

ETSI TS 124 229 V15.8.0 (2019-10)



**Digital cellular telecommunications system (Phase 2+) (GSM);
Universal Mobile Telecommunications System (UMTS);**

LTE;

**IP multimedia call control protocol based on
Session Initiation Protocol (SIP)
and Session Description Protocol (SDP);**

Stage 3

(3GPP TS 24.229 version 15.8.0 Release 15)



Reference

RTS/TSGC-0124229vf80

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 prevailing version of an ETSI deliverable is the one made publicly available in PDF format at www.etsi.org/deliver.

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/CommiteeSupportStaff.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.

© ETSI 2019.
All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

oneM2M™ logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners.

GSM® and the GSM logo are trademarks registered and owned by the GSM Association.

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables 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.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

Legal Notice

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

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

The cross reference between 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
Legal Notice	2
Modal verbs terminology.....	2
Foreword.....	37
1 Scope	38
2 References	39
3 Definitions and abbreviations.....	53
3.1 Definitions	53
3.2 Abbreviations	61
3A Interoperability with different IP-CAN.....	64
4 General	65
4.1 Conformance of IM CN subsystem entities to SIP, SDP and other protocols.....	65
4.2 URI and address assignments.....	68
4.2A Transport mechanisms.....	70
4.2B Security mechanisms.....	70
4.2B.1 Signalling security	70
4.2B.2 Media security	72
4.3 Routing principles of IM CN subsystem entities.....	75
4.4 Trust domain	75
4.4.1 General.....	75
4.4.2 P-Asserted-Identity	76
4.4.3 P-Access-Network-Info	76
4.4.4 History-Info	77
4.4.5 P-Asserted-Service.....	77
4.4.6 Resource-Priority	77
4.4.7 Reason (in a response).....	77
4.4.8 P-Profile-Key.....	77
4.4.9 P-Served-User.....	77
4.4.10 P-Private-Network-Indication.....	77
4.4.11 P-Early-Media.....	78
4.4.12 CPC and OLI	78
4.4.13 Feature-Caps	78
4.4.14 Priority	78
4.4.15 iotl.....	78
4.4.16 Restoration-Info	78
4.4.17 Relayed-Charge	78
4.4.18 Service-Interact-Info	78
4.4.19 Cellular-Network-Info	79
4.4.20 Response-Source.....	79
4.4.21 Attestation-Info header field.....	79
4.4.22 Origination-Id header field	79
4.5 Charging correlation principles for IM CN subsystems	79
4.5.1 Overview	79
4.5.2 IM CN subsystem charging identifier (ICID).....	80
4.5.2A Related ICID.....	80
4.5.3 Access network charging information	81
4.5.3.1 General.....	81
4.5.3.2 Access network charging information.....	81
4.5.4 Inter operator identifier (IOI).....	81
4.5.4A Transit inter operator identifier (Transit IOI)	83
4.5.5 Charging function addresses	84
4.5.6 Relayed charge parameters	84
4.5.7 Loopback-indication parameter	84

