

ETSI TS 123 401 V15.9.0 (2019-10)



TECHNICAL SPECIFICATION

LTE;
General Packet Radio Service (GPRS)
enhancements for Evolved Universal Terrestrial Radio
Access Network (E-UTRAN) access
(3GPP TS 23.401 version 15.9.0 Release 15)

PREVIEW
From: <https://standards.iteh.ai/catalog/standards/sist/52b53f4-bd9a-40b7-bc33-540ec2099fcd/sist-ts-123-401-v15-9-0-2019-10>



ReferenceRTS/TSGS-0223401vf90

KeywordsLTE

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.....	11
1 Scope	12
2 References	12
3 Definitions and abbreviations.....	15
3.1 Definitions	15
3.2 Abbreviations	17
4 Architecture model and concepts	18
4.1 General concepts	18
4.2 Architecture reference model	19
4.2.1 Non-roaming architecture	19
4.2.2 Roaming architecture	20
4.2.3 Reference points	22
4.2.4 Warning System architecture	23
4.3 High level functions	23
4.3.1 General.....	23
4.3.2 Network access control functions	24
4.3.2.1 General	24
4.3.2.2 Network/Access network selection	24
4.3.2.3 Authentication and authorisation function	24
4.3.2.4 Admission control function	24
4.3.2.5 Policy and Charging Enforcement Function	24
4.3.2.6 Lawful Interception	24
4.3.2a Support for Dual Connectivity.....	24
4.3.3 Packet routing and transfer functions.....	26
4.3.3.1 General	26
4.3.3.2 IP header compression function	26
4.3.3.3 Packet screening function	26
4.3.3.4 IP Multicast Forwarding between a network accessed by LIPA and a UE	26
4.3.4 Security functions	26
4.3.5 Mobility management functions	26
4.3.5.1 General	26
4.3.5.2 Reachability Management for UE in ECM-IDLE state.....	27
4.3.5.3 Tracking Area list management	28
4.3.5.4 Inter-eNodeB mobility anchor function	28
4.3.5.5 Inter-3GPP mobility anchor function	28
4.3.5.6 Idle mode signalling reduction function.....	29
4.3.5.7 Mobility Restrictions.....	31
4.3.5.8 IMS voice over PS Session Supported Indication.....	31
4.3.5.8A Homogenous Support of IMS Voice over PS Sessions Indication.....	31
4.3.5.9 Voice domain preference and UE's usage setting.....	32
4.3.5.10 Preferred and Supported Network Behaviour	32
4.3.6 Radio Resource Management functions	33
4.3.7 Network management functions	34
4.3.7.1 General	34
4.3.7.1a GTP-C signalling based Load and Overload Control.....	34
4.3.7.1a.1 GTP-C Load Control	34
4.3.7.1a.2 GTP-C Overload Control.....	34
4.3.7.2 Load balancing between MMEs.....	36
4.3.7.3 Load re-balancing between MMEs	36
4.3.7.4 MME control of overload.....	37
4.3.7.4.1 General	37

