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Foreword

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1 Scope

The present document specifies the IP Multimedia (IM) Call Model for handling of an IP multimedia session origination and termination for an IP Multimedia subscriber.

The present document includes interactions between an Application Server and IP multimedia sessions.

The IP Multimedia (IM) Subsystem stage 2 is specified in 3GPP TS 23.228 [3].

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.
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- [1] Void.
- [2] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [3] 3GPP TS 23.228: "IP multimedia subsystem; Stage 2".
- [4] Void.
- [5] 3GPP TS 24.229: "IP multimedia call control protocol based on SIP and SDP; stage 3".
- [6] IETF RFC 3261: "SIP: Session Initiation Protocol".
- [7] 3GPP TR 29.998-4-4 Release 8: "Open Service Access (OSA); Application Programming Interface (API) Mapping for Open Service Access (OSA); Part 4: Call Control Service Mapping; Subpart 4: Multiparty Call Control SIP".
- [8] 3GPP TS 29.228: "IP Multimedia (IM) Subsystem Cx Interface; Signalling flows and message contents".
- [9] 3GPP TS 23.278: "Customised Applications for Mobile network Enhanced Logic (CAMEL); IP Multimedia System (IMS) interworking; Stage 2".
- [10] 3GPP TS 23.008: "Organisation of subscriber data".
- [11] 3GPP TS 33.203: "Access security for IP based services".
- [12] 3GPP TS 29.198: "Open Service Access (OSA); Application programming Interface (API)".
- [13] Void.
- [14] 3GPP TS 29.078: "Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 3; CAMEL Application Part (CAP) specification".
- [15] IETF RFC 3264: "An Offer/Answer Model with Session Description Protocol".
- [16] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".
- [17] 3GPP TS 29.229: "Cx Interface based on the Diameter protocol".

- [18] 3GPP TS 29.328: "IP Multimedia Subsystem (IMS) Sh Interface; Signalling flows and message contents".
- [19] 3GPP TS 29.329: "Sh Interface based on the Diameter protocol".
- [20] 3GPP TS 32.240: "Telecommunication management; Charging management; Charging architecture and principles".
- [21] 3GPP TS 32.260: "Telecommunication management; Charging management; IP Multimedia Subsystem (IMS) charging".
- [22] IETF RFC 5627 (October 2009): "Obtaining and Using Globally Routable User Agent URIs (GRUUs) in the Session Initiation Protocol (SIP)".
- [23] 3GPP TS 24.147: "Conferencing using the IP Multimedia (IM) Core Network (CN) subsystem; Stage 3".
- [24] 3GPP TS 24.247: "Messaging service using the IP Multimedia (IM) Core Network (CN) subsystem; Stage 3".
- [25] 3GPP TS 33.328: "IMS Media Plane Security".
- [26] 3GPP TS 29.364: "IP Multimedia Subsystem (IMS) Application Server (AS) service data descriptions for AS interoperability".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [2] and the following apply:

Application Server Incoming Leg Control Model (AS-ILCM): models AS behaviour for handling SIP information for an incoming leg.

Application Server information (AS-info): AS-info contains individualized information concerning one particular Application Server entry.

This information contains e.g. Application Server Address (6.9.1.1) and its corresponding Default IP Multimedia Handling information (6.9.1.2).

Application Server Outgoing Leg Control Model (AS-OLCM): models AS behaviour for handling SIP information for an outgoing leg.

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.

Filter Criteria (FC): the information which the S-CSCF receives from the HSS or the AS that defines the relevant SPTs for a particular application.

They define the subset of SIP requests received by the S-CSCF that should be sent or proxied to a particular application.

Incoming Leg Control Model (ILCM): models the behaviour of an S-CSCF for handling SIP information sent to and received from an AS for an incoming session leg.

Initial Filter Criteria (iFC): 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.

Initial Request: a SIP request that either initiates the creation of a new dialog or is part of a standalone transaction.

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

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

IP Multimedia session: IP Multimedia session and IP Multimedia call are treated as equivalent in the present document.

Original Dialog Identifier: an indication that the S-CSCF includes in a Route header for itself when sending requests to an AS. When the AS returns this indication in a Route header of a message sent to the S-CSCF, the S-CSCF uses it to associate the message with the previous request sent by the S-CSCF (i.e. the original SIP dialog).

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

Outgoing Leg Control Model (OLCM): models the behaviour of an S-CSCF for handling SIP information received from and sent to an AS for an outgoing session leg.

