



**5G;  
Non-Access-Stratum (NAS)  
protocol for 5G System (5GS); Stage 3  
(3GPP TS 24.501 version 17.8.0 Release 17)**



---

Reference

---

RTS/TSGC-0124501vh80

---

Keywords

---

5G

**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 - APE 7112B  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° w061004871

---

**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](http://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/CommitteeSupportStaff.aspx>

If you find a security vulnerability in the present document, please report it through our  
Coordinated Vulnerability Disclosure Program:

<https://www.etsi.org/standards/coordinated-vulnerability-disclosure>

---

**Notice of disclaimer & limitation of liability**

---

The information provided in the present deliverable is directed solely to professionals who have the appropriate degree of experience to understand and interpret its content in accordance with generally accepted engineering or other professional standard and applicable regulations.

No recommendation as to products and services or vendors is made or should be implied.

No representation or warranty is made that this deliverable is technically accurate or sufficient or conforms to any law and/or governmental rule and/or regulation and further, no representation or warranty is made of merchantability or fitness for any particular purpose or against infringement of intellectual property rights.

In no event shall ETSI be held liable for loss of profits or any other incidental or consequential damages.

Any software contained in this deliverable is provided "AS IS" with no warranties, express or implied, including but not limited to, the warranties of merchantability, fitness for a particular purpose and non-infringement of intellectual property rights and ETSI shall not be held liable in any event for any damages whatsoever (including, without limitation, damages for loss of profits, business interruption, loss of information, or any other pecuniary loss) arising out of or related to the use of or inability to use the software.

---

**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 2022.  
All rights reserved.

---

# Intellectual Property Rights

## Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are 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 Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, 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.

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.

---

# 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.....	24
1 Scope .....	25
2 References .....	25
3 Definitions and abbreviations .....	29
3.1 Definitions .....	29
3.2 Abbreviations .....	40
4 General .....	43
4.1 Overview .....	43
4.2 Coordination between the protocols for 5GS mobility management and 5GS session management .....	43
4.3 UE domain selection .....	44
4.3.1 UE's usage setting .....	44
4.3.2 Domain selection for UE originating sessions / calls .....	44
4.3.3 Change of UE's usage setting .....	46
4.3.4 Change or determination of IMS voice availability .....	46
4.4 NAS security .....	47
4.4.1 General.....	47
4.4.2 Handling of 5G NAS security contexts.....	47
4.4.2.1 General .....	47
4.4.2.2 Establishment of a mapped 5G NAS security context during inter-system change from S1 mode to N1 mode in 5GMM-CONNECTED mode.....	50
4.4.2.3 Establishment of a 5G NAS security context during N1 mode to N1 mode handover .....	51
4.4.2.4 Establishment of an EPS security context during inter-system change from N1 mode to S1 mode in 5GMM-CONNECTED mode .....	52
4.4.2.5 Establishment of secure exchange of NAS messages .....	52
4.4.2.6 Change of security keys .....	54
4.4.3 Handling of NAS COUNT and NAS sequence number .....	55
4.4.3.1 General .....	55
4.4.3.2 Replay protection .....	56
4.4.3.3 Integrity protection and verification.....	56
4.4.3.4 Ciphering and deciphering .....	56
4.4.3.5 NAS COUNT wrap around .....	57
4.4.4 Integrity protection of NAS signalling messages.....	57
4.4.4.1 General .....	57
4.4.4.2 Integrity checking of NAS signalling messages in the UE .....	58
4.4.4.3 Integrity checking of NAS signalling messages in the AMF .....	58
4.4.5 Ciphering of NAS signalling messages .....	60
4.4.6 Protection of initial NAS signalling messages .....	60
4.4.7 Protection of NAS IEs .....	62
4.5 Unified access control .....	63
4.5.1 General.....	63
4.5.2 Determination of the access identities and access category associated with a request for access for UEs not operating in SNPN access mode .....	65
4.5.2A Determination of the access identities and access category associated with a request for access for UEs operating in SNPN access mode .....	70
4.5.3 Operator-defined access categories.....	75
4.5.4 Access control and checking.....	77
4.5.4.1 Access control and checking in 5GMM-IDLE mode and in 5GMM-IDLE mode with suspend indication.....	77
4.5.4.2 Access control and checking in 5GMM-CONNECTED mode and in 5GMM-CONNECTED mode with RRC inactive indication .....	79
4.5.5 Exception handling and avoiding double barring .....	81

