8 Performance Requirement

8.1 General

The performance requirements for the physical channels specified in TS 36.211 [8] clause 6 (for downlink physical channels) shall be as defined in the respective sections below.

The requirements for the UE in this clause are specified for the downlink reference measurement channels specified in Annex A, the propagation conditions specified in Annex B and the downlink physical channels specified in Annex C.

Unless otherwise stated the throughput measurements in clause 8 shall be performed according to the general rules for statistical testing in Annex G clause G.3.

The requirement for a UE that support E-UTRA in downlink shall be tested according to the declared UE PDSCH category and CA capabilities.

The fading of the signals and the AWGN signals applied to each receiver antenna connector shall be uncorrelated. The levels of the test signal applied to each of the antenna connectors shall be as defined in the respective test cases.

The UE performance in this section is considered to be operating band independent. Therefore, the required performance in the respective test cases can be verified in one of the operating bands supported by the UE under test. All the test points supported by the bands of the multiband UE (based on channel bandwidth, DL and UL configuration) need to be tested.

8.1.1 Dual-antenna receiver capability

The performance requirements are based on UE(s) that utilize a dual-antenna receiver.

For all test cases, the SNR is defined as:

$$SNR = \frac{\hat{E}_s^{(1)} + \hat{E}_s^{(2)}}{N_{oc}^{(1)} + N_{oc}^{(2)}},$$

where the superscript indicates the receiver antenna connector. The above SNR definition assumes that the REs are not precoded. The SNR definition does not account for any gain which can be associated to the precoding operation. The relative power of physical channels transmitted is defined in Table C.3.2-1. The SNR requirement applies for the UE categories given for each test.

For enhanced performance requirements type A, the SINR is defined as

$$SINR = \frac{\hat{E}_s^{(1)} + \hat{E}_s^{(2)}}{N_{oc}^{(1)'} + N_{oc}^{(2)'}}$$

where the superscript indicates the receiver antenna connector. The above SINR definition assumes that the REs are not precoded. The SINR definition does not account for any gain which can be associated to the precoding operation. The relative power of physical channels transmitted is defined in Table C.3.2-1. The SINR requirement applies for the UE categories given for each test.

The applicability of the requirements with respect to CA capabilities is given as in Table 8.1.1-1. In case the CA capability is omitted, the requirement is applicable to a UE regardless of its CA capability.

Table 8.1.1-1: Applicability of the requirement with respect to the CA capability

CA Capability	CA Capability Description
CL_X	The requirement is applicable to a UE that indicates a CA bandwidth class X on at least one E-UTRA band.
CL_X-Y	The requirement is applicable to a UE that indicates CA bandwidth classes X and Y on at least one E-UTRA band combination.
Note: The CA bandwidth classes are defined in Table 5.4.2A-1	

For test cases with more than one component carrier, "Fraction of Maximum Throughput" in the performance requirement refers to the ratio of the sum of throughput values of all component carriers to the sum of the nominal maximum throughput values of all component carriers. The normative reference for this requirement is TS 36.101 [2] clause 8.1.1.

8.1.1.1 Simultaneous unicast and MBMS operations

8.1.1.2 Dual-antenna receiver capability in idle mode

8.2 Demodulation of PDSCH (Cell-Specific Reference Symbols)

8.2.1 FDD (Fixed Reference Channel)

The parameters specified in Table 8.2.1-1 are valid for all FDD tests unless otherwise stated.

Table 8.2.1-1: Common Test Parameters (FDD)

Parameter	Unit	Value	Comments
Inter-TTI Distance		1	
Number of HARQ processes	Processes	8	For FDD, 8 HARQ processes in the DL, as specified in TS 36.213 [10] clause 7. All 8 HARQ processes are used.
Scheduling of retransmissions			1. Retransmissions use the same Transport Block Size (TBS) as the initial transmission. 2. HARQ processes are scheduled consecutively, independent of the fact, whether retransmissions (for negatively acknowledged HARQ processes) or new transmissions (for positively acknowledged HARQ processes) occur.
Maximum number of HARQ transmission		4	It is always 4 for FDD, as specified in TS 36.213 [10] clause 8
Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM {0,0,1,2} for 64QAM	
Number of OFDM symbols for PDCCH	OFDM symbols	4 for 1.4 MHz bandwidth, 3 for 3 MHz and 5 MHz bandwidths, 2 for 10 MHz, 15 MHz and 20 MHz bandwidths	The PCFICH carries information about the number of OFDM symbols used for transmission of PDCCHs in a subframe, as specified in TS 36.211 [8] clause 6.7
Cyclic Prefix		Normal	CP consist of the following physical resource blocks (RBs) parameters: 12 consecutive subcarriers at a 15 kHz spacing and 7 OFDM symbols, as specified in TS 36.211 [8] clause 6.2.3
Cell ID		0 (Note 1)	The Cell ID is uniquely defined by a number in the range of 0 to 503, representing the physical-layer cell identity, as specified in TS 36.211 [8] clause 6.11.
Cross carrier scheduling		Not configured	
Note 1: For CA tests, Cell ID = 0 applies only to P-Cell. For S-Cell, Cell ID = 1 is used.			

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.

8.2.1.1 FDD PDSCH Single Antenna Port Performance (Cell-Specific Reference Symbols)

8.2.1.1.1 FDD PDSCH Single Antenna Port Performance

8.2.1.1.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS.

8.2.1.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8 and forward.

8.2.1.1.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.1, with the addition of the relevant parameters in Tables 8.2.1-1, 8.2.1.1.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.1.1.3-2 for the specified SNR. For QPSK and 64QAM performance the bandwidths specified in Table 5.4.2.1-1 are verified.

Table 8.2.1.1.1.3-1: Test Parameters for Testing

Parameter		Unit	Test 1- 5	Test 6- 8	Test 9- 15	Test 16-18
Downlink power allocation	ρ_A	dB	0	0	0	0
	ρ_B	dB	0 (Note 1)	0 (Note 1)	0 (Note 1)	0 (Note 1)
	σ	dB	0	0	0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98	-98	-98
Symbols for unused PRBs			OCNG (Note 2)	OCNG (Note 2)	OCNG (Note 2)	OCNG (Note 2)
Modulation			QPSK	16QAM	64QAM	16QAM
PDSCH transmission mode			1	1	1	1
Note 1: $P_B = 0$						
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UE's with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.						

Table 8.2.1.1.1.3-2: Minimum performance (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.0	1-5
2	10 MHz	R.2 FDD	OP.1 FDD	ETU70	1x2 Low	70	-0.4	1-5
3	10 MHz	R.2 FDD	OP.1 FDD	ETU300	1x2 Low	70	0.0	1-5
4	10 MHz	R.2 FDD	OP.1 FDD	HST	1x2 Low	70	-2.4	1-5
5	1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	0.0	1-5
6	10 MHz	R.3 FDD	OP.1 FDD	EVA5	1x2 Low	70	6.7	2-5
7	10 MHz	R.3 FDD	OP.1 FDD	ETU70	1x2 Low	30	1.4	2-5
8	10 MHz	R.3 FDD	OP.1 FDD	ETU300	1x2 High	70	9.4	2-5
9	3 MHz	R.5 FDD	OP.1 FDD	EVA5	1x2 Low	70	17.6	1-5
10	5 MHz	R.6 FDD	OP.1 FDD	EVA5	1x2 Low	70	17.4	2-5
11	10 MHz	R.7 FDD	OP.1 FDD	EVA5	1x2 Low	70	17.7	2-5
12	10 MHz	R.7 FDD	OP.1 FDD	ETU70	1x2 Low	70	19.0	2-5
13	10 MHz	R.7 FDD	OP.1 FDD	EVA5	1x2 High	70	19.1	2-5
14	15 MHz	R.8 FDD	OP.1 FDD	EVA5	1x2 Low	70	17.7	2-5
15	20 MHz	R.9 FDD	OP.1 FDD	EVA5	1x2 Low	70	17.6	3-5
16	3 MHz	R.0 FDD	OP.1 FDD	ETU70	1x2 Low	30	1.9	1-5
17	10 MHz	R.1 FDD	OP.1 FDD	ETU70	1x2 Low	30	1.9	1-5
18	20 MHz	R.1 FDD	OP.1 FDD	ETU70	1x2 Low	30	1.9	1-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.1.

8.2.1.1.1.4 Test description

8.2.1.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Frequencies to be tested for 1PRB allocation: Low Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.1.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.9.

2. The parameter settings for the cell are set up according to Table 8.2.1-1and 8.2.1.1.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.1.1.4.3.

8.2.1.1.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.1.1.3-1 and 8.2.1.1.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Tables 8.2.1.1.1.5-1as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.
4. Repeat steps from 1 to 3 for each subtest in Table 8.2.1.1.1.5-1 as appropriate.

8.2.1.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.2.1.1.1.5 Test requirement

Table 8.2.1.1.1.3-1defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 for each throughput test shall meet or exceed the specified value in Table 8.2.1.1.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.1.1.5-1: Test requirement (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-0.2	1-5
2	10 MHz	R.2 FDD	OP.1 FDD	ETU70	1x2 Low	70	+0.4	1-5
3	10 MHz	R.2 FDD	OP.1 FDD	ETU300	1x2 Low	70	+0.8	1-5
4	10 MHz	R.2 FDD	OP.1 FDD	HST	1x2 Low	70	-1.8	1-5
5	1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low	70	+0.8	1-5
6	10 MHz	R.3 FDD	OP.1 FDD	EVA5	1x2 Low	70	+7.5	2-5
7	10 MHz	R.3 FDD	OP.1 FDD	ETU70	1x2 Low	30	+2.2	2-5
8	10 MHz	R.3 FDD	OP.1 FDD	ETU300	1x2 High	70	+10.2	2-5
9	3 MHz	R.5 FDD	OP.1 FDD	EVA5	1x2 Low	70	+18.4	1-5
10	5 MHz	R.6 FDD	OP.1 FDD	EVA5	1x2 Low	70	+18.2	2-5
11	10 MHz	R.7 FDD	OP.1 FDD	EVA5	1x2 Low	70	+18.5	2-5
12	10 MHz	R.7 FDD	OP.1 FDD	ETU70	1x2 Low	70	+19.8	2-5
13	10 MHz	R.7 FDD	OP.1 FDD	EVA5	1x2 High	70	+19.9	2-5
14	15 MHz	R.8 FDD	OP.1 FDD	EVA5	1x2 Low	70	+18.5	2-5
15	20 MHz	R.9 FDD	OP.1 FDD	EVA5	1x2 Low	70	+18.4	3-5
16	3 MHz	R.0 FDD	OP.1 FDD	ETU70	1x2 Low	30	+2.7	1-5
17	10 MHz	R.1 FDD	OP.1 FDD	ETU70	1x2 Low	30	+2.7	1-5
18	20 MHz	R.1 FDD	OP.1 FDD	ETU70	1x2 Low	30	+2.7	1-5

8.2.1.1.1_1 FDD PDSCH Single Antenna Port Performance (Release 9 and forward)

8.2.1.1.1_1.1 Test purpose

Same test purpose as in clause 8.2.1.1.1.1.

8.2.1.1.1_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward of UE category 1 and 2.

8.2.1.1.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.1.1.1.3 with the following exceptions:

- Instead of Table 8.2.1.1.1.3-1 → use Table 8.2.1.1.1_1.3-1.
- Instead of Table 8.2.1.1.1.3-2 → use Table 8.2.1.1.1_1.3-2.

Table 8.2.1.1.1_1.3-1: Test Parameters for Testing

Parameter		Unit	Test 1- 5	Test 6- 8	Test 9- 15	Test 16-18
Downlink power allocation	ρ_A	dB	0	0	0	0
	ρ_B	dB	0 (Note 1)	0 (Note 1)	0 (Note 1)	0 (Note 1)
	σ	dB	0	0	0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98	-98	-98
Symbols for unused PRBs			OCNG (Note 2)	OCNG (Note 2)	OCNG (Note 2)	OCNG (Note 2)
Modulation			QPSK	16QAM	64QAM	16QAM
PDSCH transmission mode			1	1	1	1
Note 1: $P_B = 0$ Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.						

Table 8.2.1.1.1_1.3-2: Minimum performance (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	N/A							
2	N/A							
3	N/A							
4	N/A							
5	N/A							
6	5 MHz	R.3-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	6.7	1
7	5 MHz	R.3-1 FDD	OP.1 FDD	ETU70	1x2 Low	30	1.4	1
8	5 MHz	R.3-1 FDD	OP.1 FDD	ETU300	1x2 High	70	9.4	1
9	N/A							
10	5 MHz	R.6-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	17.5	1
11	10 MHz	R.7-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	16.7	1
12	10 MHz	R.7-1 FDD	OP.1 FDD	ETU70	1x2 Low	70	18.1	1
13	10 MHz	R.7-1 FDD	OP.1 FDD	EVA5	1x2 High	70	17.8	1
14	15 MHz	R.8-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	16.8	1
15	20 MHz	R.9-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	17.3	2
	20 MHz	R.9-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	16.7	1
16	N/A							
17	N/A							
18	N/A							

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.1.

8.2.1.1.1_1.4 Test description

Same test description as in clause 8.2.1.1.1.4 with the following exceptions:

- Instead of Table 8.2.1.1.1.3-1 → use Table 8.2.1.1.1_1.3-1.
- Instead of Table 8.2.1.1.1.3-2 → use Table 8.2.1.1.1_1.3-2.

- Instead of Table 8.2.1.1.1.5-1 → use Table 8.2.1.1.1_1.5-1.

8.2.1.1.1_1.5 Test requirement

Same test requirements as in clause 8.2.1.1.1.5 with the following exceptions:

- Instead of Table 8.2.1.1.1.3-1 → use Table 8.2.1.1.1_1.3-1.
- Instead of Table 8.2.1.1.1.5-1 → use Table 8.2.1.1.1_1.5-1.

Table 8.2.1.1.1_1.5-1: Test requirement (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	N/A							
2	N/A							
3	N/A							
4	N/A							
5	N/A							
6	5 MHz	R.3-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	+7.5	1
7	5 MHz	R.3-1 FDD	OP.1 FDD	ETU70	1x2 Low	30	+2.2	1
8	5 MHz	R.3-1 FDD	OP.1 FDD	ETU300	1x2 High	70	+10.2	1
9	N/A							
10	5 MHz	R.6-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	+18.3	1
11	10 MHz	R.7-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	+17.5	1
12	10 MHz	R.7-1 FDD	OP.1 FDD	ETU70	1x2 Low	70	+18.9	1
13	10 MHz	R.7-1 FDD	OP.1 FDD	EVA5	1x2 High	70	+18.6	1
14	15 MHz	R.8-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	+17.6	1
15	20 MHz	R.9-2 FDD	OP.1 FDD	EVA5	1x2 Low	70	+18.1	2
	20 MHz	R.9-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	+17.5	1
16	N/A							
17	N/A							
18	N/A							

8.2.1.1.1_A FDD PDSCH Single Antenna Port Performance for CA

8.2.1.1.1_A.1 FDD PDSCH Single Antenna Port Performance for CA (intra-band contiguous DL CA)

8.2.1.1.1_A.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS.

8.2.1.1.1_A.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward that support intra-band contiguous DL CA.

8.2.1.1.1_A.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.1, with the addition of the relevant parameters in Tables 8.2.1-1, 8.2.1.1.1_A.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.1.1_A.1.3-2 for the specified SNR. For QPSK and 64QAM performance the bandwidths specified in Table 5.4.2.1-1 are verified.

Table 8.2.1.1.1_A.1.3-1: Test Parameters for Testing

Parameter		Unit	Test 1	Test 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0 (Note 1)
	σ	dB	0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98
Symbols for unused PRBs			OCNG (Note 2)	OCNG (Note 2)
Modulation			QPSK	QPSK
PDSCH transmission mode			1	1

Note 1: $P_B = 0$
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.
Note 3: For CA test cases, PUCCH format 1b with channel selection is used to feedback ACK/NACK.
Note 4: For CA test cases, the same PDSCH transmission mode is applied to each component carrier.

Table 8.2.1.1.1_A.1.3-2: Minimum performance (FRC)

Test num.	Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		UE cate-gory	CA capa-bility
						Fraction of maximum throughput (%)	SNR (dB)		
1	2x10 MHz	R.2 FDD	OP.1 FDD (Note 1)	EVA5	1x2 Low	70	-1.1	3-8	CL_A-A (Note 2)
2	2x20 MHz	R.42 FDD	OP.1 FDD (Note 1)	EVA5	1x2 Low	70	-1.3	5-8	CL_C

Note 1: For CA capable UE, the OCNG pattern applies for each CC.
Note 2: 30usec timing difference between two CCs is applied in inter-band CA case.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.1.

8.2.1.1.1_A.1.4 Test description

8.2.1.1.1_A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested for full allocation: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.1.1_A.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.35 as appropriate
2. The parameter settings for the cell are set up according to Table 8.2.1-1and 8.2.1.1.1_A.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A. 2. Message contents are defined in clause 8.2.1.1.1_A.1.4.3.

8.2.1.1.1_A.1.4.2 Test procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.1.1.1_A.1.4.3
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.1.1_A.1.3-1 and 8.2.1.1.1_A.1.3-2 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.1.1.1_A.1.5-1 as appropriate.
6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A, Table G.3A.5-1 on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.
7. Repeat steps from 1 to 6 for each subtest in Table 8.2.1.1.1_A.1.5-1 depending on UE CA capability as defined in Table 8.1.1-1 and as appropriate.

8.2.1.1.1_A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

8.2.1.1.1_A.1.5 Test requirement

Table 8.2.1.1.1_A.1.3-1defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 for the throughput test shall meet or exceed the specified value in Table 8.2.1.1.1_A. 1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.1.1_A.5-1: Test requirement (FRC)

Test num.	Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		UE cate-gory	CA capa-bility
						Fraction of maximum throughput (%)	SNR (dB)		
1	NA								
2	2x20 MHz	R.42 FDD	OP.1 FDD (Note 1)	EVA5	1x2 Low	70	-0.5	5-8	CL_C
Note 1: For CA capable UE, the OCNG pattern applies for each CC.									

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.1.1.1_A.2 FDD PDSCH Single Antenna Port Performance for CA (inter-band DL CA)

8.2.1.1.1_A.2.1 Test purpose

Same test purpose as in clause 8.2.1.1.1_A.1.1

8.2.1.1.1_A.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward that support inter-band DL CA.

8.2.1.1.1_A.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.1.1.1_A.1.3

8.2.1.1.1_A.2.4 Test description

8.2.1.1.1_A.2.4.1 Initial conditions

Same initial conditions as in clause 8.2.1.1.1_A.1.4.1 with the following exceptions:

- Instead of clause 8.2.1.1.1_A.1.4.3 → use 8.2.1.1.1_A.2.4.3

8.2.1.1.1_A.2.4.2 Test procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels except PHICH and with the timing offsets according to Table 8.2.1.1.1_A.2.5-1.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.1.1.1_A.2.4.3
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.1.1_A.2.3-1 and 8.2.1.1.1_A.2.3-2 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carriers according to Tables 8.2.1.1.1_A.2.5-1 as appropriate.
6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A, Table G.3A.5-2 on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.
7. Repeat steps from 1 to 6 for each subtest in Table 8.2.1.1.1_A.2.5-1 depending on UE CA capability as defined in Table 8.1.1-1 and as appropriate.

8.2.1.1.1_A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] subclause 4.6. In test procedure step 2, for SCC configuration there are no additional message contents.

8.2.1.1.1_A.2.5 Test requirement

Table 8.2.1.1.1_A.2.3-1defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 for the throughput test shall meet or exceed the specified value in Table 8.2.1.1.1_A.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.1.1_A.2.5-1: Test requirement (FRC)

Test num.	Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		UE cate-gory	CA capa-bility
						Fraction of maximum throughput (%)	SNR (dB)		
1	2x10 MHz	R.2 FDD	OP.1 FDD (Note 1)	EVA5	1x2 Low	70	-0.3	3-8	CL_A-A (Note 2)
2	NA								
Note 1: For CA capable UE, the OCNG pattern applies for each CC.									
Note 2: 30usec or 922*Ts timing difference between two CCs is applied in inter-band CA case.									

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.1.1.2 FDD PDSCH Single Antenna Port Performance with 1 PRB in presence of MBSFN

8.2.1.1.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS for 1 PRB allocation in presence of MBSFN.

8.2.1.1.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8 and forward.

8.2.1.1.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.1, with the addition of the relevant parameters in Tables 8.2.1-1, 8.2.1.1.2.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.1.1.2.3-2, for the specified SNR.

Table 8.2.1.1.2.3-1: Test Parameters for Testing 1 PRB allocation

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for MBSFN portion of MBSFN subframes (Note 2)			OCNG (Note 3)
PDSCH transmission mode			1
Note 1: $P_B = 0$ Note 2: The MBSFN portion of an MBSFN subframe comprises the whole MBSFN subframe except the first two symbols in the first slot. Note 3: The MBSFN portion of the MBSFN subframes shall contain QPSK modulated data. Cell-specific reference signals are not inserted in the MBSFN portion of the MBSFN subframes, QPSK modulated MBSFN data is used instead.			

Table 8.2.1.1.2.3-2: Minimum performance 1 PRB allocation (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.29 FDD	OP.3 FDD	ETU70	1x2 Low	30	2.0	1-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.1.

8.2.1.1.2.4 Test description

8.2.1.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Low Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Tables 8.2.1.1.2.3-2as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.9.
2. The parameter settings for the cell are set up according to Tables 8.2.1-1, 8.2.1.1.2.3-1as appropriate.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.1.2.4.3.

8.2.1.1.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.1.2.3-1 and 8.2.1.1.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.2.1.1.2.5-1as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.1.2.4.3-1: *SystemInformationBlockType2*: Additional FDD PDSCH Single Antenna Port Performance for 1 PRB allocation with MBSFN subframes test point 1 requirement

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 SystemInformationBlockType2			
Information Element	**Value/remark**	**Comment**	**Condition**
SystemInformationBlockType2 ::= SEQUENCE {			
mbsfn-SubframeConfig ::= SEQUENCE {			
radioframeAllocationPeriod	n1	Every radio frame is with MBSFN subframe	
radioframeAllocationOffset	0		
subframeAllocation CHOICE {			
oneFrame	111111	Subframe 1, 2, 3, 6, 7, 8 is used for MBSFN	FDD
}			
}			

8.2.1.1.2.5 Test requirement

Table 8.2.1.1.2.3-1defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.1 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.1.2.5-1for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.1.2.5-1: Test requirement 1 PRB allocation with MBSFN subframes (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.29 FDD	OP.3 FDD	ETU70	1x2 Low	30	+2.8	1-5

8.2.1.2 FDD PDSCH Transmit Diversity Performance (Cell-Specific Reference Symbols)

8.2.1.2.1 FDD PDSCH Transmit Diversity 2x2

8.2.1.2.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using transmit diversity (SFBC).

8.2.1.2.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8 and forward.

8.2.1.2.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.1.2.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.2.1.3-2 for the specified SNR. For transmit diversity (SFBC) performance with 2 transmitter antennas as specified.

Table 8.2.1.2.1.3-1: Test Parameters for Testing Transmit Diversity Performance

Parameter		Unit	Test 1-2
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			2
Note 1: $P_B = 1$			

Table 8.2.1.2.1.3-2: Minimum performance Transmit Diversity (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11 FDD	OP.1 FDD	EVA5	2x2 Medium	70	6.8	2-5
2	10 MHz	R.10 FDD	OP.1 FDD	HST	2x2 Low	70	-2.3	1-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.2.

8.2.1.2.1.4 Test description

8.2.1.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.2.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Tables 8.2.1-1 and 8.2.1.2.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.2.1.4.3.

8.2.1.2.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.2.1.3-1 and 8.2.1.2.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.

2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.1.2.1.5-1 as appropriate.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

4. Repeat steps from 1 to 3 for each test interval in Table 8.2.1.2.1.5-1 as appropriate.

8.2.1.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.2.1.2.1.5 Test requirement

Table 8.2.1.2.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Table 8.2.1.2. 1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.2.1.5-1: Test requirement Transmit Diversity (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11 FDD	OP.1 FDD	EVA5	2x2 Medium	70	7.7	2-5
2	10 MHz	R.10 FDD	OP.1 FDD	HST	2x2 Low	70	-1.7	1-5

8.2.1.2.1_1 FDD PDSCH Transmit Diversity 2x2 (Release 9 and forward)

8.2.1.2.1_1.1 Test purpose

Same test purpose as in clause 8.2.1.2.1.1.

8.2.1.2.1_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward of UE category 1.

8.2.1.2.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.1.2.1.3 with the following exceptions:

- Instead of Table 8.2.1.2.1.3-1 → use Table 8.2.1.2.1_1.3-1.
- Instead of Table 8.2.1.2.1.3-2 → use Table 8.2.1.2.1_1.3-2.

Table 8.2.1.2.1_1.3-1: Test Parameters for Testing Transmit Diversity Performance

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			2
Note 1: $P_B = 1$			

Table 8.2.1.2.1_1.3-2: Minimum performance Transmit Diversity (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	5 MHz	R.11-2 FDD	OP.1 FDD	EVA5	2x2 Medium	70	5.9	1

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.2.

8.2.1.2.1_1.4 Test description

Same test description as in clause 8.2.1.2.1.4 with the following exceptions:

- Instead of Table 8.2.1.2.1.3-1 → use Table 8.2.1.2.1_1.3-1.
- Instead of Table 8.2.1.2.1.3-2 → use Table 8.2.1.2.1_1.3-2.
- Instead of Table 8.2.1.2.1.5-1 → use Table 8.2.1.2.1_1.5-1.

8.2.1.2.1_1.5 Test requirement

Same test requirements as in clause 8.2.1.2.1.5 with the following exceptions:

- Instead of Table 8.2.1.2.1.3-1 → use Table 8.2.1.2.1_1.3-1.
- Instead of Table 8.2.1.2.1.5-1 → use Table 8.2.1.2.1_1.5-1.

Table 8.2.1.2.1_1.5-1: Test requirement Transmit Diversity (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	5 MHz	R.11-2 FDD	OP.1 FDD	EVA5	2x2 Medium	70	+6.8	1

8.2.1.2.2 FDD PDSCH Transmit Diversity 4x2

8.2.1.2.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using transmit diversity (SFBC-FSTD).

8.2.1.2.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8 and forward.

8.2.1.2.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.1.2.2.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.2.2.3-2 for the specified SNR. For transmit diversity (SFBC) performance with 4 transmitter antennas as specified.

Table 8.2.1.2.2.3-1: Test Parameters for Testing Transmit Diversity Performance

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			2
Note 1: $P_B = 1$			

Table 8.2.1.2.2.3-2: Minimum performance Transmit Diversity (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	1.4 MHz	R.12 FDD	OP.1 FDD	EPA5	4x2 Medium	70	0.6	1-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.2.

8.2.1.2.2.4 Test description

8.2.1.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.2.2.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.11 for antenna configuration 4x2.
2. The parameter settings for the cell are set up according to Tables 8.2.1-1 and 8.2.1.2.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.2.2.4.3.

8.2.1.2.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.2.2.3-1 and 8.2.1.2.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.

2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.1.2.2.5-1 as appropriate.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.2.2.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional FDD PDSCH transmit diversity performance downlink power allocation test point 1 requirement

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		
}			

8.2.1.2.2.5 Test requirement

Table 8.2.1.2.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Table 8.2.1.2.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.2.2.5-1: Test requirement Transmit Diversity (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	1.4 MHz	R.12 FDD	OP.1 FDD	EPA5	4x2 Medium	70	1.5	1-5

8.2.1.2.2_1 FDD PDSCH Transmit Diversity 4x2 (Release 9 and forward)

8.2.1.2.2_1.1 Test purpose

Same test purpose as in clause 8.2.1.2.2.1.

8.2.1.2.2_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward.

8.2.1.2.2_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.1.2.2.3 with the following exceptions:

- Instead of Table 8.2.1.2.2.3-1 → use Table 8.2.1.2.2_1.3-1.

- Instead of Table 8.2.1.2.2.3-2 → use Table 8.2.1.2.2_1.3-2.

Table 8.2.1.2.2_1.3-1: Test Parameters for Testing Transmit Diversity Performance

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			2
Note 1: $P_B = 1$			

Table 8.2.1.2.2_1.3-2: Minimum performance Transmit Diversity (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.13 FDD	OP.1 FDD	ETU70	4x2 Low	70	-0.9	1-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.2.

8.2.1.2.2_1.4 Test description

Same test description as in clause 8.2.1.2.2.4 with the following exceptions:

- Instead of Table 8.2.1.2.2.3-1 → use Table 8.2.1.2.2_1.3-1.
- Instead of Table 8.2.1.2.2.3-2 → use Table 8.2.1.2.2_1.3-2.
- Instead of Table 8.2.1.2.2.5-1 → use Table 8.2.1.2.2_1.5-1.

8.2.1.2.2_1.5 Test requirement

Same test requirements as in clause 8.2.1.2.2.5 with the following exceptions:

- Instead of Table 8.2.1.2.2.3-1 → use Table 8.2.1.2.2_1.3-1.
- Instead of Table 8.2.1.2.2.5-1 → use Table 8.2.1.2.2_1.5-1.

Table 8.2.1.2.2_1.5-1: Test requirement Transmit Diversity (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.13 FDD	OP.1 FDD	ETU70	4x2 Low	70	0	1-5

8.2.1.2.3_C FDD PDSCH Transmit diversity 2x2 for eICIC

8.2.1.2.3_C.1 FDD PDSCH Transmit diversity 2x2 for eICIC (non-MBFSN ABS)

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Connection diagram in Annex A of TS 36.508 is TBD

- Tests requirements are TBD

- Test tolerances are incomplete

8.2.1.2.3_C.1.1 Test purpose

To verify the UE's performance of transmit diversity (SFBC) with 2 transmit antennas if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS of the aggressor cell.

8.2.1.2.3_C.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.2.1.2.3_C.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.1.2.3_C.1.3-1.

In Table 8.2.1.2.3_C.1.3-1, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Table C.3.2-1 in Annex C.3.2 and for Cell 2 is according to Table C.3.3-1 in Annex C.3.3, respectively.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.2.3_C.1.3-2 for the specified SNR.

Table 8.2.1.2.3_C.1.3-1: Test Parameters for Transmit diversity Performance (FRC)

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3
	σ	dB	0	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-102 (Note 2)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N_{oc3}	dBm/15kHz	-94.8 (Note 4)	N/A

$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.1.2.3_C.1.3-2	6
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	2.5 (synchronous cells)	
Cell Id			0	1
ABS pattern (Note 5)			N/A	11000100 11000000 11000000 11000000 11000000
RLM/RRM Measurement Subframe Pattern (Note 6)			10000000 10000000 10000000 10000000 10000000	N/A
CSI Subframe Sets (Note7)	$C_{CSI,0}$		11000100 11000000 11000000 11000000 11000000	N/A
	$C_{CSI,1}$		00111011 00111111 00111111 00111111 00111111	N/A
Number of control OFDM symbols			2	
PDSCH transmission mode			2	N/A
Cyclic prefix			Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5: ABS pattern as defined in [14]. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 8: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 9: SIB-1 will not be transmitted in Cell2 in this test.

Table 8.2.1.2.3_C.1.3-2: Minimum Performance Transmit Diversity (FRC)

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.11-4 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA 5	2x2 Medium	70	3.4	2-8

Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.2.3.

8.2.1.2.3_C.1.4 Test description

8.2.1.2.3_C.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.2.3_C.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure [TBD] for antenna configuration 2x2.
2. The parameter settings for the cell1 are set up according to Tables 8.2.1-1 and 8.2.1.2.3_C.1.3-1 as appropriate.
3. Downlink signals are initially set up for Cell1 according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.2.3_C.1.4.3.

8.2.1.2.3_C.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.2.3_C.1.3-1 and 8.2.1.2.3_C.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.1.2.3_C.1.5-1 as appropriate.
3. Set the Cell2 –aggressor cell- as defined in Tables 8.2.1.2.3_C.1.3-1, 8.2.1.2.3_C.1.5-1 and according to Annex C3.3.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.2.3_C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.2.3_C.1.4.3-1: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional FDD PDSCH transmit diversity performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	'10000001000000010000001000000010000000'	BIT STRING (SIZE (40))	
}			
}			
}			

Table 8.2.1.2.3_C.1.4.3-2: *CQI-ReportConfig-r10-DEFAULT*: Additional FDD PDSCH transmit diversity performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'11000100110000001100 00001100000011000000'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'00111011001111110011 11110011111100111111'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

8.2.1.2.3_C.1.5 Test requirement

Table 8.2.1.2.3_C.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Table 8.2.1.2.3_C.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.2.3_C.1.5-1: Test requirement Transmit Diversity (FRC)

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.11-4 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA 5	2x2 Medium	70	[TBD]	2-8
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									

8.2.1.3 FDD PDSCH Open Loop Spatial Multiplexing Performance (Cell-Specific Reference Symbols)

8.2.1.3.1 FDD PDSCH Open Loop Spatial Multiplexing 2x2

8.2.1.3.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.1.3.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8 and forward.

8.2.1.3.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.1.3.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.3.1.3-1 for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.1.3.1.3-1: Test Parameters for Large Delay CDD (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			3
Note 1: $P_B = 1$			

Table 8.2.1.3.1.3-2: Minimum performance Large Delay CDD (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.0	2-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.3.

8.2.1.3.1.4 Test description

8.2.1.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.3.1.3-2, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Tables 8.2.1-1 and 8.2.1.3.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.3.1.4.3.

8.2.1.3.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.3.1.3-1 and 8.2.1.3.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.2.1.3.1.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.3.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.3.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.1.3.1.5 Test requirement

Table 8.2.1.3.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.3.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.3.1.5-1: Test Requirement Large Delay CDD (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.9	2-5

8.2.1.3.1_A FDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA

8.2.1.3.1_A.1 FDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (intra-band contiguous DL CA)

8.2.1.3.1_A.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.1.3.1_A.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward that support intra-band contiguous DL CA.

8.2.1.3.1_A.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.1.3.1_A.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.3.1_A.1.3-1 for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.1.3.1_A.1.3-1: Test Parameters for Large Delay CDD (FRC)

Parameter		Unit	Test 1 -2
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ		
dB N_{oc} 0at antenna port		dBm/15kHz	-98
PDSCH Transmission mode			3
Note 1: $P_B = 1$ Note 2: For CA test cases, PUCCH format 1b with channel selection is used to feedback ACK/NACK. Note 3: For CA test cases, the same PDSCH transmission mode is applied to each component carrier.			

Table 8.2.1.3.1_A.1.3-2: Minimum performance Large Delay CDD (FRC)

Test num.	Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		UE cate-gory	CA capa-bility
						Fraction of maximum throughput (%)	SNR (dB)		
1	2x10 MHz	R.11 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	13.7	3-8	CL_A-A
2	2x20 MHz	R.30 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	13.2	3,5-8	CL_A-A (Note 3), CL_C
3	2x20 MHz	R.35-1 FDD	OP.1 FDD (Note 1)	EVA5	2x2 Low	70	15.8	4	CL_A-A, CL_C
4	15MHz + 10 MHz	R.35-2 FDD for 15MHz CC	OP.1 FDD (Note 1)	[EVA5]	2x2 Low	70	TBD	3	CL_A-A
		R.35-3 FDD for 10MHz CC	OP.1 FDD (Note 1)			TBD	TBD		
5	20MHz + *X* MHz	R.30 FDD for 20MHz CC	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	[13.2]	3	CL_A-A
		As defined in Note 4	OP.1 FDD (Note 1)			TBD	TBD		
6	20MHz + *X* MHz	R.35-1 FDD for 20MHz CC	OP.1 FDD (Note 1)	EVA5	2x2 Low	70	[15.8]	4	CL_A-A
		As defined in Note 5	OP.1 FDD (Note 1)			TBD	TBD		

Note 1: For CA capable UE, the OCNG pattern applies for each CC.
Note 3: For UE category 5-8 test CA capability is CL_C; for UE category 3 test CA capability is CL_A-A and CL_C.
Note 4: For UE category 3 test, 20MHz+X is the maximum aggregated bandwidth supported for the UE under test, where X is 10MHz or 15MHz. The reference channel is R.11 FDD without scheduling subframe #0 when X is 10MHz and R.30-1 FDD when X is 15MHz.
Note 5: For UE category 4 test, 20MHz+X is the maximum aggregated bandwidth supported for the UE under test, where X is 10MHz or 15MHz. The reference channel is R.35-3 FDD when X is 10MHz and R.35-2 FDD when X is 15MHz.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.3.

8.2.1.3.1_A.1.4 Test description

8.2.1.3.1_A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.3.1_A.1.3-1, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.36 as appropriate.
2. The parameter settings for the cell are set up according to Tables 8.2.1-1 and 8.2.1.3.1_A.1.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.3.1_A.1.4.3.

8.2.1.3.1_A.1.4.2 Test procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels except PHICH.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for PhysicalConfigDedicated-DEFAULT is defined in Table 8.2.1.3.1_A.1.4.3-1, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.2.1.3.1_A.1.4.3-1A.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.3.1_A. 1.3-1 and 8.2.1.3.1_A.1.3-2 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.5. Set the parameters of the reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carrier according to Table 8.2.1.3.1_A.1.5-1 as appropriate.

6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A, table G.3A.5-3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval on both the component carrier.

7. Repeat steps from 1 to 6 for each subtest in Table 8.2.1.3.1_A.1.5-1 depending on UE CA capability as defined in Table 8.1.1-1 and as appropriate.

8.2.1.3.1_A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions

Table 8.2.1.3.1_A.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.3.1_A.1.4.3-1A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
antennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			
}			

8.2.1.3.1_A.1.5 Test requirement

Table 8.2.1.3.1_A.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for the throughput test shall meet or exceed the specified value in Tables 8.2.1.3.1_A.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.3.1_A.1.5-1: Test Requirement Large Delay CDD (FRC)

Test num.	Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		UE cate-gory	CA capa-bility
						Fraction of maximum throughput (%)	SNR (dB)		
1	NA								
2	2x20 MHz	R.30 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	14.1	3, 5-8	CL_C
3	2x20 MHz	R.35-1 FDD	OP.1 FDD (Note 1)	EVA5	2x2 Low	70	16.7	4	CL_C
Note 1: For CA capable UE, the OCNG pattern applies for each CC.									

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.1.3.1_A.2 FDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (inter-band DL CA)

Editor's notes: This test case is incomplete. The following item is missing or incomplete:

-Test tolerances are incomplete

8.2.1.3.1_A.2.1 Test purpose

Same test purpose as in clause 8.2.1.3.1_A.1.1

8.2.1.3.1_A.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 that support inter-band DL CA.

8.2.1.3.1_A.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.1.3.1_A.1.3.

8.2.1.3.1_A.2.4 Test description

8.2.1.3.1_A.2.4.1 Initial conditions

Same initial conditions as in clause 8.2.1.3.1_A.1.4.1.

8.2.1.3.1_A.2.4.2 Test procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for PhysicalConfigDedicated-DEFAULT is defined in Table 8.2.1.3.1_A.2.4.3-1, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.2.1.3.1_A.2.4.3-1A
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.3.1_A.2.3-1 and 8.2.1.3.1_A.2.3-2 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carrier according to Table 8.2.1.3.1_A.2.5-1 as appropriate.
6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A, table G.3A.5-4. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval on both the component carrier.
7. Repeat steps from 1 to 6 for each subtest in Table 8.2.1.3.1_A.2.5-1 depending on UE CA capability as defined in Table 8.1.1-1 and as appropriate.

8.2.1.3.1_A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions

Table 8.2.1.3.1_A.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.3.1_A.2.4.3-1A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
antennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			
}			

8.2.1.3.1_A.2.5 Test requirement

Table 8.2.1.3.1_A.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for the throughput test shall meet or exceed the specified value in Tables 8.2.1.3.1_A.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.3.1_A.2.5-1: Test Requirement Large Delay CDD (FRC)

Test num.	Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		UE cate-gory	CA capa-bility
						Fraction of maximum throughput (%)	SNR (dB)		
1	2x10 MHz	R.11 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	13.7+ TT	3-8	CL_A-A
2	NA								
3	NA								
Note 1: For CA capable UE, the OCNG pattern applies for each CC.									

