

Technical Specification Group Services and System Aspects **TSGS#16(02)0317**

Meeting #16, Marco Island, USA, 10-13 June 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 #16.

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.

S2 Tdoc #	CR #	rev	Rel	Title	cat	V in	V out	WI
S2-020269	125	1	Rel-5	E.164 numbers as public user identifiers	F	5.4.1	5.5.0	IMS-CCR
S2-021045	161		Rel-5	Consistent and correct use of destination subscriber & fix a fault of changing destination to originating subscriber	F	5.4.1	5.5.0	IMS-CCR
S2-021123	167		Rel-5	Corrections to architecture of MRF	F	5.4.1	5.5.0	IMS-CCR
S2-021180	170		Rel-5	External Application Servers	F	5.4.1	5.5.0	IMS-CCR
S2-021343	157	1	Rel-5	Correct stage 2 text following IETF changes	F	5.4.1	5.5.0	IMS-CCR
S2-021344	155	1	Rel-5	Clarifying function of barring IMPU as a function	F	5.4.1	5.5.0	IMS-CCR
S2-021367	156	1	Rel-5	Clarification of the relation between Public User Identities and Service Profiles	F	5.4.1	5.5.0	IMS-CCR
S2-021433	160	1	Rel-5	IMS call redirected towards the PSTN/CS domain	F	5.4.1	5.5.0	IMS-CCR
S2-021434	173	1	Rel-5	Media negotiation	F	5.4.1	5.5.0	IMS-CCR
S2-021435	168	1	Rel-5	S-CSCF allocation	F	5.4.1	5.5.0	IMS-CCR
S2-021436	169	1	Rel-5	Registration flow	F	5.4.1	5.5.0	IMS-CCR
S2-021438	164	1	Rel-5	Clarification on the filter criteria for ASs	F	5.4.1	5.5.0	IMS-CCR
S2-021439	158	1	Rel-5	Forking In IMS	F	5.4.1	5.5.0	IMS-CCR
S2-021441rev3	162	2	Rel-5	Clarification on the charging concept with stage 3	F	5.4.1	5.5.0	IMS-CCR
S2-021487	171	3	Rel-5	Restrictions of the Signalling PDP context	F	5.4.1	5.5.0	IMS-CCR
S2-021515rev3	174	3	Rel-5	Number of media components per PDP Context	F	5.4.1	5.5.0	IMS-CCR
S2-021524	153	2	Rel-5	Deriving IMS parameters from the USIM	F	5.4.1	5.5.0	IMS-CCR
S2-021525	154	2	Rel-5	Clarification of the function "Implicit Registration"	F	5.4.1	5.5.0	IMS-CCR

CHANGE REQUEST

⌘ **23.228 CR 125** ⌘ ev **1** ⌘ Current version: **5.3.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ E.164 numbers as public user identifiers		
Source:	⌘ Siemens		
Work item code:	⌘ IMS-CCR	Date:	⌘ 2002-01-09
Category:	⌘ F	Release:	⌘ Rel-5
	<i>Use <u>one</u> of the following categories:</i> 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 .		<i>Use <u>one</u> of the following releases:</i> 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

Reason for change:	⌘ 23.228 specifies that the public user identifier may be an E.164 number. There is a need to clarify that in this case the public user identifier shall take the format of a "tel:"-URL as defined in RFC 2806.
Summary of change:	⌘ A clarification and reference to RFC 2806 is added.
Consequences if not approved:	⌘ Information might be misleading.

Clauses affected:	⌘ 4.3.3.2		
Other specs affected:	<input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> 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/3G_Specs/CRs.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.

4.3.3.2 Public user identities

Every IM CN subsystem subscriber 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 RFC2543 [12] and RFC2396 [13]) or the "tel:"-URL format [15].~~E-164 numbers.~~
- At least one Public User Identity shall be securely stored on the USIM (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 USIM.
- It shall be possible to register globally (i.e. through one single UE request) a subscriber that has more than one public identity via a mechanism within the IP multimedia CN subsystem (e.g. by using a Service Profile). This shall not preclude the user from registering individually some of his/her public identities if needed.
- Public User Identities 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).

3GPP TSG-SA2 Meeting #24
 Madrid, Spain, April 22-26, 2002

Tdoc S2-021525

CR-Form-v4	
CHANGE REQUEST	
⌘ 23.228 CR 154 ⌘ ev 2 ⌘ Current version: 5.4.1 ⌘	

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Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ Clarification of the function "Implicit Registration"		
Source:	⌘ Ericsson, Nokia, Dynamicsoft, Siemens		
Work item code:	⌘ IMS-CCR	Date:	⌘ 22 nd April 2002
Category:	⌘ F	Release:	⌘ Rel-5
	Use <u>one</u> of the following categories:		Use <u>one</u> of the following releases:
	F (correction)		2 (GSM Phase 2)
	A (corresponds to a correction in an earlier release)		R96 (Release 1996)
	B (addition of feature),		R97 (Release 1997)
	C (functional modification of feature)		R98 (Release 1998)
	D (editorial modification)		R99 (Release 1999)
	Detailed explanations of the above categories can be found in 3GPP TR 21.900.		REL-4 (Release 4)
			REL-5 (Release 5)

Reason for change:	⌘ Current Stage 2 spec do not clearly define what is Implicit registration
Summary of change:	⌘ Add functional definition/behaviour for Implicit registration
Consequences if not approved:	⌘ Undefined functional requirements and unclear/no guidelines for Stage 3

Clauses affected:	⌘ 5.2
Other specs affected:	⌘ <input checked="" type="checkbox"/> Other core specifications ⌘ 24.229, 29.228, 29.229
	<input type="checkbox"/> Test specifications
	<input type="checkbox"/> O&M Specifications
Other comments:	⌘

*****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
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	Policy Control 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

*****Second CHANGE*****

5.2 Application level registration procedures

The following sub-sections address requirements and information flows related to registration in the IP multimedia subsystem. Assumptions that apply to the various information flows are listed as appropriate.

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. 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 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.

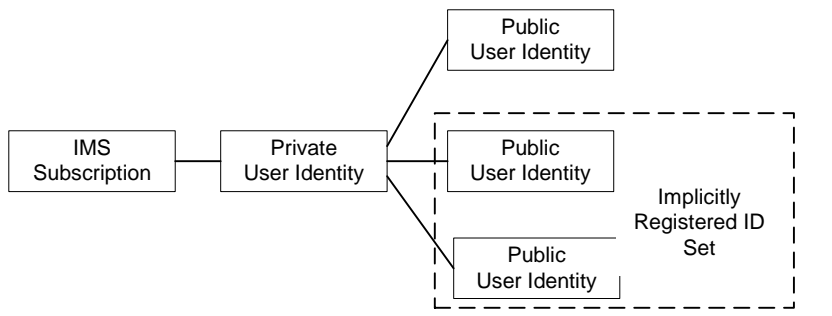


Figure 5.2.1a Relationship of public user identities when implicitly registered

5.2.1a.1 Implicit Registration for UE without ISIM

In case an UE is registering in the IMS without ISIM, it shall require the network's assistance to register at least one public user identity, which is used for session establishment & IMS signalling. Implicit registration shall be used as part of a mandatory function for these ISIM-less UEs to register the public user identity(s). In addition to the functions defined in section 5.2.1a, the following additional functions are required for this scenario.

- The Temporary public identity shall be used for initial registration process
- It shall be defined in HSS that if the user does not have implicit registration activated then the user shall not be allowed to register in the IMS using the Temporary public user identity.

5.2.2 Registration flows

5.2.2.1 Requirements to consider for registration

3GPP TSG-SA2#24 Meeting
 Madrid, Spain, 22-26 April 2002

Tdoc S2-021524

CR-Form-v4
CHANGE REQUEST
⌘ 23.228 CR 153 ⌘ 2- ⌘ Current version: 5.4.1 ⌘

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

Proposed change affects: ⌘ (U)SIM ME/UE ISIM Core Network

Title:	⌘	Deriving IMS parameters from the USIM
Source:	⌘	Ericsson, Siemens, Nokia, Dynamicsoft
Work item code:	⌘	IMS-CCR
	Date: ⌘	22/04/2002
Category:	⌘	F
		Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900 .
	Release: ⌘	Rel-5
		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

Reason for change:	⌘	There is a requirement to be able to use pre-R5 UICC for accessing IMS services.
Summary of change:	⌘	Added a requirement that Public Id, Private ID and Home Network domain will be derived from USIMs IMSI, if ISIM application isn't in the UICC. Added a clarification that the USIM data used to derive the Private Id shall uniquely identify the user. Also, added statement that the temporary Public Id derived from the IMSI shall not be exposed to the user and only used during registration to get other identities that are implicitly registered. The S-CSCF shall prevent the temporary Public Id from being used for sessions and any other IMS processes. Finally, added statement that implicit registration shall be active when a temporary Public Id is registered.
Consequences if not approved:	⌘	It will not be possible to use pre-R5 UICC to access IMS services.

Clauses affected:	⌘	4.3.3.1, 4.3.3.2, 4.6.3 and 5.2.1												
Other specs Affected:	⌘	<table style="width: 100%; border: none;"> <tr> <td style="width: 10%;"><input checked="" type="checkbox"/></td> <td style="width: 40%;">Other core specifications</td> <td style="width: 10%;">⌘</td> <td style="width: 30%;">23.003, 24.228, 24.229, 29.228, 29.229</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Test specifications</td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/></td> <td>O&M Specifications</td> <td></td> <td></td> </tr> </table>	<input checked="" type="checkbox"/>	Other core specifications	⌘	23.003, 24.228, 24.229, 29.228, 29.229	<input type="checkbox"/>	Test specifications			<input type="checkbox"/>	O&M Specifications		
<input checked="" type="checkbox"/>	Other core specifications	⌘	23.003, 24.228, 24.229, 29.228, 29.229											
<input type="checkbox"/>	Test specifications													
<input type="checkbox"/>	O&M Specifications													
Other comments:	⌘	Is dependent on the other CRs regarding Implicit Registration and Barring of IMPUs.												

*****First change*****

4.3.3 Identification of users

There are various identities that may be associated with a user of IP multimedia services. This section describes these identities and their use.

4.3.3.1 Private user identities

Every IM CN subsystem subscriber shall have a private user identity. The private identity is assigned by the home network operator, and used, for example, for Registration, Authorisation, Administration, and Accounting purposes. This identity shall take the form of a Network Access Identifier (NAI) as defined in RFC 2486 [14]. It is possible for a representation of the IMSI to be contained within the NAI for the private identity.

- The Private User Identity is not used for routing of SIP messages.
- The Private User Identity shall be contained in all Registration requests, (including Re-registration and De-registration requests) passed from the UE to the home network.
- An ISIM application shall securely store the Private User Identity. It shall not be possible for the UE to modify the UICC's Private User Identity information.

- The Private User Identity is a unique global identity defined by the Home Network Operator, which may be used within the home network to uniquely identify the user from a network perspective.
- The Private User Identity shall be permanently allocated to a user (it is not a dynamic identity), and is valid for the duration of the user's subscription with the home network.
- The Private User Identity is used to identify the user's information (for example authentication information) stored within the HSS (for use for example during Registration).
- The Private User Identity may be present in charging records based on operator policies.
- The Private User Identity identifies the subscription (e.g. IM service capability) not the user.
- The Private User Identity is authenticated only during registration of the subscriber, (including re-registration and de-registration).
- The HSS and S-CSCF need to obtain and store the Private User Identity.
- If the UICC does not contain an ISIM application, then the private user identity shall be derived from the USIM's IMSI, which allows for uniquely identifying the user within the 3GPP operator's network. The format of the private user identity derived from the IMSI is specified in 3GPP TS 23.003 [24].

4.3.3.2 Public user identities

Every IM CN subsystem subscriber 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 E.164 numbers.

- 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 subscriber that has more than one public identity via a mechanism within the IP multimedia CN subsystem (e.g. by using a Service Profile). This shall not preclude the user from registering individually some of his/her public identities if needed.
- Public User Identities 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].
- 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 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.

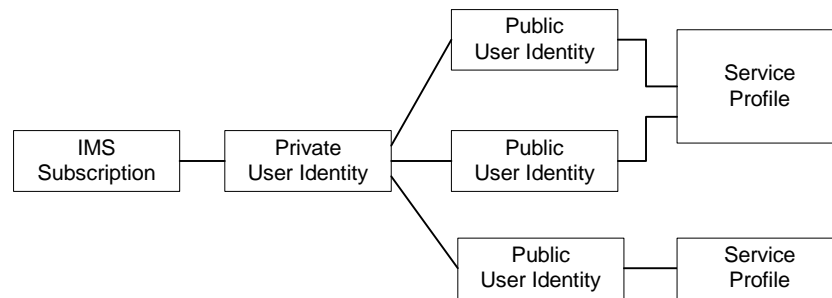


Figure 4.5: Relationship of the private user identity and public user identities

All Public user identities that are associated with the same Service Profile should have the same set of services. Public user identities that are associated with a different Service Profile could have a different set of services. Each Public user identity is only associated with a single Service Profile.

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.

*****Second change*****

5.2 Application level registration procedures

The following sub-sections address requirements and information flows related to registration in the IP multimedia subsystem. Assumptions that apply to the various information flows are listed as appropriate.

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. 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

CHANGE REQUEST

⌘ **23.228** CR **174** ⌘ rev **3** ⌘ Current version: **5.4.1** ⌘

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

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ Number of media components per PDP Context		
Source:	⌘ Nokia, Nortel Networks, Ericsson, AT&T Wireless		
Work item code:	⌘ IMS-CCR	Date:	⌘ 26.04.2002
Category:	⌘ F	Release:	⌘ REL-5
	Use <u>one</u> of the following categories:		Use <u>one</u> of the following releases:
	F (correction)	R96 (Release 1996)	2 (GSM Phase 2)
	A (corresponds to a correction in an earlier release)	R97 (Release 1997)	
	B (addition of feature),	R98 (Release 1998)	
	C (functional modification of feature)	R99 (Release 1999)	
	D (editorial modification)	REL-4 (Release 4)	
	Detailed explanations of the above categories can be found in 3GPP TR 21.900.		REL-5 (Release 5)

Reason for change:	⌘ A mechanism for the IMS network to control this has been added to 23.228 by CR#134, however this mechanism can be considerably simplified. This simplification ensures that the necessary stage-3 work can be completed with Rel5 timeframe.
Summary of change:	⌘ This CR proposes simplifications to the mechanisms described in section 4.2.5.1.
Consequences if not approved:	⌘ Too complex mechanism endangering the timely completion of Rel5

Clauses affected:	⌘ 4.2.5.1		
Other specs Affected:	⌘ <input type="checkbox"/> Other core specifications	⌘ <input type="checkbox"/>	
	<input type="checkbox"/> Test specifications		
	<input type="checkbox"/> O&M Specifications		
Other comments:	⌘ Corresponding changes are required to TS 23.207		

How to create CRs using this form:

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

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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.

4.2.5.1 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 both on media component level and on IMS session 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. 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.

~~The P-CSCF shall also have the capability to indicate to the UE for each IMS session that a separate PDP Context is not required for the media traffic of the IMS session.~~

~~If the UE receives such an indication for an IMS session, it may transfer the media components of this IMS session in a PDP Context that carries media components from other IMS sessions.~~

~~If the UE receives no such indication for an IMS session, the UE shall open separate PDP Context(s) for the media traffic of this IMS session.~~

- 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 IMS session level indication described above to the UE. The session level indication shall be transferred in SIP/SDP signaling upon session initiation.

PDP contexts created to carry IMS media components may either carry a single media component, or may carry multiple media components.

It shall be possible to have a separate PDP context for each media component.

The IMS network shall have the capability to transfer an indication per media component to the UE to indicate to the UE whether it is allowed to have multiple media components carried in a single PDP Context. This indication shall be transferred upon session initiation and upon addition of media component(s) to active IMS sessions.

Each of these indications identifies a group. Media components that are indicated as belonging to the same group may be carried within the same PDP context. A group may contain a single media component or may contain multiple media components.

The Home Network of the UE is responsible for setting this indication. The criteria and information for setting this indication is an implementation and configuration matter of the Home Network.

The P-CSCF may validate this indication based on its knowledge about e.g. the GPRS charging capabilities. In the case that the Home Network mandates the opening of separate PDP contexts for certain

media components, the P-CSCF shall not override this indication. In the case that the Home Network allows the grouping of certain media components, the P-CSCF may however override this indication and mandate the opening of separate PDP contexts for some/all of these media components. The criteria for this validation is an implementation and configuration matter of the P-CSCF.

The UE makes the final decision whether to have multiple or a single media components carried in a single PDP Context, even if the IMS network indicated that these components are allowed to be grouped. Media components assigned to different groups shall not be carried by the same PDP Context.

Note: An additional criteria for the UE to decide whether to have multiple or a single media component carried in a single PDP Context is the QoS requirements for these media components.

The indication described above shall be transferred to the UE before the UE initiates the PDP context activation for IMS media component.

Note: The exact SIP message and other detailed means of transferring this indication are subject to stage 3 design.

The indication described above shall be transferred to the UE before the UE initiates the 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.

CR-Form-v5

CHANGE REQUEST

⌘ **23.228 CR 171** ⌘ rev **3** ⌘ Current version: **5.4.1** ⌘

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

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ Restrictions on the Signalling PDP context		
Source:	⌘ Ericsson		
Work item code:	⌘ IMS-CCR	Date:	⌘ 25/04/02
Category:	⌘ F	Release:	⌘ Rel-5
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

Reason for change:	⌘ The TS 23.228 allows two different procedures for the UE to obtain the IPv6 address of the P-CSCF. One procedure is using communication towards DHCPv6 and DNS servers to obtain the P-CSCF address. The DHCPv6 and DNS communications should be considered as signalling, i.e. it should be possible to use the PDP context for IMS signalling. Otherwise a separate PDP context has to be set-up, which would cause un-necessary delay.
Summary of change:	⌘ The restrictions on the PDP context for IMS signalling are extended to allow messages destined to DHCPv6 and DNS servers, within the domain of the GGSN operator. Also, it is clarified that if the network-operator does not support a dedicated signalling PDP context, the network will consider the PDP context as a general-purpose PDP context.
Consequences if not approved:	⌘ Procedures for P-CSCF discovery using DHCPv6 and DNS will not be optimal.

Clauses affected:	⌘ 4.2.6		
Other specs affected:	⌘ <input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘ 24.228 and 24.229	
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/3G_Specs/CRs.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.

4.2.6 QoS Requirements for IM CN subsystem signalling

The UE shall be able to establish a dedicated signalling separate PDP-Context for IM Subsystem related signalling. ~~The UE shall also be able to~~ or utilize a general-purpose PDP context for IM subsystem signalling traffic. The application level signalling flag is used to indicate the dedicated signalling PDP context. If the network-operator does not support a dedicated signalling PDP context, the network will consider the PDP context as UE shall use a general-purpose PDP context. ~~for IM subsystem signalling.~~

The use of a dedicated signalling PDP Context for IM Subsystem related signalling may provide enhanced QoS for signalling traffic.

~~At PDP context setup it shall be possible for the GGSN to determine if the PDP context is to be used for IM Subsystem related signalling.~~ If the the dedicated signalling PDP context is to be used for IM Subsystem related signalling, rules and restrictions may apply to the bearer according to operator implementation. A ~~minimum~~ set of capabilities shall be standardised to provide user experience consistency and satisfy user expectation. The rules and restrictions on other capabilities beyond the ~~minimum~~ standardised set are configured by the operator in the GGSN.

To enable the described mechanism to work without requiring end-user interaction and under roaming circumstances, it is a requirement for the UE to be made aware of the rules and restrictions applied by the visited network operator. As there is as yet no mechanism available in Release 5 for providing the information about the restrictions back to the UE, the available set of rules and restrictions in Release 5 is the ~~minimum~~ set of capabilities as defined below.

~~For~~ ~~the dedicated signalling PDP Signalling Context context~~ is subject to restrictions, ~~the minimum set of capabilities to be applied is defined as follows:~~ ~~all~~ messages from the UE on the Signalling PDP Context shall have their destination restricted to:

- ~~-the P-CSCF assigned for this UE, or to any one of the set of possible P-CSCFs that may be assigned to this UE;~~
- ~~-and towards DHCP and DNS servers within the IMS operator's domain where the GGSN and P-CSCF are located.~~

The UE is not trusted to implement these restrictions, therefore the restrictions are enforced in the GGSN by the operator of the GGSN.

4.3 Naming and addressing concepts

CHANGE REQUEST

⌘ **23.228 CR 162** ⌘ rev **2** ⌘ Current version: **5.4.1** ⌘

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

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ Inclusion of charging concept		
Source:	⌘ NEC CORPORATION		
Work item code:	⌘ IMS-CCR	Date:	⌘ 6.5.2002
Category:	⌘ F	Release:	⌘ REL-5
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

Reason for change:	⌘ In the current 23.228 V5.4.1, charging related procedure is described sparsely, but it is not clear for readers where he/she can see the overview of charging procedures. Therefore new subclause for charging concept is proposed for the guidance of further information.
Summary of change:	⌘ New subclause 4.9 charging concept is proposed to be incorporated for the guidance of further information about charging related procedures.
Consequences if not approved:	⌘ It is ambiguous for readers where overview of the charging principles is described.

Clauses affected:	⌘ Sections 4.9		
Other specs affected:	⌘ <input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> 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/3G_Specs/CRs.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.

----- Start of 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"
- [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 33.2xx210: "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”

[27] 3GPP TS 32.200: “Telecommunication management; Charging management; Charging principles”

[28] 3GPP TS 32.225: ” Telecommunication Management; Charging Management; Charging Data Description for IP Multimedia Subsystem”

----- **End of Change**-----

----- **Start of Change**-----

4.8 Security Concepts

IM CN Subsystem functional elements provide security, as needed, by security methods defined in 3GPP TS 32.203[19] and TS 33.2xx10 [20]. If interacting with external Networks, Security Associations are provided in accordance with operator policy.

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 and charging information are described in 3GPP TS 32.200 [27] and 3GPP TS 32.225 [28].

----- **End of Change**-----

CHANGE REQUEST

⌘ **23.228 CR 158** ⌘ rev **1** ⌘ Current version: **5.4.1** ⌘

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

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ Forking in IMS		
Source:	⌘ Ericsson		
Work item code:	⌘ IMS-CCR	Date:	⌘ 25/04/02
Category:	⌘ F	Release:	⌘ Rel-5
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

Reason for change:	⌘ SIP as defined by IETF includes the possibility for a proxy to fork SIP requests. If IMS will interwork with non-IMS networks supporting SIP, then IMS must be able to handle the situation when a proxy forks a request.
Summary of change:	⌘ A new chapter is added describing the UE action in case forking has occurred. It is described that the UE shall never request more resources than needed to support the SDP specified in the original INVITE. The P-CSCF shall be able to detect forking and always use the same authorisation token in all provisional responses forwarded to the UE. The PCF/P-CSCF shall be able to authorise resources according to a "logical or" of the resources requested in the SIP message exchange.
Consequences if not approved:	⌘ Unpredictable behaviour of IMS if a proxy outside IMS performs forking

Clauses affected:	⌘ 4.2.7(new), 5.4.6.3, 5.4.7.1 and 5.4.7.2		
Other specs affected:	⌘ <input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘	24.228, 24.229
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/3G_Specs/CRs.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 *****

4.2.7 Support of SIP forking

SIP forking is the ability of a SIP proxy server to fork SIP request messages to multiple destinations according to [12]. 3GPP CSCFs and ASes that behave according to this version of the specification shall not fork any request.

Other networks outside the IM CN Subsystem are able to perform SIP forking. Hence, 3GPP UEs shall be ready to receive responses generated due to a forked request and behave according to the procedures specified in [12] and in this section.

The UE may accept or reject early dialogues from different terminations as described in [12], for example if the UE is only capable of supporting a limited number of simultaneous dialogs.

Upon the reception of a first final 200 OK (for INVITE), the UE shall acknowledge the 200 OK and cancel other early dialogues that may have been established. The UE may require updating the allocated resources according to the resources needed. In case the UE receives a subsequent 200 OK, the UE shall acknowledge the dialogue and immediately send a BYE to drop the dialog.

The UE shall be able to include preferences, in INVITE's, indicating that proxies should not fork the INVITE request.

On the terminating side, a UE shall be able to receive, as specified in [12], several requests for the same dialog that were forked by a previous SIP entity.

***** SECOND 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 than 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 Functions have been omitted from the diagram.

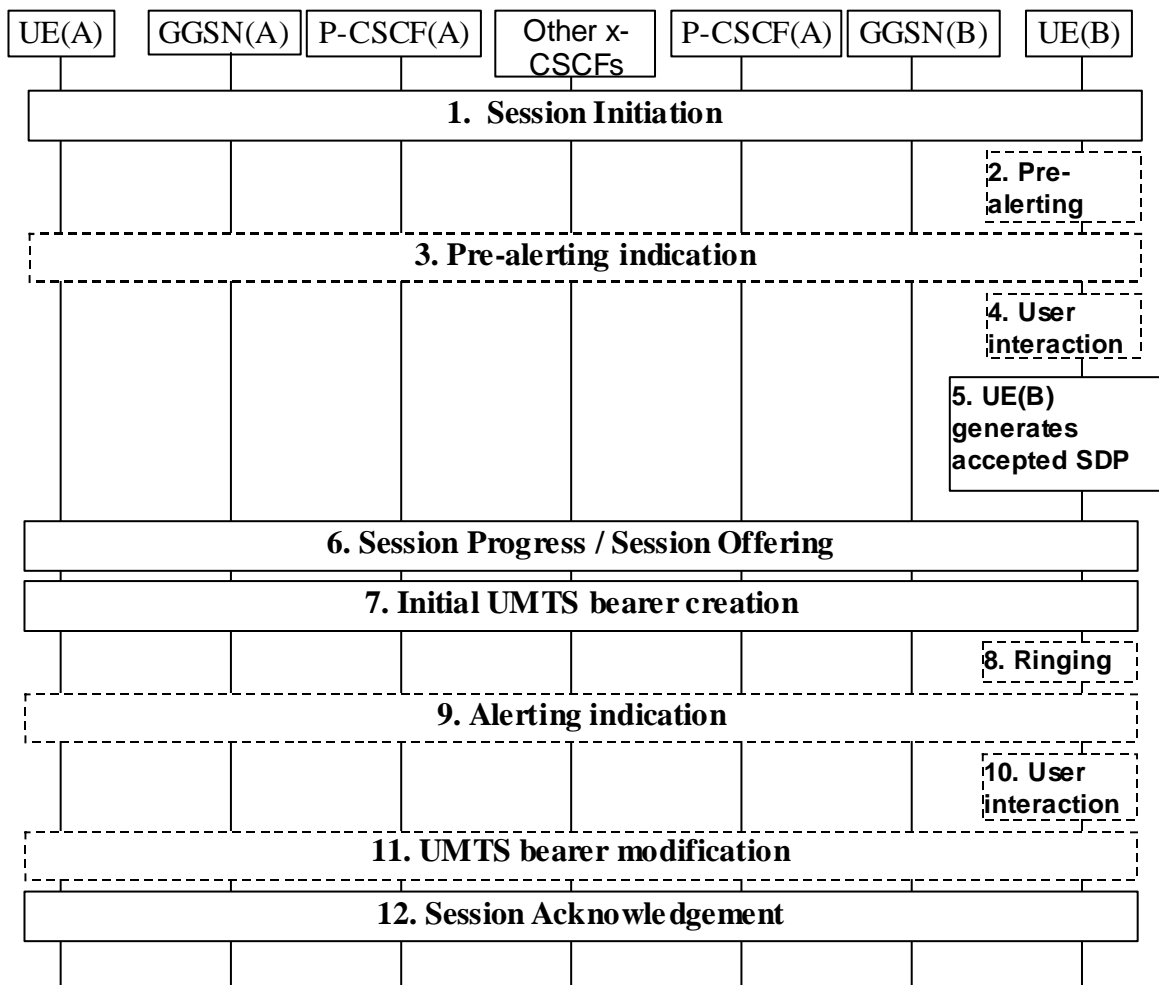


Figure 5.7: Bearer establishment showing optional pre-alerting

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, which is a logical entity of the P-CSCF. (Note: If the PCF is implemented in a separate physical node, the interface between the PCF and the P-CSCF is not standardised).

There are seven 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.
7. Indication of PDP Context Modification from the GGSN to the PCF.

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 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) shall use the SDP contained in the SIP signaling to calculate the proper authorisation. The PCF 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 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. 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 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 makes policy decisions and provides an indication to the GGSN about committing 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 may authorise the "logical OR" of the resources requested in the responses. When the session established indication has been received, if the PCF earlier have authorised the "logical OR" of the resources then the PCF 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. The GGSN shall restrict any use of the IP resources prior to this indication from the PCF, 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 be committed at the time they are authorised by the PCF.

CHANGE REQUEST

⌘ **23.228 CR 164** ⌘ rev **1** ⌘ Current version: **5.4.1** ⌘

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

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ Clarification on the filter criteria for ASs		
Source:	⌘ NEC CORPORATION		
Work item code:	⌘ IMS-CCR	Date:	⌘ 17.4.2002
Category:	⌘ F	Release:	⌘ REL-5
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

Reason for change:	⌘ In the current 23.228 V5.4.1, it is not clearly stated that there is operators engineering requirement for coexisting the different type of ASs for a filter criteria under a S-CSCF .
Summary of change:	⌘ In 4.2.4 , it is proposed to describe that there is operators engineering requirement for coexisting the different type of ASs for a filter criteria under a S-CSCF .
Consequences if not approved:	⌘ Ambiguity for the operators requirement will be remained

Clauses affected:	⌘ 4.2.4		
Other specs affected:	⌘ <input checked="" type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘ TS 23.218, TS24.229	
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/3G_Specs/CRs.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.

----- 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.
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 (or other sources, e.g. application servers). This filter information is stored and conveyed on a per application server basis for each subscriber. 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. It shall be possible that these different type of ASs are coexisted under a S-CSCF for the support of operators engineering requirement at a certain period . At this period, more than one type of ASs will ne assigned for a filter criteria.
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.

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 support the control of timers
3. The protocol on the ISC interface shall allow the S-CSCF to differentiate between session control on Mw, Mm and Mg interfaces and the ISC interface.

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

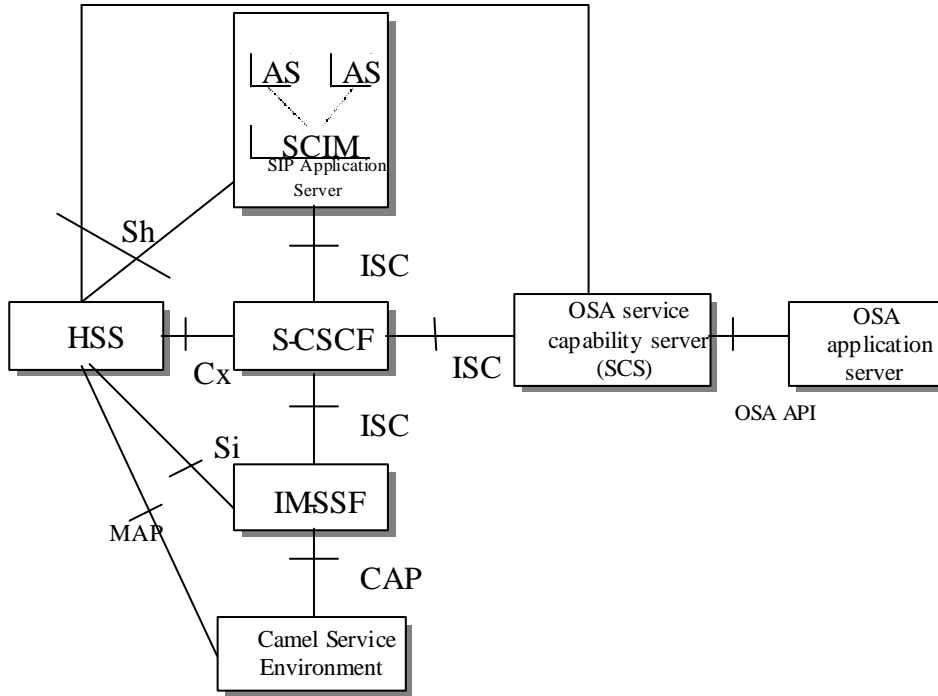


Figure 4.3: Functional architecture for the provision of service in the IMS

----- End of Change -----

CHANGE REQUEST

⌘ **23.228 CR 169** ⌘ rev **-1** ⌘ Current version: **5.4.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ Registration flow		
Source:	⌘ Nokia		
Work item code:	⌘ IMS-CCR	Date:	⌘ 17.04.2002
Category:	⌘ F	Release:	⌘ REL-5
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

Reason for change:	⌘ S-CSCF selection is that in both normal registration and session initiation for unregistered user the same S-CSCF capabilities are sent from the HSS. The reason for this is that this simplifies the S-CSCF selection in the normal registration case if the registration overlaps with the unregistered service case, i.e. if there is already allocated S-CSCF for the unregistered services for the user then the same S-CSCF should be assigned in the registration. If the assigned S-CSCFs for the normal registration and unregistered services are different then this violates the requirement, which requires that only one S-CSCF is allocated for the user.		
Summary of change:	⌘ The Cx-Query response shall contain the S-CSCF name, if it is known by HSS.		
Consequences if not approved:	⌘ Inconsistent specifications and stage 2 requirement that one S-CSCF is allocated for the subscriber is not fulfilled.		

Clauses affected:	⌘ 5.2.2.3		
Other specs affected:	⌘ <input checked="" type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘ 29.229	
Other comments:	⌘ This functionality is described in subsection 6.1.2 of TS 29.229 and the rationality was given in N4-020062.		

How to create CRs using this form:

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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.

5.2.2.3 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 subscriber is considered to be always roaming. For subscribers roaming in their home network, the home network shall perform the role of the visited network elements and the home network elements.

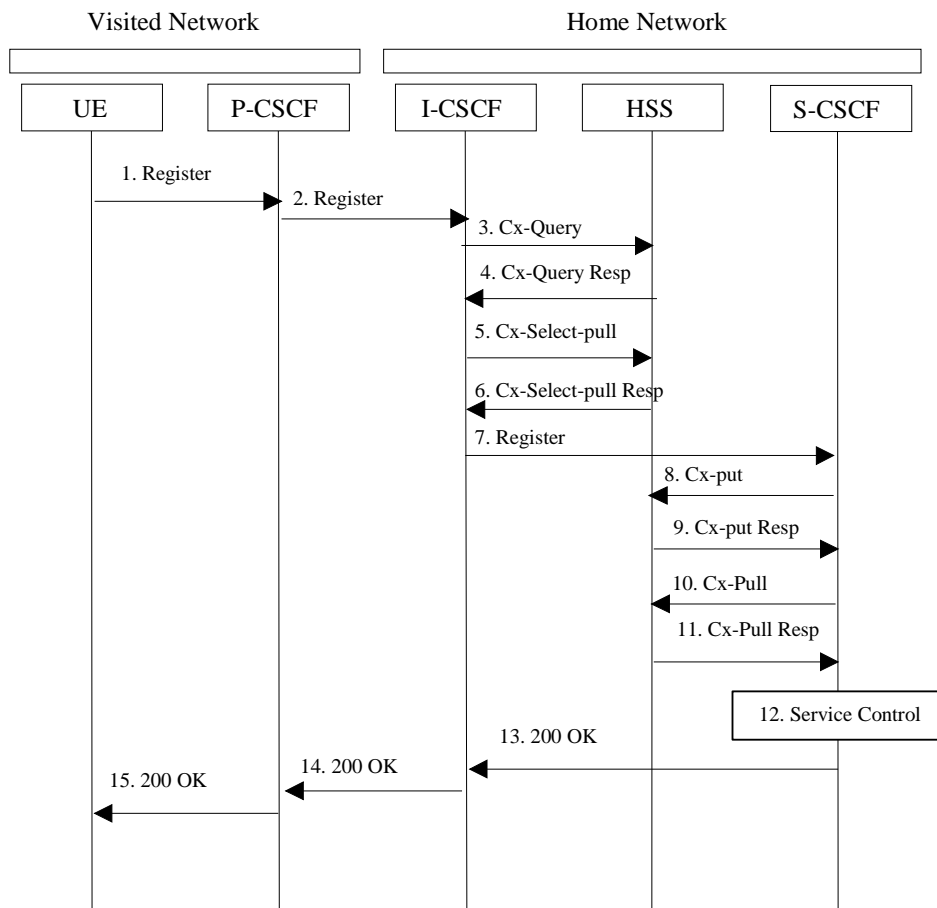


Figure 5.1: Registration – User not registered

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. 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. 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 subscriber.
9. The HSS shall send Cx-Put Resp to the I-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 subscriber 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.

CHANGE REQUEST

⌘ 23.228 CR 168 ⌘ rev -1 ⌘ Current version: 5.4.0 ⌘

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

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ S-CSCF allocation		
Source:	⌘ Nokia		
Work item code:	⌘ IMS-CCR	Date:	⌘ 17.04.2002
Category:	⌘ F Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.	Release:	⌘ REL-5 Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

Reason for change:	⌘ TS 23.228 does not give enough freedom for optimising a profile downloading. The bandwidth on Cx-interface is wasted.
Summary of change:	⌘ A new parameter is added to the Cx-put message which informs the HSS that the S-CSCF will maintain the service profile.
Consequences if not approved:	⌘ The idea of supporting operators engineering requirements are not adequately supported.

Clauses affected:	⌘ 5.3.1, 5.3.2.1, 5.12.1
Other specs affected:	⌘ <input checked="" type="checkbox"/> Other core specifications ⌘ 24.228, 24.229, 29.229, 29.228 <input type="checkbox"/> Test specifications <input type="checkbox"/> 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.

5.3.1 Mobile initiated de-registration

When the UE wants to de-register from the IMS then the UE shall perform application level de-registration. De-registration is accomplished by a registration with an expiration time of zero seconds. De-registration follows the same path as defined in subclause 5.2.2.3 “Registration Information Flow – User not registered”.

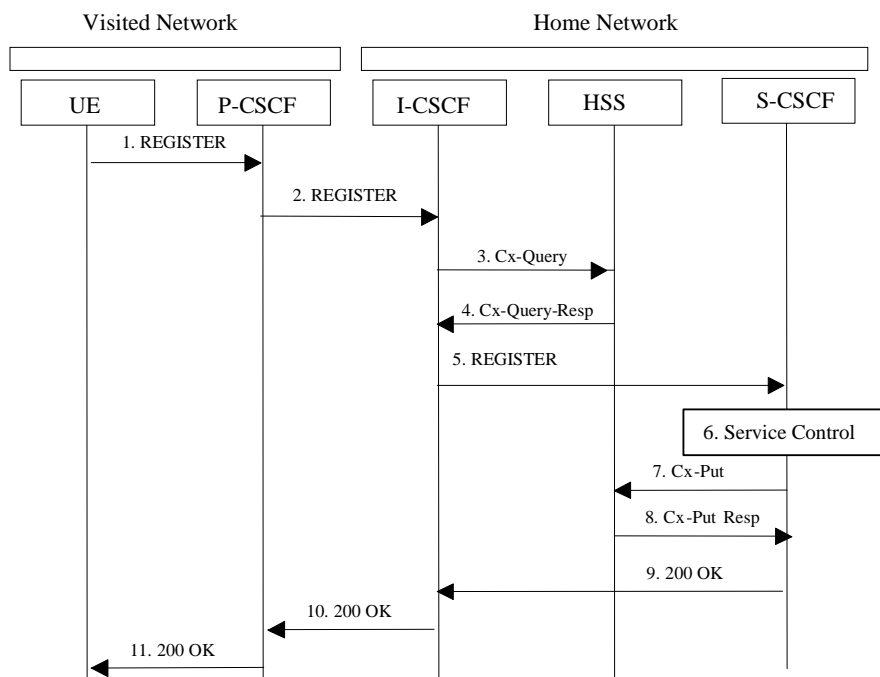


Figure 5.3: De-registration - user currently registered

1. The UE decides to initiate de-registration. To de-register, the UE sends a new REGISTER request with an expiration value of zero seconds. 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, it shall examine the “home domain name” to discover the entry point to the home network (i.e. the I-CSCF). The proxy does not use the entry point cached from prior registrations. 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).
4. The HSS shall determine that the user is currently registered. The Cx-Query Resp (indication of entry point, e.g. S-CSCF) is sent from the HSS to the I-CSCF.
5. The I-CSCF, using the name of the S-CSCF, shall determine the address of the S-CSCF through a name-address resolution mechanism and then shall send the de-register information flow (P-CSCF address/name, public user identity, private user identity, UE IP address, I-CSCF(THIG) in case network configuration hiding is desired) to the S-CSCF.

