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Abstract of document:

This 3GPP Technical Specification (TS) specifies the IP Multimedia (IM) Call Model for handling of an IP multimedia session origination and termination for an IP Multimedia subscriber. This pecification includes interactions between the Service Platform and IP multimedia sessions.

Related documents are; TS 22.228, TS 23.228, TS 24.228, TS 24.229, TS 29.228, TS 29.198 TS 23.278, TR 29.998

Changes since last presentation to TSG CN Meeting #10:

Previously presented as TS 23.cde V0.3.0 (2000-11) as a skeleton specification prior to specification number assignment. Since then significant changes to the organization and content of the document have taken place following the conclusion of the architectural discussions on Service Control for IMS in TSG SA WG 2.

Outstanding Issues:

Determination of what information is needed from HSS to I-CSCF for S-CSCF selection	Completion March 02
Determination of Sr interface protocol between AS – MRF	Completion March 02
Determination of requirements for Sh interface protocol between HSS – AS	Completion March 02
Applying Filtering for unknown methods	Completion March 02
Supplying Information from S-CSCF to AS about user registration	Completion March 02
Correlation by S-CSCF of B2BUA-AS separate dialogues to same call	Completion March 02
Call Release by S-CSCF / AS	Completion March 02
Definition of Modes of operation of S-CSCF with Application Server	Completion March 02
Definition of Procedures for S-CSCF handling of IP Multimedia Registration	Completion March 02
Definition of authentication data needed from HSS by S-CSCF at registration	Completion March 02

Definition of requirements on HSS for during IP Multimedia Registration	Completion March 02
Definition of requirements (if any) on the HSS during IP Multimedia Sessions	Completion March 02
Definition of S-CSCF handling of Subscription and Notification	Completion March 02
Functional requirements for MRF	Completion March 02
S-CSCF behaviours in the case of dependencies between different application servers	Completion March 02
Definition of AS Handling of IP multimedia sessions	Completion March 02
Definition of Specific IP Multimedia session handling for SIP AS (if any)	Completion March 02

Contentious Issues:

Still some ongoing discussion on whether section 7 (HSS) and section 8 (MRF) should be contained in this specification.

3GPP TS 23.218 V1.0.0 (2001-12)

Technical Specification

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Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

This 3GPP Technical Specification (TS) specifies the IP Multimedia (IM) Call Model for handling of an IP multimedia session origination and termination for an IP Multimedia subscriber.

This specification includes interactions between the Service Platform and IP multimedia sessions.

The IP Multimedia (IM) Subsystem stage 2 is specified in 3GPP TS 23.228 [8] and the signalling flows for the IP multimedia call control based on SIP and SDP are specified in 3GPP TS 24.228 [9].

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.

This specification may contain references to pre-Release-4 GSM specifications. These references shall be taken to refer to the Release 5 version where that version exists. Conversion from the pre-Release-4 number to the Release 4 (onwards) number is given in subclause 6.1 of 3GPP TR 41.001.

[<seq>] <doctype> <#>[([up to and including]{yyyy[-mm]|V<a[.b[.c]]>}[onwards])]: "<Title>".

[1] 3GPP TR 41.001: "GSM Release specifications".

[2] 3GPP TR 21.905: " Vocabulary for 3GPP Specifications ".

[3] 3GPP TS 23.003: "Numbering, addressing & identification".

[4] 3GPP TS 23.060: "General Packet Radio Service; Service description; Stage 2".

[5] 3GPP TS 23.078: "Customized Applications for Mobile network Enhanced Logic (CAMEL) - Phase 3; Stage 2".

[6] 3GPP TR 21.978: "Feasibility Technical Report – CAMEL Control of VoIP Services".

[7] 3GPP TS 23.097: "Multiple Subscriber Profile (MSP) - Stage 2 ".

[8] 3GPP TS 23.228: "IP Multimedia (IM) Subsystem –Stage 2".

[9] 3GPP TS 24.228: "Signalling flows for the IP multimedia call control based on SIP and SDP".

[10] 3GPP TS 24.229: "IP multimedia call control protocol based on SIP and SDP ".

[11] 3GPP TS 29.078: "CAMEL Application Part (CAP) specification - Phase 3".

[12] IETF RFC 2543bis: "SIP: Session Initiation Protocol".

[13] 3GPP TS 23.127: "Virtual Home Environment - Stage 2".

[14] 3GPP TS 29.198: "Open Service Access (OSA); Application programming Interface (API)".

[15] 3GPP TR 29.998: "Open Service Access (OSA); Application Programming Interface (API) Mapping for OSA; Part 4: Call Control Service Mapping; Subpart 4: Multiparty Call Control SIP".

[16] 3GPP TS 29.228: ” IP Multimedia (IM) Subsystem Cx Interface; Signalling flows and message contents”

[17] 3GPP TS 23.278: "Camel Phase 4 – stage 2 IM CN Interworking"

3 Definitions, symbols and abbreviations

Delete from the above heading those words which are not applicable.

Subclause numbering depends on applicability and should be renumbered accordingly.

3.1 Definitions

For the purposes of the present document, the [following] terms and definitions [given in ... and the following] apply.

Application Server information (AS-info): AS-info contains individualized information concerning one particular Application Server entry. This information contains e.g. Application Server Address (6.8.1.1) and it's corresponding Default IP Multimedia Handling information (6.8.1.2).

Filter Criteria (FC) is the information the S-CSCF receives from the HSS or the AS that defines the relevant SPIs for a particular application. They define the subset of SIP requests received by the S-CSCF that should be sent/proxied to a particular application.

Initial Filter Criteria (iFC) are filter criteria that are stored in the HSS as part of the user profile and are downloaded to the S-CSCF upon user registration. They represent a provisioned subscription of a user to an application.

IP Multimedia Service Switching Function (IM-SSF): functional entity that interfaces SIP to CAP.

IP Multimedia Basic Call State Model (IM-BCSM): IM-BCSM provides a high-level model of CSCF activities required to establish and maintain communication paths for users. As such, it identifies a set of basic call activities in a CSCF and shows how these activities are joined together to process a basic call.

IP Multimedia CAMEL Subscription Information (IM-CSI): IM-CSI identifies the subscriber as having IP Multimedia CAMEL services.

IP Multimedia session: IP Multimedia session and IP Multimedia call are treated as equivalent in this specification.

Originating IP Multimedia Basic Call State Model (O-IM-BCSM): originating half of the IM-BCSM. The O-IM-BCSM corresponds to that portion of the IM-BCSM associated with the originating party.

Originating IP Multimedia CAMEL Subscription Information (O-IM-CSI): O-IM-CSI identifies the subscriber as having originating IP Multimedia CAMEL services.

Point In Association (PIA): PIAs identify CSCF activities associated with one or more basic association/connection states of interest to OSS service logic instances.

Service Key: The Service Key identifies to the Application Server the service logic that shall apply. Service Key identifies to the gsmSCF the service logic. The Service Key is administered by the HPLMN, and is passed transparently by the CSCF to the gsmSCF. The Service Key is a part of the T/O-IM-CSI.

Service Platform Gateway (SP GW): functional entity that interfaces the CSCF to an external Service Platform.

Service Points of Interest (SPI) are the points in the SIP signalling that may cause the S-CSCF to send/proxy the SIP message to an SIP AS/OSA SCS/IM-SSF. The subset of all possible SPIs which are relevant to a particular application are defined by means of Filter Criteria.

Service Platform Trigger Points (STP) are the points in the SIP signalling that instruct the SIP AS/OSA SCS/IM-SSF to trigger the service logic. For the IM-SSF they are defined by the IP Multimedia Camel Subscriber Information (IM-CSI).

Subsequent Filter Criteria (sFC) are filter criteria that are signalled from the SIP AS/OSA SCS/IM-SSF to the S-CSCF. They allow for dynamic definition of the relevant SPIs at application execution time.

Editor's Note: sFCs will not be used in Rel 5. (see Contribution N1-011040)

Terminating IP Multimedia Basic Call State Model (T-IM-BCSM): terminating half of the IM-BCSM. The T-IM-BCSM corresponds to that portion of the IM-BCSM associated with the terminating party.

Terminating IP Multimedia CAMEL Subscription Information (T-IM-CSI): T-IM-CSI identifies the subscriber as having terminating IP Multimedia CAMEL services.

