Technical Specification Group Services and System Aspects ***TSGS#12(01)0335***

Meeting #12, Stockholm, Sweden, 18-21 June 2001

Source: **TSG SA WG2**
Title: **CRs on 23.228 Rel5**
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 #12.
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.

On 23.228 Rel5:

CR#	***rev***	***Rel***	***title***	***cat***	***in ver***	***out ver***	***S2#***	***WI***
038		R5	Combined Services Architecture	C	5.0.0	5.1.0	S2-011349	IMS
038	1	R5	Combined Services Architecture	C	5.0.0	5.1.0	S2-011520	IMS
040	1	R5	Security functional roles for Roles of Session Control	F	5.0.0	5.1.0	S2-011524	IMS
009	1	R5	Registration of users with multiple public identifiers: avoiding useless registration messages	C	5.0.0	5.1.0	S2-011530	IMS-CCR
020	1	R5	Registration information removal from S-CSCF	C	5.0.0	5.1.0	S2-011533	IMS-CCR
028	1	R5	SLF Mechanism for all kinds of CSCF types	B	5.0.0	5.1.0	S2-011534	IMS-CCR
014	1	R5	Registration flows	C	5.0.0	5.1.0	S2-011535	IMS-CCR
042		R5	Definition of default codec in 23.228	F	5.0.0	5.1.0	S2-011536	IMS
023	1	R5	Changes for DTMF Tone Interworking	F	5.0.0	5.1.0	S2-011545	IMS-CCR
044		R5	Session handling in IM (Redirection)	F	5.0.0	5.1.0	S2-011546	IMS
015	1	R5	MT call procedures for unregistered subscriber	B	5.0.0	5.1.0	S2-011547	IMS-CCR
017	1	R5	Providing local services in the IM Subsystem	C	5.0.0	5.1.0	S2-011556rev1	IMS-CCR
018	1	R5	Emergency call handling in the IMS	B	5.0.0	5.1.0	S2-011562	EMC1-PS
046		R5	Subscription Updating Procedure	B	5.0.0	5.1.0	S2-011575rev1	IMS-CCR
036	1	R5	23.228 Additional information on the service control architecture	C	5.0.0	5.1.0	S2-011581	IMS

3GPP TSG SA2#18 **S2-011349**
Puerto Rico, 14-18 May 2001

Source: **Drafting Group,**
Title: **Combined CR for Service Control in section 4.2**
Document for: **Approval**

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3GPP TSG-SA2#18
Puerto Rico, USA 14-18 May 2001

CR-Form-v3

CHANGE REQUEST

⌘ **23.228** **CR** **038** ⌘ rev **-** ⌘ Current version: **5.0.0** ⌘

*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:	⌘	Combined CR for Service Control in section 4.2
Source:	⌘	SA2 Services Architecture Drafting Group
Work item code:	⌘	1514
Date:	⌘	04.28.2001
Category:	⌘	**C**
Release:	⌘	REL-5

Use one of the following categories:
F *(essential correction)*
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Use one of the following releases:
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R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

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Clauses affected:	⌘	4.2
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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4.2 IM services concepts

4.2.1 Virtual Home Environment (VHE)

4.2.1.1 Support of CAMEL

It shall be possible for an operator to offer access to services based on the CSE for its IM CN subsystem subscribers. This shall be supported by a CAP interface to the Serving-CSCF. It should be noted that there is no requirement for any operator to support CAMEL services for their IM CN subsystem subscribers or for inbound roamers.
It shall be possible for a home network to provide support for CAMEL based services to a subscriber roaming in a network that does not support CAMEL on the IM CN subsystem or does not support the required CAMEL Version. To achieve this, the home operator may support the CAP capable Serving-CSCF in the home network.

4.2.1.2 Support of OSA

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

4.2.2 Support of Local Services in the IMS

Visited network provided services offer an opportunity for revenue generation by allowing access to services of a local nature to visiting users (inbound roamers). There shall be a standardised means for providing inbound roamers with access to local services.

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.

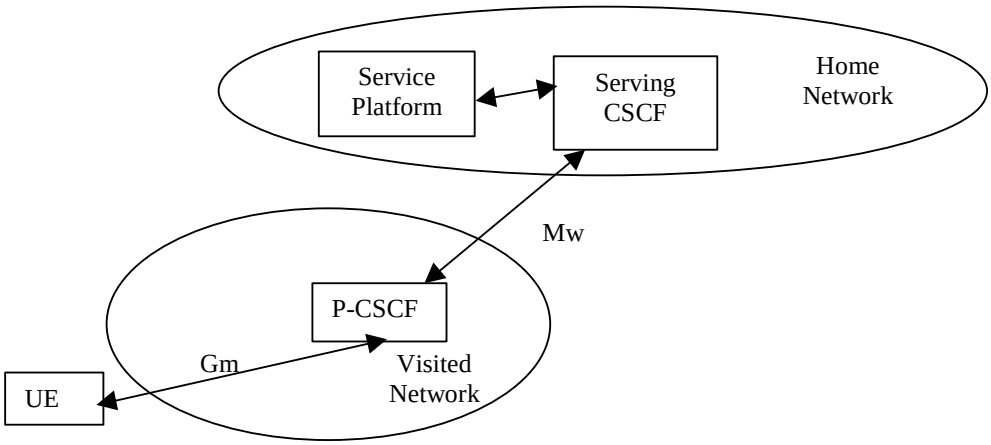

Figure 4-1: Service Platform in Home Network

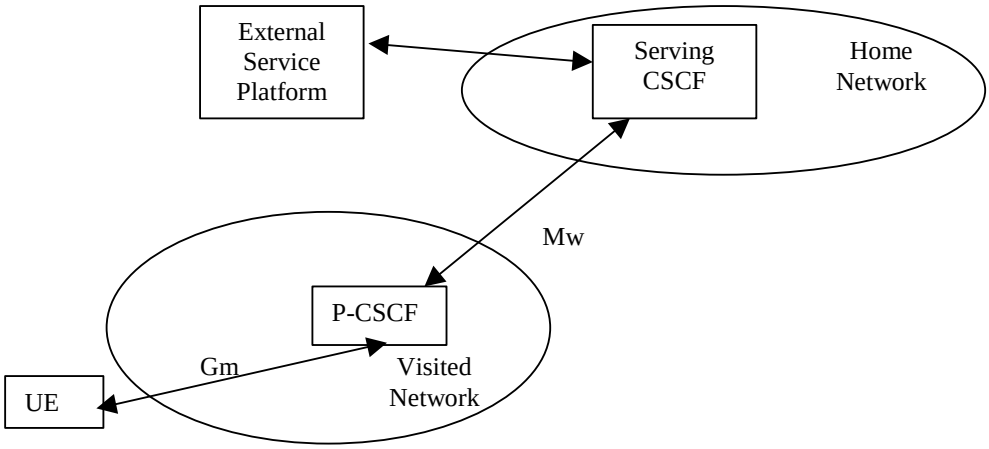

Figure 4-2: External Service Platform

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.

Editor's Note: the types of protocols to be used on the interfaces between the Serving-CSCF and the different service platforms in these different scenarios are FFS.

The roles that the CSCF plays are described below.

- When subscribers roam to visited networks, the Serving-CSCF is located in the home network , the roamed to (visited) network shall support a Proxy-CSCF. The Proxy-CSCF shall enable the session control to be passed to the home network based Serving-CSCF that shall provide 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.
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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.

4.2.4 Serving CSCF to service platform Interface

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".,~~purposes, SIP+.~~
2. ~~Guidelines for SIP+ are needed;~~ SIP+ is based on the SIP protocol information with necessary enhancements to allow for remote service ~~control~~execution; controversial enhancements should be avoided.
3. The depicted functional architecture does not propose a specific physical implementation.
4. 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 SIP+ to communicate with the S-CSCF. ~~Further details are needed.~~
5. The S-CSCF shall decide whether an Application Server is required to receive information related to an incoming ~~if a~~ SIP session request to ensure appropriate service handling.~~is subject to inform a service~~. 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. ~~To~~ The name(s)/address(es) information of~~identify~~ the application server(s) ~~service to be informed is based on information~~are received from the HSS.

   Editors Note: The details of the "filter" information has to be further identified.

6. 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.~~translate SIP+ to CAP and to hold the needed functions to do that.~~
7. The IM SSF and the CAP interface support legacy services only.
8. After informing the node of a SIP session request, this node shall ensure that the S-CSCF shall be made aware of any resulting activity by sending messages to the S-CSCF.
9. From the perspective of the S-CSCF, The "SIP Application server", "OSA service capability server" and "IM-SSF" shall exhibit the same interface behaviour.

10. 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.

11. 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".

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

~~12.~~13. 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 Serving-CSCF control interface:

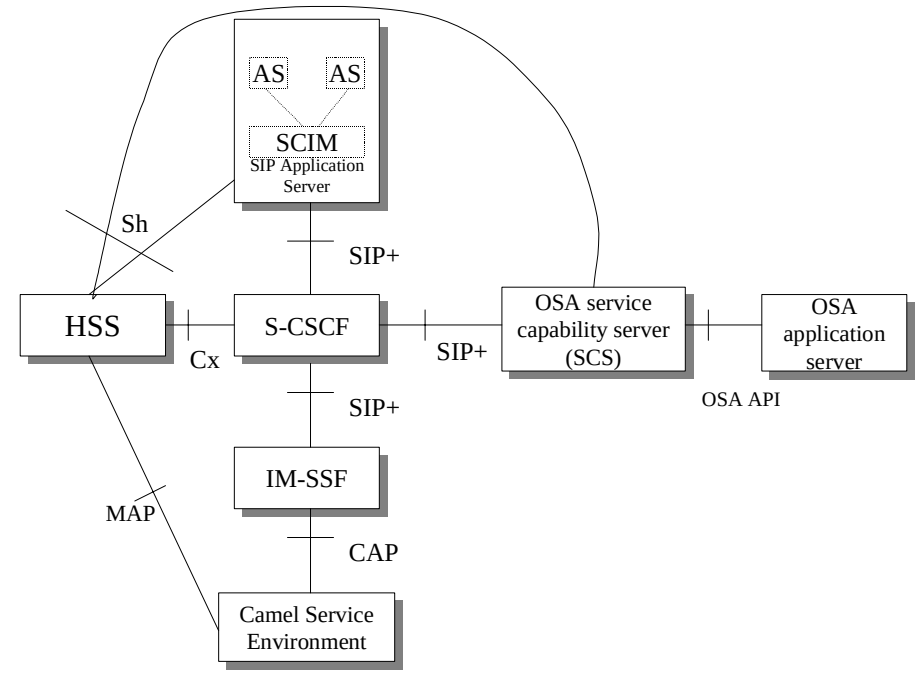
1. SIP+ shall be capable to bring the full range of information (e.g. message headers, message bodies) available at the S-CSCF to the Application Server's attention.
2. SIP+ shall preserve the extensibility of the SIP network signalling protocol on the interface to the application server. Introducing extensions (e.g. new SIP method, SIP header) in the network SIP signalling protocol shall make these extensions implicitly available to the Application Server without requiring separate extensions to SIP+.
3. The S-CSCF is application logic agnostic, i.e. it has no specific knowledge about a particular application logic invoked via the SIP+ interface.
4. The S-CSCF contacts the Application Server for the execution of applications. This shall be possible during the registration and during the session from setup to the release.
5. An Application Server can initiate a new session/transactions at the S-CSCF without having been contacted by the S-CSCF beforehand.
6. SIP+ is currently envisioned to connect the S-CSCF to entities (Application Servers, OSA SCS, IM SSF) within the operators network.
7. SIP+ shall be a protocol between a Controlling Entity (SIP Application Server, IM-SSF, OSA-SCS) and a Controlled Entity (S-CSCF). The Controlling Entity takes/makes decisions on the SIP session. The Controlled Entity acts according to the requests from the Controlling Entity, and notifies the Controlling Entity of events of interest (e.g a timer event or a SIP event).
8. The SIP+ protocol shall enable a multi-vendor open interface between SIP application server/IMS-SSF/OSA-SCS and the S-CSCF.
9. SIP+ shall support service control for both originating SIP sessions and terminating SIP sessions. The A-party´s services are accessed from the A-party's S-CSCF. The B-party´s services are accessed from the B-party's S-CSCF
10. SIP+ shall allow the simultaneous handling of services within a session.
11. SIP+ shall allow the Controlling Entity to request the transmission of a specific SIP message(s). This may, or may not, be in reaction to a message from the Controlled Entity
12. SIP+ shall allow the Controlling Entity to request the transmission of a SIP message with added/deleted/modified content.(headers & sip message body (e.g. SDP))
13. SIP+ shall allow filter setting from the Controlling Entity.
14. SIP+ shall allow Service Control triggering from the Controlled Entity on basic or complex triggers.
15. SIP+ shall allow the Controlling Entity to request the initiation of a SIP session. This may, or may not, be in reaction to a message from the Controlled Entity
16. SIP+ shall be able to convey charging information.
17. SIP+ shall support Load Control functions.
18. Means for detecting the failure/availability of a SIP AS/IM-SSF/OSA-SCS and S-CSCF shall be provided.
19. SIP+ shall support the transport the following information from the S-CSCF to the Controlling Entity:
    - Subscriber ID (Private subscriber identifier and, optionally, public subscriber identifier)
    - Information on the event which occurred

- terminating/originating information
- SIP information

20. SIP+ shall support the transport the following information from the Controlling Entity to the S-CSCF:
    - Subscriber ID
    - Session handling request
21. The “SIP+” protocol shall support the control of timers
22. The SIP+ protocol shall allow the S-CSCF to to differentiate between session control and SIP+.