6. Based on the filter criteria, the S-CSCF shall send de-registration information to the service control platform and perform whatever service control procedures are appropriate. Service control platform removes all subscription information related to this specific subscriber.
7. Based on operator choice the S-CSCF can send either Cx-Put (public user identity, private user identity, clear S-CSCF name) or Cx-Put (public user identity, private user identity, keep S-CSCF name), and the subscriber is no longer considered registered in the S-CSCF. The S-CSCF shall send Cx-Put (public user identity, private user identity, clear S-CSCF name) to the HSS. The HSS then either clears or keeps the S-CSCF name for that subscriber according to request. In both cases the state of the subscriber identity is stored as unregistered in the HSS. If the S-CSCF name is kept, then the HSS shall be able to clear the serving S-CSCF at any time.
8. The HSS shall send Cx-Put Resp to the S-CSCF to acknowledge the sending of Cx-Put.
9. The S-CSCF shall return the 200 OK information flow to the I-CSCF. The S-CSCF may release all registration information regarding this specific registration of the subscriber after sending information flow 200 OK.
10. The I-CSCF shall send information flow 200 OK to the P-CSCF.
11. The P-CSCF shall send information flow 200 OK to the UE. The P-CSCF ~~may~~ releases all registration information regarding this specific registration of the subscriber after sending information flow 200 OK.

***** NEXT MODIFIED SECTION *****

5.3.2.1 Network Initiated Application (SIP) De-registration, Registration Timeout

The following flow shows a network initiated IM CN subsystem terminal application (SIP) de-registration based on a registration timeout. A timer value is provided at initial registration and is refreshed by subsequent re-registrations. The flow assumes that the timer has expired. The locations (home or visited network) of the P-CSCF and S-CSCF are not indicated as the scenario remains the same for all cases.

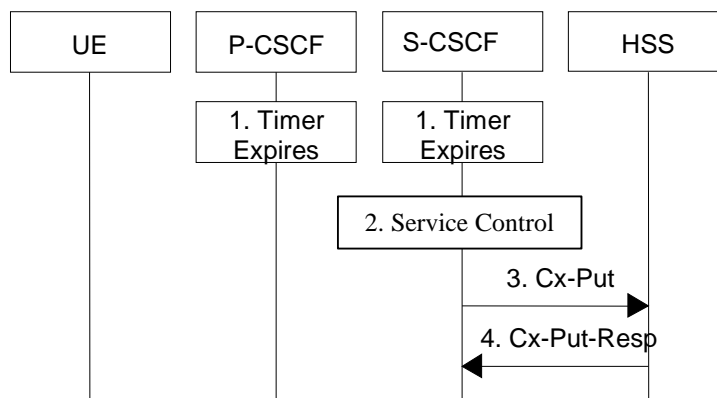


Figure 5.4: Network initiated application de-registration, registration timeout

1. The registration timers in the P-CSCF and in the S-CSCF expire. The timers are assumed to be close enough that no external synchronisation is required. The P-CSCFs updates their-its internal

databases to remove the subscriberUE from being registered. It is assumed that any GPRS PDP context cleanup will be handled by independent means.

2. Based on the filter criteria, the S-CSCF shall send de-registration information to the service control platform and perform whatever service control procedures are appropriate. Service control platform removes all subscription information related to this specific subscriber.
3. Based on operator choice the S-CSCF can send either Cx-Put (public user identity, private user identity, clear S-CSCF name) or Cx-Put (public user identity, private user identity, keep S-CSCF name), and the subscriber is no longer considered registered in the S-CSCF. The HSS then either clears or keeps S-CSCF name for that subscriber according to the request. In both cases the state of the subscriber identity is stored as unregistered in the HSS. If the S-CSCF name is kept, then the HSS shall be able to clear the serving S-CSCF at any time. The S-CSCF sends an update to the HSS to remove itself as the registered S-CSCF for this UE.
4. The HSS shall send Cx-Put Resp to the S-CSCF to acknowledge the sending of Cx-Put. The HSS confirms the update.

*** NEXT MODIFIED SECTION ***

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 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 subscriber or provides 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 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 subscriber profile then the S-CSCF shall ~~has to~~ download the service ~~profile~~relevant information from HSS before it performs 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:

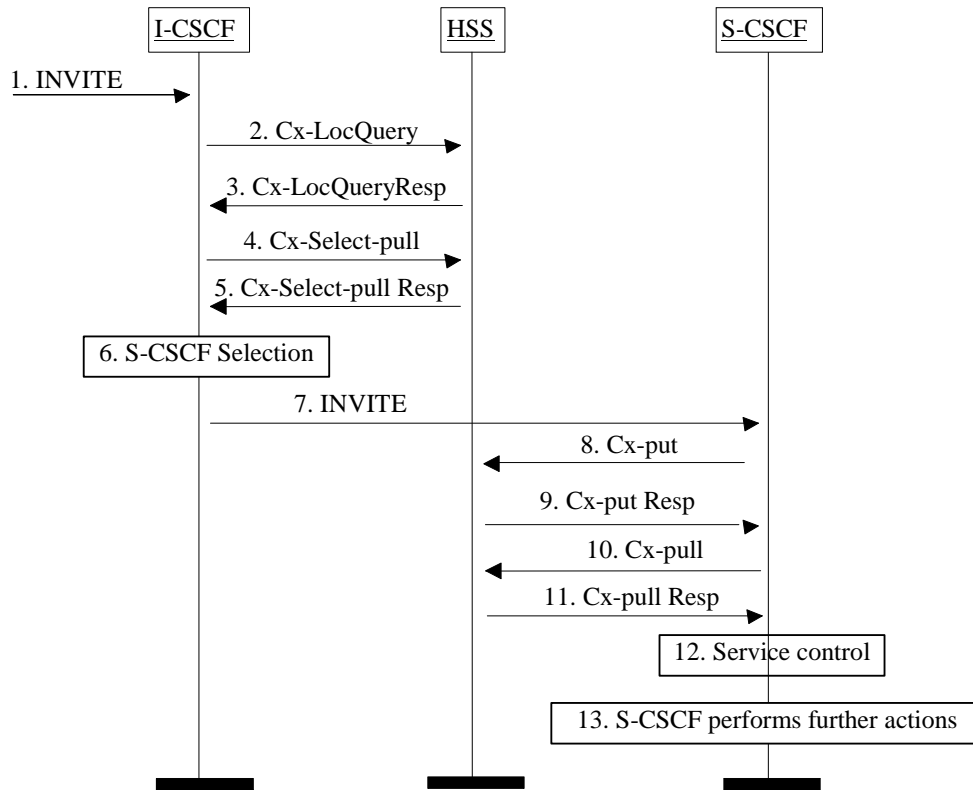


Figure 5.43: Mobile Terminating call procedures to unregistered IMS Public User Identity that has services related to unregistered state

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 subscriber or provides the I-CSCF with the previously allocated S-CSCF name.
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 subscriber.
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 subscriber. This will result in all terminating traffic for unregistered Public User Identities of that subscriber being routed to this particular S-CSCF until the registration period

expires or the subscriber 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 subscriber 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 performs whatever service control is appropriate for this call attempt.
13. S-CSCF performs whatever further actions are appropriate for this call attempt.

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.

Should the subscriber register a Public User Identity at another S-CSCF during the register expiry time then the registration from the new S-CSCF will take precedence, overwriting the previous S-CSCF name stored in the HSS.

CHANGE REQUEST

⌘ **TS 23.228 CR 173** ⌘ rev **1** ⌘ Current version: **5.4.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ Media Negotiation
Source:	⌘ Orange France
Work item code:	⌘ IMS - CCR Date: ⌘ 15.04.2002
Category:	⌘ F Release: ⌘ REL-5
<p style="text-align: center;"><i>Use <u>one</u> of the following categories:</i></p> <p style="text-align: center;">F (essential correction) A (corresponds to a correction in an earlier release) B (Addition of feature), C (Functional modification of feature) D (Editorial modification)</p> <p style="text-align: center;"><i>Use <u>one</u> of the following releases:</i></p> <p style="text-align: center;">2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)</p> <p style="text-align: center;">Detailed explanations of the above categories can be found in 3GPP TR 21.900.</p>	

Reason for change: ⌘ Negotiation between UE#1 and UE#2 at session establishment and after session establishment is currently limited to **codec** negotiation. In fact, the "procedures for codec and media flows negotiations" should be extended to **media** negotiation including all headers of the session description such as attributes (e.g. send only/receive only), bandwidth and so on.
 This will reflect more surely the **user's wishes** and the **terminal's capabilities**.

Summary of change: ⌘ This document proposes that the procedures for codec and media flow negotiations include all headers of the session description (not only the codec choices), in particular the attributes (a= line in SDP) and the bandwidth requirements (b= line in SDP) in the "INVITE", "SDP" and "Final SDP" when these messages contain a session description.

Consequences if not approved: ⌘ It will not be possible to negotiate the media characteristics but only the codecs. The stage 2 specifications will be misaligned with stage 1 specifications (22.941 v0.7.0 §7.1 Multimedia Service in particular section "Mixed Media Interactive communication").

Clauses affected: ⌘ 5.11.3 Procedures for codec and media flow negotiations

Other specs Affected: ⌘ Other core specifications ⌘ Test specifications O&M Specifications

Other comments: ⌘ The rest of the text could be aligned next meeting after the huge modifications to implement the Unify draft from IETF.

5.11.3 Procedures for codec and media characteristics flow negotiations

This section gives information flows for :

- ~~the procedures for determining the set of mutually supported codecs~~ negotiated characteristics between the endpoints of a multi-media session, determining the initial media characteristics (including common codecs) to be used for the multi-media session, and
- ~~the procedures for modifying a session within the existing resources reservation or with a new resources reservation (adding/deleting a media flow, changing between media characteristics including codecs, changing bandwidth requirements)~~ when ~~multiple ones are supported~~ 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 ~~common 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 ~~common media characteristics~~ codecs, 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 ~~this common subset~~ these media characteristics. The session initiator, upon receiving the common subset, determines the media characteristics ~~the codec (or set of including~~ codecs) to be used initially.

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 ~~common list~~ 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 propose additional codecs, to receive additional authorisation for QoS resources, or~~ to change ~~to a different codec that~~ the session, which requires resources beyond those allocated to the existing session.

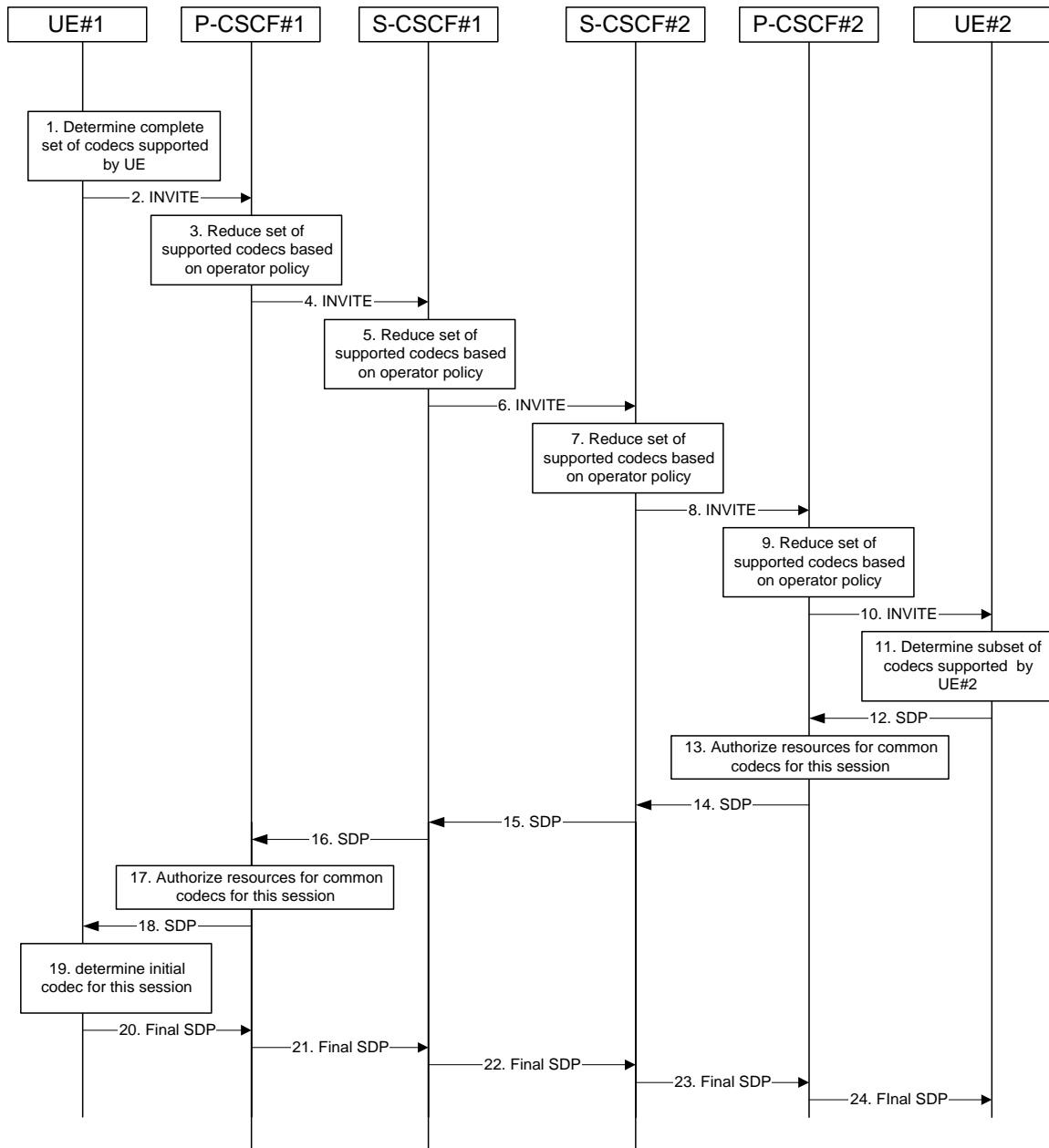


Figure 5.30: Codec negotiation during initial session establishment

The detailed procedure is as follows:

1. UE#1 inserts the codec(s) to a SDP payload. The inserted codec(s) shall reflect the UE#1's terminal capabilities and user preferences for the session. capable of supporting for this session. It builds a SDP containing bandwidth requirements and characteristics of each, and assigns local port numbers for each possible media flow. Multiple media flows may be offered, and for each media flow (m= line in SDP), there may be multiple codec choices offered.
2. UE#1 sends the initial INVITE message to P-CSCF#1 containing this SDP
3. P-CSCF#1 examines the media parameters, and removes any choices that the network operator decides based on local policy, not to allow on the network.
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 subscriber 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 subscriber 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.
10. The Authorization-Token is included in the INVITE message. P-CSCF#2 forwards the INVITE message to UE#2
11. UE#2 determines the complete set of codecs that it is capable of supporting for this session. It determines the intersection with those appearing in the SDP in the INVITE message. For each media flow that is not supported, UE#2 inserts a SDP entry for media (m= line) with port=0. For each media flow that is supported, UE#2 inserts a SDP entry with an assigned port and with the codecs in common with those in the SDP from UE#1.12. UE#2 returns the SDP listing common media flows and codecs to P-CSCF#2
13. P-CSCF#2 authorises the QoS resources for the remaining media flows and codec choices.
14. P-CSCF#2 forwards the SDP response to S-CSCF#2.
15. S-CSCF#2 forwards the SDP response to S-CSCF#1
16. S-CSCF#1 forwards the SDP response to P-CSCF#1
17. P-CSCF#1 authorises the QoS resources for the remaining media flows and codec choices. The Authorization-Token is generated by the PCF.
18. The Authorization-Token is included in the SDP message. P-CSCF#1 forwards the SDP response to UE#1
19. UE#1 determines which media flows should be used for this session, and which codecs should be used for each of those media flows. If there was more than one media flow, or if there was more than one choice of codec for a media flow, then UE#1 must include an SDP in the “Final SDP” message sent to UE#2.
- 20-24. UE#2 sends the “Final 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.

5.11.3.2 Codec or media [characteristics](#) flow change within the existing reservation

After the multi-media session is established, it is possible for either endpoint to change the set of media flows or [media characteristics \(e.g. codecs\)](#) for ~~a~~ media flows. If the change is within the resources already reserved, then it is only necessary to synchronise the change with the other endpoint. Note that an admission control decision will not fail if the new resource request is within the existing reservation.

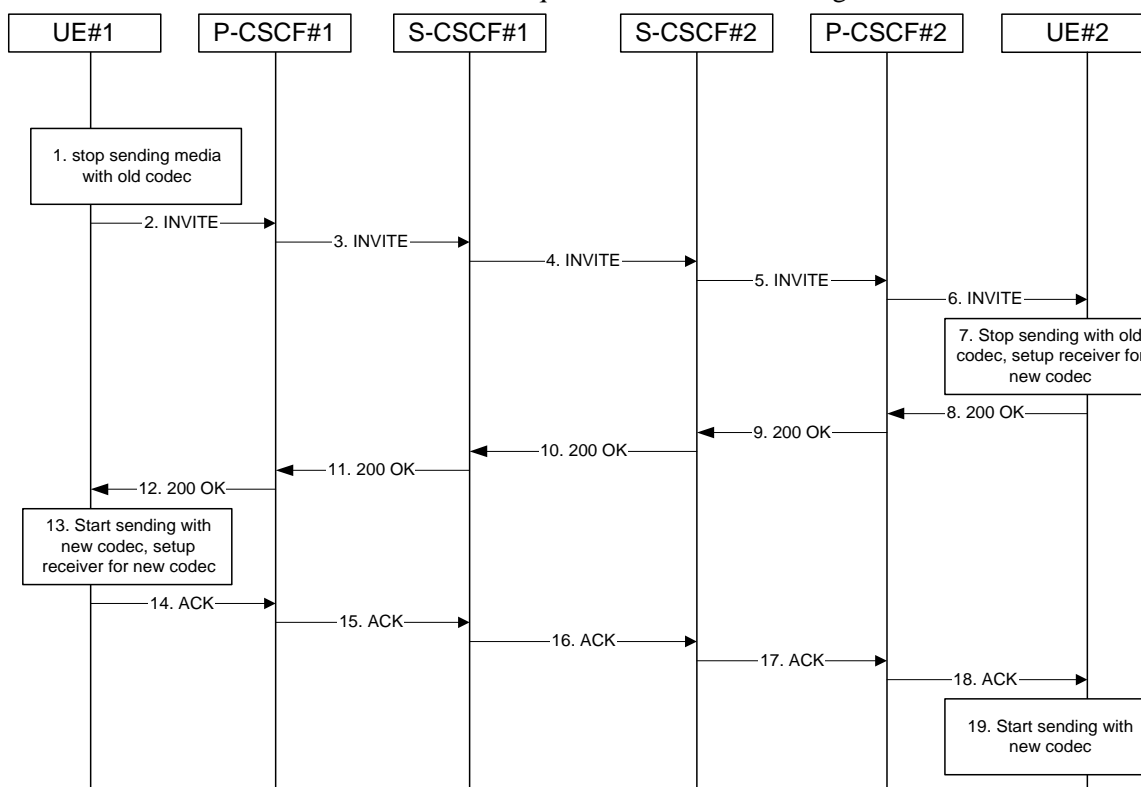


Figure 5.31: Codec or media flow change - same reservation

The detailed procedure is as follows:

1. UE#1 determines that a new media stream is desired, or that a change is needed in the codec in use for an existing media stream. UE#1 evaluates the impact of this change, and determines the existing resources reserved for the session are adequate. UE#1 builds a revised SDP that includes all the common media flows determined by the initial negotiation, but assigns a codec and port number only to those to be used onward. UE#1 stops transmitting media streams on those to be dropped from the session.
- 2-6. UE#1 sends an INVITE message through the signalling path to UE#2. At each step along the way, the CSCFs recognise the SDP is a proper subset of that previously authorised, and take no further action.
7. UE#2 receives the INVITE message, and agrees that it is a change within the previous resource reservation. (If not, it would respond with a SDP message, following the procedures of 5.11.3.1). UE#2 stops sending the media streams to be deleted, and initialises its media receivers for the new codec.
- 8-12. UE#2 forwards a 200-OK final response to the INVITE message along the signalling path back to UE#1.
13. UE#1 starts sending media using the new codecs. UE#1 also releases any excess resources no longer needed.
- 14-18. UE#1 sends the SIP final acknowledgement, ACK, to UE#2.
19. UE#2 starts sending media using the new codecs. UE#2 also releases any excess resources no longer needed

5.11.3.3 Codec or media [characteristics](#) flow change requiring new resources and/or authorisation

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

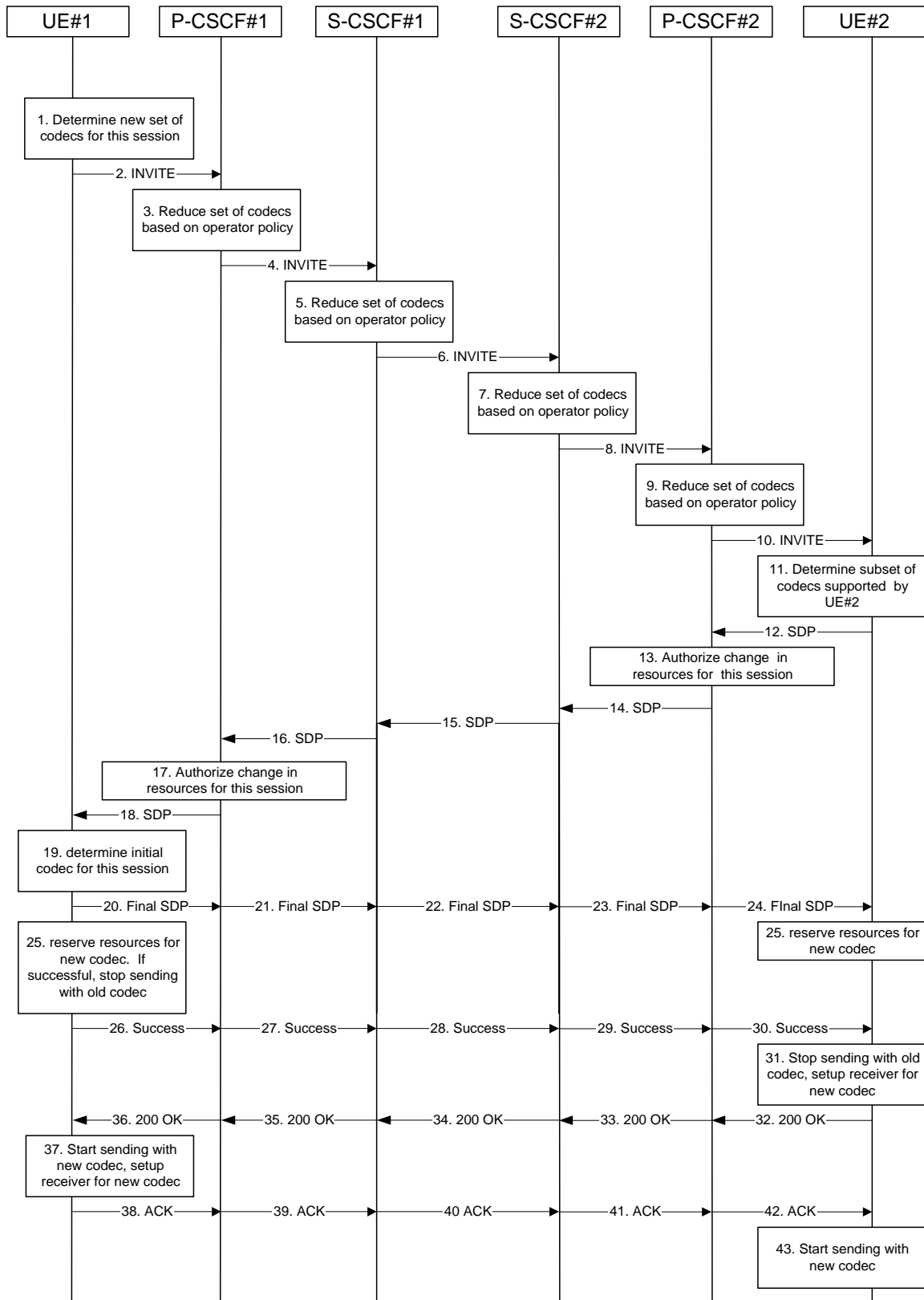


Figure 5.32: Codec or media flow change - new reservation

The detailed procedure is as follows:

1. UE#1 inserts the revised set of codecs to a SDP payload. The inserted codec(s) shall reflect the UE#1's terminal capabilities and user preferences for the session. It builds a SDP containing bandwidth requirements and characteristics of each, and assigns local port numbers for each possible media flow. Multiple media flows may be offered, and for each media flow (m= line in SDP), there may be multiple codec choices offered.
2. UE#1 sends an INVITE message to P-CSCF#1 containing this SDP
3. P-CSCF#1 examines the media parameters, and removes any choices that the network operator decides, based on local policy, not to allow on the network
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 subscriber 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 subscriber 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 flows and the codec choices, and removes any that the destination network operator decides, based on local policy, not to allow on the network.
10. P-CSCF#2 forwards the INVITE message to UE#2
 - 11. UE#2 determines the complete set of codecs that it is capable of supporting for this session. It determines the intersection with those appearing in the SDP in the INVITE message. For each media flow that is not supported, UE#2 inserts a SDP entry for media (m= line) with port=0. For each media flow that is supported, UE#2 inserts a SDP entry with an assigned port and with the codecs in common with those in the SDP from UE#1.
12. UE#2 returns the SDP listing common media flows and codecs to P-CSCF#2
13. P-CSCF#2 increases the authorisation for the QoS resources, if needed, for the remaining media flows and codec choices.
14. P-CSCF#2 forwards the SDP response to S-CSCF#2.
15. S-CSCF#2 forwards the SDP response to S-CSCF#1
16. S-CSCF#1 forwards the SDP response to P-CSCF#1
17. P-CSCF#1 increases the authorisation for the QoS resources, if needed, for the remaining media flows and codec choices.
18. P-CSCF#1 forwards the SDP response to UE#1
19. UE#1 determines which media flows should be used for this session, and which codecs should be used for each of those media flows. If there was more than one media flow, or if there was more than one choice of codec for a media flow, then UE#1 must include an SDP in the "Final SDP" message sent to UE#2.
- 20-24. UE#1 sends the "Final SDP" message to UE#2, including the SDP from step #19 if needed.
25. UE#1 and UE#2 reserve the resources needed for the added or changed media flows. If the reservation is successfully completed by UE#1, it stops transmitting any deleted media streams.
- 26-30. UE#1 sends the "Resource Reservation Successful" message to UE#2, via the signalling path through the CSCFs.
31. UE#2 stops sending the media streams to be deleted, and initialises its media receivers for the new codec.
- 32-36. UE#2 sends the 200-OK final response to UE#1, along the signalling path
37. UE#1 starts sending media using the new codecs. UE#1 also releases any excess resources no longer needed.
- 38-40. UE#1 sends the SIP final acknowledgement, ACK, to UE#2 along the signalling path
43. UE#2 starts sending media using the new codecs. UE#2 also releases any excess resources no longer needed

CHANGE REQUEST

⌘ **23.228 CR 160** ⌘ rev **-1** ⌘ Current version: **5.4.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ IMS call redirected towards the PSTN/CS domain		
Source:	⌘ Orange France		
Work item code:	⌘ IMS-CCR	Date:	⌘ 05/04/2002
Category:	⌘ F Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.	Release:	⌘ REL-5 Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

Reason for change:	⌘ Currently, TS 23.228 section 5.12 indicates that some services can be defined and associated to a user not currently registered in the IMS, i.e. 'services related to unregistered state'. However it is not clearly stated that when a user is not registered within the IMS but has a CS subscription the network shall be able to redirect the call towards the PSTN/CS domain in order to cover the case of a user roaming in a CS domain but not registered in the IMS (this flow is shown in §5.7.2a (MT#3) Mobile Termination, CS Domain Roaming).
Summary of change:	⌘ This CR clarifies in section 5.12 and sub-clauses that call redirection towards PSTN/CS domain is part of IMS services related to unregistered state and that its support is mandatory. When a user is unregistered in the IMS but has a CS subscription the procedure "Mobile Terminating call to unregistered Public User Identity" applies and may be followed by the MT#3 procedure. The next modifications regard sections 5.11.5.2 and 5.11.5.2a ('Redirection to PSTN termination) and precise that when the user is not currently registered in the IMS, the I-CSCF may assign a temporary S-CSCF.
Consequences if not approved:	⌘ When the user is not registered in the IMS the call may not be redirected towards the PSTN/CS domain even if the user is reachable via the CS domain.

Clauses affected:	⌘ 5.12, 5.12.1, 5.11.5.2, 5.11.5.2a
Other specs affected:	⌘ <input type="checkbox"/> Other core specifications ⌘ <input type="checkbox"/> <input type="checkbox"/> Test specifications <input type="checkbox"/> 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.

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. As part of the "services related to unregistered state" eCall redirection to PSTN/CS domain shall be supported to cover the cases when the UE is not registered in IMS but can be reached via the PSTN/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 and 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 subscriber. 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 service control and I-CSCF routes the call further to the selected destination. S-CSCF has to download the service profile from HSS before it performs 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:

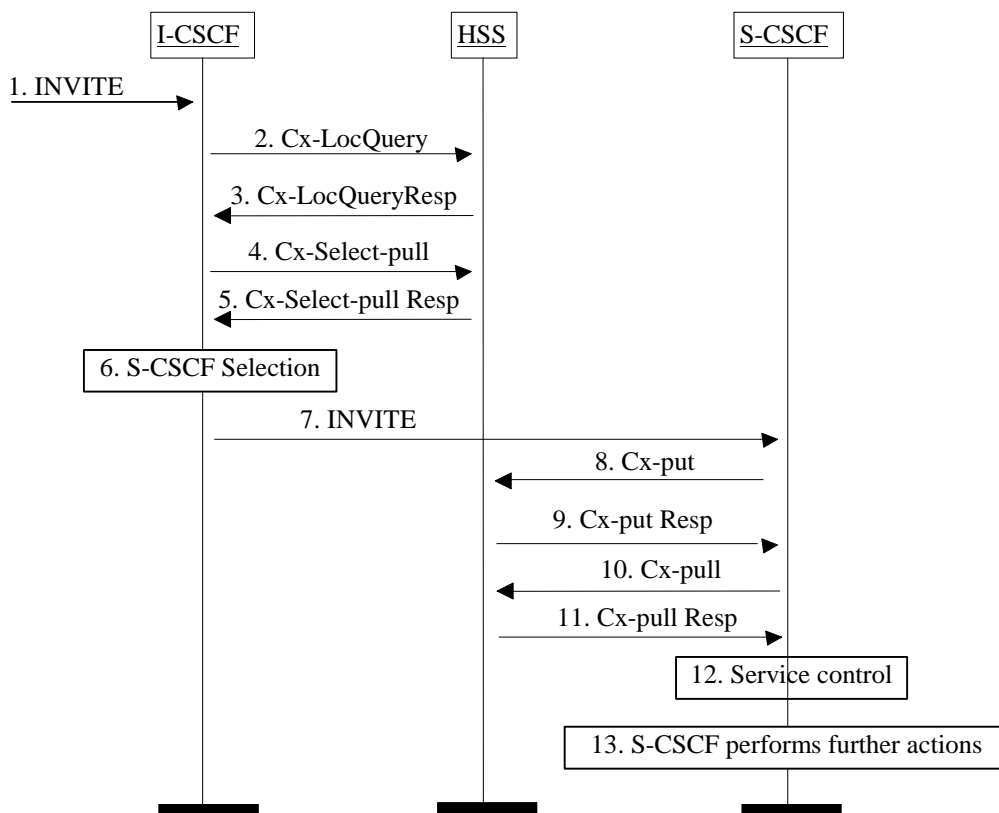


Figure 5.43: Mobile Terminating call procedures to unregistered IMS Public User Identity that has services related to unregistered state

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 subscriber or provides the I-CSCF with the previously allocated S-CSCF name.
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 subscriber.
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 subscriber. This will result in all terminating traffic for unregistered Public User Identities of that subscriber being routed to this particular S-CSCF until the registration period expires or the subscriber attaches the Public User Identity to the network.
9. The HSS shall send Cx-Put Resp to the I-CSCF to acknowledge the sending of Cx-Put.
10. If 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 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.

Should the subscriber register a Public User Identity at another S-CSCF during the register expiry time then the registration from the new S-CSCF will take precedence, overwriting the previous S-CSCF name stored in the HSS.

Next Change

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 towards towards the destination according to the termination flow.

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 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:

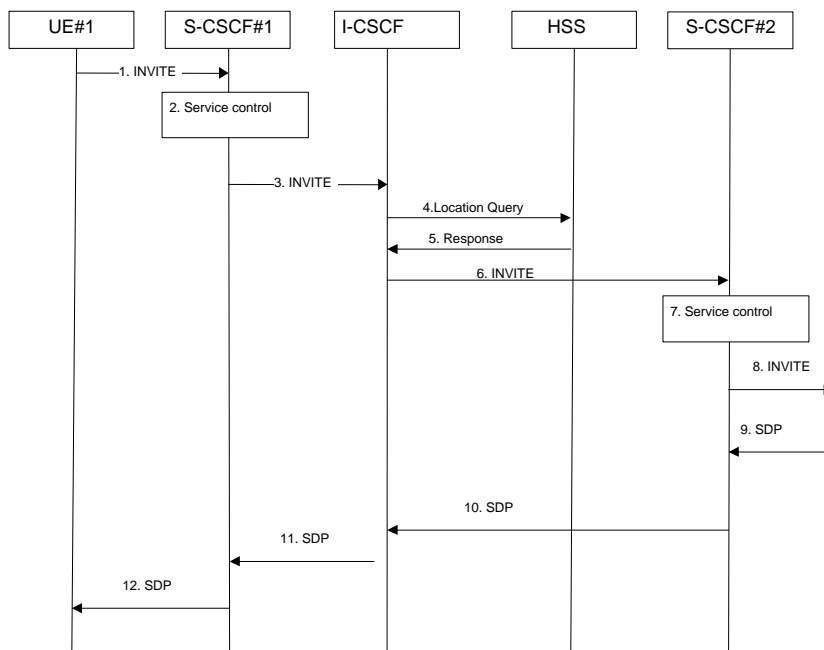


Figure 5.37: Session redirection to PSTN Termination (S-CSCF #2 forwards INVITE)

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 subscriber.
5. HSS responds with the address of the current Serving CSCF (S-CSCF#2) for the terminating subscriber.
6. I-CSCF forwards the INVITE request to S-CSCF#2, who will handle the session termination.
7. S-CSCF#2 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 remain in the path of the SIP signalling.
8. S-CSCF#2 forwards the INVITE toward the destination, according to the procedures of the terminating flow.
9. The destination responds with the SDP message, and the session establishment 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.

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 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 REDIRECTS to the originating UE#1 is shown in the figure 5.37a:

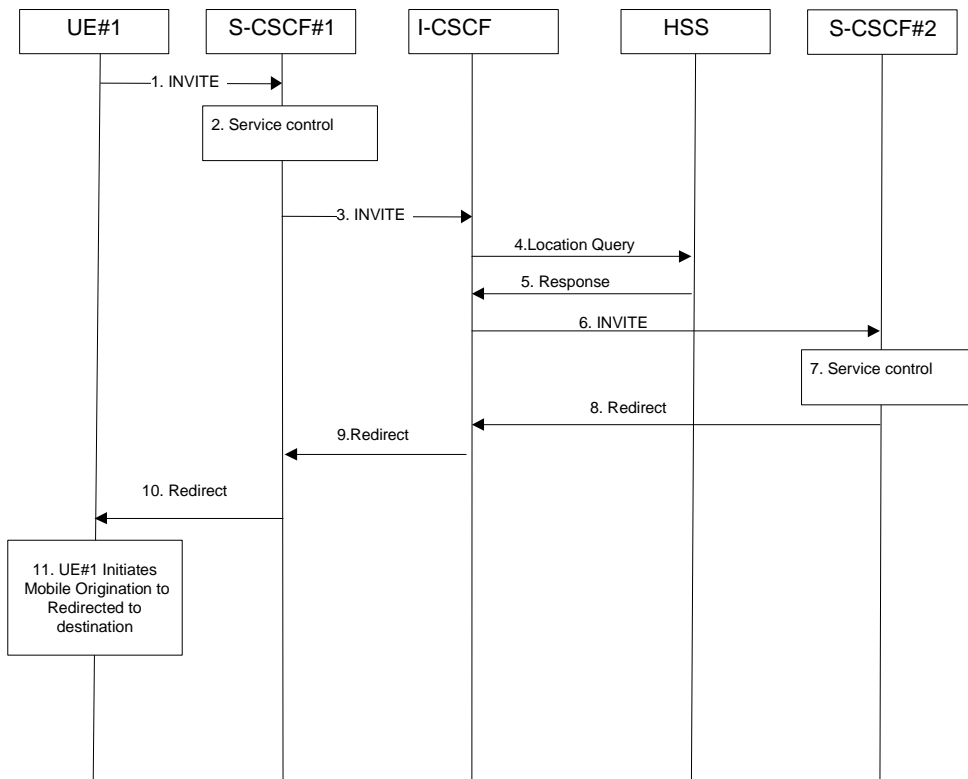


Figure 5.37a: Session redirection to PSTN Termination (REDIRECT to originating UE#1)

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 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 subscriber.
5. HSS responds with the address of the current Serving CSCF (S-CSCF#2) for the terminating subscriber.
6. I-CSCF forwards the INVITE request to S-CSCF#2, who will handle the session termination.
7. S-CSCF#2 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).

CHANGE REQUEST

⌘ **23.228 CR 156** ⌘ rev **1** ⌘ Current version: **5.4.1** ⌘

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Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ Clarification of the relation between Public User Identities and Service Profiles		
Source:	⌘ Ericsson		
Work item code:	⌘ IMS-CCR	Date:	⌘ 2002-04-12
Category:	⌘ F	Release:	⌘ REL-5
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900 .		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

Reason for change:	⌘ The current description of the relation between Public User Identities and Service Profiles are ambiguous and could be misinterpreted.
Summary of change:	⌘ Clarification of the description of the relation between Public User Identities and Service Profiles
Consequences if not approved:	⌘ Ambiguous specifications

Clauses affected:	⌘ 4.3.3.2, 4.3.3.4	
Other specs Affected:	<input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> 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

4.3.3.2 Public user identities

Every IM CN subsystem subscriber 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 E.164 numbers.
- 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 subscriber that has more than one public identity via a mechanism within the IP multimedia CN subsystem (e.g. by using [an Implicit Registration Set a Service Profile](#)). This shall not preclude the user from registering individually some of his/her public identities if needed.
- Public User Identities 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).

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.

