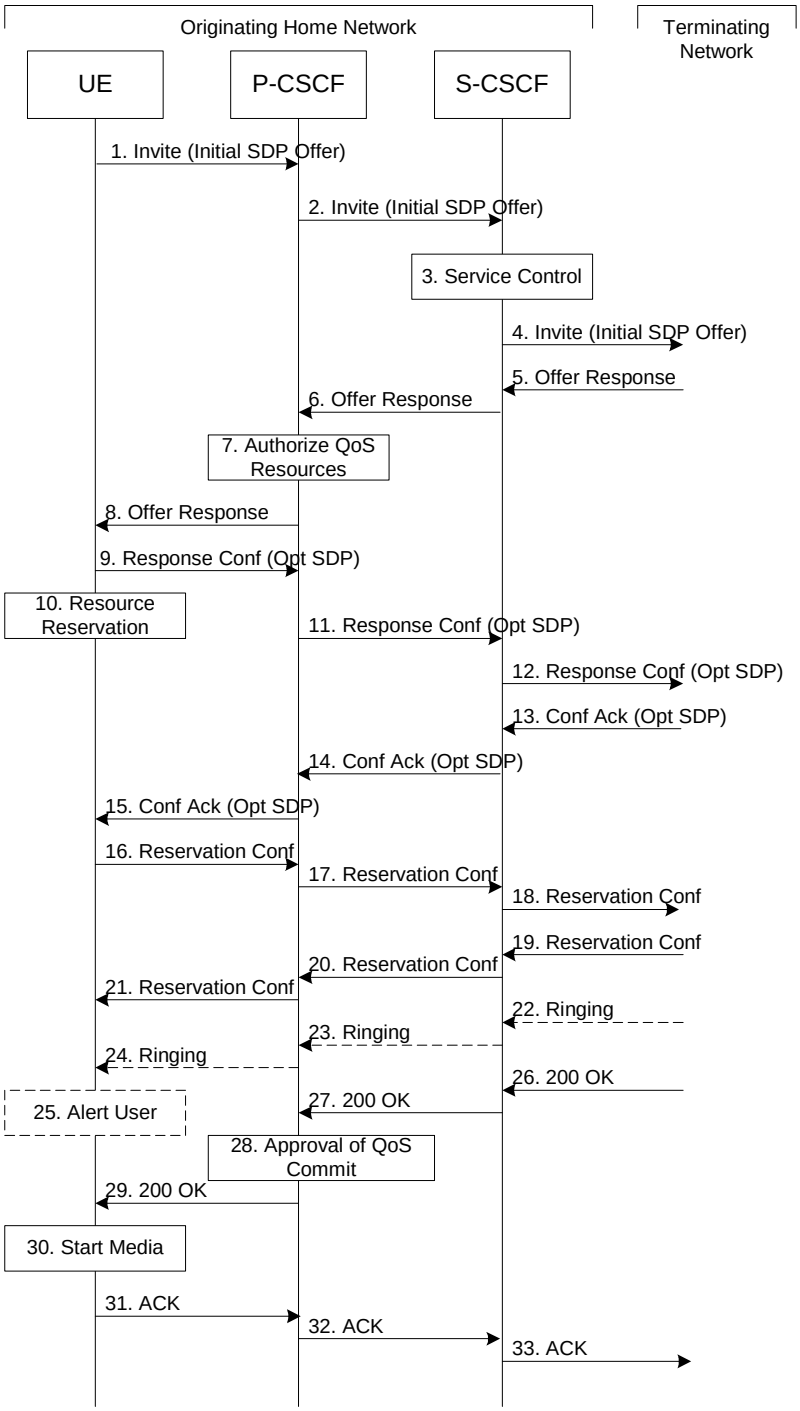


Figure 5.15: Mobile origination procedure - home

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 performs any origination service control 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 ~~PCF~~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(~~PCF~~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(~~PCF~~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 occured. 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.

**********Next Change**********

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.

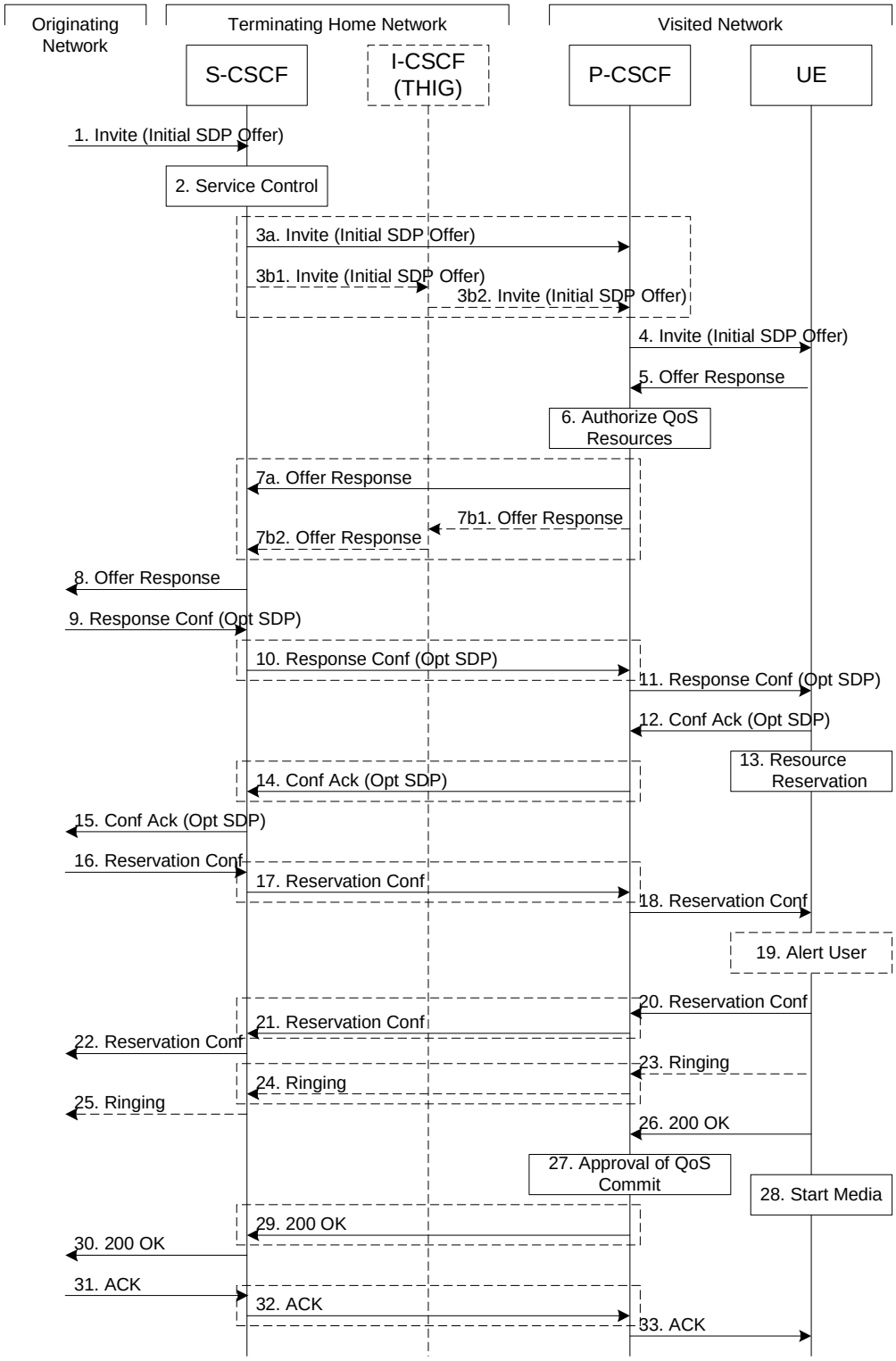


Figure 5.17: Mobile termination procedure - roaming

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 performs any termination service control 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 ~~PCF~~PDFand 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(~~PCF~~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(~~PCF~~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. PCSCF 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.

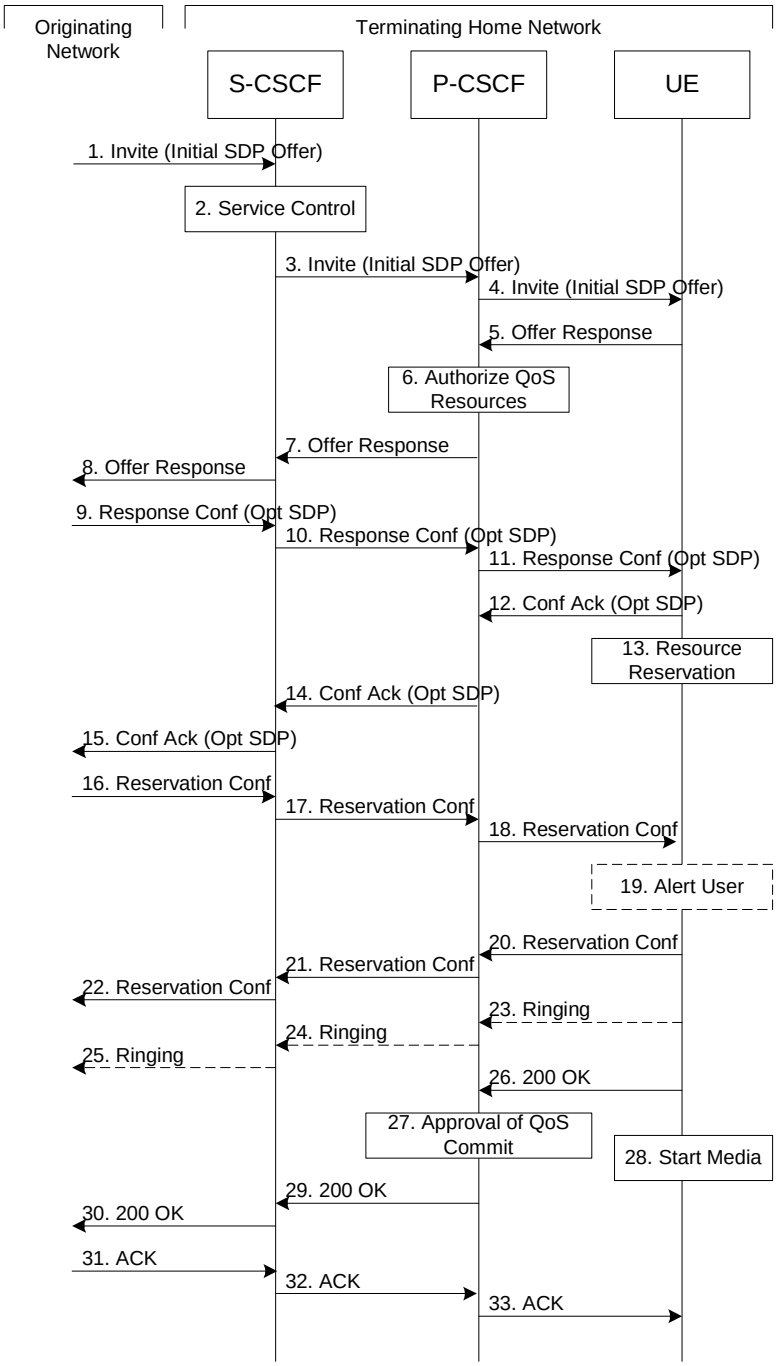


Figure 5.18: Mobile termination procedure - home

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 performs any termination service control 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 ~~PCF~~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(~~PCF~~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(~~PCF~~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..

**********Next Change**********

5.10.1 Mobile terminal initiated session release

The following flow shows a mobile terminal initiated IM CN subsystem application (SIP) session release. It is assumed that the session is active and that the bearer was established directly between the two visited networks (the visited networks could be the Home network in either or both cases).

