Annex A (normative): Measurement channels

A.1 General

The throughput values defined in the measurement channels specified in Annex A, are calculated and are valid per datastream (codeword). For multi-stream (more than one codeword) transmissions, the throughput referenced in the minimum requirements is the sum of throughputs of all datastreams (codewords).

The UE category entry in the definition of the reference measurement channel in Annex A is only informative and reveals the UE categories, which can support the corresponding measurement channel. Whether the measurement channel is used for testing a certain UE category or not is specified in the individual minimum requirements.

A.2 UL reference measurement channels

A.2.1 General

The measurement channels in the following clauses are defined to derive the requirements in clause 6 (Transmitter Characteristics) and clause 7 (Receiver Characteristics). The measurement channels represent example configurations of physical channels for different data rates.

The measurement channels in the following clauses are applicable to both FDD and TDD.

The active uplink slots for TDD configurations are specified in table A.2.1-1. TDD slot patterns defined for reference sensitivity tests will be used for TDD UL RMCs, unless otherwise stated. The active uplink slots for additional TDD configuration specified in Table A.2.1-2, with the TDD pattern defined in Table A.2.1-3, is used for the phase continuty tests for DMRS bundling with 15 kHz SCS.

Table A.2.1-1: TDD active uplink slots

SCS	Active Uplink slots
15 kHz	4, 9
30 kHz	8, 9, 18, 19
60 kHz	16, 17, 18, 19, 36, 37, 38, 39

Table A.2.1-2: TDD active uplink slots for additional TDD configuration

SCS	Active Uplink slots
15 kHz	8, 9

Table A.2.1-3: TDD pattern for additional TDD configuration

Parameter		Value
		SCS 15 kHz (μ0)
TDD Slot Configuration pattern (Note 1)		7DS2U
Special Slot Configuration (Note 2)		6D+4G+4U
referenceSubcarrierSpacing		15 kHz
UL-DL configuration	*dl-UL-TransmissionPeriodicity*	10 ms
	nrofDownlinkSlots	7
	nrofDownlinkSymbols	6
	nrofUplinkSlot	2
	nrofUplinkSymbols	4
NOTE 1: D denotes a slot with all DL symbols; S denotes a slot with a mix of DL, UL and guard symbols; U denotes a slot with all UL symbols. The field is for information. NOTE 2: D, G, U denote DL, guard and UL symbols, respectively. The field is for information.		

A.2.2 Reference measurement channels

A.2.2.1 DFT-s-OFDM Pi/2-BPSK

Table A.2.2.1-1: Reference Channels for DFT-s-OFDM Pi/2-BPSK

Parameter	Allocated resource blocks (L_{CRB})	DFT-s-OFDM Symbols per slot (Note 1)	Modulation	MCS Index (Note 2)	Payload size	Transport block CRC	LDPC Base Graph	Number of code blocks per slot (Note 3)	Total number of bits per slot	Total modulated symbols per slot
Unit					Bits	Bits			Bits	
	1	11	pi/2 BPSK	0	24	16	2	1	132	132
	5	11	pi/2 BPSK	0	160	16	2	1	660	660
	9	11	pi/2 BPSK	0	288	16	2	1	1188	1188
	10	11	pi/2 BPSK	0	320	16	2	1	1320	1320
	12	11	pi/2 BPSK	0	384	16	2	1	1584	1584
	15	11	pi/2 BPSK	0	480	16	2	1	1980	1980
	18	11	pi/2 BPSK	0	576	16	2	1	2376	2376
	24	11	pi/2 BPSK	0	768	16	2	1	3168	3168
	25	11	pi/2 BPSK	0	808	16	2	1	3300	3300
	30	11	pi/2 BPSK	0	984	16	2	1	3960	3960
	32	11	pi/2 BPSK	0	1032	16	2	1	4224	4224
	36	11	pi/2 BPSK	0	1128	16	2	1	4752	4752
	45	11	pi/2 BPSK	0	1416	16	2	1	5940	5940
	50	11	pi/2 BPSK	0	1544	16	2	1	6600	6600
	60	11	pi/2 BPSK	0	1864	16	2	1	7920	7920
	64	11	pi/2 BPSK	0	2024	16	2	1	8448	8448
	75	11	pi/2 BPSK	0	2408	16	2	1	9900	9900
	80	11	pi/2 BPSK	0	2472	16	2	1	10560	10560
	81	11	pi/2 BPSK	0	2536	16	2	1	10692	10692
	90	11	pi/2 BPSK	0	2792	16	2	1	11880	11880
	100	11	pi/2 BPSK	0	3104	16	2	1	13200	13200
	108	11	pi/2 BPSK	0	3368	16	2	1	14256	14256
	120	11	pi/2 BPSK	0	3752	16	2	1	15840	15840
	128	11	pi/2 BPSK	0	3976	24	2	2	16896	16896
	135	11	pi/2 BPSK	0	4104	24	2	2	17820	17820
	160	11	pi/2 BPSK	0	4872	24	2	2	21120	21120
	162	11	pi/2 BPSK	0	5000	24	2	2	21384	21384
	180	11	pi/2 BPSK	0	5512	24	2	2	23760	23760
	216	11	pi/2 BPSK	0	6664	24	2	2	28512	28512
	243	11	pi/2 BPSK	0	7560	24	2	2	32076	32076
	270	11	pi/2 BPSK	0	8448	24	2	3	35640	35640

NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.

NOTE 2: MCS Index is based on MCS table 6.1.4.1-1 defined in TS 38.214 [10].

NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

NOTE 4: The RMCs apply to all channel bandwidth where $L_{CRB} \leq N_{RB.}$

Table A.2.2.1-2: Void

Table A.2.2.1-3: Void

A.2.2.2 DFT-s-OFDM QPSK

Table A.2.2.2-1: Reference Channels for DFT-s-OFDM QPSK for

Parameter	Allocated resource blocks (L_{CRB})	DFT-s-OFDM Symbols per slot (Note 1)	Modulation	MCS Index (Note 2)	Payload size	Transport block CRC	LDPC Base Graph	Number of code blocks per slot (Note 3)	Total number of bits per slot	Total modulated symbols per slot
Unit					Bits	Bits			Bits	
	1	11	QPSK	2	48	16	2	1	264	132
	5	11	QPSK	2	256	16	2	1	1320	660
	9	11	QPSK	2	456	16	2	1	2376	1188
	10	11	QPSK	2	504	16	2	1	2640	1320
	12	11	QPSK	2	608	16	2	1	3168	1584
	15	11	QPSK	2	768	16	2	1	3960	1980
	18	11	QPSK	2	928	16	2	1	4752	2376
	20	11	QPSK	2	1032	16	2	1	5280	2640
	24	11	QPSK	2	1192	16	2	1	6336	3168
	25	11	QPSK	2	1256	16	2	1	6600	3300
	30	11	QPSK	2	1544	16	2	1	7920	3960
	32	11	QPSK	2	1608	16	2	1	8448	4224
	36	11	QPSK	2	1800	16	2	1	9504	4752
	45	11	QPKS	2	2208	16	2	1	11880	5940
	50	11	QPSK	2	2472	16	2	1	13200	6600
	60	11	QPSK	2	3104	16	2	1	15840	7920
	64	11	QPSK	2	3240	16	2	1	16896	8448
	75	11	QPSK	2	3752	16	2	1	19800	9900
	80	11	QPSK	2	3976	24	2	2	21120	10560
	81	11	QPSK	2	4040	24	2	2	21384	10692
	90	11	QPSK	2	4488	24	2	2	23760	11880
	100	11	QPSK	2	5000	24	2	2	26400	13200
	108	11	QPSK	2	5384	24	2	2	28512	14256
	120	11	QPSK	2	5896	24	2	2	31680	15840
	128	11	QPSK	2	6408	24	2	2	33792	16896
	135	11	QPSK	2	6664	24	2	2	35640	17820
	160	11	QPSK	2	7944	24	2	3	42240	21120
	162	11	QPSK	2	8064	24	2	3	42768	21384
	180	11	QPSK	2	8976	24	2	3	47520	23760
	216	11	QPSK	2	10752	24	2	3	57024	28512
	243	11	QPSK	2	12040	24	2	4	64152	32076
	270	11	QPSK	2	13320	24	2	4	71280	35640

NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.

NOTE 2: MCS Index is based on MCS table 6.1.4.1-1 defined in TS 38.214 [10].

NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

NOTE 4: The RMCs apply to all channel bandwidth where $L_{CRB} \leq N_{RB.}$

Table A.2.2.2-2: Void

Table A.2.2.2-3: Void

A.2.2.3 DFT-s-OFDM 16QAM

Table A.2.2.3-1: Reference Channels for DFT-s-OFDM 16QAM

Parameter	Allocated resource blocks (L_{CRB})	DFT-s-OFDM Symbols per slot (Note 1)	Modulation	MCS Index (Note 2)	Payload size	Transport block CRC	LDPC Base Graph	Number of code blocks per slot (Note 3)	Total number of bits per slot	Total modulated symbols per slot
Unit					Bits	Bits			Bits	
	1	11	16QAM	10	176	16	2	1	528	132
	5	11	16QAM	10	888	16	2	1	2640	660
	9	11	16QAM	10	1608	16	2	1	4752	1188
	10	11	16QAM	10	1800	16	2	1	5280	1320
	12	11	16QAM	10	2088	16	2	1	6336	1584
	15	11	16QAM	10	2664	16	2	1	7920	1980
	18	11	16QAM	10	3240	16	2	1	9504	2376
	24	11	16QAM	10	4224	24	1	1	12672	3168
	25	11	16QAM	10	4352	24	1	1	13200	3300
	30	11	16QAM	10	5248	24	1	1	15840	3960
	32	11	16QAM	10	5632	24	1	1	16896	4224
	36	11	16QAM	10	6272	24	1	1	19008	4752
	45	11	16QAM	10	7808	24	1	1	23760	5940
	50	11	16QAM	10	8712	24	1	2	26400	6600
	60	11	16QAM	10	10504	24	1	2	31680	7920
	64	11	16QAM	10	11272	24	1	2	33792	8448
	75	11	16QAM	10	13064	24	1	2	39600	9900
	80	11	16QAM	10	14088	24	1	2	42240	10560
	81	11	16QAM	10	14088	24	1	2	42768	10692
	100	11	16QAM	10	17424	24	1	3	52800	13200
	108	11	16QAM	10	18960	24	1	3	57024	14256
	120	11	16QAM	10	21000	24	1	3	63360	15840
	128	11	16QAM	10	22536	24	1	3	67584	16896
	135	11	16QAM	10	23568	24	1	3	71280	17820
	160	11	16QAM	10	28168	24	1	4	84480	21120
	162	11	16QAM	10	28168	24	1	4	85536	21384
	216	11	16QAM	10	37896	24	1	5	114048	28512
	243	11	16QAM	10	43032	24	1	6	128304	32076
	270	11	16QAM	10	47112	24	1	6	142560	35640

NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.

NOTE 2: MCS Index is based on MCS table 6.1.4.1-1 defined in TS 38.214 [10].

NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)

NOTE 4: The RMCs apply to all channel bandwidth where $L_{CRB} \leq N_{RB.}$

Table A.2.2.3-2: Void

Table A.2.2.3-3: Void

A.2.2.4 DFT-s-OFDM 64QAM

Table A.2.2.4-1: Reference Channels for DFT-s-OFDM 64QAM

Parameter	Allocated resource blocks (L_{CRB})	DFT-s-OFDM Symbols per slot (Note 1)	Modulation	MCS Index (Note 2)	Payload size	Transport block CRC	LDPC Base Graph	Number of code blocks per slot (Note 3)	Total number of bits per slot	Total modulated symbols per slot
Unit					**Bits**	**Bits**			**Bits**	
	1	11	64QAM	18	408	16	2	1	792	132
	5	11	64QAM	18	2024	16	2	1	3960	660
	9	11	64QAM	18	3624	16	2	1	7128	1188
	10	11	64QAM	18	3968	24	1	1	7920	1320
	12	11	64QAM	18	4736	24	1	1	9504	1584
	15	11	64QAM	18	6016	24	1	1	11880	1980
	18	11	64QAM	18	7168	24	1	1	14256	2376
	24	11	64QAM	18	9480	24	1	2	19008	3168
	25	11	64QAM	18	9992	24	1	2	19800	3300
	30	11	64QAM	18	12040	24	1	2	23760	3960
	32	11	64QAM	18	12808	24	1	2	25344	4224
	36	11	64QAM	18	14344	24	1	2	28512	4752
	45	11	64QAM	18	17928	24	1	3	35640	5940
	50	11	64QAM	18	19968	24	1	3	39600	6600
	60	11	64QAM	18	24072	24	1	3	47520	7920
	64	11	64QAM	18	25608	24	1	4	50688	8448
	75	11	64QAM	18	30216	24	1	4	59400	9900
	80	11	64QAM	18	31752	24	1	4	63360	10560
	81	11	64QAM	18	32264	24	1	4	64152	10692
	90	11	64QAM	18	35856	24	1	5	71280	11880
	100	11	64QAM	18	39936	24	1	5	79200	13200
	108	11	64QAM	18	43032	24	1	6	85536	14256
	120	11	64QAM	18	48168	24	1	6	95040	15840
	128	11	64QAM	18	51216	24	1	7	101376	16896
	135	11	64QAM	18	54296	24	1	7	106920	17820
	160	11	64QAM	18	63528	24	1	8	126720	21120
	162	11	64QAM	18	64552	24	1	8	128304	21384
	180	11	64QAM	18	71688	24	1	9	142560	23760
	216	11	64QAM	18	86040	24	1	11	171072	28512
	243	11	64QAM	18	96264	24	1	12	192456	32076
	270	11	64QAM	18	108552	24	1	13	213840	35640

NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.
NOTE 2: MCS Index is based on MCS table 6.1.4.1-1 defined in TS 38.214 [10].
NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
NOTE 4: The RMCs apply to all channel bandwidth where $L_{CRB} \leq N_{RB}$.

Table A.2.2.4-2: Void

Table A.2.2.4-3: Void

A.2.2.5 DFT-s-OFDM 256QAM

Table A.2.2.5-1: Reference Channels for DFT-s-OFDM 256QAM

Parameter	Allocated resource blocks (L_{CRB})	DFT-s-OFDM Symbols per slot (Note 1)	Modulation	MCS Index (Note 2)	Payload size	Transport block CRC	LDPC Base Graph	Number of code blocks per slot (Note 3)	Total number of bits per slot	Total modulated symbols per slot
Unit					**Bits**	**Bits**			**Bits**	
	1	11	256QAM	20	704	16	2	1	1056	132
	5	11	256QAM	20	3496	16	2	1	5280	660
	9	11	256QAM	20	6272	24	1	1	9504	1188
	10	11	256QAM	20	7040	24	1	1	10560	1320
	12	11	256QAM	20	8456	24	1	2	12672	1584
	15	11	256QAM	20	10504	24	1	2	15840	1980
	18	11	256QAM	20	12552	24	1	2	19008	2376
	24	11	256QAM	20	16896	24	1	3	25344	3168
	25	11	256QAM	20	17424	24	1	3	26400	3300
	30	11	256QAM	20	21000	24	1	3	31680	3960
	32	11	256QAM	20	22536	24	1	3	33792	4224
	36	11	256QAM	20	25104	24	1	3	38016	4752
	45	11	256QAM	20	31752	24	1	4	47520	5940
	50	11	256QAM	20	34816	24	1	5	52800	6600
	60	11	256QAM	20	42016	24	1	5	63360	7920
	64	11	256QAM	20	45096	24	1	6	67584	8448
	75	11	256QAM	20	53288	24	1	7	79200	9900
	80	11	256QAM	20	56368	24	1	7	84480	10560
	81	11	256QAM	20	57376	24	1	7	85536	10692
	90	11	256QAM	20	63528	24	1	8	95040	11880
	100	11	256QAM	20	69672	24	1	9	105600	13200
	108	11	256QAM	20	75792	24	1	9	114048	14256
	120	11	256QAM	20	83976	24	1	10	126720	15840
	128	11	256QAM	20	90176	24	1	11	135168	16896
	135	11	256QAM	20	94248	24	1	12	142560	17820
	160	11	256QAM	20	112648	24	1	14	168960	21120
	162	11	256QAM	20	114776	24	1	14	171072	21384
	180	11	256QAM	20	127080	24	1	16	190080	23760
	216	11	256QAM	20	151608	24	1	18	228096	28512
	243	11	256QAM	20	172176	24	1	21	256608	32076
	270	11	256QAM	20	188576	24	1	23	285120	35640

NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.
NOTE 2: MCS Index is based on MCS table 5.1.3.1-2 defined in TS 38.214 [10].
NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
NOTE 4: The RMCs apply to all channel bandwidth where $L_{CRB} \leq N_{RB.}$

Table A.2.2.5-2: Void

Table A.2.2.5-3: Void

A.2.2.6 CP-OFDM QPSK

Table A.2.2.6-1: Reference Channels for CP-OFDM QPSK

Parameter	Allocated resource blocks (L_{CRB})	CP-OFDM Symbols per slot (Note 1)	Modulation	MCS Index (Note 2)	Payload size	Transport block CRC	LDPC Base Graph	Number of code blocks per slot (Note 3)	Total number of bits per slot	Total modulated symbols per slot
Unit					Bits	Bits			Bits	
	1	11	QPSK	2	48	16	2	1	264	132
	5	11	QPSK	2	256	16	2	1	1320	660
	6	11	QPSK	2	304	16	2	1	1584	792
	9	11	QPSK	2	456	16	2	1	2376	1188
	10	11	QPSK	2	504	16	2	1	2640	1320
	11	11	QPSK	2	552	16	2	1	2904	1452
	12	11	QPSK	2	608	16	2	1	3168	1584
	13	11	QPSK	2	672	16	2	1	3432	1716
	15	11	QPSK	2	768	16	2	1	3960	1980
	16	11	QPSK	2	808	16	2	1	4224	2112
	18	11	QPSK	2	928	16	2	1	4752	2376
	19	11	QPSK	2	984	16	2	1	5016	2508
	24	11	QPSK	2	1192	16	2	1	6336	3168
	25	11	QPSK	2	1256	16	2	1	6600	3300
	26	11	QPSK	2	1288	16	2	1	6864	3432
	31	11	QPSK	2	1544	16	2	1	8184	4092
	33	11	QPSK	2	1672	16	2	1	8712	4356
	38	11	QPSK	2	1928	16	2	1	10032	5016
	39	11	QPSK	2	2024	16	2	1	10296	5148
	40	11	QPSK	2	2024	16	2	1	10560	5280
	47	11	QPSK	2	2408	16	2	1	12408	6204
	51	11	QPSK	2	2536	16	2	1	13464	6732
	52	11	QPSK	2	2600	16	2	1	13728	6864
	53	11	QPSK	2	2664	16	2	1	13992	6996
	54	11	QPSK	2	2664	16	2	1	14256	7128
	61	11	QPSK	2	3104	16	2	1	16104	8052
	65	11	QPSK	2	3240	16	2	1	17160	8580
	67	11	QPSK	2	3368	16	2	1	17688	8844
	68	11	QPSK	2	3368	16	2	1	17952	8976
	78	11	QPSK	2	3848	24	2	2	20592	10296
	79	11	QPSK	2	3912	24	2	2	20856	10428
	80	11	QPSK	2	3976	24	2	2	21120	10560
	81	11	QPSK	2	4040	24	2	2	21384	10692
	93	11	QPSK	2	4616	24	2	2	24552	12276
	95	11	QPSK	2	4744	24	2	2	25080	12540
	106	11	QPSK	2	5256	24	2	2	27984	13992
	107	11	QPSK	2	5256	24	2	2	28248	14124
	108	11	QPSK	2	5384	24	2	2	28512	14256
	109	11	QPSK	2	5384	24	2	2	28776	14388
	121	11	QPSK	2	6024	24	2	2	31944	15972
	123	11	QPSK	2	6152	24	2	2	32472	16236
	133	11	QPSK	2	6664	24	2	2	35112	17556
	135	11	QPSK	2	6664	24	2	2	35640	17820
	137	11	QPSK	2	6792	24	2	2	36168	18084
	160	11	QPSK	2	7944	24	2	3	42240	21120
	162	11	QPSK	2	8064	24	2	3	42768	21384
	189	11	QPSK	2	9480	24	2	3	49896	24948
	216	11	QPSK	2	10752	24	2	3	57024	28512
	217	11	QPSK	2	10752	24	2	3	57288	28644
	245	11	QPSK	2	12296	24	2	4	64680	32340
	270	11	QPSK	2	13320	24	2	4	71280	35640
	273	11	QPSK	2	13576	24	2	4	72072	36036

NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.
NOTE 2: MCS Index is based on MCS table 5.1.3.1-1 defined in TS 38.214 [10].
NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
NOTE 4: The RMCs apply to all channel bandwidth where $L_{CRB} \leq N_{RB.}$

Table A.2.2.6-2: Void

Table A.2.2.6-3: Void

A.2.2.7 CP-OFDM 16QAM

Table A.2.2.7-1: Reference Channels for CP-OFDM 16QAM

Parameter	Allocated resource blocks (L_{CRB})	CP-OFDM Symbols per slot (Note 1)	Modulation	MCS Index (Note 2)	Payload size	Transport block CRC	LDPC Base Graph	Number of code blocks per slot (Note 3)	Total number of bits per slot	Total modulated symbols per slot
Unit					Bits	Bits			Bits	
	1	11	16QAM	10	176	16	2	1	528	132
	5	11	16QAM	10	888	16	2	1	2640	660
	6	11	16QAM	10	1064	16	2	1	3168	792
	9	11	16QAM	10	1608	16	2	1	4752	1188
	10	11	16QAM	10	1800	16	2	1	5280	1320
	11	11	16QAM	10	1928	16	2	1	5808	1452
	12	11	16QAM	10	2088	16	2	1	6336	1584
	13	11	16QAM	10	2280	16	2	1	6864	1716
	15	11	16QAM	10	2664	16	2	1	7920	1980
	16	11	16QAM	10	2792	16	2	1	8448	2112
	18	11	16QAM	10	3240	16	2	1	9504	2376
	19	11	16QAM	10	3368	16	2	1	10032	2508
	24	11	16QAM	10	4224	24	1	1	12672	3168
	25	11	16QAM	10	4352	24	1	1	13200	3300
	26	11	16QAM	10	4480	24	1	1	13728	3432
	31	11	16QAM	10	5376	24	1	1	16368	4092
	33	11	16QAM	10	5760	24	1	1	17424	4356
	38	11	16QAM	10	6656	24	1	1	20064	5016
	39	11	16QAM	10	6784	24	1	1	20592	5148
	40	11	16QAM	10	7040	24	1	1	21120	5280
	47	11	16QAM	10	8192	24	1	1	24816	6204
	51	11	16QAM	10	8968	24	1	2	26928	6732
	52	11	16QAM	10	9224	24	1	2	27456	6864
	53	11	16QAM	10	9224	24	1	2	27984	6996
	54	11	16QAM	10	9480	24	1	2	28512	7128
	61	11	16QAM	10	10760	24	1	2	32208	8052
	65	11	16QAM	10	11272	24	1	2	34320	8580
	67	11	16QAM	10	11784	24	1	2	35376	8844
	68	11	16QAM	10	11784	24	1	2	35904	8976
	78	11	16QAM	10	13576	24	1	2	41184	10296
	79	11	16QAM	10	13832	24	1	2	41712	10428
	80	11	16QAM	10	14088	24	1	2	42240	10560
	81	11	16QAM	10	14088	24	1	2	42768	10692
	93	11	16QAM	10	16392	24	1	2	49404	12276
	95	11	16QMA	10	16392	24	1	2	50160	12540
	106	11	16QAM	10	18432	24	1	3	55968	13992
	107	11	16QAM	10	18960	24	1	3	56496	14124
	108	11	16QAM	10	18960	24	1	3	57024	14256
	109	11	16QAM	10	18960	24	1	3	57552	14388
	121	11	16QAM	10	21000	24	1	3	63888	15972
	123	11	16QAM	10	21504	24	1	3	64944	16236
	133	11	16QAM	10	23040	24	1	3	70224	17556
	135	11	16QAM	10	23568	24	1	3	71280	17820
	137	11	16QAM	10	24072	24	1	3	72336	18084
	160	11	16QAM	10	28168	24	1	4	84480	21120
	162	11	16QAM	10	28168	24	1	4	85536	21384
	189	11	16QAM	10	32776	24	1	4	99792	24948
	216	11	16QAM	10	37896	24	1	5	114048	28512
	217	11	16QAM	10	37896	24	1	5	114576	28644
	245	11	16QAM	10	43032	24	1	6	129360	32340
	270	11	16QAM	10	47112	24	1	6	142560	35640
	273	11	16QAM	10	48168	24	1	6	144144	36036

NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.
NOTE 2: MCS Index is based on MCS table 5.1.3.1-1 defined in TS 38.214 [10].
NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
NOTE 4: The RMCs apply to all channel bandwidth where $L_{CRB} \leq N_{RB.}$

Table A.2.2.7-2: Void

Table A.2.2.7-3: Void

A.2.2.8 CP-OFDM 64QAM

Table A.2.2.8-1: Reference Channels for CP-OFDM 64QAM

Parameter	Allocated resource blocks (L_{CRB})	CP-OFDM Symbols per slot (Note 1)	Modulation	MCS Index (Note 2)	Payload size	Transport block CRC	LDPC Base Graph	Number of code blocks per slot (Note 3)	Total number of bits per slot	Total modulated symbols per slot
Unit					**Bits**	**Bits**			**Bits**	
	1	11	64QAM	19	408	16	2	1	792	132
	5	11	64QAM	19	2024	16	2	1	3960	660
	9	11	64QAM	19	3624	16	2	1	7128	1188
	10	11	64QAM	19	3968	24	1	1	7920	1320
	11	11	64QAM	19	4352	24	1	1	8712	1452
	12	11	64QAM	19	4736	24	1	1	9504	1584
	13	11	64QAM	19	5120	24	1	1	10296	1716
	15	11	64QAM	19	6016	24	1	1	11880	1980
	18	11	64QAM	19	7168	24	1	1	14256	2376
	19	11	64QAM	19	7552	24	1		15048	2508
	24	11	64QAM	19	9480	24	1	2	19008	3168
	25	11	64QAM	19	9992	24	1	2	19800	3300
	26	11	64QAM	19	10504	24	1	2	20592	3432
	31	11	64QAM	19	12296	24	1	2	24552	4092
	33	11	64QAM	19	13064	24	1	2	26136	4356
	38	11	64QAM	19	15112	24	1	2	30096	5016
	39	11	64QAM	19	15624	24	1	2	30888	5148
	47	11	64QAM	19	18960	24	1	3	37224	6204
	51	11	64QAM	19	20496	24	1	3	40392	6732
	52	11	64QAM	19	21000	24	1	3	41184	6864
	53	11	64QAM	19	21000	24	1	3	41976	6996
	61	11	64QAM	19	24567	24	1	3	48312	8052
	65	11	64QAM	19	26120	24	1	4	51480	8580
	67	11	64QAM	19	26632	24	1	4	53064	8844
	78	11	64QAM	19	31240	24	1	4	61776	10296
	79	11	64QAM	19	31752	24	1	4	62568	10428
	80	11	64QAM	19	31752	24	1	4	63360	10560
	81	11	64QAM	19	32264	24	1	4	64152	10692
	93	11	64QAM	19	36896	24	1	5	73656	12276
	95	11	64QAM	19	37896	24	1	5	75240	12540
	93	11	64QAM	19	36896	24	1	5	73656	12276
	106	11	64QAM	19	42016	24	1	5	83952	13992
	107	11	64QAM	19	43032	24	1	6	84744	14124
	108	11	64QAM	19	43032	24	1	6	85536	14256
	109	11	64QAM	19	44040	24	1	6	86328	14388
	121	11	64QAM	19	48168	24	1	6	95832	15972
	123	11	64QAM	19	49176	24	1	6	97416	16236
	133	11	64QAM	19	53288	24	1	7	105336	17556
	135	11	64QAM	19	54296	24	1	7	106920	17820
	137	11	64QAM	19	54296	24	1	7	108504	18084
	160	11	64QAM	19	63528	24	1	8	126720	21120
	162	11	64QAM	19	64552	24	1	8	128304	21384
	189	11	64QAM	19	75792	24	1	9	149688	24948
	216	11	64QAM	19	86040	24	1	11	171072	28512
	217	11	64QAM	19	86040	24	1	11	171864	28644
	245	11	64QAM	19	98376	24	1	12	194040	32340
	270	11	64QAM	19	108552	24	1	13	213840	35640
	273	11	64QAM	19	108552	24	1	13	216216	36036

NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.
NOTE 2: MCS Index is based on MCS table 5.1.3.1-1 defined in TS 38.214 [10].
NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
NOTE 4: The RMCs apply to all channel bandwidth where $L_{CRB} \leq N_{RB.}$

Table A.2.2.8-2: Void

Table A.2.2.8-3: Void

A.2.2.9 CP-OFDM 256QAM

Table A.2.2.9-1: Reference Channels for CP-OFDM 256QAM

Parameter	Allocated resource blocks (L_{CRB})	CP-OFDM Symbols per slot (Note 1)	Modulation	MCS Index (Note 2)	Payload size	Transport block CRC	LDPC Base Graph	Number of code blocks per slot (Note 3)	Total number of bits per slot	Total modulated symbols per slot
Unit					Bits	Bits			Bits	
	1	11	256QAM	20	704	16	2	1	1056	132
	5	11	256QAM	20	3496	16	2	1	5280	660
	9	11	256QAM	20	6272	24	1	1	9504	1188
	10	11	256QAM	20	7040	24	1	1	10560	1320
	11	11	256QAM	20	7680	24	1	1	11616	1452
	12	11	256QAM	20	8456	24	1	2	12672	1584
	13	11	256QAM	20	9224	24	1	2	13728	1716
	15	11	256QAM	20	10504	24	1	2	15840	1980
	18	11	256QAM	20	12552	24	1	2	19008	2376
	19	11	256QAM	20	13320	24	1	2	20064	2508
	24	11	256QAM	20	16896	24	1	3	25344	3168
	25	11	256QAM	20	17424	24	1	3	26400	3300
	26	11	256QAM	20	18432	24	1	3	27456	3432
	31	11	256QAM	20	22032	24	1	3	32736	4092
	33	11	256QAM	20	23040	24	1	3	34848	4356
	38	11	256QAM	20	26632	24	1	4	40128	5016
	39	11	256QAM	20	27656	24	1	4	41184	5148
	47	11	256QAM	20	32776	24	1	4	49632	6204
	51	11	256QAM	20	35856	24	1	5	53856	6732
	52	11	256QAM	20	36896	24	1	5	54912	6864
	53	11	256QAM	20	36896	24	1	5	55968	6996
	61	11	256QAM	20	43032	24	1	6	64416	8052
	65	11	256QAM	20	46104	24	1	6	68640	8580
	67	11	256QAM	20	47112	24	1	6	70752	8844
	78	11	256QAM	20	55304	24	1	7	82368	10296
	79	11	256QAM	20	55304	24	1	7	83424	10428
	80	11	256QAM	20	56368	24	1	7	84480	10560
	81	11	256QAM	20	57376	24	1	7	85536	10692
	93	11	256QAM	20	65576	24	1	8	98208	12276
	95	11	256QAM	20	67584	24	1	8	100320	12540
	106	11	256QAM	20	73776	24	1	9	111936	13992
	107	11	256QAM	20	75792	24	1	9	112992	14124
	108	11	256QAM	20	75792	24	1	9	114048	14256
	109	11	256QAM	20	75792	24	1	9	115104	14388
	121	11	256QAM	20	86040	24	1	11	127776	15972
	123	11	256QAM	20	86040	24	1	11	129888	16236
	133	11	256QAM	20	94248	24	1	12	140448	17556
	135	11	256QAM	20	94248	24	1	12	142560	17820
	137	11	256QAM	20	96264	24	1	12	144672	18084
	160	11	256QAM	20	112648	24	1	14	168960	21120
	162	11	256QAM	20	114776	24	1	14	171072	21384
	189	11	256QAM	20	131176	24	1	16	199584	24948
	216	11	256QAM	20	151608	24	1	18	228096	28512
	217	11	256QAM	20	151608	24	1	18	229152	28644
	245	11	256QAM	20	172176	24	1	21	258720	32340
	270	11	256QAM	20	188576	24	1	23	285120	35640
	273	11	256QAM	20	192624	24	1	23	288288	36036

NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.
NOTE 2: MCS Index is based on MCS table 5.1.3.1-2 defined in TS 38.214 [10].
NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)
NOTE 4: The RMCs apply to all channel bandwidth where $L_{CRB} \leq N_{RB.}$

Table A.2.2.9-2: Void

Table A.2.2.9-3: Void

A.2.3 Reference measurement channels for TDD

The TDD UL RMCs are defined in clause A.2.2 with the active UL slots specified in table A.2.1-1 and TDD slot patterns as defined for reference sensitivity tests.

The TDD UL RMCs for the phase continuty tests for DMRS bundling are defined in clause A.2.2 with the active UL slots and TDD pattern specified in tables A.2.1-2 and A.2.1-3.

A.2.3.1 DFT-s-OFDM Pi/2-BPSK

Table A.2.3.1-1: Void

Table A.2.3.1-2: Void

Table A.2.3.1-3: Void

A.2.3.2 DFT-s-OFDM QPSK

Table A.2.3.2-1: Void

Table A.2.3.2-2: Void

Table A.2.3.2-3: Void

A.2.3.3 DFT-s-OFDM 16QAM

Table A.2.3.3-1: Void

Table A.2.3.3-2: Void

Table A.2.3.3-3: Void

A.2.3.4 DFT-s-OFDM 64QAM

Table A.2.3.4-1: Void

Table A.2.3.4-2: Void

Table A.2.3.4-3: Void

A.2.3.5 DFT-s-OFDM 256QAM

Table A.2.3.5-1: Void

Table A.2.3.5-2: Void

Table A.2.3.5-3: Void

A.2.3.6 CP-OFDM QPSK

Table A.2.3.6-1: Void

Table A.2.3.6-2: Void

Table A.2.3.6-3: Void

A.2.3.7 CP-OFDM 16QAM

Table A.2.3.7-1: Void

Table A.2.3.7-2: Void

Table A.2.3.7-3: Void

A.2.3.8 CP-OFDM 64QAM

Table A.2.3.8-1: Void

Table A.2.3.8-2: Void

Table A.2.3.8-3: Void

A.2.3.9 CP-OFDM 256QAM

Table A.2.3.9-1: Void

Table A.2.3.9-2: Void

Table A.2.3.9-3: Void

A.3 DL reference measurement channels

A.3.1 General

Unless otherwise stated, Tables A.3.2.2-1, A.3.2.2-2, A.3.2.2-3, A.3.3.2-1, A.3.3.2-2 and A.3.3.2-3 are applicable for measurements of the Receiver Characteristics (clause 7) with the exception of clauses 7.4 (Maximum input level).