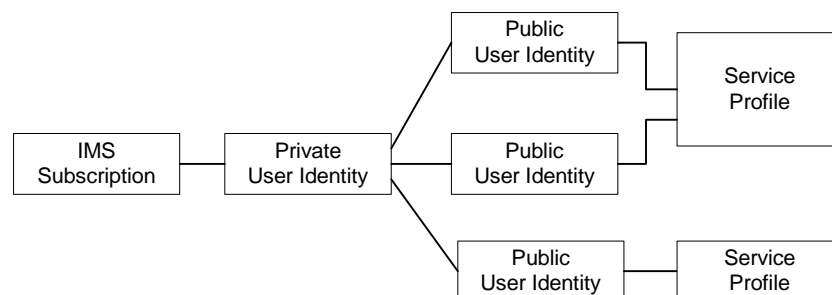


Figure 4.5: Relationship of the private user identity and public user identities

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. IMPUs with different Service Profiles may belong to the same Implicit Registration Set. ~~All Public user identities that are associated with the same Service Profile should have the~~

~~same set of services. Public user identities that are associated with a different Service Profile could have a different set of services. Each Public user identity is only associated with a single Service Profile.~~

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.

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.

3GPP TSG-SA2#24 Meeting
 Madrid, Spain, 22-26 April 2002

Tdoc S2-0201344

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CHANGE REQUEST	
⌘ 23.228 CR 155 ⌘	⌘ 1 ⌘ Current version: 5.4.1 ⌘

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

Proposed change affects: ⌘ (U)SIM ME/UE ISIM Core Network

Title:	⌘ Clarifying function of barring IMPU as a function		
Source:	⌘ Ericsson, Nokia, Dynamicsoft, Siemens		
Work item code:	⌘ IMS-CCR	Date:	⌘ 22/04/02
Category:	⌘ F	Release:	⌘ Rel-5
	<i>Use one of the following categories:</i> 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 .		<i>Use one of the following releases:</i> 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

Reason for change:	⌘ Clarify that it shall be possible to bar an IMPU from access to sessions in the IMS domain, without such possibility, the solution to support pre-Rel 5 UICC (without ISIM) requires a more complex solution. In addition, it is understood that such function is necessary even without the ISIM-less scenario, as there may be cases where an IMPU is part of the ISIM application within the UICC. The user/operator does not want to use this IMPU for some reason and a simple way of preventing should follow the same principle as described in case of ISIM-less case.
Summary of change:	⌘ Add indication per IMPU barring info that will prevent an IMPU to be used for session, this is applied after Registration has been completed.
Consequences if not approved:	⌘ Preventing IMPUs from being used even when the IMPUs must not be allowed for sessions.

Clauses affected:	⌘ 4.6.3 , 5.2.1		
Other specs Affected:	⌘ <input checked="" type="checkbox"/> Other core specifications	⌘ 24.228, 24.229, 29.228, 29.229	
	<input type="checkbox"/> Test specifications		
	<input type="checkbox"/> O&M Specifications		
Other comments:	⌘ This solution is used to develop the Pre-Rel 5 IMS user access (ISIM-less UICC), see contributions related to this (S2-021004, S2-021005).		

*****First change *****

4.6.3 Serving-CSCF

The Serving-CSCF (S-CSCF) performs the session control services for the UE. It maintains a session state as needed by the network operator for support of the services. Within an operator's network, different S-CSCFs may have different functionalities. The functions performed by the S-CSCF during a session are:

Registration

- May behave as a Registrar as defined in RFC 3261 [12] or subsequent versions, i.e. it accepts registration requests and makes its information available through the location server (eg. HSS).

Session-related and session-unrelated flows

- Session control for the registered endpoint's sessions. [It shall reject IMS communication to/from public user identity\(s\) that are barred for IMS communications after completion of registration, as described in subclause 5.2.1.](#)
- May behave as a Proxy Server as defined in RFC 3261 [12] or subsequent versions, i.e. it accepts requests and services them internally or forwards them on, possibly after translation.
- May behave as a User Agent as defined in RFC 3261 [12] or subsequent versions, i.e. it may terminate and independently generate SIP transactions.
- Interaction with Services Platforms for the support of Services
- Provide endpoints with service event related information (e.g. notification of tones/announcement together with location of additional media resources, billing notification)
- On behalf of an originating endpoint (i.e. the originating subscriber/UE)
 - Obtain from a database the Address of the I-CSCF for the network operator serving the destination subscriber from the destination name of the terminating subscriber (e.g. dialled phone number or SIP URL), when the destination subscriber is a customer of a different network operator, and forward the SIP request or response to that I-CSCF.
 - When the destination name of the terminating subscriber (e.g. dialled phone number or SIP URL), and the destination subscriber is a customer of the same network operator, forward the SIP request or response to an I-CSCF within the operator's network.
 - Depending on operator policy, forward the SIP request or response to another SIP server located within an ISP domain outside of the IM CN subsystem.
 - Forward the SIP request or response to a BGCF for call routing to the PSTN or CS Domain.
- On behalf of a destination endpoint (i.e. the terminating subscriber/UE)
 - Forward the SIP request or response to a P-CSCF for a MT procedure to a home subscriber within the home network, or for a subscriber roaming within a visited network where the home network operator has chosen not to have an I-CSCF in the path
 - Forward the SIP request or response to an I-CSCF for a MT procedure for a roaming subscriber within a visited network where the home network operator has chosen to have an I-CSCF in the path.
 - Modify the SIP request for routing an incoming session to CS domain according to HSS and service control interactions, in case the subscriber is to receive the incoming session via the CS domain.
 - Forward the SIP request or response to a BGCF for call routing to the PSTN or the CS domain.

Charging and resource utilisation:

- Generation of CDRs.

*****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 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 procedures.

3GPP TSG-SA2 Meeting #24
 Madrid, Spain, April 22-26, 2002

Tdoc S2-021343

CR-Form-v4
CHANGE REQUEST
⌘ 23.228 CR 157 ⌘ ev -1 ⌘ Current version: 5.4.1 ⌘

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Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ Correct stage 2 text following IETF changes		
Source:	⌘ Ericsson		
Work item code:	⌘ IMS-CCR	Date:	⌘ 22 nd April 2002
Category:	⌘ F	Release:	⌘ REL_5
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

Reason for change:	⌘ It was agreed in SA2#23 that SA2 spec shall be updated to correct the changes regarding the resource reservation preconditions as per Unify draft (the actual solutions are documented in the drafts manyfolks, Update and SDP Offer/Answer). This CR addresses that agreement.
Summary of change:	⌘ Changes to all the flows that showed SDP handling according to the latest manyfolks draft, Consistent showing of Ringing as optional, Additionally, only one service control trigger shown at initial INVITE for example purpose. Also clarifies the principle for Resource Commit to resource authorisations. As per agreement within SA2, the end to end session flows in Annex B are removed
Consequences if not approved:	⌘ Stage 2 requirements incorrect with stage 3 work

Clauses affected:	⌘ 5.4.7, 5.4.8, 5.4.10, 5.5.1, 5.5.2, 5.5.3, 5.5.4, 5.6, 5.7, 5.11.3		
Other specs affected:	⌘ <input checked="" type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘	24.228, 24.229, 29.208
Other comments:	⌘ Other WGs have been already informed of the decision via LS from SA2#23.		

*****First CHANGE*****

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, which is a logical entity of the P-CSCF. (Note: If the PCF is implemented in a separate physical node, the interface between the PCF and the P-CSCF is not standardised).

There are seven 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.
7. Indication of PDP Context Modification from the GGSN to the PCF.

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 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) shall use the SDP contained in the SIP signaling to calculate the proper authorisation. The PCF 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 to uniquely identify the media component(s).

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. 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 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 makes policy decisions and provides an indication to the GGSN ~~that the user is now allowed to use~~ ~~about committing~~ 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.

The GGSN enforces the policy decisions. The GGSN may restrict any use of the GPRS resources prior to this indication from the PCF. The GGSN shall restrict any use of the IP resources prior to this indication from the PCF, 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 be allowed to be used by the user ~~committed~~ at the time they are authorised by the PCF.

5.4.7.3 Removal of QoS Commit

The PCF makes policy decisions and provides an indication to the GGSN about revoking the user's capacity to use ~~commitment~~ for 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. The GGSN shall restrict any use of the IP resources after this indication from the PCF, e.g. by closing the gate and blocking the media flow.

*****SECOND CHANGE*****

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 session calls.

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.

~~The concept of "QoS-Assured" sessions are introduced. A "QoS-Assured" session will not complete until required resources have been allocated to the session. This is termed a "precondition" for the session to complete.~~

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 with the Resource Reservation Successful message. 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).

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.

*****Third CHANGE*****

5.4.10 Overview of session flow procedures

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

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

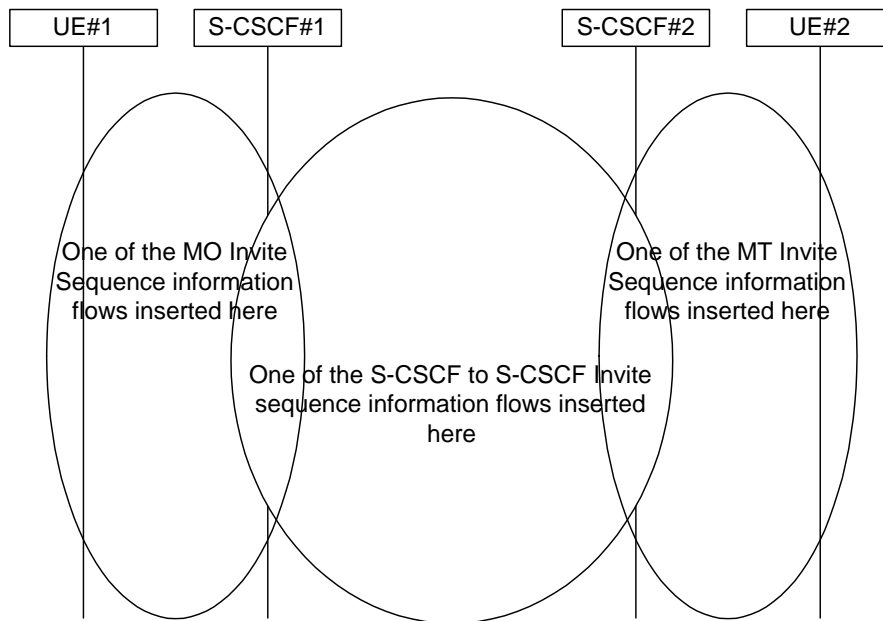


Figure 5.9: Overview of Session Flow Sections

The following procedures are defined:

For the origination sequence:

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

For the termination sequence:

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

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

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

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

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

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

- (MT#2) Mobile termination, home

An informative example of this session flow is given in Annex B.1

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

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

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

Table 5.2: Combinations of session procedures

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

5.4.11 Signalling Transport Interworking

A Signalling gateway function (SGW) is used to interconnect different signalling networks i.e. SCTP/IP based signalling networks and SS7 signalling networks. The signalling gateway function may be implemented as a stand alone entity or inside another entity [1]. The session flows in this specification do not show the SGW, but when interworking with PSTN/CS domain, it is assumed that there is a SGW for signalling transport conversion.

5.5 Serving-CSCF/MGCF to serving-CSCF/MGCF procedures

This section presents the detailed application level flows to define the procedures for Serving-CSCF to Serving-CSCF.

This section contains four session flow procedures, showing variations on the signalling path between the Serving-CSCF that handles session origination, and the Serving-CSCF that handles session termination. This signalling path depends on:

- whether the originator and destination are served by the same network operator,
- whether the network operators have chosen to hide their internal configuration.

The Serving-CSCF handling session origination performs an analysis of the destination address, and determines whether it is a subscriber of the same network operator or a different operator.

If the analysis of the destination address determined that it belongs to a subscriber of a different operator, the request is forwarded (optionally through 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. The I-CSCF then forwards the request to the S-CSCF. If the analysis of the destination address determines that it belongs to a subscriber of the same operator, the S-CSCF passes the request to a local I-CSCF, who queries the HSS for current location information. The I-CSCF then forwards the request to the S-CSCF.

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 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 subscriber either located in the home service area, or roaming. The I-CSCF therefore forwards the request to the S-CSCF serving the destination subscriber.

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.

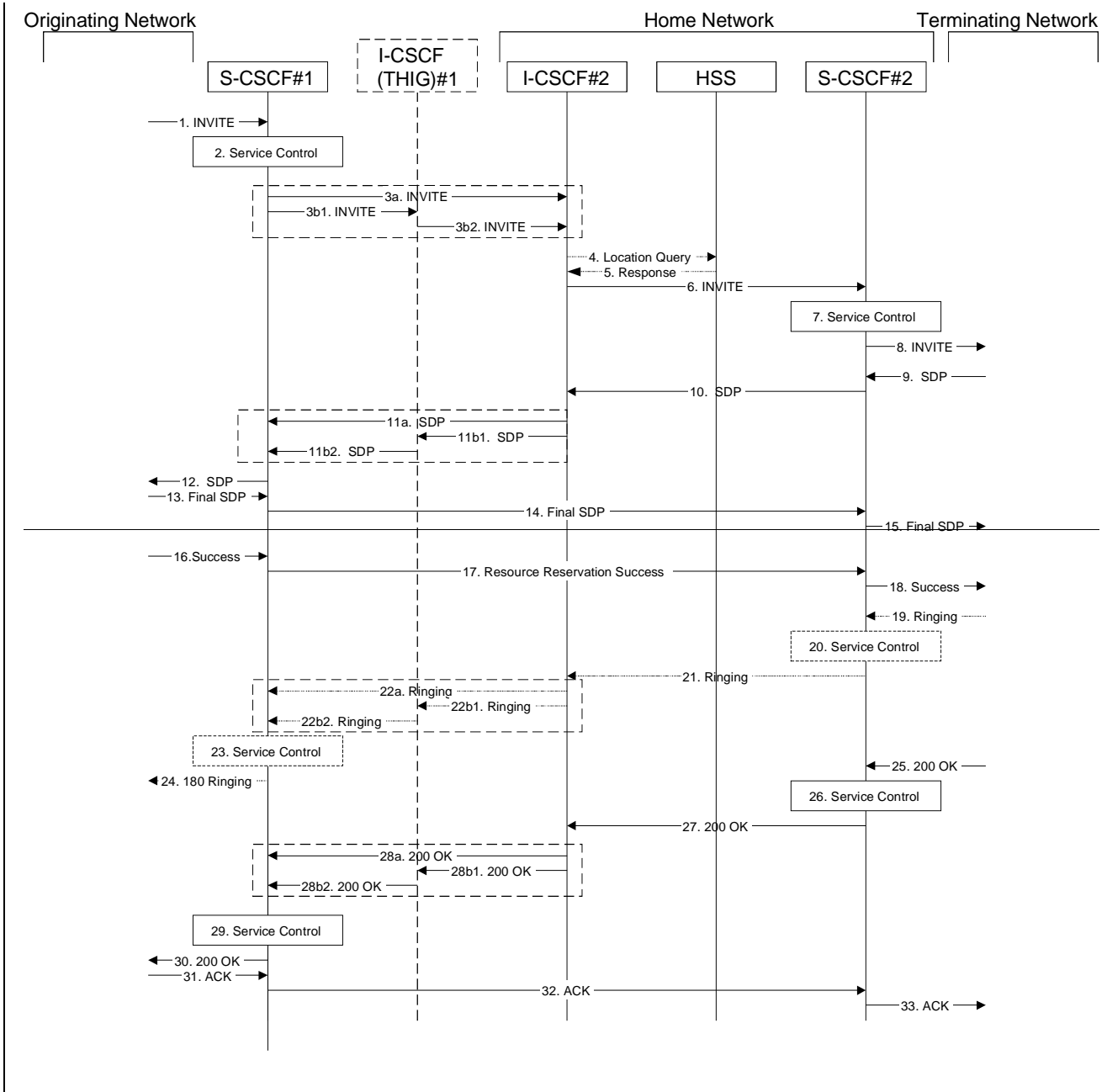
PSTN-OPSTN origination. The "Originating Network" of S-S#1 is the home network. The element labeled S-CSCF#1 is the MGCF of the PSTN-O procedure.

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.



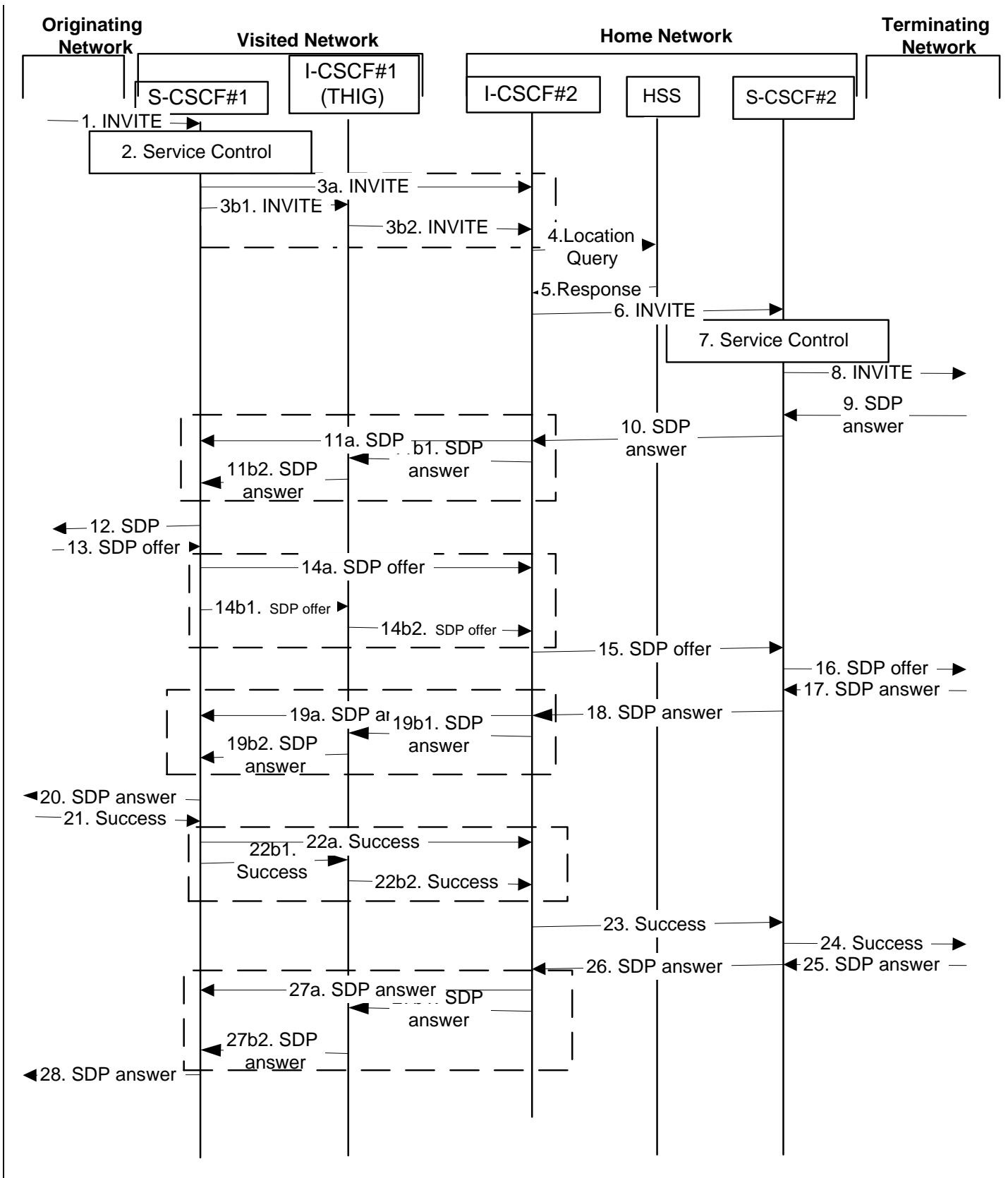


Figure 5.10-1: Serving to serving procedure - different operators (part 1)

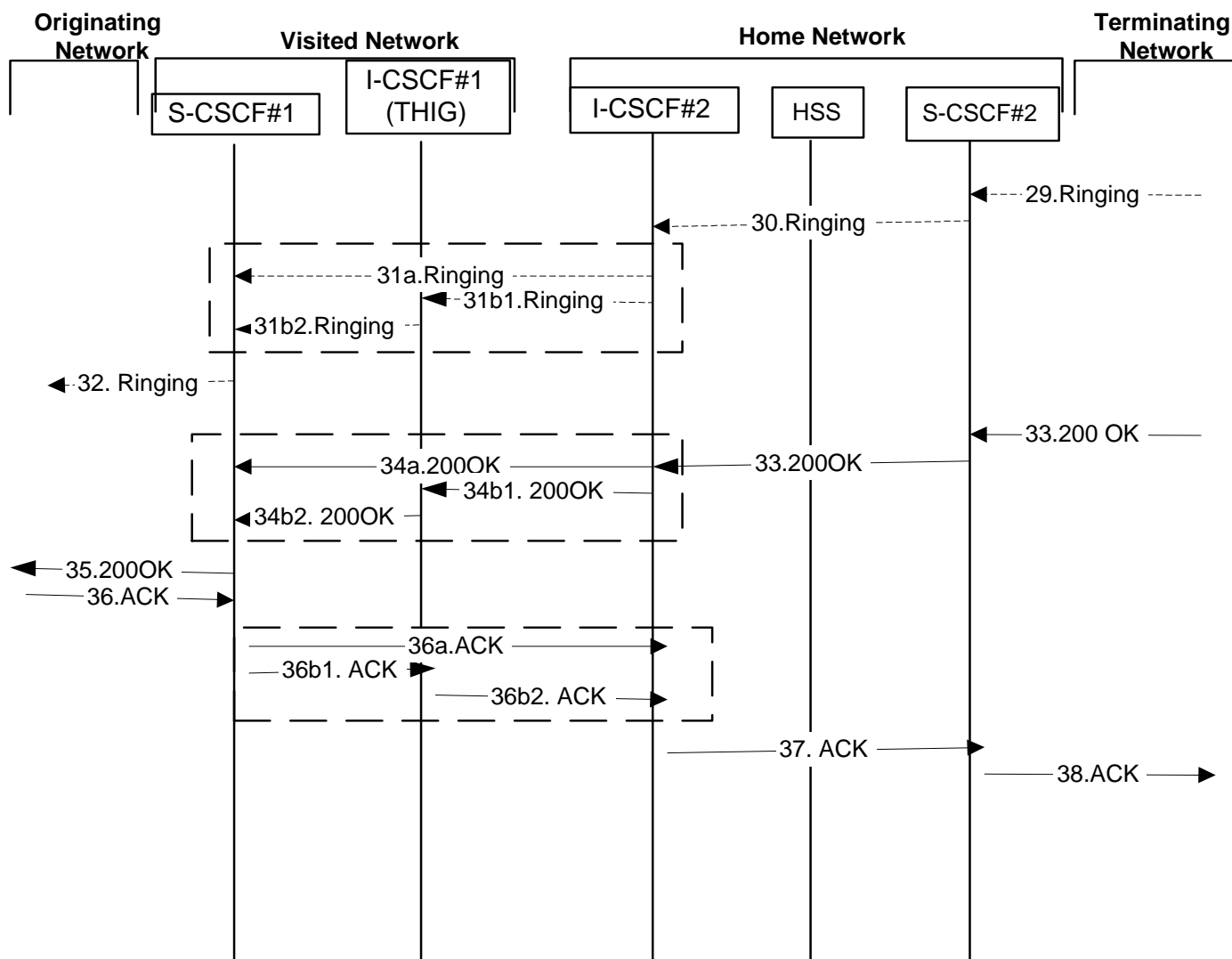


Figure 5.10-2: Serving to serving procedure - different operators (part 2)

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.
2. S-CSCF#1 performs 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, flow (2) is an inter-operator message to the I-CSCF entry point for the terminating subscriber. 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 subscriber'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 subscriber'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 subscriber.
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 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~~ ~~it decides the final~~ set of media streams, and forwards this information to S-CSCF#1 by the origination procedures
- 14-15. S-CSCF#1 forwards the ~~offered~~ final SDP to S-CSCF#2. This may possibly be routed through I-CSCF#1 or I-CSCF#2 depending on operator configuration of the I-CSCFs
- 16-5. S-CSCF#2 forwards the ~~offered~~ final SDP to the terminating endpoint, as per the termination procedure
- 17-6-20. ~~The terminating end point acknowledges the offer with answered SDP and passes through the session path to the originating end point. When the originating endpoint has completed the resource reservation procedures, it sends the "Resource reservation success" message to S-CSCF#1 by the origination procedures.~~
- 21-24-17. S-CSCF#1 forwards this message to S-CSCF#2. This may possibly be routed through I-CSCF#1 or I-CSCF#2 depending on operator configuration of the I-CSCFs. Originating end point acknowledges successful resource reservation and the message is forwarded to the terminating end point.
18. S-CSCF#2 forwards this message to the terminating endpoint, as per the termination procedure
19. The terminating endpoint may optionally send a provisional response indicating alerting is in progress. This message is sent by the termination procedure to S-CSCF#2.
20. S-CSCF#2 performs whatever service control is appropriate for alerting
21. S-CSCF#2 forwards the ringing message to I-CSCF#2
22. I-CSCF#2 forwards the ringing message to S-CSCF#1. Based on the choice made in step #3 above, this may be sent directly to S-CSCF#1 (22a) or may be sent through I-CSCF(THIG)#1 (22b1 and 22b2)
23. S-CSCF#1 performs whatever service control is appropriate for this alerting flow
24. S-CSCF#1 forwards the ringing message to the originator, per the origination procedure
- 25-28. The SIP final response, 200-OK, is sent by the terminating endpoint over the signalling path. This is typically generated when the subscriber has accepted the incoming session setup attempt. The message is sent to S-CSCF#2 per the termination procedure Terminating end point acknowledges the response and this message is sent to the originating end point through the established session path.

- ~~26. S-CSCF#2 performs whatever service control logic is appropriate for this session setup completion~~
- ~~27. The 200-OK is passed to the I-CSCF#2.~~
- ~~28. The 200-OK is passed to the S-CSCF#1. Based on the choice made in step #3 above, this may be sent directly to S-CSCF#1 (28a) or may be sent through I-CSCF(THIG)#1 (28b1 and 28b2).~~
- ~~29-32. S-CSCF#1 performs whatever service control logic is appropriate for this session setup completion. Terminating end point then generates ringing and this message is sent to the originating end point through the established session path.~~
- ~~30. The 200-OK is returned to the originating endpoint, by the origination procedure.~~
- ~~31. The originating endpoint sends the final acknowledgement to S-CSCF#1 by the origination procedures.~~
- ~~32. S-CSCF#1 forwards this message to S-CSCF#2. This may possibly be routed through I-CSCF#1 or I-CSCF#2 depending on operator configuration of the I-CSCFs.~~
- ~~33-35. S-CSCF#2 forwards this message to the terminating endpoint, as per the termination procedure. Terminating end point then sends 200 OK via the established session path to the originating end point.~~
- ~~36-38. Originating end point acknowledges the establishment of the session and sends to the terminating end point via the established session path.~~

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 subscriber either located in the home service area, or roaming. The I-CSCF therefore forwards the request to the S-CSCF serving the destination subscriber.

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.

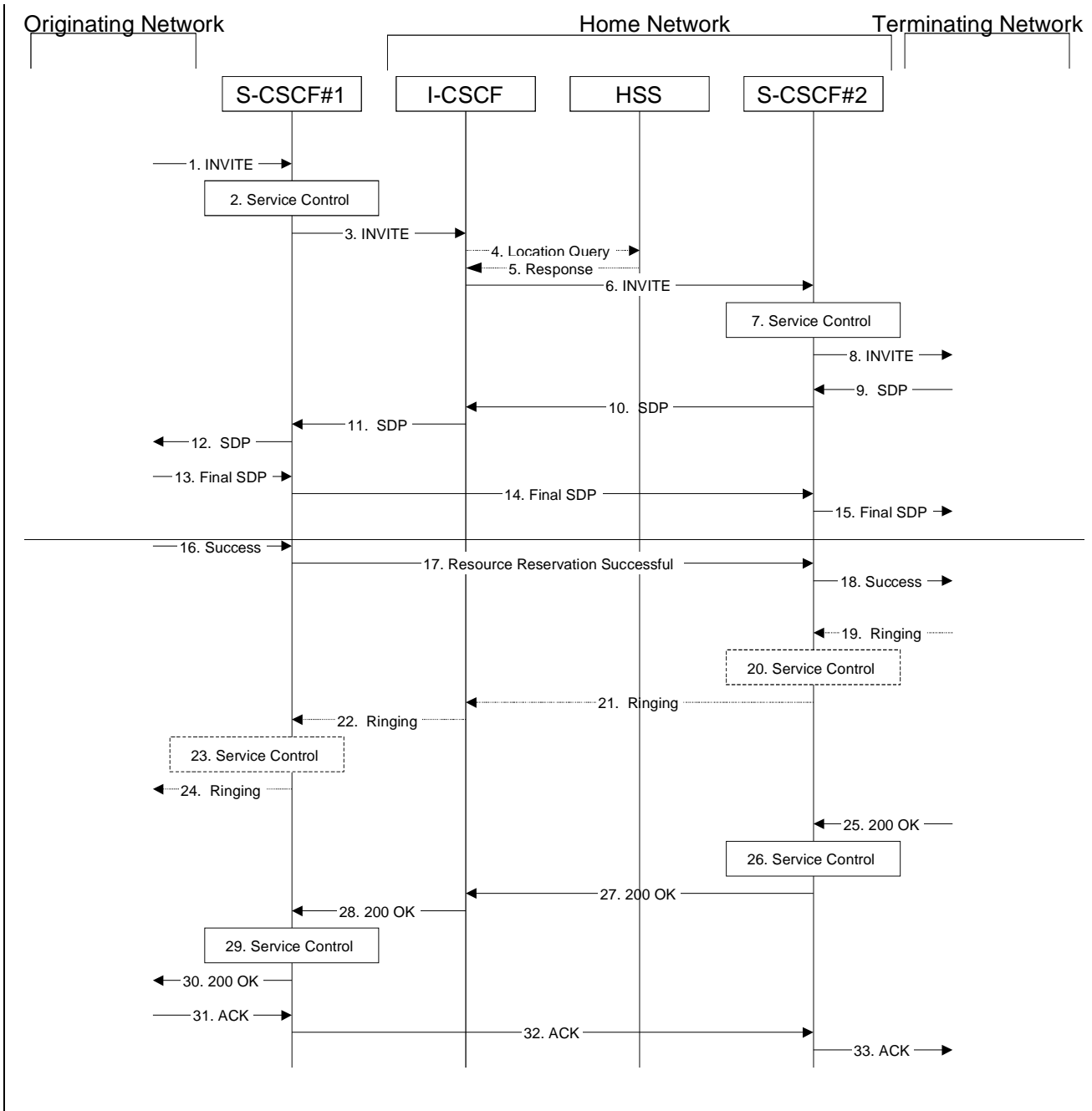
PSTN-OPSTN origination. The “Originating Network” of S-S#2 is the home network. The element labelled S-CSCF#1 is the MGCF of the PSTN-O procedure.

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.



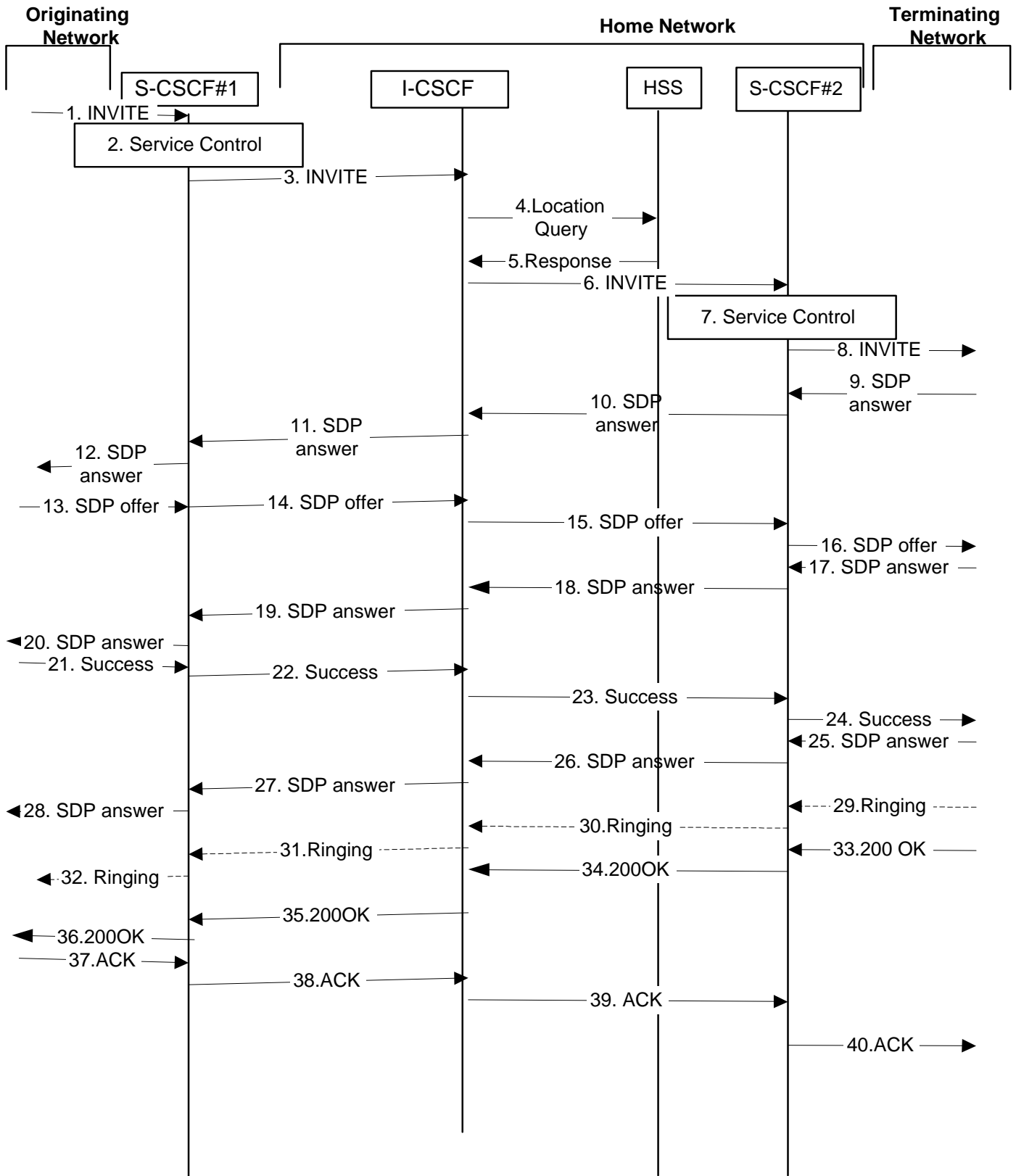


Figure 5.11: Serving to serving procedure - same operator

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.

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. 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 subscriber.
6. I-CSCF forwards the INVITE request to the S-CSCF (S-CSCF#2) that will handle the session termination.
7. S-CSCF#2 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 media stream capabilities of the destination are returned along the signalling path, as per the termination procedure. The terminating end point responds with an answer to the offered SDP and this message is passed along the established session path.~~
- ~~10. S-CSCF#2 forwards the SDP to I-CSCF~~
- ~~11. I-CSCF forwards the SDP to S-CSCF#1.~~
- ~~12. S-CSCF#1 forwards the SDP to the originator, as per the originating procedure.~~
- ~~13-16. The originator decides the final on the offered -set of media streams, 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.~~
- ~~14. S-CSCF#1 forwards the final SDP to S-CSCF#2.~~
- ~~15. S-CSCF#2 forwards the final SDP to the terminating endpoint, as per the termination procedure~~
- ~~16. When the originating endpoint has completed the resource reservation procedures, it sends the "Resource reservation success" message to S-CSCF#1 by the origination procedures.~~
- ~~17-20. S-CSCF#1 forwards this message to S-CSCF#2. Terminating end point responds to the offered SDP and the response if forwarded to the originating end point via the established session path.~~
- ~~18. S-CSCF#2 forwards this message to the terminating endpoint, as per the termination procedure~~
- ~~19. The terminating endpoint may optionally send a provisional response indicating alerting is in progress. This message is sent by the termination procedure to S-CSCF#2.~~
- ~~20. S-CSCF#2 performs whatever service control is appropriate for this alerting flow~~
- ~~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. Terminating end point sends ringing message to S-CSCF#2.~~
- ~~30. S-CSCF#2 forwards the ringing message to I-CSCF~~
- ~~31-22. I-CSCF forwards the ringing message to S-CSCF#1.~~
- ~~23. S-CSCF#1 performs whatever service control is appropriate for this alerting flow~~
- ~~32-24. S-CSCF#1 forwards the ringing message to the originator, per the origination procedure~~

3325. The SIP final response, 200-OK, is sent by the terminating endpoint over the signalling path. This is typically generated when the subscriber has accepted the incoming session setup attempt. The message is sent to S-CSCF#2 per the termination procedure.

3426. S-CSCF#2 performs whatever service control logic is appropriate for this session setup completion

3527. The 200-OK is passed to the I-CSCF

3628. The 200-OK is passed to the S-CSCF#1

~~29. S-CSCF#1 performs whatever service control logic is appropriate for this session setup completion~~

370. The 200-OK is passed to the Originating Network

3831. The originating endpoint sends the final acknowledgement to S-CSCF#1 by the origination procedures.

3932. S-CSCF#1 forwards this message to S-CSCF#2.

4033. S-CSCF#2 forwards this message to the terminating endpoint, as per the termination procedure

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.

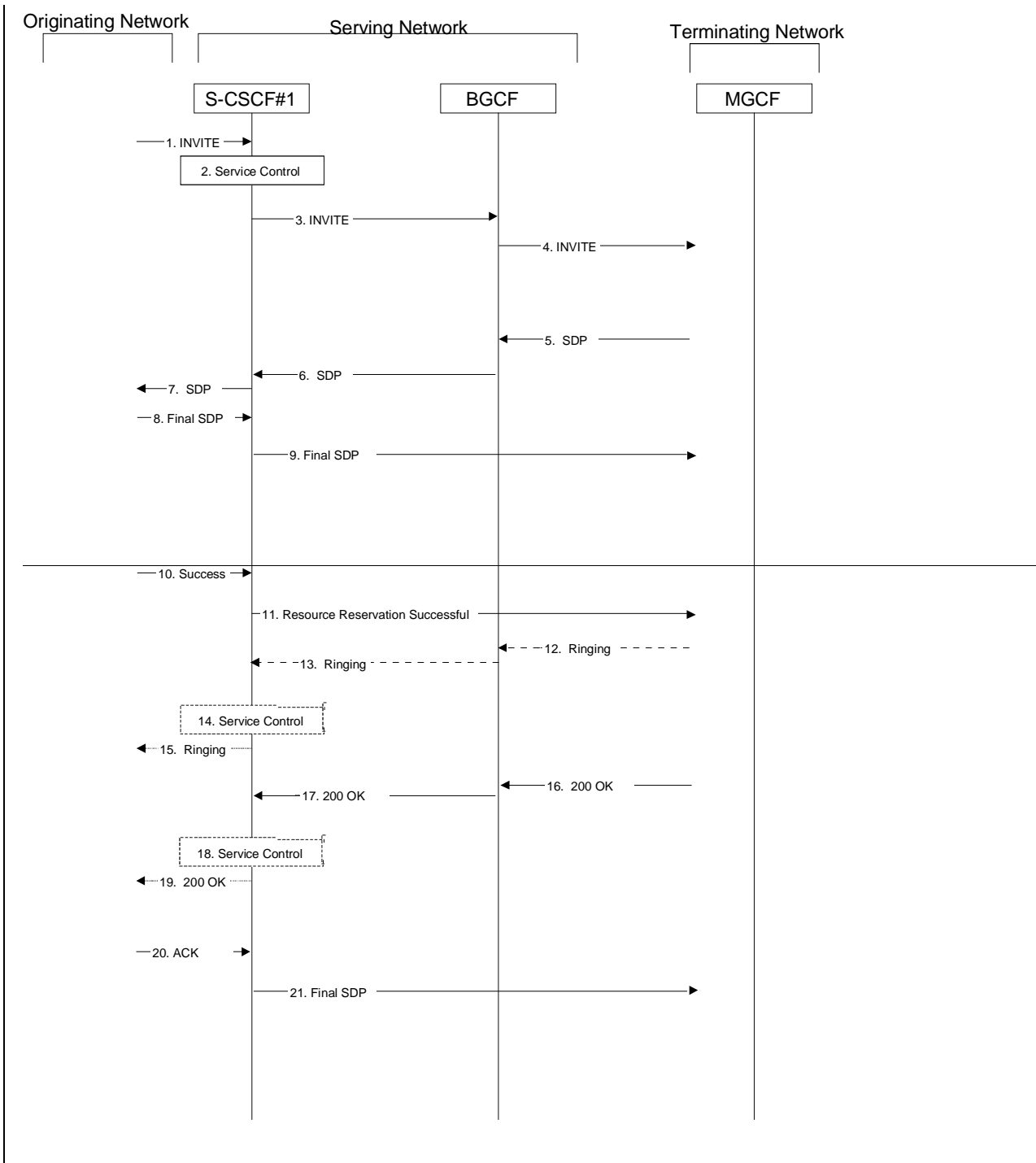
Origination sequences that share this common S-S procedure are:

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.



