10 Performance requirement (E-DCH)

10.1 General

The performance requirements for the UE in this subclause are specified for the propagation conditions specified in Annex D.2 and the Downlink Physical channels specified in Annex E.5A.

Unless otherwise stated the performance requirements are specified at the antenna connector of the UE. For UE(s) with more than one receive antenna connector the fading of the signals and the AWGN signals applied to each receiver antenna connector shall be uncorrelated. The levels of the test signal appled to each of the antenna connectors shall be as defined in the respective sections below. Enhanced performance requirements Type 1 are based on receiver diversity.

A UE with one antenna connector may also fulfill the enhanced performance requirements Type 1. The levels of the test signal are applied to the single antenna connector as defined in the respective sections below.

When DCCH has been configured on downlink DCH then DCCH Data shall be continuously transmitted on downlink DCH during the measurement period. When there is no signalling to transmit on downlink DCCH then dummy DCCH transmission as described in Annex C.9 shall be used.

When DTCH has been configured on downlink DCH then DTCH Data shall be continuously transmitted on downlink DCH during the measurement period.

The MAC header transmission on HS-DSCH for all E-DCH test cases shall use a correct MAC-hs header consistent with the actual HSDPA transmission.

The DL and UL RLC SDU size for all E-DCH tests in clause 10 shall be set according to Annex C.11.3.

Unless otherwise stated, the UE output power for the tests shall be greater than -10 dBm.

> NOTE: If tests are performed with maximum UE output power it is known that this may cause a good UE to fail at least for tests in section 10.4.

For Release 7 and later UEs that support the optional Type 1 enhanced peformance requirements the UE shall be tested according to this enhanced performance requirement as well.

10.2 Detection of E-DCH HARQ ACK Indicator Channel (E-HICH)

10.2.1 Single link performance

10.2.1.1 Single link performance (10ms TTI)

10.2.1.1.1 Definition and applicability

The receive characteristics of the E-DCH HARQ ACK Indicator Channel (E-HICH) in different multi-path fading environments are determined by the missed ACK and false ACK values. The requirements and this test apply to Release 6 and later releases for all types of UTRA for the FDD UE that support E-DCH and HSDPA.

10.2.1.1.2 Minimum requirement

For the parameters specified in Table 10.2.1.1.2.1 the average downlink E-HICH E_c/I_{or} power ratio shall be below the specified value for the missed ACK probabilities in Table 10.2.1.1.2.2. For the parameters specified in Table 10.2.1.1.2.1 the false ACK probability shall be below the specified value in Table 10.2.1.1.2.3.

Table 10.2.1.1.2.1: Parameters for E-HICH – Serving E-DCH cell

Parameter	Unit	Missed ACK	False ACK
I_{oc}	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
P-CPICH E_c/I_{or}	dB	-10	
E-HICH signalling pattern	-	100% ACK	100% DTX

Table 10.2.1.1.2.2: Minimum requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB)	$\hat{I}_{or}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-35.1	0	0.01

Table 10.2.1.1.2.3: Minimum requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – single link

Test Number	Propagation Conditions	Reference value	
		$\hat{I}_{or}/I_{oc}$ (dB)	False ACK probability
2	VA30	0	0.5

The reference for this requirement is TS 25.101 [1] clause 10.2.1

10.2.1.1.3 Test purpose

To verify that the average probability for missed ACK and false ACK when E-HICH is transmitted using 12 consecutive slots do not exceed the specified values.

10.2.1.1.4 Method of test

10.2.1.1.4.1 Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulator to the UE antenna connector as shown in figure Figure A.10.

2) Set the test parameters for the missed ACK test and the false ACK test as specified in table 10.2.1.1.5.1.to 10.2.1.1.5.3 and table E.5A.2.

3) The UL Reference Measurement Channel parameters are defined in Annex C.11

4) The value of Absolute Grant Scope shall be set to 0, and the Absolute Grant shall be set to 5.

5) The relative grant is not configured. This ensures that the UL datarate remains constant.

6) The UE is switched on.

7) Enter the UE into loopback mode 1, looping back both the 12.2kbps RMC and HSDPA to E-DCH, and start the loopback test. See TS 34.108 [3] clause 7.3.9 and TS 34.109 [4] clauses 5.3.2.3 and 5.3.2.6. To fill the RLC transmit buffer, run the loopback for [3]s before starting the procedure.

8) Switch on the fading simulator.

10.2.1.1.4.2 Procedure

NOTE: The measurement principle for the missed ACK test (step 2 to 5) and for the false ACK test (step 6 to 9) is as follows. Upon the UE transmission on E-DPCCH and E-DPDCH, the SS reacts with E-HICH = ACK or DTX. The UE transmits new data or retransmissions on the corresponding E-DPCCH and E-DPDCH. The SS shall discriminate between:

(1) new data is a sign for ACK, received by the UE

(2) retransmission is a sign for NACK or DTX, received by the UE. The later is interpreted as NACK by higher layer and causes retransmission.

. 1. The Nominal Avg. Information Bit Rate in the DL is set to 534 kbps according to QPSK H-Set 1. The expected througput under this level and fading conditions is 142 kbps. The UL datarate was configured by signalling AG value = 5 on the E-AGCH. The expected UL datarate is 71.6 kbps corresponding to E-TFC Index 45.

2. In the test Missed ACK the SS responds with 100% ACK.

3. If the UE indicates on the E-DPCCH a retransmission, the ACK from the SS was received as NACK or DTX by the UE. This is counted as missed(ACK).

   If the UE indicates on the E-DPCCH new data, the ACK from the SS was received as ACK by the UE. This is counted as correct ACK.

4. Continue until statistical significance according to Annex F.6.4 is achieved.

5. If the number of retransmissions reaches the maximum number of retransmissions due to several false or missed ACK detections in series, the first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK. This case is not counted as sample.

6. In the test false ACK the SS responds with 100% DTX.

7. If the UE indicates on the E-DPCCH new data, the DTX from the SS was received as ACK by the UE. This is counted as false(ACK). If the UE indicates on E-DPCCH retransmission, the DTX from the SS was received as DTX or NACK by the UE. This is counted as correct reception.

8. Continue until statistical significance according to Annex F.6.4 is achieved.

9. The number of retransmissions will reach the maximum number of transmissions due to several retransmissions in series. The first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK received by the UE. This case is not counted as sample.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9.2.1 of 34.108 [3] with the following exceptions:

RADIO BEARER SETUP:

Information Element	Value/remark
RLC PDU size	112
- E-DCH Transmission Time	10 ms
E-DCH MAC-d flow maximum number of retransmissions	15 (max)
E-DCH info	
- Happy bit delay condition	10 ms (indication of exhausted resources on frame basis)

10.2.1.1.5. Test requirements

Table 10.2.1.1.5.1: Test Parameters for E-HICH – Serving E-DCH cell

Parameter	Unit	Missed ACK	False ACK
I_{oc}	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
E-HICH E_c/I_{or}	dB	--35 (test1)	-∞ (test 2)
E-HICH signalling pattern	-	100% ACK	100% DTX

Table 10.2.1.1.5.2: Test requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB)	$\hat{I}_{or}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-35.0	0.6	0.01

Table 10.2.1.1.5.3: Test requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – single link

Test Number	Propagation Conditions	Reference value	
		$\hat{I}_{or}/I_{oc}$ (dB)	False ACK probability
2	VA30	0.6	0.5

To pass the test,

the ratio (missed(ACK) / all valid ACKs, sent) ≤ 0.01 and
the ratio (false(ACK) / (all valid DTX, sent)) ≤ 0.5

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.

10.2.1.1A Single link performance (10ms TTI, Type 1)

10.2.1.1A.1 Definition and applicability

The receive characteristics of the E-DCH HARQ ACK Indicator Channel (E-HICH) in different multi-path fading environments are determined by the missed ACK values. The requirements and this test apply to Release 7 and later releases for all types of UTRA FDD UEs that support E-DCH and HSDPA and the optional Type 1 enhanced performance requirements.

10.2.1.1A.2 Minimum requirement

For the parameters specified in Table 10.2.1.1A.2.1 the average downlink E-HICH E_c/I_{or} power ratio shall be below the specified value for the missed ACK probabilities in Table 10.2.1.1A.2.2

Table 10.2.1.1A.2.1: Parameters for E-HICH – Serving E-DCH cell

Parameter	Unit	Missed ACK
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
P-CPICH E_c/I_{or}	dB	-10
E-HICH signalling pattern	-	100% ACK

Table 10.2.1.1A.2.2: Enhanced performance requirement Type 1 for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB)	$\hat{I}_{or}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-38.3	0	0.01

The reference for this requirement is TS 25.101 [1] clause 10.2.1.

10.2.1.1A.3   Test purpose

To verify that the average probability for missed ACK when E-HICH is transmitted using 12 consecutive slots do not exceed the specified values.

10.2.1.1A.4   Method of test

10.2.1.1A.4.1   Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulator to the UE antenna connectors as shown in figure Figure A.21 for UEs that support receive diversity or figure A.10 for UEs that do not support receive diversity.

2) Set the test parameters for the missed ACK test as specified in table 10.2.1.1A.5.1and 10.2.1.1A.5.2 and table E.5A.2.

3) The UL Reference Measurement Channel parameters are defined in Annex C.11

4) The value of Absolute Grant Scope shall be set to 0, and the Absolute Grant shall be set to 5.

5) The relative grant is not configured. This ensures that the UL datarate remains constant.

6) The UE is switched on.

7) Enter the UE into loopback mode 1, looping back both the 12.2kbps RMC and HSDPA to E-DCH, and start the loopback test. See TS 34.108 [3] clause 7.3.9 and TS 34.109 [4] clauses 5.3.2.3 and 5.3.2.6. To fill the RLC transmit buffer, run the loopback for [3]s before starting the procedure.

8) Switch on the fading simulators.

10.2.1.1A.4.2   Procedure

NOTE: The measurement principle for the missed ACK test (step 2 to 5) is as follows. Upon the UE transmission on E-DPCCH and E-DPDCH, the SS reacts with E-HICH = ACK. The UE transmits new data or retransmissions on the corresponding E-DPCCH and E-DPDCH. The SS shall discriminate between:

(1) new data is a sign for ACK, received by the UE

(2) retransmission is a sign for NACK or DTX, received by the UE. The later is interpreted as NACK by higher layer and causes retransmission.

1. The Nominal Avg. Information Bit Rate in the DL is set to 534 kbps according to QPSK H-Set 1. The expected througput under this level and fading conditions is 142 kbps. The UL datarate was configured by signalling AG value = 5 on the E-AGCH. The expected UL datarate is 71.6 kbps corresponding to E-TFC Index 45.

2. In the test Missed ACK the SS responds with 100% ACK.

3. If the UE indicates on the E-DPCCH a retransmission, the ACK from the SS was received as NACK or DTX by the UE. This is counted as missed(ACK).

If the UE indicates on the E-DPCCH new data, the ACK from the SS was received as ACK by the UE. This is counted as correct ACK.

4. Continue until statistical significance according to Annex F.6.4 is achieved.

5. If the number of retransmissions reaches the maximum number of retransmissions due to several false or missed ACK detections in series, the first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK. This case is not counted as sample.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9.2.1 of 34.108 [3] with the following exceptions:

RADIO BEARER SETUP:

Information Element	Value/remark
RLC PDU size	112
- E-DCH Transmission Time	10 ms
E-DCH MAC-d flow maximum number of retransmissions	15 (max)
E-DCH info	
- Happy bit delay condition	10 ms (indication of exhausted resources on frame basis)

10.2.1.1A.5. Test requirements

Table 10.2.1.1A.5.1: Test Parameters for E-HICH – Serving E-DCH cell

Parameter	Unit	Missed ACK
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
E-HICH E_c/I_{or}	dB	-38.2(test1)
E-HICH signalling pattern	-	100% ACK

Table 10.2.1.1A.5.2: Test requirement Type 1 for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB)	$\hat{I}_{or}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-38.2	0.6	0.01

To pass the test,

the ratio (missed(ACK) / all valid ACKs, sent) ≤ 0.01

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.

10.2.1.2 Single link performance (2ms TTI)

10.2.1.2.1 Definition and applicability

The receive characteristics of the E-DCH HARQ ACK Indicator Channel (E-HICH) in different multi-path fading environments are determined by the missed ACK and false ACK values. The requirements and this test apply to Release 6 and later releases for all types of UTRA for the FDD UE that support E-DCH with 2ms TTI and HSDPA.

10.2.1.2.2 Minimum requirement

For the parameters specified in Table 10.2.1.2.2.1 the average downlink E-HICH E_c/I_{or} power ratio shall be below the specified value for the missed ACK probabilities in Table 10.2.1.2.2.2 For the parameters specified in Table 10.2.1.2.2.1 the false ACK probability shall be below the specified value in Table 10.2.1.2.2.3.

Table 10.2.1.2.2.1: Parameters for E-HICH – Serving E-DCH cell

Parameter	Unit	Missed ACK	False ACK
I_{oc}	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
P-CPICH E_c / I_{or}	dB	-10	
E-HICH signalling pattern	-	100% ACK	100% DTX

Table 10.2.1.2.2.2: Minimum requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c / I_{or} (dB)	$\hat{I}_{or} / I_{oc}$ (dB)	Missed ACK probability
1	VA30	-28.3	0	0.01

Table 10.2.1.2.2.3: Minimum requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value	
		$\hat{I}_{or} / I_{oc}$ (dB)	False ACK probability
2	VA30	0	0.5

The reference for this requirement is TS 25.101 [1] clause 10.2.1

10.2.1.2.3 Test purpose

To verify that the average probability for missed ACK and false ACK, when E-HICH is transmitted using 3 consecutive slots, do not exceed the specified values.

10.2.1.2.4 Method of test

10.2.1.2.4.1 Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulator to the UE antenna connector as shown in figure Figure A.10.

2) Set the test parameters for the missed ACK test and the false ACK test as specified in table 10.2.1.2.5.1.to 10.2.1.2.5.3 and table E.5A.2.

3) The UL Reference Measurement Channel parameters are defined in Annex C.11

4) The value of Absolute Grant Scope shall be set to the 0 and the Absolute Grant shall be set to 4.

5) The relative grant is not configured. This ensures that the UL datarate remains constant.

6) The UE is switched on.

7) Enter the UE into loopback mode 1, looping back both the 12.2kbps RMC and HSDPA to E-DCH, and start the loopback test. See TS 34.108 [3] clause 7.3.9 and TS 34.109 [4] clauses 5.3.2.3 and 5.3.2.6. To fill the RLC transmit buffer, run the loopback for [3]s before starting the procedure.

8) Switch on the fading simulator.

10.2.1.2.4.2   Procedure

NOTE: The measurement principle for the missed ACK test (step 2 to 5) and for the false ACK test (step 6 to 9) is as follows. Upon the UE transmission on E-DPCCH and E-DPDCH, the SS reacts with E-HICH = ACK or DTX. The UE transmits new data or retransmissions on the corresponding E-DPCCH and E-DPDCH. The SS shall discriminate between:

(1) new data is a sign for ACK, received by the UE

(2) retransmission is a sign for NACK or DTX, received by the UE. The later is interpreted as NACK by higher layer and causes retransmission.

1.   The Nominal Avg. Information Bit Rate in the DL is set to 534 kbps according to QPSK H-Set 1. The expected througput under this level and fading conditions is 142 kbps. The UL data rate was configured by signalling AG value 4 on the E-AGCH. The expected UL datarate is 273 kbps corresponding to E-TFC Index 39.

2.   In the test Missed ACK the SS responds with 100% ACK.

3.   If the UE indicates on the E-DPCCH a retransmission, the ACK from the SS was received as NACK or DTX by the UE. This is counted as missed(ACK).

     If the UE indicates on the E-DPCCH new data, the ACK from the SS was received as ACK by the UE. This is counted as correct ACK.

4.   Continue until statistical significance according to Annex F.6.4 is achieved.

5.   If the number of retransmissions reaches the maximum number of retransmissions due to several false or missed ACK detections in series, the first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK. This case is not counted as sample.

6.   In the test False ACK the SS responds with 100% DTX.

7.   If the UE indicates on the E-DPCCH new data, the DTX from the SS was received as ACK by the UE. This is counted as false(ACK). If the UE indicates on E-DPCCH retransmission, the DTX from the SS was received as DTX or NACK by the UE. This is counted as correct reception.

8.   Continue until statistical significance according to Annex F.6.4 is achieved.

9.   The number of retransmissions will reach the maximum number of transmissions due to several retransmissions in series. The first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK received by the UE. This case is not counted as sample.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9.2.1 of 34.108 [3] with the following exceptions:

RADIO BEARER SETUP:

Information Element	Value/remark
RLC PDU size	112
- E-DCH Transmission Time	2ms
E-DCH MAC-d flow maximum number of retransmissions	15 (max)
E-DCH info	
- Happy bit delay condition	2ms (indication of exhausted resources on TTI basis)

10.2.1.2.5.   Test requirements

Table 10.2.1.2.5.1: Test Parameters for E-HICH – Serving E-DCH cell

Parameter	Unit	Missed ACK	False ACK
I_{oc}	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
E-HICH E_c/I_{or}	dB	-28.2 (test 1)	-∞ (test 2)
E-HICH signalling pattern	-	100% ACK	100% DTX

Table 10.2.1.2.5.2: Test requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB)	$\hat{I}_{or}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-28.2	0.6	0.01

Table 10.2.1.2.5.3: Test requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value	
		$\hat{I}_{or}/I_{oc}$ (dB)	False ACK probability
2	VA30	0.6	0.5

To pass the test,

the ratio (missed(ACK) / all valid ACKs, sent) ≤ 0.01 and
the ratio (false(ACK) /(all valid DTX, sent)) ≤ 0.5

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.

10.2.1.2A   Single link performance (2ms TTI, Type 1)

10.2.1.2A.1   Definition and applicability

The receive characteristics of the E-DCH HARQ ACK Indicator Channel (E-HICH) in different multi-path fading environments are determined by the missed ACK values. The requirements and this test apply to Release 7 and later releases for all types of UTRA FDD UEs that support E-DCH with 2ms TTI and HSDPA and the optional Type 1 enhanced performance requirements.

10.2.1.2A.2   Minimum requirement

For the parameters specified in Table 10.2.1.2A.2.1 the average downlink E-HICH E_c/I_{or} power ratio shall be below the specified value for the missed ACK probabilities in Table 10.2.1.2A.2.2

Table 10.2.1.2A.2.1: Parameters for E-HICH – Serving E-DCH cell

Parameter	Unit	Missed ACK
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
P-CPICH E_c/I_{or}	dB	-10
E-HICH signalling pattern	-	100% ACK

Table 10.2.1.2A.2.2: Enhanced performance requirement Type 1 for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB)	$\hat{I}_{or}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-31.7	0	0.01

The reference for this requirement is TS 25.101 [1] clause 10.2.1

10.2.1.2A.3 Test purpose

To verify that the average probability for missed ACK, when E-HICH is transmitted using 3 consecutive slots, do not exceed the specified values.

10.2.1.2A.4 Method of test

10.2.1.2A.4.1 Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulator to the UE antenna connector as shown in figure Figure A.21 for UEs that support receive diversity or figure A.10 for UEs that do not support receive diversity.

2) Set the test parameters for the missed ACK test as specified in table 10.2.1.2A.5.1and 10.2.1.2A.5.2 and table E.5A.2.

3) The UL Reference Measurement Channel parameters are defined in Annex C.11

4) The value of Absolute Grant Scope shall be set to the 0 and the Absolute Grant shall be set to 4.

5) The relative grant is not configured. This ensures that the UL datarate remains constant.

6) The UE is switched on.

7) Enter the UE into loopback mode 1, looping back both the 12.2kbps RMC and HSDPA to E-DCH, and start the loopback test. See TS 34.108 [3] clause 7.3.9 and TS 34.109 [4] clauses 5.3.2.3 and 5.3.2.6. To fill the RLC transmit buffer, run the loopback for [3]s before starting the procedure.

8) Switch on the fading simulator.

10.2.1.2A.4.2 Procedure

NOTE: The measurement principle for the missed ACK test (step 2 to 5) is as follows. Upon the UE transmission on E-DPCCH and E-DPDCH, the SS reacts with E-HICH = ACK. The UE transmits new data or retransmissions on the corresponding E-DPCCH and E-DPDCH. The SS shall discriminate between:

(1) new data is a sign for ACK, received by the UE

(2) retransmission is a sign for NACK or DTX, received by the UE. The later is interpreted as NACK by higher layer and causes retransmission.

1. The Nominal Avg. Information Bit Rate in the DL is set to 534 kbps according to QPSK H-Set 1. The expected througput under this level and fading conditions is 142 kbps. The UL data rate was configured by signalling AG value 4 on the E-AGCH. The expected UL datarate is 273 kbps corresponding to E-TFC Index 39.

2. In the test Missed ACK the SS responds with 100% ACK.

3. If the UE indicates on the E-DPCCH a retransmission, the ACK from the SS was received as NACK or DTX by the UE. This is counted as missed(ACK).

If the UE indicates on the E-DPCCH new data, the ACK from the SS was received as ACK by the UE. This is counted as correct ACK.

4. Continue until statistical significance according to Annex F.6.4 is achieved.

5. If the number of retransmissions reaches the maximum number of retransmissions due to several false or missed ACK detections in series, the first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK. This case is not counted as sample.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9.2.1 of 34.108 [3] with the following exceptions:

RADIO BEARER SETUP:

Information Element	Value/remark
RLC PDU size	112
- E-DCH Transmission Time	2ms
E-DCH MAC-d flow maximum number of retransmissions	15 (max)
E-DCH info	
- Happy bit delay condition	2ms (indication of exhausted resources on TTI basis)

10.2.1.2A.5. Test requirements

Table 10.2.1.2A.5.1: Test Parameters for E-HICH – Serving E-DCH cell

Parameter	Unit	Missed ACK
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
E-HICH E_c/I_{or}	dB	-31.6 (test 1)
E-HICH signalling pattern	-	100% ACK

Table 10.2.1.2A.5.2: Test requirement Type 1 for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} **(dB)**	$\hat{I}_{or}/I_{oc}$ **(dB)**	Missed ACK probability
1	VA30	-31.6	0.6	0.01

To pass the test,

the ratio (missed(ACK) / all valid ACKs, sent) ≤ 0.01

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.

10.2.2 Detection in Inter-Cell Handover conditions

10.2.2.1 RLS not containing the Serving E-DCH cell

10.2.2.1.1 RLS not containing the Serving E-DCH cell (10ms TTI)

10.2.2.1.1.1 Definition and applicability

The receive characteristics of the E-DCH HARQ ACK Indicator Channel (E-HICH) is determined during an inter-cell soft handover by the missed ACK and false ACK error probabilities. During the soft handover a UE receives signals from different cells. A UE has to be able to detect E-HICH signalling from different cells belonging to different RLS, not containing the Serving E-DCH cell.

The requirements and this test apply to Release 6 and later releases for all types of UTRA for the FDD UE that support E-DCH and HSDPA.

10.2.2.1.1.2 Minimum requirement

For the parameters specified in Table 10.2.2.1.1.2.1 the average downlink E-HICH E_c/I_{or} power ratio of cell belonging to RLS not containing the Serving E-DCH cell shall be below the specified value for the missed ACK probabilities in Table 10.2.2.1.1.2.2. For the parameters specified in Table 10.2.2.1.1.2.1 the false ACK probability shall be below the specified value in Table 10.2.2.1.1.2.3

Table 10.2.2.1.1.2.1: Requirement scenario parameters for E-HICH – cell belonging to RLS not containing the Serving E-DCH cell

Parameter	Unit	Missed ACK	False ACK
I_{oc}	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
P-CPICH E_c/I_{or} (*)	dB	-10	
E-HICH signalling pattern for the Serving E-DCH cell	-	100% NACK (-1)[1]	100% NACK (-1)[1]
E-HICH signalling pattern for cell belonging to RLS not containing the Serving E-DCH cell		100% ACK (+1)	100% NACK (0)
NOTE 1: The Serving E-DCH cell E-HICH E_c/I_{or} power level is set to -16 dB when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots and to -23 dB when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots.			

Table 10.2.2.1.1.2.2: Minimum requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – cell belonging to RLS not containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB)	$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-23.6	0	0.05

Table 10.2.2.1.1.2.3: Minimum requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – cell belonging to RLS not containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value	
		$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	False ACK probability
2	VA30	0	2E-4

The reference for this requirement is TS 25.101 [1] clause 10.2.2.

