

ETSI TS 138 533 V17.3.1 (2022-09)



**5G;
NR;
User Equipment (UE) conformance specification;
Radio Resource Management (RRM)
(3GPP TS 38.533 version 17.3.1 Release 17)**

<https://standards.iteh.ai/catalog/standards/sist/7b257397-5a72-419c-93a5-d2d45d5bb316/etsi-ts-138-533-v17-3-1-2022-09>



ReferenceRTS/TSGR-0538533vh31

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:

<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://standards-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 the 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, symbols and abbreviations	26
3.1 Definitions	26
3.2 Symbols.....	27
3.3 Abbreviations	28
3A Requirements for the support of RRM	30
3A.1 General	30
3A.1.0 Overview of RRM requirements.....	30
3A.1.1 Test coverage across 5G NR connectivity options	31
3A.2 Requirements Classification for Statistical Testing.....	31
3A.3 Antenna Configuration	31
3A.4 NR band groups.....	31
3A.4.0 General.....	31
3A.4.1 NR operating bands in FR1	32
3A.4.2 NR operating bands in FR2	32
3A.5 NR operating band configuration	33
3A.6 UE with Multiband Capability	34
4 EN-DC with all NR cells in FR1.....	34
4.0 General	34
4.1 Void.....	35
4.2 Void.....	35
4.3 RRC_CONNECTED state mobility	35
4.3.1 Void	35
4.3.2 RRC connection mobility control	35
4.3.2.1 Void.....	35
4.3.2.2 Random access.....	35
4.3.2.2.1 EN-DC FR1 contention based random access.....	35
4.3.2.2.2 EN-DC FR1 non-contention based random access.....	41
4.3.2.2.3 EN-DC FR1 2-step contention based random access	48
4.3.2.2.4 EN-DC FR1 2-step non-contention based random access	53
4.3.2.3 Void.....	58
4.4 Timing	58
4.4.1 UE transmit timing	58
4.4.1.0 Minimum conformance requirements	58
4.4.1.0.1 Minimum conformance requirements for UE transmit timing accuracy	58
4.4.1.1 EN-DC FR1 UE transmit timing accuracy.....	60
4.4.2 UE timer accuracy	66
4.4.3 Timing advance	66
4.4.3.0 Minimum conformance requirements	66
4.4.3.0.1 Minimum conformance requirements for timing advance adjustment accuracy	66
4.4.3.0.2 Minimum conformance requirements for timing advance adjustment delay.....	66
4.4.3.1 EN-DC FR1 timing advance adjustment accuracy.....	67
4.5 Signaling characteristics.....	72
4.5.1 Radio link monitoring.....	72
4.5.1.00 General	72
4.5.1.0 Minimum conformance requirements	72
4.5.1.0.1 Minimum conformance requirements for out-of-sync SSB-based RLM.....	72
4.5.1.0.2 Void.....	73

4.5.1.0.3	Minimum conformance requirements for out-of-sync CSI-RS based RLM.....	73
4.5.1.0.4	Minimum conformance requirements for in-sync CSI-RS based RLM	74
4.5.1.1	EN-DC FR1 radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode	76
4.5.1.2	EN-DC FR1 radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode	81
4.5.1.3	EN-DC FR1 radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in DRX mode	86
4.5.1.4	EN-DC FR1 radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in DRX mode	91
4.5.1.5	EN-DC FR1 radio link monitoring out-of-sync test for PSCell configured with CSI-RS-based RLM RS in non-DRX mode	96
4.5.1.6	EN-DC FR1 radio link monitoring in-sync test for PSCell configured with CSI-RS-based RLM RS in non-DRX mode	101
4.5.1.7	EN-DC FR1 radio link monitoring out-of-sync test for PSCell configured with CSI-RS-based RLM RS in DRX mode.....	106
4.5.2	Interruption	117
4.5.2.0	Minimum conformance requirements	117
4.5.2.0.1	Minimum conformance requirements for interruptions at transitions between active and non-active during DRX.....	117
4.5.2.0.2	Minimum conformance requirements for interruptions during measurements on deactivated NR SCC.....	117
4.5.2.0.3	Minimum conformance requirements for interruptions during measurements on deactivated E-UTRAN SCC	118
4.5.2.1	EN-DC FR1 interruptions at transitions between active and non-active during DRX in synchronous EN-DC	119
4.5.2.2	EN-DC FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC.....	122
4.5.2.3	EN-DC FR1 interruptions during measurements on deactivated NR SCC in synchronous EN-DC...	126
4.5.2.4	EN-DC FR1 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC	132
4.5.2.5	EN-DC FR1 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC	137
4.5.2.5.3	Minimum conformance requirements.....	137
4.5.2.6	EN-DC FR1 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC	141
4.5.3	SCell activation and deactivation delay.....	146
4.5.3.0	Minimum conformance requirements	146
4.5.3.1	EN-DC FR1 SCell activation and deactivation of known SCell in non-DRX for 160ms SCell measurement cycle.....	150
4.5.3.2	EN-DC FR1 SCell activation and deactivation of known SCell in non-DRX for 640ms SCell measurement cycle.....	158
4.5.3.3	EN-DC FR1 SCell activation and deactivation of unknown SCell in non-DRX	160
4.5.4	UE UL carrier RRC reconfiguration delay	162
4.5.4.1	EN-DC FR1 UE UL carrier RRC reconfiguration delay.....	162
4.5.5	Link recovery procedures	170
4.5.5.0	Minimum conformance requirements	170
4.5.5.0.3	Scheduling availability of UE during beam failure detection and candidate beam detection.....	172
4.5.5.0.4	Requirements for Beam Failure Recovery in SCell.....	172
4.5.5.1	EN-DC FR1 SSB-based beam failure detection and link recovery in non-DRX	172
4.5.5.2	EN-DC FR1 SSB-based beam failure detection and link recovery in DRX	179
4.5.5.3	EN-DC FR1 CSI-RS-based beam failure detection and link recovery in non-DRX.....	185
4.5.5.4	EN-DC FR1 CSI-RS-based beam failure detection and link recovery in DRX	192
4.5.5.5	EN-DC FR1 SCell CSI-RS-based beam failure detection and SSB-based link recovery in non-DRX	195
4.5.5.6	EN-DC FR1 SCell CSI-RS-based beam failure detection and SSB-based link recovery in DRX.....	201
4.5.6	Active BWP switch delay.....	210
4.5.6.1	DCI-based and time-based active BWP switch.....	210
4.5.6.1.0	Minimum conformance requirements.....	210
4.5.6.1.1	EN-DC FR1 DCI-based DL active BWP switch in non-DRX in synchronous EN-DC	212
4.5.6.1.2	EN-DC FR1 DCI-based DL active BWP switch with SCell in non-DRX in synchronous EN-DC	220