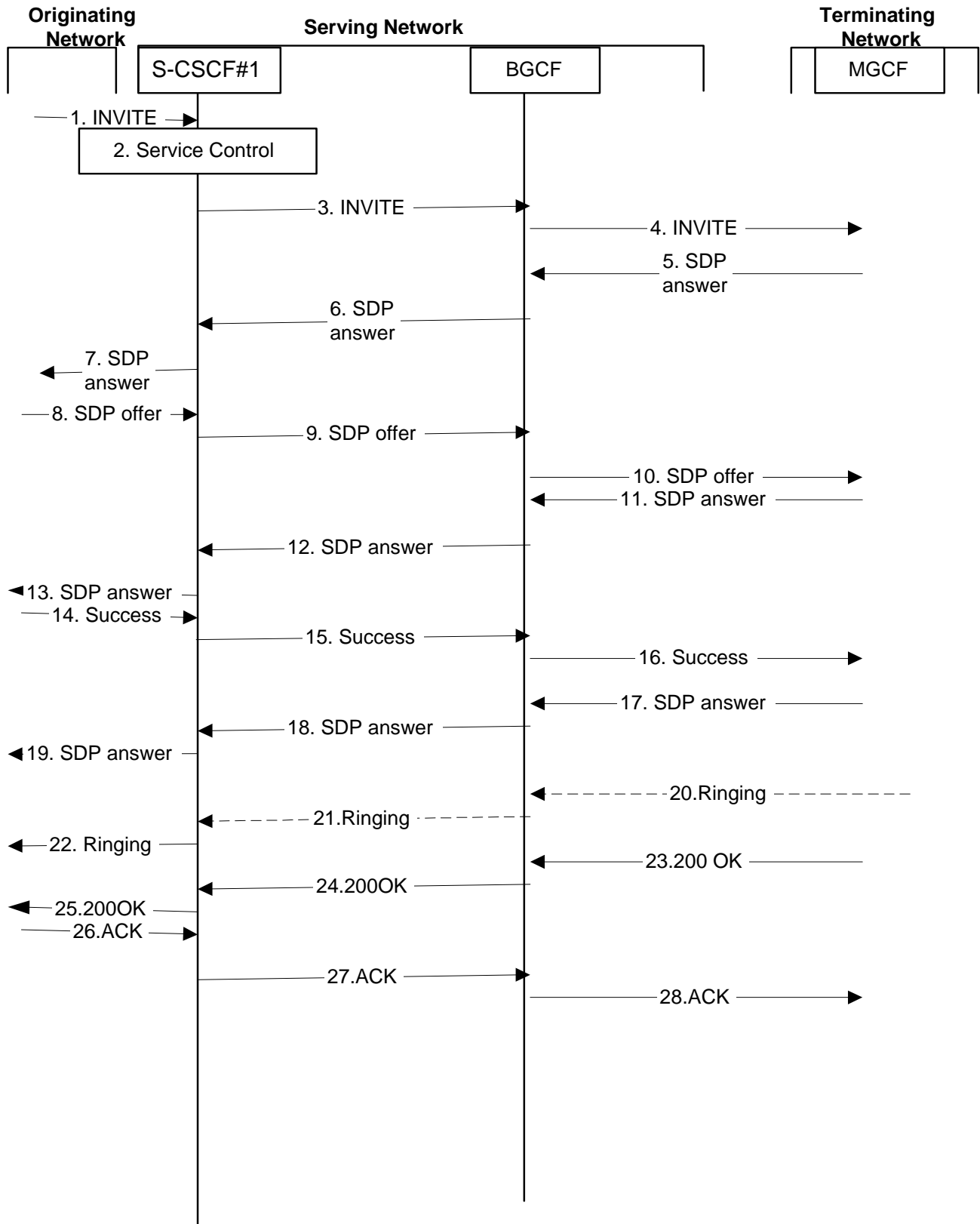


Figure 5.12: Serving to PSTN procedure - same operator

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.

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. 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 SDP answer, as per the PSTN termination procedure.
- ~~6.~~ The BGCF forwards the SDP to S-CSCF#1.
- ~~7.~~ S-CSCF#1 forwards the SDP to the originator, as per the originating procedure.
8. The originator decides the offeredfinal set of media streams, and forwards this information to S-CSCF#1 by the origination procedures
- ~~9-10.~~ S-CSCF#1 forwards the offeredfinal 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 “Resource reservation success” message to S-CSCF#1 by the origination procedures and it is passed to the terminating end point through the session path.
- ~~17-19.~~ S-CSCF#1 forwards the “Resource reservation success” to the terminating endpoint as per the PSTN terminating procedures. The terminating endpoint acknowledges the result and the message is passed onto the originating end point via the session path.
12. The terminating endpoint may optionally send a provisional response indicating alerting is in progress to the BGCF
- ~~13.~~ The message is forwarded to the S-CSCF#1.
- ~~14.~~ S-CSCF#1 performs whatever service control is appropriate for this alerting flow
- ~~20-21.~~ Terminating end point generates ringing message and forwards it to BGCF which in tern forwards the message to SCSCF#1.
- ~~22.~~ 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.
- ~~18.~~ S-CSCF#1 performs whatever service control is appropriate for this session setup completion
- ~~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.

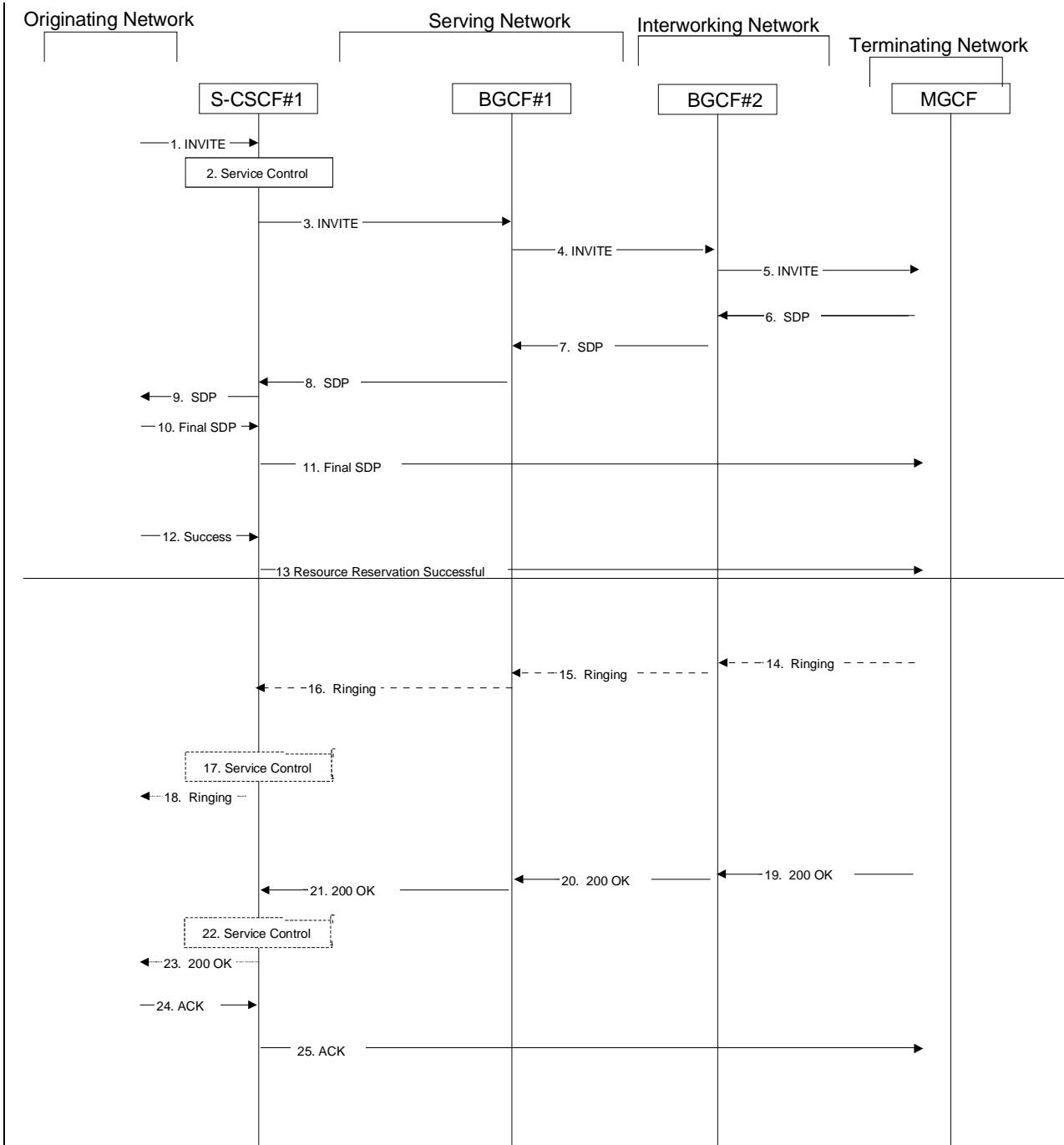
Origination sequences that share this common S-S procedure are:

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.



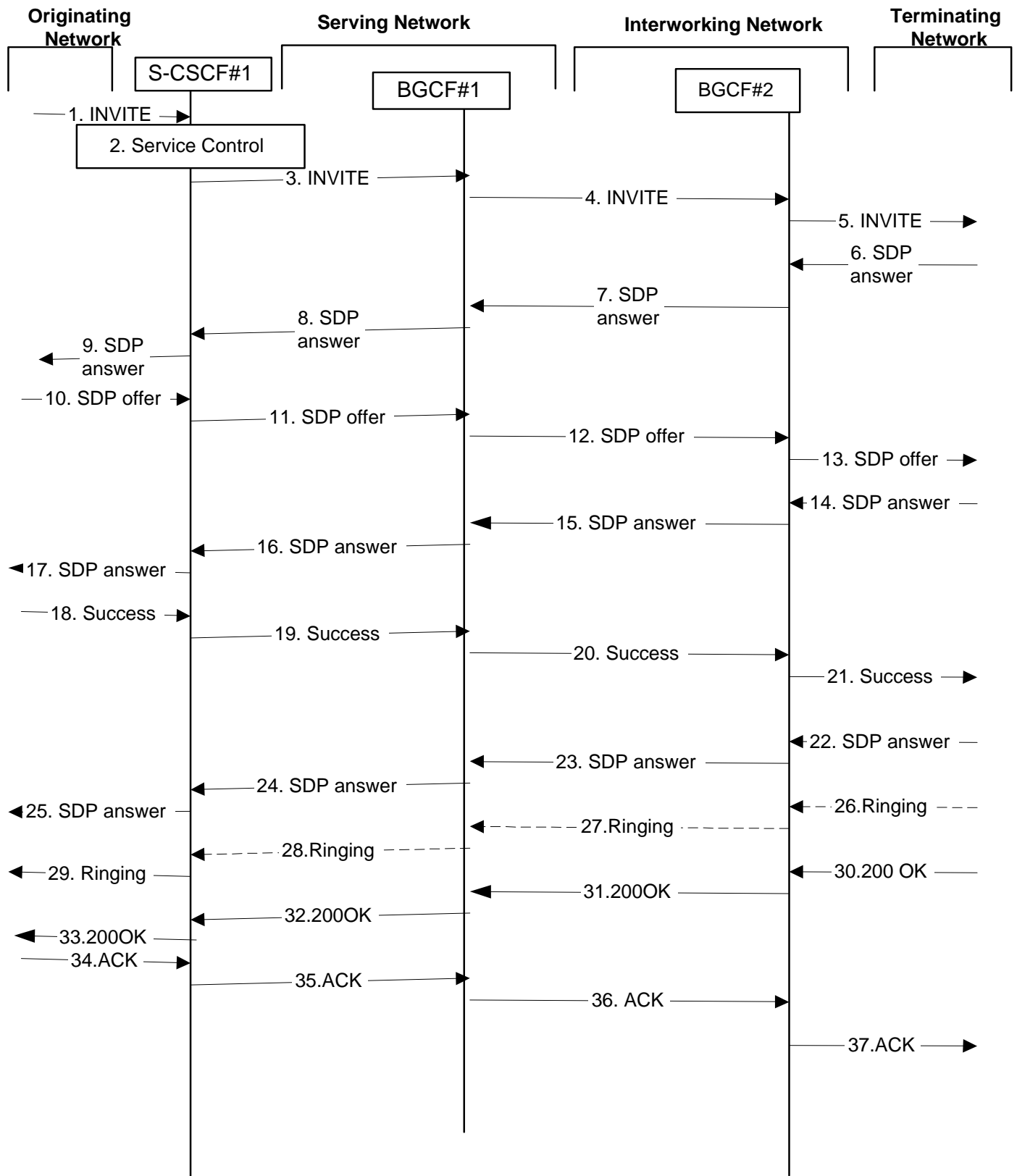


Figure 5.13: Serving to PSTN procedure - different operator

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.

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. 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. The media stream capabilities of the destination are returned along the signalling path, as per the PSTN termination procedure.
7. BGCF#2 forwards the SDP to BGCF#1
8. BGCF#1 forwards the SDP to S-CSCF#1.
9. S-CSCF#1 forwards the SDP to the originator, as per the originating procedure.
10. The originator decides the offered~~final~~ set of media streams, and forwards this information to S-CSCF#1 by the origination procedures
- 11-13. S-CSCF#1 forwards the offered~~final~~ 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.
12. ~~When the originating endpoint has completed the resource reservation procedures, it sends the "Resource reservation success" message to S-CSCF#1 by the origination procedures.~~
13. ~~S-CSCF#1 forwards the "Resource reservation success" to the terminating endpoint, as per the PSTN terminating procedures.~~
14. ~~The terminating endpoint may optionally send a provisional response indicating alerting is in progress.~~
15. ~~This information flow is forwarded to BGCF#1.~~
16. ~~This information flow is forward to S-CSCF#1~~
17. ~~S-CSCF#1 performs whatever service control is appropriate for this alerting flow~~
18. ~~S-CSCF#1 forwards the ringing message to the originator, per the origination procedure~~
19. ~~When the destination party answers, the termination procedure results in a SIP 200-OK final response.~~
20. ~~This information flow is forwarded to the BGCF#1~~
21. ~~This information flow is forwarded to the S-CSCF~~
22. ~~S-CSCF#1 performs whatever service control is appropriate for this session setup completion~~

23. The 200-OK is returned to the originating endpoint, by the origination procedure.
24. The originating endpoint sends the final acknowledgement to S-CSCF#1 by the origination procedures.
25. The S-CSCF#1 forwards the acknowledgement to the terminating endpoint, as per the PSTN terminating procedure.

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.

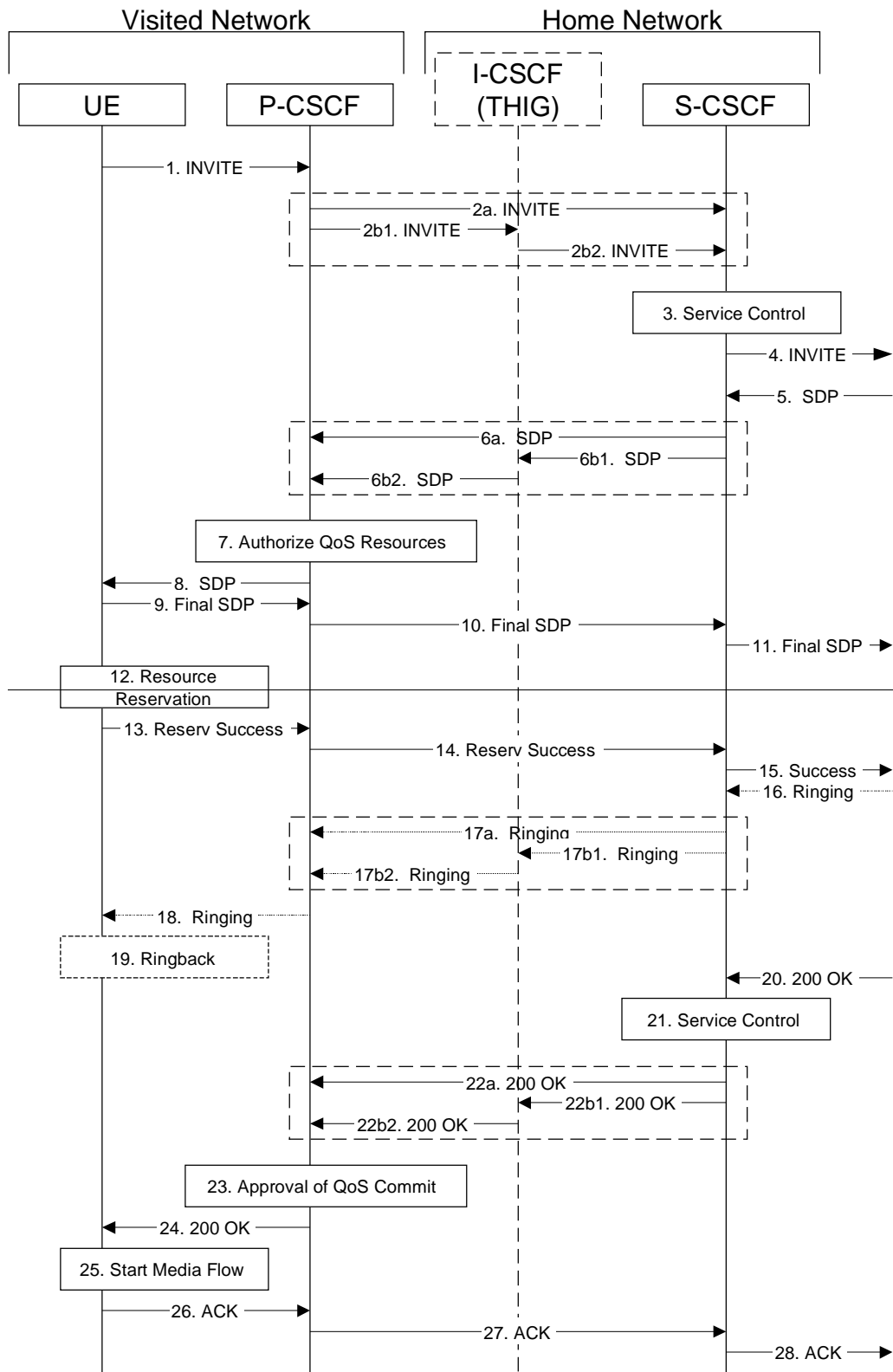
Sessions originated in the PSTN to a mobile destination are a special case of the Origination procedures. The MGCF uses H.248 [19] to control a Media Gateway, and communicates with the SS7 network. The MGCF initiates the SIP request, and subsequent nodes consider the signalling as if it came from a S-CSCF.

5.6.1 (MO#1) Mobile origination, roaming

This origination procedure applies to roaming subscribers. .

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.



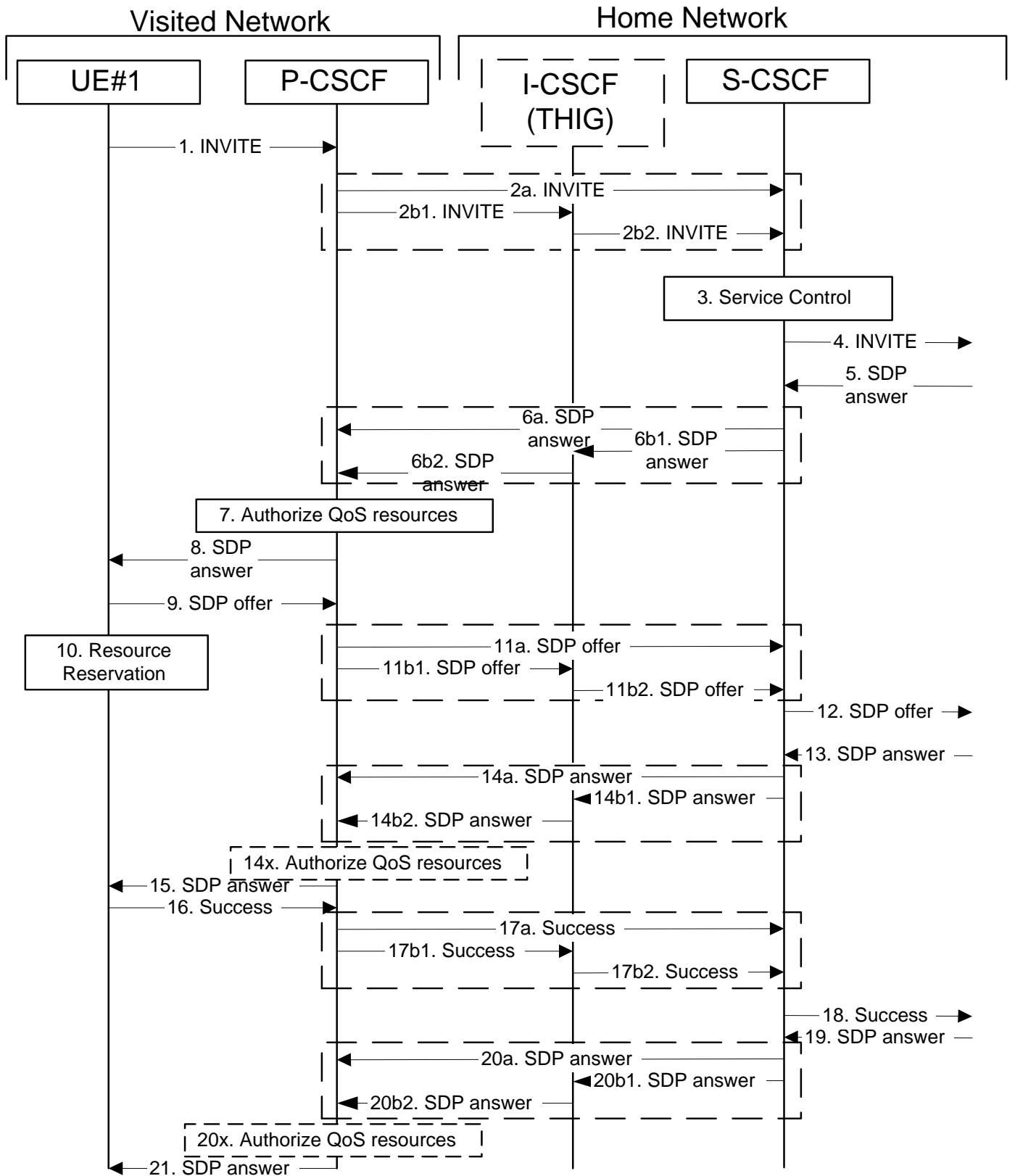


Figure 5.14-1: Mobile origination procedure – roaming (part 1)

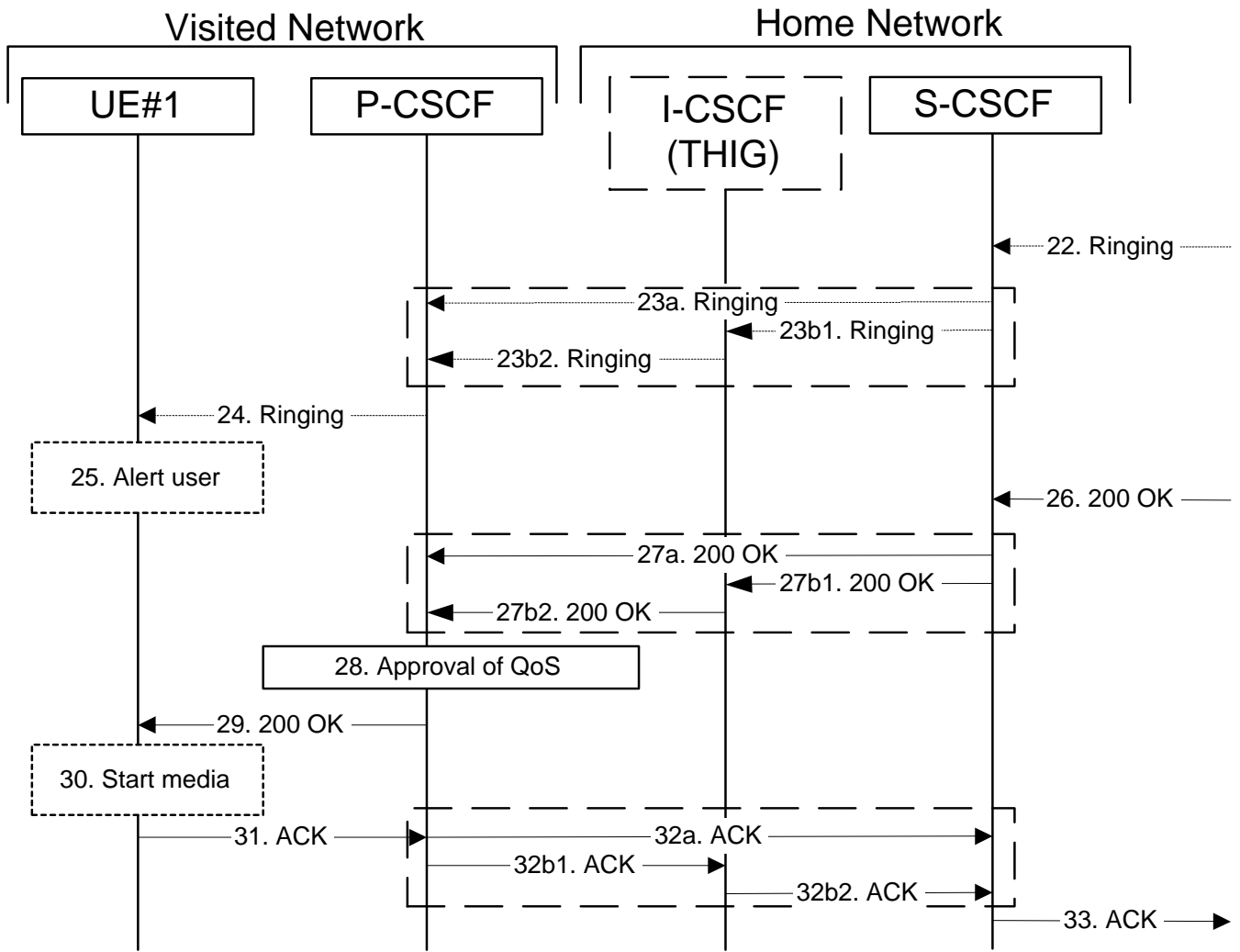


Figure 5.14-2: Mobile origination procedure – roaming (part 2)

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 subscriber. 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 SDP 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)(firewall) (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 SDP message. P-CSCF forwards the SDP message to the originating endpoint
9. UE decides the ~~offered~~final set of media streams for this session, and sends the ~~offered~~Final SDP to P-CSCF
- 10-11. After determining the needed resources in step 8, UE initiates the reservation procedures for the resources needed for this session P-CSCF forwards the ~~offered~~ final SDP to S-CSCF. This may possibly be routed through the I-CSCF depending on operator configuration of the I-CSCF.
- 11-12. S-CSCF forwards this message to the terminating endpoint, as per the S-S procedure.
12. ~~After determining the final media streams in step #9, UE initiates the reservation procedures for the resources needed for this session.~~
- 13-14x. ~~The terminating end point responds to the offered SDP with an answer and P-CSCF validates that the resources are allowed to be used.~~
15. The answered SDP is forwarded to the UE.
16. When the resource reservation is completed, UE sends the successful "Resource Reservation Successful" message to the terminating endpoint, via the signalling path established by the INVITE message. The message is sent first to P-CSCF.
- 17-18. P-CSCF forwards this message to S-CSCF. This may possibly be routed through the I-CSCF depending on operator configuration of the I-CSCF.
- 18-19. S-CSCF forwards this message to the terminating endpoint, as per the S-S procedure.
- 19-20x. The terminating end point responds to the offered SDP with an answer and P-CSCF validates that the resources are allowed to be used.
21. P-CSCF forwards this message to the UE.
- 22-24. Terminating end point may generate ringing and it is then forwarded via the session path to the UE.
16. ~~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.~~
17. ~~S-CSCF forwards this message to P-CSCF. Based on the choice made in step #2 above, this may be sent directly to P-CSCF (17a) or may be sent through I-CSCF(THIG) (17b1 and 17b2).~~
18. ~~P-CSCF forwards the ringing message to UE~~
- 19-25. ~~UE indicates to the originating subscriber that the destination is ringing~~
- 26-27. ~~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.~~
- 27-28. S-CSCF performs whatever service control is appropriate for the completed session setup.

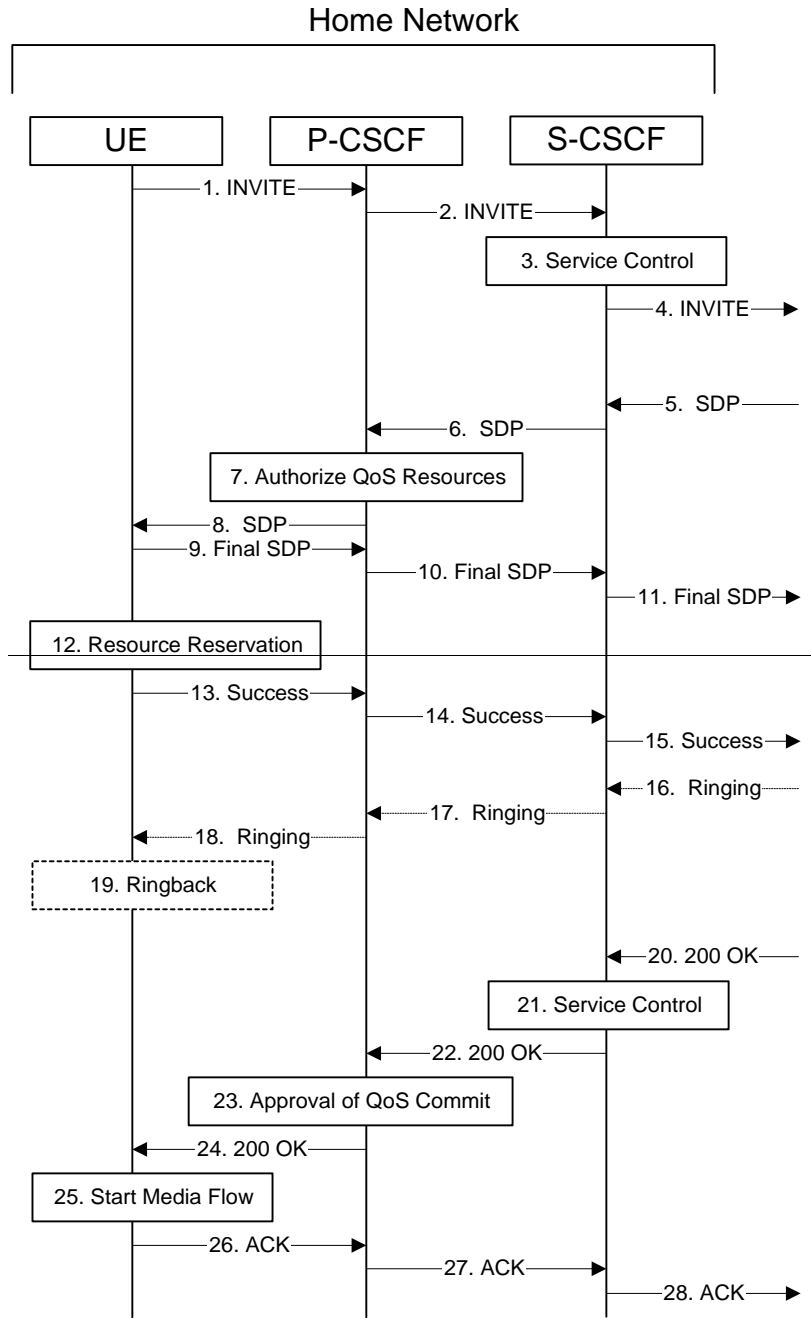
272. S-CSCF sends a SIP 200-OK final response along the signalling path back to P-CSCF. Based on the choice made in (2) above, this response may either be sent directly from S-CSCF to P-CSCF (choice (a)), or be sent indirectly through I-CSCF(THIG) (choice (b)).
283. P-CSCF indicates the resources reserved for this session should now be approved for use~~committed~~.
294. P-CSCF sends a SIP 200-OK final response to the session originator
3025. UE starts the media flow(s) for this session
3126. UE responds to the 200 OK with a SIP ACK message, which is sent to P-CSCF.
3227. P-CSCF forwards the final ACK message to S-CSCF. This may possible be routed through the I-CSCF depending on operator configuration of the I-CSCF.
3328. S-CSCF forwards the final ACK message to the terminating endpoint, per the S-S procedure.

5.6.2 (MO#2) Mobile origination, home

This origination procedure applies to subscribers 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.



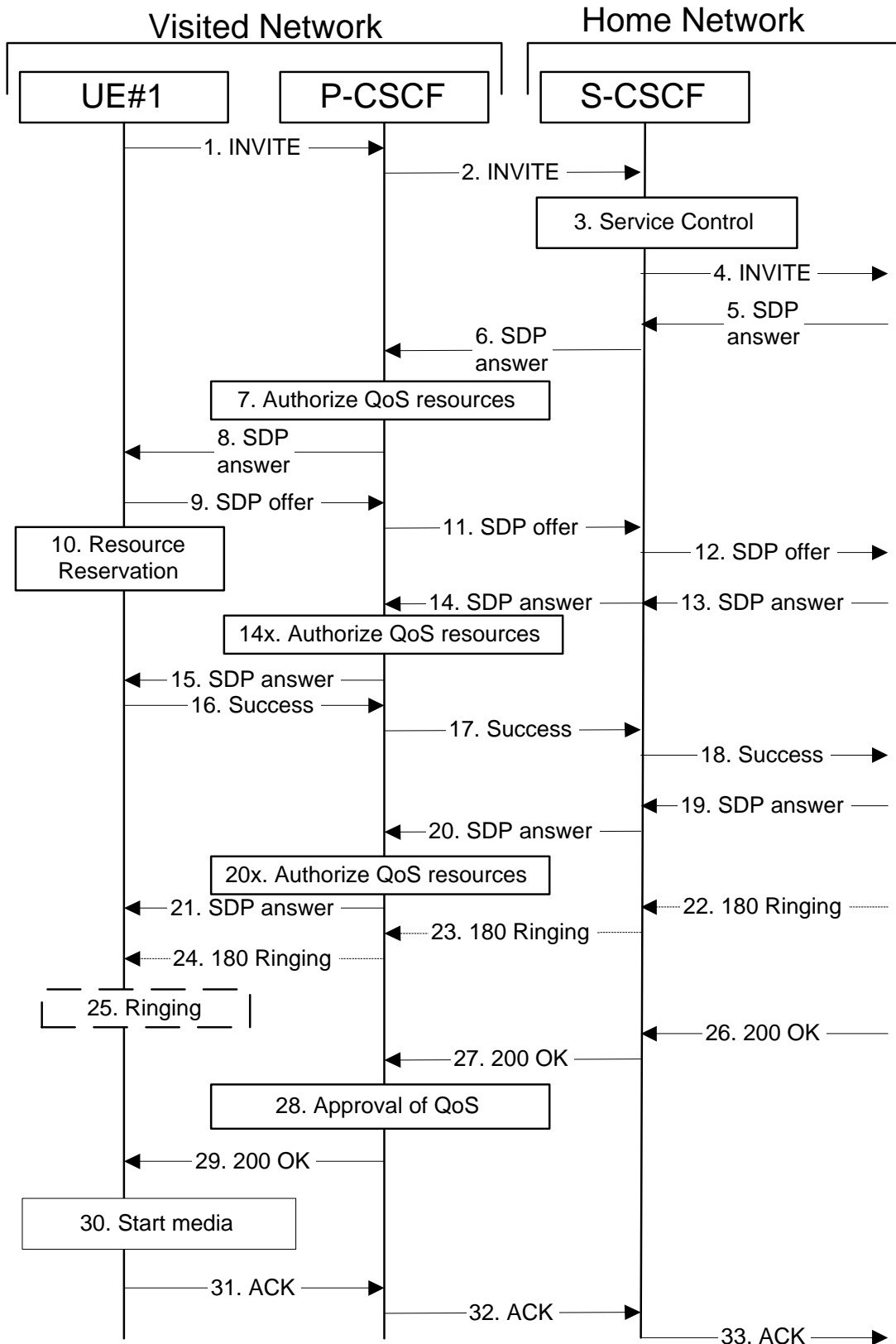


Figure 5.15: Mobile origination procedure - home

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.

