

ETSI TS 138 331 V15.25.0 (2024-05)



**5G;
NR;
Radio Resource Control (RRC);
Protocol specification
(3GPP TS 38.331 version 15.25.0 Release 15)**

[ETSI TS 138 331 V15.25.0 \(2024-05\)](https://standards.iteh.ai/catalog/standards/etsi/b653932a-f5fc-452c-bb2d-a9842f499aba/etsi-ts-138-331-v15-25-0-2024-05)

<https://standards.iteh.ai/catalog/standards/etsi/b653932a-f5fc-452c-bb2d-a9842f499aba/etsi-ts-138-331-v15-25-0-2024-05>



ReferenceRTS/TSGR-0238331vfp0

Keywords5G

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:

<https://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/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 2024.
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. (2024-05)

The cross reference between 3GPP and ETSI identities can be found under <https://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.....	15
1 Scope	16
2 References	16
3 Definitions, symbols and abbreviations	18
3.1 Definitions	18
3.2 Abbreviations	18
4 General	20
4.1 Introduction	20
4.2 Architecture	20
4.2.1 UE states and state transitions including inter RAT	20
4.2.2 Signalling radio bearers	22
4.3 Services	23
4.3.1 Services provided to upper layers	23
4.3.2 Services expected from lower layers	23
4.4 Functions	23
5 Procedures	24
5.1 General	24
5.1.1 Introduction.....	24
5.1.2 General requirements.....	24
5.1.3 Requirements for UE in MR-DC	25
5.2 System information	25
5.2.1 Introduction.....	25
5.2.2 System information acquisition	26
5.2.2.1 General UE requirements	26
5.2.2.2 SIB validity and need to (re)-acquire SIB	27
5.2.2.2.1 SIB validity.....	27
5.2.2.2.2 SI change indication and PWS notification	27
5.2.2.3 Acquisition of System Information	28
5.2.2.3.1 Acquisition of <i>MIB</i> and <i>SIB1</i>	28
5.2.2.3.2 Acquisition of an SI message	29
5.2.2.3.3 Request for on demand system information	29
5.2.2.3.4 Actions related to transmission of <i>RRCSystemInfoRequest</i> message	30
5.2.2.4 Actions upon receipt of System Information	30
5.2.2.4.1 Actions upon reception of the <i>MIB</i>	30
5.2.2.4.2 Actions upon reception of the <i>SIB1</i>	31
5.2.2.4.3 Actions upon reception of <i>SIB2</i>	34
5.2.2.4.4 Actions upon reception of <i>SIB3</i>	34
5.2.2.4.5 Actions upon reception of <i>SIB4</i>	34
5.2.2.4.6 Actions upon reception of <i>SIB5</i>	35
5.2.2.4.7 Actions upon reception of <i>SIB6</i>	35
5.2.2.4.8 Actions upon reception of <i>SIB7</i>	35
5.2.2.4.9 Actions upon reception of <i>SIB8</i>	36
5.2.2.4.10 Actions upon reception of <i>SIB9</i>	37
5.2.2.5 Essential system information missing	37
5.3 Connection control	38
5.3.1 Introduction.....	38
5.3.1.1 RRC connection control	38
5.3.1.2 AS Security	38
5.3.2 Paging	39
5.3.2.1 General	39