3.2 Symbols

For the purposes of the present document, the following symbols apply:

Symbol format

<symbol> <Explanation>

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

API	Application Programming Interface
AS	Application Server
AS-ILCM	Application Server Incoming Leg Control Model
AS-OLCM	Application Server Outgoing Leg Control Model
BCSM	Basic Call State Model
B2BUA	Back to Back User Agent
CAMEL	Customized Applications for Mobile network Enhanced Logic
CAP	CAMEL Application Part
CF	Call Forwarding
CFonCLI	Call Forwarding on Calling Line Identification
CLI	Calling Line Identification
CSCF	Call Session Control Function
CSE	CAMEL Service Environment
DP	Detection Point
EDP	Event Detection Point
FC	Filter Criteria
FTN	Forwarded To Number
GGSN	Gateway GPRS Support Node
GPRS	General Packet Radio Service
gprsSSF	GPRS Service Switching Function
gsmSCF	GSM Service Control Function
gsmSRF	GSM Specialised Resource Function
gsmSSF	GSM Service Switching Function
HPLMN	Home PLMN
HSS	Home Subscriber Server
IE	Information Element
IF	Information Flow
IP	Internet Protocol
I-CSCF	Interrogating CSCF
IFC	Intial Filter Criteria
ILCM	Incoming Leg Control Model
IM	IP Multimedia
IM-BCSM	IP Multimedia Basic Call State Model
IM-CSI	IP Multimedia CAMEL Subscription Information
IM-SSF	IP Multimedia Service Switching Function
IPLMN	Interrogating PLMN
MAP	Mobile Application Part
MGCF	Media Gateway Control Function
MO	Mobile Originating
MRF	Multimedia Resource Function
MT	Mobile Terminating
NNI	Network Node Interface
O-IM-BCSM	Originating IP Multimedia Basic Call State Model
O-IM-CSI	Originating IP Multimedia CAMEL Subscription Information
OLCM	Outgoing Leg Control Model
OSA	Open Service Access
OSS	Operations and Supervisory System
PIA	Point In Association
PIC	Point In Call
PLMN	Public Land Mobile Network
P-CSCF	Proxy CSCF
SCIM	Service Capability Interaction Manager
SCS	Service Capability Server
SDP	Session Description Protocol
SFC	Subsequent Filter Criteria
SIP	Session Initiation Protocol
S-CSCF	Serving CSCF

SPGW	Service Platform Gateway
SPI	Service Points of Interest
STP	Service Platform Trigger Points
T-IM-BCSM	Terminating IP Multimedia Basic Call State Model
T-IM-CSI	Terminating IP Multimedia CAMEL Subscription Information
TDP	Trigger Detection Point
UA	User Agent
UE	User Equipment
UNI	User Network Interface
VPLMN	Visited PLMN

4 Architecture and information flows for IM Multimedia session

Subclauses 4.1 and 4.2 show the architecture for handling a basic MO multimedia session and a basic MT multimedia session. A basic mobile-to-mobile multimedia session is treated as the concatenation of a MO multimedia session and a MT multimedia session.

Subclauses 4.3, 4.4 and 4.5 show the information flows for handling a basic MO multimedia session and a basic MT multimedia session.

4.1 Architecture for a Mobile Originated IP Multimedia session

This is specified in 3GPP TS 23.228 [8].

4.2 Architecture for a Mobile Terminated IP Multimedia session

This is specified in 3GPP TS 23.228 [8].

4.3 Information flow for a Mobile Originated IP Multimedia session

The information flow for a MO multimedia session is specified in 3GPP TS 24.228 [9].

4.4 Information flow for retrieval of routeing information for Mobile Terminated IP Multimedia session

The information flow for retrieval of routeing information for a MT multimedia session is specified in 3GPP TS 24.228 [9]

4.5 Information flow for an Mobile Terminated IP Multimedia session

The information flow for a MT multimedia session is specified in 3GPP TS 24.228 [9].

5 Functional requirements of network entities

Editor's Note : The network entities involved in service provision are the S-CSCF, HSS, the Application Servers, (SIP application server, IM-SSF and OSA SCS), and the MRF. Detailed work on the model for the behaviour of the S-CSCF and the mapping of SIP methods and responses to basic service primitives will be included in this section. The functional requirements of the S-CSCF, HSS, Application Servers and the MRF will be included in this section.

5.1 Architecture for Service Provision for IP Multimedia Subsystem

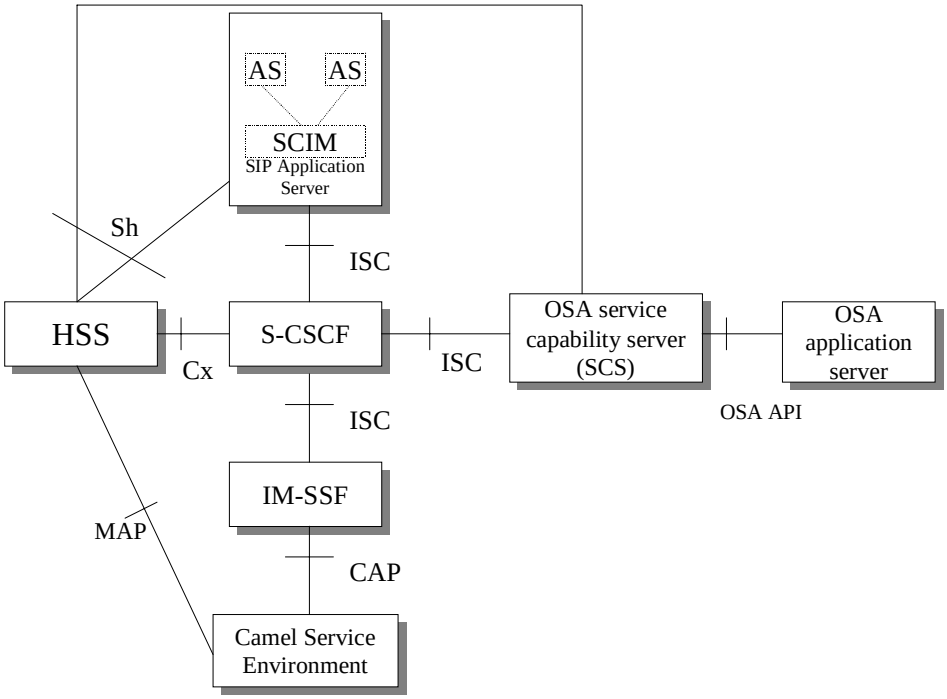

Figure 5.1-1: Functional architecture for support of Service Provision for IP Multimedia subsystem

Figure 5.1-1 illustrates the architecture with the S-CSCF communicating to Application Servers via the IPmultimedia service control (ISC) interface. The Application Servers maybe

- SIP Application Servers - which 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
- The IM-SSF - which is a particular type of application server the purpose of which is to host the CAMEL network features (i.e. trigger detection points, CAMEL Service Switching Finite State Machine, etc) and to interface to CAP.
- The OSA service capability server (OSA SCS) which interfaces to the OSA framework Application Server and which provides a standardized way for third party secure access to the IM subsystem. The OSA reference architecture defines an OSA Application Server as an entity that provides the service logic execution environment for client applications using the OSA API [13]. This definition of Application Server differs from the definition of Application Server in the context of service provisioning for the IM subsystem, i.e the entity communicating to the S-CSCF via the ISC interface.
- In addition a specialised type of SIP Application Server, the service capability interaction manager (SCIM) which performs the role of interaction management between other application servers

All the Application Servers, (including the IM-SSF and the OSA SCS) behave as SIP application servers on the ISC interface.

In addition the MRF may also interact directly with the Application Servers (Sr Interface) or via the S-CSCF (ISC and Mr interfaces).

Editor's Note: The protocol used between the Application Servers and the MRF (Sr Interface) is for further study.