4.3.7.4.1a	Throttling of Downlink Data Notification Requests.....	39
4.3.7.4.1b	Throttling of NIDD Submit Requests.....	39
4.3.7.4.2	NAS level congestion control.....	40
4.3.7.5	PDN GW control of overload.....	45
4.3.8	Selection functions.....	45
4.3.8.1	PDN GW selection function (3GPP accesses).....	45
4.3.8.2	Serving GW selection function.....	47
4.3.8.3	MME selection function.....	48
4.3.8.4	SGSN selection function.....	49
4.3.8.5	Selection of PCRF.....	49
4.3.9	IP network related functions.....	50
4.3.9.1	Domain Name Service function.....	50
4.3.9.2	DHCP function.....	50
4.3.9.3	Explicit Congestion Notification.....	50
4.3.10	Functionality for Connection of eNodeBs to Multiple MMEs.....	50
4.3.11	E-UTRAN Sharing Function.....	50
4.3.12	IMS Emergency Session Support.....	51
4.3.12.1	Introduction.....	51
4.3.12.2	Architecture Reference Model for Emergency Services.....	52
4.3.12.3	Mobility and Access Restrictions for Emergency Services.....	52
4.3.12.3a	Reachability Management for UE in ECM-IDLE state.....	53
4.3.12.4	PDN GW selection function (3GPP accesses) for Emergency Services.....	53
4.3.12.5	QoS for Emergency Services.....	53
4.3.12.6	PCC for Emergency Services.....	53
4.3.12.7	Load re-balancing between MMEs for Emergency Services.....	54
4.3.12.8	IP Address Allocation.....	54
4.3.12.9	Handling of PDN Connections for Emergency Bearer Services.....	54
4.3.12.10	ISR function for Emergency Bearer Services.....	54
4.3.12.11	Support of eCall Only Mode.....	54
4.3.13	Closed Subscriber Group functions.....	55
4.3.14	Location Service functions.....	55
4.3.15	Selected IP Traffic Offload (SIPTO) function.....	55
4.3.15a	Selected IP Traffic Offload (SIPTO) at the Local Network.....	56
4.3.15a.1	General.....	56
4.3.15a.2	SIPTO at the Local Network with stand-alone GW (with S-GW and L-GW collocated) function.....	57
4.3.15a.3	SIPTO at the Local Network with L-GW function collocated with the (H)eNB.....	57
4.3.16	Local IP Access (LIPA) function.....	58
4.3.17	Support for Machine Type Communications (MTC).....	59
4.3.17.1	General.....	59
4.3.17.2	Overview of protection from Potential MTC Related Overload.....	59
4.3.17.3	Optimising periodic TAU Signalling.....	61
4.3.17.4	UE configuration and usage of indicators.....	61
4.3.17.5	Void.....	63
4.3.17.6	Support of UEs configured for low access priority, Extended Access Barring and permission for override.....	63
4.3.17.7	High latency communication.....	63
4.3.17.8	Support for Non-IP Data Delivery (NIDD).....	64
4.3.17.8.1	General.....	64
4.3.17.8.2	ESM Procedures.....	64
4.3.17.8.3	Delivery mechanism.....	65
4.3.17.9	Service Gap Control.....	66
4.3.18	Multimedia Priority Service.....	68
4.3.18.1	General.....	68
4.3.18.2	IMS-based Multimedia Priority Services.....	69
4.3.18.2.1	Originating IMS-based MPS Session.....	69
4.3.18.2.2	Terminating IMS-based MPS Session.....	69
4.3.18.3	Priority EPS Bearer Services.....	69
4.3.18.4	CS fallback.....	70
4.3.18.5	Network Congestion Controls for MPS.....	70
4.3.18.6	Load Re-balancing between MMEs for MPS.....	70
4.3.19	Core Network node resolution.....	70
4.3.19.1	General.....	70