10.2.2.1.1.3 Test Purpose

NOTE: Through all the text below including clause 10.2.2.1.5 the following abbreviation holds: Cell 1: cell belonging to RLS containing the Serving E-DCH cell, Cell 2: cell belonging to RLS not containing the Serving E-DCH cell

To verify that during an inter-cell soft handover for cell 2 the average probability for missed ACK and the average probability for false ACK, when E-HICH is transmitted using 12 consecutive slots, does not exceed specified values.

10.2.2.1.1.4   Method of test

10.2.2.1.1.4.1   Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulators to the UE antenna connector as shown in figure Figure A.11.

2) The UL Reference Measurement Channel parameters are defined in Annex C.11.

3) Set the test parameters for the missed ACK and false ACK test as specified in table 10.2.2.1.1.5.1 to 10.2.2.1.1.5.3 and table E.5A.3, with the exception of $\hat{I}_{or2}$ that shall be set to -∞. Set the fading conditions to VA30.

4) The value of Absolute Grant Scope shall be set to 0, and the Absolute Grant shall be set to 5

5) The relative grant is not configured. This ensures that the UL datarate remains constant.

6) The UE is switched on.

7) Enter the UE into loopback mode 1, looping back both the 12.2kbps RMC and HSDPA to E-DCH, and start the loopback test. See TS 34.108 [3] clause 7.3.9 and TS 34.109 [4] clauses 5.3.2.3 and 5.3.2.6. To fill the RLC transmit buffer, run the loopback for [3]s before starting the procedure

8) Set $\hat{I}_{or2}$ according to tables 10.2.2.1.1.5.2 to 10.2.2.1.1.5.3. The downlink DPCH of cell 2 must remain inactivated.

9) UE shall transmit a MEASUREMENT REPORT message triggered by event 1A containing the CFN-SFN time difference between cell 1 and cell 2.

10) The downlink DPCH of cell 2 shall be activated.

11) SS shall send an ACTIVE SET UPDATE message, adding cell 2 to the active set.

12) The fading simulators are switched on.

10.2.2.1.1.4.2   Procedure

NOTE: The measurement principle for the missed ACK test (step 2 to 5) and for the false ACK test (step 6 to 9) is as follows. Upon the UE transmission on E-DPCCH and E-DPDCH, the SS responds with E-HICH = ACK on the cell 2 and with E-HICH = NACK on the cell 1. The UE transmits new data or retransmissions on the corresponding E-DPCCH and E-DPDCH. The SS shall discriminate between:

(1) new data is a sign for ACK, received by the UE from any of the cells

(2) retransmission is a sign for NACK received by the UE on both cells.

1. The Nominal Avg. Information Bit Rate in the DL is set to 534 kbps according to QPSK H-Set 1. The expected thoughput under this level and fading conditions is tested with a single cell in clause 9.2.1, but the DL throughput for this test case will be less than for the single cell case because of interference from Cell 2. The DL throughput for this test case is estimated based on the HSDPA throughput corresponding to the subtests using "HS-PDSCH Ec/Ior = -6dB" condition in 9.2.1A. The worst case for a conformant UE is 22 kbps. The UL data rate was configured by signalling AG value 5 on the E-AGCH. The expected UL datarate is 71.6 kbps corresponding to E-TFC Index 45.

2. In the test Missed ACK the SS responds with 100% NACK (-1) on cell 1 and 100% ACK (1) cell 2.

3. If the UE indicates on the E-DPCCH a retransmission, the ACK from cell 2 was received as NACK by the UE. This is counted as missed (ACK). If the UE indicates on the E-DPCCH new data, the ACK from cell 2 was received as ACK by the UE. This is counted as correct ACK.

4. Continue until statistical significance according to Annex F.6.4 is achieved.

5. If the number of retransmissions reaches the maximum number of retransmissions due to several false or missed ACK detections in series, the first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK. This case is not counted as sample.

6. In the test false ACK the SS responds with 100% NACK (-1) on cell 1 and with 100% NACK (0) on cell 2.

7. If the UE indicates on the E-DPCCH new data, the NACK (DTX) from the SS on cell 2 was received as ACK by the UE. This is counted as false(ACK). If the UE indicates on the the E-DPCCH retransmission, then NACK (DTX) from cell 2 was received as NACK by the UE. This is counted as correct reception.

8. Continue until statistical significance according to Annex F.6.4 is achieved.

9. The number of retransmissions will reach the maximum number of transmissions due to several retransmissions in series. The first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK received by the UE. This case is not counted as sample.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9.2.1 of 34.108 [3] with the following exceptions:

RADIO BEARER SETUP:

Information Element	Value/remark
-RLC PDU size	112
- E-DCH Transmission Time	10 ms
E-DCH MAC-d flow maximum number of retransmissions	15 (max)
E-DCH info	
- Happy bit delay condition	10 ms

ACTIVE SET UPDATE message:

Information Element/Group name	Value/Remark	Version
Message Type (10.2.17)		
UE information elements		
- RRC transaction identifier	0	
- Integrity check info		
-message authentication code	SS calculates the value of MAC-I for this message and writes to this IE. The first/ leftmost bit of the bit string contains the most significant bit of the MAC-I.	
-RRC message sequence number	SS provides the value of this IE, from its internal counter.	
- Activation time	"now".	
- New U-RNTI	Not Present	
- New H-RNTI	Not Present	Rel-6
- New Primary E-RNTI	Not Present	Rel-6
- New Secondary E-RNTI	Not Present	Rel-6
CN information elements		
- CN Information info	Not Present	
Phy CH information elements		
Uplink radio resources		
- Maximum allowed UL TX power	33 dBm	
Downlink radio resources		
- Radio link addition information	1	
- Radio link addition information		
- Primary CPICH info		
- Primary scrambling code	Same as adding cell	
- Downlink DPCH info for each RL		
- CHOICE mode	FDD	
- Primary CPICH usage for channel estimation	Primary CPICH may be used	
- DPCH frame offset	This should be reflected by the IE" Cell synchronisation information" in received MEASUREMENT REPORT message	
- Secondary CPICH info	Not Present	
- DL channelisation code		
- Secondary scrambling code	Not Present	
- Spreading factor	128	
- Code number	96	
- Scrambling code change	No code change	
- TPC combination index	1	
- Closed loop timing adjustment mode	Not Present	
- Downlink F-DPCH info for each RL	Not Present	
E-HICH Information		Rel-6
- Channelisation Code	6	
- Signature Sequence	1	
E-RGCH Information	Not Present	Rel-6
- Radio link removal information	Not Present	
- TX Diversity Mode	Not Present	
Serving HS-DSCH cell information	Not Present	Rel-6
E-DCH reconfiguration information	Not Present	Rel-6

10.2.2.1.1.5 Test Requirements

For table 10.2.2.1.1.5.1, the average downlink E- HICH E_c/I_{or} power ratio shall be below the specified value for missed ACK probability in Table 10.2.2.1.1.5.2. For table 10.2.2.1.1.5.1, the false ACK probability shall be below the specified value in Table 10.2.2.1.1.5.3

Table 10.2.2.1.1.5.1: Requirement scenario parameters for E-HICH – cell belonging to RLS not containing the Serving E-DCH cell

Parameter Note 1	Unit	Missed ACK	False ACK
I_{oc}	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
E-HICH$_1$ E_c/I_{or}	dB	-22.9	
E-HICH$_2$ E_c/I_{or}	dB	-23.5 (test1)	-∞ (test 2)
HS-DPSCH$_1$ E_c/I_{or}	dB	-2.9(test 1)	-2.9(test 2)
E-HICH signalling pattern for the Serving E-DCH cell	-	100% NACK (-1)'	100% NACK (-1)'
E-HICH signalling pattern for cell belonging to RLS not containing the Serving E-DCH cell		100% ACK (+1)	100% NACK (0)
NOTE 1: Index 1: cell belonging to RLS containing the Serving E-DCH cell, Index 2: cell belonging to RLS not containing the Serving E-DCH cell.			

Table 10.2.2.1.1.5.2: Test requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – cell belonging to RLS not containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB)	$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-23.5	0.6	0.05

Table 10.2.2.1.1.5.3: Test requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – cell belonging to RLS not containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value	
		$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	False ACK probability
2	VA30	0.6	2E-4

To pass the test,

The ratio (missed (ACK) / all valid ACKs, sent) <= 0.05 and

The ratio (false (ACK) / all valid samples) <= 0.0002

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.

10.2.2.1.1A RLS not containing the Serving E-DCH cell (10ms TTI, Type 1)

10.2.2.1.1A.1 Definition and applicability

The receive characteristics of the E-DCH HARQ ACK Indicator Channel (E-HICH) is determined during an inter-cell soft handover by the missed ACK error probabilities. During the soft handover a UE receives signals from different cells. A UE has to be able to detect E-HICH signalling from different cells belonging to different RLS, not containing the Serving E-DCH cell.

The requirements and this test apply to Release 7 and later releases for all types of UTRA FDD UEs that support E-DCH and HSDPA and the optional Type 1 enhanced performance requirements.

10.2.2.1.1A.2 Minimum requirement

For the parameters specified in Table 10.2.2.1.1A.2.1 the average downlink E-HICH E_c/I_{or} power ratio of cell belonging to RLS not containing the Serving E-DCH cell shall be below the specified value for the missed ACK probabilities in Table 10.2.2.1.1A.2.2.

Table 10.2.2.1.1A.2.1: Requirement scenario parameters for E-HICH – cell belonging to RLS not containing the Serving E-DCH cell

Parameter	Unit	Missed ACK
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
P-CPICH E_c/I_{or} (*)	dB	-10
E-HICH signalling pattern for the Serving E-DCH cell	-	100% NACK (-1)[1]
E-HICH signalling pattern for cell belonging to RLS not containing the Serving E-DCH cell		100% ACK (+1)
NOTE 1: The Serving E-DCH cell E-HICH E_c/I_{or} power level is set to -16 dB when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots and to -23 dB when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots.		

Table 10.2.2.1.1A.2.2: Enhanced performance requirement Type 1 for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – cell belonging to RLS not containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB)	$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-27.8	0	0.05

The reference for this requirement is TS 25.101 [1] clause 10.2.2.

10.2.2.1.1A.3   Test Purpose

NOTE: Through all the text below including clause 10.2.2.1.5 the following abbreviation holds: Cell 1: cell belonging to RLS containing the Serving E-DCH cell, Cell 2: cell belonging to RLS not containing the Serving E-DCH cell

To verify that during an inter-cell soft handover for cell 2 the average probability for missed ACK, when E-HICH is transmitted using 12 consecutive slots, does not exceed specified values.

10.2.2.1.1A.4   Method of test

10.2.2.1.1A.4.1   Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulators to the UE antenna connector as shown in figure Figure A.24 for UEs that support receive diversity or figure A.11 for UEs that do not support receive diversity..

2) The UL Reference Measurement Channel parameters are defined in Annex C.11

3) Set the test parameters for the missed ACK test as specified in table 10.2.2.1.1A.5.1 and 10.2.2.1.1A.5.2 and table E.5A.3 with the exception of $\hat{I}_{or2}$ that shall be set to -∞.. Set the fading conditions to VA 30

4) The value of Absolute Grant Scope shall be set to 0, and the Absolute Grant shall be set to 5

5) The relative grant is not configured. This ensures that the UL datarate remains constant.

6) The UE is switched on.

7) Enter the UE into loopback mode 1, looping back both the 12.2kbps RMC and HSDPA to E-DCH, and start the loopback test. See TS 34.108 [3] clause 7.3.9 and TS 34.109 [4] clauses 5.3.2.3 and 5.3.2.6. To fill the RLC transmit buffer, run the loopback for [3]s before starting the procedure

8) Set $\hat{I}_{or2}$ according to tables 10.2.2.1.1A.5.1 to 10.2.2.1.1A.5.2. The downlink DPCH of cell 2 must remain inactivated.

9) UE shall transmit a MEASUREMENT REPORT message triggered by event 1A containing the CFN-SFN time difference between cell 1 and cell 2.

10) The downlink DPCH of cell 2 shall be activated.

11) SS shall send an ACTIVE SET UPDATE message, adding cell 2 to the active set.

12) The fading simulators are switched on

10.2.2.1.1A.4.2 Procedure

NOTE: The measurement principle for the missed ACK test (step 2 to 5) is as follows. Upon the UE transmission on E-DPCCH and E-DPDCH, the SS responds with E-HICH = ACK on the cell 2 and with E-HICH = NACK on the cell 1. The UE transmits new data or retransmissions on the corresponding E-DPCCH and E-DPDCH. The SS shall discriminate between:

(1) new data is a sign for ACK, received by the UE from any of the cells

(2) retransmission is a sign for NACK received by the UE on both cells.

1. The Nominal Avg. Information Bit Rate in the DL is set to 534 kbps according to QPSK H-Set 1. The expected thoughput under this level and fading conditions is tested with a single cell in clause 9.2.1, but the DL throughput for this test case will be less than for the single cell case because of interference from Cell 2. The DL throughput for this test case is estimated based on the HSDPA throughput corresponding to the subtests using "HS-PDSCH Ec/Ior = -6dB" condition in 9.2.1A. The worst case for a conformant UE is 22 kbps. The UL data rate was configured by signalling AG value 5 on the E-AGCH. The expected UL datarate is 71.6 kbps corresponding to E-TFC Index 45.

2. In the test Missed ACK the SS responds with 100% NACK (-1) on cell 1 and 100% ACK (1) cell 2.

3. If the UE indicates on the E-DPCCH a retransmission, the ACK from cell 2 was received as NACK by the UE. This is counted as missed (ACK). If the UE indicates on the E-DPCCH new data, the ACK from cell 2 was received as ACK by the UE. This is counted as correct ACK.

4. Continue until statistical significance according to Annex F.6.4 is achieved.

5. If the number of retransmissions reaches the maximum number of retransmissions due to several false or missed ACK detections in series, the first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK. This case is not counted as sample.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9.2.1 of 34.108 [3] with the following exceptions:

RADIO BEARER SETUP:

Information Element	Value/remark
-RLC PDU size	112
- E-DCH Transmission Time	10 ms
E-DCH MAC-d flow maximum number of retransmissions	15 (max)
E-DCH info	
- Happy bit delay condition	10 ms

ACTIVE SET UPDATE message:

Information Element/Group name	Value/Remark	Version
Message Type (10.2.17)		
UE information elements		
- RRC transaction identifier	0	
- Integrity check info		
-message authentication code	SS calculates the value of MAC-I for this message and writes to this IE. The first/ leftmost bit of the bit string contains the most significant bit of the MAC-I.	
-RRC message sequence number	SS provides the value of this IE, from its internal counter.	
- Activation time	"now".	
- New U-RNTI	Not Present	
- New H-RNTI	Not Present	Rel-6
- New Primary E-RNTI	Not Present	Rel-6
- New Secondary E-RNTI	Not Present	Rel-6
CN information elements		
- CN Information info	Not Present	
Phy CH information elements		
Uplink radio resources		
- Maximum allowed UL TX power	33 dBm	
Downlink radio resources		
- Radio link addition information	1	
- Radio link addition information		
- Primary CPICH info		
- Primary scrambling code	Same as adding cell	
- Downlink DPCH info for each RL		
- CHOICE mode	FDD	
- Primary CPICH usage for channel estimation	Primary CPICH may be used	
- DPCH frame offset	This should be reflected by the IE" Cell synchronisation information" in received MEASUREMENT REPORT message	
- Secondary CPICH info	Not Present	
- DL channelisation code		
- Secondary scrambling code	Not Present	
- Spreading factor	128	
- Code number	96	
- Scrambling code change	No code change	
- TPC combination index	1	
- Closed loop timing adjustment mode	Not Present	
- Downlink F-DPCH info for each RL	Not Present	
E-HICH Information		Rel-6
- Channelisation Code	6	
- Signature Sequence	1	
E-RGCH Information	Not Present	Rel-6
- Radio link removal information	Not Present	
- TX Diversity Mode	Not Present	
Serving HS-DSCH cell information	Not Present	Rel-6
E-DCH reconfiguration information	Not Present	Rel-6

10.2.2.1.1A.5   Test Requirements

For Table 10.2.2.1.1A.5.1, the average downlink E- HICH E_c/I_{or} power ratio shall be below the specified value for missed ACK probability in Table 10.2.2.1.1A.5.2.

Table 10.2.2.1.1A.5.1: Requirement scenario parameters for E-HICH – cell belonging to RLS not containing the Serving E-DCH cell

Parameter Note 1	Unit	Missed ACK
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
E-HICH$_1$ E_c/I_{or}	dB	-22.9
E-HICH$_2$ E_c/I_{or}	dB	-27.7 (test1)
HS-DPSCH$_1$ E_c/I_{or}	dB	-2.9(test 1)
E-HICH signalling pattern for the Serving E-DCH cell	-	100% NACK (-1)'
E-HICH signalling pattern for cell belonging to RLS not containing the Serving E-DCH cell		100% ACK (+1)
NOTE 1: Index 1: cell belonging to RLS containing the Serving E-DCH cell, Index 2: cell belonging to RLS not containing the Serving E-DCH cell.		

Table 10.2.2.1.1A.5.2: Test requirement Type 1 for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – cell belonging to RLS not containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB)	$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-27.7	0.6	0.05

To pass the test,

The ratio (missed (ACK) / all valid ACKs, sent) <= 0.05

> NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.

10.2.2.1.2 RLS not containing the Serving E-DCH cell (2ms TTI)

10.2.2.1.2.1 Definition and applicability

The receive characteristics of the E-DCH HARQ ACK Indicator Channel (E-HICH) is determined during an inter-cell soft handover by the missed ACK and false ACK error probabilities. During the soft handover a UE receives signals from different cells. A UE has to be able to detect E-HICH signalling from different cells belonging to different RLS, not containing the Serving E-DCH cell.

The requirements and this test apply to Release 6 and later releases for all types of UTRA for the FDD UE that support E-DCH with 2ms TTI and HSDPA.

10.2.2.1.2.2 Minimum requirement

For the parameters specified in Table 10.2.2.1.2.2.1 the average downlink E-HICH E_c/I_{or} power ratio of cell belonging to RLS not containing the Serving E-DCH cell shall be below the specified value for the missed ACK probabilities in Table 10.2.2.1.2.2.2. For the parameters specified in Table 10.2.2.1.2.2.1 the false ACK probability shall be below the specified value in Table 10.2.2.1.2.2.3.

Table 10.2.2.1.2.2.1: Requirement scenario parameters for E-HICH – cell belonging to RLS not containing the Serving E-DCH cell

Parameter	Unit	Missed ACK	False ACK
I_{oc}	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
P-CPICH E_c/I_{or} (*)	dB	-10	
E-HICH signalling pattern for the Serving E-DCH cell	-	100% NACK (-1)[1]	100% NACK (-1)[1]
E-HICH signalling pattern for cell belonging to RLS not containing the Serving E-DCH cell		100% ACK (+1)	100% NACK (0)
NOTE 1: The Serving E-DCH cell E-HICH E_c/I_{or} power level is set to -16 dB when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots and to -23 dB when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots.			

Table 10.2.2.1.2.2.2: Minimum requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – cell belonging to RLS not containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB)	$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-16.3	0	0.05

Table 10.2.2.1.2.2.3: Minimum requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – cell belonging to RLS not containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value	
		I_{or1}/I_{oc} and I_{or2}/I_{oc} (dB)	False ACK probability
2	VA30	0	2E-4

The reference for this requirement is TS 25.101 [1] clause 10.2.2.

10.2.2.1.2.3 Test Purpose

NOTE: Through all the text below including clause 10.2.2.1.2.5 the following abbreviation holds: Cell 1: cell belonging to RLS containing the Serving E-DCH cell, Cell 2: cell belonging to RLS not containing the Serving E-DCH cell

To verify that during an inter-cell soft handover for cell 2 the average probability for missed ACK and the average probability for false ACK, when E-HICH is transmitted using 3 consecutive slots, does not exceed specified values.

10.2.2.1.2.4 Method of test

10.2.2.1.2.4.1 Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulators to the UE antenna connector as shown in Figure A.11.

2) The UL Reference Measurement Channel parameters are defined in Annex C.11.

3) Set the test parameters for the missed ACK and false ACK test as specified in table 10.2.2.1.2.5.1 to 10.2.2.1.2.5.3 and table E.5A.3 with the exception of $\hat{I}_{or2}$ that shall be set to -∞. Set the fading conditions to VA30

4) The value of Absolute Grant Scope shall be set to 0 and the Absolute Grant shall be set to 3.

5) The relative grant is not configured. This ensures that the UL datarate remains constant.

6) The UE is switched on.

7) Enter the UE into loopback mode 1, looping back both the 12.2kbps RMC and HSDPA to E-DCH, and start the loopback test. See TS 34.108 [3] clause 7.3.9 and TS 34.109 [4] clauses 5.3.2.3 and 5.3.2.6. To fill the RLC transmit buffer, run the loopback for [3]s before starting the procedure.

8) Set $\hat{I}_{or2}$ according to tables 10.2.2.1.2.5.2 to 10.2.2.1.2.5.3. The downlink DPCH of cell 2 must remain inactivated.

9) UE shall transmit a MEASUREMENT REPORT message triggered by event 1A containing the CFN-SFN time difference between cell 1 and cell 2.

10) The downlink DPCH of cell 2 shall be activated.

11) SS shall send an ACTIVE SET UPDATE message, adding cell 2 to the active set.

12) The fading simulators are switched on.

10.2.2.1.2.4.2 Procedure

NOTE: The measurement principle for the missed ACK test (step 2 to 5) and for the false ACK test (step 6 to 9) is as follows. Upon the UE transmission on E-DPCCH and E-DPDCH, the SS responds with E-HICH = ACK on the cell 2 and with E-HICH = NACK on the cell 1. The UE transmits new data or retransmissions on the corresponding E-DPCCH and E-DPDCH. The SS shall discriminate between:

(1) new data is a sign for ACK, received by the UE from any of the cells

(2) retransmission is a sign for NACK received by the UE on both cells.

1. The Nominal Avg. Information Bit Rate in the DL is set to 534 kbps according to QPSK H-Set 1. The expected thoughput under this level and fading conditions is tested with a single cell in clause 9.2.1, but the DL throughput for this test case will be less than for the single cell case because of interference from Cell 2. The DL throughput for this test case is estimated based on the HSDPA throughput corresponding to the subtests using "HS-PDSCH Ec/Ior = -6dB" condition in 9.2.1A. The worst case for a conformant UE is 22 kbps. The UL data rate was configured by signalling AG value 3 on the E-AGCH. The expected UL datarate is 123.5 kbps corresponding to E-TFC Index 21

2. In the test Missed ACK the SS responds with 100% NACK (-1) on cell 1 and 100% ACK (1) cell 2.

3. If the UE indicates on the the E-DPCCH a retransmission, the ACK from cell 2 was received as NACK by the UE. This is counted as missed (ACK). If the UE indicates on the E-DPCCH new data, the ACK from cell 2 was received as ACK by the UE. This is counted as correct ACK.

4. Continue until statistical significance according to Annex F.6.4 is achieved.

5. If the number of retransmissions reaches the maximum number of retransmissions due to several false or missed ACK detections in series, the first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK. This case is not counted as sample.

6. In the test false ACK the SS responds with 100% NACK (-1) on cell 1 and with 100% NACK (0) on cell 2.

7. If the UE indicates on the the E-DPCCH new data, the NACK (DTX) from the SS on cell 2 was received as ACK by the UE. This is counted as false(ACK). If the UE indicates on the the E-DPCCH retransmission, then NACK (DTX) from cell 2 was received as NACK by the UE. This is counted as correct reception.