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.1.3.1_A.2_1 FDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (inter-band DL CA) (Release 11 and forward)

Editor's notes: This test case is incomplete. The following item is missing or incomplete:

-Test tolerances are incomplete

8.2.1.3.1_A.2_1.1 Test purpose

Same test purpose as in clause 8.2.1.3.1_A.1.1

8.2.1.3.1_A.2_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 11 and forward that support inter-band DL CA.

8.2.1.3.1_A.2_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.1.3.1_A.1.3

8.2.1.3.1_A.2_1.4 Test description

8.2.1.3.1_A.2_1.4.1 Initial conditions

Same initial conditions as in clause 8.2.1.3.1_A.1.4.1.

8.2.1.3.1_A.2_1.4.2 Test procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for PhysicalConfigDedicated-DEFAULT is defined in Table 8.2.1.3.1_A.2_1.4.3-1, PhysicalConfigDedicatedSCell-r10-DEFAULT is defined in Table 8.2.1.3.1_A.2_1.4.3-1A
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.3.1_A.2_1.3-1 and 8.2.1.3.1_A.2_1.3-2 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.
5. Set the parameters of the reference channel, the propagation condition, the correlation matrix and the SNR on each of the component carrier according to Table 8.2.1.3.1_A_1.2.5-1 as appropriate.
6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A, table G.3A.5-4. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval on both the component carrier.
7. Repeat steps from 1 to 6 for each subtest in Table 8.2.1.3.1_A.2_1.5-1 depending on UE CA capability as defined in Table 8.1.1-1 and as appropriate.

8.2.1.3.1_A.2_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions

Table 8.2.1.3.1_A.2_1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.3.1_A.2_1.4.3-1A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
antennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			
}			

8.2.1.3.1_A.2_1.5 Test requirement

Table 8.2.1.3.1_A.2_1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for the throughput test shall meet or exceed the specified value in Tables 8.2.1.3.1_A.2_1.5-1 for the specified SNR including test tolerances for all throughput tests. Test points selection for different UE Categories should refer to Tables 8.2.1.3.1_A.2_1.5-2.

Table 8.2.1.3.1_A.2_1.5-1: Test Requirement Large Delay CDD (FRC)

Test num.	Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		UE cate-gory	CA capa-bility
						Fraction of maximum throughput (%)	SNR (dB)		
1	2x10 MHz	R.11 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	14.6	3-8	CL_A-A
2	2x20 MHz	R.30 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	14.1	3	CL_A-A
3	2x20 MHz	R.35-1 FDD	OP.1 FDD (Note 1)	EVA5	2x2 Low	70	15.8+ TT	4	CL_A-A
4	15MHz + 10 MHz	R.35-2 FDD for 15MHz CC	OP.1 FDD (Note 1)	[EVA5]	2x2 Low	70	TBD	3	CL_A-A
		R.35-3 FDD for 10MHz CC	OP.1 FDD (Note 1)			TBD	TBD		
5	20MHz + *X* MHz	R.30 FDD for 20MHz CC	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	[13.2] +TT	3	CL_A-A
		As defined in Note 4	OP.1 FDD (Note 1)			TBD	TBD		
6	20MHz + *X* MHz	R.35-1 FDD for 20MHz CC	OP.1 FDD (Note 1)	EVA5	2x2 Low	70	[15.8] +TT	4	CL_A-A
		As defined in Note 5	OP.1 FDD (Note 1)			TBD	TBD		

Note 1: For CA capable UE, the OCNG pattern applies for each CC.
Note 4: For UE category 3 test, 20MHz+X is the maximum aggregated bandwidth supported for the UE under test, where X is 10MHz or 15MHz. The reference channel is R.11 FDD without scheduling subframe #0 when X is 10MHz and R.30-1 FDD when X is 15MHz.
Note 5: For UE category 4 test, 20MHz+X is the maximum aggregated bandwidth supported for the UE under test, where X is 10MHz or 15MHz. The reference channel is R.35-3 FDD when X is 10MHz and R.35-2 FDD when X is 15MHz.

Table 8.2.1.3.1_A.2_1.5-2: Test Points Selection for UE Category

Maximum aggregated bandwidth [MHz] (Note 1)	Applicable test points		
	Category 3	Category 4	Category 5-8
20	1	1	1
25	1, 4	1	1
30	1, 5	1, 6	1
35	1, 5	1, 6	1
40	1, 2	1, 3	1

Note 1: Maximum over all supported CA configurations and bandwidth combination sets according to Table 5.4.2A.1-2 for UE category 3 and 4.
Note 2: If a specific maximum aggregated bandwidth is supported in multiple CA configurations, the test can be run in any of them

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.1.3.2 FDD PDSCH Open Loop Spatial Multiplexing 4x2

8.2.1.3.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.1.3.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8 and forward.

8.2.1.3.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.1.3.2.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.3.2.3-1 for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.1.3.2.3-1: Test Parameters for Large Delay CDD (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
PDSCH transmission mode			3
Note 1: $P_B = 1$			

Table 8.2.1.3.2.3-2: Minimum performance Large Delay CDD (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.14 FDD	OP.1 FDD	EVA70	4x2 Low	70	14.3	2-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.3.

8.2.1.3.2.4 Test description

8.2.1.3.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.3.2.3-2, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.11 for antenna configuration 4x2.
2. The parameter settings for the cell are set up according to Tables 8.2.1-1 and 8.2.1.3.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.3.2.4.3.

8.2.1.3.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.3.2.3-1 and 8.2.1.3.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.

2. Set the parameters of the reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.2.1.3.2.5-1 as appropriate.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.3.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.3.2.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.1.3.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm3	1111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.1.3.2.5 Test requirement

Table 8.2.1.3.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.3.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.3.2.5-1: Test Requirement Large Delay CDD (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.14 FDD	OP.1 FDD	EVA70	4x2 Low	70	15.2	2-5

8.2.1.3.3_C FDD FDD PDSCH Open Loop Spatial Multiplexing 2x2 for eICIC

8.2.1.3.3_C.1 FDD PDSCH Open Loop Spatial Multiplexing 2x2 for eICIC (non-MBSFN ABS)

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

-Step of test procedure may be confirmed or updated.

- Test requirement table needs to be corrected or updated.

- Connection diagram in Annex A of TS 36.508 is TBD

-Test tolerances are incomplete

8.2.1.3.3_C.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.1.3.3_C.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.2.1.3.3_C.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.1.3.3_C.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.3.3_C.1.3-1 for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.1.3.3_C.1.3-1: Test Parameters for Large Delay CDD (FRC) no MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-102 (Note 2)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N_{oc3}	dBm/15kHz	-94.8 (Note 4)	N/A

$\hat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.1.3.3_C.1.3-2	[6]
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Cell Id			0	1
Time Offset between Cells		[μs]	2.5 (synchronous cells)	
ABS pattern (Note 5)			N/A	11000100, 11000000, 11000000, 11000000, 11000000
RLM/RRM Measurement Subframe Pattern(Note 6)			10000000 10000000 10000000 10000000 10000000	N/A
CSI Subframe Sets (Note 7)	$C_{CSI,0}$		11000100 11000000 11000000 11000000 11000000	N/A
	$C_{CSI,1}$		00111011 00111111 00111111 00111111 00111111	N/A
Number of control OFDM symbols			2	
PDSCH transmission mode			3	N/A
Cyclic prefix			Normal	Normal

Note 1: $P_B = 1$
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5: ABS pattern as defined in [14]. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5]
Note 8: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 9: SIB-1 will not be transmitted in Cell2 in this test.

Table 8.2.1.3.3_C.1.3-2: Minimum performance Large Delay CDD (FRC) no MBSFN ABS

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.11 FDD	OP.1 FDD	OP.1 FDD	EVA 5	EVA 5	2x2 Low	[70]	[13.3]	2-8

Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.3.3.

8.2.1.3.3_C.1.4 Test description

8.2.1.3.3_C.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.3.3_C.1.3-2, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure TBD for antenna configuration 2x2.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.2.1.3.3_C.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.3.3_C.1.4.3.

8.2.1.3.3_C.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.3.3_C.1.3-1 and 8.2.1.3.3_C.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.2.1.3.3_C.1.5-1 as appropriate.
3. Set the Cell2 –aggressor cell- as defined in Tables 8.2.1.3.3_C.1.3-2, 8.2.1.3.3_C.1.5-1 and according to Annex C3.3 for non-MBSFN ABS.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.3.3_C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.3.3_C.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.3.3_C.1.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	'10000000100000001000 00001000000010000000'	BIT STRING (SIZE (40))	
}			
}			
}			

Table 8.2.1.3.3_C.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'11000100110000001100 00001100000011000000'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'00111011001111110011 11110011111100111111'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

8.2.1.3.3.5 Test requirement

Table 8.2.1.3.3_C.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.3.3_C.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.3.3_C.1.5-1: Test Requirement Large Delay CDD (FRC)

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.11 FDD	OP.1 FDD	OP.1 FDD	EVA 5	EVA 5	2x2 Low	[70]	[13.3 +TT]	2-8
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									

8.2.1.3.3_C.2 FDD PDSCH Open Loop Spatial Multiplexing 2x2 for eICIC (MBSFN ABS)

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

-Step of test procedure may be confirmed or updated.

- Test requirement table needs to be corrected or updated.

- Connection diagram in Annex A of TS 36.508 is TBD

-Test tolerances are incomplete

8.2.1.3.3_C.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.1.3.3_C.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.2.1.3.3_C.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1 and 8.2.1.3.3_C.2.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.1.3.3_C.2.3-1 for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.1.3.3_C.2.3-1: Test Parameters for Large Delay CDD (FRC) MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3
	σ	dB	0	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-102 (Note 2)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N_{oc3}	dBm/15kHz	-94.8 (Note 4)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.1.3.3_C.2.3-2	6
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	MBSFN
Cell Id			0	126
Time Offset between Cells		μs	2.5 (synchronous cells)	
ABS pattern (Note 5)			N/A	0001000000 0100000010 0000001000 0000000000
RLM/RRM Measurement Subframe Pattern (Note 6)			0001000000 0100000010 0000001000 0000000000	N/A
CSI Subframe Sets (Note 7)	$C_{CSI,0}$		0001000000 0100000010 0000001000 0000000000	N/A
	$C_{CSI,1}$		1110111111 1011111101 1111110111 1111111111	N/A
MBSFN Subframe Allocation (Note 10)			N/A	001000 100001 000100 000000
Number of control OFDM symbols			2	
PDSCH transmission mode			3	N/A
Cyclic prefix			Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #4, #5, #6, #7, #8, #9, #10, #11, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbol #0 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 5: ABS pattern as defined in [14]. The 4th, 12th, 19th and 27th subframes indicated by ABS pattern are MBSFN ABS subframes. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 8: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 9: SIB-1 will not be transmitted in Cell2 in this test.
Note 10: MBSFN Subframe Allocation as defined in [5], four frames with 24 bits is chosen for MBSFN subframe allocation.
Note 11: The maximum number of uplink HARQ transmission is limited to 2 so that each PHICH channel transmission is in a subframe protected by MBSFN ABS in this test.

Table 8.2.1.3.3_C.2.3-2: Minimum performance Large Delay CDD (FRC) MBSFN ABS

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.11 FDD	OP.1 FDD	OP.1 FDD	EVA 5	EVA 5	2x2 Low	70	12.0	2-8
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.3.3.

8.2.1.3.3_C.2.4 Test description

8.2.1.3.3_C.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.1.3.3_C.2.3-2, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure TBD for antenna configuration 2x2.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.1-1 and 8.2.1.3.3_C.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.3.3_C.2.4.3.

8.2.1.3.3_C.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.1.3.3_C.2.3-1 and 8.2.1.3.3_C.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.2.1.3.3_C.2.5-1 as appropriate.
3. Set the Cell2 –aggressor cell- as defined in Tables 8.2.1.3.3_C.2.3-2, 8.2.1.3.3_C.2.5-1 and according to Annex C3.3 for MBSFN ABS.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.3.3_C.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.3.3_C.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.3.3_C.2.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	'00010000000100000010 00000010000000000000'	BIT STRING (SIZE (40))	
}			
}			
}			

Table 8.2.1.3.3_C.2.4.3-3: *CQI-ReportConfig-r10-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'00010000000100000010 00000010000000000000'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'11101111111011111101 11111101111111111111'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

8.2.1.3.3_C.2.5 Test requirement

Table 8.2.1.3.3_C.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.3.3_C.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.3.3_C.2.5-1: Test Requirement Large Delay CDD (FRC)

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.11 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	2x2 Low	70	12.0+ TT	2-8
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									

8.2.1.4 FDD PDSCH Closed Loop Spatial Multiplexing Performance (Cell-Specific Reference Symbols)

8.2.1.4.1 FDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 2x2

8.2.1.4.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing.

8.2.1.4.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8.

8.2.1.4.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1, 8.2.1.4.1.3-1 and 8.2.1.4.1.3-3 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.1.4.1.3-2 and 8.2.1.4.1.3-4 for the specified SNR. For single-layer spatial multiplexing closed loop rank-one performance with wideband and frequency selective precoding is specified. For multi-layer spatial multiplexing closed loop rank-two performance with wideband and frequency selective precoding is specified.

Table 8.2.1.4.1.3-1: Test Parameters for Testing Single-Layer Spatial Multiplexing (FRC)

Parameter		Unit	Test 1	Test 2
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98
Precoding granularity		PRB	6	50
PMI delay (Note 2)		ms	8	8
Reporting interval		ms	1	1
Reporting mode			PUSCH 1-2	PUSCH 3-1
CodeBookSubsetRestriction bitmap			001111	001111
PDSCH transmission mode			4	4
Note 1: $P_B = 1$ Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4) If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4) If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)				

Table 8.2.1.4.1.3-2: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.10 FDD	OP.1 FDD	EVA5	2x2 Low	70	-2.5	1-5
2	10 MHz	R.10 FDD	OP.1 FDD	EPA5	2x2 High	70	-2.3	1-5

Table 8.2.1.4.1.3-3: Test Parameters for Testing Multi-Layer Spatial Multiplexing

Parameter		Unit	Test 3	Test 4
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	0
N_{oc} at antenna port		dBm/15kHz	-98	-98
Precoding granularity		PRB	50	50
PMI delay (Note 2)		ms	8	8
Reporting interval		ms	1	1
Reporting mode			PUSCH 3-1	PUSCH 3-1
CodeBookSubsetRestriction bitmap			110000	110000
PDSCH transmission mode			4	4
Note 1: $P_B = 1$ Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)				

Table 8.2.1.4.1.3-4: Minimum performance Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
3	10 MHz	R.11 FDD	OP.1 FDD	EVA5	2x2 Low	70	12.9	2-5
4	10 MHz	R.11 FDD	OP.1 FDD	ETU70	2x2 Low	70	14.3	2-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.4.

8.2.1.4.1.4 Test description

8.2.1.4.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Tables 8.2.1.4.1.3-2 and 8.2.1.4.1.3-4 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Tables 8.2.1-1, 8.2.1.4.1.3-1 and 8.2.1.4.1.3.-3 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.4.1.4.3.

8.2.1.4.1.4.2 Test procedure

1. For single-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.1.4.1.3-1 and 8.2.1.4.1.3-2. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.1.4.1.3-3 and 8.2.1.4.1.3-4. The SS sends downlink MAC padding bits on the DL RMC.
2. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.1.4.1.5-1 and 8.2.1.4.1.5-2 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.
5. Repeat steps from 1 to 4 for each test interval in Tables 8.2.1.4.1.5-1 and 8.2.1.4.1.5-2 as appropriate.

8.2.1.4.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.4.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop single-layer spatial multiplexing performance downlink power allocation for Test number 1, 2

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	001111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.4.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation for Test number 3, 4

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	110000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.4.1.4.3-3: *CQI-ReportConfig-DEFAULT:* Additional FDD PDSCH closed loop single -layer spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.2.1.4.1.4.3-4: *CQI-ReportConfig-DEFAULT:* Additional FDD PDSCH closed loop single/multi-layer spatial multiplexing performance downlink power allocation for Test number 2, 3, 4

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

8.2.1.4.1.5 Test requirement

Tables 8.2.1.4.3-1 and 8.2.1.4.3-3 define the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.4.1.5-1 and 8.2.1.4.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.4.1.5-1: Test requirement Single-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.10 FDD	OP.1 FDD	EVA5	2x2 Low	70	-1.6	1-5
2	10 MHz	R.10 FDD	OP.1 FDD	EPA5	2x2 High	70	-1.4	1-5

Table 8.2.1.4.1.5-2: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
3	10 MHz	R.11 FDD	OP.1 FDD	EVA5	2x2 Low	70	13.8	2-5
4	10 MHz	R.11 FDD	OP.1 FDD	ETU70	2x2 Low	70	15.2	2-5

8.2.1.4.1_1 FDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 2x2 (Release 9 and forward)

8.2.1.4.1_1.1 Test purpose

Same test purpose as in clause 8.2.1.4.1.1

8.2.1.4.1_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward.

8.2.1.4.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.1.4.1.3 with the following exceptions:

- Instead of Table 8.2.1.4.1.3-3 → use Table 8.2.1.4.1_1.3-1.
- Instead of Table 8.2.1.4.1.3-4 → use Table 8.2.1.4.1_1.3-2.

Table 8.2.1.4.1_1.3-1: Test Parameters for Testing Multi-Layer Spatial Multiplexing

Parameter		Unit	Test 3-4
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	50
PMI delay (Note 2)		ms	8
Reporting interval		ms	1
Reporting mode			PUSCH 3-1
PDSCH transmission mode			4
CodeBookSubsetRestriction bitmap			110000

Note 1: $P_B = 1$

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)

Table 8.2.1.4.1_1.3-2: Minimum performance Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
3	10 MHz	R.35 FDD	OP.1 FDD	EPA5	2x2 Low	70	18.9	2-5
4	10 MHz	R.11 FDD	OP.1 FDD	ETU70	2x2 Low	70	14.3	2-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.4.

8.2.1.4.1_1.4 Test description

Same test description as in clause 8.2.1.4.1.4 with the following exceptions:

- Instead of Table 8.2.1.4.1.3-3 → use Table 8.2.1.4.1_1.3-1.
- Instead of Table 8.2.1.4.1.3-4 → use Table 8.2.1.4.1_1.3-2.
- Instead of Table 8.2.1.4.1.5-2 → use Table 8.2.1.4.1_1.5-1.

8.2.1.4.1_1.5 Test requirement

Same test requirement as in clause 8.3.2.1.1.5 with the following exceptions:

- Instead of Table 8.2.1.4.1.3-3 → use Table 8.2.1.4.1_1.3-1.
- Instead of Table 8.2.1.4.1.5-2 → use Table 8.2.1.4.1_1.5-1.

Table 8.2.1.4.1_1.5-1: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
3	10 MHz	R.35 FDD	OP.1 FDD	EPA5	2x2 Low	70	+19.8	2-5
4	10 MHz	R.11 FDD	OP.1 FDD	ETU70	2x2 Low	70	+15.2	2-5

8.2.1.4.2 FDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 4x2

8.2.1.4.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing.

8.2.1.4.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8.

8.2.1.4.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1, 8.2.1.4.2.3-1 and 8.2.1.4.2.3-3 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.1.4.2.3-2 and 8.2.1.4.2.3-4 for the specified SNR. For single-layer spatial multiplexing closed loop rank-one performance with wideband and frequency selective precoding is specified. For multi-layer spatial multiplexing closed loop rank-two performance with wideband and frequency selective precoding is specified.

Table 8.2.1.4.2.3-1: Test Parameters for Testing Single-Layer Spatial Multiplexing

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6
PMI delay (Note 2)		ms	8
Reporting interval		ms	1
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			00000000000000 00000000000000 00000000000000 00000011111111 11111111
PDSCH transmission mode			4
Note 1: $P_B = 1$			
Note 2:			

Table 8.2.1.4.2.3-2: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.13 FDD	OP.1 FDD	EVA5	4x2 Low	70	-3.2	1-5

Table 8.2.1.4.2.3-3: Test Parameters for Testing Multi-Layer Spatial Multiplexing

Parameter		Unit	Test 2
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6
PMI delay (Note 2)		ms	8
Reporting interval		ms	1
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			00000000000000 00000000000000 00001111111111 11111100000000 00000000
PDSCH transmission mode			4
Note 1: $P_B = 1$ Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)			

Table 8.2.1.4.2.3-4: Minimum performance Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	10.5	2-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.4.

8.2.1.4.2.4 Test description

8.2.1.4.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: As specified per test number in Tables 8.2.1.4.2.3-2 and 8.2.1.4.2.3-4 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.11 for antenna configuration 4x2.
2. The parameter settings for the cell are set up according to Tables 8.2.1-1, 8.2.1.4.2.3-1 and 8.2.1.4.2.3-3 as appropriate.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.4.2.4.3.

8.2.1.4.2.4.2 Test procedure

1. For single-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.1.4.2.3-1 and 8.2.1.4.2.3-2. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.1.4.2.3-3 and 8.2.1.4.2.3-4. The SS sends downlink MAC padding bits on the DL RMC.

2. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.

3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.1.4.2.5-1 and 8.2.1.4.2.5-2 as appropriate.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

5. Repeat steps from 1 to 4 for each test interval in Tables 8.2.1.4.2.5-1 and 8.2.1.4.2.5-2 as appropriate.

8.2.1.4.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.4.2.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop spatial multiplexing performance downlink power allocation for Test numbers 1, 2

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.1.4.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop single-layer spatial multiplexing performance downlink power for Test number 1

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000000000000000000000000000000000000000111111111111111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.4.2.4.3-3: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation Test number 2

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000000000000000111111111111111110000000000000000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.4.2.4.3-4: *CQI-ReportConfig-DEFAULT:* Additional FDD PDSCH closed loop single/multi-layer spatial multiplexing performance downlink power allocation Test number 1, 2

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

8.2.1.4.2.5 Test requirement

Tables 8.2.1.4.2.3-1 and 8.2.1.4.2.3-3 define the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.4.25-1 and 8.2.1.4.2.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.4.2.5-1: Test requirement Single-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.13 FDD	OP.1 FDD	EVA5	4x2 Low	70	-2.3	1-5

Table 8.2.1.4.2.5-2: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz	R.14 FDD	OP.1 FDD	EVA5	4x2 Low	70	11.4	2-5

8.2.1.4.2_1 FDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 4x2 (Release 9 and forward)

8.2.1.4.2_1.1 Test purpose

Same test purpose as in clause 8.2.1.4.2.1

8.2.1.4.2_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward.

8.2.1.4.2_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.1.4.2.3 with the following exceptions:

- Instead of Table 8.2.1.4.2.3-3 → use Table 8.2.1.4.2_1.3-1.
- Instead of Table 8.2.1.4.2.3-4 → use Table 8.2.1.4.2_1.3-2.

Table 8.2.1.4.2_1.3-1: Test Parameters for Testing Multi-Layer Spatial Multiplexing

Parameter		Unit	Test 2
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
	σ	dB	3
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6
PMI delay (Note 2)		ms	8
Reporting interval		ms	1
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			0000000000000 0000000000000 0000001111111 1111111110000 000000000000
PDSCH transmission mode			4
Note 1: $P_B = 1$ Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)			

Table 8.2.1.4.2_1.3-2: Minimum performance Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz	R.36 FDD	OP.1 FDD	EPA5	4x2 Low	70	14.7	2-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.4.

8.2.1.4.2_1.4 Test description

Same test description as in clause 8.2.1.4.2.4 with the following exceptions:

- Instead of Table 8.2.1.4.2.3-3 → use Table 8.2.1.4.2_1.3-1.
- Instead of Table 8.2.1.4.2.3-4 → use Table 8.2.1.4.2_1.3-2.
- Instead of Table 8.2.1.4.2.5-2 → use Table 8.2.1.4.2_1.5-1.

8.2.1.4.2_1.5 Test requirement

Same test requirement as in clause 8.3.2.1.2.5 with the following exceptions:

- Instead of Table 8.2.1.4.2.3-3 → use Table 8.2.1.4.2_1.3-1.
- Instead of Table 8.2.1.4.2.5-2 → use Table 8.2.1.4.2_1.5-1.

Table 8.2.1.4.2_1.5-1: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz	R.36 FDD	OP.1 FDD	EPA5	4x2 Low	70	+15.6	2-5

8.2.1.4.2_A FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA

8.2.1.4.2_A.1 FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA (intra-band contiguous DL CA)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- Connection diagram is FFS.
- Test tolerance is undefined
- Test frequencies are FFS
- Statistical significance related parameters in Annex G.3A are FFS

8.2.1.4.2_A.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing.

8.2.1.4.2_A.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release10 and forward which supports intra-band contiguous DL CA.

8.2.1.4.2_A.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1, 8.2.1.4.2_A.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.1.4.2_A.1.3-2 for the specified SNR. For multi-layer spatial multiplexing closed loop rank-two performance with wideband and frequency selective precoding is specified.

Table 8.2.1.4.2_A.1.3-1: Test Parameters for Testing Multi-Layer Spatial Multiplexing

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6
PMI delay (Note 2)		ms	8
Reporting interval		ms	1
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			0000000000000 0000000000000 0000001111111 1111111110000 000000000000
CSI request field (Note 3)			'10'

Note 1: $P_B = 1$

Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)

Note 3: CSI request field applies for CA demodulation requirement only. Multiple CC-s under test are configured as the 1st set of serving cells by higher layers.

Note 4: For CA test cases, ACK/NACK bits are transmitted using PUSCH with PUCCH format 1b with channel selection configured.

Table 8.2.1.4.2_A.1.3-2: Minimum performance Multi-Layer Spatial Multiplexing (FRC)

Test num.	Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		UE cate-gory	CA capa-bility
						Fraction of maximum throughput (%)	SNR (dB)		
1	2x10 MHz	R.14 FDD	OP.1 FDD (Note 1)	EVA5	4x2 Low	70	10.8	3-8	CL_A-A
2	2x20 MHz	R.14-3 FDD	OP.1 FDD (Note 1)	EVA5	4x2 Low	70	[10.9]	5-8	CL_C

Note 1: For CA capable UE, the OCNG pattern applies for each CC.

The normative reference for this requirement is TS 36.101 [2] clause 8.2.1.4.

8.2.1.4.2_A.1.4 Test description

8.2.1.4.2_A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause FFS.

Channel Bandwidths to be tested: As specified per test number in Tables 8.2.1.4.2_A.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure FFS for antenna configuration 4x2.

2. The parameter settings for the cell are set up according to Tables 8.2.1-1, 8.2.1.4.2_A.1.3-1 as appropriate.

3. Downlink signals for PCC are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.1.4.2_A.1.4.3.

8.2.1.4.2_A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels except PHICH.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for *PDSCH-ConfigDedicated-DEFAULT* is defined in Table 8.2.1.4.2_A.1.4.3-1, *PhysicalConfigDedicated-DEFAULT* is defined in Table 8.2.1.4.2_A.1.4.3-2, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 8.2.1.4.2_A.1.4.3-2A , *CQI-ReportConfig-DEFAULT* is defined in Table 8.2.1.4.2_A.1.4.3-3, *CQI-ReportConfig-r10-DEFAULT* is defined in Table 8.2.1.4.2_A.1.4.3-4, *CQI-ReportAperiodic-r10-DEFAULT* is defined in Table 8.2.1.4.2_A.1.4.3-5.

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.1.4.2_A.1.3-1 and 8.2.1.4.2_A.1.3-3. The SS sends downlink MAC padding bits on the DL RMC.

5. SS schedules the UL transmission to carry the PUSCH CSI feedback via PDCCH DCI format 0 with CSI request bit set to '10' and I_MCS=29 and N_PRB allocated to be less or equal to 20.

6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.1.4.2_A.1.5-1 as appropriate.

7. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.4.2_A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.4.2_A.1.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.1.4.2_A.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation Test number 1

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000011111111 11111111000000000000 0000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.4.2_A.1.4.3-2A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
antennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000011111111 11111111000000000000 0000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.4.2_A.1.4.3-3: *CQI-ReportConfig-DEFAULT:* Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.2.1.4.2_A.1.4.3-4: *CQI-ReportConfig-r10-DEFAULT:* Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	CQI-ReportAperiodic-r10-DEFAULT		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10	Not present		
}			

Table 8.2.1.4.2_A.1.4.3-5: *CQI-ReportAperiodic-r10-DEFAULT:* Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11000000	P-Cell, S-Cell report	
trigger2-r10	00000000	No report	
}			
}			
}			

8.2.1.4.2_A.1.5 Test requirement

Tables 8.2.1.4.2_A.1.3-1 define the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.4.2_A.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.4.2_A.1.5-1: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test num.	Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		UE cate-gory	CA capa-bility
						Fraction of maximum throughput (%)	SNR (dB)		
1	NA								
2	2x20 MHz	R.14-3 FDD	OP.1 FDD (Note 1)	EVA5	4x2 Low	70	[10.9] +TT	5-8	CL_C
Note 1: For CA capable UE, the OCNG pattern applies for each CC.									

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.1.4.2_A.2 FDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA (inter-band DL CA)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined

- Connection diagram is FFS.
- Test tolerance is undefined

- Test frequencies are FFS
- Statistical significance related parameters in Annex G.3A are FFS

8.2.1.4.2_A.2.1 Test purpose

Same test purpose as in clause 8.2.1.4.2_A.1.1.

8.2.1.4.2_A.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release10 and forward which supports inter-band DL CA.

8.2.1.4.2_A.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.1.4.2_A.1.3.

8.2.1.4.2_A.2.4 Test description

8.2.1.4.2_A.2.4.1 Initial conditions

Same initial conditions as in clause 8.2.1.4.2_A.1.4.1.

8.2.1.4.2_A.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for *PDSCH-ConfigDedicated-DEFAULT* is defined in Table 8.2.1.4.2_A.2.4.3-1, *PhysicalConfigDedicated-DEFAULT* is defined in Table 8.2.1.4.2_A.2.4.3-2, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 8.2.1.4.2_A.2.4.3-2A , *CQI-ReportConfig-DEFAULT* is defined in Table 8.2.1.4.2_A.2.4.3-3, *CQI-ReportConfig-r10-DEFAULT* is defined in Table 8.2.1.4.2_A.2.4.3-4, *CQI-ReportAperiodic-r10-DEFAULT* is defined in Table 8.2.1.4.2_A.2.4.3-5.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.1.4.2_A.2.3-1 and 8.2.1.4.2_A.2.3-3. The SS sends downlink MAC padding bits on the DL RMC.
5. SS schedules the UL transmission to carry the PUSCH CSI feedback via PDCCH DCI format 0 with CSI request bit set to '10' and I_MCS=29 and N_PRB allocated to be less or equal to 20.
6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.1.4.2_A.2.5-1 as appropriate.
7. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.1.4.2_A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.1.4.2_A.2.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.1.4.2_A.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation Test number 1

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000011111111 11111111000000000000 0000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.1.4.2_A.2.4.3-2A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
antennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000011111111 11111111000000000000 0000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			
}			

Table 8.2.1.4.2_A.2.4.3-3: *CQI-ReportConfig-DEFAULT:* Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.2.1.4.2_A.2.4.3-4: *CQI-ReportConfig-r10-DEFAULT:* Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	CQI-ReportAperiodic-r10-DEFAULT		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10	Not present		
}			

Table 8.2.1.4.2_A.2.4.3-5: *CQI-ReportAperiodic-r10-DEFAULT:* Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11000000	P-Cell, S-Cell report	
trigger2-r10	00000000	No report	
}			
}			
}			

8.2.1.4.2_A.2.5 Test requirement

Table 8.2.1.4.2_A.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.1.4.2_A.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.1.4.2_A.2.5-1: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test num.	Band-width	Reference channel	OCNG pattern	Propa-gation condi-tion	Correlation matrix and antenna config.	Reference value		UE cate-gory	CA capa-bility
						Fraction of maximum throughput (%)	SNR (dB)		
1	2x10 MHz	R.14 FDD	OP.1 FDD (Note 1)	EVA5	4x2 Low	70	10.8+ TT	3-8	CL_A-A
2	NA								
Note 1: For CA capable UE, the OCNG pattern applies for each CC.									

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.2 TDD (Fixed Reference Channel)

The parameters specified in Table 8.2.2-1 are valid for all TDD tests unless otherwise stated.

Table 8.2.2-1: Common Test Parameters (TDD)

Parameter	Unit	Value	Comments
Uplink downlink configuration (Note 1)		1	
Special subframe configuration (Note 2)		4	
Inter-TTI Distance		1	
Number of HARQ processes	Processes	7	For TDD, 7 HARQ processes in the DL, as specified in TS 36.213 [10] clause 7. All 7 HARQ processes are used.
Scheduling of retransmissions			1. Retransmissions use the same Transport Block Size (TBS) as the initial transmission. 2. HARQ processes are scheduled consecutively, independent of the fact, whether retransmissions (for negatively acknowledged HARQ processes) or new transmissions (for positively acknowledged HARQ processes) occur. 3. In case when the initial transmission and the retransmissions are scheduled in subframes with a different N_{PRB} (in terms of TS 36.213 [10] subclause 7.1.7) $29 \le I_{MCS} \le 31$ according to TS 36.213 [10] subclause 7.1.7.2 and the appropriate modulation is used.
Maximum number of HARQ transmission		4	It is always 4 for TDD, as specified in TS 36.213 [10] clause 8
Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM {0,0,1,2} for 64QAM	
Number of OFDM symbols for PDCCH	OFDM symbols	4 for 1.4 MHz bandwidth, 3 for 3 MHz and 5 MHz bandwidths, 2 for 10 MHz, 15 MHz and 20 MHz bandwidths	The PCFICH carries information about the number of OFDM symbols used for transmission of PDCCHs in a subframe, as specified in TS 36.211 [8] clause 6.7
Cyclic Prefix		Normal	CP consist of the following physical resource blocks (RBs) parameters: 12 consecutive subcarriers at a 15 kHz spacing and 7 OFDM symbols, as specified in TS 36.211 [8] clause 6.2.3
Cell ID		0 (Note 3)	The Cell ID is uniquely defined by a number in the range of 0 to 503, representing the physical-layer cell identity, as specified in TS 36.211 [8] clause 6.11.
Cross carrier scheduling		Not configured	
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: For CA tests, Cell ID = 0 applies only to P-Cell. For S-Cell, Cell ID = 1 is used.			

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.

8.2.2.1 TDD PDSCH Single Antenna Port Performance (Cell-Specific Reference Symbols)

8.2.2.1.1 TDD PDSCH Single Antenna Port Performance

8.2.2.1.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS and also for the transmission on a single-antenna port with full RB allocation.

8.2.2.1.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8 and forward.

8.2.2.1.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.1, with the addition of the relevant parameters in Tables 8.2.2-1, 8.2.2.1.1.3-1 and the downlink physical channel setup according to table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.1.1.3-2 for the specified SNR.

Table 8.2.2.1.1.3-1: Test Parameters

Parameter		Unit	Test 1- 5	Test 6- 8	Test 9- 15	Test 16- 18
Downlink power allocation	ρ_A	dB	0	0	0	0
	ρ_B	dB	0 (Note 1)	0 (Note 1)	0 (Note 1)	0 (Note 1)
N_{oc} at antenna port		dBm/15kHz	-98	-98	-98	-98
Symbols for unused PRBs			OCNG (Note 2)	OCNG (Note 2)	OCNG (Note 2)	OCNG (Note 2)
Modulation			QPSK	16QAM	64QAM	16QAM
ACK/NACK feedback mode			Multiplexing	Multiplexing	Multiplexing	Multiplexing

Note 1: $P_B = 0$

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.2.2.1.1.3-2: Minimum performance (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.2	1-5
2	10 MHz	R.2 TDD	OP.1 TDD	ETU70	1x2 Low	70	-0.6	1-5
3	10 MHz	R.2 TDD	OP.1 TDD	ETU300	1x2 Low	70	-0.2	1-5
4	10 MHz	R.2 TDD	OP.1 TDD	HST	1x2 Low	70	-2.6	1-5
5	1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.0	1-5
6	10 MHz	R.3 TDD	OP.1 TDD	EVA5	1x2 Low	70	6.7	2-5
7	10 MHz	R.3 TDD	OP.1 TDD	ETU70	1x2 Low	30	1.4	2-5
8	10 MHz	R.3 TDD	OP.1 TDD	ETU300	1x2 High	70	9.3	2-5
9	3 MHz	R.5 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.6	1-5
10	5 MHz	R.6 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.6	2-5
11	10 MHz	R.7 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.6	2-5
12	10 MHz	R.7 TDD	OP.1 TDD	ETU70	1x2 Low	70	19.1	2-5
13	10 MHz	R.7 TDD	OP.1 TDD	EVA5	1x2 High	70	19.1	2-5
14	15 MHz	R.8 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.8	2-5
15	20 MHz	R.9 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.7	3-5
16	3 MHz	R.0 TDD	OP.1 TDD	ETU70	1x2 Low	30	2.1	1-5
17	10 MHz	R.1 TDD	OP.1 TDD	ETU70	1x2 Low	30	2.0	1-5
18	20 MHz	R.1 TDD	OP.1 TDD	ETU70	1x2 Low	30	2.1	1-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.

8.2.2.1.1.4 Test description

8.2.2.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Frequencies to be tested for 1PRB allocation: Low Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Bandwidths to be tested: As specified per test number in Tables 8.2.2.1.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.9.

2. The parameter settings for the cell are set up according to Tables 8.2.2-1, 8.2.2.1.1.3-1 as appropriate.

3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.1.1.4.3.

8.2.2.1.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.1.1.3-1 and 8.2.2.1.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.

2. Set the parameters of the reference channel, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Tables 8.2.2.1.1.5-1as appropriate.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

4. Repeat steps from 1 to 3 for each subtest in Tables 8.2.2.1.1.5-1 as appropriate.

8.2.2.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.2.2.1.1.5 Test requirement

Table 8.2.2.1.1.3-1 defines the primary level settings including test tolerances for all throughput tests.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A for each throughput test shall meet or exceed the specified value in Tables 8.2.2.1.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.1.1.5-1: Test Requirement (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-0.4	1-5
2	10 MHz	R.2 TDD	OP.1 TDD	ETU70	1x2 Low	70	0.2	1-5
3	10 MHz	R.2 TDD	OP.1 TDD	ETU300	1x2 Low	70	0.6	1-5
4	10 MHz	R.2 TDD	OP.1 TDD	HST	1x2 Low	70	-2.0	1-5
5	1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.8	1-5
6	10 MHz	R.3 TDD	OP.1 TDD	EVA5	1x2 Low	70	7.5	2-5
7	10 MHz	R.3 TDD	OP.1 TDD	ETU70	1x2 Low	30	2.2	2-5
8	10 MHz	R.3 TDD	OP.1 TDD	ETU300	1x2 High	70	10.1	2-5
9	3 MHz	R.5 TDD	OP.1 TDD	EVA5	1x2 Low	70	18.4	1-5
10	5 MHz	R.6 TDD	OP.1 TDD	EVA5	1x2 Low	70	18.4	2-5
11	10 MHz	R.7 TDD	OP.1 TDD	EVA5	1x2 Low	70	18.4	2-5
12	10 MHz	R.7 TDD	OP.1 TDD	ETU70	1x2 Low	70	19.9	2-5
13	10 MHz	R.7 TDD	OP.1 TDD	EVA5	1x2 High	70	19.9	2-5
14	15 MHz	R.8 TDD	OP.1 TDD	EVA5	1x2 Low	70	18.6	2-5
15	20 MHz	R.9 TDD	OP.1 TDD	EVA5	1x2 Low	70	18.5	3-5
16	3 MHz	R.0 TDD	OP.1 TDD	ETU70	1x2 Low	30	2.9	1-5
17	10 MHz	R.1 TDD	OP.1 TDD	ETU70	1x2 Low	30	2.8	1-5
18	20 MHz	R.1 TDD	OP.1 TDD	ETU70	1x2 Low	30	2.9	1-5

8.2.2.1.1_1 TDD PDSCH Single Antenna Port Performance (Release 9 and forward)

8.2.2.1.1_1.1 Test purpose

Same test purpose as in clause 8.2.2.1.1.1.

8.2.2.1.1_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward.

8.2.2.1.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.2.1.1.3 with the following exceptions:

- Instead of Table 8.2.2.1.1.3-1 → use Table 8.2.2.1.1_1.3-1.
- Instead of Table 8.2.2.1.1.3-2 → use Table 8.2.2.1.1_1.3-2.