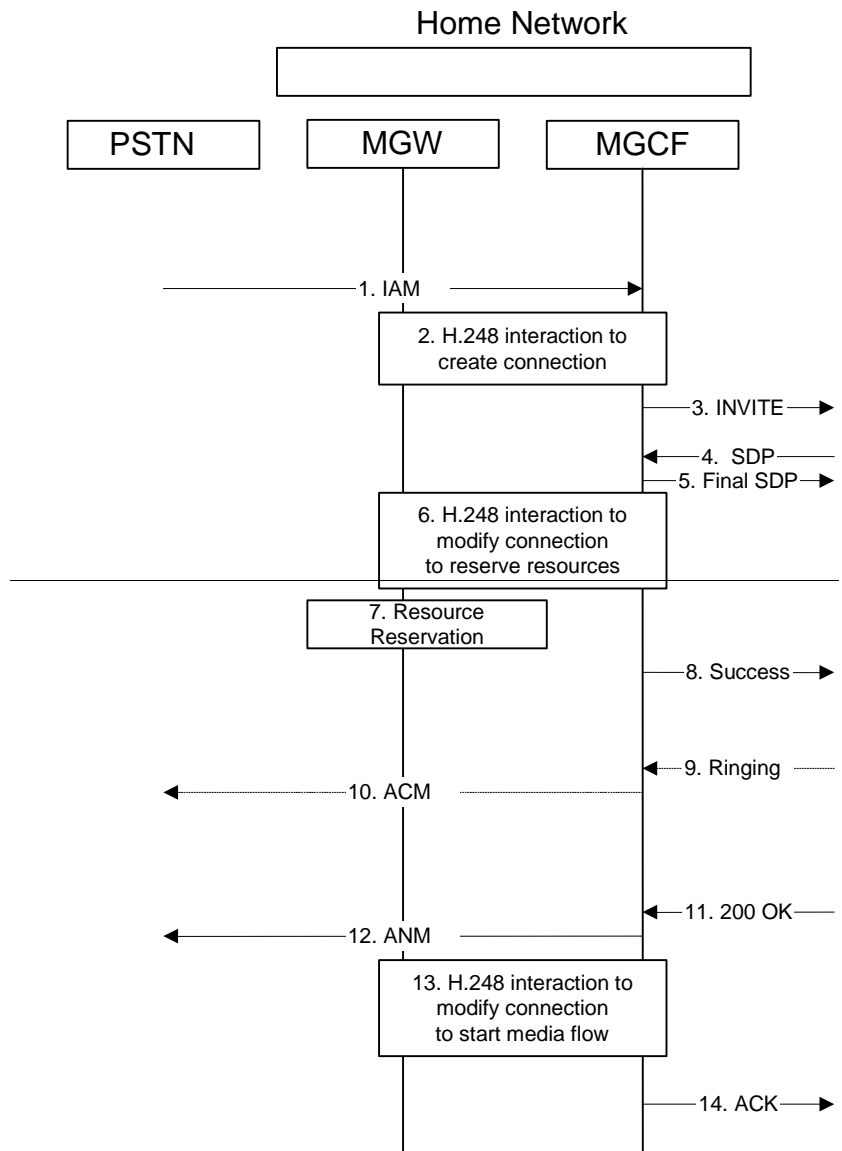
2. P-CSCF remembers (from the registration procedure) the next hop CSCF for this UE. In this case it forwards the INVITE to the S-CSCF in the home network.
3. S-CSCF validates the service profile, and performs any origination service control required for this subscriber. This includes authorisation of 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 SDP 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 SDP message. P-CSCF forwards the SDP message to the originating endpoint.
9. UE decides the ~~offered~~final set of media streams for this session, and sends the ~~offered~~Final SDP to P-CSCF.
10. UE initiates resource reservation for the offered media.
11. P-CSCF forwards this message to S-CSCF
- ~~12.~~ 12. S-CSCF forwards this message to the terminating endpoint, as per the S-S procedure.
- ~~12.~~ 12. ~~After determining the final media streams in step #9, UE initiates the reservation procedures for the resources needed for this session.~~
- ~~13-14x.~~ 13-14x. The terminating end point answers to the offered media and PCSCF authorises the media.
15. PCSCF forwards the answered media towards the UE.
- ~~163.~~ 163. When the resource reservation is completed, UE sends the successful "Resource Reservation ~~Successful~~" message to the terminating endpoint, via the signalling path established by the INVITE message. The message is sent first to P-CSCF.
174. P-CSCF forwards this message to S-CSCF.
- ~~185.~~ 185. S-CSCF forwards this message to the terminating endpoint, as per the S-S procedure.
- ~~19-20x.~~ 19-20x. The terminating end point answers to the offered media and PCSCF authorises the media.
21. PCSCF forwards the answered media to the UE.
- ~~22~~22~~6.~~ 22~~6.~~ 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.
- ~~23~~23~~7.~~ 23~~7.~~ S-CSCF forwards this message to P-CSCF.
- ~~24~~24~~8.~~ 24~~8.~~ P-CSCF forwards the ringing message to UE.
- ~~25~~25~~9.~~ 25~~9.~~ UE indicates to the originating subscriber that the destination is ringing.
- ~~26~~26~~9.~~ 26~~9.~~ 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.
- ~~21.~~ 21. ~~S-CSCF performs any origination service control required by session setup completion.~~
- ~~27~~27~~2.~~ 27~~2.~~ S-CSCF passes the 200-OK response back to P-CSCF, following the path of the INVITE request of step (2) above.
- ~~28~~28~~3.~~ 28~~3.~~ P-CSCF indicates the resources reserved for this session should now be approved for use~~committed~~.

- 294. P-CSCF passes the 200-OK response back to UE
- ~~3025~~. UE starts the media flow(s) for this session.
- ~~3126~~. UE responds to the 200 OK with an ACK message which is sent to P-CSCF.
- ~~3227~~. P-CSCF forwards the final ACK message to S-CSCF.
- ~~3328~~. S-CSCF forwards the final ACK message to the terminating endpoint, per the S-S procedure.

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.



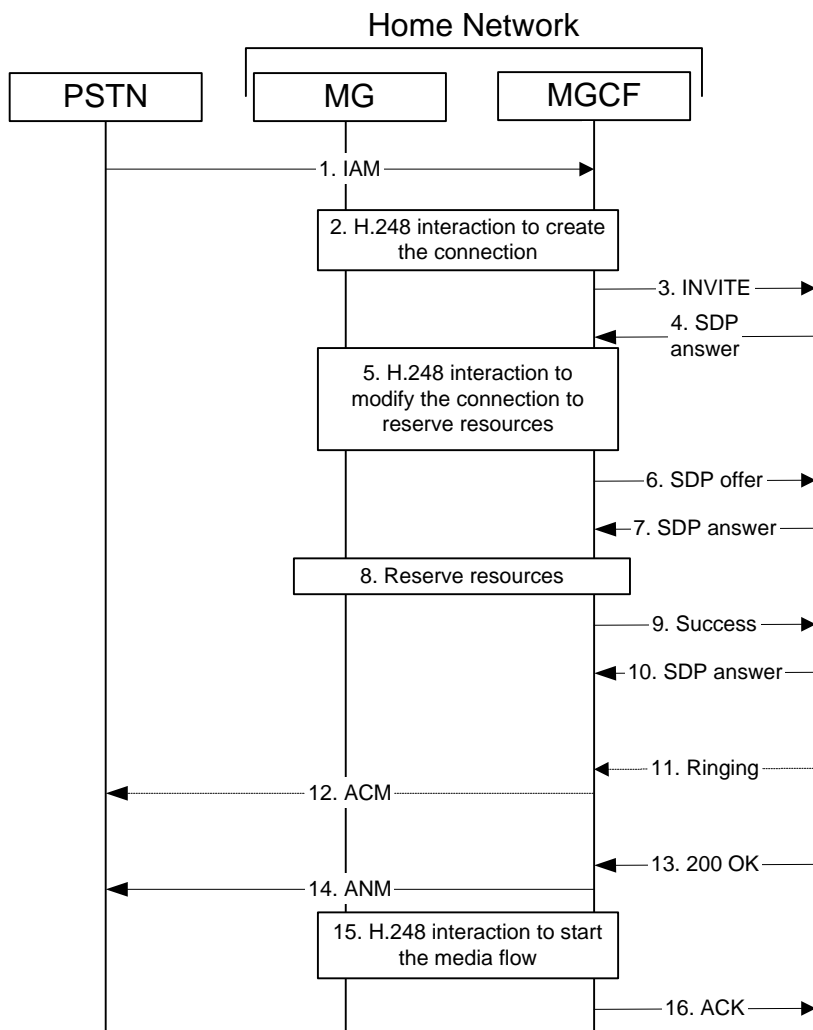


Figure 5.16: PSTN origination procedure

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 decides the final set of media streams for this session, and sends the final SDP per the S-S procedures.~~
- 5.6. —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, and sends the offered SDP per the S-S procedures.~~
7. ~~Terminating end point responds to the offered media.~~
- 8.7. MGW reserves the resources needed for the session

98. When the resource reservation is completed, MGCF sends the successful-“Resource Reservation Successful” message to the terminating endpoint, per the S-S procedures.
10. Terminating end point responds to the successful media resource reservation.
119. 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.
120. If alerting is being performed, the MGCF forwards an ACM message to PSTN
131. When the destination party answers, the terminating and S-S procedures result in a SIP 200-OK final response being sent to MGCF
142. MGCF forwards an ANM message to to the PSTN
153. MGCF initiates a H.248 command to alter the connection at MGW to make it bi-directional
164. 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).

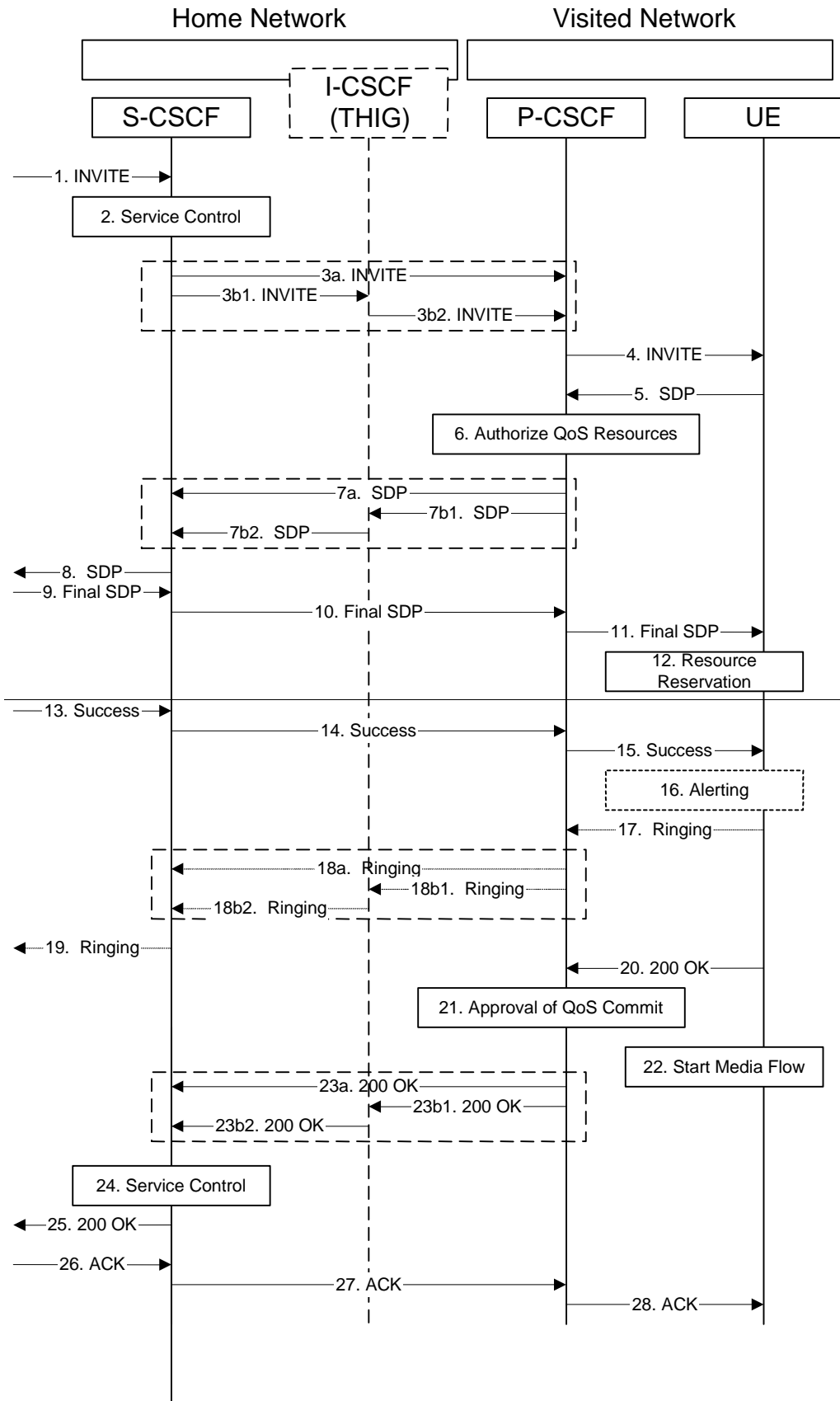
Sessions destined to the PSTN are a special case of the Termination procedures. The MGCF uses H.248 to control a Media Gateway, and communicates with the SS7 network. The MGCF receives and processes SIP requests, and subsequent nodes consider the signalling as if it came from a S-CSCF.

5.7.1 (MT#1) Mobile termination, roaming

This termination procedure applies to roaming subscribers.

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.



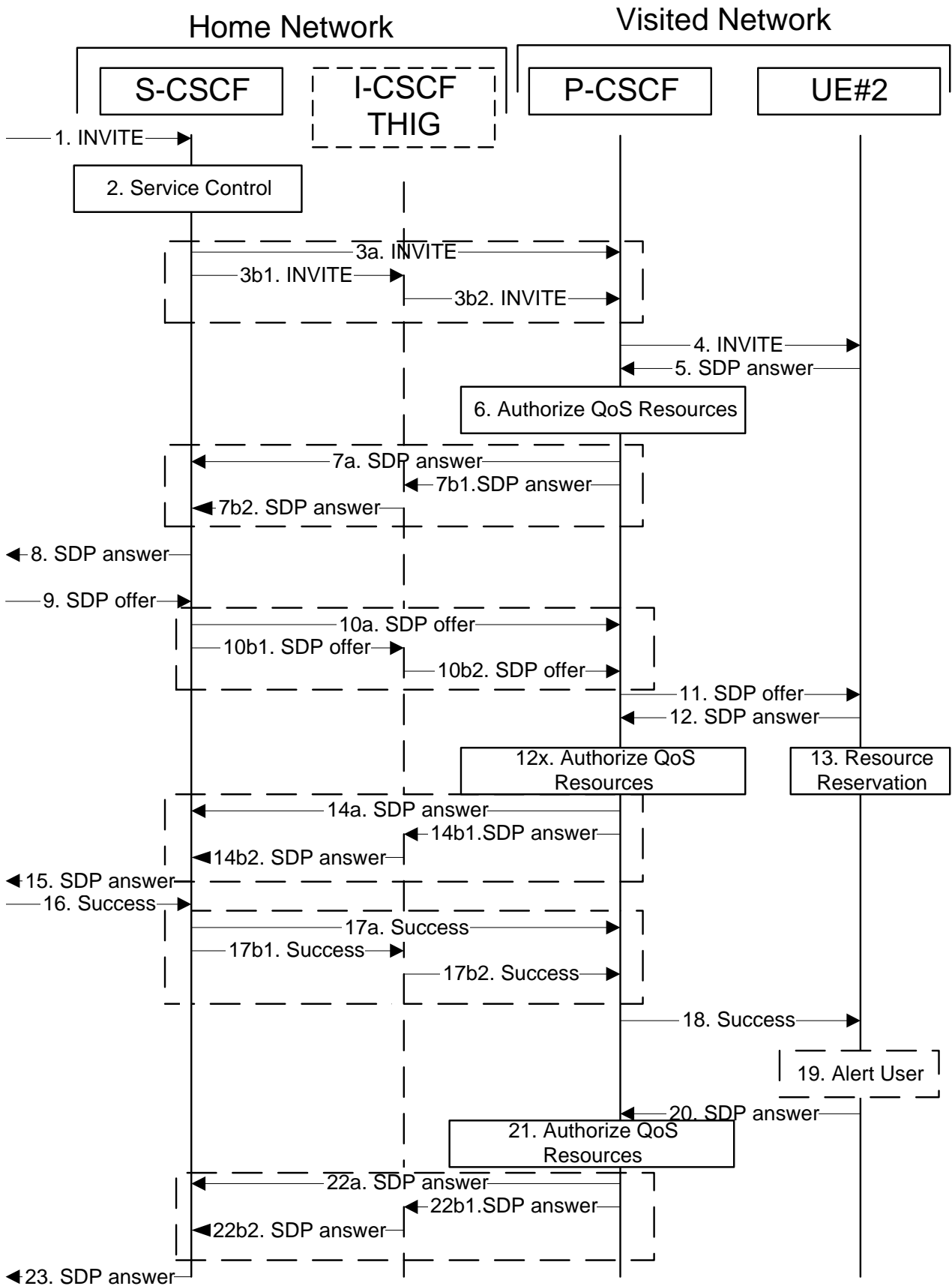


Figure 5.17-1: Mobile termination procedure – roaming (part 1)

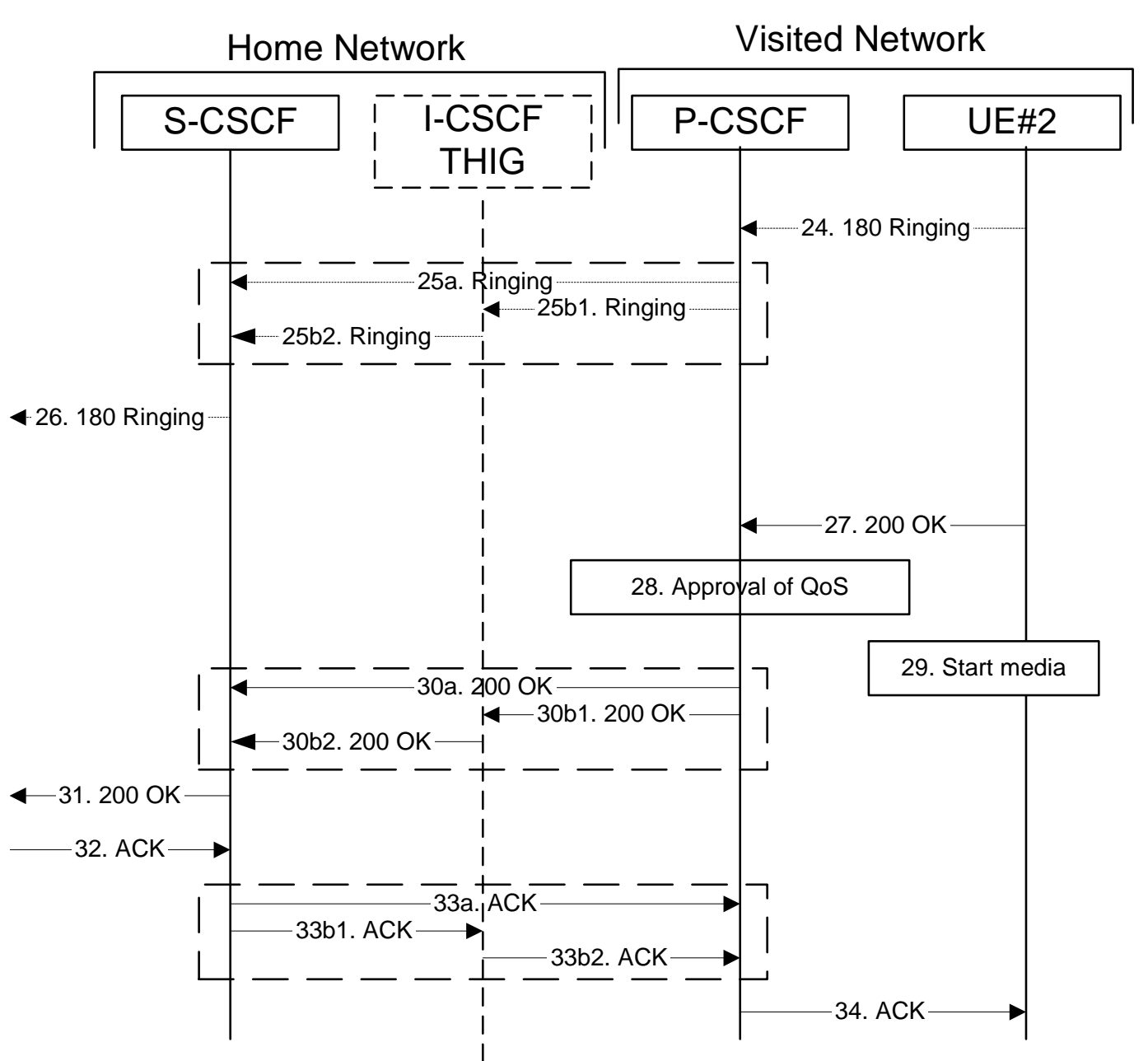


Figure 5.17-2: Mobile termination procedure - roaming (part 2)

Procedure MT#1 is as follows:

1. The originating party sends the SIP INVITE request, via one of the origination procedures, and via one of the Inter-Serving procedures, to the Serving-CSCF for the terminating subscriber.
2. S-CSCF validates the service profile, and performs any termination service control required for this subscriber. 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 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 SDP message back to the originator. This 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 SDP 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 SDP message to the originator, per the S-S procedure.
9. The originating endpoint sends the offered final SDP to be used in this session, via the S-S procedure, to S-CSCF.
10. S-CSCF forwards the offered final SDP to P-CSCF. This may possibly be routed through the I-CSCF depending on operator configuration of the I-CSCF.
11. —P-CSCF forwards the offered final SDP to UE.
- 12-12x. UE responds to the offered resources and PCSCF authorises the resources.
132. UE initiates the reservation procedures for the resources needed for this session.
- 14-15. PCSCF forwards the resource answer to the SCSCF and then to the originating end point via session path.
163. When the originating endpoint has completed its resource reservation, it sends the successful “Resource Reservation Successful” message to S-CSCF, via the S-S procedures.
174. S-CSCF forwards the message to P-CSCF. This may possibly be routed through the I-CSCF depending on operator configuration of the I-CSCF.
185. P-CSCF forwards the message to UE.
196. ~~Before proceeding with session establishment, the UE waits for two events. First, the resource reservation initiated in step #12 must complete successfully. Second, the resource reservation initiated by the originating endpoint must complete successfully (which is indicated by message #15 received by UE). The UE may now immediately accept the session (and proceed with step #20), or UE#2r alerts the destination subscriber of an incoming session setup attempt (and proceed with step #17).~~
- 20-23. UE#2 responds to the successful resource reservation towards the originating end point.
2417. 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.
2518. P-CSCF forwards the Ringing message to S-CSCF. Based on the choice made in step #3 above, this may be sent directly to S-CSCF (18a) or may be sent through I-CSCF(THIG) (18b1 and 18b2).
2619. S-CSCF forwards this message to the originating endpoint, per the S-S procedure.
270. When the destination party answers, the UE sends a SIP 200-OK final response to P-CSCF.
281. P-CSCF indicates the resources reserved for this session should now be committed.

292. UE starts the media flow(s) for this session

~~3023.~~ P-CSCF sends a SIP 200-OK final response along the signalling path back to the S-CSCF
Based on the choice made in (3) above, this response may either be sent directly from P-CSCF to S-CSCF (choice (a)), or be sent indirectly through the I-CSCF(THIG) (choice (b)).

~~24.~~ S-CSCF performs whatever service control is required for the session setup completion

~~3125.~~ S-CSCF forwards the SIP 200-OK final response along the signalling path back to the session originator, as per the S-S procedure.

~~3226.~~ 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.

~~3327.~~ S-CSCF forwards the SIP ACK message to P-CSCF. This may possibly be routed through the I-CSCF depending on operator configuration of the I-CSCF.

~~3428.~~ P-CSCF forwards the ACK message to UE.

5.7.2 (MT#2) Mobile termination, home

This termination procedure applies to subscribers 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.

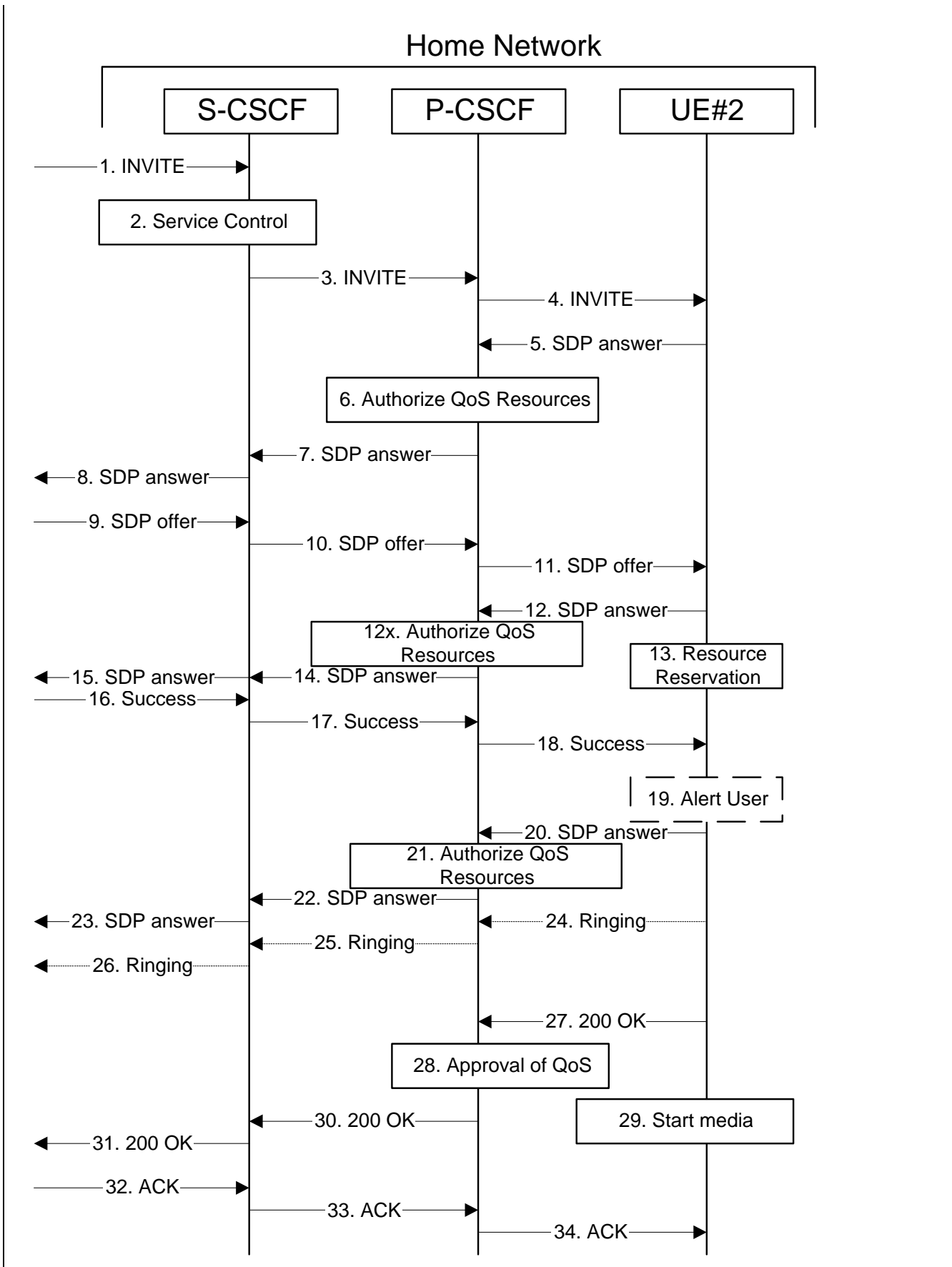


Figure 5.18: Mobile termination procedure - home

Procedure MT#2 is as follows:

1. UE#1 sends the SIP INVITE request, via one of the origination procedures, and via one of the Serving to Serving-CSCF procedures, to the Serving-CSCF for the terminating subscriber.
2. S-CSCF validates the service profile, and performs any termination service control required for this subscriber. 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 SDP message back to the originator. This 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 SDP message to S-CSCF.
8. S-CSCF forwards the SDP message to the originator, per the S-S procedure.
9. The originating endpoint sends the offered SDP to be used in this session, via the S-S procedure, to S-CSCF.
10. S-CSCF forwards the offered SDP to P-CSCF.
11. P-CSCF forwards the offered SDP to UE.
- 12-12x. UE responds to the offered SDP and P-CSCF authorises the response.
132. UE initiates the reservation procedures for the resources needed for this session.
- 14-15. The response is forwarded to the originating end point.
163. When the originating endpoint has completed its resource reservation, it sends the successful "Resource Reservation Successful" message to S-CSCF, via the S-S procedures.
174. S-CSCF forwards the message to P-CSCF.
185. P-CSCF forwards the message to UE.
196. Before proceeding with session establishment, the UE waits for two events. First, the resource reservation initiated in step #12 must complete successfully. Second, the resource reservation initiated by the originating endpoint must complete successfully (which is indicated by message #15 received by UE). The UE may now immediately accept the session (and proceed with step #20), or UE#2 -alerts the destination subscriber of an incoming session setup attempt (and proceed with step #17).
- 20-23. UE#2 responds to the successful resource reservation and P-CSCF authorises the possible response offer and the message is forwarded to the originating end.
2417. 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.
2518. P-CSCF forwards the Ringing message to S-CSCF.
2619. S-CSCF forwards this message to the originating endpoint, per the S-S procedure.
270. When the destination party answers, UE sends a SIP 200-OK final response to P-CSCF.
281. P-CSCF indicates the resources reserved for this session should now be committed.

292. UE starts the media flow(s) for this session.
3023. P-CSCF forwards the 200-OK to S-CSCF, following the path of the INVITE request in step (3) above
3124. S-CSCF performs any service control required on session setup completion.
3225. S-CSCF forwards the 200-OK final response, as per the appropriate S-S procedure.
3326. The session originator responds to the 200-OK by sending the ACK message to S-CSCF via the S-S procedure.
3427. S-CSCF forwards the SIP ACK message to P-CSCF.
3528. P-CSCF forwards the ACK message to UE.

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

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

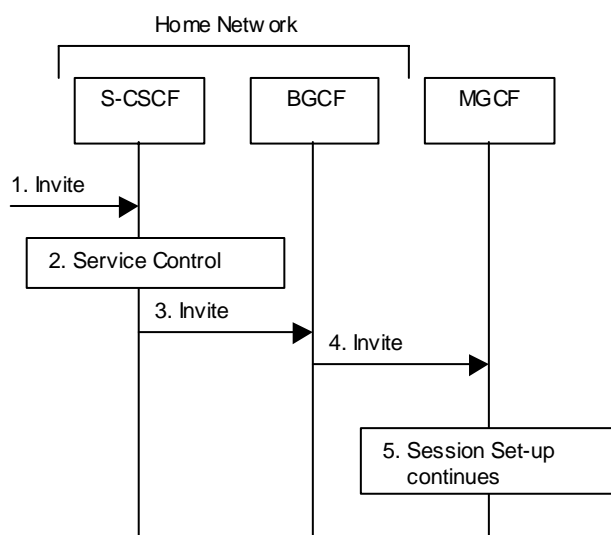


Figure 5.18a: Mobile Terminating procedures to a subscriber that is unregistered for IMS services but is registered for CS services

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

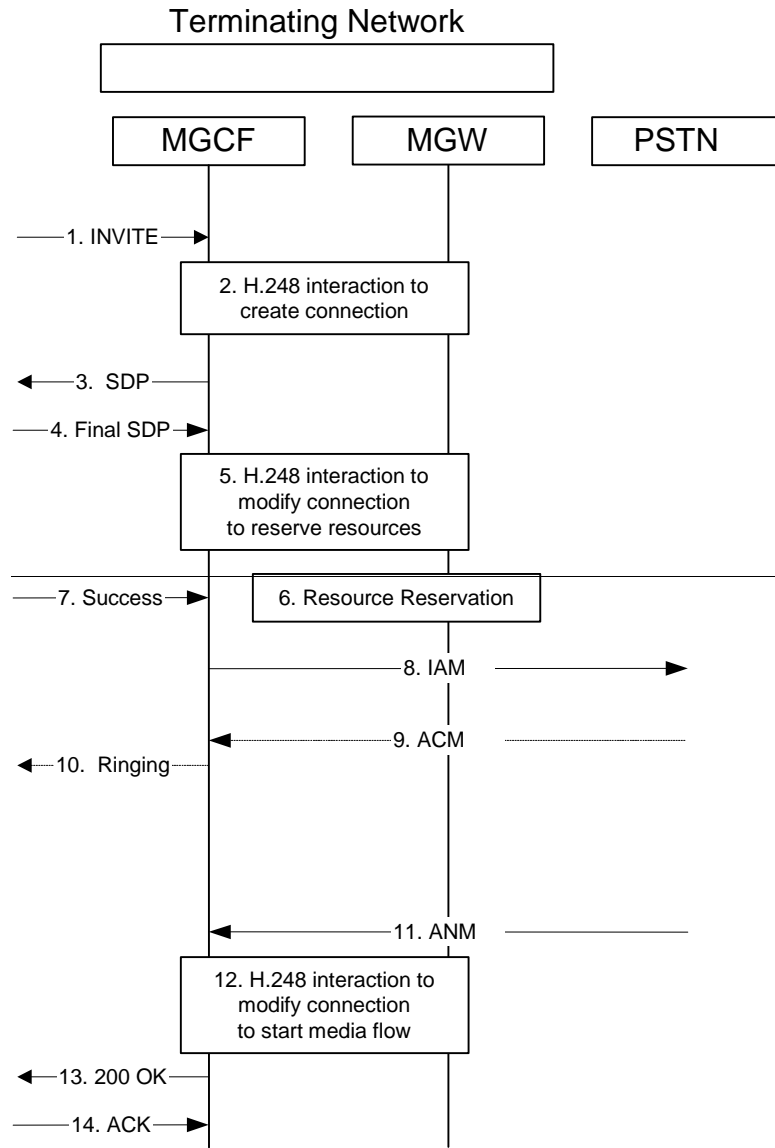
5.7.3 (PSTN-T) PSTN termination

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

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

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

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



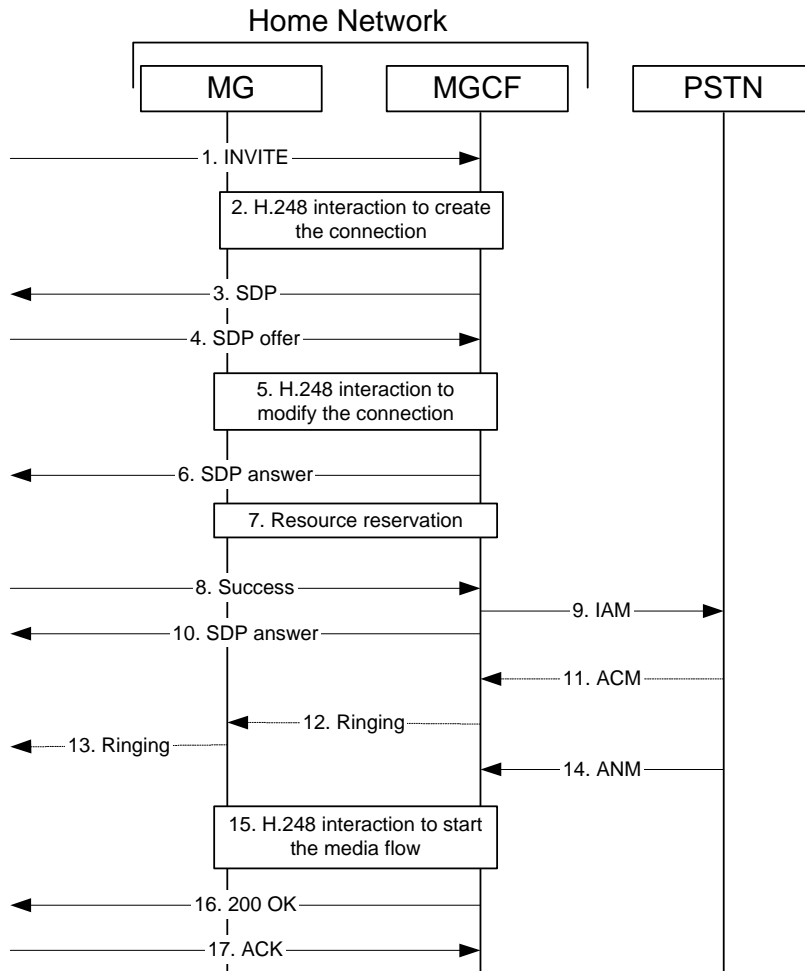


Figure 5.19: PSTN termination procedure

The PSTN termination procedure is as follows:

1. MGCF receives an INVITE request, through one of the origination procedures and via one of the inter-serving procedures.
2. MGCF initiates a H.248 interaction to pick an outgoing channel and determine media capabilities of the MGW.
3. MGCF determines the subset of the media flows proposed by the originating endpoint that it supports, and responds with an SDP message back to the originator. This response is sent via the S-S procedure.
4. The originating endpoint sends the offered final SDP to be used in this session, via the S-S procedure, to MGCF.
5. MGCF initiates a H.248 interaction to modify the connection established in step #2 and instruct MGW to reserve the resources necessary for the media streams.
6. MGCF responds to the offered media towards the originating party.
7. MGW reserved the resources necessary for the media streams.
8. When the originating endpoint has completed its resource reservation, it sends the successful “Resource Reservation Successful” message to MGCF, via the S-S procedures.
9. MGCF sends an IAM message to the PSTN
10. MGCF sends response to the successful resource reservation towards originating end.

119. The PSTN establishes the path to the destination. It may optionally alert the destination user before completing the session. If so, it responds with an ACM message

12-130. If the PSTN is alerting the destination user, MGCF indicates this to the originating party by a provisional response indicating Ringing. This message is sent via the S-S procedures.

141. When the destination party answers, the PSTN sends an ANM message to MGCF

152. MGCF initiates a H.248 interaction to make the connection in the MGW bi-directional.

163. MGCF sends a SIP 200-OK final response along the signalling path back to the session originator

174. The Originating party acknowledges the final response with a SIP ACK message

5.8 Procedures related to routing information interrogation

The mobile terminated sessions for a subscriber shall be routed either to a Serving-CSCF or to a MGCF (if the subscriber is roaming in a legacy network). When a mobile terminated session set-up arrives at a CSCF that is authorised to route sessions, the CSCF interrogates the HSS for routing information.

The Cx reference point shall support retrieval of routing information from HSS to CSCF. The resulting routing information can be either Serving-CSCF signalling transport parameters (e.g. IP-address).

**** Fourth Change *****

5.11.3 Procedures for codec and media flow negotiations

This section gives information flows for the procedures for determining the set of mutually-supported codecs between the endpoints of a multi-media session, determining the initial codecs to be used for the multi-media session, and the procedures for changing between codecs when multiple ones are supported.

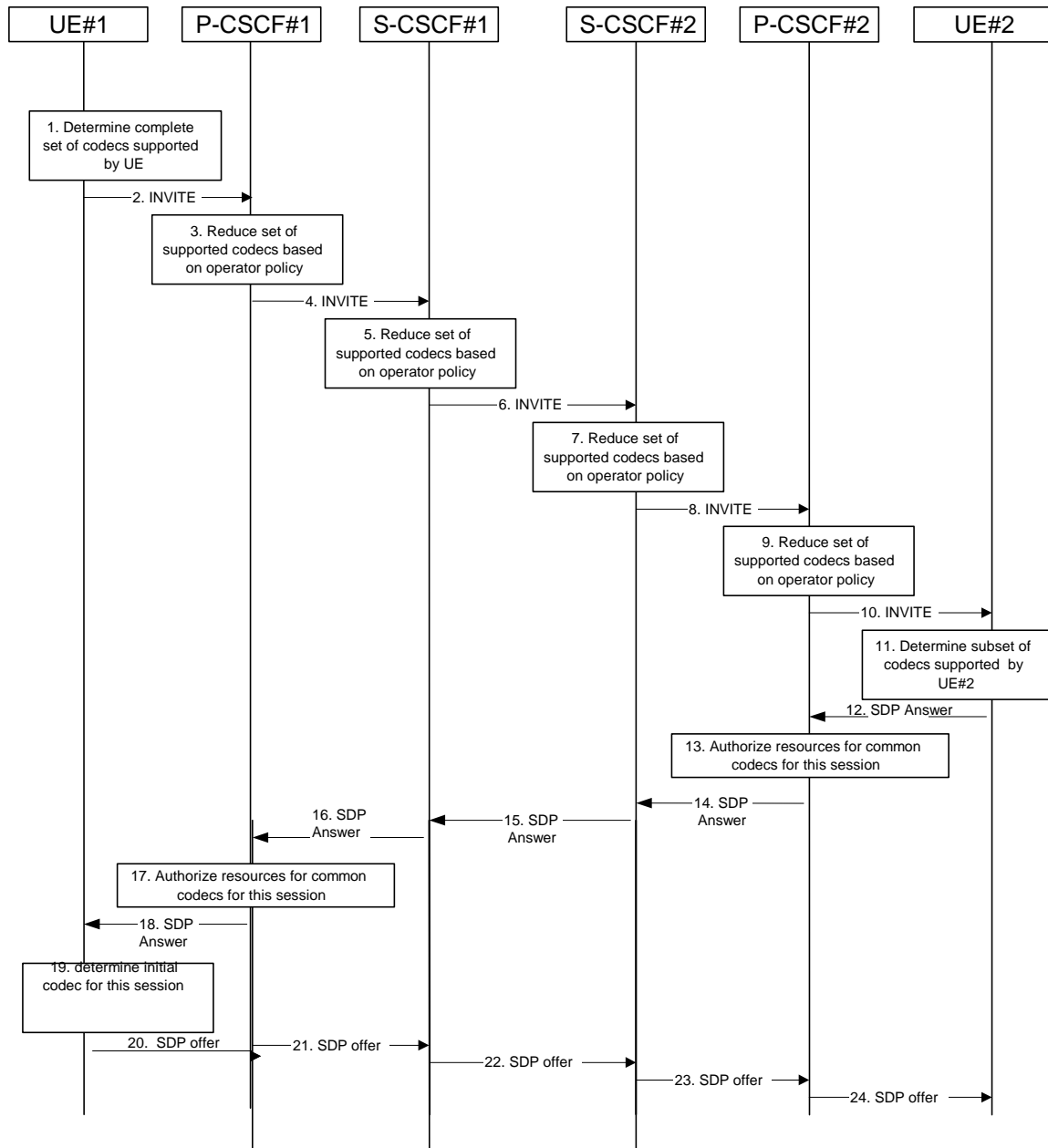
5.11.3.1 Codec negotiation during initial session establishment

Initial session establishment in the IM CN subsystem must determine 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 common codecs, 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 codec that the originator is willing to support for this session. When the message arrives at the destination endpoint, it responds with the subset that it is also willing to support for the session. Media authorisation is performed for this common subset. The session initiator, upon receiving the common subset, determines the codec (or set of 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 codec that was included in the initial common list, 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 propose additional codecs, to receive additional authorisation for QoS resources, or to change to a different codec that requires resources beyond those allocated to the session.