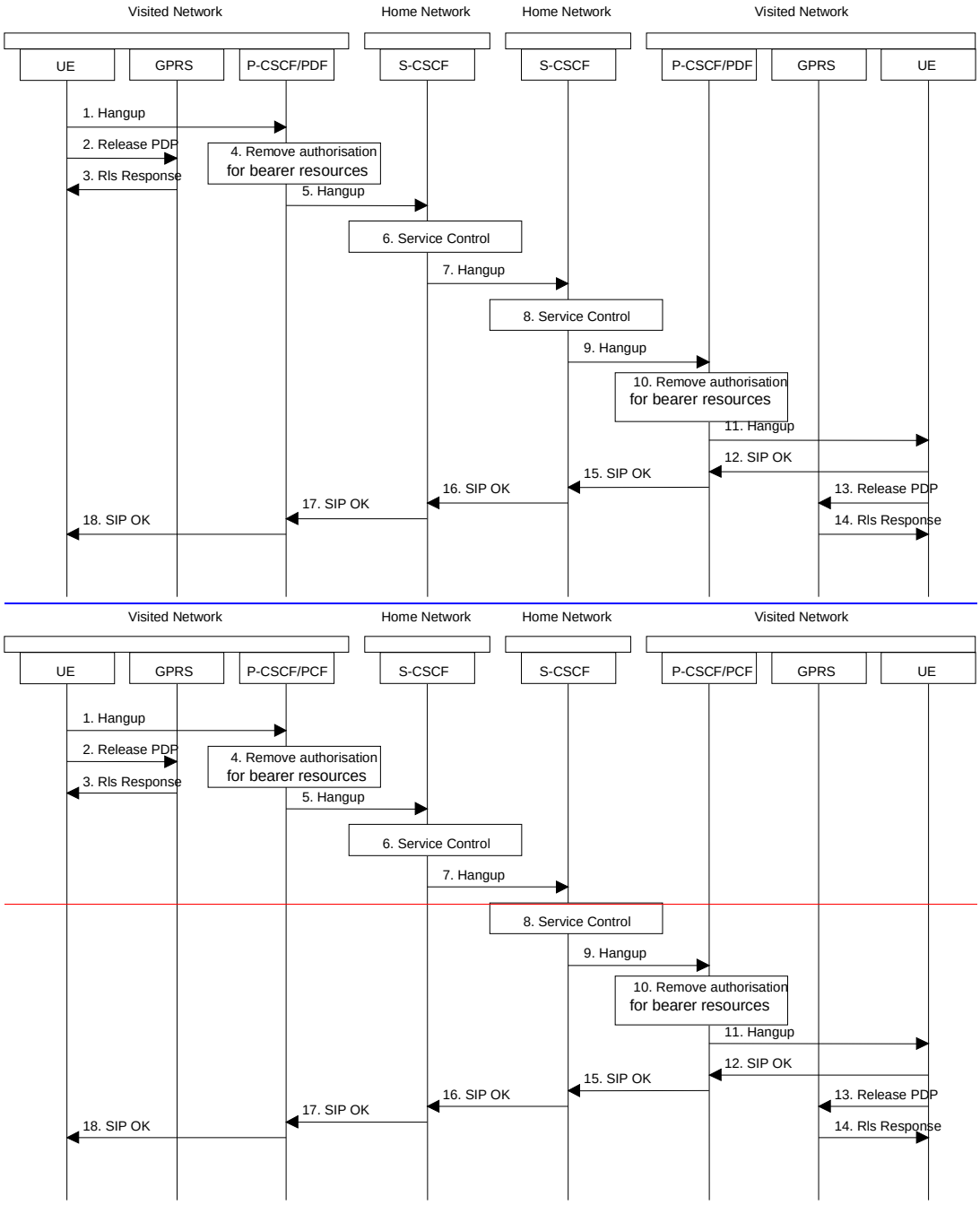


Figure 5.22: Mobile initiated session release

1. One mobile party hangs up, which generates a message (Bye message in SIP) from the UE to the P-CSCF.

2. Steps 2 and 3 may take place before or after Step 1 and in parallel with Step 4. The UE initiates the release of the bearer PDP context. The GPRS subsystem releases the PDP context. The IP network resources that had been reserved for the message receive path to the mobile for this session are now released. This is initiated from the GGSN. If RSVP was used to allocated resources, then the appropriate release messages for that protocol would invoked here.

3. The GPRS subsystem responds to the UE.

4. The P-CSCF/~~PCF~~PDF removes the authorisation for resources that had previously been issued for this endpoint for this session. This step will also result in a release indication to the GPRS subsystem to confirm that the IP bearers associated with the session have been deleted

5. The P-CSCF sends a hangup to the S-CSCF of the releasing party.
6. The S-CSCF performs whatever service control procedures are appropriate for this ending session.
7. The S-CSCF of the releasing party forwards the Hangup to the S-CSCF of the other party.
8. The S-CSCF performs whatever service control procedures are appropriate for this ending session.
9. The S-CSCF of the other party forwards the Hangup on to the P-CSCF.
10. The P-CSCF/~~PCF~~PDF removes the authorisation for resources that had previously been issued for this endpoint for this session. This step also results in a release indication to the GPRS subsystem to confirm that the IP bearers associated with the UE#2 session have been deleted.
11. The P-CSCF forwards the Hangup on to the UE.
12. The mobile responds with an acknowledgement, the SIP OK message (number 200), that is sent back to the P-CSCF.
13. Steps 13 and 14 may be done in parallel with step 12. The Mobile initiates the release of the bearer PDP context.
14. The GPRS subsystem releases the PDP context. The IP network resources that were reserved for the message receive path to the mobile for this session are now released. This is initiated from the GGSN. If RSVP was used to allocated resources, then the appropriate release messages for that protocol would invoked here.
15. The SIP OK message is sent to the S-CSCF.
16. The S-CSCF of the other party forwards the OK to the S-CSCF of the releasing.
17. The S-CSCF of the releasing party forwards the OK to the P-CSCF of the releasing.
18. The P-CSCF of the releasing party forwards the OK to the UE.

5.10.2 PSTN initiated session release

The following flow shows a PSTN terminal initiated IM CN subsystem application (SIP) session release. It is assumed that the session is active and that the bearer was established to the PSTN from the Home Network (the visited network could be the Home network in this case).

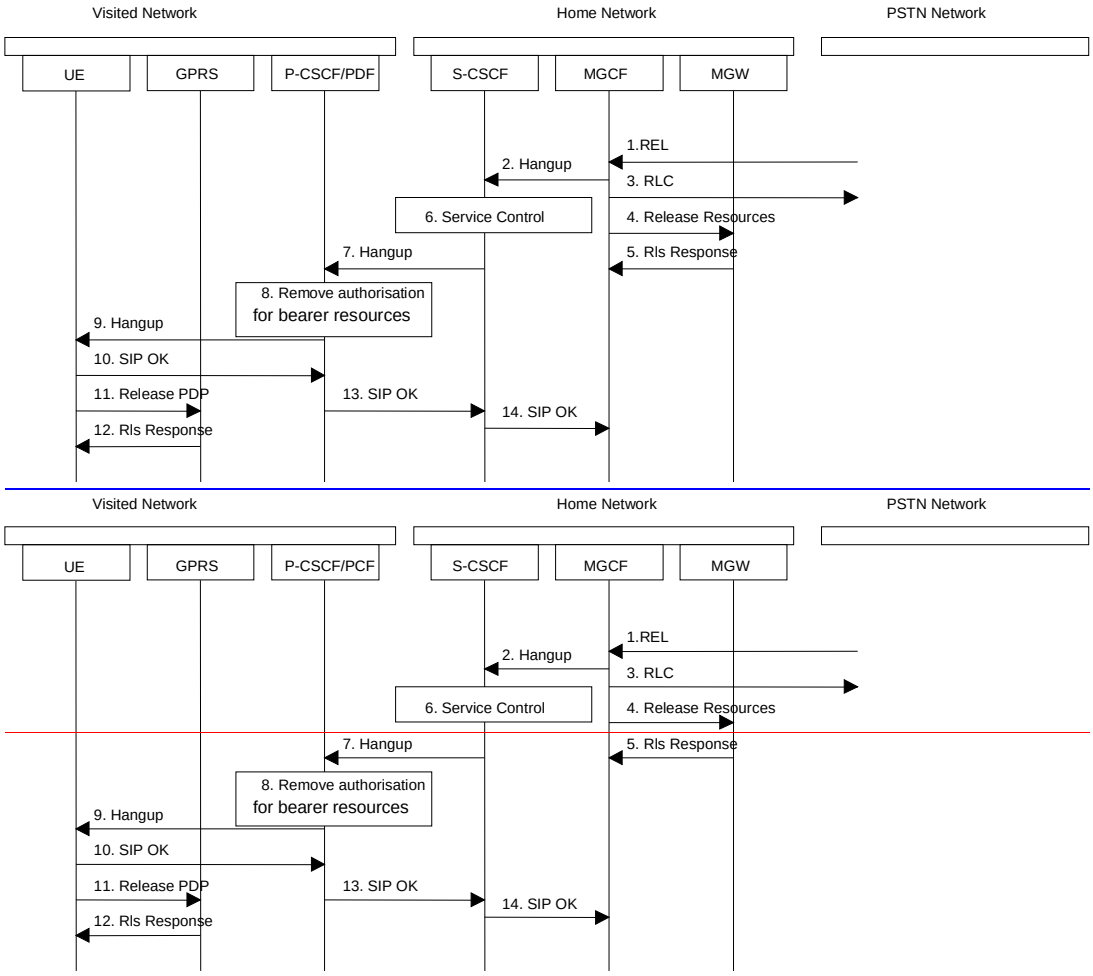


Figure 5.23: PSTN initiated session release

1. PSTN party hangs up, which generates an ISUP REL message to the MGCF.
2. The MGCF sends a Hangup (Bye message in SIP) to the S-CSCF to notify the mobile that the far end party has disconnected.
3. Step 3 may be done in parallel with Step 2. Depending on the GSTN network type Step 3 may need to wait until after step 14. The MGCF notes the reception of the REL and acknowledges it with an RLC. This is consistent with the ISUP protocol.
4. The MGCF requests the MGW to release the vocoder and ISUP trunk using the H.248/MEGACO Transaction Request (subtract). This also results in disconnecting the two parties in the H.248 context. The IP network resources that were reserved for the message receive path to the PSTN for this session are now released. This is initiated from the MGW. If RSVP was used to allocated resources, then the appropriate release messages for that protocol would be invoked here.
5. The MGW sends an acknowledgement to the MGCF upon completion of step 6.
6. The S-CSCF performs whatever service control procedures are appropriate for this ending session.
7. The S-CSCF forwards the Hangup to the P-CSCF.
8. The P-CSCF/~~PCF~~PDF removes the authorisation for resources that had previously been issued for this endpoint for this session. This step also results in a release indication to the GPRS subsystem to confirm that the IP bearers associated with the UE#2 session have been deleted.
9. The P-CSCF forwards the Hangup to the UE.

10. The mobile responds with an acknowledgement, the SIP OK message (number 200), which is sent back to the P-CSCF.

11. Steps 11and 12 may be done in parallel with step 10. The Mobile initiates the release of the bearer PDP context.

12. The GPRS subsystem releases the PDP context. The IP network resources that had been reserved for the message receive path to the mobile for this session are now released. This is initiated from the GGSN. If RSVP was used to allocated resources, then the appropriate release messages for that protocol would invoked here.

13. The SIP OK message is sent to the S-CSCF.

14. The S-CSCF forwards the message to the MGCF.

5.10.3 Network initiated session release

5.10.3.0 Deletion of PDP context used to transport IMS SIP signalling

It is possible that the GPRS subsystem deletes the PDP context used to transport IMS SIP signalling (e.g. due to routing area update, overload situations).

In this case the UE shall initiate a procedure to re-establish a PDP context to transport IMS SIP signalling. If there are any IMS related PDP contexts active the re-establishment of the PDP context to transport IMS signalling shall be perfomed by using the Secondary PDP Context Activation Procedure as defined in TS 23.060 [23]. If re-establishment fails then the UE shall de-activate all other IMS related PDP context(s).

5.10.3.1 Network initiated session release - P-CSCF initiated

The following flows show a Network initiated IM CN subsystem application (SIP) session release. It is assumed that the session is active and that the bearer was established directly between the two visited networks (the visited networks could be the Home network in either or both cases).

A bearer is removed e.g. triggered by a mobile power down, due to a previous loss of coverage, or accidental/malicious removal, etc. In this case the 'Indication of PDP Context Release' procedure will be performed (see 3GPP TS 23.207). The flow for this case is shown in Figure 5.24.