8. Continue until statistical significance according to Annex F.6.4 is achieved.

9. The number of retransmissions will reach the maximum number of transmissions due to several retransmissions in series. The first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK received by the UE. This case is not counted as sample.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9.2.1 of 34.108 [3] with the following exceptions:

RADIO BEARER SETUP:

Information Element	Value/remark
-RLC PDU size	112
- E-DCH Transmission Time	2ms
E-DCH MAC-d flow maximum number of retransmissions	15 (max)
E-DCH info	
- Happy bit delay condition	2ms

ACTIVE SET UPDATE message:

Information Element/Group name	Value/Remark	Version
Message Type (10.2.17)		
UE information elements		
- RRC transaction identifier	0	
- Integrity check info		
-message authentication code	SS calculates the value of MAC-I for this message and writes to this IE. The first/ leftmost bit of the bit string contains the most significant bit of the MAC-I.	
-RRC message sequence number	SS provides the value of this IE, from its internal counter.	
- Activation time	"now".	
- New U-RNTI	Not Present	
- New H-RNTI	Not Present	Rel-6
- New Primary E-RNTI	Not Present	Rel-6
- New Secondary E-RNTI	Not Present	Rel-6
CN information elements		
- CN Information info	Not Present	
Phy CH information elements		
Uplink radio resources		
- Maximum allowed UL TX power	33 dBm	
Downlink radio resources		
- Radio link addition information	1	
- Radio link addition information		
- Primary CPICH info		
- Primary scrambling code	Same as adding cell	
- Downlink DPCH info for each RL		
- CHOICE mode	FDD	
- Primary CPICH usage for channel estimation	Primary CPICH may be used	
- DPCH frame offset	This should be reflected by the IE" Cell synchronisation information" in received MEASUREMENT REPORT message	
- Secondary CPICH info	Not Present	
- DL channelisation code		
- Secondary scrambling code	Not Present	
- Spreading factor	128	
- Code number	96	
- Scrambling code change	No code change	
- TPC combination index	1	
- Closed loop timing adjustment mode	Not Present	
- Downlink F-DPCH info for each RL	Not Present	
E-HICH Information		Rel-6
- Channelisation Code	6	
- Signature Sequence	1	
E-RGCH Information	Not Present	Rel-6
- Radio link removal information	Not Present	
- TX Diversity Mode	Not Present	
Serving HS-DSCH cell information	Not Present	Rel-6
E-DCH reconfiguration information	Not Present	Rel-6

10.2.2.1.2.5   Test Requirements

For table 10.2.2.1.2.5.1, the average downlink E- HICH E_c/I_{or} power ratio shall be below the specified value for missed ACK probability in Table 10.2.2.1.2.5.2. For table 10.2.2.1.2.5.1, the false ACK probability shall be below the specified value in Table 10.2.2.1.2.5.3

Table 10.2.2.1.2.5.1: Requirement scenario parameters for E-HICH – cell belonging to RLS not containing the Serving E-DCH cell

Parameter Note 1	Unit	Missed ACK	False ACK
I_{oc}	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
E-HICH$_1$ E_c/I_{or}	dB	-15.9	
E-HICH$_2$ E_c/I_{or}	dB	-16.2 (test 1)	-∞ (test 2)
HS-DPSCH$_1$ E_c/I_{or}	dB	-3.1(test 1)	-3.1(test 2)
E-HICH signalling pattern for the Serving E-DCH cell	-	100% NACK (-1)[1]	100% NACK (-1)[1]
E-HICH signalling pattern for cell belonging to RLS not containing the Serving E-DCH cell		100% ACK (+1)	100% NACK (0)
NOTE 1: Index 1: cell belonging to RLS containing the Serving E-DCH cell, Index 2: cell belonging to RLS not containing the Serving E-DCH cell.			

Table 10.2.2.1.2.5.2 Test requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – cell belonging to RLS not containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB)	$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-16.2	0.6	0.05

Table 10.2.2.1.2.5.3: Test requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – cell belonging to RLS not containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value	
		I_{or1}/I_{oc} and I_{or2}/I_{oc} (dB)	False ACK probability
2	VA30	0.6	2E-4

To pass the test,

The ratio (missed (ACK) / all valid ACKs, sent) <= 0.05 and

The ratio (false (ACK) / all valid samples) <= 0.0002

> NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.

10.2.2.1.2A RLS not containing the Serving E-DCH cell (2ms TTI, Type 1)

10.2.2.1.2A.1 Definition and applicability

The receive characteristics of the E-DCH HARQ ACK Indicator Channel (E-HICH) is determined during an inter-cell soft handover by the missed ACK error probabilities. During the soft handover a UE receives signals from different cells. A UE has to be able to detect E-HICH signalling from different cells belonging to different RLS, not containing the Serving E-DCH cell.

The requirements and this test apply to Release 7 and later releases for all types of UTRA FDD UEs that support E-DCH with 2ms TTI and HSDPA and the optional Type 1 enhanced performance requirements.

10.2.2.1.2A.2 Minimum requirement

For the parameters specified in Table 10.2.2.1.2A.2.1 the average downlink E-HICH E_c/I_{or} power ratio of cell belonging to RLS not containing the Serving E-DCH cell shall be below the specified value for the missed ACK probabilities in Table 10.2.2.1.2A.2.2.

Table 10.2.2.1.2A.2.1: Requirement scenario parameters for E-HICH – cell belonging to RLS not containing the Serving E-DCH cell

Parameter	Unit	Missed ACK
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
P-CPICH E_c/I_{or} (*)	dB	-10
E-HICH signalling pattern for the Serving E-DCH cell	-	100% NACK (-1)[1]
E-HICH signalling pattern for cell belonging to RLS not containing the Serving E-DCH cell		100% ACK (+1)
NOTE 1: The Serving E-DCH cell E-HICH E_c/I_{or} power level is set to -16 dB when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots and to -23 dB when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots.		

Table 10.2.2.1.2A.2.2: Enhanced performance requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – cell belonging to RLS not containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB)	$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-20.6	0	0.05

The reference for this requirement is TS 25.101 [1] clause 10.2.2.

10.2.2.1.2A.3   Test Purpose

NOTE: Through all the text below including clause 10.2.2.1.2.5 the following abbreviation holds: Cell 1: cell belonging to RLS containing the Serving E-DCH cell, Cell 2: cell belonging to RLS not containing the Serving E-DCH cell

To verify that during an inter-cell soft handover for cell 2 the average probability for missed ACK, when E-HICH is transmitted using 3 consecutive slots, does not exceed specified values.

10.2.2.1.2A.4   Method of test

10.2.2.1.2A.4.1   Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulators to the UE antenna connector as shown in Figure A.24 for UEs that support receive diversity or figure A.11 for UEs that do not support receive diversity..

2) The UL Reference Measurement Channel parameters are defined in Annex C.11

3) Set the test parameters for the missed ACK test as specified in table 10.2.2.1.2A.5.1 and 10.2.2.1.2A.5.2 and table E.5A.3 with the exception of $\hat{I}_{or2}$ that shall be set to -∞.. Set the fading conditions to VA 30

4) The value of Absolute Grant Scope shall be set to 0 and the Absolute Grant shall be set to 3.

5) The relative grant is not configured. This ensures that the UL datarate remains constant.

6) The UE is switched on.

7) Enter the UE into loopback mode 1, looping back both the 12.2kbps RMC and HSDPA to E-DCH, and start the loopback test. See TS 34.108 [3] clause 7.3.9 and TS 34.109 [4] clauses 5.3.2.3 and 5.3.2.6. To fill the RLC transmit buffer, run the loopback for [3]s before starting the procedure.

8) Set $\hat{I}_{or2}$ according to tables 10.2.2.1.2A.5.1 to 10.2.2.1.2A.5.2. The downlink DPCH of cell 2 must remain inactivated.

9) UE shall transmit a MEASUREMENT REPORT message triggered by event 1A containing the CFN-SFN time difference between cell 1 and cell 2.

10) The downlink DPCH of cell 2 shall be activated.

11) SS shall send an ACTIVE SET UPDATE message, adding cell 2 to the active set.

12) The fading simulators are switched on.

10.2.2.1.2A.4.2 Procedure

NOTE: The measurement principle for the missed ACK test (step 2 to 5) is as follows. Upon the UE transmission on E-DPCCH and E-DPDCH, the SS responds with E-HICH = ACK on the cell 2 and with E-HICH = NACK on the cell 1. The UE transmits new data or retransmissions on the corresponding E-DPCCH and E-DPDCH. The SS shall discriminate between:

(1) new data is a sign for ACK, received by the UE from any of the cells

(2) retransmission is a sign for NACK received by the UE on both cells.

1. The Nominal Avg. Information Bit Rate in the DL is set to 534 kbps according to QPSK H-Set 1. The expected thoughput under this level and fading conditions is tested with a single cell in clause 9.2.1, but the DL throughput for this test case will be less than for the single cell case because of interference from Cell 2. The DL throughput for this test case is estimated based on the HSDPA throughput corresponding to the subtests using "HS-PDSCH Ec/Ior = -6dB" condition in 9.2.1A. The worst case for a conformant UE is 22 kbps. The UL data rate was configured by signalling AG value 3 on the E-AGCH. The expected UL datarate is 123.5 kbps corresponding to E-TFC Index 21

2. In the test Missed ACK the SS responds with 100% NACK (-1) on cell 1 and 100% ACK (1) cell 2.

3. If the UE indicates on the the E-DPCCH a retransmission, the ACK from cell 2 was received as NACK by the UE. This is counted as missed (ACK). If the UE indicates on the E-DPCCH new data, the ACK from cell 2 was received as ACK by the UE. This is counted as correct ACK.

4. Continue until statistical significance according to Annex F.6.4 is achieved.

5. If the number of retransmissions reaches the maximum number of retransmissions due to several false or missed ACK detections in series, the first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK. This case is not counted as sample.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9.2.1 of 34.108 [3] with the following exceptions:

RADIO BEARER SETUP:

Information Element	Value/remark
-RLC PDU size	112
- E-DCH Transmission Time	2ms
E-DCH MAC-d flow maximum number of retransmissions	15 (max)
E-DCH info	
- Happy bit delay condition	2ms

ACTIVE SET UPDATE message:

Information Element/Group name	Value/Remark	Version
Message Type (10.2.17)		
UE information elements		
- RRC transaction identifier	0	
- Integrity check info		
-message authentication code	SS calculates the value of MAC-I for this message and writes to this IE. The first/ leftmost bit of the bit string contains the most significant bit of the MAC-I.	
-RRC message sequence number	SS provides the value of this IE, from its internal counter.	
- Activation time	"now".	
- New U-RNTI	Not Present	
- New H-RNTI	Not Present	Rel-6
- New Primary E-RNTI	Not Present	Rel-6
- New Secondary E-RNTI	Not Present	Rel-6
CN information elements		
- CN Information info	Not Present	
Phy CH information elements		
Uplink radio resources		
- Maximum allowed UL TX power	33 dBm	
Downlink radio resources		
- Radio link addition information	1	
- Radio link addition information		
- Primary CPICH info		
- Primary scrambling code	Same as adding cell	
- Downlink DPCH info for each RL		
- CHOICE mode	FDD	
- Primary CPICH usage for channel estimation	Primary CPICH may be used	
- DPCH frame offset	This should be reflected by the IE" Cell synchronisation information" in received MEASUREMENT REPORT message	
- Secondary CPICH info	Not Present	
- DL channelisation code		
- Secondary scrambling code	Not Present	
- Spreading factor	128	
- Code number	96	
- Scrambling code change	No code change	
- TPC combination index	1	
- Closed loop timing adjustment mode	Not Present	
- Downlink F-DPCH info for each RL	Not Present	
E-HICH Information		Rel-6
- Channelisation Code	6	
- Signature Sequence	1	
E-RGCH Information	Not Present	Rel-6
- Radio link removal information	Not Present	
- TX Diversity Mode	Not Present	
Serving HS-DSCH cell information	Not Present	Rel-6
E-DCH reconfiguration information	Not Present	Rel-6

10.2.2.1.2A.5 Test Requirements

For table 10.2.2.1.2A.5.1, the average downlink E- HICH E_c/I_{or} power ratio shall be below the specified value for missed ACK probability in Table 10.2.2.1.2A.5.2

Table 10.2.2.1.2A.5.1: Requirement scenario parameters for E-HICH – cell belonging to RLS not containing the Serving E-DCH cell

Parameter Note 1	Unit	Missed ACK
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
E-HICH$_1$ E_c/I_{or}	dB	-15.9
E-HICH$_2$ E_c/I_{or}	dB	-20.5 (test 1)
HS-DPSCH$_1$ E_c/I_{or}	dB	-3.00 (test 1)
E-HICH signalling pattern for the Serving E-DCH cell	-	100% NACK (-1)^1
E-HICH signalling pattern for cell belonging to RLS not containing the Serving E-DCH cell		100% ACK (+1)
NOTE 1: Index 1: cell belonging to RLS containing the Serving E-DCH cell, Index 2: cell belonging to RLS not containing the Serving E-DCH cell.		

Table 10.2.2.1.2A.5.2 Test requirement Type 1 for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – cell belonging to RLS not containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB)	$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-20.5	0.6	0.05

To pass the test,

The ratio (missed (ACK) / all valid ACKs, sent) <= 0.05

> NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.

10.2.2.2 RLS containing the Serving E-DCH cell

10.2.2.2.1 RLS containing the Serving E-DCH cell (10ms TTI)

10.2.2.2.1.1 Definition and applicability

The receive characteristics of the E-DCH HARQ ACK Indicator Channel (E-HICH) is determined during an inter-cell soft handover by the missed ACK and false ACK error probabilities. During the soft handover a UE receives signals from different cells. A UE has to be able to detect E-HICH signalling from different cells belonging to different RLS, containing the Serving E-DCH cell.

The requirements and this test apply to Release 6 and later releases for all types of UTRA for the FDD UE that support E-DCH and HSDPA.

10.2.2.2.1.2 Minimum requirement

For the parameters specified in Table 10.2.2.2.1.2.1 the average downlink E-HICH E$_c$/I$_{or}$ power ratio of cell belonging to RLS containing the Serving E-DCH cell shall be below the specified value for the missed ACK probabilities in Table 10.2.2.2.1.2.2. For the parameters specified in Table 10.2.2.2.1.2.1 the false ACK probability shall be below the specified value in Table 10.2.2.2.1.2.3

Table 10.2.2.2.1.2.1: Requirement scenario parameters for E-HICH – RLS containing the serving cell in SHO

Parameter	Unit	Missed ACK	False ACK
I_{oc}	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
P-CPICH E_c/I_{or} (*)	dB	-10	
E-HICH signalling pattern for Serving E-DCH cell	-	100% ACK (+1)	100% DTX (0)
E-HICH signalling pattern for cell belonging to RLS not containing the Serving E-DCH cell		100% NACK (0)	100% NACK (0)

Table 10.2.2.2.1.2.2: Minimum requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – RLS containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB) for Serving E-DCH cell (ACK)	$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-29.7	0	0.05

Table 10.2.2.2.1.2.3: Minimum requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – RLS containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value	
		$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	False ACK probability
2	PA3	0	0.1
3	VA120	0	0.1

The reference for this requirement is TS 25.101 [1] clause 10.2.2.1

10.2.2.2.1.3 Test purpose

NOTE: Through all the text below including clause 10.2.2.2.5 the following abbreviation holds: Cell 1: cell belonging to RLS containing the Serving E-DCH cell, Cell 2: cell belonging to RLS not containing the Serving E-DCH cell

To verify that during an inter-cell soft handover for cell 1 the average probability for missed ACK and the average probability for false ACK, when E-HICH is transmitted using 12 consecutive slots, does not exceed specified values.

10.2.2.2.1.4 Method of test

10.2.2.2.1.4.1 Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulators to the UE antenna connector as shown in figure Figure A.11.

2) The UL Reference Measurement Channel parameters are defined in Annex C.11.

3) Set the test parameters for the missed ACK and false ACK test as specified in table 10.2.2.2.1.5.1 to 10.2.2.2.1.5.3 and table E.5A.3, with the exception of $\hat{I}_{or2}$ that shall be set to -∞. Set the fading conditions to VA 30, PA 3 or VA 120

4) The value of Absolute Grant Scope shall be set to 0 and the Absolute Grant shall be set to 5.

5) The relative grant is not configured. This ensures that the UL datarate remains constant.

6) The UE is switched on.

7) Enter the UE into loopback mode 1, looping back both the 12.2kbps RMC and HSDPA to E-DCH, and start the loopback test. See TS 34.108 [3] clause 7.3.9 and TS 34.109 [4] clauses 5.3.2.3 and 5.3.2.6. To fill the RLC transmit buffer, run the loopback for [3]s before starting the procedure.

8) Reset $\hat{I}_{or2}$ according to tables 10.2.2.2.1.5.2 to 10.2.2.2.1.5.3. The downlink DPCH of cell 2 must remain inactivated.

9) UE shall transmit a MEASUREMENT REPORT message triggered by event 1A containing the CFN-SFN time difference between cell 1 and cell 2.

10) The downlink DPCH of cell 2 shall be activated.

11) The SS shall send an ACTIVE SET UPDATE message, adding cell 2 to the active set.

12) The fading simulators are switched on.

10.2.2.2.1.4.2 Procedure

NOTE: The measurement principle for the missed ACK test (step 3 to 5) and for the false ACK test (step 6 to 9) is as follows. Upon the UE transmission on E-DPCCH and E-DPDCH, the SS responds with E-HICH = ACK or DTX on cell 1 and with NACK (DTX) on cell 2. The UE transmits new data or retransmissions on the corresponding E-DPCCH and E-DPDCH. The SS shall discriminate between:

(1) new data is a sign for ACK, received by the UE from any of the cells.

(2) retransmission is a sign for NACK received by the UE on both cells. DTX, received by the UE from cell 1, is interpreted as NACK by higher layer and causes retransmission.

1. The Nominal Avg. Information Bit Rate in the DL is set to 534 kbps according to QPSK H-Set 1. The expected thoughput under this level and fading conditions is tested with a single cell in clause 9.2.1, and the DL throughput for this test case will be less than for the single cell case because of interference from Cell 2. The DL throughput for this test case is estimated based on the HSDPA throughput corresponding to the subtests using "HS-PDSCH Ec/Ior = -6dB" condition in 9.2.1A. The UL data rate was configured by by signalling AG value 5 on the E-AGCH. The expected UL datarate is 71.6 kbps corresponding to E-TFC Index 45.

2. In the test Missed ACK the SS responds with 100% ACK(1) on cell 1 and 100% NACK(0) on cell 2.

3. If the UE indicates on the the E-DPCCH a retransmission, the ACK from cell 1 was received as NACK by the UE. This is counted as missed(ACK).

   If the UE indicates on the the E-DPCCH new data, the ACK from cell 1 was received as ACK by the UE. This is counted as correct ACK.

4. Continue until statistical significance according to Annex F.6.4 is achieved.

5. If the number of retransmissions reaches the maximum number of retransmissions due to several false or missed ACK detections in series, the first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK. This case is not counted as sample.

6. In the test false ACK the SS responds with 100% DTX (0) on cell 1 and with 100% NACK(0) on cell 2.

7. If the UE indicates on the E-DPCCH new data, the DTX from cell 1 was received as ACK by the UE. This is counted as false(ACK).

NOTE: An ACK reception from cell 2 also causes new data. However, the probability for this event is < 2E-4 according to Table 10.2.2.1.1.5.3

   If the UE indicates on the E-DPCCH retransmission, then DTX or NACK was received by the UE from cell 1. This is counted as correct reception.

8. Continue until statistical significance according to Annex F.6.4 is achieved.

9. The number of retransmissions will reach the maximum number of retransmissions due to several retransmissions in series. The first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK received by the UE. This case is not counted as sample.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9.2.1 of 34.108 [3] with the following exceptions:

RADIO BEARER SETUP:

Information Element	Value/remark
- RLC PDU size	112
- E-DCH Transmission Time	10 ms
E-DCH MAC-d flow maximum number of retransmissions	15 (max)
E-DCH info	
- Happy bit delay condition	10 ms

ACTIVE SET UPDATE message:

Information Element/Group name	Value/Remark	Version
Message Type (10.2.17)		
UE information elements		
- RRC transaction identifier	0	
- Integrity check info		
-message authentication code	SS calculates the value of MAC-I for this message and writes to this IE. The first/ leftmost bit of the bit string contains the most significant bit of the MAC-I.	
-RRC message sequence number	SS provides the value of this IE, from its internal counter.	
- Activation time	"now".	
- New U-RNTI	Not Present	
- New H-RNTI	Not Present	Rel-6
- New Primary E-RNTI	Not Present	Rel-6
- New Secondary E-RNTI	Not Present	Rel-6
CN information elements		
- CN Information info	Not Present	
Phy CH information elements		
Uplink radio resources		
- Maximum allowed UL TX power	33 dBm	
Downlink radio resources		
- Radio link addition information	1	
- Radio link addition information		
- Primary CPICH info		
- Primary scrambling code	Same as adding cell	
- Downlink DPCH info for each RL		
- CHOICE mode	FDD	
- Primary CPICH usage for channel estimation	Primary CPICH may be used	
- DPCH frame offset	This should be reflected by the IE" Cell synchronisation information" in received MEASUREMENT REPORT message	
- Secondary CPICH info	Not Present	
- DL channelisation code		
- Secondary scrambling code	Not Present	
- Spreading factor	128	
- Code number	96	
- Scrambling code change	No code change	
- TPC combination index	1	
- Closed loop timing adjustment mode	Not Present	
- Downlink F-DPCH info for each RL	Not Present	
E-HICH Information		Rel-6
- Channelisation Code	6	
- Signature Sequence	1	
E-RGCH Information	Not Present	Rel-6
- Radio link removal information	Not Present	
- TX Diversity Mode	Not Present	
Serving HS-DSCH cell information	Not Present	Rel-6
E-DCH reconfiguration information	Not Present	Rel-6

10.2.2.2.1.5   Test requirements

For table 10.2.2.2.1.5.1, the average downlink E- HICH E_c/I_{or} power ratio shall be below the specified value for missed ACK probability in Table 10.2.2.2.1.5.2. For table 10.2.2.2.5.1, the false ACK probability shall be below the specified value in Table 10.2.2.2.1.5.3.

Table 10.2.2.2.1.5.1: Requirement scenario parameters for E-HICH – RLS containing the serving cell in SHO

Parameter	Unit	Missed ACK	False ACK
I_{oc}	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
E-HICH$_1$ E_c/I_{or}	dB	-29.6 (test 1)	-∞ (test2,3)
E-HICH$_2$ E_c/I_{or}	dB	-∞	
HS-DPSCH$_1$ E_c/I_{or}	dB	-2.9(test 1)	-2.9 (test,2.3)
E-HICH signalling pattern for Serving E-DCH cell	-	100% ACK (+1)	100% DTX (0)
E-HICH signalling pattern for cell belonging to RLS not containing the Serving E-DCH cell		100% NACK (0)	100% NACK (0)

Table 10.2.2.2.1.5.2: Test requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – RLS containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB) for Serving E-DCH cell (ACK)	$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-29.6	0.6	0.05

Table 10.2.2.2.1.5.3: Test requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – RLS containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value	
		$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	False ACK probability
2	PA3	0.6	0.1
3	VA120	0.6	0.1

To pass the test,

The ratio (missed (ACK) / all valid ACKs, sent) ≤ 0.05 and

The ratio (false (ACK) /(all valid samples)) ≤ 0.1

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.

10.2.2.2.1A RLS containing the Serving E-DCH cell (10ms TTI, Type 1)

10.2.2.2.1A.1 Definition and applicability

The receive characteristics of the E-DCH HARQ ACK Indicator Channel (E-HICH) is determined during an inter-cell soft handover by the missed ACK probabilities. During the soft handover a UE receives signals from different cells. A UE has to be able to detect E-HICH signalling from different cells belonging to different RLS, containing the Serving E-DCH cell.

The requirements and this test apply to Release 7 and later releases for all types of UTRA for the FDD UE that support E-DCH and HSDPA and the optional Type 1 enhanced performance requirements.

10.2.2.2.1A.2 Minimum requirement

For the parameters specified in Table 10.2.2.2.1A.2.1 the average downlink E-HICH E_c/I_{or} power ratio of cell belonging to RLS containing the Serving E-DCH cell shall be below the specified value for the missed ACK probabilities in Table 10.2.2.2.1A.2.2.

