

ETSI TS 129 228 V14.2.0 (2017-03)



**Digital cellular telecommunications system (Phase 2+) (GSM);
Universal Mobile Telecommunications System (UMTS);
LTE;
IP Multimedia (IM) Subsystem Cx and Dx Interfaces;
Signalling flows and message contents
(3GPP TS 29.228 version 14.2.0 Release 14)**



Reference

RTS/TSGC-0429228ve20

Keywords

GSM,LTE,UMTS

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

The present document can be downloaded from:
<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status.
Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:
<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2017.
All rights reserved.

DECT™, PLUGTESTS™, UMTS™ and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.
3GPP™ and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and
of the 3GPP Organizational Partners.
GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under
<http://webapp.etsi.org/key/queryform.asp>.

Modal verbs terminology

In the present document "shall", "shall not", "should", "should not", "may", "need not", "will", "will not", "can" and "cannot" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"must" and "must not" are NOT allowed in ETSI deliverables except when used in direct citation.

Contents

Intellectual Property Rights	2
Foreword.....	2
Modal verbs terminology.....	2
Foreword.....	7
1 Scope	8
2 References	8
3 Definitions, symbols and abbreviations	9
3.1 Definitions	9
3.2 Abbreviations	10
4 Main Concept	10
5 General Architecture	11
5.1 Functional requirements of network entities	11
5.1.1 Functional requirements of P-CSCF	11
5.1.2 Functional requirements of I-CSCF.....	11
5.1.3 Functional requirements of S-CSCF.....	11
5.1.4 Functional requirements of HSS	11
5.1.5 Functional classification of Cx interface procedures	11
5.1.6 Functional Requirements of the Presentity Presence Proxy.....	11
6 Procedure Descriptions.....	12
6.1 Location management procedures	12
6.1.1 User registration status query.....	12
Detailed behaviour	13
6.1.2 S-CSCF registration/deregistration notification.....	15
Detailed behaviour	22
6.1.3 Network initiated de-registration by the HSS, administrative	27
Detailed behaviour	28
6.1.4 User location query	30
Detailed behaviour	31
6.2 User data handling procedures	32
6.2.1 User Profile download	32
6.2.2 HSS initiated update of User Information.....	32
Detailed behaviour	34
6.3 Authentication procedures.....	35
6.3.1 Detailed behaviour	38
6.4 User identity to HSS resolution.....	39
6.5 Implicit registration	40
6.5.1 S-CSCF initiated procedures.....	40
6.5.1.1 Registration	40
6.5.1.2 De-registration	40
6.5.1.3 Authentication	40
6.5.1.4 Downloading the user profile	40
6.5.1.5 Initiation of a session to a non-registered user	40
6.5.2 HSS initiated procedures	41
6.5.2.1 Update of User Profile	41
6.5.2.2 De-registration	41
6.5.2.3 Update of the Charging information	41
6.5.2.4 Update of the SIP Digest Authentication Data.....	41
6.5.2.5 Update of the Allowed WAF and/or WWSF Identities.....	41
6.6 Download of the Relevant User Profile and Charging Information and Allowed WAF and/or WWSF Identities	42
6.6.1 HSS initiated update of User Profile	42
6.6.2 S-CSCF operation	42

6.7	S-CSCF Assignment.....	42
7	Information element contents.....	45
7.1	Visited Network Identifier.....	45
7.2	Public User Identity.....	45
7.2a	Public Service Identity	45
7.2b	Wildcarded Public Identity.....	45
7.2c	Void.....	45
7.3	Private User Identity.....	45
7.3a	Private Service Identity	45
7.4	S-CSCF Name	45
7.4a	AS Name	45
7.5	S-CSCF Capabilities.....	46
7.6	Result.....	46
7.7	User Profile	46
7.8	Server Assignment Type	46
7.9	Authentication Data.....	46
7.9.1	Item Number	46
7.9.2	Authentication Scheme.....	46
7.9.3	Authentication Information.....	46
7.9.4	Authorization Information	46
7.9.5	Confidentiality Key.....	46
7.9.6	Integrity Key	47
7.9.7	Authentication Context.....	47
7.9.8	Digest Authenticate.....	47
7.9.8.1	Digest Realm.....	47
7.9.8.2	Void.....	47
7.9.8.3	Digest Algorithm.....	47
7.9.8.4	Digest QoP	47
7.9.8.5	Digest HA1	47
7.9.9	Line Identifier	47
7.9.10	Framed IP Address.....	47
7.9.11	Framed IPv6 Prefix	47
7.9.12	Framed Interface Id.....	48
7.9.8.1	Digest Realm.....	48
7.9.8.2	Void.....	48
7.9.8.3	Digest Algorithm.....	48
7.9.8.4	Digest QoP	48
7.9.8.5	Digest HA1	48
7.9.9	Line Identifier	48
7.10	Number Authentication Items	48
7.11	Reason for de-registration	48
7.12	Charging information	48
7.13	Routing information	48
7.14	Type of authorization	48
7.15	Void.....	48
7.16	User Data Already Available.....	49
7.17	Associated Private Identities	49
7.18	Originating-Request	49
7.19	User Authorization Request Flags.....	49
7.20	Loose-Route Indication	49
7.21	S-CSCF Restoration Information	49
7.22	Associated Registered Private Identities	49
7.23	Multiple Registration Indication.....	49
7.24	Session-Priority	49
7.25	Identities with Emergency Registration	49
7.26	Privileged-Sender Indication	50
7.27	LIA Flags.....	50
7.28	Server Assignment Request Flags	50
7.29	Allowed WAF and/or WWSF Identities	50
8	Error handling procedures	50