4.5.8	IM CN subsystem Functional Entity Identifier	84
4.5.8.1	General	84
4.5.8.2	Tracking of IM CN subsystem functional entities generating charging information	84
4.5.8.3	Tracking of applications generating charging information	85
4.6	Support of local service numbers	85
4.7	Emergency service	85
4.7.1	Introduction.....	85
4.7.2	Emergency calls generated by a UE	85
4.7.3	Emergency calls generated by an AS.....	86
4.7.4	Emergency calls received from an enterprise network	86
4.7.5	Location in emergency calls	86
4.7.6	eCall type of emergency service	87
4.8	Tracing of signalling	87
4.8.1	General.....	87
4.8.2	Trace depth	87
4.9	Overlap signalling	88
4.9.1	General.....	88
4.9.2	Overlap signalling methods	88
4.9.2.1	In-dialog method	88
4.9.2.1.1	General	88
4.9.2.2	Multiple-INVITE method	88
4.9.2.2.1	General	88
4.9.3	Routeing impacts	88
4.9.3.1	General	88
4.9.3.2	Deterministic routeing.....	88
4.9.3.3	Digit collection.....	89
4.10	Dialog correlation for IM CN subsystems.....	89
4.10.1	General.....	89
4.10.2	CONF usage.....	89
4.11	Priority mechanisms	89
4.12	Overload control.....	91
4.13	II-NNI traversal scenario.....	91
4.13.1	General.....	91
4.13.2	Identifying the II-NNI traversal scenario.....	92
4.13.3	Security aspects	92
4.14	Restoration procedures	92
4.14.1	General.....	92
4.14.2	P-CSCF restoration procedures.....	93
4.14.3	S-CSCF restoration procedures.....	93
4.15	Resource sharing	93
4.16	Priority sharing	94
4.17	3GPP PS data off.....	94
4.18	Dynamic Service Interaction	94
5	Application usage of SIP	95
5.1	Procedures at the UE	95
5.1.0	General.....	95
5.1.1	Registration and authentication.....	95
5.1.1.1	General	95
5.1.1.1A	Parameters contained in the ISIM	96
5.1.1.1B	Parameters provisioned to a UE without ISIM or USIM	96
5.1.1.1B.1	Parameters provisioned in the IMC	96
5.1.1.1B.2	Parameters when UE does not contain ISIM, USIM or IMC	97
5.1.1.2	Initial registration.....	97
5.1.1.2.1	General	97
5.1.1.2.2	Initial registration using IMS AKA	102
5.1.1.2.3	Initial registration using SIP digest without TLS	103
5.1.1.2.4	Initial registration using SIP digest with TLS	104
5.1.1.2.5	Initial registration using NASS-IMS bundled authentication.....	104
5.1.1.2.6	Initial registration using GPRS-IMS-Bundled authentication	105
5.1.1.3	Subscription to the registration-state event package	105
5.1.1.3A	Void.....	106

5.1.1.4	User-initiated reregistration and registration of an additional public user identity	106
5.1.1.4.1	General	106
5.1.1.4.2	IMS AKA as a security mechanism.....	110
5.1.1.4.3	SIP digest without TLS as a security mechanism.....	111
5.1.1.4.4	SIP digest with TLS as a security mechanism.....	111
5.1.1.4.5	NASS-IMS bundled authentication as a security mechanism	112
5.1.1.4.6	GPRS-IMS-Bundled authentication as a security mechanism.....	112
5.1.1.5	Authentication	112
5.1.1.5.1	IMS AKA - general	112
5.1.1.5.2	Void.....	114
5.1.1.5.3	IMS AKA abnormal cases.....	114
5.1.1.5.4	SIP digest without TLS – general.....	115
5.1.1.5.5	SIP digest without TLS – abnormal procedures	115
5.1.1.5.6	SIP digest with TLS – general.....	115
5.1.1.5.7	SIP digest with TLS – abnormal procedures	116
5.1.1.5.8	NASS-IMS bundled authentication – general	116
5.1.1.5.9	NASS-IMS bundled authentication – abnormal procedures.....	116
5.1.1.5.10	GPRS-IMS-Bundled authentication – general.....	116
5.1.1.5.11	GPRS-IMS-Bundled authentication – abnormal procedures.....	116
5.1.1.5.12	Abnormal procedures for all security mechanisms.....	116
5.1.1.5A	Network-initiated re-authentication	116
5.1.1.5B	Change of IPv6 address due to privacy.....	117
5.1.1.6	User-initiated deregistration.....	117
5.1.1.6.1	General	117
5.1.1.6.2	IMS AKA as a security mechanism.....	120
5.1.1.6.3	SIP digest without TLS as a security mechanism.....	120
5.1.1.6.4	SIP digest with TLS as a security mechanism.....	121
5.1.1.6.5	NASS-IMS bundled authentication as a security mechanism	121
5.1.1.6.6	GPRS-IMS-Bundled authentication as a security mechanism.....	121
5.1.1.7	Network-initiated deregistration	122
5.1.2	Subscription and notification	123
5.1.2.1	Notification about multiple registered public user identities.....	123
5.1.2.2	General SUBSCRIBE requirements.....	123
5.1.2A	Generic procedures applicable to all methods excluding the REGISTER method.....	123
5.1.2A.1	UE-originating case.....	123
5.1.2A.1.1	General	123
5.1.2A.1.2	Structure of Request-URI.....	129
5.1.2A.1.3	UE without dial string processing capabilities	129
5.1.2A.1.4	UE with dial string processing capabilities.....	130
5.1.2A.1.5	Setting the "phone-context" tel URI parameter	130
5.1.2A.1.5A	Policy on local numbers	131
5.1.2A.1.6	Abnormal cases	132
5.1.2A.2	UE-terminating case.....	134
5.1.3	Call initiation - UE-originating case	136
5.1.3.1	Initial INVITE request	136
5.1.4	Call initiation - UE-terminating case	139
5.1.4.1	Initial INVITE request	139
5.1.4.2	Reliable 18x Policy	141
5.1.4A	Session modification.....	142
5.1.4A.0	General	142
5.1.4A.1	Generating session modification request.....	142
5.1.4A.2	Receiving session modification request	142
5.1.5	Call release.....	143
5.1.5A	Precondition disabling policy	143
5.1.6	Emergency service.....	143
5.1.6.1	General	143
5.1.6.2	Initial emergency registration.....	145
5.1.6.2A	New initial emergency registration	145
5.1.6.3	Initial subscription to the registration-state event package	146
5.1.6.4	User-initiated emergency reregistration	146
5.1.6.5	Authentication.....	146
5.1.6.6	User-initiated emergency deregistration	146