Private User Identity: a unique global identity defined by the Home Network Operator, as defined in 3GPP TS 23.228 [3].

Public User Identity: the public user identity/identities are used by any user for requesting communications to other users and are in the form of a SIP URL or TEL URL as defined in 3GPP TS 23.228 [3].

Served User: The served user is the public user identity, for which the IM CN subsystem handles the call. For an origination call leg the served user is the user for which a UE or AS originates the call for. For a terminating call leg the served user is the user for which a UE or an AS terminates the call for.

Service Key: the Service Key identifies to the Application Server the service logic that shall apply. The Service Key is administered by the HPLMN. For CAMEL services, the Service Key is an element of the CAMEL Subscription Information (CSI).

Service Point Trigger (SPT): 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 SPTs which are relevant to a particular application are defined by means of Filter Criteria.

Service Platform Trigger Points (STP): the points in the SIP signalling that instruct the SIP AS, OSA SCS and IM-SSF to trigger the service logic.

For the IM-SSF the IP Multimedia Camel Subscriber Information (IM-CSI) defines them.

Subsequent Filter Criteria (sFC): 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 SPTs at application execution time.

Subsequent Request: a SIP request which is part of an existing dialog. This also includes target refresh requests as defined in IETF RFC 3261 [6].

Standalone Transaction: a SIP transaction that is not part of an existing dialog and does not initiate the creation of a new dialog.

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

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.228 [7] subclause 4.13 apply:

IMS application reference
IMS communication service
IMS communication service identifier

3.2 Abbreviations

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

AAA	Authentication, Authorization, and Accounting
API	Application Programming Interface
AS	Application Server
AS-ILCM	Application Server Incoming Leg Control Model
AS-OLCM	Application Server Outgoing Leg Control Model

B2BUA	Back-to-Back User Agent
CAMEL	Customized Applications for Mobile network Enhanced Logic
CAP	CAMEL Application Part
CCF	Charging Collection Function
CDR	Charging Data Records
CF	Call Forwarding
CFonCLI	Call Forwarding on Calling Line Identification
CGI	Common Gateway Interface
CPL	Call Processing Language
CLI	Calling Line Identification
CSCF	Call Session Control Function
CSE	CAMEL Service Environment
ECF	Event Charging Function
FC	Filter Criteria
GPRS	General Packet Radio Service
GPRS CID	GPRS Charging Identifiers
GRUU	Globally Routable User agent URI
gsmSCF	gsm Service Control Function
HPLMN	Home PLMN
HSS	Home Subscriber Server
IETF	Internet Engineering Task Force
I-CSCF	Interrogating CSCF
IARI	IMS Application Reference Identifier
ICID	IMS Charging ID
ICSI	IMS Communication Service Identifier
iFC	Initial Filter Criteria
ILCM	Incoming Leg Control Model
IM	IP Multimedia
IM-CSI	IP Multimedia CAMEL Subscription Information
IMS	IP Multimedia Subsystem
IMSI	International Mobile Subscriber Identity
IM-SSF	IP Multimedia Service Switching Function
IOI	Inter Operator Identifier
IP	Internet Protocol
ISC	IP multimedia Service Control
MAP	Mobile Application Part
MGCF	Media Gateway Control Function
MRFC	Multimedia Resource Function Controller
MRFP	Multimedia Resource Function Processor
O-IM-CSI	Originating IP Multimedia CAMEL Subscription Information
ODI	Original Dialog Identifier
OLCM	Outgoing Leg Control Model
OSA	Open Service Access
PLMN	Public Land Mobile Network
P-CSCF	Proxy CSCF
RFC	Request For Comments
SCF	Session Charging Function
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
SPT	Service Point Trigger
STP	Service platform Trigger Points
T-IM-CSI	Terminating IP Multimedia CAMEL Subscription Information
UA	User Agent
UE	User Equipment
URL	Uniform Resource Locator
XML	EXtensible Markup Language
MRB	Media Resource Broker
IVR	Interactive Voice Response

4 Architecture and information flows for IM multimedia session

4.0 Introduction

Subclauses 4.1 and 4.2 show the architecture for handling a basic UE-originating multimedia session and a basic UE-terminating multimedia session. A basic UE-to-UE multimedia session is treated as the concatenation of a UE-originating multimedia session and a UE-terminating multimedia session.