4.5.6.2	RRC-based active BWP switch.....	227
4.5.6.2.0	Minimum conformance requirements.....	227
4.5.6.2.1	EN-DC FR1 RRC-based DL active BWP switch in non-DRX in synchronous EN-DC.....	228
4.5.7	PSCell addition and release delay.....	234
4.5.7.0	Minimum conformance requirements.....	234
4.5.7.0.1	NR PSCell Addition Delay Requirement.....	234
4.5.7.0.2	NR PSCell Release Delay Requirement.....	234
4.5.7.1	EN-DC FR1 addition and release delay of known PSCell.....	235
4.5.8	UL switching.....	240
4.5.8.0	Minimum conformance requirements.....	240
4.5.8.1	EN-DC FR1 interruptions at switching between two uplink carriers.....	241
4.6	Measurement procedures.....	251
4.6.1	Intra-frequency measurements.....	251
4.6.1.0	Minimum conformance requirements.....	251
4.6.1.0.1	Minimum conformance requirements for event-triggered reporting without gap.....	251
4.6.1.0.2	Minimum conformance requirements for event-triggered measurements with gap.....	255
4.6.1.1	EN-DC FR1 event-triggered reporting without gap in non-DRX.....	258
4.6.1.2	EN-DC FR1 event-triggered reporting without gap in DRX.....	262
4.6.1.3	EN-DC FR1 event-triggered reporting with gap in non-DRX.....	265
4.6.1.4	EN-DC FR1 event-triggered reporting with gap in DRX.....	271
4.6.1.5	EN-DC FR1 event-triggered reporting without gap in non-DRX with SSB time index detection.....	276
4.6.1.6	EN-DC FR1 event-triggered reporting with gap in non-DRX with SSB time index detection.....	280
4.6.1.7	EN-DC FR1 event-triggered reporting without gap in DRX for UE configured with highSpeedMeasFlag-r16.....	284
4.6.2	Inter-frequency measurements.....	289
4.6.2.0	Minimum conformance requirements for Inter-frequency measurements.....	289
4.6.2.1	EN-DC FR1-FR1 event-triggered reporting in non-DRX.....	290
4.6.2.2	EN-DC FR1-FR1 event-triggered reporting in DRX.....	295
4.6.2.3	Void.....	301
4.6.2.4	Void.....	301
4.6.2.5	EN-DC FR1-FR1 event-triggered reporting in non-DRX with SSB time index detection.....	301
4.6.2.6	EN-DC FR1-FR1 event-triggered reporting in DRX with SSB time index detection.....	306
4.6.2.7	Void.....	311
4.6.2.8	Void.....	311
4.6.3	Void.....	311
4.6.4	L1-RSRP measurement for beam reporting.....	311
4.6.4.0	Minimum conformance requirements.....	311
4.6.4.0.1	Minimum conformance requirements for SSB-based L1-RSRP measurement for beam reporting.....	312
4.6.4.1	EN-DC FR1 SSB-based L1-RSRP measurement in non-DRX.....	315
4.6.4.1.5	Test requirement.....	319
4.6.4.2	EN-DC FR1 SSB-based L1-RSRP measurement in DRX.....	319
4.6.4.2.3	Minimum conformance requirements.....	320
4.6.4.3	EN-DC FR1 CSI-RS-based L1-RSRP measurement in non-DRX.....	323
4.6.4.4	EN-DC FR1 CSI-RS-based L1-RSRP measurement in DRX.....	327
4.6.4.5	EN-DC FR1 SSB-based L1-RSRP measurement in DRX for UE configured with highSpeedMeasFlag-r16.....	330
4.6.5	CLI measurements.....	334
4.6.5.0	Minimum conformance requirements.....	334
4.6.5.0.2	Minimum conformance requirements for CLI-RSSI measurement with non-DRX.....	335
4.6.5.1	EN-DC FR1 SRS-RSRP measurement with non-DRX.....	335
4.6.5.1.3	Minimum conformance requirements.....	336
4.6.5.2	EN-DC FR1 CLI-RSSI measurement with non-DRX.....	339
4.6.6	342	
4.6.7	L1-SINR measurement for beam reporting.....	342
4.6.7.0	Minimum conformance requirements.....	342
4.6.7.1	EN-DC FR1 CSI-RS based CMR and no dedicated IMR L1-SINR measurement in non-DRX.....	347
4.6.7.2	EN-DC FR1 SSB based CMR and dedicated IMR L1-SINR measurement in DRX.....	352
4.6.7.3	EN-DC FR1 CSI-RS based CMR and dedicated IMR L1-SINR measurement in DRX.....	358
4.7	Measurement performance requirements.....	363
4.7.1	SS-RSRP.....	363
4.7.1.0	Minimum conformance requirements.....	363