Table 10.2.2.2.1A.2.1: Requirement scenario parameters for E-HICH – RLS containing the serving cell in SHO

Parameter	Unit	Missed ACK
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
P-CPICH E_c/I_{or} (*)	dB	-10
E-HICH signalling pattern for Serving E-DCH cell	-	100% ACK (+1)
E-HICH signalling pattern for cell belonging to RLS not containing the Serving E-DCH cell		100% NACK (0)

Table 10.2.2.2.1A.2.2: Enhanced performance requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – RLS containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB) for Serving E-DCH cell (ACK)	$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-33.4	0	0.05

The reference for this requirement is TS 25.101 [1] clause 10.2.2.1

10.2.2.2.1A.3 Test purpose

NOTE: Through all the text below including clause 10.2.2.2.5 the following abbreviation holds: Cell 1: cell belonging to RLS containing the Serving E-DCH cell, Cell 2: cell belonging to RLS not containing the Serving E-DCH cell

To verify that during an inter-cell soft handover for cell 1 the average probability for missed ACK, when E-HICH is transmitted using 12 consecutive slots, does not exceed specified values.

10.2.2.2.1A.4 Method of test

10.2.2.2.1A.4.1 Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulators to the UE antenna connector as shown in figure Figure A.24 for UEs that support receive diversity or figure A.11 for UEs that do not support receive diversity.

2) The UL Reference Measurement Channel parameters are defined in Annex C.11

3) Set the test parameters for the missed ACK test as specified in table 10.2.2.2.1A.5.1 and 10.2.2.2.1A.5.2 and table E.5A.3 with the exception of $\hat{I}_{or2}$ that shall be set to -∞. Set the fading conditions to VA 30.

4) The value of Absolute Grant Scope shall be set to 0 and the Absolute Grant shall be set to 5.

5) The relative grant is not configured. This ensures that the UL datarate remains constant.

6) The UE is switched on.

7) Enter the UE into loopback mode 1, looping back both the 12.2kbps RMC and HSDPA to E-DCH, and start the loopback test. See TS 34.108 [3] clause 7.3.9 and TS 34.109 [4] clauses 5.3.2.3 and 5.3.2.6. To fill the RLC transmit buffer, run the loopback for [3]s before starting the procedure.

8) Reset $\hat{I}_{or2}$ according to tables 10.2.2.2.1A.5.1 to 10.2.2.2.1A.5.2. The downlink DPCH of cell 2 must remain inactivated.

9) UE shall transmit a MEASUREMENT REPORT message triggered by event 1A containing the CFN-SFN time difference between cell 1 and cell 2.

10) The downlink DPCH of cell 2 shall be activated.

11) The SS shall send an ACTIVE SET UPDATE message, adding cell 2 to the active set.

12) The fading simulators are switched on.

10.2.2.2.1A.4.2 Procedure

NOTE: The measurement principle for the missed ACK test (step 3 to 5) is as follows. Upon the UE transmission on E-DPCCH and E-DPDCH, the SS responds with E-HICH = ACK on cell 1 and with NACK (DTX) on cell 2. The UE transmits new data or retransmissions on the corresponding E-DPCCH and E-DPDCH. The SS shall discriminate between:

(1) new data is a sign for ACK, received by the UE from any of the cells.

(2) retransmission is a sign for NACK received by the UE on both cells. DTX, received by the UE from cell 1, is interpreted as NACK by higher layer and causes retransmission.

1. The Nominal Avg. Information Bit Rate in the DL is set to 534 kbps according to QPSK H-Set 1. The expected thoughput under this level and fading conditions is tested with a single cell in clause 9.2.1 and the DL throughput for this test case will be less than for the single cell case because of interference from Cell 2. The DL throughput for this test case is estimated based on the HSDPA throughput corresponding to the subtests using "HS-PDSCH Ec/Ior = -6dB" condition in 9.2.1A. The UL data rate was configured by by signalling AG value 5 on the E-AGCH. The expected UL datarate is 71.6 kbps corresponding to E-TFC Index 45.

2. In the test Missed ACK the SS responds with 100% ACK(1) on cell 1 and 100% NACK(0) on cell 2.

3. If the UE indicates on the the E-DPCCH a retransmission, the ACK from cell 1 was received as NACK by the UE. This is counted as missed(ACK).

   If the UE indicates on the the E-DPCCH new data, the ACK from cell 1 was received as ACK by the UE. This is counted as correct ACK.

4. Continue until statistical significance according to Annex F.6.4 is achieved.

5. If the number of retransmissions reaches the maximum number of retransmissions due to several false or missed ACK detections in series, the first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK. This case is not counted as sample.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9.2.1 of 34.108 [3] with the following exceptions:

RADIO BEARER SETUP:

Information Element	Value/remark
- RLC PDU size	112
- E-DCH Transmission Time	10 ms
E-DCH MAC-d flow maximum number of retransmissions	15 (max)
E-DCH info	
- Happy bit delay condition	10 ms

ACTIVE SET UPDATE message:

Information Element/Group name	Value/Remark	Version
Message Type (10.2.17)		
UE information elements		
- RRC transaction identifier	0	
- Integrity check info		
-message authentication code	SS calculates the value of MAC-I for this message and writes to this IE. The first/ leftmost bit of the bit string contains the most significant bit of the MAC-I.	
-RRC message sequence number	SS provides the value of this IE, from its internal counter.	
- Activation time	"now".	
- New U-RNTI	Not Present	
- New H-RNTI	Not Present	Rel-6
- New Primary E-RNTI	Not Present	Rel-6
- New Secondary E-RNTI	Not Present	Rel-6
CN information elements		
- CN Information info	Not Present	
Phy CH information elements		
Uplink radio resources		
- Maximum allowed UL TX power	33 dBm	
Downlink radio resources		
- Radio link addition information	1	
- Radio link addition information		
- Primary CPICH info		
- Primary scrambling code	Same as adding cell	
- Downlink DPCH info for each RL		
- CHOICE mode	FDD	
- Primary CPICH usage for channel estimation	Primary CPICH may be used	
- DPCH frame offset	This should be reflected by the IE" Cell synchronisation information" in received MEASUREMENT REPORT message	
- Secondary CPICH info	Not Present	
- DL channelisation code		
- Secondary scrambling code	Not Present	
- Spreading factor	128	
- Code number	96	
- Scrambling code change	No code change	
- TPC combination index	1	
- Closed loop timing adjustment mode	Not Present	
- Downlink F-DPCH info for each RL	Not Present	
E-HICH Information		Rel-6
- Channelisation Code	6	
- Signature Sequence	1	
E-RGCH Information	Not Present	Rel-6
- Radio link removal information	Not Present	
- TX Diversity Mode	Not Present	
Serving HS-DSCH cell information	Not Present	Rel-6
E-DCH reconfiguration information	Not Present	Rel-6

10.2.2.2.1A.5   Test requirements

For table 10.2.2.2.1A.5.1, the average downlink E- HICH E_c/I_{or} power ratio shall be below the specified value for missed ACK probability in Table 10.2.2.2.1A.5.2

Table 10.2.2.2.1A.5.1: Requirement scenario parameters for E-HICH – RLS containing the serving cell in SHO

Parameter	Unit	Missed ACK
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
E-HICH$_1$ E_c/I_{or}	dB	-33.3 (test 1)
E-HICH$_2$ E_c/I_{or}	dB	-∞
HS-DPSCH$_1$ E_c/I_{or}	dB	-2.9(test 1)
E-HICH signalling pattern for Serving E-DCH cell	-	100% ACK (+1)
E-HICH signalling pattern for cell belonging to RLS not containing the Serving E-DCH cell		100% NACK (0)

Table 10.2.2.2.1A.5.2: Test requirement Type 1 for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 12 consecutive slots – RLS containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB) for Serving E-DCH cell (ACK)	$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-33.3	0.6	0.05

To pass the test,

The ratio (missed (ACK) / all valid ACKs, sent) ≤ 0.05

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.

10.2.2.2.2 RLS containing the Serving E-DCH cell (2ms TTI)

10.2.2.2.2.1 Definition and applicability

The receive characteristics of the E-DCH HARQ ACK Indicator Channel (E-HICH) is determined during an inter-cell soft handover by the missed ACK and false ACK error probabilities. During the soft handover a UE receives signals from different cells. A UE has to be able to detect E-HICH signalling from different cells belonging to different RLS, containing the Serving E-DCH cell.

The requirements and this test apply to Release 6 and later releases for all types of UTRA for the FDD UE that support E-DCH with 2ms TTI and HSDPA.

10.2.2.2.2.2 Minimum requirement

For the parameters specified in Table 10.2.2.2.2.2.1 the average downlink E-HICH E_c/I_{or} power ratio of cell belonging to RLS containing the Serving E-DCH cell shall be below the specified value for the missed ACK probabilities in Table 10.2.2.2.22..2. For the parameters specified in Table 10.2.2.2.2.2.1 the false ACK probability shall be below the specified value in Table 10.2.2.2.2.2.3

Table 10.2.2.2.2.2.1: Requirement scenario parameters for E-HICH – RLS containing the serving cell in SHO

Parameter	Unit	Missed ACK	False ACK
I_{oc}	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
P-CPICH E_c/I_{or} (*)	dB	-10	
E-HICH signalling pattern for Serving E-DCH cell	-	100% ACK (+1)	100% DTX (0)
E-HICH signalling pattern for cell belonging to RLS not containing the Serving E-DCH cell		100% NACK (0)	100% NACK (0)

Table 10.2.2.2.2.2.2: Minimum requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – RLS containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB) for Serving E-DCH cell (ACK)	$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-23.2	0	0.05

Table 10.2.2.2.2.2.3: Minimum requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – RLS containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value	
		$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	False ACK probability
2	PA3	0	0.1
3	VA120	0	0.1

The reference for this requirement is TS 25.101 [1] clause 10.2.2.1

10.2.2.2.2.3 Test purpose

NOTE: Through all the text below including clause 10.2.2.2.5 the following abbreviation holds: Cell 1: cell belonging to RLS containing the Serving E-DCH cell, Cell 2: cell belonging to RLS not containing the Serving E-DCH cell

To verify that during an inter-cell soft handover for cell 1 the average probability for missed ACK and the average probability for false ACK, when E-HICH is transmitted using 3 consecutive slots, does not exceed specified values.

10.2.2.2.2.4 Method of test

10.2.2.2.2.4.1 Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulators to the UE antenna connector as shown in figure Figure A.11.

2) The UL Reference Measurement Channel parameters are defined in Annex C.11.

3) Set the test parameters for the missed ACK and false ACK test as specified in table 10.2.2.2.2.5.1 to 10.2.2.2.2.5.3 and table E.5A.3, with the exception of $\hat{I}_{or2}$ that shall be set to -∞. Set the fading conditions to VA 30, PA 3 or VA 120.

4) The value of Absolute Grant Scope shall be set to 0, and the Absolute Grant shall be set to 3.

5) The relative grant is not configured. This ensures that the UL datarate remains constant.

6) The UE is switched on.

7) Enter the UE into loopback mode 1, looping back both the 12.2kbps RMC and HSDPA to E-DCH, and start the loopback test. See TS 34.108 [3] clause 7.3.9 and TS 34.109 [4] clauses 5.3.2.3 and 5.3.2.6. To fill the RLC transmit buffer, run the loopback for [3]s before starting the procedure.

8) Reset $\hat{I}_{or2}$ according to tables 10.2.2.2.2.5.2 to 10.2.2.2.2.5.3. The downlink DPCH of cell 2 must remain inactivated.

9) UE shall transmit a MEASUREMENT REPORT message triggered by event 1A containing the CFN-SFN time difference between cell 1 and cell 2.

10) The downlink DPCH of cell 2 shall be activated.

11) The SS shall send an ACTIVE SET UPDATE message, adding cell 2 to the active set.

12) The fading simulators are switched on.

10.2.2.2.2.4.2 Procedure

NOTE: The measurement principle for the missed ACK test (step 2 to 5) and for the false ACK test (step 6 to 9) is as follows. Upon the UE transmission on E-DPCCH and E-DPDCH, the SS responds with E-HICH = ACK or DTX on cell 1 and with DTX on cell 2. The UE transmits new data or retransmissions on the corresponding E-DPCCH and E-DPDCH. The SS shall discriminate between:

(1) new data is a sign for ACK, received by the UE from any of the cells.

(2) retransmission is a sign for NACK received by the UE on both cells. DTX, received by the UE from cell 1, is interpreted as NACK by higher layer and causes retransmission.

1. The Nominal Avg. Information Bit Rate in the DL is set to 534 kbps according to QPSK H-Set 1. The expected thoughput under this level and fading conditions is tested with a single cell in clause 9.2.1, and the DL throughput for this test case will be less than for the single cell case because of interference from Cell 2. The DL throughput for this test case is estimated based on the HSDPA throughput corresponding to the subtests using "HS-PDSCH Ec/Ior = -6dB" condition in 9.2.1A. The UL data rate was configured by signalling AG value 3 on the E-AGCH. The expected UL datarate is 123.5 kbps corresponding to E-TFC Index 21.

2. In the test Missed ACK the SS responds with 100% ACK(1) on cell 1 and 100% NACK(0) on cell 2.

3. If the UE indicates on the the E-DPCCH a retransmission, the ACK from cell 1 was received as NACK by the UE. This is counted as missed(ACK).

   If the UE indicates on the the E-DPCCH new data, the ACK from cell 1 was received as ACK by the UE. This is counted as correct ACK.

4. Continue until statistical significance according to Annex F.6.4 is achieved.

5. If the number of retransmissions reaches the maximum number of retransmissions due to several false or missed ACK detections in series, the first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK. This case is not counted as sample.

6. In the test false ACK the SS responds with 100% DTX (0) on cell 1 and with 100% NACK(0) on cell 2.

7. If the UE indicates on the E-DPCCH new data, the DTX from cell 1 was received as ACK by the UE. This is counted as false(ACK).

NOTE: An ACK reception from cell 2 also causes new data. However, the probability for this event is < 2E-4 according to Table 10.2.2.1.2.2.3:

   If the UE indicates on the E-DPCCH retransmission, then DTX or NACK was received by the UE from cell 1. This is counted as correct reception.

8. Continue until statistical significance according to Annex F.6.4 is achieved.

9. The number of retransmissions will reach the maximum number of transmissions due to several retransmissions in series. The first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK received by the UE. This case is not counted as sample.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9.2.1 of 34.108 [3] with the following exceptions:

RADIO BEARER SETUP:

Information Element	Value/remark
- RLC PDU size	112
- E-DCH Transmission Time	2ms
E-DCH MAC-d flow maximum number of retransmissions	15 (max)
E-DCH info	
- Happy bit delay condition	2ms

ACTIVE SET UPDATE message:

Information Element/Group name	Value/Remark	Version
Message Type (10.2.17)		
UE information elements		
- RRC transaction identifier	0	
- Integrity check info		
-message authentication code	SS calculates the value of MAC-I for this message and writes to this IE. The first/ leftmost bit of the bit string contains the most significant bit of the MAC-I.	
-RRC message sequence number	SS provides the value of this IE, from its internal counter.	
- Activation time	"now".	
- New U-RNTI	Not Present	
- New H-RNTI	Not Present	Rel-6
- New Primary E-RNTI	Not Present	Rel-6
- New Secondary E-RNTI	Not Present	Rel-6
CN information elements		
- CN Information info	Not Present	
Phy CH information elements		
Uplink radio resources		
- Maximum allowed UL TX power	33 dBm	
Downlink radio resources		
- Radio link addition information	1	
- Radio link addition information		
- Primary CPICH info		
- Primary scrambling code	Same as adding cell	
- Downlink DPCH info for each RL		
- CHOICE mode	FDD	
- Primary CPICH usage for channel estimation	Primary CPICH may be used	
- DPCH frame offset	This should be reflected by the IE" Cell synchronisation information" in received MEASUREMENT REPORT message	
- Secondary CPICH info	Not Present	
- DL channelisation code		
- Secondary scrambling code	Not Present	
- Spreading factor	128	
- Code number	96	
- Scrambling code change	No code change	
- TPC combination index	1	
- Closed loop timing adjustment mode	Not Present	
- Downlink F-DPCH info for each RL	Not Present	
E-HICH Information		Rel-6
- Channelisation Code	6	
- Signature Sequence	1	
E-RGCH Information	Not Present	Rel-6
- Radio link removal information	Not Present	
- TX Diversity Mode	Not Present	
Serving HS-DSCH cell information	Not Present	Rel-6
E-DCH reconfiguration information	Not Present	Rel-6

10.2.2.2.2.5 Test requirements

For table 10.2.2.2.2.5.1, the average downlink E- HICH E_c/I_{or} power ratio shall be below the specified value for missed ACK probability in Table 10.2.2.2.2.5.2. For table 10.2.2.2.2.5.1, the false ACK probability shall be below the specified value in Table 10.2.2.2.2.5.3.

Table 10.2.2.2.2.5.1: Requirement scenario parameters for E-HICH – RLS containing the serving cell in SHO

Parameter	Unit	Missed ACK	False ACK
I_{oc}	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
E-HICH$_1$ E_c/I_{or}	dB	-23.1 (test 1)	-∞ (test 2 ,3)
E-HICH$_2$ E_c/I_{or}	dB	-∞	
HS-DPSCH$_1$ E_c/I_{or}	dB	-2.9(test 1)	-2.9 (test 2,3)
E-HICH signalling pattern for Serving E-DCH cell	-	100% ACK (+1)	100% DTX (0)
E-HICH signalling pattern for cell belonging to RLS not containing the Serving E-DCH cell		100% NACK (0)	100% NACK (0)

Table 10.2.2.2.2.5.2: Test requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – RLS containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB) for Serving E-DCH cell (ACK)	$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-23.1	0.6	0.05

Table 10.2.2.2.2.5.3: Test requirement for False ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – RLS containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value	
		$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	False ACK probability
2	PA3	0.6	0.1
3	VA120	0.6	0.1

To pass the test,

The ratio (missed (ACK) / all valid ACKs, sent) ≤ 0.05 and

The ratio (false (ACK) /(all valid samples)) ≤ 0.1

> NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.

10.2.2.2.2A RLS containing the Serving E-DCH cell (2ms TTI, Type 1)

10.2.2.2.2A.1 Definition and applicability

The receive characteristics of the E-DCH HARQ ACK Indicator Channel (E-HICH) is determined during an inter-cell soft handover by the missed ACK error probabilities. During the soft handover a UE receives signals from different cells. A UE has to be able to detect E-HICH signalling from different cells belonging to different RLS, containing the Serving E-DCH cell.

The requirements and this test apply to Release 7 and later releases for all types of UTRA for the FDD UE that support E-DCH with 2ms TTI and HSDPA and the optional Type 1 enhanced performance requirements.

10.2.2.2.2A.2 Minimum requirement

For the parameters specified in Table 10.2.2.2.2A.2.1 the average downlink E-HICH E_c/I_{or} power ratio of cell belonging to RLS containing the Serving E-DCH cell shall be below the specified value for the missed ACK probabilities in Table 10.2.2.2.2A.2.2.

Table 10.2.2.2.2A.2.1: Requirement scenario parameters for E-HICH – RLS containing the serving cell in SHO

Parameter	Unit	Missed ACK
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
P-CPICH E_c/I_{or} (*)	dB	-10
E-HICH signalling pattern for Serving E-DCH cell	-	100% ACK (+1)
E-HICH signalling pattern for cell belonging to RLS not containing the Serving E-DCH cell		100% NACK (0)

Table 10.2.2.2.2A.2.2: Enhanced performance requirement for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – RLS containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB) for Serving E-DCH cell (ACK)	$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-27.1	0	0.05

The reference for this requirement is TS 25.101 [1] clause 10.2.2.1

10.2.2.2.2A.3   Test purpose

NOTE: Through all the text below including clause 10.2.2.2.5 the following abbreviation holds: Cell 1: cell belonging to RLS containing the Serving E-DCH cell, Cell 2: cell belonging to RLS not containing the Serving E-DCH cell

To verify that during an inter-cell soft handover for cell 1 the average probability for missed ACK, when E-HICH is transmitted using 3 consecutive slots, does not exceed specified values.

10.2.2.2.2A.4   Method of test

10.2.2.2.2A.4.1   Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulators to the UE antenna connector as shown in figure Figure A.24 for UEs that support receive diversity or figure A.10 for UEs that do not support receive diversity.

2) The UL Reference Measurement Channel parameters are defined in Annex C.11

3) Set the test parameters for the missed ACK test as specified in table 10.2.2.2.2A.5.1 and 10.2.2.2.2A.5.2 and table E.5A.3 with the exception of $\hat{I}_{or2}$ that shall be set to -∞. Set the fading conditions to VA 30.

4) The value of Absolute Grant Scope shall be set to 0, and the Absolute Grant shall be set to 3.

5) The relative grant is not configured. This ensures that the UL datarate remains constant.

6) The UE is switched on.

7) Enter the UE into loopback mode 1, looping back both the 12.2kbps RMC and HSDPA to E-DCH, and start the loopback test. See TS 34.108 [3] clause 7.3.9 and TS 34.109 [4] clauses 5.3.2.3 and 5.3.2.6. To fill the RLC transmit buffer, run the loopback for [3]s before starting the procedure.

8) Reset $\hat{I}_{or2}$ according to tables 10.2.2.2.2A.5.1 to 10.2.2.2.2A.5.2. The downlink DPCH of cell 2 must remain inactivated.

9) UE shall transmit a MEASUREMENT REPORT message triggered by event 1A containing the CFN-SFN time difference between cell 1 and cell 2.

10) The downlink DPCH of cell 2 shall be activated.

11) The SS shall send an ACTIVE SET UPDATE message, adding cell 2 to the active set.

12) The fading simulators are switched on.

10.2.2.2.2A.4.2 Procedure

NOTE: The measurement principle for the missed ACK test (step 2 to 5) is as follows. Upon the UE transmission on E-DPCCH and E-DPDCH, the SS responds with E-HICH = ACK on cell 1 and with DTX on cell 2. The UE transmits new data or retransmissions on the corresponding E-DPCCH and E-DPDCH. The SS shall discriminate between:

(1) new data is a sign for ACK, received by the UE from any of the cells.

(2) retransmission is a sign for NACK received by the UE on both cells. DTX, received by the UE from cell 1, is interpreted as NACK by higher layer and causes retransmission.

1. The Nominal Avg. Information Bit Rate in the DL is set to 534 kbps according to QPSK H-Set 1. The expected thoughput under this level and fading conditions is tested with a single cell in clause 9.2.1and the DL throughput for this test case will be less than for the single cell case because of interference from Cell 2. The DL throughput for this test case is estimated based on the HSDPA throughput corresponding to the subtests using "HS-PDSCH Ec/Ior = -6dB" condition in 9.2.1A. The UL data rate was configured by signalling AG value 3 on the E-AGCH. The expected UL datarate is 123.5 kbps corresponding to E-TFC Index 21.

2. In the test Missed ACK the SS responds with 100% ACK(1) on cell 1 and 100% NACK(0) on cell 2.

3. If the UE indicates on the the E-DPCCH a retransmission, the ACK from cell 1 was received as NACK by the UE. This is counted as missed(ACK).

   If the UE indicates on the the E-DPCCH new data, the ACK from cell 1 was received as ACK by the UE. This is counted as correct ACK.

4. Continue until statistical significance according to Annex F.6.4 is achieved.

5. If the number of retransmissions reaches the maximum number of retransmissions due to several false or missed ACK detections in series, the first new data on the E-DPDCH with E-DPCCH are not the consequence of ACK. This case is not counted as sample.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9.2.1 of 34.108 [3] with the following exceptions:

RADIO BEARER SETUP:

Information Element	Value/remark
- RLC PDU size	112
- E-DCH Transmission Time	2ms
E-DCH MAC-d flow maximum number of retransmissions	15 (max)
E-DCH info	
- Happy bit delay condition	2ms

ACTIVE SET UPDATE message:

Information Element/Group name	Value/Remark	Version
Message Type (10.2.17)		
UE information elements		
- RRC transaction identifier	0	
- Integrity check info		
-message authentication code	SS calculates the value of MAC-I for this message and writes to this IE. The first/ leftmost bit of the bit string contains the most significant bit of the MAC-I.	
-RRC message sequence number	SS provides the value of this IE, from its internal counter.	
- Activation time	"now".	
- New U-RNTI	Not Present	
- New H-RNTI	Not Present	Rel-6
- New Primary E-RNTI	Not Present	Rel-6
- New Secondary E-RNTI	Not Present	Rel-6
CN information elements		
- CN Information info	Not Present	
Phy CH information elements		
Uplink radio resources		
- Maximum allowed UL TX power	33 dBm	
Downlink radio resources		
- Radio link addition information	1	
- Radio link addition information		
- Primary CPICH info		
- Primary scrambling code	Same as adding cell	
- Downlink DPCH info for each RL		
- CHOICE mode	FDD	
- Primary CPICH usage for channel estimation	Primary CPICH may be used	
- DPCH frame offset	This should be reflected by the IE" Cell synchronisation information" in received MEASUREMENT REPORT message	
- Secondary CPICH info	Not Present	
- DL channelisation code		
- Secondary scrambling code	Not Present	
- Spreading factor	128	
- Code number	96	
- Scrambling code change	No code change	
- TPC combination index	1	
- Closed loop timing adjustment mode	Not Present	
- Downlink F-DPCH info for each RL	Not Present	
E-HICH Information		Rel-6
- Channelisation Code	6	
- Signature Sequence	1	
E-RGCH Information	Not Present	Rel-6
- Radio link removal information	Not Present	
- TX Diversity Mode	Not Present	
Serving HS-DSCH cell information	Not Present	Rel-6
E-DCH reconfiguration information	Not Present	Rel-6

10.2.2.2.2A.5 Test requirements

For table 10.2.2.2.2A.5.1, the average downlink E- HICH E_c/I_{or} power ratio shall be below the specified value for missed ACK probability in Table 10.2.2.2.2A.5.2.