5.3.2.2	Initiation	40
5.3.2.3	Reception of the <i>Paging message</i> by the UE	40
5.3.3	RRC connection establishment	41
5.3.3.1	General	41
5.3.3.2	Initiation	41
5.3.3.3	Actions related to transmission of <i>RRCSetupRequest</i> message	42
5.3.3.4	Reception of the <i>RRCSetup</i> by the UE	42
5.3.3.5	Reception of the <i>RRCReject</i> by the UE	43
5.3.3.6	Cell re-selection or cell selection while T390, T300 or T302 is running (UE in RRC_IDLE)	44
5.3.3.7	T300 expiry	44
5.3.3.8	Abortion of RRC connection establishment	44
5.3.4	Initial AS security activation	44
5.3.4.1	General	44
5.3.4.2	Initiation	45
5.3.4.3	Reception of the <i>SecurityModeCommand</i> by the UE	45
5.3.5	RRC reconfiguration	46
5.3.5.1	General	46
5.3.5.2	Initiation	46
5.3.5.3	Reception of an <i>RRCReconfiguration</i> by the UE	47
5.3.5.4	Secondary cell group release	50
5.3.5.5	Cell Group configuration	50
5.3.5.5.1	General	50
5.3.5.5.2	Reconfiguration with sync	51
5.3.5.5.3	RLC bearer release	51
5.3.5.5.4	RLC bearer addition/modification	52
5.3.5.5.5	MAC entity configuration	52
5.3.5.5.6	RLF Timers & Constants configuration	53
5.3.5.5.7	SpCell Configuration	53
5.3.5.5.8	SCell Release	53
5.3.5.5.9	SCell Addition/Modification	54
5.3.5.6	Radio Bearer configuration	54
5.3.5.6.1	General	54
5.3.5.6.2	SRB release	54
5.3.5.6.3	SRB addition/modification	55
5.3.5.6.4	DRB release	56
5.3.5.6.5	DRB addition/modification	56
5.3.5.7	AS Security key update	59
5.3.5.8	Reconfiguration failure	60
5.3.5.8.1	Void	60
5.3.5.8.2	Inability to comply with <i>RRCReconfiguration</i>	60
5.3.5.8.3	T304 expiry (Reconfiguration with sync Failure)	61
5.3.5.9	Other configuration	61
5.3.5.10	MR-DC release	62
5.3.5.11	Full configuration	62
5.3.6	Counter check	63
5.3.6.1	General	63
5.3.6.2	Initiation	63
5.3.6.3	Reception of the <i>CounterCheck</i> message by the UE	63
5.3.7	RRC connection re-establishment	64
5.3.7.1	General	64
5.3.7.2	Initiation	65
5.3.7.3	Actions following cell selection while T311 is running	65
5.3.7.4	Actions related to transmission of <i>RRCReestablishmentRequest</i> message	66
5.3.7.5	Reception of the <i>RRCReestablishment</i> by the UE	67
5.3.7.6	T311 expiry	67
5.3.7.7	T301 expiry or selected cell no longer suitable	67
5.3.7.8	Reception of the <i>RRCSetup</i> by the UE	68
5.3.8	RRC connection release	68
5.3.8.1	General	68
5.3.8.2	Initiation	68
5.3.8.3	Reception of the <i>RRCRelease</i> by the UE	68
5.3.8.4	T320 expiry	70

5.3.8.5	UE actions upon the expiry of <i>DataInactivityTimer</i>	70
5.3.9	RRC connection release requested by upper layers	70
5.3.9.1	General	70
5.3.9.2	Initiation	70
5.3.10	Radio link failure related actions	71
5.3.10.1	Detection of physical layer problems in RRC_CONNECTED	71
5.3.10.2	Recovery of physical layer problems	71
5.3.10.3	Detection of radio link failure	71
5.3.11	UE actions upon going to RRC_IDLE	72
5.3.12	UE actions upon PUCCH/SRS release request	73
5.3.13	RRC connection resume	73
5.3.13.1	General	73
5.3.13.2	Initiation	74
5.3.13.3	Actions related to transmission of <i>RRCResumeRequest</i> or <i>RRCResumeRequest1</i> message	75
5.3.13.4	Reception of the <i>RRCResume</i> by the UE	76
5.3.13.5	T319 expiry or Integrity check failure from lower layers while T319 is running	77
5.3.13.6	Cell re-selection or cell selection while T390, T319 or T302 is running (UE in RRC_INACTIVE)	78
5.3.13.7	Reception of the <i>RRCSetup</i> by the UE	78
5.3.13.8	RNA update	78
5.3.13.9	Reception of the <i>RRCRelease</i> by the UE	78
5.3.13.10	Reception of the <i>RRCReject</i> by the UE	78
5.3.13.11	Inability to comply with <i>RRCResume</i>	78
5.3.13.12	Inter RAT cell reselection	79
5.3.14	Unified Access Control	79
5.3.14.1	General	79
5.3.14.2	Initiation	79
5.3.14.3	Void	81
5.3.14.4	T302, T390 expiry or stop (Barring alleviation)	81
5.3.14.5	Access barring check	81
5.3.15	RRC connection reject	82
5.3.15.1	Initiation	82
5.3.15.2	Reception of the <i>RRCReject</i> by the UE	82
5.4	Inter-RAT mobility	82
5.4.1	Introduction	82
5.4.2	Handover to NR	83
5.4.2.1	General	83
5.4.2.2	Initiation	83
5.4.2.3	Reception of the <i>RRCReconfiguration</i> by the UE	83
5.4.3	Mobility from NR	84
5.4.3.1	General	84
5.4.3.2	Initiation	84
5.4.3.3	Reception of the <i>MobilityFromNRCommand</i> by the UE	84
5.4.3.4	Successful completion of the mobility from NR	85
5.4.3.5	Mobility from NR failure	85
5.5	Measurements	85
5.5.1	Introduction	85
5.5.2	Measurement configuration	87
5.5.2.1	General	87
5.5.2.2	Measurement identity removal	88
5.5.2.3	Measurement identity addition/modification	89
5.5.2.4	Measurement object removal	89
5.5.2.5	Measurement object addition/modification	90
5.5.2.6	Reporting configuration removal	91
5.5.2.7	Reporting configuration addition/modification	91
5.5.2.8	Quantity configuration	92
5.5.2.9	Measurement gap configuration	92
5.5.2.10	Reference signal measurement timing configuration	93
5.5.2.11	Measurement gap sharing configuration	93
5.5.3	Performing measurements	94
5.5.3.1	General	94
5.5.3.2	Layer 3 filtering	97

