3GPP TSG-RAN Meeting #23
Phoenix, Arizona, USA, 9th – 12th March 2004

Tdoc RP-040045

CR-Form-v7

CHANGE REQUEST

25.141	CR	338	rev	2	Current version	6.4.0

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Proposed change affects: UICC apps ☐ ME ☐ Radio Access Network [X] Core Network ☐

Title:	Performance requirements for HS-DPCCH signaling detection
Source:	Fujitsu, NTT DoCoMo, Panasonic
Work item code:	HSDPA-RF
Date:	Xx/03/2004
Category:	**B**
Release:	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	Introducing the performance requirements for HS-DPCCH signaling detection.
Summary of change:	Performance requirements for HSDPA signaling detection are added. And a new reference measurement channel for HS-DPCCH is defined. Test Tolerances and Measurement system set-up are revised.
Consequences if not approved:	Performance requirements for HS-DPCCH signaling deteciton are not specified, and resulting HSDPA performance specifications are incomplete.

Clauses affected:	4.2.3, 8.(new), Annex A.(new), Annex B.3, Annex F

Other specs Affected:	Y	N		
	X		Other core specifications	25.104
		X	Test specifications	
		X	O&M Specifications	

Other comments:

4.2.3 Performance requirement

Table 4.1E: Test Tolerances for Performance Requirements.

Subclause	Test Tolerance[1]
8.2, Demodulation in static propagation condtion	0.4dB
8.3, Demodulation of DCH in multiplath fading conditons	0.6dB
8.4 Demodulation of DCH in moving propagation conditions	0.6dB
8.5 Demodulation of DCH in birth/death propagation conditions	0.6dB
8.8.1 RACH preamble detection in static propagation conditions	0.4dB
8.8.2 RACH preamble detection in multipath fading case 3	0.6dB
8.8.3 Demodulation of RACH message in static propagation conditions	0.4dB
8.8.4 Demodulation of RACH message in multipath fading case 3	0.6dB
8.9.3 Demodulation of CPCH message in static propagation conditions	0.4dB
8.9.4 Demodulation of CPCH message in multipath fading case 3	0.6dB
8.10 Site Selection Diversity Transmission (SSDT) Mode	0.4dB
8.X.1 ACK false alarm in static propagation conditions	0.4dB
8.X.2 ACK false alarm in multipath fading conditions	0.6dB
8.X.3 ACK mis-detection in static propagation conditions	0.4dB
8.X.4 ACK mis-detection in multipath fading conditions	0.6dB
Note 1: Unless otherwise stated, the Test Tolerances are applied to the stimulus signal(s). See Annex F.	

{Separate Section}

8.X Performance of signaling detection for HS-DPCCH

The performance requirement of HS-DPCCH signaling detection is determined by the two parameters: the probability of false detection of ACK; P(DTX->ACK) and the probability of mis-detection of ACK; P(ACK->DTX or NACK).

8.X.1 ACK false alarm in static propagation conditions

8.X.1.1 Definition and applicability

ACK false alarm is defined as a conditional probability of erroneous detection of ACK when input is only DPCCH and DPDCH (+interference). The performance requirement of ACK false alarm in static propagation conditions is determined by the maximum error ratio allowed when the receiver input signal is at a specified E_c/N_0 limit. ACK false alarm: P(DTX->ACK) shall be 10^{-2} or less.

8.X.1.2 Minimum requirement

ACK false alarm, P(DTX->ACK) ~~shall be above or equal to~~should not exceed the limits for the E_c/N_0 specified in Table 8.Y.

Table 8.Y: Performance requirements for ACK false alarm in AWGN channel

Received E_c/N_0	Required error ratio
-19.9 dB	< 10^{-2}

The reference for this requirement is TS 25.104 subclause 8.Z.1.

8.X.1.3 Test purpose

The test shall verify the receiver's ability to detect HS-DPCCH signaling (ACK/NACK) under static propagation conditions.

8.X.1.4 Method of test

8.X.1.4.1 Initial conditions

Test environment: normal; see subclause 4.4.1.