Unless otherwise stated, Tables A.3.2.3-1, A.3.2.3-2, A.3.2.3-3, A.3.3.3-1, A.3.3.3-2 and A.3.3.3-3 are applicable for clauses 7.4 (Maximum input level) and for UE not supporting PDSCH 256QAM,

Unless otherwise stated, Tables A.3.2.4-1, A.3.2.4-2, A.3.2.4-3, A.3.3.4-1, A.3.3.4-2 and A.3.3.4-3 are applicable for clauses 7.4 (Maximum input level) and for UE supporting PDSCH 256QAM,

Unless otherwise stated, Tables A.3.2.2-1, A.3.2.2-2, A.3.2.2-3, A.3.3.2-1, A.3.3.2-2 and A.3.3.2-3 also apply for the modulated interferer used in Clauses 7.5, 7.6 and 7.8 with test specific bandwidths.

In case of carrier aggregation scenarios, the k1 values and number of HARQ processes of the Reference Measurement Channels specified in Annex A.3 shall be adapted as specified in table A.3.1-2 and A.3.1-3.

Table A.3.1-1. Common reference channel parameters

Parameter		Unit	Value
CORESET frequency domain allocation			Full BW
CORESET time domain allocation			2 OFDM symbols at the begin of each slot
PDSCH mapping type			Type A
PDSCH start symbol index (S)			2
Number of consecutive PDSCH symbols (L)			12
PDSCH PRB bundling		PRBs	2
Dynamic PRB bundling			false
Overhead value for TBS determination			0
First DMRS position for Type A PDSCH mapping			2
DMRS type			Type 1
Number of additional DMRS			2
FDM between DMRS and PDSCH			Disable
CSI-RS for tracking	First subcarrier index in the PRB used for CSI-RS (k0)		0 for CSI-RS resource 1,2,3,4
	OFDM symbols in the PRB used for CSI-RS		l_0 = 6 for CSI-RS resource 1 and 3 l_0 = 10 for CSI-RS resource 2 and 4
	Number of CSI-RS ports		1 for CSI-RS resource 1,2,3,4
	CDM Type		'No CDM' for CSI-RS resource 1,2,3,4
	Density (ρ)		3 for CSI-RS resource 1,2,3,4
	CSI-RS periodicity	Slots	15 kHz SCS: 20 for CSI-RS resource 1,2,3,4 30 kHz SCS: 40 for CSI-RS resource 1,2,3,4 60 kHz SCS: 80 for CSI-RS resource 1,2,3,4
	CSI-RS offset	Slots	15 kHz SCS: 0 for CSI-RS resource 1 and 2 1 for CSI-RS resource 3 and 4 30 kHz SCS: 1 for CSI-RS resource 1 and 2 2 for CSI-RS resource 3 and 4 60 kHz SCS: 2 for CSI-RS resource 1 and 2 3 for CSI-RS resource 3 and 4
	Frequency Occupation		Start PRB 0 Number of PRB = BWP size
	QCL info		TCI state #0
PTRS configuration			PTRS is not configured

Table A.3.1-2: Carrier aggregation test parameters for K1 values

The number of slots between PDSCH and corresponding HARQ-ACK information		CCs with the same duplex mode and SCS with Pcell	CCs with different duplex mode and/or SCS with Pcell
FDD 15 kHz + FDD 15 kHz CA	FDD PCell	{2}	N/A
FDD 15 kHz + FDD 30 kHz CA	15kHz PCell	{2}	{3}
	30kHz PCell	{2}	{2}
FDD 15 kHz + TDD 15 kHz CA	FDD PCell	{2}	{2}
	TDD PCell	{4,3,2}	{4,3,2,6,5}
FDD 15 kHz + TDD 30 kHz CA	FDD PCell	{2}	{3}
	TDD PCell	{8,7,6,5,4,3,2}	{8,6,4,2,10}
TDD 15 kHz + TDD 15 kHz CA	TDD PCell	{4,3,2}	N/A
TDD 15 kHz + TDD 30 kHz CA	15kHz PCell	{4,3,2}	{4,4,3,3,2,7,6}
	30kHz PCell	{8,7,6,5,4,3,2}	{7,5,4}
FDD 30 kHz + FDD 30 kHz CA	FDD PCell	{2}	N/A
FDD 30 kHz + TDD 15 kHz CA	FDD PCell	{2}	{2}
	TDD PCell	{4,3,2}	{4,4,3,3,7,7,6,6,5,5}
FDD 30 kHz + TDD 30 kHz CA	FDD PCell	{2}	{2}
	TDD PCell	{8,7,6,5,4,3,2}	{8,7,6,5,4,3,2,2,10,-} (NOTE 1)
TDD 30 kHz + TDD 30 kHz CA	TDD PCell	{8,7,6,5,4,3,2}	N/A
NOTE 1: No PDSCH shall be scheduled in slots 9 and 19 to avoid HARQ conflicts and maximize Throughput. Hence no K1 value is applicable for them.			

Table A.3.1-3: Carrier Aggregation test parameters for number of HARQ processes

HARQ process number		CCs with the same duplex mode and SCS with Pcell	CCs with different duplex mode and/or SCS with Pcell
FDD 15 kHz + FDD 15 kHz CA	FDD PCell	4	N/A
FDD 15 kHz + FDD 30 kHz CA	15kHz PCell	8	8
	30kHz PCell	8	8
FDD 15 kHz + TDD 15 kHz CA	FDD PCell	4	8
	TDD PCell	8	8
FDD 15 kHz + TDD 30 kHz CA	FDD PCell	4	8
	TDD PCell	10	8
TDD 15 kHz + TDD 15 kHz CA	TDD PCell	8	N/A
TDD 15 kHz + TDD 30 kHz CA	15kHz PCell	8	12
	30kHz PCell	8	8
FDD 30 kHz + FDD 30 kHz CA	FDD PCell	8	N/A
FDD 30 kHz + TDD 15 kHz CA	FDD PCell	8	8
	TDD PCell	8	16
FDD 30 kHz + TDD 30 kHz CA	FDD PCell	8	8
	TDD PCell	8	16
TDD 30 kHz + TDD 30 kHz CA	TDD PCell	8	N/A

A.3.2 DL reference measurement channels for FDD

A.3.2.1 General

Table A.3.2.1-1 Additional reference channels parameters for FDD

Parameter	Unit	Value
Number of HARQ Processes		4
K1 value		2 for all slots

A.3.2.2 FRC for receiver requirements for QPSK

Table A.3.2.2-1 Fixed reference channel for receiver requirements (SCS 15 kHz, FDD, QPSK 1/3)

Parameter	Unit	Value							
Channel bandwidth	**MHz**	**5**	**10**	**15**	**20**	**25**	**30**	**40**	**50**
Subcarrier spacing	kHz	15	15	15	15	15	15	15	15
Subcarrier spacing configuration μ		0	0	0	0	0	0	0	0
Allocated resource blocks		25	52	79	106	133	160	216	270
Subcarriers per resource block		12	12	12	12	12	12	12	12
Allocated slots per Frame		8	8	8	8	8	8	8	8
MCS Index		4	4	4	4	4	4	4	4
MCS Table for TBS determination		64QAM							
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding Rate		1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1
Information Bit Payload per Slot									
For Slots 0,1	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,3,4,5,6,7,8,9	Bits	1672	3368	5120	6912	8712	10504	14088	17424
Transport block CRC	Bits	16	16	24	24	24	24	24	24
LDPC base graph		2	2	1	1	1	1	1	1
Number of Code Blocks per Slot									
For Slots 0,1	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,3,4,5,6,7,8,9	CBs	1	1	1	1	2	2	2	3
Binary Channel Bits per Slot									
For Slots 0,1	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,3,4,5,6,7,8,9	Bits	5400	11232	17064	22896	28728	34560	46656	58320
Max. Throughput averaged over 1 frame	Mbps	1.338	2.694	4.096	5.530	6.970	8.403	11.270	13.9392

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame
NOTE 4: Slot i is slot index per frame

Table A.3.2.2-2 Fixed reference channel for receiver requirements (SCS 30 kHz, FDD, QPSK 1/3)

Parameter	Unit	Value											
Channel bandwidth	**MHz**	**5**	**10**	**15**	**20**	**25**	**30**	**40**	**50**	**60**	**80**	**90**	**100**
Subcarrier spacing configuration μ		1	1	1	1	1	1	1	1	1	1	1	1
Allocated resource blocks		11	24	38	51	65	78	106	133	162	217	245	273
Subcarriers per resource block		12	12	12	12	12	12	12	12	12	12	12	12
Allocated slots per Frame		17	17	17	17	17	17	17	17	17	17	17	17
MCS Index		4	4	4	4	4	4	4	4	4	4	4	4
MCS Table for TBS determination		64QAM											
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding Rate		1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1	1	1	1	1
Information Bit Payload per Slot													
For Slots 0,1,2	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 3,…,19	Bits	736	1608	2472	3368	4224	4992	6912	8712	10504	14088	15880	17928
Transport block CRC	Bits	16	16	16	16	24	24	24	24	24	24	24	24
LDPC base graph		2	2	2	2	1	1	1	1	1	1	1	1
Number of Code Blocks per Slot													
For Slots 0,1,2	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 3,…,19	CBs	1	1	1	1	1	1	1	2	2	2	2	3
Binary Channel Bits per Slot													
For Slots 0,1,2	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 3,…,19	Bits	2376	5184	8208	11016	14040	16848	22896	28728	34992	46872	52920	58968
Max. Throughput averaged over 1 frame	Mbps	1.251	2.734	4.202	5.726	7.181	8.486	11.750	14.810	17.857	23.950	26.996	30.478
NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.													
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).													
NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame													
NOTE 4: Slot i is slot index per frame													

Table A.3.2.2-3 Fixed reference channel for receiver requirements (SCS 60 kHz, FDD, QPSK 1/3)

Parameter	Unit	Value										
Channel bandwidth	**MHz**	**10**	**15**	**20**	**25**	**30**	**40**	**50**	**60**	**80**	**90**	**100**
Subcarrier spacing configuration μ		2	2	2	2	2	2	2	2	2	2	2
Allocated resource blocks		11	18	24	31	38	51	65	79	107	121	135
Subcarriers per resource block		12	12	12	12	12	12	12	12	12	12	12
Allocated slots per Frame		36	36	36	36	36	36	36	36	36	36	36
MCS Index		4	4	4	4	4	4	4	4	4	4	4
MCS Table for TBS Determination		64QAM										
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding Rate		1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1	1	1	1
Information Bit Payload per Slot												
For Slots 0,1,2,3	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 4,…,39	Bits	736	1192	1608	2024	2472	3368	4224	5120	6912	7808	8712
Transport block CRC	Bits	16	16	16	16	16	16	24	24	24	24	24
LDPC base graph		2	2	2	2	2	2	1	1	1	1	1
Number of Code Blocks per Slot												
For Slot 0,1,2,3	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 4,…,39	CBs	1	1	1	1	1	1	1	1	1	1	2
Binary Channel Bits per Slot												
For Slot 0,1,2,3	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 4,…,39	Bits	2376	3888	5184	6696	8208	11016	14040	17064	23112	26136	29160
Max. Throughput averaged over 1 frame	Mbps	2.650	4.291	5.789	7.286	8.899	12.125	15.206	18.432	24.883	28.109	31.363

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame
NOTE 4: Slot i is slot index per frame

A.3.2.3 FRC for maximum input level for 64QAM

Table A.3.2.3-1 Fixed reference channel for maximum input level receiver requirements (SCS 15 kHz, FDD, 64QAM)

Parameter	Unit	Value							
Channel bandwidth	**MHz**	**5**	**10**	**15**	**20**	**25**	**30**	**40**	**50**
Subcarrier spacing	kHz	15	15	15	15	15	15	15	15
Subcarrier spacing configuration μ		0	0	0	0	0	0	0	0
Allocated resource blocks		25	52	79	106	133	160	216	270
Subcarriers per resource block		12	12	12	12	12	12	12	12
Allocated slots per Frame		8	8	8	8	8	8	8	8
MCS Index		24	24	24	24	24	24	24	24
MCS Table for TBS determination		64QAM							
Modulation		64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1
Information Bit Payload per Slot									
For Slots 0,1	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,3,4,5,6,7,8,9	Bits	12296	25608	38936	52224	64552	77896	106576	131176
Transport block CRC	Bits	24	24	24	24	24	24	24	24
LDPC base graph		1	1	1	1	1	1	1	1
Number of Code Blocks per Slot									
For Slot 0,1	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,3,4,5,6,7,8,9	CBs	2	4	5	7	8	10	13	16
Binary Channel Bits per Slot									
For Slot 0,1	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,3,4,5,6,7,8,9	Bits	16200	33696	51192	68688	86184	103680	139968	174960
Max. Throughput averaged over 1 frame	Mbps	9.837	20.486	31.149	41.779	51.642	62.317	85.261	104.941

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame
NOTE 4: Slot i is slot index per frame

Table A.3.2.3-2 Fixed reference channel for maximum input level receiver requirements (SCS 30 kHz, FDD, 64QAM)

Parameter	Unit	Value										
Channel bandwidth	**MHz**	**5**	**10**	**15**	**20**	**25**	**30**	**40**	**50**	**60**	**80**	**100**
Subcarrier spacing configuration μ		1	1	1	1	1	1	1	1	1	1	1
Allocated resource blocks		11	24	38	51	65	78	106	133	162	217	273
Subcarriers per resource block		12	12	12	12	12	12	12	12	12	12	12
Allocated slots per Frame		17	17	17	17	17	17	17	17	17	17	17
MCS Index		24	24	24	24	24	24	24	24	24	24	24
MCS Table for TBS determination		64QAM										
Modulation		64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1	1	1	1
Information Bit Payload per Slot												
For Slots 0,1,2	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 3,…,19	Bits	5376	11784	18432	25104	31752	37896	52224	64552	79896	106576	135296
Transport block CRC	Bits	24	24	24	24	24	24	24	24	24	24	24
LDPC base graph		1	1	1	1	1	1	1	1	1	1	1
Number of Code Blocks per Slot												
For Slot2 0,1,2	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 3,…,19	CBs	1	2	3	3	4	5	7	8	10	13	17
Binary Channel Bits per Slot												
For Slots 0,1,2	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 3,…,19	Bits	7128	15552	24624	33048	42120	50544	68688	86184	104976	140616	176904
Max. Throughput averaged over 1 frame	Mbps	9.139	20.033	31.334	42.677	53.978	64.423	88.781	109.738	135.823	181.179	230.003

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame
NOTE 4: Slot i is slot index per frame

Table A.3.2.3-3 Fixed Reference Channel for Maximum input level receiver requirements (SCS 60 kHz, FDD, 64QAM)

Parameter	Unit	Value									
Channel bandwidth	**MHz**	**10**	**15**	**20**	**25**	**30**	**40**	**50**	**60**	**80**	**100**
Subcarrier spacing configuration μ		2	2	2	2	2	2	2	2	2	2
Allocated resource blocks		11	18	24	31	38	51	65	79	107	135
Subcarriers per resource block		12	12	12	12	12	12	12	12	12	12
Allocated slots per Frame		36	36	36	36	36	36	36	36	36	36
MCS Index		24	24	24	24	24	24	24	24	24	24
MCS Table for TBS determination		64QAM									
Modulation		64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1	1	1
Information Bit Payload per Slot											
For Slots 0,1,2,3	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 4,…,39	Bits	5376	8712	11784	15112	18432	25104	31752	38936	52224	65576
Transport block CRC	Bits	24	24	24	24	24	24	24	24	24	24
LDPC base graph		1	1	1	1	1	1	1	1	1	1
Number of Code Blocks per Slot											
For Slots 0,1,2,3	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 4,…,39	CBs	1	2	2	2	3	3	4	5	7	8
Binary Channel Bits per Slot											
For Slots 0,1,2,3	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 4,…,39	Bits	7128	11664	15552	20088	24624	33048	42120	51192	69336	87480
Max. Throughput averaged over 1 frame	Mbps	19.354	31.363	42.422	54.403	66.355	90.374	114.307	140.170	188.006	236.074

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame
NOTE 4: Slot i is slot index per frame

A.3.2.4 FRC for maximum input level for 256 QAM

Table A.3.2.4-1 Fixed reference channel for maximum input level receiver requirements (SCS 15 kHz, FDD, 256QAM)

Parameter	Unit	Value							
Channel bandwidth	**MHz**	**5**	**10**	**15**	**20**	**25**	**30**	**40**	**50**
Subcarrier spacing	kHz	15	15	15	15	15	15	15	15
Subcarrier spacing configuration μ		0	0	0	0	0	0	0	0
Allocated resource blocks		25	52	79	106	133	160	216	270
Subcarriers per resource block		12	12	12	12	12	12	12	12
Allocated slots per Frame		8	8	8	8	8	8	8	8
MCS Index		23	23	23	23	23	23	23	23
MCS Table for TBS determination		256QAM							
Modulation		256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM
Target Coding Rate		4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1
Information Bit Payload per Slot									
For Slots 0,1	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,3,4,5,6,7,8,9	Bits	16896	34816	53288	71688	90176	108552	143400	180376
Transport block CRC	Bits	24	24	24	24	24	24	24	24
LDPC base graph		1	1	1	1	1	1	1	1
Number of Code Blocks per Slot									
For Slot 0,1	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,3,4,5,6,7,8,9	CBs	3	5	7	9	12	14	18	22
Binary Channel Bits per Slot									
For Slots 0,1	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,3,4,5,6,7,8,9	Bits	21600	44928	68256	91584	114912	138240	186624	233280
Max. Throughput averaged over 1 frame	Mbps	13.517	27.853	42.630	57.350	72.141	86.842	114.720	144.310

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame
NOTE 4: Slot i is slot index per frame

Table A.3.2.4-2 Fixed reference channel for maximum input level receiver requirements (SCS 30 kHz, FDD, 256QAM)

Parameter	Unit	Value										
Channel bandwidth	**MHz**	**5**	**10**	**15**	**20**	**25**	**30**	**40**	**50**	**60**	**80**	**100**
Subcarrier spacing configuration μ		1	1	1	1	1	1	1	1	1	1	1
Allocated resource blocks		11	24	38	51	65	78	106	133	162	217	273
Subcarriers per resource block		12	12	12	12	12	12	12	12	12	12	12
Allocated slots per Frame		17	17	17	17	17	17	17	17	17	17	17
MCS Index		23	23	23	23	23	23	23	23	23	23	23
MCS Table for TBS determination		256QAM										
Modulation		256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM
Target Coding Rate		4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1	1	1	1
Information Bit Payload per Slot												
For Slots 0,1,2	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 3,…,19	Bits	7424	16136	25608	33816	44040	52224	71688	90176	108552	147576	184424
Transport block CRC	Bits	24	24	24	24	24	24	24	24	24	24	24
LDPC base graph		1	1	1	1	1	1	1	1	1	1	1
Number of Code Blocks per Slot												
For Slots 0,1,2	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 3,…,19	CBs	1	3	4	5	6	7	9	12	14	19	23
Binary Channel Bits per Slot												
For Slots 0,1,2	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 3,…,19	Bits	9504	20736	32832	44064	56160	67392	91584	114912	139968	187488	235872
Max. Throughput averaged over 1 frame	Mbps	12.621	27.431	43.534	57.487	74.868	88.781	121.870	153.299	184.538	250.879	313.521

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame
NOTE 4: Slot i is slot index per frame

Table A.3.2.4-3 Fixed reference channel for maximum input level receiver requirements (SCS 60 kHz, FDD, 256QAM)

Parameter	Unit	Value									
Channel bandwidth	**MHz**	**10**	**15**	**20**	**25**	**30**	**40**	**50**	**60**	**80**	**100**
Subcarrier spacing configuration μ		2	2	2	2	2	2	2	2	2	2
Allocated resource blocks		11	18	24	31	38	51	65	79	107	135
Subcarriers per resource block		12	12	12	12	12	12	12	12	12	12
Allocated slots per Frame		36	36	36	36	36	36	36	36	36	36
MCS Index		23	23	23	23	23	23	23	23	23	23
MCS Table for TBS determination		256QAM									
Modulation		256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM
Target Coding Rate		4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1	1	1
Information Bit Payload per Slot											
For Slots 0,1,2,3	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 4,…,39	Bits	7424	12040	16136	21000	25608	33816	44040	53288	71688	90176
Transport block CRC	Bits	24	24	24	24	24	24	24	24	24	24
LDPC base graph		1	1	1	1	1	1	1	1	1	1
Number of Code Blocks per Slot											
For Slots 0,1,2,3	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 4,…,39	CBs	1	2	3	3	4	5	6	7	9	12
Binary Channel Bits per Slot											
For Slot 0,1,2,3	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 4,…,39	Bits	9504	15552	20736	26784	32832	44064	56160	68256	92448	116640
Max. Throughput averaged over 1 frame	Mbps	26.726	43.344	58.090	75.600	92.189	121.738	158.544	191.837	258.077	324.634

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame
NOTE 4: Slot i is slot index per frame

A.3.2.5 FRC for maximum input level for 1024 QAM

Table A.3.2.5-1 Fixed reference channel for maximum input level receiver requirements (SCS 15 kHz, FDD, 1024QAM)

Parameter	Unit	Value							
Channel bandwidth	**MHz**	**5**	**10**	**15**	**20**	**25**	**30**	**40**	**50**
Subcarrier spacing	kHz	15	15	15	15	15	15	15	15
Subcarrier spacing configuration μ		0	0	0	0	0	0	0	0
Allocated resource blocks		25	52	79	106	133	160	216	270
Subcarriers per resource block		12	12	12	12	12	12	12	12
Allocated slots per Frame		8	8	8	8	8	8	8	8
MCS Index		23	23	23	23	23	23	23	23
MCS Table for TBS determination		1024QAM							
Modulation		1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM
Target Coding Rate		0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1
Information Bit Payload per Slot									
For Slots 0,1	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,3,4,5,6,7,8,9	Bits	21000	44040	67584	90176	112648	135296	184424	229576
Transport block CRC	Bits	24	24	24	24	24	24	24	24
LDPC base graph		1	1	1	1	1	1	1	1
Number of Code Blocks per Slot									
For Slot 0,1	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,3,4,5,6,7,8,9	CBs	3	6	9	11	14	17	22	28
Binary Channel Bits per Slot									
For Slots 0,1	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,3,4,5,6,7,8,9	Bits	27000	56160	85320	114480	143640	172800	233280	291600
Max. Throughput averaged over 1 frame	Mbps	16.800	35.232	54.067	72.141	90.118	108.237	147.539	183.661

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame
NOTE 4: Slot i is slot index per frame

Table A.3.2.5-2 Fixed reference channel for maximum input level receiver requirements (SCS 30 kHz, FDD, 1024QAM)

Parameter	Unit	Value										
Channel bandwidth	**MHz**	**5**	**10**	**15**	**20**	**25**	**30**	**40**	**50**	**60**	**80**	**100**
Subcarrier spacing configuration μ		1	1	1	1	1	1	1	1	1	1	1
Allocated resource blocks		11	24	38	51	65	78	106	133	162	217	273
Subcarriers per resource block		12	12	12	12	12	12	12	12	12	12	12
Allocated slots per Frame		17	17	17	17	17	17	17	17	17	17	17
MCS Index		23	23	23	23	23	23	23	23	23	23	23
MCS Table for TBS determination		1024QAM										
Modulation		1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM
Target Coding Rate		0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1	1	1	1
Information Bit Payload per Slot												
For Slots 0,1,2	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 3,…,19	Bits	9224	20496	32264	43032	55304	65576	90176	112648	139376	184424	233608
Transport block CRC	Bits	24	24	24	24	24	24	24	24	24	24	24
LDPC base graph		1	1	1	1	1	1	1	1	1	1	1
Number of Code Blocks per Slot												
For Slots 0,1,2	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 3,…,19	CBs	2	3	4	6	7	8	11	14	17	22	28
Binary Channel Bits per Slot												
For Slots 0,1,2	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 3,…,19	Bits	11880	25920	41040	55080	70200	84240	114480	143640	174960	234360	294840
Max. Throughput averaged over 1 frame	Mbps	15.681	34.843	54.849	73.154	94.017	111.479	153.299	191.502	236.939	313.521	397.134

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame
NOTE 4: Slot i is slot index per frame

Table A.3.2.5-3 Fixed reference channel for maximum input level receiver requirements (SCS 60 kHz, FDD, 1024QAM)

Parameter	Unit	Value									
Channel bandwidth	**MHz**	**10**	**15**	**20**	**25**	**30**	**40**	**50**	**60**	**80**	**100**
Subcarrier spacing configuration μ		2	2	2	2	2	2	2	2	2	2
Allocated resource blocks		11	18	24	31	38	51	65	79	107	135
Subcarriers per resource block		12	12	12	12	12	12	12	12	12	12
Allocated slots per Frame		36	36	36	36	36	36	36	36	36	36
MCS Index		23	23	23	23	23	23	23	23	23	23
MCS Table for TBS determination		1024QAM									
Modulation		1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM
Target Coding Rate		0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1	1	1
Information Bit Payload per Slot											
For Slots 0,1,2,3	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 4,…,39	Bits	9224	15368	20496	26120	32264	43032	55304	67584	90176	114776
Transport block CRC	Bits	24	24	24	24	24	24	24	24	24	24
LDPC base graph		1	1	1	1	1	1	1	1	1	1
Number of Code Blocks per Slot											
For Slots 0,1,2,3	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 4,…,39	CBs	2	2	3	4	4	6	7	9	11	14
Binary Channel Bits per Slot											
For Slot 0,1,2,3	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 4,…,39	Bits	11880	19440	25920	33480	41040	55080	70200	85320	115560	145800
Max. Throughput averaged over 1 frame	Mbps	33.206	55.325	73.786	94.032	116.150	154.915	199.094	243.302	324.634	413.194

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame
NOTE 4: Slot i is slot index per frame

A.3.3 DL reference measurement channels for TDD

A.3.3.1 General

Table A.3.3.1-1 Additional reference channels parameters for TDD

Parameter		Value		
		SCS 15 kHz (μ=0)	**SCS 30 kHz (μ=1)**	**SCS 60 kHz (μ=2)**
TDD Slot Configuration pattern (Note 1)		DDDSU	7DS2U	14D$S_1$$S_2$4U
Special Slot Configuration (Note 2)		10D+2G+2U	6D+4G+4U	S_1=12D+2G, S_2=6G+8U
referenceSubcarrierSpacing		15 kHz	30 kHz	60 kHz
UL-DL configuration	*dl-UL-TransmissionPeriodicity*	5 ms	5 ms	5 ms
	nrofDownlinkSlots	3	7	14
	nrofDownlinkSymbols	10	6	12
	nrofUplinkSlot	1	2	4
	nrofUplinkSymbols	2	4	8
Number of HARQ Processes		8	8	16
The number of slots between PDSCH and corresponding HARQ-ACK information (Note 3)		K1 = 4 if mod(i,5) = 0 K1 = 3 if mod(i,5) = 1 K1 = 2 if mod(i,5) = 2 where i is slot index per frame; i = {0,…,9}	K1 = 8 if mod(i,10) = 0 K1 = 7 if mod(i,10) = 1 K1 = 6 if mod(i,10) = 2 K1 = 5 if mod(i,10) = 3 K1 = 4 if mod(i,10) = 4 K1 = 3 if mod(i,10) = 5 K1 = 2 if mod(i,10) = 6 where i is slot index per frame; i = {0,…,19}	K1 = 13 if mod(i,20) = 2 K1 = 12 if mod(i,20) = 3 K1 = 11 if mod(i,20) = 4 K1 = 10 if mod(i,20) = 5 K1 = 9 if mod(i,20) = 6 K1 = 8 if mod(i,20) = 7 K1 = 7 if mod(i,20) = 8 K1 = 6 if mod(i,20) = 9 K1 = 6 if mod(i,20) = 10 K1 = 6 if mod(i,20) = 11 K1 = 6 if mod(i,20) = 12 K1 = 6 if mod(i,20) = 13 where i is slot index per frame; i = {0,…,39}

NOTE 1: D denotes a slot with all DL symbols; S denotes a slot with a mix of DL, UL and guard symbols; U denotes a slot with all UL symbols. The field is for information.
NOTE 2: D, G, U denote DL, guard and UL symbols, respectively. The field is for information.
NOTE 3: i is the slot index per frame.
NOTE 4: A -2ms or +3ms time offset to the NR configuration pattern relative to the E-UTRA UL-DL configuration must be apply in the TDD intra-band EN-DC.

A.3.3.2 FRC for receiver requirements for QPSK

Table A.3.3.2-1 Fixed reference channel for receiver requirements (SCS 15 kHz, TDD, QPSK 1/3)

Parameter	Unit	Value							
Channel bandwidth	**MHz**	**5**	**10**	**15**	**20**	**25**	**30**	**40**	**50**
Subcarrier spacing	kHz	15	15	15	15	15	15	15	15
Subcarrier spacing configuration μ		0	0	0	0	0	0	0	0
Allocated resource blocks		25	52	79	106	133	160	216	270
Subcarriers per resource block		12	12	12	12	12	12	12	12
Allocated slots per Frame		4	4	4	4	4	4	4	4
MCS Index		4	4	4	4	4	4	4	4
MCS Table for TBS determination		64QAM							
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding Rate		1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1
Information Bit Payload per Slot									
For Slots 0,1,3,4,8,9	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,5,6,7	Bits	1672	3368	5120	6912	8712	10504	14088	17424
Transport block CRC	Bits	16	16	24	24	24	24	24	24
LDPC base graph		2	2	1	1	1	1	1	1
Number of Code Blocks per Slot									
For Slots 0,1,3,4,8,9	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,5,6,7	CBs	1	1	1	1	2	2	2	3
Binary Channel Bits per Slot									
For Slots 0,1,3,4,8,9	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,5,6,7	Bits	5400	11232	17064	22896	28728	34560	46656	58320
Max. Throughput averaged over 1 frame	Mbps	0.669	1.347	2.048	2.765	3.485	4.202	5.635	6.970

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame
NOTE 4: Slot i is slot index per frame

Table A.3.3.2-2 Fixed reference channel for receiver requirements (SCS 30 kHz, TDD, QPSK 1/3)

Parameter	Unit		Value										
Channel bandwidth	**MHz**	**5**	**10**	**15**	**20**	**25**	**30**	**40**	**50**	**60**	**70**	**80**	**100**
Subcarrier spacing configuration μ		1	1	1	1	1	1	1	1	1	1	1	1
Allocated resource blocks		11	24	38	51	65	78	106	133	162	162	217	273
Subcarriers per resource block		12	12	12	12	12	12	12	12	12	12	12	12
Allocated slots per Frame		11	11	11	11	11	11	11	11	11	13	11	11
MCS Index		4	4	4	4	4	4	4	4	4	4	4	4
MCS Table for TBS determination		64QAM											
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding Rate		1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1	1	1	1	1
Information Bit Payload per Slot													
For Slots 0,1,2 and Slot i, if mod(i, 10) = {7,8,9} for i from {0,…,19}	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 10) = {0,1,2,3,4,5,6} for i from {3,…,19}	Bits	736	1608	2472	3368	4224	4992	6912	8712	10504	12296	14088	17928
Transport block CRC	Bits	16	16	16	16	24	24	24	24	24	24	24	24
LDPC base graph		2	2	2	2	1	1	1	1	1	1	1	1
Number of Code Blocks per Slot													
For Slots 0,1,2 and Slot i, if mod(i, 10) = {7,8,9} for i from {0,…,19}	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 10) = {0,1,2,3,4,5,6} for i from {3,…,19}	CBs	1	1	1	1	1	1	1	2	2	2	2	3
Binary Channel Bits per Slot													
For Slots 0,1,2 and Slot i, if mod(i, 10) = {7,8,9} for i from {0,…,19}	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 10) = {0,1,2,3,4,5,6} for i from {3,…,19}	Bits	2376	5184	8208	11016	14040	16848	22896	28728	34992	40824	46872	58968
Max. Throughput averaged over 1 frame	Mbps	0.810	2.1.769	2.719	3.705	4.646	5.491	7.603	9.583	11.554	13.526	15.497	19.721

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame
NOTE 4: Slot i is slot index per frame

Table A.3.3.2-3 Fixed reference channel for receiver requirements (SCS 60 kHz, TDD, QPSK 1/3)

Parameter	Unit		Value									
Channel bandwidth	**MHz**	**10**	**15**	**20**	**25**	**30**	**40**	**50**	**60**	**70**	**80**	**100**
Subcarrier spacing configuration μ		2	2	2	2	2	2	2	2	2	2	2
Allocated resource blocks		11	18	24	31	38	51	65	79	93	107	135
Subcarriers per resource block		12	12	12	12	12	12	12	12	12	12	12
Allocated slots per Frame		24	24	24	24	24	24	24	24	26	24	24
MCS Index		4	4	4	4	4	4	4	4	4	4	4
MCS Table for TBS determination		64QAM										
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target Coding Rate		1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1	1	1	1
Information Bit Payload per Slot												
For Slots 0,1,2,3 and Slot i, if mod(i, 20) = {14,15,16,17,18,19} for i from {0,…,39}	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 20) = {0,…, 13} for i from {4,…,39}	Bits	736	1192	1608	2024	2472	3368	4224	5120	6016	6912	8712
Transport block CRC	Bits	16	16	16	16	16	16	24	24	24	24	24
LDPC base graph		2	2	2	2	2	2	1	1	1	1	1
Number of Code Blocks per Slot												
For Slots 0,1,2,3 and Slot i, if mod(i, 20) = {14,15,16,17,18,19} for i from {0,…,39}	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 20) = {0,…, 13} for i from {4,…,39}	CBs	1	1	1	1	1	1	1	1	1	1	2
Binary Channel Bits per Slot												
For Slots 0,1,2,3 and Slot i, if mod(i, 20) = {14,15,16,17,18,19} for i from {0,…,39}	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 20) = {0,…,13} for i from {4,…,39}	Bits	2376	3888	5184	6696	8208	11016	14040	17064	20088	23112	29160
Max. Throughput averaged over 1 frame	Mbps	1.766	3.2.861	3.859	4.858	5.933	8.083	10.138	12.288	14.438	16.589	20.909

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame
NOTE 4: Slot i is slot index per frame

A.3.3.3 FRC for maximum input level for 64QAM

Table A.3.3.3-1 Fixed reference channel for maximum input level receiver requirements (SCS 15 kHz, TDD, 64QAM)

Parameter	Unit	Value							
Channel bandwidth	**MHz**	**5**	**10**	**15**	**20**	**25**	**30**	**40**	**50**
Subcarrier spacing	kHz	15	15	15	15	15	15	15	15
Subcarrier spacing configuration μ		0	0	0	0	0	0	0	0
Allocated resource blocks		25	52	79	106	133	160	216	270
Subcarriers per resource block		12	12	12	12	12	12	12	12
Allocated slots per Frame		4	4	4	4	4	4	4	4
MCS Index		24	24	24	24	24	24	24	24
MCS Table for TBS determination		64QAM							
Modulation		64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1
Information Bit Payload per Slot									
For Slots 0,1,3,4,8,9	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,5,6,7	Bits	12296	25608	38936	52224	64552	77896	106576	131176
Transport block CRC	Bits	24	24	24	24	24	24	24	24
LDPC base graph		1	1	1	1	1	1	1	1
Number of Code Blocks per Slot									
For Slots 0,1,3,4,8,9	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,5,6,7	CBs	2	4	5	7	8	10	13	16
Binary Channel Bits per Slot									
For Slots 0,1,3,4,8,9	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,5,6,7	Bits	16200	33696	51192	68688	86184	103680	139968	174960
Max. Throughput averaged over 1 frame	Mbps	4.918	10.243	15.574	20.890	20.890	31.158	42.630	52.470