In the event of loss of coverage, 3G TS 23.060 defines the Iu or RAB Release procedures. In case of PDP context with streaming or conversational class the maximum bitrate of the GTP tunnel between SGSN and GGSN is modified to 0 kbit/s. This is indicated to the P-CSCF / ~~PCF~~PDF by performing the 'PDP Context Modification' procedure (see 3GPP TS 23.207) as shown in Figure 5.25. For loss of coverage in case of other PDP contexts (background or interactive traffic class), the PDP context is preserved with no modifications.

Other network initiated session release scenarios are of course possible. In particular such scenarios initiated in the home network for administrative reasons might begin with an S-CSCF.

5.10.3.1.1 Network initiated session release - P-CSCF initiated - removal of PDP context

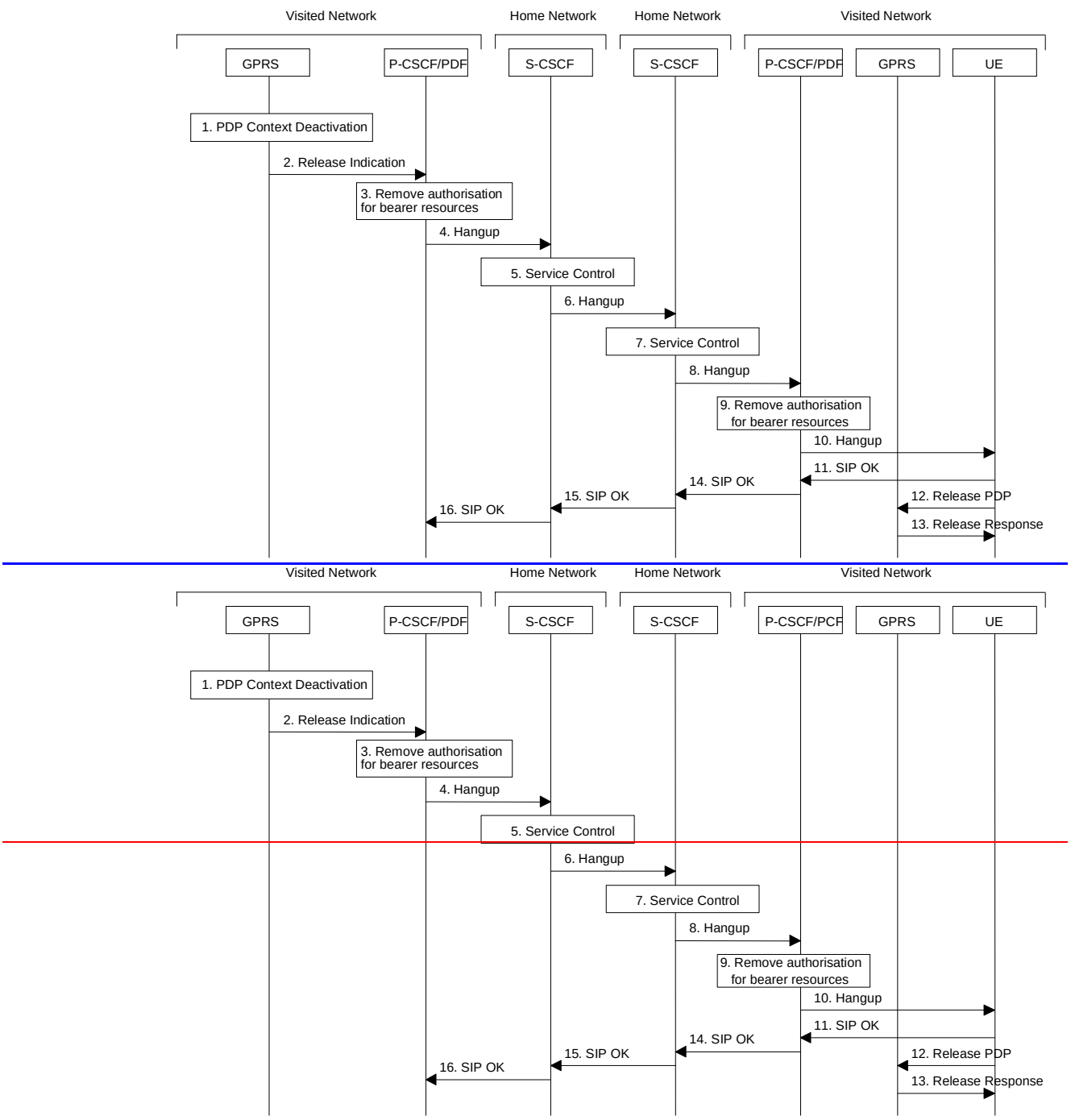


Figure 5.26: Network initiated session release - P-CSCF initiated - removal of PDP context

1. A bearer related to the session is terminated, for example, triggered by a mobile power down, etc. This is noted by the GPRS subsystem.

2. If a request state was created in the ~~PCF~~PDF at PDP context activation, the GGSN shall send a release indication to the P-CSCF/~~PCF~~PDF for the disconnected bearer. The P-CSCF might also note the release due to a SIP Session Timeout.

3. The P-CSCF/~~PCF~~PDF removes the authorisation for resources related to the bearer that had previously been issued for this endpoint for this session.

The following steps are only performed in case the P-CSCF/~~PCF~~PDF has decided to terminate the session.

4. The P-CSCF generates a Hangup (Bye message in SIP) to the S-CSCF of the releasing party (e.g. if all PDP contexts related to the same IMS session are deleted). It is noted that this message should be able to carry a cause value to indicate the reason for the generation of the hangup.
5. The S-CSCF performs whatever service control procedures are appropriate for this ending session.
6. The S-CSCF of the releasing party forwards the Hangup to the S-CSCF of the other party.
7. The S-CSCF performs whatever service control procedures are appropriate for this ending session.
8. The S-CSCF of the other party forwards the Hangup on to the P-CSCF.
9. The P-CSCF/~~PCF~~PDF removes the authorisation for resources that had previously been issued for this endpoint for this session. This step also results in a release indication to the GPRS subsystem to confirm that the IP bearers associated with the session have been deleted for UE#2.
10. The P-CSCF forwards the Hangup on to the UE.
11. The mobile responds with an acknowledgement, the SIP OK message (number 200), which is sent back to the P-CSCF.
12. Steps 12 and 13 may be done in parallel with step 11. The Mobile initiates the release of the bearer PDP context.
13. The GPRS subsystem releases the PDP context. The IP network resources that had been reserved for the message receive path to the mobile for this session are now released. This is initiated from the GGSN. If RSVP was used to allocated resources, then the appropriate release messages for that protocol would invoked here.
14. The SIP OK message is sent to the S-CSCF.
15. The S-CSCF of the other party forwards the OK to the S-CSCF of the releasing party.
16. The S-CSCF of the releasing party forwards the OK to the P-CSCF of the releasing party.

5.10.3.1.2 P-CSCF initiated session release after loss of radio coverage

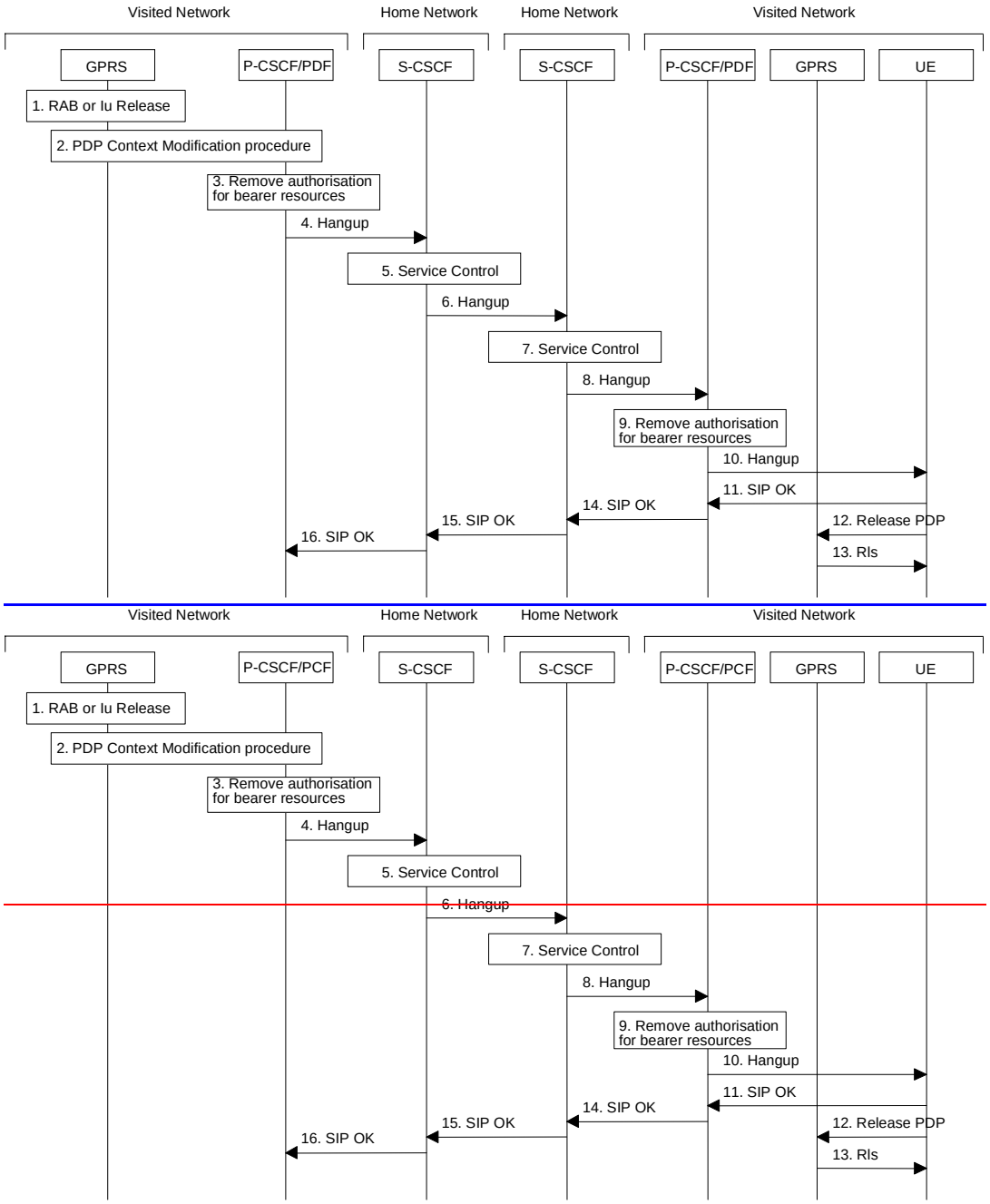


Figure 5.26a: P-CSCF initiated session release after loss of radio coverage

- 1. In the event of loss of radio coverage the Iu connection or RAB(s) are released. In case of PDP context with streaming or conversational class the maximum bitrate of the GTP tunnel between SGSN and GGSN is modified to 0 kbit/s by PDP Context Modification procedures. For PDP contexts using background or interactive traffic class, the PDP context is preserved with no modifications.

- 2. If a request state was created in the ~~PCF~~PDF at PDP context activation, the GGSN shall initiate the PDP context modification procedure by sending a modify indication to the P-CSCF/~~PCF~~PDF for the affected bearers in order to indicate the change of the maximum bitrate to 0 kbit/s. The P-CSCF/~~PCF~~PDF shall accept this modification.

3. It is optional for the P-CSCF/~~PCF~~PDF to deactivate the affected bearer(s) and additionally IP bearers related to the affected session (e.g. a chat session could still be allowed). For these IP bearers the P-CSCF/~~PCF~~PDF

performs 'Revoke Authorization for UMTS and IP Resources' procedure (see 3GPP TS 23.207). If the P-CSCF decides to terminate the session then the P-CSCF/~~PCF~~PDF removes the authorisation for resources that had previously been issued for this endpoint for this session.

The following steps are only performed in case the P-CSCF/~~PCF~~PDF has decided to terminate the session.