RF channels to be tested: B, M and T; see subclause 4.8

1) Connect the BS tester generating the wanted signal and AWGN generators to both BS antenna connectors for diversity reception via a combining network as shown in annex B.

8.X.1.4.2 Procedure

1) Adjust the AWGN generator to -84 dBm/3.84 MHz at the BS input.

2) The characteristics of the wanted signal shall be configured according to the corresponding UL reference measurement channel defined in annex A.

3) Adjust the equipment so that required E_c/N_0 specified in table 8.Y+1 is achieved. To achieve the specified E_c/N_0, the ratio of the wanted signal level relative to the AWGN signal at the BS input should be adjusted to: E_c/N_0 [dB].

4) The test signal generator sends only DPCCH and DPDCH and the receiver tries to detect HS-DPCCH signaling. This pattern is repeated. ACK false detection should be made only on those slots ACK/NACK should ~~has~~ be~~en~~ observed~~sent in~~.

8.X.1.5 Test requirements

ACK false alarm, P(DTX->ACK) ~~shall be above or equal to~~should not exceed the limits for the E_c/N_0 specified in Table 8.Y+1.

Table 8.Y+1: Performance requirements for ACK false alarm in AWGN channel

Received E_c/N_0	Required error ratio
-19.5 dB	$< 10^{-2}$

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 subclause 4.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.

8.X.2 ACK false alarm in multipath fading conditions

8.X.2.1 Definition and applicability

ACK false alarm is defined as a conditional probability of erroneous detection of ACK when input is only DPCCH and DPDCH (+interference). The performance requirement of ACK false alarm in multipath fading conditions is determined by the maximum error ratio allowed when the receiver input signal is at a specified E_c/N_0 limit. ACK false alarm: P(DTX->ACK) shall be 10^{-2} or less.

8.X.2.2 Minimum requirement

ACK false alarm, P(DTX->ACK) ~~shall be above or equal to~~should not exceed the limits for the E_c/N_0 specified in Table 8.Y+2.

Table 8.Y+2: Performance requirements for ACK false alarm in fading channels

Propagation conditions	Received E_c/N_0	Required error ratio
Case 1	-13.1 dB	$< 10^{-2}$
Case 2	-16.0 dB	$< 10^{-2}$
Case 3	-17.8 dB	$< 10^{-2}$

The reference for this requirement is TS 25.104 subclause 8.Z.1.

8.X.2.3 Test purpose

The test shall verify the receiver's ability to detect HS-DPCCH signaling (ACK/NACK) under multipath fading case 3 propagation conditions.

8.X.2.4 Method of test

8.X.2.4.1 Initial conditions

Test environment: normal; see subclause 4.4.1.

RF channels to be tested: B, M and T; see subclause 4.8

1) Connect the BS tester generating the wanted signal, multipath fading simulators and AWGN generators to both BS antenna connectors for diversity reception via a combining network as shown in annex B.

8.X.2.4.2 Procedure

1) Adjust the AWGN generator to -84 dBm/3.84 MHz at the BS input.

2) The characteristics of the wanted signal shall be configured according to the corresponding UL reference measurement channel defined in annex A.

3) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex D.

4) Adjust the equipment so that required E_c/N_0 specified in table 8.Y+3 is achieved. To achieve the specified E_c/N_0, the ratio of the wanted signal level relative to the AWGN signal at the BS input should be adjusted to: E_c/N_0 [dB].

5) The test signal generator sends only DPCCH and DPDCH and the receiver tries to detect HS-DPCCH signaling. This pattern is repeated. ACK false detection should be made only on those slots ACK/NACK should be observed ~~has been sent in~~.

8.X.2.5 Test requirements

ACK false alarm, P(DTX->ACK) ~~shall be above or equal to~~should not exceed the limits for the E_c/N_0 specified in Table 8.Y+3.

Table 8.Y+3: Performance requirements for ACK false alarm in fading channels

Propagation conditions	Received E_c/N_0	Required error ratio
Case 1	-12.5 dB	$< 10^{-2}$
Case 2	-15.4 dB	$< 10^{-2}$
Case 3	-17.2 dB	$< 10^{-2}$

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 subclause 4.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.