Editors Note: Further requirements are for further study.

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



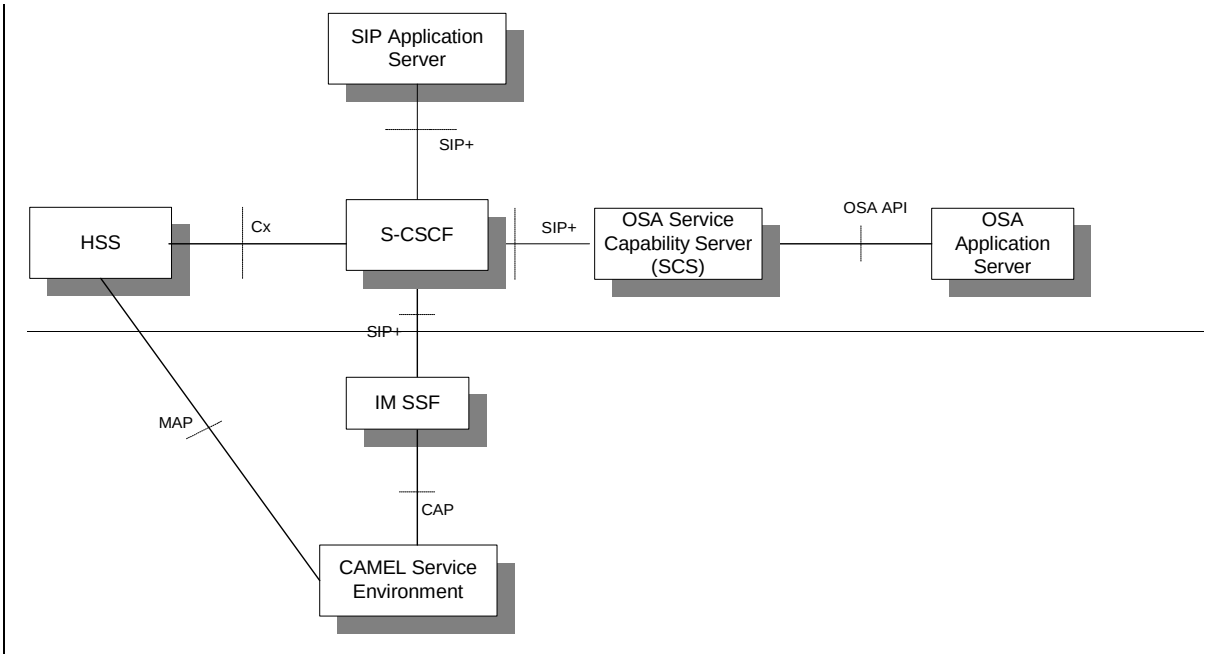


Figure 4.3: Functional architecture for the provision of service in the IMS

4.2.5 HSS to service platform Interface

The "application server" (SIP Application Server and/or the OSA service capability server) may communicate to the HSS. The Sh interface is used for this purpose. The Sh interface is shown in Figure 4.3.

For the Sh interface, the following shall apply:

1 The Sh interface is an intra-operator interface.

2. The Sh interface is between the HSS and the "Sip application server" and between the HSS and the "OSA service capability server".

3GPP TSG SA2#18 **S2-011520~~349~~**
Puerto Rico, 14-18 May 2001

Source: **Drafting Group,**
Title: **Combined CR for Service Control in section 4.2**
Document for: **Approval**

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CR-Form-v3

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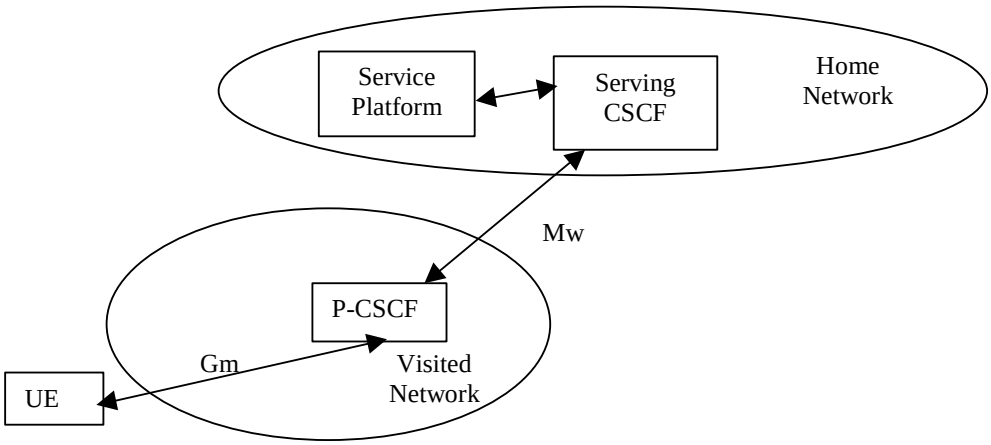

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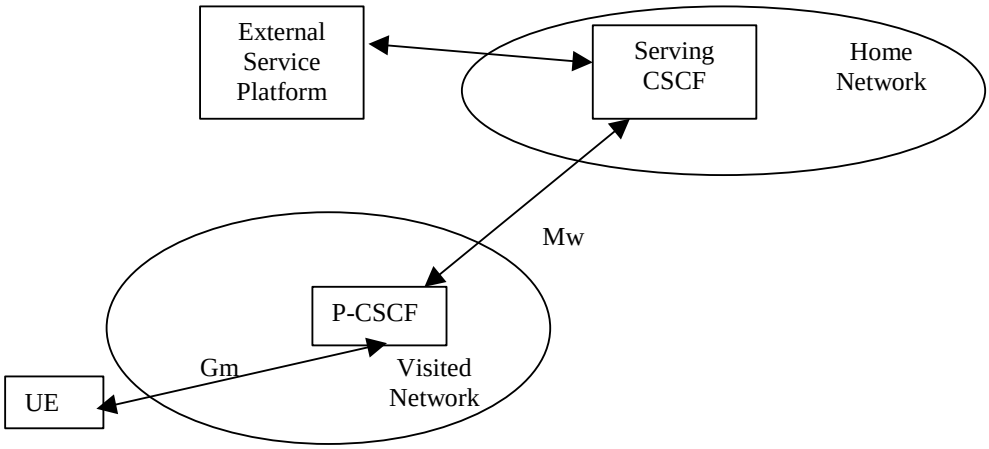

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~~12.~~13. The S-CSCF does not provide authentication and security functionality for secure direct third party access to the IM subsystem. The OSA framework provides a standardized way for third party secure access to the IM subsystem.

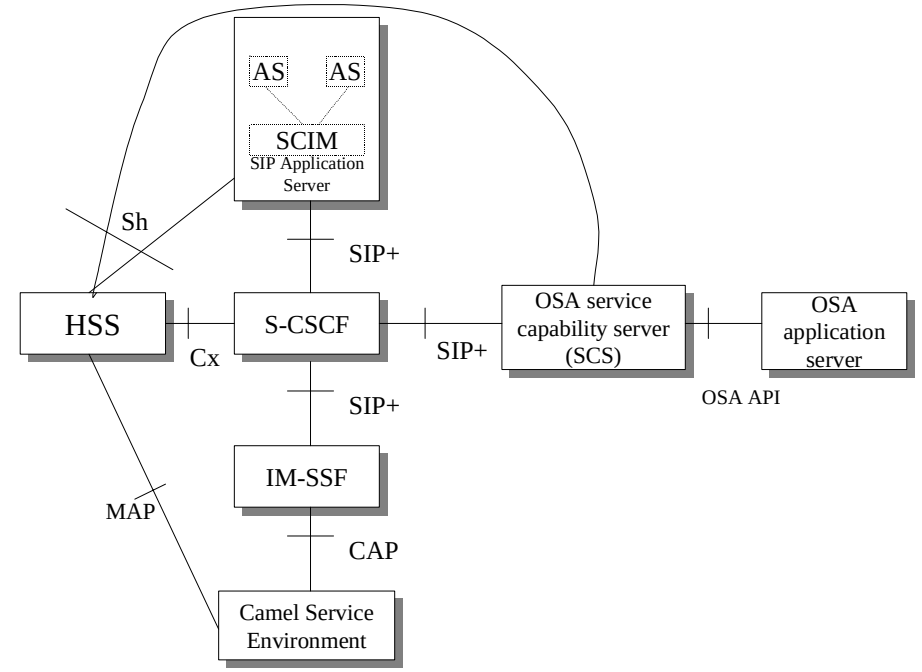
More specifically the following requirements apply to the Serving-CSCF control interface:

1. SIP+ shall be capable to bring the full range of information (e.g. message headers, message bodies) available at the S-CSCF to the Application Server’s attention.
2. SIP+ shall preserve the extensibility of the SIP network signalling protocol on the interface to the application server. Introducing extensions (e.g. new SIP method, SIP header) in the network SIP signalling protocol shall make these extensions implicitly available to the Application Server without requiring separate extensions to SIP+.
3. The S-CSCF is application logic agnostic, i.e. it has no specific knowledge about a particular application logic invoked via the SIP+ interface.
4. The S-CSCF contacts the Application Server for the execution of applications. This shall be possible during the registration and during the session from setup to the release.
5. An Application Server can initiate a new session/transactions at the S-CSCF without having been contacted by the S-CSCF beforehand.
6. SIP+ is currently envisioned to connect the S-CSCF to entities (Application Servers, OSA SCS, IM SSF) within the operators network.
7. SIP+ shall be a protocol between a Controlling Entity (SIP Application Server, IM-SSF, OSA-SCS) and a Controlled Entity (S-CSCF). The Controlling Entity takes/makes decisions on the SIP session. The Controlled Entity acts according to the requests from the Controlling Entity, and notifies the Controlling Entity of events of interest (e.g a timer event or a SIP event).
8. The SIP+ protocol shall enable a multi-vendor open interface between SIP application server/IMS-SSF/OSA-SCS and the S-CSCF.
9. SIP+ shall support service control for both originating SIP sessions and terminating SIP sessions. The A-party´s services are accessed from the A-party’s S-CSCF. The B-party´s services are accessed from the B-party’s S-CSCF
10. SIP+ shall allow the simultaneous handling of more than one services within a session.
11. SIP+ shall allow the Controlling Entity to request the transmission of a specific SIP message(s). This may, or may not, be in reaction to a message from the Controlled Entity
12. SIP+ shall allow the Controlling Entity to request the transmission of a SIP message with added/deleted/modified content.(headers & sip message body (e.g. SDP))
13. SIP+ shall allow filter setting from the Controlling Entity.
14. SIP+ shall allow Service Control triggering from the Controlled Entity on basic or complex triggers.
15. SIP+ shall allow the Controlling Entity to request the initiation of a SIP session. This may, or may not, be in reaction to a message from the Controlled Entity
16. SIP+ shall be able to convey charging information.
17. SIP+ shall support Load Control functions.
18. Means for detecting the failure/availability of a SIP AS/IM-SSF/OSA-SCS and S-CSCF shall be provided.

19. SIP+ shall support the transport of the following information from the S-CSCF to the Controlling Entity:
    - Subscriber ID (Private subscriber identifier and, optionally, public subscriber identifier)
    - Information on the event which occurred
    - terminating/originating information
    - SIP information
20. SIP+ shall support the transport of the following information from the Controlling Entity to the S-CSCF:
    - Subscriber ID
    - Session handling request
21. The "SIP+" protocol shall support the control of timers
22. The SIP+ protocol shall allow the S-CSCF to ~~to~~ differentiate between session control and SIP+.

Editors Note: Further requirements are for further study.