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame
NOTE 4: Slot i is slot index per frame

Table A.3.3.3-2 Fixed reference channel for maximum input level receiver requirements (SCS 30 kHz, TDD, 64QAM)

Parameter	Unit		Value										
Channel bandwidth	**MHz**	**5**	**10**	**15**	**20**	**25**	**30**	**40**	**50**	**60**	**70**	**80**	**100**
Subcarrier spacing configuration μ		1	1	1	1	1	1	1	1	1	1	1	1
Allocated resource blocks		11	24	38	51	65	78	106	133	162	189	217	273
Subcarriers per resource block		12	12	12	12	12	12	12	12	12	12	12	12
Allocated slots per Frame		11	11	11	11	11	11	11	11	11	13	11	11
MCS Index		24	24	24	24	24	24	24	24	24	24	24	24
MCS Table for TBS determination		64QAM											
Modulation		64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1	1	1	1	1
Information Bit Payload per Slot													
For Slots 0,1,2 and Slot i, if mod(i, 10) = {7,8,9} for i from {0,…,19}	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 10) = {0,1,2,3,4,5,6} for i from {3,…,19}	Bits	5376	11784	18432	25104	31752	37896	52224	64552	79896	92200	106576	135296
Transport block CRC	Bits	24	24	24	24	24	24	24	24	24	24	24	24
LDPC base graph		1	1	1	1	1	1	1	1	1	1	1	1
Number of Code Blocks per Slot													
For Slots 0,1,2 and Slot i, if mod(i, 10) = {7,8,9} for i from {0,…,19}	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 10) = {0,1,2,3,4,5,6} for i from {3,…,19}	CBs	1	2	3	3	4	5	7	8	10	11	13	17
Binary Channel Bits per Slot													
For Slots 0,1,2 and Slot i, if mod(i, 10) = {7,8,9} for i from {0,…,19}	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 10) = {0,1,2,3,4,5,6} for i from {3,…,19}	Bits	7128	15552	24624	33048	42120	50544	68688	86184	104976	122472	140616	176904
Max. Throughput averaged over 1 frame	Mbps	5.914	12.962	20.275	27.614	34.927	41.686	57.446	71.007	87.886	101.42	117.234	148.826

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame
NOTE 4: Slot i is slot index per frame

Table A.3.3.3-3. Fixed reference channel for maximum input level receiver requirements (SCS 60 kHz, TDD, 64QAM)

Parameter	Unit		Value									
Channel bandwidth	**MHz**	**10**	**15**	**20**	**25**	**30**	**40**	**50**	**60**	**70**	**80**	**100**
Subcarrier spacing configuration μ		2	2	2	2	2	2	2	2	2	2	2
Allocated resource blocks		11	18	24	31	38	51	65	79	93	107	135
Subcarriers per resource block		12	12	12	12	12	12	12	12	12	12	12
Allocated slots per Frame		24	24	24	24	24	24	24	24	26	24	24
MCS Index		24	24	24	24	24	24	24	24	24	24	24
MCS Table for TBS determination		64QAM										
Modulation		64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM	64 QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1	1	1	1
Information Bit Payload per Slot												
For Slots 0,1,2,3 and Slot i, if mod(i, 20) = {14,15,16,17,18,19} for i from {0,…,39}	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 20) = {0,…, 13} for i from {4,…,39}	Bits	5376	8712	11784	15112	18432	25104	31752	38936	45096	52224	65576
Transport block CRC	Bits	24	24	24	24	24	24	24	24	24	24	24
LDPC base graph		1	1	1	1	1	1	1	1	1	1	1
Number of Code Blocks per Slot												
For Slots 0,1,2,3 and Slot i, if mod(i, 20) = {14,15,16,17,18,19} for i from {0,…,39}	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 20) = {0,…, 13} for i from {4,…,39}	CBs	1	2	2	2	3	3	4	5	6	7	8
Binary Channel Bits per Slot												
For Slots 0,1,2,3 and Slot i, if mod(i, 20) = {14,15,16,17,18,19} for i from {0,…,39}	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 20) = {0,…, 13} for i from {4,…,39}	Bits	7128	11664	15552	20088	24624	33048	42120	51192	60264	69336	87480
Max. Throughput averaged over 1 frame	Mbps	12.902	20.909	28.282	36.269	44.237	60.250	76.205	93.446	108.23	125.338	157.382

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame
NOTE 4: Slot i is slot index per frame

A.3.3.4 FRC for maximum input level for 256 QAM

Table A.3.3.4-1 Fixed reference channel for maximum input level receiver requirements (SCS 15 kHz, TDD, 256QAM)

Parameter	Unit	Value							
Channel bandwidth	**MHz**	**5**	**10**	**15**	**20**	**25**	**30**	**40**	**50**
Subcarrier spacing	kHz	15	15	15	15	15	15	15	15
Subcarrier spacing configuration μ		0	0	0	0	0	0	0	0
Allocated resource blocks		25	52	79	106	133	160	216	270
Subcarriers per resource block		12	12	12	12	12	12	12	12
Allocated slots per Frame		4	4	4	4	4	4	4	4
MCS Index		23	23	23	23	23	23	23	23
MCS table for TBS determination		256QAM							
Modulation		256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM
Target Coding Rate		4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1
Information Bit Payload per Slot									
For Slots 0,1,3,4,8,9	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,5,6,7	Bits	16896	34816	53288	71688	90176	108552	143400	180376
Transport block CRC	Bits	24	24	24	24	24	24	24	24
LDPC base graph		1	1	1	1	1	1	1	1
Number of Code Blocks per Slot									
For Slots 0,1,3,4,8,9	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,5,6,7	CBs	3	5	7	9	12	14	18	23
Binary Channel Bits per Slot									
For Slots 0,1,3,4,8,9	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,5,6,7	Bits	21600	44928	68256	91584	114912	138240	186624	233280
Max. Throughput averaged over 1 frame	Mbps	6.758	13.926	21.315	28.675	36.070	43.421	57.360	72.150

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame
NOTE 4: Slot i is slot index per frame

Table A.3.3.4-2 Fixed Reference channel for maximum input level receiver requirements (SCS 30 kHz, TDD, 256QAM)

Parameter	Unit		Value										
Channel bandwidth	**MHz**	**5**	**10**	**15**	**20**	**25**	**30**	**40**	**50**	**60**	**70**	**80**	**100**
Subcarrier spacing configuration μ		1	1	1	1	1	1	1	1	1	1	1	1
Allocated resource blocks		11	24	38	51	65	78	106	133	162	189	217	273
Subcarriers per resource block		12	12	12	12	12	12	12	12	12	12	12	12
Allocated slots per Frame		11	11	11	11	11	11	11	11	11	13	11	11
MCS Index		23	23	23	23	23	23	23	23	23	23	23	23
MCS Table for TBS determination		256QAM											
Modulation		256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM
Target Coding Rate		4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1	1	1	1	1
Information Bit Payload per Slot													
For Slots 0,1,2 and Slot i, if mod(i, 10) = {7,8,9} for i from {0,…,19}	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 10) = {0,1,2,3,4,5,6} for i from {3,…,19}	Bits	7424	16136	25608	33816	44040	52224	71688	90176	108552	127080	147576	184424
Transport block CRC	Bits	24	24	24	24	24	24	24	24	24	24	24	24
LDPC base graph		1	1	1	1	1	1	1	1	1	1	1	1
Number of Code Blocks per Slot													
For Slots 0,1,2 and Slot i, if mod(i, 10) = {7,8,9} for i from {0,…,19}	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 10) = {0,1,2,3,4,5,6} for i from {3,…,19}	CBs	1	1	1	1	1	1	1	2	2	2	2	3
Binary Channel Bits per Slot													
For Slots 0,1,2 and Slot i, if mod(i, 10) = {7,8,9} for i from {0,…,19}	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 10) = {0,1,2,3,4,5,6} for i from {3,…,19}	Bits	9504	20736	32832	44064	56160	67392	91584	114912	139968	163296	187488	235872
Max. Throughput averaged over 1 frame	Mbps	8.166	17.750	28.169	37.198	48.444	57.446	78.857	99.194	119.407	139.788	162.334	202.866

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame
NOTE 4: Slot i is slot index per frame

Table A.3.3.4-3 Fixed reference channel for maximum input level receiver requirements (SCS 60 kHz, TDD, 256QAM)

Parameter	Unit		Value									
Channel bandwidth	**MHz**	**10**	**15**	**20**	**25**	**30**	**40**	**50**	**60**	**70**	**80**	**100**
Subcarrier spacing configuration μ		2	2	2	2	2	2	2	2	2	2	2
Allocated resource blocks		11	18	24	31	38	51	65	79	93	107	135
Subcarriers per resource block		12	12	12	12	12	12	12	12	12	12	12
Allocated slots per Frame		24	24	24	24	24	24	24	24	26	24	24
MCS Index		23	23	23	23	23	23	23	23	23	23	23
MCS Table for TBS determination		256QAM										
Modulation		256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM	256 QAM
Target Coding Rate		4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1	1	1	1
Information Bit Payload per Slot												
For Slots 0,1,2,3 and Slot i, if mod(i, 20) = {14,15,16,17,18,19} for i from {0,…,39}	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 20) = {0,…, 13} for i from {4,…,39}	Bits	7424	12040	16136	21000	25608	33816	44040	53288	62504	71688	90176
Transport block CRC	Bits	24	24	24	24	24	24	24	24	24	24	24
LDPC base graph		1	1	1	1	1	1	1	1	1	1	1
Number of Code Blocks per Slot												
For Slots 0,1,2,3 and Slot i, if mod(i, 20) = {14,15,16,17,18,19} for i from {0,…,39}	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 20) = {0,…, 13} for i from {4,…,39}	CBs	1	2	3	3	4	5	6	7	8	9	12
Binary Channel Bits per Slot												
For Slots 0,1,2,3 and Slot i, if mod(i, 20) = {14,15,16,17,18,19} for i from {0,…,39}	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 20) = {0,…, 13} for i from {4,…,39}	Bits	9504	15552	20736	26784	32832	44064	56160	68256	80352	92448	116640
Max. Throughput averaged over 1 frame	Mbps	17.818	28.896	38.726	50.400	61.459	81.158	105.696	127.891	150.010	172.051	216.422

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame
NOTE 4: Slot i is slot index per frame

A.3.3.5 FRC for maximum input level for 1024 QAM

Table A.3.3.5-1 Fixed reference channel for maximum input level receiver requirements (SCS 15 kHz, TDD, 1024QAM)

Parameter	Unit	Value							
Channel bandwidth	**MHz**	**5**	**10**	**15**	**20**	**25**	**30**	**40**	**50**
Subcarrier spacing	kHz	15	15	15	15	15	15	15	15
Subcarrier spacing configuration μ		0	0	0	0	0	0	0	0
Allocated resource blocks		25	52	79	106	133	160	216	270
Subcarriers per resource block		12	12	12	12	12	12	12	12
Allocated slots per Frame		4	4	4	4	4	4	4	4
MCS Index		23	23	23	23	23	23	23	23
MCS table for TBS determination		1024QAM							
Modulation		1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM
Target Coding Rate		0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1
Information Bit Payload per Slot									
For Slots 0,1,3,4,8,9	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,5,6,7	Bits	21000	44040	67584	90176	112648	135296	184424	229576
Transport block CRC	Bits	24	24	24	24	24	24	24	24
LDPC base graph		1	1	1	1	1	1	1	1
Number of Code Blocks per Slot									
For Slots 0,1,3,4,8,9	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,5,6,7	CBs	3	6	9	11	14	17	22	28
Binary Channel Bits per Slot									
For Slots 0,1,3,4,8,9	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slots 2,5,6,7	Bits	27000	56160	85320	114480	143640	172800	233280	291600
Max. Throughput averaged over 1 frame	Mbps	8.400	17.616	27.034	36.070	45.059	54.118	73.770	91.830

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame
NOTE 4: Slot i is slot index per frame

Table A.3.3.5-2 Fixed Reference channel for maximum input level receiver requirements (SCS 30 kHz, TDD, 1024QAM)

Parameter	Unit	Value											
Channel bandwidth	**MHz**	**5**	**10**	**15**	**20**	**25**	**30**	**40**	**50**	**60**	**70**	**80**	**100**
Subcarrier spacing configuration μ		1	1	1	1	1	1	1	1	1	1	1	1
Allocated resource blocks		11	24	38	51	65	78	106	133	162	189	217	273
Subcarriers per resource block		12	12	12	12	12	12	12	12	12	12	12	12
Allocated slots per Frame		11	11	11	11	11	11	11	11	11	13	11	11
MCS Index		23	23	23	23	23	23	23	23	23	23	23	23
MCS Table for TBS determination		1024QAM											
Modulation		1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM
Target Coding Rate		0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1	1	1	1	1
Information Bit Payload per Slot													
For Slots 0,1,2 and Slot i, if mod(i, 10) = {7,8,9} for i from {0,…,19}	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 10) = {0,1,2,3,4,5,6} for i from {3,…,19}	Bits	9224	20496	32264	43032	55304	65576	90176	112648	139376	159800	184424	233608
Transport block CRC	Bits	24	24	24	24	24	24	24	24	24	24	24	24
LDPC base graph		1	1	1	1	1	1	1	1	1	1	1	1
Number of Code Blocks per Slot													
For Slots 0,1,2 and Slot i, if mod(i, 10) = {7,8,9} for i from {0,…,19}	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 10) = {0,1,2,3,4,5,6} for i from {3,…,19}	CBs	2	3	4	6	7	8	11	14	17	19	22	28
Binary Channel Bits per Slot													
For Slots 0,1,2 and Slot i, if mod(i, 10) = {7,8,9} for i from {0,…,19}	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 10) = {0,1,2,3,4,5,6} for i from {3,…,19}	Bits	11880	25920	41040	55080	70200	84240	114480	143640	174960	204120	234360	294840
Max. Throughput averaged over 1 frame	Mbps	10.146	22.546	35.490	47.335	60.834	72.134	99.194	123.913	153.314	175.868	202.866	256.969

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame
NOTE 4: Slot i is slot index per frame

Table A.3.3.5-3 Fixed reference channel for maximum input level receiver requirements (SCS 60 kHz, TDD, 1024QAM)

Parameter	Unit	Value										
Channel bandwidth	**MHz**	**10**	**15**	**20**	**25**	**30**	**40**	**50**	**60**	**70**	**80**	**100**
Subcarrier spacing configuration μ		2	2	2	2	2	2	2	2	2	2	2
Allocated resource blocks		11	18	24	31	38	51	65	79	93	107	135
Subcarriers per resource block		12	12	12	12	12	12	12	12	12	12	12
Allocated slots per Frame		24	24	24	24	24	24	24	24	26	24	24
MCS Index		23	23	23	23	23	23	23	23	23	23	23
MCS Table for TBS determination		1024QAM										
Modulation		1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM	1024 QAM
Target Coding Rate		0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Maximum number of HARQ transmissions		1	1	1	1	1	1	1	1	1	1	1
Information Bit Payload per Slot												
For Slots 0,1,2,3 and Slot i, if mod(i, 20) = {14,15,16,17,18,19} for i from {0,…,39}	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 20) = {0,…, 13} for i from {4,…,39}	Bits	9224	15368	20496	26120	32264	43032	55304	67584	79896	90176	114776
Transport block CRC	Bits	24	24	24	24	24	24	24	24	24	24	24
LDPC base graph		1	1	1	1	1	1	1	1	1	1	1
Number of Code Blocks per Slot												
For Slots 0,1,2,3 and Slot i, if mod(i, 20) = {14,15,16,17,18,19} for i from {0,…,39}	CBs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 20) = {0,…, 13} for i from {4,…,39}	CBs	2	2	3	4	4	6	7	9	10	11	14
Binary Channel Bits per Slot												
For Slots 0,1,2,3 and Slot i, if mod(i, 20) = {14,15,16,17,18,19} for i from {0,…,39}	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Slot i, if mod(i, 20) = {0,…, 13} for i from {4,…,39}	Bits	11880	19440	25920	33480	41040	55080	70200	85320	100440	115560	145800
Max. Throughput averaged over 1 frame	Mbps	22.138	36.883	49.190	62.688	77.434	103.277	132.730	162.202	191.750	216.422	275.462

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.
NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).
NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame
NOTE 4: Slot i is slot index per frame

A.4 CSI reference measurement channels

A.5 OFDMA Channel Noise Generator (OCNG)

A.5.1 OCNG Patterns for FDD

A.5.1.1 OCNG FDD pattern 1: Generic OCNG FDD Pattern for all unused REs

Table A.5.1.1-1: OP.1 FDD: Generic OCNG FDD Pattern for all unused REs

OCNG Appliance OCNG Parameters	Control Region (Core Set)	Data Region
Resources allocated	All unused REs (Note 1)	All unused REs (Note 2)
Structure	PDCCH	PDSCH
Content	Uncorrelated pseudo random QPSK modulated data	Uncorrelated pseudo random QPSK modulated data
Transmission scheme for multiple antennas ports transmission	Single Tx port transmission	Spatial multiplexing using any precoding matrix with dimensions same as the precoding matrix for PDSCH
Subcarrier Spacing	Same as for RMC PDCCH in the active BWP	Same as for RMC PDSCH in the active BWP
Power Level	Same as for RMC PDCCH	Same as for RMC PDSCH
NOTE 1: All unused REs in the active CORESETS appointed by the search spaces in use. NOTE 2: Unused available REs refer to REs in PRBs not allocated for any physical channels, CORESETs, synchronization signals or reference signals in channel bandwidth.		

A.5.2 OCNG Patterns for TDD

A.5.2.1 OCNG TDD pattern 1: Generic OCNG TDD Pattern for all unused REs

Table A.5.2.1-1: OP.1 TDD: Generic OCNG TDD Pattern for all unused REs

OCNG Appliance OCNG Parameters	Control Region (Core Set)	Data Region
Resources allocated	All unused REs (Note 1)	All unused REs (Note 2)
Structure	PDCCH	PDSCH
Content	Uncorrelated pseudo random QPSK modulated data	Uncorrelated pseudo random QPSK modulated data
Transmission scheme for multiple antennas ports transmission	Single Tx port transmission	Spatial multiplexing using any precoding matrix with dimensions same as the precoding matrix for PDSCH
Subcarrier Spacing	Same as for RMC PDCCH in the active BWP	Same as for RMC PDSCH in the active BWP
Power Level	Same as for RMC PDCCH	Same as for RMC PDSCH
NOTE 1: All unused REs in the active CORESETS appointed by the search spaces in use. NOTE 2: Unused available REs refer to REs in PRBs not allocated for any physical channels, CORESETs, synchronization signals or reference signals in channel bandwidth.		

A.6 Void

A.7 V2X reference measurement channels

A.7.1 General

The algorithm for determining the payload size A is as follows; given a desired coding rate R and radio block allocation NRB

1. Calculate the RE number of 2nd stage SCI Q_SCI2^' that can be transmitted in a given sub-frame, where in order to make sure that the code-rate of 2-A is approximate to SCI 1-A, a beta offset is selected based on MCS, and vacant resource elements γ value is determined based on NRB and DMRS frequency density.

2. Transport Block Size is determined according to clause 8.1.3.2 of TS 38.214 [13] based on Table A.7.1-1.

3. Calculate Binary Channel Bits per Slot for PSSCH as below

Binary Channel Bits per Slot = (NRB* Subcarriers per resource block*CP-OFDM symbols per slot – DMRS resource REs – PSCCH resource Res - Q_SCI2^') * Qm

Where Qm is the modulation order corresponding to MCS.

In Table A.7.1-1 Common reference channel parameters are listed the Sidelink reference measurement channels specified in annexes A.7.2 to A.7.6.

Table A.7.1-1: Common reference channel parameters

Parameter	Value	remark
Number of HARQ Processes	1	
Channel state	AWGN	
Subcarriers per resource block	12	
sl-PSSCH-DMRS-TimePatternList	2	symbol4 and symbol 10 in each slot FDMed with PSSCH within DMRS symbol Frequency density is ½
CP-OFDM symbols per slot (Note1)	12 for all slots	Excluding the first OFDM symbol in one SL slot used for AGC
PSCCH resource	10 PRBs, 3 symbols in time domain	
Slot number in 10ms	$10*2^{\mu}$	$\mu=0,1,2$ for 15kHz, 30kHz, 60kHz
PT-RS	disable	
CSI-RS	disable	
x-overhead	0	
PSFCH period	0	
2nd stage SCI payload size	59	35bits SCI-2A + 24bits CRC
Redundancy Version	RV0	For channel coding
Alpha value for SCI-2	1	

A.7.2 FRC for V2X receiver requirements for QPSK

For V2X transmission over PC5, Table A.7.2-1, Table A.7.2-2 and Table A.7.2-3 are applicable for measurements on the Receiver Characteristics with the exception of Maximum input level.

Table A.7.2-1: Fixed reference channel for V2X receiver requirements (SCS 15 kHz, QPSK)

Parameter	Unit	Value				
Channel bandwidth	MHz	**5**[3]	**10**	**20**	**30**	**40**
Subcarrier spacing	kHz	15	15	15	15	15
Subchannel size		12	10	15	10	12
Allocated resource blocks		24	50	105	160	216
MCS Index		4	4	4	4	4
MCS Table for TBS determination		64QAM				
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK
Transport Block Size		1608	3624	7936	12296	16896
Transport block CRC	Bits	16	16	24	24	24
LDPC base graph		2	2	1	1	1
Number of Code Blocks per Slot		1	1	1	2	3
Beta offset for 2nd stage SCI		2.25	2.25	2.25	2.25	2.25
γ value when 2nd stage SCI rate match		7	1	1	1	1
Binary Channel Bits per Slot		5160	12036	26556	41076	55860
Max. Throughput averaged over 100ms	Mbps	0.1608	0.3624	0.7936	1.2296	1.6896
NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). NOTE 2: γ is the number of vacant resource elements in the resource block to which the last coded symbol of the 2nd-stage SCI belongs. NOTE 3: The CBW is only applicable for PS UE in n14.						

Table A.7.2-2: Fixed reference channel for V2X receiver requirements (SCS 30 kHz, QPSK)

Parameter	Unit	Value			
Channel bandwidth	MHz	**10**	**20**	**30**	**40**
Subcarrier spacing	kHz	30	30	30	30
Subchannel size		12	10	15	15
Allocated resource blocks		24	50	75	105
MCS Index		4	4	4	4
MCS Table for TBS determination		64QAM			
Modulation		QPSK	QPSK	QPSK	QPSK
Transport Block Size		1608	3624	5632	7936
Transport block CRC	Bits	16	16	24	24
LDPC base graph		2	2	1	1
Number of Code Blocks per Slot		1	1	1	1
Beta offset for 2nd stage SCI		2.25	2.25	2.25	2.25
γ value when 2nd stage SCI rate match		7	1	1	1
Binary Channel Bits per Slot		5160	12036	18636	26556
Max. Throughput averaged over 100ms	Mbps	0.3216	0.7248	1.1264	1.5872
NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). NOTE 2: γ is the number of vacant resource elements in the resource block to which the last coded symbol of the 2nd-stage SCI belongs.					

Table A.7.2-3: Fixed reference channel for V2X receiver requirements (SCS 60 kHz, QPSK)

Parameter	Unit	Value			
Channel bandwidth	MHz	**10**	**20**	**30**	**40**
Subcarrier spacing	kHz	60	60	60	60
Subchannel size		10	12	12	10
Allocated resource blocks		10	24	36	50
MCS Index		4	4	4	4
MCS Table for TBS determination		64QAM			
Modulation		QPSK	QPSK	QPSK	QPSK
Transport Block Size		456	1608	2536	3624
Transport block CRC	Bits	16	16	16	16
LDPC base graph		2	2	2	2
Number of Code Blocks per Slot		1	1	1	1
Beta offset for 2nd stage SCI		2.25	2.25	2.25	2.25
γ value when 2nd stage SCI rate match		7	7	7	1
Binary Channel Bits per Slot		1464	5160	8328	12036
Max. Throughput averaged over 100ms	Mbps	0.1824	0.6432	1.0144	1.4496
NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). NOTE 2: γ is the number of vacant resource elements in the resource block to which the last coded symbol of the 2nd-stage SCI belongs.					

A.7.3 FRC for maximum input level for 64QAM

For V2X transmission over PC5, Table A.7.3-1, Table A.7.3-2 and TableA.7.3-3 are applicable for Maximum input level when the maximum modulation order is 64QAM.

Table A.7.3-1: Fixed reference channel for V2X receiver requirements (SCS 15 kHz, 64QAM)

Parameter	Unit	Value				
Channel bandwidth	MHz	**5**[3]	**10**	**20**	**30**	**40**
Subcarrier spacing	kHz	15	15	15	15	15
Subchannel size		12	10	15	10	12
Allocated resource blocks		24	50	105	160	216
MCS Index		24	24	24	24	24
MCS Table for TBS determination		64QAM				
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM
Transport Block Size		11528	27144	60456	92200	127080
Transport block CRC	Bits	24	24	24	24	24
LDPC base graph		1	1	1	1	1
Number of Code Blocks per Slot		2	4	8	11	16
Beta offset for 2nd stage SCI		6.25	6.25	6.25	6.25	6.25
γ value when 2nd stage SCI rate match		7	1	1	1	1
Binary Channel Bits per Slot		15336	35964	79524	123084	167436
Max. Throughput averaged over 100ms	Mbps	1.1528	2.7144	6.0456	9.22	12.708
NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). NOTE 2: γ is the number of vacant resource elements in the resource block to which the last coded symbol of the 2nd-stage SCI belongs. NOTE 3: The CBW is only applicable for PS UE in n14.						

Table A.7.3-2: Fixed reference channel for V2X receiver requirements (SCS 30 kHz, 64QAM)

Parameter	Unit	Value			
Channel bandwidth	MHz	**10**	**20**	**30**	**40**
Subcarrier spacing	kHz	30	30	30	30
Subchannel size		12	10	15	15
Allocated resource blocks		24	50	75	105
MCS Index		24	24	24	24
MCS Table for TBS determination		64QAM			
Modulation		64QAM	64QAM	64QAM	64QAM
Transport Block Size		11528	27144	42016	60456
Transport block CRC	Bits	24	24	24	24
LDPC base graph		1	1	1	1
Number of Code Blocks per Slot		2	4	5	8
Beta offset for 2nd stage SCI		6.25	6.25	6.25	6.25
γ value when 2nd stage SCI rate match		7	1	1	1
Binary Channel Bits per Slot		15336	35964	55764	79524
Max. Throughput averaged over 100ms	Mbps	2.3056	5.4288	8.4032	12.091
NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). NOTE 2: γ is the number of vacant resource elements in the resource block to which the last coded symbol of the 2nd-stage SCI belongs.					

TableA.7.3-3: Fixed reference channel for V2X receiver requirements (SCS 60 kHz, 64QAM)

Parameter	Unit	Value			
Channel bandwidth	MHz	**10**	**20**	**30**	**40**
Subcarrier spacing	kHz	60	60	60	60
Subchannel size		10	12	12	10
Allocated resource blocks		10	24	36	50
MCS Index		24	24	24	24
MCS Table for TBS determination		64QAM			
Modulation		64QAM	64QAM	64QAM	64QAM
Transport Block Size		3240	11528	18960	27144
Transport block CRC	Bits	16	24	24	24
LDPC base graph		2	1	1	1
Number of Code Blocks per Slot		1	2	3	4
Beta offset for 2nd stage SCI		6.25	6.25	6.25	6.25
γ value when 2nd stage SCI rate match		7	7	7	1
Binary Channel Bits per Slot		4248	15336	24840	35964
Max. Throughput averaged over 100ms	Mbps	1.296	4.6112	7.584	10.858
NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). NOTE 2: γ is the number of vacant resource elements in the resource block to which the last coded symbol of the 2nd-stage SCI belongs.					

A.7.4 FRC for maximum input level for 256QAM

For V2X transmission over PC5, Table A.7.4-1, Table A.7.4-2 and Table A.7.4-3 are applicable for Maximum input level when the 256QAM is supported.

Table A.7.4-1: Fixed reference channel for V2X receiver requirements (SCS 15 kHz, 256QAM)

Parameter	Unit	Value				
Channel bandwidth	MHz	**5**[3]	**10**	**20**	**30**	**40**
Subcarrier spacing	kHz	15	15	15	15	15
Subchannel size		12	10	15	10	12
Allocated resource blocks		24	50	105	160	216
MCS Index		23	23	23	23	23
MCS Table for TBS determination		256QAM				
Modulation		256QAM	256QAM	256QAM	256QAM	256QAM
Transport Block Size		15880	36896	81976	127080	172176
Transport block CRC	Bits	24	24	24	24	24
LDPC base graph		1	1	1	1	1
Number of Code Blocks per Slot		2	5	10	16	21
Beta offset for 2nd stage SCI		6.25	6.25	6.25	6.25	6.25
γ value when 2nd stage SCI rate match		3	3	3	3	3
Binary Channel Bits per Slot		20544	48000	106080	164160	223296
Max. Throughput averaged over 100ms	Mbps	1.588	3.6896	8.1976	12.708	17.218
NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).						
NOTE 2: γ is the number of vacant resource elements in the resource block to which the last coded symbol of the 2nd-stage SCI belongs.						
NOTE 3: The CBW is only applicable for PS UE in n14.						

Table A.7.4-2: Fixed reference channel for V2X receiver requirements (SCS 30 kHz, 256QAM)

Parameter	Unit	Value			
Channel bandwidth	MHz	**10**	**20**	**30**	**40**
Subcarrier spacing	kHz	30	30	30	30
Subchannel size		12	10	15	15
Allocated resource blocks		24	50	75	105
MCS Index		23	23	23	23
MCS Table for TBS determination		256QAM			
Modulation		256QAM	256QAM	256QAM	256QAM
Transport Block Size		15880	36896	58384	81976
Transport block CRC	Bits	24	24	24	24
LDPC base graph		1	1	1	1
Number of Code Blocks per Slot		2	5	7	10
Beta offset for 2nd stage SCI		6.25	6.25	6.25	6.25
γ value when 2nd stage SCI rate match		3	3	3	3
Binary Channel Bits per Slot		20544	48000	74400	106080
Max. Throughput averaged over 100ms	Mbps	3.176	7.3792	11.677	16.395
NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).					
NOTE 2: γ is the number of vacant resource elements in the resource block to which the last coded symbol of the 2nd-stage SCI belongs.					

Table A.7.4-3: Fixed reference channel for V2X receiver requirements (SCS 60kHz, 256QAM)

Parameter	Unit	Value			
Channel bandwidth	MHz	**10**	**20**	**30**	**40**
Subcarrier spacing	kHz	60	60	60	60
Subchannel size		10	12	12	10
Allocated resource blocks		10	24	36	50
MCS Index		23	23	23	23
MCS Table for TBS determination		256QAM			
Modulation		256QAM	256QAM	256QAM	256QAM
Transport Block Size		4480	15880	25608	36896
Transport block CRC	Bits	24	24	24	24
LDPC base graph		1	1	1	1
Number of Code Blocks per Slot		1	2	4	5
Beta offset for 2nd stage SCI		6.25	6.25	6.25	6.25
γ value when 2nd stage SCI rate match		3	3	3	3
Binary Channel Bits per Slot		5760	20544	33216	48000
Max. Throughput averaged over 100ms	Mbps	1.792	6.352	10.243	14.758
NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). NOTE 2: γ is the number of vacant resource elements in the resource block to which the last coded symbol of the 2nd-stage SCI belongs.					

Annex B (informative): Void

Annex C (informative): Downlink physical channels

C.1 General

The following clauses, describes the downlink Physical Channels that are transmitted during a connection i.e., when measurements are done.

C.2 Setup

Table C.2-1 describes the downlink Physical Channels that are required for connection set up.

Table C.2-1: Downlink Physical Channels required for connection set-up

Physical Channel
PBCH
SSS
PSS
PDCCH
PDSCH
PBCH DMRS
PDCCH DMRS
PDSCH DMRS
CSI-RS

C.3 Connection

C.3.1 Measurement of Receiver Characteristics

Unless otherwise stated, Table C.3.1-1 is applicable for measurements on the Receiver Characteristics (clause 7).

Table C.3.1-1: Downlink Physical Channels transmitted during a connection (FDD and TDD)

Parameter	Unit	Value
SSS transmit power	W	Test specific
EPRE ratio of PSS to SSS	dB	0
EPRE ratio of PBCH to SSS	dB	0
EPRE ratio of PBCH to PBCH DMRS	dB	0
EPRE ratio of PDCCH to SSS	dB	0
EPRE ratio of PDCCH to PDCCH DMRS	dB	0
EPRE ratio of PDSCH to SSS	dB	0
EPRE ratio of PDSCH to PDSCH DMRS (Note 1)	dB	-3
EPRE ratio of CSI-RS to SSS	dB	0
EPRE ratio of PTRS to PDSCH	dB	Test specific
EPRE ratio of OCNG DMRS to SSS	dB	0
EPRE ratio of OCNG to OCNG DMRS (Note 1)	dB	0
NOTE 1: No boosting is applied to any of the channels except PDSCH DMRS. For PDSCH DMRS, 3 dB power boosting is applied assuming DMRS Type 1 configuration when DMRS and PDSCH are TDM'ed and only half of the DMRS REs are occupied. NOTE 2: Number of DMRS CDM groups without data for PDSCH DMRS configuration for OCNG is set to 1.		

Annex D (normative): Characteristics of the interfering signal

D.1 General

Some RF performance requirements for the NR UE receiver are defined with interfering signals present in addition to the wanted signal.

For NR bands with $F_{DL\_high} < 2700$ MHz and $F_{UL\_high} < 2700$ MHz, a modulated 5 MHz full bandwidth NR down link signal, and in some cases an additional CW signal, are used as interfering signal. For intra-band contiguous CA bandwidth class B and C, a modulated 5 MHz NR downlink signal is used. And for some cases an additional CW signal is used.

For NR bands with $F_{DL\_low} \geq 3300$ MHz and $F_{UL\_low} \geq 3300$ MHz, a modulated NR downlink signal which equals to channel bandwidth of the wanted signal for single carrier and inter-band CA cases is used as interfering signal. For intra-band contiguous CA bandwidth Class C, a modulated NR downlink signal which equals to the aggregated channel bandwidth of the wanted signal is used. For intra-band contiguous CA bandwidth class D and E cases, a modulated 50 MHz NR downlink signal is used. And for some cases an additional CW signal is used.

D.2 Interference signals

Table D.2-1 and Table D.2-4 describes the modulated interferer for different channel bandwidth options for NR band lower than 2700MHz.