4.3.19.2	MSB in LAC and MME Group ID.....	70
4.3.19.3	Explicit Indication.....	70
4.3.20	Relaying function.....	71
4.3.20.1	General.....	71
4.3.20.2	RN startup and attach procedure.....	71
4.3.20.2.1	General.....	71
4.3.20.2.2	Attach for RN preconfiguration.....	72
4.3.20.2.3	Attach for RN operation.....	72
4.3.20.3	DeNB E-RAB activation/modification.....	73
4.3.21	Core Network assisted eNodeB parameters tuning.....	74
4.3.21.1	CN Assistance Information.....	74
4.3.21.2	Void.....	74
4.3.21.3	Core Network Assistance Procedures.....	74
4.3.22	UE Power Saving Mode.....	75
4.3.23	Access network selection and traffic steering based on RAN-assisted WLAN interworking.....	76
4.3.23a	Access network selection and traffic steering based on RAN-Controlled WLAN interworking.....	77
4.3.24	RAN user plane congestion management function.....	77
4.3.24.1	General.....	77
4.3.24.2	RAN user plane congestion mitigation in the RAN.....	77
4.3.24.3	RAN user plane congestion mitigation in the CN.....	77
4.3.25	Dedicated Core Networks (DCNs).....	78
4.3.25.1	General.....	78
4.3.25.1a	UE assisted Dedicated Core Network selection.....	79
4.3.25.2	Considerations for Roaming.....	80
4.3.25.3	Considerations for Network Sharing.....	80
4.3.26	Support for Monitoring Events.....	80
4.3.27	Paging Enhancements.....	80
4.3.27.1	Paging for Enhanced Coverage.....	80
4.3.27a	Restriction of use of Enhanced Coverage for voice centric UE.....	81
4.3.27b	Enhanced Coverage for data centric UEs.....	81
4.3.28	Restriction of use of Enhanced Coverage.....	81
4.3.29	3GPP PS Data Off.....	81
4.3.29.1	General.....	81
4.3.30	Unlicensed spectrum aggregation (LAA/LWA/LWIP).....	82
4.3.31	Subscription handling for Aerial UEs.....	83
4.4	Network elements.....	83
4.4.1	E-UTRAN.....	83
4.4.2	MME.....	83
4.4.3	Gateway.....	85
4.4.3.1	General.....	85
4.4.3.2	Serving GW.....	85
4.4.3.3	PDN GW.....	85
4.4.4	SGSN.....	86
4.4.5	GERAN.....	87
4.4.6	UTRAN.....	87
4.4.7	PCRF.....	87
4.4.7.1	General.....	87
4.4.7.2	Home PCRF (H-PCRF).....	87
4.4.7.3	Visited PCRF (V-PCRF).....	87
4.4.8	PDN GW's associated AAA Server.....	87
4.4.9	HeNB subsystem.....	87
4.4.10	DeNB.....	88
4.4.11	CSG Subscriber Server.....	89
4.4.12	RAN Congestion Awareness Function.....	89
4.5	Void.....	90
4.6	EPS Mobility Management and Connection Management states.....	90
4.6.1	General.....	90
4.6.2	Definition of main EPS Mobility Management states.....	90
4.6.2.1	EMM-DEREGISTERED.....	90
4.6.2.2	EMM-REGISTERED.....	90
4.6.3	Definition of EPS Connection Management states.....	91
4.6.3.1	ECM-IDLE.....	91

4.6.3.2	ECM-CONNECTED.....	92
4.6.4	State transition and functions.....	92
4.7	Overall QoS concept	93
4.7.1	PDN connectivity service	93
4.7.2	The EPS bearer	94
4.7.2.1	The EPS bearer in general.....	94
4.7.2.2	The EPS bearer with GTP-based S5/S8.....	96
4.7.2.3	The EPS bearer with PMIP-based S5/S8	97
4.7.3	Bearer level QoS parameters	97
4.7.4	Support for Application / Service Layer Rate Adaptation	99
4.7.5	Application of PCC in the Evolved Packet System	99
4.7.6	Bearer Control Mode in EPC.....	100
4.7.7	Support of rate control of user data using CIoT EPS Optimisation	100
4.7.7.1	General.....	100
4.7.7.2	Serving PLMN Rate Control.....	101
4.7.7.3	APN Rate Control	101
4.7.8	Inter-UE QoS for NB-IoT UEs using Control Plane CIoT EPS Optimisation.....	102
4.8	Compatibility Issues	103
4.8.1	Network Configuration for Interaction with UTRAN/GERAN.....	103
4.9	Paging Policy Differentiation.....	103
4.10	Introduction of CIoT EPS Optimisations	103
4.11	User Plane CIoT EPS Optimisation	104
4.12	Supporting up to 15 EPS bearers per UE	105
5	Functional description and information flows.....	106
5.1	Control and user planes	106
5.1.0	General.....	106
5.1.1	Control Plane	106
5.1.1.1	General.....	106
5.1.1.2	eNodeB - MME.....	106
5.1.1.3	UE - MME	107
5.1.1.4	SGSN - MME.....	107
5.1.1.5	SGSN - S-GW.....	108
5.1.1.6	S-GW - P-GW	108
5.1.1.7	MME - MME.....	109
5.1.1.8	MME - S-GW.....	109
5.1.1.9	MME - HSS	110
5.1.1.10	MME - EIR	110
5.1.1.11	Void.....	110
5.1.1.12	MME - CSS.....	111
5.1.1.13	MME - RCAF	111
5.1.2	User Plane.....	112
5.1.2.1	UE - P-GW user plane with E-UTRAN.....	112
5.1.2.2	eNodeB - S-GW	112
5.1.2.3	UE - PDN GW user plane with 2G access via the S4 interface	113
5.1.2.4	UE - PDN GW user plane with 3G access via the S12 interface	114
5.1.2.5	UE - PDN GW user plane with 3G access via the S4 interface	115
5.1.2.6	UE - P-GW user plane with Control Plane CIoT EPS Optimisations	116
5.2	Identities.....	116
5.2.1	EPS bearer identity	116
5.2.2	Globally Unique Temporary UE Identity	116
5.2.3	Tracking Area Identity (TAI).....	117
5.2.4	eNodeB S1-AP UE Identity (eNodeB S1-AP UE ID)	117
5.2.5	MME S1-AP UE Identity (MME S1-AP UE ID)	117
5.2.6	Closed Subscriber Group ID.....	117
5.3	Authentication, security and location management.....	117
5.3.1	IP address allocation	117
5.3.1.1	General	117
5.3.1.2	IP address allocation, renewal and release mechanisms for GTP based S5/S8.....	120
5.3.1.2.1	IPv4 address allocation via default bearer activation and release via PDN connection release.....	120
5.3.1.2.2	Allocation, renewal and release of the IPv6 default prefix via IPv6 stateless address autoconfiguration.....	120