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



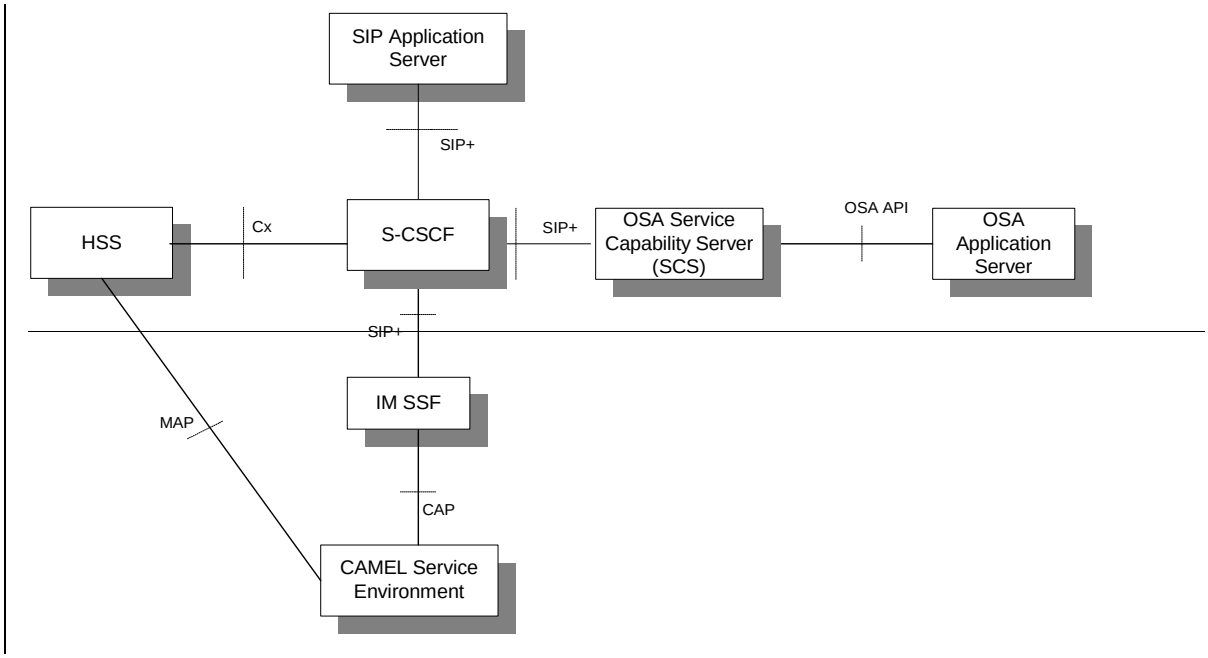


Figure 4.3: Functional architecture for the provision of service in the IMS

4.2.5 HSS to service platform Interface

The "application server" (SIP Application Server and/or the OSA service capability server) may communicate to the HSS. The Sh interface is used for this purpose. The Sh interface is shown in Figure 4.3.

For the Sh interface, the following shall apply:

1 The Sh interface is an intra-operator interface.

2. The Sh interface is between the HSS and the "Sip application server" and between the HSS and the "OSA service capability server".

3 The Sh interface transports transparent data for e.g. service related data , user related information, … In this case, the term transparent implies that the exact representation of the information is not understood by the HSS or the protocol.

3GPP SA2#18 **Tdoc S2-011351**
Puerto Rico, USA
14-18 May, 2001

Source: Motorola
Title: Security Associations for Roles of Session Control Functions
Document for: Approval

Proposal

It is proposed that SA2 approve the following CR and send the text to SA3 for endorsement.

3GPP TSG-SA2#18
Puerto Rico, USA, 14-18 May 2001

CR-Form-v3

CHANGE REQUEST

⌘ **23.228** **CR** **040** ⌘ rev **1-** ⌘ Current version: **5.0.0** ⌘

*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:	⌘	Security Associations for Roles of Session Control Functions
Source:	⌘	Motorola
Work item code:	⌘	1514 ***Date:*** ⌘ 05.08.2001
Category:	⌘	**F** ***Release:*** ⌘ REL-5

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	Security associations of ~~Session Control~~IM subsystem functions are incorrect or missing
Summary of change:	⌘	Addition and Correction of security associations of ~~Session Control~~IM subsystem Functions.
Consequences if not approved:	⌘	Security associations of ~~Session Control~~IM subsystem functions will be incorrect or missing

Clauses affected:	⌘	2, 4.6.1, 4.6.2, 4.6.3, 4.6.4, 4.7
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ 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://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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.

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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.

[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 2543: "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"

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

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

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

[20] 3GPP TS 33.2xx00: "Network Domain Security: IP network layer security"

** Next changed section **

4.6 Roles of Session Control Functions

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

4.6.1 Proxy-CSCF

The Proxy-CSCF (P-CSCF) is the first contact point within the IM CN subsystem. Its address is discovered by UEs following PDP context activation, using the mechanism described in section "Procedures related to Local CSCF Discovery ". The P-CSCF behaves like a Proxy (as defined in RFC2543 or subsequent versions), i.e. it accepts requests and services them internally or forwards them on, possibly after translation. The P-CSCF may also behave as a User Agent (as defined in the RFC2543 or subsequent versions), i.e. in abnormal conditions it may terminate and independently generate SIP transactions.
The Policy Control Function (PCF) is a logical entity of the P-CSCF. If the PCF is implemented in a separate physical node, the interface between the PCF and the P-CSCF is not standardised.
The functions performed by the P-CSCF are:

- Forward the SIP register request received from the UE to an I-CSCF determined using the home domain name, as provided by the UE.
- Forward SIP messages received from the UE to the SIP server (e.g. S-CSCF) whose name the P-CSCF has received as a result of the registration procedure.
- As part of processing of the request and before forwarding, the P-CSCF may modify the Request URI of outgoing requests according to a set of provisioned rules defined by the network operator (e.g. Number analysis and potential modification such as translation from local to international format.)
- Forward the SIP request or response to the UE.
- Detect an emergency session and select a S-CSCF in the visited network to handle emergency sessions.
- ~~The g~~Generation of CDRs.
- Maintain a Security Association between itself and each UE, as defined in ~~Access Security for IP-based services Specification~~ TS 33.203 ~~xx~~ [19].
- ~~- Provide security towards Interrogating-CSCF and Serving-CSCF by security methods defined in Network Domain Security specification TS 33.2xx00 [20].~~

Editor's Note: The following functions require further study:

- Authorisation of bearer resources and QoS management. Details of the P-CSCF role in QoS management and authorisation of bearer resources for the session are being investigated by the QoS ad-hoc group.

4.6.2 Interrogating-CSCF

Interrogating-CSCF (**I-CSCF**) is the contact point within an operator's network for all connections destined to a subscriber of that network operator, or a roaming subscriber

currently located within that network operator's service area. There may be multiple I-CSCFs within an operator's network. The functions performed by the I-CSCF are:
Registration

- Assigning a S-CSCF to a user performing SIP registration (see section on Procedures related to Serving-CSCF assignment)

Session Flows

- Route a SIP request received from another network towards the S-CSCF.
- Obtain from HSS the Address of the S-CSCF.
- - Forward the SIP request or response to the S-CSCF determined by the step above

~~Provide security towards Proxy-CSCF by security methods defined in TS 33.2xx [20].~~

~~Provide security towards Serving-CSCF, if needed, by security methods defined in TS 33.2xx [20].~~

Charging and resource utilisation:

- Generation of CDRs.

In performing the above functions the operator may use the I-CSCF or other techniques to hide the configuration, capacity, and topology of the network from the outside. When the I-CSCF is chosen to meet the hiding requirement then for sessions traversing across different operators domains, the I-CSCF may forward the SIP request or response to another I-CSCF allowing the operators to maintain configuration independence.

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 RFC2543 or subsequent versions, i.e. it accepts registration requests and makes its information available through the location server (eg. HSS).

Session flows

- Session control for the registered endpoint's sessions.
- May behave as a Proxy Server as defined in RFC2543 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 RFC2543 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)
- ~~Security towards Proxy-CSCF, as defined by the Network Domain Security specification TS 33.200.~~
- ~~Provide security towards Interrogating-CSCF and BGCFs, if needed, by security methods defined in TS 33.2xx [20]~~
- ~~Provide security towards Proxy-CSCF by security methods defined in TS 33.2xx [20]~~

- ~~If interacting with external Networks, Security Associations are provided in accordance with operator policy.~~

- 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.

- 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 session 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 session for a roaming subscriber within a visited network where the home network operator has chosen to have an I-CSCF in the path.

Charging and resource utilisation:

- Generation of CDRs.

4.6.4 Breakout Gateway Control Function

The Breakout Gateway control function (BGCF) selects the network in which PSTN breakout is to occur. If the BGCF determines that the breakout is to occur in the same network in which the BGCF is located within, then the BGCF shall select a MGCF which will be responsible for the interworking with the PSTN. If the break out is in another network, the BGCF will forward this session signalling to another BGCF, or an MGCF, depending on the configuration, in the selected network.

The functions performed by the BGCF are:

- Receives request from S-CSCF to select appropriate PSTN break out point for the session

- Select the network in which the interworking with the PSTN is to occur. If the interworking is in another network, then the BGCF will forward the SIP signalling to the BGCF of that network.

- Select the MGCF in the network in which the interworking with PSTN is to occur and forward the SIP signalling to that MGCF. This may not apply if the interworking is a different network.

- ~~Provide security towards another BGCF by security methods defined in TS 33.2xx [20].~~

~~Provide security towards Serving-CSCF and MGCFs, as needed, by security methods defined in TS 33.2xx [20].~~

Charging and resource utilisation:

- Generation of CDRs.

The BGCF may make use of information received from other protocols, or may make use of administrative information, when making the choice of which network the interworking shall occur.

** New section **

4.7 Security Concepts

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

3GPP TSG-SA WG2 Meeting #18
Puerto Rico, 14th - 18th May 2001

Tdoc S2-011530

CR-Form-v3

CHANGE REQUEST

⌘ **23.228** **CR** **09** ⌘ rev **Rev1** ⌘ Current version: **5.0.0** ⌘

*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 **X** Core Network **x**

Title:	⌘	Registration of users with multiple public identifiers: avoiding useless registration messages
Source:	⌘	Alcatel
Work item code:	⌘	IMS-CCR
Date:	⌘	07 May 2001
Category:	⌘	**C**
Release:	⌘	REL-5

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	Registration of a subscriber having more than one Public user identity is not defined. Hence as a result, an user having more than one public identity might need to send as many registration messages as he/she has got Public user identity.
Summary of change:	⌘	A global subscriber registration is desirable via a single register message.
Consequences if not approved:	⌘	Knowing that Register message is a periodic message, Multiple registration (via 1 Register messages per public identity) would have strong negative effects on performances (Utran & core network).
Clauses affected:	⌘	3G TS 23.228 §4.3.3.2
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ 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 RFC2543 [12] and RFC2396 [13]) or 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. This shall not preclude the user from registering individually some of his/her public identities if needed.
- Public User Identitys are not authenticated by the network during registration.
- Public User Identities may be used to identify the user's information within the HSS (for example during mobile terminated session set-up).

3GPP TSG-SA WG2 #18
14-18 May, 2001
Puerto Rico

Tdoc S2-~~011292~~011533

Source: Nokia

Title: Registration information removal from S-CSCF

Agenda item: 11

Document for: Approval

Introduction

This contribution introduces changes to the De-registration - user currently registered flow in 3G TS 23.228. Currently I-CSCF and P-CSCF shall release all registration information after sending information flow 200 OK but S-CSCF does not release all registration information after sending information flow 200 OK. There is no need to keep subscriber information in the S-CSCF because the HSS does not anymore contain the S-CSCF name for that subscriber.

In addition, there is no need release registration information from I-CSCF because I-CSCF does not keep any profile information, it is stateless regarding the subscriber.

Proposal

It is proposed that also S-CSCF shall release all registration information after sending information flow 200 OK and the similar text is removed from I-CSCF. The proposed changes are included in the CR against 3GPP TS 23.228 attached below.

3GPP TSG-SA WG2 #18
14-18 May, 2001
Puerto Rico

Tdoc S2-~~011292~~011533

3GPP TSG-SA2 #18
Puerto Rico, May 2001

CR-Form-v3

CHANGE REQUEST

⌘ **23.228** **CR** **020** ⌘ rev **-1** ⌘ Current version: **5.0.0** ⌘

*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 information removal from S-CSCF (De-registration - user currently registered)
Source:	⌘	Nokia
Work item code:	⌘	~~1515~~IMS-CCR ***Date:*** ⌘ 2001-05-09
Category:	⌘	**C** ***Release:*** ⌘ REL-5

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Function-al modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	S-CSCF does not release registration information when user is deregistered and S-CSCF entry is removed from HSS. In addition, I-CSCF is stateless it does not keep any profile information. There is no need to release all registration information from I-CSCF.
Summary of change:	⌘	A statement which tells that all registration information is also removed from S-CSCF in case of De-registration - user currently registered. In addition, the following sentence is removed: "The I-CSCF shall release all registration information after sending information flow 200 OK.
Consequences if not approved:	⌘	

Clauses affected:	⌘	5.3.1
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ 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

Application level de-registration should be initiated by the UE upon roaming to a new network and power off of the terminal (if possible). 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”.