8.X.3 ACK mis-detection in static propagation conditions

8.X.3.1 Definition and applicability

The probability of ACK mis-detection is defined a probability of ACK mis-detected when ACK is transmitted. The performance requirement of ACK mis-detection in static propagation conditions is determined by the maximum error ratio allowed when the receiver input signal is at a specified E_c/N_0 limit.

~~The threshold factor is chosen to fulfil the requirements on ACK false alarm; P(DTX ->ACK) in subclauses 8.X.1 and 8.X.2.~~

8.X.3.2 Minimum requirement

The probability of ACK mis-detection, P(ACK->NACK or DTX) (= mis-detected when ACK is transmitted) should not exceed the required error ratio for the E_c/N_0 specified in Table 8.Y+4.

Table 8.Y+4: Performance requirements for ACK mis-detection in AWGN channel

Received E_c/N_0	Required error ratio
-17.3 dB	$< 10^{-2}$

The reference for this requirement is TS 25.104 subclause 8.Z.2.

8.X.3.3 Test purpose

The test shall verify the receiver's ability to receive the test signal under static propagation conditions with an error ratio not exceeding a specified limit.

8.X.3.4 Method of test

8.X.3.4.1 Initial conditions

Test environment: normal; see subclause 4.4.1.

RF channels to be tested: B, M and T; see subclause 4.8

~~Threshold factor: Chosen to fulfil the requirements on ACK false alarm; P(DTX ->ACK) in subclauses 8.X.1 and 8.X.2.~~

1) Connect the BS tester generating the wanted signal and AWGN generators to both BS antenna connectors for diversity reception via a combining network as shown in annex B.

8.X.3.4.2 Procedure

1) Adjust the AWGN generator to -84 dBm/3.84 MHz at the BS input.

2) The characteristics of the wanted signal shall be configured according to the corresponding UL reference measurement channel defined in annex A.

3) Adjust the equipment so that required E_c/N_0 specified in table 8.Y+5 is achieved. To achieve the specified E_c/N_0, the ratio of the wanted signal level relative to the AWGN signal at the BS input should be adjusted to: E_c/N_0 [dB].

4) The test signal generator sends the ACKs with DPCCH/DPDCH. The receiver tries to detect ACK. The error ratio is calculated for the ACKs that have been detected.

8.X.3.5 Test requirements

The probability of ACK mis-detection, P(ACK->NACK or DTX) (= mis-detected when ACK is transmitted) should not exceed the required error ratio for the E_c/N_0 specified in Table 8.Y+5.

Table 8.Y+5: Performance requirements for ACK mis-detection in AWGN channel

Received E_c/N_0	Required error ratio
-16.9 dB	$< 10^{-2}$

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 subclause 4.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.

8.X.4 ACK mis-detection in multipath fading conditions

8.X.4.1 Definition and applicability

The probability of ACK mis-detection is defined a probability of ACK mis-detected when ACK is transmitted. The performance requirement of ACK mis-detection in multipath fading conditions is determined by the maximum error ratio allowed when the receiver input signal is at a specified E_c/N_0 limit.

~~The threshold factor is chosen to fulfil the requirements on ACK false alarm; P(DTX ->ACK) in subclauses 8.X.1 and 8.X.2.~~

8.X.4.2 Minimum requirement

The probability of ACK mis-detection, P(ACK->NACK or DTX) (= mis-detected when ACK is transmitted) should not exceed the required error ratio for the E_c/N_0 specified in Table 8.Y+6.

Table 8.Y+6: Performance requirements for ACK mis-detection in fading channels

Propagation conditions	Received E_c/N_0	Required error ratio
Case 1	-10.7 dB	$< 10^{-2}$
Case 2	-13.6 dB	$< 10^{-2}$
Case 3	-12.1 dB	$< 10^{-2}$

The reference for this requirement is TS 25.104 subclause 8.Z.2.

8.X.4.3 Test purpose

The test shall verify the receiver's ability to receive the test signal under multipath fading propagation conditions with an error ratio not exceeding a specified limit.

8.X.4.4 Method of test

8.X.4.4.1 Initial conditions

Test environment: normal; see subclause 4.4.1.