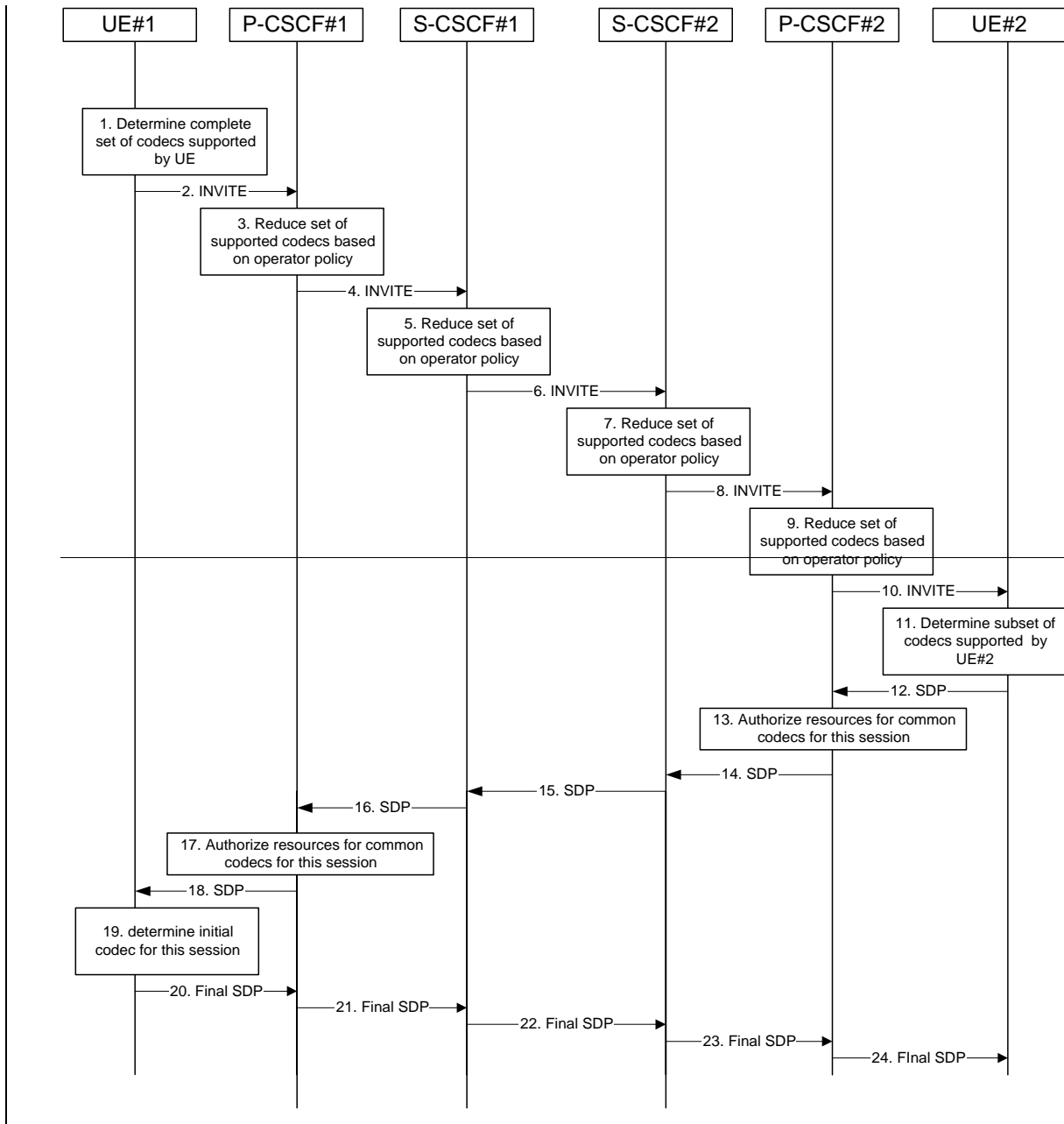


Figure 5.30: Codec negotiation during initial session establishment

The detailed procedure is as follows:

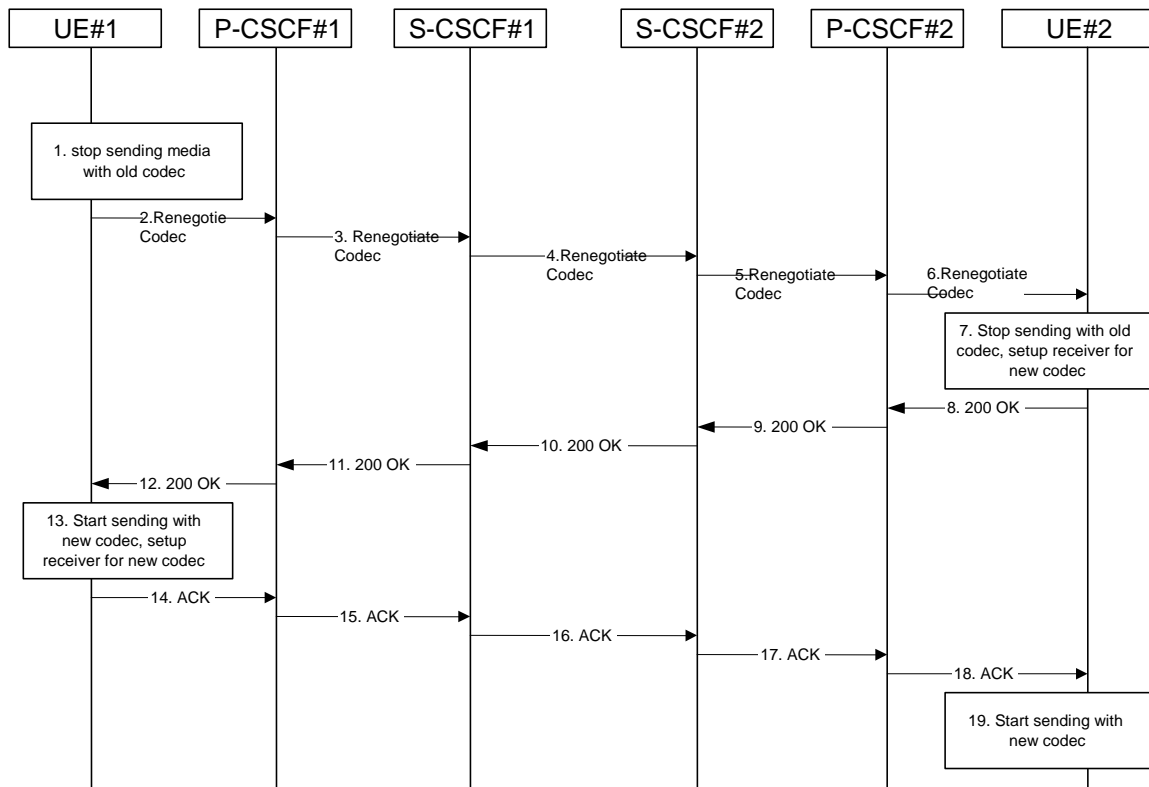
1. UE#1 inserts the codec(s) to a SDP payload. The inserted codec(s) shall reflect the UE#1's terminal capabilities and user preferences for the session. capable of supporting for this session. It builds a SDP containing bandwidth requirements and characteristics of each, and assigns local port numbers for each possible media flow. Multiple media flows may be offered, and for each media flow (m= line in SDP), there may be multiple codec choices offered.
2. UE#1 sends the initial INVITE message to P-CSCF#1 containing this SDP
3. P-CSCF#1 examines the media parameters, and removes any choices that the network operator decides based on local policy, not to allow on the network.
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 subscriber 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 subscriber 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.
10. The Authorization-Token is included in the INVITE message. P-CSCF#2 forwards the INVITE message to UE#2
11. UE#2 determines the complete set of codecs that it is capable of supporting for this session. It determines the intersection with those appearing in the SDP in the INVITE message. For each media flow that is not supported, UE#2 inserts a SDP entry for media (m= line) with port=0. For each media flow that is supported, UE#2 inserts a SDP entry with an assigned port and with the codecs in common with those in the SDP from UE#1.
12. UE#2 returns the SDP listing common media flows and codecs to P-CSCF#2
13. P-CSCF#2 authorises the QoS resources for the remaining media flows and codec choices.
14. P-CSCF#2 forwards the SDP response to S-CSCF#2.
15. S-CSCF#2 forwards the SDP response to S-CSCF#1
16. S-CSCF#1 forwards the SDP response to P-CSCF#1
17. P-CSCF#1 authorises the QoS resources for the remaining media flows and codec choices. The Authorization-Token is generated by the PCF.
18. The Authorization-Token is included in the SDP message. P-CSCF#1 forwards the SDP response to UE#1
19. UE#1 determines which media flows should be used for this session, and which codecs should be used for each of those media flows. If there was more than one media flow, or if there was more than one choice of codec for a media flow, then UE#1 ~~must include an SDP in the "Final SDP"~~ need to renegotiate the codecs by sending another offer to reduce codec to one message with the sent to UE#2.
- 20-24. UE#2 sends the "~~Offered~~Final 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.

5.11.3.2 Codec or media flow change within the existing reservation

After the multi-media session is established, it is possible for either endpoint to change the set of media flows or codec for a media flow. If the change is within the resources already reserved, then it is only necessary to synchronise the change with the other endpoint. Note that an admission control decision will not fail if the new resource request is within the existing reservation.



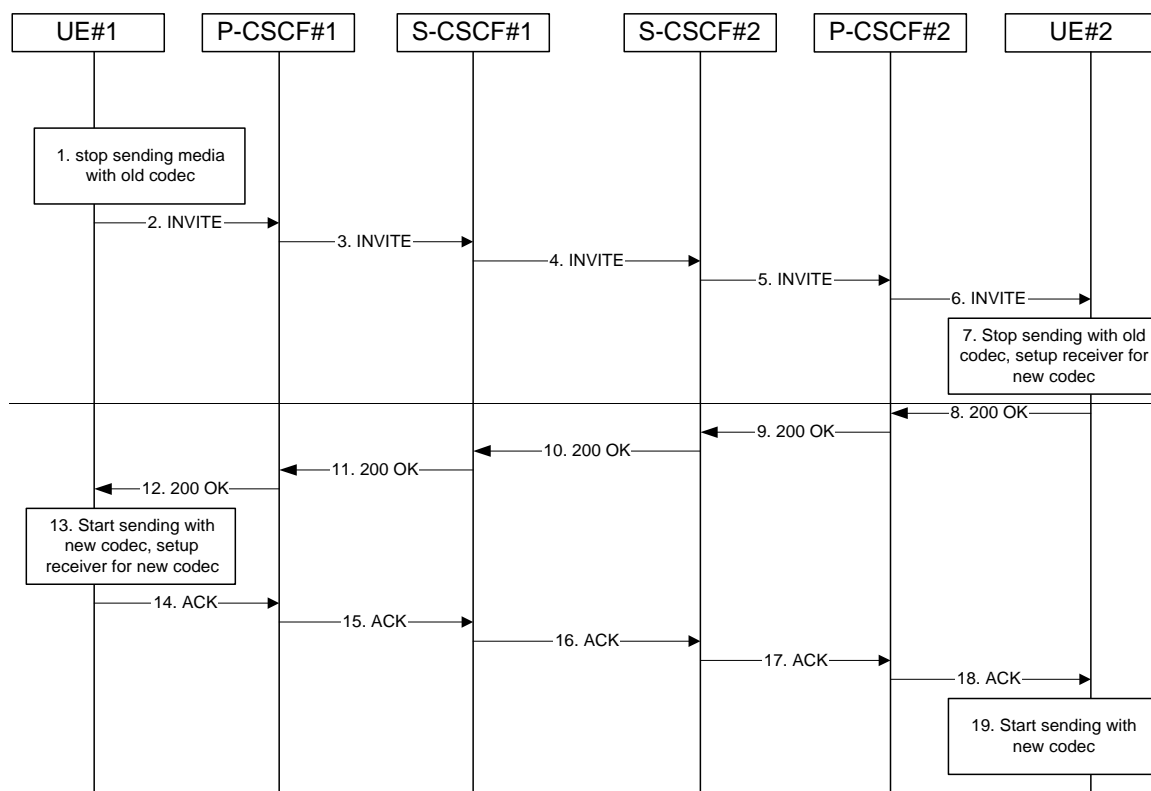


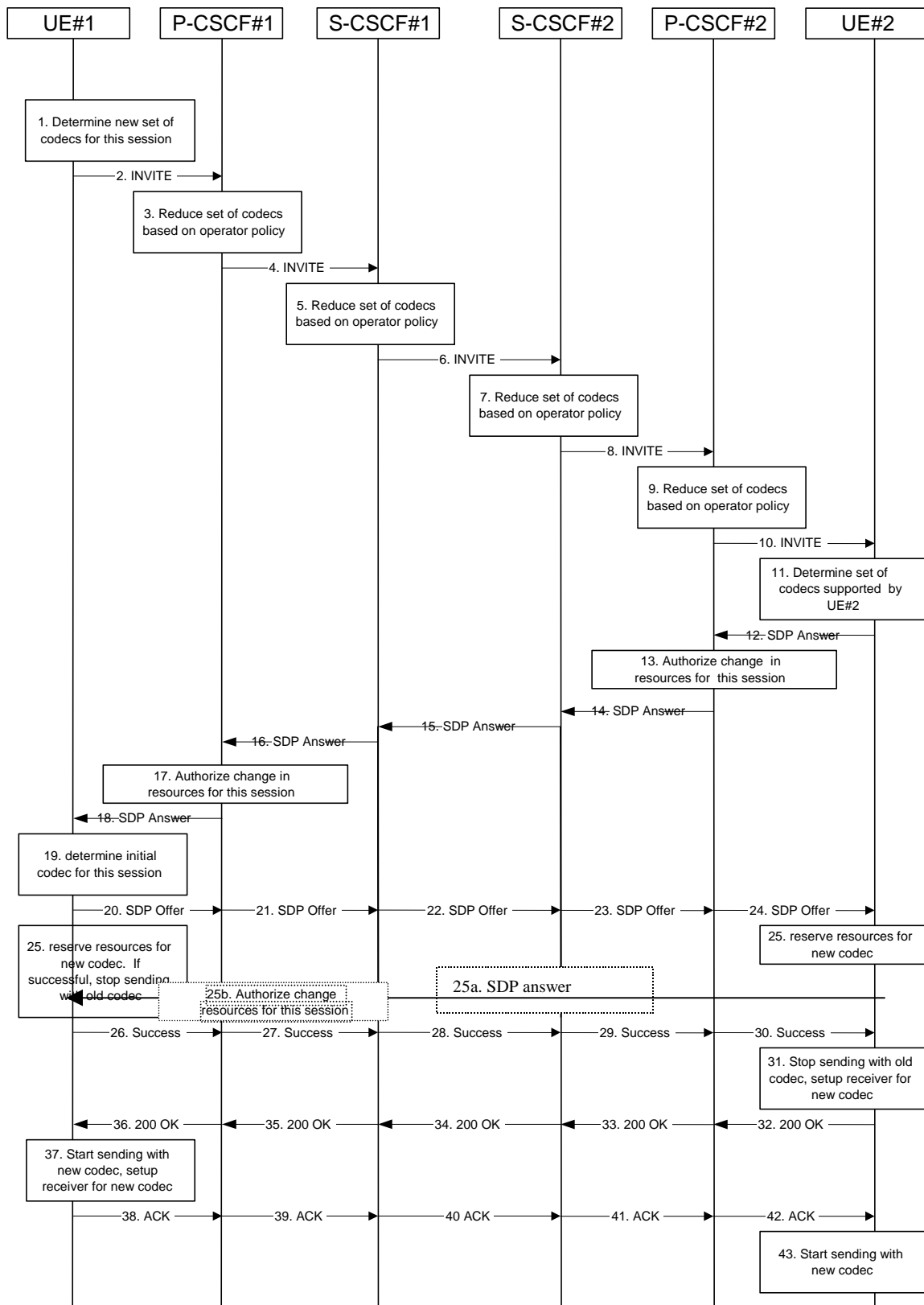
Figure 5.31: Codec or media flow change - same reservation

The detailed procedure is as follows:

1. UE#1 determines that a new media stream is desired, or that a change is needed in the codec in use for an existing media stream. UE#1 evaluates the impact of this change, and determines the existing resources reserved for the session are adequate. UE#1 builds a revised SDP that includes all the common media flows determined by the initial negotiation, but assigns a codec and port number only to those to be used onward. UE#1 stops transmitting media streams on those to be dropped from the session.
- 2-6. UE#1 sends an INVITE message through the signalling path to UE#2. At each step along the way, the CSCFs recognise the SDP is a proper subset of that previously authorised, and take no further action.
7. UE#2 receives the INVITE message, and agrees that it is a change within the previous resource reservation. (If not, it would respond with a SDP message, following the procedures of 5.11.3.1). UE#2 stops sending the media streams to be deleted, and initialises its media receivers for the new codec.
- 8-12. UE#2 forwards a 200-OK final response to the INVITE message along the signalling path back to UE#1.
13. UE#1 starts sending media using the new codecs. UE#1 also releases any excess resources no longer needed.
- 14-18. UE#1 sends the SIP final acknowledgement, ACK, to UE#2.
19. UE#2 starts sending media using the new codecs. UE#2 also releases any excess resources no longer needed.

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

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



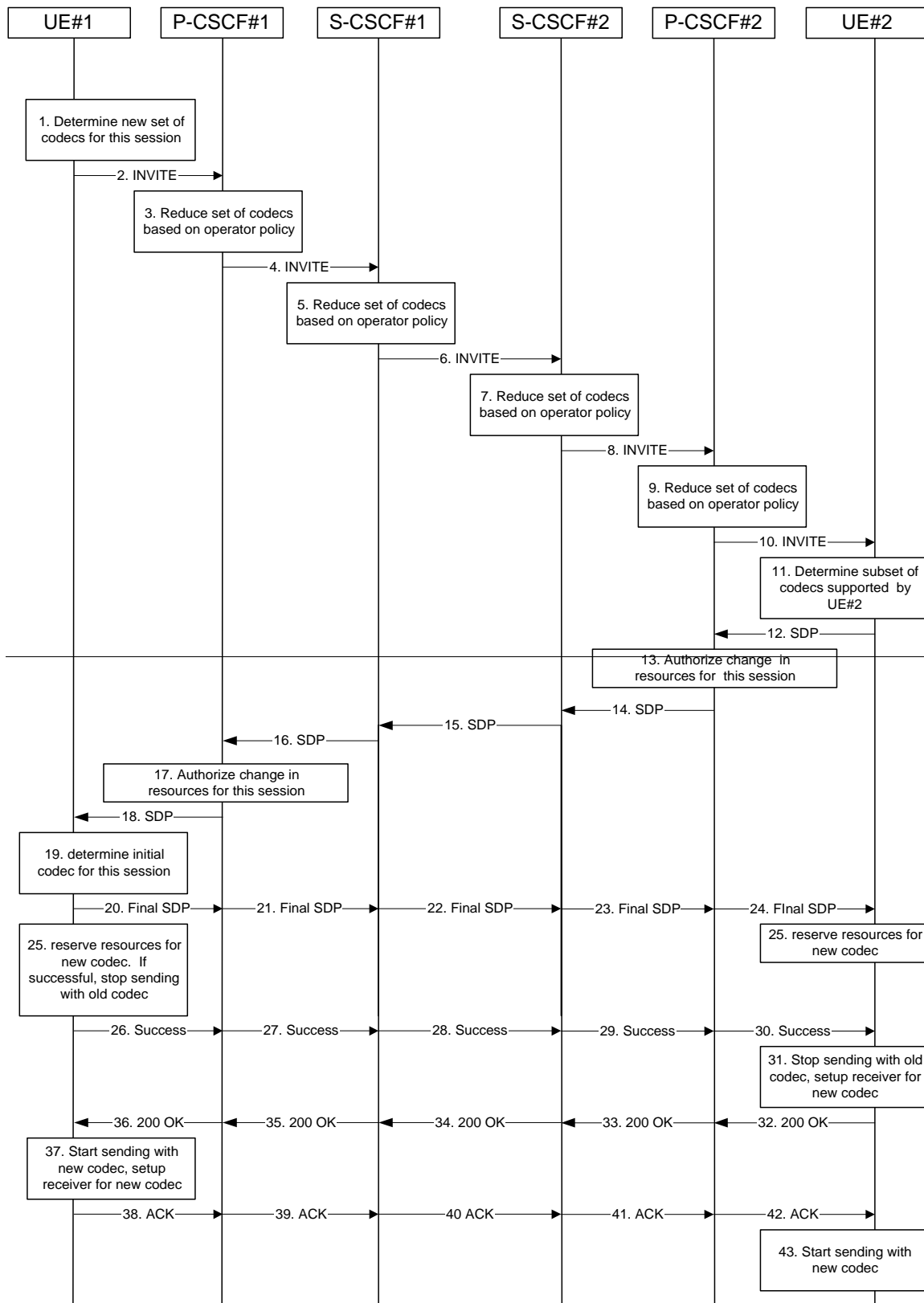


Figure 5.32: Codec or media flow change - new reservation

The detailed procedure is as follows:

1. UE#1 inserts the revised set of codecs to a SDP payload. The inserted codec(s) shall reflect the UE#1's terminal capabilities and user preferences for the session. It builds a SDP containing bandwidth requirements and characteristics of each, and assigns local port numbers for each possible media flow.

Multiple media flows may be offered, and for each media flow (m= line in SDP), there may be multiple codec choices offered.

2. UE#1 sends an INVITE message to P-CSCF#1 containing this SDP
3. P-CSCF#1 examines the media parameters, and removes any choices that the network operator decides, based on local policy, not to allow on the network.
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 subscriber 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 subscriber 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 flows and the codec choices, and removes any that the destination network operator decides, based on local policy, not to allow on the network.
10. P-CSCF#2 forwards the INVITE message to UE#2
11. UE#2 determines the complete set of codecs that it is capable of supporting for this session. It determines the intersection with those appearing in the SDP in the INVITE message. For each media flow that is not supported, UE#2 inserts a SDP entry for media (m= line) with port=0. For each media flow that is supported, UE#2 inserts a SDP entry with an assigned port and with the codecs in common with those in the SDP from UE#1.
12. UE#2 returns the SDP listing common media flows and codecs to P-CSCF#2. It may additionally provide more codecs than originally offered and then the offered set need to be renegotiated.
13. P-CSCF#2 increases the authorisation for the QoS resources, if needed, for the remaining media flows and codec choices.
14. P-CSCF#2 forwards the SDP response to S-CSCF#2.
15. S-CSCF#2 forwards the SDP response to S-CSCF#1
16. S-CSCF#1 forwards the SDP response to P-CSCF#1
17. P-CSCF#1 increases the authorisation for the QoS resources, if needed, for the remaining media flows and codec choices.
18. P-CSCF#1 forwards the SDP response to UE#1
19. UE#1 determines which media flows should be used for this session, and which codecs should be used for each of those media flows. If there was more than one media flow, or if there was more than one choice of codec for a media flow, then UE#1 must include an SDP in the response message by including "Final SDP" message sent to UE#2.
- 20-24. UE#1 sends the offered"Final SDP" message to UE#2, including the SDP from step #19 if needed.
25. UE#1 and UE#2 reserve the resources needed for the added or changed media flows. If the reservation is successfully completed by UE#1, it stops transmitting any deleted media streams.
- 25a. If UE#1 has sent an updated offer of SDP in steps 20-24, then UE#2 responds to the offer.
- 25b. P-CSCF#1 authorises the offered SDP sent by UE#2.

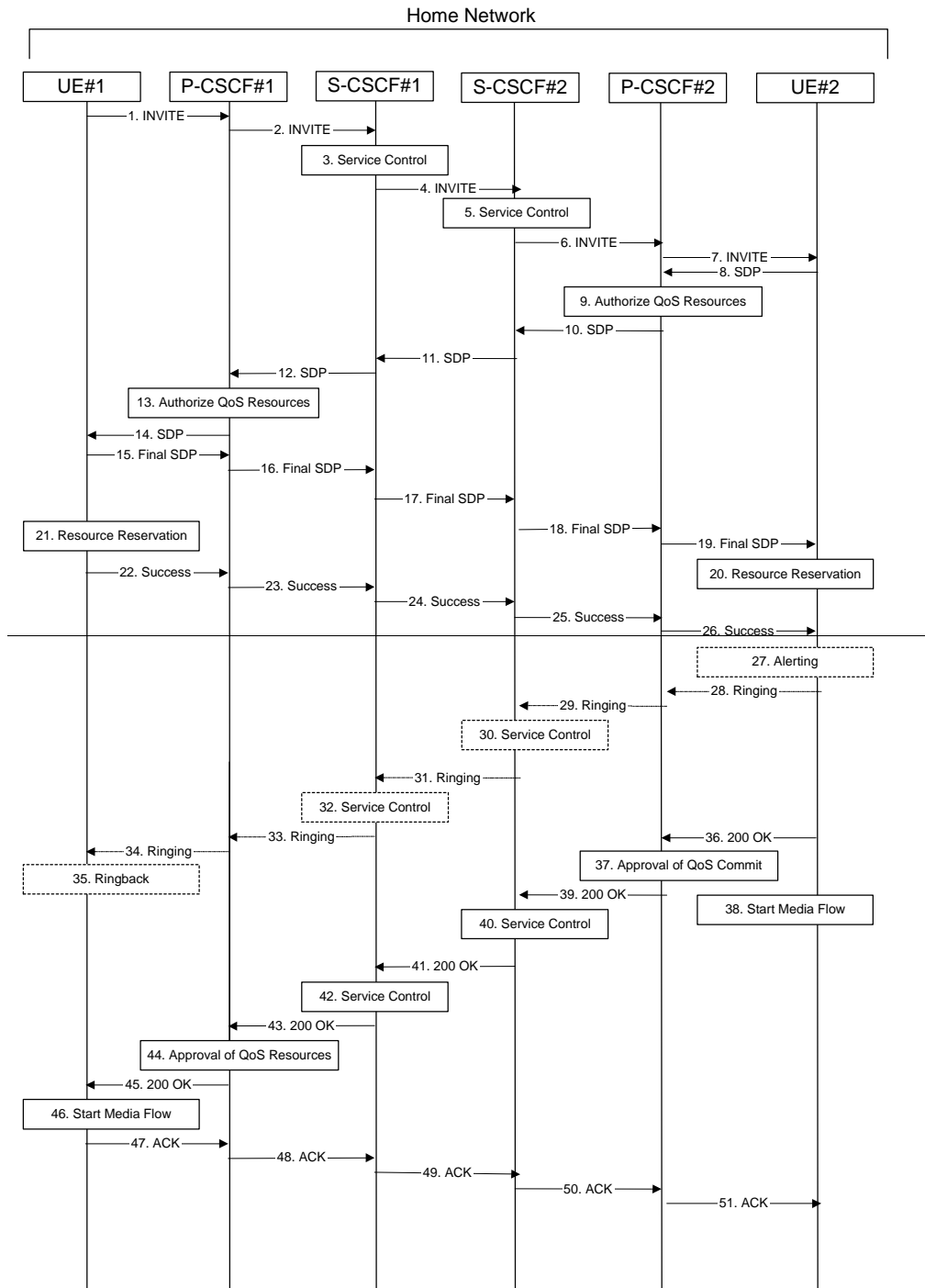
- 26-30. UE#1 sends the successful “Resource Reservation Successful” message with final SDP to UE#2, via the signalling path through the CSCFs.
- 31. UE#2 stops sending the media streams to be deleted, and initialises its media receivers for the new codec.
- 32-36. UE#2 sends the 200-OK final response to UE#1, along the signalling path
- 37. UE#1 starts sending media using the new codecs. UE#1 also releases any excess resources no longer needed.
- 38-40. UE#1 sends the SIP final acknowledgement, ACK, to UE#2 along the signalling path
- 43. UE#2 starts sending media using the new codecs. UE#2 also releases any excess resources no longer needed

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.



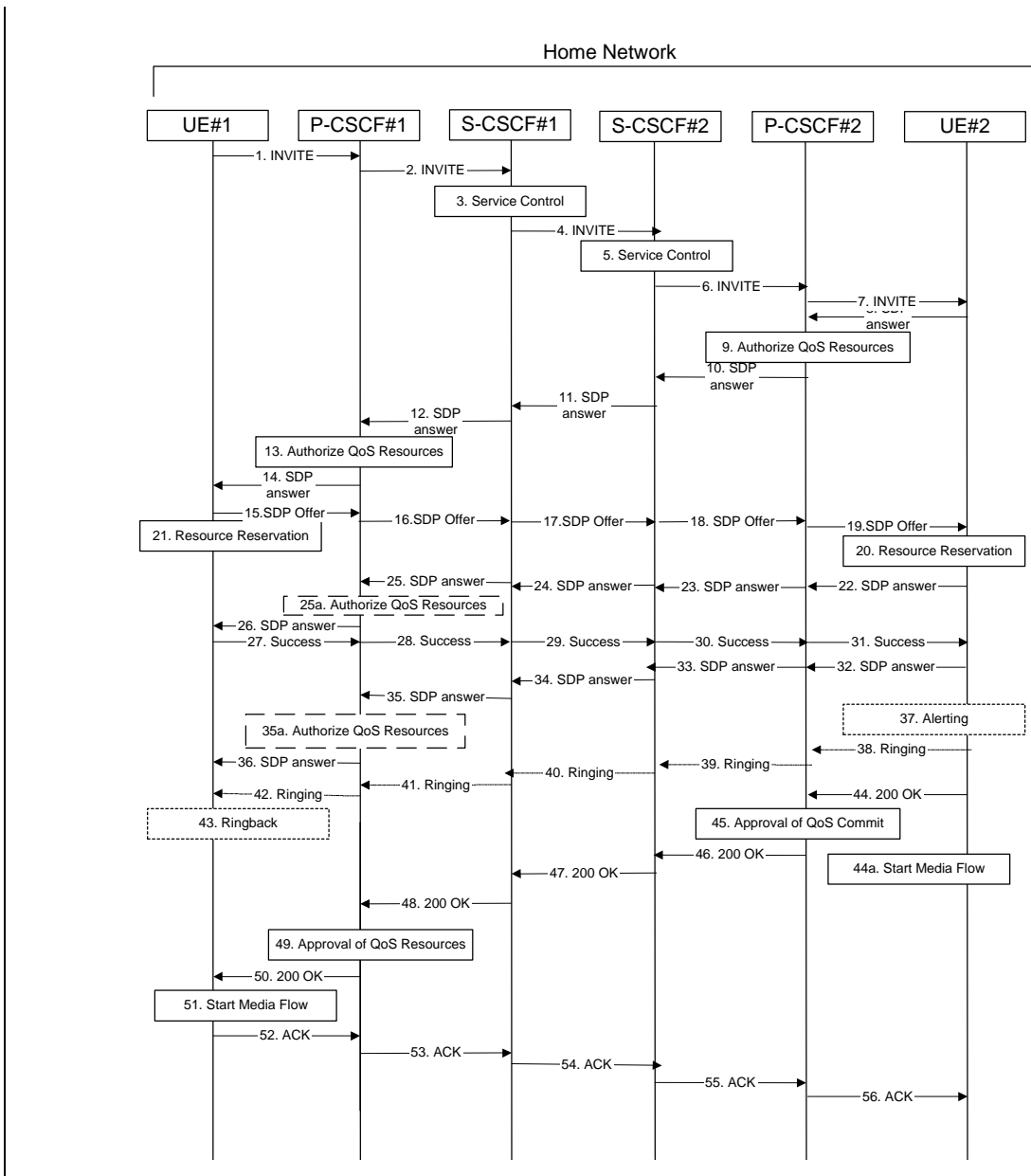


Figure 5.33: Multimedia session flow - addition of another media

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 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 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 offeredfinal set of media streams for this media addition, and sends the offeredfinal SDP to P-CSCF#1.
- ~~16. P-CSCF#1 forwards the final SDP to S-CSCF#1.~~
- ~~17. S-CSCF#1 forwards the final SDP to S-CSCF#2.~~
- ~~18. S-CSCF#2 forwards the final SDP to P-CSCF#2.~~
- ~~19. P-CSCF#2 forwards the final SDP to UE#2.~~
20. UE#2 initiates the resource reservation procedures for the resources necessary for this additional media.
21. After determining the offeredfinal 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#~~21~~ has successfully reserved the needed resources, it sends the “reservation successful” message to UE#~~22~~ along the signaling path established by the INVITE message. The message is sent first to P-CSCF#~~11~~.
- ~~23. P-CSCF#1 forwards the message to S-CSCF#1.~~
- ~~24. S-CSCF#1 forwards the message to S-CSCF#2.~~
- ~~25. S-CSCF#2 forwards the message to P-CSCF#2.~~
- 25a. P-CSCF#1 authorises any additional media for the proposed SDP.
26. P-CSCF#~~12~~ forwards the message to UE#~~12~~.
- 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 subscriber 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~~29. P-CSCF#2 forwards the ringing message to S-CSCF#2.
- ~~4~~30. S-CSCF#2 performs whatever service control is appropriate for this ringing flow.
- ~~4~~31. S-CSCF#2 forwards the message to S-CSCF#1.

- ~~32. S-CSCF#1 performs whatever service control is appropriate for this ringing flow.~~
- ~~3341. S-CSCF#1 forwards the message to P-CSCF#1.~~
- ~~4234. P-CSCF#1 forwards the message to UE#1.~~
- ~~4335. UE#1 indicates to the originator that the media addition is being delayed due to alerting. Typically this involves playing a ringback sequence.~~
- ~~4436. 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).~~
- ~~4537. P-CSCF#2 approves the commitment of the QoS resources for this additional media.~~
- ~~38. After sending the 200-OK, UE#2 may initiate the new media flow(s).~~
- ~~4639. P-CSCF#2 forwards the final response to S-CSCF#2.~~
- ~~40. S-CSCF#2 performs whatever service control is appropriate for this additional media.~~
- ~~447. S-CSCF#2 forwards the final response to S-CSCF#1.~~
- ~~42. S-CSCF#1 performs whatever service control is appropriate for this additional media.~~
- ~~483. S-CSCF#1 forwards the final response to P-CSCF#1.~~
- ~~494. P-CSCF#1 approves the commitment of the QoS resources for this additional media.~~
- ~~450. P-CSCF#1 forwards the final response to UE#1.~~
- ~~5146. UE#1 starts the media flow(s) for this additional media.~~
- ~~5247. 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.~~
- ~~5348. P-CSCF#1 forwards the ACK to S-CSCF#1~~
- ~~5449. S-CSCF#1 forwards the ACK to S-CSCF#2.~~
- ~~559. S-CSCF#2 forwards the ACK to P-CSCF#2.~~
- ~~564. P-CSCF#2 forwards the ACK to UE#2.~~

*****Fifth Change*****

~~Annex B (Informative): Sample end-end session flows~~

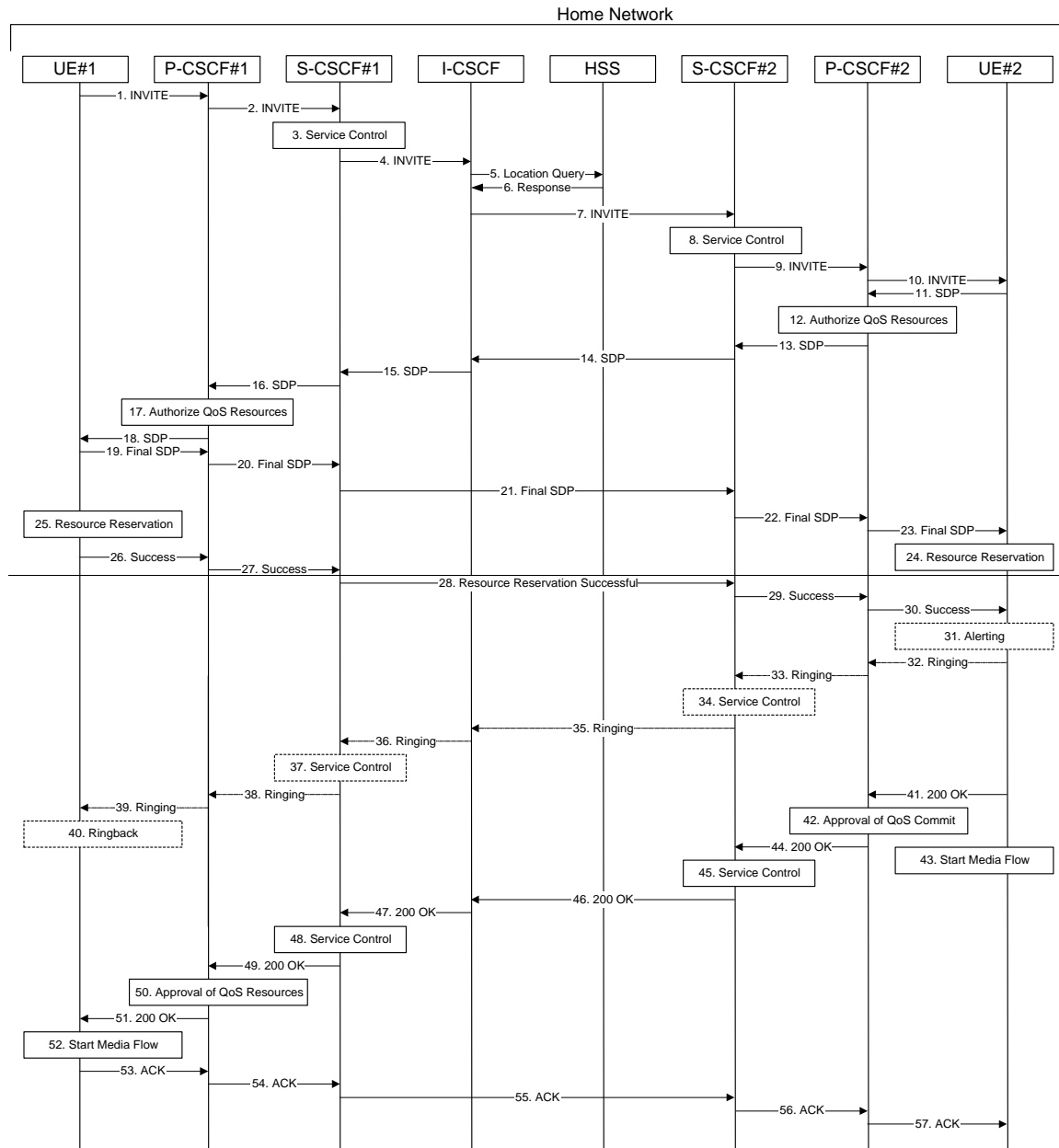
~~B.1 Sample end-end Session Flow - Mobile Origination/Termination~~

~~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 the proper PDP contexts for exchanging SIP signalling messages, has performed the proxy discovery procedures described in section 5.1.1, and has registered in the IM-CN subsystem. As a result of registration, an S-CSCF has been chosen in the home network.~~

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. This UE has already established the proper PDP contexts for exchanging SIP signalling messages, has performed the proxy discovery procedures described in section 5.1.1, and has registered in the IM-CN subsystem. As a result of registration, an S-CSCF was chosen in the home network.