5.5.3.3	Derivation of cell measurement results	97
5.5.3.3a	Derivation of layer 3 beam filtered measurement	98
5.5.4	Measurement report triggering	98
5.5.4.1	General	98
5.5.4.2	Event A1 (Serving becomes better than threshold)	101
5.5.4.3	Event A2 (Serving becomes worse than threshold)	102
5.5.4.4	Event A3 (Neighbour becomes offset better than SpCell)	102
5.5.4.5	Event A4 (Neighbour becomes better than threshold)	103
5.5.4.6	Event A5 (SpCell becomes worse than threshold1 and neighbour becomes better than threshold2)	103
5.5.4.7	Event A6 (Neighbour becomes offset better than SCell)	104
5.5.4.8	Event B1 (Inter RAT neighbour becomes better than threshold)	105
5.5.4.9	Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2)	106
5.5.5	Measurement reporting	107
5.5.5.1	General	107
5.5.5.2	Reporting of beam measurement information	112
5.5.5.3	Sorting of cell measurement results	113
5.5.6	Location measurement indication	113
5.5.6.1	General	113
5.5.6.2	Initiation	113
5.5.6.3	Actions related to transmission of <i>LocationMeasurementIndication</i> message	114
5.6	UE capabilities	114
5.6.1	UE capability transfer	114
5.6.1.1	General	114
5.6.1.2	Initiation	115
5.6.1.3	Reception of the <i>UECapabilityEnquiry</i> by the UE	115
5.6.1.4	Setting band combinations, feature set combinations and feature sets supported by the UE	115
5.6.1.5	Void	117
5.7	Other	117
5.7.1	DL information transfer	117
5.7.1.1	General	117
5.7.1.2	Initiation	118
5.7.1.3	Reception of the <i>DLInformationTransfer</i> by the UE	118
5.7.2	UL information transfer	118
5.7.2.1	General	118
5.7.2.2	Initiation	118
5.7.2.3	Actions related to transmission of <i>ULInformationTransfer</i> message	118
5.7.2.4	Failure to deliver <i>ULInformationTransfer</i> message	118
5.7.2a	UL information transfer for MR-DC	119
5.7.2a.1	General	119
5.7.2a.2	Initiation	119
5.7.2a.3	Actions related to transmission of <i>ULInformationTransferMRDC</i> message	119
5.7.3	SCG failure information	119
5.7.3.1	General	119
5.7.3.2	Initiation	120
5.7.3.3	Failure type determination for (NG)EN-DC	120
5.7.3.4	Setting the contents of <i>MeasResultSCG-Failure</i>	120
5.7.3.5	Actions related to transmission of <i>SCGFailureInformation</i> message	121
5.7.3a	EUTRA SCG failure information	123
5.7.3a.1	General	123
5.7.3a.2	Initiation	123
5.7.3a.3	Actions related to transmission of <i>SCGFailureInformationEUTRA</i> message	123
5.7.4	UE Assistance Information	124
5.7.4.1	General	124
5.7.4.2	Initiation	124
5.7.4.3	Actions related to transmission of <i>UEAssistanceInformation</i> message	124
5.7.5	Failure information	126
5.7.5.1	General	126
5.7.5.2	Initiation	126
5.7.5.3	Actions related to transmission of <i>FailureInformation</i> message	126