5.1.6.7	Network-initiated emergency deregistration	146
5.1.6.8	Emergency session setup.....	146
5.1.6.8.1	General	146
5.1.6.8.2	Emergency session set-up in case of no registration	147
5.1.6.8.3	Emergency session set-up within an emergency registration	149
5.1.6.8.4	Emergency session setup within a non-emergency registration	151
5.1.6.9	Emergency session release.....	153
5.1.6.10	Successful or provisional response to a request not detected by the UE as relating to an emergency session.....	153
5.1.6.11	eCall type of emergency service	154
5.1.6.11.1	General	154
5.1.6.11.2	Initial INVITE request.....	154
5.1.6.11.3	Transfer of an updated MSD	155
5.1.6.12	Current location discovery during an emergency call	156
5.1.6.12.1	General	156
5.1.6.12.2	Current location information requested	156
5.1.6.12.3	Providing current location information	156
5.1.7	Void	157
5.1.8	Void	157
5.1.9	P-CSCF addresses management	157
5.2	Procedures at the P-CSCF	157
5.2.1	General.....	157
5.2.2	Registration.....	162
5.2.2.1	General	162
5.2.2.2	IMS AKA as a security mechanism	167
5.2.2.3	SIP digest without TLS as a security mechanism	171
5.2.2.4	SIP digest with TLS as a security mechanism	172
5.2.2.5	NASS-IMS bundled authentication as a security mechanism	174
5.2.2.6	GPRS-IMS-Bundled authentication as a security mechanism	174
5.2.2.7	P-CSCF reconfigured to not accept registrations	175
5.2.3	Subscription to the user's registration-state event package	175
5.2.3A	Void	176
5.2.3B	SUBSCRIBE request	176
5.2.4	Registration of multiple public user identities	176
5.2.5	Deregistration	178
5.2.5.1	User-initiated deregistration.....	178
5.2.5.2	Network-initiated deregistration	179
5.2.6	General treatment for all dialogs and standalone transactions excluding the REGISTER method.....	179
5.2.6.1	Introduction	179
5.2.6.2	Determination of UE-originated or UE-terminated case	179
5.2.6.3	Requests initiated by the UE	180
5.2.6.3.1	General for all requests.....	180
5.2.6.3.2	General for all responses	182
5.2.6.3.2A	Abnormal cases	182
5.2.6.3.3	Initial request for a dialog.....	183
5.2.6.3.4	Responses to an initial request for a dialog	185
5.2.6.3.5	Target refresh request for a dialog	186
5.2.6.3.6	Responses to a target refresh request for a dialog	186
5.2.6.3.7	Request for a standalone transaction	187
5.2.6.3.8	Responses to a request for a standalone transaction	188
5.2.6.3.9	Subsequent request other than a target refresh request	189
5.2.6.3.10	Responses to a subsequent request other than a target refresh request	189
5.2.6.3.11	Request for an unknown method that does not relate to an existing dialog.....	189
5.2.6.3.12	Responses to a request for an unknown method that does not relate to an existing dialog	191
5.2.6.4	Requests terminated by the UE	191
5.2.6.4.1	General for all requests.....	191
5.2.6.4.2	General for all responses	192
5.2.6.4.3	Initial request for a dialog.....	192
5.2.6.4.4	Responses to an initial request for a dialog	193
5.2.6.4.5	Target refresh request for a dialog	195
5.2.6.4.6	Responses to a target refresh request for a dialog	195
5.2.6.4.7	Request for a standalone transaction	196