4.1 Architecture for a UE-originating IP multimedia session

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

4.2 Architecture for a UE-terminating IP multimedia session

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

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4.3 Void

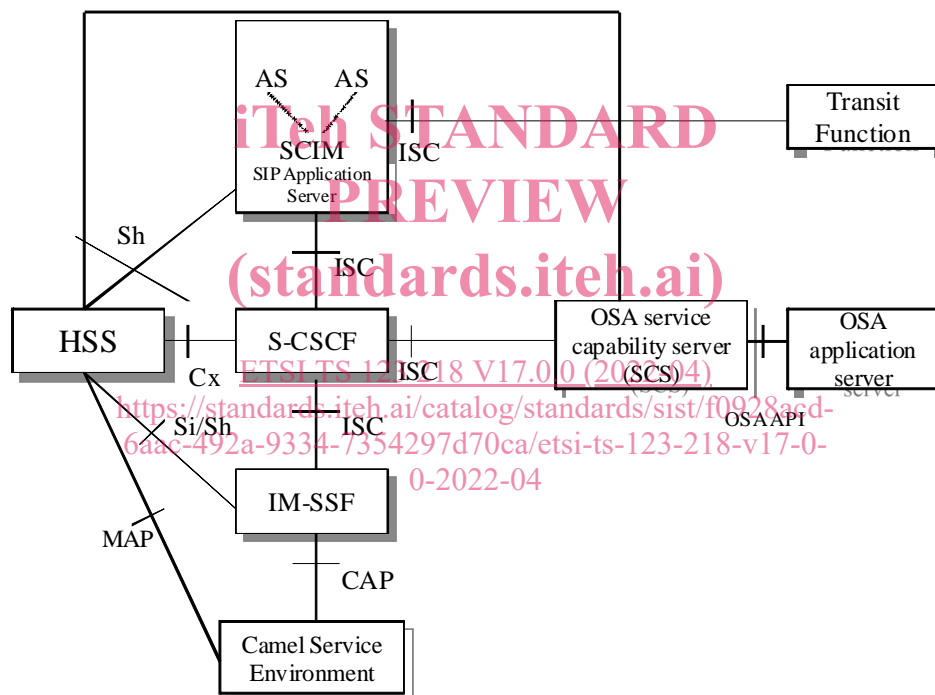
4.4 Void

4.5 Void

5 Functional requirements of network entities

5.1 Architecture for service provision for IP multimedia subsystem

5.1.1 General



NOTE: Not all interfaces shown are within the scope of this document.

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 IP multimedia service control (ISC) interface. The Application Servers can be:

- 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 as specified in 3GPP TS 29.078 [14];
- 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 as specified in 3GPP TS 29.198 [12]. 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 specialized type of SIP Application Server, the service capability interaction manager (SCIM) which performs the role of interaction management between other application servers.

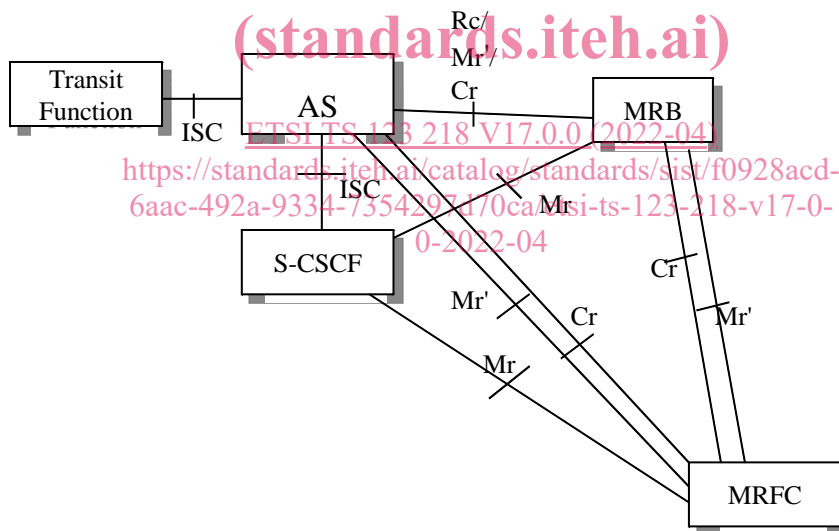
All the Application Servers, (including the IM-SSF and the OSA SCS) behave as SIP application servers on the ISC interface.