6	Protocol data units, formats and parameters (ASN.1)	127
6.1	General	127
6.1.1	Introduction	127
6.1.2	Need codes and conditions for optional downlink fields	127
6.1.3	General rules	130
6.2	RRC messages	130
6.2.1	General message structure	130
–	NR-RRC-Definitions	130
–	BCCH-BCH-Message	130
–	BCCH-DL-SCH-Message	131
–	DL-CCCH-Message	131
–	DL-DCCH-Message	132
–	PCCH-Message	132
–	UL-CCCH-Message	133
–	UL-CCCH1-Message	133
–	UL-DCCH-Message	134
6.2.2	Message definitions	135
–	CounterCheck	135
–	CounterCheckResponse	136
–	DLInformationTransfer	137
–	FailureInformation	138
–	LocationMeasurementIndication	138
–	MeasurementReport	139
–	MIB	140
–	MobilityFromNRCommand	141
–	Paging	142
–	RRCReestablishment	143
–	RRCReestablishmentComplete	144
–	RRCReestablishmentRequest	145
–	RRCReconfiguration	146
–	RRCReconfigurationComplete	149
–	RRCReject	150
–	RRCRelease	151
–	RRCResume	154
–	RRCResumeComplete	156
–	RRCResumeRequest	157
–	RRCResumeRequest1	158
–	RRCSetup	158
–	RRCSetupComplete	159
–	RRCSetupRequest	161
–	RRCSystemInfoRequest	162
–	SCGFailureInformation	163
–	SCGFailureInformationEUTRA	164
–	SecurityModeCommand	165
–	SecurityModeComplete	166
–	SecurityModeFailure	166
–	SIB1	167
–	SystemInformation	169
–	UEAssistanceInformation	170
–	UECapabilityEnquiry	174
–	UECapabilityInformation	174
–	ULInformationTransfer	175
–	ULInformationTransferMRDC	176
6.3	RRC information elements	177
6.3.0	Parameterized types	177
–	SetupRelease	177
6.3.1	System information blocks	177
–	SIB2	177
–	SIB3	180
–	SIB4	181
–	SIB5	184
–	SIB6	186

–	SIB7.....	187
–	SIB8.....	188
–	SIB9.....	189
6.3.2	Radio resource control information elements	190
–	AdditionalSpectrumEmission	190
–	Alpha	191
–	AMF-Identifier	191
–	ARFCN-ValueEUTRA	191
–	ARFCN-ValueNR	192
–	BeamFailureRecoveryConfig	192
–	BetaOffsets	194
–	BSR-Config.....	195
–	BWP	196
–	BWP-Downlink.....	196
–	BWP-DownlinkCommon	197
–	BWP-DownlinkDedicated	198
–	BWP-Id.....	198
–	BWP-Uplink	199
–	BWP-UplinkCommon	199
–	BWP-UplinkDedicated	200
–	CellAccessRelatedInfo.....	201
–	CellAccessRelatedInfo-EUTRA-5GC	202
–	CellAccessRelatedInfo-EUTRA-EPC	203
–	CellGroupConfig.....	203
–	CellGroupId	206
–	CellIdentity.....	207
–	CellReselectionPriority	207
–	CellReselectionSubPriority	207
–	CGI-InfoEUTRA.....	208
–	CGI-InfoNR.....	208
–	CodebookConfig.....	209
–	ConfiguredGrantConfig	211
–	ConnEstFailureControl.....	214
–	ControlResourceSet.....	215
–	ControlResourceSetId	216
–	ControlResourceSetZero	217
–	CrossCarrierSchedulingConfig.....	217
–	CSI-AperiodicTriggerStateList.....	218
–	CSI-FrequencyOccupation.....	219
–	CSI-IM-Resource	220
–	CSI-IM-ResourceId	221
–	CSI-IM-ResourceSet.....	221
–	CSI-IM-ResourceSetId	222
–	CSI-MeasConfig.....	222
–	CSI-ReportConfig.....	224
–	CSI-ReportConfigId	229
–	CSI-ResourceConfig.....	229
–	CSI-ResourceConfigId	230
–	CSI-ResourcePeriodicityAndOffset	230
–	CSI-RS-ResourceConfigMobility	231
–	CSI-RS-ResourceMapping	233
–	CSI-SemiPersistentOnPUSCH-TriggerStateList.....	234
–	CSI-SSB-ResourceSet.....	235
–	CSI-SSB-ResourceSetId.....	235
–	DedicatedNAS-Message	235
–	DMRS-DownlinkConfig	236
–	DMRS-UplinkConfig	237
–	DownlinkConfigCommon.....	238
–	DownlinkConfigCommonSIB	239
–	DownlinkPreemption.....	241
–	DRB-Identity	242
–	DRX-Config.....	242