4.7.1.1	Intra-frequency measurements	368
4.7.1.2	Inter-frequency measurements	377
4.7.2	SS-RSRQ	384
4.7.2.0	Minimum conformance requirements	384
4.7.2.1	EN-DC FR1 SS-RSRQ measurement accuracy	386
4.7.2.2	Inter-Frequency SS-RSRQ measurement accuracy.....	390
4.7.2.2.1	EN-DC FR1-FR1 SS-RSRQ absolute measurement accuracy	390
4.7.2.2.2	EN-DC FR1-FR1 SS-RSRQ relative measurement accuracy.....	394
4.7.3	SS-SINR	396
4.7.3.0	Minimum conformance requirements	396
4.7.3.0.1	Intra-frequency SS-SINR measurement accuracy requirements	396
4.7.3.0.2	Inter-frequency absolute SS-SINR measurement accuracy requirements	397
4.7.3.0.3	Inter-frequency relative SS-SINR measurement accuracy requirements.....	398
4.7.3.1	EN-DC FR1 SS-SINR measurement accuracy	399
4.7.3.2	Inter-Frequency SS-SINR measurement accuracy	403
4.7.3.2.1	EN-DC FR1-FR1 SS-SINR absolute measurement accuracy.....	403
4.7.3.2.2	EN-DC FR1-FR1 SS-SINR relative measurement accuracy.....	406
4.7.4	L1-RSRP.....	408
4.7.4.0	Minimum conformance requirements	408
4.7.4.0.1	SSB based absolute L1-RSRP measurement accuracy requirements	408
4.7.4.0.3	CSI-RS based absolute L1-RSRP measurement accuracy requirements.....	411
4.7.4.0.4	CSI-RS based relative L1-RSRP measurement accuracy requirements	412
4.7.4.1	SSB based L1-RSRP measurements	413
4.7.4.1.1	EN-DC FR1 SSB-based L1-RSRP absolute measurement accuracy.....	413
4.7.4.1.2	EN-DC FR1 SSB-based L1-RSRP relative measurement accuracy	418
4.7.4.2	CSI-RS based L1-RSRP measurements	420
4.7.4.2.1	EN-DC FR1 CSI-RS-based L1-RSRP absolute measurement accuracy	420
4.7.4.2.2	EN-DC FR1 CSI-RS-based L1-RSRP relative measurement accuracy.....	424
4.7.5	SFTD	426
4.7.5.0	Minimum conformance requirements	426
4.7.5.0.1	SFTD Accuracy Requirement	426
4.7.5.1	EN-DC FR1 SFTD measurement accuracy.....	427
4.7.6	CLI measurements	431
4.7.6.0	Minimum conformance requirements	431
4.7.6.0.1	Minimum conformance requirements for SRS-RSRP accuracy.....	431
4.7.6.0.1.1	SRS-RSRP report mapping.....	432
4.7.6.0.2	Minimum conformance requirements for CLI-RSSI measurement accuracy with FR1 serving cell	433
4.7.6.1	EN-DC SRS-RSRP measurement accuracy with FR1 serving cell.....	434
4.7.6.2	EN-DC CLI-RSSI measurement accuracy with FR1 serving cell.....	439
4.7.7	L1-SINR measurement for beam reporting	443
4.7.7.0	Minimum conformance requirements	443
4.7.7.0.1	Minimum conformance requirements for CSI-RS based CMR and no dedicated IMR configured and CSI-RS resource set with repetition off.....	443
4.7.7.0.2	Minimum conformance requirements for SSB based CMR and dedicated IMR.....	446
4.7.7.0.3	Minimum conformance requirements for CSI-RS based CMR and dedicated IMR	448
4.7.7.1	EN-DC FR1 CSI-RS based CMR and no dedicated IMR configured and CSI-RS resource set with repetition off L1-SINR measurement accuracy.....	452
4.7.7.2	EN-DC FR1 SSB based CMR and dedicated IMR L1-SINR absolute measurement accuracy	457
4.7.7.3	EN-DC FR1 CSI-RS based CMR and dedicated IMR L1-SINR measurement accuracy	462
4A	NE-DC with all NR cells in FR1.....	467
4A.0	General	467
4A.1	Signalling characteristics.....	467
4A.1.1	E-UTRAN PSCell addition.....	467
4A.1.1.0	Minimum conformance requirements	467
4A.1.1.0.1	E-UTRA PSCell Addition Delay Requirement	467
4A.1.1.0.2	E-UTRA PSCell Release Delay Requirement	468
4A.1.1.1	NE-DC FR1 addition and release delay of known PSCell	468
4A.1.1.1	Test purpose	468
4A.1.1.2	Test applicability	469
4A.1.1.3	Minimum conformance requirements.....	469

4A.1.1.4	Test description	469
4A.1.1.5	Test Requirements	469
4A.1.2	Active BWP switch delay	470
4A.2	Measurement performance requirements	470
4A.2.1	SFTD accuracy	470
5	EN-DC with at least one NR cell in FR2	471
5.0	General	471
5.1	Void	471
5.2	Void	471
5.3	RRC_CONNECTED state mobility	471
5.3.1	Void	471
5.3.2	RRC connection mobility control	471
5.3.2.1	Void	471
5.3.2.2	Random access	471
5.3.2.2.1	EN-DC FR2 contention based random access	471
5.3.2.2.2	EN-DC FR2 non-contention based random access	479
5.3.2.2.3	EN-DC FR2 2-step contention based random access	487
5.3.2.2.4	EN-DC FR2 2-step non-contention based random access	491
5.3.2.3	Void	495
5.4	Timing	495
5.4.1	UE transmit timing	495
5.4.1.0	Minimum Conformance Requirements	495
5.4.1.0.1	Minimum conformance requirements for UE transmit timing accuracy	495
5.4.1.1	EN-DC FR2 UE transmit timing accuracy	497
5.4.2	UE timer accuracy	503
5.4.3	Timing advance	503
5.4.3.0	Minimum conformance requirements	503
5.4.3.0.1	Minimum conformance requirements for timing advance adjustment accuracy	503
5.4.3.1	EN-DC FR2 timing advance adjustment accuracy	503
5.5	Signaling characteristics	508
5.5.1	Radio link monitoring	508
5.5.1.0	Minimum conformance requirements	508
5.5.1.0.1	Minimum conformance requirements for out-of-sync SSB-based RLM	508
5.5.1.0.2	Minimum conformance requirements for in-sync SSB-based RLM	509
5.5.1.0.3	Minimum conformance requirements for out-of-sync CSI-RS based RLM	510
5.5.1.0.4	Minimum conformance requirements for in-sync CSI-RS based RLM	513
5.5.1.0.5	Minimum conformance requirements for UE scheduling restrictions during radio link monitoring	516
5.5.1.1	EN-DC FR2 radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode	517
5.5.1.2	EN-DC FR2 radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode	523
5.5.1.3	EN-DC FR2 radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in DRX mode	529
5.5.1.4	EN-DC FR2 radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in DRX mode	535
5.5.1.5	EN-DC FR2 radio link monitoring out-of-sync test for PSCell configured with CSI-RS-based RLM RS in non-DRX mode	540
5.5.1.6	EN-DC FR2 radio link monitoring in-sync test for PSCell configured with CSI-RS-based RLM RS in non-DRX mode	545
5.5.1.7	EN-DC FR2 radio link monitoring out-of-sync test for PSCell configured with CSI-RS-based RLM RS in DRX mode	550
5.5.1.9	EN-DC FR2 radio link monitoring UE scheduling restrictions	561
5.5.2	Interruption	566
5.5.2.0	Minimum conformance requirements	566
5.5.2.0.1	Minimum conformance requirements for interruptions at transitions between active and non-active during DRX	566
5.5.2.0.2	Minimum conformance requirements for interruptions during measurements on deactivated NR SCC	566
5.5.2.0.3	Minimum conformance requirements for interruptions during measurements on deactivated E-UTRAN SCC	567