5.3.1.2.3	IPv6 parameter configuration via stateless DHCPv6.....	121
5.3.1.2.4	IPv4 address allocation, renewal and release and IPv4 parameter configuration via DHCPv4.....	121
5.3.1.2.5	Void.....	122
5.3.1.2.6	IPv6 Prefix Delegation via DHCPv6.....	122
5.3.2	Attach procedure.....	122
5.3.2.1	E-UTRAN Initial Attach.....	122
5.3.2.2	UTRAN/GERAN Initial Attach.....	137
5.3.3	Tracking Area Update procedures.....	138
5.3.3.0	Triggers for tracking area update.....	138
5.3.3.0A	Provision of UE's TAI to MME in ECM-CONNECTED state.....	139
5.3.3.1	Tracking Area Update procedure with Serving GW change.....	140
5.3.3.1A	Tracking Area Update procedure with Serving GW change and data forwarding.....	149
5.3.3.2	E-UTRAN Tracking Area Update without S-GW Change.....	151
5.3.3.3	Routing Area Update with MME interaction and without S-GW change.....	160
5.3.3.4	Void.....	167
5.3.3.5	Void.....	167
5.3.3.6	Routing Area Update with MME interaction and with S-GW change.....	167
5.3.4	Service Request procedures.....	174
5.3.4.1	UE triggered Service Request.....	174
5.3.4.2	Handling of abnormal conditions in UE triggered Service Request.....	177
5.3.4.3	Network Triggered Service Request.....	178
5.3.4A	Connection Suspend procedure.....	183
5.3.4B	Data Transport in Control Plane CIoT EPS Optimisation.....	184
5.3.4B.1	General.....	184
5.3.4B.2	Mobile Originated Data Transport in Control Plane CIoT EPS Optimisation with P-GW connectivity.....	185
5.3.4B.3	Mobile Terminated Data Transport in Control Plane CIoT EPS Optimisation with P-GW connectivity.....	189
5.3.4B.4	Establishment of S1-U bearer during Data Transport in Control Plane CIoT EPS Optimisation.....	195
5.3.4B.5	eNB Control Plane Relocation Indication procedure.....	196
5.3.5	S1 release procedure.....	197
5.3.5A	Connection Resume procedure.....	199
5.3.6	Void.....	201
5.3.6A	PDN GW Pause of Charging procedure.....	201
5.3.7	GUTI Reallocation procedure.....	203
5.3.8	Detach procedure.....	203
5.3.8.1	General.....	203
5.3.8.2	UE-initiated Detach procedure.....	204
5.3.8.2.1	UE-initiated Detach procedure for E-UTRAN.....	204
5.3.8.2.2	UE-initiated Detach procedure for GERAN/UTRAN with ISR activated.....	205
5.3.8.3	MME-initiated Detach procedure.....	207
5.3.8.3A	SGSN-initiated Detach procedure with ISR activated.....	209
5.3.8.4	HSS-initiated Detach procedure.....	210
5.3.9	HSS User Profile management function procedure.....	212
5.3.9.1	General.....	212
5.3.9.2	Insert Subscriber Data procedure.....	212
5.3.9.3	Purge function.....	213
5.3.10	Security Function.....	214
5.3.10.1	General.....	214
5.3.10.2	Authentication and Key Agreement.....	214
5.3.10.3	User Identity Confidentiality.....	214
5.3.10.4	User Data and Signalling Confidentiality.....	214
5.3.10.4.1	AS security mode command procedure.....	214
5.3.10.4.2	NAS Security Mode Command procedure.....	214
5.3.10.5	ME identity check procedure.....	215
5.3.11	UE Reachability procedures.....	216
5.3.11.1	General.....	216
5.3.11.2	UE Reachability Notification Request procedure.....	216
5.3.11.3	UE Activity Notification procedure.....	216
5.3.12	Update CSG Location Procedure.....	217
5.3.13	CSS subscription data management function procedure.....	217
5.3.13.1	General.....	217