Table 10.2.2.2.2A.5.1: Requirement scenario parameters for E-HICH – RLS containing the serving cell in SHO

Parameter	Unit	Missed ACK
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
E-HICH$_1$ E_c/I_{or}	dB	-27.0 (test 1)
E-HICH$_2$ E_c/I_{or}	dB	$-\infty$
HS-DPSCH$_1$ E_c/I_{or}	dB	-2.9(test 1)
E-HICH signalling pattern for Serving E-DCH cell	-	100% ACK (+1)
E-HICH signalling pattern for cell belonging to RLS not containing the Serving E-DCH cell		100% NACK (0)

Table 10.2.2.2.2A.5.2: Test requirement Type 1 for Missed ACK when hybrid ARQ acknowledgement indicator is transmitted using 3 consecutive slots – RLS containing the Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-HICH E_c/I_{or} (dB) for Serving E-DCH cell (ACK)	$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed ACK probability
1	VA30	-27.0	0.6	0.05

To pass the test,

The ratio (missed (ACK) / all valid ACKs, sent) ≤ 0.05

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.

10.3 Detection of E-DCH Relative Grant Channel (E-RGCH)

10.3.1 Single link performance

10.3.1.1 Single link performance (10ms TTI)

10.3.1.1.1 Definition and applicability

The receive characteristics of the E-DCH Relative Grant Channel (E-RGCH) in multi-path fading environment is determined by the missed UP/DOWN and missed HOLD. The requirements and this test apply to Release 6 and later releases for all types of UTRA for the FDD UE that support E-DCH and HSDPA.

NOTE: The fail cases for Up are Down (erroneous detection) and Hold (missed detection).

The fail cases for Down are Up and Hold. TS 25.101 designated this test "Missed Up/Down". It is assumed that the minimum requirements apply for both fail cases erroneous and missed detection.

10.3.1.1.2 Minimum requirement

For the parameters specified in Table 10.3.1.1.2.1 the average downlink E-RGCH E_c/I_{or} power ratio shall be below the specified value for the missed UP/DOWN probabilities in Table 10.3.1.1.2.2. For the parameters specified in Table 10.3.1.1.2.1 the missed HOLD probability shall be below the specified value in Table 10.3.1.1.2.

Table 10.3.1.1.2.1: Parameters for E-RGCH – Serving E-DCH cell

Parameter	Unit	Missed UP/DOWN	Missed HOLD
I_{oc}	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
P-CPICH E_c/I_{or}	dB	-10	
E-RGCH signalling pattern	-	50% UP 50% DOWN	100% HOLD

Table 10.3.1.1.2.2: Minimum requirement for Missed UP/DOWN when relative scheduling grant is transmitted using 12 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-RGCH E_c/I_{or} (dB)	$\hat{I}_{or}/I_{oc}$ (dB)	Missed UP/DOWN probability
1	VA30	-31	0	0.05/0.05

Table 10.3.1.1.2.3: Minimum requirement for Missed HOLD when relative scheduling grant is transmitted using 12 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value	
		$\hat{I}_{or}/I_{oc}$ (dB)	Missed HOLD probability
2	VA30	0	0.1

The reference for this requirement is TS 25.101 [1] clause 10.3.1

10.3.1.1.3   Test purpose

To verify that average probability for missed up down and average probability for missed hold, when E-RGCH is transmitted using 12 consecutive slots, do not exceed specified values.

10.3.1.1.4   Method of test

10.3.1.1.4.1   Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulator to the UE antenna connector as shown in figure Figure A.10.

2) The UL Reference Measurement Channel parameters are defined in Annex C.11

3) Set the test parameters for the missed up down test and the missed hold test as specified in table 10.3.1.1.5.1. to 10.3.1.1.5.3 and table E.5A.2. Set the fading conditions to VA 30

4) The value of Absolute Grant Scope shall be set to the 0. and the Absolute Grant shall be set to 5

5) The UE is switched on.

6) Enter the UE into loopback mode 1, looping back both the 12.2kbps RMC and HSDPA to E-DCH, and start the loopback test. See TS 34.108 [3] clause 7.3.9 and TS 34.109 [4] clauses 5.3.2.3 and 5.3.2.6. To fill the RLC transmit buffer, run the loopback for [3]s before starting the procedure.

7) The fading simulator is switched on.

10.3.1.1.4.2 Procedure

NOTE: The measurement principle for the missed up down test (step 3 to 10) and for the missed hold test (step 11 to 15) is as follows. The UE transmits E-DPCCH and E-DPDCH. The SS transmits E-RGCH up or down or hold (DTX). The UE changes or holds the transport format of the corresponding E-DPCCH and E-DPDCH accordingly. This is visible for the SS by reading the E-TFCI, signalled on the corresponding E-DPCCH.

1) The Nominal Avg. Information Bit Rate in the DL is set to 534 kbps according to QPSK H-Set 1. The expected throughput under this level and fading conditions is 142 kbps. The expected UL datarate is 71.6 kbps corresponding to E-TFC Index 45.

2) Upon reception of every E-DPCCH and E-DPDCH, the SS signals always "DTX" on the E-HICH during the entire test. This way there is no E_HICH power. Nevertheless the UE will transmit new data, since "E-DCH MAC-d flow maximum number of retransmissions" is set to 0.

3) The SS signals 4 consecutive "down" on the E-RGCH

4) The SS reads the E-TFCI for 4 consecutive HARQ processes, signalled on the E-DPCCH, corresponding to these "down"

5) If the UE increases or holds the transport format at each HARQ process upon a "down" command, count a missed(down).

   If the UE signals Happy Bit = 1, the UE may transmit less data than granted. (TS25.321 [13] section 11.8.1.5. bullet point 1) The corresponding E-DPCCH and E-DPDCH TTI is not counted as sample.

6) The SS signals 4 consecutive "up" on the E-RGCH

7) The SS reads the E-TFCI for 4 consecutive HARQ processes, signalled on the E-DPCCH corresponding to these "up".

8) If the UE decreases or holds the transport format at each HARQ process upon an "up" command, count a missed(up).

   If the UE signals Happy Bit = 1, the UE may transmit less data than granted. (TS25.321 [13] section 11.8.1.5. bullet point 1) The corresponding E-DPCCH and E-DPDCH TTI is not counted as sample.

9) Repeat the "down-up" cycle in step 3 to 8, such that statistical significance according to Annex F.6.4 is achieved for up and down separately.

   Due to missed up or missed down the operating range will shift down or up. If the operating range shifts outside the range shown in Table 10.3.1.1.4.2.1 the operating range must be re-adjusted.

Table 10.3.1.1.4.2.1 E-TFCI operating point/range(10 ms)

missed up down	missed hold	AG Value	β_{ed}/β_c	E-TFCI	TB Size=N*112 + Header + Padding	UL rate kbps
		6	24/15	59	1264 = 11*112 + 18 + 14	126.4
			21/15	52	951 = 8* 112 + 18 + 37	95.1
Initial operating range	**Initial operating point**	**5**	**19/15**	**45**	**716 = 6*112 + 18 + 26**	**71.6**
			17/15	**40**	**584 = 5*112 + 18 + 6**	**58.4**
		4	15/15	35	477 = 4*112 + 18 + 11	47.7
			13/15	28	359 = 3*112 + 18 + 4	35.9
			12/15	19	249 = 2*112 + 18 + 7	24.9

10) If one counter reaches the pass criterion, this counter is stopped and the remaining counter is continued. The missed up down test is decided pass, if the last counter reaches pass. The missed up down test is decided fail, if the first counter reaches fail.

11) Hold on E-RGCH is indicated by DTX from the SS.

12) The SS signals "DTX" on the E-RGCH

13) The SS reads the E-TFCI, signalled on the E-DPCCH corresponding to that "DTX".

14) If the UE increases or decreases the transport format upon a "DTX" command, record a missed(hold).

If the UE signals Happy Bit = 1, the UE may transmit less data than granted. (TS25.321 [13] section 11.8.1.5. bullet point 1) The corresponding E-DPCCH and E-DPDCH TTI is not counted as sample.

15) Repeat step 11 to 14, such that statistical significance according to Annex F.6.4 is achieved.

Due to missed hold the operating range will shift down or up. If the operating range shifts outside the range shown in Table 10.3.1.1.4.2.1 the operating range must be re-adjusted.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9.2.1 of 34.108 [3] with the following exceptions:

RADIO BEARER SETUP:

Information Element	Value/remark	Version
RLC PDU size	112	Rel-6
- E-DCH Transmission Time	10 ms	
E-DCH MAC-d flow maximum number of retransmissions	0	
E-DCH info		Rel-6
- Happy bit delay condition	10 ms (indication of exhausted resources on frame basis)	
- E-DCH minimum set E-TFCI	Not Present in RGCH performance tests, all E-TFCs should be in the selection process)	
Downlink information for each radio link list		
- Downlink information for each radio link		
- CHOICE E-RGCH Information		Rel-6
- E-RGCH Information		
- Signature Sequence	0	
- RG combination index	0	

10.3.1.1.5 Test requirements

Table 10.3.1.1.5.1: Test Parameters for E-RGCH – Serving E-DCH cell

Parameter	Unit	Missed UP/DOWN	Missed HOLD
I_{oc}	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
E-RGCH E_c/I_{or}	dB	-30.9 (test 1)	$-\infty$ (test 2)
E-RGCH signalling pattern	-	50% UP 50% DOWN	100% HOLD

Table 10.3.1.1.5.2: Test requirement for Missed UP/DOWN when relative scheduling grant is transmitted using 12 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-RGCH E_c/I_{or} (dB)	$\hat{I}_{or}/I_{oc}$ (dB)	Missed UP/DOWN probability
1	VA30	-30.9	0.6	0.05/0.05

Table 10.3.1.1.5.3: Test requirement for Missed HOLD when relative scheduling grant is transmitted using 12 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value	
		$\hat{I}_{or}/I_{oc}$ **(dB)**	**Missed HOLD probability**
2	VA30	0.6	0.1

To pass the test,

the ratio (missed(down) / all valid down commands, sent) <= 0.05   and

the ratio (missed(up) / all valid up commands, sent) <= 0.05   and

the ratio (missed(hold) / all DTX from the SS) <= 0.1

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.

10.3.1.1A   Single link performance (10ms TTI, Type 1)

10.3.1.1A.1   Definition and applicability

The receive characteristics of the E-DCH Relative Grant Channel (E-RGCH) in multi-path fading environment is determined by the missed UP/DOWN. The requirements and this test apply to Release 7 and later releases for all types of UTRA for the FDD UE that support E-DCH and HSDPA and the optional Type 1 enhanced performance requirements.

NOTE: The fail cases for Up are Down (erroneous detection) and Hold (missed detection).

The fail cases for Down are Up and Hold. TS 25.101 designated this test "Missed Up/Down". It is assumed that the minimum requirements apply for both fail cases erroneous and missed detection.

10.3.1.1A.2   Minimum requirement

For the parameters specified in Table 10.3.1.1A.2.1 the average downlink E-RGCH E_c/I_{or} power ratio shall be below the specified value for the missed UP/DOWN probabilities in Table 10.3.1.1A.2.2.

Table 10.3.1.1A.2.1: Parameters for E-RGCH – Serving E-DCH cell

Parameter	Unit	Missed UP/DOWN
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
P-CPICH E_c/I_{or}	dB	-10
E-RGCH signalling pattern	-	50% UP 50% DOWN

Table 10.3.1.1A.2.2: Enhanced performance requirement for Missed UP/DOWN when relative scheduling grant is transmitted using 12 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-RGCH E_c/I_{or} **(dB)**	$\hat{I}_{or}/I_{oc}$ **(dB)**	**Missed UP/DOWN probability**
1	VA30	-35	0	0.05/0.05

The reference for this requirement is TS 25.101 [1] clause 10.3.1

10.3.1.1A.3   Test purpose

To verify that average probability for missed up down, when E-RGCH is transmitted using 12 consecutive slots, do not exceed specified values.

10.3.1.1A.4   Method of test

10.3.1.1A.4.1   Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulator to the UE antenna connector as shown in figure Figure A.21 for UEs that support receive diversity or figure A.10 for UEs that do not support receive diversity.

2) The UL Reference Measurement Channel parameters are defined in Annex C.11

3) Set the test parameters for the missed up down test as specified in table 10.3.1.1A.5.1. and 10.3.1.1A.5.2 and table E.5A.2. Set the fading conditions to VA 30

4) The value of Absolute Grant Scope shall be set to the 0. and the Absolute Grant shall be set to 5

5) The UE is switched on.

6) Enter the UE into loopback mode 1, looping back both the 12.2kbps RMC and HSDPA to E-DCH, and start the loopback test. See TS 34.108 [3] clause 7.3.9 and TS 34.109 [4] clauses 5.3.2.3 and 5.3.2.6. To fill the RLC transmit buffer, run the loopback for [3]s before starting the procedure.

7) The fading simulators are switched on.

10.3.1.1A.4.2   Procedure

NOTE: The measurement principle for the missed up down test (step 3 to 10) is as follows. The UE transmits E-DPCCH and E-DPDCH. The SS transmits E-RGCH up or down. The UE changes or holds the transport format of the corresponding E-DPCCH and E-DPDCH accordingly. This is visible for the SS by reading the E-TFCI, signalled on the corresponding E-DPCCH.

1) The Nominal Avg. Information Bit Rate in the DL is set to 534 kbps according to QPSK H-Set 1. The expected througput under this level and fading conditions is 142 kbps. The expected UL datarate is 71.6 kbps corresponding to E-TFC Index 45.

2) Upon reception of every E-DPCCH and E-DPDCH, the SS signals always "DTX" on the E-HICH during the entire test. This way there is no E_HICH power. Nevertheless the UE will transmit new data, since "E-DCH MAC-d flow maximum number of retransmissions" is set to 0.

3) The SS signals 4 consecutive "down" on the E-RGCH

4) The SS reads the E-TFCI for 4 consecutive HARQ processes, signalled on the E-DPCCH, corresponding to these "down"

5) If the UE increases or holds the transport format at each HARQ process upon a "down" command, count a missed(down).

   If the UE signals Happy Bit = 1, the UE may transmit less data than granted. (TS25.321 [13] section 11.8.1.5. bullet point 1) The corresponding E-DPCCH and E-DPDCH TTI is not counted as sample.

6) The SS signals 4 consecutive "up" on the E-RGCH

7) The SS reads the E-TFCI for 4 consecutive HARQ processes, signalled on the E-DPCCH corresponding to these "up".

8) If the UE decreases or holds the transport format at each HARQ process upon an "up" command, count a missed(up).

   If the UE signals Happy Bit = 1, the UE may transmit less data than granted. (TS25.321 [13] section 11.8.1.5. bullet point 1) The corresponding E-DPCCH and E-DPDCH TTI is not counted as sample.

9) Repeat the "down-up" cycle in step 3 to 8, such that statistical significance according to Annex F.6.4 is achieved for up and down separately.

Due to missed up or missed down the operating range will shift down or up. If the operating range shifts outside the range shown in Table 10.3.1.1A.4.2.1 the operating range must be re-adjusted.

Table 10.3.1.1A.4.2.1 E-TFCI operating point/range(10 ms)

missed up down	AG Value	ß$_{ed}$/ß$_c$	E-TFCI	TB Size=N*112 + Header + Padding	UL rate kbps
	6	24/15	59	1264 = 11*112 + 18 + 14	126.4
		21/15	52	951 = 8* 112 + 18 + 37	95.1
Initial operating range	**5**	**19/15**	**45**	**716 = 6*112 + 18 + 26**	**71.6**
		17/15	**40**	**584 = 5*112 + 18 + 6**	**58.4**
	4	15/15	35	477 = 4*112 + 18 + 11	47.7
		13/15	28	359 = 3*112 + 18 + 4	35.9
		12/15	19	249 = 2*112 + 18 + 7	24.9

10) If one counter reaches the pass criterion, this counter is stopped and the remaining counter is continued. The missed up down test is decided pass, if the last counter reaches pass. The missed up down test is decided fail, if the first counter reaches fail.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9.2.1 of 34.108 [3] with the following exceptions:

RADIO BEARER SETUP:

Information Element	Value/remark	Version
RLC PDU size	112	Rel-6
- E-DCH Transmission Time	10 ms	
E-DCH MAC-d flow maximum number of retransmissions	0	
E-DCH info		Rel-6
- Happy bit delay condition	10 ms (indication of exhausted resources on frame basis)	
- E-DCH minimum set E-TFCI	Not Present in RGCH performance tests, all E-TFCs should be in the selection process)	
Downlink information for each radio link list		
- Downlink information for each radio link		
- CHOICE E-RGCH Information		Rel-6
- E-RGCH Information		
- Signature Sequence	0	
- RG combination index	0	

10.3.1.1A.5 Test requirements

Table 10.3.1.1A.5.1: Test Parameters for E-RGCH – Serving E-DCH cell

Parameter	Unit	Missed UP/DOWN
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
E-RGCH E_c/I_{or}	dB	-34.9 (test 1)
E-RGCH signalling pattern	-	50% UP 50% DOWN

Table 10.3.1.1A.5.2: Test requirement Type 1 for Missed UP/DOWN when relative scheduling grant is transmitted using 12 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-RGCH E_c/I_{or} **(dB)**	$\hat{I}_{or}/I_{oc}$ **(dB)**	**Missed UP/DOWN probability**
1	VA30	-34.9	0.6	0.05/0.05

To pass the test,

the ratio (missed(down) / all valid down commands, sent) <= 0.05   and

the ratio (missed(up) / all valid up commands, sent) <= 0.05

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.

10.3.1.2 Single link performance (2ms TTI)

10.3.1.2.1 Definition and applicability

The receive characteristics of the E-DCH Relative Grant Channel (E-RGCH) in multi-path fading environment is determined by the missed UP/DOWN and missed HOLD. The requirements and this test apply to Release 6 and later releases for all types of UTRA for the FDD UE that support E-DCH with 2ms TTI and HSDPA.

NOTE: The fail cases for Up are Down (erroneous detection) and Hold (missed detection).

The fail cases for Down are Up and Hold. TS 25.101 designated this test "Missed Up/Down". It is assumed that the minimum requirements apply for both fail cases erroneous and missed detection.

10.3.1.2.2 Minimum requirement

For the parameters specified in Table 10.3.1.2.2.1 the average downlink E-RGCH E_c/I_{or} power ratio shall be below the specified value for the missed UP/DOWN probabilities in Table 10.3.1.2.2.2 and

For the parameters specified in Table 10.3.1.2.2.1 the missed HOLD probability shall be below the specified value in Table 10.3.1.2.2.3

Table 10.3.1.2.2.1: Parameters for E-RGCH – Serving E-DCH cell

Parameter	Unit	Missed UP/DOWN	Missed HOLD
I_{oc}	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
P-CPICH E_c/I_{or}	dB	-10	
E-RGCH signalling pattern	-	50% UP 50% DOWN	100% HOLD

Table 10.3.1.2.2.2: Minimum requirement for Missed UP/DOWN when relative scheduling grant is transmitted using 3 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-RGCH E_c/I_{or} **(dB)**	$\hat{I}_{or}/I_{oc}$ **(dB)**	**Missed UP/DOWN probability**
1	VA30	-24.4	0	0.05/0.05

Table 10.3.1.2.2.3: Minimum requirement for Missed HOLD when relative scheduling grant is transmitted using 3 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value	
		$\hat{I}_{or}/I_{oc}$ **(dB)**	**Missed HOLD probability**
2	VA30	0	0.1

The reference for this requirement is TS 25.101 [1] clause 10.3.1

10.3.1.2.3 Test purpose

To verify that average probability for missed up down and average probability for missed hold when E-RGCH is transmitted using 12 consecutive slots do not exceed specified values.

10.3.1.2.4 Method of test

10.3.1.2.4.1 Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulator to the UE antenna connector as shown in figure Figure A.10.

2) The UL Reference Measurement Channel parameters are defined in Annex C.11

3) Set the test parameters for the missed up down test and the missed hold test as specified in table 10.3.1.2.5.1 to 10.3.1.2.5.3 and table E.5A.2. Set the fading conditions to VA 30

4) The value of Absolute Grant Scope shall be set to the 0, and the Absolute Grant shall be set to 4

5) The UE is switched on.

6) Enter the UE into loopback mode 1, looping back both the 12.2kbps RMC and HSDPA to E-DCH, and start the loopback test. See TS 34.108 [3] clause 7.3.9 and TS 34.109 [4] clauses 5.3.2.3 and 5.3.2.6To fill the RLC transmit buffer, run the loopback for [3]s before starting the procedure.

7) The fading simulator is switched on.

10.3.1.2.4.2 Procedure

NOTE: The measurement principle for the missed up down test (step 3 to 10) and for the missed hold test (step 11 to 15) is as follows. The UE transmits E-DPCCH and E-DPDCH. The SS transmits E-RGCH up or down or hold (DTX). The UE changes or holds the transport format of the corresponding E-DPCCH and E-DPDCH accordingly. This is visible for the SS by reading the E-TFCI, signalled on the corresponding E-DPCCH.

1) The Nominal Avg. Information Bit Rate in the DL is set to 534 kbps according to QPSK H-Set 1. The expected througput under this level and fading conditions is 142 kbps. The UL data rate was configured by by signalling AG value 4 on the E-AGCH. The expected UL datarate is 273 kbps corresponding to E-TFC Index 39.

2) Upon reception of every E-DPCCH and E-DPDCH, the SS signals always "DTX" on the E-HICH during the entire test. This way there is no E_HICH power. Nevertheless the UE will transmit new data, since "E-DCH MAC-d flow maximum number of retransmissions" is set to 0.

3) The SS signals 8 consecutive "up" on the E-RGCH

4) The SS reads the E-TFCI for 8 consecutive HARQ processes, signalled on the E-DPCCH, corresponding to these "up"

5) If the UE decreases or holds the transport format at each HARQ process upon an "up" command, count a missed(up).

   If the UE signals Happy Bit = 1, the UE may transmit less data than granted. (TS25.321 [13] section 11.8.1.5. bullet point 1) The corresponding E-DPCCH and E-DPDCH TTI is not counted as sample.

6) The SS signals 8 consecutive "down" on the E-RGCH

7) The SS reads the E-TFCI for 8 consecutive HARQ processes, signalled on the E-DPCCH corresponding to these "down".

8) If the UE increases or holds the transport format at each HARQ process upon a "down" command, count a missed(down).

   If the UE signals Happy Bit = 1, the UE may transmit less data than granted. (TS25.321 [13] section 11.8.1.5. bullet point 1) The corresponding E-DPCCH and E-DPDCH TTI is not counted as sample.

9) Repeat the "up-down" cycle in step 3 to 8, such that statistical significance according to Annex F.6.4 is achieved for up and down separately.

10) If one counter reaches the pass criterion, this counter is stopped and the remaining counter is continued. The missed up down test is decided pass, if the last counter reaches pass. The missed up down test is decided fail, if the first counter reaches fail.

   Due to missed up or missed down the operating range will shift down or up. If the operating point shifts into the range "risk of buffer underflow" or "ambiguous E-TFCI" (see Table 10.3.1.2.4.2.1) the operating point must be re-adjusted.