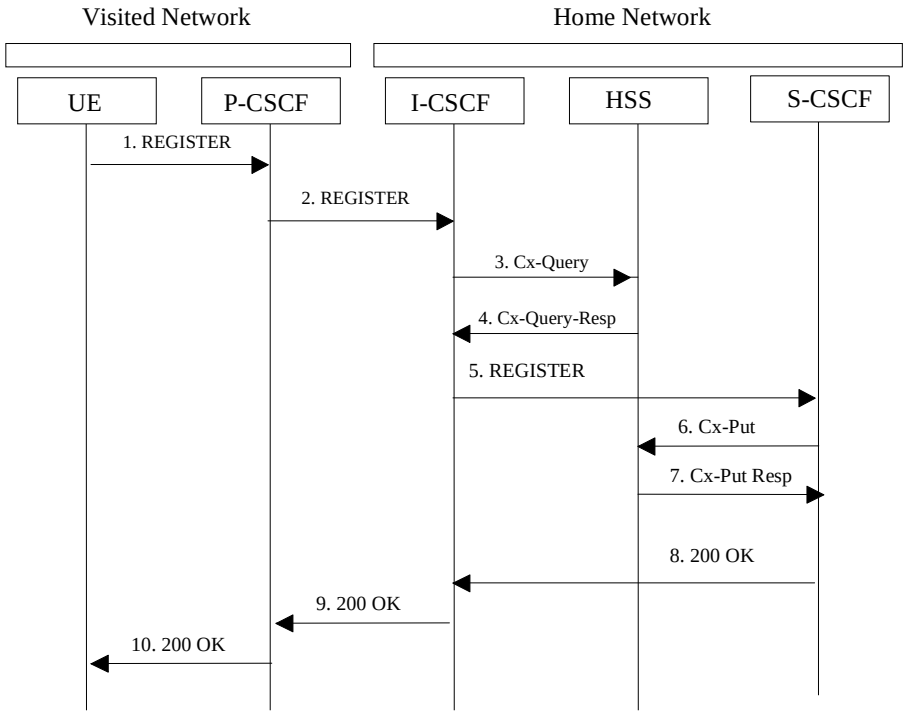

Figure 5.3: De-registration - user currently registered

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 (subscriber identity, home networks domain name).

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-CSCFs “name” in the contact header, subscriber identity, and visited network contact name). A name-address resolution mechanism is utilised in order to determine the address of the home network from the home domain name. When the I-CSCF receives the registration information flow from the proxy, it shall examine the subscriber identity and the home domain name, and employ the services of a name-address resolution mechanism, to determine the HSS address to contact.

3. The I-CSCF shall send the Cx-Query information flow to the HSS (P-CSCF name, subscriber identity, home domain name, visited network contact name). The P-CSCF name is the contact name that the

operator wishes to use for future contact to that P- CSCF. The Cx-query (P-CSCF name, subscriber identity, home domain name, and visited network contact name) information flow is sent to the HSS.

(Editors Note: It is FFS whether the terminal name, or proxy name, or both is included within this and subsequent register messages).

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-CSCFs "name" in the contact header, subscriber identity, visited network contact name) to the selected S-CSCF.

6. The S-CSCF shall send Cx-Put (subscriber identity, clear S-CSCF name) to the HSS. The HSS clears the S-CSCF name for that subscriber.

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

8. The S-CSCF shall return the 200 OK information flow to the I-CSCF. The S-CSCF ~~shall~~may release all registration information regarding this specific registration of the subscriber after sending information flow 200 OK.

9. The I-CSCF shall send information flow 200 OK to the P-CSCF. ~~The I-CSCF shall release all registration information after sending information flow 200 OK.~~

9. The P-CSCF shall send information flow 200 OK to the UE. The P-CSCF ~~shall~~ may release all registration information regarding this specific registration of the subscriber after sending information flow 200 OK.

S2 #18 **S2-011534**
May 14th to May 18th , 2001
Puerto Rico

CR-Form-v3

CHANGE REQUEST

⌘ **TS 23.228 CR 028** ⌘ rev **1-** ⌘ Current version: **5.0.0** ⌘

*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:	⌘	SLF mechanism to be used by S-CSCF for HSS discovery
Source:	⌘	Siemens AG
Work item code:	⌘	IMS-CCR
Date:	⌘	14.5.2001
Category:	⌘	**B**
Release:	⌘	REL-5

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	A unified mechanism has to be chosen for HSS discovery by the different types of CSCFs. This is not yet sufficient considered in TS23.228. Thus it is proposed to adopt the existing and agreed SLF mechanism for this purpose.
Summary of change:	⌘	Textual modification, indicating the unified usage of the SLF mechanism
Consequences if not approved:	⌘	Standardisation effort will be increased to find an alternative mechanism
Clauses affected:	⌘	5.8.1 “User Identity to HSS resolution” and 5.8.2 “SLF on register”
Other specs Affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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).

5.8.1 User identity to HSS resolution

This section describes the resolution mechanism, which enables the I-CSCF and the S-CSCF to find the address of the HSS, that holds the subscriber data for a given user identity when multiple and separately addressable HSSs have been deployed by the network operator. This resolution mechanism is not required in networks that utilise a single HSS e.g. optionally, it could be switched off on the I-CSCF and on the S-CSCF using O&M mechanisms. An example for a single HSS solution is a server farm architecture. By default, the resolution mechanism shall be supported.

On REGISTER and on MT INVITEs, the I-CSCF queries the HSS for subscriber specific data, e. g. the actual location or authentication parameters. This also has to be accomplished by the S-CSCF on REGISTER. In the case when more than one independently addressable HSS is utilized by a network operator, the HSS where user information for a given subscriber is available has to be found. To get the HSS ~~address~~ name the I-CSCF and the S-CSCF query~~ies~~ the Subscription Locator Functional (SLF) entity. The relationship with number portability is for further study.

The subscription locator is accessed via the Dx interface. The Dx interface is the standard interface between the ~~I~~-CSCF and the SLF.

A way to use the subscription locator is described in the following.
The Dx interface provides:

- ~~-~~an operation to query the subscription locator from the I-CSCF or from the S-CSCF, respectively
- a response to provide the HSS ~~address~~ name towards the I-CSCF~~-~~ or towards the S-CSCF, respectively.

By sending the Dx-operation DX_SLF_QUERY the I-CSCF or the S-CSCF indicates a subscriber identity of which it is looking for an HSS. By the Dx-operation DX_SLF_RESP the SLF responds with the HSS name. The I-CSCF or the S-CSCF, respectively,~~-~~ continues by querying the selected HSS. As an option at the registration flow, the I-CSCF may forward the HSS ~~address~~ name towards the serving CSCF to simplify the procedure by which the serving CSCF finds the subscriber's HSS. This option is for further study and can be used in a single HSS environment.

The following two sections present the session flows on REGISTER and on INVITE messages.

5.8.2 SLF on register

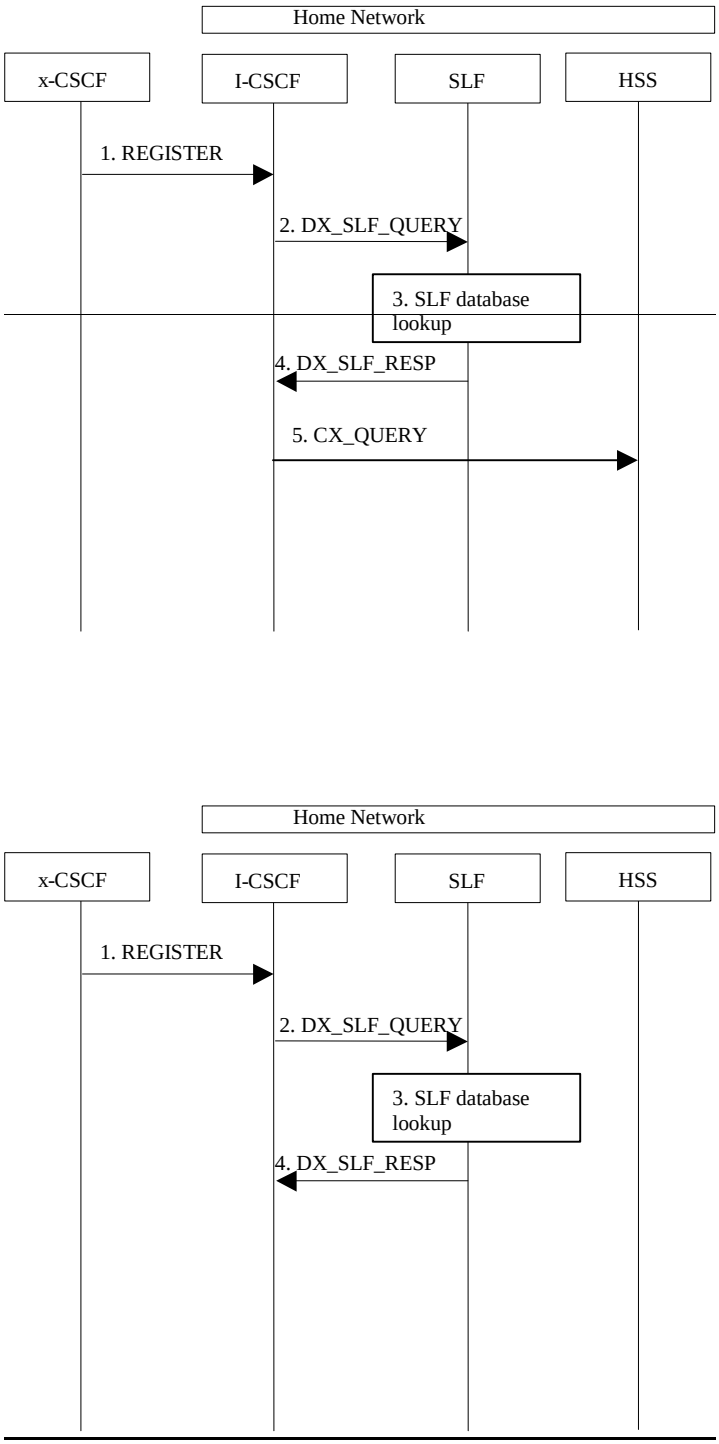

Figure 5.20: SLF on register (1)

1. I-CSCF receives a REGISTER request and now has to query for the location of the subscriber's data.

2. The I-CSCF sends a DX_SLF_QUERY to the SLF and includes as parameter the subscriber identity which is stated in the REGISTER request.

3. The SLF looks up its database for the queried subscriber identity.

4. The SLF answers with the HSS name in which the subscriber's data can be found.

~~5.The I-CSCF can proceed by querying the appropriate HSS.~~

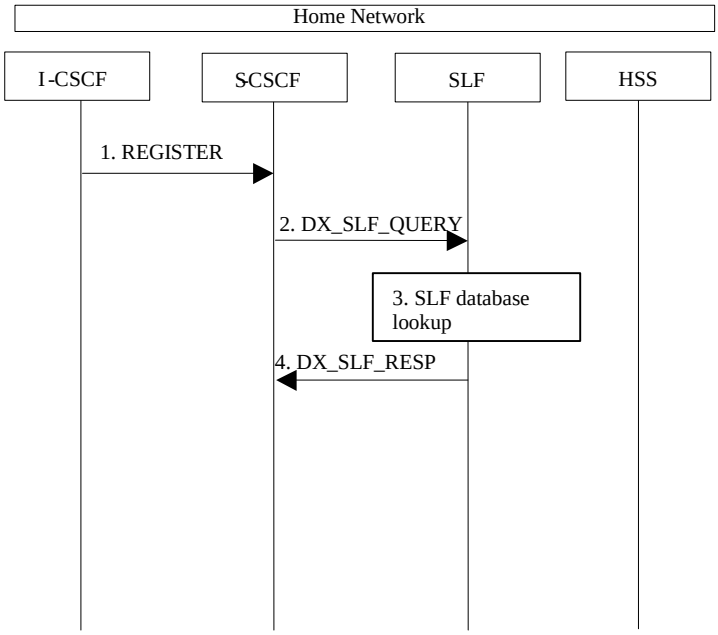

Figure 5.21: SLF on register (2)

1. I-CSCF sends a REGISTER request to the S-CSCF. This now has to query for the location of the subscriber's data.

2. The S-CSCF sends a DX_SLF_QUERY to the SLF and includes as parameter the subscriber identity which is stated in the REGISTER request.