4. The P-CSCF generates a Hangup (Bye message in SIP) to the S-CSCF of the releasing party. It is noted that this message should be able to carry a cause value to indicate the reason for the generation of the hangup.
5. The S-CSCF performs whatever service control procedures are appropriate for this ending session.
6. The S-CSCF of the releasing party forwards the Hangup to the S-CSCF of the other party.
7. The S-CSCF performs whatever service control procedures are appropriate for this ending session.
8. The S-CSCF of the other party forwards the Hangup on to the P-CSCF.
9. The P-CSCF/~~PCF~~PDF removes the authorisation for resources that had previously been issued for this endpoint for this session. This step also results in a release indication to the GPRS subsystem to confirm that the IP bearers associated with the session have been deleted for UE#2.
10. The P-CSCF forwards the Hangup on to the UE.
11. The mobile responds with an acknowledgement, the SIP OK message (number 200), which is sent back to the P-CSCF.
12. Steps 12 and 13 may be done in parallel with step 11. The Mobile initiates the release of the bearer PDP context.
13. The GPRS subsystem releases the PDP context. The IP network resources that had been reserved for the message receive path to the mobile for this session are now released. This is initiated from the GGSN. If RSVP was used to allocated resources, then the appropriate release messages for that protocol would invoked here.
14. The SIP OK message is sent to the S-CSCF.
15. The S-CSCF of the other party forwards the OK to the S-CSCF of the releasing party.
16. The S-CSCF of the releasing party forwards the OK to the P-CSCF of the releasing party.

**********Next Change**********

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 characteritics 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.

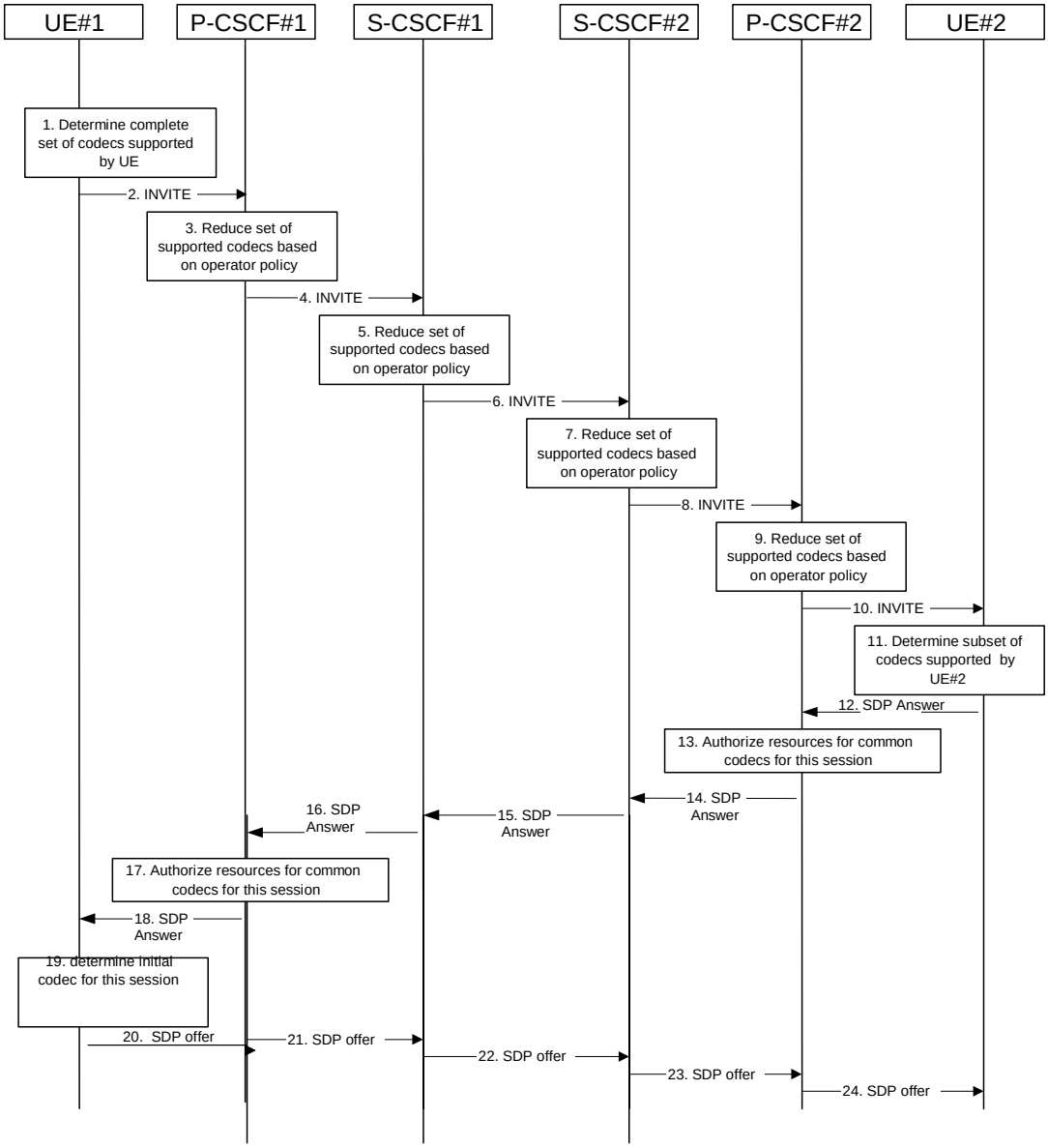


Figure 5.30: Codec negotiation during initial session establishment

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 nework operator decides based on local policy, not to allow on the network.

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.

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.

8. S-CSCF#3 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. The Authorization-Token is generated by the ~~PCF~~PDF.

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~~PDF.

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.

3GPP TSG-SA2 Meeting #27
Beijing, China, October 14, 2002

Tdoc ⌘ S2-023116

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **216** ⌘ **rev** **2** ⌘ 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 ☒

Title:	⌘	Changes to IMS service concepts
Source:	⌘	Lucent Technologies
Work item code:	⌘	IMS-CCR
Date:	⌘	14.10.2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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 one 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:	⌘	The current section 4.2.1 is titled Virtual Home Environment but the section does not deal with the subject of VHE. Rather it deals with home based services.
Summary of change:	⌘	Change the heading to indicate the subject of the section
Consequences if not approved:	⌘	Misunderstanding by developers of IMS

Clauses affected:	⌘	4.2.1

Other specs affected:	⌘	Y	N		⌘
		☐	☐	Other core specifications	
		☐	☐	Test specifications	
		☐	☐	O&M Specifications	

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.

4.2 IMS services concepts

4.2.1 ~~Virtual Home Environment (VHE)~~Home-network based services

4.2.1.1 Support of CAMEL

It shall be possible for an operator to offer access to services based on the CSE for its IM CN subsystem subscribers. It should be noted that there is no requirement for any operator to support CAMEL services for their IM CN subsystem subscribers or for inbound roamers.

For more information refer to section 4.2.4.

4.2.1.2 Support of OSA

It shall be possible for an operator to offer access to services based on OSA for its IM CN subsystem subscribers. This shall be supported by an OSA API between the Application Server (AS) and the network.

4.2.2 Support of Local Services in the IMS

[Editor's note: Local Services are not supported in Release 5 (decision from SA#15). However, in order not to create a Release 6 version of 23.228, the following text is kept in version 5 (to be deleted from version 5 as soon as a version 6 is created):

Visited network provided services offer an opportunity for revenue generation by allowing access to services of a local nature to visiting users (inbound roamers). There shall be a standardised means to access local services. The mechanism to access local services shall be exactly the same for home users and inbound roamers.

Access to local services shall be provided in the following manner

1. It shall be possible for the HPLMN to determine whether the roaming user is requesting a local service, or is "dialing" an address according to the local addressing plan. This shall be based upon an indication received from the UE. The same indication shall be used to access local services as well as to use the local addressing plan. This indication shall be included in the Request URI of the SIP Invite. 2. The P-CSCF shall route the session towards the S-CSCF as per the session origination procedures.

2. Processing the SIP URI (e.g. address analysis and potential modification such as translation into globally routable format) shall be performed by an Application Server in the subscriber's Home Network. The S-CSCF routes the session towards this Home Network Application Server based upon filter criteria which are triggered by the 'local indication' received from the UE.

3. The S-CSCF routes the session, via normal SIP routing, towards its destination (eg a server in the VPLMN). The ISC interface is not used as an inter-operator interface.

There shall be a standardised mechanism for the UE that is registered in the IM Subsystem, to receive and/or retrieve information about the available local services. It shall be possible to advertise local services to a registered UE independent of whether the UE has an active SIP session. Local services may be presented e.g. by directing the user to a web page.

Note: For users who have roamed, services relevant to the locality of the user may also be provided by the home network.

End of editor's note.]

3GPP TSG-SA2 Meeting #27
Beijing, China, 14-18.10.2002

S2-023074rev5

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **217** ⌘**rev** **5** ⌘ 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 [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Incorporating messaging aspects to 23.228
Source:	⌘	Nokia
Work item code:	⌘	IMS2
Date:	⌘	18/10/2002
Category:	⌘	**B**
Release:	⌘	Rel-6

Use one 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 one 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:	⌘	SA1 has stabilized the IMS messaging concepts and requirements in TR 22.940. Subsequently, CN1 has done an analysis on the applicability of SIP for the different messaging types identified by CN1. As a conclusion, it is understood that SIP and the IMS architecture could be used for Immediate and Session-based messaging. This CR incorporates the relevant aspects to the stage-2 specification.
Summary of change:	⌘	General statements on Session-based Messaging have been incorporated. A new flow is added to describe Immediate Messaging on the stage-2 level.
Consequences if not approved:	⌘	

Clauses affected:	⌘	New clause added (5.x)			
		Y	**N**		
Other specs affected:	⌘		**X**	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

How to create CRs using this form:
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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 set of changes **********

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 23.002: "Network Architecture".

[2] CCITT Recommendation E.164: "Numbering plan for the ISDN era".

[3] CCITT Recommendation Q.65: "Methodology – Stage 2 of the method for the characterisation of services supported by an ISDN".

[4] ITU Recommendation I.130: "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN"

[5] GSM 03.64: "Digital cellular telecommunication system (Phase 2+); Overall Description of the General Packet Radio Service (GPRS) Radio Interface; Stage 2".

[6] GSM 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".

[7] 3GPP TS 23.221: "Architectural Requirements".

[8] 3GPP TS 22.228: "Service requirements for the IP multimedia core network subsystem"

[9] 3GPP TS 23.207: "End-to-end QoS concept and architecture"

[10] 3GPP TS 24.228: "Signalling flows for the IP multimedia call control based on SIP and SDP"

[11] 3GPP TS 25.301: "Radio interface protocol architecture"

[12] RFC 3261: "SIP: Session Initiation Protocol"

[13] RFC 2396: "Uniform Resource Identifiers (URI): Generic Syntax"

[14] RFC 2486: "The Network Access Identifier"

[15] RFC 2806: "URLs for Telephone Calls"

[16] RFC 2916: "E.164 number and DNS"

[16a] RFC 3041: "Privacy Extensions for Stateless Address Autoconfiguration in IPv6"

[17] ITU Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies"

[18] ITU Recommendation H.248: "Gateway control protocol"

[19] 3GPP TS 33.203: "Access Security for IP-based services"

[20] 3GPP TS 33.210: "Network Domain Security: IP network layer security "

[21] 3GPP TS 26.235: "Packet Switched Multimedia Applications; Default Codecs".

[22] 3GPP TR 22.941: " IP Based Multimedia Services Framework "

[23] 3GPP TS 23.060: “General Packet Radio Service (GPRS); Service description; Stage 2

[24] 3GPP TS 23.003: “Technical Specification Group Core Network; Numbering, addressing and identification”

[25] 3GPP TS 32.200: “Telecommunication management; Charging management; Charging principles”

[26] 3GPP TS 32.225: ” Telecommunication Management; Charging Management; Charging Data Description for IP Multimedia Subsystem”

[27] 3GPP TS 22.071: “Technical Specification Group Services and System Aspects,Location Services (LCS);Service description, Stage 1”

[28] 3GPP TS 23.271: “Technical Specification Group Services and System Aspects, Functional stage 2 description of LCS”

[29] 3GPP TS 23.078: “Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 3 - Stage 2”

[xx] 3GPP TS 22.340: “ IMS Messaging; Stage 1”

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

5.x IMS messaging concepts and procedures

This clause describes architectural concepts and procedures for providing Messaging in the IM CN Subsystem.