RF channels to be tested: B, M and T; see subclause 4.8

~~Threshold factor: Chosen to fulfil the requirements on ACK false alarm; P(DTX ->ACK) in subclauses 8.X.1 and 8.X.2.~~

1) Connect the BS tester generating the wanted signal, multipath fading simulators and AWGN generators to both BS antenna connectors for diversity reception via a combining network as shown in annex B.

8.X.4.4.2 Procedure

1) Adjust the AWGN generator to -84 dBm/3.84 MHz at the BS input.

2) The characteristics of the wanted signal shall be configured according to the corresponding UL reference measurement channel defined in annex A.

3) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex D.

4) Adjust the equipment so that required E_c/N_0 specified in table 8.Y+7 is achieved. To achieve the specified E_c/N_0, the ratio of the wanted signal level relative to the AWGN signal at the BS input should be adjusted to: E_c/N_0 [dB]

5) The test signal generator sends the ACKs with DPCCH/DPDCH. The receiver tries to detect ACK. The error ratio is calculated for the ACKs that have been detected.

8.X.4.5 Test requirements

The probability of ACK mis-detection, P(ACK->NACK or DTX) (= mis-detected when ACK is transmitted) should not exceed the required error ratio for the E_c/N_0 specified in Table 8.Y+7.

Table 8.Y+7: Performance requirements for ACK mis-detection in fading channels

Propagation conditions	Received E_c/N_0	Required error ratio
Case 1	-10.1 dB	$< 10^{-2}$
Case 2	-13.0 dB	$< 10^{-2}$
Case 3	-11.5 dB	$< 10^{-2}$

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 subclause 4.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.

{Separate Section}

A.? Reference measurement channel for HS-DPCCH

The parameters for the UL HS-DPCCH reference measurement channel are specified in Table A.?.

Table A.?: Reference measurement channel for HS-DPCCH

Parameter				Unit
DPDCH	DTCH	Information bit rate	12.2	kbps
		Physical channel	60	kbps
		Repetition rate	22	%
	DCCH	Information bit rate	2.4	kbps
		Physical channel	15	kbps
		Repetition rate	22	%
	Spreading factor		64	
	Interleaving		20	ms
	Number of DPDCHs		1	
DPCCH	Dedicated pilot		6	Bits/slot
	Power control		2	Bits/slot
	TFCI		2	Bits/slot
	Spreading factor		256	
Power ratio of DPCCH/DPDCH			-2.69	dB
Amplitude ratio of DPCCH/DPDCH			0.7333	
Closed loop power control			OFF	
Repetition factor of ACK/NACK			1	
HS-DPCCH power offset to DPCCH			0	dB
HS-DPCCH timing offset to DPCCH			0	symbol

DPDCH/DPCCH are same as 12.2kbps reference measurement channel specified in Annex A.2.

B.3 Performance requirement

B.3.1 Demodulation of DCH, RACH ~~and~~ CPCH and HS-DPCCH signaling in static conditions