Table 8.2.2.1.1_1.3-1: Test Parameters

Parameter		Unit	Test 1- 5	Test 6- 8	Test 9- 15	Test 16- 18
Downlink power allocation	ρ_A	dB	0	0	0	0
	ρ_B	dB	0 (Note 1)	0 (Note 1)	0 (Note 1)	0 (Note 1)
N_{oc} at antenna port		dBm/15kHz	-98	-98	-98	-98
Symbols for unused PRBs			OCNG (Note 2)	OCNG (Note 2)	OCNG (Note 2)	OCNG (Note 2)
Modulation			QPSK	16QAM	64QAM	16QAM
ACK/NACK feedback mode			Multiplexing	Multiplexing	Multiplexing	Multiplexing

Note 1: $P_B = 0$
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.2.2.1.1_1.3-2: Minimum performance (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	N/A							
2	N/A							
3	N/A							
4	N/A							
5	N/A							
6	5 MHz	R.3-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	6.7	1
7	5 MHz	R.3-1 TDD	OP.1 TDD	ETU70	1x2 Low	30	1.4	1
8	5 MHz	R.3-1 TDD	OP.1 TDD	ETU300	1x2 High	70	9.3	1
9	N/A							
10	5 MHz	R.6-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.6	1
11	10 MHz	R.7-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.6	1
12	10 MHz	R.7-1 TDD	OP.1 TDD	ETU70	1x2 Low	70	19.1	1
13	10 MHz	R.7-1 TDD	OP.1 TDD	EVA5	1x2 High	70	19.1	1
14	15 MHz	R.8-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.8	1
15	20 MHz	R.9-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.7	2
	20 MHz	R.9-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.7	1
16	N/A							
17	N/A							
18	N/A							

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.

8.2.2.1.1_1.4 Test description

Same test description as in clause 8.2.2.1.1.4 with the following exceptions:

- Instead of Table 8.2.2.1.1.3-1 → use Table 8.2.2.1.1_1.3-1.
- Instead of Table 8.2.2.1.1.3-2 → use Table 8.2.2.1.1_1.3-2.

- Instead of Table 8.2.2.1.1.5-1 → use Table 8.2.2.1.1_1.5-1.

8.2.2.1.1_1.5 Test requirement

Same test requirements as in clause 8.2.2.1.1.5 with the following exceptions:

- Instead of Table 8.2.2.1.1.3-1 → use Table 8.2.2.1.1_1.3-1.
- Instead of Table 8.2.2.1.1.5-1 → use Table 8.2.2.1.1_1.5-1.

Table 8.2.2.1.1_1.5-1: Test Requirement (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	N/A							
2	N/A							
3	N/A							
4	N/A							
5	N/A							
6	5 MHz	R.3-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	7.5	1
7	5 MHz	R.3-1 TDD	OP.1 TDD	ETU70	1x2 Low	30	2.2	1
8	5 MHz	R.3-1 TDD	OP.1 TDD	ETU300	1x2 High	70	10.1	1
9	N/A							
10	5 MHz	R.6-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	+18.4	1
11	10 MHz	R.7-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	+18.4	1
12	10 MHz	R.7-1 TDD	OP.1 TDD	ETU70	1x2 Low	70	+19.9	1
13	10 MHz	R.7-1 TDD	OP.1 TDD	EVA5	1x2 High	70	+19.9	1
14	15 MHz	R.8-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	+18.6	1
15	20 MHz	R.9-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	+18.5	2
	20 MHz	R.9-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	+18.5	1
16	N/A							
17	N/A							
18	N/A							

8.2.2.1.1_A TDD PDSCH Single Antenna Port Performance for CA

8.2.2.1.1_A.1 TDD PDSCH Single Antenna Port Performance for CA (intra-band contiguous DL CA)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined

- Test tolerance are FFS
- Statistical significance related parameters in Annex G.3A are FFS

8.2.2.1.1_A.1.1 Test purpose

Same test purpose as 8.2.2.1.1.1.

8.2.2.1.1_A.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward which support intra-band contiguous DL CA.

8.2.2.1.1_A.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.1, with the addition of the relevant parameters in Tables 8.2.2-1, 8.2.2.1.1_A.1.3-1 and the downlink physical channel setup according to table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.1.1_A.1.3-2 for the specified SNR. For QPSK and 64QAM performance the bandwidths specified in Table 5.4.2.1-1 are verified.

Table 8.2.2.1.1_A.1.3-1: Test Parameters

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Modulation			QPSK
ACK/NACK feedback mode			Multiplexing

Note 1: $P_B = 0$

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.2.2.1.1_A.1.3-2: Minimum performance (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category	CA Applicability
						Fraction of Maximum Throughput (%)	SNR (dB)		
1	2x20 MHz	R.42 TDD	OP.1 TDD (Note1)	EVA5	1x2 Low	70	-1.2	5-8	CL_C
Note 1: For CA capable UE, the OCNG pattern applies for each CC.									

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.

8.2.2.1.1_A.1.4 Test description

8.2.2.1.1_A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Tables 8.2.2.1.1_A.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.35 as appropriate.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1, 8.2.2.1.1_A.1.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.1.1_A.1.4.3.

8.2.2.1.1_A.1.4.2 Test procedure

1. Configure SCC according to Annex C0, C.1 and Annex C.3.2 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents are defined in clause 8.2.2.1.1_A.1.4.3.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4 SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.1.1_A.1.3-1 and 8.2.2.1.1_A.1.3-2 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. Set the parameters of the reference channel, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Tables 8.2.2.1.1_A.1.5-1as appropriate.
6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A, Table G.3A.5-6 on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers.
7. Repeat steps from 1 to 6 for each subtest in Tables 8.2.2.1.1_A.1.5-1 as appropriate

8.2.2.1.1_A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

In test procedure step 2, for SCC configuration there are no additional message contents.

8.2.2.1.1_A.1.5 Test requirement

Table 8.2.2.1.1_A.1.3-1 defines the primary level settings including test tolerances for all throughput tests.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause 3.3.1 for the throughput test shall meet or exceed the specified value in Tables 8.2.2.1.1_A. 1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.1.1_A.1.5-1: Test Requirement (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category	CA Applicability
						Fraction of Maximum Throughput (%)	SNR (dB)		
1	2x20 MHz	R.42 TDD	OP.1 TDD (Note1)	EVA5	1x2 Low	70	-1.2+TT	5-8	CL_C
Note 1: For CA capable UE, the OCNG pattern applies for each CC.									

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.2.1.2 TDD PDSCH Single Antenna Port Performance with 1 PRB in the presence of MBSFN

8.2.2.1.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on a single-antenna port with different channel models and MCS and also for the transmission on a single-antenna port with single RB allocation in the presence of MBSFN.

8.2.2.1.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8 and forward.

8.2.2.1.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.1, with the addition of the relevant parameters in Tables 8.2.2-1, 8.2.2.1.2.3-1 and the downlink physical channel setup according to table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.1.2.3-2 for the specified SNR.

Table 8.2.2.1.2.3-1: Test Parameters for Testing 1 PRB allocation

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for MBSFN portion of MBSFN subframes (Note 2)			OCNG (Note 3)
ACK/NACK feedback mode			Multiplexing
Note 1: $P_B = 0$ Note 2: The MBSFN portion of an MBSFN subframe comprises the whole MBSFN subframe except the first two symbols in the first slot. Note 3: The MBSFN portion of the MBSFN subframes shall contain QPSK modulated data. Cell-specific reference signals are not inserted in the MBSFN portion of the MBSFN subframes, QPSK modulated MBSFN data is used instead.			

Table 8.2.2.1.2.3-2: Minimum performance 1 PRB allocation (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.29 TDD	OP.3 TDD	ETU70	1x2 Low	30	2.0	1-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.

8.2.2.1.2.4 Test description

8.2.2.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Low Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Bandwidths to be tested: As specified per test number in Tables 8.2.2.1.2.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.9.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1, 8.2.2.1.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.1.2.4.3.

8.2.2.1.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.1.2.3-1 and 8.2.2.1.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the reference channel, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Tables 8.2.2.1.1.2.5-1as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.2.2.1.2.4.3-1: SystemInformationBlockType2: Additional TDD PDSCH Single Antenna Port Performance for 1 PRB allocation with MBSFN subframes test point 1 requirement

Derivation Path: TS 36.508 [7] clause 4.4.3.3, Table 4.4.3.3-1 SystemInformationBlockType2			
Information Element	**Value/remark**	**Comment**	**Condition**
SystemInformationBlockType2 ::= SEQUENCE {			
mbsfn-SubframeConfig ::= SEQUENCE {			
radioframeAllocationPeriod	n1	Every radio frame is with MBSFN subframe	
radioframeAllocationOffset	0		
subframeAllocation CHOICE {			
oneFrame	01001x	subframe 4 and 9 is used for MBSFN.	TDD
}			
}			
}			

8.2.2.1.2.5 Test requirement

Table 8.2.2.1.2.3-1 defines the primary level settings including test tolerances for all throughput tests.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A for each throughput test shall meet or exceed the specified value in Tables 8.2.2.1.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.1.2.5-1: Test Requirement 1PRB with MBSFN subframes (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.29 TDD	OP.3 TDD	ETU70	1x2 Low	30	2.8	1-5

8.2.2.2 TDD PDSCH Transmit Diversity Performance (Cell-Specific Reference Symbols)

8.2.2.2.1 TDD PDSCH Transmit Diversity 2x2

8.2.2.2.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using transmit diversity (SFBC).

8.2.2.2.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8 and forward.

8.2.2.2.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1 and 8.2.2.2.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.2.2.1.3-2 for the specified SNR. For transmit diversity (SFBC) performance with 2 and 4 transmitter antennas as specified.

Table 8.2.2.2.1.3-1: Test Parameters for Testing Transmit Diversity Performance (FRC)

Parameter		Unit	Test 1-2
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
N_{oc} at antenna port		dBm/15kHz	-98
ACK/NACK feedback mode			Multiplexing
Note 1: $P_B = 1$			

Table 8.2.2.2.1.3-2: Minimum performance Transmit Diversity (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11 TDD	OP.1 TDD	EVA5	2x2 Medium	70	6.8	2-5
2	10 MHz	R.10 TDD	OP.1 TDD	HST	2x2 Low	70	-2.3	1-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.2.

8.2.2.2.1.4 Test description

8.2.2.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Table 8.2.2.2.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1 and 8.2.2.2.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.2.1.4.3.

8.2.2.2.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.2.1.3-1 and 8.2.2.2.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.2.2.1.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.
4. Repeat steps from 1 to 3 for each test interval in Table 8.2.2.2.1.5-1 as appropriate.

8.2.2.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.2.2.2.1.5 Test requirement

Table 8.2.2.2.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Table 8.2.2.2.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.2.1.5-1: Test requirement Transmit Diversity (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11 TDD	OP.1 TDD	EVA5	2x2 Medium	70	7.7	2-5
2	10 MHz	R.10 TDD	OP.1 TDD	HST	2x2 Low	70	-1.7	1-5

8.2.2.2.1_1 TDD PDSCH Transmit Diversity 2x2 (Release 9 and forward)

8.2.2.2.1_1.1 Test purpose

Same test purpose as in clause 8.2.2.2.1.1

8.2.2.2.1_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward.

8.2.2.2.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.2.2.1.3 with the following exceptions:

- Instead of Table 8.2.2.2.1.3-1 → use Table 8.2.2.2.1_1.3-1.
- Instead of Table 8.2.2.2.1.3-2 → use Table 8.2.2.2.1_1.3-2.

Table 8.2.2.2.1_1.3-1: Test Parameters for Testing Transmit Diversity Performance (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
N_{oc} at antenna port		dBm/15kHz	-98
ACK/NACK feedback mode			Multiplexing
Note 1: $P_B = 1$			

Table 8.2.2.2.1_1.3-2: Minimum performance Transmit Diversity (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	5 MHz	R.11-2 TDD	OP.1 TDD	EVA5	2x2 Medium	70	6.8	1

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.2.

8.2.2.2.1_1.4 Test description

Same test description as in clause 8.2.2.2.1.4 with the following exceptions:

- Instead of Table 8.2.2.2.1.3-1 → use Table 8.2.2.2.1_1.3-1.
- Instead of Table 8.2.2.2.1.3-2 → use Table 8.2.2.2.1_1.3-2.
- Instead of Table 8.2.2.2.1.5-1 → use Table 8.2.2.2.1_1.5-1.

8.2.2.2.1_1.5 Test requirement

Same test requirements as in clause 8.2.1.2.1.5 with the following exceptions:

- Instead of Table 8.2.1.2.1.3-1 → use Table 8.2.1.2.1_1.3-1.
- Instead of Table 8.2.1.2.1.5-1 → use Table 8.2.1.2.1_1.5-1.

Table 8.2.2.2.1_1.5-1: Test requirement Transmit Diversity (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	5 MHz	R.11-2 TDD	OP.1 TDD	EVA5	2x2 Medium	70	+7.7	1

8.2.2.2 TDD PDSCH Transmit Diversity 4x2

8.2.2.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on four antenna ports using transmit diversity (SFBC-FSTD).

8.2.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8 and forward.

8.2.2.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1 and 8.2.2.2.2.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.2.2.2.3-2 for the specified SNR. For transmit diversity (SFBC) performance with 2 and 4 transmitter antennas as specified.

Table 8.2.2.2.2.3-1: Test Parameters for Testing Transmit Diversity Performance (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
N_{oc} at antenna port		dBm/15kHz	-98
ACK/NACK feedback mode			Multiplexing
Note 1: $P_B = 1$			

Table 8.2.2.2.2.3-2: Minimum performance Transmit Diversity (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	1.4 MHz	R.12 TDD	OP.1 TDD	EPA5	4x2 Medium	70	0.2	1-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.2.

8.2.2.2.2.4 Test description

8.2.2.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Table 8.2.2.2.2.3-2 as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.11 for antenna configuration 4x2.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1 and 8.2.2.2.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.2.2.4.3.

8.2.2.2.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.2.2.3-1 and 8.2.2.2.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.2.2.2.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.2.2.2.2.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional TDD PDSCH transmit diversity performance downlink power allocation test point 1 requirement

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-3		
}			

8.2.2.2.2.5 Test requirement

Table 8.2.2.2.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Table 8.2.2.2.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.2.2.5-1: Test requirement Transmit Diversity (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	1.4 MHz	R.12 TDD	OP.1 TDD	EPA5	4x2 Medium	70	1.1	1-5

8.2.2.2.2_1 TDD PDSCH Transmit Diversity 4x2 (Release 9 and forward)

8.2.2.2.2_1.1 Test purpose

Same test purpose as in clause 8.2.2.2.2.1.

8.2.2.2.2_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward.

8.2.2.2.2_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.1.2.2.3 with the following exceptions:

- Instead of Table 8.2.2.2.2.3-1 → use Table 8.2.2.2.2_1.3-1.
- Instead of Table 8.2.2.2.2.3-2 → use Table 8.2.2.2.2_1.3-2.

Table 8.2.2.2.2_1.3-1: Test Parameters for Testing Transmit Diversity Performance (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
N_{oc} at antenna port		dBm/15kHz	-98
ACK/NACK feedback mode			Multiplexing
Note 1: $P_B = 1$			

Table 8.2.2.2.2_1.3-2: Minimum performance Transmit Diversity (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.13 TDD	OP.1 TDD	ETU70	4x2 Low	70	-0.5	1-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.2.

8.2.2.2.2_1.4 Test description

Same test description as in clause 8.2.2.2.2.4 with the following exceptions:

- Instead of Table 8.2.2.2.2.3-1 → use Table 8.2.2.2.2_1.3-1.
- Instead of Table 8.2.2.2.2.3-2 → use Table 8.2.2.2.2_1.3-2.
- Instead of Table 8.2.2.2.2.5-1 → use Table 8.2.2.2.2_1.5-1.

8.2.2.2.2_1.5 Test requirement

Same test requirements as in clause 8.2.2.2.2.5 with the following exceptions:

- Instead of Table 8.2.2.2.2.3-1 → use Table 8.2.2.2.2_1.3-1.
- Instead of Table 8.2.2.2.2.5-1 → use Table 8.2.2.2.2_1.5-1.

Table 8.2.2.2.2_1.5-1: Test requirement Transmit Diversity (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.13 TDD	OP.1 TDD	ETU70	4x2 Low	70	+0.4	1-5

8.2.2.2.3_C TDD PDSCH Transmit diversity 2x2 for eICIC

8.2.2.2.3_C.1 TDD PDSCH Transmit diversity 2x2 for eICIC (non-MBFSN ABS)

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Connection diagram in Annex A of TS 36.508 is TBD
- Test tolerances are incomplete

8.2.2.2.3_C.1.1 Test purpose

To verify the UE's performance of transmit diversity (SFBC) with 2 transmit antennas if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS of the aggressor cell.

8.2.2.2.3_C.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.2.2.2.3_C.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1 and 8.2.2.2.3_C.1.3-1.

In Table 8.2.2.2.3_C.1.3-1, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Table C.3.2-1 in Annex C.3.2 and for Cell 2 is according to Table C.3.3-1 in Annex C.3.3, respectively.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.2.2.2.3_C.1.3-2 for the specified SNR.

Table 8.2.2.2.3_C.1.3-1: Test Parameters for Transmit diversity Performance (FRC)

Parameter		Unit	Cell 1	Cell 2
Uplink downlink configuration			1	1
Special subframe configuration			4	4
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-102 (Note 2)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N_{oc3}	dBm/15kHz	-94.8 (Note 4)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.2.2.3_C. 1.3-2	6
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	2.5 (synchronous cells)	
Cell Id			0	1
ABS pattern (Note 5)			N/A	0000010001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 6)			0000000001 0000000001	N/A
CSI Subframe Sets (Note 7)	$C_{CSI,0}$		0000010001 0000000001	N/A
	$C_{CSI,1}$		1100101000 1100111000	N/A
Number of control OFDM symbols			2	
ACK/NACK feedback mode			Multiplexing	
PDSCH transmission mode			2	N/A
Cyclic prefix			Normal	Normal

Note 1: $P_B = 1$.
Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 5: ABS pattern as defined in [14]. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 8: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 9: SIB-1 will not be transmitted in Cell2 in this test.

Table 8.2.2.2.3_C.1.3-2: Minimum Performance Transmit Diversity (FRC)

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.11-4 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	2x2 Medium	70	3.8	2-8
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\widehat{E}_s / N_{oc2}$ of cell 1.									
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.2.3.

8.2.2.2.3_C.1.4 Test description

8.2.2.2.3_C.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.2.2.3_C.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure [TBD] for antenna configuration 2x2.
2. The parameter settings for the cell1 are set up according to Tables 8.2.2-1 and 8.2.2.2.3_C.1.3-1 as appropriate.
3. Downlink signals are initially set up for Cell1 according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.2.3_C.1.4.3.

8.2.2.2.3_C.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.2.3_C.1.3-1 and 8.2.2.2.3_C.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.2.2.3_C.1.5-1 as appropriate.
3. Set the Cell2 –aggressor cell- as defined in Tables 8.2.2.2.3_C.1.3-1, 8.2.2.2.3_C.1.5-1 and according to Annex C3.3.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.2.3_C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.2.2.3_C.1.4.3-1: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional TDD PDSCH transmit diversity performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000000010000000001'	BIT STRING (SIZE (20))	
}			
}			
}			
}			

Table 8.2.2.2.3_C.1.4.3-2: *CQI-ReportConfig-r10-DEFAULT*: Additional FDD PDSCH transmit diversity performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000100010000000001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'11001010001100111000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

8.2.2.2.3_C.1.5 Test requirement

Table 8.2.2.2.3_C.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for each throughput test shall meet or exceed the specified value in Table 8.2.2.2.3_C.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.2.3_C.1.5-1: Test requirement Transmit Diversity (FRC)

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.11-4 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	2x2 Medium	70	3.8 + TT	2-8
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									

8.2.2.3 TDD PDSCH Open Loop Spatial Multiplexing Performance (Cell-Specific Reference Symbols)

8.2.2.3.1 TDD PDSCH Open Loop Spatial Multiplexing 2x2

8.2.2.3.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.2.3.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8 and forward.

8.2.2.3.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1 and 8.2.2.3.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.3.1.3-2 for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.2.3.1.3-1: Test Parameters for Large Delay CDD (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
N_{oc} at antenna port		dBm/15kHz	-98
ACK/NACK feedback mode			Bundling
Note 1: $P_B = 1$			

Table 8.2.2.3.1.3-2: Minimum performance Large Delay CDD (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.1	2-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.3.

8.2.2.3.1.4 Test description

8.2.2.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Table 8.2.2.3.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1 and 8.2.2.3.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.3.1.4.3.

8.2.2.3.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.3.1.3-1 and 8.2.2.3.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.2.3.1.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.3.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.2.2.3.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.2.3.1.5 Test requirement

Table 8.2.2.3.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Tables 8.2.2.3.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.3.5-1: Test requirement Large Delay CDD (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.11-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	14.0	2-5

8.2.2.3.1_A TDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA

8.2.2.3.1_A.1 TDD PDSCH Open Loop Spatial Multiplexing 2x2 for CA (intra-band contiguous DL CA)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- Connection diagram is FFS.
- Test tolerance is undefined
- Test frequencies are FFS
- Statistical significance related parameters in Annex G.3A are FFS

8.2.2.3.1_A.1.1 Test purpose

Same test purpose as 8.2.2.3.1.1.

8.2.2.3.1_A.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward which support intra-band contiguous DL CA.

8.2.2.3.1_A.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1 and 8.2.2.3.1_A.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.3.1_A.1.3-2 for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.2.3.1_A.1.3-1: Test Parameters for Large Delay CDD (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
N_{oc} at antenna port		dBm/15kHz	-98
ACK/NACK feedback mode			Bundling
Note 1: $P_B = 1$			

Table 8.2.2.3.1_A.1.3-2: Minimum performance Large Delay CDD (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category	CA Applicability
						Fraction of Maximum Throughput (%)	SNR (dB)		
1	2x20 MHz	R.30-1 TDD	OP.1 TDD (Note 1)	EVA70	2x2 Low	70	13.7	5-8	CL_C
2	2x20 MHz	R.30-2 TDD	OP.1 TDD (Note 1)	[EVA70]	2x2 Low	70	[TBD]	3	CL_C
3	2x20 MHz	R.35-1 TDD	OP.1 TDD (Note 1)	EVA5	2x2 Low	70	[TBD]	4	CL_C
Note 1: For CA capable UE, the OCNG pattern applies for each CC									

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.3.

8.2.2.3.1_A.1.4 Test description

8.2.2.3.1_A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause FFS.

Bandwidths to be tested: As specified per test number in Table 8.2.2.3.1_A.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure group A.36 as appropriate.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1 and 8.2.2.3.1_A.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.3.1_A.1.4.3.

8.2.2.3.1_A.1.4.2 Test procedure

1. Configure SCC according to Annex C . 0, C.1 and Annex C.3.2 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for *PhysicalConfigDedicated-DEFAULT* is defined in Table 8.2.2.3.1_A.1.4.3-1. *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 8.2.2.3.1_A.1.4.3-1A.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.3.1_A.1.3-1 and 8.2.2.3.1_A.1.3-2 on both PCC and SCC. The SS sends downlink MAC padding bits on the DL RMC.

5. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.2.3.1_A. 1.5-1 as appropriate.

6. Measure the average throughput per component carrier for a duration sufficient to achieve statistical significance according to Annex G clause G.3A, Table G.3A.5-7 on both PCC and SCC. Count the number of NACKs, ACKs and statDTXs on the UL during each subtest on both component carriers

7. Repeat steps from 1 to 6 for each subtest in Tables 8.2.2.3.1_A. 1. 5-1 as appropriate

8.2.2.3.1_A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.2.2.3.1_A.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.3.1_A.1.4.3-1A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
antennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			
}			

8.2.2.3.1_A.1.5 Test requirement

Table 8.2.2.3.1_A.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for the throughput test shall meet or exceed the specified value in Tables 8.2.2.3.1_A.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.3.1_A.1.5-1: Test requirement Large Delay CDD (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category	CA Applicability
						Fraction of Maximum Throughput (%)	SNR (dB)		
1	2x20 MHz	R.30-1 TDD	OP.1 TDD (Note 1)	EVA70	2x2 Low	70	13.7+ TT	5-8	CL_C
2	2x20 MHz	R.30-2 TDD	OP.1 TDD (Note 1)	[EVA70]	2x2 Low	70	[TBD]	3	CL_C
3	2x20 MHz	R.35-1 TDD	OP.1 TDD (Note 1)	EVA5	2x2 Low	70	[TBD]	4	CL_C
Note1: For CA capable UE, the OCNG pattern applies for each CC									

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.2.2.3.2 TDD PDSCH Open Loop Spatial Multiplexing 4x2

8.2.2.3.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on four antenna ports using large delay CDD.

8.2.2.3.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8 and forward.

8.2.2.3.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1 and 8.2.2.3.2.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.3.2.3-2 for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.2.3.2.3-1: Test Parameters for Large Delay CDD (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
N_{oc} at antenna port		dBm/15kHz	-98
ACK/NACK feedback mode			Bundling
Note 1: $P_B = 1$			

Table 8.2.2.3.2.3-2: Minimum performance Large Delay CDD (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.14 TDD	OP.1 TDD	EVA70	4x2 Low	70	14.2	2-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.3.

8.2.2.3.2.4 Test description

8.2.2.3.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Table 8.2.2.3.2.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.11 for antenna configuration 4x2.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1 and 8.2.2.3.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.3.2.4.3.

8.2.2.3.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.3.2.3-1 and 8.2.2.3.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Table 8.2.2.3.2.5-1 as appropriate.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.3.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.2.2.3.2.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.2.3.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power for Test number 1

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm3	1111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.2.2.3.2.5 Test requirement

Table 8.2.2.3.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Tables 8.2.2.3.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.3.2.5-1: Test requirement Large Delay CDD (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.14 TDD	OP.1 TDD	EVA70	4x2 Low	70	15.1	2-5

8.2.2.3.3_C TDD PDSCH Open Loop Spatial Multiplexing 2x2 for eICIC

8.2.2.3.3_C.1 TDD PDSCH Open Loop Spatial Multiplexing 2x2 for eICIC (non-MBSFN ABS)

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

-Step of test procedure may be confirmed or updated.

- Test Tolerance is undefined.

- Connection diagram in Annex A of TS 36.508 is TBD

8.2.2.3.3_C.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.2.3.3_C.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.2.2.3.3_C.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1 and 8.2.2.3.3_C.1.3-1,and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

The requirements for non-MBSFN ABS are specified in Table 8.2.2.3.3_C.1.3-2, with the addition of parameters in Table 8.2.2.3.3_C.1.3-1and the downlink physical channel setup according to Annex C.3.2 and Annex C.3.3.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.3.3_C.1.3-2for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.2.3.3_C.1.3-1: Test Parameters for Large Delay CDD (FRC) – no MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Uplink downlink configuration			1	1
Special subframe configuration			4	4
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-102 (Note 2)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N_{oc3}	dBm/15kHz	-94.8 (Note 4)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.2.3.3_C.1.3-2	6
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Cell Id			0	1
Time Offset between Cells		μs	2.5 (synchronous cells)	
ABS pattern (Note 5)			N/A	0000010001, 0000000001
RLM/RRM Measurement Subframe Pattern (Note 6)			0000000001, 0000000001	N/A
CSI Subframe Sets (Note 7)	$C_{CSI,0}$		0000010001, 0000000001	N/A
	$C_{CSI,1}$		1100101000 1100111000	N/A
Number of control OFDM symbols			2	
ACK/NACK feedback mode			Multiplexing	
PDSCH transmission mode			3	N/A
Cyclic prefix			Normal	Normal

Note 1: $P_B = 1$.

Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.

Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.

Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.

Note 5: ABS pattern as defined in [14]. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.

Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].

Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].

Note 8: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.

Note 9: SIB-1 will not be transmitted in Cell2 in this test.

Table 8.2.2.3.3_C.1.3-2: Minimum performance Large Delay CDD (FRC) – no MBSFN ABS

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.11 TDD	OP.1 TDD	OP.1 TDD	EVA 5	EVA 5	2x2 Low	70	14.0	2-8
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\widehat{E}_s / N_{oc2}$ of cell 1.									
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.3.3.

8.2.2.3.3_C.1.4 Test description

8.2.2.3.3_C.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.2.3.3_C.1.3-2, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure TBD for antenna configuration 2x2.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.2-1 and 8.2.2.3.3_C.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.3.3_C.1.4.3.

8.2.2.3.3_C.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.3.3_C.1.3-1 and 8.2.2.3.3_C.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.2.2.3.3_C.1.5-1 as appropriate.
3. Set the Cell2 –aggressor cell- as defined in Tables 8.2.2.3.3_C.1.3-1, 8.2.2.3.3_C.1.5-1 and according to Annex C3.3
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.3.3_C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.2.3.3_C.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.3.3_C.1.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000000010000000001'	BIT STRING (SIZE (20))	
}			
}			
}			
}			

Table 8.2.2.3.3_C.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000100010000000001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'11001010001100111000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

8.2.2.3.3_C.1.5 Test requirement

Table 8.2.2.3.3_C.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.2.3.3_C.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.3.3_C.1.5-1: Test Requirement Large Delay CDD (FRC)

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.11 TDD	OP.1 TDD	OP.1 TDD	EVA 5	EVA 5	2x2 Low	70	14.0+TT	2-8
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									

8.2.2.3.3_C.2 TDD PDSCH Open Loop Spatial Multiplexing 2x2 for eICIC (MBSFN ABS)

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

-Step of test procedure may be confirmed or updated.

- Test Tolerance is undefined.

- Connection diagram in Annex A of TS 36.508 is TBD

8.2.2.3.3_C.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using large delay CDD.

8.2.2.3.3_C.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.2.2.3.3_C.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1 and 8.2.2.3.3_C.2.3-1and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

The requirements for MBSFN ABS are specified in Table 8.2.2.3.3_C.2.3-2, with the addition of parameters in Table 8.2.2.3.3_C.2.3-1and the downlink physical channel setup according to Annex C.3.2 and Annex C.3.3.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.3.3_C.2.3-2for the specified SNR. For open-loop spatial multiplexing performance with large delay CDD is specified.

Table 8.2.2.3.3_C.2.3-1: Test Parameters for Large Delay CDD (FRC) – MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Uplink downlink configuration			1	1
Special subframe configuration			4	4
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-102 (Note 2)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N_{oc3}	dBm/15kHz	-94.8 (Note 4)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.2.2.3.3_C.2.3-2	6
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	MBSFN
Cell Id			0	126
Time Offset between Cells		μs	2.5 (synchronous cells)	
ABS pattern (Note 5)			N/A	0000000001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 6)			0000000001 0000000001	N/A
CSI Subframe Sets (Note 7)	$C_{CSI,0}$		0000000001 0000000001	N/A
	$C_{CSI,1}$		1100111000 1100111000	N/A
MBSFN Subframe Allocation (Note 10)			N/A	000010
Number of control OFDM symbols			2	
ACK/NACK feedback mode			Multiplexing	
PDSCH transmission mode			3	N/A
Cyclic prefix			Normal	Normal

Note 1: $P_B = 1$.

Note 2: This noise is applied in OFDM symbols #1, #2, #3, #4, #5, #6, #7, #8, #9, #10,#11, #12, #13 of a subframe overlapping with the aggressor ABS.

Note 3: This noise is applied in OFDM symbol #0 of a subframe overlapping with the aggressor ABS.

Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.

Note 5: ABS pattern as defined in [14]. The 10th and 20th subframes indicated by ABS pattern are MBSFN ABS subframes. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.

Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]

Note 7: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].

Note 8: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.

Note 9: SIB-1 will not be transmitted in Cell2 in this test.

Note 10: MBSFN Subframe Allocation as defined in [5], one frame with 6 bits is chosen for MBSFN subframe allocation.

Table 8.2.2.3.3_C.2.3-2: Minimum performance Large Delay CDD (FRC) – MBSFN ABS

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.11 TDD	OP.1 TDD	OP.1 TDD	EVA 5	EVA 5	2x2 Low	70	12.2	2-8
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\widehat{E}_s / N_{oc2}$ of cell 1.									
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.3.3.

8.2.2.3.3_C.2.4 Test description

8.2.2.3.3_C.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: As specified per test number in Table 8.2.2.3.3_C.2.3-2, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure TBD for antenna configuration 2x2.
2. The parameter settings for the cell 1 are set up according to Tables 8.2.2-1 and 8.2.2.3.3_C.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.3.3_C.2.4.3.

8.2.2.3.3_C.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2A for C_RNTI to transmit the DL RMC according to Tables 8.2.2.3.3_C.2.3-1 and 8.2.2.3.3_C.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.2.2.3.3_C.2.5-1 as appropriate.
3. Set the Cell2 –aggressor cell- as defined in Tables 8.2.2.3.3_C.2.3-1, 8.2.2.3.3_C.2.5-1 and according to Annex C3.3
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.3.3_C.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.2.3.3_C.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm3		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm3	11		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.3.3_C.2.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10			
subframeConfig1-5-r10	'00000000010000000001'	BIT STRING (SIZE (20))	
}			
}			
}			
}			

Table 8.2.2.3.3_C.2.4.3-3: *CQI-ReportConfig-r10-DEFAULT*: Additional FDD PDSCH open loop spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
cqi-ReportAperiodic-r10	Not present		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000000010000000001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'11001110001100111000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

8.2.2.3.3_C.2.5 Test requirement

Table 8.2.2.3.3_C.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.2.3.3_C.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.3.3_C.2.5-1: Test Requirement Large Delay CDD (FRC)

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SNR (dB) (Note 2)	
1	R.11 TDD	OP.1 TDD	OP.1 TDD	EVA 5	EVA 5	2x2 Low	70	12.2+TT	2-8
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent. Note 2: SNR corresponds to of cell 1.									

8.2.2.4 TDD PDSCH Closed Loop Spatial Multiplexing Performance (Cell-Specific Reference Symbols)

8.2.2.4.1 TDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 2x2

8.2.2.4.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed loop spatial multiplexing with wideband and frequency selective precoding.

8.2.2.4.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8.

8.2.2.4.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1, 8.2.2.4.1.3-1 and 8.2.2.4.1.3-3 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.4.1.3-2 and 8.2.2.4.1.3-4 for the specified SNR. For single-layer spatial multiplexing closed loop rank-one performance with wideband and frequency selective precoding is specified. For multi-layer spatial multiplexing closed loop rank-two performance with wideband and frequency selective precoding is specified.

Table 8.2.2.4.1.3-1: Test Parameters for Testing Single-Layer Spatial Multiplexing (FRC)

Parameter		Unit	Test 1	Test 2
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)
N_{oc} at antenna port		dBm/15kHz	-98	-98
Precoding granularity		PRB	6	50
PMI delay (Note 2)		ms	10 or 11	10 or 11
Reporting interval		ms	1 or 4 (Note 3)	1or 4 (Note 3)
Reporting mode			PUSCH 1-2	PUSCH 3-1
CodeBookSubsetRestriction bitmap			001111	001111
ACK/NACK feedback mode			Multiplexing	Multiplexing

Note 1: $P_B = 1$
Note 2: If the UE reports in an available uplink reporting instance at SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)
Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms

Table 8.2.2.4.1.3-2: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.10 TDD	OP.1 TDD	EVA5	2x2 Low	70	-3.1	1-5
2	10 MHz	R.10 TDD	OP.1 TDD	EPA5	2x2 High	70	-2.8	1-5

Table 8.2.2.4.1.3-3: Test Parameters for Testing Multi-Layer Spatial Multiplexing

Parameter		Unit	Test 3	Test 4
Downlink power allocation	ρ_A	dB	-3	-3
	ρ_B	dB	-3 (Note 1)	-3 (Note 1)
N_{oc} at antenna port		dBm/15kHz	-98	-98
Precoding granularity		PRB	50	50
PMI delay (Note 2)		ms	10 or 11	10 or 11
Reporting interval		ms	1 or 4 (Note 3)	1 or 4 (Note 3)
Reporting mode			PUSCH 3-1	PUSCH 3-1
ACK/NACK feedback mode			Bundling	Bundling
CodeBookSubsetRestriction bitmap			110000	110000

Note 1: $P_B = 1$
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)
Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms

Table 8.2.2.4.1.3-4: Minimum performance Multi-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
3	10 MHz	R.11-1 TDD	OP.1 TDD	EVA5	2x2 Low	70	12.8	2-5
4	10 MHz	R.11-1 TDD	OP.1 TDD	ETU70	2x2 Low	70	13.9	2-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.4.

8.2.2.4.1.4 Test description

8.2.2.4.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Tables 8.2.2.4.1.3-2 and 8.2.2.4.1.3-4 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1, 8.2.2.4.1.3-1 and 8.2.2.4.1.3-3 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.4.1.4.3.

8.2.2.4.1.4.2 Test procedure

1. For single-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.2.4.1.3-1 and 8.2.2.4.1.3-2. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.2.4.1.3-3 and 8.2.2.4.1.3-4. The SS sends downlink MAC padding bits on the DL RMC.

2. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.

3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.2.4.1.5-1 and 8.2.2.4.1.5-2 as appropriate.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

5. Repeat steps from 1 to 4 for each test interval in Tables 8.2.2.4.1.5-1 and 8.2.2.4.1.5-2 as appropriate.

8.2.2.4.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.2.2.4.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop single-layer spatial multiplexing performance downlink power allocation for Test number 1,2

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	001111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.4.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation for Test number 3,4

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	110000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.4.1.4.3-3: *CQI-ReportConfig-DEFAULT:* Additional TDD PDSCH closed loop single -layer spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.2.2.4.1.4.3-4: *CQI-ReportConfig-DEFAULT:* Additional TDD PDSCH closed loop single/multi-layer spatial multiplexing performance downlink power allocation for Test number 2, 3, 4

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm31		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

8.2.2.4.1.5 Test requirement

Tables 8.2.2.4.1.3-1 and 8.2.2.4.1.3-3 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Tables 8.2.2.4.1.5-1 and 8.2.2.4.1.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.4.1.5-1: Test requirement Single-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.10 TDD	OP.1 TDD	EVA5	2x2 Low	70	-2.2	1-5
2	10 MHz	R.10 TDD	OP.1 TDD	EPA5	2x2 High	70	-2.0	1-5

Table 8.2.2.4.1.5-2: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
3	10 MHz	R.11-1 TDD	OP.1 TDD	EVA5	2x2 Low	70	13.7	2-5
4	10 MHz	R.11-1 TDD	OP.1 TDD	ETU70	2x2 Low	70	14.8	2-5

8.2.2.4.1_1 TDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 2x2 (Release 9 and forward)

8.2.2.4.1_1.1 Test purpose

Same test purpose as in clause 8.2.2.4.1.1.

8.2.2.4.1_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward.

8.2.2.4.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.2.4.1.3 with the following exceptions:

- Instead of Table 8.2.2.4.1.3-3 → use Table 8.2.2.4.1_1.3-1.
- Instead of Table 8.2.2.4.1.3-4 → use Table 8.2.2.4.1_1.3-2.

Table 8.2.2.4.1_1.3-1: Test Parameters for Testing Multi-Layer Spatial Multiplexing

Parameter		Unit	Test 3-4
Downlink power allocation	ρ_A	dB	-3
	ρ_B	dB	-3 (Note 1)
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	50
PMI delay (Note 2)		ms	10 or 11
Reporting interval		ms	1 or 4 (Note 3)
Reporting mode			PUSCH 3-1
ACK/NACK feedback mode			Bundling
CodeBookSubsetRestriction bitmap			110000

Note 1: $P_B = 1$
Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)
Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms

Table 8.2.2.4.1_1.3-2: Minimum performance Multi-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
3	10 MHz	R.35 TDD	OP.1 TDD	EPA5	2x2 Low	70	19.5	2-5
4	10 MHz	R.11-1 TDD	OP.1 TDD	ETU70	2x2 Low	70	13.9	2-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.4.

8.2.2.4.1_1.4 Test description

Same test description as in clause 8.2.2.4.1.4 with the following exceptions:

- Instead of Table 8.2.2.4.1.3-3 → use Table 8.2.2.4.1_1.3-1.
- Instead of Table 8.2.2.4.1.3-4 → use Table 8.2.2.4.1_1.3-2.
- Instead of Table 8.2.2.4.1.5-2 → use Table 8.2.2.4.1_1.5-1.