5.2.6.4.8	Responses to a request for a standalone transaction	197
5.2.6.4.9	Subsequent request other than a target refresh request	198
5.2.6.4.10	Responses to a subsequent request other than a target refresh request	198
5.2.6.4.11	Request for an unknown method that does not relate to an existing dialog	199
5.2.6.4.12	Responses to a request for an unknown method that does not relate to an existing dialog	199
5.2.7	Initial INVITE	199
5.2.7.1	Introduction	199
5.2.7.2	UE-originating case	199
5.2.7.3	UE-terminating case	201
5.2.7.4	Access network charging information	201
5.2.8	Call release	201
5.2.8.1	P-CSCF-initiated call release	201
5.2.8.1.1	Cancellation of a session currently being established	201
5.2.8.1.2	Release of an existing session	202
5.2.8.1.3	Abnormal cases	204
5.2.8.1.4	Release of the existing dialogs due to registration expiration and deletion of the security association, IP association or TLS session	204
5.2.8.2	Call release initiated by any other entity	205
5.2.8.3	Session expiration	205
5.2.9	Subsequent requests	205
5.2.9.1	UE-originating case	205
5.2.9.2	UE-terminating case	205
5.2.10	Emergency service	205
5.2.10.1	General	205
5.2.10.2	General treatment for all dialogs and standalone transactions excluding the REGISTER method – requests from an unregistered user	207
5.2.10.2A	General treatment for all dialogs and standalone transactions excluding the REGISTER method – requests to an unregistered user	209
5.2.10.3	General treatment for all dialogs and standalone transactions excluding the REGISTER method after emergency registration	209
5.2.10.4	General treatment for all dialogs and standalone transactions excluding the REGISTER method - non-emergency registration	211
5.2.10.5	Abnormal and rejection cases	214
5.2.11	Void	216
5.2.12	Resource sharing	216
5.2.13	Priority sharing	216
5.3	Procedures at the I-CSCF	216
5.3.0	General	216
5.3.1	Registration procedure	216
5.3.1.1	General	216
5.3.1.2	Normal procedures	216
5.3.1.3	Abnormal cases	217
5.3.2	Initial requests	218
5.3.2.1	Normal procedures	218
5.3.2.1A	Originating procedures for requests containing the "orig" parameter	222
5.3.2.2	Abnormal cases	224
5.3.3	Void	225
5.3.3.1	Void	225
5.3.3.2	Void	225
5.3.3.3	Void	225
5.3.4	Void	225
5.3.5	Subsequent requests	225
5.4	Procedures at the S-CSCF	225
5.4.0	General	225
5.4.1	Registration and authentication	226
5.4.1.1	Introduction	226
5.4.1.2	Initial registration and user-initiated reregistration	228
5.4.1.2.1	Unprotected REGISTER	228
5.4.1.2.1A	Challenge with IMS AKA as security mechanism	230
5.4.1.2.1B	Challenge with SIP digest as security mechanism	230
5.4.1.2.1C	Challenge with SIP digest with TLS as security mechanism	231
5.4.1.2.1D	Initial registration and user-initiated reregistration for NASS-IMS bundled authentication	231