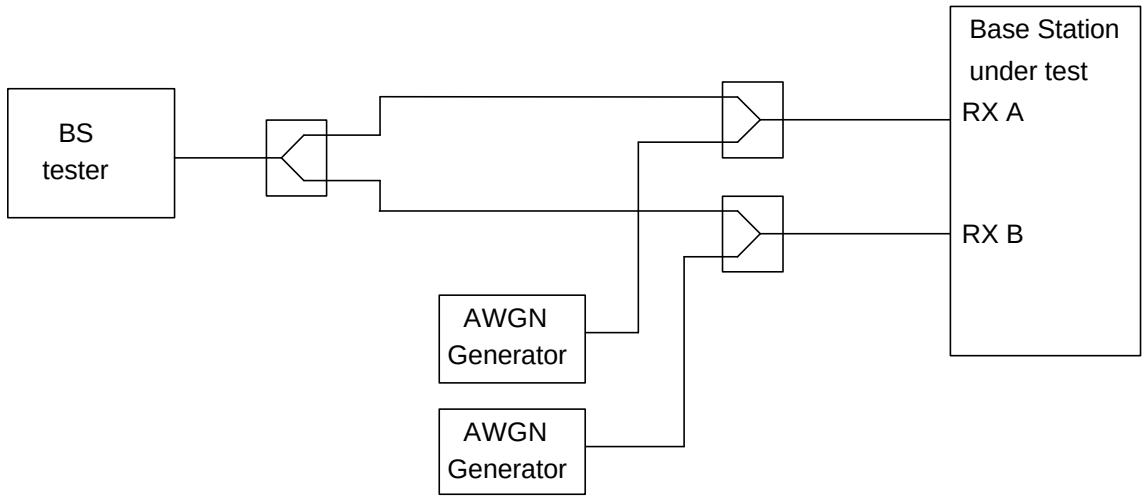

Figure B.13: Functional Set-up for Demodulation of DCH, RACH and CPCH in static conditions

B.3.2 Demodulation of DCH, RACH ~~and~~ CPCH and HS-DPCCH signaling in multipath fading conditions

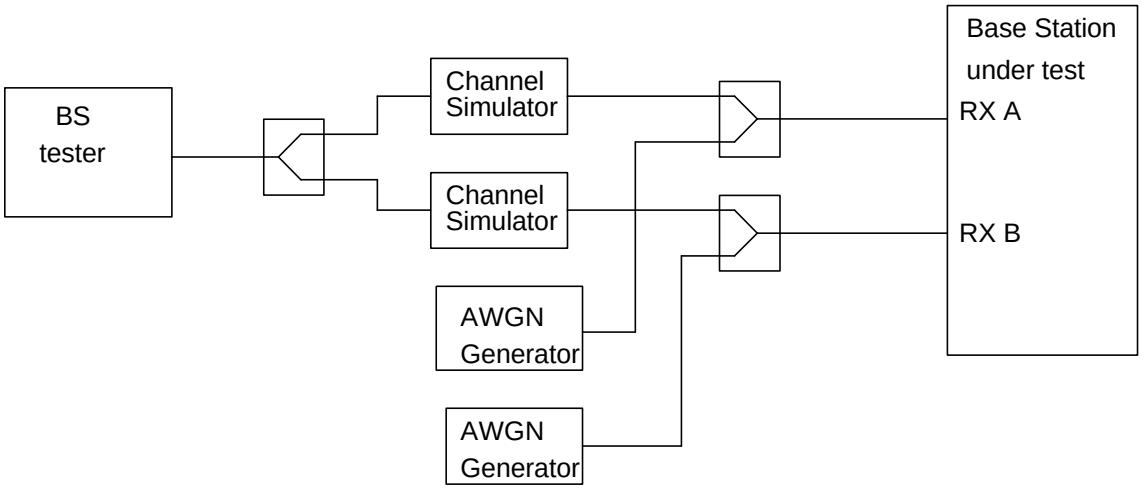

Figure B.14: Functional Set-up for Demodulation of DCH, RACH and CPCH in multipath fading conditions

