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TECHNICAL SPECIFICATION

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NR;**

**User Equipment (UE) radio transmission and reception;  
Part 3: Range 1 and Range 2 Interworking operation  
with other radios  
(3GPP TS 38.101-3 version 15.8.0 Release 15)**



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# Contents

Intellectual Property Rights .....	2
Legal Notice .....	2
Modal verbs terminology.....	2
Foreword.....	9
1 Scope .....	10
2 References .....	10
3 Definitions, symbols and abbreviations .....	11
3.1 Definitions .....	11
3.2 Symbols.....	11
3.3 Abbreviations .....	11
4 General .....	12
4.1 Relationship between minimum requirements and test requirements .....	12
4.2 Applicability of minimum requirements .....	12
4.3 Specification suffix information.....	13
5 Operating bands and channel arrangement.....	14
5.1 General .....	14
5.2 Operating bands.....	14
5.2A Operating bands for CA .....	14
5.2A.1 Inter-band CA between FR1 and FR2.....	14
5.2B Operating bands for DC .....	15
5.2B.1 General.....	15
5.2B.2 Void .....	15
5.2B.3 Void .....	15
5.2B.4 Void .....	15
5.2B.5 Void .....	15
5.2B.6 Void .....	15
5.2B.7 Void .....	15
5.3 UE Channel bandwidth .....	15
5.3A UE Channel bandwidth for CA .....	15
5.3A.1 Inter-band CA between FR1 and FR2.....	15
5.3B UE Channel bandwidth for EN-DC.....	15
5.3B.1 Intra-band EN-DC in FR1.....	16
5.3B.1.1 General .....	16
5.3B.1.2 BCS for Intra-band contiguous EN-DC .....	16
5.3B.1.3 BCS for Intra-band non-contiguous EN-DC.....	17
5.3B.2 Void.....	18
5.4 Channel arrangement for CA.....	18
5.4B Channel arrangement for DC.....	18
5.4B.1 Channel spacing for intra-band EN-DC carriers.....	18
5.5 Configuration .....	19
5.5A Configuration for CA .....	19
5.5A.1 Inter-band CA configurations between FR1 and FR2.....	19
5.5B Configuration for DC .....	20
5.5B.1 General.....	20
5.5B.2 Intra-band contiguous EN-DC .....	21
5.5B.3 Intra-band non-contiguous EN-DC.....	21
5.5B.4 Inter-band EN-DC within FR1.....	22
5.5B.4.1 Inter-band EN-DC configurations within FR1 (two bands) .....	22
5.5B.4.2 Inter-band EN-DC configurations within FR1 (three bands) .....	24
5.5B.4.3 Inter-band EN-DC configurations within FR1 (four bands) .....	29
5.5B.4.4 Inter-band EN-DC configurations within FR1 (five bands).....	33
5.5B.4.5 Inter-band EN-DC configurations within FR1 (six bands) .....	35
5.5B.4a Inter-band NE-DC within FR1.....	35