–	FilterCoefficient	244
–	FreqBandIndicatorNR.....	244
–	FrequencyInfoDL	245
–	FrequencyInfoDL-SIB.....	246
–	FrequencyInfoUL	246
–	FrequencyInfoUL-SIB.....	247
–	Hysteresis	248
–	I-RNTI-Value.....	249
–	LocationMeasurementInfo	249
–	LogicalChannelConfig	250
–	LogicalChannelIdentity.....	252
–	MAC-CellGroupConfig.....	252
–	MeasConfig	253
–	MeasGapConfig	254
–	MeasGapSharingConfig.....	256
–	MeasId.....	257
–	MeasIdToAddModList.....	257
–	MeasObjectEUTRA.....	257
–	MeasObjectId	259
–	MeasObjectNR	259
–	MeasObjectToAddModList	263
–	MeasResultCellListSFTD-NR.....	264
–	MeasResultCellListSFTD-EUTRA	264
–	MeasResults	265
–	MeasResult2EUTRA.....	268
–	MeasResult2NR.....	269
–	MeasResultSCG-Failure	269
–	MeasTriggerQuantityEUTRA.....	269
–	MobilityStateParameters.....	270
–	MultiFrequencyBandListNR.....	271
–	MultiFrequencyBandListNR-SIB	271
–	NextHopChainingCount.....	272
–	NG-5G-S-TMSI	272
–	NR-NS-PmaxList	273
–	NZP-CSI-RS-Resource	273
–	NZP-CSI-RS-ResourceId	274
–	NZP-CSI-RS-ResourceSet	274
–	NZP-CSI-RS-ResourceSetId	275
–	P-Max.....	276
–	PCI-List.....	276
–	PCI-Range.....	276
–	PCI-RangeElement.....	277
–	PCI-RangeIndex.....	277
–	PCI-RangeIndexList	278
–	PDCCCH-Config	278
–	PDCCCH-ConfigCommon.....	279
–	PDCCCH-ConfigSIB1	281
–	PDCCCH-ServingCellConfig	281
–	PDCCP-Config	282
–	PDSCH-Config.....	285
–	PDSCH-ConfigCommon	288
–	PDSCH-ServingCellConfig	288
–	PDSCH-TimeDomainResourceAllocationList	290
–	PHR-Config.....	290
–	PhysCellId	291
–	PhysicalCellGroupConfig	292
–	PLMN-Identity	294
–	PLMN-IdentityInfoList	294
–	PRB-Id.....	295
–	PTRS-DownlinkConfig	295
–	PTRS-UplinkConfig.....	296
–	PUCCH-Config.....	297

–	PUCCH-ConfigCommon.....	301
–	PUCCH-PathlossReferenceRS-Id	302
–	PUCCH-PowerControl	302
–	PUCCH-SpatialRelationInfo.....	304
–	PUCCH-TPC-CommandConfig	305
–	PUSCH-Config.....	306
–	PUSCH-ConfigCommon	308
–	PUSCH-PowerControl.....	308
–	PUSCH-ServingCellConfig	310
–	PUSCH-TimeDomainResourceAllocationList	311
–	PUSCH-TPC-CommandConfig.....	312
–	Q-OffsetRange.....	313
–	Q-QualMin	313
–	Q-RxLevMin	314
–	QuantityConfig.....	314
–	RACH-ConfigCommon.....	315
–	RACH-ConfigDedicated.....	318
–	RACH-ConfigGeneric	320
–	RA-Prioritization.....	321
–	RadioBearerConfig	322
–	RadioLinkMonitoringConfig	324
–	RadioLinkMonitoringRS-Id.....	326
–	RAN-AreaCode.....	326
–	RateMatchPattern	326
–	RateMatchPatternId.....	328
–	RateMatchPatternLTE-CRS.....	329
–	RejectWaitTime	329
–	ReportConfigId.....	330
–	ReportConfigInterRAT	330
–	ReportConfigNR.....	332
–	ReportConfigToAddModList	337
–	ReportInterval	337
–	ReselectionThreshold	338
–	ReselectionThresholdQ	338
–	ResumeCause	338
–	RLC-BearerConfig	339
–	RLC-Config	340
–	RLF-TimersAndConstants	343
–	RNTI-Value	343
–	RSRP-Range.....	344
–	RSRQ-Range	344
–	SCellIndex	344
–	SchedulingRequestConfig	345
–	SchedulingRequestId	346
–	SchedulingRequestResourceConfig.....	346
–	SchedulingRequestResourceId	347
–	ScramblingId.....	347
–	SCS-SpecificCarrier	348
–	SDAP-Config.....	348
–	SearchSpace	349
–	SearchSpaceId.....	353
–	SearchSpaceZero	353
–	SecurityAlgorithmConfig.....	354
–	ServCellIndex	354
–	ServingCellConfig	355
–	ServingCellConfigCommon.....	359
–	ServingCellConfigCommonSIB.....	361
–	ShortI-RNTI-Value	362
–	ShortMAC-I.....	362
–	SINR-Range.....	363
–	SI-SchedulingInfo.....	363
–	SK-Counter.....	366