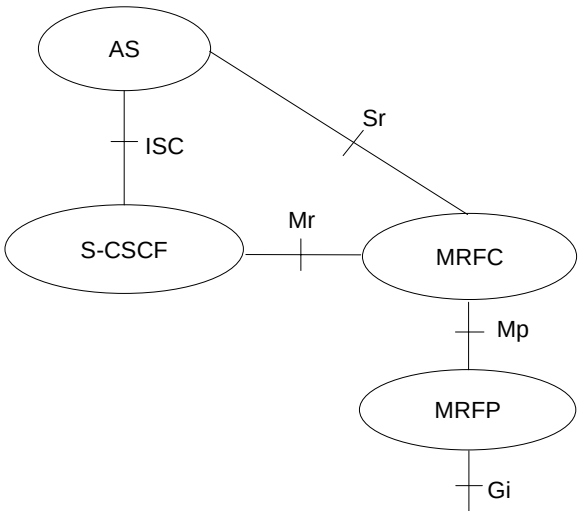

Figure 5.2: Relationship of MRF (MRFC and MRFP) with S-CSCF and Application Servers

5.2 Service Interaction with IP Multimedia Subsystem

Table 5.1 lists in the first three columns the SIP initial points of interest that a service logic would be interested in. These initial points of interest would invoke a service (or application) in the associated service platforms listed (or pointed to) in the fourth column of table 5.1 in order of sequence. This information is downloaded to subscriber's S-CSCF from HSS during registration. At de-registration or registration expiration, these trigger information will be released from S-CSCF.

The first column lists possible session initiating SIP requests that can cause a new SIP session to be established. Each of such request can represent a Service Point of Interest (SPI) thus may also cause the S-CSCF to start interaction with a service platform. In the second column, all these possible cases may optionally be further split into originating session establishment and session terminating cases. If the further split is not defined, only one list of AS-info exists and is hence used for all session cases no matter whether originating or terminating detected. If the further split is defined, two possible session cases may but not necessarily need to exist. This means that if only one of the session cases is defined, the other session case shall not cause any list of AS-info taken into use, hence no Application Servers shall be invoked for the unidentified session case. The third column identifies the situation that could lead to the invocation of a service.

It is not possible to define Initial Filtering Criteria (iFC) for a SIP request which is a subsequent request in an already established SIP signalling session. Such subsequent requests will adhere to the criteria which was selected by the time of session establishment, if any. However, such requests themselves may also have an entry in the iFC, which is to be used in those cases when that particular request is outside of any existing session.

If there is no entry defined for some detected SIP request, a default initial point of interest may have been predefined for such cases. One (and only one) entry in the iFC can be set as default. The description in the 'Service invocation' column need not match for these default cases.

Possible SIP session initiating SIP request:	Session case:		Service invocation:	Sequence of Application Servers to be contacted in the given order:	
INVITE Note2	Any	Originating session	Initial call/session request by the originating subscriber	<list of AS-info> Note1	<list of AS-info> e.g. AS-info1, AS-info2
		Terminating session	Initial incoming call/session request to the terminating subscriber		<list of AS-info> e.g. AS-info4, AS-info1
OPTIONS	Any	Originating session	Standalone OPTIONS transaction in orig. direction	<list of AS-info> Note1	<list of AS-info>
		Terminating session	Standalone OPTIONS transaction in term. direction		<list of AS-info>
REFER	Any	Originating session	Standalone REFER transaction in orig. direction	<list of AS-info> Note 1	<list of AS-info>
		Terminating session	Standalone REFER transaction in term. direction		<list of AS-info>
REGISTER	Any	Originating session	User is registering himself with the network	<list of AS-info> Note1	<list of AS-info>
SUBSCRIBE	Any	Originating session	Request for subscription to some event in orig. direction	<list of AS-info> Note1	<list of AS-info>
		Terminating session	Request for subscription to some event in term. direction		<list of AS-info>
Note1: Used if no session case is defined, i.e. if session case is of type "Any" Note2: covers both initial INVITE and re-INVITE cases					

Table 5. 1: Initial points of interest

Editor's note: Filtering unknown methods which create a new call-ID is FFS

Editor's note: The SIP messages showed in the table are from today's SIP specification, other new SIP request can also be used as initial points of interest upon SIP extension or implementation requirements.

This point of interest information shown in table 5.1 is subscriber specific information. In addition, these points of interest listed above (in the first three columns) are generic and service platform independent. Each point of interest is associated with a sequence of Application Servers (fourth column) which identifies the Application Servers (AS-info) that need to be involved due to SPI and also mandates the order in which they are to be contacted. ISC interface is invoked to interact with service logic when those points of interest are met in user's S-CSCF.

Each invoked Application Server/service logic may decide not to be engaged with the invoked session by indicating that during the very first SIP transaction when the Record-Route/Route is generated for subsequent SIP requests. The denial would mean that no subsequent requests shall be routed to such Application Servers/service logic any more during the lifetime of that session. Any Application Server which has denied to receive subsequent requests in a session cannot revoke the denial by means of Initial Filter Criteria (iFC).

6 Functional requirements of serving CSCF

Editor's Note :The functional behaviour of the S-CSCF will be specified here.

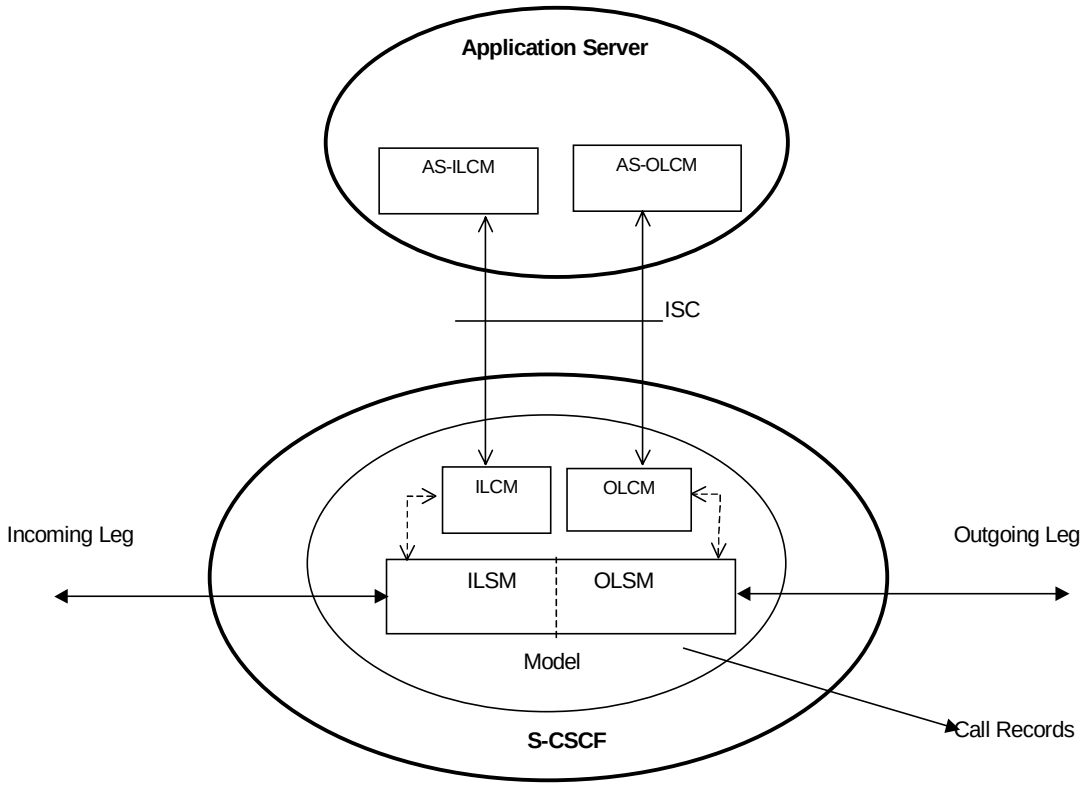

Figure 6.1: Service Control Model with Incoming Leg Control and Outgoing Leg Control The definitions for S-CSCF used in the model are:

Combined ILSM OLSM – Incoming/outgoing Leg State Model: Models the behaviour of an S-CSCF for handling SIP messages on an incoming and outgoing session leg. 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.

6.1 Modes of operation between S-CSCF and Application Server

Editors Note: The modes of operation of the S-CSCF for example Registrar or Proxy or User Agent etc will be described here.

6.2 Interfaces defined for S-CSCF

6.2.1 S-CSCF – X-CSCF (Mw and Mm) interface

The protocol used between two CSCFs is also based on Session Initiation Protocol, which is specified in 3GPP TS 24.229[10].