The service enablers for Messaging and possible reuse of IMS service enablers within this context as well security & charging expectations, addressing, privacy, content handling and limitations, filtering, media types and message lengths, etc. are to be further studied.

Any ISIM related architectural requirements would be studied as part of overall IMS Messaging.

5.x.1 Immediate Messaging

This sub-clause describes architectural concepts and procedures for fulfiling the requirements for Immediate Messaging described in TS 22.340 [xx].

5.x.1.1 Procedures to enable Immediate Messaging

IMS users shall be able to exchange immediate messages with each other by using the procedure described in this sub-clause. This procedure shall allow the exchange of any type of multimedia content (subject to possible restrictions on message length, FFS).

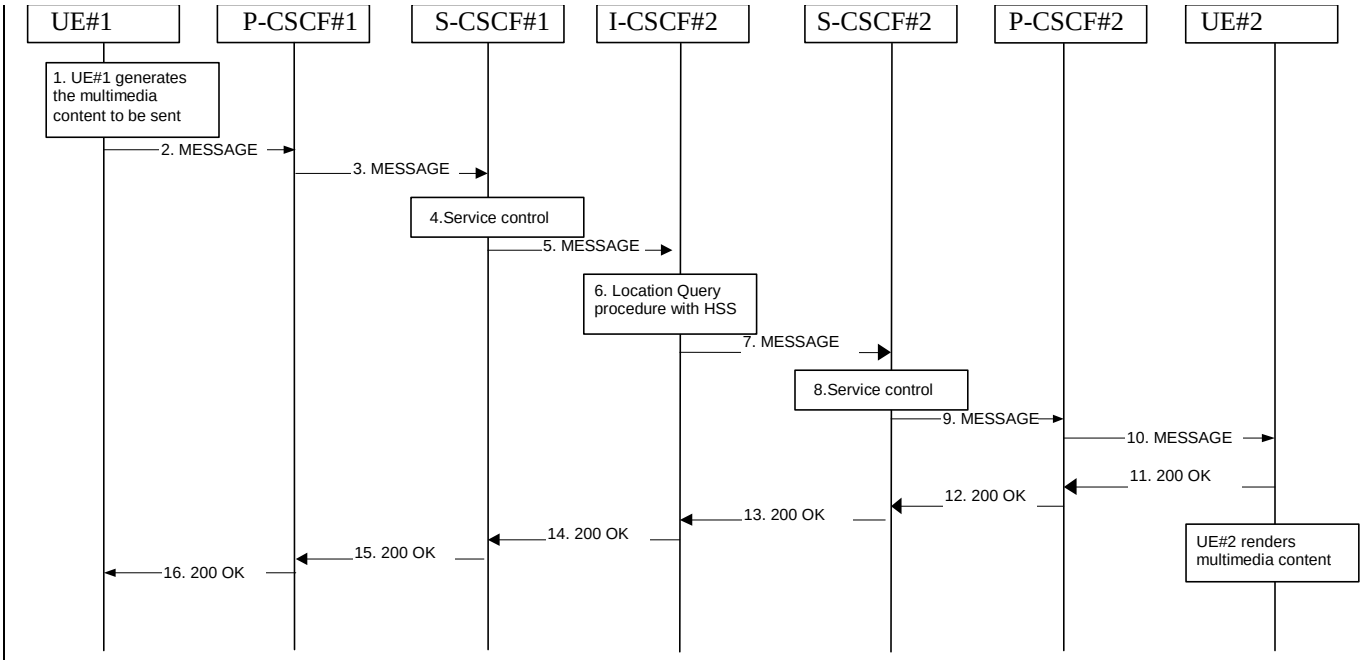

Figure 5.x: Immediate Messaging procedure

1. UE#1 generates the multimedia content intended to be sent to UE#2.
2. UE#1 sends the MESSAGE request to P-CSCF#1 that includes the multimedia content in the message body.
3. P-CSCF#1 forwards the MESSAGE request to S-CSCF#1 along the path determined upon UE#1's most recent registration procedure.
4. S-CSCF#1 performs whatever service control logic is appropriate for this MESSAGE request.
5. S-CSC#1 forwards the MESSAGE request to I-CSCF#2.
6. I-CSCF#2 performs Location Query procedure with the HSS to acquire the S-CSCF address of the destination user (S-CSCF#2).
7. I-CSCF#2 forwards the MESSAGE request to S-CSCF#2.
8. S-CSCF#2 performs whatever service control logic is appropriate for this MESSAGE request.
9. S-CSCF#2 forwards the MESSAGE request to P-CSCF#2 along the path determined upon UE#2's most recent registration procedure.
10. P-CSCF#2 forwards the MESSAGE request to UE#2. After receiving the MESSAGE UE#2 renders the multimedia content to the user.
11. – 16. UE#2 acknowledges the MESSAGE request with a 200OK response. The 200OK response traverses the transaction path back to UE#1.

5.x.2 Session-based Messaging

This subclause describes architectural concepts and procedures for fulfiling the requirements for Session-based Messaging described in TS 22.340 [xx].

Session-based IMS messaging communications shall as much as possible use the same basic IMS session delivery mechanisms (e.g. routing, security, service control) as defined in clause 4 and 5 of this document. The details of the impacts of Session-based Messaging in IMS are for further study."

3GPP TSG-SA2 Meeting #27
Beijing, China, 14-18.10.2002

S2-023074

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **217** ⌘**rev** **1** ⌘ 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 ☒

Title:	⌘	Incorporating messaging aspects to 23.228
Source:	⌘	Nokia
Work item code:	⌘	IMS2
Date:	⌘	18/10/2002
Category:	⌘	**B**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
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Use one of the following releases:

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R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	SA1 has stabilized the IMS messaging concepts and requirements in TR 22.940. Subsequently, CN1 has done an analysis on the applicability of SIP for the different messaging types identified by CN1. As a conclusion, it is understood that SIP and the IMS architecture could be used for Immediate and Session-based messaging. This CR incorporates the relevant aspects to the stage-2 specification.
Summary of change:	⌘	General statements on Session-based Messaging have been incorporated. A new flow is added to describe Immediate Messaging on the stage-2 level.
Consequences if not approved:	⌘	

Clauses affected:	⌘	New clause added (5.x)

Other specs affected: ⌘	Y	N	
		X	Other core specifications
		X	Test specifications
		X	O&M Specifications

⌘

Other comments: ⌘

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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 set of changes **********

2 References

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[3] CCITT Recommendation Q.65: "Methodology – Stage 2 of the method for the characterisation of services supported by an ISDN".

[4] ITU Recommendation I.130: "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN"

[5] GSM 03.64: "Digital cellular telecommunication system (Phase 2+); Overall Description of the General Packet Radio Service (GPRS) Radio Interface; Stage 2".

[6] GSM 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".

[7] 3GPP TS 23.221: "Architectural Requirements".

[8] 3GPP TS 22.228: "Service requirements for the IP multimedia core network subsystem"

[9] 3GPP TS 23.207: "End-to-end QoS concept and architecture"

[10] 3GPP TS 24.228: "Signalling flows for the IP multimedia call control based on SIP and SDP"

[11] 3GPP TS 25.301: "Radio interface protocol architecture"

[12] RFC 3261: "SIP: Session Initiation Protocol"

[13] RFC 2396: "Uniform Resource Identifiers (URI): Generic Syntax"

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[20] 3GPP TS 33.210: "Network Domain Security: IP network layer security "

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[23] 3GPP TS 23.060: “General Packet Radio Service (GPRS); Service description; Stage 2

[24] 3GPP TS 23.003: “Technical Specification Group Core Network; Numbering, addressing and identification”

[25] 3GPP TS 32.200: “Telecommunication management; Charging management; Charging principles”

[26] 3GPP TS 32.225: ” Telecommunication Management; Charging Management; Charging Data Description for IP Multimedia Subsystem”

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[29] 3GPP TS 23.078: “Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 3 - Stage 2”

[xx] 3GPP TS 22.340: “ IMS Messaging; Stage 1”

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

****

5.x IMS messaging concepts and procedures

This clause describes architectural concepts and procedures for providing Messaging in the IM CN Subsystem.

5.x.1 Immediate Messaging

This sub-clause describes architectural concepts and procedures for fulfiling the requirements for Immediate Messaging described in TS 22.340 [xx].

5.x.1.1 Procedures to enable Immediate Messaging

IMS users shall be able to exchange immediate messages with each other by using the procedure described in this sub-clause. This procedure shall allow the exchange of any type of multimedia content, and shall not impose restrictions to the type and length of multimedia content to be sent.

Note: Although the procedure by nature does not impose limitiations to the multimedia content type and length, it is expected that implementation and operator policy constraints will exist.

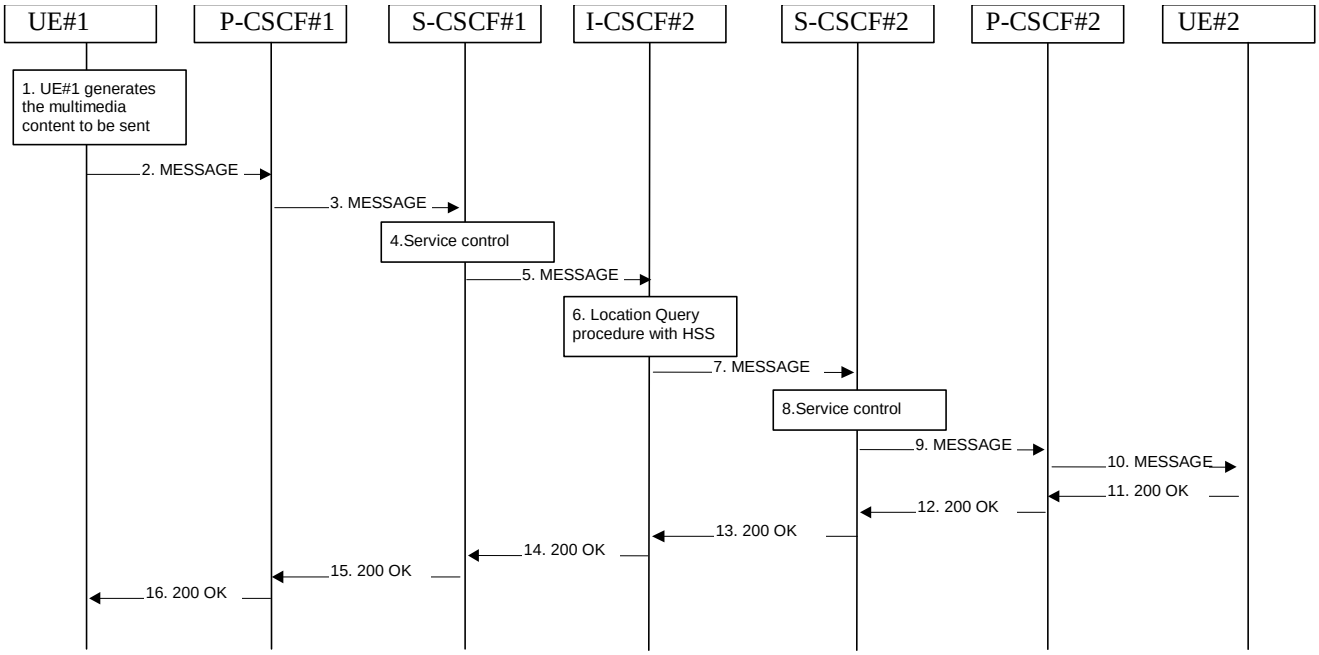

Figure 5.x: Immediate Messaging procedure

1. UE#1 generates the multimedia content intended to be sent to UE#2.
2. UE#1 sends the MESSAGE request to P-CSCF#1 that includes the multimedia content in the message body.
3. P-CSCF#1 forwards the MESSAGE request to S-CSCF#1 along the path determined upon UE#1's most recent registration procedure.
4. S-CSCF#1 performs whatever service control logic is appropriate for this MESSAGE request.
5. S-CSC#1 forwards the MESSAGE request to I-CSCF#2.
6. I-CSCF#2 performs Location Query procedure with the HSS to acquire the S-CSCF address of the destination user (S-CSCF#2).
7. I-CSCF#2 forwards the MESSAGE request to S-CSCF#2.
8. S-CSCF#2 performs whatever service control logic is appropriate for this MESSAGE request.
9. S-CSCF#2 forwards the MESSAGE request to P-CSCF#2 along the path determined upon UE#2's most recent registration procedure.
10. P-CSCF#2 forwards the MESSAGE request to UE#2
11. – 16. UE#2 acknowledges the MESSAGE request with a 200OK response. The 200OK response traverses the transaction path back to UE#1.