Table D.2-1: Description of modulated NR interferer for NR bands with $F_{DL\_high} < 2700$ MHz and $F_{UL\_high} < 2700$ MHz

	Channel bandwidth					
	5 MHz	**10MHz**	**15 MHz**	**20 MHz**	**25 MHz**	**30 MHz**
RB	NOTE 1					
$BW_{Interferer}$	5 MHz					
	Channel bandwidth					
	40 MHz	**50 MHz**	**60 MHz**	**80 MHz**	**90 MHz**	**100 MHz**
RB	NOTE 1					
$BW_{Interferer}$	5 MHz					
NOTE 1: The RB configured for interfering signal is the same as maximum RB number defined in Table 5.3.2-1 for each sub-carrier spacing.						

Table D.2-2 and Table D.2-3 describe the modulated interferer for different channel bandwidth options for NR band higher than 3300MHz.

Table D.2-2: Description of modulated NR interferer for NR bands with $F_{DL\_low} \geq 3300$ MHz and $F_{UL\_low} \geq 3300$ MHz

	Channel bandwidth								
	10 MHz	**15 MHz**	**20 MHz**	**40 MHz**	**50 MHz**	**60 MHz**	**80 MHz**	**90 MHz**	**100 MHz**
RB	NOTE 1								
$BW_{Interferer}$	10 MHz	15 MHz	20 MHz	40 MHz	50 MHz	60 MHz	80 MHz	90 MHz	100 MHz
NOTE 1: The RB configured for interfering signal is the same as maximum RB number defined in Table 5.3.2-1 for each sub-carrier spacing.									

Table D.2-3: Description of modulated NR interferer for NR bands with F_{DL_low}≥ 3300 MHz and F_{UL_low}≥ 3300 MHz for Intra-band contiguous CA

	Aggregated Channel bandwidth of Bandwdith Class C								Bandwidth Class D/E
	110 MHz	**120 MHz**	**130 MHz**	**140 MHz**	**150 MHz**	**160 MHz**	**180 MHz**	**200 MHz**	
RB(SCS=30 kHz)	NOTE 1								133
RB(SCS=60 kHz)	NOTE 1								65
$BW_{Interferer}$	110 MHz	120 MHz	130 MHz	140 MHz	150 MHz	160 MHz	180 MHz	**200 MHz**	50MHz
NOTE 1: The interfering signal shall be configured in the same way as the aggregated bandwidth of the wanted signal. The RB configurations for each component carrier are defined in Table 5.3.2-1 for each sub-carrier spacing.									

Table D.2-4: Description of modulated NR interferer for NR bands with F_{DL_low} < 2700 MHz and F_{UL_low} < 2700 MHz for Intra-band contiguous CA

	Bandwidth Class B	Bandwidth Class C
RB	NOTE 1	NOTE 1
$BW_{Interferer}$	5 MHz	5 MHz
NOTE 1: The RB configured for interfering signal is the same as maximum RB number defined in Table 5.3.2-1 for each sub-carrier spacing.		

Annex E (normative): Environmental conditions

E.1 General

This normative annex specifies the environmental requirements of the UE. Within these limits the requirements of the present documents shall be fulfilled.

E.2 Environmental

The requirements in this clause apply to all types of UE(s).

E.2.1 Temperature

The UE shall fulfil all the requirements in the full temperature range of:

Table E.2.1-1: Temperature conditions

+15°C to +35°C	For normal conditions (with relative humidity up to 75 %)
-10°C to +55°C	For extreme conditions (see IEC publications 68-2-1 and 68-2-2)

Outside this temperature range the UE, if powered on, shall not make ineffective use of the radio frequency spectrum. In no case shall the UE exceed the transmitted levels as defined in clause 6.2 for extreme operation.

E.2.2 Voltage

The UE shall fulfil all the requirements in the full voltage range, i.e. the voltage range between the extreme voltages.

The manufacturer shall declare the lower and higher extreme voltages and the approximate shutdown voltage. For the equipment that can be operated from one or more of the power sources listed below, the lower extreme voltage shall not be higher, and the higher extreme voltage shall not be lower than that specified below.

Table E.2.2-1: Voltage conditions

Power source	Lower extreme voltage	Higher extreme voltage	Normal conditions voltage
AC mains	0,9 * nominal	1,1 * nominal	nominal
Regulated lead acid battery	0,9 * nominal	1,3 * nominal	1,1 * nominal
Non regulated batteries: Leclanché Lithium Mercury/nickel & cadmium	 0,85 * nominal 0,95 * nominal 0,90 * nominal	 Nominal 1,1 * Nominal	 Nominal 1,1 * Nominal Nominal

Outside this voltage range the UE if powered on, shall not make ineffective use of the radio frequency spectrum. In no case shall the UE exceed the transmitted levels as defined in clause 6.2 for extreme operation. In particular, the UE shall inhibit all RF transmissions when the power supply voltage is below the manufacturer declared shutdown voltage.

E.2.3 Vibration

The UE shall fulfil all the requirements when vibrated at the following frequency/amplitudes.

Table E.2.3-1: Vibration conditions

Frequency	ASD (Acceleration Spectral Density) random vibration
5 Hz to 20 Hz	0.96 m^2/s^3
20 Hz to 500 Hz	0.96 m^2/s^3 at 20 Hz, thereafter –3 dB/Octave

Outside the specified frequency range the UE, if powered on, shall not make ineffective use of the radio frequency spectrum. In no case shall the UE exceed the transmitted levels as defined in TS 38.101-1 for extreme operation.

Annex F (normative): Transmit modulation

F.0 General

While measuring the transmit modulation quality of carriers, an existence of the carrier leakage needs to be taken into account indicated by the parameters in *UplinkTxDirectCurrent* IE, *UplinkTxDirectCurrentTwoCarrierList-r16 or UplinkTxDirectCurrentMoreCarrierList*.

F.1 Measurement Point

Figure F.1-1 shows the measurement point for the unwanted emission falling into non-allocated RB(s) and the EVM for the allocated RB(s).

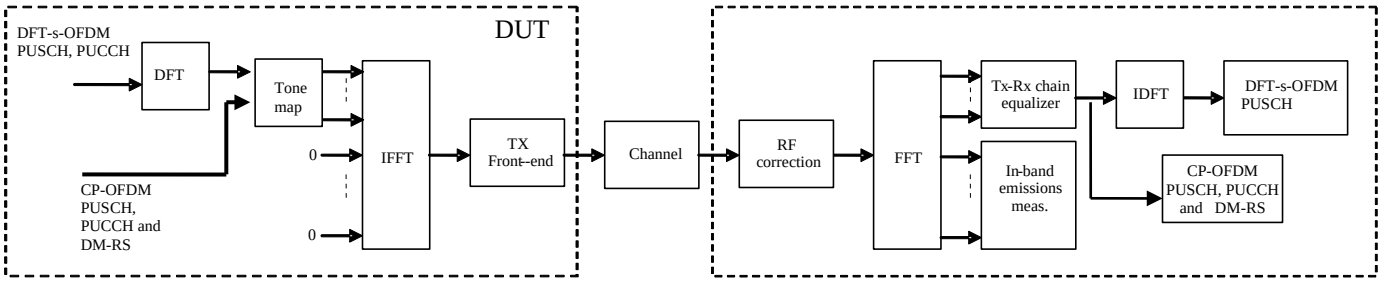

Figure F.1-1: EVM measurement points

F.2 Basic Error Vector Magnitude measurement

The EVM is the difference between the ideal waveform and the measured waveform for the allocated RB(s)

$$EVM = \sqrt{\frac{\sum_{v \in T_m} |z'(v) - i(v)|^2}{|T_m| ¿ P_0}},$$

where

T_m is a set of $|T_m|$ modulation symbols with the considered modulation scheme being active within the measurement period,

$z'(v)$ are the samples of the signal evaluated for the EVM,

$i(v)$ is the ideal signal reconstructed by the measurement equipment, and

P_0 is the average power of the ideal signal. For normalized modulation symbols P_0 is equal to 1.

The basic EVM measurement interval is defined over one slot in the time domain for PUCCH and PUSCH and over one preamble sequence for the PRACH.

F.3 Basic in-band emissions measurement

The in-band emissions are a measure of the interference falling into the non-allocated resources blocks. The in-band emission requirement is evaluated for PUCCH and PUSCH transmissions. The in-band emission requirement is not evaluated for PRACH transmissions.

The in-band emissions are measured as follows

$$Emissions_{absolute}(\Delta_{RB}) = \begin{cases} \frac{1}{|T_s|}\sum_{t\in T_s}\sum_{\max(f_{\min}, f_l+12\cdot\Delta_{RB}*\Delta f)}^{f_l+(12\cdot\Delta_{RB}+11)*\Delta f}|Y(t,f)|^2, \Delta_{RB} ¿ 0 \\ \frac{1}{|T_s|}\sum_{t\in T_s}\sum_{f_h+(12\cdot\Delta_{RB}-11)*\Delta f}^{\min(f_{\max}, f_h+12\cdot\Delta_{RB}*\Delta f)}|Y(t,f)|^2, \Delta_{RB} ¿ 0 \end{cases},$$

where

T_s is a set of $|T_s|$ OFDM symbols with the considered modulation scheme being active within the measurement period,

Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB}=1$ or $\Delta_{RB}=-1$ for the first adjacent RB),

$f_{\min}$ (resp. $f_{\max}$) is the lower (resp. upper) edge of the UL UE channel bandwidth,

f_l and f_h are the lower and upper edge of the allocated BW, and

$Y(t,f)$ is the frequency domain signal evaluated for in-band emissions as defined in the clause (ii)

The relative in-band emissions are, given by

$$Emissions_{relative}(\Delta_{RB}) = \frac{Emissions_{absolute}(\Delta_{RB})}{\frac{1}{|T_s|\cdot N_{RB}}\sum_{t\in T_s}\sum_{f_l}^{f_l+(12\cdot N_{RB}-1)\Delta f}|Y(t,f)|^2}$$

where

N_{RB} is the number of allocated RBs

The basic in-band emissions measurement interval is defined over one slot in the time domain. When the PUSCH or PUCCH transmission slot is shortened due to multiplexing with SRS, the in-band emissions measurement interval is reduced by one OFDM symbol, accordingly.

In the evaluation of in-band emissions, the timing is set according to $\Delta\tilde{t}=\Delta\tilde{c}$, where sample time offsets $\Delta\tilde{t}$ and $\Delta\tilde{c}$ are defined in clause F.4.

F.4 Modified signal under test

Implicit in the definition of EVM is an assumption that the receiver is able to compensate a number of transmitter impairments.

The DFT-s-OFDM modulated signals or PRACH signal under test is modified and, in the case of DFT-s-OFDM modulated signals, decoded according to:

$$Z'(t,f) = IDFT\left\{ \frac{FFT\left[z(v - \Delta\tilde{t}) \cdot e^{-j2\pi\Delta\tilde{f}v} \right] . e^{j2\pi f\Delta\tilde{t}}}{\tilde{a}(t,f) \cdot e^{j\tilde{\phi}(t,f)}} \right\}$$

where

$z(v)$ is the time domain samples of the signal under test.

The CP-OFDM modulated signals or PUSCH demodulation reference signal or PUCCH data signal under test is equalised and, in the case of CP-OFDM modulated signals decoded according to:

$$Z'(t,f) = \frac{FFT\left[z(v - \Delta\tilde{t}) \cdot e^{-j2\pi\Delta\tilde{f}v} \right] . e^{j2\pi f\Delta\tilde{t}}}{\tilde{a}(t,f) \cdot e^{j\tilde{\phi}(t,f)}}$$

where

$z(v)$ is the time domain samples of the signal under test.

To minimize the error, the signal under test should be modified with respect to a set of parameters following the procedure explained below.

Notation:

$\Delta\tilde{t}$ is the sample timing difference between the FFT processing window in relation to nominal timing of the ideal signal.

$\Delta\tilde{f}$ is the RF frequency offset.

$\tilde{\phi}(t,f)$ is the phase response of the TX chain.

$\tilde{a}(t,f)$ is the amplitude response of the TX chain.

In the following $\Delta\tilde{c}$ represents the middle sample of the EVM window of length W (defined in the next clauses) or the last sample of the first window half if W is even.

The EVM analyser shall

- detect the start of each slot and estimate $\Delta\tilde{t}$ and $\Delta\tilde{f}$,
- determine $\Delta\tilde{c}$ so that the EVM window of length W is centred
  - on the time interval determined by the measured cyclic prefix minus 16κ samples of the considered OFDM symbol for symbol l for subcarrier spacing configuration μ in a subframe, with l = 0 or l = 7*2^μ for normal CP, i.e. the first 16κ samples of the CP should not be taken into account for this step. In the determination of the number of excluded samples, a sampling rate of $1/T_c$ is assumed. If a different sampling rate is used, the number of excluded samples is scaled linearly.

- on the measured cyclic prefix of the considered OFDM symbol symbol for all other symbols for normal CP and for symbol 0 to 11 for extended CP.

- on the measured preamble cyclic prefix for the PRACH

To determine the other parameters a sample timing offset equal to $\Delta\tilde{c}$ is corrected from the signal under test. The EVM analyser shall then

- correct the RF frequency offset $\Delta\tilde{f}$ for each time slot, and

- apply an FFT of appropriate size. The chosen FFT size shall ensure that in the case of an ideal signal under test, there is no measured inter-subcarrier interference.

The carrier leakage shall be removed from the evaluated signal before calculating the EVM and the in-band emissions; however, the removed relative carrier leakage power also has to satisfy the applicable requirement.

At this stage the allocated RBs shall be separated from the non-allocated RBs. In the case of PUCCH and PUSCH EVM, the signal on the non-allocated RB(s), $Y(t,f)$, is used to evaluate the in-band emissions.

Moreover, the following procedure applies only to the signal on the allocated RB(s).

- In the case of PUCCH and PUSCH, the UL EVM analyzer shall estimate the TX chain equalizer coefficients $\tilde{a}(t,f)$ and $\tilde{\phi}(t,f)$ used by the ZF equalizer for all subcarriers by time averaging at each signal subcarrier of the amplitude and phase of the reference and data symbols. The time-averaging length is 1 slot. This process creates an average amplitude and phase for each signal subcarrier used by the ZF equalizer. The knowledge of data modulation symbols may be required in this step because the determination of symbols by demodulation is not reliable before signal equalization.

- In the case of PRACH, the UL EVM analyzer shall estimate the TX chain coefficients $\tilde{a}(t)$ and $\tilde{\phi}(t)$ used for phase and amplitude correction and are seleted so as to minimize the resulting EVM. The TX chain coefficients are not dependent on frequency, i.e. $\tilde{a}(t,f)=\tilde{a}(t)$ and $\tilde{\phi}(t,f)=\tilde{\phi}(t)$. The TX chain coefficient are chosen independently for each preamble transmission and for each $\Delta\tilde{t}$.

At this stage estimates of $\Delta\tilde{f}$, $\tilde{a}(t,f)$, $\tilde{\phi}(t,f)$ and $\Delta\tilde{c}$ are available. $\Delta\tilde{t}$ is one of the extremities of the window W , i.e. $\Delta\tilde{t}$ can be $\Delta\tilde{c}+\alpha-\left\lfloor\frac{W}{2}\right\rfloor$ or $\Delta\tilde{c}+\left\lfloor\frac{W}{2}\right\rfloor$, where $\alpha=0$ if W is odd and $\alpha=1$ if W is even. The EVM analyser shall then

- calculate EVM_l with $\Delta\tilde{t}$ set to $\Delta\tilde{c}+\alpha-\left\lfloor\frac{W}{2}\right\rfloor$,

- calculate EVM_h with $\Delta\tilde{t}$ set to $\Delta\tilde{c}+\left\lfloor\frac{W}{2}\right\rfloor$.

For the EVM calculation on the symbols with a transient period when the UE signals a transient period capability (tp) of 2, 4 or 7usec, $\Delta\tilde{t}$ is is given below.

- calculate EVM_{l_tp} with $\Delta\tilde{t}$ set to $\left\lfloor\frac{tp+tp_{start}}{T_c}\right\rfloor+1$, where is $1/T_c$ the sampling rate

- calculate EVM_{h_tp} with $\Delta\tilde{t}$ set to $\left\lfloor\frac{CP+tp_{start}}{T_c}\right\rfloor-1$, where $1/T_c$ is the sampling rate and the CP is the cyclic prefix of the symbol on which EVM is calculated(e.g. long CP for the first symbol of the slot) in seconds

A pictorial representation of the EVM measurement windows is given in Figure F.4-1.

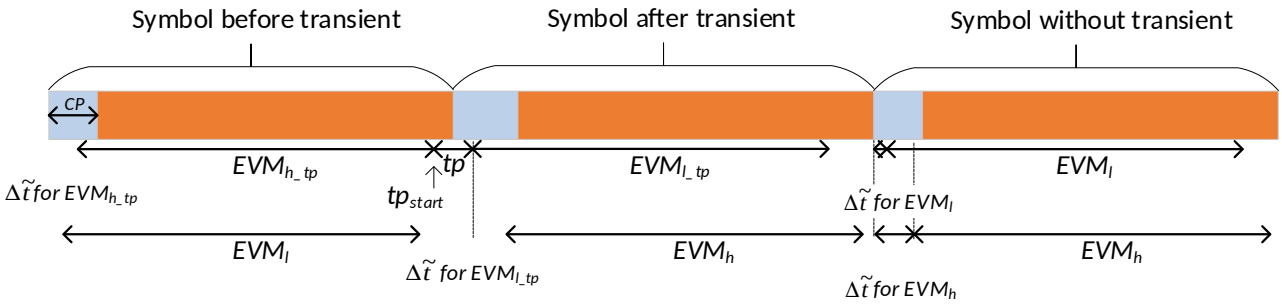

Figure F.4-1 EVM measruement window

F.5 Window length

F.5.1 Timing offset

As a result of using a cyclic prefix, there is a range of $\Delta\tilde{t}$, which, at least in the case of perfect Tx signal quality, would give close to minimum error vector magnitude. As a first order approximation, that range should be equal to the length of the cyclic prefix. Any time domain windowing or FIR pulse shaping applied by the transmitter reduces the $\Delta\tilde{t}$ range within which the error vector is close to its minimum.

F.5.2 Window length

The window length *W* affects the measured EVM and is expressed as a function of the configured cyclic prefix length. In the case where equalization is present, as with frequency domain EVM computation, the effect of FIR is reduced. This is because the equalization can correct most of the linear distortion introduced by the FIR. However, the time domain windowing effect can't be removed.

F.5.3 Window length for normal CP

Table F.5.3-1, F.5.3-2, F.5.3-3 below specify the EVM window length (*W*) for normal CP.

Table F.5.3-1: EVM window length for normal CP for NR, FR1, 15 kHz SCS

Channel Bandwidth (MHz)	FFT size	Cyclic prefix length for symbols 1-6 and 8-13 in FFT samples	EVM window length *W*	Ratio of *W* to total CP length for symbols 1-6 and 8-13[1] (%)
5	512	36	18	50
10	1024	72	36	50
15	1536	108	54	50
20	2048	144	72	50
25	2048	144	72	50
30	3072	216	108	50
35	3072	216	108	50
40	4096	288	144	50
45	4096	288	144	50
50	4096	288	144	50
NOTE 1: These percentages are informative and apply to a slot's symbols 1 to 6 and 8 to 13. Symbols 0 and 7 have a longer CP and therefore a lower percentage.				

Table F.5.3-2: EVM window length for normal CP for NR, FR1, 30 kHz SCS

Channel Bandwidth (MHz)	FFT size	Cyclic prefix length for symbols 1-13 in FFT samples	EVM window length *W*	Ratio of *W* to total CP length for symbols 1-13[1] (%)
5	256	18	9	50
10	512	36	18	50
15	768	54	27	50
20	1024	72	36	50
25	1024	72	36	50
30	1536	108	54	50
35	1536	108	54	50
40	2048	144	72	50
45	2048	144	72	50
50	2048	144	72	50
60	3072	216	108	50
70	3072	216	108	50
80	4096	288	144	50
90	4096	288	144	50
100	4096	288	144	50
NOTE 1: These percentages are informative and apply to a slot's symbols 1 through 13. Symbol 0 has a longer CP and therefore a lower percentage.				

Table F.5.3-3: EVM window length for normal CP for NR (60 kHz SCS)

Channel Bandwidth (MHz)	FFT size	Cyclic prefix length for symbols in FFT samples	EVM window length *W*	Ratio of *W* to total CP length [1] (%)
10	256	18	9	50
15	384	27	14	50
20	512	36	18	50
25	512	36	18	50
30	768	54	27	50
35	768	54	27	50
40	1024	72	36	50
45	1024	72	36	50
50	1024	72	36	50
60	1536	108	54	50
70	1536	108	54	50
80	2048	144	72	50
90	2048	144	72	50
100	2048	144	72	50
NOTE 1: These percentages are informative and apply to all OFDM symbols within subframe except for symbol 0 of slot 0 and slot 2. Symbol 0 of slot 0 and slot 2 may have a longer CP and therefore a lower percentage.				

F.5.4 Window length for Extended CP

Table F.5.4-1 below specifies the EVM window length (*W*) for extended CP. The number of CP samples excluded from the EVM window is the same as for normal CP length.

Table F.5.4-1: EVM window length for extended CP for NR, FR1, 60 kHz SCS

Channel Bandwidth (MHz)	FFT size	Cyclic prefix length in FFT samples	EVM window length *W*	Ratio of *W* to total CP length[1] (%)
10	256	64	54	84.4
15	384	96	80	83.3
20	512	128	106	82.8
25	512	128	110	85.9
30	768	192	164	85.4
35	768	192	164	85.4
40	1024	256	220	85.9
45	1024	256	220	85.9
50	1024	256	220	85.9
60	1536	384	330	85.9
70	1536	384	330	85.9
80	2048	512	440	85.9
90	2048	512	440	85.9
100	2048	512	440	85.9
NOTE 1: These percentages are informative.				

F.5.5 Window length for PRACH

The table below specifies the EVM window length for PRACH preamble formats for L_{RA}= 839 and $\Delta f^{\mathrm{RA}} \in \{1.25, 5\}$ kHz .

Table F.5.5-1 EVM window length for PRACH formats for L_{RA}= 839

Preamble format	Cyclic prefix length N_{CP}	Nominal FFT size[1]	EVM window length *W* in FFT samples	Ratio of *W* to CP[2]
0	3168	24576	2307	72.8%
1	21024	24576	20163	95.9%
2	4688	24576	3827	81.6%
3	3168	6144	2952	93.2%
NOTE 1: The use of other FFT sizes is possible as long as appropriate scaling of the window length is applied NOTE 2: These percentages are informative				

The table below specifies the EVM window length for PRACH preamble formats for L_{RA}= 139 and $\Delta f^{\mathrm{RA}} = 15 \cdot 2^{\mu}$ kHz where $\mu \in \{0, 1, 2\}$.

Table F.5.5-2 EVM window length for PRACH formats for L_{RA}= 139

Preamble format	Cyclic prefix length N_{CP}	Nominal FFT size[1]	EVM window length *W* in FFT samples	Ratio of *W* to CP[2]
A1	288□2$^{-\mu}$	2048□2$^{-\mu}$	144□2$^{-\mu}$	50.0%
A2	576□2$^{-\mu}$	2048□2$^{-\mu}$	432□2$^{-\mu}$	75.0%
A3	864□2$^{-\mu}$	2048□2$^{-\mu}$	720□2$^{-\mu}$	83.3%
B1	216□2$^{-\mu}$	2048□2$^{-\mu}$	72□2$^{-\mu}$	33.3%
B2	360□2$^{-\mu}$	2048□2$^{-\mu}$	216□2$^{-\mu}$	60.0%
B3	504□2$^{-\mu}$	2048□2$^{-\mu}$	360□2$^{-\mu}$	71.4%
B4	936□2$^{-\mu}$	2048□2$^{-\mu}$	792□2$^{-\mu}$	84.6%
C0	1240□2$^{-\mu}$	2048□2$^{-\mu}$	1096□2$^{-\mu}$	88.4%
C2	2048□2$^{-\mu}$	2048□2$^{-\mu}$	1904□2$^{-\mu}$	93.0%
NOTE 1: The use of other FFT sizes is possible as long as appropriate scaling of the window length is applied NOTE 2: These percentages are informative				

F.6 Averaged EVM

The general EVM is averaged over basic EVM measurements for n slots in the time domain.

$$\overline{EVM} = \sqrt{\frac{1}{n}\sum_{i=1}^{n} EVM_i^2}$$,

where n is

$$n = \begin{cases} 10, for\ 15\,kHz\ SCS \\ 20, for\ 30\,kHz\ SCS \\ 40, for\ 60\,kHz\ SCS \end{cases}$$

for PUCCH, PUSCH.

The EVM requirements shall be tested against the maximum of the RMS average at the window W extremities of the EVM measurements:

Thus $\overline{\mathrm{EVM}}_l$ is calculated using $\Delta\tilde{t} = \Delta\tilde{t}_l$ in the expressions above and $\overline{\mathrm{EVM}}_h$ is calculated using $\Delta\tilde{t} = \Delta\tilde{t}_h$.

Thus we get:

$$EVM = \max\left(\overline{\mathrm{EVM}}_l, \overline{\mathrm{EVM}}_h\right)$$

The calculation of the EVM for the demodulation reference signal, EVM_{DMRS} , follows the same procedure as calculating the general EVM, with the exception that the modulation symbol set T_m defined in clause F.2 is restricted to symbols containing uplink demodulation reference signals.

The basic EVM_{DMRS} measurements are first averaged over n slots in the time domain to obtain an intermediate average $\overline{EVM}_{DMRS}$.

$$\overline{EVM}_{DMRS} = \sqrt{\frac{1}{n}\sum_{i=1}^{n} EVM_{DMRS,i}^2}$$

In the determination of each $EVM_{DMRS,i}$, the timing is set to $\Delta\tilde{t} = \Delta\tilde{t}_l$ if $\overline{\mathrm{EVM}}_l > \overline{\mathrm{EVM}}_h$, and it is set to $\Delta\tilde{t} = \Delta\tilde{t}_h$ otherwise, where $\overline{\mathrm{EVM}}_l$ and $\overline{\mathrm{EVM}}_h$ are the general average EVM values calculated in the same n slots over which the intermediate average $\overline{EVM}_{DMRS}$ is calculated. Note that in some cases, the general average EVM may be calculated only for the purpose of timing selection for the demodulation reference signal EVM.

Then the results are further averaged to get the EVM for the demodulation reference signal, EVM_{DMRS} ,

$$EVM_{DMRS} = \sqrt{\frac{1}{6}\sum_{j=1}^{6} \overline{EVM}_{DMRS,j}^2}$$

The PRACH EVM, EVM_{PRACH} , is averaged over 2 preamble sequence measurements for long preamble formats as defined in table 6.3.3.1-1 in [6] and averaged over 10 preamble sequence measurements for short preamble formats as defined in table 6.3.3.1-2 in [6].

The EVM requirements shall be tested against the maximum of the RMS average at the window *W* extremities of the EVM measurements:

Thus $\overline{\mathrm{EVM}}_{\mathrm{PRACH,l}}$ is calculated using $\Delta\tilde{t} = \Delta\tilde{t}_l$ and $\overline{\mathrm{EVM}}_{\mathrm{PRACH,h}}$ is calculated using $\Delta\tilde{t} = \Delta\tilde{t}_h$.

Thus we get:

$$EVM_{PRACH} = \max\left(\overline{\mathrm{EVM}}_{\mathrm{PRACH,l}}, \overline{\mathrm{EVM}}_{\mathrm{PRACH,h}}\right)$$

F.7 Spectrum Flatness

The data shall be taken from FFT coded data symbols and the demodulation reference symbols of the allocated resource block.

F.8 EVM measurement for dual Tx

For UE with dual transmission antennas, if UE indicates IE [*txDiversity-r16*], EVM is measured at each antenna connector to get EVM_1 and EVM_2, and the total EVM is calculated by values of EVM_1 and EVM_2 with weighting factor of linear power at each antenna connector.

$$EVM = \frac{P_1 * EVM_1 + P_2 * EVM_2}{P_1 + P_2}$$

where P_1 and P_2 denote the linear power measured at each antenna connector respectively.

F.9 Phase offset measurement for DMRS bundling

F.9.1 Measurement point

The measurement point for phase offset measurement is defined in Figure F.9.1-1.

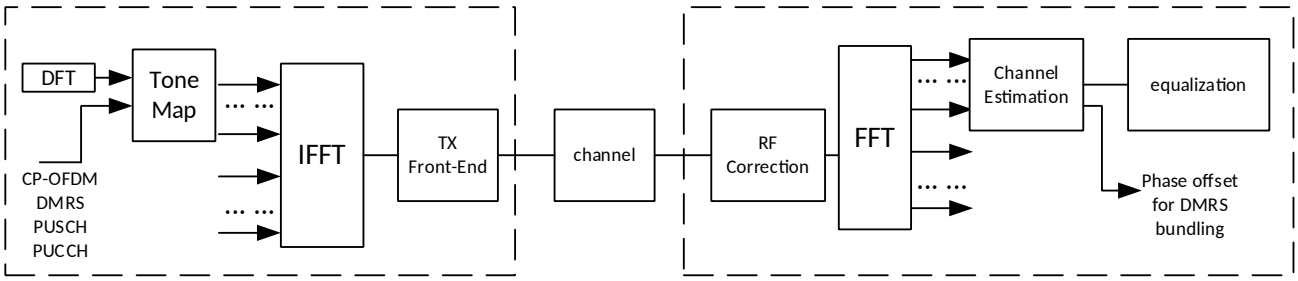

Figure F.9.1-1: Measurement point for phase offset for DMRS bundling

F.9.2 Symbols used

Phase offset is determined based on DMRS REs (3 DMRS symbols per slot) with the option to use data symbols.

F.9.3 Modified test signal

[editor notes: updates based on LS reply from RAN5]

F.9.4 Phase offset measurement

The phase offset measurement is based on the phase response of the Tx chain $\tilde{\phi}(t,f)$ as derived based on Annex F.4.

The phase difference $\Delta\tilde{\varphi}(f)$ for each subcarrier between a reference timeslot t_{ref} and the measurement timeslot t_m is then calculated as defined below:

$$\Delta\tilde{\varphi}(f)=\tilde{\varphi}(t_m,f)-\tilde{\varphi}(t_{ref},f)$$

The phase offset between the reference and measurement timeslots are then calculated as the maximum over the results for all subcarriers as shown below:

$$PhaseOffset=\max_{f}(\Delta\tilde{\varphi}(f))$$

F.10 EVM for UL MIMO

F10.1 General

EVM for UL MIMO is measured per layer. A zero-forcing (ZF) MIMO receiver architecture is used so that dual layer transmissions by the UE can be demodulated by the test equipment receiver.

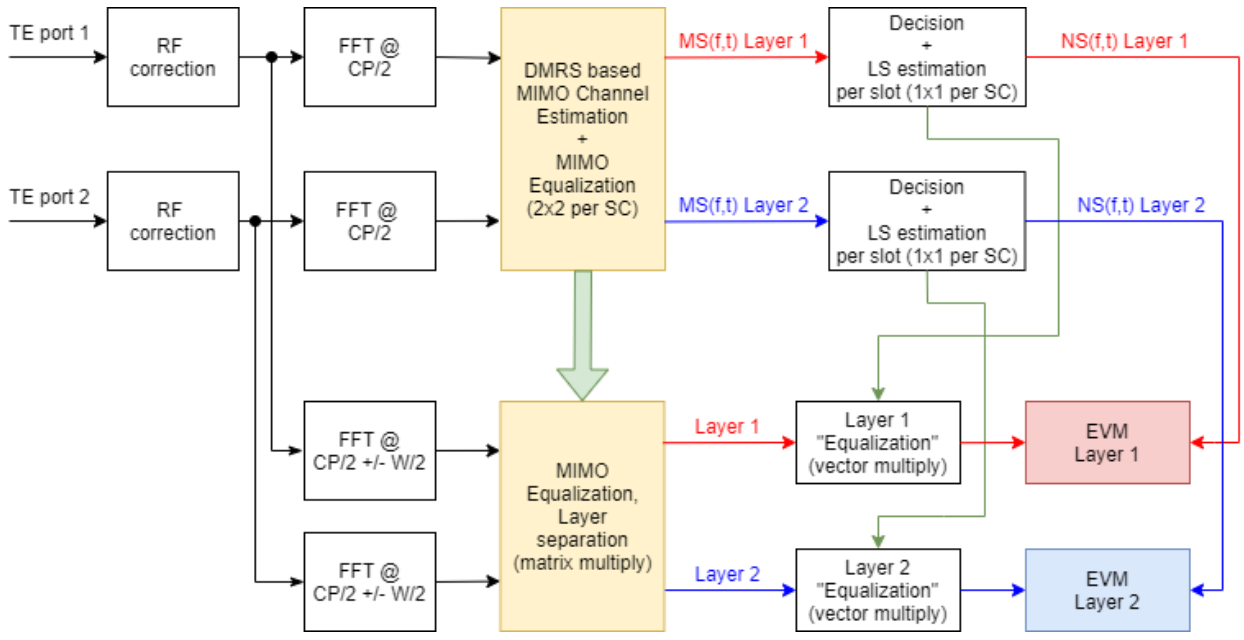

Figure F.10.1-1: EVM calculation block diagram for 2-Layer UL MIMO

The TE receives signals from 2 different ports which are connected to two antenna connectors in the test system.

For UL MIMO measurements a MIMO equalization step as described in section F.10.2 is performed to separate the layers.

Each layer is then processed as described in section F.10.3 to receive the measurement results for each individual layer.

F10.2 MIMO Equalization

The MIMO equalization is based only on reference signals (DMRS) without using any data symbols. For the equalization process all available DMRS symbols shall be used.

The effective 2x2 channel matrix is estimated using reference signals of different subcarriers, e.g. in case of DMRS antenna ports 0 and 2. In case that same subcarriers are used, e.g. DMRS antenna ports 0 and 1, a channel decomposition is necessary taking advantage of the orthogonal codes w_f and w_t and assuming identical channel coefficients for adjacent subcarriers of same CDM group.

Effective channel including the precoding matrix P is:

$$\widetilde{H} = HP = \begin{bmatrix} \tilde{h}_{0,0} & \tilde{h}_{0,1} \\ \tilde{h}_{1,0} & \tilde{h}_{1,1} \end{bmatrix}$$

with

$$\tilde{h}_{n,v} = \frac{y_n r_v^{¿}}{¿ r_v \vee ¿^2 ¿}$$

where y denotes the received symbol on port index n and r the reference signal for layer index v.

Since reference signals of a specific layer are transmitted only on subcarriers of one CDM group channel, interpolation is needed in order to obtain channel coefficients for all subcarriers. Channel interpolation is done using the channel coefficients of active CDM group in all other CDM groups.

The channel coefficients used to calculate the equalizer coefficients are obtained after channel smoothing in frequency domain by computing the moving average of interpolated channel coefficients. The moving average window size is 7. For subcarriers at or near the edge of allocation the window size is reduced accordingly.

The ZF equalizer coefficients are calculated as the inverse of the effective channel matrix, in general:

$$G_{ZF} = \widetilde{H}^{-1}$$

F10.3 Layer processing

After performing the MIMO equalization as described in section F.10.2 each layer is processed using the existing procedure as defined in Annex E of TS 38.521-1 [4].