8.2.2.4.1_1.5 Test requirement

Same test requirements as in clause 8.2.2.4.1.5 with the following exceptions:

- Instead of Table 8.2.2.4.1.3-3 → use Table 8.2.2.4.1_1.3-1.

- Instead of Table 8.2.2.4.1.5-2 → use Table 8.2.2.4.1_1.5-1.

Table 8.2.2.4.1_1.5-1: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
3	10 MHz	R.35 TDD	OP.1 TDD	EPA5	2x2 Low	70	+20.4	2-5
4	10 MHz	R.11-1 TDD	OP.1 TDD	ETU70	2x2 Low	70	+14.8	2-5

8.2.2.4.2 TDD PDSCH Closed Loop Single/Multi Layer Spatial Multiplexing 4x2

8.2.2.4.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on four antenna ports using closed loop spatial multiplexing with wideband and frequency selective precoding.

8.2.2.4.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8.

8.2.2.4.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.2.2-1, 8.2.2.4.2.3-1 and 8.2.2.4.2.3-3 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.4.3-2 and 8.2.2.4.2.3-4 for the specified SNR. For single-layer spatial multiplexing closed loop rank-one performance with wideband and frequency selective precoding is specified. For multi-layer spatial multiplexing closed loop rank-two performance with wideband and frequency selective precoding is specified.

Table 8.2.2.4.2.3-1: Test Parameters for Testing Single-Layer Spatial Multiplexing (FRC)

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6
PMI delay (Note 2)		ms	10 or 11
Reporting interval		ms	1 or 4 (Note 3)
Reporting mode			PUSCH 1-2
CodeBookSubsetRestriction bitmap			000000000000 000000000000 000000000000 000000001111 111111111111
ACK/NACK feedback mode			Multiplexing
Note 1: $P_B = 1$ Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4) Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms			

Table 8.2.2.4.2.3-2: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.13 TDD	OP.1 TDD	EVA5	4x2 Low	70	-3.5	1-5

Table 8.2.2.4.2.3-3: Test Parameters for Testing Multi-Layer Spatial Multiplexing

Parameter		Unit	Test 2
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	6
PMI delay (Note 2)		ms	10 or 11
Reporting interval		ms	1 or 4 (Note 3)
Reporting mode			PUSCH 1-2
ACK/NACK feedback mode			Bundling
CodeBookSubsetRestriction bitmap			000000000000 000000000000 000001111111 111111110000 000000000000
Note 1: $P_B = 1$ Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4) Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms			

Table 8.2.2.4.2.3-4: Minimum performance Multi-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz	R.14 TDD	OP.1 TDD	EVA5	4x2 Low	70	10.7	2-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.4.

8.2.2.4.2.4 Test description

8.2.2.4.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: As specified per test number in Tables 8.2.2.4.2.3-2 and 8.2.2.4.2.3-4 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 Figure A.11 for antenna configuration 4x2.
2. The parameter settings for the cell are set up according to Tables 8.2.2-1, 8.2.2.4.2.3-1 and 8.2.2.4.2.3-3 as appropriate.
3. Downlink signals are initially set up according to Annex C.0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.4.2.4.3.

8.2.2.4.2.4.2 Test procedure

1. For single-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.2.4.2.3-1 and 8.2.2.4.2.3-2. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.2.4.2.3-3 and 8.2.2.4.2.3-4. The SS sends downlink MAC padding bits on the DL RMC.
2. SS schedules the UL transmission to carry the PUSCH CQI feedback via PDCCH DCI format 0 with CQI request bit set to 1 and I_MCS=29 and N_PRB allocated to be less or equal to 4.
3. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.2.4.2.5-1 and 8.2.2.4.2.5-2 as appropriate.
4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.
5. Repeat steps from 1 to 4 for each test interval in Tables 8.2.2.4.2.5-1 and 8.2.2.4.2.5-2 as appropriate.

8.2.2.4.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.2.2.4.2.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop spatial multiplexing performance downlink power allocation for Test numbers 1,2

Derivation Path: 36.508 clause 4.6.3			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.2.4.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop single-layer spatial multiplexing performance downlink power allocation for Test number 1

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000000000000 00000000111111111111 1111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.4.2.4.3-3: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation for Test number 2

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000011111111 11111111000000000000 0000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.4.2.4.3-4: *CQI-ReportConfig-DEFAULT:* Additional TDD PDSCH closed loop single/multi-layer spatial multiplexing performance downlink power allocation for Test number 1, 2

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

8.2.2.4.2.5 Test requirement

Tables 8.2.2.4.2.3-1 and 8.2.2.4.2.3-3 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2, for each throughput test shall meet or exceed the specified value in Tables 8.2.2.4.2.5-1 and 8.2.2.4.2.5-2 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.4.2.5-1: Test requirement Single-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz	R.13 TDD	OP.1 TDD	EVA5	4x2 Low	70	-2.6	1-5

Table 8.2.2.4.2.5-2: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz	R.14 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.6	2-5

8.2.2.4.2_1 TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 (Release 9 and forward)

8.2.2.4.2_1.1 Test purpose

Same test purpose as in clause 8.2.2.4.2.1.

8.2.2.4.2_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward.

8.2.2.4.2_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.2.2.4.2.3 with the following exceptions:

- Instead of Table 8.2.2.4.2.3-3 → use Table 8.2.2.4.2_1.3-1.
- Instead of Table 8.2.2.4.2.3-4 → use Table 8.2.2.4.2_1.3-2.

Table 8.2.2.4.2_1.3-1: Test Parameters for Testing Multi-Layer Spatial Multiplexing

Parameter		Unit	Test 2
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)

N_{oc} at antenna port	dBm/15kHz	-98
Precoding granularity	PRB	6
PMI delay (Note 2)	ms	10 or 11
Reporting interval	ms	1 or 4 (Note 3)
Reporting mode		PUSCH 1-2
ACK/NACK feedback mode		Bundling
CodeBookSubsetRestriction bitmap		0000000000000 0000000000000 0000001111111 1111111110000 000000000000
Note 1: $P_B = 1$ Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4) Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms		

Table 8.2.2.4.2_1.3-2: Minimum performance Multi-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz	R.36 TDD	OP.1 TDD	EPA5	4x2 Low	70	15.7	2-5

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.4.

8.2.2.4.2_1.4 Test description

Same test description as in clause 8.2.2.4.2.4 with the following exceptions:

- Instead of Table 8.2.2.4.2.3-3 → use Table 8.2.2.4.2_1.3-1.
- Instead of Table 8.2.2.4.2.3-4 → use Table 8.2.2.4.2_1.3-2.
- Instead of Table 8.2.2.4.2.5-2 → use Table 8.2.2.4.2_1.5-1.

8.2.2.4.2_1.5 Test requirement

Same test requirements as in clause 8.2.2.4.2.5 with the following exceptions:

- Instead of Table 8.2.2.4.2.3-3 → use Table 8.2.2.4.2_1.3-1.
- Instead of Table 8.2.2.4.2.5-2 → use Table 8.2.2.4.2_1.5-1.

Table 8.2.2.4.2_1.5-1: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz	R.36 TDD	OP.1 TDD	EPA5	4x2 Low	70	+16.6	2-5

8.2.2.4.2_A TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA

8.2.2.4.2_A.1 TDD PDSCH Closed Loop Multi Layer Spatial Multiplexing 4x2 for CA (intra-band contiguous DL CA)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- Connection diagram is FFS.
- Test tolerance is undefined
- Test frequencies are FFS
- Statistical significance related parameters in Annex G.3A are FFS

8.2.2.4.2_A.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for transmission on two antenna ports using closed-loop spatial multiplexing.

8.2.2.4.2_A.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release10 and forward which supports Intra-band contiguous DL CA.

8.2.2.4.2_A.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.2, with the addition of the relevant parameters in Tables 8.2.1-1, 8.2.2.4.2_A.1.3-1 and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.2.2.4.2_A.1.3-2 for the specified SNR. For multi-layer spatial multiplexing closed loop rank-two performance with wideband and frequency selective precoding is specified.

Table 8.2.2.4.2_A.1.3-1: Test Parameters for Testing Multi-Layer Spatial Multiplexing

Parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	-6
	ρ_B	dB	-6 (Note 1)
N_{oc} at antenna port		dBm/15kHz	-98
Precoding granularity		PRB	8
PMI delay (Note 2)		ms	10 or 11
Reporting interval		ms	1 or 4 (Note 2)
Reporting mode			PUSCH 1-2
ACK/NACK feedback mode			- (Note 5)
CodeBookSubsetRestriction bitmap			0000000000000000000000000000001111111111111111110000000000
CSI request field (Note 3)			'10'
Note 1: $P_B = 1$ Note 2: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4) Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms Note 4: CSI request field applies for CA demodulation requirement only. Multiple CC-s under test are configured as the 1st set of serving cells by high layers. Note 5: ACK/NACK bits are transmitted using PUSCH with PUCCH format 1b with channel selection configured.			

Table 8.2.2.4.2_A.1.3-2: Minimum performance Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category	CA capability
						Fraction of Maximum Throughput (%)	SNR (dB)		
1	2x20 MHz	R.43 TDD	OP.1 TDD (Note 1)	EVA5	4x2 Low	70	11.1	5-8	CL_C
Note 1: For CA capable UE, the OCNG pattern applies for each CC.									

The normative reference for this requirement is TS 36.101 [2] clause 8.2.2.4.

8.2.2.4.2_A.1.4 Test description

8.2.2.4.2_A.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause FFS.

Channel Bandwidths to be tested: As specified per test number in Tables 8.2.2.4.2_A.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.2 .

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure FFS for antenna configuration 4x2.
2. The parameter settings for the cell are set up according to Tables 8.2.1-1, 8.2.2.4.2_A.1.3-1 as appropriate.
3. Downlink signals for PCC are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.2.2.4.2_A.1.4.3.

8.2.2.4.2_A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for *PDSCH-ConfigDedicated-DEFAULT* is defined in Table 8.2.2.4.2_A.1.4.3-1, *PhysicalConfigDedicatedSCell-r10-DEFAULT* is defined in Table 8.2.2.4.2_A.1.4.3-2A , *PhysicalConfigDedicated-DEFAULT* is defined in Table 8.2.2.4.2_A.1.4.3-2, *CQI-ReportConfig-DEFAULT* is defined in Table 8.2.2.4.2_A.1.4.3-3, *CQI-ReportConfigSCell-DEFAULT* is defined in Table 8.2.2.4.2_A.1.4.3-4, *CQI-ReportAperiodic-r10-DEFAULT* is defined in Table 8.2.2.4.2_A.1.4.3-5.
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. For multi-layer spatial multiplexing, SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Tables 8.2.2.4.2_A.1.3-1 and 8.2.2.4.2_A.1.3-3. The SS sends downlink MAC padding bits on the DL RMC.
5. SS schedules the UL transmission to carry the PUSCH CSI feedback via PDCCH DCI format 0 with CSI request bit set to '10' and I_MCS=29 and N_PRB allocated to be less or equal to 20.
6. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.2.2.4.2_A.1.5-1 as appropriate.
7. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during the test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.2.2.4.2_A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.2.2.4.2_A.1.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop spatial multiplexing performance downlink power allocation

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB-6		
}			

Table 8.2.2.4.2_A.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation Test number 1

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000011111111 11111111000000000000 0000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.4.2_A.1.4.3-2A: *PhysicalConfigDedicatedSCell-r10-DEFAULT*: Additional FDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-6A			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated SCell-r10-DEFAULT ::= SEQUENCE {			
nonUL-Configuration-r10 SEQUENCE {			
antennaInfo-r10 CHOICE {			
antennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	00000000000000000000 00000000000011111111 11111111000000000000 0000		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.2.2.4.2_A.1.4.3-3: *CQI-ReportConfig-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	rm12		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic	Not present		
}			

Table 8.2.2.4.2_A.1.4.3-4: *CQI-ReportConfig-r10-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-2AA			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10 ::= SEQUENCE {			
cqi-ReportAperiodic-r10	CQI-ReportAperiodic-r10-DEFAULT		
nomPDSCH-RS-EPRE-Offset	0		
cqi-ReportPeriodic-r10	Not present		
pmi-RI-Report-r9	Not present		
csi-SubframePatternConfig-r10	Not present		
}			

Table 8.2.2.4.2_A.1.4.3-5: *CQI-ReportAperiodic-r10-DEFAULT:* Additional TDD PDSCH closed loop multi-layer spatial multiplexing performance downlink power allocation

Derivation Path: 36.508 clause 4.6.3 Table 4.6.3-1A			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportAperiodic-r10 ::=CHOICE {			
setup SEQUENCE {			
cqi-ReportModeAperiodic-r10	rm12		
aperiodicCSI-Trigger-r10 ::= SEQUENCE {			
trigger1-r10	11000000	P-Cell, S-Cell report	
trigger2-r10	00000000	No report	
}			
}			
}			

8.2.2.4.2_A.1.5 Test requirement

Tables 8.2.2.4.2_A.1.3-1 define the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.2 for each throughput test shall meet or exceed the specified value in Tables 8.2.2.4.2_A.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.2.2.4.2_A.1.5-1: Test requirement Multi-Layer Spatial Multiplexing (FRC)

Test number	Band-width	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category	CA capability
						Fraction of Maximum Throughput (%)	SNR (dB)		
1	2x20 MHz	R.43 TDD	OP.1 TDD (Note 1)	EVA5	4x2 Low	70	11.1 + TT	5-8	CL_C
Note 1: For CA capable UE, the OCNG pattern applies for each CC.									

Decide pass or fail for each subtest according to Annex G.3A.4. Decide the entire test pass or fail according to Annex G.3A.6.

8.3 Demodulation of PDSCH (User-Specific Reference Symbols)

8.3.1 FDD

The parameters specified in Table 8.3.1-1 are valid for FDD unless otherwise stated.

Table 8.3.1-1: Common Test Parameters for User-specific Reference Symbols

Parameter	Unit	Value
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Number of HARQ processes	Processes	8
Maximum number of HARQ transmission		4
Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM {0,0,1,2} for 64QAM
Number of OFDM symbols for PDCCH	OFDM symbols	2
Precoder update granularity		Frequency domain: 1 PRG for Transmission mode 9 Time domain: 1 ms
Note 1: as specified in Table 4.2-2 in TS 36.211 [8]. Note 2: as specified in Table 4.2-1 in TS 36.211 [8].		

8.3.1.1 FDD PDSCH Single-layer Spatial Multiplexing Performance (UE-Specific Reference Symbols)

8.3.1.1.1_D FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 without a simultaneous transmission for eDL-MIMO

8.3.1.1.1_D.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna ports 7 or 8 without a simultaneous transmission on the other antenna port and multiple CSI reference symbols configurations with non-zero and zero transmission power.

8.3.1.1.1_D.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward that support eDL-MIMO. Applicability requires support for FGI bit 103.

8.3.1.1.1_D.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.3, with the addition of the relevant parameters in Tables 8.3.1-1, 8.3.1.1.1_D.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.1.1.1_D.3-2 for the specified SNR.

Table 8.3.1.1.1_D.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with multiple CSI-RS configurations

parameter		Unit	Test 1	Test 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0 (Note 1)
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0,1	
CSI reference signals			Antenna ports 15,…,18	Antenna ports 15,…,18
Beamforming model			Annex B.4.1	Annex B.4.1
CSI-RS periodicity and subframe offset $T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$		Subframes	5 / 2	5 / 2
CSI reference signal configuration			0	3
Zero-power CSI-RS configuration $I_{\text{CSI-RS}}$ / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	3 / 0001000000000000	3 / 0001000000000000
N_{oc} at antenna port		dBm/15kHz	-98	-98
Symbols for unused PRBs			OCNG (Note 4)	OCNG (Note 4)
Number of allocated resource blocks (Note 2)		PRB	50	50
Simultaneous transmission			No	Yes (Note 3, 5)
PDSCH transmission mode			9	9

Note 1: $P_B = 1$.
Note 2: The modulation symbols of the signal under test are mapped onto antenna port 7 or 8.
Note 3: Modulation symbols of an interference signal is mapped onto the antenna port (7 or 8) not used for the input signal under test.
Note 4: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.
Note 5: The two UEs' scrambling identities n_{SCID} are set to 0 for CDM-multiplexed DM RS with interfering simultaneous transmission test cases.

Table 8.3.1.1.1_D.3-2: Minimum performance for CDM-multiplexed DM RS without simultaneous transmission (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.43 FDD	OP.1 FDD	EVA5	2x2 Low	70	-1	1-8

The normative reference for this requirement is TS 36.101 [2] clause 8.3.1.1.

8.3.1.1.1_D.4 Test description

8.3.1.1.1_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Tables 8.3.1-1 and 8.3.1.1.1_D.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.1.1.1_D.4.3.

8.3.1.1.1_D.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.1.1.1_D.3-1, 8.3.1.1.1_D.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.1.1.1_D.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/PDSCH for the test UE are sent on antenna port 7 (or 8) using two Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity specified in Table 8.3.1-1. CSI-RS are sent on antenna ports 15-18 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.1.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.1.1.1_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.1.1.1_D.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.3.1.1.1_D.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

Table 8.3.1.1.1_D.4.3-3: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	0 for Test 1 3 for Test 2	Parameter: CSI reference signal configuration	
subframeConfig-r10	2	$\Delta_{\text{CSI-RS}} = I_{\text{CSI–RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI–RS}}$	
p-C-r10	-3 dB	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	3	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	2	Parameter: $I_{\text{CSI–RS}}$	
}			
}			
}			

8.3.1.1.1_D.5 Test requirement

Table 8.3.1.1.1_D.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.3.2 for the throughput test shall meet or exceed the specified value in Table 8.3.1.1.1_D.5-1 for the specified SNR including test tolerances for the throughput test.

Table 8.3.1.1.1_D.5-1: Test requirement for CDM-multiplexed DM RS without simultaneous transmission (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.43 FDD	OP.1 FDD	EVA5	2x2 Low	70	-.01	1-8

8.3.1.1.2_D FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 with a simultaneous transmission for eDL-MIMO

8.3.1.1.2_D.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna ports 7 or 8 with a simultaneous transmission on the other antenna port and multiple CSI reference symbols configurations with non-zero and zero transmission power.

8.3.1.1.2_D.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward that support eDL-MIMO. Applicability requires support for FGI bit 103.

8.3.1.1.2_D.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.3, with the addition of the relevant parameters in Tables 8.3.1-1, 8.3.1.1.2_D.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.1.1.2_D.3-2 for the specified SNR.

Table 8.3.1.1.2_D.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with multiple CSI-RS configurations

parameter		Unit	Test 1	Test 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0 (Note 1)
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0,1	
CSI reference signals			Antenna ports 15,…,18	Antenna ports 15,…,18
Beamforming model			Annex B.4.1	Annex B.4.1
CSI-RS periodicity and subframe offset $T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$		Subframes	5 / 2	5 / 2
CSI reference signal configuration			0	3
Zero-power CSI-RS configuration $I_{\text{CSI-RS}}$ / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	3 / 0001000000000000	3 / 0001000000000000
N_{oc} at antenna port		dBm/15kHz	-98	-98
Symbols for unused PRBs			OCNG (Note 4)	OCNG (Note 4)
Number of allocated resource blocks (Note 2)		PRB	50	50
Simultaneous transmission			No	Yes (Note 3, 5)
PDSCH transmission mode			9	9

Note 1: $P_B = 1$.

Note 2: The modulation symbols of the signal under test are mapped onto antenna port 7 or 8.

Note 3: Modulation symbols of an interference signal is mapped onto the antenna port (7 or 8) not used for the input signal under test.

Note 4: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Note 5: The two UEs' scrambling identities n_{SCID} are set to 0 for CDM-multiplexed DM RS with interfering simultaneous transmission test cases.

Table 8.3.1.1.2_D.3-2: Minimum performance for CDM-multiplexed DM RS with interfering simultaneous transmission (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz 64QAM 1/2	R.50 FDD	OP.1 FDD	EPA5	2x2 Low	70	21.9	2-8

Note 1: The reference channel applies to both the input signal under test and the interfering signal.

The normative reference for this requirement is TS 36.101 [2] clause 8.3.1.1.

8.3.1.1.2_D.4 Test description

8.3.1.1.2_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Tables 8.3.1-1 and 8.3.1.1.2_D.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.1.1.2_D.4.3.

8.3.1.1.2_D.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.1.1.2_D.3-1, 8.3.1.1.2_D.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.1.1.2_D.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/PDSCH for the test UE are sent on antenna port 7 (or 8) and another simultaneous transmission of DRS/PDSCH not for the test UE are sent on antenna port 8 (or 7). The DRS/PDSCH transmissions use two Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity specified in Table 8.3.1-1. CSI-RS are sent on antenna ports 15-18 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.1.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.1.1.2_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.1.1.2_D.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.3.1.1.2_D.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

Table 8.3.1.1.2_D.4.3-3: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	0 for Test 1 3 for Test 2	Parameter: CSI reference signal configuration	
subframeConfig-r10	2	$\Delta_{\text{CSI-RS}} = I_{\text{CSI–RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI–RS}}$	
p-C-r10	-3 dB	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	3	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	2	Parameter: $I_{\text{CSI–RS}}$	
}			
}			
}			

8.3.1.1.2_D.5 Test requirement

Table 8.3.1.1.2_D.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.3.2 for the throughput test shall meet or exceed the specified value in Table 8.3.1.1.2_D.5-1 for the specified SNR including test tolerances for the throughput test.

Table 8.3.1.1.2_D.5-1: Test requirement for CDM-multiplexed DM RS with interfering simultaneous transmission (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz 64QAM 1/2	R.50 FDD	OP.1 FDD	EPA5	2x2 Low	70	22.8	2-8
Note 1: The reference channel applies to both the input signal under test and the interfering signal.								

8.3.1.1.3 FDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM9 Interference Model - Enhanced Performance Requirement Type A

Editor's notes: This test case is incomplete. The following item is missing or incomplete:

-Test tolerances are incomplete

-Connection diagram is TBD

8.3.1.1.3.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna ports 7 or 8 without a simultaneous transmission on the other antenna port in the serving cell when the PDSCH transmission in the serving cell is interfered by PDSCH of one dominant interfering cell applying transmission mode 9 interference model defined in clause B.5.4.

8.3.1.1.3.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 11 and forward that support enhanced receiver Type A.

8.3.1.1.3.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.3, with the addition of the relevant parameters in Tables 8.3.1-1, 8.3.1.1.3.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.1.1.3.3-2 for the specified SNR.

Table 8.3.1.1.3.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with TM9 interference model

parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
CSI reference signals			Antenna ports 15,…,18	N/A
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	5 / 2	N/A
CSI reference signal configuration			0	N/A
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.73
$BW_{Channel}$		MHz	10	10
Cyclic Prefix			Normal	Normal
Cell Id			0	126
Number of control OFDM symbols			2	2
PDSCH transmission mode			9	N/A
Beamforming model			As specified in clause B.4.3 (Note 4, 5)	N/A
Interference model			N/A	As specified in clause B.5.4
Probability of occurrence of transmission rank in interfering cells	Rank 1		N/A	70
	Rank 2		N/A	30
Precoder update granularity		PRB	50	6
PMI delay (Note 5)		Ms	8	N/A
Reporting interval		Ms	5	N/A
Reporting mode			PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			0000000000000000 0000000000000000 0000000000000000 1111111111111111	N/A
Symbols for unused PRBs			OCNG (Note 6)	N/A
Simultaneous transmission			No simultaneous transmission on the other antenna port in (7 or 8) not used for the input signal under test	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}´ is defined by its associated DIP value as specified in clause B.5.1.

Note 3: The modulation symbols of the signal under test in Cell 1 are mapped onto antenna port 7 or 8.

Note 4: The precoder in clause B.4.3 follows UE recommended PMI.

Note 5: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI

	cannot be applied at the eNB downlink before SF#(n+4).
Note 6:	These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.
Note 7:	All cells are time-synchronous.

Table 8.3.1.1.3.3-2: Enhanced Performance Requirement Type A, CDM-multiplexed DM RS with TM9 interference model

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.48 FDD	OP.1 FDD	N/A	EVA5	EVA5	4x2 Low	70	-1.1	1-8
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.									
Note 2: SINR corresponds to $\widehat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.									
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.									

The normative reference for this requirement is TS 36.101 [2] clause 8.3.1.1A.

8.3.1.1.3.4 Test description

8.3.1.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, TBD.
2. The parameter settings for the cell are set up according to Tables 8.3.1-1 and 8.3.1.1.3.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.1.1.3.4.3.

8.3.1.1.3.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.1.1.3.3-1, 8.3.1.1.3.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.1.1.3.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/PDSCH for the test UE are sent on antenna port 7 (or 8) using four Tx antennas with beam-forming model as specified in

Annex B.4.1 and precoder update granularity specified in Table 8.3.1.1.3.3-1. CSI-RS are sent on antenna ports 15-18 using four Tx antennas with mapping according to beam-forming model as specified in Annex B.4.1.

3. Set the Cell2 –aggressor cell- as defined in Tables 8.3.1.1.3.3-1, 8.3.1.1.3.3-2 and according to Annex B.4.3.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.1.1.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.1.1.3.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.3.1.1.3.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	000000000000000000 000000000000000000 000000000000111111 1111111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

Table 8.3.1.1.3.4.3-3: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	0	Parameter: CSI reference signal configuration	
subframeConfig-r10	2	$\Delta_{\text{CSI-RS}} = I_{\text{CSI–RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI–RS}}$	
p-C-r10	-3 dB	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	NULL	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	NULL	Parameter: $I_{\text{CSI–RS}}$	
}			
}			
}			

Table 8.3.1.1.3.4.3-4: CQI-ReportPeriodic-r10

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-2AC CQI-ReportPeriodic-r10-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	25	FDD	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
}			
ri-ConfigIndex	483	FDD	
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			

8.3.1.1.3.5 Test requirement

Table 8.3.1.1.3.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.3.2 for the throughput test shall meet or exceed the specified value in Table 8.3.1.1.3.5-1 for the specified SNR including test tolerances for the throughput test.

Table 8.3.1.1.3.5-1: Enhanced Performance Requirement Type A, CDM-multiplexed DM RS with TM9 interference model

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.48 FDD	OP.1 FDD	N/A	EVA5	EVA5	4x2 Low	70	-1.1+TT	1-8
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.									
Note 2: SINR corresponds to $\hat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.									
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.									

8.3.1.2 FDD PDSCH Dual-layer Spatial Multiplexing Performance (UE-Specific Reference Symbols)

8.3.1.2.1_D FDD PDSCH Dual-layer Spatial Multiplexing for eDL-MIMO

8.3.1.2.1_D.1 Test purpose

To verify the UE's rank-2 performance and ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for dual-layer transmission on antenna ports 7 and 8 using DM-RS with full RB allocation with multiple CSI reference symbol configurations with non-zero and zero transmission power.

8.3.1.2.1_D.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward that support eDL-MIMO. Applicability requires support for FGI bit 103.

8.3.1.2.1_D.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.3.3, with the addition of the relevant parameters in Tables 8.3.1-1, 8.3.1.2.1_D.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.1.2.1_D.3-2 for the specified SNR.

Table 8.3.1.2.1_D.3-1: Test Parameters for Testing CDM-multiplexed DM RS (dual layer) with multiple CSI-RS configurations

parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	-3
Cell-specific reference signals			Antenna ports 0 and 1
CSI reference signals			Antenna ports 15,16
Beamforming model			Annex B.4.2
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	5 / 2
CSI reference signal configuration			8
Zero-power CSI-RS configuration I_{CSI-RS} / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	3 / 0010000000000000
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Number of allocated resource blocks (Note 2)		PRB	50
Simultaneous transmission			No
PDSCH transmission mode			9

Note 1: $P_B = 1$.

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.3.1.2.1_D.3-2: Minimum performance for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.51 FDD	OP.1 FDD	EPA5	2x2 Low	70	13.3	2-8

The normative reference for this requirement is TS 36.101 [2] clause 8.3.1.2.

8.3.1.2.1_D.4 Test description

8.3.1.2.1_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A. 10.
2. The parameter settings for the cell are set up according to Tables 8.3.1-1 and 8.3.1.2.1_D.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.1.2.1_D.4.3.

8.3.1.2.1_D.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.1.2.1_D.3-1, 8.3.1.2.1_D.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.1.2.1_D.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna ports 7 and 8 using two Tx antennas with beam-forming model as specified in Annex B.4.2 and precoder update granularity specified in Table 8.3.1-1. CSI-RS are sent on antenna ports 15 and 16 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.2.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.1.2.1_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.1.2.1_D.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.3.1.2.1_D.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

Table 8.3.1.2.1_D.4.3-3: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	8	Parameter: CSI reference signal configuration	
subframeConfig-r10	2	$\Delta_{\text{CSI-RS}} = I_{\text{CSI–RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI–RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	3	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	2	Parameter: $I_{\text{CSI–RS}}$	
}			
}			
}			

8.3.1.2.1_D.5 Test requirement

Table 8.3.1.2.1_D.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.3.3.1 for the throughput test shall meet or exceed the specified value in Table 8.3.1.2.1_D.5-1 for the specified SNR including test tolerances for the throughput test.

Table 8.3.1.2.1_D.5-1: Test requirement for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.51 FDD	OP.1 FDD	EPA5	2x2 Low	70	14.2	2-8

8.3.2 TDD

The parameters specified in Table 8.3.2-1 are valid for TDD unless otherwise stated.

Table 8.3.2-1: Common Test Parameters for User-specific Reference Symbols

Parameter	Unit	Value
Uplink downlink configuration (Note 1)		1
Special subframe configuration (Note 2)		4
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Number of HARQ processes. All these HARQ processes are used.	Processes	7
Maximum number of HARQ transmission		4
Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM {0,0,1,2} for 64QAM
Number of OFDM symbols for PDCCH	OFDM symbols	2
Precoder update granularity		Frequency domain: 1 PRB for Transmission mode 7 & 8, 1 PRG for Transmission mode 9 Time domain: 1 ms
ACK/NACK feedback mode		Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8]. Note 2: as specified in Table 4.2-1 in TS 36.211 [8].		

For all test cases, the SNR is defined as:

$$SNR = \frac{\hat{E}_s^{(1)} + \hat{E}_s^{(2)}}{N_{oc}^{(1)} + N_{oc}^{(2)}},$$

where the superscript indicates the receiver antenna connector. The SNR requirement applies for the UE categories given for each test.

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.

8.3.2.1 TDD PDSCH Single-layer Spatial Multiplexing Performance (UE-Specific Reference Symbols)

8.3.2.1.1 TDD PDSCH Single-layer Spatial Multiplexing on antenna port 5 (Release 8 and forward)

8.3.2.1.1.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna port 5 using user-specific reference signals with full RB or single RB allocation.

8.3.2.1.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8 and forward.

8.3.2.1.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.3.1, with the addition of the relevant parameters in Tables 8.3.2-1, 8.3.2.1.1.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.3.2.1.1.3-2 for the specified SNR.

Table 8.3.2.1.1.3-1: Test Parameters for Testing DRS

parameter		Unit	Test 1	Test 2	Test 3	Test 4
Downlink power allocation	ρ_A	dB	0	0	0	0
	ρ_B	dB	0 (Note 1)	0 (Note 1)	0 (Note 1)	0 (Note 1)
	σ	dB	0	0	0	0
Cell-specific reference signals		Antenna port 0				
Beamforming model		Annex B.4.1				
N_{oc} at antenna port		dBm/15kHz	-98	-98	-98	-98
Symbols for unused PRBs			OCNG (Note 2)	OCNG (Note 2)	OCNG (Note 2)	OCNG (Note 2)
PDSCH transmission mode			7	7	7	7
Note 1: $P_B = 0$						
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.						

Table 8.3.2.1.1.3-2: Minimum performance DRS (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.25 TDD	OP.1 TDD	EPA5	2x2 Low	70	-0.8	1-5
2	10 MHz 16QAM 1/2	R.26 TDD	OP.1 TDD	EPA5	2x2 Low	70	7.0	2-5
3	10 MHz 64QAM 3/4	R.27 TDD	OP.1 TDD	EPA5	2x2 Low	70	17.0	2-5
4	10 MHz 16QAM 1/2	R.28 TDD	OP.1 TDD	EPA5	2x2 Low	30	1.7	1-5

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.

8.3.2.1.1.4 Test description

8.3.2.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10 for antenna configuration 2x2.
2. The parameter settings for the cell are set up according to Tables 8.3.2-1 and 8.3.2.1.1.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.1.1.4.3.

8.3.2.1.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1 for C_RNTI to transmit the DL RMC according to Tables 8.3.2.1.1.3-1, 8.3.2.1.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.1.1.5-1 as appropriate.

   BCH/CRS/PDCCH/PCFICH are sent on antenna port 0 using one Tx antenna, while DRS/Dedicated data for the test UE are sent on antenna port 5 using two Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity specified in Table 8.3.2-1.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.
4. Repeat steps from 1 to 3 for each test interval in Tables 8.3.2.1.1.5-1 as appropriate.

8.3.2.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.3.2.1.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*: Additional TDD PDSCH DRS performance downlink power allocation test point 1 requirement for Test number 1 - 4

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm7		
ue-TransmitAntennaSelection CHOICE {			
Release	NULL		
}			
}			
}			
}			

8.3.2.1.1.5 Test requirement

Table 8.3.2.1.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.3.1 for each throughput test shall meet or exceed the specified value in Table 8.3.2.1.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.3.2.1.1.5-1: Test requirement DRS

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.25 TDD	OP.1 TDD	EPA5	2x2 Low	70	0.1	1-5
2	10 MHz 16QAM 1/2	R.26 TDD	OP.1 TDD	EPA5	2x2 Low	70	7.9	2-5
3	10 MHz 64QAM 3/4	R.27 TDD	OP.1 TDD	EPA5	2x2 Low	70	17.9	2-5
4	10 MHz 16QAM 1/2	R.28 TDD	OP.1 TDD	EPA5	2x2 Low	30	2.6	1-5

8.3.2.1.1_1 TDD PDSCH Single-layer Spatial Multiplexing on antenna port 5 (Release 9 and forward)

8.3.2.1.1_1.1 Test purpose

Same test purpose as in clause 8.3.2.1.1.1.

8.3.2.1.1_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward of UE category 1.

8.3.2.1.1_1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 8.3.2.1.1.3 with the following exceptions:

- Instead of Table 8.3.2.1.1.3-1 -> use Table 8.3.2.1.1_1.3-1.
- Instead of Table 8.3.2.1.1.3-2 -> use Table 8.3.2.1.1_1.3-2.

Table 8.3.2.1.1_1.3-1: Test Parameters for Testing DRS (Antenna port 5)

Parameter		Unit	Test 1 (Note 4)	Test 2	Test 3	Test 4 (Note 4)
Downlink power allocation	ρ_A	dB	N/A	0	0	NA
	ρ_B	dB		0 (Note 1)	0 (Note 1)	
	σ	dB		0	0	
Cell-specific reference signals		Antenna port 0				
Beamforming model		Annex B.4.1				
N_{oc} at antenna port		dBm/15kHz	N/A	-98	-98	NA
Symbols for unused PRBs			N/A	OCNG (Note 2)	OCNG (Note 2)	N/A
PDSCH transmission mode			N/A	7	7	N/A

Note 1: $P_B = 0$
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.
Note 3: The modulation symbols of the signal under test are mapped onto antenna port 5.
Note 4: This tests are covered in subclause 8.3.2.1.1

Table 8.3.2.1.1_1.3-2: Minimum performance DRS (FRC) (Antenna port 5)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1 (Note 1)	N/A							
2	5MHz 16QAM 1/2	R.26-1 TDD	OP.1 TDD	EPA5	2x2 Low	70	7.0	1
3	10 MHz 64QAM 3/4	R.27-1 TDD	OP.1 TDD	EPA5	2x2 Low	70	17.0	1
4 (Note 1)	N/A							
Note 1: These tests are covered in subclause 8.3.2.1.1								

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.

8.3.2.1.1_1.4 Test description

Same test description as in clause 8.3.2.1.1.4 with the following exceptions:

- Instead of Table 8.3.2.1.1.3-1 -> use Table 8.3.2.1.1_1.3-1.
- Instead of Table 8.3.2.1.1.3-2 -> use Table 8.3.2.1.1_1.3-2.
- Instead of Table 8.3.2.1.1.5-1 -> use Table 8.3.2.1.1_1.5-1.

8.3.2.1.1_1.5 Test requirement

Same test requirement as in clause 8.3.2.1.1.5 with the following exceptions:

- Instead of Table 8.3.2.1.1.3-1 -> use Table 8.3.2.1.1_1.3-1.
- Instead of Table 8.3.2.1.1.5-1 -> use Table 8.3.2.1.1_1.5-1.

Table 8.3.2.1.1_1.5-1: Test requirement DRS (FRC) (Antenna port 5)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1 (Note 1)	N/A							
2	5MHz 16QAM 1/2	R.26-1 TDD	OP.1 TDD	EPA5	2x2 Low	70	7.9	1
3	10 MHz 64QAM 3/4	R.27-1 TDD	OP.1 TDD	EPA5	2x2 Low	70	17.9	1
4 (Note 1)	N/A							
Note 1: These tests are covered in subclause 8.3.2.1.1								

8.3.2.1.2 TDD PDSCH Single-layer Spatial Multiplexing on antenna port 7 or 8 without a simultaneous transmission

8.3.2.1.2.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna port 7 or 8 without a simultaneous transmission on the other antenna port using DM-RS with full RB allocation.

8.3.2.1.2.2 Test applicability

This test applies to Release 9 UEs that support enhanced Dual Layer TDD (TM8) and all types of E-UTRATDD UE release 10 and forward.

8.3.2.1.2.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.3.2, with the addition of the relevant parameters in Tables 8.3.2-1, 8.3.2.1.2.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.3.2.1.2.3-2 for the specified SNR.

Table 8.3.2.1.2.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer)

parameter		Unit	Test 1	Test 2	Test 3	Test 4 (Note 3)	Test 5 (Note 3)
Downlink power allocation	ρ_A	dB	0	0	0	N/A	N/A
	ρ_B	dB	0 (Note 1)	0 (Note 1)	0 (Note 1)	N/A	N/A
	σ	dB	-3	-3	-3		
Cell-specific reference signals			Antenna port 0 and antenna port 1				
N_{oc} at antenna port		dBm/15kHz	-98	-98	-98	N/A	N/A
Symbols for unused PRBs			OCNG (Note 4)	OCNG (Note 4)	OCNG (Note 4)	N/A	N/A
Simultaneous transmission			No	No	No	N/A	N/A

Note 1: $P_B = 1$
Note 2: The modulation symbols of the signal under test are mapped onto antenna port 7 or 8.
Note 3: Test 4 and Test 5 are covered in subclause 8.3.2.1.3.
Note 4: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.3.2.1.2.3-2: Minimum performance for CDM-multiplexed DM RS without simultaneous transmission (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.31 TDD	OP.1 TDD	EVA5	2x2 Low	70	-1.0	1-5
2	10 MHz 16QAM 1/2	R.32 TDD	OP.1 TDD	EPA5	2x2 Medium	70	7.7	2-5
	5MHz 16QAM 1/2	R.32-1 TDD	OP.1 TDD	EPA5	2x2 Medium	70	7.7	1
3	10 MHz 64QAM 3/4	R.33 TDD	OP.1 TDD	EPA5	2x2 Low	70	17.7	2-5
	10 MHz 64QAM 3/4	R.33-1 TDD	OP.1 TDD	EPA5	2x2 Low	70	17.7	1

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.

8.3.2.1.2.4 Test description

8.3.2.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Tables 8.3.2-1 and 8.3.2.1.2.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.1.2.4.3.

8.3.2.1.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2B for C_RNTI to transmit the DL RMC according to Tables 8.3.2.1.2.3-1, 8.3.2.1.2.3-2. The SS sends downlink MAC padding bits on the DL RMC.