5.3.13.2	Insert CSG Subscriber Data procedure	217
5.3.14	UE Radio Capability Match Request	218
5.4	Session Management, QoS and interaction with PCC functionality	219
5.4.1	Dedicated bearer activation.....	219
5.4.2	Bearer modification with bearer QoS update.....	221
5.4.2.1	PDN GW initiated bearer modification with bearer QoS update.....	221
5.4.2.2	HSS Initiated Subscribed QoS Modification.....	224
5.4.3	PDN GW initiated bearer modification without bearer QoS update.....	225
5.4.4	Bearer deactivation	227
5.4.4.1	PDN GW initiated bearer deactivation.....	227
5.4.4.2	MME Initiated Dedicated Bearer Deactivation.....	231
5.4.5	UE requested bearer resource modification	232
5.4.6	Void	235
5.4.7	E-UTRAN initiated E-RAB modification procedure.....	235
5.4.8	E-UTRAN initiated UE Context Modification procedure	237
5.5	Handover	238
5.5.1	Intra-E-UTRAN handover	238
5.5.1.1	X2-based handover.....	238
5.5.1.1.1	General	238
5.5.1.1.2	X2-based handover without Serving GW relocation.....	239
5.5.1.1.3	X2-based handover with Serving GW relocation	241
5.5.1.2	S1-based handover	244
5.5.1.2.1	General	244
5.5.1.2.2	S1-based handover, normal	245
5.5.1.2.3	S1-based handover, Reject	251
5.5.1.2.4	S1-based handover, Cancel.....	252
5.5.2	Inter RAT handover	252
5.5.2.0	General	252
5.5.2.1	E-UTRAN to UTRAN Iu mode Inter RAT handover.....	253
5.5.2.1.1	General	253
5.5.2.1.2	Preparation phase.....	254
5.5.2.1.3	Execution phase.....	257
5.5.2.1.4	E-UTRAN to UTRAN Iu mode Inter RAT handover Reject	260
5.5.2.2	UTRAN Iu mode to E-UTRAN Inter RAT handover	261
5.5.2.2.1	General	261
5.5.2.2.2	Preparation phase.....	261
5.5.2.2.3	Execution phase.....	265
5.5.2.2.4	UTRAN Iu mode to E-UTRAN Inter RAT handover reject.....	268
5.5.2.3	E-UTRAN to GERAN A/Gb mode Inter RAT handover.....	268
5.5.2.3.1	General	268
5.5.2.3.2	Preparation phase.....	269
5.5.2.3.3	Execution phase.....	273
5.5.2.3.4	E-UTRAN to GERAN A/Gb mode Inter RAT handover reject	276
5.5.2.4	GERAN A/Gb mode to E-UTRAN Inter RAT handover.....	277
5.5.2.4.1	General	277
5.5.2.4.2	Preparation phase.....	278
5.5.2.4.3	Execution phase.....	281
5.5.2.4.4	GERAN A/Gb mode to E-UTRAN Inter RAT handover reject	284
5.5.2.5	Inter RAT handover Cancel	284
5.5.2.5.1	General	284
5.5.2.5.2	Source RAN to Target RAN Inter RAT handover Cancel	285
5.6	Network Assisted Cell Change.....	286
5.6.1	Architecture Principles for E-UTRAN to GERAN NACC.....	286
5.6.2	Void	287
5.7	Information storage	287
5.7.1	HSS.....	288
5.7.2	MME.....	292
5.7.3	Serving GW	297
5.7.4	PDN GW.....	300
5.7.5	UE.....	303
5.7.6	Handling of Wild Card APN.....	304
5.7.7	CSS	305