B.1.1 Session flow diagram



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

1. UE#1 sends a SIP INVITE request, containing an initial 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 performs whatever service control logic is appropriate for this session-setup attempt.

4. S-CSCF#1 translates the destination address and determines the session setup will be completed within the home operator's network. It therefore forwards the INVITE to I-CSCF#1.
5. I-CSCF#1 sends 'Cx location query' to the HSS to obtain the location information for the destination
6. The HSS responds with 'Cx location query response' and indicates the destination is located in the home service area.
7. I-CSCF#1 forwards the INVITE to S-CSCF#2, which was identified by the HSS as serving this subscriber.
8. S-CSCF#2 validates the service profile, and performs whatever service control logic is appropriate for this session setup attempt.
9. 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.
10. P-CSCF#2 remembers (from the registration procedure) the address of UE#2 and forwards the INVITE to UE#2.
11. UE#2 returns the media stream capabilities of the destination to the session originator, along the signalling path established by the INVITE message
12. P-CSCF#2 authorises the QoS resources required for this session
13. P-CSCF#2 forwards the SDP to S-CSCF#2
14. S-CSCF#2 forwards the SDP to I-CSCF
15. I-CSCF forwards the SDP to S-CSCF#1
16. S-CSCF#1 forwards the SDP message to P-CSCF#1
17. P-CSCF#1 authorises the resources necessary for this session
18. P-CSCF#1 forwards the SDP message to the originating endpoint, UE#1
19. The originator decides the final set of media streams for this session, and sends the Final SDP to P-CSCF#1
20. P-CSCF#1 forwards the final SDP to S-CSCF#1
21. S-CSCF#1 forwards the final SDP to S-CSCF#2. This message may be routed through I-CSCF, depending on operator configuration of I-CSCF.
22. S-CSCF#2 forwards the final SDP to P-CSCF#2
23. P-CSCF#2 forwards the final SDP to UE#2.
24. UE#2 initiates the resource reservation procedures for the resources necessary for this session.
25. After determining the final set of media streams for this session, step #19 above, UE#1 initiates the reservation procedures for the resources needed for this session
26. When UE#1 has successfully reserved the needed resources, it sends the "reservation successful" message to UE#2 along the signalling path established by the INVITE message. The message is sent first to P-CSCF#1.
27. P-CSCF#1 forwards the message to S-CSCF#1
28. S-CSCF#1 forwards the message to S-CSCF#2. This message may be routed through I-CSCF, depending on operator configuration of I-CSCF.
29. S-CSCF#2 forwards the message to P-CSCF#2
30. P-CSCF#2 forwards the message to UE#2.

- 31.— UE#2 may optionally delay the session establishment in order to alert the subscriber to the incoming session.
- 32.— 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.
- 33.— P-CSCF#2 forwards the ringing message to S-CSCF#2
- 34.— S-CSCF#2 performs whatever service control is appropriate for this ringing session
- 35.— S-CSCF#2 forwards the message to I-CSCF
- 36.— I-CSCF forwards the message to S-CSCF#1
- 37.— S-CSCF#1 performs whatever service control is appropriate for this ringing session.
- 38.— S-CSCF#1 forwards the message to P-CSCF#1
- 39.— P-CSCF#1 forwards the message to UE#1
- 40.— UE#1 indicates to the originator that the session is being delayed due to alerting. Typically this involves playing a ringback sequence.
- 41.— When the destination party answers, 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.
- 42.— P-CSCF#2 approves the commitment of the QoS resources for this session
- 43.— After sending the 200-OK, UE#2 initiates the media flow.
- 44.— P-CSCF#2 forwards the final response to S-CSCF#2
- 45.— S-CSCF#2 performs whatever service control is appropriate for this completed session.
- 46.— S-CSCF#2 forwards the final response to I-CSCF
- 47.— I-CSCF forwards the final response to S-CSCF#1
- 48.— S-CSCF#1 performs whatever service control is appropriate for this completed session
- 49.— S-CSCF#1 forwards the final response to P-CSCF#1
- 50.— P-CSCF#1 approves the commitment of the QoS resources for this session
- 51.— P-CSCF#1 forwards the final response to UE#1
- 52.— UE#1 starts the media flow for this session
- 53.— 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.
- 54.— P-CSCF#1 forwards the ACK to S-CSCF#1
- 55.— S-CSCF#1 forwards the ACK to S-CSCF#2. This message may be routed through I-CSCF, depending on operator configuration of I-CSCF.
- 56.— S-CSCF#2 forwards the ACK to P-CSCF#2
- 57.— P-CSCF#2 forwards the ACK to UE#2

B.1.2 — Session flow decomposition into procedure blocks

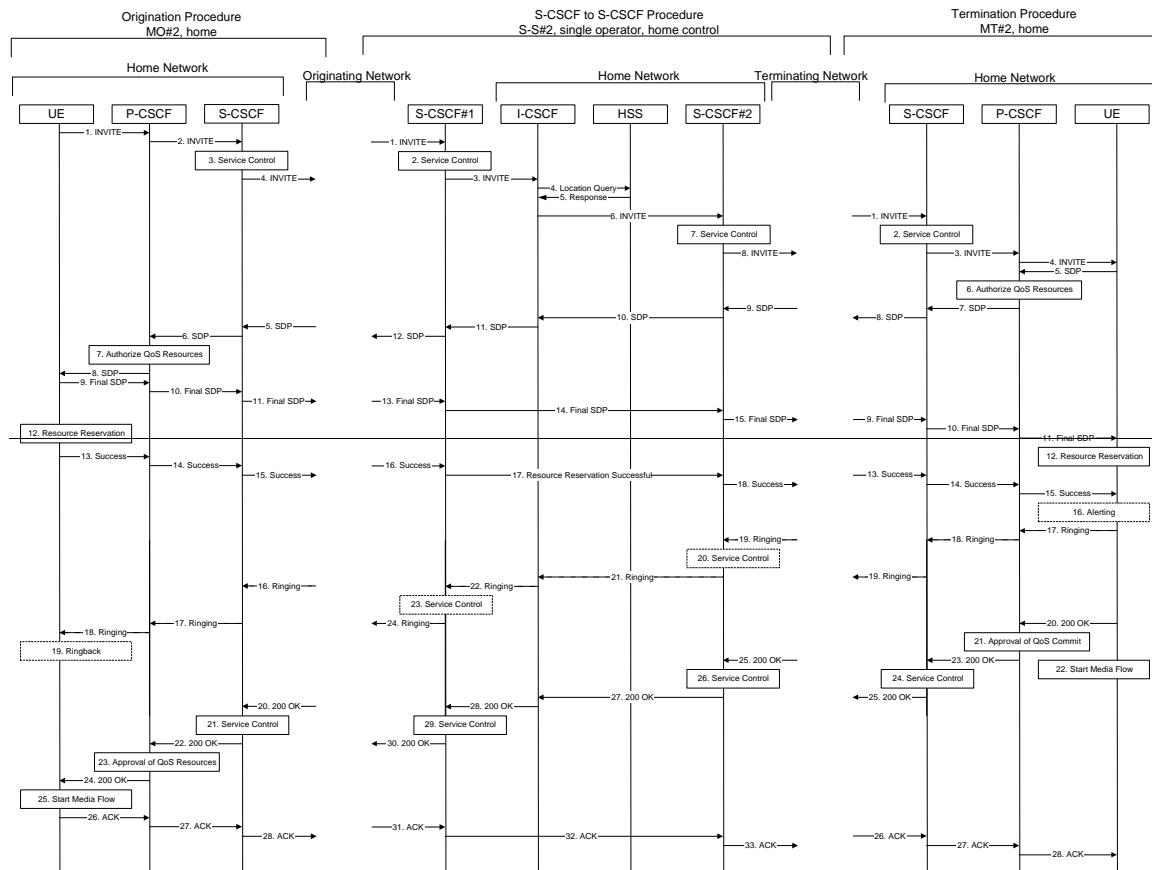
The end-to-end session flow given in the previous section can be decomposed into an originating part, an inter-serving part, and a terminating part.

The originating part is for a mobile origination, with subscriber located in the home operator service area. This procedure is given in Section 5.6.2, (MO#2) Mobile origination, located in home network.

The inter-serving part is for a single operator, where the destination party is located within the operator's service area. This procedure is given in Section 5.5.2, (S-S#2) Single network operator performing origination and termination, with home control of termination.

The terminating part is for a mobile termination, with subscriber located in the home operator service area. This procedure is given in Section 5.7.2, (MT#2) Mobile termination, located in home network.

The following diagram illustrates this decomposition, showing how the three separate procedures fit together to produce an end-to-end session flow.



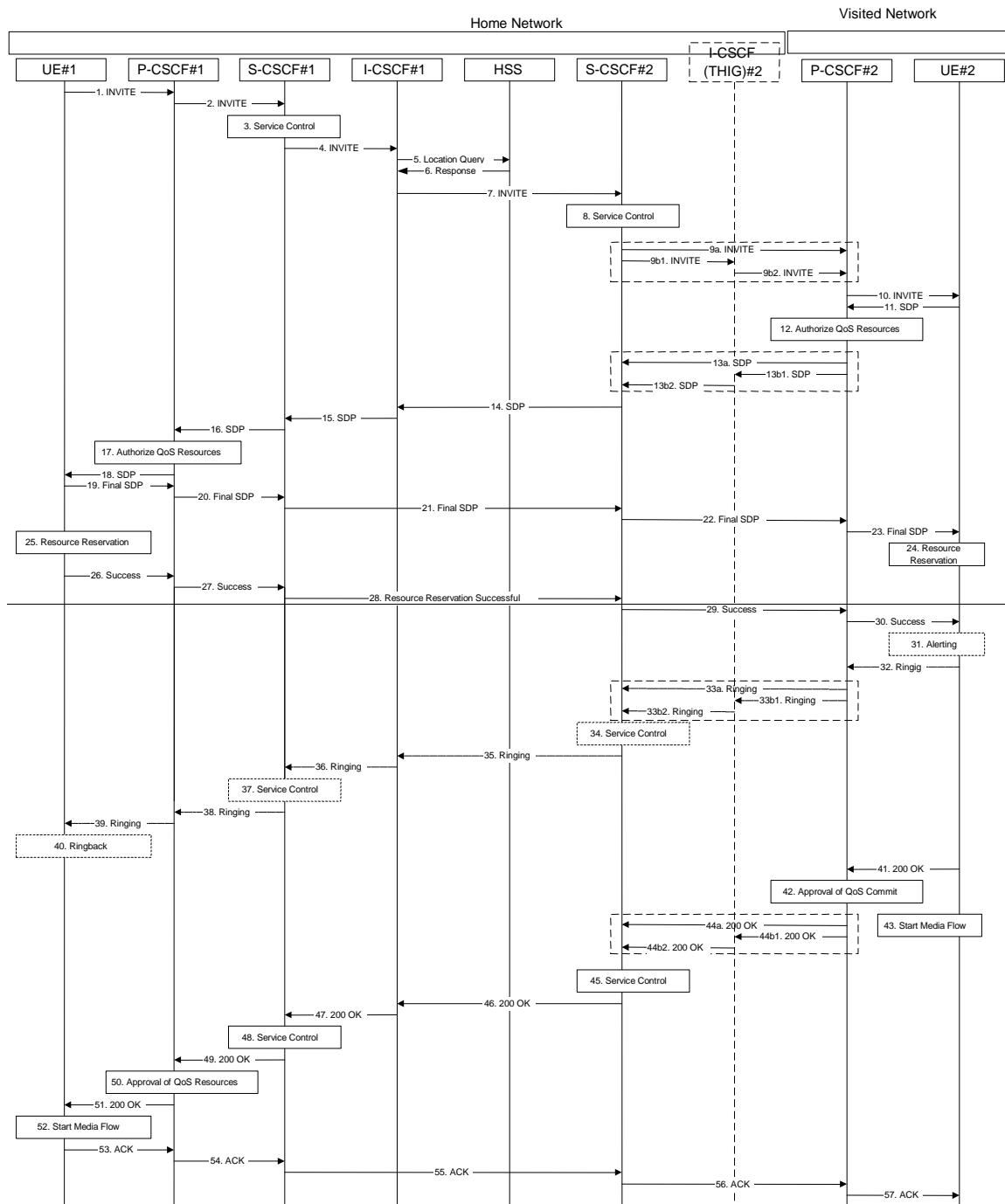
B.2 Sample end-end Session Flow - Mobile Origination, home, to Mobile Termination, roaming

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 the proper PDP contexts for exchanging SIP signalling messages, has performed the proxy discovery procedures described in section 5.1.1, and has registered in the IM-CN subsystem

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

The destination party is a UE located in a service area of a network operator different from that of its service subscription. This UE has already established the proper PDP contexts for exchanging SIP signalling messages, has performed the proxy discovery procedures described in section 5.1.1, and has registered in the IM-CN subsystem.

B.2.1 Session flow diagram



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

1. UE#1 sends a SIP INVITE request, containing an initial 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 performs whatever service control logic is appropriate for this session setup attempt.
4. S-CSCF#1 translates the destination address and determines the session will be completed within the home operator's network. It therefore forwards the INVITE to I-CSCF#1.

5. I-CSCF#1 sends 'Cx-location-query' to the HSS to obtain the location information for the destination
6. The HSS responds with 'Cx-location-query-response' and indicates the destination is a roaming UE, under home network control.
7. I-CSCF#1 forwards the INVITE to S-CSCF#2, which was identified by the HSS as serving this subscriber.
8. S-CSCF#2 validates the service profile, and performs whatever service control logic is appropriate for this session setup attempt.
9. 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 visited network, possibly through I-CSCF#1. This next hop is either the P-CSCF that is serving the visiting UE (choice (a)), or an I-CSCF#1 within the home network that is performing the configuration hiding function for the home network operator (choice (b)).
 - (9a) If the home network operator does not desire to keep their network configuration hidden, the INVITE request is forwarded directly to P-CSCF#2.
 - (9b) If the home network operator desires to keep their network configuration hidden, the INVITE request is forwarded through I-CSCF#1 to P-CSCF#2.
 - (9b1) S-CSCF#2 forwards the INVITE request to I-CSCF#1 within the home network
 - (9b2) I-CSCF#1 forwards the INVITE request to P-CSCF#2
10. P-CSCF#2 remembers (from the registration procedure) the address of UE#2, and forwards the INVITE to UE#2
11. UE#2 returns the media stream capabilities of the destination to the session originator, along the signalling path established by the INVITE message
12. P-CSCF#2 authorises the QoS resources required for this session
13. P-CSCF#2 forwards the SDP to S-CSCF#2. Based on the choice made in (9) above, this response may either be sent directly from P-CSCF#2 to S-CSCF#2 (choice (a)), or be sent indirectly through I-CSCF#1 (choice (b)).
14. S-CSCF#2 forwards the SDP to I-CSCF#1
15. I-CSCF#1 forwards the SDP to S-CSCF#1
16. S-CSCF#1 forwards the SDP message to P-CSCF#1
17. P-CSCF#1 authorises the resources necessary for this session
18. P-CSCF#1 forwards the SDP message to the originating endpoint, UE#1
19. The originator decides the final set of media streams for this session, and sends the Final SDP to P-CSCF#1
20. P-CSCF#1 forwards the final SDP to S-CSCF#1
21. S-CSCF#1 forwards the final SDP to S-CSCF#2. This message may be routed through I-CSCF#1, depending on operator configuration of I-CSCF#1.
22. S-CSCF#2 forwards the final SDP to P-CSCF#2. This message may be routed through I-CSCF#2, depending on operator configuration of I-CSCF#2.
23. P-CSCF#2 forwards the final SDP to UE#2.
24. UE#2 initiates the resource reservation procedures for the resources necessary for this session.
25. After determining the final set of media streams for this session, step #19 above, UE#1 initiates the reservation procedures for the resources needed for this session
26. When UE#1 has successfully reserved the needed resources, it sends the "reservation successful" message to UE#2 along the signalling path established by the INVITE message. The message is sent first to P-CSCF#1.

27. P-CSCF#1 forwards the message to S-CSCF#1
28. S-CSCF#1 forwards the message to S-CSCF#2. This message may be routed through I-CSCF, depending on operator configuration of I-CSCF.
29. S-CSCF#2 forwards the message to P-CSCF#2. This message may be routed through I-CSCF#2, depending on operator configuration of I-CSCF#2.
30. P-CSCF#2 forwards the message to UE#2.
31. UE#2 may optionally delay the session establishment in order to alert the subscriber to the incoming session.
32. 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.
33. P-CSCF#2 forwards the ringing message to S-CSCF#2. Based on the choice made in (9) above, this response may either be sent directly from P-CSCF#2 to S-CSCF#2 (choice (a)), or be sent indirectly through I-CSCF(THIG)#2 (choice (b)).
34. S-CSCF#2 performs whatever service control is appropriate for this ringing session
35. S-CSCF#2 forwards the message to I-CSCF#1
36. I-CSCF#1 forwards the message to S-CSCF#1
37. S-CSCF#1 performs whatever service control is appropriate for this ringing session.
38. S-CSCF#1 forwards the message to P-CSCF#1
39. P-CSCF#1 forwards the message to UE#1
40. UE#1 indicates to the originator that the session is being delayed due to alerting. Typically this involves playing a ringback sequence.
41. When the destination party answers, UE#2 sends a SIP 200-OK final response to P-CSCF#2
42. P-CSCF#2 approves the commitment of the QoS resources for this session
43. After sending the 200-OK, UE#2 initiates the media flow.
44. P-CSCF#2 sends a SIP 200-OK final response along the signalling path back toward the session originator. Based on the choice made in (9) above, this response may either be sent directly from P-CSCF#2 to S-CSCF#2 (choice (a)), or be sent indirectly through I-CSCF(THIG)#2 (choice (b)).
45. S-CSCF#2 performs whatever service control is appropriate for the completed session.
46. S-CSCF#2 sends a SIP 200-OK final response along the signalling path back to I-CSCF#1.
47. I-CSCF#1 sends a SIP 200-OK final response along the signalling path back to S-CSCF#1
48. S-CSCF#1 performs whatever service control logic is appropriate for this session setup completion
49. S-CSCF#1 sends a SIP 200-OK final response along the signalling path back to P-CSCF#1
50. P-CSCF#1 approves the commitment of the QoS resources for this session.
51. P-CSCF#1 sends a SIP 200-OK final response along the signalling path back to UE#1
52. UE#1 starts the media flow for this session
53. UE#1 responds to the final response with a SIP ACK message which is passed to UE#2 via the signalling path. The message is sent first to P-CSCF#1
54. P-CSCF#1 forwards the ACK to S-CSCF#1
55. S-CSCF#1 forwards the ACK to S-CSCF#2. This message may be routed through I-CSCF#1, depending on operator configuration of I-CSCF#1

56. S-CSCF#2 forwards the ACK to P-CSCF#2. This message may be routed through I-CSCF#2, depending on operator configuration of I-CSCF#2

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

B.2.2 Session flow decomposition into procedure blocks

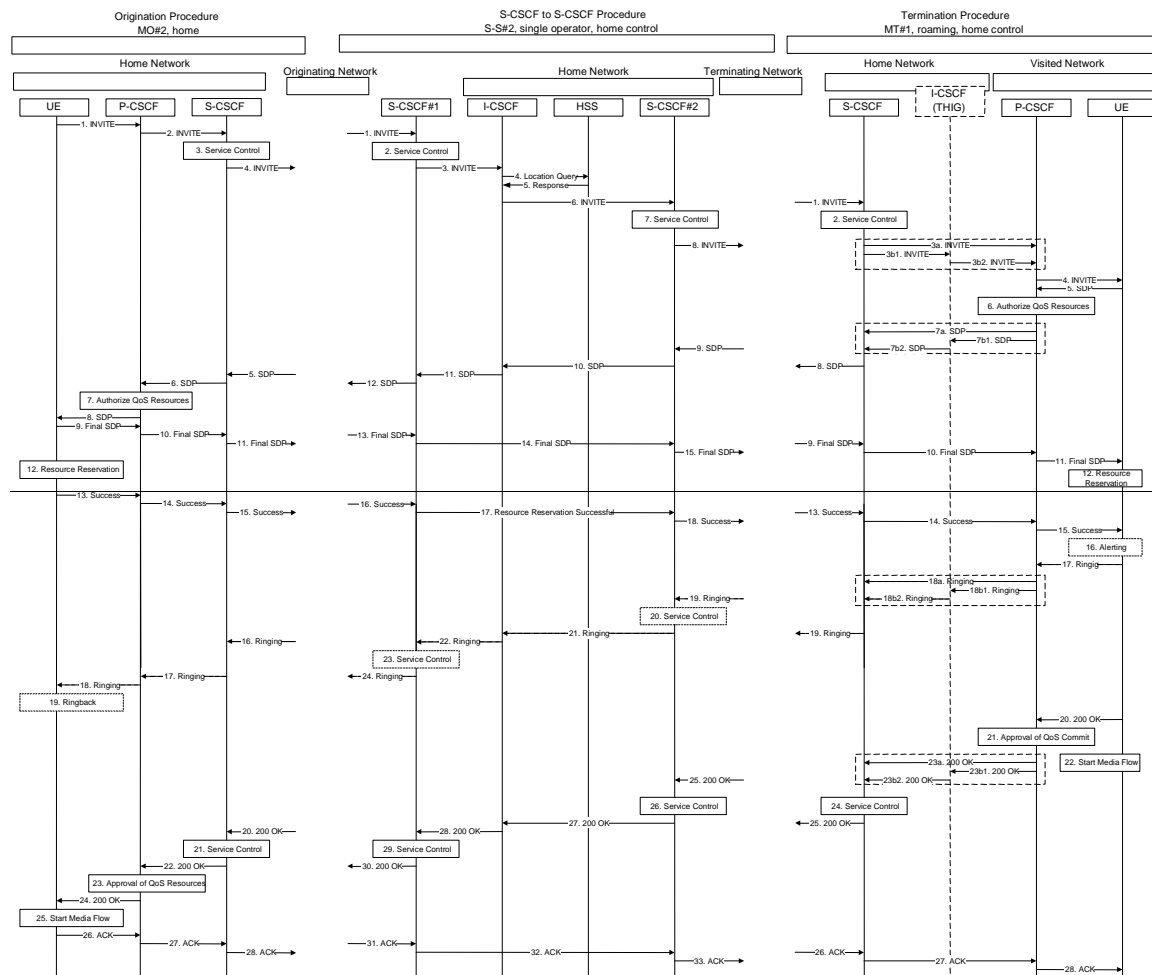
The end-to-end session flow given in the previous section can be decomposed into an originating part, an inter-serving part, and a terminating part.

The originating part is for a mobile origination, with subscriber located in the home operator service area. This procedure is given in Section 5.6.3, (MO#2) Mobile origination, home.

The inter-serving part is for a single operator, where the destination party is located within the operator's service area. This procedure is given in Section 5.5.3, (S-S#2) Single network operator performing origination and termination.

The terminating part is for a mobile termination, roaming, with home control. This procedure is given in Section 5.7.1, (MT#1) Mobile termination, roaming.

The following diagram illustrates this decomposition, showing how the three separate procedures fit together to produce an end-to-end session flow.



B.3 Sample end-end Session Flow - Mobile Origination, roaming, to Mobile Termination, home

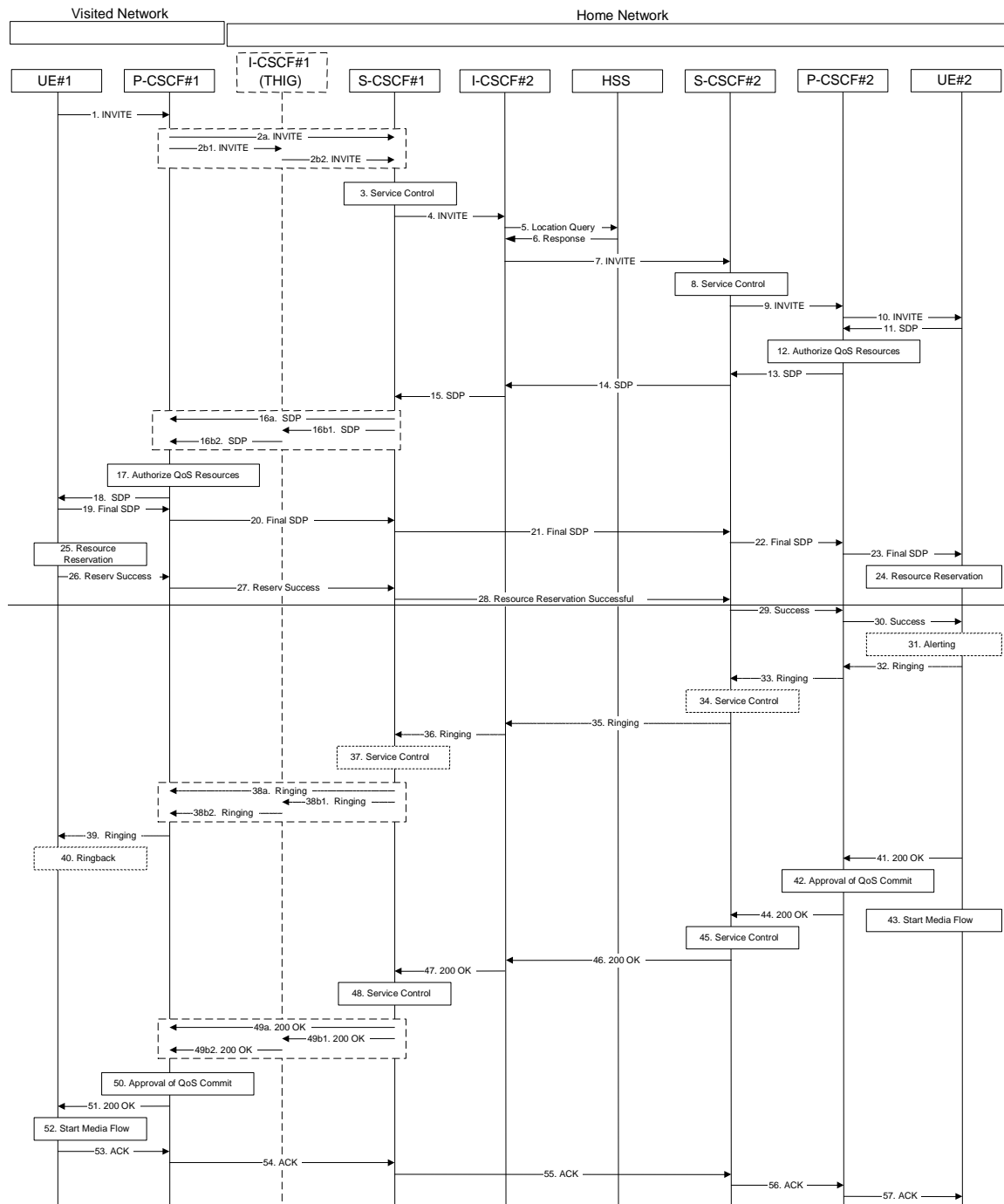
For this end-to-end session flow, we assume the originator is a UE located outside the service area of the network operator to whom the UE is subscribed. The UE has already established the proper PDP contexts for exchanging

SIP signalling messages, has performed the proxy discovery procedures described in section 5.1.1, and has registered in the IM CN subsystem.

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. This UE has already established the proper PDP contexts for exchanging SIP signalling messages, has performed the proxy discovery procedures described in section 5.1.1, and has registered in the IM CN subsystem.

B.3.1 Session flow diagram



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

1. UE#1 sends a SIP INVITE request, containing an initial SDP, to P-CSCF#1, which was obtained from the CSCF discovery procedures.

2. ~~P-CSCF#1 remembers (from the registration procedure) the next hop CSCF for this UE. It forwards the INVITE to the S-CSCF within the home operator's network, possibly through an I-CSCF(THIG). The next hop is either S-CSCF#1 serving UE#1 (choice (a)), or I-CSCF(THIG)#1 in 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 INVITE request is forwarded directly to S-CSCF#1~~
 - (2b) ~~If the home network operator desires to keep their network configuration hidden, the INVITE request is forwarded through an I-CSCF(THIG) to the S-CSCF~~
 - (2b1) ~~P-CSCF#1 forwards the INVITE request to I-CSCF(THIG)#1 in the home network~~
 - (2b2) ~~I-CSCF(THIG)#1 forwards the INVITE request to S-CSCF#1.~~
3. ~~S-CSCF#1 validates the service profile, and performs whatever service control logic is appropriate for this session setup attempt.~~
4. ~~S-CSCF#1 translates the destination address and determines the session will be completed within the home operator's network. It therefore forwards the INVITE to I-CSCF#2.~~
5. ~~I-CSCF#2 sends 'Cx location query' to the HSS to obtain the location information for the destination~~
6. ~~The HSS responds with 'Cx location query response' and indicates the destination is in the home service area.~~
7. ~~I-CSCF#2 forwards the INVITE to S-CSCF#2, identified by the HSS as serving this subscriber.~~
8. ~~S-CSCF#2 validates the service profile, and performs whatever service control logic is appropriate for this session setup attempt.~~
9. ~~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.~~
10. ~~P-CSCF#2 remembers (from the registration procedure) the UE address, and forwards the INVITE to the UE~~
11. ~~UE#2 returns the media stream capabilities of the destination to the session originator, along the signalling path established by the INVITE message~~
12. ~~P-CSCF#2 authorises the QoS resources required for this session~~
13. ~~P-CSCF#2 forwards the SDP to S-CSCF#2.~~
14. ~~S-CSCF#2 forwards the SDP to I-CSCF#2.~~
15. ~~I-CSCF#2 forwards the SDP to S-CSCF#1~~
16. ~~S-CSCF#1 forwards the SDP message to P-CSCF#1. Based on the choice made in (2) above, this response may either be sent directly from S-CSCF#1 to P-CSCF#1 (choice (a)), or be sent indirectly through I-CSCF(THIG)#1 (choice (b)).~~
17. ~~P-CSCF#1 authorises the resources necessary for this session~~
18. ~~P-CSCF#1 forwards the SDP message to the originating endpoint, UE#1~~
19. ~~The originator decides the final set of media streams for this session, and sends the Final SDP to P-CSCF#1~~
20. ~~P-CSCF#1 forwards the final SDP to S-CSCF#1. This message may be routed through I-CSCF(THIG)#1, depending on operator configuration of I-CSCF#1.~~
21. ~~S-CSCF#1 forwards the final SDP to S-CSCF#2. This message may be routed through I-CSCF#2, depending on operator configuration of I-CSCF#2.~~
22. ~~S-CSCF#2 forwards the final SDP to P-CSCF#2.~~

- 23.— P-CSCF#2 forwards the final SDP to UE#2.
- 24.— UE#2 initiates the resource reservation procedures for the resources necessary for this session.
- 25.— After determining the final set of media streams for this session, step #19 above, UE#1 initiates the reservation procedures for the resources needed for this session
- 26.— When UE#1 has successfully reserved the needed resources, it sends the “reservation successful” message to UE#2 along the signalling path established by the INVITE message. The message is sent first to P-CSCF#1.
- 27.— P-CSCF#1 forwards the message to S-CSCF#1. This message may be routed through I-CSCF#1, depending on operator configuration of I-CSCF#1.
- 28.— S-CSCF#1 forwards the message to S-CSCF#2. This message may be routed through I-CSCF#2, depending on operator configuration of I-CSCF#2.
- 29.— S-CSCF#2 forwards the message to P-CSCF#2.
- 30.— P-CSCF#2 forwards the message to UE#2.
- 31.— UE#2 may optionally delay the session establishment in order to alert the subscriber to the incoming session.
- 32.— 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.
- 33.— P-CSCF#2 forwards the ringing message to S-CSCF#2.
- 34.— S-CSCF#2 performs whatever service control is appropriate for this ringing session
- 35.— S-CSCF#2 forwards the message to I-CSCF#2
- 36.— I-CSCF#2 forwards the message to S-CSCF#1
- 37.— S-CSCF#1 performs whatever service control is appropriate for this ringing session.
- 38.— S-CSCF#1 forwards the message to P-CSCF#1. Based on the choice made in (2) above, this response may either be sent directly from S-CSCF#1 to P-CSCF#1 (choice (a)), or be sent indirectly through I-CSCF(THIG)#1 (choice (b)).
- 39.— P-CSCF#1 forwards the message to UE#1
- 40.— UE#1 indicates to the originator that the session is being delayed due to alerting. Typically this involves playing a ringback sequence.
- 41.— When the destination party answers, the UE sends a SIP 200-OK final response to P-CSCF#2
- 42.— P-CSCF#2 approves the commitment of the QoS resources for this session
- 43.— After sending the 200-OK, UE#2 initiates the media flow.
- 44.— P-CSCF#2 sends a SIP 200-OK final response along the signalling path back to S-CSCF#2.
- 45.— S-CSCF#2 performs whatever service control is appropriate for the completed session.
- 46.— S-CSCF#2 sends a SIP 200-OK final response along the signalling path back to I-CSCF#2.
- 47.— I-CSCF#2 sends a SIP 200-OK final response along the signalling path back to S-CSCF#1. Based on the choice made in (2) above, this response may either be sent directly from I-CSCF#2 to S-CSCF#1 (choice (a)), or be sent indirectly through I-CSCF(THIG)#1 (choice (b)).
- 48.— S-CSCF#1 performs whatever service control logic is appropriate for this session setup completion
- 49.— S-CSCF#1 sends a SIP 200-OK final response along the signalling path back to P-CSCF#1
- 50.— P-CSCF#1 approves the commitment of the QoS resources for this session.

51. P-CSCF#1 sends a SIP 200-OK final response along the signalling path back to UE#1
52. UE#1 starts the media flow for this session
53. UE#1 responds to the final response with a SIP ACK message, which is passed to UE#2 via the signalling path. This message is sent first to P-CSCF#1.
54. P-CSCF#1 forwards the ACK to S-CSCF#1. This message may be routed through I-CSCF#1, depending on operator configuration of I-CSCF#1.
55. S-CSCF#1 forwards the ACK to S-CSCF#2. This message may be routed through I-CSCF#2, depending on operator configuration of I-CSCF#2.
56. S-CSCF#2 forwards the ACK to P-CSCF#2.
57. P-CSCF#2 forwards the ACK to UE#2.

B.3.2 Session flow decomposition into procedure blocks

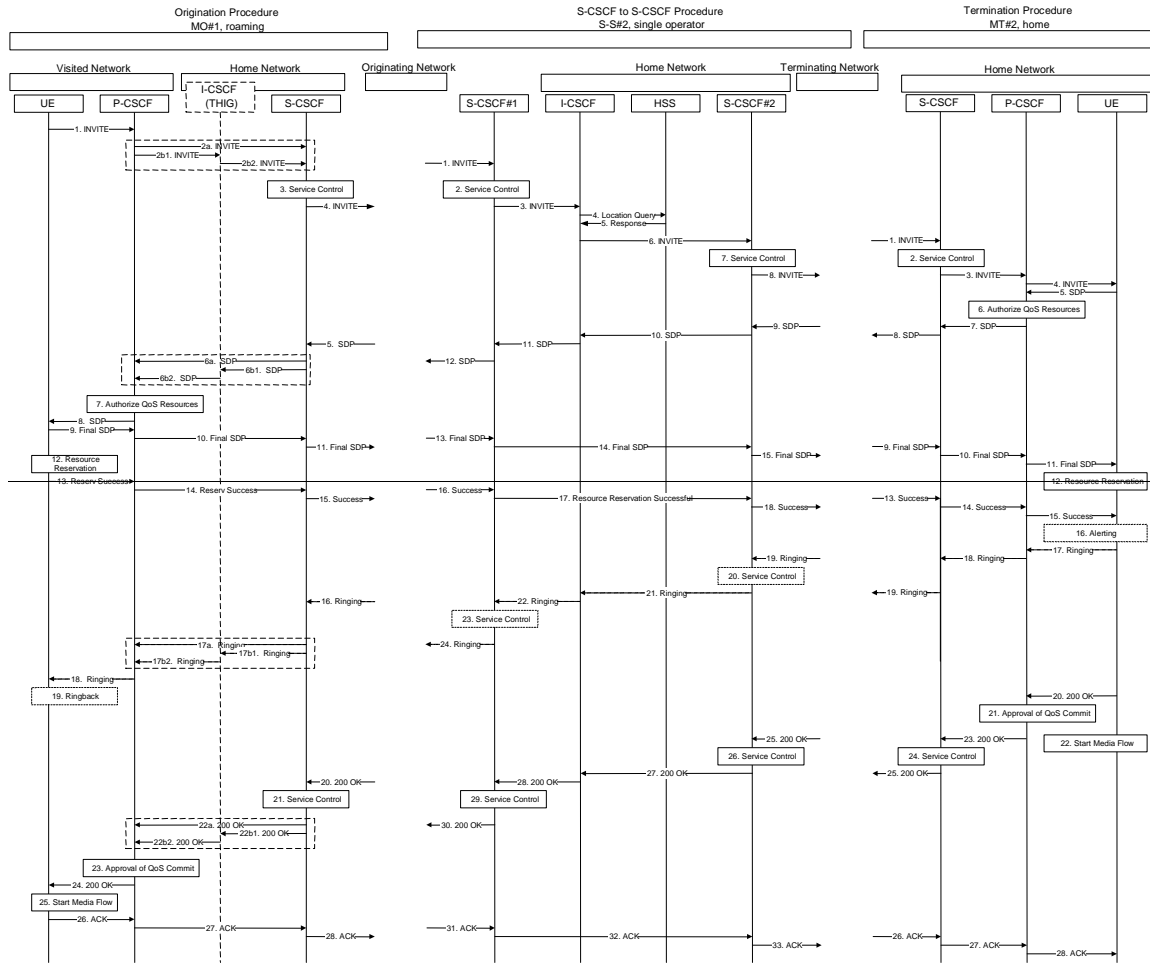
The end-to-end session flow given in the previous section can be decomposed into an originating part, an inter-serving part, and a terminating part.

The originating part is for a mobile origination, with subscriber located in the home operator service area. This procedure is given in Section 5.6.1, (MO#1) Mobile origination, roaming.

The inter-serving part is for a single operator, where the destination party is located within the operator's service area. This procedure is given in Section 5.5.2, (S-S#2) Single network operator performing origination and termination.

The terminating part is for a mobile termination, with the subscriber located in the home operator service area. This procedure is given in Section 5.7.2, (MT#2) Mobile termination, home.

The following diagram illustrates this decomposition, showing how the three separate procedures fit together to produce an end-to-end session flow.