3. The SLF looks up its database for the queried subscriber identity.

4. The SLF answers with the HSS name in which the subscriber's data can be found.

5.8.3 SLF on UE invite

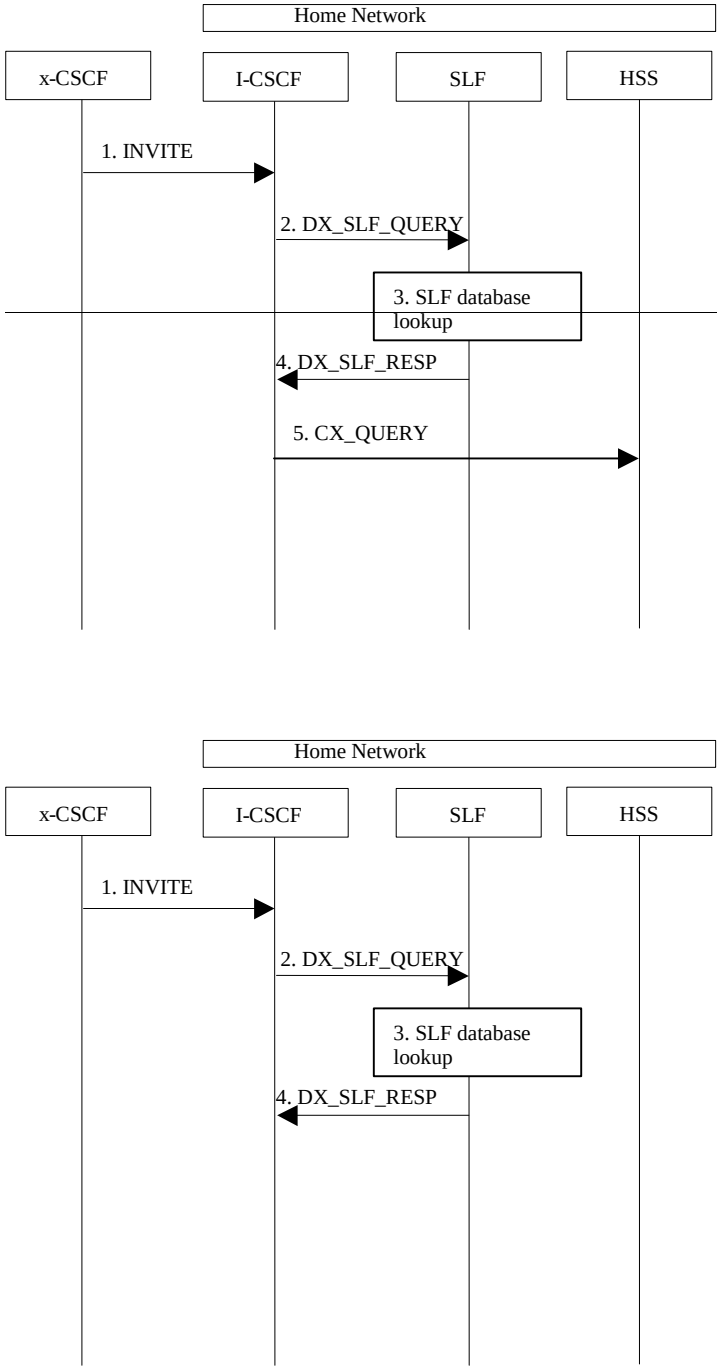

Figure 5.21: SLF on UE invite

1. I-CSCF receives an INVITE request and now has to query for the location of the subscriber's data.

2. The I-CSCF sends a DX_SLF_QUERY to the HSS and includes as parameter the subscriber identity which is stated in the INVITE request.

3. The SLF looks up its database for the queried subscriber identity.

4. The SLF answers with the HSS name in which the subscriber's data can be found.

5. ~~The I-CSCF can proceed by querying the appropriate HSS.~~

The synchronisation between the SLF and the different HSSs is an O&M issue.
To prevent an SLF service failure e.g. in the event of a server outage, the SLF could be distributed over multiple servers. Several approaches could be employed to discover these servers. An example is the use of the DNS mechanism in combination with a new DNS SRV record. The specific algorithm for this however does not affect the basic SLF concept and is thus for further study.

3GPP TSG-SA WG2 #18
14-18 May, 2001
Puerto Rico

Tdoc S2-011535

CR-Form-v3

CHANGE REQUEST

⌘ **23.228** **CR** **014** ⌘ rev **1** ⌘ Current version: **5.0.0** ⌘

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

Title:	⌘	Registration flows
Source:	⌘	Nokia, Siemens AG.
Work item code:	⌘	1515
Date:	⌘	16.05.2001
Category:	⌘	**C**
Release:	⌘	REL-5

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	The detailed registration flows have reached a mature state in Stage-3 specifications, and are contained in 3G TS 24.228. This CR resolves the inconsistencies between the Stage-3 and Stage-2 registration flows, and contains the necessary changes to be applied to the Stage-2 flows accordingly.
Summary of change:	⌘	This CR consolidates the parameters of the Cx interfaces according to the current requirements.
Consequences if not approved:	⌘	

Clauses affected:	⌘	5.2.2.3 and 5.2.2.4		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments:	⌘			

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1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest

version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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.

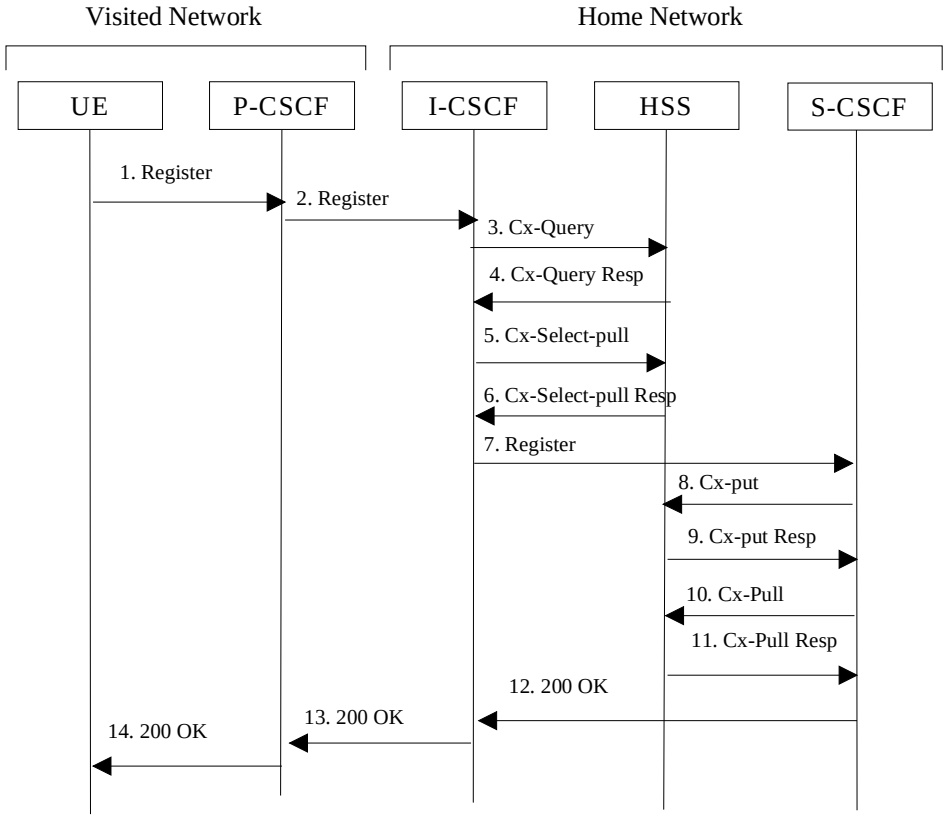

Figure 5.1: Registration – User not registered

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 (subscriber identity, home networks domain name).

2. Upon receipt of the register information flow, ~~it~~ 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-CSCFs "name~~" in the contact header~~, subscriber identity, visited network contact name). A name-address resolution mechanism is utilised in order to determine the address of the home network from the home domain name. When the I-CSCF receives the registration information flow from the proxy, it shall examine the subscriber identity and the home domain name, and employ the services of a name-address resolution mechanism, to determine the HSS address to contact.

3. The I-CSCF shall send the Cx-Query information flow to the HSS (~~P-CSCF name~~, subscriber identity, ~~home domain name, visited network contact name~~, visited domain name). The P-CSCF name is the contact name that the operator wishes to use for future contact to that P- CSCF.

~~Editors Note: It is FFS whether the terminal name, or proxy name, or both is included within this and subsequent register messages.~~

~~The Cx-query (P-CSCF name, subscriber identity, home domain name, visited network contact name) information flow is sent to the HSS.~~ The HSS shall check whether the user is registered already. The HSS shall indicate whether the user is allowed to register in that visited network according to the User subscription and operator limitations/restrictions if any.

4. Cx-Query Resp is sent from the HSS to the I-CSCF. If the checking in HSS was not successful the Cx-Query Resp shall reject the registration attempt.

5. At this stage, it is assumed that the authentication of the user has been completed (although it may have been determined at an earlier point in the information flows). The I-CSCF shall send Cx-Select-Pull (~~serving network indication~~, subscriber 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 . 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 in case network configuration hiding is desired. If an I-CSCF is chosen as the home network contact point, it may be distinct from the I-CSCF that appears in this registration flow. I-CSCF shall then send the register information flow (P-CSCFs name, subscriber identity, visited network contact name, home network contact point 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 initiatation signalling to the home network. ~~and then shall send the register information flow (P-CSCFs "name" in the contact header, subscriber identity, visited network contact name) to the selected S-CSCF.~~

8. The S-CSCF shall send Cx-Put (subscriber 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 (subscriber 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-CSCFs name, as supplied by the visited network. This represents the 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. ~~The S-CSCF shall determine whether the home contact name is the S-CSCF name or an I-CSCF name. If an I-CSCF is chosen as the home contact name, it may be distinct from the I-CSCF that appears in this registration flow. The home contact name will be used by the P-CSCF to forward signalling to the home network.~~ The S-CSCF shall return the 200 OK information flow (serving network contact ~~name, S-CSCF name~~information) to the I-CSCF.

13. The I-CSCF shall send information flow 200 OK (serving network contact ~~name~~information) to the P-CSCF. The I-CSCF shall release all registration information after sending information flow 200 OK.

14. The P-CSCF shall store the serving network contact ~~name~~information, and shall send information flow 200 OK to the UE.

5.2.2.4 Re-Registration information flow – User currently registered

Editor's Note: the definition of re-registration timers requires further study, however it is noted that the timers in the UE are shorter than the registration related timers in the network.

Periodic application level re-registration is initiated by the UE either to refresh an existing registration or in response to a change in the registration status of the UE. Re-registration follows the same process as defined in subclause 5.2.2.3 "Registration Information Flow – User not registered".

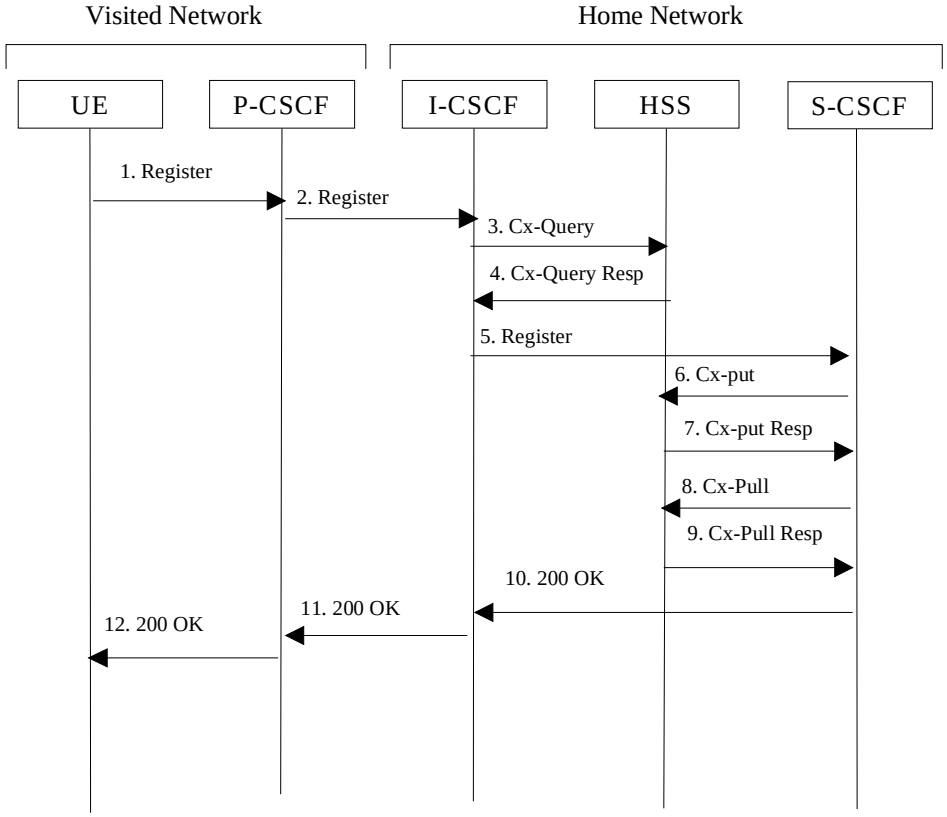

Figure 5.2: Re-registration - user currently registered

1. Prior to expiry of the agreed registration timer, the UE initiates a re-registration. To re-register, the UE sends a new REGISTER request. The UE sends the REGISTER information flow to the proxy (subscriber identity, home networks domain name).

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 does not use the entry point cached from prior registrations. The proxy shall send the Register information flow to the I-CSCF (P-CSCFs "name~~" in the contact header~~, subscriber identity, visited network contact name). A name-address resolution mechanism is utilised in order to determine the address of the home network from the home domain name. When the I-CSCF receives the registration information flow from the proxy, it shall examine the subscriber identity and the home domain name, and employ the services of a name-address resolution mechanism, to determine the HSS address to contact.

3. The I-CSCF shall send the Cx-Query information flow to the HSS (~~P-CSCF name~~, subscriber identity, ~~home domain name, and visited network contact name~~, visited domain name). ~~The P-CSCF name is the contact name that the operator wishes to use for future contact to that P- CSCF.~~

~~Editors Note: It is FFS whether the terminal name, or proxy name, or both is included within this and subsequent register messages.~~

~~The Cx-query (P-CSCF name, subscriber identity, home domain name, and visited network contact name) information flow is sent to the HSS.~~

4. The HSS shall check whether the user is registered already and return an indication indicating that an S-CSCF is assigned. The Cx-Query Resp (indication of entry contact point, e.g. S-CSCF) is sent from the HSS to the I-CSCF.