5.7A	Charging	305
5.7A.1	General	305
5.7A.2	Usage Data Reporting for Secondary RAT	306
5.7A.3	Secondary RAT Usage Data Reporting Procedure	306
5.7A.4	Secondary RAT Periodic Usage Data Reporting Procedure	308
5.8	MBMS	308
5.9	Interactions with other services	308
5.9.1	Location Reporting Procedure	308
5.9.2	Location Change Reporting Procedure	309
5.9.2.1	General	309
5.9.2.2	Reporting at Presence Reporting Area entering and leaving	311
5.9.3	IMSI and APN information retrieval procedure	312
5.10	Multiple-PDN support and PDN activation for UEs supporting "Attach without PDN connectivity"	313
5.10.1	General	313
5.10.2	UE requested PDN connectivity	314
5.10.3	UE or MME requested PDN disconnection	322
5.10.4	MME triggered Serving GW relocation	324
5.11	UE Capability Handling	326
5.11.1	General	326
5.11.2	UE Radio Capability Handling	326
5.11.3	UE Core Network Capability	328
5.11.4	UE Radio Capability for Paging Information	329
5.11.5	UE Radio Capability for Category M Differentiation	329
5.12	Warning message delivery	329
5.12.1	General	329
5.12.2	Void	330
5.12.3	Void	330
5.13	Discontinuous Reception and UE Specific DRX Parameter handling	330
5.13a	Extended Idle mode Discontinuous Reception (DRX)	331
5.14	Configuration Transfer procedure	331
5.14.1	Architecture Principles for Configuration Transfer	332
5.14.2	Addressing, routing and relaying	333
5.14.2.1	Addressing	333
5.14.2.2	Routing	333
5.14.2.3	Relaying	333
5.14.2.4	Applications using the Configuration Transfer procedures	333
5.15	RAN Information Management (RIM) procedures	333
5.15.1	General	333
5.15.2	Addressing, routing and relaying	334
5.15.2.1	Addressing	334
5.15.2.2	Routing	334
5.15.2.3	Relaying	334
5.15.3	Applications using the RIM Procedures	334
5.16	MME-initiated procedure on UE's CSG membership change	334
5.17	Home eNodeB Multicast Packet Forwarding Function	335
5.18	HPLMN Notification with specific indication due to MME initiated Bearer removal	335
5.19	Procedures to support Dedicated Core Networks	335
5.19.1	NAS Message Redirection Procedure	335
5.19.2	Attach, TAU and RAU procedure for Dedicated Core Network	336
5.19.2a	Impacts to Handover Procedures	339
5.19.3	MME/SGSN or HSS initiated Dedicated Core Network Reselection	340
Annex A (informative):	Void	342
Annex B (informative):	Void	343
Annex C (informative):	Void	344
Annex D (normative):	Interoperation with Gn/Gp SGSNs	345
D.1	General Considerations	345
D.2	Interoperation Scenario	345