6.2.2 S-CSCF – Application Server (ISC) interface

The protocol used between the S- CSCF and the Application Servers (ISC interface) is also based on Session Initiation Protocol, which is specified in 3GPP TS 24.229[10].

6.2.3 S-CSCF – HSS (Cx) interface

This interface is used to send subscriber data to the S-CSCF, including Filter criteria which indicates which SIP requests should be proxied to which Application Servers.

The protocol used between the S-CSCF and HSS (Cx Interface) is specified in 3GPP TS 29.228[16].

6.3 Handling of IP Multimedia Registration

6.4 Handling of Mobile Originated IP Multimedia Sessions

The S-CSCF only looks for initial filter criteria when receiving an initial request or refreshing request for a dialog.

When such a session request comes in, the S-CSCF shall first check this is a originating request or a terminating request. This section describes the requirements for the S-CSCF when this request is an originating request. So, if this request is an originating request, the S-CSCF shall:

Check whether this message matches the initial filter criteria of the application servers assigned for that user by checking the service profile against the user public identity which is used to place this request.

If this request doesn't match the initial filter criteria of any application server, the S-CSCF shall forward this message downstream based on the route decision defined in 24.229.

If this request matches the initial filter criteria of only one application server and the S-CSCF has not interacted with that application server during this initial or refreshing transaction, the S-CSCF shall forward this request to that application server; if the S-CSCF has interacted with that application server in this transaction, the S-CSCF shall not forward this message to that application server but forward this request downstream based on the route decision defined in 24.229.

If this originating request matches the initial filter criteria of more than one application server, the S-CSCF shall forward this request to the one which has not been interacted with in this transaction and has the highest priority according the Priority List given by HSS among those matched application servers; if all of them have been interacted in this transaction, the S-CSCF shall forward this message downstream based on the route decision defined in 24.229; if the first attempt fails, the S-CSCF shall try others one by one according to their priories until there is a successful contact.

Editor's Note: The behaviours of the S-CSCF in the case that multiple services in different application servers are dependent each other is FFS.

6.5 Handling of Mobile Terminated IP Multimedia Sessions

The S-CSCF only looks for initial filter criteria when receiving an initial request or refreshing request for a dialog.

When such a request comes in, the S-CSCF shall first check this is a originating request or a terminating request. This section describes the requirements for the S-CSCF when this request is a terminating request. So, if this request is an terminating request, the S-CSCF shall:

Check whether this request matches the initial filter criteria of the application servers assigned for that user by checking the service profile against the user public identity, which this request is addressed to.

The subsequent requirements for the S-CSCF are the same as those for handling originating sessions.

It is possible that originating UE and terminating UE shares the same S-CSCF and AS, therefore the shared application server is allowed to be interacted by the S-CSCF twice in one transaction but in originating and terminating procedures respectively.

Editor's Note: The behaviours of the S-CSCF in the case that multiple services in different application servers are dependent each other is FFS.

6.6 Handling of Multimedia Session Release

6.7 Handling of Subscription and Notification

6.8 Description of Subscriber Data

6.8.1 Application Server Subscription Information

This subclause defines the contents of the Application Server related Subscription Information. This information shall be sent by the HSS to the S-CSCF via the Cx Interface during registration. More than one Application Server may be specified in the subscriber data in which case all the relevant data shall be included for each Application Server specified.

6.8.1.1 Application Server Address

Address to be used to access the service platform for a particular subscriber.

6.8.1.2 Default IP Multimedia Handling

The Default IP Multimedia Handling indicates whether the IP Multimedia session shall be released or continued as requested in case of loss of communications between the S-CSCF and Application Server.

6.8.1.3 Filter Criteria

Filter Criteria (FC) is the information the S-CSCF receives from the HSS or the AS that defines the relevant SPIs for a particular application. They define the subset of SIP requests received by the S-CSCF that should be sent/proxied to a particular application. When the S-CSCF receives a SIP request, it evaluates the filter criteria. If the SIP request matches the filter criteria, the S-CSCF proxies the SIP request to the corresponding SIP AS/IM-SSF/OSA SCS. Filtering is done for SIP requests messages only and can be e.g. based upon:

- The method of the SIP request.
- Whether the request was received in the originating or terminating case.
- A particular media type included in the SDP of a request.
- The presence/content of a particular SIP header.

Editor’s note: The list (based on what filtering can be done) is not a complete one.

Initial Filter Criteria (iFC) are filter criteria that are stored in the HSS as part of the user profile and are downloaded to the S-CSCF upon user registration. They represent a provisioned subscription of a user to an application. After downloading the User Profile from the HSS, the S-CSCF activates for the indicated Application Server the Service Points of Interest that are correlated to the iFC in the User Profile. Initial Filter Criteria are valid throughout the registration lifetime of a user or until the User Profile is changed.

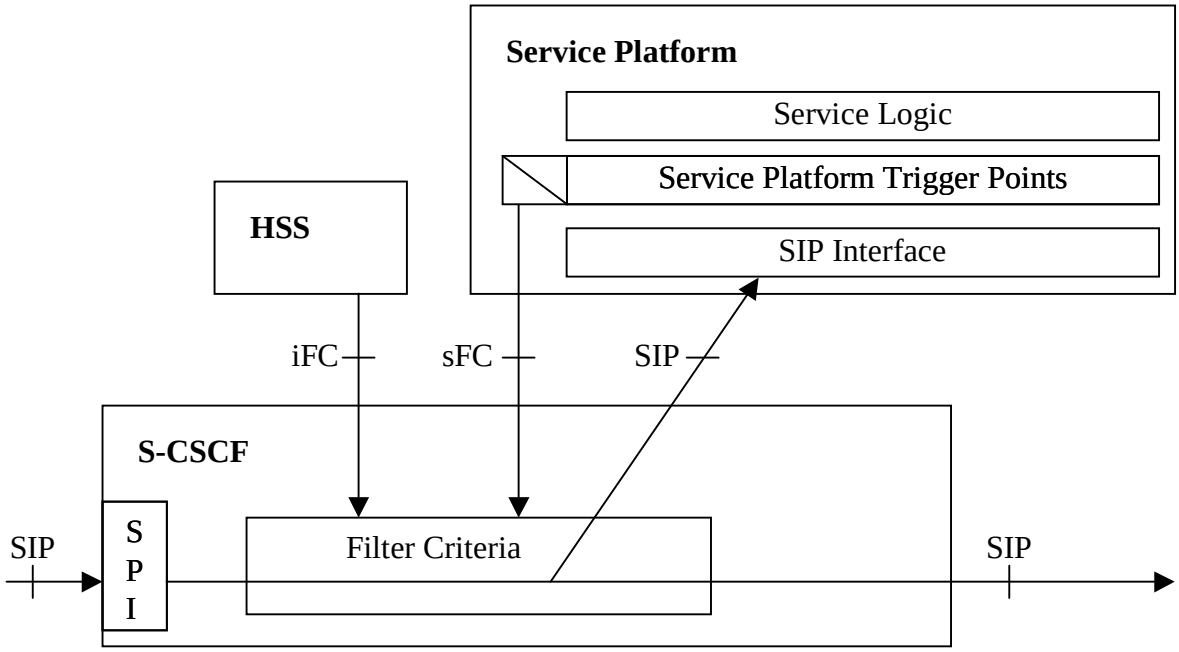

Figure 6.8.1.3-1 Application triggering architecture

6.8.1.4 Priority List

If there are multiple application servers are assigned for one subscriber, this list gives the priority the S-CSCF shall contact with in case a SIP message matches the initial filter criteria of more than one application server. In this case, the S-CSCF shall interact with the application server which has the highest priority.

6.8.2 Authentication Data

This subclause defines the Authentication Data. This data shall be sent by the HSS to the S-CSCF via the Cx Interface during registration.

Editors Note: Further Authentication Data breakdown clauses will be needed.

Editors Note: Further Subscriber Data clauses will be needed.

7 Functional requirements of HSS

Editor's Note : The functional behaviour of the HSS will be specified here.

Editors Note: This section needs coordination with CN4.