5.5B.4a.1	Inter-band NE-DC configurations within FR1 (two bands) .....	35
5.5B.5	Inter-band EN-DC including FR2 .....	36
5.5B.5.1	Inter-band EN-DC configurations including FR2 (two bands) .....	36
5.5B.5.2	Inter-band EN-DC configurations including FR2 (three bands) .....	40
5.5B.5.3	Inter-band EN-DC configurations including FR2 (four bands) .....	43
5.5B.5.4	Inter-band EN-DC configurations including FR2 (five bands) .....	44
5.5B.5.5	Void .....	46
5.5B.6	Inter-band EN-DC including FR1 and FR2 .....	46
5.5B.6.1	Void .....	46
5.5B.6.2	Inter-band EN-DC configurations including FR1 and FR2 (three bands) .....	46
5.5B.6.3	Inter-band EN-DC configurations including FR1 and FR2 (four bands) .....	48
5.5B.6.4	Inter-band EN-DC configurations including FR1 and FR2 (five bands) .....	49
5.5B.6.5	Inter-band EN-DC configurations including FR1 and FR2 (six bands) .....	50
5.5B.7	Inter-band NR-DC between FR1 and FR2 .....	50
5.5B.7.1	Inter-band NR-DC configurations between FR1 and FR2 (two bands) .....	50
6	Transmitter characteristics .....	51
6.1	General .....	51
6.2	Void .....	51
6.2A	Transmitter power for CA .....	51
6.2A.1	UE maximum output power for CA .....	51
6.2A.1.1	Inter-band CA between FR1 and FR2 .....	51
6.2A.2	UE maximum output power reduction for CA .....	51
6.2A.2.1	Inter-band CA between FR1 and FR2 .....	51
6.2A.3	UE additional maximum output power reduction for CA .....	51
6.2A.4	Configured output power for CA .....	52
6.2A.4.1	Configured output power level .....	52
6.2A.4.2	$\Delta T_{IB,c}$ for CA .....	52
6.2A.4.2.1	$\Delta T_{IB,c}$ for Inter-band CA between FR1 and FR2 .....	52
6.2B	Transmitter power for DC .....	52
6.2B.1	UE maximum output power for DC .....	52
6.2B.1.1	Intra-band contiguous EN-DC .....	52
6.2B.1.2	Intra-band non-contiguous EN-DC .....	53
6.2B.1.3	Inter-band EN-DC within FR1 .....	53
6.2B.1.3a	Inter-band NE-DC within FR1 .....	55
6.2B.1.4	Inter-band EN-DC including FR2 .....	56
6.2B.1.5	Inter-band EN-DC including both FR1 and FR2 .....	56
6.2B.2	UE maximum output power reduction for DC .....	56
6.2B.2.0	General .....	56
6.2B.2.1	Intra-band contiguous EN-DC .....	56
6.2B.2.1.1	General .....	56
6.2B.2.1.2	MPR for power class 3 and power class 2 .....	57
6.2B.2.2	Intra-band non-contiguous EN-DC .....	57
6.2B.2.2.1	General .....	57
6.2B.2.2.2	MPR for power class 3 and power class 2 .....	58
6.2B.2.3	Inter-band EN-DC within FR1 .....	59
6.2B.2.3a	Inter-band NE-DC within FR1 .....	59
6.2B.2.4	Inter-band EN-DC including FR2 .....	59
6.2B.2.5	Inter-band EN-DC including both FR1 and FR2 .....	59
6.2B.3	UE additional maximum output power reduction for EN-DC .....	59
6.2B.3.1	Intra-band contiguous EN-DC .....	59
6.2B.3.1.0	General .....	59
6.2B.3.1.1	A-MPR for DC <sub>(n)</sub> 71AA .....	59
6.2B.3.1.2	A-MPR for NS <sub>04</sub> .....	61
6.2B.3.2	Intra-band non-contiguous EN-DC .....	63
6.2B.3.2.0	General .....	63
6.2B.3.2.1	A-MPR for NS <sub>04</sub> .....	63
6.2B.3.3	Inter-band EN-DC within FR1 .....	65
6.2B.3.4	Inter-band EN-DC including FR2 .....	65
6.2B.3.5	Inter-band EN-DC including both FR1 and FR2 .....	65
6.2B.4	Configured output power for DC .....	65
6.2B.4.1	Configured output power level .....	65