5.x.2 Session-based Messaging

This subclause describes architectural concepts and procedures for fulfiling the requirements for Session-based Messaging described in TS 22.340 [xx].

Session-based IMS messaging communications use the same basic IMS session delivery mechanisms (e.g. routing, security, service control) as defined in clause 4 and 5 of this document. IMS messaging sessions use INVITE-type dialogs and the offer-answer model to initiate and establish the session-based messaging connection between users. The details of the messaging-type media component are described in the corresponding 'm=' line of the SDP.

3GPP TSG-SA WG2 Meeting #27
Beijing, China, 14th - 18th October 2002.

Tdoc ⌘S2-023059

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **213** ⌘**rev** **1** ⌘ 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 ☒

Title:	⌘	Description of "Service Profile"
Source:	⌘	AWS
Work item code:	⌘	IMS
Date:	⌘	14/10/2002
Category:	⌘	**F**
Release:	⌘	5

Use one 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)*
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Use one 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:	⌘	Currently the Description of Service profile is vague
Summary of change:	⌘	The text clarifies what a service profile is
Consequences if not approved:	⌘	Ambiguity in the text leading to misinterpretation of service profile handling in the IMS

Clauses affected:	⌘	4.3.3.4			
		Y	**N**		
Other specs Affected:	⌘	**X**		Other core specifications	⌘ 29.228v5.x.y
			X	Test specifications	
			X	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.

**********First Modification **********

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1] 3GPP TS 23.002: "Network Architecture".

[2] CCITT Recommendation E.164: "Numbering plan for the ISDN era".

[3] CCITT Recommendation Q.65: "Methodology – Stage 2 of the method for the characterisation of services supported by an ISDN".

[4] ITU Recommendation I.130: "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN"

[5] GSM 03.64: "Digital cellular telecommunication system (Phase 2+); Overall Description of the General Packet Radio Service (GPRS) Radio Interface; Stage 2".

[6] GSM 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".

[7] 3GPP TS 23.221: "Architectural Requirements".

[8] 3GPP TS 22.228: "Service requirements for the IP multimedia core network subsystem"

[9] 3GPP TS 23.207: "End-to-end QoS concept and architecture"

[10] 3GPP TS 24.228: "Signalling flows for the IP multimedia call control based on SIP and SDP"

[11] 3GPP TS 25.301: "Radio interface protocol architecture"

[12] RFC 3261: "SIP: Session Initiation Protocol"

[13] RFC 2396: "Uniform Resource Identifiers (URI): Generic Syntax"

[14] RFC 2486: "The Network Access Identifier"

[15] RFC 2806: "URLs for Telephone Calls"

[16] RFC 2916: "E.164 number and DNS"

[16a] RFC 3041: "Privacy Extensions for Stateless Address Autoconfiguration in IPv6"

[17] ITU Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies"

[18] ITU Recommendation H.248: "Gateway control protocol"

[19] 3GPP TS 33.203: "Access Security for IP-based services"

[20] 3GPP TS 33.210: "Network Domain Security: IP network layer security "

[21] 3GPP TS 26.235: "Packet Switched Multimedia Applications; Default Codecs".

[22] 3GPP TR 22.941: " IP Based Multimedia Services Framework "

[23] 3GPP TS 23.060: “General Packet Radio Service (GPRS); Service description; Stage 2

[24] 3GPP TS 23.003: “Technical Specification Group Core Network; Numbering, addressing and identification”

[25] 3GPP TS 32.200: “Telecommunication management; Charging management; Charging principles”

[26] 3GPP TS 32.225: ” Telecommunication Management; Charging Management; Charging Data Description for IP Multimedia Subsystem”

[27] 3GPP TS 22.071: “Technical Specification Group Services and System Aspects,Location Services (LCS);Service description, Stage 1”

[28] 3GPP TS 23.271: “Technical Specification Group Services and System Aspects, Functional stage 2 description of LCS”

[29] 3GPP TS 23.078: “Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 3 - Stage 2”

[30] 3GPP TS 29.228: “IP Multimedia (IM) Subsystem Cx and Dx Interfaces; Signalling flows and message contents”

3 Definitions, symbols and abbreviations

**********End of First modification **********

**********Second modification **********

4.3.3.4 Relationship of private and public user identities

The home network operator is responsible for the assignment of the private user identifier, and public user identifiers; other identities that are not defined by the operator may also exist.

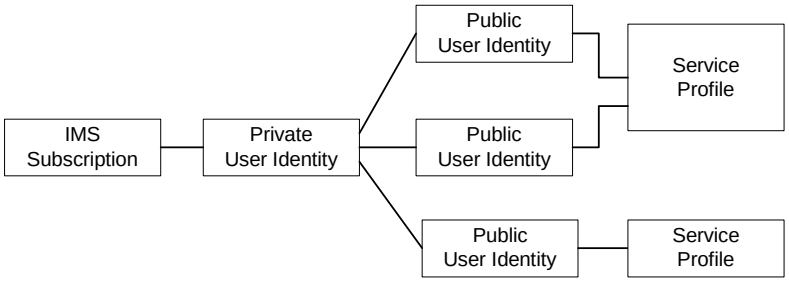

Figure 4.5: Relationship of the private user identity and public user identities

~~Each Public user identity is associated with one and only one Service Profile. Each service profile is associated with one or more Public user identities. The Service Profile is a collection of service and user related data. The Service Profile is~~

~~independent from the Implicit Registration Set, e.g. IMPUs with different Service Profiles may belong to the same Implicit Registration Set.~~

The IMS Service Profile is a collection of service and user related data as defined in 3GPP TS 29.228 [30]. The Service Profile is independent from the Implicit Registration Set, e.g. IMPUs with different Service Profiles may belong to the same Implicit Registration Set. Initial filter criteria in the service profile provide a simple service logic comprising of user / operator preferences that are of static nature i.e. they do not get changed on a frequent basis.

Application servers will provide more complex and dynamic service logic that can potentially make use of additional information not available directly via SIP messages (e.g. location, time, day etc.).

The IMS Service profile is defined and maintained in the HSS and its scope is limited to IM CN Subsystem. The service profile is downloaded from the HSS to the S-CSCF.Only one service profile per Public user identity is downloaded to the S-CSCF at a given time (such as at registration, update of a profile etc.) based on the Public user identities being served by the S-CSCF. Nothing precludes that multiple service profiles can be defined in the HSS for a subscription. Each Public user identity is associated with one and only one Service Profile. Each service profile is associated with one or more Public user identities.

All Service Profiles that share the same Private user identity are associated to the same S-CSCF. Later releases may allow different Service Profiles that share the same Private user identity to be associated with different S-CSCFs.

An ISIM application shall securely store the home domain name of the subscriber. It shall not be possible for the UE to modify the information from which the home domain name is derived.

If the UICC does not have an ISIM application, then, the home domain name shall be derived from the Mobile Country Code and Mobile Network Code fields of the USIM's IMSI. The format of the home domain name is specified in 3GPP TS 23.003 [24].

The storage location of the Private User Identity, Public User Identity and home domain name for a standalone SIP Client could be stored on the ISIM.

It is not a requirement for a user to be able to register on behalf of another user or for a device to be able to register on behalf of another device or for combinations of the above for the IM CN subsystem for this release.

4.3.4 Identification of network nodes

The CSCF, BGCF and MGCF nodes shall be identifiable using a valid SIP URL (Host Domain Name or Network Address) on those interfaces supporting the SIP protocol, (e.g. Gm, Mw, Mm, and Mg). These SIP URLs would be used when identifying these nodes in header fields of SIP messages. However this does not require that these URLs will be globally published in DNS.

**********End of Second modification**********

3GPP TSG-SA2 Meeting #27
Beijing, China, October 14, 2002

Tdoc ⌘ S2-023056

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **211** ⌘**rev** **1** ⌘ 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 ☒

Title:	⌘	Relocation of service architecture text
Source:	⌘	Lucent Technologies
Work item code:	⌘	IMS-CCR
Date:	⌘	14.10.2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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 one 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:	⌘	Some service architecture information from 23.228 belongs in 23.002.
Summary of change:	⌘	Rearrange text, delete duplicate figure and move some text from 23.228 to 23.002
Consequences if not approved:	⌘	Developers will have difficulty finding the required information. Duplicate material may get out of sync.

Clauses affected:	⌘	Clauses 4.2.4 and 4.2.4a

	Y	N			
Other specs affected:	X		Other core specifications	⌘	TS 23.002 CR-106
			Test specifications		
			O&M Specifications		

Other comments:	⌘	

How to create CRs using this form:
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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.
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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.

4.2.4 IP multimedia Subsystem Service Control Interface (ISC)

The ISC interface is between the Serving CSCF and the service platform(s).

An Application Server (AS) offering value added IM services resides either in the user's home network or in a third party location. The third party could be a network or simply a stand-alone AS.

The Serving-CSCF to AS interface is used to provide services residing in an AS. Two cases were identified:

- Serving-CSCF to an AS in Home Network.

- Serving-CSCF to an AS in External Network (e.g., Third Party or Visited)

The SIP Application Server may host and execute services. The SIP Application Server can influence and impact the SIP session on behalf of the services and it uses the ISC interface to communicate with the S-CSCF.

The S-CSCF shall decide whether an Application Server is required to receive information related to an incoming SIP session request to ensure appropriate service handling.. The decision at the S-CSCF is based on (filter) information received from the HSS. This filter information is stored and conveyed on a per application server basis for each user. The name(s)/address(es) information of the application server(s) are received from the HSS.

The S-CSCF does not handle service interaction issues.

Once the IM SSF, OSA SCS or SIP Application Server has been informed of a SIP session request by the S-CSCF, the IM SSF, OSA SCS or SIP Application Server shall ensure that the S-CSCF is made aware of any resulting activity by sending messages to the S-CSCF.

From the perspective of the S-CSCF, The “SIP Application server”, “OSA service capability server” and “IM-SSF” shall exhibit the same interface behaviour.

When the name/address of more than one “application server” is transferred from the HSS, the S-CSCF shall contact the “application servers” in the order supplied by the HSS. The response from the first “application server” shall be used as the input to the second “application server”. Note that these multiple “application servers” may be any combination of the SIP Application server, OSA service capability server, or IM-SSF types.

The S-CSCF does not provide authentication and security functionality for secure direct third party access to the IM subsystem. The OSA framework provides a standardized way for third party secure access to the IM subsystem.

If a S-CSCF receives a SIP request on the ISC interface that was originated by an Application Server destined to a user served by that S-CSCF, then the S-CSCF shall treat the request as a terminating request to that user and provide the terminating request functionality as described above. Both registered and unregistered terminating requests shall be supported.