5. At this stage, it is assumed that the authentication of the user has been completed (although it may have been determined at an earlier point in the information flows). The I-CSCF, using the name of the S-CSCF, shall determine the address of the S-CSCF through a name-address resolution mechanism. 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 in case network configuration hiding is desired. If an I-CSCF is chosen as the home network contact point, it may be distinct from the I-CSCF that appears in this registration flow. I-CSCF shall then send the register information flow (P-CSCFs name, subscriber identity, visited network contact name, home network contact point 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 initiatation signalling to the home network.~~and then shall send the re-register information flow (P-CSCFs "name" in the contact header, subscriber identity, visited network contact name) to the identified S-CSCF.~~

6. The S-CSCF shall send Cx-Put (subscriber identity, S-CSCF name) to the HSS. The HSS stores the S-CSCF name for that subscriber. Note: Optionally as an optimisation, the S-CSCF can detect that this is a re-registration and omit the Cx-Put request.

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

8. On receipt of the Cx-Put Resp information flow, the S-CSCF shall send the Cx-Pull information flow (subscriber 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-CSCFs name, as supplied by the visited network. This represents the name that the home network forwards the subsequent terminating session signalling to for the UE. Note: Optionally as an optimisation, the S-CSCF can detect that this a re-registration and omit the Cx-Pull request.

9. The HSS shall return the information flow Cx-Pull-Resp (user information) to the S-CSCF. The S-CSCF shall store the user information for that indicated user.

10. ~~The S-CSCF shall determine whether the home contact name is the S-CSCF name or the I-CSCF name. If an I-CSCF is chosen as the home contact name, it may be distinct from the I-CSCF that appears in this registration flow. The home contact name will be used by the P-CSCF to forward signalling to the home network.~~ The S-CSCF shall return the 200 OK information flow (serving network contact ~~name, S-CSCF name~~information) to the I-CSCF.

11. The I-CSCF shall send information flow 200 OK (serving network contact ~~name~~information) to the P-CSCF. The I-CSCF shall release all registration information after sending information flow 200 OK.

12. The P-CSCF shall store the serving network contact ~~name~~information, and shall send information flow 200 OK to the UE.

5.2.2.5 Stored information.

Table 5.1 provides an indication of the information stored in the indicated nodes during and after the registration process.

Table 5.1 Information Storage before, during and after the registration process

Node	Before Registration	During Registration	After Registration
UE - in local network	Credentials Home Domain		Credentials Home Domain Proxy Name/Address
Proxy-CSCF - in local network	Routing Function	Network Entry point UE Address	Network Entry point UE Address
Interrogating-CSCF - in Home network	HSS Address	Serving-CSCF address/name (Editors Note: Access to Potential list of Serving-CSCFs is FFS)	No State Information
HSS	User Service Profile		Serving-CSCF address/name ~~Proxy address/name?~~
Serving-CSCF (Home)	No state information	HSS Address/name Subscriber profile (limited – as per network scenario) Proxy address/name	May have session state Information HSS Address/name Subscriber information Proxy address/name

References

[24.228] 3G TS 24.228: TSG CN: Signalling flows for the IP multimedia call control based on SIP and SDP v0.5.0

3GPP TSG-SA2 Meeting #18
Puerto Rico, USA, May 14th-18th, 2001

Tdoc DocNumber S2-011536~~222~~

CR-Form-v3

CHANGE REQUEST

⌘ **TS23.228** **CR** **CR-Num** **042** **-** ⌘ Current version: **5.0.0** ⌘

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

Title:	⌘	Mandated speech codecs in IM
Source:	⌘	BT
Work item code:	⌘	IMS-CCR
Date:	⌘	New
Category:	⌘	**F**
Release:	⌘	REL-5

Use one of the following categories:
F *(essential correction)*
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C *(Functional modification of feature)*
D *(Editorial modification)*
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Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	The current text of 23.228 does not specify any mandated codec for the support of speech in IM. Only a 'native codec' is suggested. See related Tdoc: S2-010752 .
Summary of change:	⌘	Revision of text to mandate AMR.
Consequences if not approved:	⌘	Operators will have interworking difficulties and also lack confiedence in all standardised UE supporting at least one speech codec.

Clauses affected:	⌘	Sections 5		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ 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://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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 to 23.228}*----------

2 References

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

----------*{second change to 23.228}*----------

5.4.1 Bearer interworking concepts

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

~~For this release the IM CN subsystem supports the AMR codec as the native codec for voice over IP~~. Default codecs to be supported within the UE are defined in [Ref **XXX**]. The use of default codecs within the UE enables~~Thus~~ the IM CN subsystem ~~is able~~ to interwork with other networks ~~which support this codec~~ (on an end to end basis ~~either as native~~ or through transcoding ~~in the other party's network~~).

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

Support for transcoding to other codec formats is for further study.

----------*{end of changes}*----------

3GPP TSG-SA WG2 Meeting #18 ***S2-011545***
Rio Grande, Puerto Rico, 14-18 May, 20001

CR-Form-v3

CHANGE REQUEST

⌘ **23.228** **CR** **023** ⌘ rev **1** ⌘ Current version: **5.0.0** ⌘

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

Title:	⌘	Changes to support DTMF Tone interworking
Source:	⌘	Lucent Technologies
Work item code:	⌘	IMS-CCR
Date:	⌘	14.2.2001
Category:	⌘	**F**
Release:	⌘	REL-5

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F *(essential correction)*
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C *(Functional modification of feature)*
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REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	The text in section 5.4.1 on Bearer interworking fails to address interworking for DTMF tones.
Summary of change:	⌘	Text is added to section 5.4.1 to indicate the need to support interworking for DTMF tones.
Consequences if not approved:	⌘	Correct interworking with other networks will not be supported.

Clauses affected:	⌘	5.4.1
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/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://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.
3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

5.4.1 Bearer interworking concepts

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

For this release the IM CN subsystem supports the AMR codec as the native codec for voice over IP. Thus the IM CN subsystem is able to interwork with other networks which support this codec (either as native or through transcoding in the other party's network).

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

Editor's Note: Support for transcoding to other codec formats is for further study.

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

3GPP TSG-SA2 Meeting #18
Puerto Rico, USA, May 14-18, 2001

Tdoc DocNumber S2-01~~12191~~1546

CR-Form-v3

CHANGE REQUEST

⌘ **TS23.228** **CR** **CR-Num** **044** **-** ⌘ Current version: **5.0.0** ⌘

*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 [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Session handling in IM (Redirection)
Source:	⌘	BT
Work item code:	⌘	IMS
Date:	⌘	9th May 2001
Category:	⌘	**F**
Release:	⌘	REL-5

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	The current method of redirection to the CS domain makes incorrect assumptions on the A party subscription, terminal and network capabilities and is not operable. This requires correction. See related Tdoc: S2-011218 .
Summary of change:	⌘	Re-application of current PSTN-T mechanisms for the case of redirected sessions where the next destination is C7/PSTN/CS Domain. Removal of requirement for Originating party to place a CS Domain call to the redirecting parties choice of destination.
Consequences if not approved:	⌘	Operators will have difficulties resolving session forwarding customer care issues from IM domain. User privacy of forwarded to destinations will be broken. See related Tdoc.

Clauses affected:	⌘	Sections 5
Other specs affected:	⌘	[ ] Other core specifications ⌘ [ ] Test specifications [ ] O&M Specifications
Other comments:	⌘	

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/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.

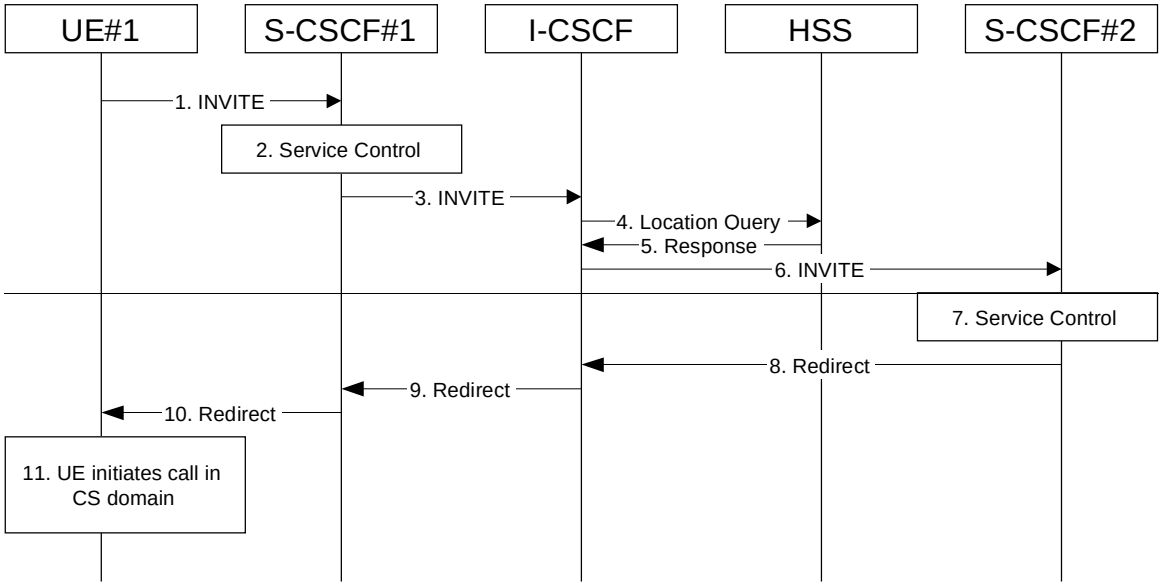
2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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.

5.11.5.2 Session Redirection to PSTN Termination (S-CSCF #2 forwards INVITE) ~~initiated by S-CSCF to CS-domain~~

The S-CSCF of the destination user (S-CSCF#2) ~~in the scenario above~~ 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. ~~It recognizes this situation by the redirected URL being a tel: URL.~~

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



~~Figure 5.37: Session redirection initiated by S-CSCF to CS-Domain~~

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

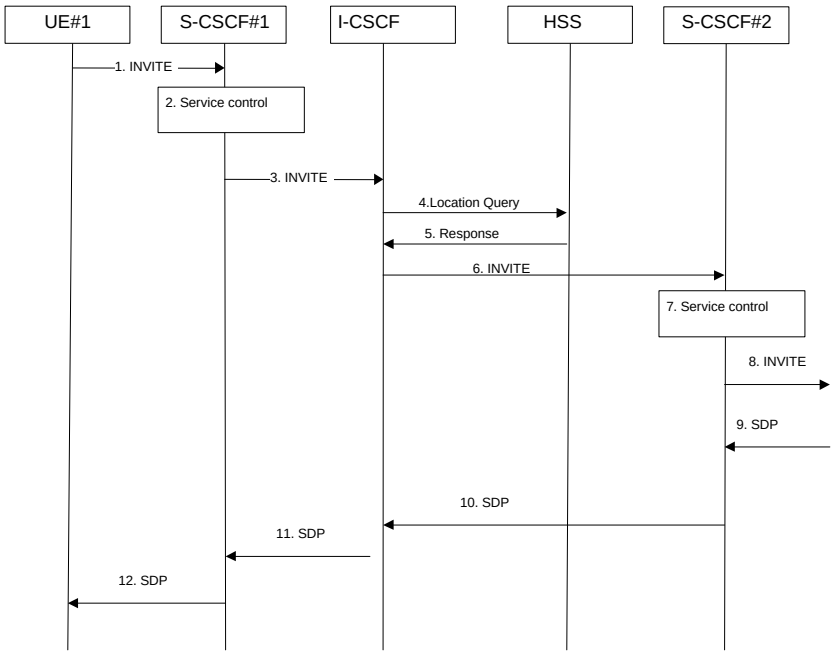


Figure 5.37: Session redirection to PSTN Termination (S-CSCF #2 forwards INVITE)

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(firewall) 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. ~~new destination URL in the CS domain, i.e. a tel: URL~~. 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 establshment proceeds normally.