6.2B.4.1.1	Intra-band contiguous EN-DC	65
6.2B.4.1.2	Intra-band non-contiguous EN-DC	69
6.2B.4.1.3a	Inter-band NE-DC within FR1	73
6.2B.4.1.4	Inter-band EN-DC including FR2	76
6.2B.4.1.5	Inter-band EN-DC including both FR1 and FR2	76
6.2B.4.2	$\Delta T_{IB,c}$ for DC	77
6.2B.4.2.0	General	77
6.2B.4.2.1	Intra-band contiguous EN-DC	77
6.2B.4.2.2	Intra-band non-contiguous EN-DC	77
6.2B.4.2.3	Inter-band EN-DC within FR1	77
6.2B.4.2.3.1	$\Delta T_{IB,c}$ for EN-DC two bands	77
6.2B.4.2.3.2	$\Delta T_{IB,c}$ for EN-DC three bands	79
6.2B.4.2.3.3	$\Delta T_{IB,c}$ for EN-DC four bands	84
6.2B.4.2.3.4	$\Delta T_{IB,c}$ for EN-DC five bands	88
6.2B.4.2.3.5	$\Delta T_{IB,c}$ for EN-DC six bands	90
6.2B.4.2.3a	Inter-band NE-DC within FR1	90
6.2B.4.2.4	Inter-band EN-DC including FR2	90
6.2B.4.2.4.1	$\Delta T_{IB,c}$ for EN-DC two bands	90
6.2B.4.2.4.2	$\Delta T_{IB,c}$ for EN-DC three bands	91
6.2B.4.2.4.3	$\Delta T_{IB,c}$ for EN-DC four bands	91
6.2B.4.2.4.4	$\Delta T_{IB,c}$ for EN-DC five bands	91
6.2B.4.2.4.5	Void	91
6.2B.4.2.5	Inter-band EN-DC including both FR1 and FR2	91
6.2B.4.2.5.1	$\Delta T_{IB,c}$ for EN-DC three bands	91
6.2B.4.2.5.2	$\Delta T_{IB,c}$ for EN-DC four bands	91
6.2B.4.2.5.3	$\Delta T_{IB,c}$ for EN-DC five bands	91
6.2B.4.2.5.4	$\Delta T_{IB,c}$ for EN-DC six bands	91
6.2B.5	Configured output power for NR-DC	92
6.2B.5.1	Configured output power level	92
6.2B.5.1.1	Inter-band NR-DC between FR1 and FR2	92
6.3	Output power dynamics	92
6.3A	Output power dynamics for CA	92
6.3B	Output power dynamics for DC	92
6.3B.0	General	92
6.3B.1	Output power dynamics for EN-DC with UL sharing from UE perspective	92
6.3B.1.1	E-UTRA and NR switching time mask for TDM based UL sharing from UE perspective	92
6.3B.1a	Output power dynamics for NE-DC with UL sharing from UE perspective	94
6.3B.2	Output power dynamics for intra-band EN-DC without dual PA capability	94
6.3B.3	Output power dynamics for intra-band EN-DC with dual PA capability	94
6.4	Void	95
6.4A	Transmit signal quality for CA	95
6.4A.1	Frequency error for CA	95
6.4A.2	Transmit modulation quality for CA	95
6.4B	Transmit signal quality for DC	95
6.4B.2	Transmit modulation quality for DC	96
6.4B.2.1	Transmit modulation quality for Intra-band contiguous EN-DC	96
6.4B.2.1.1	Error Vector Magnitude	96
6.4B.2.1.2	Carrier leakage	96
6.4B.2.1.3	In-band emissions	96
6.4B.2.2	Transmit modulation quality for Intra-band non-contiguous EN-DC	97
6.4B.2.2.1	Error Vector Magnitude	97
6.4B.2.2.2	Carrier leakage	97
6.4B.2.2.3	In-band emissions	97
6.4B.2.3a	Transmit modulation quality for Inter-band NE-DC within FR1	97
6.4B.2.4	Transmit modulation quality for Inter-band EN-DC including FR2	97
6.4B.2.5	Transmit modulation quality for inter-band EN-DC including both FR1 and FR2	97
6.5	Void	98
6.5A	Output RF spectrum emissions for CA	98
6.5A.1	Occupied bandwidth for CA	98
6.5A.2	Out-of-band emissions for CA	98
6.5A.3	Spurious emissions for CA	98
6.5A.3.1	Inter-band CA between FR1 and FR2	98