Table 10.3.1.2.4.2.1 E-TFCI operating point/range(2 ms)

missed up down	missed hold	AG Value	β_{ed}/β_c	E-TFCI	TB Size=N*112+Header+min Padding	UL rate kbps
			Risk of buffer underflow			
			21/15	54	817 = 7*112 + 18 + 15	408
		5	19/15	50	707 = 6*112 + 18 + 17	353.5
Initial operating range			17/15	45	590 = 5*112 + 18 + 12	295.5
	Initial operating point	4	15/15	39	474 = 4*112 + 18 + 8	273
			13/15	31	355 = 3*112 + 18 + 1	177.5
Ambiguous E-TFCI			12/15	21	247 = 2*112 + 18 + 5	123.5
		3	11/15	21	247 = 2*112 + 18 + 5	123.5

11) Hold on E-RGCH is indicated by DTX from the SS.

12) The SS signals "DTX" on the E-RGCH

13) The SS reads the E-TFCI, signalled on the E-DPCCH corresponding to that "DTX".

14) If the UE increases or decreases the transport format upon a "DTX" command, record a missed(hold).

   If the UE signals Happy Bit = 1, the UE may transmit less data than granted. (TS25.321 [13] section 11.8.1.5. bullet point 1) The corresponding E-DPCCH and E-DPDCH TTI is not counted as sample.

15) Repeat step 12 to 14, such that statistical significance according to Annex F.6.4 is achieved.

   Due to missed hold the operating point will shift down or up. If the operating point shifts into the range "risk of buffer underflow" or "ambiguous E-TFCI" (see Table 10.3.1.2.4.2) the operating point must be re-adjusted.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9.2.1 of 34.108 [3] with the following exceptions:

RADIO BEARER SETUP:

Information Element	Value/remark	Version
- RLC PDU size	112	Rel-6
- E-DCH Transmission Time	10 ms (Test 2 and 4), 2ms (Test 1 and 3)	
E-DCH MAC-d flow maximum number of retransmissions	0	
E-DCH info		Rel-6
- Happy bit delay condition	10 ms (Test 2 and 4), 2ms (Test 1 and 3) (indication of exhausted resources on frame basis)	
- E-DCH minimum set E-TFCI	Not Present in RGCH performance tests, all E-TFCs should be in the selection process)	
Downlink information for each radio link list		
- Downlink information for each radio link		
- CHOICE E-RGCH Information		Rel-6
- E-RGCH Information		
- Signature Sequence	0	
- RG combination index	0	

10.3.1.2.5 Test requirements

Table 10.3.1.2.5.1: Test Parameters for E-RGCH – Serving E-DCH cell

Parameter	Unit	Missed UP/DOWN	Missed HOLD
I_{oc}	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
E-RGCH E_c / I_{or}	dB	-24.3 (test 1)	-∞ (test 2)
E-RGCH signalling pattern	-	50% UP 50% DOWN	100% HOLD

Table 10.3.1.2.5.2: Test requirement for Missed UP/DOWN when relative scheduling grant is transmitted using 3 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-RGCH E_c / I_{or} **(dB)**	$\hat{I}_{or} / I_{oc}$ **(dB)**	Missed UP/DOWN probability
1	VA30	-24.3	0.6	0.05/0.05

Table 10.3.1.2.5.3: Test requirement for Missed HOLD when relative scheduling grant is transmitted using 3 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value	
		$\hat{I}_{or} / I_{oc}$ **(dB)**	Missed HOLD probability
2	VA30	0.6	0.1

To pass the test,

the ratio (missed(down) / all valid down commands, sent) <= 0.05 and

the ratio (missed(up) / all valid up commands, sent) <= 0.05 and

the ratio (missed(hold) / all DTX from the SS) <= 0.1

NOTE : If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.

10.3.1.2A Single link performance (2ms TTI, Type 1)

10.3.1.2A.1 Definition and applicability

The receive characteristics of the E-DCH Relative Grant Channel (E-RGCH) in multi-path fading environment is determined by the missed UP/DOWN. The requirements and this test apply to Release 7 and later releases for all types of UTRA for the FDD UE that support E-DCH with 2ms TTI and HSDPA and the optional Type 1 enhanced performance requirements.

NOTE: The fail cases for Up are Down (erroneous detection) and Hold (missed detection).

The fail cases for Down are Up and Hold. TS 25.101 designated this test "Missed Up/Down". It is assumed that the minimum requirements apply for both fail cases erroneous and missed detection.

10.3.1.2A.2 Minimum requirement

For the parameters specified in Table 10.3.1.2A.2.1 the average downlink E-RGCH E_c/I_{or} power ratio shall be below the specified value for the missed UP/DOWN probabilities in Table 10.3.1.2A.2.2.

Table 10.3.1.2A.2.1: Parameters for E-RGCH – Serving E-DCH cell

Parameter	Unit	Missed UP/DOWN
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
P-CPICH E_c/I_{or}	dB	-10
E-RGCH signalling pattern	-	50% UP 50% DOWN

Table 10.3.1.2A.2.2: Enhanced performance requirement for Missed UP/DOWN when relative scheduling grant is transmitted using 3 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-RGCH E_c/I_{or} (dB)	$\hat{I}_{or}/I_{oc}$ (dB)	Missed UP/DOWN probability
1	VA30	-28.6	0	0.05/0.05

The reference for this requirement is TS 25.101 [1] clause 10.3.1

10.3.1.2A.3 Test purpose

To verify that average probability for missed up down, when E-RGCH is transmitted using 12 consecutive slots, do not exceed specified values.

10.3.1.2A.4 Method of test

10.3.1.2A.4.1 Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulator to the UE antenna connector as shown in figure Figure A.21 for UEs that support receive diversity or figure A.10 for UEs that do not support receive diversity.

2) The UL Reference Measurement Channel parameters are defined in Annex C.11

3) Set the test parameters for the missed up down test as specified in table 10.3.1.2A.5.1 and 10.3.1.2A.5.2 and table E.5A.2. Set the fading conditions to VA 30

4) The value of Absolute Grant Scope shall be set to the 0, and the Absolute Grant shall be set to 4

5) The UE is switched on.

6) Enter the UE into loopback mode 1, looping back both the 12.2kbps RMC and HSDPA to E-DCH, and start the loopback test. See TS 34.108 [3] clause 7.3.9 and TS 34.109 [4] clauses 5.3.2.3 and 5.3.2.6To fill the RLC transmit buffer, run the loopback for [3]s before starting the procedure.

7) The fading simulators are switched on.

10.3.1.2A.4.2 Procedure

NOTE: The measurement principle for the missed up down test (step 3 to 10) is as follows. The UE transmits E-DPCCH and E-DPDCH. The SS transmits E-RGCH up or down. The UE changes or holds the transport format of the corresponding E-DPCCH and E-DPDCH accordingly. This is visible for the SS by reading the E-TFCI, signalled on the corresponding E-DPCCH.

1) The Nominal Avg. Information Bit Rate in the DL is set to 534 kbps according to QPSK H-Set 1. The expected througput under this level and fading conditions is 142 kbps. The UL data rate was configured by by signalling AG value 4 on the E-AGCH. The expected UL datarate is 273 kbps corresponding to E-TFC Index 39.

2) Upon reception of every E-DPCCH and E-DPDCH, the SS signals always "DTX" on the E-HICH during the entire test. This way there is no E_HICH power. Nevertheless the UE will transmit new data, since "E-DCH MAC-d flow maximum number of retransmissions" is set to 0.

3) The SS signals 8 consecutive "up" on the E-RGCH

4) The SS reads the E-TFCI for 8 consecutive HARQ processes, signalled on the E-DPCCH, corresponding to that "up"

5) If the UE decreases or holds the transport format at each HARQ process upon an "up" command, count a missed(up).

   If the UE signals Happy Bit = 1, the UE may transmit less data than granted. (TS25.321 [13] section 11.8.1.5. bullet point 1) The corresponding E-DPCCH and E-DPDCH TTI is not counted as sample.

6) The SS signals 8 consecutive "down" on the E-RGCH

7) The SS reads the E-TFCI for 8 consecutive HARQ processes, signalled on the E-DPCCH corresponding to these "down".

8) If the UE increases or holds the transport format upon a "down" command, count a missed(down).

   If the UE signals Happy Bit = 1, the UE may transmit less data than granted. (TS25.321 [13] section 11.8.1.5. bullet point 1) The corresponding E-DPCCH and E-DPDCH TTI is not counted as sample.

9) Repeat the "up-down" cycle in step 3 to 8, such that statistical significance according to Annex F.6.4 is achieved for up and down separately.

10) If one counter reaches the pass criterion, this counter is stopped and the remaining counter is continued. The missed up down test is decided pass, if the last counter reaches pass. The missed up down test is decided fail, if the first counter reaches fail.

   Due to missed up or missed down the operating range will shift down or up. If the operating point shifts into the range "risk of buffer underflow" or "ambiguous E-TFCI" (see Table 10.3.1.2A.4.2.1) the operating point must be re-adjusted.

Table 10.3.1.2A.4.2.1 E-TFCI operating point/range(2 ms)

missed up down	AG Value	$\text{ß}_{ed}/\text{ß}_c$	E-TFCI	TB Size=N*112+Header+min Padding	UL rate kbps
Risk of buffer underflow					
		21/15	54	817 = 7*112 + 18 + 15	408
	5	19/15	50	707 = 6*112 + 18 + 17	353.5
Initial operating range		17/15	45	590 = 5*112 + 18 + 12	295.5
	4	15/15	39	474 = 4*112 + 18 + 8	273
		13/15	31	355 = 3*112 + 18 + 1	177.5
Ambiguous E-TFCI		12/15	21	247 = 2*112 + 18 + 5	123.5
	3	11/15	21	247 = 2*112 + 18 + 5	123.5

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9.2.1 of 34.108 [3] with the following exceptions:

RADIO BEARER SETUP:

Information Element	Value/remark	Version
- RLC PDU size	112	Rel-6
- E-DCH Transmission Time	10 ms (Test 2 and 4), 2ms (Test 1 and 3)	
E-DCH MAC-d flow maximum number of retransmissions	0	
E-DCH info		Rel-6
- Happy bit delay condition	10 ms (Test 2 and 4), 2ms (Test 1 and 3) (indication of exhausted resources on frame basis)	
- E-DCH minimum set E-TFCI	Not Present in RGCH performance tests, all E-TFCs should be in the selection process)	
Downlink information for each radio link list		
- Downlink information for each radio link		
- CHOICE E-RGCH Information		Rel-6
- E-RGCH Information		
- Signature Sequence	0	
- RG combination index	0	

10.3.1.2A.5 Test requirements

Table 10.3.1.2A.5.1: Test Parameters for E-RGCH – Serving E-DCH cell

Parameter	Unit	Missed UP/DOWN
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
E-RGCH E_c/I_{or}	dB	-28.4 (test 1)
E-RGCH signalling pattern	-	50% UP 50% DOWN

Table 10.3.1.2A.5.2: Test requirement Type 1 for Missed UP/DOWN when relative scheduling grant is transmitted using 3 consecutive slots – Serving E-DCH cell

Test Number	Propagation Conditions	Reference value		
		E-RGCH E_c/I_{or} (dB)	$\hat{I}_{or}/I_{oc}$ (dB)	Missed UP/DOWN probability
1	VA30	-28.4	0.6	0.05/0.05

To pass the test,

the ratio (missed(down) / all valid down commands, sent) <= 0.05 and

the ratio (missed(up) / all valid up commands, sent) <= 0.05

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.

10.3.2 Detection in Inter-Cell Handover conditions

10.3.2.1 Definition and applicability

The receive characteristics of the E-DCH Relative Grant Channel (E-RGCH) is determined during an inter-cell soft handover by the missed UP/DOWN and missed HOLD error probabilities. During the soft handover a UE receives signals from different cells. A UE has to be able to detect E-RGCH signalling from different cells, Serving E-DCH cell and Non-serving E-DCH RL.

The requirements and this test apply to Release 6 and later releases for all types of UTRA for the FDD UE that support E-DCH and HSDPA.

10.3.2.2 Minimum requirement for Non-serving E-DCH RL

For the parameters specified in Table 10.3.2.2.1 the missed HOLD probability shall be below the specified value in Table 10.3.2.2.2. For the parameters specified in Table 10.3.2.2.1 the average downlink E-RGCH E_c/I_{or} power ratio shall be below the specified value for the missed DOWN probabilities in Table 10.3.2.2.3.

Table 10.3.2.2.1: Requirement scenario parameters for E-RGCH – Non-serving E-DCH RL

Parameter	Unit	Missed HOLD	Missed DOWN
I_{oc}	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
P-CPICH E_c/I_{or}	dB	-10	
E-RGCH signalling pattern for Serving E-DCH cell	-	100% UP[1]	100% UP[1]
E-AGCH information		Fixed SG[2]	Fixed SG[2]
E-RGCH signalling pattern for Non-serving E-DCH RL		100% HOLD	100% DOWN
NOTE 1: Serving E-DCH cell E-RGCH E_c/I_{or} power level is set to -22 dB and relative scheduling grant is transmitted using 12 consecutive slots.			
NOTE 2: Serving E-DCH cell E-AGCH E_c/I_{or} power level is set to -15 dB and E-AGCH TTI length is 10ms.			

Table 10.3.2.2.2: Minimum requirement for Missed HOLD when relative scheduling grant is transmitted using 15 consecutive slots – Non-serving E-DCH RL

Test Number	Propagation Conditions	Reference value	
		$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed HOLD probability
1	VA30	0	0.005

Table 10.3.2.2.3: Minimum requirement for Missed DOWN when relative scheduling grant is transmitted using 15 consecutive slots – Non-serving E-DCH RL

Test Number	Propagation Conditions	Reference value		
		E-RGCH E_c/I_{or} (dB)	$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed DOWN probability
2	VA30	-27.3	0	0.05

The reference for this requirement is TS 25.101 [1] clause 10.3.2.

10.3.2.3 Test Purpose

To verify that during an inter-cell soft handover the average probability for missed HOLD and the average probability for missed DOWN do not exceed specified values.

10.3.2.4 Method of test

10.3.2.4.1 Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulators to the UE antenna connector as shown in figure Figure A.11.

2) The UL Reference Measurement Channel parameters are defined in Annex C.11.

3) Set the test parameters for the missed HOLD and missed DOWN test as specified in table 10.3.2.5.1 to 10.3.2.5.3 and table E.5A.3, with the exception of $\hat{I}_{or2}$ that shall be set to -∞. Set the fading conditions to VA 30.

4) The value of Absolute Grant Scope shall be set to 0, and the Absolute Grant shall be set to 5.

5) The UE is switched on.

6) Enter the UE into loopback mode 1, looping back both the 12.2kbps RMC and HSDPA to E-DCH, and start the loopback test. See TS 34.108 [3] clause 7.3.9 and TS 34.109 [4] clauses 5.3.2.3 and 5.3.2.6. To fill the RLC transmit buffer, run the loopback for [3]s before starting the procedure.

7) Reset $\hat{I}_{or2}$ according to tables 10.3.2.5.2 to 10.3.2.5.3. The downlink DPCH of cell 2 must remain inactivated.

8) UE shall transmit a MEASUREMENT REPORT message triggered by event 1A containing the CFN-SFN time difference between cell 1 and cell 2.

9) The downlink DPCH of cell 2 shall be activated.

10) SS shall send an ACTIVE SET UPDATE message adding cell 2 to the active set.

11) The fading simulators are switched on.

10.3.2.4.2 Procedure

NOTE: The measurement principle of the missed hold test (step 3 to 5) is as follows: Upon the UE transmission on E-DPCCH and E-DPDCH, the SS responds as follows: Cell 1 responds "up" on the E-RGCH and a fixed SG on the E-AGCH. Cell 2 responds DTX=hold. The SS reads the transport format, signalled on the E-DPCCH, corresponding to that signalling. If the E-TFCI is not changed, the reception on cell 2 is interpreted as hold. If the E-TFCI is decreased by one step, the DTX on cell 2 was received as down. If the E-TFCI is increased to the fixed SG, then the hold on cell 2 was received correctly and the Non_Serving_RG_Timer has expired.

1. The Nominal Avg. Information Bit Rate in the DL is set to 534 kbps according to QPSK H-Set 1. The expected throughput under this level and fading conditions is tested with a single cell in clause 9.2.1, but the DL throughput for this test case will be less than for the single cell case because of interference from Cell 2. The DL throughput for this test case is estimated based on the HSDPA throughput corresponding to the subtests using "HS-PDSCH Ec/Ior = -6dB" condition in 9.2.1A. The worst case for a conformant UE is 22 kbps. The UL data rate was configured by signalling AG value = 5 on the E-AGCH. The expected UL data rate is 71.6 kbps corresponding to E-TFC Index 45.

2. Upon reception of every E-DPCCH and E-DPDCH, the SS signals always "DTX" on the E-HICH during the entire test. This way there is no E_HICH power. Nevertheless the UE will transmit new data, since "E-DCH MAC-d flow maximum number of retransmissions" is set to 0.

3. Upon reception of the E-DPCCH and E-DPDCH, the SS signals "up" on the E-RGCH and AG value = 5 on the E-AGCH of cell 1 and "DTX" on the E-RGCH of cell 2.

4. The SS reads the E-TFCI transport, signalled on the E-DPCCH, corresponding to that "up and SG".

5. If the UE decreases the E-TFCI by one step, the DTX on the E-RGCH of cell 2 was received as "down". Count a missed(hold). If the UE holds the E-TFCI, count a correct sample.

Figure 10.3.2.4.2.1 Void

Table 10.3.2.4.2.2 E-TFCI operating range (10 ms)

Missed hold applicability	Missed down applicability	AG Value	$\text{ß}_{ed}/\text{ß}_c$	E-TFCI	TB Size = N*112 + Header + Padding	UL rate kbps
		6	24/15	59	1264 = 11*112 + 18 + 14	126.4
			21/15	52	951 = 8* 112 + 18 + 37	95.1
Fixed SG	**Fixed SG**	**5**	**19/15**	**45**	**716 = 6*112 + 18 + 26**	**71.6**
Applicable SG range	Applicable SG range		17/15	40	584 = 5*112 + 18 + 6	58.4
		4	15/15	35	477 = 4*112 + 18 + 11	47.7
			13/15	28	359 = 3*112 + 18 + 4	35.9
			12/15	19	249 = 2*112 + 18 + 7	24.9

> If the UE increases the E-TFCI by one or more steps at one instant to the fixed SG, signalled on the E-AGCH, the Non_Serving_RG_Timer has expired.

> If the UE signals Happy Bit = 1, the UE may transmit less data than granted. (TS25.321 [13] section 11.8.1.5. bullet point 1) The corresponding E-DPCCH and E-DPDCH blocks are not counted as sample.

> If the UE decreases the E-TFCI due to several missed hold to the TFCI = 19, (TFCI =45 → 40 → 35 → 28 → 19) without Non_Serving_RG_Timer expired, fail the UE.

6. Repeat step 3) to 5) such that statistical significance according to Annex F.6.4 is achieved.

NOTE: The measurement principle of the missed down test (step 8 to 10) is as follows: Upon the UE transmission on E-DPCCH and E-DPDCH, the SS responds as follows: Cell 1 sends "up" on the E-RGCH and a fixed SG on the E-AGCH. Cell 2 sends down. The SS reads the transport format, signalled on the E-DPCCH, corresponding to that signalling. If the transport format is decreased by one step, the Down on cell 2 was received correctly as down. If the transport format is not changed or is increased, the down on cell 2 was missed.

7. Repeat the settings of step 1

8. On cell 1, the SS signals "up" on the E-RGCH and AG value=5 on the E-AGCH. On cell 2, the SS signals a periodic sequence of 4 "down" followed by 8 "hold" on the E-RGCH. The SS should not count the E-TFCI as samples during signalling "hold". The sequence of 8 "hold" should allow reestablishment of the initial transport format for all the HARQ processes, unless "hold" is falsely detected as "down", when the Non_Serving_RG timer is undesirably started. In that case the SS shall not count as samples the 4 E-TFCI corresponding to the 4 "down" of next period (steps 9 and 10 are not executed for those).

9. The SS reads the E-TFCI at each HARQ process, signalled on the E-DPCCH corresponding to that "down on the E-RGCH of cell 2.

10. If the UE does not decrease the E-TFCI by one step at each HARQ process upon that "down on cell 2" record a missed(down). Otherwise count a correct sample.

> If the UE signals Happy Bit = 1, the UE may transmit less data than granted. (TS25.321 [13] section 11.8.1.5. bullet point 1) The corresponding E-DPCCH and E-DPDCH blocks are not counted as sample.

Figure 10.3.2.4.2.3 Void

11. Repeat step 8 to 10, such that statistical significance according to Annex F.6.4 is achieved.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9.2.1 of 34.108 [3] with the following exceptions:

RADIO BEARER SETUP

Information Element	Value/remark	Version
- RLC PDU size	112	Rel-6
- E-DCH Transmission Time	10 ms	
E-DCH MAC-d flow maximum number of retransmissions	0	
E-DCH info		Rel-6
- Happy bit delay condition	10 ms	
- E-DCH minimum set E-TFCI	Not Present in RGCH performance tests, all E-TFCs should be in the selection process)	
Downlink information for each radio link list		
- Downlink information for each radio link		
- CHOICE E-RGCH Information		Rel-6
- E-RGCH Information		
- Signature Sequence	0	
- RG combination index	0	

ACTIVE SET UPDATE message:

Information Element/Group name	Value/Remark	Version
Message Type (10.2.17)		
UE information elements		
- RRC transaction identifier	0	
- Integrity check info		
-message authentication code	SS calculates the value of MAC-I for this message and writes to this IE. The first/ leftmost bit of the bit string contains the most significant bit of the MAC-I.	
-RRC message sequence number	SS provides the value of this IE, from its internal counter.	
- Activation time	"now".	
- New U-RNTI	Not Present	
- New H-RNTI	Not Present	Rel-6
- New Primary E-RNTI	Not Present	Rel-6
- New Secondary E-RNTI	Not Present	Rel-6
CN information elements		
- CN Information info	Not Present	
Phy CH information elements		
Uplink radio resources		
- Maximum allowed UL TX power	33 dBm	
Downlink radio resources		
- Radio link addition information	1	
- Radio link addition information		
- Primary CPICH info		
- Primary scrambling code	Same as adding cell	
- Downlink DPCH info for each RL		
- CHOICE mode	FDD	
- Primary CPICH usage for channel estimation	Primary CPICH may be used	
- DPCH frame offset	This should be reflected by the IE" Cell synchronisation information" in received MEASUREMENT REPORT message	
- Secondary CPICH info	Not Present	
- DL channelisation code		
- Secondary scrambling code	Not Present	
- Spreading factor	128	
- Code number	96	
- Scrambling code change	No code change	
- TPC combination index	1	
- Closed loop timing adjustment mode	Not Present	
- Downlink F-DPCH info for each RL	Not Present	
E-HICH Information		Rel-6
- Channelisation Code	6	
- Signature Sequence	1	
E-RGCH Information		Rel-6
- Signature Sequence	0	
- RG combination index	1	
- Radio link removal information	Not Present	
- TX Diversity Mode	Not Present	
Serving HS-DSCH cell information	Not Present	Rel-6
E-DCH reconfiguration information	Not Present	Rel-6

10.3.2.5 Test Requirements

For table 10.3.2.5.1, the missed HOLD probability shall be below the specified value in Table 10.3.2.5.2. For table 10.3.2.5.1, the average downlink E-RGCH E_c/I_{or} power ratio shall be below the specified value for the missed DOWN probabilities in Table 10.3.2.5.3

Table 10.3.2.5.1: Test scenario parameters for E-RGCH – Non-serving E-DCH RL

Parameter	Unit	Missed HOLD	Missed DOWN
I_{oc}	dBm/3.84 MHz	-60	
Phase reference	-	P-CPICH	
E-RGCH$_1$ E_c/I_{or}	dB	-21.9	
E-AGCH$_1$ E_c/I_{or}	dB	-14.9	
E-RGCH$_2$ E_c/I_{or}	dB	-∞	-27.2
HS-DPSCH$_1$ E_c/I_{or}	dB	-3.1	-3.1
E-RGCH signalling pattern for Serving E-DCH cell	-	100% UP[1]	100% UP[1]
E-AGCH information		Fixed SG[2]	Fixed SG[2]
E-RGCH signalling pattern for Non-serving E-DCH RL		100% HOLD	100% DOWN
NOTE 1: Index 1: cell belonging to RLS containing the Serving E-DCH cell, Index 2: cell belonging to RLS not containing the Serving E-DCH cell NOTE 2: Serving E-DCH cell E-RGCH E_c/I_{or} power level is set to -22 dB+TT and relative scheduling grant is transmitted using 12 consecutive slots. NOTE 3: Serving E-DCH cell E-AGCH E_c/I_{or} power level is set to -15+TT dB and E-AGCH TTI length is 10ms. TT is added to Serving E-DCH cell E-RGCH E_c/I_{or} and E-AGCH E_c/I_{or} power. E-RGCH and E-AGCH reception on the serving cell is outside the test purpose. However reception errors may cause incorrect interpretation of the wanted test.			