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

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

~~11.UE#1 initiates the session in the CS domain.~~

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

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

Handling of redirection to a PSTN Termination where the S-CSCF#2 REDIRECTS to the originating UE#1 is shown in the figure 5.3X:

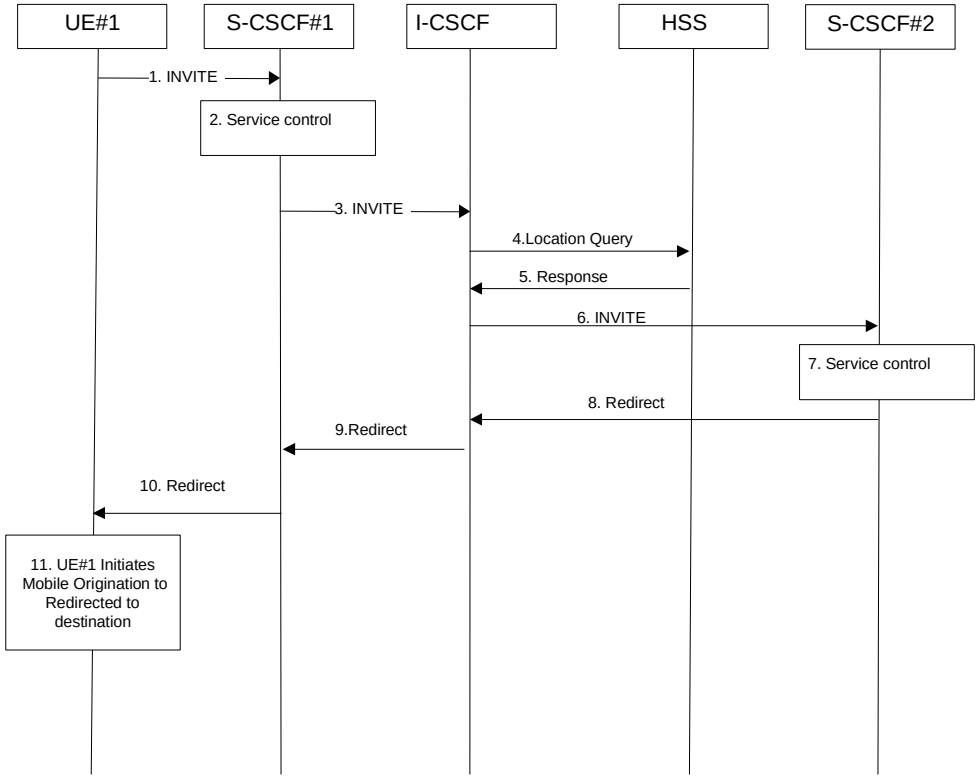


Figure 5.3X: Session redirection to PSTN Termination (REDIRECT to originating UE#1)

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(firewall) 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
11. 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).

3GPP TSG-SA WG2 #18
14-18 May, 2001
Puerto Rico

Tdoc S2-011547~~1280~~

Source: Nokia, Nortel, Alcatel

Title: MT call procedures for unregistered subscriber

Document for: Approval

Date: 09.05.2001

Introduction

This contribution contains information flows for Mobile Terminated session delivery for unregistered subscribers. The flows and text shown here have already been accepted, and have been incorporated to the Informative Annex of [23.228 v1.8.1].
This contribution proposes to add these flows and the corresponding text to the normative part of 3G TS 23.228.

Proposal

The information flows and the corresponding text that is proposed to be included to the normative part of 3G TS 23.228 is incorporated into a CR attached below.

3GPP TSG-SA WG2 #18
14-18 May, 2001
Puerto Rico

Tdoc S2-01154~~71280~~

3GPP TSG-SA WG2 #18
14-18 May, 2001
Puerto Rico

CR-Form-v3

CHANGE REQUEST

⌘ **23.228** **CR** **015** ⌘ rev **1-** ⌘ Current version: **5.0.0** ⌘

*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:	⌘	MT call delivery to unregistered subscriber
Source:	⌘	Nokia, Nortel, Alcatel
Work item code:	⌘	1515
Date:	⌘	09.05.2001
Category:	⌘	**B**
Release:	⌘	REL-5

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	Introducing information flows for MT call delivery for unregistered subscriber. The information flows have already been included in the informative annex of an earlier version of the specification (3G TS 23.228 v1.8.1).
Summary of change:	⌘	Two flows are to be added to the normative part of 3G TS 23.228.
Consequences if not approved:	⌘	

Clauses affected:	⌘	New clause to be added for these information flows: 5.12
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at:
http://www.3gpp.org/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.

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specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.

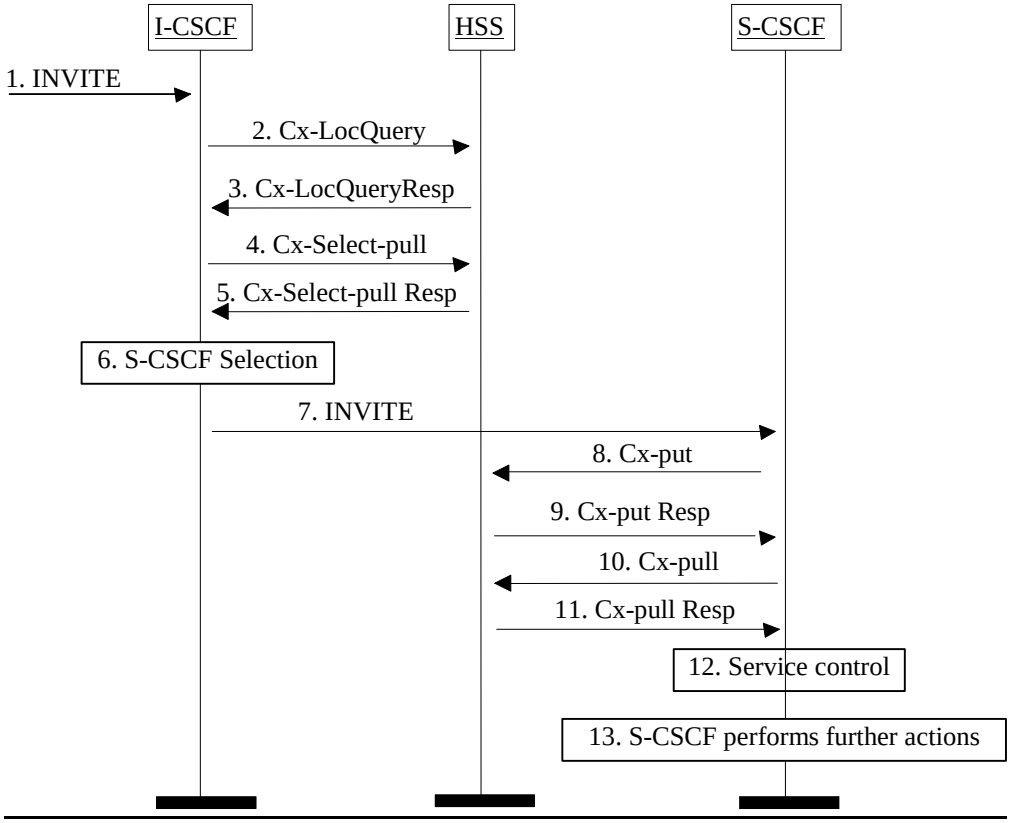
3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

5.12 Mobile Terminating call procedures to unregistered IMS subscriber

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

5.12.1 Mobile Terminating call procedures to unregistered IMS subscriber that has services related to unregistered state

In ~~the example information flow~~Figure 5.xx below the subscriber is unregistered for IMS and HSS responds back to I-CSCF with an indication that I-CSCF should selects S-CSCF for this MT call to the~~a~~ unregistered 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 subscriber's 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~~in~~ the ~~following~~ information flow in Figure 5.xx:



<u>Figure 5.xx: Mobile Terminating call procedures to unregistered IMS subscriber that has services related to unregistered state</u>

1. <u>I-CSCF receives an INVITE message.</u>
2. <u>I-CSCF queries the HSS for current location information.</u>
3. <u>HSS either responds with an indication that the subscriber is unregistered for IMS and I-CSCF should select a S-CSCF for the subscriber or provides the I-CSCF with the previously allocated S-CSCF name.</u>
4. <u>If the I-CSCF has not been provided with the location of the S-CSCF, the I-CSCF may send Cx-Select-Pull (unregistered, subscriber 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.</u>
5. <u>The HSS shall send Cx-Select-Pull Resp (required S-CSCF capabilities) to the I-CSCF.</u>
6. <u>If the I-CSCF has not be provided with the location of the S-CSCF, the I-CSCF selects a S-CSCF for the subscriber.</u>
7. <u>I-CSCF forwards the INVITE request to the S-CSCF.</u>
8. <u>The S-CSCF sends Cx-Put (subscriber identity, S-CSCF name) to the HSS. The HSS stores the S-CSCF name for that subscriber. This will result in all terminating traffic for that subscriber being routed to this particular S-CSCF until the registration period expires or the subscriber attaches to the network.</u>
9. <u>The HSS shall send Cx-Put Resp to the I-CSCF to acknowledge the sending of Cx-Put.</u>
10. <u>The S-CSCF shall send the Cx-Pull information flow (subscriber identity) towards the HSS in order to be able to download the relevant information of the subscriber profile to the S-CSCF</u>
11. <u>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 user.</u>

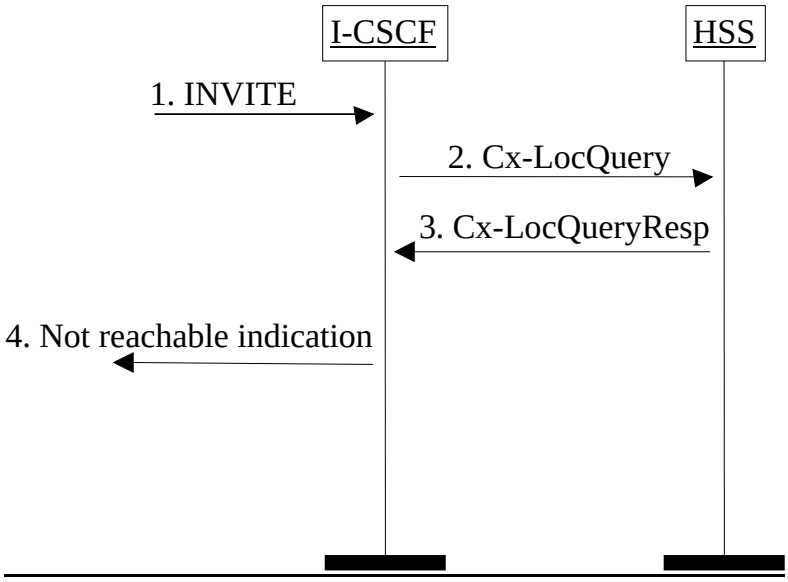
12. S-CSCF performs whatever service control is appropriate for this call attempt.

13. S-CSCF performs whatever further actions are appropriate for this call attempt.

The S-CSCF may deregister the user at any time (e.g. according to operator network engineering requirements) by issuing a Cx-Put2 (subscriber 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 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.

5.12.2 Mobile Terminating call procedures to unregistered subscriber that has no services related to unregistered state

In the example information flow the subscriber is unregistered and the subscriber has no services related to unregistration state.
This is shown in the following information flow:



1. I-CSCF receives an INVITE message.

2. I-CSCF queries the HSS for current location information.

3. HSS responds with an indication that the subscriber is unregistered, but no services are related to unregistration state.

4. I-CSCF responds to the origin of the request that the subscriber is not reachable at the moment.

References

[23.228 v1.8.1] 3G TS 23.228: TSG SA: IM Subsystem Stage 2 (ver 1.8.1)

3GPP TSG-SA WG2 #18
14-18 May, 2001
Puerto Rico

Tdoc S2-011556rev1289

Source: Nokia, Ericsson

Title: Providing local services in the IM Subsystem

Document for: Discussion and Approval

Date: 09.05.2001

Introduction

Providing local services to both home subscribers and inbound roamers offer a great opportunity for revenue generation to operators. It is therefore desirable to introduce standardized means to provide such services in the IM Subsystem, as stated in Chapter 4.2.2 of [23.228].

This contribution presents some of the basic concepts on how to provide local services, detect and route sessions of local nature. There is an accompanying CR attached to this contribution proposing changes to [23.228] to incorporate additional capabilities of IMS Core Network elements according to the proposed concept.

Considerations

A subscriber may wish to reach the local services in the roamed to network, or the home network. In the case of the roamed to network, By definition, only the visited IMS network has the required knowledge on services of local nature.
The delivery of local services can be broken down into 3 phases:

1. Service Discovery
   Detecting and searching for available local services.
   The possible means are e.g. DHCP, SLP, configured/"well-known" URLs (tel-URLs, sip-URLs), push operation, advertising, etc…
   As a result of service discovery a list of service URLs is obtained by the UE or the user.

2. The UE selects the means for reaching the service
   For sip-URLs and tel-URLs the IMS may be used, where the P-CSCF is the contact point for the UE.
   For http-URLs, rtsp-URLs, mailto-URLs etc. other means may be used.

3. Routing and service execution in IMS
   The Ue informs the IMS network whether the desired local service is in the visited network, or in the home IMS network. As the first contact point in the IMS, the P-CSCF should be able to detect the URLs which are indicated to have local significance, and execute appropriate address translation and routing mechanisms.
   As the home network has the ultimate service control, the P-CSCF shall route the local service sessions to the S-CSCF, where the subscribers' home services are to be executed.