6.5A.4	Transmit intermodulation for CA .....	98
6.5B	Output RF spectrum emissions for DC.....	98
6.5B.1	Occupied bandwidth for EN-DC .....	98
6.5B.1.4	Inter-band EN-DC including FR2 .....	98
6.5B.1.5	Inter-band EN-DC including both FR1 and FR2 .....	99
6.5B.2	Out-of-band emissions for DC.....	99
6.5B.2.1	Intra-band contiguous EN-DC .....	99
6.5B.2.1.1	Spectrum emissions mask.....	99
6.5B.2.1.2	Additional spectrum emissions mask .....	99
6.5B.2.1.2.1	Requirements for network signalled value "NS_35" .....	99
6.5B.2.1.2.2	Requirements for network signalled value "NS_04" .....	100
6.5B.2.1.3	Adjacent channel leakage ratio.....	100
6.5B.2.2	Intra-band non-contiguous EN-DC .....	101
6.5B.2.2.1	Spectrum emissions mask.....	101
6.5B.2.2.2	Additional spectrum emissions mask .....	101
6.5B.2.2.3	Adjacent channel leakage ratio.....	101
6.5B.2.3	Inter-band EN-DC within FR1 .....	101
6.5B.2.3a	Inter-band NE-DC within FR1 .....	101
6.5B.2.4	Inter-band EN-DC including FR2 .....	101
6.5B.2.5	Inter-band EN-DC including both FR1 and FR2 .....	101
6.5B.3	Spurious emissions for DC .....	102
6.5B.3.1	Intra-band contiguous EN-DC .....	102
6.5B.3.1.1	General spurious emissions .....	102
6.5B.3.1.2	Spurious emission band UE co-existence .....	102
6.5B.3.2	Intra-band non-contiguous EN-DC .....	102
6.5B.3.2.1	General spurious emissions .....	102
6.5B.3.2.2	Spurious emission band UE co-existence .....	102
6.5B.3.3	Inter-band EN-DC within FR1 .....	103
6.5B.3.3.2	Spurious emission band UE co-existence .....	103
6.5B.3.3a	Inter-band NE-DC within FR1 .....	111
6.5B.3.3a.1	General spurious emissions .....	111
6.5B.3.3a.2	Spurious emission band UE co-existence .....	111
6.5B.3.4	Inter-band EN-DC including FR2 .....	111
6.5B.3.4.1	Spurious emission band UE co-existence .....	111
6.5B.3.5	Inter-band EN-DC including both FR1 and FR2 .....	112
6.5B.3.5.1	Spurious emission band UE co-existence .....	112
6.5B.4	Additional spurious emissions .....	112
6.5B.4.1	General .....	112
6.5B.4.1.1	Minimum requirement (network signalled value "NS_04").....	112
6.5B.5	Transmit intermodulation for DC .....	112
6.5B.5.1	Intra-band contiguous EN-DC .....	112
6.5B.5.2	Intra-band non-contiguous EN-DC .....	113
6.5B.5.3	Inter-band EN-DC within FR1 .....	113
6.5B.5.3a	Inter-band NE-DC within FR1 .....	113
6.5B.5.4	Inter-band EN-DC including FR2 .....	113
6.5B.5.5	Inter-band EN-DC including both FR1 and FR2 .....	113
6.6B	Beam correspondence for DC .....	113
6.6B.1	Void .....	113
6.6B.2	Void .....	113
6.6B.3	Void .....	113
6.6B.4	Inter-band EN-DC including FR2.....	113
6.6B.5	Inter-band EN-DC including both FR1 and FR2 .....	113
7	Receiver characteristics .....	113
7.1	General .....	113
7.2	Void.....	114
7.3	Void.....	114
7.3A	Reference sensitivity for CA .....	114
7.3A.1	General.....	114
7.3A.2	Reference sensitivity power level for CA .....	115
7.3A.3	$\Delta R_{IB,c}$ for CA .....	115
7.3A.3.1	$\Delta R_{IB,c}$ for Inter-band CA between FR1 and FR2 .....	115