D.2.1	Roaming interoperation scenario.....	345
D.2.2	Non-roaming interoperation scenario.....	346
D.3	Interoperation procedures.....	346
D.3.1	General.....	346
D.3.2	Void.....	347
D.3.3	MME to 3G SGSN combined hard handover and SRNS relocation procedure.....	347
D.3.4	3G SGSN to MME combined hard handover and SRNS relocation procedure.....	352
D.3.5	Routing Area Update.....	358
D.3.6	Gn/Gp SGSN to MME Tracking Area Update.....	364
D.3.7	E-UTRAN to GERAN A/Gb mode Inter RAT handover.....	371
D.3.7.1	General.....	371
D.3.7.2	Preparation phase.....	372
D.3.7.3	Execution phase.....	375
D.3.8	GERAN A/Gb mode to E-UTRAN Inter RAT handover.....	377
D.3.8.1	General.....	377
D.3.8.2	Preparation phase.....	378
D.3.8.3	Execution phase.....	380
Annex E (normative):	Mapping between EPS and Release 99 QoS parameters.....	383
Annex F (normative):	Dedicated bearer activation in combination with the default bearer activation at Attach and UE requested PDN connectivity procedures ...	386
Annex G (informative):	Void.....	389
Annex H (normative):	Mapping between temporary and area identities.....	390
Annex I (informative):	Guidance for contributors to this specification.....	391
Annex J (informative):	High Level ISR description.....	392
J.1	General description of the ISR concept.....	392
J.2	Usage of the TIN.....	393
J.3	ISR activation.....	393
J.4	Downlink data transfer.....	394
J.5	ISR deactivation.....	395
J.6	Handling of special situations.....	395
Annex K (informative):	Isolated E-UTRAN Operation for Public Safety.....	397
K.1	General description of the IOPS concept.....	397
K.2	Operation of isolated public safety networks using a Local EPC.....	397
K.2.1	General Description.....	397
K.2.2	UE configuration.....	397
K.2.3	IOPS network configuration.....	398
K.2.4	IOPS network establishment/termination.....	398
K.2.5	UE mobility.....	401
Annex L (informative):	Optimised EPS Architecture option for CIoT.....	403
L.1	Introduction.....	403
L.2	Non-Roaming Architecture.....	403
L.3	Roaming architecture.....	404
L.4	C-SGN.....	404
Annex M (informative):	Functions and procedures over NB-IoT RAT.....	405
Annex N (informative):	Change history.....	409
History.....		417

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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
<https://standards.iteh.ai/catalog/standards/sist/f52b53f4-bd9a-40b7-bc33-540ee2099fcd/etsi-ts-123-401-v15.9.0-2019-10>

1 Scope

The present document defines the Stage 2 service description for the Evolved 3GPP Packet Switched Domain - also known as the Evolved Packet System (EPS) in this document. The Evolved 3GPP Packet Switched Domain provides IP connectivity using the Evolved Universal Terrestrial Radio Access Network (E-UTRAN).

The specification covers both roaming and non-roaming scenarios and covers all aspects, including mobility between E-UTRAN and pre-E-UTRAN 3GPP radio access technologies, policy control and charging, and authentication.

The Radio Access Network functionality is documented only to the extent necessary to describe the overall system. TS 36.300 [5] contains the overall description of the Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN).

ITU-T Recommendation I.130 [3] describes a three-stage method for characterisation of telecommunication services, and ITU-T Recommendation Q.65 [4] defines Stage 2 of the method.

TS 23.402 [2] is a companion specification to this specification.

An Evolved Packet System architecture optimised for the support of Cellular IoT (Internet of Things) applications is also defined in this document.

The Evolved Packet System also provides support for the E-UTRAN to control a Dual Connectivity radio connection that uses a combination of E-UTRA and another radio access technology (e.g. NR). TS 36.300 [5] contains the overall description for Dual Connectivity.

Enhancements to support interworking of EPS with 5GS are captured in TS 23.501 [83] and TS 23.502 [84].

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. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 23.402: "Architecture enhancements for non-3GPP accesses".
- [3] ITU-T Recommendation I.130: "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".
- [4] ITU-T Recommendation Q.65: "The unified functional methodology for the characterization of services and network capabilities".
- [5] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2".
- [6] 3GPP TS 23.203: "Policy and charging control architecture".
- [7] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2".
- [8] 3GPP TS 43.129: "Packet-switched handover for GERAN A/Gb mode; Stage 2".
- [9] 3GPP TS 23.003: "Numbering, addressing and identification".
- [10] 3GPP TS 23.122: "Non-Access-Stratum (NAS) functions related to Mobile Station in idle mode".