–	SlotFormatCombinationsPerCell	366
–	SlotFormatIndicator	367
–	S-NSSAI	368
–	SpeedStateScaleFactors	368
–	SPS-Config	369
–	SRB-Identity	370
–	SRS-CarrierSwitching	370
–	SRS-Config	372
–	SRS-TPC-CommandConfig	376
–	SSB-Index	377
–	SSB-MTC	378
–	SSB-ToMeasure	378
–	SS-RSSI-Measurement	379
–	SubcarrierSpacing	380
–	TAG-Config	380
–	TCI-State	381
–	TCI-StateId	382
–	TDD-UL-DL-ConfigCommon	382
–	TDD-UL-DL-ConfigDedicated	383
–	TrackingAreaCode	384
–	T-Reselection	384
–	TimeAlignmentTimer	385
–	TimeToTrigger	385
–	UAC-BarringInfoSetIndex	385
–	UAC-BarringInfoSetList	386
–	UAC-BarringPerCatList	387
–	UAC-BarringPerPLMN-List	387
–	UE-TimersAndConstants	388
–	UplinkConfigCommon	388
–	UplinkConfigCommonSIB	389
–	UplinkTxDirectCurrentList	389
–	ZP-CSI-RS-Resource	391
–	ZP-CSI-RS-ResourceSet	391
–	ZP-CSI-RS-ResourceSetId	392
6.3.3	UE capability information elements	392
–	AccessStratumRelease	392
–	BandCombinationList	393
–	CA-BandwidthClassEUTRA	395
–	CA-BandwidthClassNR	396
–	CA-ParametersEUTRA	396
–	CA-ParametersNR	397
–	CA-ParametersNRDC	397
–	CarrierAggregationVariant	398
–	CodebookParameters	399
–	FeatureSetCombination	400
–	FeatureSetCombinationId	401
–	FeatureSetDownlink	401
–	FeatureSetDownlinkId	404
–	FeatureSetDownlinkPerCC	404
–	FeatureSetDownlinkPerCC-Id	405
–	FeatureSetEUTRA-DownlinkId	405
–	FeatureSetEUTRA-UplinkId	405
–	FeatureSets	406
–	FeatureSetUplink	407
–	FeatureSetUplinkId	408
–	FeatureSetUplinkPerCC	408
–	FeatureSetUplinkPerCC-Id	409
–	FreqBandIndicatorEUTRA	409
–	FreqBandList	409
–	FreqSeparationClass	410
–	IMS-Parameters	411
–	InterRAT-Parameters	411