5.1.2 Provision of media resources

In addition the Application Servers can also interact with the MRFC via the S-CSCF (ISC, Mr), directly via the Mr' interface and via the Cr interface in order to control Multimedia Resource Function processing and can interact with the MRB (Rc interface, or Mr, and Mr' interfaces) in order for appropriate media resources to be assigned to calls (see clause 8 and clause 13). This is shown in figure 5.1.2. The AS can request MRF resources directly based on preconfigured addresses and DNS lookup, or indirectly using an MRB function, which will determine the most suitable resource (see clause 13).

An application server can provide the MRB with information to assist the MRB in determining the most appropriate resource. Aside from information on type of resource required, this can include information on other supporting MRBs in other networks, e.g. the visited network of a roaming user, or more information on the location of the endpoint to which the media is to be delivered, such that this may assist in determining the best location for providing the MRF.

NOTE: In this release direct interaction between an MRFC and a Transit Function has not been specified.



NOTE: An I-CSCF, S-CSCF can also use the resources of the MRF directly, or via an MRB, without going via an AS.

Figure 5.1.2: Functional architecture for support of media resources for IP multimedia subsystem

5.1.2A Border control concepts for the ISC interface

3GPP TS 23.228 [7] subclause 4.14 identifies the possibility of border control functions between two IM CN subsystems or between an IM CN subsystem and other SIP based multimedia network. Additional functionality may also be required on the ISC interface where an application server provided by a third-party service provider is supported.

An additional functionality called an ISC gateway function is defined as shown in figure 5.1.2A.

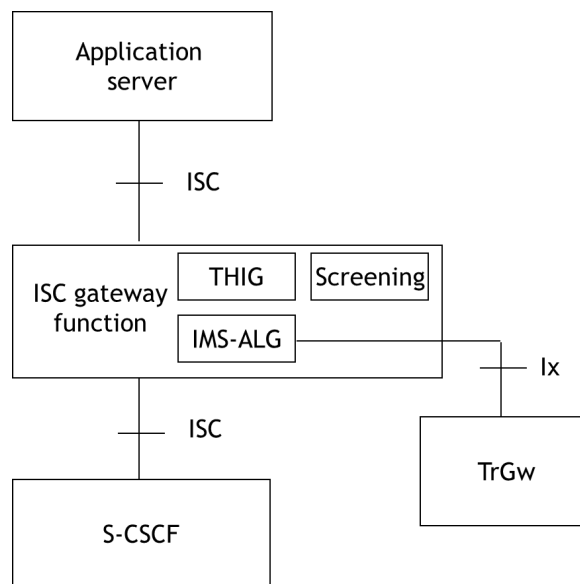


Figure 5.1.2A: ISC gateway function

The functions of the ISC gateway function are as follows:

- network configuration hiding (as for the IBCF);
- application level gateway (transcoding is not applicable for ISC gateway function);
- transport plane control, i.e. QoS control (as for the IBCF); and
- screening of SIP signalling (as for the IBCF).

NOTE 1: Additional functionality may be determined in later releases of this document. As future functionality could require knowledge of all transactions associated with an AS from the S-CSCF for a particular session / dialog, care is needed to route all such transactions through the same ISC gateway function.

While the ISC gateway function can alter the contents of the protocol on the ISC interface, the information carried should still conform to that required for the ISC interface.

NOTE 2: When this functionality is used, the effect can be to remove information that is required by subsequent AS in the filter criteria chain. Therefore care needs to be exercised both in the order in which AS appear in the filter criteria chain, and in the functionality applies in this functional entity.

NOTE 3: If the ISC gateway function modifies SIP information elements (SIP header fields, SIP message bodies) caution needs to be taken that SIP functionality (e.g. routing, iFC chain and AS application) is not impacted in a way that could create interoperability problems with networks that assume that this information is not modified.

NOTE 4: In this release the ISC gateway function does not have functionalities to save screened information in outgoing message and recover the screened information in incoming message so care is needed both in the order in which the AS appear in the filter criteria chain, and in the functionality applied in the ISC gateway.

5.1.3 Border control concepts for other interfaces

3GPP TS 23.228 [7] subclause 4.14 identifies the possibility of border control functions between two IM CN subsystems or between an IM CN subsystem and other SIP based multimedia network. A number of the interfaces identified in the architecture in subclause 5.1.1 and subclause 5.1.2 can be between the networks controlled by different operators, specifically the Mr, Mr' and Cr interfaces (for example between a third-party service provider and the visited network, or between the home network and the visited network).