5.4.1.2.1E	Initial registration and user-initiated reregistration for GPRS-IMS-Bundled authentication	232
5.4.1.2.2	Protected REGISTER with IMS AKA as a security mechanism.....	234
5.4.1.2.2A	Protected REGISTER with SIP digest as a security mechanism	237
5.4.1.2.2B	Protected REGISTER with SIP digest with TLS as a security mechanism.....	240
5.4.1.2.2C	NASS-IMS bundled authentication as a security mechanism	240
5.4.1.2.2D	GPRS-IMS-Bundled authentication as a security mechanism.....	240
5.4.1.2.2E	Protected REGISTER – Authentication already performed	241
5.4.1.2.2F	Successful registration.....	242
5.4.1.2.3	Abnormal cases - general	244
5.4.1.2.3A	Abnormal cases – IMS AKA as security mechanism.....	245
5.4.1.2.3B	Abnormal cases – SIP digest as security mechanism	246
5.4.1.2.3C	Abnormal cases – SIP digest with TLS as security mechanism	247
5.4.1.2.3D	Abnormal cases – NASS-IMS bundled authentication as security mechanism.....	247
5.4.1.2.3E	Abnormal cases – GPRS-IMS-Bundled authentication as security mechanism.....	247
5.4.1.3	Authentication and reauthentication.....	247
5.4.1.4	User-initiated deregistration.....	247
5.4.1.4.1	Normal cases	247
5.4.1.4.2	Abnormal cases - IMS AKA as security mechanism.....	249
5.4.1.4.4	Abnormal cases – SIP digest with TLS as security mechanism	249
5.4.1.4.5	Abnormal cases – NASS-IMS bundled authentication as security mechanism.....	249
5.4.1.4.6	Abnormal cases – GPRS-IMS-Bundled authentication as security mechanism.....	249
5.4.1.5	Network-initiated deregistration	249
5.4.1.6	Network-initiated reauthentication.....	251
5.4.1.7	Notification of Application Servers about registration status	252
5.4.1.7A	Including contents in the body of the third-party REGISTER request.....	254
5.4.1.8	Service profile updates	254
5.4.2	Subscription and notification	255
5.4.2.1	Subscriptions to S-CSCF events	255
5.4.2.1.1	Subscription to the event providing registration state.....	255
5.4.2.1.2	Notification about registration state.....	257
5.4.2.1.3	Void.....	261
5.4.2.1.4	Void.....	261
5.4.2.1A	Outgoing subscriptions to load-control event.....	261
5.4.2.2	Other subscriptions.....	261
5.4.3	General treatment for all dialogs and standalone transactions excluding requests terminated by the S-CSCF	262
5.4.3.1	Determination of UE-originated or UE-terminated case.....	262
5.4.3.2	Requests initiated by the served user	262
5.4.3.3	Requests terminated at the served user.....	273
5.4.3.4	Original dialog identifier	285
5.4.3.5	Void.....	285
5.4.3.6	SIP digest authentication procedures for all SIP request methods initiated by the UE excluding REGISTER.....	285
5.4.3.6.1	General	285
5.4.3.6.2	Abnormal cases	287
5.4.4	Call initiation	287
5.4.4.1	Initial INVITE.....	287
5.4.4.2	Subsequent requests	288
5.4.4.2.1	UE-originating case	288
5.4.4.2.2	UE-terminating case	288
5.4.5	Call release.....	289
5.4.5.1	S-CSCF-initiated session release	289
5.4.5.1.1	Cancellation of a session currently being established.....	289
5.4.5.1.2	Release of an existing session	289
5.4.5.1.2A	Release of the existing dialogs due to registration expiration	291
5.4.5.1.3	Abnormal cases	291
5.4.5.2	Session release initiated by any other entity.....	291
5.4.5.3	Session expiration	291
5.4.6	Call-related requests	292
5.4.6.1	ReINVITE.....	292
5.4.6.1.1	Determination of served user.....	292
5.4.6.1.2	UE-originating case.....	292