7.1 Subscriber data related storage requirements for HSS

7.2 Interfaces defined for HSS

7.2.1 HSS – X-CSCF (Cx) interface

This interface is used to send subscriber data to the S-CSCF, including Filter criteria which indicates which SIP requests should be proxied to which Application Servers.

The protocol used between the HSS and CSCF (Cx Interface) is specified in 3GPP TS 29.228[13].

7.2.2 HSS - Application Server (Sh) interface

The Sh interface is between the HSS and the SIP Application Servers and the OSA SCS and is used for transferring User Profile information.

Editor's Note: The protocol used between the HSS and Application Servers (Sh Interface) is for further study.

7.2.3 HSS – CSE interface

The protocol used on the interface between the HSS and the CAMEL Service Environment (CSE) is the MAP protocol.

7.3 Procedures during IP Multimedia Registration

7.4 Procedures during Mobile Originated IP Multimedia Sessions

7.5 Procedures during Mobile Terminated IP Multimedia Sessions

8 Functional requirements of the MRF

Editor's Note: The functional behaviour of the MRF will be specified here.

8.1 Functionality of the MRF

Editors Note: The standardised functionality of the MRF such as conferencing, tones and announcements, transcoding etc will be specified here

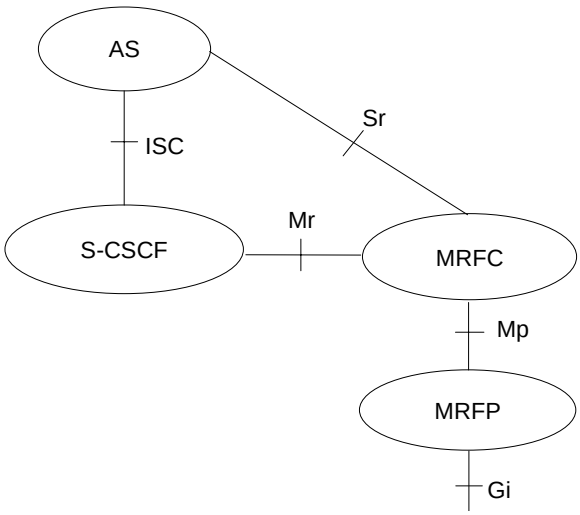

Figure 8.1: Relationship of MRF (MRFC and MRFP) with S-CSCF, GGSN and Application Servers

8.2 Interfaces defined for MRF

8.2.1 MRFC – S-CSCF (Mr) interface

The protocol used between MRFC and S-CSCF is based on Session Initiation Protocol, which is specified in 3GPP TS 24.229[10].

8.2.2 MRFC – Application Server (Sr) interface

The Sr interface is between the MRFC and the Application Servers and is used for control of the MRF by the Application Server.

Editor's Note: The protocol used between the MRFC and the Application Servers (Sr Interface) is for further study.

8.2.3 MRFP – MRFC (Mp) interface

Editor's Note: The protocol used between the MRFP and the MRFC (Mp Interface) is based on H.248 and is for further study.

8.2.4 MRFP – GGSN (Gi) interface

The protocol used between the MRFP and the GGSN is the Internet Protocol.

Editor's Note: It is presumed that real time protocols such as RTP and RTCP transported on top of UDP and IP will be used between the MRFP and the GGSN.

Editor's Note: Another interface reference point is probably required between the MRFP and the MGW but this is for further study.

9 Generic IP Multimedia session handling for SIP Application Servers

Editor's Note : This section relates to the generic behaviour of SIP Application Servers, which since SIP is the ISC interface protocol can be considered to apply to all application servers, (which also includes the SIP behaviour of the OSA SCS and IM-SSF) . The detailed work on the models for Service provision should be included in this section. These models would apply to the SIP behaviour of the OSA SCS and IM-SSF and all the application servers. This section is owned by CN1..

9.1 Architecture

This subclause describes the functional architecture needed to support interactions between the S-CSCF in the IP Multimedia Subsystem and the Application Server(s).

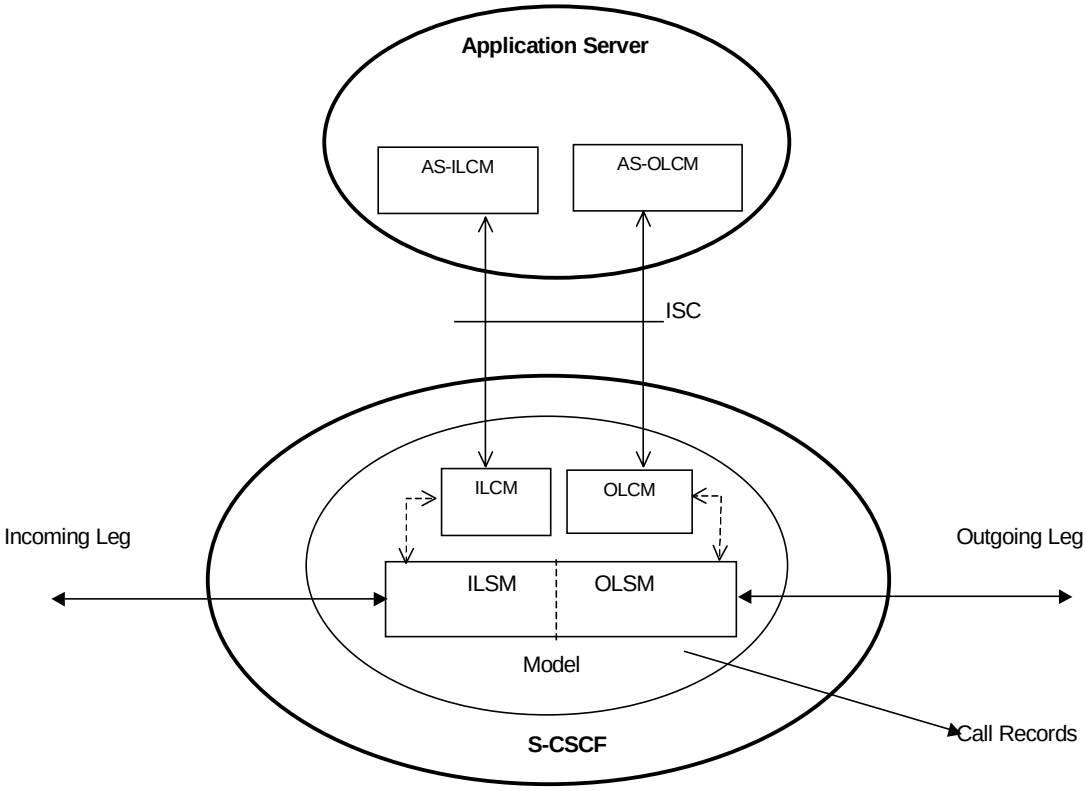

Figure 9.1: Service Control Model with Incoming Leg Control and Outgoing Leg Control

The definitions for Application Server used in the model are:

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.

9.1.1 Modes of operation between Application Server and S-CSCF

An Application Server may utilize five basic modes of operation for processing SIP Requests. Services may be built using combinations of these five modes of operation between the Application Server and the S-CSCF. An application Server may transition from one mode of operation to another during the lifetime of a multimedia session it is managing.

9.1.1.1 Application Server acting as terminating UA, or redirect server

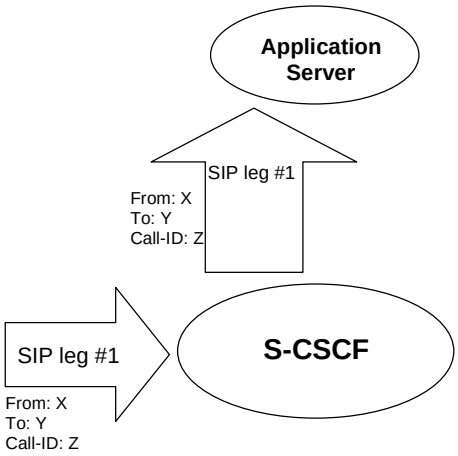

Fig 9. 2 Application Server acting as terminating UA, or redirect server

In this mode of operation the incoming SIP Request is proxied by the S-CSCF to the Application Server which then acts as either a UA or Redirect Server as specified in RFC2543bis.