5.5.2.1	EN-DC FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC	568
5.5.2.2	EN-DC FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC.....	572
5.5.2.3	EN-DC FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC...	576
5.5.2.4	EN-DC FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC	581
5.5.2.5	EN-DC FR2 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC	585
5.5.2.6	EN-DC FR2 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC	590
5.5.3	SCell activation and deactivation delay	594
5.5.3.1	EN-DC FR2 SCell activation and deactivation intra-band in non-DRX	594
5.5.4	UE UL carrier RRC reconfiguration delay	598
5.5.5	Link recovery procedures	598
5.5.5.0	Minimum conformance requirements	598
5.5.5.0.1	Minimum conformance requirements for SSB-based BFD and link recovery procedures.....	598
5.5.5.0.2	Minimum conformance requirements for CSI-RS-based BFD and link recovery procedures	602
5.5.5.0.3	Scheduling availability of UE during beam failure detection and candidate beam detection.....	608
5.5.5.0.4	Requirements for Beam Failure Recovery in SCell.....	609
5.5.5.1	EN-DC FR2 SSB-based beam failure detection and link recovery in non-DRX	609
5.5.5.2	EN-DC FR2 SSB-based beam failure detection and link recovery in DRX	615
5.5.5.3	EN-DC FR2 CSI-RS-based beam failure detection and link recovery in non-DRX	620
5.5.5.4	EN-DC FR2 CSI-RS-based beam failure detection and link recovery in DRX	625
5.5.5.5	EN-DC FR2 scheduling available restriction during SSB-based beam failure detection and link recovery in non-DRX	631
5.5.5.6	EN-DC FR2 CSI-RS-based BFD and LR for SCell in non-DRX	636
5.5.5.7	EN-DC FR2 SCell CSI-RS-based beam failure detection and link recovery in DRX	642
5.5.6	Active BWP switch delay	648
5.5.6.1	DCI-based and time-based active BWP switch.....	648
5.5.6.1.0	Minimum conformance requirements.....	648
5.5.6.1.1	EN-DC FR2 DCI-based DL active BWP switch in non-DRX in synchronous EN-DC	648
5.5.6.1.2	EN-DC FR2 DCI-based DL active BWP switch with SCell in non-DRX in synchronous EN-DC	649
5.5.6.2	RRC-based active BWP switch.....	649
5.5.6.2.0	Minimum conformance requirements.....	649
5.5.6.2.1	EN-DC FR2 RRC-based DL active BWP switch in non-DRX in synchronous EN-DC	650
5.5.7	Void	654
5.5.8	Active TCI state switch delay	654
5.5.8.0	Minimum conformance requirements	654
5.5.8.0.1	Minimum conformance requirements for MAC-CE based active TCI state switch	654
5.5.8.0.2	Minimum conformance requirements for RRC based active TCI state switch.....	655
5.5.8.1	EN-DC FR2 MAC-CE based active TCI state switch.....	656
5.5.8.2	EN-DC FR2 RRC based active TCI state switch	660
5.6	Measurement procedures.....	664
5.6.1	Intra-frequency measurements.....	664
5.6.1.0	Minimum conformance requirements	664
5.6.1.0.1	Minimum conformance requirements for event-triggered measurement without gap.....	664
5.6.1.0.2	Minimum conformance requirements for event-triggered measurement with gap.....	666
5.6.1.1	EN-DC FR2 event-triggered reporting without gap in non-DRX	668
5.6.1.2	EN-DC FR2 event-triggered reporting without gap in DRX	673
5.6.1.3	EN-DC FR2 event-triggered reporting with gap in non-DRX	677
5.6.1.4	EN-DC FR2 event-triggered reporting with gap in DRX.....	682
5.6.2	Inter-frequency measurements.....	687
5.6.2.0	Minimum conformance requirements for Inter-frequency measurements	687
5.6.2.1	EN-DC FR2-FR2 event-triggered reporting in non-DRX	689
5.6.2.2	EN-DC FR2-FR2 event-triggered reporting in DRX	693
5.6.2.3	EN-DC FR2-FR2 event-triggered reporting in non-DRX with SSB time index detection	698
5.6.2.4	EN-DC FR2-FR2 event-triggered reporting in DRX with SSB time index detection.....	702
5.6.2.5	EN-DC FR1-FR2 event-triggered reporting in non-DRX	707
5.6.2.6	EN-DC FR1-FR2 event-triggered reporting in DRX	712
5.6.2.7	EN-DC FR1-FR2 event-triggered reporting in non-DRX with SSB time index detection	718