2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.1.2.5-1 as appropriate.
BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/Dedicated data for the test UE are sent on antenna port 7 (or 8) using two Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity specified in Table 8.3.2-1.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

4. Repeat steps from 1 to 3 for each test interval in Tables 8.3.2.1.2.5-1 as appropriate.

8.3.2.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.3.2.1.2.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm8-v920		
}			
}			
Extension ::= SEQUENCE {			
antennaInfo-v920 ::= SEQUENCE{			
codebookSubsetRestriction-v920 CHOICE {			
n2TxAntenna-tm8-r9	111111		
}			
}			
}			
}			

8.3.2.1.2.5 Test requirement

Table 8.3.2.1.2.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.3.2 for each throughput test shall meet or exceed the specified value in Table 8.3.2.1.2.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.3.2.1.2.5-1: Test requirement for CDM-multiplexed DM RS without simultaneous transmission (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.31 TDD	OP.1 TDD	EVA5	2x2 Low	70	-0.1	1-5
2	10 MHz 16QAM 1/2	R.32 TDD	OP.1 TDD	EPA5	2x2 Medium	70	8.6	2-5
	5 MHz 16QAM 1/2	R.32-1 TDD	OP.1 TDD	EPA5	2x2 Medium	70	8.6	1
3	10 MHz 64QAM 3/4	R.33 TDD	OP.1 TDD	EPA5	2x2 Low	70	18.6	2-5
	10 MHz 64QAM 3/4	R.33-1 TDD	OP.1 TDD	EPA5	2x2 Low	70	18.6	1

8.3.2.1.2_D TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 without a simultaneous transmission for eDL-MIMO

8.3.2.1.2_D.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna ports 7 or 8 without a simultaneous transmission on the other antenna port and multiple CSI reference symbol configurations with non-zero and zero transmission power.

8.3.2.1.2_D.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward that support eDL-MIMO. Applicability requires support for FGI bit 104.

8.3.2.1.2_D.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.3.5, with the addition of the relevant parameters in Tables 8.3.2-1, 8.3.2.1.2_D.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.2.1.2_D.3-2 for the specified SNR.

Table 8.3.2.1.2_D.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with multiple CSI-RS configurations

Table 8.3.2.1.2_D.3-2: Minimum performance for CDM-multiplexed DM RS without simultaneous transmission (FRC) with multiple CSI-RS configurations

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.1A.

8.3.2.1.2_D.4 Test description

Parameter		Unit	Test 1	Test 2
Downlink power allocation	ρ_A	**dB**	**0**	**0**
	ρ_B	**dB**	**0 (Note 1)**	**0 (Note 1)**
	σ	**dB**	**-3**	**-3**
Cell-specific reference signals			**Antenna ports 0,1**	
CSI reference signals			**Antenna ports 15,…,22**	**Antenna ports 15,…,18**
Beamforming model			**Annex B.4.1**	**Annex B.4.1**
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$		**Subframes**	**5 / 4**	**5 / 4**
CSI reference signal configuration			**1**	**3**
Zero-power CSI-RS configuration		**Subframes / bitmap**	**4 / 0010000100000000**	**4 / 0010000000000000**
Zero-power CSI-RS bitmap				
N_{oc} **at antenna port**		**dBm/15kHz**	**-98**	**-98**
Symbols for unused PRBs			**OCNG (Note 4)**	**OCNG (Note 4)**
Number of allocated resource blocks (Note 2)		**PRB**	**50**	**50**
Simultaneous transmission			**No**	**Yes**
PDSCH transmission mode			**9**	**9**

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value Fraction of Maximum Throughput (%)	SNR (dB)	UE Category
1	**10 MHz QPSK 1/3**	**R.50 TDD**	**OP.1 TDD**	**EVA5**	**2x2 Low**	**70**	**-0.6**	**1-8**

Note 1: $P_B = 1$.

Note 2: **The modulation symbols of the signal under test are mapped onto antenna port 7 or 8.**

Note 3: **Modulation symbols of an interference signal is mapped onto the antenna port (7 or 8) not used for the input signal under test.**

Note 4: **These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.**

Note 5: **The two UEs' scrambling identities** n_{SCID} **are set to 0 for CDM-multiplexed DM RS with interfering simultaneous transmission test cases.**

8.3.2.1.2_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A. 10.
2. The parameter settings for the cell are set up according to Tables 8.3.2-1 and 8.3.2.1.2_D.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.1.2_D.4.3.

8.3.2.1.2_D.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.2.1.2_D.3-1, 8.3.2.1.2_D.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.1.2_D.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna port 7 (or 8) using two Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity specified in Table 8.3.2-1. CSI-RS are sent on antenna ports 15-22 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.1.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.2.1.2_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.2.1.2_D.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.3.2.1.2_D.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

Table 8.3.2.1.2_D.4.3-3: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release			
setup SEQUENCE {			
antennaPortsCount-r10	an8 for Test 1 an4 for Test 2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	1 for Test 1 3 for Test 2	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI–RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI–RS}}$	
p-C-r10	-6 dB for Test 1 -3 dB for Test 2	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	4	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	4	Parameter: $I_{\text{CSI–RS}}$	
}			
}			
}			

8.3.2.1.2_D.5 Test requirement

Table 8.3.2.1.2_D.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.3.5 for the throughput test shall meet or exceed the specified value in Table 8.3.2.1.2_D.5-1 for the specified SNR including test tolerances for the throughput test.

Table 8.3.2.1.2_D.5-1: Test requirement for CDM-multiplexed DM RS without simultaneous transmission (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.50 TDD	OP.1 TDD	EVA5	2x2 Low	70	0.3	1-8

8.3.2.1.3 TDD PDSCH Single-layer Spatial Multiplexing on antenna port 7 or 8 with a simultaneous transmission

8.3.2.1.3.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna port 7 or 8 with a simultaneous transmission on the other antenna port using DM-RS with full RB allocation.

8.3.2.1.3.2 Test applicability

This test applies to Release9 UEs that support enhanced Dual Layer TDD (TM8) and all types of E-UTRA TDD UE release 10 and forward.

8.3.2.1.3.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.3.2, with the addition of the relevant parameters in Tables 8.3.2-1, 8.3.2.1.3.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.3.2.1.3.3-2 for the specified SNR.

Table 8.3.2.1.3.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer)

parameter		Unit	Test 1 (Note 6)	Test 2 (Note 6)	Test 3 (Note 6)	Test 4	Test 5
Downlink power allocation	ρ_A	dB	N/A	N/A	N/A	0	0
	ρ_B	dB	N/A	N/A	N/A	0 (Note 1)	0 (Note 1)
	σ	dB	N/A	N/A	N/A	-3	-3
Cell-specific reference signals			Antenna port 0 and antenna port 1				
Beamforming model			Annex B.4.1				
N_{oc} at antenna port		dBm/15kHz	N/A	N/A	N/A	-98	-98
Symbols for unused PRBs			N/A	N/A	N/A	OCNG (Note 4)	OCNG (Note 4)
Simultaneous transmission			N/A	N/A	N/A	Yes (Note 3, 5)	Yes (Note 3, 5)
PDSCH transmission mode			N/A	N/A	N/A	8	8

Note 1: $P_B = 1$
Note 2: The modulation symbols of the signal under test are mapped onto antenna port 7 or 8.
Note 3: Modulation symbols of an interference signal is mapped onto the antenna port (7 or 8) not used for the input signal under test.
Note 4: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.
Note 5: The two UEs' scrambling identities n_{SCID} are set to 0 for CDM-multiplexed DM RS with interfering simultaneous transmission test cases.
Note 6: Test 1, Test 2 and Test 3 are covered in subclause 8.3.2.1.2.

Table 8.3.2.1.3.3-2: Minimum performance for CDM-multiplexed DM RS with interfering simultaneous transmission (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
4	10 MHz 16QAM 1/2	R.32 TDD (Note 1)	OP.1 TDD	EPA5	2x2 Medium	70	21.9	2-5
5	10 MHz 64QAM 1/2	R.34 TDD (Note 1)	OP.1 TDD	EPA5	2x2 Low	70	22.0	2-5
Note 1: The reference channel applies to both the input signal under test and the interfering signal.								

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.

8.3.2.1.3.4 Test description

8.3.2.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Tables 8.3.2-1 and 8.3.2.1.3.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.1.3.4.3.

8.3.2.1.3.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2B for C_RNTI to transmit the DL RMC according to Tables 8.3.2.1.3.3-1, 8.3.2.1.3.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.1.3.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/Dedicated data for the test UE are sent on antenna port 7 (or 8) and another simultaneous transmission of DRS/Dedicated data not for the test UE is sent on antenna port 8 (or 7). The DRS/Dedicated data transmissions use two Tx antennas with different beam-forming model as specified in Annex B.4.1 and precoder update granularity specified in Table 8.3.2-1.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.
4. Repeat steps from 1 to 3 for each test interval in Tables 8.3.2.1.3.5-1 as appropriate.

8.3.2.1.3.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions.

Table 8.3.2.1.3.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm8-v920		
}			
}			
Extension ::= SEQUENCE {			
antennaInfo-v920 ::= SEQUENCE{			
codebookSubsetRestriction-v920 CHOICE {			
n2TxAntenna-tm8-r9	111111		
}			
}			
}			
}			

8.3.2.1.3.5 Test requirement

Table 8.3.2.1.3.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.3.2 for each throughput test shall meet or exceed the specified value in Table 8.3.2.1.3.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.3.2.1.3.5-1: Test requirement for CDM-multiplexed DM RS with interfering simultaneous transmission (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
4	10 MHz 16QAM 1/2	R.32 TDD (Note 1)	OP.1 TDD	EPA5	2x2 Medium	70	22.8	2-5
5	10 MHz 64QAM 1/2	R.34 TDD (Note 1)	OP.1 TDD	EPA5	2x2 Low	70	22.9	2-5
Note 1: The reference channel applies to both the input signal under test and the interfering signal.								

8.3.2.1.3_D TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 with a simultaneous transmission for eDL-MIMO

8.3.2.1.3_D.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna ports 7 or 8 with a simultaneous transmission on the other antenna port and multiple CSI reference symbol configurations with non-zero and zero transmission power.

8.3.2.1.3_D.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward that support eDL-MIMO. Applicability requires support for FGI bit 103.

8.3.2.1.3_D.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.3.5, with the addition of the relevant parameters in Tables 8.3.2-1, 8.3.2.1.3_D.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.2.1.3_D.3-2 for the specified SNR.

Parameter		Unit	Test 1	Test 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0 (Note 1)
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0,1	
CSI reference signals			Antenna ports 15,…,22	Antenna ports 15,…,18
Beamforming model			Annex B.4.1	Annex B.4.1
CSI-RS periodicity and subframe offset $T_{CSI\text{-}RS}$ / $\Delta_{CSI\text{-}RS}$		Subframes	5 / 4	5 / 4
CSI reference signal configuration			1	3
Zero-power CSI-RS configuration $I_{CSI\text{-}RS}$		Subframes / bitmap	4 / 0010000200000000	4 / 0010000000000000
ZeroPowerCSI-RS bitmap N_{oc} at antenna port		dBm/15kHz	-98	-98
Symbols for unused PRBs			OCNG (Note 4)	OCNG (Note 4)
Number of allocated resource blocks (Note 2)		PRB	50	50
Simultaneous transmission			No	Yes
PDSCH transmission mode			9	9

Note 1: $P_B = 1$.

Note 2: The modulation symbols of the signal under test are mapped onto antenna port 7 or 8.

Note 3: Modulation symbols of an interference signal is mapped onto the antenna port (7 or 8) not used for the input signal under test.

Note 4: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Note 5: The two UEs' scrambling identities n_{SCID} are set to 0 for CDM-multiplexed DM RS with interfering simultaneous transmission test cases.

Table 8.3.2.1.3_D.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with multiple CSI-RS configurations

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value Fraction of Maximum Throughput (%)	SNR (dB)	UE Category
2	10 MHz	R.44 TDD	OP.1 TDD	EPA5	2x2 Low	70	22.1	2-8
	64QAM 1/2							

Table 8.3.2.1.3_D.3-2: Minimum performance for CDM-multiplexed DM RS with interfering simultaneous transmission (FRC) with multiple CSI-RS configurations

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.1A.

8.3.2.1.3_D.4 Test description

8.3.2.1.3_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A. 10.
2. The parameter settings for the cell are set up according to Tables 8.3.2-1 and 8.3.2.1.3_D.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C. 3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.1.3_D.4.3.

8.3.2.1.3_D.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.2.1.3_D.3-1, 8.3.2.1.3_D.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.1.3_D.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna port 7 (or 8) and another simultaneous transmission of DRS/PDSCH not for the test UE are sent on antenna port 8 (or 7). The DRS/PDSCH transmissions use two Tx antennas with beam-forming model as specified in Annex B.4.1 and precoder update granularity specified in Table 8.3.2-1. CSI-RS are sent on antenna ports 15-18 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.1.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.2.1.3_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.2.1.3_D.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.3.2.1.3_D.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

Table 8.3.2.1.3_D.4.3-3: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release			
setup SEQUENCE {			
antennaPortsCount-r10	an8 for Test 1 an4 for Test 2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	1 for Test 1 3 for Test 2	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI–RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI–RS}}$	
p-C-r10	-6 dB for Test 1 -3 dB for Test 2	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	4	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	4	Parameter: $I_{\text{CSI–RS}}$	
}			
}			
}			

8.3.2.1.3_D.5 Test requirement

Table 8.3.2.1.3_D.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.3.4 for the throughput test shall meet or exceed the specified value in Table 8.3.2.1.3_D.5-1 for the specified SNR including test tolerances for the throughput test.

Table 8.3.2.1.3_D.5-1: Test requirement for CDM-multiplexed DM RS with interfering simultaneous transmission (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
2	10 MHz 64QAM 1/2	R.44 TDD	OP.1 TDD	EPA5	2x2 Low	70	23	2-8
Note 1: The reference channel applies to both the input signal under test and the interfering signal.								

8.3.2.1.4 TDD PDSCH Single-layer Spatial Multiplexing on antenna ports 7 or 8 with TM9 Interference Model - Enhanced Performance Requirement Type A

Editor's notes: This test case is incomplete. The following item is missing or incomplete:

-Test tolerances are incomplete

-Connection diagram is TBD

8.3.2.1.4.1 Test purpose

To verify the UE's ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for single-layer transmission on antenna ports 7 or 8 without a simultaneous transmission on the other antenna port in the serving cell when the PDSCH transmission in the serving cell is interfered by PDSCH of one dominant interfering cell applying transmission mode 9 interference model defined in clause B.5.4.

8.3.2.1.4.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 11 and forward that support enhanced receiver Type A.

8.3.2.1.4.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.3, with the addition of the relevant parameters in Tables 8.3.2-1, 8.3.2.1.4.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.2.1.4.3-2 for the specified SNR.

Table 8.3.2.1.4.3-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with TM9 interference model

parameter		Unit	Cell 1	Cell 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0
	σ	dB	-3	-3
Cell-specific reference signals			Antenna ports 0,1	Antenna ports 0,1
CSI reference signals			Antenna ports 15,…,18	N/A
CSI-RS periodicity and subframe offset T_{CSI-RS} / Δ_{CSI-RS}		Subframes	5 / 4	N/A
CSI reference signal configuration			0	N/A
N_{oc} at antenna port		dBm/15kHz	-98	N/A
DIP (Note 2)		dB	N/A	-1.73
$BW_{Channel}$		MHz	10	10
Cyclic Prefix			Normal	Normal
Cell Id			0	126
Number of control OFDM symbols			2	2
PDSCH transmission mode			9	N/A
Beamforming model			As specified in clause B.4.3 (Note 4, 5)	N/A
Interference model			N/A	As specified in clause B.5.4
Probability of occurrence of transmission rank in interfering cells	Rank 1		N/A	70
	Rank 2		N/A	30
Precoder update granularity		PRB	50	6
PMI delay (Note 5)		ms	10 or 11	N/A
Reporting interval		ms	5	N/A
Reporting mode			PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			0000000000000000 0000000000000000 0000000000000000 1111111111111111	N/A
Symbols for unused PRBs			OCNG (Note 6)	N/A
Simultaneous transmission			No simultaneous transmission on the other antenna port in (7 or 8) not used for the input signal under test	N/A

Note 1: $P_B = 1$

Note 2: The respective received power spectral density of each interfering cell relative to N_{oc}' is defined by its associated DIP value as specified in clause B.5.1.

Note 3: The modulation symbols of the signal under test in Cell 1 are mapped onto antenna port 7 or 8.

Note 4: The precoder in clause B.4.3 follows UE recommended PMI.

Note 5: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI

	cannot be applied at the eNB downlink before SF#(n+4).
Note 6:	These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.
Note 7:	All cells are time-synchronous.

Table 8.3.2.1.4.3-2: Enhanced Performance Requirement Type A, CDM-multiplexed DM RS with TM9 interference model

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.48 TDD	OP.1 TDD	N/A	EVA5	EVA5	4x2 Low	70	-1.0	1-8
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.									
Note 2: SINR corresponds to $\widehat{E}_s / N_{oc}{}'$ of Cell 1 as defined in clause 8.1.1.									
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.									

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.1B.

8.3.2.1.4.4 Test description

8.3.2.1.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, TBD.
2. The parameter settings for the cell are set up according to Tables 8.3.2-1 and 8.3.2.1.4.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.1.4.4.3.

8.3.2.1.4.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.2.1.4.3-1, 8.3.2.1.4.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.1.4.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/PDSCH for the test UE are sent on antenna port 7 (or 8) using four Tx antennas with beam-forming model as specified in

Annex B.4.1 and precoder update granularity specified in Table 8.3.2.1.4.3-1. CSI-RS are sent on antenna ports 15-18 using four Tx antennas with mapping according to beam-forming model as specified in Annex B.4.1.

3. Set the Cell2 –aggressor cell- as defined in Tables 8.3.2.1.4.3-1, 8.3.2.1.4.3-2 and according to Annex B.4.3.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.2.1.4.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.2.1.4.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-6 PDSCH-ConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.3.2.1.4.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	000000000000000000 000000000000000000 000000000000111111 1111111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

Table 8.3.2.1.4.4.3-3: *CSI-RS-Config-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release			
setup SEQUENCE {			
antennaPortsCount-r10	an4	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	0	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI–RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI–RS}}$	
p-C-r10	-3 dB	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	NULL	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	NULL	Parameter: $I_{\text{CSI–RS}}$	
}			
}			
}			

Table 8.3.2.1.4.4.3-4: CQI-ReportPeriodic-r10

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-2AC CQI-ReportPeriodic-r10-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportPeriodic-r10 ::= CHOICE {			
setup SEQUENCE {			
cqi-PUCCH-ResourceIndex-r10	0		
cqi-PUCCH-ResourceIndexP1-r10	Not present		
cqi-pmi-ConfigIndex	24	TDD	
cqi-FormatIndicatorPeriodic-r10 CHOICE {			
widebandCQI-r10 SEQUENCE {			
csi-ReportMode-r10	Not present		
}			
}			
ri-ConfigIndex	484	TDD	
simultaneousAckNackAndCQI	FALSE		
cqi-Mask-r9	Not present		
csi-ConfigIndex-r10	Not present		
}			
}			

8.3.2.1.4.5 Test requirement

Table 8.3.2.1.4.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.3.4 for the throughput test shall meet or exceed the specified value in Table 8.3.2.1.4.5-1 for the specified SNR including test tolerances for the throughput test.

Table 8.3.2.1.4.5-1: Enhanced Performance Requirement Type A, CDM-multiplexed DM RS with TM9 interference model

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions		Correlation Matrix and Antenna Configuration (Note 3)	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2		Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	
1	R.48 TDD	OP.1 TDD	N/A	EVA5	EVA5	4x2 Low	70	-1.0+TT	1-8
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.									
Note 2: SINR corresponds to $\hat{E}_s / N_{oc}'$ of Cell 1 as defined in clause 8.1.1.									
Note 3: Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2.									

8.3.2.2 TDD PDSCH Dual-layer Spatial Multiplexing Performance (UE-Specific Reference Symbols)

8.3.2.2.1 TDD PDSCH Dual-layer Spatial Multiplexing

8.3.2.2.1.1 Test purpose

To verify the UE's rank-2 performance and ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for dual-layer transmission on antenna ports 7 and 8 using DM-RS with full RB allocation.

8.3.2.2.1.2 Test applicability

This test applies to Release 9 UEs that support enhanced Dual Layer TDD (TM8) and all types of E-UTRA TDD UE release 10 and forward.

8.3.2.2.1.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.3.2, with the addition of the relevant parameters in Tables 8.3.2-1, 8.3.2.2.1.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Tables 8.3.2.2.1.3-2 for the specified SNR.

Table 8.3.2.2.1.3-1: Test Parameters for Testing CDM-multiplexed DM RS (dual layer)

Parameter		Unit	Test 1	Test 2
Downlink power allocation	ρ_A	dB	0	0
	ρ_B	dB	0 (Note 1)	0 (Note 1)
	σ	dB	-3	-3
Cell-specific reference symbols			Antenna port 0 and antenna port 1	
Beamforming model			Annex B.4.2	
N_{oc} at antenna port		dBm/15kHz	-98	-98
Symbols for unused PRBs			OCNG (Note 2)	OCNG (Note 2)
Number of allocated resource blocks		PRB	50	50
PDSCH transmission mode			8	8

Note 1: $P_B = 1$

Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

Table 8.3.2.2.1.3-2: Minimum performance for CDM-multiplexed DM RS (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.31 TDD	OP.1 TDD	EVA5	2x2 Low	70	4.5	2-5
2	10 MHz 16QAM 1/2	R.32 TDD	OP.1 TDD	EPA5	2x2 Medium	70	21.7	2-5

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.

8.3.2.2.1.4 Test description

8.3.2.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.

2. The parameter settings for the cell are set up according to Tables 8.3.2-1 and 8.3.2.2.1.3-1 as appropriate.

3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.2.1.4.3.

8.3.2.2.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2B for C_RNTI to transmit the DL RMC according to Tables 8.3.2.2.1.3-1, 8.3.2.2.1.3-2. The SS sends downlink MAC padding bits on the DL RMC.

2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.2.1.5-1 as appropriate.
BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/Dedicated data for test UE are sent on antenna ports 7 and 8 using two Tx antennas with beam-forming model as specified in Annex B.4.2 and precoder update granularity specified in Table 8.3.2-1.

3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

4. Repeat steps from 1 to 3 for each test interval in Tables 8.3.2.2.1.5-1 as appropriate.

8.3.2.1.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions .

Table 8.3.2.2.1.4.3-1: PhysicalConfigDedicated-DEFAULT

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm8-v920		
}			
}			
Extension ::= SEQUENCE {			
antennaInfo-v920 ::= SEQUENCE{			
codebookSubsetRestriction-v920 CHOICE {			
n2TxAntenna-tm8-r9	111111		
}			
}			
}			
}			

8.3.2.2.1.5 Test requirement

Table 8.3.2.2.1.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.3.2 for each throughput test shall meet or exceed the specified value in Table 8.3.2.2.1.5-1 for the specified SNR including test tolerances for all throughput tests.

Table 8.3.2.2.1.5-1: Test requirement for CDM-multiplexed DM RS (FRC)

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz QPSK 1/3	R.31 TDD	OP.1 TDD	EVA5	2x2 Low	70	5.4	2-5
2	10 MHz 16QAM 1/2	R.32 TDD	OP.1 TDD	EPA5	2x2 Medium	70	22.6	2-5

8.3.2.2.1_D TDD PDSCH Dual-layer Spatial Multiplexing for eDL-MIMO

8.3.2.2.1_D.1 Test purpose

To verify the UE's rank-2 performance and ability to receive a predefined test signal, representing a multi-path fading channel that is determined by the SNR with a percentage of the information bit throughput for a specified downlink Reference Measurement Channel (RMC) not falling below a specified value for dual-layer transmission on antenna ports 7 and 8 using DM-RS with full RB allocation with multiple CSI reference symbol configurations with non-zero and zero transmission power.

8.3.2.2.1_D.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward that support eDL-MIMO. Applicability requires support for FGI bit 103.

8.3.2.2.1_D.3 Minimum conformance requirements

The requirements are specified in terms of the percentage of information bit throughput for the downlink reference measurement channels specified in Annex A clause A.3.4.2, with the addition of the relevant parameters in Tables 8.3.2-1, 8.3.2.2.1_D.3-1, and the downlink physical channel setup according to Table C.3.2-1 in Annex C.3.2.

Using this configuration the fraction of maximum throughput percentage shall meet or exceed the minimum requirements specified in Table 8.3.2.2.1_D.3-2 for the specified SNR.

Table 8.3.2.2.1_D.3-1: Test Parameters for Testing CDM-multiplexed DM RS (dual layer) with multiple CSI-RS configurations

parameter		Unit	Test 1
Downlink power allocation	ρ_A	dB	0
	ρ_B	dB	0 (Note 1)
	σ	dB	-3
Cell-specific reference signals			Antenna ports 0 and 1
CSI reference signals			Antenna ports 15,16
Beamforming model			Annex B.4.2
CSI-RS periodicity and subframe offset $T_{\text{CSI-RS}}$ /$\Delta_{\text{CSI-RS}}$		Subframes	5 / 4
CSI reference signal configuration			8
Zero-power CSI-RS configuration $I_{\text{CSI-RS}}$ / *ZeroPowerCSI-RS* bitmap		Subframes / bitmap	4 / 0010000000000000
N_{oc} at antenna port		dBm/15kHz	-98
Symbols for unused PRBs			OCNG (Note 2)
Number of allocated resource blocks (Note 2)		PRB	50
Simultaneous transmission			No
PDSCH transmission mode			9
Note 1: $P_B = 1$.			
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.			

Table 8.3.2.2.1_D.3-2: Minimum performance for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.51 TDD	OP.1 TDD	EPA5	2x2 Low	70	14.5	2-8

The normative reference for this requirement is TS 36.101 [2] clause 8.3.2.3.

8.3.2.2.1_D.4 Test description

8.3.2.2.1_D.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A. 10 .
2. The parameter settings for the cell are set up according to Tables 8.3.2-1 and 8.3.2.2.1_D.3-1 as appropriate.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.3.2.2.1_D.4.3.

8.3.2.2.1_D.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2C for C_RNTI to transmit the DL RMC according to Tables 8.3.2.2.1_D.3-1, 8.3.2.2.1_D.3-2. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the bandwidth, MCS, reference channel, the propagation condition, the correlation matrix and the SNR according to Table 8.3.2.2.1_D.5-1 as appropriate.
   BCH/CRS/PDCCH/PCFICH are sent on antenna ports 0 and 1 using two Tx antennas, while DRS/ PDSCH for the test UE are sent on antenna port 7 and 8 using two Tx antennas with beam-forming model as specified in Annex B.4.2 and precoder update granularity specified in Table 8.3.2-1. CSI-RS are sent on antenna ports 15 and 16 using two Tx antennas with mapping according to beam-forming model as specified in Annex B.4.2.
3. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G clause G.3. Count the number of NACKs, ACKs and statDTXs on the UL during each test interval and decide pass or fail according to Tables G.3.5 and G.3.6 in Annex G clause G.3.

8.3.2.2.1_D.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.3.2.2.1_D.4.3-1: *PDSCH-ConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PDSCH-ConfigDedicated-DEFAULT ::= SEQUENCE {			
p-a	dB0		
}			

Table 8.3.2.2.1_D.4.3-2: *AntennaInfoDedicated-r10*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
AntennaInfoDedicated-r10 ::= SEQUENCE {			
transmissionMode-r10	tm9-v1020		
codebookSubsetRestriction-r10	Not present	If the UE is configured with *transmissionMode* tm9, E-UTRAN only configures the field *codebookSubsetRestriction* if PMI/RI reporting is configured	
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			

Table 8.3.2.2.1_D.4.3-3: *CSI-RS-Config*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
CSI-RS-Config-r10 ::= SEQUENCE {			
csi-RS-r10 CHOICE{			
release			
setup SEQUENCE {			
antennaPortsCount-r10	an2	Parameter represents the number of antenna ports used for transmission of CSI reference signals	
resourceConfig-r10	8	Parameter: CSI reference signal configuration	
subframeConfig-r10	4	$\Delta_{\text{CSI-RS}} = I_{\text{CSI–RS}}$ when CSI-RS SubframeConfig is from 0-4; Parameter: $I_{\text{CSI–RS}}$	
p-C-r10	0	Parameter: P_c which is the assumed ratio of PDSCH EPRE to CSI-RS EPRE when UE derives CSI feedback	
}			
}			
zeroTxPowerCSI-RS-r10 CHOICE{			
release	NULL		
setup SEQUENCE {			
zeroTxPowerResourceConfigList-r10	4	Parameter: *ZeroPowerCSI-RS*	
zeroTxPowerSubframeConfig-r10	4	Parameter: $I_{\text{CSI–RS}}$	
}			
}			
}			

8.3.2.2.1_D.5 Test requirement

Table 8.3.2.2.1_D.3-1 defines the primary level settings.

The fraction of maximum throughput percentage for the downlink reference measurement channels specified in Annex A clause A.3.4.3.3 for the throughput test shall meet or exceed the specified value in Table 8.3.2.2.1_D.5-1 for the specified SNR including test tolerances for the throughput test.

Table 8.3.2.2.1_D.5-1: Test requirement for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel	OCNG Pattern	Propagation Condition	Correlation Matrix and Antenna Configuration	Reference value		UE Category
						Fraction of Maximum Throughput (%)	SNR (dB)	
1	10 MHz 16QAM 1/2	R.51 TDD	OP.1 TDD	EPA5	2x2 Low	70	15.4	2-8

8.4 Demodulation of PCFICH/PDCCH

8.4.1 FDD

8.4.1.1 FDD PCFICH/PDCCH Single-antenna Port Performance

8.4.1.1.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for a single-antenna port with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.1 remains below a given reference value.

8.4.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8 and forward.

8.4.1.1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.1.1.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Single antenna port
Number of PDCCH symbols		symbols	2
Number of PHICH groups (N_g)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	0
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note: PHICH power setting refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.4.1.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.1.3-2.

Table 8.4.1.1.3-2: Minimum performance PDCCH/PCFICH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and Correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	8 CCE	R.15 FDD	OP.1 FDD	ETU70	1x2 Low	1	-1.7

The normative reference for this requirement is TS 36.101 [2] clause 8.4.1.

8.4.1.1.4 Test description

8.4.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.9.
2. The parameter settings for the cell are set up according to Table 8.4.1.1.3-1.
3. The downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.1.1.4.3.

8.4.1.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1 for C_RNTI to transmit the DL RMC according to Table 8.4.1.1.3-2.The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.

2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.1.1.5-1 as appropriate.

3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.4.1.1.5-1, pass the UE. Otherwise fail the UE.

8.4.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6.

8.4.1.1.5 Test requirement

For the parameters specified in Table 8.4.1.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.1.5-1.

Table 8.4.1.1.5-1: Test requirement PDCCH/PCFICH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	8 CCE	R.15 FDD	OP.1 FDD	ETU70	1x2 Low	1	-0.9

8.4.1.2 FDD PCFICH/PDCCH Transmit Diversity Performance

8.4.1.2.1 FDD PCFICH/PDCCH Transmit Diversity 2x2

8.4.1.2.1.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.1 remains below a given reference value.

8.4.1.2.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8.

8.4.1.2.1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.1.2.1.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Number of PDCCH symbols		symbols	2
Number of PHICH groups (N_g)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note: PHICH power setting refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.4.1.2.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.1.3-2.

Table 8.4.1.2.1.3-2: Minimum performance PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	1.4 MHz	2 CCE	R.16 FDD	OP.1 FDD	EPA5	2 x 2 Low	1	4.3

The normative reference for this requirement is TS 36.101 [2] clause 8.4.1.

8.4.1.2.1.4 Test description

8.4.1.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 1.4MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Table 8.4.1.2.1.3-1.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.1.2.1.4.3.

8.4.1.2.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.1.2.1.3-2.The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.

2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.1.2.1.5-1.

3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.1.2.1.5-1, pass the UE. Otherwise fail the UE.

8.4.1.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.4.1.2.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.4.1.2.1.5 Test requirement

For the parameters specified in Table 8.4.1.2.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.1.5-1.

Table 8.4.1.2.1.5-1: Test requirement PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	1.4 MHz	2 CCE	R.16 FDD	OP.1 FDD	EPA5	2 x 2 Low	1	5.3

8.4.1.2.1_1 FDD PCFICH/PDCCH Transmit Diversity 2x2 (Release 9 and forward)

8.4.1.2.1_1.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.1 remains below a given reference value.

8.4.1.2.1_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward.

8.4.1.2.1_1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.1.2.1_1.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Number of PDCCH symbols		symbols	2
Number of PHICH groups (Ng)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note: PHICH power setting refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.4.1.2.1_1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.1_1.3-2.

Table 8.4.1.2.1_1.3-2: Minimum performance PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.16_1 FDD	OP.1 FDD	EVA70	2 x 2 Low	1	-0.6

The normative reference for this requirement is TS 36.101 [2] clause 8.4.1

8.4.1.2.1_1.4 Test description

8.4.1.2.1_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Table 8.4.1.2.1_1.3-1.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.1.2.1_1.4.3.

8.4.1.2.1_1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.1.2.1_1.3-2.The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.1.2.1_1.5-1.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.1.2.1_1.5-1, pass the UE. Otherwise fail the UE.

8.4.1.2.1_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.4.1.2.1_1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.4.1.2.1_1.5 Test requirement

For the parameters specified in Table 8.4.1.2.1_1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.1_1.5-1.

Table 8.4.1.2.1_1.5-1: Test requirement PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.16_1 FDD	OP.1 FDD	EVA70	2 x 2 Low	1	+0.4

8.4.1.2.2 FDD PCFICH/PDCCH Transmit Diversity 4x2

8.4.1.2.2.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.1 remains below a given reference value.

8.4.1.2.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8.

8.4.1.2.2.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.1.2.2.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Number of PDCCH symbols		symbols	2
Number of PHICH groups (N_g)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note: PHICH power setting refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.4.1.2.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.2.3-2.

Table 8.4.1.2.2.3-2: Minimum performance PDCCH/PCFICH 4 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.17 FDD	OP.1 FDD	EVA5	4 x 2 Medium	1	0.9

The normative reference for this requirement is TS 36.101 [2] clause 8.4.1.

8.4.1.2.2.4 Test description

8.4.1.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11.
2. The parameter settings for the cell are set up according to Table 8.4.1.2.2.3-1.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.1.2.2.4.3.

8.4.1.2.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.1.2.2.3-2. The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.1.2.2.5-1.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.4.1.2.2.5-1, pass the UE. Otherwise fail the UE.

8.4.1.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.4.1.2.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	11111111111111111111111111111111111111111111111111111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.4.1.2.2.5 Test requirement

For the parameters specified in Table 8.4.1.2.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.2.5-1.

Table 8.4.1.2.2.5-1: Test requirement PDCCH/PCFICH 4 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.17 FDD	OP.1 FDD	EVA5	4 x 2 Medium	1	1.9

8.4.1.2.2_1 FDD PCFICH/PDCCH Transmit Diversity 4x2 (Release 9 and forward)

8.4.1.2.2_1.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.1 remains below a given reference value.

8.4.1.2.2_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward.

8.4.1.2.2_1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.1.2.2_1.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Number of PDCCH symbols		symbols	2
Number of PHICH groups (N_g)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note: PHICH power setting refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.4.1.2.2_1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.2_1.3-2.

Table 8.4.1.2.2_1.3-2: Minimum performance PDCCH/PCFICH 4 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	5 MHz	2 CCE	R.17_1 FDD	OP.1 FDD	EPA5	4 x 2 Medium	1	6.3

The normative reference for this requirement is TS 36.101 [2] clause 8.4.1.

8.4.1.2.2_1.4 Test description

8.4.1.2.2_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 5MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11.
2. The parameter settings for the cell are set up according to Table 8.4.1.2.2_1.3-1.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.1.2.2_1.4.3.

8.4.1.2.2_1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.1.2.2_1.3-2. The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.

2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.1.2.2_1.5-1.

3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX). If Pm-dsg is less than the value specified in table 8.4.1.2.2_1.5-1, pass the UE. Otherwise fail the UE.

8.4.1.2.2_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.4.1.2.2_1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	11111111111111111111111111111111111111111111111111111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.4.1.2.2_1.5 Test requirement

For the parameters specified in Table 8.4.1.2.2_1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.2_1.5-1.

Table 8.4.1.2.2_1.5-1: Test requirement PDCCH/PCFICH 4 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	5 MHz	2 CCE	R.17_1 FDD	OP.1 FDD	EPA5	4 x 2 Medium	1	+7.3

8.4.1.2.3_C FDD PCFICH/PDCCH Transmit Diversity 2x2 for eICIC

8.4.1.2.3_C.1 FDD PCFICH/PDCCH Transmit Diversity 2x2 for eICIC (non-MBSFN ABS)

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Connection diagram in Annex A of TS 36.508 is TBD

- Tests requirements are TBD

- Test tolerances are incomplete

8.4.1.2.3_C.1.1 Test purpose

To verify the UE's performance of transmit diversity (SFBC) with 2 transmit antennas if the PCFICH/PDCCH transmission in the serving cell takes place in subframes that overlap with ABS of the aggressor cell.

8.4.1.2.3_C.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.4.1.2.3_C.1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.1.2.3_C.1.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Number of PDCCH symbols		symbols	2
Number of PHICH groups (Ng)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note: PHICH power setting refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters for non-MBSFN ABS specified in Table 8.4.1.2.3_C.1.3-1 and Table 8.4.1.2.3_C.1.3-2, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.3_C.1-3. The downlink physical setup is in accordance with Annex C.3.2 and Annex C.3.3. In Table 8.4.1.2.3_C.1.3-2, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

Table 8.4.1.2.3_C.1.3-2: Test Parameters for PDCCH/PCFICH – Non-MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-100.5 (Note 1)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N_{oc3}	dBm/15kHz	-95.3 (Note 3)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.4.1.2.3_C.1.3-3	1.5
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	2.5 (synchronous cells)	
Cell Id			0	1
ABS pattern (Note 4)			N/A	00000100 00000100 00000100 01000100 00000100
RLM/RRM Measurement Subframe Pattern (Note 5)			00000100 00000100 00000100 00000100 00000100	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		00000100 00000100 00000100 01000100 00000100	N/A
	$C_{CSI,1}$		11111011 11111011 11111011 10111011 11111011	N/A
Number of control OFDM symbols			3	
Number of PHICH groups (N_g)			1	
PHICH duration			Extended	
Unused RE-s and PRB-s			OCNG	
Cyclic prefix			Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. PDCCH/PCFICH other than that associated with SIB1/Paging are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell.
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5];
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5];
Note 7: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 8: SIB-1 will not be transmitted in Cell2 in the test.

Table 8.4.1.2.3_C.1.3-3: Minimum performance PDCCH/PCFICH – Non-MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value	
			Cell 1	Cell 2	Cell 1	Cell 2		Pm-dsg (%)	SNR (dB) (Note 2)
1	8 CCE	R15-1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	2x2 Low	1	-3.9
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.									
Note 2: SNR corresponds to $\widehat{E}_s / N_{oc2}$ of cell 1									
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									

The normative reference for this requirement is TS 36.101 [2] clause 8.4.1.2.3

8.4.1.2.3_C.1.4 Test description

8.4.1.2.3_C.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure [TBD] for antenna configuration 2x2.
2. The parameter settings for the cell1 are set up according to Tables 8.4.1.2.3_C.1.3-1 and 8.4.1.2.3_C.1.3-2.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.1.2.3_C.1.4.3.

8.4.1.2.3_C.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.1.2.3_C.1.3-3. The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.1.2.3_C.1.5-1
3. Set the Cell2 –aggressor cell- as defined in Tables 8.4.1.2.3_C.1.3-2, 8. 4.1.2.3_C.1.5-1 and according to Annex C3.3.
4. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.1.2.3_C.1.5-1, pass the UE. Otherwise fail the UE.

8.4.1.2.3_C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.4.1.2.3_C.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.4.1.2.3_C.1.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	'00000100000001000000 01000000010000000100'	BIT STRING (SIZE (40))	
}			
}			
}			

Table 8.4.1.2.3_C.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'00000100000001000000 01000100010000000100'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'11111011111110111111 10111011101111111011'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

8.4.1.2.3_C.1.5 Test requirement

For the parameters specified in Table 8.4.1.2.3_C.1.3-2, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.3_C.1.5-1.

Table 8.4.1.2.3_C.1.5-1: Test Requirement PDCCH/PCFICH – Non-MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value	
			Cell 1	Cell 2	Cell 1	Cell 2		Pm-dsg (%)	SNR (dB) (Note 2)
1	8 CCE	R15-1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	2x2 Low	1	[TBD]
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1									

8.4.1.2.3_C.2 FDD PCFICH/PDCCH Transmit Diversity 2x2 for eICIC (MBSFN ABS)

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Connection diagram in Annex A of TS 36.508 is TBD

- Tests requirements are TBD

- Test tolerances are incomplete

8.4.1.2.3_C.2.1 Test purpose

To verify the UE's performance of transmit diversity (SFBC) with 2 transmit antennas if the PCFICH/PDCCH transmission in the serving cell takes place in subframes that overlap with ABS of the aggressor cell.