4.5.6	Mapping between access categories/access identities and RRC establishment cause .....	85
4.6	Network slicing .....	86
4.6.1	General .....	86
4.6.2	Mobility management aspects .....	88
4.6.2.1	General .....	88
4.6.2.2	NSSAI storage .....	89
4.6.2.3	Provision of NSSAI to lower layers in 5GMM-IDLE mode .....	94
4.6.2.4	Network slice-specific authentication and authorization .....	96
4.6.2.5	Mobility management based network slice admission control .....	97
4.6.2.6	Provision of NSAG information to lower layers .....	98
4.6.3	Session management aspects .....	99
4.6.3.0	General .....	99
4.6.3.1	Session management based network slice admission control .....	99
4.6.3.2	Support of network slice admission control and interworking with EPC .....	100
4.6.3.3	Session management based network slice data rate limitation control .....	100
4.7	NAS over non-3GPP access .....	100
4.7.1	General .....	100
4.7.2	5GS mobility management aspects .....	100
4.7.2.1	General .....	100
4.7.2.2	Establishment cause for non-3GPP access .....	101
4.7.3	5GS session management aspects .....	102
4.7.4	Limited service state over non-3GPP access .....	103
4.7.5	NAS signalling using trusted WLAN access network .....	103
4.8	Interworking with E-UTRAN connected to EPC .....	104
4.8.1	General .....	104
4.8.2	Single-registration mode .....	104
4.8.2.1	General .....	104
4.8.2.2	Single-registration mode with N26 interface .....	104
4.8.2.3	Single-registration mode without N26 interface .....	104
4.8.2.3.1	Interworking between NG-RAN and E-UTRAN .....	104
4.8.3	Dual-registration mode .....	107
4.8.4	Core Network selection for UEs not using CIoT 5GS optimizations .....	108
4.8.4A	Core Network selection and redirection for UEs using CIoT optimizations .....	108
4.8.4A.1	Core network selection .....	108
4.8.4A.2	Redirection of the UE by the core network .....	109
4.9	Disabling and re-enabling of UE's N1 mode capability .....	109
4.9.1	General .....	109
4.9.2	Disabling and re-enabling of UE's N1 mode capability for 3GPP access .....	109
4.9.3	Disabling and re-enabling of UE's N1 mode capability for non-3GPP access .....	112
4.10	Interworking with ePDG connected to EPC .....	112
4.11	UE configuration parameter updates .....	113
4.12	Access traffic steering, switching and splitting (ATSSS) .....	113
4.13	Support of NAS signalling using wireline access network .....	113
4.14	Non-public network .....	114
4.14.1	General .....	114
4.14.2	Stand-alone non-public network .....	114
4.14.3	Public network integrated non-public network (PNI-NPN) .....	116
4.15	Time synchronization and time sensitive communication .....	117
4.15.1	General .....	117
4.15.2	Void .....	117
4.15.2.1	Void .....	117
4.15.2.2	Void .....	117
4.15.2.3	Void .....	117
4.15.3	Time synchronization .....	117
4.15.4	User plane node management .....	118
4.16	UE radio capability signalling optimisation .....	118
4.17	5GS mobility management in NB-N1 mode .....	119
4.18	5GS session management in NB-N1 mode .....	119
4.19	5GS mobility management in WB-N1 mode for IoT .....	120
4.20	5GS session management in WB-N1 mode for IoT .....	120
4.21	Authentication and Key Management for Applications (AKMA) .....	121
4.22	Uncrewed aerial vehicle identification, authentication, and authorization .....	121





















































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































