B.3.3 Verification of the internal BER and BLER calculation

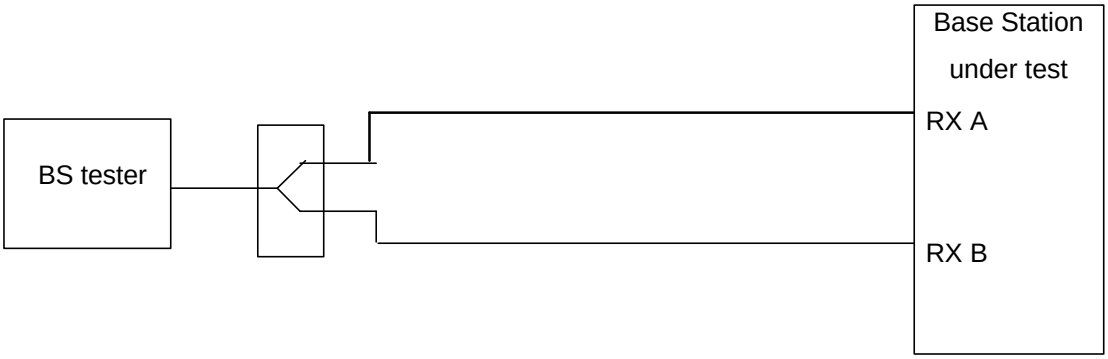

Figure B.15: Functional Set-up for Verification of the internal BLER c

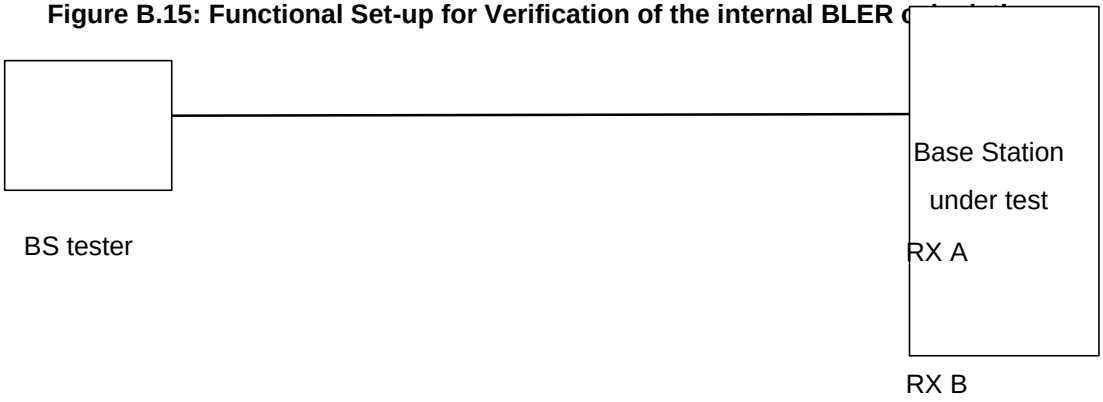

Figure B.16: Functional Set-up for Verification of the internal BER calculation

{Separate Section}

Table F.3: Derivation of Test Requirements (Performance tests)

Test	Minimum Requirement in TS 25.104	Test Tolerance (TT)	Test Requirement in TS 25.141
8.2, Demodulation in static propagation condtion	Received E_b/N_0 values	0.4 dB	Minimum requirement + TT
8.3, Demodulation of DCH in multiplath fading conditons	Received E_b/N_0 values	0.6 dB	Minimum requirement + TT
8.4 Demodulation of DCH in moving propagation conditions	Received E_b/N_0 values	0.6 dB	Minimum requirement + TT
8.5 Demodulation of DCH in birth/death propagation conditions	Received E_b/N_0 values	0.6 dB	Minimum requirement + TT
8.8.1 RACH preamble detection in static propagation conditions	Received E_c/N_0 values	0.4dB	Minimum requirement + TT
8.8.2 RACH preamble detection in multipath fading case 3	Received E_c/N_0 values	0.6dB	Minimum requirement + TT
8.8.3 Demodulation of RACH message in static propagation conditions	Received E_b/N_0 values	0.4dB	Minimum requirement + TT
8.8.4 Demodulation of RACH message in multipath fading case 3	Received E_b/N_0 values	0.6dB	Minimum requirement + TT
8.9.3 Demodulation of CPCH message in static propagation conditions	Received E_b/N_0 values	0.4 dB	Minimum requirement + TT
8.9.4 Demodulation of CPCH message in multipath fading case 3	Received E_b/N_0 values	0.6 dB	Minimum requirement + TT
8.10 Site Selection Diversity Transmission (SSDT) Mode	$SIR_{target} + Q_{th} +7.5$ $SIR_{target} + Q_{th} -7.5$	0.4 dB	$Q_{th} + 7.5 +TT$ $Q_{th} +7.5 -TT$
8.X.1 ACK false alarm in static propagation conditions	Received E_c/N_0 values	0.4 dB	Minimum requirement + TT
8.X.2 ACK false alarm in multipath fading conditions	Received E_c/N_0 values	0.6 dB	Minimum requirement + TT
8.X.3 ACK mis-detection in static propagation conditions	Received E_c/N_0 values	0.4 dB	Minimum requirement + TT
8.X.4 ACK mis-detection in multipath fading conditions	Received E_c/N_0 values	0.6 dB	Minimum requirement + TT