Table 10.3.2.5.2: Test requirements for Missed HOLD when relative scheduling grant is transmitted using 15 consecutive slots – Non-serving E-DCH RL

Test Number	Propagation Conditions	Reference value	
		$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed HOLD probability
1	VA30	0.6	0.005

Table 10.3.2.5.3: Test requirements for Missed DOWN when relative scheduling grant is transmitted using 15 consecutive slots – Non-serving E-DCH RL

Test Number	Propagation Conditions	Reference value		
		E-RGCH E_c/I_{or} (dB)	$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed DOWN probability
2	VA30	-27.2	0.6	0.05

To pass the test,

The ratio (missed (hold) / all DTX from the SS) <= 0.005 and

The ratio (missed (down) / all valid down commands, sent) <= 0.05

NOTE : If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.

10.3.2A Detection in Inter-Cell Handover conditions (Type 1)

10.3.2A.1 Definition and applicability

The receive characteristics of the E-DCH Relative Grant Channel (E-RGCH) is determined during an inter-cell soft handover by the missed UP/DOWN error probabilities. During the soft handover a UE receives signals from different cells. A UE has to be able to detect E-RGCH signalling from different cells, Serving E-DCH cell and Non-serving E-DCH RL.

The requirements and this test apply to Release 7 and later releases for all types of UTRA for the FDD UE that support E-DCH and HSDPA and the optional Type 1 enhanced performance requirements.

10.3.2A.2 Minimum requirement for Non-serving E-DCH RL

For the parameters specified in Table 10.3.2A.2.1 the average downlink E-RGCH E_c/I_{or} power ratio shall be below the specified value for the missed DOWN probabilities in Table 10.3.2A.2.2.

Table 10.3.2A.2.1: Requirement scenario parameters for E-RGCH – Non-serving E-DCH RL

Parameter	Unit	Missed DOWN
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
P-CPICH E_c/I_{or}	dB	-10
E-RGCH signalling pattern for Serving E-DCH cell	-	100% UP[1]
E-AGCH information		Fixed SG[2]
E-RGCH signalling pattern for Non-serving E-DCH RL		100% DOWN
NOTE 1: Serving E-DCH cell E-RGCH E_c/I_{or} power level is set to -22 dB and relative scheduling grant is transmitted using 12 consecutive slots.		
NOTE 2: Serving E-DCH cell E-AGCH E_c/I_{or} power level is set to -15 dB and E-AGCH TTI length is 10ms.		

Table 10.3.2A.2.2: Enhanced performance requirement for Missed DOWN when relative scheduling grant is transmitted using 15 consecutive slots – Non-serving E-DCH RL

Test Number	Propagation Conditions	Reference value		
		E-RGCH E_c/I_{or} (dB)	$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed DOWN probability
2	VA30	-31.2	0	0.05

The reference for this requirement is TS 25.101 [1] clause 10.3.2.

10.3.2A.3 Test Purpose

To verify that during an inter-cell soft handover the average probability for missed DOWN do not exceed specified values.

10.3.2A.4 Method of test

10.3.2A.4.1 Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulators to the UE antenna connector as shown in figure Figure A.24 for UEs that support receive diversity or figure A.11 for UEs that do not support receive diversity.

2) The UL Reference Measurement Channel parameters are defined in Annex C.11.

3) Set the test parameters for the missed DOWN test as specified in table 10.3.2A.5.1 and 10.3.2A.5.2 and table E.5A.3 with the exception of $\hat{I}_{or2}$ that shall be set to -∞.. Set the fading conditions to VA 30.

4) The value of Absolute Grant Scope shall be set to the 0, and the Absolute Grant shall be set to 5.

5) The UE is switched on.

6) Enter the UE into loopback mode 1, looping back both the 12.2kbps RMC and HSDPA to E-DCH, and start the loopback test. See TS 34.108 [3] clause 7.3.9 and TS 34.109 [4] clauses 5.3.2.3 and 5.3.2.6. To fill the RLC transmit buffer, run the loopback for [3]s before starting the procedure.

7) Reset $\hat{I}_{or2}$ according to tables 10.3.2A.5.1 to 10.3.2A.5.2. The downlink DPCH of cell 2 must remain inactivated.

8) UE shall transmit a MEASUREMENT REPORT message triggered by event 1A containing the CFN-SFN time difference between cell 1 and cell 2.

9) The downlink DPCH of cell 2 shall be activated.

10) SS shall send an ACTIVE SET UPDATE message adding cell 2 to the active set.

11) The fading simulators are switched on.

10.3.2A.4.2 Procedure

NOTE: The measurement principle of the missed down test is as follows: Upon the UE transmission on E-DPCCH and E-DPDCH, the SS responds as follows: Cell 1 sends "up" on the E-RGCH and a fixed SG on the E-AGCH. Cell 2 sends down. The SS reads the transport format, signalled on the E-DPCCH, corresponding to that signalling. .If the transport format is decreased by one step, the Down on cell 2 was received correctly as down. If the transport format is not changed or is increased, the down on cell 2 was missed.

1. The Nominal Avg. Information Bit Rate in the DL is set to 534 kbps according to QPSK H-Set 1. The expected throughput under this level and fading conditions is tested with a single cell in clause 9.2.1, but the DL throughput for this test case will be less than for the single cell case because of interference from Cell 2. The DL throughput for this test case is estimated based on the HSDPA throughput corresponding to the subtests using "HS-PDSCH Ec/Ior = -6dB" condition in 9.2.1A. The worst case for a conformant UE is 22 kbps. The UL data rate was configured by signalling AG value = 5 on the E-AGCH. The expected UL data rate is 71.6 kbps corresponding to E-TFC Index 45.

Table 10.3.2A.4.2.1 E-TFCI operating range (10 ms)

Missed down applicability	AG Value	$ß_{ed}/ß_c$	E-TFCI	TB Size = N*112 + Header + Padding								UL rate kbps
	6	24/15	59	1264	=	11*112	+	18	+	14		126.4
		21/15	52	951	=	8*112	+	18	+	37		95.1
Fixed SG	**5**	**19/15**	**45**	**716**	**=**	**6*112**	**+**	**18**	**+**	**26**		**71.6**
Applicable SG range		17/15	40	584	=	5*112	+	18	+	6		58.4
	4	15/15	35	477	=	4*112	+	18	+	11		47.7
		13/15	28	359	=	3*112	+	18	+	4		35.9
		12/15	19	249	=	2*112	+	18	+	7		24.9

2. The SS signals 12 consecutive "down" on the E-RGCH of cell 2 followed by a sequence of hold. The SS signals up on the E-RGCH of cell 1 and AG value = 5 on the E-AGCH always. (To avoid the lower limit of SG after several down in sequence, the SS signals hold continuously on cell 2 until the initial transport format is re-established). The SS should not count the E-TFCI as samples during signalling hold.). The SS shall take into account that UE may falsely detect "Hold" of the non-serving cell to "Down". This is FFS.

3. The SS reads the E-TFCI at each HARQ process, signalled on the E-DPCCH corresponding to that "down on the E-RGCH of cell 2.

4 If the UE does not decrease the E-TFCI by one step at each HARQ process upon that "down on cell 2" record a missed(down). Otherwise count a correct sample.

If the UE signals Happy Bit = 1, the UE may transmit less data than granted. (TS25.321 [13] section 11.8.1.5. bullet point 1) The corresponding E-DPCCH and E-DPDCH blocks are not counted as sample.

5. Repeat step 2 to 4, such that statistical significance according to Annex F.6.4 is achieved.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9.2.1 of 34.108 [3] with the following exceptions:

RADIO BEARER SETUP

Information Element	Value/remark	Version
- RLC PDU size	112	Rel-6
- E-DCH Transmission Time	10 ms	
E-DCH MAC-d flow maximum number of retransmissions	0	
E-DCH info		Rel-6
- Happy bit delay condition	10 ms	
- E-DCH minimum set E-TFCI	Not Present in RGCH performance tests, all E-TFCs should be in the selection process)	
Downlink information for each radio link list		
- Downlink information for each radio link		
- CHOICE E-RGCH Information		Rel-6
- E-RGCH Information		
- Signature Sequence	0	
- RG combination index	0	

ACTIVE SET UPDATE message:

Information Element/Group name	Value/Remark	Version
Message Type (10.2.17)		
UE information elements		
- RRC transaction identifier	0	
- Integrity check info		
-message authentication code	SS calculates the value of MAC-I for this message and writes to this IE. The first/ leftmost bit of the bit string contains the most significant bit of the MAC-I.	
-RRC message sequence number	SS provides the value of this IE, from its internal counter.	
- Activation time	"now".	
- New U-RNTI	Not Present	
- New H-RNTI	Not Present	Rel-6
- New Primary E-RNTI	Not Present	Rel-6
- New Secondary E-RNTI	Not Present	Rel-6
CN information elements		
- CN Information info	Not Present	
Phy CH information elements		
Uplink radio resources		
- Maximum allowed UL TX power	33 dBm	
Downlink radio resources		
- Radio link addition information	1	
- Radio link addition information		
- Primary CPICH info		
- Primary scrambling code	Same as adding cell	
- Downlink DPCH info for each RL		
- CHOICE mode	FDD	
- Primary CPICH usage for channel estimation	Primary CPICH may be used	
- DPCH frame offset	This should be reflected by the IE" Cell synchronisation information" in received MEASUREMENT REPORT message	
- Secondary CPICH info	Not Present	
- DL channelisation code		
- Secondary scrambling code	Not Present	
- Spreading factor	128	
- Code number	96	
- Scrambling code change	No code change	
- TPC combination index	1	
- Closed loop timing adjustment mode	Not Present	
- Downlink F-DPCH info for each RL	Not present	
E-HICH Information		Rel-6
- Channelisation Code	6	
- Signature Sequence	1	
E-RGCH Information	Not Present	Rel-6
- Signature Sequence	0	
- RG combination index	1	
- Radio link removal information	Not Present	
- TX Diversity Mode	Not Present	
Serving HS-DSCH cell information	Not Present	Rel-6
E-DCH reconfiguration information	Not Present	Rel-6

10.3.2A.5   Test Requirements

For table 10.3.2A.5.1, the average downlink E-RGCH E_c/I_{or} power ratio shall be below the specified value for the missed DOWN probabilities in Table 10.3.2A.5.2

Table 10.3.2A.5.1: Test scenario parameters for E-RGCH – Non-serving E-DCH RL

Parameter	Unit	Missed DOWN
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
E-RGCH$_1$ E_c/I_{or}	dB	-21.9
E-AGCH$_1$ E_c/I_{or}	dB	-14.9
E-RGCH$_2$ E_c/I_{or}	dB	-31.1
HS-DPSCH$_1$ E_c/I_{or}	dB	-3.1
E-RGCH signalling pattern for Serving E-DCH cell	-	100% UP[1]
E-AGCH information		Fixed SG[2]
E-RGCH signalling pattern for Non-serving E-DCH RL		100% DOWN
NOTE 1: Index 1: cell belonging to RLS containing the Serving E-DCH cell, Index 2: cell belonging to RLS not containing the Serving E-DCH cell NOTE 2: Serving E-DCH cell E-RGCH E_c/I_{or} power level is set to -22 dB+TT and relative scheduling grant is transmitted using 12 consecutive slots. NOTE 3: Serving E-DCH cell E-AGCH E_c/I_{or} power level is set to -15+TT dB and E-AGCH TTI length is 10ms. TT is added to Serving E-DCH cell E-RGCH E_c/I_{or} and E-AGCH E_c/I_{or} power. E-RGCH and E-AGCH reception on the serving cell is outside the test purpose. However reception errors may cause incorrect interpretation of the wanted test.		

Table 10.3.2A.5.2: Test requirements Type 1 for Missed DOWN when relative scheduling grant is transmitted using 15 consecutive slots – Non-serving E-DCH RL

Test Number	Propagation Conditions	Reference value		
		E-RGCH E_c/I_{or} (dB)	$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$ (dB)	Missed DOWN probability
2	VA30	-31.1	0.6	0.05

To pass the test,

The ratio (missed (down) / all valid down commands, sent) <= 0.05

NOTE : If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.

10.4 Demodulation of E-DCH Absolute Grant Channel (E-AGCH)

10.4.1 Single link performance

10.4.1.1 Definition and applicability

The receive characteristics of the E-DCH Absolute Grant Channel (E-AGCH) in multi-path fading environment is determined by the missed detection probability. The requirements and this test apply to Release 6 and later releases for all types of UTRA for the FDD UE that support HSDPA and E-DCH.

10.4.1.2 Minimum requirement

For the parameters specified in Table 10.4.1.1 the average downlink E-AGCH E_c/I_{or} power ratio shall be below the specified value for the missed detection probability in Table 10.4.1.2.

Table 10.4.1.1: Test parameters for E-AGCH detection – single link

Parameter	Unit	Missed detection
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
P-CPICH E_c/I_{or}	dB	-10
E-AGCH information	-	Varying SG
E-AGCH TTI length	ms	10

Table 10.4.1.2: Minimum requirement for E-AGCH detection – single link

Test Number	Propagation Conditions	Reference value		
		E-AGCH E_c/I_{or} (dB)	$\hat{I}_{or}/I_{oc}$ (dB)	Miss detection probability
1	VA30	-23.2	0	0.01

10.4.1.3 Test Purpose

The aim of the test is to verify that the missed detection probability of the E-AGCH channel does not exceed 0.01.

10.4.1.4 Method of test

10.4.1.4.1 Initial conditions

Test environment: normal; see clause G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4

1) Connect the SS and AWGN noise source and fading simulator to the UE antenna connector as shown in Figure A.10.

2) The UL Reference Measurement Channel parameters are defined in Annex C.11.

3) Set the test parameters for the missed detection test as specified in Table 10.4.1.3, 10.4.1.3a and Table E.5A.2. Setup the fading simulator as per the fading condition, which is described in Table 10.4.1.3a.

4) Relative Grant shall not be transmitted on the E-RGCH and only Absolute Grant sent on E-AGCH will affect the Serving Grant (SG).

5) The value of Absolute Grant Scope shall be set to the 0 and the Absolute Grant shall be set to the 4.

6) The UE is switched on.

7) Enter the UE into loopback mode 1 looping back both the 12.2kbps RMC and HSDPA to E-DCH and start the loopback test. See TS34.108[3] clause 7.3.9 and TS34.109[4] clause 5.3.2.3 and 5.3.2.6 for details regarding loopback test mode for HSDPA and E-DCH. This way the UE is configured to transmit a data stream on the E-DPDCH with E-DPCCH. To fill the RLC transmit buffer, run the loopback for [3]s before starting the procedure.

8) Switch on the fading simulator

10.4.1.4.2 Procedure

1) The SS shall signal 100% ACK on the E-HICH for all processes.

2) The SS shall signal the Absolute Grants according to the E-AGCH information sequence as defined in Table 10.4.1.3.

3) The SS shall analyse the E-TFCI transmitted on the E-DPCCH for each E-DCH TTI to determine if a missed detection event has occurred by correlating the detected E-TFCIs with the expected E-TFCIs corresponding to the absolute grant sequence sent on E-AGCH. If the expected E-TFC is not detected by the SS, record a missed detection event.

4) The test shall be run such that statistical significance according to Annex F.6.4 is achieved.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9.2.1 of 34.108 [3] with the following exceptions:

RADIO BEARER SETUP:

Information Element	Value/remark
E-DCH MAC-d flow maximum number of retransmissions	0

10.4.1.5   Test Requirements

The missed detection probability shall not exceed to the values specified in Table 10.4.1.3a.

The missed detection probability = the ratio of (missed detection event)/ (all detected E-TFCI event) ≤ 0.01.

Tables 10.4.1.3 and 10.4.1.3a define the primary level settings including test tolerance and test parameters for the test.

Table 10.4.1.3: Test parameters for E-AGCH detection – single link

Parameter	Unit	Missed detection
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
P-CPICH E_c/I_{or}	dB	-10
E-AGCH information		The E-AGCH information sequence "AG$_4$ AG$_8$ AG$_{10}$ AG$_4$ AG$_8$ AG$_{10}$ AG$_4$ AG$_8$ AG$_{10}$,..." shall be transmitted continuously, where AG$_4$, AG$_8$ and AG$_{10}$ denote absolute grant index of 4, 8, 10 respectively
E-AGCH TTI length	ms	10
E-HICH E_c/I_{or}	dB	-20
β_c		15/15
β_d		5/15
β_{hs}		15/15

Table 10.4.1.3a: Test requirement for E-AGCH detection – single link

Test Number	Propagation Conditions	Reference value		
		E-AGCH E_c/I_{or} (dB)	$\hat{I}_{or}/I_{oc}$ (dB)	Miss detection probability
1	VA30	-23.1	0.6	0.01

The exact mapping of the E-AGCH absolute grant indices and the expected E-TFCIs is shown in Table 10.4.1.4. The mapping shall be used by the SS to compute the missed detection probability.

Table 10.4.1.4: Mapping of the E-AGCH test sequence and the expected E-TFCI

Absolute Grant Index	Expected E-TFCI index
AG$_4$	E-TFCI$_{28}$
AG$_8$	E-TFCI$_{67}$
AG$_{10}$	E-TFCI$_{81}$
NOTE: E-TFCI$_{28}$, E-TFCI$_{67}$ E-TFCI$_{81}$ denotes the E-TFC index of 28, 67 and 81 from 10ms TTI Table 0 in 25.321[13]. This mapping is based on the assumption that 1, 5 or 9 RLC PDUs of size 336 bits are used respectively.	

10.4.1A   Single link performance (Type 1)

10.4.1A.1   Definition and applicability

The receive characteristics of the E-DCH Absolute Grant Channel (E-AGCH) in multi-path fading environment is determined by the missed detection probability. The requirements and this test apply to Release 7 and later releases for all types of UTRA for the FDD UE that support HSDPA and E-DCH and the optional Type 1 enhanced performance requirements.

10.4.1A.2   Minimum requirement

For the parameters specified in Table 10.4.1A.1 the average downlink E-AGCH E_c/I_{or} power ratio shall be below the specified value for the missed detection probability in Table 10.4.1A.2.

Table 10.4.1A.1: Test parameters for E-AGCH detection – single link

Parameter	Unit	Missed detection
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
P-CPICH E_c/I_{or}	dB	-10
E-AGCH information	-	Varying SG
E-AGCH TTI length	ms	10

Table 10.4.1A.2: Enhanced performance requirement for E-AGCH detection – single link

Test Number	Propagation Conditions	Reference value		
		E-AGCH E_c/I_{or} (dB)	$\hat{I}_{or}/I_{oc}$ (dB)	Miss detection probability
1	VA30	-26.8	0	0.01

10.4.1A.3   Test Purpose

The aim of the test is to verify that the missed detection probability of the E-AGCH channel does not exceed 0.01.

10.4.1A.4   Method of test

10.4.1A.4.1   Initial conditions

Test environment: normal; see clause G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4

1) Connect the SS and AWGN noise source and fading simulator to the UE antenna connector as shown in Figure A.21 for UEs that support receive diversity or figure A.10 for UEs that do not support receive diversity.

2) The UL Reference Measurement Channel parameters are defined in Annex C.11.

3) Set the test parameters for the missed detection test as specified in Table 10.4.1A.3 and 10.4.1A.5 and Table E.5A.2. Setup the fading simulator as per the fading condition, which is described in Table 10.4.1A.5.

4) Relative Grant shall not be transmitted on the E-RGCH and only Absolute Grant sent on E-AGCH will affect the Serving Grant (SG).

5) The value of Absolute Grant Scope shall be set to the 0 and the Absolute Grant shall be set to the 4.

6) The UE is switched on.

7) Enter the UE into loopback mode 1 looping back both the 12.2kbps RMC and HSDPA to E-DCH and start the loopback test. See TS34.108[3] clause 7.3.9 and TS34.109[4] clause 5.3.2.3 and 5.3.2.6 for details regarding loopback test mode for HSDPA and E-DCH. This way the UE is configured to transmit a data stream on the E-DPDCH with E-DPCCH. To fill the RLC transmit buffer, run the loopback for [3]s before starting the procedure.

8) Switch on the fading simulators

10.4.1A.4.2 Procedure

1) The SS shall signal 100% ACK on the E-HICH for all processes.

2) The SS shall signal the Absolute Grants according to the E-AGCH information sequence as defined in Table 10.4.1A.3.

3) The SS shall analyse the E-TFCI transmitted on the E-DPCCH for each E-DCH TTI to determine if a missed detection event has occurred by correlating the detected E-TFCIs with the expected E-TFCIs corresponding to the absolute grant sequence sent on E-AGCH. If the expected E-TFC is not detected by the SS, record a missed detection event.

4) The test shall be run such that statistical significance according to Annex F.6.4 is achieved.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9.2.1 of 34.108 [3] with the following exceptions:

RADIO BEARER SETUP:

Information Element	Value/remark
E-DCH MAC-d flow maximum number of retransmissions	0

10.4.1A.5 Test Requirements

The missed detection probability shall not exceed to the values specified in Table 10.4.1A.5.

The missed detection probability = the ratio of (missed detection event)/ (all detected E-TFCI event) ≤ 0.01.

Table 10.4.1A.3 and 10.4.1A.5 define the primary level settings including test tolerance and test parameters for the test.

Table 10.4.1A.3: Test parameters for E-AGCH detection – single link

Parameter	Unit	Missed detection
I_{oc}	dBm/3.84 MHz	-60
Phase reference	-	P-CPICH
P-CPICH E_c/I_{or}	dB	-10
E-AGCH information		The E-AGCH information sequence "AG$_4$ AG$_8$ AG$_{10}$ AG$_4$ AG$_8$ AG$_{10}$ AG$_4$ AG$_8$ AG$_{10,...}$" shall be transmitted continuously, where AG$_4$, AG$_8$ and AG$_{10}$ denote absolute grant index of 4, 8, 10 respectively
E-AGCH TTI length	ms	10
E-HICH E_c/I_{or}	dB	-20
β_c		15/15
β_d		5/15
β_{hs}		15/15

The exact mapping of the E-AGCH absolute grant indices and the expected E-TFCIs is shown in Table 10.4.1A.4. The mapping shall be used by the SS to compute the missed detection probability.

Table 10.4.1A.4: Mapping of the E-AGCH test sequence and the expected E-TFCI

Absolute Grant Index	Expected E-TFCI index
AG$_4$	E-TFCI$_{28}$
AG$_8$	E-TFCI$_{67}$
AG$_{10}$	E-TFCI$_{81}$
NOTE: E-TFCI$_{28}$, E-TFCI$_{67}$ E-TFCI$_{81}$ denotes the E-TFC index of 28, 67 and 81 from 10ms TTI Table 0 in 25.321[13]. This mapping is based on the assumption that 1, 5 or 9 RLC PDUs of size 336 bits are used respectively.	

Table 10.4.1A.5: Test requirement for E-AGCH detection – single link

Test Number	Propagation Conditions	Reference value		
		E-AGCH E_c/I_{or} (dB)	$\hat{I}_{or}/I_{oc}$ (dB)	Miss detection probability
1	VA30	-26.7	0.6	0.01

11 Performance requirement (MBMS)

11.1 General

The performance requirements for the UE in this subclause are specified for the propagation conditions specified in Annex D.2 and the Downlink Physical channels specified in Annex E.5B.

Unless otherwise stated the receiver characteristics are specified at the antenna connector of the UE. For UEs with more than one receiver antenna connector 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 sections below.

For MBMS test cases which require invalid MAC header to be transmitted during the test, the configuration of invalid MAC header for MTCH transmission shall use the value "1111" for the MBMS-Id field. The UE shall discard PDU's with this invalid MAC header according TS 25.321[13] section 10.