8.4.1.2.3_C.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.4.1.2.3_C.2.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.1.2.3_C.2.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Number of PDCCH symbols		symbols	2
Number of PHICH groups (Ng)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note: PHICH power setting refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters for MBSFN ABS specified in Table 8.4.1.2.3_C.2.3-1 and Table 8.4.1.2.3_C.2.3-2, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.3_C.2-5. The downlink physical setup is in accordance with Annex C.3.2 and Annex C.3.3. In Table 8.4.1.2.3_C.2.3-2, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

Table 8.4.1.2.3_C.2.3-2: Test Parameters for PDCCH/PCFICH – MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-100.5 (Note 1)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N_{oc3}	dBm/15kHz	-95.3 (Note 3)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.4.1.2.3_C.2.3-3	1.5
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	MBSFN
Time Offset between Cells		µs	2.5 (synchronous cells)	
Cell Id			0	126
ABS pattern (Note 4)			N/A	0001000000 0100000010 0000001000 0000000000
RLM/RRM Measurement Subframe Pattern (Note 5)			0001000000 0100000010 0000001000 0000000000	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		0001000000 0100000010 0000001000 0000000000	N/A
	$C_{CSI,1}$		1110111111 1011111101 1111110111 1111111111	N/A
MBSFN Subframe Allocation (Note 9)			N/A	001000 100001 000100 000000
Number of control OFDM symbols			3	
Number of PHICH groups (N_g)			1	
PHICH duration			extended	
Unused RE-s and PRB-s			OCNG	
Cyclic prefix			Normal	Normal

Note 1:	This noise is applied in OFDM symbols #1, #2, #3, #4, #5, #6, #7, #8, #9, #10, #11, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 2:	This noise is applied in OFDM symbols #0 of a subframe overlapping with the aggressor ABS.
Note 3:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4:	ABS pattern as defined in [14]. The 4th, 12th, 19th and 27th subframes indicated by ABS pattern are MBSFN ABS subframes. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the MBSFN ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 6:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 7:	Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 8:	SIB-1 will not be transmitted in Cell2 in this test.
Note 9:	MBSFN Subframe Allocation as defined in [5], four frames with 24 bits is chosen for MBSFN subframe allocation.
Note 10:	The maximum number of uplink HARQ transmission is limited to 2 so that each PHICH channel transmission is in a subframe protected by MBSFN ABS in this test.

Table 8.4.1.2.3_C.2.3-3: Minimum performance PDCCH/PCHICH – MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value	
			Cell 1	Cell 2	Cell 1	Cell 2		Pm-dsg (%)	SNR (dB) (Note 2)
1	8 CCE	R15-1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	2x2 Low	1	-4.2
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									

The normative reference for this requirement is TS 36.101 [2] clause 8.4.1.2.3

8.4.1.2.3_C.2.4 Test description

8.4.1.2.3_C.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure [TBD] for antenna configuration 2x2.
2. The parameter settings for the cell1 are set up according to Tables 8.4.1.2.3_C.2.3-1 and 8.4.1.2.3_C.2.3-2.
3. The downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.1.2.3_C.2.4.3.

8.4.1.2.3_C.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.1.2.3_C.2.3-3. The details of PDCCH and PDSCH are specified in Table A.3.5.1-1 and Table A.3.5.1-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.

2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.1.2.3_C.2.5-1.

3. Set the Cell2 –aggressor cell- as defined in Tables 8.4.1.2.3_C.2.3-2, 8.4.1.2.3_C.2.5-1 and according to Annex C3.3

4. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.1.2.3_C.2.5-1, pass the UE. Otherwise fail the UE.

8.4.1.2.3_C.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.4.1.2.3_C.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.4.1.2.3_C.2.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	'00010000001000000100000000010000'	BIT STRING (SIZE (40))	
}			
}			
}			

Table 8.4.1.2.3_C.2.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'00010000000100000010 00000010000000000000'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'11101111111011111101 11111101111111111111'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

8.4.1.2.3_C.2.5 Test requirement

For the parameters specified in Table 8.4.1.2.3_C.2.3-2, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.3_C.2.5-1.

Table 8.4.1.2.3_C.2.5-1: Test Requirement PDCCH/PCHICH – MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna Configuration	Reference Value	
			Cell 1	Cell 2	Cell 1	Cell 2		Pm-dsg (%)	SNR (dB) (Note 2)
1	8 CCE	R15-1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	2x2 Low	1	[TBD]
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\widehat{E}_s / N_{oc2}$ of cell 1									

8.4.2 TDD

8.4.2.1 TDD PCFICH/PDCCH Single-antenna Port Performance

8.4.2.1.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for a single-antenna port with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.2 remains below a given reference value.

8.4.2.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8 and forward.

8.4.2.1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.2.1.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Single antenna port
Uplink downlink configuration (Note 1)			0
Special subframe configuration (Note 2)			4
Number of PDCCH symbols		symbols	2
Number of PHICH groups (N_g)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	0
	PCFICH_RB PDCCH_RB PHICCH_RB OCNG_RB	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: PHICH power setting refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.4.2.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.1.3-2.

Table 8.4.2.1.3-2: Minimum performance PDCCH/PCFICH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	8 CCE	R.15 TDD	OP.1 TDD	ETU70	1x2Low	1	-1.6

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.

8.4.2.1.4 Test description

8.4.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.9.
2. The parameter settings for the cell are set up according to 8.4.2.1.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.2.1.4.3.

8.4.2.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1 for C_RNTI to transmit the DL RMC according to Table 8.4.2.1.3-2. The details of PDCCH and PDSCH are specified in Table A.3.5.2-1 and Table A.3.5.2-2 respectively. The SS sends downlink MAC padding bits on the DL RMC.
2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.4.2.1.5-1 as appropriate.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the radio (statDTX)/(NACK +ACK+statDTX). If Pm-dsg is less than the value specified in table 8.4.2.2.1.5-1, pass the UE. Otherwise fail the UE.

8.4.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:.

Table 8.4.2.1.4.3-1: TDD-Configuration-DEFAULT

Derivation Path: 36.508 clause 4.6.4			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Configuration-DEFAULT ::= SEQUENCE {			
subframeAssignment	sa0		
specialSubframePatterns	Ssp4		
}			

8.4.2.1.5 Test requirement

For the parameters specified in Table 8.4.2.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.1.5-1.

Table 8.4.2.1.5-1: Test requirement PDCCH/PCFICH

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	8 CCE	R.15 TDD	OP.1 TDD	ETU70	1x2Low	1	-0.8

8.4.2.2 TDD PCFICH/PDCCH Transmit Diversity Performance

8.4.2.2.1 TDD PCFICH/PDCCH Transmit Diversity 2x2

8.4.2.2.1.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.2 remains below a given reference value.

8.4.2.2.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8.

8.4.2.2.1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.2.2.1.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			0
Special subframe configuration (Note 2)			4
Number of PDCCH symbols		symbols	2
Number of PHICH groups (N_g)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: PHICH power setting refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group			

For the parameters specified in Table 8.4.2.2.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.1.3-2.

Table 8.4.2.2.1.3-2: Minimum performance PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	1.4 MHz	2 CCE	R.16 TDD	OP.1 TDD	EPA5	2 x 2 Low	1	4.2

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.

8.4.2.2.1.4 Test description

8.4.2.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 1.4MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to 8.4.2.2.1.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.2.2.1.4.3.

8.4.2.2.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.2.2.1.3-2. The details of PDCCH and PDSCH are specified in Table A.3.5.2-1 and Table A.3.5.2-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.
2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.4.2.2.1.5-1 as appropriate.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the radio (statDTX)/(NACK +ACK+statDTX). If Pm-dsg is less than the value specified in table 8.4.2.2.1.5-1, pass the UE. Otherwise fail the UE

8.4.2.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:.

Table 8.4.2.2.1.4.3-1: TDD-Configuration-DEFAULT

Derivation Path: 36.508 clause 4.6.4			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Configuration-DEFAULT ::= SEQUENCE {			
subframeAssignment	Sa0		
specialSubframePatterns	Ssp4		
}			

Table 8.4.2.2.1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.4.2.2.1.5 Test requirement

For the parameters specified in Table 8.4.2.2.1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.1.5-1.

Table 8.4.2.2.1.5-1: Test requirement PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	1.4 MHz	2 CCE	[R.16 TDD]	OP.1 TDD	EPA5	2 x 2 Low	1	5.2

8.4.2.2.1_1 TDD PCFICH/PDCCH Transmit Diversity 2x2 (Release 9 and forward)

8.4.2.2.1_1.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.2 remains below a given reference value.

8.4.2.2.1_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward.

8.4.2.2.1_1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.2.2.1_1.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			0
Special subframe configuration (Note 2)			4
Number of PDCCH symbols		symbols	2
Number of PHICH groups (N_g)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: PHICH power setting refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group			

For the parameters specified in Table 8.4.2.2.1_1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.1_1.3-2.

Table 8.4.2.2.1_1.3-2: Minimum performance PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.16_1 TDD	OP.1 TDD	EVA70	2 x 2 Low	1	0.1

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.

8.4.2.2.1_1.4 Test description

8.4.2.2.1_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to 8.4.2.2.1_1.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.2.2.1_1.4.3.

8.4.2.2.1_1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.2.2.1_1.3-2. The details of PDCCH and PDSCH are specified in Table A.3.5.2-1 and Table A.3.5.2-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.
2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.4.2.2.1_1.5-1 as appropriate.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the radio (statDTX)/(NACK +ACK+statDTX). If Pm-dsg is less than the value specified in table 8.4.2.2.1_1.5-1, pass the UE. Otherwise fail the UE

8.4.2.2.1_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:.

Table 8.4.2.2.1_1.4.3-1: TDD-Configuration-DEFAULT

Derivation Path: 36.508 clause 4.6.4			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Configuration-DEFAULT ::= SEQUENCE {			
subframeAssignment	Sa0		
specialSubframePatterns	Ssp4		
}			

Table 8.4.2.2.1_1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.4.2.2.1_1.5 Test requirement

For the parameters specified in Table 8.4.2.2.1_1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.1_1.5-1.

Table 8.4.2.2.1_1.5-1: Test requirement PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.16_1 TDD	OP.1 TDD	EVA70	2 x 2 Low	1	+1.0

8.4.2.2.2 TDD PCFICH/PDCCH Transmit Diversity 4x2

8.4.2.2.2.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.2 remains below a given reference value.

8.4.2.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8.

8.4.2.2.2.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.2.2.2.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			0
Special subframe configuration (Note 2)			4
Number of PDCCH symbols		symbols	2
Number of PHICH groups (N_g)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: PHICH power setting refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.4.2.2.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.2.3-2.

Table 8.4.2.2.2.3-2: Minimum performance PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.17 TDD	OP.1 TDD	EVA5	4 x 2 Medium	1	1.2

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.

8.4.2.2.4 Test description

8.4.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.11.
2. The parameter settings for the cell are set up according to 8.4.2.2.2.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.2.2.2.4.3.

8.4.2.2.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.2.2.2.3-2. The details of PDCCH and PDSCH are specified in Table A.3.5.2-1 and Table A.3.5.2-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.
2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.4.2.2.2.5-1 as appropriate.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the radio (statDTX)/(NACK +ACK+statDTX). If Pm-dsg is less than the value specified in table 8.4.2.2.2.5-1, pass the UE. Otherwise fail the UE

8.4.2.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:.

Table 8.4.2.2.2.4.3-1: TDD-Configuration-DEFAULT

Derivation Path: 36.508 clause 4.6.4			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Configuration-DEFAULT ::= SEQUENCE {			
subframeAssignment	Sa0		
specialSubframePatterns	Ssp4		
}			

Table 8.4.2.2.2.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	11111111111111111111111111111111111111111111111111111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.4.2.2.2.5 Test requirement

For the parameters specified in Table 8.4.2.2.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.2.5-1.

Table 8.4.2.2.2.5-1: Test requirement PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.17 TDD	OP.1 TDD	EVA5	4 x 2 Medium	1	2.2

8.4.2.2.2_1 TDD PCFICH/PDCCH Transmit Diversity 4x2 (Release 9 and forward)

8.4.2.2.2_1.1 Test purpose

This test verifies the demodulation performance of PCFICH/PDCCH for transmit diversity with a given SNR for which the average probability of miss-detection of the Downlink Scheduling Grant, tested jointly on PDCCH and PCFICH of the specified reference measurement channels in A.3.5.2 remains below a given reference value.

8.4.2.2.2_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward.

8.4.2.2.2_1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.2.2.2_1.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			0
Special subframe configuration (Note 2)			4
Number of PDCCH symbols		symbols	2
Number of PHICH groups (Ng)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: PHICH power setting refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.4.2.2.2_1.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.2_1.3-2.

Table 8.4.2.2.2_1.3-2: Minimum performance PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	5 MHz	2 CCE	R.17_1 TDD	OP.1 TDD	EPA5	4 x 2 Medium	1	6.5

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.

8.4.2.2.2_1.4 Test description

8.4.2.2.2_1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 5 MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connectors as shown in TS 36.508 [7] Annex A, Figure A.11.
2. The parameter settings for the cell are set up according to 8.4.2.2.2_1.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.2.2.2_1.4.3.

8.4.2.2.2_1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.2.2.2_1.3-2. The details of PDCCH and PDSCH are specified in Table A.3.5.2-1 and Table A.3.5.2-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.
2. Set the parameters of the propagation condition, the correlation matrix, antenna configuration and the SNR according to Tables 8.4.2.2.2_1.5-1 as appropriate.
3. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the radio (statDTX)/(NACK +ACK+statDTX). If Pm-dsg is less than the value specified in table 8.4.2.2.2_1.5-1, pass the UE. Otherwise fail the UE

8.4.2.2.2_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exception:.

Table 8.4.2.2.2_1.4.3-1: TDD-Configuration-DEFAULT

Derivation Path: 36.508 clause 4.6.4			
Information Element	**Value/remark**	**Comment**	**Condition**
TDD-Configuration-DEFAULT ::= SEQUENCE {			
subframeAssignment	Sa0		
specialSubframePatterns	Ssp4		
}			

Table 8.4.2.2.2_1.4.3-2: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n4TxAntenna-tm4	11111111111111111111 11111111111111111111 11111111111111111111 1111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

8.4.2.2.2_1.5 Test requirement

For the parameters specified in Table 8.4.2.2.2.3-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.2_1.5-1.

Table 8.4.2.2.2_1.5-1: Test requirement PDCCH/PCFICH 2 Tx Antenna Port

Test number	Bandwidth	Aggregation level	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
							Pm-dsg (%)	SNR (dB)
1	5 MHz	2 CCE	R.17_1 TDD	OP.1 TDD	EPA5	4 x 2 Medium	1	+7.5

8.4.2.2.3_C TDD PCFICH/PDCCH Transmit Diversity 2x2 for eICIC

8.4.2.2.3_C.1 TDD PCFICH/PDCCH Transmit Diversity 2x2 for eICIC (non-MBSFN ABS)

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Connection diagram in Annex A of TS 36.508 is TBD

- Test tolerances are incomplete

8.4.2.2.3_C.1.1 Test purpose

To verify the UE's performance of transmit diversity (SFBC) with 2 transmit antennas if the PCFICH/PDCCH transmission in the serving cell takes place in subframes that overlap with ABS of the aggressor cell.

8.4.2.2.3_C.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.4.2.2.3_C.1.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.2.2.3_C.1.3-1: Test Parameters for PDCCH/PCFICH

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			0
Special subframe configuration (Note 2)			4
Number of PDCCH symbols		symbols	2
Number of PHICH groups (N_g)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: PHICH power setting refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group			

For the parameters for non-MBSFN ABS specified in Table 8.4.2.2.3_C.1.3-1 and Table 8.4.2.2.3_C.1.3-2, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.3_C.1.3-3. The downlink physical setup is in accordance with Annex C.3.2 and Annex C.3.3. In Table 8.4.2.2.3_C.1.3-2, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

Table 8.4.2.2.3_C.1.3-2: Test Parameters for PDCCH/PCFICH – Non-MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Uplink downlink configuration			1	1
Special subframe configuration			4	4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-100.5 (Note 1)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N_{oc3}	dBm/15kHz	-95.3 (Note 3)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.4.2.2.3_C.1.3-3	1.5
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	2.5 (synchronous cells)	
Cell Id			0	1
ABS pattern (Note 4)			N/A	0000010001 0000000001
RLM/RRM Measurement Subframe Pattern(Note 5)			0000000001 0000000001	
CSI Subframe Sets(Note 6)	$C_{CSI,0}$		0000010001 0000000001	N/A
	$C_{CSI,1}$		1100101000 1100111000	N/A
Number of control OFDM symbols			3	
ACK/NACK feedback mode			Multiplexing	
Number of PHICH groups (N_g)			1	
PHICH duration			extended	
Unused RE-s and PRB-s			OCNG	
Cyclic prefix			Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. PDCCH/PCFICH other than that associated with SIB1/Paging are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell.
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 7: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 8: SIB-1 will not be transmitted in Cell2 in the test.

Table 8.4.2.2.3_C.1.3-3: Minimum performance PDCCH/PCFICH – Non-MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1		Correlation Matrix and Antenna Configuration	Reference Value	
			Cell 1	Cell 2	Cell 1	Cell 2		Pm-dsg (%)	SNR (dB) (Note 2)
1	8 CCE	R15-1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	2x2 Low	1	-3.9
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.2.3

8.4.2.2.3_C.1.4 Test description

8.4.2.2.3_C.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure [TBD] for antenna configuration 2x2.
2. The parameter settings for the cell1 are set up according to Tables 8.4.2.2.3_C.1.3-1 and 8.4.2.2.3_C.1.3-2.
3. The downlink signals are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.2.2.3_C.1.4.3.

8.4.2.2.3_C.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.2.2.3_C.1.3-3. The details of PDCCH and PDSCH are specified in Table A.3.5.2-1 and Table A.3.5.2-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.2.2.3_C.1.5-1
3. Set the Cell2 –aggressor cell- as defined in Tables 8.4.2.2.3_C.1.3-2, 8.4.2.2.3_C.1.5-1 and according to Annex C3.3.
4. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.2.2.3_C.1.5-1, pass the UE. Otherwise fail the UE.

8.4.2.2.3_C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.4.2.2.3_C.1.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.4.2.2.3_C.1.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000000010000000001'	BIT STRING (SIZE (20))	
}			
}			
}			
}			

Table 8.4.2.2.3_C.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000100010000000001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'11001010001100111000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			

8.4.2.2.3_C.1.5 Test requirement

For the parameters specified in Table 8.4.2.2.3_C.1.3-2, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.3_C.1.5-1.

Table 8.4.2.2.3_C.1.5-1: Test Requirement PDCCH/PCFICH – Non-MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1		Correlation Matrix and Antenna Configuration	Reference Value	
			Cell 1	Cell 2	Cell 1	Cell 2		Pm-dsg (%)	SNR (dB) (Note 2)
1	8 CCE	R15-1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	2x2 Low	1	-3.9 + [TT]
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.									
Note 2: SNR corresponds to $\widehat{E}_s / N_{oc2}$ of cell 1.									

8.4.2.2.3_C.2 TDD PCFICH/PDCCH Transmit Diversity 2x2 for eICIC (MBSFN ABS)

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Connection diagram in Annex A of TS 36.508 is TBD

- Test tolerances are incomplete

8.4.2.2.3_C.2.1 Test purpose

To verify the UE's performance of transmit diversity (SFBC) with 2 transmit antennas if the PCFICH/PDCCH transmission in the serving cell takes place in subframes that overlap with ABS of the aggressor cell.

8.4.2.2.3_C.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.4.2.2.3_C.2.3 Minimum conformance requirements

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH.

Table 8.4.2.2.3_C.2.3-1: Test Parameters for PDCCH/PCFICH - MBSFN ABS

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			0
Special subframe configuration (Note 2)			4
Number of PDCCH symbols		symbols	2
Number of PHICH groups (N_g)			1
PHICH duration			Normal
Unused RE-s and PRB-s			OCNG
Cell ID			0
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: PHICH power setting refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group			

For the parameters for MBSFN ABS specified in Table 8.4.2.2.3_C.2.3-1 and Table 8.4.2.2.3_C.2.3-2, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.3_C.2-5.

The downlink physical setup is in accordance with Annex C.3.2 and Annex C.3.3. In Table 8.4.2.2.3_C.2.3-2, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

Table 8.4.2.2.3_C.2.3-2: Minimum performance PDCCH/PCHICH – MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
Uplink downlink configuration			1	1
Special subframe configuration			4	4
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-100.5 (Note 1)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N_{oc3}	dBm/15kHz	-95.3 (Note 3)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.4.2.2.3_C.2.3-3	1.5
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	MBSFN
Time Offset between Cells		µs	2.5 (synchronous cells)	
Cell Id			0	126
ABS pattern (Note 4)			N/A	0000000001 0000000001
RLM/RRM Measurement Subframe Pattern(Note 5)			0000000001 0000000001	
CSI Subframe Sets(Note 6)	$C_{CSI,0}$		0000000001 0000000001	N/A
	$C_{CSI,1}$		1100111000 1100111000	N/A
MBSFN Subframe Allocation (Note 9)			N/A	000010
Number of control OFDM symbols			3	
ACK/NACK feedback mode			Multiplexing	
Number of PHICH groups (N_g)			1	
PHICH duration			extended	
Unused RE-s and PRB-s			OCNG	
Cyclic prefix			Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #4, #5, #6, #7, #8, #9, #10, #11, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 2: This noise is applied in OFDM symbols #0 of a subframe overlapping with the aggressor ABS.
Note 3: This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. The 10th and 20th subframes indicated by ABS pattern are MBSFN ABS subframes. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the MBSFN ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5].
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5].
Note 7: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 8: SIB-1 will not be transmitted in Cell2 in this test.
Note 9: MBSFN Subframe Allocation as defined in [5], one frame with 6 bits is chosen for MBSFN subframe allocation.

Table 8.4.2.2.3_C.2.3-3: Minimum performance PDCCH/PCHICH – MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern		Propagation Conditions(Note 1)		Correlation Matrix and Antenna Configuration	Reference Value	
			Cell 1	Cell 2	Cell 1	Cell 2		Pm-dsg (%)	SNR (dB) (Note 2)
1	8 CCE	R15-1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	2x2 Low	1	-4.1
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									

The normative reference for this requirement is TS 36.101 [2] clause 8.4.2.2.3

8.4.2.2.3_C.2.4 Test description

8.4.2.2.3_C.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: 10MHz, as defined in TS 36.508 [7] clause 4.3.1.2

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure [TBD] for antenna configuration 2x2.
2. The parameter settings for the cell1 are set up according to Tables 8.4.2.2.3_C.2.3-1 and 8.4.2.2.3_C.2.3-2.
3. The downlink signals are initially set up according to Annex C0, C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.4.2.2.3_C.2.4.3.

8.4.2.2.3_C.2.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 2 for C_RNTI to transmit the DL RMC according to Table 8.4.2.2.3_C.2.3-3. The details of PDCCH and PDSCH are specified in Table A.3.5.2-1 and Table A.3.5.2-2 respectively. The SS sends downlink MAC padding bits on the DL RMC. Transmission scheme for the PDSCH shall be transmit diversity.
2. Set the parameters of the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.4.2.2.3_C.2.5-1.
3. Set the Cell2 –aggressor cell- as defined in Tables 8.4.2.2.3_C.2.3-2, 8.4.2.2.3_C.2.5-1 and according to Annex C3.3
4. Measure the Pm-dsg for a duration sufficient to achieve statistical significance according to Annex G clause G.4. Count the number of NACKs, ACKs and statDTXs on the UL PUCCH during each subtest interval. Pm-dsg is the ratio (statDTX)/(NACK+ACK+statDTX).

   If Pm-dsg is less than the value specified in table 8.4.2.2.3_C.2.5-1, pass the UE. Otherwise fail the UE.

8.4.2.2.3_C.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions:

Table 8.4.2.2.3_C.2.4.3-1: *PhysicalConfigDedicated-DEFAULT*

Derivation Path: 36.331 clause 6.3.2			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
antennaInfo CHOICE {			
antennaInfoDedicated ::= SEQUENCE {			
transmissionMode	tm4		
codebookSubsetRestriction CHOICE {			
n2TxAntenna-tm4	111111		
}			
ue-TransmitAntennaSelection CHOICE {			
release	NULL		
}			
}			
}			
}			

Table 8.4.2.2.3_C.1.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	‘00000000010000000001’	BIT STRING (SIZE (20))	
}			
}			
}			
}			

Table 8.4.2.2.3_C.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000000010000000001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'11001110001100111000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			

8.4.2.2.3_C.2.5 Test requirement

For the parameters specified in Table 8.4.2.2.3_C.2.3-2, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.3_C.2.5-1.

Table 8.4.1.2.3_C.2.5-1: Test Requirement PDCCH/PCHICH – MBSFN ABS

Test Number	Aggregation Level	Reference Channel	OCNG Pattern		Propagation Conditions(Note 1)		Correlation Matrix and Antenna Configuration	Reference Value	
			Cell 1	Cell 2	Cell 1	Cell 2		Pm-dsg (%)	SNR (dB) (Note 2)
1	8 CCE	R15-1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	2x2 Low	1	-4.1 + [TT]
Note 1: The propagation conditions for Cell 1 and Cell2 are statistically independent.									
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.									

8.5 Demodulation of PHICH

8.5.1 FDD

8.5.1.1 FDD PHICH Single-antenna Port Performance

8.5.1.1.1 Test purpose

This test verifies the demodulation performance of PHICH for a single antenna port with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.5.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8 and forward.

8.5.1.1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.1.1.3-1: Test Parameters for PHICH

Parameter		Unit	Single antenna port
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	0
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	0
PHICH duration			Normal
Number of PHICH groups (Note 1)			Ng = 1
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG
Cell ID			0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note 1: according to Clause 6.9 in TS 36.211 [8] Note 2: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.5.1.1.3-1 the average probability of a miss-detecting an ACK for a NACK (Pm-an) shall be below the specified value in Table 8.5.1.1.3-2.

Table 8.5.1.1.3-2: Minimum performance PHICH

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.18	OP.1 FDD	ETU70	1 x 2 Low	0.1	5.5
2	10 MHz	R.24	OP.1 FDD	ETU70	1 x 2 Low	0.1	0.6

The normative reference for this requirement is TS 36.101 [2] clause 8.5.

8.5.1.1.4 Test description

8.5.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.9.

2. The parameter settings for the cell are set up according to Table 8.5.1.1.3-1.

3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.1.1.4.3.

8.5.1.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.1.1.5-1 Test 1 as appropriate.

2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1 to happen during 8 consecutive uplink TTIs via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.1.1.4.2-1 indicates the transmissions for one cycle.

Table 8.5.1.1.4.2-1: PHICH test pattern

TTI	1-4	5-8	9-12	13-16	17-20	21-24
PDCCH	S	S	-	-	S	S
PHICH	-	-	A	A	-	-
PUSCH		T	T	R	R	T
UL HARQ Process	1-4	5-8	1-4	5-8	1-4	5-8
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK						

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. Such re-transmissions (if they occur) will potentially happen in TTI 13 to 20. DTXs on TTI 13 to 20 are counted as successful ACK receptions while any transmission on these TTIs is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).
If Pm-an is less than the value specified in table 8.5.1.1.5-1, pass the UE. Otherwise fail the UE.

5. Repeat the same procedure (steps 1 to 3) with test conditions according to the Table 8.5.1.1.5-1 for Test 2.

8.5.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6, with the following exceptions

Table 8.5.1.1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.5.1.1.5 Test requirement

For the parameters specified in Table 8.5.1.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.1.1.5-1.

Table 8.5.1.1.5-1: Test requirement PHICH

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.18	OP.1 FDD	ETU70	1 x 2 Low	0.1	6.4
2	10 MHz	R.24	OP.1 FDD	ETU70	1 x 2 Low	0.1	1.5

8.5.1.2 FDD PHICH Transmit Diversity Performance

8.5.1.2.1 FDD PHICH Transmit Diversity 2x2

8.5.1.2.1.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.5.1.2.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8.

8.5.1.2.1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.1.2.1.3-1: Test Parameters for PHICH

Parameter		Unit	Transmit diversity
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
PHICH duration			Normal
Number of PHICH groups (Note 1)			Ng = 1
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG
Cell ID			0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note 1: according to Clause 6.9 in TS 36.211 [8] Note 2: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.5.1.2.1.3-1 the average probability of a miss-detecting an ACK for a NACK (Pm-an) shall be below the specified value in Table 8.5.1.2.1.3-2

Table 8.5.1.2.1.3-2: Minimum performance PHICH 2 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	1.4 MHz	R.19	OP.1 FDD	EPA5	2 x 2 Low	0.1	5.6

The normative reference for this requirement is TS 36.101 [2] clause 8.5.1.

8.5.1.2.1.4 Test description

8.5.1.2.1.4.1 Initial conditions

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 1.4 MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10.

2. The parameter settings for the cell are set up according to Table 8.5.1.2.1.3-1.

3. Downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B clauses B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.1.2.1.4.3.

8.5.1.2.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.1.2.1.5-1.

2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1 to happen during 8 consecutive uplink TTIs via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.1.2.1.4.2-1 indicates the transmissions for one cycle.

Table 8.5.1.2.1.4.2-1: PHICH test pattern

TTI	1-4	5-8	9-12	13-16	17-20	21-24
PDCCH	S	S	-	-	S	S
PHICH	-	-	A	A	-	-
PUSCH		T	T	R	R	T
UL HARQ Process	1-4	5-8	1-4	5-8	1-4	5-8
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK						

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. Such re-transmissions (if they occur) will potentially happen in TTI 13 to 20. DTXs on TTI 13 to 20 are counted as successful ACK receptions while any transmission on these TTIs is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).
If Pm-an is less than the value specified in table 8.5.1.2.1.5-1, pass the UE. Otherwise fail the UE.

8.5.1.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions

Table 8.5.1.2.1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.5.1.2.1.5 Test requirement

For the parameters specified in Table 8.5.1.2.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.1.2.1.5-1.

Table 8.5.1.2.1.5-1: Test requirement PHICH 2 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	1.4 MHz	R.19	OP.1 FDD	EPA5	2 x 2 Low	0.1	6.7

8.5.1.2.1_1 FDD PHICH Transmit Diversity 2x2 (Release 9 and forward)

8.5.1.2.1_1.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.5.1.2.1_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward.

8.5.1.2.1_1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.1.2.1_1.3-1: Test Parameters for PHICH

Parameter		Unit	Transmit diversity
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
PHICH duration			Normal
Number of PHICH groups (Note 1)			Ng = 1
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s		OCNG	
Cell ID			0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note 1: according to Clause 6.9 in TS 36.211 [8] Note 2: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.5.1.2.1_1.3-1 the average probability of a miss-detecting an ACK for a NACK (Pm-an) shall be below the specified value in Table 8.5.1.2.1_1.3-2

Table 8.5.1.2.1_1.3-2: Minimum performance PHICH 2 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.19_1	OP.1 FDD	EVA70	2 x 2 Low	0.1	4.4

The normative reference for this requirement is TS 36.101 [2] clause 8.5.1.

8.5.1.2.1_1.4 Test description

8.5.1.2.1_1.4.1 Initial conditions

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.10.
2. The parameter settings for the cell are set up according to Table 8.5.1.2.1_1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.1.2.1_1.4.3.

8.5.1.2.1_1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.1.2.1_1.5-1.
2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1 to happen during 8 consecutive uplink TTIs via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.1.2.1_1.4.2-1 indicates the transmissions for one cycle.

Table 8.5.1.2.1_1.4.2-1: PHICH test pattern

TTI	1-4	5-8	9-12	13-16	17-20	21-24
PDCCH	S	S	-	-	S	S
PHICH	-	-	A	A	-	-
PUSCH		T	T	R	R	T
UL HARQ Process	1-4	5-8	1-4	5-8	1-4	5-8
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK						

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. Such re-transmissions (if they occur) will potentially happen in TTI 13 to 20. DTXs on TTI 13 to 20 are counted as successful ACK receptions while any transmission on these TTIs is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).
   If Pm-an is less than the value specified in table 8.5.1.2.1_1.5-1, pass the UE. Otherwise fail the UE.

8.5.1.2.1_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions

Table 8.5.1.2.1_1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.5.1.2.1_1.5 Test requirement

For the parameters specified in Table 8.5.1.2.1_1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.1.2.1_1.5-1.

Table 8.5.1.2.1_1.5-1: Test requirement PHICH 2 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.19_1	OP.1 FDD	EVA70	2 x 2 Low	0.1	+5.5

8.5.1.2.2 FDD PHICH Transmit Diversity 4x2

8.5.1.2.2.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.5.1.2.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 8.

8.5.1.2.2.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.1.2.2.3-1: Test Parameters for PHICH

Parameter		Unit	Transmit diversity
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
PHICH duration			Normal
Number of PHICH groups (Note 1)			Ng = 1
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG
Cell ID			0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note 1: according to Clause 6.9 in TS 36.211 [8] Note 2: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.5.1.2.2.3-1 the average probability of a miss-detecting an ACK for a NACK (Pm-an) shall be below the specified value in Table 8.5.1.2.2.3-2.

Table 8.5.1.2.2.3-2: Minimum performance PHICH 4 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.20	OP.1 FDD	EVA5	4 x 2 Medium	0.1	6.0

The normative reference for this requirement is TS 36.101 [2] clause 8.5.1.

8.5.1.2.2.4 Test description

8.5.1.2.2.4.1 Initial conditions

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11.
2. The parameter settings for the cell are set up according to Table 8.5.1.2.2.3-1.
3. Downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.1.2.2.4.3.

8.5.1.2.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.1.2.2.5-1.

2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1 to happen during 8 consecutive uplink TTIs via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.1.2.2.4.2-1 indicates the transmissions for one cycle.

Table 8.5.1.2.2.4.2-1: PHICH test pattern

TTI	1-4	5-8	9-12	13-16	17-20	21-24
PDCCH	S	S	-	-	S	S
PHICH	-	-	A	A	-	-
PUSCH		T	T	R	R	T
UL HARQ Process	1-4	5-8	1-4	5-8	1-4	5-8
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK						

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. Such re-transmissions (if they occur) will potentially happen in TTI 13 to 20. DTXs on TTI 13 to 20 are counted as successful ACK receptions while any transmission on these TTIs is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK). If Pm-an is less than the value specified in table 8.5.1.2.2.5-1, pass the UE. Otherwise fail the UE.

8.5.1.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions

Table 8.5.1.2.2.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.5.1.2.2.5 Test requirement

For the parameters specified in Table 8.5.1.2.2.3-1 the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.1.2.2.5-1.

Table 8.5.1.2.2.5-1: Test requirement PHICH 4 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.20	OP.1 FDD	EVA5	4 x 2 Medium	0.1	7.0

8.5.1.2.2_1 FDD PHICH Transmit Diversity 4x2 (Release 9 and forward)

8.5.1.2.2_1.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.5.1.2.2_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 9 and forward.

8.5.1.2.2_1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.1.2.2_1.3-1: Test Parameters for PHICH

Parameter		Unit	Transmit diversity
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
PHICH duration			Normal
Number of PHICH groups (Note 1)			Ng = 1
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s		OCNG	
Cell ID			0
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
Note 1: according to Clause 6.9 in TS 36.211 [8] Note 2: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.5.1.2.2_1.3-1 the average probability of a miss-detecting an ACK for a NACK (Pm-an) shall be below the specified value in Table 8.5.1.2.2_1.3-2.

Table 8.5.1.2.2_1.3-2: Minimum performance PHICH 4 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	5 MHz	R.20_1	OP.1 FDD	EPA5	4 x 2 Medium	0.1	6.1

The normative reference for this requirement is TS 36.101 [2] clause 8.5.1.

8.5.1.2.2_1.4 Test description

8.5.1.2.2_1.4.1 Initial conditions

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 5 MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11.

2. The parameter settings for the cell are set up according to Table 8.5.1.2.2_1.3-1.

3. Downlink signals are initially set up according to Annex C.1 and C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B clauses B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.1.2.2_1.4.3.

8.5.1.2.2_1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.1.2.2_1.5-1.

2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1 to happen during 8 consecutive uplink TTIs via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.1.2.2_1.4.2-1 indicates the transmissions for one cycle.

Table 8.5.1.2.2_1.4.2-1: PHICH test pattern

TTI	1-4	5-8	9-12	13-16	17-20	21-24
PDCCH	S	S	-	-	S	S
PHICH	-	-	A	A	-	-
PUSCH		T	T	R	R	T
UL HARQ Process	1-4	5-8	1-4	5-8	1-4	5-8
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK						

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. Such re-transmissions (if they occur) will potentially happen in TTI 13 to 20. DTXs on TTI 13 to 20 are counted as successful ACK receptions while any transmission on these TTIs is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK). If Pm-an is less than the value specified in table 8.5.1.2.2_1.5-1, pass the UE. Otherwise fail the UE.

8.5.1.2.2_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions

Table 8.5.1.2.2_1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.5.1.2.2_1.5 Test requirement

For the parameters specified in Table 8.5.1.2.2_1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.1.2.2_1.5-1.

Table 8.5.1.2.2_1.5-1: Test requirement PHICH 4 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	5 MHz	R.20_1	OP.1 FDD	EPA5	4 x 2 Medium	0.1	+7.1

8.5.1.2.3_C FDD PHICH Transmit Diversity 2x2 for eICIC

8.5.1.2.3_C.1 FDD PHICH Transmit Diversity 2x2 for eICIC (non-MBSFN ABS)

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Connection diagram in Annex A of TS 36.508 is TBD

- Tests requirements are TBD

- Test tolerances are incomplete

8.5.1.2.3_C.1.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which the average probability of miss detection of Hybrid Indicator ("ACK to NACK") of the specified reference measurement channels remains below a specified value.

8.5.1.2.3_C.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.5.1.2.3_C.1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.1.2.3_C.1.3-1: Test Parameters for PHICH

Parameter	Unit	Cell 1	Cell 2	
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-100.5 (Note 1)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N_{oc3}	dBm/15kHz	-95.3 (Note 3)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.5.1.2.3_C.1.3-2	1.5
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Time Offset between Cells		µs	2.5 (synchronous cells)	
Cell Id			0	1
ABS pattern (Note 4)			N/A	00000100 00000100 00000100 01000100 00000100
RLM/RRM Measurement Subframe Pattern (Note 5)			00000100 00000100 00000100 00000100 00000100	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		00000100 00000100 00000100 01000100 00000100	N/A
	$C_{CSI,1}$		11111011 11111011 11111011 10111011 11111011	N/A
Number of control OFDM symbols			3	
Number of PHICH groups (N_g)			1	
PHICH duration			extended	
Unused RE-s and PRB-s			OCNG	OCNG
Cyclic prefix			Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS

Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS

Note 3: This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABS

Note 4: ABS pattern as defined in [14]. PHICH is transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell but not in the 26th subframe indicated by the ABS pattern.

Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]

Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5]

Note 7: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.

Note 8: SIB-1 will not be transmitted in Cell2 in the test.

For the parameters specified in Table 8.5.1.2.3_C.1.3-1, the average probability of a miss-detecting an ACK for a NACK (Pm-an) shall be below the specified value in Table 8.5.1.2.3_C.1.3-2. . In Table 8.5.1.2.3_C.1.3-1, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

Table 8.5.1.2.3_C.1.3-2: Minimum performance PHICH

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Antenna Configuration and Correlation Matrix	Reference Value	
		Cell 1	Cell 2	Cell 1	Cell 2		Pm-an (%)	SNR (dB) (Note 2)
1	R.19_1	OP.1 FDD	OP.1 FDD	EPA5	EPA5	2x2 Low	0.1	4.6
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.								
Note 2: SNR corresponds to $\hat{E}_s / N_{oc2}$ of cell 1.								
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.								

The normative reference for this requirement is TS 36.101 [2] clause 8.5.1.2.3.