7.3A.4	Void .....	115
7.3B	Reference sensitivity level for DC .....	115
7.3B.1	General.....	115
7.3B.2	Reference sensitivity for DC.....	116
7.3B.2.1	Intra-band contiguous EN-DC .....	116
7.3B.2.2	Intra-band non-contiguous EN-DC .....	116
7.3B.2.3	Inter-band EN-DC within FR1 .....	116
7.3B.2.3.1	Reference sensitivity exceptions due to UL harmonic interference for EN-DC in NR FR1 .....	116
7.3B.2.3.2	Reference sensitivity exceptions due to receiver harmonic mixing for EN-DC in NR FR1.....	118
7.3B.2.3.3	Void.....	120
7.3B.2.3.4	Reference sensitivity exceptions due to cross band isolation for EN-DC in NR FR1 .....	120
7.3B.2.3.5	MSD for intermodulation interference due to dual uplink operation for EN-DC in NR FR1 .....	121
7.3B.2.3.5.1	MSD test points for intermodulation interference due to dual uplink operation for EN-DC in NR FR1 involving two bands .....	122
7.3B.2.3.5.2	MSD test points for intermodulation interference due to dual uplink operation for EN-DC in NR FR1 involving three bands .....	123
7.3B.2.3.5.3	Void .....	129
7.3B.2.3a	Inter-band NE-DC within FR1 .....	129
7.3B.2.3a.1	Reference sensitivity exceptions due to UL harmonic interference for NE-DC in NR FR1 .....	129
7.3B.2.4	Inter-band EN-DC including FR2 .....	129
7.3B.2.4.1	Void.....	129
7.3B.2.5	Inter-band EN-DC including both FR1 and FR2 .....	129
7.3B.2.5.1	Reference sensitivity exceptions due to UL harmonic interference for EN-DC including both FR1 and FR2 .....	129
7.3B.3	$\Delta R_{IB,c}$ , $\Delta R_{IBNC}$ for DC .....	129
7.3B.3.0	General.....	129
7.3B.3.1	Intra-band contiguous EN-DC .....	131
7.3B.3.2	Intra-band non-contiguous EN-DC .....	131
7.3B.3.3	Inter-band EN-DC within FR1 .....	132
7.3B.3.3.1	$\Delta R_{IB,c}$ for EN-DC in two bands .....	132
7.3B.3.3.2	$\Delta R_{IB,c}$ for EN-DC three bands .....	133
7.3B.3.3.3	$\Delta R_{IB,c}$ for EN-DC four bands .....	136
7.3B.3.3.4	$\Delta R_{IB,c}$ for EN-DC five bands .....	139
7.3B.3.3.5	$\Delta R_{IB,c}$ for EN-DC six bands.....	141
7.3B.3.3a	Inter-band NE-DC within FR1 .....	141
7.3B.3.4	Inter-band EN-DC including FR2 .....	141
7.3B.3.4.1	$\Delta R_{IB,c}$ for EN-DC in two bands .....	141
7.3B.3.4.2	$\Delta R_{IB,c}$ for EN-DC three bands .....	141
7.3B.3.4.3	$\Delta R_{IB,c}$ for EN-DC four bands .....	141
7.3B.3.4.4	$\Delta R_{IB,c}$ for EN-DC five bands .....	141
7.3B.3.4.5	Void.....	142
7.3B.3.5	Inter-band EN-DC including both FR1 and FR2 .....	142
7.3B.3.5.2	$\Delta R_{IB,c}$ for EN-DC three bands .....	142
7.3B.3.5.3	$\Delta R_{IB,c}$ for EN-DC four bands.....	142
7.3B.3.5.4	$\Delta R_{IB,c}$ for EN-DC five bands .....	142
7.3B.3.5.5	$\Delta R_{IB,c}$ for EN-DC six bands.....	142
7.4	Void.....	142
7.4A	Maximum input level for CA .....	142
7.4B	Maximum input level for DC in FR1 .....	142
7.4B.1	Intra-band contiguous EN-DC in FR1 .....	142
7.4B.2	Intra-band non-contiguous EN-DC in FR1 .....	143
7.4B.3	Inter-band EN-DC within FR1.....	143
7.5	Void.....	143
7.5A	Adjacent channel selectivity for CA.....	143
7.5B	Adjacent channel selectivity for DC in FR1 .....	143
7.5B.1	Intra-band contiguous EN-DC in FR1 .....	143
7.5B.2	Intra-band non-contiguous EN-DC in FR1 .....	144
7.5B.3	Inter-band EN-DC within FR1.....	144
7.6	Void.....	146
7.6A	Blocking characteristics for CA .....	146
7.6B	Blocking characteristics for DC in FR1 .....	146
7.6B.1	General.....	146