5.6.2.8	EN-DC FR1-FR2 event-triggered reporting in DRX with SSB time index detection.....	723
5.6.3	L1-RSRP measurement for beam reporting.....	729
5.6.3.0	Minimum conformance requirements	729
5.6.3.0.1	Minimum conformance requirements for SSB-based L1-RSRP measurement for beam reporting	729
5.6.3.0.2	Minimum conformance requirements for CSI-RS-based L1-RSRP measurement for beam reporting	730
5.6.3.1	EN-DC FR2 SSB-based L1-RSRP measurement in non-DRX.....	733
5.6.3.2	EN-DC FR2 SSB-based L1-RSRP measurement in DRX	737
5.6.3.3	EN-DC FR2 CSI-RS-based L1-RSRP measurement in non-DRX	741
5.6.3.4	EN-DC FR2 CSI-RS-based L1-RSRP measurement in DRX.....	745
5.6.4	CLI measurements	748
5.6.4.0	Minimum conformance requirements	748
5.6.4.0.1	Minimum conformance requirements for SRS-RSRP measurement period.....	748
5.6.4.1	EN-DC FR2 SRS-RSRP measurement in non-DRX.....	749
5.6.5	753	
5.6.6	L1-SINR measurement for beam reporting	753
5.6.6.0	Minimum conformance requirements	753
5.6.6.0.1	L1-SINR reporting with CSI-RS based CMR and no dedicated IMR configured.....	753
5.6.6.0.2	L1-SINR reporting with SSB based CMR and dedicated IMR configured	756
5.6.6.0.3	L1-SINR reporting with CSI-RS based CMR and dedicated IMR configured.....	758
5.6.6.1	EN-DC FR2 CSI-RS based CMR and no dedicated IMR L1-SINR measurement in DRX.....	760
5.6.6.2	EN-DC FR2 SSB based CMR and dedicated IMR L1-SINR measurement in non-DRX.....	765
5.6.6.3	EN-DC FR2 CSI-RS based CMR and dedicated IMR L1-SINR measurement in non-DRX	770
5.7	Measurement performance requirements	775
5.7.1	SS-RSRP.....	775
5.7.1.0	Minimum conformance requirements	775
5.7.1.0.1	Intra-frequency SS-RSRP measurement accuracy requirements.....	775
5.7.1.0.2	Inter-frequency SS-RSRP measurement accuracy requirements.....	776
5.7.1.1	EN-DC FR2 SS-RSRP measurement accuracy.....	778
5.7.1.2	EN-DC FR2-FR2 SS-RSRP measurement accuracy.....	784
5.7.1.3	EN-DC FR1-FR2 SS-RSRP measurement accuracy.....	791
5.7.2	SS-RSRQ	792
5.7.2.0	Minimum conformance requirements	792
5.7.2.0.1	Intra-frequency SS-RSRQ measurement accuracy requirements	792
5.7.2.0.2	Inter-frequency SS-RSRQ measurement accuracy requirements	793
5.7.2.1	EN-DC FR2 SS-RSRQ measurement accuracy	794
5.7.2.2	EN-DC FR2-FR2 SS-RSRQ measurement accuracy	798
5.7.3	SS-SINR	803
5.7.3.0	Minimum conformance requirements	803
5.7.3.0.1	Intra-frequency SS-SINR measurement accuracy requirements	803
5.7.3.0.2	Inter-frequency SS-SINR measurement accuracy requirements	804
5.7.3.1	EN-DC FR2 SS-SINR measurement accuracy	805
5.7.3.2	EN-DC FR2-FR2 SS-SINR measurement accuracy	809
5.7.4	L1-RSRP.....	815
5.7.4.0	Minimum conformance requirements	815
5.7.4.0.1	SSB-based L1-RSRP absolute measurement accuracy requirements.....	815
5.7.4.0.2	SSB-based L1-RSRP relative measurement accuracy requirements	815
5.7.4.0.3	CSI-RS-based L1-RSRP absolute measurement accuracy requirements.....	816
5.7.4.0.4	CSI-RS-based L1-RSRP relative measurement accuracy requirements.....	817
5.7.4.1	EN-DC FR2 SSB based L1-RSRP measurement accuracy.....	818
5.7.4.2	EN-DC FR2 CSI-RS based L1-RSRP measurement accuracy	824
5.7.5	SRS-RSRP	830
5.7.5.0	Minimum conformance requirements	830
5.7.5.0.1	Minimum conformance requirements for SRS-RSRP measurement accuracy.....	830
5.7.5.1	EN-DC FR2 SRS-RSRP measurement accuracy	832
6	NR standalone in FR1	837
6.0	General	837
6.1	RRC_IDLE state mobility	837
6.1.1	NR cell re-selection	837
6.1.1.0	Minimum conformance requirements	837

6.1.1.0.1	Minimum conformance requirements for intra-frequency cell re-selection	837
6.1.1.0.2	Minimum conformance requirements for inter-frequency cell re-selection	837
6.1.1.0.3	Minimum conformance requirements for intra-frequency cell re-selection for UE configured with highSpeedMeasFlag-r16	839
6.1.1.0.4	Minimum conformance requirements for intra-frequency cell re-selection when UE configured with relaxed measurement criterion	839
6.1.1.0.5	Minimum conformance requirements for inter-frequency cell re-selection when UE configured with relaxed measurement criterion	841
6.1.1.1	NR SA FR1 cell re-selection	843
6.1.1.2	NR SA FR1-FR1 cell re-selection	849
6.1.1.3	NR SA FR1 cell re-selection for UE fulfilling low mobility relaxed measurement criterion	853
6.1.1.4	NR SA FR1 cell re-selection for UE fulfilling not-at-cell edge relaxed measurement criterion	860
6.1.1.5	NR SA FR1-FR1 cell re-selection for UE fulfilling low mobility relaxed measurement criterion	866
6.1.1.6	NR SA FR1-FR1 cell re-selection for UE fulfilling not-at-cell edge relaxed measurement criterion	872
6.1.1.7	NR SA FR1 cell re-selection for UE configured with highSpeedMeasFlag-r16	878
6.1.2	NR – E-UTRA cell re-selection	883
6.1.2.0	Minimum conformance requirements	883
6.1.2.0.1	Minimum conformance requirements for NR – E-UTRA cell re-selection	883
6.1.2.0.2	Minimum conformance requirement for inter-RAT E-UTRAN cells for UE configured with relaxed measurement criterion	885
6.1.2.1	NR SA FR1 – E-UTRA cell re-selection to higher priority E-UTRA	887
6.1.2.2	NR SA FR1 – E-UTRA cell re-selection to lower priority E-UTRA	892
6.1.2.3	NR SA FR1 – E-UTRA cell re-selection to lower priority E-UTRAN for UE fulfilling low mobility relaxed measurement criterion	898
6.1.2.4	NR SA FR1 – E-UTRA cell re-selection to lower priority E-UTRAN for UE fulfilling not-at-cell edge relaxed measurement criterion	904
6.1.2.5	NR SA FR1 – E-UTRA cell re-selection to lower priority E-UTRA for UE configured with highSpeedMeasFlag-r16	909
6.2	RRC_INACTIVE state mobility	915
6.3	RRC_CONNECTED state mobility	915
6.3.1	Handover	915
6.3.1.0	Minimum conformance requirements	915
6.3.1.0.1	Minimum conformance requirements for NR – E-UTRAN handover	915
6.3.1.0.2	Minimum conformance requirements for NR FR1 – NR FR1 handover	915
6.3.1.0.3	Minimum conformance requirements for NR – UTRAN handover	916
6.3.1.0.4	Minimum conformance requirements for NR FR1- NR FR1 DAPS handover	917
6.3.1.1	NR SA FR1 handover with known target cell	919
6.3.1.2	NR SA FR1 handover with unknown target cell	923
6.3.1.3	NR SA FR1-FR1 handover with unknown target cell	926
6.3.1.4	NR SA FR1 – E-UTRA handover with known target cell	929
6.3.1.5	NR SA FR1 – E-UTRA handover with unknown target cell	936
6.3.1.6	NR SA FR1 – UTRAN FDD handover with known target cell	941
6.3.1.7	NR SA FR1 synchronous DAPS handover	947
6.3.1.8	NR SA FR1 asynchronous DAPS handover	955
6.3.1.9	NR SA FR1 Intra-band inter-frequency synchronous DAPS handover	960
6.3.1.10	NR SA FR1 Intra-band inter-frequency asynchronous DAPS handover	968
6.3.1.11	NR SA FR1 Inter-band inter-frequency synchronous DAPS handover	975
6.3.1.12	NR SA FR1 Inter-band inter-frequency asynchronous DAPS handover	984
6.3.2	RRC connection mobility control	992
6.3.2.1	RRC re-establishment	992
6.3.2.1.0	Minimum conformance requirements	992
6.3.2.1.1	NR SA FR1 RRC re-establishment	994
6.3.2.1.2	NR SA FR1 - FR1 RRC re-establishment	998
6.3.2.1.3	NR SA FR1 RRC re-establishment without serving cell timing	1002
6.3.2.2	Random access	1006
6.3.2.2.0	Minimum conformance requirements	1006
6.3.2.2.1	NR SA FR1 contention based random access	1008
6.3.2.2.2	NR SA FR1 non-contention based random access	1014
6.3.2.2.3	NR SA FR2 2-step contention based random access	1021
6.3.2.2.4	NR SA FR2 2-step non-contention based random access	1024
6.3.2.3	RRC connection release with redirection	1028