9.1.1.2 Application Server acting as originating UA

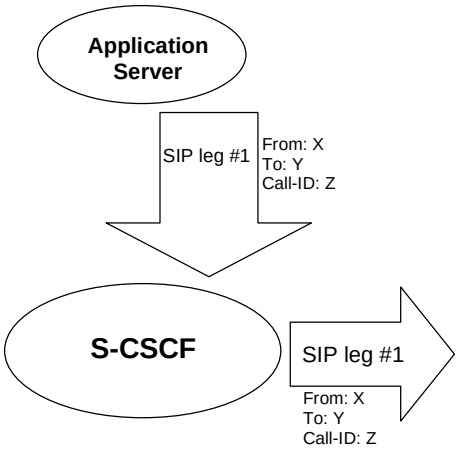

Fig 9. 3 Application Server acting as originating UA

In this mode of operation the Application Server acts as a UA as specified in RFC2543bis and generates a SIP Request which it sends to the S-CSCF which then proxies it towards the destination.

9.1.1.3 Application Server acting as a SIP proxy

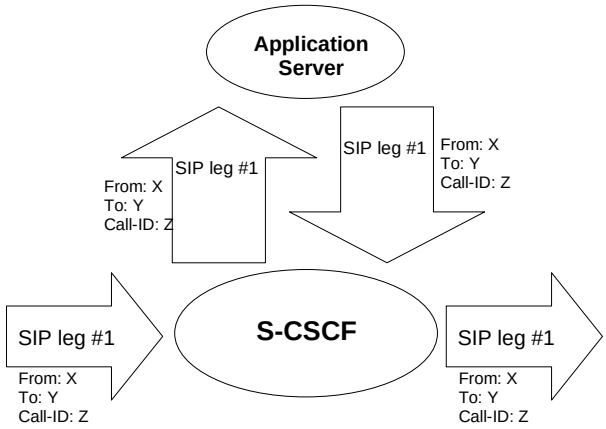

Fig 9. 4 Application Server acting as a SIP proxy

In this mode of operation the incoming SIP Request is proxied by the S-CSCF to the Application Server which then acts as a proxy as specified in RFC2543bis proxying the Request back to the S-CSCF which then proxies it towards the destination. During the proxy operation the Application Server may add, remove or modify the header contents contained in the SIP request according to the Proxy rules specified in RFC2543bis.

9.1.1.4 Application Server performing 3rd party call control/ B2BUA mode

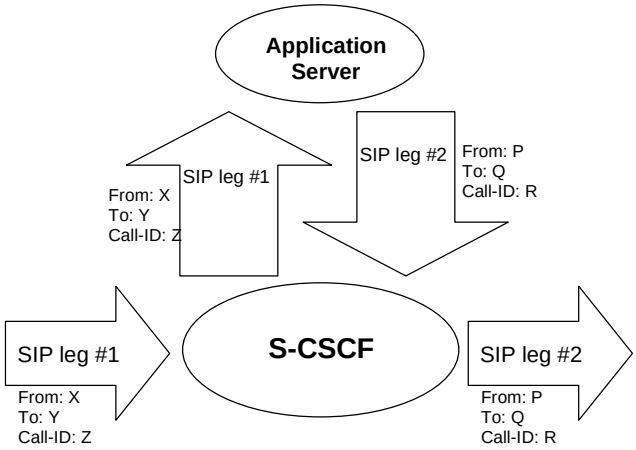

Fig 9. 5 Application Server performing 3rd party call control

In this mode of operation the incoming SIP Request is proxied by the S-CSCF to the Application Server which then generates a new SIP Request for a different SIP leg which it sends to the S-CSCF which then proxies it towards the destination. In this mode the Application Server behaves as a B2BUA for the multiple SIP legs as specified in RFC2543bis.

9.1.1.5 Application Server not Involved or no longer involved

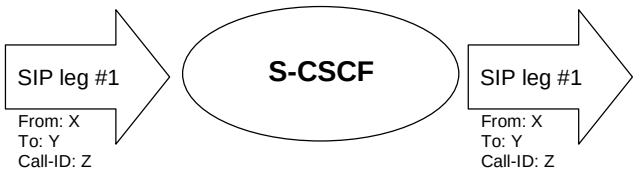

Fig 9. 6 A SIP leg is passed through the S-CSCF without Application Server involvement

In this mode of operation the Application Server was either never involved in the SIP session signalling or has determined to be no longer involved. The incoming SIP Request is proxied by the S-CSCF towards the destination. The Application Server may maintain itself in the SIP session signalling path by inserting itself in a Record-Route Header as specified in RFC2543bis. If the Application Server does not insert itself in a Record Route header then this mode of operation will be used for all subsequent requests related to this SIP leg.

9.2 Interfaces defined for a SIP Application Server

9.2.1 S-CSCF – Application Server (ISC) interface

This interface is used by the Application Server to control a IP Multimedia session via a S-CSCF. Transactions between the S-CSCF and the Application Server on this interface are initiated either as a result of the S-CSCF proxying a SIP request to the Application Server or by the Application Server initiating by generating and sending a SIP request to the S-CSCF. This interface is based on SIP.

9.2.2 Application Server – HSS (Sh) interface

The Sh interface is between the HSS and the SIP Application Servers and the OSA SCS and is used for transferring User Profile information.

Editor's Note: The protocol used between the HSS and Application Servers (Sh Interface) is for further study.

9.2.3 Application Server – MRF (Sr) interface

The Sr interface is between the Application Servers and the MRF and is used for control of the MRF by the Application Server.

Editor's Note: The protocol used between the MRF and Application Servers (Sr Interface) is for further study.

9.3 Description of Application Server related Subscriber Data

9.3.1 Application server Subscription Information

This subclause defines the general contents of the Subscription Information that may be required by the Application Server. This information shall be obtained from the HSS by the Application Server via the Sh Interface during registration.

9.3.1.1 Service Key

The Service Key identifies to the Application Server the service logic that shall apply.

9.3.1.2 Service Platform Trigger Points (STP)

Service Platform Trigger Points (STP) are the points in the SIP signalling that instruct the Application Server to trigger the service logic.

9.4 Procedures for Multimedia Session Handling with a SIP based Service Platform

9.4.1 Application Server Handling of mobile originated IP Multimedia calls

9.4.2 Application Server Handling of mobile terminated IP Multimedia calls

10 Specific IP Multimedia session handling for SIP Application Servers

Editor's Note : This section relates to the specific behaviour which only applies to SIP Application Servers. This section may include specific functionality related to the SCIM. If no specific behaviour that only applies to SIP application servers (and does not apply to IM-SSF and OSA-SCS) is identified to require standradization then this section will be removed. This section is owned by CN1.

11 IP Multimedia session handling with IM-SSF Application Server

This subclause describes the functional architecture needed to support CAMEL interactions with the S-CSCF in the IP Multimedia Subsystem. The IM-SSF is a SIP Application Server that interfaces SIP to CAP. The generic SIP Application Server behaviour of the IM-SSF is specified in section 9 of this specification.

The detailed CAMEL procedures for IM-SSF Application Server are specified in TS 23.278[17].

Annex <A> (normative):
<Normative annex title>

A.1 Heading levels in an annex

Heading levels within an annex are used as in the main document, but for Heading level selection, the "A.", "B.", etc. are ignored. e.g. **B.1.2** is formatted using ***Heading 2*** style.

Bibliography

The Bibliography is optional. If it exists, it shall follow the last annex in the document.

The following material, though not specifically referenced in the body of the present document (or not publicly available), gives supporting information.

Bibliography format

- <Publication>: "<Title>".

OR

<Publication>: "<Title>".

Annex B (informative): Information flows for example services

Editor's note: This annex contains some informative example information flows that show the possible flow of information for some example services. They are intended only to help aid the understanding of the behaviour of the S-CSCF and Application Servers for service provision for the IM CN subsystem.

This annex contains some informative example information flows that show the possible flow of information for some example services. They are intended only to help aid the understanding of the behaviour of the S-CSCF and Application Servers for service provision for the IM CN subsystem.