–	MAC-Parameters	412
–	MeasAndMobParameters.....	413
–	MeasAndMobParametersMRDC	414
–	MIMO-Layers.....	415
–	MIMO-ParametersPerBand.....	415
–	ModulationOrder	419
–	MRDC-Parameters	419
–	NRDC-Parameters	420
–	PDCP-Parameters	421
–	PDCP-ParametersMRDC	421
–	Phy-Parameters	422
–	Phy-ParametersMRDC	425
–	ProcessingParameters	426
–	RAT-Type	426
–	RF-Parameters.....	427
–	RF-ParametersMRDC.....	429
–	RLC-Parameters	430
–	SDAP-Parameters	431
–	SimultaneousRxTxPerBandPair	431
–	SRS-SwitchingTimeNR	431
–	SRS-SwitchingTimeEUTRA.....	432
–	SupportedBandwidth	432
–	UE-CapabilityRAT-ContainerList.....	433
–	UE-CapabilityRAT-RequestList	433
–	UE-CapabilityRequestFilterCommon	434
–	UE-CapabilityRequestFilterNR	434
–	UE-MRDC-Capability.....	435
–	UE-NR-Capability.....	436
6.3.4	Other information elements	439
–	EUTRA-AllowedMeasBandwidth	439
–	EUTRA-MBSFN-SubframeConfigList.....	439
–	EUTRA-MultiBandInfoList	440
–	EUTRA-NS-PmaxList	440
–	EUTRA-PhysCellId	441
–	EUTRA-PhysCellIdRange	441
–	EUTRA-PresenceAntennaPort1	442
–	EUTRA-Q-OffsetRange	442
–	OtherConfig	442
–	RRC-TransactionIdentifier.....	443
6.4	RRC multiplicity and type constraint values	444
–	Multiplicity and type constraint definitions	444
–	End of NR-RRC-Definitions.....	447
6.5	Short Message	447
7	Variables and constants	449
7.1	Timers	449
7.1.1	Timers (Informative).....	449
7.1.2	Timer handling.....	452
7.2	Counters	453
7.3	Constants	453
7.4	UE variables	453
–	NR-UE-Variables	453
–	VarPendingRNA-Update	454
–	VarMeasConfig	454
–	VarMeasReportList	455
–	VarResumeMAC-Input	456
–	VarShortMAC-Input	456
–	End of NR-UE-Variables	457
8	Protocol data unit abstract syntax.....	458
8.1	General	458
8.2	Structure of encoded RRC messages.....	458

8.3	Basic production.....	458
8.4	Extension.....	458
8.5	Padding.....	459
9	Specified and default radio configurations.....	459
9.1	Specified configurations.....	459
9.1.1	Logical channel configurations.....	459
9.1.1.1	BCCH configuration	459
9.1.1.2	CCCH configuration	460
9.1.1.3	PCCH configuration.....	460
9.1.2	Void.....	460
9.2	Default radio configurations.....	460
9.2.1	Default SRB configurations	460
9.2.2	Default MAC Cell Group configuration	461
9.2.3	Default values timers and constants.....	461
10	Generic error handling.....	461
10.1	General	461
10.2	ASN.1 violation or encoding error	462
10.3	Field set to a not comprehended value	462
10.4	Mandatory field missing.....	462
10.5	Not comprehended field	463
11	Radio information related interactions between network nodes	464
11.1	General	464
11.2	Inter-node RRC messages	464
11.2.1	General.....	464
11.2.2	Message definitions	465
–	HandoverCommand	465
–	HandoverPreparationInformation	466
–	CG-Config	469
–	CG-ConfigInfo	474
–	MeasurementTimingConfiguration	482
–	UERadioPagingInformation	483
–	UERadioAccessCapabilityInformation	484
11.2.3	Mandatory information in inter-node RRC messages.....	485
11.3	Inter-node RRC information element definitions	486
11.4	Inter-node RRC multiplicity and type constraint values	487
–	Multiplicity and type constraints definitions	487
–	End of NR-InterNodeDefinitions	487
12	Processing delay requirements for RRC procedures	488
Annex A (informative):	Guidelines, mainly on use of ASN.1	492
A.1	Introduction	492
A.2	Procedural specification	492
A.2.1	General principles.....	492
A.2.2	More detailed aspects	492
A.3	PDU specification	493
A.3.1	General principles.....	493
A.3.1.1	ASN.1 sections	493
A.3.1.2	ASN.1 identifier naming conventions.....	494
A.3.1.3	Text references using ASN.1 identifiers	495
A.3.2	High-level message structure	496
A.3.3	Message definition	497
A.3.4	Information elements.....	499
A.3.5	Fields with optional presence	500
A.3.6	Fields with conditional presence	501
A.3.7	Guidelines on use of lists with elements of SEQUENCE type.....	502
A.3.8	Guidelines on use of parameterised SetupRelease type.....	502
A.3.9	Guidelines on use of ToAddModList and ToReleaseList	503