6.3.2.3.0	Minimum conformance requirements.....	1028
6.3.2.3.1	NR SA FR1 RRC connection release with redirection	1030
6.3.2.3.2	NR SA FR1 – E-UTRA RRC connection release with redirection	1033
6.3.3	Conditional handover.....	1038
6.3.3.0	Minimum conformance requirements	1038
6.3.3.0.1	Minimum conformance requirements for NR FR1 intra-frequency conditional handover.....	1038
6.3.3.0.2	Minimum conformance requirements for NR FR1 inter-frequency conditional handover.....	1041
6.3.3.1	NR SA FR1 conditional handover	1044
6.3.3.2	NR SA FR1-FR1 conditional handover	1051
6.4	Timing	1059
6.4.1	UE transmit timing	1059
6.4.1.0	Minimum conformance requirements	1059
6.4.1.1	NR SA FR1 UE transmit timing accuracy	1060
6.4.2	UE timer accuracy	1066
6.4.3	Timing advance	1066
6.4.3.0	Minimum conformance requirement.....	1066
6.4.3.0.1	Minimum conformance requirement for timing advance adjustment.....	1066
6.4.3.1	NR SA FR1 timing advance adjustment accuracy	1066
6.5	Signaling characteristics.....	1071
6.5.1	Radio link monitoring.....	1071
6.5.1.00	General	1071
6.5.1.0	Minimum conformance requirements	1072
6.5.1.0.1	Minimum conformance requirements for out-of-sync SSB-based RLM.....	1072
6.5.1.0.2	Minimum conformance requirements for in-sync SSB-based RLM	1074
6.5.1.0.3	Minimum conformance requirements for out-of-sync and in-sync CSI-RS based RLM	1075
6.5.1.1	NR SA FR1 radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in non-DRX mode	1076
6.5.1.2	NR SA FR1 radio link monitoring in-sync test for PCell configured with SSB-based RLM RS in non-DRX mode	1081
6.5.1.3	NR SA FR1 radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in DRX mode	1088
6.5.1.4	NR SA FR1 radio link monitoring in-sync test for PCell configured with SSB-based RLM RS in DRX mode	1093
6.5.1.5	NR SA FR1 radio link monitoring out-of-sync test for PCell configured with CSI-RS-based RLM RS in non-DRX mode	1100
6.5.1.6	NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in non-DRX mode	1107
6.5.1.7	NR SA FR1 radio link monitoring out-of-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode.....	1113
6.5.1.8	NR SA FR1 radio link monitoring in-sync test for PCell configured with CSI-RS-based RLM RS in DRX mode	1120
6.5.2	Interruption	1126
6.5.2.0	Minimum conformance requirements	1126
6.5.2.0.1	Minimum conformance requirements for interruptions during measurements on deactivated NR SCC.....	1126
6.5.2.1	NR SA FR1 interruptions during measurements on deactivated NR SCC.....	1127
6.5.3	SCell activation and deactivation delay.....	1133
6.5.3.0	Minimum conformance requirements	1133
6.5.3.0.1	Minimum conformance requirements for SCell activation and deactivation delay.....	1133
6.5.3.1	NR SA FR1 SCell activation and deactivation of known SCell in non-DRX for 160ms SCell measurement cycle.....	1134
6.5.3.2	NR SA FR1 SCell activation and deactivation of known SCell in non-DRX for 640ms SCell measurement cycle.....	1143
6.5.3.3	NR SA FR1 SCell activation and deactivation of unknown SCell in non-DRX.....	1145
6.5.4	UE UL carrier RRC reconfiguration delay	1147
6.5.4.0	Minimum conformance requirements	1147
6.5.4.0.1	Minimum conformance requirements for UL carrier RRC reconfiguration delay	1147
6.5.4.1	NR SA FR1 UE UL carrier RRC reconfiguration delay	1147
6.5.5	Link recovery procedures	1155
6.5.5.0	Minimum conformance requirements	1155
6.5.5.0.1	Minimum conformance requirements for SSB-based BFD and link recovery procedures.....	1155
6.5.5.0.3	Scheduling availability of UE during beam failure detection and candidate beam detection.....	1155