Since the channel estimation is calculated only on the DMRS symbols, an averaging including all 14 symbols of one slot, i.e. data and reference signals, is needed in order to minimize EVM. The averaging is achieved by the least square (LS) equalization method described for single layer in Annex E.3. of TS 38.521-1 [4].

MS(f,t) and *NS(f,t)* are processed with a LS estimator, to derive one equalizer coefficient per time slot and per allocated subcarrier. *EC(f)* is defined for each layer as:

$$EC_v(f) = \sum_{t=0}^{13} NS_v ¿¿¿$$

With * denoting complex conjugation. *EC(f)* are used to equalize layer data symbols.

EVM equalizer spectral flatness is derived from equalizer coefficients for each layer as follows:

$$c_v = \left| EC_v(f) \right| \sqrt{\left| g_{v,0} \right|^2 + \left| g_{v,1} \right|^2}$$

Annex G (normative): Difference of relative phase and power errors

G.0 General

This annex gives further information needed for understanding and implementing 6.4D.4. The following terms should be understood as follows:

Relative phase error: refers to the phase difference between signals at different antenna connectors, which should be ideally 0. It should be understood as for a slot i.e. (slot) relative phase. It is calculated based on DMRS symbols of that slot or on SRS symbols.

Difference of relative phase error: refers to the difference between the relative phase error determined per slot and the relative phase error determined based on the SRS transmitted.

G.1 Measurement Point

Figure G.1-1 shows the measurement point for the difference of relative phase and power errors.

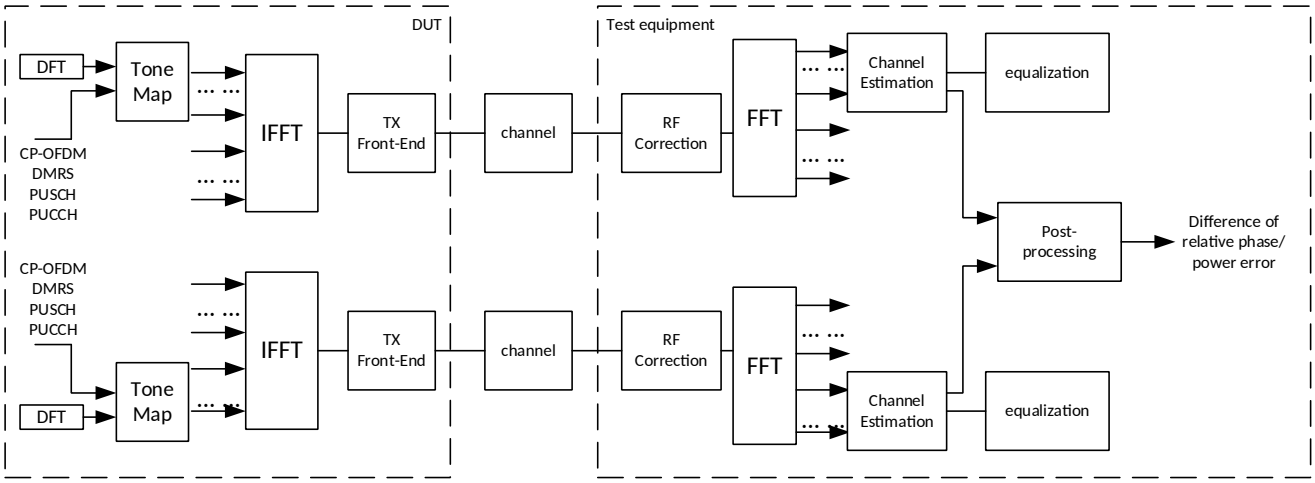

Figure G.1-1 - Measurement point for difference of relative phase/power error for UL coherent MIMO

G.2 Relative Phase Error Measurement

Here are listed the different aspects that may lead to different interpretations.

G.2.1 Symbols and subcarriers used

Phase error is determined based on DMRS REs (DMRS mapping type A with 3 DMRS symbols per slot, the REs corresponding to the odd subcarriers and DMRS symbols are non-allocated for data or DMRS.) and SRS REs (with 4 SRS symbols in the SRS slot, same SRS resource mapping is used for non-codebook-based and codebook-based precoding).

For the DMRS and SRS to occupy identical SCs and maximimize their frequency density, DMRS configuration type 1 and SRS comb2 configuration are used.

UL RMC described in Annex A.2 is used.

G.2.2 CFO (carrier frequency offset) correction

The TE performs a CFO correction on a slot-by-slot basis using a common frequency correction at the two uplink antenna connectors.

G.2.3 Steps of the measurement method

Below are detailed the steps necessary to obtain the maximum difference of relative phase error during the 20ms time window.

1 Determination for each subcarrier and at each antenna, the SRS relative phase error based on the last SRS transmitted on Ant1 and Ant2, that relative phase error serves as a reference for the calculation of the difference of relative phase error for each slot inside the 20 ms time window.

The output is the “SRS relative phase error” vector for the last SRS transmitted: $\left[1 \times number_{¿}\right]$.

2 Calculation for the last SRS transmitted, for each RB of the SRS relative phase errors based on the arithmetic mean of the subcarrier SRS relative phase errors determined in previous step.

The output is the “SRS relative phase error” vector for the last SRS transmitted: $\left[1 \times number_{¿}\right]$.

3 CFO correction on slot-by-slot basis using a common frequency correction for both antenna outputs.

4 Determination for each subcarrier and at each antenna, the phase over the slot being analyzed. The phase is extracted from the channel estimate derived from the 3 DMRS symbols of the slot using the LSE technique.

The output is one vector of dimension $\left[1 \times number_{¿}\right]$ for each antenna.

5 Calculation for a slot for each subcarrier of the relative phase error (difference between the vectors determined in the previous step).

The output is subcarrier relative phase errors of a slot: $\left[1 \times number_{¿}\right]$.

6 Calculation for a slot, for each RB of the relative phase errors based on the arithmetic mean of the subcarrier relative phase errors determined in previous step.

The output is a “slot relative phase error” vector for a slot:$\left[1 \times number_{¿}\right]$.

7 Calculation for a slot of the difference of relative phase errors based on the “SRS relative phase error” (reference) determined in step 2 and the “slot relative phase error” determined in previous step.

The output is a “difference of relative phase error” vector for a slot:$\left[1 \times number_{¿}\right]$.

8 Calculation for a slot of the arithmetic mean value of the “difference of relative phase error” vector determined in previous step, this value corresponds to an RB.

The output is a “difference of relative phase error” value for a slot: $\left[1 \times 1\right]$.

9 Perform for each slot of the 20ms time window, steps 3 to 8.

The output is a “difference of relative phase error” vector: $\left[1 \times number_{¿}\right]$.

10 Calculation of the maximum value of the “difference of relative phase error”.

The output is the “difference of relative phase error” that should be verified as complying with the 40° maximum allowable difference of relative phase error requirement: $\left[1 \times 1\right]$.

Annex H (informative): Void

Annex I (informative): Void

Annex J (informative): Void

Annex K (informative): Void

Annex L (normative): ModifiedMPR-Behavior

L.1 Indication of modified MPR behavior

This annex contains the definitions of the bits in the field *modifiedMPR-Behavior* indicated per supported NR band in the IE *RF-Parameters* [7] by a UE supporting an MPR or A-MPR modified in a given version of this specification. A modified MPR or A-MPR behaviour can apply to a supported NR band in stand-alone operation (including CA and NN-DC operation) or in non-standalone operation with the said NR band as part of an EN-DC or NE-DC band combination.

NOTE 1: In the present release, the *modifiedMPR-Behavior* is indicated [7] by an 8-bit bitmap per supported NR band.

Table L.1-1: Definitions of the bits in the field *modifiedMPR-Behavior*

NR Band	Index of field (bit number)	Definition (description of the supported functionality if indicator set to one)	Notes
n30	0 (leftmost bit)	Requirements for network signalling value NS_21 as defined in Clause 6.5.2.3.y of 38.101-1 v17.6.0 and A-MPR as defined in Clause 6.2.3.14 of 38.101-1 v17.6.0.	This bit shall be set to 1 by a UE supporting the Rel-17 version of the specification. If the bit is not set, then requirements for NS_21 as defined in Clause 6.5.2.3.3 of 38.101-1 v16.11.0 and A-MPR as defined in Clause 6.2.3.14 of 38.101-1 v16.11.0 apply.
n41	0 (leftmost bit)	EN-DC contiguous intraband MPR as defined in clause 6.2B.2.1 of 38.101-3 v15.5.0	- This bit shall be set to 1 by a UE supporting DC_(n)41AA UE EN-DC
	1	EN-DC non-contiguous intraband MPR as defined in clause 6.2B.2.2 of 38.101-3 v15.5.0	- This bit shall be set to 1 by a UE supporting DC_41A_n41A EN-DC
	2	EN-DC contiguous and non-contiguous intraband MPR and A-MPR as defined in 38.101-3 v16.4.0. If this bit is not set the UE uses Rel-15 MPR or A-MPR for EN-DC contiguous and non-contiguous intraband MPR and A-MPR	-This bit may be set to 1 by a UE supporting DC_(n)41AA or DC_41A_n41A EN-DC
	3	PC 1.5 MPR as defined in Table 6.2D.2-3	This bit may be set to 1 by a UE of any release supporting power class 1.5. This bit is intended to be set by larger form factor FWA devices. If the bit is not set for a Rel-17 and later UE, PC 1.5 MPR as defined in Table 6.2D.2-2 applies. If the bit is not set for a Rel-16 and earlier UE, MPR in Table 6.2.2-4 of 38.101-1 v16.5.0 applies.
n71	0 (leftmost bit)	EN-DC contiguous intraband MPR as defined in clause 6.2B.2.1 of 38.101-3 v15.5.0	- This bit shall be set to 1 by a UE supporting DC_(n)71AA UE EN-DC
n77	0 (leftmost bit)	PC 1.5 MPR as defined in Table 6.2D.2-3	This bit may be set to 1 by a UE of any release supporting power class 1.5. This bit is intended to be set by larger form factor FWA devices. If the bit is not set for a Rel-17 and later UE, PC 1.5 MPR as defined in Table 6.2D.2-2 applies. If the bit is not set for a Rel-16 and earlier UE, MPR in Table 6.2.2-4 of 38.101-1 v16.5.0 applies.
n78	0 (leftmost bit)	PC 1.5 MPR as defined in Table 6.2D.2-3	This bit may be set to 1 by a UE of any release supporting power class 1.5. This bit is intended to be set by larger form factor FWA devices. If the bit is not set for a Rel-17 and later UE, PC 1.5 MPR as defined in Table 6.2D.2-2. If the bit is not set for a Rel-16 and earlier UE, MPR in Table 6.2.2-4 of 38.101-1 v16.5.0 applies.
n79	0 (leftmost bit)	PC 1.5 MPR as defined in Table 6.2D.2-3	This bit may be set to 1 by a UE of any release

			supporting power class 1.5. This bit is intended to be set by larger form factor FWA devices. If the bit is not set for a Rel-17 and later UE, PC 1.5 MPR as defined in Table 6.2D.2-2 applies. If the bit is not set for a Rel-16 and earlier UE, MPR in Table 6.2.2-4 of 38.101-1 v16.5.0 applies.
n96	0 (leftmost bit)	Support of all band n96 network signalling labels as defined in Table 6.2F.3.1-1 of 38.101-1 Rel-17	This bit may be set to 1 by a Rel-16 UE to indicate support of all network signalling labels for n96 as defined in Table 6.2F.3.1-1 of 38.101-1 Rel-17
	1	Support of all band n96 network signalling labels as defined in Table 6.2F.3.1-1 of 38.101-1 Rel-18	This bit may be set to 1 by a Rel-16 and Rel-17 UE to indicate support of all network signalling labels for n96 as defined in Table 6.2F.3.1-1 of 38.101-1 Rel-18
n102	0 (leftmost bit)	Support of all band n102 network signalling labels as defined in Table 6.2F.3.1-1 of 38.101-1 Rel-17	This bit may be set to 1 by a Rel-16 UE to indicate support of all network signalling labels for n102 as defined in Table 6.2F.3.1-1 of 38.101-1 Rel-17
	1	Support of all band n102 network signalling labels as defined in Table 6.2F.3.1-1 of 38.101-1 Rel-18	This bit may be set to 1 by a Rel-16 and Rel-17 UE to indicate support of all network signalling labels for n102 as defined in Table 6.2F.3.1-1 of 38.101-1 Rel-18

Annex M (informative): Change history

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2017-08	RAN4#84	R4-1708909				Initial Skeleton	0.0.1
2017-10	RAN4#84 Bis	R4-1709958				Added approved TPs in RAN4-NR-AH#3 R4-1709948, TP for TS 38.101-1: minimum output power, Huawei R4-1709454, TP for TS 38.101-1:UE Tx spurious emission for range 1, ZTE Corporation	0.1.0
2017-10	RAN4#84 Bis	R4-1711978				Embedded approved TPs in RAN4#84Bis R4-1711556, "TP to TS 38.101: Draft CR to Transmitter power clause", Nokia R4-1710962, "TP to TS 38.101-1: Draft CR to Output RF spectrum emissions" Nokia R4-1711608, "TP for TS38.101-1 on conducted UE transmitter intermodulation for FR1(section 6.5)" ZTE Corporation Number of TPs by editors	0.2.0
2017-12	RAN4#85	R4-1713805				Approved TPs in RAN4#85 R4-1713204, TP on general parts for 38.101-1 NR FR1, Ericsson R4-1714047, WF on MPR for sub6GHz, NTT DOCOMO, INC. R4-1714052, TP for TS 38.101-1 introduction of band n71 for transmitter characteristics, T-Mobile USA Inc. R4-1714162, TP to 38.101-1: ACS, Ericsson R4-1714163, TP to 36.101-1: In-band blocking, Ericsson R4-1714446, TP to 36.101-1: Out-of-band blocking and exceptions for spurious response, Ericsson R4-1714369, TP for NBB requirement for FR1, Intel Corporation R4-1714529, TP on introducing operating bands for NR-LTE DC including SUL band combinations in 38.101-1, Huawei R4-1714097, TP for TS 38.101-1: UE RF requirements for standalone SUL, Huawei R4-1714536, TP for TS 38.101-1: Channel Bandwidth Definition, Qualcomm Incorporated (Note, this TP was further discussed and edited in the reflector) R4-1714114, TP for TS 38.101-1: Channel Arrangement, Qualcomm Incorporated (Note, this TP was further discussed and edited in the reflector) R4-1714029, Sub6 Reference Sensitivity, Qualcomm Incorporated R4-1714329, TP to TR 38.101-01 v0.2.0: ON/OFF mask design for NR UE transmissions for FR1, Ericsson Band list according to R4-1714542, List of bands and band combinations to be introduced into RAN4 NR core requirements by December 2017, RAN4 Chairmen Input from: R4-1714479, TP for TR 38.817-01 NR channel bandwidth, Huawei, HiSilicon	0.3.0
2017-12	RAN4#85	R4-1714569				Further corrections and alignments with 38.104 after email review	0.4.0
2017-12	RAN#78	RP-172475				v1.0.0 submitted for plenary approval. Contents same as 0.4.0	1.0.0
2017-12	RAN#78					Approved by plenary – Rel-15 spec under change control	15.0.0
2018-03	RAN#79	RP-180264	0003		F	Implementation of endorced CRs to 38.101-1 Endorsed draft CRs F: R4-1800400, Editorial corrections for 38.101-1, Qualcomm B: R4-1801102, Draft CR for 30 MHz CBW support, Huawei F: R4-1800032, 38.101-1 n71 draft CR for section 6.2.3 - UE A-MPR - NS values, T-Mobile USA Inc. B: R4-1801121, Draft pCR for TS 38.101-1 version 15.0.0: Remaining ON/OFF masks for FR1 NR UE transmissions, Ericsson F: R4-1800417, Correction of NR SEM table and additional requirements table, vivo F: R4-1800033, 38.101-1 n71 draft CR for section 6.5.3.2 Spurious emissions for UE co-existence, T-Mobile USA Inc. F: R4-1801114, Proposal on protected band numbering in UE specs, Sprint Corporation	15.1.0

						F: R4-1800407, Draft CR for TS 38.101-1: Mandatory 4Rx antenna performance for NR UE, Vodafone Group Plc F: R4-1800451 Draft CR for TS 38.101-1: Clarification of 4Rx NR bands, Huawei, HiSilicon F: R4-1801136, Draft CR for TS 38.101-1: REFSENS for NR bands, Huawei, HiSilicon F: R4-1801137, Draft CR: n71 REFSENS, Dish Network F: R4-1800395, Draft CR to 38.101-1: corrections to ACS and in-band blocking, Ericsson F: R4-1800396, Draft CR to 38.101-1: corrections to out-of-band blocking, Ericsson F: R4-1800397, Draft CR to 38.101-1: corrections to spurious response, Ericsson F: R4-1800305, Draft CR for NR FR1 wide band intermodulation requirements, MediaTek Inc. F: R4-1800320, Draft CR to 38.101-1: Rx Spurious emission for NR FR1 (section 7.9), ZTE Corporation F: R4-1800473, Draft CR on UE RF requirements for SUL in TS 38.101-1, Huawei F: R4-1800965, Draft CR to TS 38.101-1: Asymmetric CH BW operation, Dish Network F: R4-1800882, Draft CR for correction of UE channel bandwidth for Bands n77 and n78 for TS 38.101-1, Orange UK F: R4-1801012, Draft CR to 38.101-1: Clarifications to UE spectrum utilization section 5.3, Ericsson F: R4-1800030, 38.101-1 n71 draft CR for section 5.4.4 - TX–RX frequency separation, T-Mobile USA Inc F: R4-1801228, Draft CR to 38.101-1: Channel spacing for CA for NR FR1(section 5.4.1.2), ZTE Corporation F: R4-1801231, Correction CR for channel spacing:38.101-1, Samsung F: R4-1801235, Draft CR to TS 38.101-1: Corrections on channel raster calculation in section 5.4.2, ZTE Corporation F: R4-1801318, Draft CR on synchronization raster, Huawei RAN4#86: R4-1803053, Draft CR for new spec structure of 38.101-1, Ericsson R4-1801479, Draft CR to 38.101-1: Default Tx-RX frequency separation for NR FR1(section 5.4.4), ZTE R4-1801581, Draft CR for TS 38.101-1 update of 4Rx bands, Huawei Technologies France R4-1802211, draft CR TS 38.101-1 Uplink configuration for FR1 NR REFSENS, Skyworks Solutions Inc. R4-1802342, Draft CR for NR FR1 ACS case 2 transmitter power setting correction (Note 1), MediaTek Inc. R4-1802509, Draft CR on 38.101-1 v15.0.0: Remaining ON/OFF masks for FR1 NR UE transmissions, Ericsson R4-1802566, Draft CR to TS 38.101-1: Clarification of mixed numerology guardband size, Ericsson R4-1802978, Draft CR to TS 38.101-1: Corrections on channel raster in Section 5.4.2.3, Intel Corporation R4-1803064, Draft CR for 38.101-1: Correction of errors, Sprint Corporation R4-1803065, Draft CR for 38.101-1 Introduction of n41requirements, Sprint Corporation R4-1803242, Draft CR to 38.101-1: Corrections to n66, Dish Network R4-1803285, Draft CR to 38.101-1: Correction to CH BWs without symmetric uplink Dish Network, Skyworks Solutions Inc. R4-1803436, Introduction of UL subcarrier alignment for additional bands, AT&T R4-1803456, Draft CR for 38.101-1: Spurious Emissions for UE Coexistence, Sprint Corporation R4-1803461, CR on configured transmitted power for TS 38.101-1, Huawei R4-1803452, draft CR for introduction of completed band combinations from 37.865-01-01 into 38.101-1, Ericsson R4-1803567, Draft CR for TS 38.101-1: Sync raster offset in re-farming bands (5.4.3), Ericsson R4-1803365, CR to introduce MPR for PC2 and PC3 and A-MPR for UTRA protection, Nokia	
2018-06	RAN#80	RP-181262	0011		F	CR to TS 38.101-1: Implementation of endorsed draft CRs from RAN4 #86bis and RAN4 #87 R4-1803900, Draft CR into TS 38.101-1 Introduction of band combinations for SUL, Huawei R4-1804021 CR for clarifications for NR FR1 CA BW Classes	15.2.0

						Nokia, Nokia Shanghai Bell R4-1804140 CR for Narrow Band Blocking requirement for FR1 Intel Corporation R4-1804219 Draft CR for 38.101-1: n41 SEM and additional spurious emissions SPRINT Corporation R4-1804266 Draft CR to 38.101-1 MPR channel bandwidth criteria Skyworks Solutions Inc. R4-1804267 Draft CR to 38.101-1 n3,n5,n8 REFSENS levels Skyworks Solutions Inc. R4-1804268 Draft CR to 38.101-1: Corrrection to n41 uplink configuration for reference sensitivity Skyworks Solutions Inc. R4-1804370 Draft CR to add missing NR inter-band DL CA in FR1 for TS 38.101-1 NTT DOCOMO, INC. R4-1804581 Draft CR to 38.101-1: On EVM Wording Qualcomm, Inc. R4-1804948 Corrections to 5.3.3 in TS 38.101-1 Nokia, Nokia Shanghai Bell R4-1804877 draft CR introduction completed band combinations 37.865-01-01 -> 38.101-1 Ericsson R4-1805444 Draft CR to TS 38.101-1: Asymmetric CH BW operation Dish Network R4-1805447 drfat CR for including SRS antenna switching in configured output power Qualcomm Incorporated R4-1805462 Editorial corrections to UE RF requirements in 38.101-1 Qualcomm Incorporated R4-1805659 Draft CR for CBW for n50 for 38.101-1 Huawei R4-1805664 Draft CR to 38.101-1: Addition of Annex F Rohde & Schwarz R4-1805665 Correction to inner and outer definitions for MPR Qualcomm Incorporated R4-1805684 Draft CR to TS38.101-1: Channel Raster to Resource Element Mapping (Section 5.4.2.2) and RB alignment with different numerologies (Section 5.3.4) ZTE Corporation R4-1805698 Draft CR for 38.101-1 for Rx(Ch7) of Band n77, n78 and n79 RF requirements CMCC R4-1805699 Draft CR to 38.101-1:introduction of Tx/Rx requirements for inter-band CA ZTE Corporation R4-1805751 Draft CR on UE-to-UE coexistence requirements to protect band 29 from NR band 71 LG Electronics France R4-1805783 Draft CR for 38.101-1 for Tx(Ch6) of Band n77, n78 and n79 RF requirements CMCC R4-1805902 Draft CR into TS 38.101-1 Correction on SUL_n78-n80 Huawei, HiSilicon R4-1805904 Draft CR into TS 38.101-1 Introduction of new band combinations for SUL Huawei, HiSilicon R4-1805921 Draft CR on NR UE REFSENS SNR FRC for FR1 Intel Corporation R4-1805981 Draft CR for TS38.101-1:Sync raster Samsung R4-1804548 Draft CR for CA BW class for FR1 NTT DOCOMO, INC. R4-1806170 Draft CR on frequency error for TS 38.101-1 ZTE Corporation R4-1806481 Draft CR for Environmental conditions in TS 38.101-1 Annex NTT DOCOMO, INC. R4-1806657 Draft CR to 38.101-1: Measurement BW for min and off power Skyworks Solutions Inc. R4-1806669 Draft CR to TS38.101-1_introduction of completed band combinations for inter-band 2UL CA ZTE Corporation R4-1806673 Draft CR to TS38.101-1_Remove brackets from Tx and Rx spurious emission table ZTE Corporation R4-1806677 Draft CR on including CA bandwidth class and band combinations for intra-band CA LG Electronics France R4-1806719 Introduction of 7.5 kHz frequency shift for Band n71 Ericsson, T-Mobile R4-1806844 Draft CR for 38.101-1 for Tx(Ch6): missing maximum power requirements for n1 and n8 SoftBank Corp. R4-1806945 Draft CR for TS 38.101-1: Channel raster and NR-ARFCN clarification (5.4.2) Ericsson R4-1807039 Intra-band CA terminology for UE ZTE Corporation R4-1807178 Corrections to n70 TX/RX frequency separation Dish Network R4-1807181 Corrections to spurious emissions UE co-existence table Dish Network R4-1807234 Draft CR into TS 38.101-1 Some Corrections for SUL Huawei, HiSilicon R4-1807269 Corrections to Wide band intermodulation table <2700MHz Dish Network	

						R4-1807392 to remove the brackets for SU in 38.101-1 Huawei, HiSilicon R4-1807647 Draft CR to TS 38.101-1: Correction to Asymmetric CH BW operation Dish Network R4-1807680 Draft CR on 38.101-1 on channel raster to achieve alignment of data and SSB subcarrier grids Nokia, Nokia Shanghai Bell, Ericsson R4-1807705 CR for TS 38.101-1 A-MPR for n51 Huawei, Hisilicon R4-1807814 Draft CR for 38.101-1: SEM correction for n41 Sprint Corporation R4-1807851 Draft CR for 38.101-1: UE spurious emission protection requirements for n5 Sprint Corporation R4-1807920 General requirements for downlink inter-band CA Qualcomm Incorporated R4-1807923 Resolution bandwidth for ACLR Qualcomm Incorporated R4-1808084 Introduction of n12 into TS 38.101-1 Nokia R4-1808087 Draft CR 38.101-1: Introduction of n2, n25, n66 and n70 Sprint Corporation, Dishnetwork R4-1808090 Draft CR to TS 38.101-1: Inclusion of Simultaneous RxTx UE capability for some band combinations Ericsson, Vodafone, Orange R4-1808107 Draft CR to TS38.101-1_corrections on UE coexistence ZTE Corporation R4-1808111 TP to TS38.101-1 - UE ON/OFF masks Ericsson R4-1808116 Draft CR to 38.101-1: introduction of Band n34,n39 and n40 RF requirements ZTE Corporation,CMCC R4-1808136 Draft CR to 38.101-1: FR1 UE Power Control Qualcomm Incorporated R4-1808141 Correction to MPR for PC2 and spectrum emission mask measurement bandwidth Qualcomm Incorporated R4-1808142 Draft CR for 38.101-1 n41 A-MPR Sprint Corporation, Nokia, Nokia Shanghai Bell, Ericsson R4-1808143 Draft CR for TS 38.101-1 A-MPR for n20 Huawei, HiSilicon R4-1808155 Draft CR for TS 38.101-1: to correct reqirements for n71 Samsung R4-1808178 Addition parameters about n50 & n51 in TS 38.101-1 Huawei, Hisilicon, Etisalat (editors note: n50 not implemented per chairmans aggreement) R4-1808182 Draft CR for TS 38.101-1 A-MPR for n28 Huawei, HiSilicon R4-1808187 CR for RF requirements for Coherent UL MIMO for FR1 Qualcomm Austria RFFE GmbH R4-1808207 Draft CR to 38.101-1: On EVM Averaging Length, Wording , Qualcomm R4-1808209 Draft CR for 38.101-1 for Tx (Ch6) of HPUE Qualcomm R4-1808466 Draft CR on UL RMC and OCNG pattern for FDD REFSENS tests RD session R4-1808493 Draft CR for TS 38.101-1: Channel and sync raster corrections (5.4) Ericsson R4-1808507 Draft CR for TS38.101-1 on addition of new 90MHz UE CBW for n41/n78 LG Electronics Inc., LG Uplus, Samsung R4-1808176, Draft CR for 38.101-1 : Introduction of A-MPR for n8, SoftBank R4-1808201, Draft CR for 38.101-1 : Introduction of A-MPR for n1, SoftBank R4-1807101, draft CR introduction completed band combinations 37.865-01-01 -> 38.101-1, Ericsson	
2018-09	RAN#81	RP-181896	0025		F	Big CR for 38.101-1 Endorced draft CRs from RAN4#NR-AH-1807 R4-1809335, Draft CR on UL RMC for FR1 RF tests, Qualcomm Incorporated R4-1809337, Draft CR on NR UE REFSENS SNR FRC for FR1, Intel Corporation R4-1809339, Draft CR on measurement of receiver characteristics for FR1 RF Tests, Qualcomm Incorporated R4-1809396, Draft CR on NR UE maximum input level FRC for FR1, Intel R4-1809567, Draft CR on OCNG pattern for FR1 REFSENS tests, Qualcomm Incorporated, Rohde & Schwarz Endorced draft CRs from RAN4#88	15.3.0

						R4-1809714, Draft CR to correct in-band blocking parameters for FR1, Anritsu Corporation R4-1809784, Draft CR to 38.101-1: Corrections on CA bandwidth classes for FR1, ZTE Corporation R4-1809785, Draft CR to TS 38.101-1 for Corrections on UE transmitter power, ZTE Corporation R4-1809793, Draft CR to 38.101-1: Corrections on additional spectrum emission mask, ZTE Corporation R4-1809919, Correction on UE receiver requirement for FR1, CATT R4-1810091, Draft CR TS 38.101-1 - UE ON-OFF mask clean up, Ericsson R4-1810210, Draft CR for TS 38.101-1: MPR inner and outer RB allocations formula correction, MediaTek, Inc. R4-1810229, Draft CR for TS 38.101-1: Spurious emission for UE coexistence table corrections, MediaTek, Inc. R4-1810230, Draft CR for TS38.101-1 to correct 90MHz UE CBW, LG Electronics, Inc. R4-1810232, Draft CR for TS 38.101-1: Table 7.3.2-1 n77 reference sensitivity corrections, MediaTek, Inc. R4-1810369, Draft CR to 38.101-1: Corrections on symbols and abbreviations in section 3, ZTE Corporation R4-1810376, Draft CR: General corrections to n71 requirements, Dish Network R4-1810428, Draft CR on TS38.101-1 for UE maximum output power for UL MIMO, OPPO R4-1810552, Correction of reference tables, OPPO R4-1810729, Draft CR for introduction of Band n74 for TS 38.101-1, NTT DOCOMO, Inc. R4-1810862, Draft CR to 38.101-1: Updates to Transmit Modulation Annex, Rohde & Schwarz R4-1810892, CR to update Table 6.2D.1-2 for FR1, Qualcomm Incorporated R4-1810961, CR on ACS minimum requirement, Intel Corporation R4-1810965, CR on Out-of-Band Blocking minimum requirement, Intel Corporation R4-1810967, CR on Rx Intermodulation characteristics for CA, Intel Corporation R4-1810974, Annex lettering change for 38.101-1, Qualcomm Incorporated R4-1811189, CR to add more details to Coherent UL MIMO spec for FR1, Qualcomm Incorporated R4-1811280, Corrections of NR receiver characteristics titles, Vivo R4-1811455, Draft CR on DL Physical Channel for FR1 RF tests, Qualcomm Europe Inc. (Spain) R4-1811457, NS numbering, Qualcomm Incorporated R4-1811459, Correction on UE transmitter requirement for FR1, CATT R4-1811463, Draft CR for 38.101-1: Addition of missing NR CA configurations n8-n75 and n28-n75, VodafoneItalia SpA R4-1811472, Addition parameters about n51 in TS 38.101-1, Huawei, Hisilicon, Etisalat R4-1811474, CR CP- OFDM almost contiguous allocation, Nokia, Nokia Shanghai Bell R4-1811477, Draft CR to 38.101-1: FR1 Power Control, Qualcomm Incorporated R4-1811478, A-MPR correction for n20 and n28, Huawei, HiSilicon R4-1811490, Draft CR to 38.101-1: Addition of Carrier Leakage table, Rohde & Schwarz R4-1811491, Draft CR for TS38.101-1 on transmit signal quality, OPPO R4-1811493, CR to TS 38.101-1: pi/2 BPSK with Spectrum Shaping, Indian Institute of Tech (M),Indian Institute of Tech (H), CEWiT, Nokia R4-1811513, A proposal on 2UL co-ex table modification, SoftBank Corp. R4-1811514, Draft CR to TS 38.101-1: Clarification on OCNG, Keysight Technologies UK Ltd R4-1811516, Draft CR on NR DL FRCs for FR1 UE RF requirements, Intel Corporation R4-1811550, Draft CR to TS 38.101-1 on channel bandwidth and spacing descriptions, Ericsson R4-1811553, Draft CR to 38.101-1: Corrections on description of channel raster entries, ZTE Corporation R4-1811783, Measurement period of PRACH time mask, CATT R4-1811792, Draft CR for A-MPR revision for n1, NTT DOCOMO, INC.	