8.1	Registration error cases	50
8.1.1	Cancellation of the old S-CSCF.....	50
8.1.2	Error in S-CSCF name.....	51
8.1.3	Error in S-CSCF assignment type.....	51
9	Protocol version identification	51
10	Operational Aspects	51
Annex A (normative): Mapping of Cx operations and terminology to Diameter		52
A.1	Introduction	52
A.2	Cx message to Diameter command mapping	52
A.3	Cx message parameters to Diameter AVP mapping	52
A.4	Message flows	53
A.4.1	Registration– user not registered	54
A.4.2	Registration – user currently registered.....	55
A.4.3	UE initiated de-registration	55
A.4.4	Network initiated de-registration.....	56
A.4.4.1	Registration timeout.....	56
A.4.4.2	Administrative de-registration	56
A.4.4.3	De-registration initiated by service platform	57
A.4.5	UE Terminating SIP session set-up	57
A.4.6	Initiation of a session to a non-registered user	58
A.4.6a	AS originating session on behalf of a non-registered user	58
A.4.7	User Profile update.....	59
Annex B (informative): User profile UML model		60
B.1	General description.....	60
B.2	Service profile	60
B.2.1	Public Identification	61
B.2.1A	Core Network Service Authorization	63
B.2.2	Initial Filter Criteria.....	64
B.2.3	Service Point Trigger.....	65
Annex C (informative): Conjunctive and Disjunctive Normal Form		67
Annex D (informative): High-level format for the User Profile		70
Annex E (normative): XML schema for the Cx interface user profile.....		71
Annex F (normative): Definition of parameters for service point trigger matching		77
Annex G (normative): Emergency registrations.....		78
Annex H (normative): Diameter overload control mechanism		79
H.1	General	79
H.2	HSS behaviour.....	79
H.3	I/S-CSCF behaviour	79
Annex I (Informative): Diameter overload node behaviour		80
I.1	Message prioritization	80
Annex J (normative): Diameter message priority mechanism.....		81
J.1	General	81
J.2	Cx/Dx interfaces.....	81
J.2.1	General.....	81
J.2.2	S-CSCF/I-CSCF behaviour.....	81
J.2.3	HSS/SLF behaviour	81
J.2.4	Interactions	81

Annex K (normative):	Diameter load control mechanism.....	82
K.1	General	82
K.2	HSS behaviour.....	82
K.3	I-CSCF/S-CSCF behaviour	82
Annex L (informative):	Change history	83
History		88

Foreword

This Technical Specification (TS) has been produced by ETSI 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:

1. The interactions between the HSS (Home Subscriber Server) and the CSCF (Call Session Control Functions), referred to as the Cx interface.
2. The interactions between the CSCF and the SLF (Server Locator Function), referred to as the Dx interface.
3. The interactions between the SIP Core and the SIP database, referred to as the Cx interface, for the Mission Critical Services, where this interface is named as AAA-1, as described in 3GPP TS 23.280 [30].

NOTE: In the 3GPP TS 23.280 [30] the term SIP database is used for the HSS and the term SIP Core is used for the P-CSCF, the I-CSCF and the S-CSCF when compared to this specification.

The IP Multimedia (IM) Subsystem stage 2 is specified in 3GPP TS 23.228 [1] and the signalling flows for the IP multimedia call control based on SIP and SDP are specified in 3GPP TS 24.228 [2].

This document addresses the signalling flows for Cx and Dx interfaces.

This document also addresses how the functionality of Px interface is accomplished.

The Presence Service Stage 2 description (architecture and functional solution) is specified in 3GPP TS 23.141 [10].

2 References

- [1] 3GPP TS 23.228: "IP Multimedia (IM) Subsystem – Stage 2".
- [2] 3GPP TS 24.228: "Signalling flows for the IP multimedia call control based on SIP and SDP".
- [3] 3GPP TS 33.203: "Access security for IP-based services".
- [4] 3GPP TS 23.002: "Network architecture".
- [5] 3GPP TS 29.229: "Cx Interface based on Diameter – Protocol details".
- [6] 3GPP TS 23.218: "IP Multimedia (IM) Session Handling; IP Multimedia (IM) call model".
- [7] IETF RFC 2045 "Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies".
- [8] 3GPP TS 24.229: "IP Multimedia Call Control Protocol based on SIP and SDP" – stage 3.
- [9] Void.
- [10] 3GPP TS 23.141: "Presence Service; Architecture and Functional Description".
- [11] IETF RFC 3261 "SIP: Session Initiation Protocol".
- [12] IETF RFC 4566 "SDP: Session Description Protocol".
- [13] IEEE 1003.1-2004, Part 1: Base Definitions.
- [14] IETF RFC 2486 "The Network Access Identifier".
- [15] IETF RFC 3966 "The tel URI for Telephone Numbers".
- [16] IETF RFC 2617 "HTTP Authentication: Basic and Digest Access Authentication".
- [17] 3GPP TS 23.003: "Numbering, addressing and identification".
- [18] 3GPP TS 23.008: "Organization of subscriber data".
- [19] 3GPP TS 23.380: "IMS Restoration Procedures".