6.5.5.0.4	Requirements for Beam Failure Recovery in SCell.....	1155
6.5.5.0.2	Minimum conformance requirements for CSI-RS-based BFD and link recovery procedures	1155
6.5.5.1	NR SA FR1 SSB-based beam failure detection and link recovery in non-DRX.....	1157
6.5.5.2	NR SA FR1 SSB-based beam failure detection and link recovery in DRX.....	1165
6.5.5.3	NR SA FR1 CSI-RS-based beam failure detection and link recovery in non-DRX	1172
6.5.5.4	NR SA FR1 CSI-RS-based beam failure detection and link recovery in DRX.....	1180
6.5.5.5	NR SA FR1 SCell CSI-RS-based beam failure detection and SSB-based link recovery in non-DRX	1187
6.5.5.6	NR SA FR1 SCell CSI-RS-based beam failure detection and SSB-based link recovery in DRX	1193
6.5.6	Active BWP switch delay.....	1200
6.5.6.1	DCI-based and time-based active BWP switch.....	1200
6.5.6.1.0	Minimum conformance requirements.....	1200
6.5.6.1.1	NR SA FR1-DCI-based DL active BWP switch in non-DRX.....	1202
6.5.6.1.2	NR SA FR1 DCI-based DL active BWP switch in non-DRX.....	1210
6.5.6.2	RRC-based active BWP switch.....	1219
6.5.6.2.0	Minimum conformance requirements.....	1219
6.5.6.2.1	NR SA FR1 RRC-based DL active BWP switch in non-DRX.....	1219
6.5.7	DL interruptions at switching between two uplink carriers	1227
6.5.7.0	Minimum conformance requirements	1227
6.5.7.1	NR SA FR1 DL Interruptions at switching between two uplink carriers in FDD-TDD CA	1228
6.5.7.2	NR SA FR1 DL Interruptions at switching between two uplink carriers in TDD-TDD CA	1240
6.6	Measurement procedures.....	1249
6.6.1	Intra-frequency measurements.....	1249
6.6.1.0	Minimum conformance requirements	1249
6.6.1.0.1	Minimum conformance requirements for event-triggered measurement without gap.....	1249
6.6.1.0.2	Minimum conformance requirements for event-triggered measurement with gap.....	1250
6.6.1.0.3	Minimum conformance requirements for event-triggered measurement without gap with SSB index reading	1251
6.6.1.0.4	Minimum conformance requirements for event-triggered measurement with gap with SSB index reading	1253
6.6.1.0.5	Minimum conformance requirements for event-triggered measurement without gap for UE configured with highSpeedMeasFlag-r16.....	1254
6.6.1.1	NR SA FR1 event-triggered reporting without gap in non-DRX.....	1256
6.6.1.2	NR SA FR1 event-triggered reporting without gap in DRX	1260
6.6.1.3	NR SA FR1 event-triggered reporting with gap in non-DRX.....	1265
6.6.1.4	NR SA FR1 event-triggered reporting with gap in DRX	1271
6.6.1.5	NR SA FR1 event-triggered reporting without gap in non-DRX with SSB index reading.....	1276
6.6.1.6	NR SA FR1 event-triggered reporting with gap in non-DRX with SSB index reading.....	1280
6.6.1.7	NR SA FR1 event-triggered reporting without gap in DRX for UE configured with highSpeedMeasFlag-r16	1284
6.6.2	Inter-frequency measurements.....	1289
6.6.2.0	Minimum conformance requirements for Inter-frequency measurements	1289
6.6.2.1	NR SA FR1-FR1 event-triggered reporting in non-DRX	1289
6.6.2.2	NR SA FR1-FR1 event-triggered reporting in DRX.....	1295
6.6.2.3	Void.....	1301
6.6.2.4	Void.....	1301
6.6.2.5	NR SA FR1-FR1 event-triggered reporting in non-DRX with SSB time index detection	1301
6.6.2.6	NR SA FR1-FR1 event-triggered reporting in DRX with SSB time index detection	1308
6.6.2.7	Void.....	1314
6.6.2.8	Void.....	1314
6.6.3	Inter-RAT Measurements	1314
6.6.3.0	Minimum conformance requirements	1314
6.6.3.0.1	Minimum conformance requirements for inter-RAT event triggered reporting to E-UTRAN FDD	1314
6.6.3.0.2	Minimum conformance requirements for inter-RAT event triggered reporting to E-UTRAN TDD.....	1317
6.6.3.1	NR SA FR1 – E-UTRAN event-triggered reporting in non-DRX	1319
6.6.3.2	NR SA FR1 – E-UTRAN event-triggered reporting in DRX	1327
6.6.3.3	NR SA FR1 – E-UTRAN event-triggered reporting in DRX for UE configured with highSpeedMeasFlag-r16	1333
6.6.4	L1-RSRP measurement for beam reporting.....	1338
6.6.4.0	Minimum conformance requirements	1338

6.6.4.0.1	Minimum conformance requirements for SSB-based L1-RSRP measurement for beam reporting	1338
6.6.4.0.2	Minimum conformance requirements for CSI-RS-based L1-RSRP measurement for beam reporting	1338
6.6.4.1	NR SA FR1 SSB-based L1-RSRP measurement in non-DRX	1338
6.6.4.2	NR SA FR1 SSB-based L1-RSRP measurement in DRX.....	1342
6.6.4.3	NR SA FR1 CSI-RS-based L1-RSRP measurement in non-DRX	1346
6.6.4.4	NR SA FR1 CSI-RS-based L1-RSRP measurement in DRX	1350
6.6.4.5	NR SA FR1 SSB-based L1-RSRP measurement in DRX for UE configured with highSpeedMeasFlag-r16	1353
6.6.5	UTRAN inter-RAT measurement.....	1358
6.6.5.1	NR SA FR1 – UTRAN event-triggered reporting in non-DRX	1358
6.6.6 to 6.6.7	1365	
6.6.8	L1-SINR measurement for beam reporting	1365
6.6.8.0	Minimum conformance requirements	1365
6.6.8.0.1	L1-SINR reporting with CSI-RS based CMR and no dedicated IMR configured.....	1365
6.6.8.0.2	L1-SINR reporting with SSB based CMR and dedicated IMR configured	1365
6.6.8.0.3	L1-SINR reporting with CSI-RS based CMR and dedicated IMR configured.....	1365
6.6.8.1	NR SA FR1 CSI-RS based CMR and no dedicated IMR L1-SINR measurement in DRX	1365
6.6.8.2	NR SA FR1 SSB based CMR and dedicated IMR L1-SINR measurement in non-DRX	1371
6.6.8.3	NR SA FR1 CSI-RS based CMR and dedicated IMR L1-SINR measurement in non-DRX.....	1377
6.6.9	Idle Mode CA/DC Measurements	1383
6.6.9.0	Minimum conformance requirements.....	1383
6.6.9.1	NR SA FR1 SA Idle mode CA/DC measurement for FR1.....	1383
6.6.10 to 6.6.14.....		1390
6.6.15	Idle Mode inter-RAT CA/DC Measurements	1390
6.6.15.0	Minimum conformance requirements.....	1390
6.6.15.1	NR SA FR1 Idle Mode measurements of inter-RAT CA candidate cells for early reporting	1390
6.7	Measurement performance requirements	1397
6.7.1	SS-RSRP.....	1397
6.7.1.0	Minimum conformance requirements	1397
6.7.1.0.1	Intra-frequency absolute SS-RSRP measurement accuracy requirements.....	1397
6.7.1.0.2	Intra-frequency relative SS-RSRP measurement accuracy requirements	1397
6.7.1.0.3	Inter-frequency absolute SS-RSRP measurement accuracy requirements.....	1397
6.7.1.0.4	Inter-frequency relative SS-RSRP measurement accuracy requirements.....	1397
6.7.1.1	Intra-frequency measurements	1397
6.7.1.1.1	NR SA FR1 SS-RSRP absolute measurement accuracy.....	1397
6.7.1.1.2	NR SA FR1 SS-RSRP relative measurement accuracy	1404
6.7.1.2	Inter-frequency measurements	1406
6.7.1.2.1	NR SA FR1-FR1 SS-RSRP absolute measurement accuracy	1406
6.7.1.2.2	NR SA FR1-FR1 SS-RSRP relative measurement accuracy.....	1413
6.7.2	SS-RSRQ	1415
6.7.2.0	Minimum conformance requirements	1415
6.7.2.0.1	Intra-frequency SS-RSRQ measurement accuracy requirements	1415
6.7.2.0.2	Inter-frequency SS-RSRQ absolute measurement accuracy requirements	1415
6.7.2.0.3	Inter-frequency SS-RSRQ relative measurement accuracy requirements	1415
6.7.2.1	NR SA FR1 SS-RSRQ measurement accuracy.....	1415
6.7.2.2	Inter-Frequency SS-RSRQ measurement accuracy.....	1419
6.7.2.2.1	NR SA FR1-FR1 SS-RSRQ absolute measurement accuracy.....	1419
6.7.2.2.2	NR SA FR1-FR1 SS-RSRQ relative measurement accuracy	1424
6.7.3	SS-SINR	1426
6.7.3.0	Minimum conformance requirements	1426
6.7.3.0.1	Intra-frequency SS-SINR measurement accuracy requirements	1426
6.7.3.0.2	Inter-frequency absolute SS-SINR measurement accuracy requirements	1426
6.7.3.0.3	Inter-frequency relative SS-SINR measurement accuracy requirements.....	1426
6.7.3.1	NR SA FR1 SS-SINR measurement accuracy	1426
6.7.3.2	Inter-Frequency SS-SINR measurement accuracy	1430
6.7.3.2.1	NR SA FR1-FR1 SS-SINR absolute measurement accuracy	1430
6.7.3.2.2	NR SA FR1-FR1 SS-SINR relative measurement accuracy	1434
6.7.4	L1-RSRP.....	1436
6.7.4.0	Minimum conformance requirements	1436
6.7.4.0.1	SSB based absolute L1-RSRP measurement accuracy requirements	1436