						R4-1811798, Draft CR for Pcmax for FR1, Qualcomm Incorporated R4-1811799, Pcmax for inter-band NR CA FR1 draft CR, InterDigital, Inc. R4-1811812, Draft CR to 38.101-1: On FR1 AMPR Band n41 NS_04, Qualcomm Incorporated R4-1811816, CR to update the definition of Long and Short subslot for FR1, Qualcomm R4-1811894, Addition parameters about n50 in TS 38.101-1, Huawei R4-1811896, Draft CR for TS 38.101-1: n41 GSCN range modification, MediaTek Inc. R4-1811285, Draft CR TS 38.101-1: NS_04 A-MPR' and spurious emisison corrections, Sprint	
2018-12	RAN#82	RP-182836	0029	1	F	Endorced draft CRs from RAN4#88Bis: R4-1812050, CR Simplification of NR NS_08, Nokia R4-1812054, Correction for Inter-band CA operating bands table in TS 38.101-1, Nokia. R4-1812079, draft CR to introduce asymmetric UL DL channel BW combinations for n71, T-Mobile USA Inc. R4-1812121, Draft CR on Note1 Corrections in 38.101 RX tests, Qualcomm R4-1812128, draftCR on 256QAM UL power requirement, Intel Corporation R4-1812200, Draft CR to TS 38.101-1 Add clarification note to PC3 MPR table, Intel Corporation R4-1812217, Draft CR to 38.101-1: Corrections on the descriptions of UE channel bandwidth for CA, ZTE Corporation R4-1812319, Draft CR for TS 38.101-1: REFSENS UL configuration corrections, MediaTek Inc. R4-1812320, Draft CR for TS 38.101-1: Out-of-band blocking exceptions for CA, MediaTek Inc. R4-1812322, Draft CR for TS 38.101-1: Blocking characteristics for SUL, MediaTek Inc. R4-1812397, Clarification for almost contiguous CP-OFDM, Qualcomm Incorporated R4-1812508, Draft CR to 38.101-1: Corrections on channel raster & SS raster for operating bands, ZTE Corporation R4-1812611, Draft CR to 38.101-1: Some corrections for inter-band CA combinations, ZTE Corporation R4-1813459, Draft CR for TS 38.101-1: Support 4Rx for n38, Huawei R4-1813469, draftCR on applicability of TDD configuratiin for CA in TS 38.101-1, Huawei R4-1813521, Addition of ?TC,c for single carrier Pcmax for FR1, vivo R4-1813798, Draft CR to 38.101-1: Corrections on UE additional maximum output power reduction, ZTE Corporation R4-1813811, Draft CR to 38.101-1: Corrrection to n12 reference sensitivity power levels, Skyworks Solutions Inc. R4-1813812, Band n41 spurious emission limits, Qualcomm Incorporated R4-1813813, Draft CR for TS 38.101-1: P-Max for 5G NR HPUE, CMCC R4-1814158, CR on Spurious emissions for UE co-existence, Intel Corporation R4-1814159, Draft CR for CA ACS/IBB for Bandwidth class C, Qualcomm R4-1813843, Draft CR to 38.101-1: Update of Annex F, Rohde & Schwarz R4-1813845, Correction for PI/2 PBSK requriements, Nokia Endorsed draft CR's from RAN4#89 R4-1815950, dCR on TS38.101-1 merging draft CRs from RAN4#88Bis, Qualcomm Incorporated R4-1814752, DraftCR to TS 38.101-1 pi/2 BPSK in n41, CMCC R4-1814824, n50 A-MPR, Qualcomm Incorporated R4-1814959, Changes to Max input power UL and DL configuratgions in FR1, OPPO R4-1814970, NR FR1 relative power tolerance CR, Nokia R4-1814972, A-MPR for NS_03 and NS_03U and re-formulation of NS_100, Nokia R4-1815060, draft CR for adding note about the fallback of NR CA in FR1 for TS 38.101-1, NTT DOCOMO, INC. R4-1815392, Draft CR to 38.101-1: Update to NS_04 requirements, Rohde & Schwarz R4-1815563, Draft CR to 38.101-1 on Clarification on 7.5 KHz raster shift in NR re-farmed bands, Ericsson R4-1815863, Draft CR for 38.101-1: Nominal carrier spacing for 30	15.4.0

						kHz raster, SPRINT Corporation R4-1815898, draft CR on CA configuration on bandwidth class F, Huawei R4-1815917, draftCR on DL RMC for TS 38.101-1, Huawei R4-1816162, Draft CR on introduction of SRS switch IL in FR1, OPPO R4-1816199, Draft CR on FR1-FR2 UE-to-UE coexistence for TS38.101-1, LG Electronics France R4-1816200, Draft CR to 38.101-1 on intra-band contiguous CA configurations for FR1, ZTE Corporation R4-1816240, Transient period for SRS Antenna Switching for FR1, Qualcomm R4-1816243, Draft CR to TS38.101-1_Clarifications on MSD and UL configuration tables for inter-band CA, ZTE Corporation R4-1816466, Draft CR on some changes for SUL band combinations to TS 38.101-1, Huawei R4-1816468, Support of 7.5 kHz carrier shift for additional operating bands, Ericsson R4-1816604, TDD configuration for UE Tx test in FR1, Ericsson R4-1816663, Draft CR to 38.101-1 (5.3.4) RB alignment, Huawei R4-1816755, CR to 38.101-1: ACS and IBB intra-band contiguous CA, Intel Corporation Further changes in RAN#82 - 7.5 kHz frequency shift is specified for all FDD bands in clause 5.4.2.1	
2018-12	RAN#82	RP-182814	0030	2	F	Company CR on 2Rx exception for NR vehicular UE at FR1	15.4.0
2019-03	RAN#83	RP-190403	0034		F	CR to TS 38.101-1: Implementation of endorsed draft CRs from RAN4#90 Endorced draft CR from Ran4#90 R4-1900032, Editorial corrections for 38.101-1, Qualcomm Incorporated R4-1900031, draftCR on SRS IL for CA, Qualcomm Incorporated R4-1900161, CR on Relative power tolerance, Intel Corporation R4-1900162, CR on Minimum output power, Intel Corporation R4-1900274, Draft CR to TS 38.101-1 on NR general spectrum emission mask, ZTE Corporation R4-1900275, Draft CR to TS 38.101-1 on spurious emisssion for network signalled value NS_40, NS_41 and NS_42, ZTE Corporation R4-1900424, Correction of table references and other typos, Ericsson R4-1900508, Draft CR to TS 38.101-1 on UE transmitter power and some other editorial corrections, ZTE Corporation R4-1900723, Draft CR on editorial error of TS38.101-1, LG Electronics Inc. R4-1900727, Update to PRACH EVM window length for FR1, Rohde & Schwarz R4-1900840, Draft CR for 38.101-1 modification of Transmit intermodulation requirement, Huawei R4-1900848, [RAN5 LS]Draft CR for 38.101-1: adding note for inter-band CA spurious emissions, Huawei R4-1901033, Alignment of Foob related description for 38.101-1, vivo R4-1901273, Correction of HARQ-ACK transmission timing for DL RMC for FR1 TDD SCS=60kHz, Ericsson R4-1901766, draft_CR TS 38.101-1 Correction to UL configuration for reference sensitivity, Skyworks Solutions Inc. R4-1901823, draft CR on spurious requirment for TS 38.101-1, Huawei, HiSilicon R4-1901835, draftCR on MSD for CA_n41-n78 for TS 38.101-1, Huawei R4-1901847, Draft CR for 38.101-1: Addition of default power class, Sprint Corporation R4-1901873, Receiver requirement RMC references, Qualcomm Incorporated R4-1901925, Draft CR to 38.101-1 to update and clarify Rx wide band intermod and spurious requirments for BW class C, D, E, Qualcomm Incorporated R4-1901992, Draft CR to 38.101-1. Correct FR1 NS_41 AMPR for n50, Huawei R4-1902001, Draft CR to 38.101-1 on n41 – B40 coexistence, Qualcomm Incorporated R4-1902150, Draft CR to TS38.101-1_Clarifications on MSD and UL configuration tables for inter-band CA, ZTE Corporation R4-1902166, Tx ON/OFF time mask for FR1, Qualcomm Inc	15.5.0

						R4-1902174, Draft CR to 38.101-1: On FR1 A-MPR NS_08 for n8, Qualcomm Incorporated R4-1902175, Draft CR on AMPR requirements for NS_05U and NS_08U to TS 38.101-1, Huawei R4-1902194, [41 DL]Draft CR for 38.101-1 adding DL intra-band CA requirements for frequency less than 2700MHz, Huawei R4-1902196, Draft CR for 7.9A Spurious emissions for CA, CMCC R4-1902223, UE optional bandwidth for FR1, Nokia R4-1902225, CR to 38.101-1 on CA BW Classes fallback groups, Intel Corporation R4-1902233, Draft CR to 38.101-1: SUL clarifications, Nokia R4-1902339, Draft CR to TS 38.101-1 on FR1 extension, Ericsson R4-1902455, Completion of the Pcmax specification: additional P-max and P_NR, Ericsson R4-1902468, Draft CR: Introduction of Annex on Characteristics of the Interfering Signal, Samsung R4-1902479, Draft CR on some errors to TS 38.101-1, Huawei R4-1902480, Draft CR for 38.101-1 modification of requirements for network signalled value NS_04, Huawei R4-1902655, CR to 38.101-1 on NR Uplink RBs location, Intel Corporation R4-1901610, Draft CR for 38.101-1 REFSENS for UL MIMO , Huawei Editorial changes after RAN#83 To align the annex numbering with other specifications (TS 38.101-x series), annexes J and K were added and Change history was numbered as annex L.	
2019-06	RAN#84	RP-191240	0047		F	CR to TS 38.101-1: Implementation of endorsed draft CRs from RAN4#90bis and RAN4#91 Endorced draft CRs from RAN4#90Bis R4-1902826, Draft CR for 38.101-1 modification of ACS test parameters case 2 for intra-band contiguous CA, Huawei R4-1902926, Draft CR to TS 38.101-1 Correction to Pcmax, Intel Corporation R4-1902975, Draft CR on PRACH and PUCCH format description for EVM in FR1, Anritsu corporation R4-1903032, Draft CR on editorial error of TS38.101-1, LG Electronics France R4-1903120, Draft CR on DL power allocation for TS 38.101-1, Intel Corporation R4-1903124, Draft CR on b41-n40 coexistence, Intel Corporation R4-1903151, Draft CR to TS38.101-1_removing DC sections, ZTE Corporation R4-1903195, Draft CR for 38.101-1: remove the bracket of UE capability "powerBoosting-pi2BPSK", Huawei R4-1903392, Draft CR for TS 38.101-1: Corrections to EVM equalizer spectrum flatness requirements, MediaTek Inc. R4-1903473, Draft CR on FREF,Shift, CMCC R4-1903508, Draft CR to TS 38.101-1 on spurious emissions for UE co-existence, ZTE Corporation R4-1904335, DraftCR TS 38.101 Corrections to NS_100 UTRA ACLR frequency band list, Skyworks Solutions Inc. R4-1904460, Draft CR for 38.101-1 CA Pcmax, Huawei R4-1904537, Draft CR for TR 38.101-1 correction of A-MPR for NS_04, Huawei R4-1904554, Draft CR to 38.101-1: FR1 power dynamics DTX removal, Qualcomm Incorporated R4-1904927, Draft CR to clarify frequency of carrier leakage in RBs for FR1, Anritsu corporation R4-1904928, Draft CR to TS 38.101-1 on description of UE additional output power reduction, ZTE Corporation R4-1904929, draft Rel-15 CR for editorial corrections in 38.101-1, Ericsson R4-1904941, draft CR to 38.101-1 Correction to Pi/2 BPSK power boosting, Intel Corporation R4-1904957, Draft CR for TR38.101-1 – Update to EVM averaging, Rohde & Schwarz R4-1904958, Draft CR for TR38.101-1 – Update to spectrum flatness, Rohde & Schwarz R4-1904967, Draft CR for 38.101-1 definition of Maximum input level for intra-band contiguous CA, Huawei R4-1904969, Draft CR for 38.101-1: editoral correction, Huawei R4-1904987, Draft CR for correction on TS38.101-1, CATT Endorced draft CRs from RAN4#91 R4-1905339 removal of A-MPR brackets in FR1 Nokia	15.6.0

						R4-1905503 Change description 4.2(d) in Applicability of minimum requirements for TS 38.101-1 vivo R4-1905524 [Rx]Draft CR for 38.101-1 Removing the brackets in Rx requirements Huawei R4-1905526 [Rx]Draft CR for 38.101-1 defining NBB requirements<2.7GHz Huawei R4-1905772 Draft CR to TS38.101-1 Almost contiguous MPR Intel Corporation R4-1905795 Correction to a description of PRB for in-band emission in FR1 Anritsu Corporation R4-1905797 Correction to power control in FR1 Anritsu Corporation R4-1906140 draft CR for TS 38.101-1 Rx requirement for CA Huawei R4-1906153 Draft CR for TS 38.101-1: Editorial corrections to intra-band contiguous CA ACS and in-band blocking requirements MediaTek Inc. R4-1906154 Draft CR for TS 38.101-1: Adding symbol definitions for intra-band contiguous CA Rx maximum input level and ACS requirements MediaTek Inc. R4-1906871 Draft CR for TS 38.101-1 UE optional bandwidth for FR1 Huawei R4-1907131 Draft CR to 38.101-1. Clarification to FR1 NS_43 AMPR frequency ranges Qualcomm Incorporated R4-1907135 Draft CR to 38.101-1 rel. 15 to fix missing Exceptions for Out-of-band Blocking Apple R4-1907419 Draft CR for TS 38.101-1: Editorial improvement to EVM equalizer spectrum flatness requirements for Pi/2 BPSK MediaTek Inc. R4-1907429 Draft CR to TS38.101-1 A-MPR for Inter-band CA Intel Corporation R4-1907434 [Rx]Draft CR for 38.101-1 modifying characteristics of the interfering signal in Annex D Huawei R4-1907435 Draft CR to TS38.101-1_introduction of n41C and corrections on Rx requirements for NR intra-band contiguous CA ZTE Corporation R4-1907439 Draft CR to TS 38.101-1 on CA bandwidth class description ZTE Corporation R4-1907471 Draft CR to 38.101-1. Clarify all RB reference so transmission BW applies for all SCS Qualcomm Incorporated R4-1907474 Draft CR for TS 38.101-1 Correction of channel bandwidth set for NR CA Huawei R4-1907477 Draft CR to TS 38.101-1 on maximum aggregated bandwidth for NR CA configurations ZTE Corporation R4-1907481 Correction of RefSens exceptions due to UL harmonic interference for NR CA in 38.101-1 vivo R4-1907687 Correction to CA carrier spacing Ericsson	
2019-06	RAN#84	RP-191248	0037	1	B	Introduction of n48 in to TS 38.101-1	16.0.0
2019-06	RAN#84	RP-191241	0040		B	CR to REL-16 TS 38.101-1: Implementation of endorsed draft CRs on NR combinations and dual Connectivity combinations	16.0.0
2019-06	RAN#84	RP-191242	0041	1	B	CR to TS 38.101-1: Introduction of band n14 – Endorsed R4-1904008 in RAN4#90b	16.0.0
2019-06	RAN#84	RP-191246	0042	1	B	CR to TS 38.101-1: Introduction of band n30 + editorial in table 7.6.2-2	16.0.0
2019-06	RAN#84	RP-191244	0043	1	B	CR to introduce n18 to TS 38.101-1	16.0.0
2019-06	RAN#84	RP-191250	0044	1	B	n65 introduction to 38.101-1	16.0.0
2019-06	RAN#84	RP-191251	0045		B	Addition channel bandwidth of 30MHz for n50 in TS 38.101-1	16.0.0
2019-06	RAN#84	RP-191252	0046	1	B	Introduction of a new NR band for LTE/NR spectrum sharing in Band 41/n41	16.0.0
2019-06	RAN#84	RP-191241	0048		B	CR on introducing NR inter-band CA of 3DL Bands and 1UL band	16.0.0
2019-06	RAN#84	RP-191241	0049		B	CR to reflect the completed NR inter-band CA/DC combinations into Rel16 TS38.101-1	16.0.0
2019-06	RAN#84	RP-191241	0050		B	CR to reflect the completed NR inter-band CA/DC combinations for 3 bands DL with 2 bands UL into Rel16 TS38.101-1	16.0.0
2019-06	RAN#84	RP-191241	0051		B	CR introduction completed band combinations 38.716-01-01 -> 38.101-1	16.0.0
2019-09	RAN#85	RP-192038	0052		F	Correction to FR1 ASEM NS_27	16.1.0
2019-09	RAN#85	RP-192032	0053		B	Addition of NS information on 30MHz support for n41	16.1.0
2019-09	RAN#85	RP-192031	0054	1	B	Addition of new channel bandwidths for n7 into TS 38.101-1	16.1.0
2019-09	RAN#85	RP-192027	0055		B	CR on introducing NR intra-band CA for 3DL Bands and 1UL band	16.1.0
2019-09	RAN#85	RP-192027	0057	1	F	Minor corrections of intra-band non-contiguous CA operating bands in TS 38.101-1	16.1.0
2019-09	RAN#85	RP-192027	0058	1	F	Adding DeltaFHD for CA_n1-n77 refersense requirments	16.1.0
2019-09	RAN#85	RP-192032	0060		B	CR to introduce 30MHz bandwidth of n41 into TS 38.101-1	16.1.0
2019-09	RAN#85	RP-192026	0061	1	B	Characteristics of Interfering signal for Contiguous Intra-band CA	16.1.0

						Class B	
2019-09	RAN#85	RP-192027	0062	1	F	Correction Inter-band CA configurations	16.1.0
2019-09	RAN#85	RP-192027	0063	1	F	Finalizing Generic Intra-band Contiguous CA Class B requirements	16.1.0
2019-09	RAN#85	RP-192034	0064	1	B	n29 introduction to 38.101	16.1.0
2019-09	RAN#85	RP-192027	0065		F	[SUL] CR on SUL band combinations into Rel-16 TS 38.101-1	16.1.0
2019-09	RAN#85	RP-192029	0066		B	CR on Introduction of SUL band n89 into Rel-16 TS 38.101-1	16.1.0
2019-09	RAN#85	RP-192046	0068	2	F	Correction to Band n66	16.1.0
2019-09	RAN#85	RP-192026	0070	1	F	CR to 38.101-1. Revamp CA ACS and IBB tables to differentiate by band numbers and not frequency	16.1.0
2019-09	RAN#85	RP-192038	0071		F	CR to 38.101-1. Add missing AMPR to NS27	16.1.0
2019-09	RAN#85	RP-192026	0072		B	CR for 38.101-1 Rx requirement for NR intra-band non-contiguous CA	16.1.0
2019-09	RAN#85	RP-192036	0073		F	CR for 38.101-1: Correction to the Spurious Emission for UE Coexistence table for n14	16.1.0
2019-09	RAN#85	RP-192037	0074		F	CR for 38.101-1: Correction to the Spurious Emission for UE Coexistence table for n30	16.1.0
2019-09	RAN#85	RP-192027	0075		B	CR introduction completed band combinations 38.716-01-01 -> 38.101-1	16.1.0
2019-09	RAN#85	RP-192027	0076		B	CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into Rel16 TS 38.101-1	16.1.0
2019-09	RAN#85	RP-192027	0077		B	CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into Rel16 TS 38.101-1	16.1.0
2019-09	RAN#85	RP-192049	0079		A	CR to TS 38.101-1: Implementation of endorsed draft CRs from RAN4#92 (Rel-16) - Mirrors changes in R4-1910350 (of RAN4#92) for Rel-15 TS 38.101-1	16.1.0
2019-12	RAN#86	RP-193022	0097		F	CR to align NS27 AMPR to CA_NS_10 AMPR for 40MHz BW at the center of band 48.	16.2.0
2019-12	RAN#86	RP-193028	0099		A	CR for 38.101- RX Out-of-Band Blocking for B38 and B41	16.2.0
2019-12	RAN#86	RP-193028	0103		A	CR for 38.101-1 n39 AMPR	16.2.0
2019-12	RAN#86	RP-193013	0105	1	B	Introduction of 2010-2025MHz SUL band into Rel-16 TS 38.101-1	16.2.0
2019-12	RAN#86	RP-193015	0110		B	Addition of 25, 30 and 40 MHz to NR band n25 in TS 38.101-1	16.2.0
2019-12	RAN#86	RP-193028	0112		A	Sync raster to SSB resource element mapping	16.2.0
2019-12	RAN#86	RP-193028	0114		A	CR to TS 38.101-1 Almost contiguous A-MPR (R16)	16.2.0
2019-12	RAN#86	RP-193028	0118		A	CR to 38.101-1 (Rel-16) to clarify measurement interval and observation window on frequency error	16.2.0
2019-12	RAN#86	RP-193020	0119		D	Format misalignment on NS_47 protection requirement table	16.2.0
2019-12	RAN#86	RP-193028	0121		A	CR to TS 38.101-1: Replace CBW with symbols defined in the specification	16.2.0
2019-12	RAN#86	RP-193012	0124		B	CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into Rel16 TS 38.101-1	16.2.0
2019-12	RAN#86	RP-193012	0125		B	CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into Rel16 TS 38.101-1	16.2.0
2019-12	RAN#86	RP-193012	0126		F	CR to remove square brackets for n90 in TS38.101-1	16.2.0
2019-12	RAN#86	RP-193028	0128		A	CR for TS38.101-1, Clarification and Editorial corrections	16.2.0
2019-12	RAN#86	RP-193012	0132		B	Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1	16.2.0
2019-12	RAN#86	RP-193029	0133		B	Adding band n71 and n28 to 4 Rx antenna ports support in 38.101-1	16.2.0
2019-12	RAN#86	RP-193028	0137		A	CR for TS 38.101-1: Editorial correction for n2 uplink configuration note index in Table 7.3.2-3	16.2.0
2019-12	RAN#86	RP-193028	0138		A	CR to TS 38.101-1 on A-MPR table cleanup (Rel-16)	16.2.0
2019-12	RAN#86	RP-193029	0140		A	CR for TS 38.101-1: Removing CA configurations for CA_n77D/E, CA_n78D/E, and CA_n79D/E	16.2.0
2019-12	RAN#86	RP-193029	0144		A	CR for TS 38.101-1: Fix out-of-band blocking issue for n50 and n75	16.2.0
2019-12	RAN#86	RP-193029	0146		A	CR to TS 38.101-1 on corrections to channel raster entries for NR band (Rel-16)	16.2.0
2019-12	RAN#86	RP-193029	0150		A	CR to transmit modulation quality in FR1	16.2.0
2019-12	RAN#86	RP-193012	0151		F	Corrections Intra-band CA simultaneous TX/RX requirements	16.2.0
2019-12	RAN#86	RP-193029	0153		F	Removal of brackets from reciever requirements in 38.101-1 REL-16	16.2.0
2019-12	RAN#86	RP-193012	0155		B	Extension of CA BW class B	16.2.0
2019-12	RAN#86	RP-193029	0157		A	CR to 38.101-1: Editorial correction of UL RMCs	16.2.0
2019-12	RAN#86	RP-193012	0164		B	CR for 38.101-1 introduce SUL band combination CA_n78(2A)_SUL_n78A-n86A	16.2.0
2019-12	RAN#86	RP-193010	0165		F	CR for 38.101-1: add BCS1 configurations for CA_n78(2A)	16.2.0
2019-12	RAN#86	RP-193017	0166		B	CR to 38.101-1 - Band n75 - wider CBW	16.2.0
2019-12	RAN#86	RP-193018	0167		B	CR for TS 38.101: adding wider channel bandwidths	16.2.0
2019-12	RAN#86	RP-193016	0168		B	CR to 38.101-1: Addition of channel bandwidth for band n38	16.2.0
2019-12	RAN#86	RP-193012	0169		B	CR introduction completed band combinations 38.716-01-01 -> 38.101-1	16.2.0
2019-12	RAN#86	RP-193012	0170		B	CR introduction completed band combinations 38.716-04-01 -> 38.101-1	16.2.0
2019-12	RAN#86	RP-193021	0171		C	CR for 38.101-1: Making 90 MHz channel bandwidth mandatory for n41, n78 and n90	16.2.0

2019-12	RAN#86	RP-193020	0172		B	CR for 38.101-1: adding 30 MHz CHBW to NS_04 for n41	16.2.0
2019-12	RAN#86	RP-193029	0174		A	CR to 38.101-1-g10 Corrections to Transient Time Masks	16.2.0
2019-12	RAN#86	RP-193010	0176	1	F	CR for intra-band DL contiguous CA RF requirements	16.2.0
2019-12	RAN#86	RP-193010	0179		B	Introduction of almost contiguous MPR for PC2	16.2.0
2019-12	RAN#86	RP-193029	0180		A	CR for asynchronous operation for NR CA n78-n79	16.2.0
2019-12	RAN#86	RP-193028	0182		A	CR to 38.101-1: DMRS Exceptions	16.2.0
2020-03	RAN#87	RP-200408	0191		F	Corrections to n65	16.3.0
2020-03	RAN#87	RP-200377	0201	1	F	CR for 38.101-1 to introduce BCS1 for CA_n77C and CA_n78C	16.3.0
2020-03	RAN#87	RP-200394	0203		A	CR to TS 38.101-1 on corrections to network signalling value (Rel-16)	16.3.0
2020-03	RAN#87	RP-200484	0208		A	CR for 38.101- n39 NS flag change due to conflict	16.3.0
2020-03	RAN#87	RP-200394	0210		A	Mirror CR for 38.101-1: n41 and n25 corrections	16.3.0
2020-03	RAN#87	RP-200380	0211	2	F	CR for 38.101-1: Corrections to intra-band CA tables	16.3.0
2020-03	RAN#87	RP-200387	0212		F	CR for 38.101-1: Missing 70 MHz for NS_01	16.3.0
2020-03	RAN#87	RP-200381	0215		B	CR for 38.101-1: Introduction of n26	16.3.0
2020-03	RAN#87	RP-200380	0216		F	CR to TS 38.101-1: Corrections on MSD tables for CA_n20-n78 and CA_n66-n78	16.3.0
2020-03	RAN#87	RP-200394	0218		A	CR to TS 38.101-1: corrections on ACS for intra-band contiguous CA	16.3.0
2020-03	RAN#87	RP-200380	0219	1	F	CR to TS 38.101-1: Improvement on NR 3DL inter-band CA combination	16.3.0
2020-03	RAN#87	RP-200394	0221		A	CR to TS 38.101-1: Replace CBW with symbols defined in the specification. NOTE: The CR is based on something else than the latest version of the specification and therefore it is not implemented, e.g. Tables 6.2.3.1-1, 7.6.2-2 and Table 7.6.2-4 in CR0221 are different compared to those in 38.101-1 v16.2.0.	16.3.0
2020-03	RAN#87	RP-200380	0222		B	CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into Rel16 TS 38.101-1	16.3.0
2020-03	RAN#87	RP-200380	0223		B	CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into Rel16 TS 38.101-1	16.3.0
2020-03	RAN#87	RP-200394	0224	1	B	Introduction of n53 into TS 38.101-1	16.3.0
2020-03	RAN#87	RP-200394	0229		A	CR for TS38.101-1, Remove notes for UE channel bandwidth	16.3.0
2020-03	RAN#87	RP-200394	0231		A	CR for TS38.101-1, Correction of IE RF-Parameters name of maxUplinkDutyCycle	16.3.0
2020-03	RAN#87	RP-200380	0234	1	B	Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1	16.3.0
2020-03	RAN#87	RP-200377	0239	1	F	CR for TS 38.101-1: Corrections for n48 receiver requirements	16.3.0
2020-03	RAN#87	RP-200386	0240	1	B	CR for TS 38.101: adding wider channel bandwidths for n66	16.3.0
2020-03	RAN#87	RP-200392	0241	1	F	Maintenance on the UE BW for n92 and n94	16.3.0
2020-03	RAN#87	RP-200392	0242		F	Maintenance on the Rx-Tx separation terms	16.3.0
2020-03	RAN#87	RP-200394	0244		A	CR for 38.101-1: to remove fallback group 1 in table 5.5A.1-1	16.3.0
2020-03	RAN#87	RP-200389	0247		F	CR for 38.101-1: to correct CA_n8A-n75A REFSENS	16.3.0
2020-03	RAN#87	RP-200384	0249	1	B	CR for 38.101-1: to introduce UE RF requirements for adding wider channel bandwidth in band n28	16.3.0
2020-03	RAN#87	RP-200383	0250	1	B	CR to 38.101-1 Band n1 - wider CBW - Additional Channel BW	16.3.0
2020-03	RAN#87	RP-200385	0252	1	B	CR to 38.101-1 Band n38 - wider CBW - Additional Channel BW	16.3.0
2020-03	RAN#87	RP-200380	0260	1	F	Editorial corrections	16.3.0
2020-03	RAN#87	RP-200377	0263		F	CR for alomost contiguous allocation applicability	16.3.0
2020-03	RAN#87	RP-200394	0265	1	A	CR for inter-band CA Tx requirement	16.3.0
2020-03	RAN#87	RP-200377	0266	1	F	CR for intra-band CA configuration and DL RF requirements	16.3.0
2020-03	RAN#87	RP-200391	0273		F	CR for 38.101-1: Mandatory support for n41 by UEs that support n90	16.3.0
2020-03	RAN#87	RP-200394	0275		A	CR for [agreed] asynchronous operation for NR CA n78-n79 NOTE: The CR is based on something else than the latest version of the specification and therefore it is not implemented, e.g. Tables 6.2A.4.2.3-1, Table 7.3A.6-1, 7.3A.6.2 and table notes are different compared to those in 38.101-1 v16.2.0.	16.3.0
2020-03	RAN#87	RP-200380	0280		F	CR for 38.101-1: delta Tib corrections	16.3.0
2020-03	RAN#87	RP-200394	0281		A	Removal of unnecessary definition of $offset_{max,IMD3}$ from Table 6.2.3.2-1	16.3.0

2020-06	RAN#88	RP-201338	0293	4	B	CR to TS 38.101-1: Switching time mask between two uplink carriers in UL CA and SUL	16.4.0
2020-06	RAN#88	RP-200959	0294		F	Corrections to CA n48	16.4.0
2020-06	RAN#88	RP-200985	0300		A	CR to asymmetric CBW operation in FR1	16.4.0
2020-06	RAN#88	RP-200985	0302		A	CR on ACLR MBW definition in FR1	16.4.0
2020-06	RAN#88	RP-200959	0305		B	Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1	16.4.0
2020-06	RAN#88	RP-200959	0307		F	CR Coexistence cleanup for 38101-1 Rel16	16.4.0
2020-06	RAN#88	RP-200985	0310		A	CR to TS 38.101-1 R16: corrections on ACS for intra-band contiguous CA	16.4.0
2020-06	RAN#88	RP-200966	0311		F	CR for TS 38.101-1: UL harmonic MSD and OOBB exception	16.4.0
2020-06	RAN#88	RP-200981	0315		F	Update 4Rx Requirement for Band n30	16.4.0
2020-06	RAN#88	RP-200958	0317		B	CR on NR V2X UE RF requirements for single carrier in TS38.101-1	16.4.0
2020-06	RAN#88	RP-200985	0327		A	Maintenance CR to 38101-1 on relative power tolerance R16	16.4.0
2020-06	RAN#88	RP-200974	0329		F	Endorsed CR on default AMPR signaling for n91 n92 n93 and n94	16.4.0
2020-06	RAN#88	RP-200985	0331		A	Update of CSI-RS definition for FR1 DL RMCs	16.4.0
2020-06	RAN#88	RP-200985	0335		A	Correction to FR1 QPSK UL RMC	16.4.0
2020-06	RAN#88	RP-200966	0336		B	CR to TS38.101-1: Introduction of NR DC(Clauses 3	16.4.0
2020-06	RAN#88	RP-200985	0338		A	CR to TS 38.101-1: Correction on the CA nominal channel spacing	16.4.0
2020-06	RAN#88	RP-200985	0340		A	CR to TS 38.101-1: Replace CBW with symbols defined in the specification.	16.4.0
2020-06	RAN#88	RP-200959	0341		B	CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into Rel16 TS 38.101-1	16.4.0
2020-06	RAN#88	RP-200985	0345		A	30k SSB SCS for n50	16.4.0
2020-06	RAN#88	RP-200985	0347		A	Addition of 30k SSB SCS for Band n38	16.4.0
2020-06	RAN#88	RP-200985	0354		A	IBE measurements for Pi/2 BPSK with spectrum shaping	16.4.0
2020-06	RAN#88	RP-200959	0357		B	CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into Rel16 TS 38.101-1	16.4.0
2020-06	RAN#88	RP-200959	0360		B	CR introduction completed band combinations 38.716-01-01 -	16.4.0
2020-06	RAN#88	RP-200959	0361		B	CR introduction completed band combinations 38.716-04-01 -	16.4.0
2020-06	RAN#88	RP-200959	0364		B	CR on Introduction of completed SUL band combinations into TS 38.101-1	16.4.0
2020-06	RAN#88	RP-201045	0365		F	CR for 38.101-1 to introduce BCS2 for CA_n78(2A).	16.4.0
2020-06	RAN#88	RP-200985	0367		A	CR for 38.101-1 to remove the NR CA configuration for REFSENS exception due to cross band isolation for CA (mirror CR)	16.4.0
2020-06	RAN#88	RP-200985	0369		A	CR for 38.101-1 to add the REFSENS exception for inter band CA with SDL (mirror CR)	16.4.0
2020-06	RAN#88	RP-200979	0373		F	CR on introduce delta-MPR for inter-band CA in band n28 and review value with brackets	16.4.0
2020-06	RAN#88	RP-200985	0379		A	IBE requirement for almost contiguous allocations	16.4.0
2020-06	RAN#88	RP-200985	0385		A	OOB blocking for n70 adjacent to n25	16.4.0
2020-06	RAN#88	RP-200985	0394		F	CR for TS 38.101-1 UE co-existence correction (R16)	16.4.0
2020-06	RAN#88	RP-200985	0396		F	CR for 38.101-1 RFC corrections (R16)	16.4.0
2020-06	RAN#88	RP-200985	0400		A	TS38.101-1 CR on 30KHz SSB SCS for n40(Rel-16)	16.4.0
2020-06	RAN#88	RP-200959	0318	1	F	CR to add simultaneous RXTX capability for CA_n41-n79	16.4.0
2020-06	RAN#88	RP-200985	0404		A	CR for 38.101-1: to add some missing sub-clause title for NR inter-band CA	16.4.0
2020-06	RAN#88	RP-200985	0343	1	A	CR for [agreed] asynchronous operation for NR CA n78-n79	16.4.0
2020-06	RAN#88	RP-201045	0387	1	B	CR on FR1 UL contiguous CA requirement	16.4.0
2020-06	RAN#88	RP-200974	0325	1	F	CR on blocking requirements for n91 n92 n93 and n94	16.4.0
2020-06	RAN#88	RP-201045	0380	1	B	Addition of mutual UE coexistence between US bands and NR Band n77	16.4.0
2020-06	RAN#88	RP-200977	0356	1	B	CR for TS 38.101: adding 50 MHz CBW for n1	16.4.0
2020-06	RAN#88	RP-200980	0358	1	B	CR to TS 38.101-1 - Add 40 MHz CBW in band n3	16.4.0
2020-06	RAN#88	RP-200982	0359	1	B	CR to TS 38.101-1 - Add 50 MHz CBW in band n65	16.4.0
2020-06	RAN#88	RP-200985	0405		F	Corrections of UE co-ex tables for Japan-related bands (R16)	16.4.0
2020-06	RAN#88	RP-201045	0320	2	B	CR to 38.101-1: Introduce an operating band list and NR bands to UL MIMO	16.4.0
2020-06	RAN#88	RP-200966	0362	1	B	CR to 38.101-1 for Introduction of requirements for NR-DC	16.4.0
2020-09	RAN#89	RP-201495	0407	1	F	Correction to FR1 UL contiguous CA MPR regions	16.5.0
2020-09	RAN#89	RP-201506	0409		F	CR for n26 AMPR for 256QAM	16.5.0
2020-09	RAN#89	RP-201512	0411		A	OOB blocking for Inter-band CA	16.5.0
2020-09	RAN#89	RP-201512	0416	1	F	Correction to ASEM for NS_27	16.5.0
2020-09	RAN#89	RP-201507	0419		F	Introduction of UE PC2 for NR band n40	16.5.0
2020-09	RAN#89	RP-201502	0422	1	B	Introduction of LTE/NR spectrum sharing in band 48/n48 frequency range	16.5.0
2020-09	RAN#89	RP-201507	0423		F	Coexistence cleanup for 38101-1 Rel16	16.5.0
2020-09	RAN#89	RP-201506	0424		D	CR Editorial cleanup of band combination tables for 38101-1 Rel16	16.5.0
2020-09	RAN#89	RP-201512	0426		A	CR to TS 38.101-1: corrections on narrow band blocking for intra-band contiguous CA	16.5.0
2020-09	RAN#89	RP-201492	0428	1	F	CR for TS 38.101-1: Removal of table 6.5E.3.4.3-1 and table 6.5E.3.4.3-2	16.5.0