~~Regarding the general provision of services in the IMS, the following statements shall guide the further development.~~

~~1.Besides the Cx interface the S-CSCF supports only one standardised protocol for service control, which delegates service execution to an “Application Server”.~~

~~2.The depicted functional architecture does not propose a specific physical implementation.~~

~~3.Scope of the SIP Application Server: the SIP Application Server may host and execute services. It is intended to allow the SIP Application Server to influence and impact the SIP session on behalf of the services and it uses the ISC interface to communicate with the S-CSCF.~~

~~4. The S-CSCF shall decide whether an Application Server is required to receive information related to an incoming SIP session request to ensure appropriate service handling.. The decision at the S-CSCF is based on (filter) information received from the HSS. This filter information is stored and conveyed on a per application server basis for each user. The name(s)/address(es) information of the application server(s) are received from the HSS.~~

~~5.The purpose of the IM SSF is to host the CAMEL network features (i.e. trigger detection points, CAMEL Service Switching Finite State Machine, etc) and to interface to CAP.~~

~~6.The IM SSF and the CAP interface support legacy services only.~~

~~7.Once the IM-SSF, OSA-SCS or SIP Application Server has been informed of a SIP session request by the S-CSCF, the IM-SSF, OSA-SCS or SIP Application Server shall ensure that the S-CSCF is made aware of any resulting activity by sending messages to the S-CSCF.~~

~~8.From the perspective of the S-CSCF, The "SIP Application server", "OSA service capability server" and "IM-SSF" shall exhibit the same interface behaviour.~~

~~9.The application server may contain "service capability interaction manager" (SCIM) functionality and other application servers. The SCIM functionality is an application which performs the role of interaction management. The internal components are represented by the "dotted boxes" inside the SIP application server. The internal structure of the application server is outside the standards.~~
~~The Sh interface shall have sufficient functionality to enable this scenario.~~

~~10.When the name/address of more than one "application server" is transferred from the HSS, the S-CSCF shall contact the "application servers" in the order supplied by the HSS. The response from the first "application server" shall be used as the input to the second "application server". Note that these multiple "application servers" may be any combination of the SIP Application server, OSA service capability server, or IM-SSF types.~~

~~11.The S-CSCF does not handle service interaction issues..~~

~~12.The S-CSCF does not provide authentication and security functionality for secure direct third party access to the IM subsystem. The OSA framework provides a standardized way for third party secure access to the IM subsystem.~~

~~12a. If a S-CSCF receives a SIP request on the ISC interface that was originated by an Application Server destined to a user served by that S-CSCF, then the S-CSCF shall treat the request as a terminating request to that user and provide the terminating request functionality as described in items 4 and 10 above. Both registered and unregistered terminating requests shall be supported.~~

More specifically the following requirements apply to the IMS Service control interface:

1. The ISC interface shall be able to convey charging information.
2. The protocol on the ISC interface shall allow the S-CSCF to differentiate between SIP requests on Mw, Mm and Mg interfaces and SIP Requests on the ISC interface.

~~The figure below depicts an overall view of how services can be provided.~~

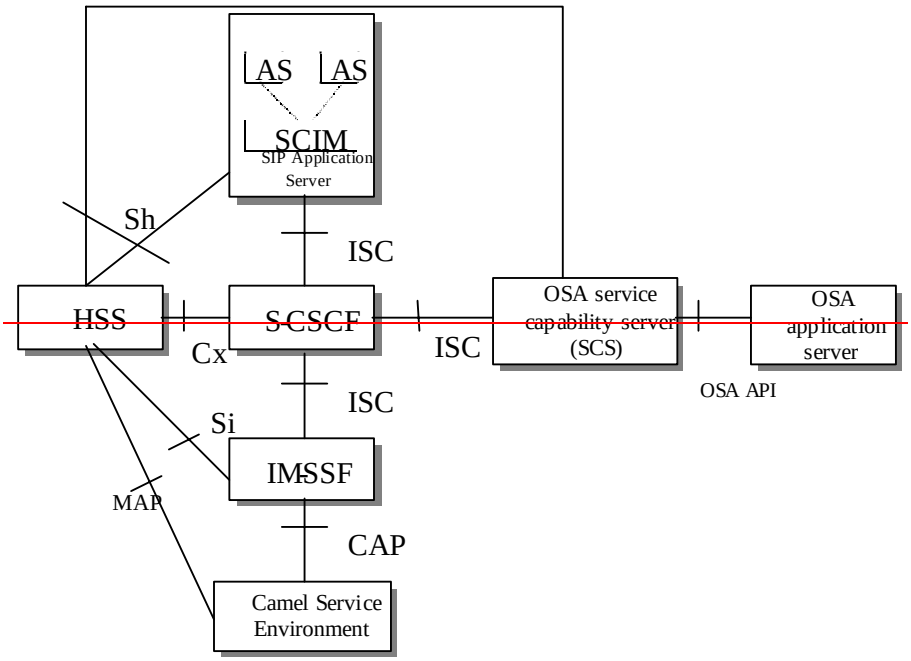

Figure 4.3: ~~Functional architecture for the provision of service in the IMS~~Void

Besides the Cx interface the S-CSCF supports only one standardised protocol for service control, which delegates service execution to an "Application Server". The protocol to be used on the ISC interface shall be SIP (as defined by RFC 3261 [12], other relevant RFC's, and additional enhancements introduced to support 3GPP´s needs on the Mw, Mm, Mg interfaces). On the ISC interface, extensions to SIP shall be avoided but are not expressly prohibited.

The notion of a "SIP leg" used throughout this specification is identical to the notion of a call leg which is the same as a SIP dialog defined by RFC 3261 [12]. The same SIP leg that is received by the S-CSCF on the Mw, Mm and Mg interfaces is sent on the ISC interface. The same SIP leg that is received by the S-CSCF on the ISC interface is sent on the Mw, Mm and Mg interfaces.

Concerning the relationship between the SIP legs of the ISC interface and the SIP legs of the Mw, Mm, and Mg interfaces the S-CSCF acts as a SIP proxy, as shown in Figures 4.a-4e below.

Figures 4.3a-4.3e below depict the possible high-level interactions envisioned between the S-CSCF and the Application Server.

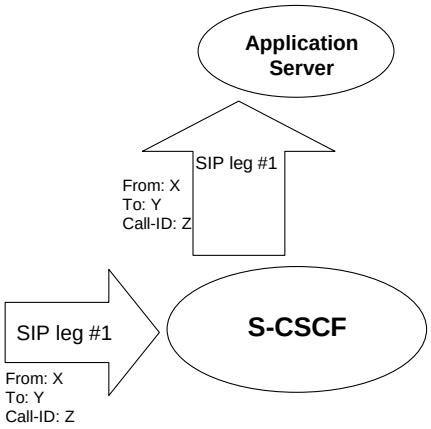

Figure 4.3a: Application Server acting as terminating UA, or redirect server

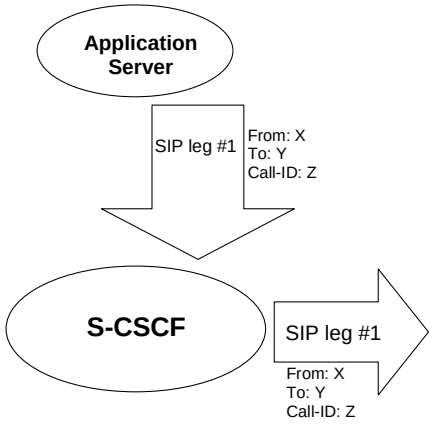

Figure 4.3b: Application Server acting as originating UA

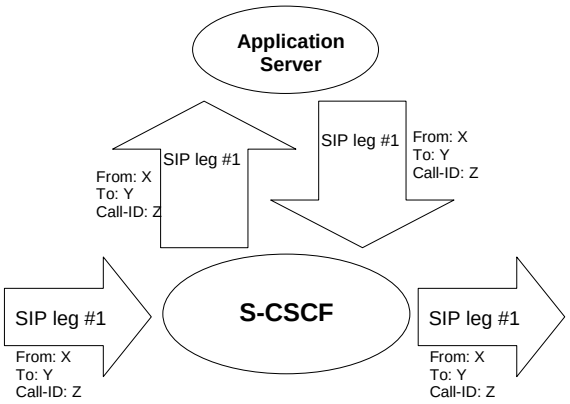

Figure 4.3c: Application Server acting as a SIP proxy

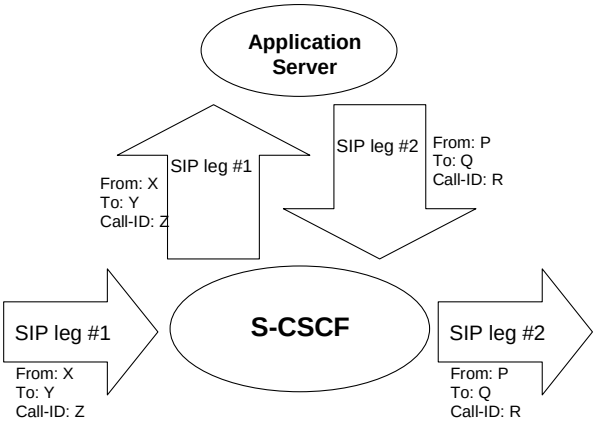

Figure 4.3d: Application Server performing 3rd party call control

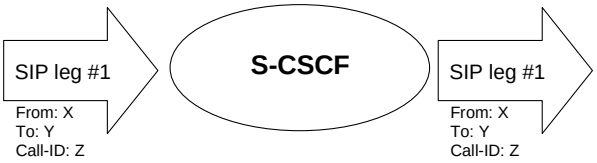

Figure 4.3e: A SIP leg is passed through the S-CSCF without Application Server involvement

4.2.4a HSS to service platform Interface

The “application server” (SIP Application Server and/or the OSA service capability server and/or IM-SSF) may communicate to the HSS. The Sh and Si interfaces are used for this purpose. ~~The Sh and Si interfaces are shown in Figure 4.3.~~

For the Sh interface, the following shall apply:

1 The Sh interface is an intra-operator interface.

2. The Sh interface is between the HSS and the “SIP application server” and between the HSS and the “OSA service capability server”. The HSS is responsible for policing what information will be provided to each individual application server.

3 The Sh interface transports transparent data for e.g. service related data , user related information, …
In this case, the term transparent implies that the exact representation of the information is not understood by the HSS or the protocol.

4 The Sh interface also supports mechanisms for transfer of user related data stored in the HSS (e.g. user service related data, MSISDN, visited network capabilities, user location (cell global ID/SAI or the address of the serving network element, etc))

Note: before providing information relating to the location of the user to a SIP Application Server, detailed privacy checks frequently need to be performed in order to meet the requirements in TS22.071 [27]. The SIP Application Server can ensure that these privacy requirements are met by using the Le interface to the GMLC (see TS 23.271) instead of using the Sh interface.

The Si interface is between the HSS and the IM-SSF. It transports CAMEL subscription information including triggers for use by CAMEL based application services.

3GPP TSG-SA2 Meeting #27
Beijing, China, October 14, 2002

Tdoc ⌘ S2-023019

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **210** ⌘ **rev** **1** ⌘ 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 ☒

Title:	⌘	Removal of duplicate text
Source:	⌘	Lucent Technologies
Work item code:	⌘	IMS-CCR
Date:	⌘	14.10.2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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 one 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:	⌘	Text and figures related to address management are duplicated in 23.228 and 23.221.
Summary of change:	⌘	Remove duplicate text from 23.228. To make the sections exactly the same, the material will be copied from 23.228 and will replace the section in 23.221.
Consequences if not approved:	⌘	Text and figures may get out of sync leading to conflicting information and implementation errors.

Clauses affected:	⌘	Clauses 4.3.1 and 4.3.2

Other specs affected:	⌘	Y	N		⌘	
		X		Other core specifications		TS 23.221 CR-37
				Test specifications		
				O&M Specifications		

Other comments: ⌘

How to create CRs using this form:
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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.

4.3 Naming and addressing concepts

4.3.1 Address management

The mechanisms for addressing and routing for access to IM CN subsystem services and issues of general IP address management are discussed in TS 23.221 [7].

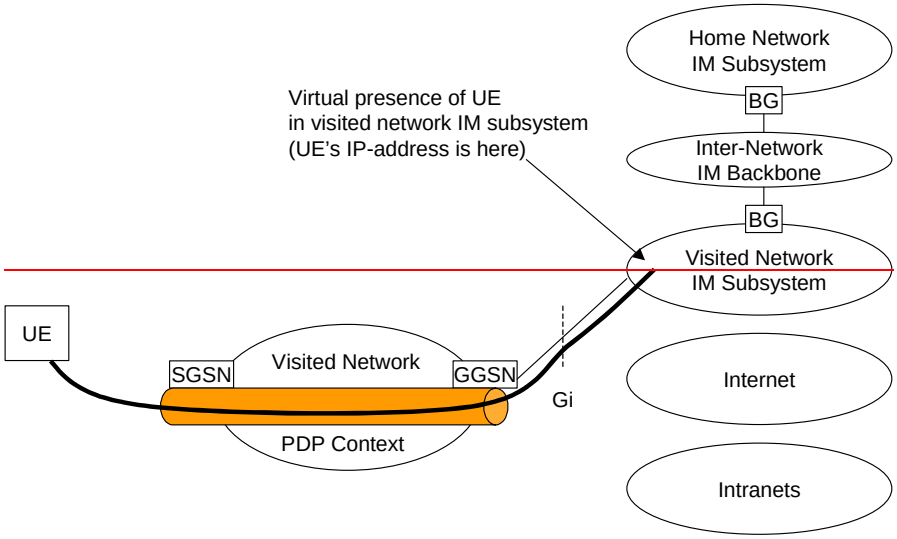
According to the procedures defined in TS 23.060 [23], when a UE is assigned an IPv6 prefix, it can change the global IPv6 address it is currently using via the mechanism defined in RFC 3041 [16a], or similar means. When a UE is registered in the IM CN Subsystem, any change to the IP address that is used to access the IM CN subsystem shall trigger automatic registration in order to update the UE's IP address.