6.7.4.0.2	SSB based relative L1-RSRP measurement accuracy requirements.....	1436
6.7.4.0.3	CSI-RS based absolute L1-RSRP measurement accuracy requirements.....	1436
6.7.4.0.4	CSI-RS based relative L1-RSRP measurement accuracy requirements	1436
6.7.4.1	SSB based L1-RSRP measurements	1436
6.7.4.1.1	NR SA FR1 SSB based L1-RSRP absolute measurement accuracy	1436
6.7.4.1.2	NR SA FR1 SSB based L1-RSRP relative measurement accuracy.....	1441
6.7.4.2	CSI-RS based L1-RSRP measurements	1443
6.7.4.2.1	NR SA FR1 CSI-RS based L1-RSRP absolute measurement accuracy	1443
6.7.4.2.2	NR SA FR1 CSI-RS based L1-RSRP relative measurement accuracy.....	1447
6.7.5	E-UTRAN RSRP	1449
6.7.5.0	Minimum conformance requirements	1449
6.7.5.0.1	E-UTRAN RSRP absolute accuracy	1449
6.7.5.1	NR SA FR1 – E-UTRAN RSRP absolute measurement accuracy.....	1450
6.7.6	E-UTRAN RSRQ	1457
6.7.6.0	Minimum conformance requirements	1457
6.7.6.0.1	E-UTRAN RSRQ absolute accuracy.....	1457
6.7.6.1	NR SA FR1 – E-UTRAN RSRQ absolute measurement accuracy.....	1458
6.7.7	E-UTRAN RS-SINR.....	1464
6.7.7.0	Minimum conformance requirements	1464
6.7.7.0.1	E-UTRAN RS-SINR absolute accuracy.....	1464
6.7.7.1	NR SA FR1 – E-UTRAN RS-SINR absolute measurement accuracy.....	1465
6.7.8	1472	
6.7.9	L1-SINR measurement for beam reporting	1472
6.7.9.0	Minimum conformance requirements	1472
6.7.9.0.1	Minimum conformance requirements for CSI-RS based CMR and no dedicated IMR configured and CSI-RS resource set with repetition off.....	1472
6.7.9.0.2	Minimum conformance requirements for SSB based CMR and dedicated IMR.....	1475
6.7.9.0.3	Minimum conformance requirements for CSI-RS based CMR and dedicated IMR	1477
6.7.9.1	NR SA FR1 CSI-RS based CMR and no dedicated IMR configured and CSI-RS resource set with repetition off L1-SINR measurement accuracy.....	1481
6.7.9.2	NR SA FR1 SSB based CMR and dedicated IMR L1-SINR absolute measurement accuracy.....	1485
6.7.9.3	NR SA FR1 CSI-RS based CMR and dedicated IMR L1-SINR measurement accuracy	1490
7	NR standalone with at least one NR cell in FR2.....	1496
7.0	General	1496
7.1	RRC_IDLE state mobility	1496
7.1.1	NR cell re-selection	1496
7.1.1.0	Minimum conformance requirements	1496
7.1.1.0.1	Minimum conformance requirements for intra-frequency cell re-selection	1496
7.1.1.0.2	Minimum conformance requirements for inter-frequency cell re-selection	1496
7.1.1.0.3	Minimum conformance requirements for intra-frequency cell re-selection for UE configured with relaxed measurement criterion.....	1498
7.1.1.0.4	Minimum conformance requirements for inter-frequency cell re-selection for UE configured with relaxed measurement criterion.....	1499
7.1.1.1	NR SA FR2 cell re-selection	1500
7.1.1.2	NR SA FR2-FR2 cell re-selection.....	1505
7.1.1.3	NR SA FR2 cell re-selection for UE fulfilling low mobility relaxed measurement criterion	1510
7.1.1.4	NR SA FR2 cell re-selection for UE fulfilling not-at-cell edge relaxed measurement criterion.....	1515
7.1.1.5	NR SA FR2-FR2 cell re-selection for UE fulfilling low mobility relaxed measurement criterion...	1520
7.1.1.6	NR SA FR2-FR2 cell re-selection for UE fulfilling not-at-cell edge relaxed measurement criterion	1525
7.2	RRC_INACTIVE state mobility	1530
7.3	RRC_CONNECTED state mobility	1530
7.3.1	Handover	1530
7.3.1.4	NR SA FR1-FR2 synchronous DAPS handover	1530
7.3.1.5	NR SA FR1-FR2 asynchronous DAPS handover	1541
7.3.2	RRC connection mobility control	1548
7.3.2.1	RRC re-establishment	1548
7.3.2.1.0	Minimum conformance requirements.....	1548
7.3.2.1.1	NR SA FR2 RRC re-establishment	1549
7.3.2.1.2	NR SA FR2 - FR2 RRC re-establishment	1553
7.3.2.1.3	NR SA FR2 RRC re-establishment without serving cell timing	1556