7.6B.2	In-band blocking for DC in FR1 .....	146
7.6B.2.1	Intra-band contiguous EN-DC in FR1 .....	146
7.6B.2.2	Intra-band non-contiguous EN-DC in FR1 .....	146
7.6B.2.3	Inter-band EN-DC within FR1 .....	146
7.6B.3	Out-of-band blocking for DC in FR1 .....	147
7.6B.3.1	Intra-band contiguous EN-DC in FR1 .....	147
7.6B.3.2	Intra-band non-contiguous EN-DC in FR1 .....	147
7.6B.3.3	Inter-band EN-DC within FR1 .....	147
7.6B.3.3a	Inter-band NE-DC within FR1 .....	148
7.6B.3.4	Inter-band EN-DC including FR2 .....	149
7.6B.3.5	Inter-band EN-DC including both FR1 and FR2 .....	149
7.6B.4	Narrow band blocking for DC in FR1 .....	149
7.6B.4.1	Intra-band contiguous EN-DC in FR1 .....	149
7.6B.4.2	Intra-band non-contiguous EN-DC in FR1 .....	149
7.6B.4.3	Inter-band EN-DC within FR1 .....	149
7.7	Void .....	150
7.7A	Spurious response for CA .....	150
7.7B	Spurious response for DC in FR1 .....	150
7.7B.1	Intra-band contiguous EN-DC in FR1 .....	150
7.7B.2	Intra-band non-contiguous EN-DC in FR1 .....	150
7.7B.3	Inter-band EN-DC within FR1 .....	150
7.8	Void .....	151
7.8A	Intermodulation characteristics for CA .....	151
7.8B	Intermodulation characteristics for DC in FR1 .....	151
7.8B.1	General .....	151
7.8B.2	Wide band Intermodulation .....	151
7.8B.2.1	Intra-band contiguous EN-DC in FR1 .....	151
7.8B.2.2	Intra-band non-contiguous EN-DC in FR1 .....	152
7.8B.2.3	Inter-band EN-DC within FR1 .....	152
7.9	Void .....	152
7.9A	Spurious emissions for CA .....	152
7.9B	Spurious emissions for DC in FR1 .....	153
7.9B.1	Intra-band contiguous EN-DC in FR1 .....	153
7.9B.2	Intra-band non-contiguous EN-DC in FR1 .....	153
7.9B.3	Inter-band EN-DC within FR1 .....	153
<b>Annex A (normative):</b>	<b>Measurement channels .....</b>	<b>154</b>
<b>Annex B:</b>	<b>Void .....</b>	<b>166</b>
<b>Annex C:</b>	<b>Void .....</b>	<b>166</b>
<b>Annex D:</b>	<b>Void .....</b>	<b>166</b>
<b>Annex E:</b>	<b>Void .....</b>	<b>166</b>
<b>Annex F:</b>	<b>Void .....</b>	<b>166</b>
<b>Annex G:</b>	<b>Void .....</b>	<b>166</b>
<b>Annex H (normative):</b>	<b>Modified MPR behavior .....</b>	<b>167</b>
H.1	Indication of modified MPR behavior .....	167
<b>Annex I (normative):</b>	<b>Dual uplink interferer .....</b>	<b>168</b>
<b>Annex J:</b>	<b>Void .....</b>	<b>169</b>
<b>Annex K:</b>	<b>Void .....</b>	<b>169</b>
<b>Annex L (informative):</b>	<b>Change history .....</b>	<b>170</b>
History .....		177

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# 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:

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# 1 Scope

The present document establishes the minimum RF requirements for NR User Equipment (UE) Interworking operation with other radios. This includes but is not limited to additional requirements for carrier aggregation or NR dual connectivity between Range 1 and Range 2 and additional requirements due to NR non-standalone (NSA) operation mode with E-UTRA.

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# 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 38.101-1: "NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone"
- [3] 3GPP TS 38.101-2: "NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone"
- [4] 3GPP TS 36.101: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception"
- [5] 3GPP TS 38.521-3: "NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios"
- [6] Recommendation ITU-R M.1545: "Measurement uncertainty as it applies to test limits for the terrestrial component of International Mobile Telecommunications-2000"
- [7] 3GPP TS 36.211: "E-UTRA; Physical channels and modulation"
- [8] 3GPP TS 36.331: " Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification"
- [9] 3GPP TS 38.331: "NR; Radio Resource Control (RRC) protocol specification"
- [10] 3GPP TS 38.213: "NR; Physical layer procedures for control"
- [11] 3GPP TS 38.306: "NR; User Equipment (UE) radio access capabilities"
- [12] 3GPP TS 38.133: "NR; Requirements for support of radio resource management".

## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

### 3.2 Symbols

For the purposes of the present document, the following symbols apply:

$\Delta R_{IB,c}$	Allowed reference sensitivity relaxation due to support for CA or DC operation, for serving cell $c$ .
$\Delta T_{IB,c}$	Allowed maximum configured output power relaxation due to support for CA or DC operation, for serving cell $c$
$BW_{E-UTRA\_Channel}$	Channel bandwidth of E-UTRA carrier
$BW_{E-UTRA\_Channel\_CA}$	Channel bandwidth of E-UTRA sub-block which is composed of intra-band contiguous CA E-UTRA carriers
$BW_{NR\_Channel}$	Channel bandwidth of NR carrier
$BW_{NR\_Channel\_CA}$	Channel bandwidth of NR sub-block which is composed of intra-band contiguous CA NR carriers
$Ceil(x)$	Rounding upwards; $ceil(x)$ is the smallest integer such that $ceil(x) \geq x$
$EN-DC_{ACLR}$	The ratio of the filtered mean power centred on the aggregated sub-block bandwidth ENBW to the filtered mean power centred on an adjacent bandwidth of the same size ENBW
$E-UTRA_{ACLR}$	E-UTRA ACLR
$F_C$	<i>RF reference frequency</i> for the carrier center on the channel raster
$F_{DL\_low}$	The lowest frequency of the downlink <i>operating band</i>
$F_{DL\_high}$	The highest frequency of the downlink <i>operating band</i>
$F_{UL\_low}$	The lowest frequency of the uplink <i>operating band</i>
$F_{UL\_high}$	The highest frequency of the uplink <i>operating band</i>
$F_{OOB}$	The boundary between the NR out of band emission and spurious emission domains
$L_{CRB}$	Transmission bandwidth which represents the length of a contiguous resource block allocation expressed in units of resource blocks
$Max()$	The largest of given numbers
$Min()$	The smallest of given numbers
$NR_{ACLR}$	NR ACLR
$N_{RB}$	Transmission bandwidth configuration, expressed in units of resource blocks
$P_{CMAX}$	The configured maximum UE output power
$RB_{start}$	Indicates the lowest RB index of transmitted resource blocks
$W_{gap}$	The sub-block gap between the two sub-blocks

### 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

ACLR	Adjacent Channel Leakage Ratio
ACS	Adjacent Channel Selectivity
A-MPR	Additional Maximum Power Reduction
BCS	Bandwidth Combination Set
CA	Carrier Aggregation
CC	Component Carrier
DC	Dual Connectivity
EN-DC	E-UTRA/NR DC
EVM	Error Vector Magnitude
FDM	Frequency Division Multiplexing
FR	Frequency Range

ENBW	The aggregated bandwidth of an E-UTRA sub-block and an adjacent NR sub-block
ITU-R	Radiocommunication Sector of the International Telecommunication Union
MBW	Measurement bandwidth defined for the protected band
MPR	Allowed maximum power reduction
MSD	Maximum Sensitivity Degradation
MCG	Master Cell Group
NR	New Radio
NS	Network Signalling
NSA	Non-Standalone, a mode of operation where operation of an other radio is assisted with an other radio
OOB	Out-of-band
OOBE	Out-of-band emission
OTA	Over The Air
PRB	Physical Resource Block
RE	Resource Element
REFSENS	Reference Sensitivity
RF	Radio Frequency
Rx	Receiver
SCG	Secondary Cell Group
SCS	Subcarrier spacing
SEM	Spectrum Emission Mask
SUL	Supplementary uplink
TDM	Time Division Multiplex
Tx	Transmitter
UE	User Equipment
UL MIMO	Up Link Multiple Antenna transmission
ULSUP	Uplink sharing from UE perspective

## 4 General

### 4.1 Relationship between minimum requirements and test requirements

The present document is interwork specification for NR UE, covering RF characteristics and minimum performance requirements. Conformance to the present specification is demonstrated by fulfilling the test requirements specified in the conformance specification 3GPP TS 38.521-3 [5].

The Minimum Requirements given in this specification make no allowance for measurement uncertainty. The test specification TS 38.521-3 [5] defines test tolerances. These test tolerances are individually calculated for each test. The test tolerances are used to relax the minimum requirements in this specification to create test requirements. For some requirements, including regulatory requirements, the test tolerance is set to zero.

The measurement results returned by the test system are compared - without any modification - against the test requirements as defined by the shared risk principle.

The shared risk principle is defined in Recommendation ITU-R M.1545 [6].

### 4.2 Applicability of minimum requirements

- a) In this specification the Minimum Requirements are specified as general requirements and additional requirements. Where the Requirement is specified as a general requirement, the requirement is mandated to be met in all scenarios
- b) For specific scenarios for which an additional requirement is specified, in addition to meeting the general requirement, the UE is mandated to meet the additional requirements.