5.4.6.1.3	UE-terminating case	292
5.4.7	Void	292
5.4.7A	GRUU management.....	292
5.4.7A.1	Overview of GRUU operation	292
5.4.7A.2	Representation of public GRUUs.....	293
5.4.7A.3	Representation of temporary GRUUs	294
5.4.7A.4	GRUU recognition and validity	294
5.4.8	Emergency service.....	295
5.4.8.1	General	295
5.4.8.2	Initial emergency registration or user-initiated emergency reregistration.....	295
5.4.8.3	User-initiated emergency deregistration	296
5.4.8.4	Network-initiated emergency deregistration	296
5.4.8.5	Network-initiated emergency reauthentication	296
5.4.8.6	Subscription to the event providing registration state	296
5.4.8.7	Notification of the registration state.....	296
5.5	Procedures at the MGCF	297
5.5.1	General.....	297
5.5.2	Subscription and notification	298
5.5.3	Call initiation	298
5.5.3.1	Initial INVITE.....	298
5.5.3.1.1	Calls originated from circuit-switched networks	298
5.5.3.1.2	Calls terminating in circuit-switched networks	298
5.5.3.2	Subsequent requests	299
5.5.3.2.1	Calls originating in circuit-switched networks	299
5.5.3.2.2	Calls terminating in circuit-switched networks	300
5.5.4	Call release.....	300
5.5.4.1	Call release initiated by a circuit-switched network.....	300
5.5.4.2	IM CN subsystem initiated call release.....	300
5.5.4.3	MGW-initiated call release	301
5.5.5	Call-related requests	301
5.5.5.1	Session modification	301
5.5.5.1.0	General	301
5.5.5.1.1	Session modifications originating from circuit-switched networks.....	301
5.5.5.1.2	Session modifications terminating in circuit-switched networks	301
5.5.6	Further initial requests	302
5.6	Procedures at the BGCF	302
5.6.1	General.....	302
5.6.2	Common BGCF procedures.....	302
5.6.3	Specific procedures for INVITE requests and responses.....	304
5.6.4	Specific procedures for subsequent requests and responses	305
5.7	Procedures at the Application Server (AS).....	305
5.7.1	Common Application Server (AS) procedures	305
5.7.1.0	General	305
5.7.1.1	Notification about registration status	305
5.7.1.2	Extracting charging correlation information	307
5.7.1.3	Access-Network-Info and Visited-Network-ID	307
5.7.1.3A	Determination of the served user	308
5.7.1.3A.1	General	308
5.7.1.3A.2	AS serving an originating user	308
5.7.1.3A.3	AS serving a terminating user	308
5.7.1.3B	Determination of the used registration	308
5.7.1.4	User identity verification at the AS	308
5.7.1.5	Request authorization.....	311
5.7.1.6	Event notification throttling	311
5.7.1.7	Local numbering	311
5.7.1.7.1	Interpretation of the numbers in a non-international format.....	311
5.7.1.7.2	Translation of the numbers in a non-international format	312
5.7.1.8	GRUU assignment and usage.....	312
5.7.1.9	Use of ICSI and IARI values.....	313
5.7.1.10	Carrier selection	314
5.7.1.11	Tracing	315
5.7.1.12	Delivery of original destination identity	315