8.5.1.2.3_C.1.4 Test description

8.5.1.2.3_C.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.1

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure [TBD] for antenna transmit diversity 2x2 configuration.
2. The parameter settings for the cell are set up according to Table 8.5.1.2.3_C.1.3-1 and 8.5.1.2.3_C.1.3-2.
3. Downlink signals are initially set up according to Annex C.1, C.3.2 and C.3.3 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clauses B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.1.2.3_C.1.4.3.

8.5.1.2.3_C.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.1.2.3_C.1.5-1.
2. SS shall schedule PUSCH transmissions according to Annex A.2.2.1.1 Table A.2.2.1.1-1 to happen during 8 consecutive uplink TTIs via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions will transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.1.2.3_C.1.4.2-1 indicates the transmissions for one cycle.

Table 8.5.1.2.3_C.1.4.2-1: PHICH test pattern

TTI	1-4	5-8	9-12	13-16	17-20	21-24
PDCCH	S	S	-	-	S	S
PHICH	-	-	A	A	-	-
PUSCH		T	T	R	R	T
UL HARQ Process	1-4	5-8	1-4	5-8	1-4	5-8
Note 1: This table gives an example test pattern for HARQ process for FDD PHICH test Note 2: Following notation is used: S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission A: represents the ACK transmission on PHICH T: represents a scheduled PUSCH transmission R: represents a potential PUSCH re-transmission due to a missed ACK						

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. Such re-transmissions (if they occur) will potentially happen in TTI 13 to 20. DTXs on TTI 13 to 20 are counted as successful ACK receptions while any transmission on these TTIs is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).
If Pm-an is less than the value specified in table 8.5.1.2.3_C.1.5-1, pass the UE. Otherwise fail the UE.

8.5.1.2.3_C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 with the following exceptions

Table 8.5.1.2.3_C.1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

Table 8.5.1.2.3_C.1.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternFDD-r10	'00000100000001000000 01000000010000000100'	BIT STRING (SIZE (40))	
}			
}			
}			

Table 8.5.1.2.3_C.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternFDD-r10	'00000100000001000000 01000100010000000100'	BIT STRING (SIZE (40))	
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternFDD-r10	'11111011111110111111 10111011101111111011'	BIT STRING (SIZE (40))	
}			
}			
}			
}			

8.5.1.2.3_C.1.5 Test requirement

For the parameters specified in Table 8.5.1.2.3_C.1.3-1 and 8.5.1.2.3_C.1.3-2 the average probability of a miss-detecting ACK for NACK (Pm-dsg) shall be below the specified value in Table 8.5.1.2.3_C.1.5-1.

Table 8.5.1.2.3_C.1.5-1: Test requirement FDD PHICH Transmit Diversity 2x2 for eICIC (non-MBSFN ABS)

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Antenna Configuration and Correlation Matrix	Reference Value	
		Cell 1	Cell 2	Cell 1	Cell 2		Pm-an (%)	SNR (dB) (Note 2)
1	R.19_1	OP.1 FDD	OP.1 FDD	EPA5	EPA5	2x2 Low	0.1	[TBD]
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.								
Note 2: SNR corresponds to $\widehat{E}_s / N_{oc2}$ of cell 1.								
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.								

8.5.2 TDD

8.5.2.1 TDD PHICH Single-antenna Port Performance

8.5.2.1.1 Test purpose

This test verifies the demodulation performance of PHICH for a single antenna port with a given SNR for which a certain Hybrid Indicator detection error rate (i.e. missed detection of "NACK to ACK" and "ACK to NACK") of the specified reference measurement channels is achieved.

8.5.2.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8 and forward.

8.5.2.1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.2.1.3-1: Test Parameters for PHICH

Parameter		Unit	Single antenna port
Uplink downlink configuration (Note 1)			1
Special subframe configuration (Note 2)			4
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	0
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	0
PHICH duration			Normal
Number of PHICH groups (Note 3)			Ng = 1
Cell ID			0
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: according to Clause 6.9 in TS 36.211 [8] Note 4: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.5.2.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.1.3-2.

Table 8.5.2.1.3-2: Minimum performance of PHICH

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.18	OP.1 TDD	ETU70	1 x 2 Low	0.1	5.8
2	10 MHz	R.24	OP.1 TDD	ETU70	1 x 2 Low	0.1	1.3

The normative reference for this requirement is TS 36.101 [2] clause 8.5.2.

8.5.2.1.4 Test description

8.5.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.1

Bandwidths to be tested: As specified per test number in Tables 8.5.2.1.3-2 as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise source to the UE antenna connector (s) as shown in TS 36.508 [7] Annex a, Figure A.9.
2. The parameter settings for the cell are set up according to 8.5.2.1.3-1.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.2.1.4.3.

8.5.2.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.2.1.5-1 Test 1 as appropriate.
2. In Each HARQ process (4 HARQ processes for UL/DL configuration 1); SS shall schedule PUSCH transmissions according to Annex A.2.3.1.1 Table A.2.3.1.1-1 via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions shall transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.2.1.4.2-1 indicates the transmissions for one cycle.
3. SS will only monitor for uplink retransmissions due to ACK missed-detections. DTX from the UE side is counted as successful ACK reception, while any transmission on these subframes is counted as NACKs.

Table 8.5.2.1.4.2-1: PHICH test pattern

Subframe Index	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
PDCCH		S			S		S			S										
PHICH												A			A		A			A
PUSCH			R?	R?				T	T				T	T				R?	R?	
HARQ process		1	3	4	2		3	1	2	4		1	3	4	2		3	1	2	4

Note 1: This table gives an example test pattern for HARQ process for TDD PHICH test
Note 2: Following notation is used:
S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission
A: represents the ACK transmission on PHICH
T: represents a scheduled PUSCH transmission
R: represents a potential PUSCH re-transmission due to a missed ACK
Note 3: TDD UL/DL configuration 1 is used here, special subframe is denoted as blue

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).

   If Pm-an is less than the value specified in table 8.5.2.1.5-1, pass the UE. Otherwise fail the UE.
5. Repeat the same procedure (steps 1 to 4) with test conditions according to the Table 8.5.2.1.5-1 for Test 2.

8.5.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6, with the following exceptions

Table 8.5.1.1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.5.2.1.5 Test requirement

For the parameters specified in Table 8.5.2.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.1.5-1.

Table 8.5.2.1.5-1: Test requirement of PHICH

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.18	OP.1 TDD	ETU70	1 x 2 Low	0.1	6.7
2	10 MHz	R.24	OP.1 TDD	ETU70	1 x 2 Low	0.1	2.2

8.5.2.2 TDD PHICH Transmit Diversity Performance

8.5.2.2.1 TDD PHICH Transmit Diversity 2x2

8.5.2.2.1.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which a certain Hybrid Indicator detection error rate (i.e. missed detection of "NACK to ACK" and "ACK to NACK") of the specified reference measurement channels is achieved.

8.5.2.2.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8.

8.5.2.2.1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.2.2.1.3-1: Test Parameters for PHICH

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			1
Special subframe configuration (Note 2)			4
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
PHICH duration			Normal
Number of PHICH groups (Note 3)			Ng = 1
Cell ID			0
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: according to Clause 6.9 in TS 36.211 [8] Note 4: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.5.2.2.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.1.3-2.

Table 8.5.2.2.1.3-2: Minimum performance of PHICH 2 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	1.4 MHz	R.19	OP.1 TDD	EPA5	2 x 2 Low	0.1	5.3

The normative reference for this requirement is TS 36.101 [2] clause 8.5.2.

8.5.2.2.1.4 Test description

8.5.2.2.1.4.1 Initial conditions

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2

Bandwidths to be tested: 1.4 MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A Figure A.10.
2. The parameter settings for the cell are set up according to Table 8.5.2.2.1.3-1.

3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B clause B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.2.2.1.4.3.

8.5.2.2.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.2.2.1.5-1.

2. In Each HARQ process (4 HARQ processes for UL/DL configuration 1), SS shall schedule PUSCH transmissions according to Annex A.2.3.1.1 Table A.2.3.1.1-1 via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions shall transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.2.2.1.4.2-1 indicates the transmissions for one cycle.

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. DTX from the UE side is counted as successful ACK reception, while any transmission on these subframes is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).

   If Pm-an is less than the value specified in table 8.5.2.2.1.5-1, pass the UE. Otherwise fail the UE.

Table 8.5.2.2.1.4.2-1: PHICH test pattern

Subframe Index	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
PDCCH		S			S		S			S										
PHICH												A			A		A			A
PUSCH			R?	R?				T	T				T	T				R?	R?	
HARQ process		1	3	4	2		3	1	2	4		1	3	4	2		3	1	2	4

Note 1: This table gives an example test pattern for HARQ process for TDD PHICH test
Note 2: Following notation is used:
S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission
A: represents the ACK transmission on PHICH
T: represents a scheduled PUSCH transmission
R: represents a potential PUSCH re-transmission due to a missed ACK
Note 3: TDD UL/DL configuration 1 is used here, special subframe is denoted as blue

8.5.2.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6, with the following exceptions:

Table 8.5.2.2.1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	
…			

8.5.2.2.1.5 Test requirement

For the parameters specified in Table 8.5.2.2.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.1.5-1.

Table 8.5.2.2.1.5-1: Test requirement of PHICH 2 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	1.4 MHz	R.19	OP.1 TDD	EPA5	2 x 2 Low	0.1	6.4

8.5.2.2.1_1 TDD PHICH Transmit Diversity 2x2 (Release 9 and forward)

8.5.2.2.1_1.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which a certain Hybrid Indicator detection error rate (i.e. missed detection of "NACK to ACK" and "ACK to NACK") of the specified reference measurement channels is achieved.

8.5.2.2.1_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward.

8.5.2.2.1_1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.2.2.1_1.3-1: Test Parameters for PHICH

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			1
Special subframe configuration (Note 2)			4
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
PHICH duration			Normal
Number of PHICH groups (Note 3)			Ng = 1
Cell ID			0
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s		OCNG	
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: according to Clause 6.9 in TS 36.211 [8] Note 4: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.5.2.2.1_1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.1_1.3-2.

Table 8.5.2.2.1_1.3-2: Minimum performance of PHICH 2 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.19_1	OP.1 TDD	EVA70	2 x 2 Low	0.1	4.2

The normative reference for this requirement is TS 36.101 [2] clause 8.5.2.

8.5.2.2.1_1.4 Test description

8.5.2.2.1_1.4.1 Initial conditions

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2

Bandwidths to be tested: 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A Figure A.10.
2. The parameter settings for the cell are set up according to Table 8.5.2.2.1_1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B clause B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.2.2.1_1.4.3.

8.5.2.2.1_1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.2.2.1_1.5-1.

2. In Each HARQ process (4 HARQ processes for UL/DL configuration 1), SS shall schedule PUSCH transmissions according to Annex A.2.3.1.1 Table A.2.3.1.1-1 via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions shall transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.2.2.1_1.4.2-1 indicates the transmissions for one cycle.

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. DTX from the UE side is counted as successful ACK reception, while any transmission on these subframes is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).

   If Pm-an is less than the value specified in table 8.5.2.2.1_1.5-1, pass the UE. Otherwise fail the UE.

Table 8.5.2.2.1_1.4.2-1: PHICH test pattern

Subframe Index	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
PDCCH		S			S		S			S										
PHICH												A			A		A			A
PUSCH			R?	R?				T	T				T	T				R?	R?	
HARQ process		1	3	4	2		3	1	2	4		1	3	4	2		3	1	2	4

Note 1: This table gives an example test pattern for HARQ process for TDD PHICH test
Note 2: Following notation is used:
S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission
A: represents the ACK transmission on PHICH
T: represents a scheduled PUSCH transmission
R: represents a potential PUSCH re-transmission due to a missed ACK
Note 3: TDD UL/DL configuration 1 is used here, special subframe is denoted as blue

8.5.2.2.1_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6, with the following exceptions:

Table 8.5.2.2.1_1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	

8.5.2.2.1_1.5 Test requirement

For the parameters specified in Table 8.5.2.2.1_1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.1_1.5-1.

Table 8.5.2.2.1_1.5-1: Test requirement of PHICH 2 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.19_1	OP.1 TDD	EVA70	2 x 2 Low	0.1	+5.3

8.5.2.2.2 TDD PHICH Transmit Diversity 4x2

8.5.2.2.2.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which a certain Hybrid Indicator detection error rate (i.e. missed detection of "NACK to ACK" and "ACK to NACK") of the specified reference measurement channels is achieved.

8.5.2.2.2.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 8.

8.5.2.2.2.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.2.2.2.3-1: Test Parameters for PHICH

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			1
Special subframe configuration (Note 2)			4
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
PHICH duration			Normal
Number of PHICH groups (Note 3)			Ng = 1
Cell ID			0
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	
Unused RE-s and PRB-s			OCNG
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing

Note 1: as specified in Table 4.2-2 in TS 36.211 [8]
Note 2: as specified in Table 4.2-1 in TS 36.211 [8]
Note 3: according to Clause 6.9 in TS 36.211 [8]
Note 4: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.

For the parameters specified in Table 8.5.2.2.2.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.2.3-2.

Table 8.5.2.2.2.3-2: Minimum performance of PHICH 4 Tx Antenna port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.20	OP.1 TDD	EVA5	4 x 2 Medium	0.1	6.1

The normative reference for this requirement is TS 36.101 [2] clause 8.5.2.

8.5.2.2.2.4 Test description

8.5.2.2.2.4.1 Initial conditions

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2

Channel Bandwidths to be tested: 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11.
2. The parameter settings for the cell are set up according to Table 8.5.2.2.2.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.2.2.2.4.3.

8.5.2.2.2.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.2.2.2.5-1.
2. In Each HARQ process (4 HARQ processes for UL/DL configuration 1), SS shall schedule PUSCH transmissions according to Annex A.2.3.1.1 Table A.2.3.1.1-1 via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions shall transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.2.2.2.4.2-1 indicates the transmissions for one cycle.
3. SS will only monitor for uplink retransmissions due to ACK missed-detections. DTX from the UE side is counted as successful ACK reception, while any transmission on these subframes is counted as NACKs.
4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).

   If Pm-an is less than the value specified in table 8.5.2.2.2.5-1, pass the UE. Otherwise fail the UE.

Table 8.5.2.2.2.4.2-1: PHICH test pattern

Subframe Index	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
PDCCH		S			S		S			S										
PHICH												A			A		A			A
PUSCH			R?	R?				T	T				T	T				R?	R?	
HARQ process		1	3	4	2		3	1	2	4		1	3	4	2		3	1	2	4

Note 1: This table gives an example test pattern for HARQ process for TDD PHICH test
Note 2: Following notation is used:
S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission
A: represents the ACK transmission on PHICH
T: represents a scheduled PUSCH transmission
R: represents a potential PUSCH re-transmission due to a missed ACK
Note 3: TDD UL/DL configuration 1 is used here, special subframe is denoted as blue

8.5.2.2.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6, with the following exceptions:

Table 8.5.2.2.2.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	
…			

8.5.2.2.2.5 Test requirement

For the parameters specified in Table 8.5.2.2.2.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.2.5-1.

Table 8.5.2.2.2.5-1: Test requirement of PHICH 4 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.20	OP.1 TDD	EVA5	4 x 2 Medium	0.1	7.1

8.5.2.2.2_1 TDD PHICH Transmit Diversity 4x2 (Release 9 and forward)

8.5.2.2.2_1.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which a certain Hybrid Indicator detection error rate (i.e. missed detection of "NACK to ACK" and "ACK to NACK") of the specified reference measurement channels is achieved.

8.5.2.2.2_1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward.

8.5.2.2.2_1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.2.2.2_1.3-1: Test Parameters for PHICH

Parameter		Unit	Transmit diversity
Uplink downlink configuration (Note 1)			1
Special subframe configuration (Note 2)			4
Downlink power allocation	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3
PHICH duration			Normal
Number of PHICH groups (Note 3)			Ng = 1
Cell ID			0
PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6, other PDCCH resource shall be occupied by non-zero data.	
Unused RE-s and PRB-s		OCNG	
N_{oc} at antenna port		dBm/15kHz	-98
Cyclic prefix			Normal
ACK/NACK feedback mode			Multiplexing
Note 1: as specified in Table 4.2-2 in TS 36.211 [8] Note 2: as specified in Table 4.2-1 in TS 36.211 [8] Note 3: according to Clause 6.9 in TS 36.211 [8] Note 4: PHICH power settings refer to PHICH group power, i.e. the total power of all active PHICH sequences within a PHICH group.			

For the parameters specified in Table 8.5.2.2.2_1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.2_1.3-2.

Table 8.5.2.2.2_1.3-2: Minimum performance of PHICH 4 Tx Antenna port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	5 MHz	R.20_1	OP.1 TDD	EPA5	4 x 2 Medium	0.1	6.2

The normative reference for this requirement is TS 36.101 [2] clause 8.5.2.

8.5.2.2.2_1.4 Test description

8.5.2.2.2_1.4.1 Initial conditions

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2

Channel Bandwidths to be tested: 5 MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A, Figure A.11.

2. The parameter settings for the cell are set up according to Table 8.5.2.2.2_1.3-1.

3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B clause B.0.

5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.2.2.2_1.4.3.

8.5.2.2.2_1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.2.2.2_1.5-1.

2. In Each HARQ process (4 HARQ processes for UL/DL configuration 1), SS shall schedule PUSCH transmissions according to Annex A.2.3.1.1 Table A.2.3.1.1-1 via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions shall transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.2.2.2_1.4.2-1 indicates the transmissions for one cycle.

3. SS will only monitor for uplink retransmissions due to ACK missed-detections. DTX from the UE side is counted as successful ACK reception, while any transmission on these subframes is counted as NACKs.

4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).

   If Pm-an is less than the value specified in table 8.5.2.2.2_1.5-1, pass the UE. Otherwise fail the UE.

Table 8.5.2.2.2_1.4.2-1: PHICH test pattern

Subframe Index	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
PDCCH		S			S		S			S										
PHICH												A			A		A			A
PUSCH			R?	R?				T	T				T	T				R?	R?	
HARQ process		1	3	4	2		3	1	2	4		1	3	4	2		3	1	2	4

Note 1: This table gives an example test pattern for HARQ process for TDD PHICH test
Note 2: Following notation is used:
S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission
A: represents the ACK transmission on PHICH
T: represents a scheduled PUSCH transmission
R: represents a potential PUSCH re-transmission due to a missed ACK
Note 3: TDD UL/DL configuration 1 is used here, special subframe is denoted as blue

8.5.2.2.2_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6, with the following exceptions:

Table 8.5.2.2.2_1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	
…			

8.5.2.2.2_1.5 Test requirement

For the parameters specified in Table 8.5.2.2.2_1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.2_1.5-1.

Table 8.5.2.2.2_1.5-1: Test requirement of PHICH 4 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	5 MHz	R.20_1	OP.1 TDD	EPA5	4 x 2 Medium	0.1	+7.2

8.5.2.2.3_C TDD PHICH Transmit Diversity 2x2 for eICIC

8.5.2.2.3_C.1 TDD PHICH Transmit Diversity 2x2 for eICIC (non-MBSFN ABS)

Editor's notes: This test case is incomplete. The following items are missing or incomplete:

- Step of test procedure may be confirmed or updated.

- Test requirement table needs to be corrected.

8.5.2.2.3_C.1.1 Test purpose

This test verifies the demodulation performance of PHICH for transmit diversity with a given SNR for which a certain Hybrid Indicator detection error rate (i.e. missed detection of "NACK to ACK" and "ACK to NACK") of the specified reference measurement channels is achieved.

8.5.2.2.3_C.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 10 and forward. Applicability requires support for FGI bit 115.

8.5.2.2.3_C.1.3 Minimum conformance requirements

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold detection).

Table 8.5.2.2.3_C.1.3-1: Test Parameters for PHICH

Parameter		Unit	Cell 1	Cell 2
Uplink downlink configuration			1	1
Special subframe configuration			4	4
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-100.5 (Note 1)	N/A
	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N_{oc3}	dBm/15kHz	-95.3 (Note 3)	N/A
$\widehat{E}_s / N_{oc2}$		dB	Reference Value in Table 8.5.2.2.3_C.1.3-2	1.5
$BW_{Channel}$		MHz	10	10
Subframe Configuration			Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	2.5 (synchronous cells)	
Cell Id			0	1
ABS pattern (Note 4)			N/A	0000010001 0000000001
RLM/RRM Measurement Subframe Pattern (Note 5)			0000000001 0000000001	N/A
CSI Subframe Sets (Note 6)	$C_{CSI,0}$		0000010001 0000000001	N/A
	$C_{CSI,1}$		1100101000 1100111000	N/A
Number of control OFDM symbols			3	
ACK/NACK feedback mode			Multiplexing	
Number of PHICH groups (N_g)			1	
PHICH duration			extended	
Unused RE-s and PRB-s			OCNG	OCNG
Cyclic prefix			Normal	Normal

Note 1: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS
Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS
Note 3: This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4: ABS pattern as defined in [14]. PHICH is transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell but not in subframe 5
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [5]
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [5]
Note 7: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 8: SIB-1 will not be transmitted in Cell2 in the test.

For the parameters specified in Table 8.5.2.2.3_C.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.3_C.1.3-2. The downlink physical setup is in accordance with Annex C.3.2 and Annex C.3.3, In Table 8.5.2.2.3_C.1.3-1, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

Table 8.5.2.2.3_C.1.3-2: Minimum performance of PHICH 2 Tx Antenna Port

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 1)		Antenna Configuration and Correlation Matrix	Reference Value	
		Cell 1	Cell 2	Cell 1	Cell 2		Pm-an (%)	SNR (dB) (Note 2)
1	R.19	OP.1 TDD	OP.1 TDD	EPA5	EPA5	2x2 Low	0.1	4.6
Note 1: The propagation conditions for Cell 1 and Cell 2 are statistically independent.								
Note 2: SNR corresponds to $\widehat{E}_s / N_{oc2}$ of cell 1.								
Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.								

The normative reference for this requirement is TS 36.101 [2] clause 8.5.2.2.3.

8.5.2.2.3_C.1.4 Test description

8.5.2.2.3_C.1.4.1 Initial conditions

Test Environment: Normal, as defined in TS 36.508 [7] clause 4.1

Frequencies to be tested: Mid Range, as defined in TS 36.508 [7] clause 4.3.1.2

Bandwidths to be tested: 10 MHz, as defined in TS 36.508 [7] clause 4.3.1.2.

1. Connect the SS, the faders and AWGN noise sources to the UE antenna connector (s) as shown in TS 36.508 [7] Annex A Figure A.10.
2. The parameter settings for the cell are set up according to Table 8.5.2.2.3_C.1.3-1.
3. Downlink signals are initially set up according to Annex C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B clause B.0.
5. Ensure the UE is in State 3A-RF according to TS 36.508 [7] clause 5.2A.2. Message contents are defined in clause 8.5.2.2.3_C.1.4.3.

8.5.2.2.3_C.1.4.2 Test procedure

1. Set the parameters of bandwidth, reference Channel, the propagation condition, antenna configuration, the correlation matrix and the SNR according to Table 8.5.2.2.3_C.1.5-1.
2. In Each HARQ process (4 HARQ processes for UL/DL configuration 1), SS shall schedule PUSCH transmissions according to Annex A.2.3.1.1 Table A.2.3.1.1-1 via PDCCH DCI format 0 with new data indicator set to true. Since the UE has no payload, the UE shall send uplink MAC padding bits in PUSCH. SS upon receiving the PUSCH transmissions shall transmit the associated ACKs. PHICH is set according to Annex 3.6 Table A.3.6-1. SS will only transmit PDCCH to schedule PUSCH transmission in the appropriate sub-frames. Table 8.5.2.2.3_C.1.4.2-1 indicates the transmissions for one cycle.
3. SS will only monitor for uplink retransmissions due to ACK missed-detections. DTX from the UE side is counted as successful ACK reception, while any transmission on these subframes is counted as NACKs.
4. Repeat steps 1 – 3 for a duration sufficient to achieve statistical significance according to Annex G clause G.4 and measure Pm-an. Pm-an is (NACK) / (ACK + NACK).

   If Pm-an is less than the value specified in table 8.5.2.2.3_C.1.5-1, pass the UE. Otherwise fail the UE.

Table 8.5.2.2. 3_C.1.4.2-1: PHICH test pattern

Subframe Index	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
PDCCH		S			S		S			S										
PHICH												A			A		A			A
PUSCH			R?	R?				T	T				T	T				R?	R?	
HARQ process		1	3	4	2		3	1	2	4		1	3	4	2		3	1	2	4

Note 1: This table gives an example test pattern for HARQ process for TDD PHICH test
Note 2: Following notation is used:
S: represents sending PDCCH DCI format 0 to schedule a future PUSCH transmission
A: represents the ACK transmission on PHICH
T: represents a scheduled PUSCH transmission
R: represents a potential PUSCH re-transmission due to a missed ACK
Note 3: TDD UL/DL configuration 1 is used here, special subframe is denoted as blue

8.5.2.2.3_C.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6, with the following exceptions:

Table 8.5.2.2.3_C.1.4.3-1: MAC-MainConfig-RBC

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1			
Information Element	**Value/remark**	**Comment**	**Condition**
MAC-MainConfig-RBC ::= SEQUENCE {			
dl-SCH-Config SEQUENCE {}	Not present		
ul-SCH-Config SEQUENCE {			
maxHARQ-Tx	n2	Only one retransmission per UL HARQ	
…			

Table 8.5.2.2.3_C.1.4.3-2: *RadioResourceConfigDedicated-SRB2-DRB(n, m)*

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-16 RadioResourceConfigDedicated-SRB2-DRB(n,m)			
Information Element	**Value/remark**	**Comment**	**Condition**
RadioResourceConfigDedicated-SRB2-DRB(n, m) ::= SEQUENCE {			
MeasSubframePatternPCell-r10 CHOICE {			
setup SEQUENCE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000000010000000001'	BIT STRING (SIZE (20))	
}			
}			
}			
}			

Table 8.5.2.2.3_C.1.4.3-3: *CQI-ReportConfig-r10-DEFAULT*

Derivation Path: 36.508 [7] clause 4.6.3, Table 4.6.3-2AA CQI-ReportConfig-r10-DEFAULT_			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-r10-DEFAULT ::= SEQUENCE {			
csi-SubframePatternConfig-r10 CHOICE {			
setup SEQUENCE {			
csi-MeasSubframeSet1-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'00000100010000000001'	BIT STRING (SIZE (20))	
}			
}			
csi-MeasSubframeSet2-r10 CHOICE {			
subframePatternTDD-r10 CHOICE {			
subframeConfig1-5-r10	'11001010001100111000'	BIT STRING (SIZE (20))	
}			
}			
}			
}			
}			

8.5.2.2.3_C.1.5 Test requirement

For the parameters specified in Table 8.5.2.2.3_C.1.3-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.3_C.1.5-1.

Table 8.5.2.2. 3_C.1.5-1: Test requirement of PHICH 2 Tx Antenna Port

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Reference value	
						Pm-an (%)	SNR (dB)
1	10 MHz	R.19	OP.1 TDD	EPA5	2 x 2 Low	0.1	TBD

8.6 Demodulation of PBCH

RAN4 will specify the PBCH performance requirements and has recommended that these requirements do not need to be tested.

8.7 Sustained downlink data rate provided by lower layers

8.7.1 FDD

8.7.1.1 FDD sustained data rate performance

8.7.1.1.1 Test purpose

The purpose of the test is to verify that the Layer 1 and Layer 2 correctly process in a sustained manner the received packets corresponding to the maximum number of DL-SCH transport block bits received within a TTI for the UE category indicated. The sustained downlink data rate shall be verified in terms of the success rate of delivered PDCP SDU(s) by Layer 2. The test case below specifies the RF conditions and the required success rate of delivered TB by Layer 1 to meet the sustained data rate requirement. The size of the TB per TTI corresponds to the largest possible DL-SCH transport block for each UE category using the maximum number of layers for spatial multiplexing. Transmission modes 1 and 3 are used with radio conditions resembling a scenario where sustained maximum data rates are available.

8.7.1.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE Release 9 and forward.

8.7.1.1.3 Minimum requirements

The parameters specified in Table 8.7.1.1.3-1 are valid for all FDD tests unless otherwise stated.

Table 8.7.1.1.3-1: Common Test Parameters (FDD)

Parameter	Unit	Value
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Number of HARQ processes	Processes	Downlink: 8 Uplink: 8
Maximum number of HARQ transmission		Downlink: 4 Uplink: 1
Scheduling of retransmissions		1. Retransmissions use the same Transport Block Size (TBS) as the initial transmission. 2. HARQ processes are scheduled consecutively, independent of the fact, whether retransmissions (for negatively acknowledged HARQ processes) or new transmissions (for positively acknowledged HARQ processes) occur. 3. Despite of 1) and 2) the number of RB-s to be allocated in each SF remains firm as specified in the RMC. Thus in case of RMC-s with SF dependent allocation, for retransmissions the TBS and the modulation scheme (MCS) are indicated implicitly ($29 \le I_{\mathrm{MCS}} \le 31$) according to TS 36.213 [10] subclause 7.1.7.2.
Redundancy version coding sequence		{0,0,1,2} for 64QAM
Number of OFDM symbols for PDCCH	OFDM symbols	1
Cross carrier scheduling		Not configured

The requirements are specified in Table 8.7.1.1.3-3, with the addition of the parameters in Table 8.7.1.1.3-2 and the downlink physical channel setup according to Annex C.3.2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.1.1.3-2: Test Parameters for sustained downlink data rate (FDD)

Parameter		Unit	Test 1	Test 2	Test 3,4	Test 3A
Bandwidth		MHz	10	10	20	10
Transmission mode			1	3	3	3
Antenna configuration			1 x 2	2 x 2	2 x 2	2 x 2
Propagation condition			Static propagation condition (Note 1)			
CodeBookSubsetRestriction bitmap			n/a	10	10	10
Downlink power allocation	ρ_A	dB	0	-3	-3	-3
	ρ_B	dB	0	-3	-3	-3
$\hat{E}_s$ at antenna port		dBm/15kHz	-85	-85	-85	-85
Symbols for unused PRBs			OP.6 FDD	OP.1 FDD	OP.1 FDD	OP.1 FDD
Note 1: No external noise sources are applied						

Table 8.7.1.1.3-3: Minimum Requirement (FDD)

Test	UE Category	Number of bits of a DL-SCH transport block received within a TTI	Measurement channel	Reference value TB success rate [%]
1	Category 1	10296	R31-1 FDD	95
2	Category 2	25456	R31-2 FDD	95
3	Category 3 (Note 1)	51024	R31-3 FDD	95
3A	Category 3 (Note 2)	36696 (Note 4)	R31-3A FDD	85
4	Category 4	75376 (Note 5)	R31-4 FDD	85
Note 1: If the operating band under test does not support 20 MHz channel bandwidth, then test is executed according to Test 3A.				
Note 2: Applicable to operating bands supporting up to 10 MHz channel bandwidths.				
Note 3: For 2 layer transmissions, 2 transport blocks are received within a TTI				
Note 4: 35160 bits for sub-frame 5				
Note 5: 71112 bits for sub-frame 5				
Note 6: The TB success rate is defined as TB success rate = 100%*$N_{DL\_correct\_rx}$/(N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL\_correct\_rx}$ is the number of correctly received DL transport blocks.				

The normative reference for this requirement is TS 36.101[2] clause 8.7.1

8.7.1.1.4 Test description

8.7.1.1.4.1 Initial conditions

Table 8.7.1.1.4.1-1: Applicable test and Transport Block Size for different UE categories

UE Category	Applicable test	DL Measurement channel	UL Measurement channel	TB_{size} per Codeword	Number of PDCP SDU per Codeword	PDCP SDU size [bits] Note 3
1	Test 1	R31-1 FDD	R.1-1 FDD	10296	1	8*FLOOR((TB_{size} - 96)/8)
2	Test 2	R31-2 FDD	R.1-2 FDD	25456	3	8*FLOOR((TB_{size} – 152)/24))
3	Test 3 (Note 1)	R31-3 FDD	R.1-3 FDD	51024	5	8*FLOOR((TB_{size} -– 208)/40))
3	Test 3A (Note 2)	R31-3A FDD	R.1-3A FDD	36696 (Note 5)	4	8*FLOOR((TB_{size} – 184)/32))"
4	Test 4 (Note 2)	R31-4 FDD	R.1-4 FDD	75376 (Note 6)	7	8*FLOOR((TB_{size} – 264)/56))

Note 1: If the operating band under test does not support 20 MHz channel bandwidth, then test is executed according to Test 3A.

Note 2: Applicable to operating bands supporting up to 10 MHz channel bandwidths.

Note 3: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.

Note 4: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).

The PDCP SDU size of each PDCP SDU is:

PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,

where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.

The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 5: 35160 bits for sub-frame 5

Note 6: 71112 bits for sub-frame 5

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: According to table 8.7.1.1.3-2.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.3 for test 1 and Figure A.10 for tests 2-5 (without using faders and AWGN generators).

2. The parameter settings for the cell are set up according to Table 8.7.1.1.5-1 and Table 8.7.1.1.5-2.

3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4 (Loopback activated) according to TS 36.508 [7] clause 4.5.4. Message contents are defined in clause 8.7.1.1.4.3.

8.7.1.1.4.2 Test procedure

1. The SS looks up TB_{size} in table 8.7.1.1.4.1-1 according to the UE category under test.
2. SS sets the counters N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and N_{DL_PDCP} to 0.
3. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.1.1.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.
4. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.
5. Steps 3 to 4 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.
6. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one
7. The SS calculates the TB success rate as $A = 100\% * N_{DL\_newtx} / (N_{DL\_newtx} + N_{DL\_retx})$
8. The SS calculates the PDCP SDU loss as $B = N_{DL\_PDCP} - N_{UL\_PDCP}$
9. The UE passes the test if $A \geq$ "corresponding TB success rates according to Table 8.7.1.1.3-3" and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.1.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.1.1.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.1.1.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

8.7.1.1.5 Test requirement

The requirements are specified in Table 8.7.1.1.5-1. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.1.1.5-1: Test requirements for sustained downlink data rate (FDD)

Test	UE Category	Number of bits of a DL-SCH transport block received within a TTI per Codeword	Measurement channel	Number of PDCP SDU per Codeword	PDCP SDU size [Octets]	Reference value
						TB success rate [%]
1	Category 1	10296	R31-1 FDD	1	1275	95
2	Category 2	25456	R31-2 FDD	3	1054	95
3	Category 3 (Note 1)	51024	R31-3 FDD	5	1270	95
3A	Category 3 (Note 2)	36696 (Note4)	R31-3A FDD	4	1141	85
4	Category 4	75376 (Note5)	R31-4 FDD	7	1341	85

Note 1: If the operating band under test does not support 20 MHz channel bandwidth, then test is executed according to Test 3A.
Note 2: Applicable to operating bands supporting up to 10 MHz channel bandwidths
Note 3: For 2 layer transmissions, 2 transport blocks are received within a TTI
Note 4: 35160 bits for sub-frame 5
Note 5: 71112 bits for sub-frame 5
Note 6: The TB success rate is defined as TB success rate = 100%*$N_{DL\_correct\_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL\_correct\_rx}$ is the number of correctly received DL transport blocks.

Table 8.7.1.1.5-2: Test Parameters for sustained downlink data rate (FDD)

Parameter		Unit	Test 1	Test 2	Test 3,4	Test 3A
Bandwidth		MHz	10	10	20	10
Transmission mode			1	3	3	3
Antenna configuration			1 x 2	2 x 2	2 x 2	2 x 2
Propagation condition			Static propagation condition (Note 1)			
CodeBookSubsetRestriction bitmap			n/a	10	10	10
Downlink power allocation	ρ_A	dB	0	-3	-3	-3
	ρ_B	dB	0	-3	-3	-3
$\hat{E}_s$ at antenna port		dBm/15kHz	-85	-85	-85	-85
Symbols for unused PRBs			OP.6 FDD	OP.1 FDD	OP.1 FDD	OP.1 FDD

Note 1: No external noise sources are applied

8.7.1.1_A FDD sustained data rate performance for CA

8.7.1.1_A.1 FDD Sustained data rate performance for CA (intra-band contiguous DL CA)

Editor's note: UL RMC is TBD

8.7.1.1_A.1.1 Test purpose

Same test purpose as 8.7.1.1

8.7.1.1_A.1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 and forward which support intra-band contiguous DL CA.

8.7.1.1_A.1.3 Minimum requirements

The parameters specified in Table 8.7.1.1_A.1.3-1 are valid for all FDD tests unless otherwise stated.

Table 8.7.1.1_A.1.3-1: Common Test Parameters (FDD)

Parameter	Unit	Value
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Number of HARQ processes per component carrier	Processes	Downlink: 8
Maximum number of HARQ transmission		Downlink: 4 Uplink: 1
Scheduling of retransmissions per component carrier		1. Retransmissions use the same Transport Block Size (TBS) as the initial transmission. 2. HARQ processes are scheduled consecutively, independent of the fact, whether retransmissions (for negatively acknowledged HARQ processes) or new transmissions (for positively acknowledged HARQ processes) occur. 3. Despite of 1) and 2) the number of RB-s to be allocated in each SF remains firm as specified in the RMC. Thus in case of RMC-s with SF dependent allocation, for retransmissions the TBS and the modulation scheme (MCS) are indicated implicitly ($29 \le I_{MCS} \le 31$) according to TS 36.213 [10] subclause 7.1.7.2.
Redundancy version coding sequence		{0,0,1,2} for 64QAM
Number of OFDM symbols for PDCCH per component carrier	OFDM symbols	1
Cross carrier scheduling		Not configured

The requirements are specified in Table 8.7.1.1_A.1.3-3, with the addition of the parameters in Table 8.7.1.1_A.1.3-2 and the downlink physical channel setup according to Annex C.3.2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.1.1_A.1.3-2: Test Parameters for sustained downlink data rate (FDD)

Parameter		Unit	Test 3B	Test 4A	Test 6A	Test 6B	Test 6C	Test 6D
Bandwidth		MHz	2x10	2x10	2x20	10+15	10+20	15+20
Transmission mode			3	3	3	3	3	3
Antenna configuration			2x2	2x2	2 x 2	2x2	2x2	2x2
Propagation condition			Static propagation condition (Note 1)					
CodeBookSubsetRestriction bitmap			10	10	10	10	10	10
Downlink power allocation	ρ_A	dB	-3	-3	-3	-3	-3	-3
	ρ_B	dB	-3	-3	-3	-3	-3	-3
	σ	dB	0	0	0	0	0	0
$\hat{E}_s$ at antenna port		dBm/15kHz	-85	-85	-85	-85	-85	-85
Symbols for unused PRBs			OP.1 FDD	OP.1 FDD	OP.1 FDD	OP.1 FDD	OP.1 FDD	OP.1 FDD

Note 1: No external noise sources are applied
Note 2: For CA test cases, PUCCH format 1b with channel selection is used to feedback ACK/NACK.

Table 8.7.1.1_A.1.3-3: Minimum requirement (FDD)

Test	UE Category	CA capability	Number of bits of a DL-SCH transport block received within a TTI	Measurement channel	Reference value
					TB success rate [%]
3B	Category 3	CL_A-A	25456	R.31-2 FDD	[95]
4A	Category 4	CL_A-A	36696 (Note 4)	R.31-3A FDD	[85]
6A	Category 6, 7	CL_A-A CL_C	75376 (Note 2)	R.31-4 FDD	85
6B	Category 6, 7	CL_A-A	36696 (Note 4) for 10MHz CC 55056 for 15MHz CC	R.31-3A FDD for 10MHz carrier CC R.31-5 FDD for 15MHz CC	[85]
6C	Category 6, 7	CL_A-A	36696 (Note 4) for 10MHz CC 75376 (Note 5) for 20MHz CC	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	[85]
6D	Category 6, 7	CL_A-A	55056 for 15MHz CC 75376 (Note 5) for 20MHz CC	R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	[85]

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI
Note 2: 71112 bits for sub-frame 5
Note 3: The TB success rate is defined as TB success rate = 100%*$N_{DL\_correct\_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL\_correct\_rx}$ is the number of correctly received DL transport blocks.
Note 4: 35160 bits for sub-frame 5.
Note 5: The TB success rate is defined as TB success rate = 100%*$N_{DL\_correct\_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL\_correct\_rx}$ is the number of correctly received DL transport blocks.
Note 6: Test 6 may not be executed for UE-s for which Test 6A is applicable.