~~According to this concept, a set of statements has been determined, and is included in the Proposal below.~~

~~Proposal~~

~~It is proposed for SA2 to accept the following statements with regards to providing local services in the IM Subsystem:~~

~~1.Local services shall be exactly the same for home subscribers and inbound roamers.~~

~~2.The Uc will inform the IMS network whether the local services shall be found in the "roamed to" network or the "home" network.~~

~~3.The P-CSCF shall perform address-mapping functions on the locally applicable destination URLs if necessary, and generate a globally routable URL (sip-URL or tel-URL) to be applied as new destination URL of the local service session.~~

~~4.The P-CSCF shall route all local service sessions to the S-CSCF of the originating subscriber according to regular routing principles of originating sessions, where the execution of the originating subscriber's home services are to be executed.~~

~~These statements are incorporated into a CR against 3G TS 23.228 attached below.~~

3GPP TSG-SA WG2 #18
14-18 May, 2001
Puerto Rico

Tdoc S2-011556rev1~~289~~

3GPP TSG-SA WG2 #18
14-18 May, 2001
Puerto Rico

CR-Form-v3

CHANGE REQUEST

⌘ **23.228 CR 017** ⌘ rev **21~~-~~** ⌘ Current version: **5.0.0** ⌘

*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 **X** Radio Access Network ☐ Core Network **X**

Title:	⌘	Providing local services in the IM Subsystem
Source:	⌘	Nokia, Ericsson
Work item code:	⌘	~~1514~~IMS-CCR
Date:	⌘	09.05.2001
Category:	⌘	**C**
Release:	⌘	REL-5

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	Adding functionality in order to enable IMS to provide local services
Summary of change:	⌘	Functionality requirements added
Consequences if not approved:	⌘	

Clauses affected:	⌘	4.2.2
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

How to create CRs using this form:
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version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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.

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.

[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 2543: "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"

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

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

[19] 3GPP TS 33.2xx: "Access Security for IP-based services"

[20] 3GPP TS 33.200: "Network Domain Security"

[21] 3GPP TR~~S~~ 22.941: " IP Based Multimedia Services Framework "

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4.2.2 Support of Local Services in the IMS

The definition of local services can be found in [21]. Visited network provided services offer an opportunity for revenue generation by allowing access to services of a local nature to visiting users (inbound roamers). There shall be a standardised means for providing inbound roamers with access to local services. The mechanism to access l~~L~~ocal services shall be exactly the same for home users and inbound roamers.

Access to l~~L~~ocal Services shall be provided in the following manner

1. ~~The Ue shall inform the network whether the subscriber is interested in a local services in the visited IMS network, or in the home IMS network. This may be included in e.g. the Request URI.~~It shall be possible for the network to determine whether the subscriber is requesting a local service in the visited IMS or the home IMS network based upon information received from the UE. This information may be included in e.g. the Request URI.
2. In the case where the services is to be provided by the visited IMS network, the P-CSCF, if required, will modify the "routing information" to a globally routable~~n~~ address ~~which is globally routable, and which~~ . This will result in the S-CSCF in the home network routinge the request back to the visited network.
3. The P-CSCF shall route the session towards the S-CSCF as per the session origination procedures, where the execution of the originating subscriber's home services are to be executed..

~~References~~

~~[23.228] 3G TS 23.228: TSG SA: IM Subsystem Stage 2 (ver 5.0.0)~~

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CR-Form-v3

CHANGE REQUEST

⌘ **23.228** **CR** **018** ⌘ rev **1** ⌘ Current version: **5.0.0** ⌘

*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 [X ?] ME/UE [X] Radio Access Network [X ?] Core Network [X]

Title:	⌘	Emergency call handling in the IMS
Source:	⌘	Nokia, Motorola, Vodafone
Work item code:	⌘	IMS-CCR
Date:	⌘	2001-05-19
Category:	⌘	**B**
Release:	⌘	REL-5

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	Currently 23.228 v.5.0.0 does not include emergency session ~~related flows~~ although S2 has acknowledged S1's requirement for emergency calls to be made via the IMS for UE with a SIM/USIM.
Summary of change:	⌘	Requirements for emergency session are added.
Consequences if not approved:	⌘	

Clauses affected:	⌘	New clause 5.x
Other specs affected:	⌘	[ ] Other core specifications ⌘ [ ] Test specifications [ ] O&M Specifications
Other comments:	⌘	

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/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://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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.x Emergency sessions

5.x.1 Requirements for Emergency Sessions

1. Architecture shall support IMS emergency sessions for the following 3 UE scenarios:
   - Registered UEs with USIM
   - Unregistered UEs with USIM
   - UEs without USIM

2. It is desirable to have a single architectural solution for the 3 scenarios above.

3. For the case of an emergency call for a user not currently attached/registered to the IM subsystem application level (SIP) registration would not be required.

4. Emergency sessions shall be handled by a CSCF in the visited network when the visited network supports the IM Subsystem.

5. The impact of GGSNs in the HPLMN has to be studied.

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CHANGE REQUEST

⌘ **TS 23.228 CR 046** ⌘ rev **-** ⌘ Current version: **5.0.0** ⌘

*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:	⌘	Subscription Updating Procedure
Source:	⌘	Ericsson, Nokia, Siemens AG
Work item code:	⌘	IMS-CCR
Date:	⌘	14.5.2001
Category:	⌘	**B**
Release:	⌘	REL-5

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	Description of the general requirements how to update subscription information from the HSS to the S-CSCF.
Summary of change:	⌘	Adding these requirements to TS23.228 chapter 5.1.5
Consequences if not approved:	⌘	

Clauses affected:	⌘	5.1.5.		
Other specs Affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments:	⌘			

5.1.4 Procedures related to Proxy-CSCF

The routing of the SIP registration information flows shall not take into account previous registrations (i.e., registration state). The routing of the session information flows (e.g., INVITE) shall take into account the information received during the registration process.

5.1.5 Subscription Updating Procedures

HSS will have the capability of informing the S-CSCF whenever the subscription data stored in HSS is changed for an IM subscriber, and the changes affect the subscription data stored in the S-CSCF.

The following list contains the requirements identified for updating the subscription information on the S-CSCF.:

1. A single procedure shall be supported in the HSS and in the S-CSCF to update the subscription information in the S-CSCF as a result of this information changing in the HSS. The procedure should either be based on a Push model or on a Pull model, but should not use both models.

2. Whenever a modification has occurred in the subscription data that constitutes the data used by the S-CSCF, this complete data set shall be downloaded to the S-CSCF. The control logic maintained in the HSS and in the S_CSCF during the subscription data update should be kept as low as possible.
   The update procedure should then be independent of the structure of the subscription data

3. The exact content of the subscriber profile have yet to be defined. The S-CSCF shall not use outdated user profile data, therefore, the S-CSCF has to make sure that for a new session the updated profile data are used.

4. The update procedure should enable the S-CSCF to avoid overload situations that might for example occur in the case of an HSS recovery, a S-CSCF recovery, an operator initiated O&M subscriber migration from one HSS to another HSS or other O&M functions that affect multiple user profiles.

5. The update procedure should enable the HSS to avoid overload situations that might for example occur in the case of an S-CSCF recovery

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Puerto Rico, 14th - 18th May 2001

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CHANGE REQUEST

⌘ **23.228** **CR** **036** ⌘ rev **-** ⌘ Current version: **5.0.0** ⌘

*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:	⌘	23.228 Additional information on the service control architecture
Source:	⌘	Service Control drafting group
Work item code:	⌘	IMS-Application Server
Date:	⌘	16th May
Category:	⌘	**C**
Release:	⌘	Rel-5

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	Current text of section 4.2. does not contain any description of the Service Control Architecture between the S-CSCF and the Application server, this CR proposes to add agreed information as a new Section 4.2.4
Summary of change:	⌘	
Consequences if not approved:	⌘	Inconsistent 23.228 text

Clauses affected:	⌘	4.2 Support of Service Control in IMS
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

How to create CRs using this form:
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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

4.2.4 S-CSCF Service Control Model

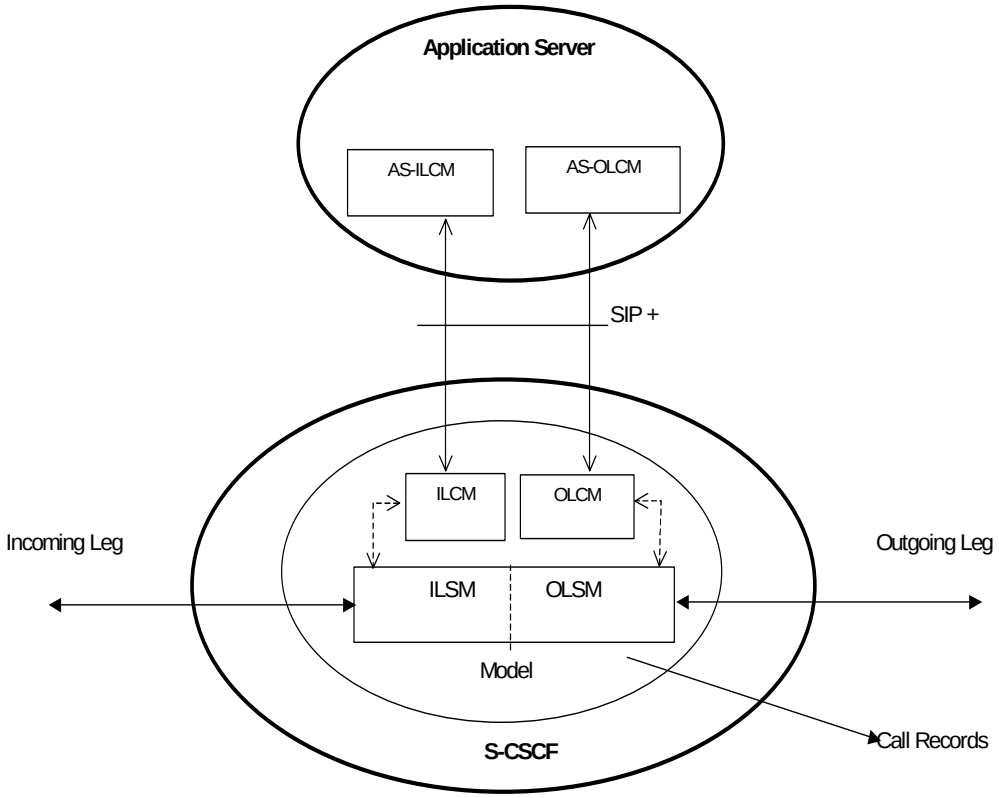

Figure 1: Service Control Model with Incoming Leg Control and Outgoing Leg Control

Figure 1 illustrates the relationship between the S-CSCF and AS. It includes a first-level of modelling inside the S-CSCF and inside the AS. To keep the model simple only one incoming leg and one outgoing leg are shown. In practice a session may consist of more than one incoming leg and/or more than one outgoing leg(s), when using User Agents. An AS may create one or more outgoing legs independent of incoming legs. An AS may create one or more outgoing legs even when there are no incoming legs.

Registration is FFS.

SIP+ is the protocol used between the S-CSCF and the AS. Incoming or outgoing leg information e.g. state information, may be passed between the S-CSCF and AS implicitly or explicitly. Implicitly means that SIP information in transit carries information about the state of the session (e.g. an INVITE message received at the S-CSCF on an incoming leg may be sent to the AS with no changes or with some additional information). Explicitly means that SIP information is generated, e.g. to transfer state change information from an S-CSCF to an AS in circumstances where there is no ongoing SIP transaction that can be used. It is a matter for Stage 3 design to determine when to use implicit or explicit mechanisms and to determine what extensions to SIP are necessary.

The internal model of the S-CSCF(shown in Figure 1) may sometimes exhibit proxy server like behaviour either by passing the requests to the Application Server or by passing the requests out of the system. A Proxy server may maintain session state or not. The S-CSCF may sometimes exhibit User Agent like behaviour. Some Applications require state to be maintained in the S-CSCF. Their exact behaviour depends on the SIP messages being handled, on their context, and on S-CSCF capabilities

needed to support the services. It is a matter for Stage 3 design to determine the more detailed modelling in the S-CSCF.

The internal model of the AS (shown in Figure 1) may exhibit User Agent like behaviour. The exact behaviour depends on the SIP messages being handled and on their context. Detailed Stage 3 modelling for the AS is not required.

The definitions used in the model are:

Combined ILSM OLSM – Incoming/outgoing Leg State Model: Models the behaviour of an S-CSCF for handling SIP messages on incoming and outgoing session legs. The Combined I/OLSM shall be able to store session state information. It may act on each leg independently, acting as a SIP Proxy, Redirect Server or User Agent dependant on the information received in the SIP request, the filter conditions specified or the state of the session.

It shall be possible to split the application handling on each leg and treat each endpoint differently.

ILCM - Incoming Leg Control Model: Models the behaviour of an S-CSCF for handling SIP information sent to and received from an AS for an incoming session leg. The ILCM shall store transaction state information

OLCM - Outgoing Leg Control Model: Models the behaviour of an S-CSCF for handling SIP information received from and sent to an AS for an outgoing session leg. The OLCM shall store transaction state information.

AS-ILCM - Application Server Incoming Leg Control Model: Models AS behaviour for handling SIP information for an incoming leg. The AS-ILCM shall store Transaction State, and may optionally store Session State depending on the specific service being executed.

AS-OLCM - Application Server Outgoing Leg Control Model: Models AS behaviour for handling SIP information for an outgoing leg. The AS-OLCM shall store Transaction State, and may optionally store Session State depending on the specific service being executed.