5.7.1.13	CPC and OLI.....	315
5.7.1.14	Emergency transactions	315
5.7.1.15	Protecting against attacks using 3xx responses.....	316
5.7.1.16	Support of Roaming Architecture for Voice over IMS with Local Breakout	316
5.7.1.16.1	Preservation of parameters	316
5.7.1.16.2	Preference for loopback routeing not to occur.....	316
5.7.1.17	Delivery of network provided location information.....	317
5.7.1.18	Delivery of MRB address information.....	317
5.7.1.19	Overload control	317
5.7.1.19.1	Outgoing subscriptions to load-control event.....	317
5.7.1.19.2	Incoming subscriptions to load-control event.....	318
5.7.1.20	Procedures in the AS for resource sharing	318
5.7.1.20.1	General	318
5.7.1.20.2	UE-originating case.....	318
5.7.1.20.3	UE-terminating case.....	319
5.7.1.20.3.1	Determine resource sharing using the initial SDP offer	319
5.7.1.20.3.2	Determine resource sharing using the initial SDP answer.....	320
5.7.1.20.4	Updating the resource sharing options	320
5.7.1.20.5	Abnormal cases	320
5.7.1.21	Dynamic Service Interaction.....	321
5.7.1.22	Service access number translation.....	321
5.7.1.23	Procedures in the AS for priority sharing.....	321
5.7.1.23.1	General	321
5.7.1.23.2	Session originating procedures	321
5.7.1.23.3	Session terminating procedures	322
5.7.1.24	Handling re-INVITE request collisions	322
5.7.1.25	User verification using the Identity header field.....	322
5.7.1.25.1	General	322
5.7.1.25.2	Originating procedures	322
5.7.1.25.3	Terminating procedures.....	323
5.7.1.25.4	Procedures over the Ms reference point.....	323
5.7.1.26	Procedures in the AS for 3GPP PS data off.....	323
5.7.2	Application Server (AS) acting as terminating UA, or redirect server	324
5.7.3	Application Server (AS) acting as originating UA	324
5.7.4	Application Server (AS) acting as a SIP proxy.....	326
5.7.5	Application Server (AS) performing 3rd party call control	327
5.7.5.1	General	327
5.7.5.2	Call initiation.....	329
5.7.5.2.1	Initial INVITE.....	329
5.7.5.2.2	Subsequent requests.....	329
5.7.5.3	Call release.....	329
5.7.5.4	Call-related requests.....	329
5.7.5.5	Further initial requests.....	330
5.7.5.6	Transcoding services invocation using third-party call control.....	330
5.7.6	Void	330
5.8	Procedures at the MRFC	330
5.8.1	General.....	330
5.8.2	Call initiation	331
5.8.2.1	Initial INVITE.....	331
5.8.2.1.1	MRFC-terminating case	331
5.8.2.1.1.1	Introduction.....	331
5.8.2.1.2	MRFC-originating case	332
5.8.2.2	Subsequent requests	332
5.8.2.2.1	Tones and announcements.....	332
5.8.2.2.2	Transcoding	332
5.8.3	Call release.....	332
5.8.3.1	S-CSCF-initiated call release	332
5.8.3.1.1	Tones and announcements.....	332
5.8.3.2	MRFC-initiated call release	332
5.8.3.2.1	Tones and announcements.....	332
5.8.4	Call-related requests	333
5.8.4.1	ReINVITE.....	333

5.8.4.1.1	MRFC-terminating case	333
5.8.4.1.2	MRFC-originating case	333
5.8.4.2	REFER	333
5.8.4.2.1	MRFC-terminating case	333
5.8.4.2.2	MRFC-originating case	333
5.8.4.2.3	REFER initiating a new session	333
5.8.4.2.4	REFER replacing an existing session	333
5.8.4.3	INFO	333
5.8.5	Further initial requests	333
5.8A	Procedures at the MRB	333
5.9	Void	334
5.9.1	Void	334
5.10	Procedures at the IBCF	334
5.10.1	General	334
5.10.2	IBCF as an exit point	335
5.10.2.1	Registration	335
5.10.2.1A	General	335
5.10.2.2	Initial requests	336
5.10.2.3	Subsequent requests	337
5.10.2.4	IBCF-initiated call release	338
5.10.3	IBCF as an entry point	338
5.10.3.1	Registration	338
5.10.3.1A	General	339
5.10.3.2	Initial requests	339
5.10.3.3	Subsequent requests	342
5.10.3.4	IBCF-initiated call release	342
5.10.3.5	Abnormal cases	343
5.10.4	THIG functionality in the IBCF	343
5.10.4.1	General	343
5.10.4.2	Encryption for network topology hiding	344
5.10.4.3	Decryption for network topology hiding	345
5.10.5	IMS-ALG functionality in the IBCF	346
5.10.6	Screening of SIP signalling	347
5.10.6.1	General	347
5.10.6.2	IBCF procedures for SIP header fields	347
5.10.6.3	IBCF procedures for SIP message bodies	348
5.10.7	Media transcoding control	348
5.10.8	Privacy protection at the trust domain boundary	348
5.10.9	Roaming architecture for voice over IMS with local breakout	349
5.10.10	HTTP procedures over the Ms reference point	349
5.10.10.1	General	349
5.10.10.2	Procedures for an IBCF acting as an entry point	349
5.10.10.3	Procedures for an IBCF acting as an exit point	350
5.11	Procedures at the E-CSCF	350
5.11.1	General	350
5.11.2	UE originating case	351
5.11.3	Use of an LRF	354
5.11.4	Subscriptions to E-CSCF events	356
5.11.4.1	Subscription to the event providing dialog state	356
5.11.4.2	Notification about dialog state	356
5.11.4.3	Subscription to the presence event package	357
5.11.4.4	Notification about presence	358
5.11.5	Current location discovery during an emergency call	358
5.11.5.1	General	358
5.11.5.2	Requesting current location informaton	359
5.11.5.3	Receiving current location informaton	359
5.12	Location Retrieval Function (LRF)	359
5.12.1	General	359
5.12.2	Treatment of incoming initial requests for a dialog and standalone requests	359
5.12.3	Subscription and notification	361
5.12.3.1	Notification about dialog state	361
5.12.3.2	Notification about UE location	362