A UE with one antenna connector may also fulfill the enhanced performance requirements Type 1. The levels of the test signal are applied to the single antenna connector as defined in the respective sections below.

11.2 Demodulation of MTCH

11.2.1 Definition and applicability

The receive characteristic of the MTCH is determined by RLC SDU error rate (RLC SDU ER). RLC SDU ER is specified for each individual data rate of the MTCH. The requirement is valid for all RRC states for which the UE has capabilities for MBMS.

The requirements and this test apply to Release 6 and later releases for all types of UTRA for the FDD UE that support MBMS.

11.2.2 Minimum requirement

For the parameters specified in Table 11.2.2.1 the average downlink S-CCPCH_E_c/I_{or} power ratio shall be below the specified value for the RLC SDU ER shown in Table 11.2.2.2.

Table 11.2.2.1: Parameters for MTCH detection

Parameter	Unit	Test 1	Test 2	Test 3
Phase reference	-		P-CPICH	
I_{oc}	dBm/3.84 MHz		-60	
$\hat{I}_{or}/I_{oc}$	dB	-3	-3	-3
MTCH Data Rate		128 kbps	256 kbps	128 kbps
Transmission Time Interval	ms	40	40	80
Propagation condition			VA3	
Number of Radio Links p		3	3	3
Delay of Radio Link 2 compared with Radio Link 1		160ms	20 ms	20 ms
Delay of Radio Link 3 compared with Radio Link 1		1240ms	40.67 ms (1 TTI + 1 slot)	80.67 ms (1 TTI + 1 slot)

Table 11.2.2.2: Test requirements for MTCH detection

Test Number	S-CCPCH_Ec/Ior (dB)	RLC SDU ER
1	-4.9	0.1
2	-5.6	0.1
3	-8.5	0.1

11.2.3   Test Purpose

The aim of the test is to verify that the RLC SDU error rate (RLC SDU ER) for each individual data rate of the MTCH channel does not exceed 0.1. The test shall be performed in CELL_PCH state only.

11.2.4   Method of test

11.2.4.1   Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulator to the UE antenna connector as shown in Figure A.23.

2) The DL Reference Measurement Channel parameters are defined in Annex C.12.1.

3) The configuration for the downlink channel for each radio link is defined in Annex.E.5B. The Ior of cell 2 and cell 3 are set to 10 dB lower than cell 1.

4) The same MTCH data shall be sent in all radio links during the test.

5) The UE is switched on.

6) The UE is interested in the broadcast service provided by the SS, this service is included in the MBMS_ACTIVATED_SERVICES variable.

7) Set up a call according to the generic call setup procedure in TS34.108 [3] clause 7.3.10 and enter the UE into loopback test mode 3 with transition to the CELL_PCH state. See TS 34.108 and TS 34.109 for details regarding loopback test mode 3 for MBMS.

8) Setup the test parameter for Test 1-3 as specified in Table 11.2.5.1 and 11.2.5.2. Set up fading simulator as per the fading condition VA3, which is described in table D.2.2.1C.

9) Switch on the fading simulator.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9 of 34.108 [3], with the exceptions stated in clause 7.3.10 of 34.108 [3], and with the following exceptions:

Contents of PHYSICAL CHANNEL RECONFIGURATION message: AM (Step 7)

Information Element	Value/remark
UTRAN DRX cycle length coefficient	7

11.2.4.2   Procedure

1) Initiate the variables N_{SS_ACC} to 0.

2) SS shall start the test by sending valid MAC headers and RLC SDUs on the MTCH radio bearer for 164 seconds (10 seconds in the second or later iteration) on each Radio Link. The delays of Radio Link 2 and 3 compared with Radio Link 1 are specified in Table 11.2.5.1. SS stores the count of transmitted RLC SDU blocks on the MTCH with valid MAC headers in the variable N_{SS} and adds it to N_{SS_ACC}.

3) The SS transmits invalid MAC headers on the MTCH and sets Ior of cell 2 and cell 3 to 10dB lower than cell 1.

4) SS shall transmit a PAGING TYPE 1 message specified in TS 34.108 [3] clause 7.3.10.4 to place the UE in CELL_FACH state.

5) UE shall move to CELL_FACH state by sending a CELL_UPDATE message. On reception of the CELL UPDATE message the SS shall transmit 3 identical CELL UPDATE CONFIRM message.

6) UE confirms the received C-RNTI to be used in CELL FACH state by transmitting a UTRAN MOBILITY INFORMATION CONFIRM message on the uplink DCCH.

7) SS shall send a "UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST" message and wait for the UE to respond with a "UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE" reporting the received RLC SDU counter value. Store this counter in the variable N_{UEOK}.

8) SS shall compute the RLC SDU error rate by the following:

   The RLC SDU error rate = $(N_{SS\_ACC} - N_{UEOK}) / N_{SS\_ACC}$

   N_{UEOK}: UE received RLC SDUs as reported in the "UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE" message in step 7.

   N_{SS_ACC}: Accumulated sum of N_{SS} tested so far.

9) The SS orders the UE to move to CELL_PCH state by transmitting a PHYSICAL CHANNEL RECONFIGURATION message with the RRC state indicator set to "CELL_PCH".

10) The UE send a PHYSICAL CHANNEL RECONFIGURATION COMPLETE message.

11) The SS puts Ior of cell 2 and cell 3 back to test parameter specified in Table 11.2.5.1.12)Repeat steps 2) to 11) until the statistical significance according to Annex to F.6.4.4 is achieved.

13) End the RRC connection according to the generic call setup procedure specified in TS 34.108 [3] clause 7.3.10.

NOTE: In the Step 5 and 13 above, the 3 identical CELL UPDATE CONFIRM messages are transmitted with the same RRC message sequence number. Transmitting 3 identical CELL UPDATE CONFIRM messages is done to increase the probability of correct message reception at the UE.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9 of 34.108 [3], with the exceptions stated in clause 7.3.10 of 34.108[3] , and with the following exceptions:

SYSTEM INFORMATION BLOCK TYPE5

Information Element	Value/remark
- PICH Power offset	-2 dB

Content of CELL UPDATE CONFIRM message for CELL_FACH (Step 5 and Step 13)

Information Element	Value/remark
RRC transaction identifier	0
Activation time	Not Present
New C-RNTI	0000000000000001 B
RRC State indicator	CELL_FACH

Contents of PHYSICAL CHANNEL RECONFIGURATION message: AM (Step 9)

Information Element	Value/remark
UTRAN DRX cycle length coefficient	7

11.2.5   Test Requirements

Table 11.2.5.1: Parameters for MTCH detection

Parameter	Unit	Test 1	Test 2	Test 3
Phase reference	-	P-CPICH		
I_{oc}	dBm/3.84 MHz	-60		
Cell1 $\hat{I}_{or1}/I_{oc}$	dB	-2.4	-2.4	-2.4
Cell2 $\hat{I}_{or2}/I_{oc}$	dB	-2.4	-2.4	-2.4
Cell3 $\hat{I}_{or3}/I_{oc}$	dB	-2.4	-2.4	-2.4
MTCH Data Rate		128 kbps	256 kbps	128 kbps
Transmission Time Interval	ms	40	40	80
Propagation condition		VA3		
Number of Radio Links p		3	3	3
Delay of Radio Link 2 compared with Radio Link 1		160ms	20 ms	20 ms
Delay of Radio Link 3 compared with Radio Link 1		1240ms	40.67 ms (1 TTI + 1 slot)	80.67 ms (1 TTI + 1 slot)

Table 11.2.5.2: Test requirements for MTCH detection

Test Number	S-CCPCH_Ec/Ior (dB)	RLC SDU ER
1	-4.8	0.1
2	-5.5	0.1
3	-8.4	0.1

The RLC SDU error rate (RLC SDU ER) for all the MTCH demodulation tests shall not exceed the value specified in 11.2.5.2 for the specified $\dfrac{S-CCPCH\_E_c}{I_{or}}$.

The RLC SDU error rate = the ratio of (transmitted RLC SDU count − received RLC SDU count) / (transmitted RLC SDU count) < 0.1.

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.

11.2A Demodulation of MTCH - Enhanced Performance Requirements Type 1

11.2A.1 Definition and applicability

The receive characteristic of the MTCH is determined by RLC SDU error rate (RLC SDU ER). RLC SDU ER is specified for each individual data rate of the MTCH. The requirement is valid for all RRC states for which the UE has capabilities for MBMS.

The requirements and this test apply to Release 7 and later releases for all types of UTRA for the FDD UE that support MBMS and enhanced receiver type 1.

11.2A.2 Minimum requirement

For the parameters specified in Table 11.2A.2.1 the average downlink S-CCPCH_E_c/I_{or} power ratio shall be below the specified value for the RLC SDU ER shown in Table 11.2A.2.2.

Table 11.2A.2.1: Parameters for MTCH detection

Parameter	Unit	Test 1	Test 2	Test 3
Phase reference	-	P-CPICH		
I_{oc}	dBm/3.84 MHz	-60		
$\hat{I}_{or}/I_{oc}$	dB	-3	-3	-3
MTCH Data Rate		128 kbps	256 kbps	128 kbps
Transmission Time Interval	ms	40	40	80
Propagation condition		VA3		
Number of Radio Links p		3	3	3
Delay of Radio Link 2 compared with Radio Link 1		160ms	20 ms	20 ms
Delay of Radio Link 3 compared with Radio Link 1		1240ms	40.67 ms (1 TTI + 1 slot)	80.67 ms (1 TTI + 1 slot)

Table 11.2A.2.2: Test requirements for MTCH detection for UE supporting the enhanced performance requirements type1

Test Number	S-CCPCH_Ec/Ior (dB)	RLC SDU ER
1	-7.7	0.1
2	-8.7	0.1
3	-11.5	0.1

11.2A.3 Test Purpose

The aim of the test is to verify that the RLC SDU error rate (RLC SDU ER) for each individual data rate of the MTCH channel does not exceed 0.1. The test shall be performed in CELL_PCH state only.

11.2A.4 Method of test

11.2A.4.1 Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulators to the UE antenna connector as shown in Figure A.25.

2) The DL Reference Measurement Channel parameters are defined in Annex C.12.1.

3) The configuration for the downlink channel for each radio link is defined in Annex E.5B. The Ior of cell 2 and cell 3 are set to 10 dB lower than cell 1.

4) The same MTCH data shall be sent in all radio links during the test.

5) The UE is switched on.

6) The UE is interested in the broadcast service provided by the SS, this service is included in the MBMS_ACTIVATED_SERVICES variable.

7) Set up a call according to the generic call setup procedure in TS34.108 [3] clause 7.3.10 and enter the UE into loopback test mode 3 with transition to the CELL_PCH state. See TS 34.108 and TS 34.109 for details regarding loopback test mode 3 for MBMS.

8) Setup the test parameter for Test 1-3 as specified in Table 11.2A.5.1 and 11.2A.5.2. Set up fading simulators as per the fading condition VA3, which is described in table D.2.2.1C.

9) Switch on the fading simulator.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9 of 34.108 [3], with the exceptions stated in clause 7.3.10 of 34.108 [3], and with the following exceptions:

Contents of PHYSICAL CHANNEL RECONFIGURATION message: AM (Step 7)

Information Element	Value/remark
UTRAN DRX cycle length coefficient	7

11.2A.4.2 Procedure

1) Initiate the variables N_{SS_ACC} to 0.

2) SS shall start the test by sending valid MAC headers and RLC SDUs on the MTCH radio bearer for 164 seconds (10 seconds in the second or later iteration) on each Radio Link. The delays of Radio Link 2 and 3 compared with Radio Link 1 are specified in Table 11.2A.5.1. SS stores the count of transmitted RLC SDU blocks on the MTCH with valid MAC headers in the variable N_{SS} and adds it to N_{SS_ACC}.

3) The SS transmits invalid MAC headers on the MTCH and sets Ior of cell 2 and cell 3 to 10dB lower than cell 1.

4) SS shall transmit a PAGING TYPE 1 message specified in TS 34.108 [3] clause 7.3.10.4 to place the UE in CELL_FACH state.

5) UE shall move to CELL_FACH state by sending a CELL_UPDATE message. On reception of the CELL UPDATE message the SS shall transmit 3 identical CELL UPDATE CONFIRM message.

6) UE confirms the received C-RNTI to be used in CELL FACH state by transmitting a UTRAN MOBILITY INFORMATION CONFIRM message on the uplink DCCH.

7) SS shall send a "UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST" message and wait for the UE to respond with a "UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE" reporting the received RLC SDU counter value. Store this counter in the variable N_{UEOK}.

8) SS shall compute the RLC SDU error rate by the following:

The RLC SDU error rate = $(N_{SS\_ACC} - N_{UEOK}) / N_{SS\_ACC}$

N_{UEOK}: UE received RLC SDUs as reported in the "UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE" message in step 7.

N_{SS_ACC}: Accumulated sum of N_{SS} tested so far.

9) The SS orders the UE to move to CELL_PCH state by transmitting a PHYSICAL CHANNEL RECONFIGURATION message with the RRC state indicator set to "CELL_PCH".

10) The UE send a PHYSICAL CHANNEL RECONFIGURATION COMPLETE message.

11) The SS puts Ior of cell 2 and cell 3 back to test parameter specified in Table 11.2A.5.1.12) Repeat steps 2) to 11) until the statistical significance according to Annex to F.6.4.4 is achieved.

13) End the RRC connection according to the generic call setup procedure specified in TS 34.108 [3] clause 7.3.10.

NOTE: In the Step 5 and 13 above, the 3 identical CELL UPDATE CONFIRM messages are transmitted with the same RRC message sequence number. Transmitting 3 identical CELL UPDATE CONFIRM messages is done to increase the probability of correct message reception at the UE.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9 of 34.108 [3], with the exceptions stated in clause 7.3.10 of 34.108 [3], and with the following exceptions:

SYSTEM INFORMATION BLOCK TYPE5

Information Element	Value/remark
- PICH Power offset	-2 dB

Content of CELL UPDATE CONFIRM message for CELL_FACH (Step 5 and Step 13)

Information Element	Value/remark
RRC transaction identifier	0
Activation time	Not Present
New C-RNTI	0000000000000001 B
RRC State indicator	CELL_FACH

Contents of PHYSICAL CHANNEL RECONFIGURATION message: AM (Step 9)

Information Element	Value/remark
UTRAN DRX cycle length coefficient	7

11.2A.5 Test Requirements

Table 11.2A.5.1: Parameters for MTCH detection

Parameter	Unit	Test 1	Test 2	Test 3
Phase reference	-	P-CPICH		
I_{oc}	dBm/3.84 MHz	-60		
Cell1 $\hat{I}_{or1}/I_{oc}$	dB	-2.4	-2.4	-2.4
Cell2 $\hat{I}_{or2}/I_{oc}$	dB	-2.4	-2.4	-2.4
Cell3 $\hat{I}_{or3}/I_{oc}$	dB	-2.4	-2.4	-2.4
MTCH Data Rate		128 kbps	256 kbps	128 kbps
Transmission Time Interval	ms	40	40	80
Propagation condition		VA3		
Number of Radio Links p		3	3	3
Delay of Radio Link 2 compared with Radio Link 1		160ms	20 ms	20 ms
Delay of Radio Link 3 compared with Radio Link 1		1240ms	40.67 ms (1 TTI + 1 slot)	80.67 ms (1 TTI + 1 slot)

Table 11.2A.5.2: Test requirements for MTCH detection for UE supporting the enhanced performance requirements type1

Test Number	S-CCPCH_Ec/Ior (dB)	RLC SDU ER
1	-7.6	0.1
2	-8.6	0.1
3	-11.4	0.1

The RLC SDU error rate (RLC SDU ER) for all the MTCH demodulation tests shall not exceed the value specified in 11.2A.5.2 for the specified $\dfrac{S-CCPCH\_E_c}{I_{or}}$.

The RLC SDU error rate = the ratio of (transmitted RLC SDU count – received RLC SDU count) / (transmitted RLC SDU count) < 0.1.

> NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.

11.3   Demodulation of MTCH and cell identification

11.3.1   Definition and applicability

MBMS combining is not controlled by a network but instead it is autonomously handled by a terminal. UE has to be able to receive MTCH and identify intra-frequency neighbour cells according to the requirements. The receive characteristic of the MTCH combined with cell identification is determined by RLC SDU error rate (RLC SDU ER).

The requirements and this test apply to Release 6 and later releases for FDD UE that supports MBMS.

11.3.2   Minimum requirements

For the parameters specified in Table 11.3.2.1 the average downlink S-CCPCH_E$_c$/I$_{or}$ power ratio shall be below the specified value for the RLC SDU error rate shown in Table 11.3.2.2. The cell reselection parameters are given in clause in Table 11.3.2.3. The different cells are assumed to be time aligned.

Table 11.3.2.1: Parameters for MTCH demodulation requirements with cell identification

Parameter	Unit	Test 1		
		Stage 1	Stage 2	Stage 3
Time in each stage	S	2	0.8	2
Phase reference	-	P-CPICH		
I_{oc}	dBm/3.84 MHz	-70	-73	-70
Cell1 $\hat{I}_{or1}/I_{oc}$	dB	-3	0	-3
Cell2 $\hat{I}_{or2}/I_{oc}$	dB	-3	0	-infinity
Cell3 $\hat{I}_{or3}/I_{oc}$	dB	-infinity	0	-3
Propagation condition		Case1		
MTCH Data Rate	Kbps	128		
Number of Radio Links		2	3	2

Table 11.3.2.2: Requirements for MTCH detection

Test Number	S-CCPCH_Ec/Ior (dB)	RLC SDU ER
1	-5.6	0.05

Parameters for combined MTCH demodulation and cell identification requirements are defined in Table 11.3.2.3.

Table 11.3.2.3: Cell reselection parameters

Parameter	Unit	Value
Serving cell in the initial condition		Cell1
Neighbour cells		32 intra-frequency neighbour cells are indicated including Cell2 and Cell3
Cell_selection_and_reselection_quality_measure		CPICH E_c/N_0
Qqualmin	dB	-20
Qrxlevmin	dBm	-115
UE_TXPWR_MAX_RACH	dB	21
Qhyst2	dB	20 dB
Treselection	Seconds	4
Sintrasearch	dB	not sent
IE "FACH Measurement occasion info"		not sent

The reference for this requirement is TS 25.101 [1] clause 11.3.1 and TS 25.101 [1] annex A.9.

11.3.3   Test purpose

To verify that the SDU error rate does not exceed the value at the S-CCPCH_Ec/Ior specified in table 11.3.2.2.

11.3.4   Method of test

11.3.4.1   Initial conditions

Test environment: normal; see clauses G.2.1 and G.2.2.

Frequencies to be tested: mid range; see clause G.2.4.

1) Connect the SS and AWGN noise source and fading simulators to the UE antenna connector as shown in Figure A.23.

2) The DL Reference Measurement Channel (128kbps 40ms TTI) parameters are defined in Annex C.12.1 and C.12.2.

3) The configuration for the downlink channel for each radio link is defined in Annex E.5B.1. The Ior of cell 2 and cell 3 are set to 10 dB lower than cell 1.

4) The same MTCH data shall be sent in all active cells during the test.

5) The UE is switched on.

6) The UE selects the broadcast service provided by the SS (included in the MBMS_ACTIVATED_SERVICES variable).

7) Set up a call according to the generic call setup procedure specified in TS 34.108 [3] clause 7.3.10 to configure and activate an MBMS session and enter the UE into loopback mode 3 with transition to CELL_PCH state. The SS broadcast the cell reselection parameters according to table 11.3.2.3. See TS 34.108 and TS 34.109 for details regarding loopback test mode 3 for MBMS.

8) Set up fading simulators as per the fading condition Case 1, which is described in table D.2.2.1.

9) Switch on the fading simulator.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9 of 34.108 [3], with the exceptions stated in clause 7.3.10 of 34.108 [3], and with the following exceptions:

Contents of PHYSICAL CHANNEL RECONFIGURATION message: AM (Step 7)

Information Element	Value/remark
UTRAN DRX cycle length coefficient	7

11.3.4.2 Procedures

1) Initiate the variables N_{SS} to 0.

2) The SS configures and activates cell 1 to 3 with RF parameters according to Stage 1 conditions in Table 11.3.5.1.

3) The SS transmits valid MAC headers and RLC SDUs on the MTCH radio bearer for 2 seconds during Stage 1, 0.8 seconds during Stage 2 and 2 seconds during T3. The SS changes the test parameters for Cell 1, Cell 2 and Cell 3 from Stage 1 to 3 as specified in table 11.3.5.1 and counts the number of transmitted RLC SDUs on the MTCH with valid MAC headers (N_{SS}) and adds it to N_{SS}_ACC.

4) The SS transmits invalid MAC headers on the MTCH radio bearer and sets Ior of cell 3 to 10dB lower than cell 1.

5) The SS transmits a PAGING TYPE 1 message specified in TS 34.108 [3] clause 7.3.10.4 to place the UE in CELL_FACH state.

6) UE shall move to CELL_FACH state by sending a CELL_UPDATE message. On reception of the CELL UPDATE message the SS shall transmit 3 identical CELL UPDATE CONFIRM message.

7) UE confirms the received C-RNTI to be used in CELL FACH state by transmitting a UTRAN MOBILITY INFORMATION CONFIRM message on the uplink DCCH.

8) The SS sends a "UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST" message.

9) The SS waits for the UE to respond by a "UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE" message reporting the number of received RLC SDUs on MTCH (N_{UEOK}).

10) The SS in Cell 1 calculates the SDU error rate by the following: The SDU error rate = ($N_{SS}\_ACC - N_{UEOK}$) / N_{SS}

N_{UEOK}: UE received RLC SDUs as reported in the "UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE" message in step 9.

N_{SS}_ACC: Accumulated sum of N_{SS} tested so far.

11) The SS orders the UE to move to CELL_PCH state by transmitting a PHYSICAL CHANNEL RECONFIGURATION message with the RRC state indicator set to "CELL_PCH".

12) The UE send a PHYSICAL CHANNEL RECONFIGURATION COMPLETE message.

13) Repeat steps 2) to 12) until the confidence level for RLC SDU's according to annex F.6.4.4.

14) End the RRC connection according to the generic call setup procedure specified in TS 34.108 [3] clause 7.3.10.

NOTE: In the Step 6 and 14 above, the 3 identical CELL UPDATE CONFIRM messages are transmitted with the same RRC message sequence number. Transmitting 3 identical CELL UPDATE CONFIRM messages is done to increase the probability of correct message reception at the UE.

Specific Message Contents

All messages indicated above shall use the same content as described in the default message content in clause 9 of 34.108 [3], with the exceptions stated in clause 7.3.10 of 34.108 [3], and with the following exceptions:

SYSTEM INFORMATION BLOCK TYPE5

Information Element	Value/remark
- PICH Power offset	-2 dB

Content of CELL UPDATE CONFIRM message for CELL_FACH (Step 6 and Step 14)

Information Element	Value/remark
RRC transaction identifier	0
Activation time	Not Present
New C-RNTI	0000000000000001 B
RRC State indicator	CELL_FACH

Contents of PHYSICAL CHANNEL RECONFIGURATION message: AM (Step 11)

Information Element	Value/remark
UTRAN DRX cycle length coefficient	7

11.3.5 Test requirements

The test parameters are specified in table 11.3.5.1.

Table 11.3.5.1: Parameters for MTCH demodulation requirements with cell identification

Parameter	Unit	Test 1		
		Stage 1	Stage 2	Stage 2
Time in each stage	S	2	0.8	2
Phase reference	-	P-CPICH		
I_{oc}	dBm/3.84 MHz	-70	-73	-70
Cell1 $\hat{I}_{or1}/I_{oc}$	dB	-2.4	0.6	-2.4
Cell2 $\hat{I}_{or2}/I_{oc}$	dB	-2.4	0.6	-infinity
Cell3 $\hat{I}_{or3}/I_{oc}$	dB	-infinity	0.6	-2.4
Propagation condition		Case1		
MTCH Data Rate	Kbps	128		
Number of Radio Links		2	3	2

The RLC SDU ER shall not exceed the value specified in table 11.3.5.2 for the specified $\dfrac{S-CCPCH\_E_c}{I_{or}}$.

Table 11.3.5.2: Requirements for MTCH detection

Test Number	S-CCPCH_Ec/Ior (dB)	RLC SDU ER
1	-5.5	0.05

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in clause F.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in clause F.4.