2020-09	RAN#89	RP-201503	0432	1	B	CR for 38.101-1: Introduction of Power Class 1.5	16.5.0
2020-09	RAN#89	RP-201488	0433	1	B	CR to TS38.101-1 on introduction of Uplink Full Power Transmission	16.5.0
2020-09	RAN#89	RP-201512	0435		A	Corrections of Japan-related CA co-ex tables for REL-15 combo	16.5.0
2020-09	RAN#89	RP-201492	0437	1	F	Correction on 5G V2X UE RF requirements in rel-16	16.5.0
2020-09	RAN#89	RP-201495	0438	2	B	A-MPR definition for CA_n48B, CA_n41B and CA_n41C	16.5.0
2020-09	RAN#89	RP-201495	0439		F	CR Restoring the clause structure of NR FR1 uplink contiguous intraband CA	16.5.0
2020-09	RAN#89	RP-201492	0440	1	F	CR on TS38.101-1 for NR V2X	16.5.0
2020-09	RAN#89	RP-201512	0442		A	30k SSB SCS for Band n34 and n39	16.5.0
2020-09	RAN#89	RP-201512	0444		F	Correction for 5 MHz channel bandwidth for n50 and introduction of Annex H	16.5.0
2020-09	RAN#89	RP-201512	0458		A	CR for 38.101-1 FRC corrections (R16)	16.5.0
2020-09	RAN#89	RP-201506	0459	1	F	CR for 38.101-1 to remove PHS system and 860~890 protection for NR CA band combination with band n1 and band n8	16.5.0
2020-09	RAN#89	RP-201506	0460	1	F	CR for 38.101-1 to add the missing region for NS_18 and maintenance the ?mprc	16.5.0
2020-09	RAN#89	RP-201512	0462		A	CR for 38.101-1 to add the missing MSD for CA_n41A-n78A	16.5.0
2020-09	RAN#89	RP-201512	0465		A	Correction to configured power with allowance for SRS switching	16.5.0
2020-09	RAN#89	RP-202117	0466		B	Introduce UE NR-U requirements to 38.101-1 including Band n46 (5 GHz) and Band n96 (6 GHz)	16.5.0
2020-09	RAN#89	RP-201495	0468	1	F	CR for intra-band UL CA non-contiguous CA requirement	16.5.0
2020-09	RAN#89	RP-201495	0469	1	F	CR for correction on intra-band UL CA contiguous CA requirement	16.5.0
2020-09	RAN#89	RP-201495	0470	1	F	CR for intra-band UL contiguous CA DC location	16.5.0
2020-09	RAN#89	RP-201495	0471	1	B	CR for intra-band UL CA non-contiguous CA requirement	16.5.0
2020-09	RAN#89	RP-201507	0480	1	F	CR to 38.101-1 - Correction to CA BCS and cross band isolation MSD tables	16.5.0
2020-09	RAN#89	RP-201512	0483		A	Correction of applicability of 2Rx requirements	16.5.0
2020-09	RAN#89	RP-201488	0486	2	B	CR to add PC3 Pi/2 BPSK DMRS for IE powerBoostPi2BPSK = 0	16.5.0
2020-09	RAN#89	RP-202098	0499	1	C	7.5 kHz UL shift for LTE/NR spectrum sharing in Band 38/n38	16.5.0
2020-12	RAN#90	RP-202440	0492	1	F	CR CatF n7 NS_46 AMPR and coexistence	16.6.0
2020-12	RAN#90	RP-202427	0498	1	F	Correction on 5G V2X UE RF requirements in TS38.101-1 in rel-16	16.6.0
2020-12	RAN#90	RP-202438	0506		F	n53 bracket removal	16.6.0
2020-12	RAN#90	RP-202442	0507	2	F	A-MPR definition for CA_n7B, CA_n48B, CA_n41B and CA_n41C	16.6.0
2020-12	RAN#90	RP-202485	0512		A	CR to TS38.101-1 on DC location correction	16.6.0
2020-12	RAN#90	RP-202509	0518		F	Coexistence cleanup for 38.101-1 Rel16	16.6.0
2020-12	RAN#90	RP-202509	0524	1	F	CR to TS 38.101-1 on simplification for inter-band CA configuration	16.6.0
2020-12	RAN#90	RP-202427	0525		F	CR on TS38.101-1 for NR V2X	16.6.0
2020-12	RAN#90	RP-202485	0527		A	CR to TS 38.101-1[R16]: Clarification of non-simultaneous Rx/Tx operation for CA_n77-n79 and CA_n78-n79 in TS 38.101-1.	16.6.0
2020-12	RAN#90	RP-202442	0533	1	F	CR to 38.101-1 Add requirement on the UL CA configurations with no DL interruption	16.6.0
2020-12	RAN#90	RP-202509	0534		F	Editorial correction on section 5.2C to 38.101-1 R16	16.6.0
2020-12	RAN#90	RP-202427	0535	1	F	CR on V2X bands reference table	16.6.0
2020-12	RAN#90	RP-202509	0536	1	F	CR on sum of power for multiple transmit connectors	16.6.0
2020-12	RAN#90	RP-202428	0540		F	CR for 38.101-1 to correct the notation of SUL band combinations in order to be aligned with 38.101-3	16.6.0
2020-12	RAN#90	RP-202485	0542		A	CR for 38.101-1 to adjust the structure of NR CA REFSENS (Rel-16)	16.6.0
2020-12	RAN#90	RP-202509	0544		F	Reference measurement channels for 70 MHz CBW	16.6.0
2020-12	RAN#90	RP-202428	0547		F	Correction to supported channel bandwidths per SUL_n41A-n81A	16.6.0
2020-12	RAN#90	RP-202414	0550	3	F	Correction to the intra-cell guard band definition for wideband operation	16.6.0
2020-12	RAN#90	RP-202414	0552	1	F	Correction to receiver requirements for shared spectrum channel access	16.6.0
2020-12	RAN#90	RP-202442	0556		F	CR Correction to NS_27 and Band 10 protection 38101-1 Rel16	16.6.0
2020-12	RAN#90	RP-202428	0557	1	F	CR for editorial corrections 38.101-1	16.6.0
2020-12	RAN#90	RP-202414	0558	2	F	Removal of square brackets for 38.101-1 NR-U	16.6.0
2020-12	RAN#90	RP-202509	0562		F	CR to for 38.101-1: CA uplink power clarification	16.6.0
2020-12	RAN#90	RP-202509	0563		D	CR for 38.101-1: Editorial corrections	16.6.0
2020-12	RAN#90	RP-202427	0566	1	F	CR for 38.101-1 NR V2X FRC	16.6.0
2020-12	RAN#90	RP-202485	0571		A	CR for TS 38.101-1: correction of delta Tib for UE supporting multiple band combinations (R16)	16.6.0
2020-12	RAN#90	RP-202442	0574	1	B	CR for intra-band UL CA non-contiguous CA requirement	16.6.0
2020-12	RAN#90	RP-202485	0581		A	CR for 38.101-1 on corrections for AMPR-Rel-16	16.6.0
2020-12	RAN#90	RP-202485	0584		A	CR to DMRS position in UL RMC for FR1	16.6.0
2020-12	RAN#90	RP-202456	0408	3	B	LTE/NR spectrum sharing in Band 40/n40	17.0.0
2020-12	RAN#90	RP-202451	0499		B	Introduction of 1880-1920MHz SUL band into Rel-17 TS 38.101-1	17.0.0
2020-12	RAN#90	RP-202452	0500		B	introduction of 2300-2400MHz SUL band into Rel-17 TS 38.101-1	17.0.0
2020-12	RAN#90	RP-202450	0503	1	B	CR for TS 38.101-1, Introduce new band combination of V2X_n39A-n47A and V2X_n40A-n47A	17.0.0
2020-12	RAN#90	RP-202468	0504		B	CR on Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1	17.0.0
2020-12	RAN#90	RP-202471	0513		B	CR on introduction of completed NR CA/DC combs with 4DL/2UL	17.0.0

						within FR1	

2020-12	RAN#90	RP-202472	0514		B	CR on Introduction of completed SUL band combinations into TS 38.101-1	17.0.0
2020-12	RAN#90	RP-202448	0543	1	B	CR to TS 38.101-1: introduction of NR band n13	17.0.0
2020-12	RAN#90	RP-202455	0545		B	CR to 38.101-1 Introduce band combination requirements for PC2 CA_n1A-n78A	17.0.0
2020-12	RAN#90	RP-202453	0546	1	B	Big CR to 38.101-1 - Additional Channel BW	17.0.0
2020-12	RAN#90	RP-202466	0548		B	CR introduction completed band combinations Rel-17 NR Intra-band -	17.0.0
2020-12	RAN#90	RP-202470	0549		B	CR introduction completed band combinations NR Inter-band 4 bands CA -	17.0.0
2020-12	RAN#90	RP-202467	0585		B	CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into TS 38.101-1	17.0.0
2020-12	RAN#90	RP-202469	0586		B	CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into TS 38.101-1	17.0.0
2021-03	RAN#91	RP-210190	0589		A	PC1 and PC3 Updates for Band n14	17.1.0
2021-03	RAN#91	RP-210117	0594	1	A	38.101 Void clean up R17	17.1.0
2021-03	RAN#91	RP-210097	0604	2	B	CR for TS 38.101-1 introduction of NR band n24	17.1.0
2021-03	RAN#91	RP-210072	0606		A	CR on editorial correction on V2X operation in TS38.101-1 in Rel-17	17.1.0
2021-03	RAN#91	RP-210178	0607		B	CR on Introduction of completed SUL band combinations into TS 38.101-1	17.1.0
2021-03	RAN#91	RP-210096	0609	2	B	CR to 38101-1 on introducing new SUL band n99	17.1.0
2021-03	RAN#91	RP-210117	0612		A	CR for TS38 101-1 Rel-17 Correction for definition of P-MPR	17.1.0
2021-03	RAN#91	RP-210117	0614		A	CR for TS38 101-1 Rel-17 Correction of condition for MPR and delta MPR	17.1.0
2021-03	RAN#91	RP-210094	0616	1	B	CR for TS 38.101-1, Introduce new band combination of V2X_n41A-n47A	17.1.0
2021-03	RAN#91	RP-210179	0617		B	CR on Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1	17.1.0
2021-03	RAN#91	RP-210094	0625		F	Revision of inter-band V2X con-currency table for V2X_n39A-n47A and V2X_n40A-n47A	17.1.0
2021-03	RAN#91	RP-210092	0628	1	B	Switching time mask for 2Tx-2Tx switching between two carriers and 1Tx-2Tx/2Tx-2Tx switching between two bands in Rel-17	17.1.0
2021-03	RAN#91	RP-210082	0630		F	CR for TS 38.101-1: Correction on 1Tx-2Tx switching between two uplink carriers (Rel-17)	17.1.0
2021-03	RAN#91	RP-210092	0631		B	CR on introducing NR SUL bands n80 to UL-MIMO configuration	17.1.0
2021-03	RAN#91	RP-210091	0633		A	CR for 38.101-1: Update of missing fallback NR-DC combinations Rel-17	17.1.0
2021-03	RAN#91	RP-210184	0636	1	B	CR on introduction of completed NR CA/DC combs with 4DL/2UL within FR1	17.1.0
2021-03	RAN#91	RP-210091	0642		A	CR on introduction of shorter Transient Period Capability	17.1.0
2021-03	RAN#91	RP-210100	0657		B	CR introduction completed band combinations Rel-17 NR Intra-band -	17.1.0
2021-03	RAN#91	RP-210091	0660		A	CR for 38.101-1 to add missing spurious emissions for band n38 UE co-existence (Rel-17)	17.1.0
2021-03	RAN#91	RP-210084	0663		A	CR to TS 38.101-1: system parameters maintenance for NR-U	17.1.0
2021-03	RAN#91	RP-210117	0665		A	Simplification of n70	17.1.0
2021-03	RAN#91	RP-210074	0669		A	CR for 38.101-1: Add CA_n25A-n41(2A)-n71A which was missing in the CR implementation	17.1.0
2021-03	RAN#91	RP-210189	0670	1	F	Big CR to TS 38.101-1 - New CBW Basket WI	17.1.0
2021-03	RAN#91	RP-210117	0674		A	CR to TS38.101-1: Correction on applicability of minimum requirements	17.1.0
2021-03	RAN#91	RP-210117	0677		A	CR to TS38.101-1: Correction on the Aggregated Channel Bandwidth	17.1.0
2021-03	RAN#91	RP-210117	0679		A	CR to TS38.101-1: Correction on configured transmitted power requirement	17.1.0
2021-03	RAN#91	RP-210100	0680	1	B	Rel-17 CR 38.101-1 for improvements Intra-band tables	17.1.0
2021-03	RAN#91	RP-210101	0681		F	Rel-17 CR 38.101-1 for corrections NR CA 2, 3 and 4 band configuration tables	17.1.0
2021-03	RAN#91	RP-210099	0688		B	CR for TS 38.101-1 Introduce NR SUL bands to PC3 UL-MIMO configuration	17.1.0
2021-03	RAN#91	RP-210117	0690		A	Missing parent clause for NR-DC PCMAX	17.1.0
2021-03	RAN#91	RP-210117	0692		A	Corrections to PCMAX for UL CA	17.1.0
2021-03	RAN#91	RP-210082	0695		A	CR CA_n7B REFSENS	17.1.0
2021-03	RAN#91	RP-210117	0699		A	CR for TS 38.101-1: Correction to FR1 time mask for SRS antenna switching	17.1.0
2021-03	RAN#91	RP-210082	0701		A	CR for TS 38.101-1: Corrections to intra-band UL NC CA requirements	17.1.0
2021-03	RAN#91	RP-210091	0703		A	CR for TS 38.101-1: Cleanup for spurious emissions for UE co-existence table	17.1.0
2021-03	RAN#91	RP-210091	0713		A	CR on TS 38.101-1 NS_49	17.1.0
2021-03	RAN#91	RP-210176	0715		B	CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into TS 38.101-1	17.1.0
2021-03	RAN#91	RP-210181	0716		B	CR to reflect the completed NR inter band CA DC combinations for 3	17.1.0

						bands DL with 2 bands UL into TS 38.101-1	

2021-03	RAN#91	RP-210101	0717		B	Introduction of specific Pcmax requirements for inter-band CA category A-B combos	17.1.0
2021-06	RAN#92	RP-211084	0736		A	Update of FR1 UL RMC tables	17.2.0
2021-06	RAN#92	RP-211104	0738		F	CR Removal of square brackets from n48 NS_27 R17 CAT F	17.2.0
2021-06	RAN#92	RP-211114	0740		A	CR TDD Intraband CA REFSENS requirement issue R17	17.2.0
2021-06	RAN#92	RP-211118	0745	1	A	CR on PC1.5 HPUE SAR issue into Rel-17 TS 38.101-1	17.2.0
2021-06	RAN#92	RP-211104	0750		A	CR on spurious emission between n40 and n41 into Rel-17 TS 38.101-1	17.2.0
2021-06	RAN#92	RP-211085	0751		F	Simplification of n70	17.2.0
2021-06	RAN#92	RP-211117	0752	1	F	CR for updates related to n24 in 38.101-1	17.2.0
2021-06	RAN#92	RP-211114	0755		B	CR on Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1	17.2.0
2021-06	RAN#92	RP-211114	0757		A	Correction on supported channel bandwidth for CA_n39-n41-n79	17.2.0
2021-06	RAN#92	RP-211080	0760	1	F	Correction of an improper usage of band edge relaxation for MOP	17.2.0
2021-06	RAN#92	RP-211085	0765		A	CR to TS38.101-1[R17]: Addition of UE co-existence requirements for n40	17.2.0
2021-06	RAN#92	RP-211115	0768		B	CR for Pcmax - NR-DC for DC cat. A-B combinations	17.2.0
2021-06	RAN#92	RP-211114	0770		B	Add channel bandwidth configuration for CA_n46A-n48A	17.2.0
2021-06	RAN#92	RP-211114	0773		B	Adding new CA_n46N-n48A configurations	17.2.0
2021-06	RAN#92	RP-211077	0779		A	Cleanup for UE co-existence 38.101-1 Rel-17	17.2.0
2021-06	RAN#92	RP-211102	0780	1	F	Correction on DL interruption applicability for inter-band CA	17.2.0
2021-06	RAN#92	RP-211079	0781		F	CR to TS 38.101-1 on UE channel bandwidth per operating band	17.2.0
2021-06	RAN#92	RP-211105	0783		A	UL MIMO coherence for Tx switching between two carriers (Rel-17)	17.2.0
2021-06	RAN#92	RP-211115	0784		B	CR on introduction of completed NR CA/DC combs with 4DL/2UL within FR1	17.2.0
2021-06	RAN#92	RP-211077	0786		A	CR to 38.101-1 for missing MSD due to receiver harmonic mixing for combos with n46	17.2.0
2021-06	RAN#92	RP-211120	0787		B	CR on Introduction of completed SUL band combinations into TS 38.101-1	17.2.0
2021-06	RAN#92	RP-211115	0788		B	CR on Introduction of completed 5 bands inter-band CA into TS 38.101-1	17.2.0
2021-06	RAN#92	RP-211078	0792		A	CR for updating the note of mandatory simultaneous Rx/Tx capability for FR1 NR-CA combinations	17.2.0
2021-06	RAN#92	RP-211078	0800		A	Correction to MPR for serving cells of intra-band UL CA	17.2.0
2021-06	RAN#92	RP-211095	0802		A	Corrections to BCS for n46	17.2.0
2021-06	RAN#92	RP-211095	0804		A	Applicability of minimum requirements for shared spectrum access	17.2.0
2021-06	RAN#92	RP-211120	0805		B	CR to 38.101-1 Introduce RF requirements for HPUE CA with 2 bands downlink and x bands uplink (x =1,2)	17.2.0
2021-06	RAN#92	RP-211120	0806		B	CR to 38.101-1 Introduce DL interruption clarification for CA conduting Tx Switching	17.2.0
2021-06	RAN#92	RP-211115	0807		B	Big CR to TS 38.101-1: Adding channel BW support in existing NR bands	17.2.0
2021-06	RAN#92	RP-211116	0808	1	B	CR to TS 38.101-1: Introduction of band n67	17.2.0
2021-06	RAN#92	RP-211116	0809	2	B	CR to TS 38.101-1: Introduction of band n85	17.2.0
2021-06	RAN#92	RP-211095	0811		A	CR to 38.101-1 with correction of NR-U 60 MHz and 80 MHz channels	17.2.0
2021-06	RAN#92	RP-211086	0814		F	CR for Rel-17 38.101-1 to correct some errors in Delta TIB and Delta RIB table	17.2.0
2021-06	RAN#92	RP-211086	0816		A	CR for 38.101-1 Rel17 corrections on power tolerance for intra-band contiguous CA	17.2.0
2021-06	RAN#92	RP-211101	0821		A	CR for 38.101-1 to correct AMPR value for NR V2X NS_52(Rel-17)	17.2.0
2021-06	RAN#92	RP-211107	0823		A	CR to TS38.101-1: Correction on configured transmitted power for NR non-contiguous CA	17.2.0
2021-06	RAN#92	RP-211115	0825		A	CR to TS38.101-1: Add missing CA_n1A-n3A-n78A	17.2.0
2021-06	RAN#92	RP-211115	0826		B	CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into TS 38.101-1	17.2.0
2021-06	RAN#92	RP-211115	0827		B	CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into TS 38.101-1	17.2.0
2021-06	RAN#92	RP-211095	0836		A	Applicability of requirements for intra-band contiguous CA	17.2.0
2021-06	RAN#92	RP-211110	0838		A	Correction to Band n48 reference sensitivity	17.2.0
2021-06	RAN#92	RP-211115	0843		B	CR 38.101-1 new combinations Rel-17 NR Intra-band	17.2.0
2021-06	RAN#92	RP-211115	0844		B	CR 38.101-1 new combinations NR Inter-band 4 bands CA	17.2.0
2021-06	RAN#92	RP-211115	0845		F	CR 38.101-1 to re-introduce the 3DL/2UL configuration accidently deleted in R4-2102320	17.2.0
2021-06	RAN#92	RP-211114	0847	1	F	Rel-17 CR 38101-1-h10 corrections 1 band NR and 2 band NR CA	17.2.0
2021-06	RAN#92	RP-211114	0848	1	F	Rel-17 CR 38101-1-h10 corrections 3 band NR CA	17.2.0
2021-06	RAN#92	RP-211115	0849		F	CR 38101-1-h10 correction non-contiguous intra-band config table	17.2.0
2021-06	RAN#92	RP-211110	0864		A	CR for TS 38.101-1 update configured transmitted power for V2X (R17)	17.2.0
2021-06	RAN#92	RP-211116	0870		A	CR for 38.101-1-h10: Corrections to NS_12, NS_13, NS_14, NS_15	17.2.0
2021-06	RAN#92	RP-211114	0871		A	CR for correction of Rel-17 NR inter-band CA DC configuration for 2DL with up to 2 bands UL	17.2.0
2021-06	RAN#92	RP-211122	0872		B	Big CR for 38.101, Introduce new band combinations for V2X con-	17.2.0

						current operation	

2021-06	RAN#92	RP-211114	0873		F	Rel-17 CR 38101-1-g70 corrections	17.2.0
2021-06	RAN#92	RP-211080	0874		F	CR for 38.101-1-h10: Corrections to intra-band non-contiguous CA REFSENS	17.2.0
2021-06	RAN#92	RP-211114	0875		F	CR for TS 38.101-1: introduction of MSD test configurations related to IMD for inter-band combinations with intra-band UL CA as UL configuration	17.2.0
2021-09	RAN#93	RP-211915	0884		B	CR on Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1	17.3.0
2021-09	RAN#93	RP-211909	0885	2	B	bigCR to TS 38.101-1 - Introduction of 35MHz and 45MHz channel bandwidth	17.3.0
2021-09	RAN#93	RP-211896	0888	1	F	CR for updates related to NR Band n24	17.3.0
2021-09	RAN#93	RP-211900	0889		B	Big CR on introduction of completed NR CA/DC combs with 4DL/2UL within FR1	17.3.0
2021-09	RAN#93	RP-211901	0890	1	B	CR to 38.101-1 Introduce SAR solution for UE power class 2 NR inter-band CA and SUL configurations	17.3.0
2021-09	RAN#93	RP-211901	0891		B	CR to 38.101-1 Introduce RF requirements for HPUE CA with 2 bands downlink and x bands uplink (x =1,2)	17.3.0
2021-09	RAN#93	RP-211902	0893		B	CR on Introduction of completed SUL band combinations into TS 38.101-1	17.3.0
2021-09	RAN#93	RP-211900	0894		B	CR on Introduction of completed 5 bands inter-band CA into TS 38.101-1	17.3.0
2021-09	RAN#93	RP-211901	0896		F	CR to TS 38.101-1: Correction on PC2 1UL_2DL table 6.2A.1.3-2	17.3.0
2021-09	RAN#93	RP-211900	0898		B	Big CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into TS 38.101-1	17.3.0
2021-09	RAN#93	RP-211900	0899		B	Big CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into TS 38.101-1	17.3.0
2021-09	RAN#93	RP-211900	0903		B	CR 38.101-1 new combinations Rel-17 NR Intra-band	17.3.0
2021-09	RAN#93	RP-211900	0904		B	CR 38.101-1 new combinations NR Inter-band 4 bands CA	17.3.0
2021-09	RAN#93	RP-211907	0905		B	Big CR to TS 38.101-1: Adding channel BW support in existing NR bands	17.3.0
2021-09	RAN#93	RP-211896	0906		B	CR for 38.101-1: Introduction of BCS4 and BCS5	17.3.0
2021-09	RAN#93	RP-211900	0907		F	CR for TS 38.101-1: Correcting CA frequency setup for 2UL interband reference sensitivity	17.3.0
2021-09	RAN#93	RP-211895	0908	1	F	CR for TS 38.101-1 Rel-17: Applying n40 and n41 spurious emissions on CA	17.3.0
2021-09	RAN#93	RP-211910	0911	1	B	Introduction of the UL 7.5kHz shift for NR TDD band n34 and n39	17.3.0
2021-09	RAN#93	RP-211895	0912		B	CR on contiguous CA with UL MIMO for power class 3	17.3.0
2021-09	RAN#93	RP-211895	0913	1	B	CR on PC2 intra-band UL contiguous CA RF requirements	17.3.0
2021-09	RAN#93	RP-211897	0914		B	CR for TS 38.101-1 Tx diversity requirements NOTE: The CR is partly implemented. .The changes were ignored in CR0914's regarding PC1.5 in clause 6.2.2 due to conflict with CR0915	17.3.0
2021-09	RAN#93	RP-211901	0915		B	CR to 38.101-1: Introduction of PC1.5 in Bands n77 and n78	17.3.0
2021-09	RAN#93	RP-211901	0916		B	CR to 38.101-1: Introduction of PC1.5 in Band n79	17.3.0
2021-09	RAN#93	RP-211888	0917		F	CR to 38.101-1: PC1.5 MPR for Band n41	17.3.0
2021-09	RAN#93	RP-211901	0918		B	CR to TS 38.101-1: Addition of PC2 A-MPR for NS_50	17.3.0
2021-09	RAN#93	RP-211921	0921		F	Big CR for TS 38.101-1 Maintenance part1 (Rel-17)	17.3.0
2021-09	RAN#93	RP-211907	0923		A	Big CR for TS 38.101-1 Maintenance part2 (Rel-17)	17.3.0
2021-09	RAN#93	RP-211900	0924		F	Rel-17 CR 38.101-1, band combination corrections	17.3.0
2021-09	RAN#93	RP-211905	0925		B	CR for updating the note of mandatory simultaneous Rx/Tx capability for Rel.17 FR1 NR-CA combinations	17.3.0
2021-09	RAN#93	RP-212600	0927	2	A	Introduction of NS value for distinguishing support of extended n77	17.3.0
2021-12	RAN#94	RP-212837	0930		F	Clarification on applicability of RB restriction for n39 and n98	17.4.0
2021-12	RAN#94	RP-212837	0932	1	B	CR on PC2 UE RF requirements of n34 in Rel-17 TS 38.101-1	17.4.0
2021-12	RAN#94	RP-212837	0933		B	CR on PC2 UE RF requirements of n39 in Rel-17 TS 38.101-1	17.4.0
2021-12	RAN#94	RP-212830	0940		B	CR on Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1	17.4.0
2021-12	RAN#94	RP-212826	0941		F	CR for 38.101-1 to remove UL MIMO restriction for SUL carrier	17.4.0
2021-12	RAN#94	RP-212833	0942		B	CR on UE maximum output power for n1 and n3 PC2	17.4.0
2021-12	RAN#94	RP-212825	0944	1	B	CR for TS 38.101-1: 1024QAM	17.4.0
2021-12	RAN#94	RP-212831	0945		B	Big CR on introduction of completed NR CA/DC combs with 4DL/2UL within FR1	17.4.0
2021-12	RAN#94	RP-212836	0947		F	CR: Rel-17 38.101-1 Corrections on spurious emission band UE co-existence	17.4.0
2021-12	RAN#94	RP-212830	0948	1	F	CR for TS 38.101-1: MSD test configurations modification for US inter-band CA combinations with n77	17.4.0
2021-12	RAN#94	RP-212835	0949	1	F	CR for TS 38.101-1: Remove unsupported channel BWs for n25 and n79	17.4.0
2021-12	RAN#94	RP-212835	0950		B	Big CR to TS 38.101-1: Adding channel BW support in existing NR bands	17.4.0
2021-12	RAN#94	RP-212832	0951	1	F	CR to TS38.101-1: Correction on MSD table to apply PC2 NR inter-band CA combination	17.4.0

2021-12	RAN#94	RP-212830	0952		F	CR to TS38.101-1: Inter-band NR CA Tx requirement including intra-band non-contiguous CA and combinations of intra-band and inter-band CA UL configuration	17.4.0
2021-12	RAN#94	RP-212830	0953		B	Big CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into TS 38.101-1	17.4.0
2021-12	RAN#94	RP-212830	0954		B	Big CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into TS 38.101-1	17.4.0
2021-12	RAN#94	RP-212832	0955		B	CR to 38.101-1 Introduce RF requirements for HPUE CA with 2 bands downlink and x bands uplink (x =1,2)	17.4.0
2021-12	RAN#94	RP-212834	0956		B	CR to 38.101-1 Introduce DL interruption clarification for CA conduting Tx Switching	17.4.0
2021-12	RAN#94	RP-212831	0957		B	CR on Introduction of completed SUL band combinations into TS 38.101-1	17.4.0
2021-12	RAN#94	RP-212831	0958		B	CR on Introduction of completed 5 bands inter-band CA into TS 38.101-1	17.4.0
2021-12	RAN#94	RP-212830	0959		B	CR 38.101-1 new combinations Rel-17 NR Intra-band	17.4.0
2021-12	RAN#94	RP-212831	0960		B	CR 38.101-1 new combinations NR Inter-band 4 bands CA	17.4.0
2021-12	RAN#94	RP-212904	0961		B	CR for 38.101-1 to introduce PC2 RF requirements for NR V2X	17.4.0
2021-12	RAN#94	RP-212837	0973	1	F	Correction to maxUplinkDutyCycle-MPE-FR1 for PC1.5	17.4.0
2021-12	RAN#94	RP-212832	0974		F	Correction to uplink Tx power for PC2 2UL CA MSD	17.4.0
2021-12	RAN#94	RP-212847	0977		A	CR to remove LO exceptions	17.4.0
2021-12	RAN#94	RP-212832	0979		B	CR to 38.101-1 Introduce RF requirements for HPUE CA with x (x>2) bands DL and y (y=1,2) bands UL	17.4.0
2021-12	RAN#94	RP-212827	0980		B	CR 38.101-1 to improve how to include BCS4 and BCS5	17.4.0
2021-12	RAN#94	RP-212845	0983		F	Big CR for TS 38.101-1 Maintenance (Rel-17)	17.4.0
2021-12	RAN#94	RP-213687	0984	1	B	Bandwidth class correction for DC_n46N-n48A DC_n46N-n48B DC_n46N-n48C combos	17.4.0
2022-03	RAN#95	RP-220357	0990	1	B	CR for introduction of the lower 6GHz unlicensed band	17.5.0
2022-03	RAN#95	RP-220357	0991	1	B	CR for introduction of operation in full unlicensed band 5925-7125MHz	17.5.0
2022-03	RAN#95	RP-220342	0993		F	CR on UL MIMO coherence for Tx switching	17.5.0
2022-03	RAN#95	RP-220359	0994		B	CR on Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1	17.5.0
2022-03	RAN#95	RP-220359	0995		B	Big CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into TS 38.101-1	17.5.0
2022-03	RAN#95	RP-220352	0996		B	CR for 4 Rx antenna ports support of band n8	17.5.0
2022-03	RAN#95	RP-220343	0997		B	Big CR to 38.101-1 Introduce RF requirements for HPUE CA	17.5.0
2022-03	RAN#95	RP-220343	0998	1	B	CR to TS38101-1 Addition of MSD for FDD PC2	17.5.0
2022-03	RAN#95	RP-220343	0999	1	B	CR to TS38101-1 Addition of PC2 A-MPR for FDD PC2	17.5.0
2022-03	RAN#95	RP-220359	1000	1	F	CR to TS38101-1 Addition of DC configurations	17.5.0
2022-03	RAN#95	RP-220359	1001	1	F	Clarification of A-MPR/NS applicability for inter-band NR-DC	17.5.0
2022-03	RAN#95	RP-220365	1002		B	Formal big CR to introduce SL enhancements UE RF requirements in Rel-17	17.5.0
2022-03	RAN#95	RP-220358	1003		B	Big CR for 38.101-1, Introduce new band combination for V2X con-current operation	17.5.0
2022-03	RAN#95	RP-220358	1004		B	Big CR for 38.101-3, Introduce new band combination for V2X con-current operation NOTE: The CR is allocated to 38.101-1 but was used for 38.101-3. The changes were ignored in CR1004 since it is not the correct spec. CR 1003 is related to 38.101-1. The changes in CR1004 will be implemented in 38.101-3 due to conflict with CR numbering	17.5.0
2022-03	RAN#95	RP-220343	1005		B	Big CR to 38.101-1 Introduce RF requirements for HPUE CA with 2 bands downlink and x bands uplink (x =1,2)	17.5.0
2022-03	RAN#95	RP-220347	1007	1	B	Introduction of upper 700MHz A block into TS 38.101	17.5.0
2022-03	RAN#95	RP-220359	1008		B	Big CR on introduction of completed NR CA/DC combs with 4DL/2UL within FR1	17.5.0
2022-03	RAN#95	RP-220359	1009		B	Big CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into TS 38.101-1	17.5.0
2022-03	RAN#95	RP-220376	1011		B	38.101-1: Introduction of 1900 MHz to 5G NR for RMR	17.5.0
2022-03	RAN#95	RP-220343	1013		F	CR to TS38.101-1: Corrections on MOP tolerance for PC2 FDD n3	17.5.0
2022-03	RAN#95	RP-220358	1015		B	Big CR to TS 38.101-1: Adding channel BW support in existing NR bands	17.5.0
2022-03	RAN#95	RP-220359	1016	1	F	CR for TS 38.101-1 Rel-17: Corrections on UE co-existence	17.5.0
2022-03	RAN#95	RP-220359	1017		B	CR on Introduction of completed 5 bands inter-band CA into TS 38.101-1	17.5.0
2022-03	RAN#95	RP-220371	1019	2	B	CR for 38.101-1 to introduce RF requirements for RedCap UE	17.5.0
2022-03	RAN#95	RP-220344	1020		B	CR for 38.101-1 to correct the REFSENS errors due to the new format(n41 n77 n78) (R17)	17.5.0
2022-03	RAN#95	RP-220349	1021		B	Big CR for TS 38.101-1 Tx diversity requirements (phase 2)	17.5.0
2022-03	RAN#95	RP-220342	1022		B	Big CR for TS 38.101-1 introduction of PC2 intra-band non-contiguous UL CA	17.5.0