5.13	ISC gateway function	362
5.13.1	General.....	362
5.13.2	ISC gateway function as an exit point	363
5.13.2.1	Registration	363
5.13.2.2	General	363
5.13.2.3	Initial requests	363
5.13.2.4	Subsequent requests	365
5.13.2.5	Call release initiated by ISC gateway function	365
5.13.3	ISC gateway function as an entry point	365
5.13.3.1	Registration	365
5.13.3.2	General	365
5.13.3.3	Initial requests	366
5.13.3.4	Subsequent requests	367
5.13.3.5	Call release initiated by the ISC gateway function	367
5.13.4	THING functionality in the ISC gateway function.....	368
5.13.5	IMS-ALG functionality in the ISC gateway function.....	368
5.13.6	Screening of SIP signalling.....	368
6	Application usage of SDP	368
6.1	Procedures at the UE	368
6.1.1	General.....	368
6.1.2	Handling of SDP at the originating UE	370
6.1.3	Handling of SDP at the terminating UE.....	373
6.1.4	Session modification	376
6.1.4.1	General	376
6.1.4.2	Generating session modification request.....	376
6.1.4.3	Receiving session modification request	376
6.2	Procedures at the P-CSCF	376
6.3	Procedures at the S-CSCF	378
6.4	Procedures at the MGCF	378
6.4.1	Calls originating from circuit-switched networks	378
6.4.2	Calls terminating in circuit-switched networks.....	378
6.4.3	Optimal Media Routeing (OMR)	379
6.4.4	Explicit congestion control support in MGCF	379
6.5	Procedures at the MRFC	379
6.6	Procedures at the AS	379
6.6.1	General.....	379
6.6.2	Transcoding	380
6.6.3	AS procedures to support WebRTC media optimization procedure	380
6.7	Procedures at the IMS-ALG functionality.....	380
6.7.1	IMS-ALG in IBCF.....	380
6.7.1.1	General	380
6.7.1.2	IMS-ALG in IBCF for support of ICE.....	381
6.7.1.2.1	General	381
6.7.1.2.2	IBCF full ICE procedures for UDP based streams	381
6.7.1.2.2.1	General.....	381
6.7.1.2.2.2	IBCF receiving SDP offer.....	381
6.7.1.2.2.3	IBCF sending SDP offer	381
6.7.1.2.2.4	IBCF receiving SDP answer	382
6.7.1.2.2.5	IBCF sending SDP answer.....	382
6.7.1.2.3	IBCF ICE lite procedures for UDP based streams	382
6.7.1.2.4	ICE procedures for TCP based streams	382
6.7.1.2.4.1	General.....	382
6.7.1.2.4.2	IBCF receiving SDP offer.....	383
6.7.1.2.4.3	IBCF sending SDP offer	383
6.7.1.2.4.4	IBCF receiving SDP answer	383
6.7.1.2.4.5	IBCF sending SDP answer.....	383
6.7.1.3	IMS-ALG in IBCF for transcoding.....	383
6.7.1.4	IMS-ALG in IBCF for NA(P)T and NA(P)T-PT controlled by the IBCF	383
6.7.1.4.1	General	383
6.7.1.5	IMS-ALG procedure in IBCF to support WebRTC media optimization procedure	384
6.7.2	IMS-ALG in P-CSCF	385