B.1 Call Forwarding Example

B.1.1 Call Forwarding through Service Platforms

Figure B.1 presents the network configuration for a call-forwarding scenario. Some interfaces between nodes have been omitted purely for clarity. In this configuration, the UE1 originates a call to the UE2. The UE2 is subscribed to a Call Forwarding (CF) service based on the Calling Line Identification (CLI). The CF service logic resides in a service platform interfacing the IM CN subsystem via the ISC interface. The service platform is programmed to detect all incoming calls/terminating sessions with UE1's CLI and to instruct the S-CSCF to forward the calls/sessions to another destination, UE3, either directly or via the UE1. These two session forwarding scenarios are shown by the red a blue coloured flows. When the session redirection is carried out directly by the S-CSCF of the UE2, the network may notify the UE1 of its call/session redirection.

As shown in the figure, the service platform could be either a SIP AS, an OSA AS or a CAMEL CSE. The latter two platforms interface the S-CSCF via the OSA SCS and IM SSF gateways, respectively.

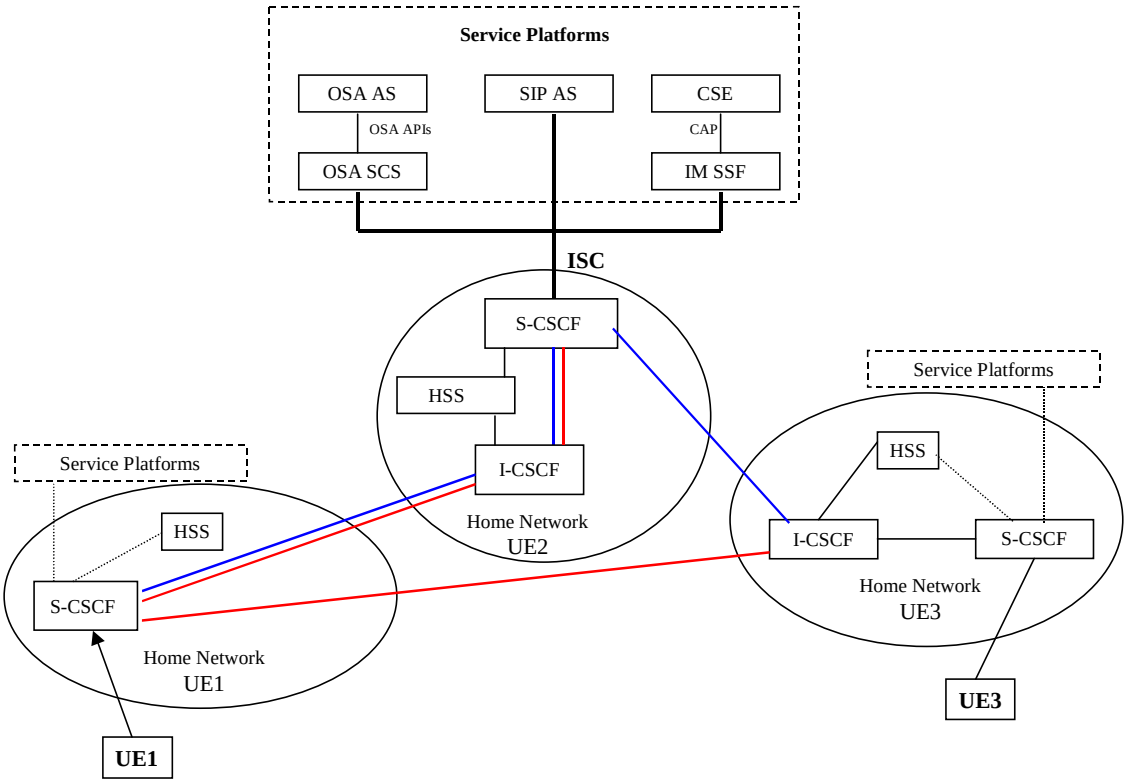

Figure B.1. Network configuration for the call forwarding examples

In this configuration, the originating UE1 and the terminating UE3 are assumed to be in their respective home network. The UE2, not shown in the figure, could be either at its home network or roaming in a visited network.

The CF feature is invoked based on the detection of the originating party's CLI "pre-activated" for call forwarding. Upon invocation of the CFonCLI feature, the call will be forwarded to a pre-specified destination. These two steps and a few underlying assumptions are briefly described below:

B.1.1.1 Service Activation and Programming

The UE2 activates its CFonCLI service and programs it with a Forward-to Number which is UE3's number, conditioning it to the originating party's line identity, CLI.

B.1.1.2 Service Invocation and Control

The UE1 makes a call to the UE2. The CFonCLI is invoked and the call is forwarded to the UE3 following a "Session Redirection" that is initiated by either the S-CSCF or the UE1[1].

B.1.2 Assumptions

For the CFonCLI service invocation and service control procedure, the following are assumed to hold:

- Normal case scenario, showing successful cases only.
- Subscriber data of all three UE1, UE2 and UE3 are stored in their respective HSS.
- All call/session control for the UE1, UE2, and UE3 is done in their respective home network S-CSCF.
- The UE2 has already subscribed to the CFonCLI service with a service provider operating a service platform where the service control logic resides.
- The pre-selected numbers (e.g., UE3) to which the originated calls are forwarded, are stored by the CFonCLI service control logic upon activation of the feature by the UE2.

[1] TS 23.228 lists six redirection procedures as follows:
Session Redirection initiated by S-CSCF to IMS
Session Redirection initiated by S-CSCF to CS-domain
Session Redirection initiated by S-CSCF to general endpoint
Session Redirection initiated by P-CSCF
Session Redirection initiated by UE
Session Redirection initiated after Bearer Establishment

B.1.3 UE Redirect based call flows

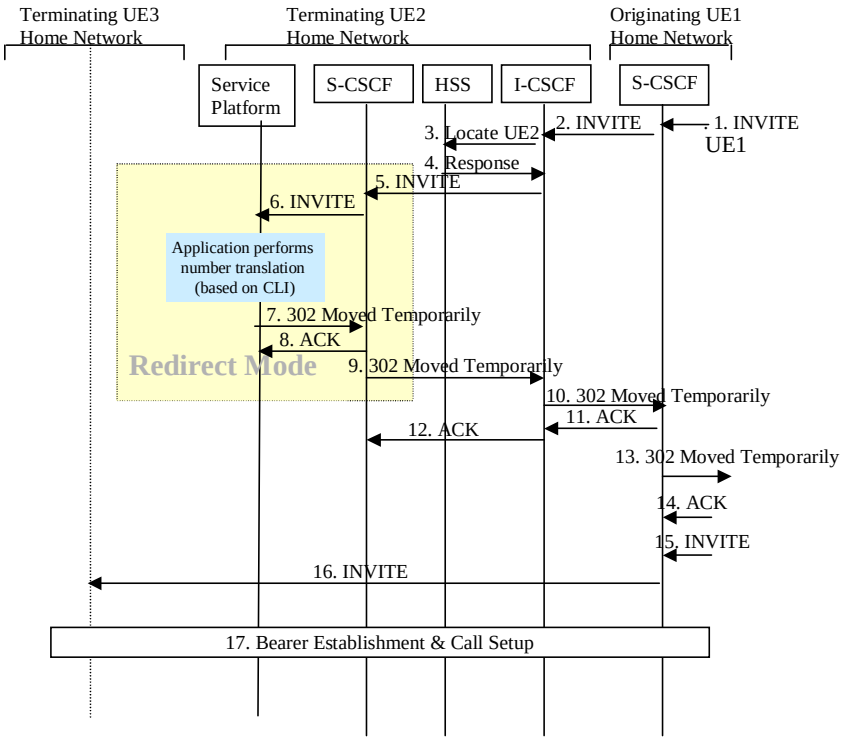

Figure B.2. CFonCLI Information Flows with UE Re-direct

Figure B.2 presents the information flow diagram for the invocation and control of the CFonCLI service based on the configuration of Figure B.1.

The UE1 initiates a call to UE2. The CFonCLI service logic is invoked in the service platform when the S-CSCF for UE2 detects that service invocation is required. The call is forwarded to the UE3 by the UE1 according to the "Session Redirection initiated by UE" procedure. The UE3 accepts the (forwarded) call. A detailed description for each flow is given below:

1) The S-CSCF of UE1 receives a SIP invite message form UE1.

2) The I-CSCF of the UE2 receives a SIP INVITE message form the S-CSCF of the originating user, UE1. UE1's CLI is included in this INVITE message.

3) The I-CSCF of the UE2 queries the HSS to obtain the S-CSCF of the UE2.