2022-03	RAN#95	RP-220342	1023	1	B	Big CR for TS 38.101-1 contiguous CA with UL MIMO for power class 2	17.5.0
2022-03	RAN#95	RP-220363	1024	1	B	Big CR for TS38.101-1: introduction of new UL MIMO bands	17.5.0
2022-03	RAN#95	RP-220359	1025		B	Big CR 38.101-1 new combinations Rel-17 NR Intra-band	17.5.0
2022-03	RAN#95	RP-220359	1026		B	Big CR 38.101-1 new combinations NR CA Inter-band 4DL/1UL	17.5.0
2022-03	RAN#95	RP-220350	1027		F	Clarification of modifiedMPR-Behavior for PC1.5	17.5.0
2022-03	RAN#95	RP-220344	1030		F	CR R17 TS38.101-1 on TDD REFSENS and MSDs	17.5.0
2022-03	RAN#95	RP-220334	1031		F	CR to R17 TS38.101-1 on MSD for CA_n5-n28	17.5.0
2022-03	RAN#95	RP-220353	1032		F	Big CRs to TS 38.101-1 for NR_BCS4	17.5.0
2022-03	RAN#95	RP-220343	1033		B	CR to TS 38.101-1 on PC1 MPR table	17.5.0
2022-03	RAN#95	RP-220360	1034		B	CR on UE RF requirements for DMRS bundling in TS 38.101-1 NOTE: The CR was not implemented.	17.5.0
2022-03	RAN#95	RP-220337	1037		F	Big CR for TS 38.101-1 Maintenance Part-1 (Rel-17)	17.5.0
2022-03	RAN#95	RP-220337	1039		F	Big CR for TS 38.101-1 Maintenance Part-2 (Rel-17)	17.5.0
2022-03	RAN#95	RP-220360	1040		B	CR on measurement for DMRS bundling in TS 38.101-1	17.5.0
2022-03	RAN#95	RP-220360	1041		B	CR on measurement for DMRS bundling in TS 38.101-1	17.5.0
2022-03	RAN#95	RP-220371	1042		B	Big CR on RedCap UE FR1-RX	17.5.0
2022-03	RAN#95	RP-220786	1043		C	Mandatory 70 MHz and 90 MHz RF channel bandwidth in TS 38.101-1	17.5.0
2022-06	RAN#96	RP-221656	1048	1	F	V2X intra-band con-current operation	17.6.0
2022-06	RAN#96	RP-221677	1049		B	CR 38.101-1 DMRS for CA	17.6.0
2022-06	RAN#96	RP-221654	1050	1	F	CR 38101-1-h50 adding FR1 NR-CA fallbacks	17.6.0
2022-06	RAN#96	RP-221661	1051	1	F	CR: Update of UE capability and RRC parameter name for Tx switching	17.6.0
2022-06	RAN#96	RP-221666	1053		A	CR for 38.101-1-h50: Correction for n7 A-MPR (NS_46)	17.6.0
2022-06	RAN#96	RP-221668	1057		A	CR for 38.101-1 Rel17 Minor AMPR Corrections for n65 to account for SCS	17.6.0
2022-06	RAN#96	RP-221671	1058		F	CR for 38.101-1 Rel17 Minor Correction for n48 NS_27 30MHz inequality	17.6.0
2022-06	RAN#96	RP-221695	1063		B	Big CR for TS 38.101-1, Introduce new band combinations of V2X con-current operation	17.6.0
2022-06	RAN#96	RP-221686	1064		B	CR on Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1	17.6.0
2022-06	RAN#96	RP-221694	1065		B	Big CR to 38.101-1 Introduce RF requirements for HPUE CA with 2 bands downlink and x bands uplink (x =1,2)	17.6.0
2022-06	RAN#96	RP-221672	1067	1	F	CR on NR-U A-MPR for PC5 VLP in South Korea	17.6.0
2022-06	RAN#96	RP-221679	1070	1	F	CR to TS 38.101-1: Protection for band 103 from newly introduced CA combinations	17.6.0
2022-06	RAN#96	RP-221661	1071	1	F	CR to TS38.101-1[R17] Some Corrections for Transmitter characteristics	17.6.0
2022-06	RAN#96	RP-221683	1072	1	F	CR to TS38.101-1: Some corrections for the tables due to introduction of 35MHz_45MHz CBW	17.6.0
2022-06	RAN#96	RP-221676	1073	1	F	CR to TS38.101-1: Corrections on Redcap requirements	17.6.0
2022-06	RAN#96	RP-221687	1074	1	F	CR to TS38.101-1: Corrections on MSD for PC2 FDD band	17.6.0
2022-06	RAN#96	RP-221686	1075		B	Big CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into TS 38.101-1	17.6.0
2022-06	RAN#96	RP-221671	1077		F	Correction to additional spurious emission requirements for n48	17.6.0
2022-06	RAN#96	RP-221681	1079	1	F	CR to TS38.101-1 for the corrections on Tx Diversity Requirement	17.6.0
2022-06	RAN#96	RP-221671	1080		B	Big CR to TS 38.101-1: Adding channel BW support in existing NR bands	17.6.0
2022-06	RAN#96	RP-221695	1081	1	B	Big CR to 38.101-1: update of simultaneous RxTx capability for band combinations	17.6.0
2022-06	RAN#96	RP-221675	1082		B	CR: Introduction of RMC for 1024QAM maximum input level	17.6.0
2022-06	RAN#96	RP-221684	1083		B	38.101-1: Introduction of 900 MHz to 5G NR for RMR	17.6.0
2022-06	RAN#96	RP-221677	1086		B	CR on UE RF requirements for DMRS bundling in TS 38.101-1	17.6.0
2022-06	RAN#96	RP-221694	1087		B	Big CR to 38.101-1 Introduce RF requirements for HPUE CA	17.6.0
2022-06	RAN#96	RP-221686	1089		B	Big CR on Introduction of completed SUL band combinations into TS 38.101-1	17.6.0
2022-06	RAN#96	RP-221686	1090		B	Big CR on Introduction of completed 5 bands inter-band CA into TS 38.101-1	17.6.0
2022-06	RAN#96	RP-221694	1092	1	F	CR for TS 38.101-1 Rel-17: Corrections on band combinations for UE co-existence	17.6.0
2022-06	RAN#96	RP-221680	1098		F	CR for 38.101-1 to introduce the missing requirements for BCS4	17.6.0
2022-06	RAN#96	RP-221677	1100	1	F	CR on DMRS bundling phase offset measurement FR1	17.6.0
2022-06	RAN#96	RP-221686	1103		B	big CR 38.101-1 new combinations Rel-17 NR Intra-band	17.6.0
2022-06	RAN#96	RP-221686	1104		B	big CR 38.101-1 new combinations NR CA Inter-band 4DL/1UL	17.6.0
2022-06	RAN#96	RP-221686	1105		B	Big CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into TS 38.101-1	17.6.0
2022-06	RAN#96	RP-221670	1107		B	Big CR for TS38.101-1: introduction of new UL MIMO bands	17.6.0
2022-06	RAN#96	RP-221677	1110		F	CR to TS 38.101-1: update of NR-V2X MPR requirements (R17)	17.6.0
2022-06	RAN#96	RP-221694	1111	1	B	Big CR for TS 38.101-1: Introduce high power UE for NR TDD intra-band CA in FR1	17.6.0

2022-06	RAN#96	RP-221673	1112	1	B	Introduction of NR licensed band 6425 – 7125 MHz NOTE: The CR is covered in CR 1112 revision2	17.6.0
2022-06	RAN#96	RP-221673	1112	2	B	Introduction of NR licensed band 6425 – 7125 MHz	17.6.0
2022-06	RAN#96	RP-221680	1113	1	B	Increasing the maximum power limit for inter-band UL CA	17.6.0
2022-06	RAN#96	RP-221661	1116	1	A	CR to R17 TS38.101-1 on transient period capability	17.6.0
2022-06	RAN#96	RP-221661	1117		F	CR for TS 38.101-1: Removing square brackets for Intra-band NC UL CA requirements	17.6.0
2022-06	RAN#96	RP-221655	1121		F	Big CR for TS 38.101-1 Maintenance Part-1 (Rel-17)	17.6.0
2022-06	RAN#96	RP-221676	1123		F	CR on RedCap FR1 RF	17.6.0
2022-06	RAN#96	RP-221681	1124		F	CR on Receiver requirements for TX diversity	17.6.0
2022-06	RAN#96	RP-221066	1125		F	CR for updating the note of mandatory simultaneous Rx/Tx capability for FR1 NR-CA combinations	17.6.0
2022-06	RAN#96	RP-221067	1126		F	CR for updating the note of mandatory simultaneous Rx/Tx capability for FR1 NR-CA combinations	17.6.0
2022-06	RAN#96	RP-221868	1128	2	F	CR to 38.101-1 on corrections of NS_21 requirements	17.6.0
2022-06	RAN#96	RP-221748	1129	1	B	CR for 38.101-1: Addition PC1.5 single uplink for 3DL combinations [NR_PC1.5_SingleUL_3DLCA]	17.6.0
2022-06	RAN#96	RP-221789	1130	1	C	Extension of operation in the n77 frequency range in Canada [n77 Canada]	17.6.0
2022-09	RAN#97	RP-222032	1135	1	F	CR: Maintenance of phase continuity requirements for DMRS bundling in FR1	17.7.0
2022-09	RAN#97	RP-222032	1136	1	F	V2X corrections	17.7.0
2022-09	RAN#97	RP-222050	1137		F	CR to R17 38.101-1 to correct NR-U 100MHz UL configuration	17.7.0
2022-09	RAN#97	RP-222050	1138		D	CR to R17 38.101-1 to correct table number for UL MIMO NR-U section	17.7.0
2022-09	RAN#97	RP-222032	1139	1	F	CR for TS 38.101-1, Correction of configured transmitted power for V2X	17.7.0
2022-09	RAN#97	RP-222032	1140	1	F	NR Band n14 PC1 MPR for NR Sidelink Operation	17.7.0
2022-09	RAN#97	RP-222028	1143	1	F	CR 38.101-1: Rel-17 Adding missing fallback combinations and bug fixes	17.7.0
2022-09	RAN#97	RP-222036	1145		F	CR for TS 38.101-1 Rel-17: Introducing missing UE coex requirements for CA_n7-n79	17.7.0
2022-09	RAN#97	RP-222034	1148		F	CR to 38.101-1: Corrections on Pcmax for TxD	17.7.0
2022-09	RAN#97	RP-222036	1149	1	F	CR to 38.101-1: Corrections on Pcmax for intra-band contiguous CA with UL MIMO	17.7.0
2022-09	RAN#97	RP-222033	1150	1	F	CR to 38.101-1 Maintenance for HPUE CA with 2 bands downlink and x bands uplink (x =1,2)	17.7.0
2022-09	RAN#97	RP-222036	1151		F	Removal of [] for Reference Sensitivity Degradation of PC2 FDD band	17.7.0
2022-09	RAN#97	RP-222036	1152		F	Corrections on the MSD tables for inter-band NR CA	17.7.0
2022-09	RAN#97	RP-222034	1155		F	Maintanence of NR TxD Tx requirements	17.7.0
2022-09	RAN#97	RP-222036	1157	1	F	CR 38.101-1 for editorial corrections to band combination tables	17.7.0
2022-09	RAN#97	RP-222032	1158		F	CR for 38.101-1 to correct the errors for FR1 RedCap UE	17.7.0
2022-09	RAN#97	RP-222050	1159		F	CR for 38.101-1 to update the requirements for V2X con-current band combinations	17.7.0
2022-09	RAN#97	RP-222036	1160	1	F	CR for 38.101-1 to introduce the missing MSD due to cross band isolation	17.7.0
2022-09	RAN#97	RP-222036	1161	1	F	CR for 38.101-1 to clarify the ambiguity of BCS4 and BCS5	17.7.0
2022-09	RAN#97	RP-222023	1162		A	Mirror CR for 38.101-1 to clarify the applicability of requirements for NS_xxU	17.7.0
2022-09	RAN#97	RP-222023	1164		F	CR to 38.101-1 Corrections to tables with wrong unit declarations	17.7.0
2022-09	RAN#97	RP-222036	1165	1	F	NOTE: The CR is allocated to 38.101-1 but the title on the coversheet is wrong as it says spec TS 38.101-3. This 38.101-1 CR. can not be implemented.	17.7.0
2022-09	RAN#97	RP-222032	1167	1	F	CR on RedCap RF to add section 6.1I	17.7.0
2022-09	RAN#97	RP-222036	1169	1	F	Correction to RF requirements of NR_RF_FR1_enh	17.7.0
2022-09	RAN#97	RP-222032	1173	1	F	CR TS 38.101-1: Correction on NR V2X requirements in TS 38.101-1	17.7.0
2022-09	RAN#97	RP-222028	1174		F	CR for TS 38.101-1 on corrections to MOP band edge relaxation for intra-band contiguous and non-contiguous CA band combinations	17.7.0
2022-09	RAN#97	RP-222050	1177		F	CR to R17 TS38.101-1 on corrections to NRU 100MHz MPR	17.7.0
2022-09	RAN#97	RP-222034	1180	1	F	CR for 38.101-1: Corrections for PC2 MPR and PC1.5 fallback to PC2 MPR	17.7.0
2022-09	RAN#97	RP-222036	1181	1	B	CR for 38.101-1: Missing combinations for NR-CA	17.7.0
2022-09	RAN#97	RP-222050	1182	1	B	CR for 38.101-1: Addition of 5 MHz channel BW for n41	17.7.0
2022-09	RAN#97	RP-222032	1184	1	F	CR 38.101-1 DMRS DL CA	17.7.0
2022-09	RAN#97	RP-222028	1187		D	Editorial clean-up	17.7.0
2022-09	RAN#97	RP-222032	1188		F	CR: Correction of DMRS bundling requirements for FR1 CA	17.7.0
2022-09	RAN#97	RP-222023	1192		F	Big CR for 38.101-1 maintenance part1 (Rel-17)	17.7.0
2022-09	RAN#97	RP-222023	1194		F	Big CR for 38.101-1 maintenance part2 (Rel-17)	17.7.0

2022-09	RAN#97	RP-222686	1196	1	A	Extension of operation in the n77 frequency range in US [n77 US]	17.7.0
2022-09	RAN#97	RP-222683	1197	2	C	Extension of operation in the n77 frequency range in Canada [n77 Canada]	17.7.0
2022-09	RAN#97	RP-222490	1198		F	CR to 38.101-1 on new NS for Canadian WCS regulation R17	17.7.0
2022-12	RAN#98-e	RP-223298	1199		B	Introduction of intra band NC UL CA in the n77 frequency range in Canada [n77 Canada]	17.8.0
2022-12	RAN#98-e	RP-223307	1200	1	F	Corrections on the definition of RedCap UE	17.8.0
2022-12	RAN#98-e	RP-223306	1202	1	F	CR on clarification for DMRS bundling RF requirements for SUL in TS 38.101-1	17.8.0
2022-12	RAN#98-e	RP-223308	1205	3	F	CR to clarify UE requirements for DMRS bundling	17.8.0
2022-12	RAN#98-e	RP-223311	1206		F	CR for TS 38.101-1, Correction of maximum configured power for PSFCH in Rel-17 sidelink enhancement	17.8.0
2022-12	RAN#98-e	RP-223290	1210		A	Addition of FR1 UL MIMO EVM measurement description	17.8.0
2022-12	RAN#98-e	RP-223290	1213		A	Addition of FR2 UL MIMO EVM measurement description Note: The CR was not implementable and therefore was not implemented in the specification.	17.8.0
2022-12	RAN#98-e	RP-223309	1216		F	CR correction to n100 and n101 UE to UE coexsistence tables and revoval of brackets	17.8.0
2022-12	RAN#98-e	RP-223295	1218	1	A	Addition of CA_n77-n78 to CA Band table R17	17.8.0
2022-12	RAN#98-e	RP-223297	1220		A	Correction to n91,n92,n93 and n94 co-ex R17	17.8.0
2022-12	RAN#98-e	RP-223310	1223		F	Definition of Window lengths for 35 and 45 MHz channel bandwidths	17.8.0
2022-12	RAN#98-e	RP-223296	1225		A	CR for TS 38.101-1 Rel-17 CAT-A: Correcting critical error with co-existence for band CA_n8-n40	17.8.0
2022-12	RAN#98-e	RP-223291	1226	1	F	CR for TS 38.101-1 Rel-17: Corrections on band combinations for UE co-existence	17.8.0
2022-12	RAN#98-e	RP-223309	1230		F	CR on NR-U A-MPR for PC5 VLP	17.8.0
2022-12	RAN#98-e	RP-223290	1233		F	Rel17 Cat F CR Correct the DL configuration for harmonic MSD for CA_n12-n66 and CA_n25-n71	17.8.0
2022-12	RAN#98-e	RP-223481	1238	4	A	Clarification of the CA_NS indication the values for n77 in the US [n77 US]	17.8.0
2022-12	RAN#98-e	RP-223308	1242		F	CR to R17 TS38.101-1 maintenance for UE co-ex requirements for UL CA	17.8.0
2022-12	RAN#98-e	RP-223309	1245	2	F	CR to 38.101-1: 4 Rx support for n104	17.8.0
2022-12	RAN#98-e	RP-223311	1246		F	Correction on the HigherPowerLimitCADC and powerClassPerBand IE	17.8.0
2022-12	RAN#98-e	RP-223298	1251	1	F	CR for corrections on Rel-17 band combinations in TS38.101-1	17.8.0
2022-12	RAN#98-e	RP-223296	1253		A	CR to 38.101-1 on removing ambiguity in CA MPR definition	17.8.0
2022-12	RAN#98-e	RP-223308	1254		F	CR for 38.101-1: introduce UL MIMO configurations for band n40	17.8.0
2022-12	RAN#98-e	RP-223309	1262	1	F	CR TS38.101-1 R17 Re-construct NR-U clause structure and introduce missing requirements	17.8.0
2022-12	RAN#98-e	RP-223291	1263	1	F	CR TS38.101-1 R17 Corrections to Cross-band isolation and Rx harmonic mixing MSD	17.8.0
2022-12	RAN#98-e	RP-223291	1267		A	CR on 'Annex G Difference of relative phase and power errors' for FR1 UL coherent MIMO	17.8.0
2022-12	RAN#98-e	RP-223291	1270		A	CR on TDD RMC for Intra-band EN-DC - TS 38.101-1	17.8.0
2022-12	RAN#98-e	RP-223308	1273	1	F	CR for 38.101-1 DMRS bundling with FR1 uplink CA	17.8.0
2022-12	RAN#98-e	RP-223308	1275		F	CR for 38.101-1: Corrections for 5 MHz for n41 and other errors	17.8.0
2022-12	RAN#98-e	RP-223308	1276		F	CR for 38.101-1: NR CA table corrections	17.8.0
2022-12	RAN#98-e	RP-223308	1278		F	CR for updating the note of mandatory simultaneous Rx/Tx capability for FR1 NR-CA combinations	17.8.0
2022-12	RAN#98-e	RP-223308	1279		F	CR for 38.101-1 for DC location R17 method	17.8.0

Change history

Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2022-12	RAN#98-e	RP-223315	1207	1	B	CR related to Introduction of new LTE TDD Band in 1670 – 1675 MHz	18.0.0
2022-12	RAN#98-e	RP-223328	1217		B	Big CR for FWA MPR and A-MPR for n71 and n85	18.0.0
2022-12	RAN#98-e	RP-223331	1227		B	Big CR to 38.101-1 Introduce RF requirements for HPUE inter- band CA with y(y=2,3,4) bands downlink and x bands uplink (x =1,2)	18.0.0
2022-12	RAN#98-e	RP-223333	1228		B	Big CR for TS 38.101-1, Introduction of new R18 Uu+V2X band combinations	18.0.0
2022-12	RAN#98-e	RP-223332	1232		B	BigCR for High power UE for inter-band CA with power class 2 on single carrier uplink on FDD band	18.0.0
2022-12	RAN#98-e	RP-223324	1244		B	big CR 38.101-1 new combinations Rel-18 NR Intra-band	18.0.0
2022-12	RAN#98-e	RP-223326	1247		B	big CR 38.101-1 new combinations Rel-18 NR Inter-band CA/DC for y bands DL with x bands UL (y=4,5,6, x=1,2)	18.0.0
2022-12	RAN#98-e	RP-223325	1248		B	Big CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into TS 38.101-1	18.0.0
2022-12	RAN#98-e	RP-223329	1250		B	Big CR on TS38.101-1 Addition of intra-band CA Combinations with PC2 and PC1.5	18.0.0
2022-12	RAN#98-e	RP-223318	1255		B	Big CR for 38.101-1 introduce UL MIMO configurations for Rel-18	18.0.0

2022-12	RAN#98-e	RP-223327	1256		B	Big CR on Introduction of completed SUL band combinations into TS 38.101-1	18.0.0
2022-12	RAN#98-e	RP-223325	1264		B	Big CR to reflect the completed NR inter-band CA DC combinations for 3 bands DL with x bands UL (x=1,2) into TS 38.101-1	18.0.0
2022-12	RAN#98-e	RP-223319	1280		B	Introduction of APT 600 MHz band	18.0.0
2023-03	RAN#99	RP-230527	1281		F	Updates to spurious emissions UE coexistence table	18.1.0
2023-03	RAN#99	RP-230535	1282		B	CR related to Introduction of NR TDD Band n54	18.1.0
2023-03	RAN#99	RP-230519	1289		A	CR TS 38.101-1: Correction on NR V2X requirements in Rel-18	18.1.0
2023-03	RAN#99	RP-230605	1294	1	B	UE RF requirements for supporting intra-band non-collocated CA for 2MIMO layer case	18.1.0
2023-03	RAN#99	RP-230501	1296		A	CR for TS 38.101-1 Rel-18: Adding missing harmonic mixing MSD for CA_n25-n71	18.1.0
2023-03	RAN#99	RP-230517	1298		A	TS 38.101-1 Rel-18 CAT-A: Correction to co-existence requirements of band n8 and n100	18.1.0
2023-03	RAN#99	RP-230504	1300		A	CR for TS 38.101-1 Rel-18 CAT-A: Corrections on band combinations for UE co-existence	18.1.0
2023-03	RAN#99	RP-230507	1302		A	CR for TS 38.101-1 Rel-18 CAT-A: Correction to NRU spectrum emission mask	18.1.0
2023-03	RAN#99	RP-230501	1305		A	CR for TS 38.101-1 Rel-18: Correction for wrong reference in NS_50	18.1.0
2023-03	RAN#99	RP-230544	1309	1	F	CR 38.101-1: Rel-18 Band combinations bug fixing and adding missing fallbacks	18.1.0
2023-03	RAN#99	RP-230512	1313		A	CR to 38.101-1: Correction of PC1 ACLR definition R18	18.1.0
2023-03	RAN#99	RP-230544	1315		A	NR CA corrections R18	18.1.0
2023-03	RAN#99	RP-230513	1317		A	CR 38.101-1 correction to A-MPR for NS_24 R18	18.1.0
2023-03	RAN#99	RP-230549	1318		B	Big CR for High-power UE operation for fixed-wireless/vehicle-mounted use cases in LTE bands and NR bands	18.1.0
2023-03	RAN#99	RP-230549	1320		A	CR to 38.101-1: Corection to PC1 UTRA ACLR for bands n71 and n85.	18.1.0
2023-03	RAN#99	RP-230502	1324		A	Addition of configuration for carrier aggregation RMCs	18.1.0
2023-03	RAN#99	RP-230516	1328	1	A	CR to introduce emissions specifications for certain LTE_V2X band combinations	18.1.0
2023-03	RAN#99	RP-230509	1338		A	Clarification of the CA_NS indication and NS values for n77 in Canada [n77 Canada]	18.1.0
2023-03	RAN#99	RP-230547	1339		B	Big CR for NR CA band combinations with two SUL cells in Rel-18	18.1.0
2023-03	RAN#99	RP-230519	1341		A	CR for 38.101-1 Corrections to the section 6.2D	18.1.0
2023-03	RAN#99	RP-230558	1342		B	Big CR to 38.101-1 Introduce DL interruption clarification for CA conduting Tx Switching	18.1.0
2023-03	RAN#99	RP-230519	1345		F	CR on NR-U A-MPR for PC5 VLP in NS_61	18.1.0
2023-03	RAN#99	RP-230543	1346		B	big CR 38.101-1 new combinations Rel-18 NR Intra-band	18.1.0
2023-03	RAN#99	RP-230519	1350		A	Rel18 Cat A CR Introduce the missing Pcmax tolerance requirement for PC2 intra-band NC UL CA	18.1.0
2023-03	RAN#99	RP-230519	1352		A	Rel18 Cat A CR Add verification clarification for OOB emission and SE emission for intra-band NC UL CA	18.1.0
2023-03	RAN#99	RP-230502	1355		A	Rel18 Cat A CR Correct the wrong table and clause that clause 6.2A.3.1.1 refer to	18.1.0
2023-03	RAN#99	RP-230504	1359	1	A	CR to clarify duplex mode of SDL bands	18.1.0
2023-03	RAN#99	RP-230501	1362		A	CR to add band n29 to blocking requirements	18.1.0
2023-03	RAN#99	RP-230507	1373		A	Correct the scaling number for MPR/A-MPR and NS_04 SEM requirement	18.1.0
2023-03	RAN#99	RP-230519	1375		A	Correct the Pcmax for intra-band non-contiguous CA to support HPUE	18.1.0
2023-03	RAN#99	RP-230544	1376		B	Big CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into TS 38.101-1	18.1.0
2023-03	RAN#99	RP-230562	1377		B	Big CR to reflect the completed 4Rx support for NR FR1 bands (<2.6GHz) into TS 38.101-1	18.1.0
2023-03	RAN#99	RP-230519	1378		A	CR to 38.101-1 R18 corrections on A-MPR for CA_NC_NS_04	18.1.0
2023-03	RAN#99	RP-230502	1381		A	CR on Harmonic mixing MSD for CA_n8A-n79A (R18 CAT-A)	18.1.0
2023-03	RAN#99	RP-230559	1384		B	Big CR to TS 38.101-1: Adding channel BW support in existing NR bands	18.1.0
2023-03	RAN#99	RP-230546	1385		B	big CR 38.101-1 NR Inter-band CA/DC for y bands DL (y=4, 5, 6) with x bands UL (x=1, 2)	18.1.0
2023-03	RAN#99	RP-230514	1386		A	Frequency range definition update for TS 38.101-1 (Rel-18)	18.1.0
2023-03	RAN#99	RP-230519	1393		A	Clarification on Time mask for Tx switching for SA (Rel-18)	18.1.0
2023-03	RAN#99	RP-230503	1400		A	CR for Rel-18 38.101-1 to correct the configurations for CA_n46M/N/O	18.1.0
2023-03	RAN#99	RP-230532	1401		B	Big CR for 38.101-1 introduce UL MIMO configurations for Rel-18	18.1.0
2023-03	RAN#99	RP-230547	1403		B	Big CR on Introduction of completed SUL band combinations into TS 38.101-1	18.1.0
2023-03	RAN#99	RP-230549	1405		B	Big CR for Rel-18 Simultaneous Rx/Tx inter-band combinations	18.1.0
2023-03	RAN#99	RP-230513	1407		A	CR for TS 38.101-1 to correct the delta MPR (R18)	18.1.0
2023-03	RAN#99	RP-230503	1411		A	CR for TS 38.101-1 to clarify the inner outer condition for almost contiguous RB allocation (R18)	18.1.0
2023-03	RAN#99	RP-230501	1414		A	CR for TS 38.101-1 to clarify band n34 protection for band n1 and	18.1.0

						n65 (R18)	
2023-03	RAN#99	RP-230501	1417		A	CR for TS 38.101-1 to clarify Out-of-band blocking exception for band n20 and n28 (R18)	18.1.0
2023-03	RAN#99	RP-230552	1418		B	Big CR on TS38.101-1 Addition of intra-band CA Combinations with PC2	18.1.0
2023-03	RAN#99	RP-230501	1427		A	Additional maximum power reduction for NS_21 (Rel-18)	18.1.0
2023-03	RAN#99	RP-230513	1430		A	CR for 38.101-1: Band combination corrections (Rel-18 Cat A)	18.1.0
2023-03	RAN#99	RP-230519	1432		A	CR for 38.101-1: Clarification of PC1.5 requirements (Rel-18 Cat A)	18.1.0
2023-03	RAN#99	RP-230503	1436		A	CR to TS 38.101-1 on humidity condition for normal temperature	18.1.0
2023-03	RAN#99	RP-230545	1439		B	Big CR to reflect the completed NR inter-band CA DC combinations for 3 bands DL with x bands UL (x=1,2) into TS 38.101-1	18.1.0
2023-03	RAN#99	RP-230516	1441		A	CR for TS 38.101-1 on cleanups for V2X operating bands and channel bandwidth (R18_CAT_A)	18.1.0
2023-03	RAN#99	RP-230504	1459		A	Output power for NS_38, NS_40, and NS_41	18.1.0
2023-03	RAN#99	RP-230504	1464	1	A	CR to TS 38.101-1 Rel-18 Minimum guardband and missing ULCA power class	18.1.0
2023-03	RAN#99	RP-230533	1467		F	Corection to Band n105 in coexistence table	18.1.0
2023-03	RAN#99	RP-230519	1469		A	CR for TS 38.101-1, Correction of minor errors in suffix E (NR V2X/Sidelink) requirements	18.1.0
2023-03	RAN#99	RP-230501	1471		A	CR to TS 38.101-1 Rel-18 4Rx for SUL	18.1.0
2023-03	RAN#99	RP-230519	1472		A	CR to update NS_50 PC2 A-MPR	18.1.0
2023-03	RAN#99	RP-230507	1475		F	CR to return he Eq1 for intra-band UL CA contiguous	18.1.0
2023-03	RAN#99	RP-230554	1476		B	Big CR for 38.101-1 on High power UE for FR1 NR inter-band CA/DC or SUL band combination with y DL-x UL and PCm (m<3) and high power on TDD	18.1.0
2023-06	RAN#100	RP-231355	1484		F	CR to K1 and PdschNumOfHarqProcess for DL-CA	18.2.0
2023-06	RAN#100	RP-231356	1488		A	FR1 OOB requirements correction	18.2.0
2023-06	RAN#100	RP-231343	1501		A	Update to UL-MIMO requirements (Rel-18)	18.2.0
2023-06	RAN#100	RP-231350	1504		A	CR to correct the A-MPR table for NS_05/NS_05U	18.2.0
2023-06	RAN#100	RP-231389	1505	1	B	CR for 38.101-1: Time mask for switching across three or four uplink bands	18.2.0
2023-06	RAN#100	RP-231384	1513		B	BigCR for High power UE for inter-band CA with power class 2 on single carrier uplink on FDD band	18.2.0
2023-06	RAN#100	RP-231377	1515		B	Big CR on Introduction of completed SUL band combinations into TS 38.101-1	18.2.0
2023-06	RAN#100	RP-231348	1517		A	CR for TS 38.101-1 to modify the errors in table 7.6.4-1 due to the introduction of equation-based method (R18)	18.2.0
2023-06	RAN#100	RP-231343	1519		A	CR for TS 38.101-1 to modify the errors for SUL_n78A-n80A configuration (R18)	18.2.0
2023-06	RAN#100	RP-231367	1521		F	On RF requirements for intra-band non-collocated CA	18.2.0
2023-06	RAN#100	RP-231355	1531		A	CR to TS38.101-1 Correction to out-of-band blocking table	18.2.0
2023-06	RAN#100	RP-231374	1534		F	NR interband 2UL CA co-ex simplication R18	18.2.0
2023-06	RAN#100	RP-231378	1535	1	B	Big CR for FWA HPUE	18.2.0
2023-06	RAN#100	RP-231383	1538		B	Big CR to 38.101-1 new combinations for Rel-18 NR HPUE Inter-band	18.2.0
2023-06	RAN#100	RP-231375	1539	1	B	Big CR to reflect the completed NR inter-band CA DC combinations for 3 bands DL with x bands UL (x=1,2) into TS 38.101-1	18.2.0
2023-06	RAN#100	RP-231355	1543		A	CR for TS 38.101-1 on corrections to the minimum guardband calculation (R18_CAT_A)	18.2.0
2023-06	RAN#100	RP-231351	1546		A	Rel-18 CR to 38 101-1 for Clarification of UL Tx Switching	18.2.0
2023-06	RAN#100	RP-231355	1549		A	Rel18 Cat A CR for 38.101-1 Correct the MSD test configuration for CA_n18-n41	18.2.0
2023-06	RAN#100	RP-231343	1554		A	CR to TS38.101-1: Generalize the increase higher power limit requirements for current CA band combinations	18.2.0
2023-06	RAN#100	RP-231355	1557		A	CR to TS38.101-1: Correction on terms for NR DC Pcmax	18.2.0
2023-06	RAN#100	RP-231374	1558		B	CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into TS 38.101-1	18.2.0
2023-06	RAN#100	RP-231379	1560		B	CR on PC 1.5 for FR1 TDD single bands	18.2.0
2023-06	RAN#100	RP-231385	1565		B	Big CR to TS 38.101-1: Adding channel BW support in existing NR bands	18.2.0
2023-06	RAN#100	RP-231356	1569		A	CR for Rel-18 38.101-1 to correct CA_n46N_BCS0 to CA_n46N_BCS1 for inter-band CA including CA_n46N	18.2.0
2023-06	RAN#100	RP-231368	1570		B	Big CR for 38.101-1 introduce UL MIMO configurations for Rel-18	18.2.0
2023-06	RAN#100	RP-231349	1577		F	CR to 38.101-1 add the missing additional spurious emissions for CA_n5B	18.2.0
2023-06	RAN#100	RP-231350	1581		A	CR to TS38.101-1 on corrections for DMRS bundling with Tx Switching (Rel-18)	18.2.0
2023-06	RAN#100	RP-231388	1585	1	F	CR for TS 38.101-1 Rel-18 CAT-F: Corrections on band combinations for UE co-existence	18.2.0
2023-06	RAN#100	RP-231351	1588		A	CR for TS 38.101-1: Adding missing requirements for NR-U Rel-18 CAT-A	18.2.0
2023-06	RAN#100	RP-231351	1590		A	CR for TS 38.101-1: Adding missing requirements for NR-U Rel-18 CAT-A	18.2.0

2023-06	RAN#100	RP-231343	1591	2	B	Introduction of enhancements for unlicensed access to 38.101-1	18.2.0
2023-06	RAN#100	RP-231375	1592		F	CR for 38.101-1 18.1.0 Bug fixes for CA/DC tables	18.2.0
2023-06	RAN#100	RP-231377	1595		F	CR for 38.101-1: Single SUL CA combination notation modifications	18.2.0
2023-06	RAN#100	RP-231356	1599		A	Update of FR1 UL MIMO EVM measurement description	18.2.0
2023-06	RAN#100	RP-231356	1605		A	CR to 38.101-1 Rel-18 Cat A, FRC correction	18.2.0
2023-06	RAN#100	RP-231349	1610		A	CR to 38.101-1 Rel-18 Cat A, Missing MSD correction	18.2.0
2023-06	RAN#100	RP-231343	1615		A	CR to clarify DC location wording	18.2.0
2023-06	RAN#100	RP-231381	1616		B	Big CR on TS38.101-1 Addition of intra-band CA Combinations	18.2.0
2023-06	RAN#100	RP-231338	1617	1	F	CR on R18 TS38.101-1 Modification on the PC2 and PC1.5 note on the CA configuration with UL single carrier	18.2.0
2023-06	RAN#100	RP-231373	1618		B	big CR 38.101-1 new combinations Rel-18 NR Intra-band	18.2.0
2023-06	RAN#100	RP-231383	1622		A	CR to TS 38.101-1 (Rel-18): Alignment of PC2 uplink/downlink frequency locations to PC3 in configuration	18.2.0
2023-06	RAN#100	RP-231383	1625		A	CR to TS 38.101-1 (Rel-18): Correction of an invalid channel bandwidth in 3DL/2UL inter-band reference sensitivity testing for both PC3 and PC2	18.2.0
2023-06	RAN#100	RP-231376	1627		B	big CR 38.101-1 new combinations Rel-18 NR Inter-band CA/DC for y bands DL with x bands UL (y=4,5,6, x=1,2)	18.2.0
2023-06	RAN#100	RP-231385	1630	1	F	CR 38.101-1 for correction of Notes in Table 5.3.5-1	18.2.0
2023-06	RAN#100	RP-231356	1635		F	CR for 38.101-1: Foob clarification and n5 and n26 protection for B26/n26	18.2.0
2023-06	RAN#100	RP-231342	1636		A	CR on PC2 for adding note to CA_n77C and CA_n78C	18.2.0
2023-06	RAN#100	RP-231349	1637		A	CR on MSD for shared spectrum band	18.2.0
2023-06	RAN#100	RP-231389	1638		B	CR for 38.101-1 to clarify the time mask for switching with multiple TAGs	18.2.0
2023-06	RAN#100	RP-231343	1639		B	Addition of 30 KHz SCS for Sync Raster for Band n53	18.2.0
2023-06	RAN#100	RP-231386	1640		B	Big CR for TS 38.101-1 Rel-18 Simultaneous Rx/Tx inter-band combinations	18.2.0