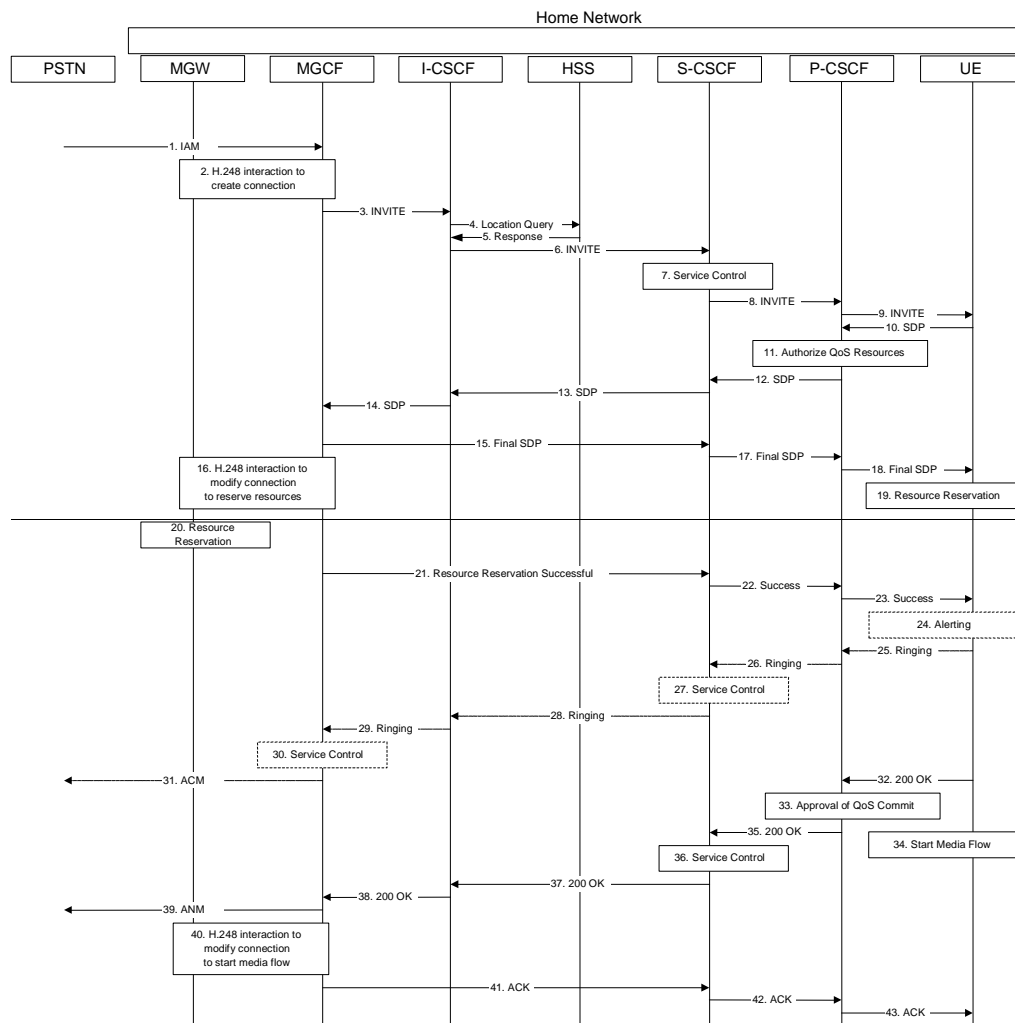


B.4 Sample end-end Session Flow - PSTN Origination Mobile Termination

The originating party on the PSTN addresses a destination that is a subscriber of the 3G network operator.

The destination party is a UE located within the service area of the network operator to which it is subscribed. This UE has already established the proper PDP contexts for exchanging SIP signalling messages, has performed the proxy discovery procedures described in section 5.1.1, and has registered in the IM CN subsystem. As a result of registration, an S-CSCF was chosen in the home network.

B.4.1 Session flow diagram



Step by step processing of this end to end session flow 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 translates the destination address and determines the session will be completed within the home network. MGCF initiates a SIP INVITE request, containing an initial SDP, to I-CSCF.
4. I-CSCF sends 'Cx location query' to the HSS to obtain the location information for the destination
5. The HSS responds with 'Cx location query response' and indicates the destination is in the home service area.
6. I-CSCF forwards the INVITE to S-CSCF, identified by the HSS as serving this subscriber.
7. S-CSCF validates the service profile, and performs whatever service control logic is appropriate for this session setup attempt.
8. S-CSCF remembers (from the registration procedure) the address of P-CSCF, and forwards the INVITE to P-CSCF.
9. P-CSCF remembers (from the registration procedure) the address of UE, and forwards the INVITE to UE.
10. UE#2 returns the media stream capabilities of the destination to the session originator, along the signalling path established by the INVITE message

11. P-CSCF authorises the QoS resources required for this session
12. P-CSCF forwards the SDP to S-CSCF.
13. S-CSCF forwards the SDP to I-CSCF
14. I-CSCF forwards the SDP to MGCF
15. MGCF decides the final set of media streams for this session, and sends the Final SDP to S-CSCF. This message may be routed through I-CSCF, depending on operator configuration of I-CSCF.
16. MGCF initiates a H.248 command to modify the connection parameters and instruct the MGW to reserve the resources needed for the session
17. S-CSCF forwards the final SDP to P-CSCF.
18. P-CSCF forwards the final SDP to UE.
19. UE initiates the resource reservation procedures for the resources necessary for this session.
20. MGW reserves the resources needed for the session
21. When MGW has successfully reserved the needed resources, MGCF sends the "reservation successful" message to UE along the signalling path established by the INVITE message. The message is sent to S-CSCF, and may be routed through I-CSCF, depending on operator configuration of I-CSCF.
22. S-CSCF forwards the message to P-CSCF.
23. P-CSCF forwards the message to UE.
24. UE may optionally delay the session establishment in order to alert the subscriber to the incoming session.
25. If UE performs alerting, it sends a ringing indication to the originator via the signalling path. The message is sent first to P-CSCF.
26. P-CSCF forwards the ringing message to S-CSCF.
27. S-CSCF performs whatever service control is appropriate for this ringing session
28. S-CSCF forwards the message to I-CSCF
29. I-CSCF forwards the message to MGCF
30. MGCF performs whatever service control is appropriate for this ringing session.
31. If alerting is being performed, the MGCF forwards an ACM message to PSTN
32. When the destination party answers, the UE sends a SIP 200-OK final response to P-CSCF
33. P-CSCF approves the commitment of the QoS resources for this session.
34. After sending the 200-OK, UE initiates the media flow.
35. P-CSCF sends the SIP 200-OK final response to S-CSCF
36. S-CSCF performs whatever service control logic is appropriate for this session setup completion
37. S-CSCF sends the SIP 200-OK final response to I-CSCF
38. I-CSCF sends the SIP 200-OK final response to MGCF
39. MGCF forwards an IP-ANM message to PSTN
40. MGCF alters the connection at MGW, via a H.248 command, to make it bi-directional
41. MGCF acknowledges the SIP final response with a SIP-ACK message, which is passed to UE#2 via the signalling path. This message is sent to S-CSCF, and may be routed through I-CSCF, depending on operator configuration of I-CSCF.

42. S-CSCF forwards the ACK to P-CSCF

43. P-CSCF forwards the ACK to UE

B.4.2 Session flow decomposition into procedure blocks

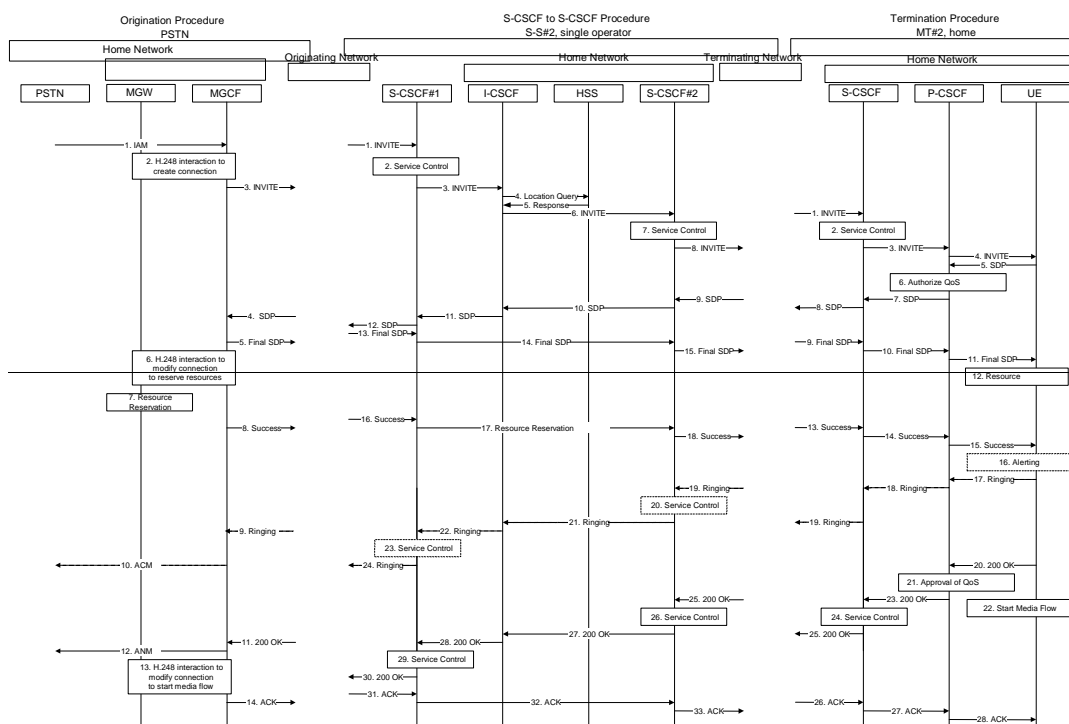
The end-to-end session flow given in the previous section can be decomposed into an originating part, an inter-serving part, and a terminating part.

The originating part is for a mobile origination, with subscriber located in the home operator service area. This procedure is given in Section 5.6.3, (PSTN-O) PSTN origination.

The inter-serving part is for a single operator, where the destination party is located within the operator's service area. This procedure is given in Section 5.5.2, (S-S#2) Single network operator performing origination and termination.

The terminating part is for a mobile termination, with the subscriber located in the home operator service area. This procedure is given in Section 5.7.2, (MT#2) Mobile termination, home.

The following diagram illustrates this decomposition, showing how the three separate procedures fit together to produce an end-to-end session flow.



Note: the S-CSCF#1 in the S-S#3 procedure is the MGCF of the PSTN-O procedure.

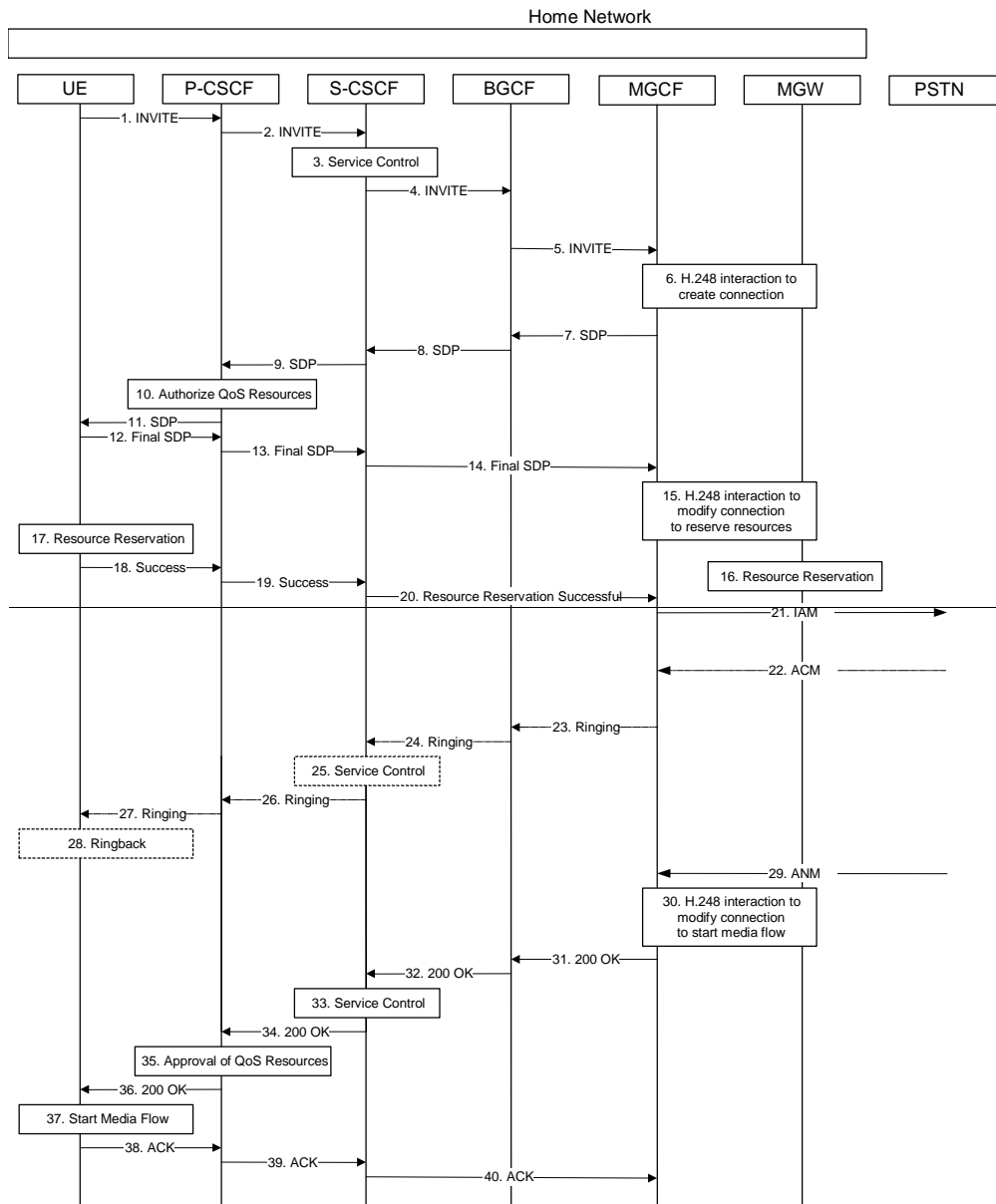
B.5 Sample end-end session flow - Mobile origination, PSTN termination in same network

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 originating party has already established the proper PDP contexts for exchange of SIP signalling messages, has performed the proxy discovery procedures described in section 5.1.1, and has registered in the IM-CN subsystem. As a result of registering, an S-CSCF has been chosen in the home network.

The UE-originating the session addresses a destination that is a non-3GPP endpoint. Therefore, the session must be completed through a Media Gateway.

The network operator serving this subscriber either decides to use a local PSTN gateway, or does not have agreements with other network operators for optimal gateway selection.

B.5.1 Session flow diagram



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

1. The UE sends a SIP INVITE request, containing an initial SDP, to the P-CSCF, which was obtained from the CSCF discovery procedures.
2. The P-CSCF forwards the INVITE to the next hop name/address, as determined from the registration procedures. In this case the next hop is the S-CSCF within the same operator's network.
3. The S-CSCF validates the service profile, and performs whatever service control logic is appropriate for this session setup attempt.
4. The S-CSCF translates the destination address and determines the session will break out to the PSTN. It therefore forwards the INVITE to a BGCF.
5. The BGCF decides to use an MGW in the home network, allocates a MGCF, and sends the INVITE request to the MGCF. Procedures for choice of the optimal Media Gateway are not standardised in this release.

6. MGCF initiates a H.248 interaction to pick an outgoing channel and determine media capabilities of the MGW.
7. MGCF determines the subset of the media flows proposed by the originating endpoint that it supports, and responds with an SDP message back to the originator via the signalling path. This response is sent to the BGCF.
8. BGCF forwards the SDP to S-CSCF
9. S-CSCF forwards the SDP message to P-CSCF
10. P-CSCF authorises the resources necessary for this session
11. P-CSCF forwards the SDP message to the originating endpoint, UE.
12. The originator decides the final set of media streams for this session, and sends the Final SDP to P-CSCF.
13. P-CSCF forwards the final SDP to S-CSCF
14. S-CSCF forwards the final SDP to MGCF. This message may be routed directly to the MGCF.
15. MGCF initiates a H.248 interaction to modify the connection established in step #8 and instruct MGW to reserve the resources necessary for the media stream.
16. MGW reserves the resources necessary for the media stream.
17. After determining the final set of media streams for this session, step #14 above, UE initiates the reservation procedures for the resources needed for this session.
18. When UE has successfully reserved the needed resources, it sends the "reservation successful" message to MGCF along the signalling path established by the INVITE message. This message is sent first to P-CSCF.
19. P-CSCF forwards the message to S-CSCF.
20. S-CSCF forwards the message to MGCF. This message may be routed through I-CSCF, depending on operator configuration of I-CSCF.
21. MGCF sends an IAM message to the PSTN
22. The PSTN sends an SS7 ACM message to indicate that the path to the destination has been established. It may optionally alert the destination user before completing the session.
23. If the PSTN is alerting the destination user, MGCF indicates this to the originating party by a provisional response indicating Ringing. This message is sent to the BGCF.
24. The BGCF forwards the message to S-CSCF
25. S-CSCF performs whatever service control is appropriate for this ringing session.
26. S-CSCF forwards the message to P-CSCF
27. P-CSCF forwards the message to UE
28. UE indicates to the originator that the session is being delayed due to alerting. Typically this involves playing a ringback sequence.
29. When the destination party answers, the PSTN sends an ANM message to MGCF
30. MGCF initiates a H.248 interaction to make the connection in the MGW bi-directional
31. MGCF sends a SIP 200-OK final response along the signalling path back to the session originator
32. BGCF sends a SIP 200-OK final response along the signalling path back to the session originator
33. S-CSCF performs whatever service control logic is appropriate for this session setup completion

- 34.— S-CSCF sends a SIP 200-OK final response to P-CSCF
- 35.— P-CSCF approves the commitment of the QoS resources for this session
- 36.— P-CSCF sends a SIP 200-OK final response along the signalling path back to the session originator
- 37.— UE starts the media flow for this session
- 38.— UE responds to the final response with a SIP ACK message, which is passed to the MGCF via the signalling path. The message is sent first to P-CSCF
- 39. P-CSCF forwards the ACK to S-CSCF.
- 40.— S-CSCF forwards the ACK to MGCF.

B.5.2 Session flow decomposition into procedure blocks

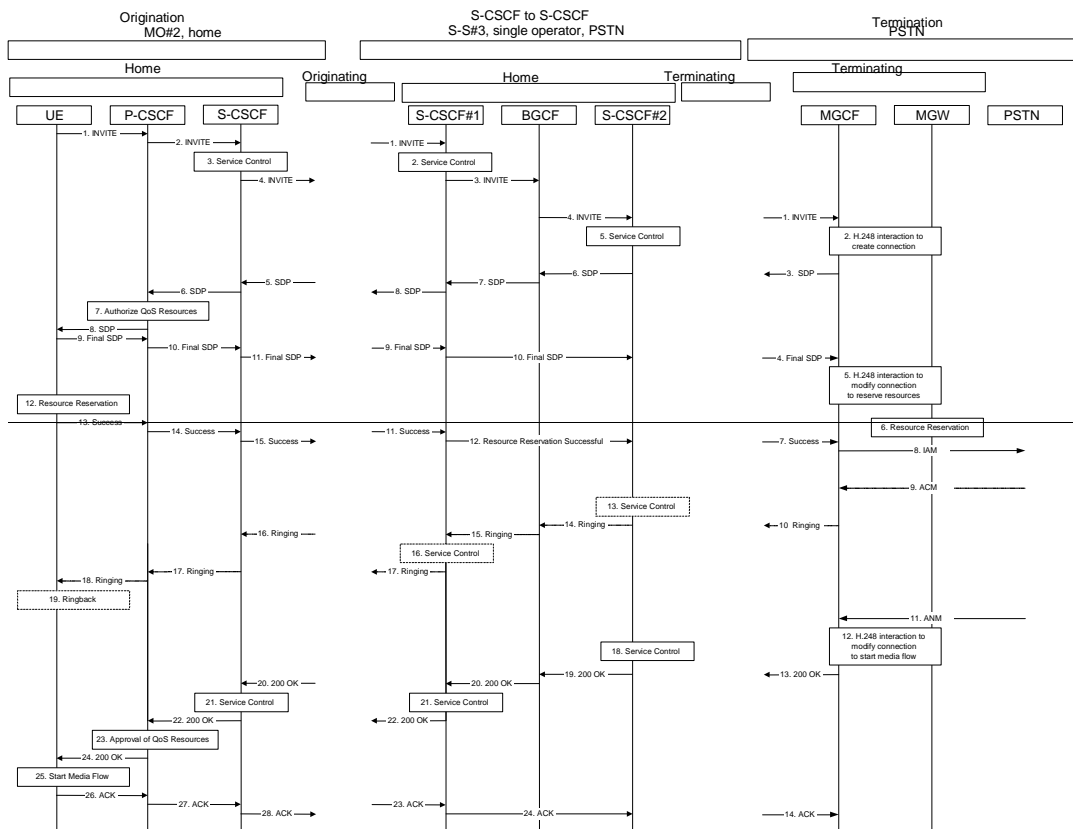
The end-to-end session flow given in the previous section can be decomposed into an originating part, an inter-serving part, and a terminating part.

The originating part is for a mobile origination, with subscriber located in the home operator service area. This procedure is given in Section 5.6.2, (MO#2) Mobile origination, home.

The inter-serving part is for a single operator, where the destination party is located within the operator's service area. This procedure is given in Section 5.5.3, (S-S#3) Session origination with PSTN termination in the same network as the S-CSCF.

The terminating part is for PSTN termination. This procedure is given in Section 5.7.3, (PSTN-T) PSTN Termination.

The following diagram illustrates this decomposition, showing how the three separate procedures fit together to produce an end-to-end session flow.



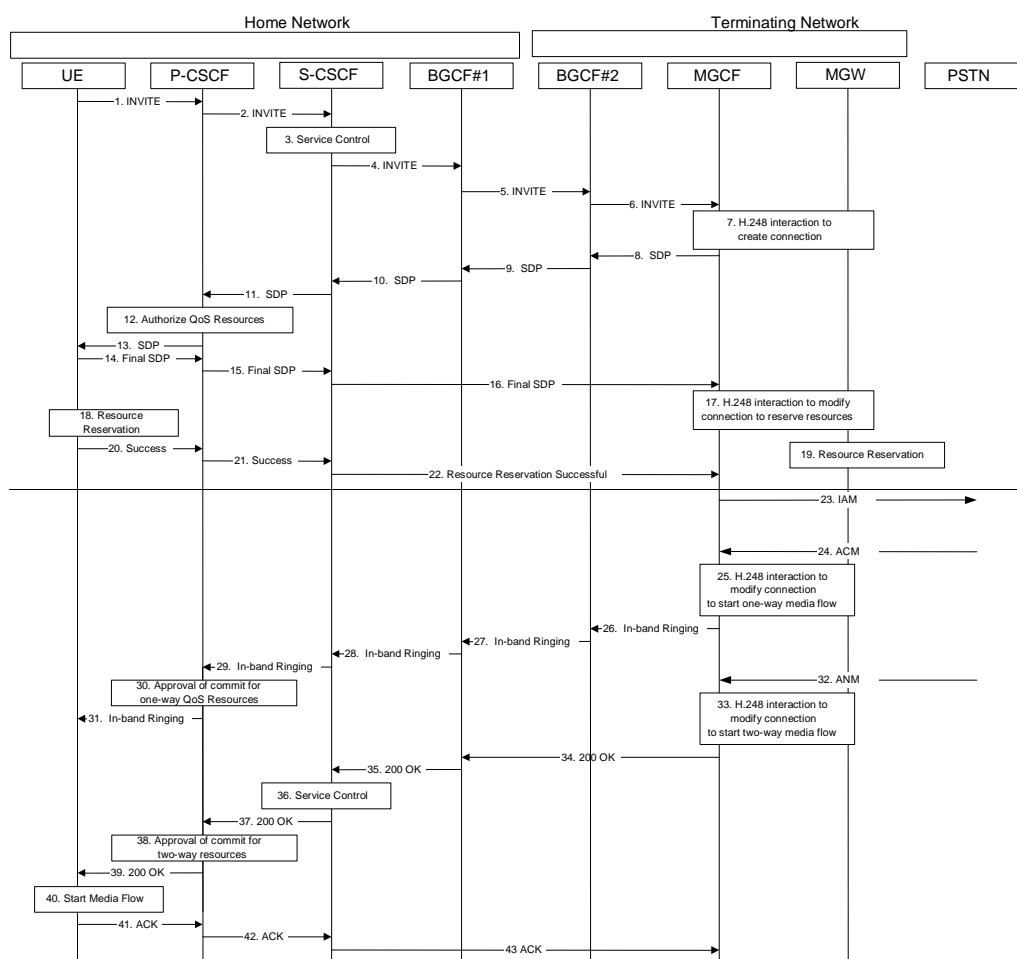
Note: the S-CSCF#2 in the S-S#3 procedure is the MGCF of the PSTN-T procedure.

B.6 Sample end-end Session Flow - Mobile Origination, PSTN Termination by separate network operator

For this end-to-end session flow, we assume the originator is a UE located outside the service area of the network operator to whom the UE is subscribed. The UE has already established the proper PDP contexts for exchanging SIP signalling messages, has performed the proxy discovery procedures described in section 5.1.1, and has registered in the IM CN subsystem.

The UE originating the session addresses a destination that is not a 3GPP endpoint, i.e. an E.164 number that must be completed by the PSTN.

The visited network operator decides not to perform the PSTN gateway function for this session setup attempt, rather to a PSTN gateway of another network operator, the third party with whom prior agreement has been made.



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

1. The UE sends a SIP INVITE request, containing an initial SDP, to the P-CSCF, which was obtained from the CSCF discovery procedures.
2. The P-CSCF forwards the INVITE to the next hop name/address, as determined from the registration procedures. In this case the next hop is the S-CSCF within the same operator's network.
3. The S-CSCF validates the service profile, and performs whatever service control logic is appropriate for this session setup attempt.
4. The S-CSCF translates the destination address and determines the session will break out to the PSTN. It therefore forwards the INVITE to BGCF#1.
5. BGCF#1 determines that another operator is better able to terminate this PSTN connection, and forwards the INVITE to BGCF#2 in that operator's network.

6. ~~BGCF#2 decides to use an MGW in its network, allocates a MGCF, and sends the INVITE request to the MGCF. Procedures for choice of the optimal Media Gateway are not standardized in Release 5.~~
7. ~~MGCF initiates a H.248 interaction to pick an outgoing channel and determine media capabilities of the MGW.~~
8. ~~MGCF determines the subset of the media flows proposed by the originating endpoint that it supports, and responds with an SDP message back to the originator via the signaling path. This response is sent to BGCF#2.~~
9. ~~BGCF#2 forwards the SDP to BGCF#1.~~
10. ~~BGCF#1 forwards the SDP to S-CSCF~~
11. ~~S-CSCF forwards the SDP message to P-CSCF~~
12. ~~P-CSCF authorizes the resources necessary for this session~~
13. ~~P-CSCF forwards the SDP message to the originating endpoint, UE.~~
14. ~~The originator decides the final set of media streams for this session, and sends the Final SDP to P-CSCF.~~
15. ~~P-CSCF forwards the final SDP to S-CSCF~~
16. ~~S-CSCF forwards the final SDP to MGCF. This message may be routed directly to the MGCF.~~
17. ~~MGCF initiates a H.248 interaction to modify the connection established in step #8 and instruct MGW to reserve the resources necessary for the media stream.~~
18. ~~MGW reserves the resources necessary for the media stream.~~
19. ~~After determining the final set of media streams for this session, step #13 above, UE initiates the reservation procedures for the resources needed for this session.~~
20. ~~When UE has successfully reserved the needed resources, it sends the "reservation successful" message to MGCF along the signaling path established by the INVITE message. This message is sent first to P-CSCF.~~
21. ~~P-CSCF forwards the message to S-CSCF.~~
22. ~~S-CSCF forwards the message to MGCF. This message may be routed through the BGCFs, depending on operator configuration of the BGCFs.~~
23. ~~MGCF sends an IAM message to the PSTN~~
24. ~~When the PSTN has established the path to the destination, it may optionally alert the destination user before completing the session. If so, it responds with an ACM message to the MGCF~~
25. ~~MGCF performs the H.248 interaction with MGF to enable a one-way media flow.~~
26. ~~If the PSTN is alerting the destination user, MGCF indicates this to the originating party by a provisional response indicating Ringing. This message is sent to BGCF#2.~~
27. ~~BGCF#2 forwards the message to BGCF#1~~
28. ~~BGCF#1 forwards the message to S-CSCF~~
29. ~~S-CSCF forwards the message to P-CSCF~~
30. ~~P-CSCF approves the resources needed for the one-way media flow.~~
31. ~~P-CSCF forwards the message to UE~~
32. ~~When the destination party answers, the PSTN sends an ANM message to MGCF~~
33. ~~MGCF initiates a H.248 interaction to make the connection in the MGW bi-directional~~

34. MGCF sends a SIP 200-OK final response along the signaling path back to the session originator
35. BGCF#2 sends a SIP 200-OK final response along the signaling path back to the session originator
36. S-CSCF performs whatever service control is appropriate for this completing session
37. S-CSCF sends the SIP 200-OK final response to the P-CSCF
38. P-CSCF approves the commitment of the QoS resources for this session
39. P-CSCF sends a SIP 200-OK final response along the signaling path back to the session originator
40. UE starts the media flow for this session
41. UE responds to the final response with a SIP ACK message, which is passed to the MGCF via the signaling path. The message is sent first to P-CSCF
42. P-CSCF forwards the ACK to S-CSCF.
43. S-CSCF forwards the ACK to MGCF.

CHANGE REQUEST

⌘ **23.228 CR 170** ⌘ rev **-** ⌘ Current version: **5.4.1** ⌘

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

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ External Application Servers		
Source:	⌘ Siemens		
Work item code:	⌘ IMS-CCR	Date:	⌘ 17.4.2002
Category:	⌘ F	Release:	⌘ REL-5
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

Reason for change:	⌘ Sub-clause 4.2.3 has been written before the IMS Service Architecture was fixed. The relationship between clauses 4.2.3 and 4.2.4 in 23.228 was never mentioned explicitly. Recent contributions to SA2 and CN1 show that this may lead to misunderstandings.
Summary of change:	⌘ It is clarified that OSA is the standardised means to support external application servers.
Consequences if not approved:	⌘ Misunderstandings and inconsistent stage 3 specifications

Clauses affected:	⌘ 4.2.3		
Other specs affected:	<input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘	
Other comments:	⌘		

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- 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.

4.2.3 Support of roaming subscribers

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.

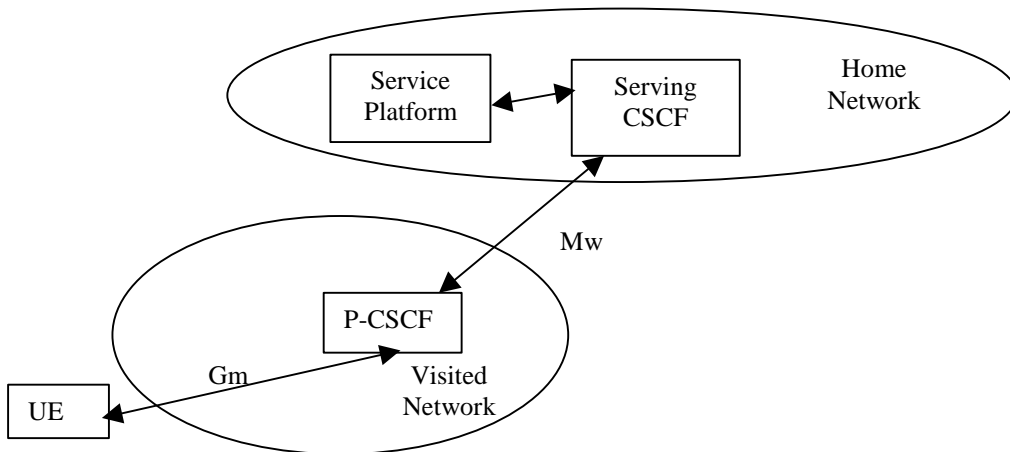


Figure 4-1: Service Platform in Home Network

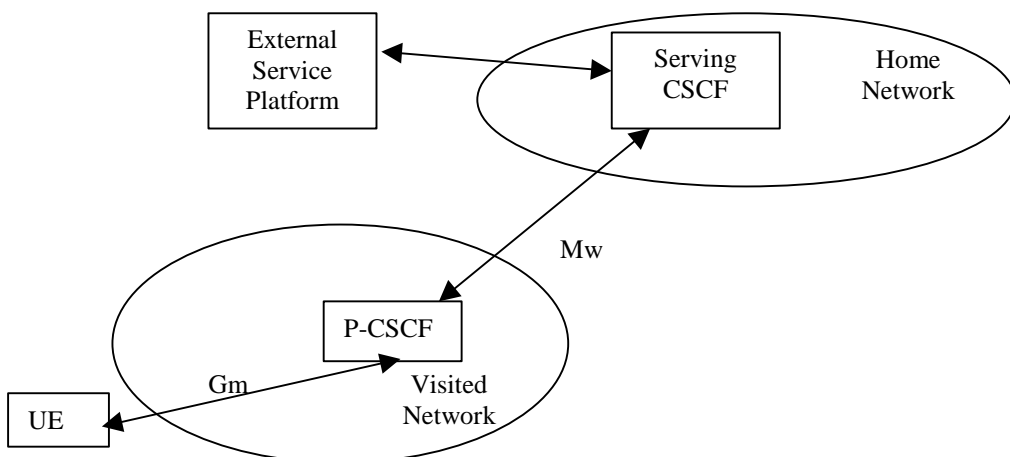


Figure 4-2: External Service Platform

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 sub-clause 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-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.

CHANGE REQUEST

⌘ **23.228 CR 167** ⌘ rev **-** ⌘ Current version: **5.4.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ Corrections to architecture of MRF		
Source:	⌘ Nokia		
Work item code:	⌘ IMS-CCR	Date:	⌘ 17.04.2002
Category:	⌘ F	Release:	⌘ REL-5
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900 .		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

Reason for change:	⌘ The Gi interface was replaced with Mb in S-020117. This is not shown in TS 23.228.		
Summary of change:	⌘ The Gi is replaced with Mb on figure 4.5a.		
Consequences if not approved:	⌘ Inconsistent specifications.		

Clauses affected:	⌘ 4.7		
Other specs affected:	⌘ <input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications		⌘
Other comments:	⌘		

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- 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.

4.7 Multimedia Resource Function

The architecture concerning the Multimedia Resource Function is presented in Figure 4.5a below.

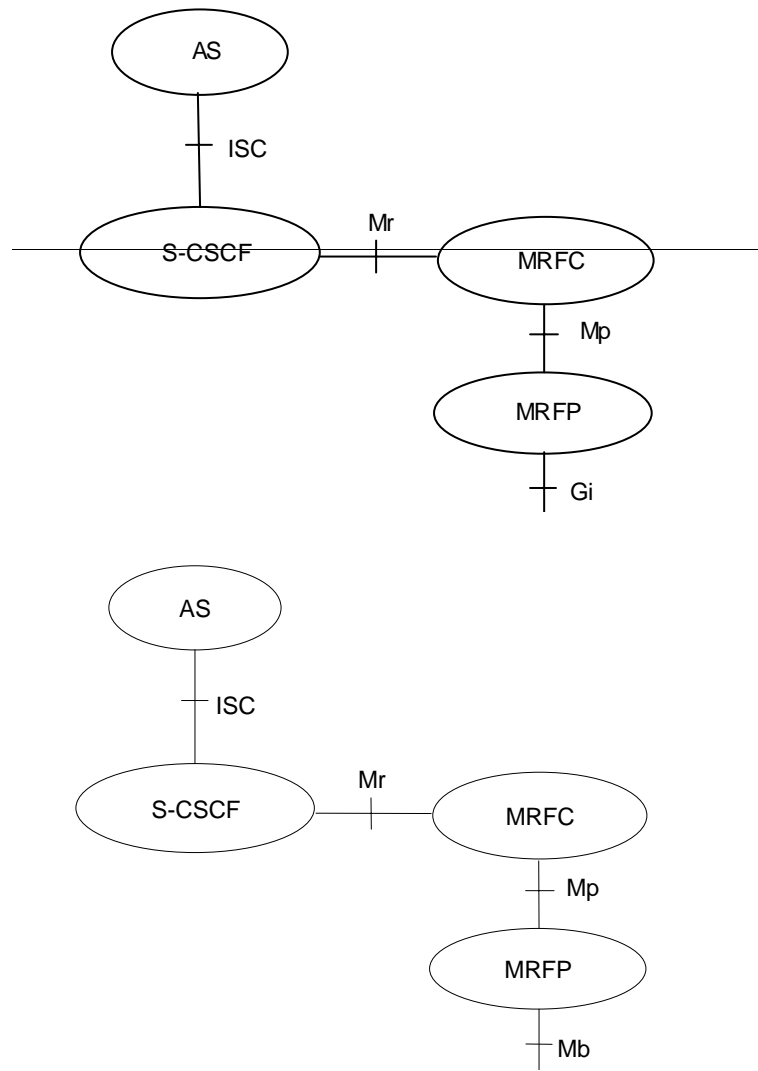


Figure 4.5a: Architecture of MRF

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.

3GPP TSG-SA2#24 Meeting
 Madrid, Spain, 22-26 April 2002

Tdoc S2-021045

CR-Form-v4	
CHANGE REQUEST	
⌘ 23.228 CR 161 ⌘	- ⌘ Current version: 5.4.1 ⌘

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

Proposed change affects: ⌘ (U)SIM ME/UE ISIM Core Network

Title:	⌘	Consistent and correct use of destination subscriber & fix a fault of changing destination to originating subscriber
Source:	⌘	Ericsson
Work item code:	⌘	IMS-CCR
	Date: ⌘	22/04/02
Category:	⌘	F
		Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900 .
	Release: ⌘	Rel-5
		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

Reason for change:	⌘	Some editorial fixes are needed otherwise wrong requirements are described on stage 2.
Summary of change:	⌘	Clarify that it is the destination and originating subscriber that are in the same network to select I-CSCF and remove one extra reference to terminating subscriber
Consequences if not approved:	⌘	Wrong stage 2 requirements.

Clauses affected:	⌘	4.6.3
Other specs Affected:	⌘	<input type="checkbox"/> Other core specifications ⌘ <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications
Other comments:	⌘	

*****First change*****

4.6.3 Serving-CSCF

The Serving-CSCF (S-CSCF) performs the session control services for the UE. It maintains a session state as needed by the network operator for support of the services. Within an operator's network, different S-CSCFs may have different functionalities. The functions performed by the S-CSCF during a session are:

Registration

- May behave as a Registrar as defined in RFC 3261 [12] or subsequent versions, i.e. it accepts registration requests and makes its information available through the location server (eg. HSS).

Session-related and session-unrelated flows

- Session control for the registered endpoint's sessions.
- May behave as a Proxy Server as defined in RFC 3261 [12] or subsequent versions, i.e. it accepts requests and services them internally or forwards them on, possibly after translation.
- May behave as a User Agent as defined in RFC 3261 [12] or subsequent versions, i.e. it may terminate and independently generate SIP transactions.
- Interaction with Services Platforms for the support of Services
- Provide endpoints with service event related information (e.g. notification of tones/announcement together with location of additional media resources, billing notification)
- On behalf of an originating endpoint (i.e. the originating subscriber/UE)
 - Obtain from a database, the Address of the I-CSCF for the network operator serving the destination subscriber from the destination name ~~of the terminating subscriber~~ (e.g. dialled phone number or SIP URL), when the destination subscriber is a customer of a different network operator, and forward the SIP request or response to that I-CSCF.
 - When the destination name of the ~~destination terminating~~ subscriber (e.g. dialled phone number or SIP URL), and the ~~originating destination~~ subscriber is a customer of the same network operator, forward the SIP request or response to an I-CSCF within the operator's network.
 - Depending on operator policy, forward the SIP request or response to another SIP server located within an ISP domain outside of the IM CN subsystem.
 - Forward the SIP request or response to a BGCF for call routing to the PSTN or CS Domain.
- On behalf of a destination endpoint (i.e. the terminating subscriber/UE)
 - Forward the SIP request or response to a P-CSCF for a MT procedure to a home subscriber within the home network, or for a subscriber roaming within a visited network where the home network operator has chosen not to have an I-CSCF in the path
 - Forward the SIP request or response to an I-CSCF for a MT procedure for a roaming subscriber within a visited network where the home network operator has chosen to have an I-CSCF in the path.
 - Modify the SIP request for routing an incoming session to CS domain according to HSS and service control interactions, in case the subscriber is to receive the incoming session via the CS domain.
 - Forward the SIP request or response to a BGCF for call routing to the PSTN or the CS domain.

Charging and resource utilisation:

- Generation of CDRs.