The normative reference for this requirement is TS 36.101[2] clause 8.7.1

8.7.1.1_A.1.4 Test description

8.7.1.1_A.1.4.1 Initial conditions

Table 8.7.1.1_A.1.4.1-1: Applicable test and Transport Block Size for different UE categories

UE Category	Applicable test	DL Measurement channel	UL Measurement channel	TB_{size} per Codeword per Component Carrier	Number of PDCP SDU per Codeword	PDCP SDU size [bits] Note 3
6,7	6A	R.31-4 FDD	TBD	75376 (Note 4)	7	8*FLOOR((TB_{size} – 264)/56))

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).

The PDCP SDU size of each PDCP SDU is:

PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,

where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.

The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.

Note 4: 71112 bits for sub-frame 5

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: According to table 8.7.1.1_A.1.3-2.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.36 (without using faders and AWGN generators).
2. The parameter settings for the cell are set up according to Table 8.7.1.1_A.1.3-1 and Table 8.7.1.1_A.1.5-1.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 4 (Loopback activated) according to TS 36.508 [7] clause 4.5.4.5. Message contents are defined in clause 8.7.1.1_A.1.4.3.

8.7.1.1_A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for PhysicalConfigDedicated-DEFAULT is defined in Table 8.2.2.3.1_A.1.4.3-1
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. The SS looks up TB_{size} in table 8.7.1.1_A.1.4.1-1 according to the UE category under test.
5. SS sets the counters N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.
6. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.1.1_A.1.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.
7. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.
8. Steps 3 to 4 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.
9. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one
10. The SS calculates the TB success rate as $A = 100\% * N_{DL\_newtx} / (N_{DL\_newtx} + N_{DL\_retx})$
11. The SS calculates the PDCP SDU loss as $B = N_{DL\_PDCP} - N_{UL\_PDCP}$
12. The UE passes the test if A ≥ "corresponding TB success rate according to Table 8.7.1.1_A.1.3-3" and B = 0.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.1.1_A.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.1.1_A.1.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.1.1_A.1.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

8.7.1.1_A.1.5 Test requirement

The requirements are specified in Table 8.7.1.1_A.1.5-1. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.1.1_A.1.5-1: Test requirements for sustained downlink data rate (FDD)

Test	UE Category	Number of bits of a DL-SCH transport block received within a TTI per Codeword	Measurement channel	Number of PDCP SDU per Codeword	PDCP SDU size [Octets]	Reference value TB success rate [%]
3B	NA					
4A	NA					
6A	Category 6,7	75376 (Note 2)	R.31-4 FDD	7	1341	85
6B	NA					
6C	NA					
6D	NA					
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI per component carrier.						
Note 2: 71112 bits for sub-frame 5						
Note 3: The TB success rate is defined as TB success rate = 100%*$N_{DL\_correct\_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL\_correct\_rx}$ is the number of correctly received DL transport blocks.						

8.7.1.1_A.2 FDD Sustained data rate performance for CA (inter-band DL CA)

Editor's note: UL RMC is TBD

8.7.1.1_A.2.1 Test purpose

Same test purpose as 8.7.1.1

8.7.1.1_A.2.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 10 which support inter-band DL CA.

8.7.1.1_A.2.3 Minimum requirements

The parameters specified in Table 8.7.1.1_A.2.3-1 are valid for all FDD tests unless otherwise stated.

Table 8.7.1.1_A.2.3-1: Common Test Parameters (FDD)

Parameter	Unit	Value
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Number of HARQ processes per component carrier	Processes	8
Maximum number of HARQ transmission		4
Redundancy version coding sequence		{0,0,1,2} for 64QAM
Number of OFDM symbols for PDCCH per component carrier	OFDM symbols	1
Cross carrier scheduling		Not configured

The requirements are specified in Table 8.7.1.1_A.2.3-3, with the addition of the parameters in Table 8.7.1.1_A.2.3-2 and the downlink physical channel setup according to Annex C.3.2. The TB success rate shall be sustained during at least 300 frames.

Table 8.7.1.1_A.2.3-2: test parameters for sustained downlink data rate (FDD)

Parameter		Unit	Test 1	Test 2	Test 3,4,6	Test 3A	Test 3B	Test 4A	Test 6A
Bandwidth		MHz	10	10	20	10	2x10	2x10	2x20
Transmission mode			1	3	3	3	3	3	3
Antenna configuration			1 x 2	2 x 2	2 x 2	2 x 2	2x2	2x2	2 x 2
Propagation condition			Static propagation condition (Note 1)						
CodeBookSubsetRestriction bitmap			n/a	10	10	10	10	10	10
Downlink power allocation	ρ_A	dB	0	-3	-3	-3	-3	-3	-3
	ρ_B	dB	0	-3	-3	-3	-3	-3	-3
	σ	dB	0	0	0	0	0	0	0
$\hat{E}_s$ at antenna port		dBm/15kHz	-85	-85	-85	-85	-85	-85	-85
Symbols for unused PRBs			OP.6 FDD	OP.1 FDD	OP.1 FDD	OP.1 FDD	OP.1 FDD	OP.1 FDD	OP.1 FDD
Note 1: No external noise sources are applied. Note 2: For CA test cases, PUCCH format 1b with channel selection is used to feedback ACK/NACK.									

Table 8.7.1.1_A.2.3-3: Minimum requirement (FDD)

Test	UE Category	CA capability	Number of bits of a DL-SCH transport block received within a TTI	Measurement channel	Reference value
					TB success rate [%]
3B	Category 3	CL_A-A	25456	R.31-2 FDD	[95]
4A	Category 4	CL_A-A	36696 (Note 4)	R.31-3A FDD	[85]
6A	Category 6, 7	CL_A-A,CL_C	75376 (Note 5)	R.31-4 FDD	85

Note 1: NA.
Note 2: NA.
Note 3: For 2 layer transmissions, 2 transport blocks are received within a TTI.
Note 4: 35160 bits for sub-frame 5.
Note 5: 71112 bits for sub-frame 5.
Note 6: The TB success rate is defined as TB success rate = 100%*$N_{DL\_correct\_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL\_correct\_rx}$ is the number of correctly received DL transport blocks.

8.7.1.1_A.2.4 Test description

8.7.1.1_A.2.4.1 Initial conditions

Table 8.7.1.1_A.2.4.1-1: Applicable test and Transport Block Size for different UE categories

UE Category	Applicable test	DL Measurement channel	UL Measurement channel	TB_{size} per Codeword per Component Carrier	Number of PDCP SDU per Codeword	PDCP SDU size [bits] Note 3
3	3B	R.31-2 FDD	TBD	25456	7	8*FLOOR((TB_{size} – 264)/56))
4	4A	R.31-3A FDD	TBD	36696 (Note 4)	7	8*FLOOR((TB_{size} – 264)/56))
6,7	6A	R.31-4 FDD	TBD	75376 (Note 4)	7	8*FLOOR((TB_{size} – 264)/56))

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.
Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).

The PDCP SDU size of each PDCP SDU is:

PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,

where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.

The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases.

Note 3: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.
Note 4: 71112 bits for sub-frame 5

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: According to table 8.7.1.1_A.2.3-2.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.36 (without using faders and AWGN generators).
2. The parameter settings for the cell are set up according to Table 8.7.1.1_A.2.3-1 and Table 8.7.1.1_A.2.5-1.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 4 (Loopback activated) according to TS 36.508 [7] clause 4.5.4.5. Message contents are defined in clause 8.7.1.1_A.2.4.3.

8.7.1.1_A.2.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for PhysicalConfigDedicated-DEFAULT is defined in Table 8.2.2.3.1_A.2.4.3-1
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. The SS looks up TB_{size} in table 8.7.1.1_A.2.4.1-1 according to the UE category under test.
5. SS sets the counters N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.
6. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.1.1_A.2.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.
7. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.
8. Steps 3 to 4 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.
9. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one
10. The SS calculates the TB success rate as $A = 100\% * N_{DL\_newtx} / (N_{DL\_newtx} + N_{DL\_retx})$
11. The SS calculates the PDCP SDU loss as $B = N_{DL\_PDCP} - N_{UL\_PDCP}$
12. The UE passes the test if $A \geq$ "corresponding TB success rate according to Table 8.7.1.1_A.1.3-3" and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.1.1_A.2.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.1.1_A.2.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.1.1_A.2.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

8.7.1.1_A.2.5 Test requirement

The requirements are specified in Table 8.7.1.1_A.2.5-1. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.1.1_A.2.5-1: Test requirements for sustained downlink data rate (FDD)

Test	UE Category	Number of bits of a DL-SCH transport block received within a TTI per Codeword	Measurement channel	Number of PDCP SDU per Codeword	PDCP SDU size [Octets]	Reference value
						TB success rate [%]
3B	Category 3	25456	R.31-2 FDD	7	TBD	[95]
4A	Category 4	36696 (Note 2)	R.31-3A FDD	7	TBD	[85]
6A	Category 6, 7	75376 (Note 3)	R.31-4 FDD	7	TBD	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI per component carrier.
Note 2: 35160 bits for sub-frame 5.
Note 3: 71112 bits for sub-frame 5.
Note 4: The TB success rate is defined as TB success rate = $100\%*N_{DL\_correct\_rx}/ (N_{DL\_newtx} + N_{DL\_retx})$, where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL\_correct\_rx}$ is the number of correctly received DL transport blocks.
Note 5: For category 6 and 7 UE, select one CA configuration among CA configurations corresponding to largest aggregated CA bandwidth signalled by UE.

8.7.1.1_A.2_1 FDD Sustained data rate performance for CA (inter-band DL CA) (Release 11 and forward)

Editor's note: UL RMC is TBD

8.7.1.1_A.2_1.1 Test purpose

Same test purpose as 8.7.1.1

8.7.1.1_A.2_1.2 Test applicability

This test applies to all types of E-UTRA FDD UE release 11 and forward which support inter-band DL CA.

8.7.1.1_A.2_1.3 Minimum requirements

Same minimum conformance requirements as in clause 8.7.1.1_A.1.3.

8.7.1.1_A.2_1.4 Test description

8.7.1.1_A.2_1.4.1 Initial conditions

Table 8.7.1.1_A.2_1.4.1-1: Applicable test and Transport Block Size for different UE categories

UE Category	Applicable test	DL Measurement channel	UL Measurement channel	TB_{size} per Codeword per Component Carrier	Number of PDCP SDU per Codeword	PDCP SDU size [bits] Note 3
3	3B	R.31-2 FDD	TBD	25456	7	8*FLOOR((TB_{size} – 264)/56))
4	4A	R.31-3A FDD	TBD	36696 (Note 4)	7	8*FLOOR((TB_{size} – 264)/56))
6,7	6A	R.31-4 FDD	TBD	75376 (Note 4)	7	8*FLOOR((TB_{size} – 264)/56))
6,7	6B	R.31-3A FDD for 10MHz carrier CC R.31-5 FDD for 15MHz CC	TBD	36696 (Note 4) for 10MHz CC 55056 for 15MHz CC	7	8*FLOOR((TB_{size} – 264)/56))
6,7	6C	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	TBD	36696 (Note 4) for 10MHz CC 75376 (Note 5) for 20MHz CC	7	8*FLOOR((TB_{size} – 264)/56))
6,7	6D	R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	TBD	55056 for 15MHz CC 75376 (Note 5) for 20MHz CC	7	8*FLOOR((TB_{size} – 264)/56))

Note 1: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.

Note 2: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).

The PDCP SDU size of each PDCP SDU is:

PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,

where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.

The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 3: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.

Note 4: 35160 bits for sub-frame 5.

Note 5: 71112 bits for sub-frame 5.

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: According to table 8.7.1.1_A.2_1.3-2.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure group A.36 (without using faders and AWGN generators).
2. The parameter settings for the cell are set up according to Table 8.7.1.1_A.2_1.3-1 and Table 8.7.1.1_A.2_1.5-1.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 4 (Loopback activated) according to TS 36.508 [7] clause 4.5.4.5. Message contents are defined in clause 8.7.1.1_A.2_1.4.3.

8.7.1.1_A.2_1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels except PHICH.
2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for PhysicalConfigDedicated-DEFAULT is defined in Table 8.2.2.3.1_A.2_1.4.3-1
3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).
4. The SS looks up TB_{size} in table 8.7.1.1_A.2_1.4.1-1 according to the UE category under test.
5. SS sets the counters N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.
6. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.1.1_A.2_1.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.
7. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.
8. Steps 3 to 4 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.
9. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one
10. The SS calculates the TB success rate as $A = 100\% * N_{DL\_newtx} / (N_{DL\_newtx} + N_{DL\_retx})$
11. The SS calculates the PDCP SDU loss as $B = N_{DL\_PDCP} - N_{UL\_PDCP}$
12. The UE passes the test if $A \geq$ "corresponding TB success rate according to Table 8.7.1.1_A.1.3-3" and $B = 0$.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.1.1_A.2_1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.1.1_A.2_1.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 1 0 1 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1	
UE test loop mode B LB setup	Not present		

Table 8.7.1.1_A.2_1.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

8.7.1.1_A.2_1.5 Test requirement

The requirements are specified in Table 8.7.1.1_A.2_1.5-1. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.1.1_A.2_1.5-1: Test requirements for sustained downlink data rate (FDD)

Test	UE Category	Number of bits of a DL-SCH transport block received within a TTI per Codeword	Measurement channel	Number of PDCP SDU per Codeword	PDCP SDU size [Octets]	Reference value
						TB success rate [%]
3B	Category 3	25456	R.31-2 FDD	7	TBD	[95]
4A	Category 4	36696 (Note 4)	R.31-3A FDD	7	TBD	[85]
6A	Category 6,7	75376 (Note 2)	R.31-4 FDD	7	1431	85
6B	Category 6, 7	36696 (Note 4) for 10MHz CC 55056 for 15MHz CC	R.31-3A FDD for 10MHz carrier CC R.31-5 FDD for 15MHz CC	7	TBD	[85]
6C	Category 6, 7	36696 (Note 4) for 10MHz CC 75376 (Note 2) for 20MHz CC	R.31-3A FDD for 10MHz CC R.31-4 FDD for 20MHz CC	7	TBD	[85]
6D	Category 6, 7	55056 for 15MHz CC 75376 (Note 2) for 20MHz CC	R.31-5 FDD for 15MHz CC R.31-4 FDD for 20MHz CC	7	TBD	[85]

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI per component carrier.
Note 2: 71112 bits for sub-frame 5
Note 3: The TB success rate is defined as TB success rate = $100\%*N_{DL\_correct\_rx}/ (N_{DL\_newtx} + N_{DL\_retx})$, where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL\_correct\_rx}$ is the number of correctly received DL transport blocks.
Note 4: 35160 bits for sub-frame 5.

Table 8.7.1.1_A.2_1.5-2: Test Points Selection for UE Category

Maximum aggregated bandwidth [MHz] (Note 1)	Applicable test points		
	Category 3	Category 4	Category 6, 7
20	3B	4A	-
25	3B	4A	6B
30	3B	4A	6C
35	3B	4A	6D
40	3B	4A	6A

Note 1: Maximum over all supported CA configurations and bandwidth combination sets according to Table 5.4.2A.1-2.
Note 2: If a specific maximum aggregated bandwidth is supported in multiple CA configurations, the test can be run in any of them

8.7.2 TDD

8.7.2.1 TDD sustained data rate performance

8.7.2.1.1 Test purpose

The purpose of the test is to verify that the Layer 1 and Layer 2 correctly process in a sustained manner the received packets corresponding to the maximum number of DL-SCH transport block bits received within a TTI for the UE category indicated. The sustained downlink data rate shall be verified in terms of the success rate of delivered PDCP SDU(s) by Layer 2. The test case below specifies the RF conditions and the required success rate of delivered TB by Layer 1 to meet the sustained data rate requirement. The size of the TB per TTI corresponds to the largest possible DL-SCH transport block for each UE category using the maximum number of layers for spatial multiplexing. Transmission modes 1 and 3 are used with radio conditions resembling a scenario where sustained maximum data rates are available.

8.7.2.1.2 Test applicability

This test applies to all types of E-UTRA TDD UE release 9 and forward.

8.7.2.1.3 Minimum requirements

The parameters specified in Table 8.7.2.1.3-1 are valid for all TDD tests unless otherwise stated.

Table 8.7.2.1.3-1: Common Test Parameters (TDD)

Parameter	Unit	Value
Special subframe configuration (Note 1)		4
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Maximum number of HARQ transmission		Downlink: 4 Uplink: 1
Redundancy version coding sequence		{0,0,1,2} for 64QAM
Scheduling of retransmissions		1. Retransmissions use the same Transport Block Size (TBS) as the initial transmission. 2. HARQ processes are scheduled consecutively, independent of the fact, whether retransmissions (for negatively acknowledged HARQ processes) or new transmissions (for positively acknowledged HARQ processes) occur. 3. Despite of 1) and 2) the number of RB-s to be allocated in each SF remains firm as specified in the RMC. Thus in case of RMC-s with SF dependent allocation, for retransmissions the TBS and the modulation scheme (MCS) are indicated implicitly ($29 \le I_{MCS} \le 31$) according to TS 36.213 [10] subclause 7.1.7.2.
Number of OFDM symbols for PDCCH	OFDM symbols	1
Cross carrier scheduling		Not configured
Note 1: as specified in Table 4.2-1 in TS 36.211 [4]		

The requirements are specified in Table 8.7.2.1.3-3, with the addition of the parameters in Table 8.7.2.1.3-2 and the downlink physical channel setup according to Annex C.3.2. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.2.1.3-2: test parameters for sustained downlink data rate (TDD)

Parameter		Unit	Test 1	Test 2	Test 3	Test 3B	Test 4
Bandwidth		MHz	10	10	20	15	20
Transmission mode			1	3	3	3	3
Antenna configuration			1 x 2	2 x 2	2 x 2	2 x 2	2x2
Propagation condition			Static propagation condition (Note 1)				
CodeBookSubsetRestriction bitmap			n/a	10	10	10	10
Downlink power allocation	ρ_A	dB	0	-3	-3	-3	-3
	ρ_B	dB	0	-3	-3	-3	-3
$\hat{E}_s$ at antenna port		dBm/15kHz	-85	-85	-85	-85	-85
Symbols for unused PRBs			OP.6 TDD	OP.1 TDD	OP.1 TDD	OP.2 TDD	OP.1 TDD
ACK/NACK feedback mode			Bundling	Bundling	Bundling	Multiplexing	Multiplexing
Note 1: No external noise sources are applied							

Table 8.7.2.1.3-3: Minimum requirement (TDD)

Test	UE Category	Number of bits of a DL-SCH transport block received within a TTI for normal/special sub-frame	Measurement channel	Reference value
				TB success rate [%]
1	Category 1	10296/0	R31-1 TDD	95
2	Category 2	25456/0	R31-2 TDD	95
3	Category 3 (Note 1)	51024/0	R31-3 TDD	95
3B	Category 3 (Note 2)	51024/0	R31-3B TDD	85
4	Category 4	75376/0 (Note 4)	R31-4 TDD	85

Note 1: If the operating band under test does not support 20 MHz channel bandwidth, then test is executed according to Test 3B.
Note 2: Applicable to operating bands supporting up to 15 MHz channel bandwidths.
Note 3: For 2 layer transmissions, 2 transport blocks are received within a TTI
Note 4: 71112 bits for sub-frame 5
Note 5: The TB success rate is defined as TB success rate = 100%*$N_{DL\_correct\_rx}$/(N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL\_correct\_rx}$ is the number of correctly received DL transport blocks.

The normative reference for this requirement is TS 36.101[2] clause 8.7.2

8.7.2.1.4 Test description

8.7.2.1.4.1 Initial conditions

Table 8.7.2.1.4.1-1: Applicable test and Transport Block Size for different UE categories

UE Category	Applicable test	DL Measurement channel	UL Measurement Channel	TB_{size} per Codeword	Number of PDCP SDU per Codeword for normal/special sub-frame	PDCP SDU size [bits] Note 3
1	Test 1	R.31-1 TDD	R.1-1 TDD	10296	1/0	8*FLOOR((TB_{size} - 96)/8)
2	Test 2	R.31-2 TDD	R.1-2 TDD	25456	3/0	8*FLOOR((TB_{size} – 152)/24))
3	Test 3 (Note 1)	R.31-3 TDD	R.1-3 TDD	51024	5/0	8*FLOOR((TB_{size} – 208)/40))
3	Test 3B (Note 2)	R.31-3B TDD	R.1-3B TDD	51024	4/0	8*FLOOR((TB_{size} – 184)/32))"
4	Test 4	R.31-4 TDD	R.1-4 TDD	75376 (Note 5)	7/0	8*FLOOR((TB_{size} – 264)/56))

Note 1: If the operating band under test does not support 20 MHz channel bandwidth, then test is executed according to Test 3B.

Note 2: Applicable to operating bands supporting up to 15 MHz channel bandwidths

Note 3: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.

Note 4: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).

The PDCP SDU size of each PDCP SDU is:

PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size – Size of Timing Advance - Size of RLC STATUS PDU) / N,

where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 5: 71112 bits for sub-frame 5

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.1.

Channel Bandwidths to be tested: According to table 8.7.2.1.3-2.

1. Connect the SS, to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, Figure A.3 for test 1 and Figure A.10 for tests 2-5 (without using faders and AWGN generators).
2. The parameter settings for the cell are set up according to Table 8.7.2.1.5-1 and Table 8.7.2.1.5-2.
3. Downlink signals are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.

4. Propagation conditions are set according to Annex B.0.

5. Ensure the UE is in State 4 (Loopback activated) according to TS 36.508 [7] clause 4.5.4. Message contents are defined in clause 8.7.2.1.4.3.

8.7.2.1.4.2 Test procedure

1. The SS looks up TB_{size} in table 8.7.2.1.4.1-1 according to the UE category under test.

2. SS sets the counters N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.

3. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.2.1.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

4. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

5. Steps 3 to 4 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

6. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one.

7. The SS calculates the TB success rate as $A = 100\% * N_{DL\_newtx} / (N_{DL\_newtx} + N_{DL\_retx})$

8. The SS calculates the PDCP SDU loss as $B = N_{DL\_PDCP} - N_{UL\_PDCP}$

9. The UE passes the test if A ≥ "corresponding TB success rates according to Table 8.7.2.1.3-3" and B = 0.

NOTE 1 In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.2.1.4.3 Message contents

Message contents are according to TS 36.508 [7] clause 4.6 and 4.7A, with the following exceptions:

Table 8.7.2.1.4.3-1: CLOSE UE TEST LOOP (in the preamble)

Derivation Path: 36.509 clause 6.1			
Information Element	**Value/remark**	**Comment**	**Condition**
Protocol discriminator	1 1 1 1		
Skip indicator	0 0 0 0		
Message type	1 0 0 0 0 0 0 0		
UE test loop mode	0 0 0 0 0 0 0 0	UE test loop mode A	
UE test loop mode A LB setup			
Length of UE test loop mode A LB setup list in bytes	0 0 0 0 0 0 1 1	Length of one LB setup DRB (3 bytes)	
LB setup DRB	0 0 0 0 0 0 0 0, 0 0 101 0 0 0, 0 0 0 Q4 Q3 Q2 Q1 Q0	UL PDCP SDU size = 40 bits (5 bytes) Q4..Q0 = Data Radio Bearer identity number for the default radio bearer. See 36.509 clause 6.1.	
UE test loop mode B LB setup	Not present		

Table 8.7.2.1.4.3-2: *SecurityModeCommand* (in the preamble)

Derivation Path: TS36.508 clause 4.6.1 table 4.6.1-19			
Information Element	**Value/remark**	**Comment**	**Condition**
SecurityModeCommand ::= SEQUENCE {			
criticalExtensions CHOICE {			
c1 CHOICE{			
securityModeCommand-r8 SEQUENCE {			
securityConfiguration SEQUENCE {			
cipheringAlgorithm	eea2		
nextHopChainingCount	Not present		
}			
nonCriticalExtension SEQUENCE {}	Not present		
}			
}			
}			
}			

8.7.2.1.5 Test requirement

The requirements are specified in Table 8.7.2.1.5-1. The PDCP SDU success rate shall be sustained during at least 300 frames.

Table 8.7.2.1.5-1: Test requirements for sustained downlink data rate (TDD)

Test	UE Category	Number of bits of a DL-SCH transport block received within a TTI per codeword for normal/special sub-frame	Measurement channel	Number of PDCP SDU per TTI per codeword for normal/special sub-frame	PDCP SDU size for normal/special sub-frame [Octets]	Reference value TB success rate [%]
1	Category 1	10296/0	R31-1 TDD	1/0	1275/0	95
2	Category 2	25456/0	R31-2 TDD	3/0	1054/0	95
3	Category 3 (Note 1)	51024/0	R31-3 TDD	5/0	1270/0	95
3B	Category 3 (Note 2)	51024	R31-3B TDD	4/0	1588	85
4	Category 4	75376/0	R31-4 TDD	7/0	1341/0	85

Note 1: If the operating band under test does not support 20 MHz channel bandwidth, then test is executed according to Test 3B.
Note 2: Applicable to operating bands supporting up to 15 MHz channel bandwidths.
Note 3: For 2 layer transmissions, 2 transport blocks are received within a TTI
Note 4: 71112 bits for sub-frame 5
Note 5: The TB success rate is defined as TB success rate = $100\%*N_{DL\_correct\_rx}/ (N_{DL\_newtx} + N_{DL\_retx})$, where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL\_correct\_rx}$ is the number of correctly received DL transport blocks.

Table 8.7.2.1.5-2: test parameters for sustained downlink data rate (TDD)

Parameter		Unit	Test 1	Test 2	Test 3	Test 3B	Test 4
Bandwidth		MHz	10	10	20	15	20
Transmission mode			1	3	3	3	3
Antenna configuration			1 x 2	2 x 2	2 x 2	2 x 2	2x2
Propagation condition			Static propagation condition (Note 1)				
CodeBookSubsetRestriction bitmap			n/a	10	10	10	10
Downlink power allocation	ρ_A	dB	0	-3	-3	-3	-3
	ρ_B	dB	0	-3	-3	-3	-3
$\hat{E}_s$ at antenna port		dBm/15kHz	-85	-85	-85	-85	-85
Symbols for unused PRBs			OP.6 TDD	OP.1 TDD	OP.1 TDD	OP.2 TDD	OP.1 TDD
ACK/NACK feedback mode			Bundling	Bundling	Bundling	Multiplexing	Multiplexing
Note 1: No external noise sources are applied							

8.7.2.1_1 TDD sustained data rate performance (Rel-10 and forward)

Editor's Note: This clause is incomplete. The following aspects are either missing or not yet determined:

- OCNG pattern needs to be confirmed.

8.7.2.1_1.1 Test purpose

Same test purpose as in clause 8.7.2.1.

8.7.2.1_1.2 Test applicability

This test case applies to E-UTRA TDD UE release 10 and forward of UE category 6 and 7.

8.7.2.1_1.3 Minimum requirements

Same minimum conformance requirements as in clause 8.7.2.1.3 with the following exceptions:

- Instead of Table 8.7.2.1.3-1 -> use Table 8.7.2.1_1.3-1.
- Instead of Table 8.7.2.1.3-2 -> use Table 8.7.2.1_1.3-2.
- Instead of Table 8.7.2.1.3-3 -> use Table 8.7.2.1_1.3-3.

Table 8.7.2.1_1.3-1: Common Test Parameters (TDD)

Parameter	Unit	Value
Special subframe configuration (Note 1)		4
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Maximum number of HARQ transmission		4
Redundancy version coding sequence		{0,0,1,2} for 64QAM
Number of OFDM symbols for PDCCH per component carrier	OFDM symbols	1
Cross carrier scheduling		Not configured
Note 1: As specified in Table 4.2-1 in TS 36.211 [4].		

Table 8.7.2.1_1.3-2: test parameters for sustained downlink data rate (TDD)

Parameter		Unit	Test 1-5	Test 6	Test 6A
Bandwidth		MHz	N/A	20	N/A
Transmission mode				3	
Antenna configuration				2 x 2	
Propagation condition				Static propagation condition (Note 1)	
CodeBookSubsetRestriction bitmap				10	
Downlink power allocation	ρ_A	dB		-3	
	ρ_B	dB		-3	
$\hat{E}_s$ at antenna port		dBm/15kHz		-85	
Symbols for unused PRBs				[OCNG]	
ACK/NACK feedback mode				Multiplexing	
Note 1: No external noise sources are applied.					

Table 8.7.2.1_1.3-3: Minimum requirement (TDD)

Test	Number of bits of a DL-SCH transport block received within a TTI for normal/special sub-frame	Measurement channel	Reference value
			TB success rate [%]
1-5	N/A		
6	75376/0 (Note 2)	R.31-4 TDD	85
6A	N/A		
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI. Note 2: 71112 bits for sub-frame 5. Note 3: The TB success rate is defined as TB success rate = 100%*$N_{DL\_correct\_rx}$/(N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL\_correct\_rx}$ is the number of correctly received DL transport blocks.			

The normative reference for this requirement is TS 36.101[2] clause 8.7.2.

8.7.2.1_1.4 Test description

Same test description as in clause 8.7.2.1.4 with the following exceptions:

- Instead of Table 8.7.2.1.3-2 -> use Table 8.7.2.1_1.3-2.
- Instead of Table 8.7.2.1.3-3 -> use Table 8.7.2.1_1.3-3.
- Instead of Table 8.7.2.1.4.1-1 -> use Table 8.7.2.1_1.4-1.
- Instead of Table 8.7.2.1.5-1 -> use Table 8.7.2.1_1.5-1.

Table 8.7.2.1_1.4-1: Applicable test and Transport Block Size for different UE categories

UE Category	Applicable test	DL Measurement channel	UL Measurement Channel	TB_{size} per Codeword	Number of PDCP SDU per Codeword for normal/special sub-frame	PDCP SDU size [bits] Note 2
6,7	Test 6	R31-4 TDD	R.1-4 TDD	75376 (Note 3)	7/0	8*FLOOR((TB_{size} – 264)/56))

Note 1: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).

The PDCP SDU size of each PDCP SDU is:

PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size – Size of Timing Advance - Size of RLC STATUS PDU) / N,

where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.
The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 2: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.

Note 3: 71112 bits for sub-frame 5

8.7.2.1_1.5 Test requirement

Same test requirement as in clause 8.7.2.1.5 with the following exceptions:

- Instead of Table 8.7.2.1.5-1 -> use Table 8.7.2.1_1.5-1.

Table 8.7.2.1_1.5-1: Test requirements for sustained downlink data rate (TDD)

Test	Number of bits of a DL-SCH transport block received within a TTI per codeword for normal/special sub-frame	Measurement channel	Number of PDCP SDU per TTI per codeword for normal/special sub-frame	PDCP SDU size for normal/special sub-frame [Octets]	Reference value TB success rate [%]
6	75376/0 (Note 2)	R.31-4 TDD	7/0	1341/0	85

Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI.

Note 2: 71112 bits for sub-frame 5.

Note 3: The TB success rate is defined as TB success rate = 100%*$N_{DL\_correct\_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL\_correct\_rx}$ is the number of correctly received DL transport blocks.

8.7.2.1_A TDD sustained data rate performance for CA

8.7.2.1_A.1 TDD sustained data rate performance for CA (intra-band contiguous DL CA)

Editor's Note: This clause is incomplete. The following aspects are either missing or not yet determined

- Message Contents for this test are undefined
- Number of PDCP SDU per TTI per codeword for normal/special sub-frame is FFS

- PDCP SDU size for normal/special sub-frame [Octets] is FFS
- Test procedure to consider SCC aspects is FFS
- UL RMC is TBD
- OCNG pattern needs to be confirmed
- The statistical rules specified for TB success rate in Annex G.y is TBD

8.7.2.1_A.1.1 Test purpose

Same test purpose as in clause 8.7.2.1.

8.7.2.1_A.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 10 and forward that support intra-band contiguous CA.

8.7.2.1_A.1.3 Minimum requirements

Same minimum conformance requirements as in clause 8.7.2.1.3 with the following exceptions:

- Instead of Table 8.7.2.1.3-1 -> use Table 8.7.2.1_A.1.3-1.
- Instead of Table 8.7.2.1.3-2 -> use Table 8.7.2.1_A.1.3-2.
- Instead of Table 8.7.2.1.3-3 -> use Table 8.7.2.1_A.1.3-3.

Table 8.7.2.1_A.1.3-1: Common Test Parameters (TDD)

Parameter	Unit	Value
Special subframe configuration (Note 1)		4
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Maximum number of HARQ transmission		4
Redundancy version coding sequence		{0,0,1,2} for 64QAM
Number of OFDM symbols for PDCCH per component carrier	OFDM symbols	1
Cross carrier scheduling		Not configured
Note 1: as specified in Table 4.2-1 in TS 36.211 [4]		

Table 8.7.2.1_A.1.3-2: test parameters for sustained downlink data rate for CA (TDD)

Parameter		Unit	Test 6	Test 6A
Bandwidth		MHz	N/A	2x20
Transmission mode				3
Antenna configuration				2 x 2
Propagation condition				Static propagation condition (Note 1)
CodeBookSubsetRestriction bitmap				10
Downlink power allocation	ρ_A	dB		-3
	ρ_B	dB		-3
	σ	dB		0
$\hat{E}_s$ at antenna port		dBm/15kHz		-85
Symbols for unused PRBs				OP.1 TDD
ACK/NACK feedback mode				- (Note 2)
Note 1: No external noise sources are applied. Note 2: PUCCH format 1b with channel selection is used to feedback ACK/NACK.				

Table 8.7.2.1_A.1.3-3: Minimum requirement (TDD)

Test	UE Category	CA Capability	Number of bits of a DL-SCH transport block received within a TTI for normal/special sub-frame	Measurement channel	Reference value TB success rate [%]
1-6	N/A				
6A	Category 6,7	CL_C	75376/0 (Note 2)	R.31-4 TDD	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI. Note 2: 71112 bits for sub-frame 5. Note 3: The TB success rate is defined as TB success rate = 100%*$N_{DL\_correct\_rx}$/ (N_{DL_newtx} + N_{DL_retx}), where NDL_newtx is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL\_correct\_rx}$ is the number of correctly received DL transport blocks.					

The normative reference for this requirement is TS 36.101[2] clause 8.7.2

8.7.2.1_A.1.4 Test description

8.7.2.1_A.1.4.1 Initial conditions

Table 8.7.2.1_A.1.4.1-1: Applicable test and Transport Block Size for different UE categories

UE Category	Applicable test	DL Measurement channel	UL Measurement channel	TB_{size} per Codeword per Component Carrier	Number of PDCP SDU per Codeword	PDCP SDU size [bits] Note 2
6,7	6A	R.31-4 TDD	TBD	75376 (Note 3)	TBD	8*FLOOR((TB_{size} – 264)/56))

Note 1: Each PDCP SDU is limited to 1500 octets (to keep below maximum SDU size of ESM as specified in TS 24.301 clause 9.9.4.12).

The PDCP SDU size of each PDCP SDU is:

PDCP SDU size = (TBsize – N*PDCP header size - AMD PDU header size - MAC header size - Size of RLC STATUS PDU) / N,

where PDCP header size is 16 bits for the RLC AM and 12-bit SN case; AMD PDU header size is CEIL[(16+(N-1)*12)/8] bytes which includes 16 bit standard AM header and (N-1) Length indicators; and MAC header size = R/R/E/LCID/F/L MAC subheader (24 bits for MAC SDU for RLC STATUS PDU with 15 bit LI) + R/R/E/LCID MAC subheader (8 bits for MAC SDU for RLC Data PDU) = 32 bits. The size of RLC STATUS PDU including one ACK_SN field and one NACK_SN field is 32 bits (if no STATUS PDU is sent or if the size of the STATUS PDU is less than 32 bits then padding will be used to fill the 32 bits). This gives: PDCP SDU size = 8*FLOOR((TBsize – N*16- 8*CEIL((16+(N-1)*12)/8) – 64)/(8*N)) bits.

The calculation of PDCP SDU sizes does not consider timing advance MAC CE as timing advance is not transmitted by SS for RF test cases, and the header sizes are informative and may vary during the test.

Note 2: Transport block size under test according to applicable Fixed Reference Channel for sustained data-rate test in annex A.3.9. In case of varying TBS across SFs of the RMC, only the maximum TBS is used for PDCP SDU size calculation.

Note 3: 71112 bits for sub-frame 5

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Test Environment: Normal as defined in TS 36.508 [7] clause 4.1.

Frequencies to be tested: Mid Range as defined in TS 36.508 [7] clause 4.3.1.2.

Channel Bandwidths to be tested: According to table 8.7.2.1_A.1.3-2.

1. Connect the SS to the UE antenna connector(s) as shown in TS 36.508 [7] Annex A, FFS.
2. The parameter settings for the cell are set up according to Table 8.7.2.1_A.1.3-1, Table 8.7.2.1_A.1.3-2 and Table 8.7.2.1_A.1.5-1.
3. Downlink signals for PCC are initially set up according to Annex C0, C.1 and Annex C.3.2 and uplink signals according to Annex H.1 and H.3.2.
4. Propagation conditions are set according to Annex B.0.
5. Ensure the UE is in State 4 (Loopback activated) according to TS 36.508 [7] clause FFS. Message contents are defined in clause 8.7.2.1_A.1.4.3.

8.7.2.1_A.1.4.2 Test procedure

1. Configure SCC according to Annex C.0, C.1 and Annex C.3.2 for all downlink physical channels except PHICH.

2. The SS shall configure SCC as per TS 36.508 [7] clause 5.2A.4. Message contents for PhysicalConfigDedicated-DEFAULT is defined in Table 8.2.2.3.1_A.1.4.3-1

3. SS activates SCC by sending the activation MAC-CE (Refer TS 36.321 [13], clauses 5.13, 6.1.3.8). Wait for at least 2 seconds (Refer TS 36.133, clauses 8.3.3.2).

4. The SS looks up TB_{size} in table 8.7.2.1_A.1.4.1-1 according to the UE category under test.

5. SS sets the counters N_{DL_newtx} ,N_{DL_retx}, N_{UL_PDCP}, and ND_{DL_PDCP} to 0.

6. For each new DL HARQ transmission the SS generates sufficient PDCP SDUs to fill up the TB in accordance with Table 8.7.2.1_A.1.4.1-1 (Note 1). The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU. The SS increments then N_{DL_newtx} by one and N_{DL_PDCP} by the number of new PDCP SDUs (Note 1) included in the sent MAC PDU.

7. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments N_{DL_retx} by one.

8. Steps 3 to 4 are repeated at every TTI for at least 300 frames or until statistical significance is fulfilled according to [Annex G FFS] and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

9. For each PDCP SDU received at the SS, if the content of the data matches that of the truncated version of the original PDCP SDU generated at the SS, the SS increments N_{UL_PDCP} by one

10. The SS calculates the TB success rate as $A = 100\% * N_{DL\_newtx} / (N_{DL\_newtx} + N_{DL\_retx})$

11. The SS calculates the PDCP SDU loss as $B = N_{DL\_PDCP} - N_{UL\_PDCP}$

12. The UE passes the test if A ≥ "corresponding TB success rate according to Table 8.7.2.1_A.1.3-3" and B = 0.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

8.7.2.1_A.1.4.3 Message contents

Same message contents as in clause 8.7.2.1.4.3.

8.7.2.1_A.1.5 Test requirement

Same test requirement as in clause 8.7.2.1.5 with the following exceptions:

- Instead of Table 8.7.2.1.5-1 -> use Table 8.7.2.1_A.1.5-1.

Table 8.7.2.1_A.1.5-1: Test requirements for sustained downlink data rate for CA (TDD)

Test	UE Category	CA Capability	Number of bits of a DL-SCH transport block received within a TTI per codeword for normal/special sub-frame	Measurement channel	Number of PDCP SDU per TTI per codeword for normal/special sub-frame	PDCP SDU size for normal/special sub-frame [Octets]	Reference value TB success rate [%]
6A	Category 6,7	CL_C	75376/0 (Note 2)	R.31-4 TDD	FFS	FFS	85
Note 1: For 2 layer transmissions, 2 transport blocks are received within a TTI. Note 2: 71112 bits for sub-frame 5. Note 3: The TB success rate is defined as TB success rate = $100\% * N_{DL\_correct\_rx} / (N_{DL\_newtx} + N_{DL\_retx})$, where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and $N_{DL\_correct\_rx}$ is the number of correctly received DL transport blocks.							