4) The HSS returns the S-CSCF location.

5) The I-CSCF forwards the INVITE to the S-CSCF of UE2.

6) Based on the information obtained from the UE2 Service Profile (during registration), the S-CSCF of the UE2 detects that the criteria for certain pre-defined triggers are met. The INVITE message is forwarded to the service platform. The service logic is invoked in the service platform.

7) Based on the outcome of the execution of the service logic, the service platform instructs the S-SCSF to REDIRECT the session to UE3. The behaviour of the service platform follows the description of a 'redirect server'. It sends the 302 Move Temporary response with UE3 as the redirect address to UE1. The service platform plays no further part in the session establishment.

8) S-CSCF of UE2 sends ACK back to the service platform to acknowledge the receiving of the 302 response.

9) S-CSCF of UE2 forwards the 302 Move Temporary to the I-CSCF of UE2

10) The I-CSCF of UE2 forwards the 302 Move Temporary to the S-CSCF of UE1.

11) The S-CSCF of UE1 sends ACK to acknowledge the receiving of the 302 Move Temporary.

12) The I-CSCF of UE2 forwards the ACK to the S-CSCF of UE2

13) The S-CSCF of UE1 forwards the 302 Move Temporary response to the next downstream hop

14) The S-CSCF of UE1 receives the ACK for that 302 response from the downstream hop

15) The UE1 re-issues an INVITE with UE3 as the destination.

16) The originating S-CSCF redirects the SIP INVITE message to the UE3's home network.

17) Bearer establishment & call setup between from the UE1 to the UE3 is performed following the procedure described in the basic call flow sections for originating, inter-network and terminating segments.

B.1.4 S-CSCF based Redirect call flows

Figure B.3 presents the information flow diagram for the invocation and control of the CFonCLI service based on the configuration of Figure B.1, where redirection is made by the S-CSCF after instructions from the service logic in the service platforms.

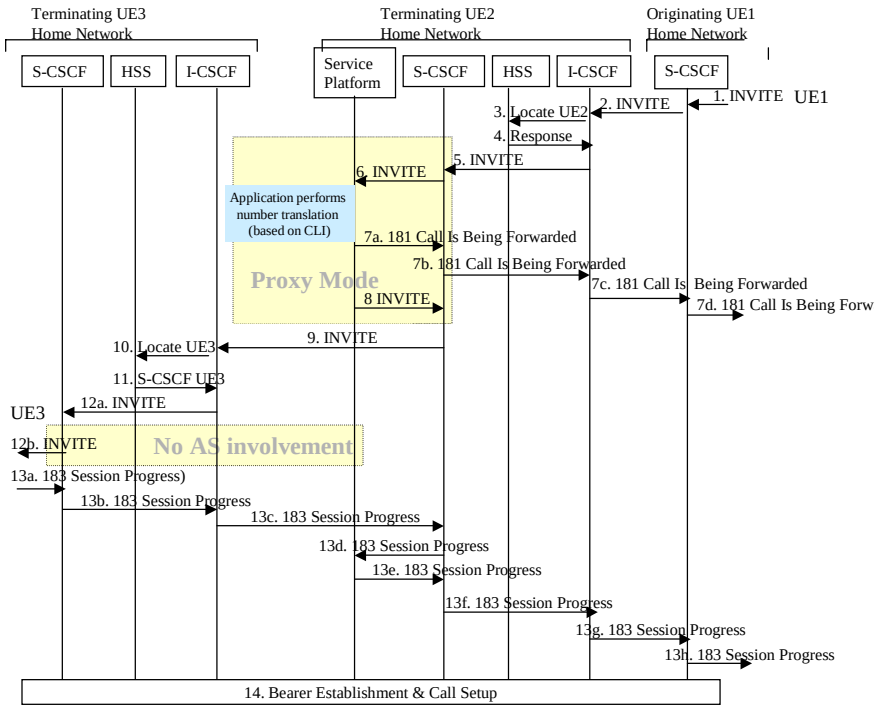

Figure B.3. CFonCLI Information Flow with S-CSCF Redirect

The UE1 (located in the originating visited network) makes a call to UE2. The CFonCLI is invoked and the CFonCLI service logic is executed by an application residing in the service platform.

The call is forwarded to the UE3 by the S-CSCF of UE2 according to the “Session Redirection” instructed by the service platform. The S-CSCF sends a SIP 181Call Is Being Forwarded to UE1 and a SIP Invite message to UE3. The UE3 accepts the (forwarded) call. A detailed description for each flow is given below:

1) through to 6) are identical to flows by the same number in the UE Redirect example provided in B.1.3.

7) (7a, 7b, 7c and 7d) The service platform notifies the UE1 that the call is being forwarded, by sending a 181 Call Is Being Forwarded message.

8) The service logic forwards the INVITE message back to S-CSCF modifies the destination address by inserting the identity of the UE3. The service platform is in SIP proxy mode.

9) The S-CSCF of UE2 forwards the modified INVITE message it received from the service platform to the I-CSCF of UE3.

10) The I-CSCF of the UE3 queries the HSS to obtain the S-CSCF of the UE3.

11) The HSS returns UE3’s S-CSCF location.

12) (12a and 12b)The I-CSCF forwards the SIP INVITE message the UE3. via its S-CSCF.

13) (13a, 13b, 13c, 13d, 13e, 13f, 13g, 13h and 13g)The UE3 accepts the incoming call and sends an 183 Session Progress back to UE1.

14) Bearer establishment & call setup between from the UE1 to the UE3 is performed following the procedure described in the basic call flow sections for originating, inter-network and terminating segments.

Annex C (informative): Documentation of preliminary material

Editor's note: This annex provides a temporary space for holding the contents of material that is to be achieving maturity, but is not yet regarded as stable.
When the material achieves stability, then it will move to the main body of the document.

Annex <X> (informative): Change history

It is usual to include an annex (usually the final annex of the document) for specifications under TSG change control which details the change history of the specification using a table as follows:

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Nov 2000		N1-001300			First draft created. Presented to CN1meeting #14.		
21/11/00		N1-001352			V 0.1.0 created based on discussion in CN1#14. Additional clause on OSA API added.		
22/11/00		N1-001386			V 0.2.0 created based on discussion in CN1#14. The clause on scope modified.		
28/11/00		N1-001448			V 0.3.0 created based on discussion in CN1/SA2 joint meeting . The title modified.		
Jan 2001		N1-010069 NJ-010102			V0.3.1 created. Specification number TS 23.218 allocated to TS 23.cde.		
16/1/01		NJ-010106			V0.4.0 created. Clause 8 on OSA API updated to include the proposal in NJ-010104 agreed at joint CN1/2/4 meeting on 23.218.		
March 2001		N1-010762			V0.5.0 created. Clause 6.5 updated to include the proposal in NJ-010117 agreed at the joint CN1/2/3/4 Feb meeting in Sophia. Reference to Visited Network updated.		
June 2001		N1-010981			V0.5.1 created. Informative Annex B created containing N1-010749 agreed at Joint CN1/2/3/4 meeting in Puerto Rico.		
August 2001		N1-011090			V0.5.2 created. Section 5 updated to include the proposals in N1-010982, N1-011013 and N1-011043; Section 6 updated to include the proposals in N1-011044 and N1-011045, agreed at CN1#18 and joint CN1/2/3/4 meetings in Dresden.		
Septemb er 2001		N1-011365			V0.6.0 created. Document layout reorganized and content updated to conform to proposal in N1-011277; Section 6 and Section 9 updated to include the proposals in N1-011342, agreed at CN1#19 meeting in Helsinki.		
October 2001		N1-011522			V.0.7.0 created. Apendix B.1 added based on N1-011423 agreed at CN1#19bis meeting in Sophia Antipolis		
October 2001		N1-011707			V.0.8.0 created using Tdocs: N1-011596, N1-011597, N1-011599, N1-011600	0.7.0	0.8.0
Nov 2001		N1-011867			V.0.9.0 created using Tdocs: N1-011751, N1-011778	0.8.0	0.9.0
Dec 2001					V.1.0.0 created using Tdocs: N1-011999, N1-012051 agreed at CN#21 in Cancun. To be presented for information at CN#14	0.9.0	1.0.0