The ability of the User plane and the Control Plane for a single session being able to pass through different GGSNs is not defined in this release.

4.3.2 ~~Addressing and routing for access to IM CN subsystem services~~Void

~~This section deals with a UE accessing IM CN subsystem services via UMTS.~~

~~A UE accessing IM CN Subsystem services requires an IP address that is logically part of the IM CN subsystem IP Addressing Domain. This is established using an appropriate PDP context. It is possible to connect to a GGSN either in the VPLMN or the HPLMN. For routing efficiency this context may benefit from being connected though a GGSN in the visited network. The connection between the UE and the Visited Network IM CN subsystem is shown below::~~



~~Figure 4.4: UE Accessing IM CN subsystem Services with GGSN in the visited network~~

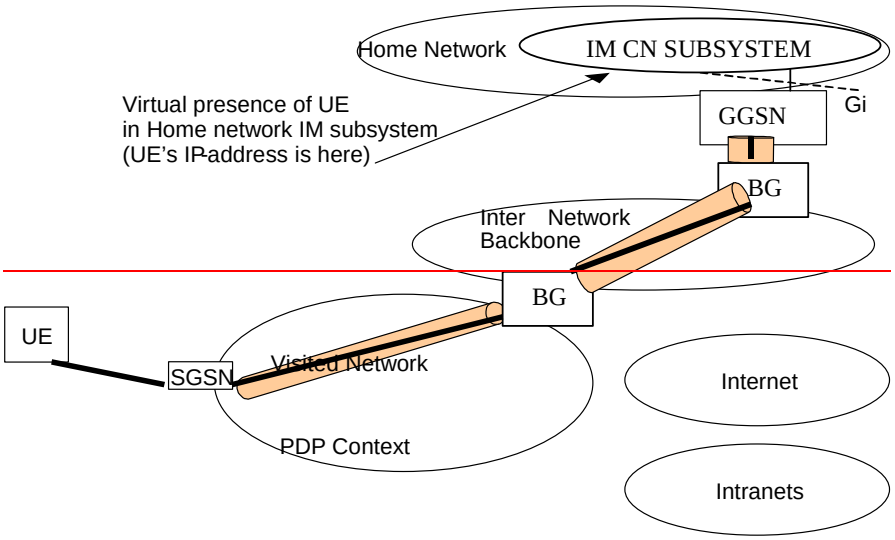


Fig. 4.4~~a UE Accessing IM CN subsystem Services with GGSN in the Home network~~: Void

3GPP TSG-SA2 Meeting #27
Beijing, China, 14 – 18 October

Tdoc S2 –~~022710~~023018rev3

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **204** ⌘**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 ☒

Title:	⌘	Clarification on MRFP reference point
Source:	⌘	NEC Corporation
Work item code:	⌘	IMS-CCR
Date:	⌘	7/10/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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 one 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:	⌘	23.228 is misaligned with stage 3 regarding supporting of Mp reference point. Such kind of statement is missing like Mp points are not supported in Rel 5.
Summary of change:	⌘	It is also proposed to add the sentence like these reference points are not supported in this version of the document.
Consequences if not approved:	⌘	Mp interface remains misaligned with 23.228 and 24.229. This causes readers confusing and misunderstood.

Clauses affected:	⌘	4.7			
Other specs affected:	⌘	**Y**	**N**		⌘
			X	Other core specifications	
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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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.

Start of change

4.7 Multimedia Resource Function

The architecture concerning the Multimedia Resource Function is presented in Figure 4.5a below.

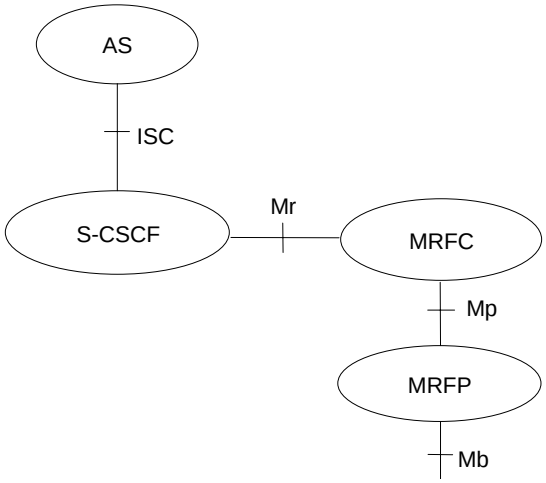

Figure 4.5a: Architecture of MRF

The MRF is split into Multimedia Resource Function Controller (MRFC) and Multimedia Resource Function Processor (MRFP).

Tasks of the MRFC are the following:

- Control the media stream resources in the MRFP.
- Interpret information coming from an AS and S-CSCF (e.g session identifier) and control MRFP accordingly.
- Generate of CDRs.

Tasks of the MRFP are the following:

- Control of the bearer on the Mb reference point .
- Provide resources to be controlled by the MRFC.
- Mixing of incoming media streams (e.g for multiple parties).
- Media stream source (for multimedia announcements).
- Media stream processing (e.g. audio transcoding, media analysis).

Tasks of an Application Server with regards to MRF are e.g. the following:

- Conference booking and provide booking information (e.g. start time, duration, list of participants) to the MRFC.
- Provide a floor control mechanism, by which end users (e.g. participants, chairman) can influence floor and provide information to the MRFC on how incoming media streams should be mixed and distributed accordingly.

The protocol used for the Mr reference point is SIP (as defined by RFC 3261 [12], other relevant RFC's, and additional enhancements introduced to support 3GPP´s needs).

The Mp reference point allows an MRFC to control media stream resources provided by an MRF.

The Mp reference point has the following properties:

- Full compliance with the H.248 standard.
- Open architecture where extensions (packages) definition work on the interface may be carried out.

The protocol for the Mp reference point is not specified in this release.

End of change

3GPP TSG-SA2 Meeting #27
Beijing, China, 14 – 18 October

Tdoc S2 –023018

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **204** ⌘**rev** **1** ⌘ 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 ☒

Title:	⌘	Clarification on MRFP reference point
Source:	⌘	NEC Corporation
Work item code:	⌘	IMS-CCR
Date:	⌘	7/10/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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 one 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:	⌘	1. In the current subclause 4.7 (MRFP), MRFP-bearer (Mb) interface are missing. 2. It is also misaligned with stage 3 regarding supporting of Mp reference point. Such kind of statement is missing like Mp points are not supported in Rel 5.
Summary of change:	⌘	1. In 4.7, it is proposed to add a sentence for Mb reference point. 2. It is also proposed to add the sentence like these reference points are not supported in this version of the document.
Consequences if not approved:	⌘	Mp interface remains misaligned with 23.228 and 24.229. This causes readers confusing and misunderstood.

Clauses affected:	⌘	4.7

Other specs affected: ⌘	Y	N		⌘
		X	Other core specifications	
		X	Test specifications	
		X	O&M Specifications	

Other comments: ⌘

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Start of change

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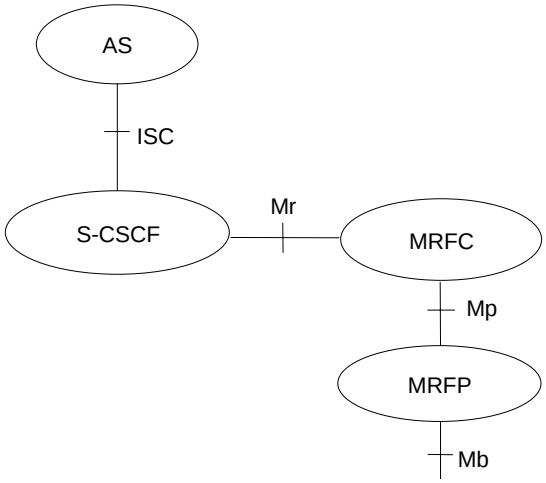

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The protocol used for the Mr reference point is SIP (as defined by RFC 3261 [12], other relevant RFC's, and additional enhancements introduced to support 3GPP´s needs).

The Mp reference point allows an MRFC to control media stream resources provided by an MRF.

The Mp reference point has the following properties:

- Full compliance with the H.248 standard.
- Open architecture where extensions (packages) definition work on the interface may be carried out.

Via the Mb reference point, IPv6 network services are accessed. These IPv6 network services are used for user data transport.

Mp reference point is not supported in this version of the document.

End of change

3GPP TSG-SA2 Meeting #27
Beijing, China, 14 – 18 October

Tdoc S2 –023016

CR-Form-v7

CHANGE REQUEST

⌘ **23.228** **CR** **207** ⌘**rev** **1** ⌘ 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 ☒

Title:	⌘	Clarification on subclause 5.4.4
Source:	⌘	NEC Corporation
Work item code:	⌘	IMS-CCR
Date:	⌘	7/10/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
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Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one 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:	⌘	In the current subclause 5.4.4 (requirements for IP multimedia session control), first sentence is changed because of unclearness of the meaning.
Summary of change:	⌘	In subclause 5.4.4, first sentence is changed because of unclearness of the meaning.
Consequences if not approved:	⌘	5.4.4 in 23.228 causes readers confused.

Clauses affected:	⌘	5.4.4

	Y	N		
Other specs affected: ⌘		X	Other core specifications	⌘
		X	Test specifications	
		X	O&M Specifications	

Other comments: ⌘

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Start of change

5.4.4 Requirements for IP multi-media session control

In order for operators to be able to offer a "carrier-grade" IP multimedia service, and ~~considering that the network cannot trust the UE to give correct references to be put in the CDR or~~ to require bearers whose features (e.g. Bandwidth) are coherent with the media components negotiated through CSCFs, the following features shall be offered:

1. Both end points of the session shall be able to negotiate (according to service /UE settings,) which resources (i.e. which media components) need to be established before the destination party is alerted. The session signalling shall ensure that these resources (including (UMTS) IP-Connectivity Network resources and IP multimedia backbone resources) are made available or reserved before the destination UE rings.

   This should nevertheless not prevent the UE from offering to the end-user the choice of accepting or rejecting the components of the session before establishing the bearers.

2. Depending on regulatory requirements, the IP multimedia service shall be able to charge the originating party for the Access IP-connectivity service of both originating and destination side or when reverse charging applies to charge the terminating party for the Access IP-connectivity service of both originating and terminating side. This implies that it should be easy to correlate CDR held by Access IP-connectivity service (e.g. GPRS) with a session.

3. The session control function of IP multimedia network of an operator (CSCF) shall be able (according to operator choice) to have a strict control (e.g. on source /destination IP address, QoS) on the flows associated with session established through SIP entering the IP multimedia bearer network from Access IP-connectivity service. This does not mean that CSCF is the enforcement point (which actually is the Gateway between the Access IP-connectivity service and the IP multimedia network, i.e. the GGSN in UMTS case) but that the CSCF may be the final decision point for this control.

4. The session control and bearer control mechanisms shall allow the session control to decide when user plane traffic between end-points of a SIP session may start/shall stop. This allows this traffic to start/stop in synchronisation with the start/stop of charging for a session.

5. The Access IP-connectivity service shall be able to notify the IP multimedia session control when Access IP-connectivity service has either modified or suspended or released the bearer(s) of an user associated with a session (because e.g. the user is no longer reachable).

6. The solution shall comply with the architectural rules relating to separation of bearer level, session control level, and service level expressed in 23.221[7].

End of change