**TSG RAN Meeting #16** **RP-020294**
**Marco Island, FL, USA, 4 - 7 June 2002**

**Title** **CRs (Rel-4 and Rel-5 Category A) to TS 25.141**
**Source** **TSG RAN WG4**
**Agenda Item** **7.4.4**

| RAN4 Tdoc | Spec | Curr Ver | New Ver | CR | R | Cat | Ph | Title | Acronym |
|---|---|---|---|---|---|---|---|---|---|
| R4-020777 | 25.141 | 4.4.0 | 4.5.0 | 207 | | F | Rel-4 | Reference measurement channels for UL RACH Ratio of preamble power and total message power | TEI4 |
| R4-020778 | 25.141 | 5.2.0 | 5.3.0 | 208 | | A | Rel-5 | Reference measurement channels for UL RACH Ratio of preamble power and total message power | TEI4 |
| R4-020817 | 25.141 | 4.4.0 | 4.5.0 | 219 | | F | Rel-4 | Test system uncertainties and test tolerances for RACH tests (Rel-4) | TEI4 |
| R4-020818 | 25.141 | 5.2.0 | 5.3.0 | 220 | | A | Rel-5 | Test system uncertainties and test tolerances for RACH tests (Rel-5) | TEI4 |

**3GPP TSG RAN WG4 Meeting #23** **R4-020777**

**Gyeongju, Korea 13th -17th May, 2002**

CR-Form-v5

# CHANGE REQUEST

⌘ **25.141** **CR** **207** ⌘ **rev** **-** ⌘ Current version: **4.4.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

***Proposed change affects:*** ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☒ Core Network ☐

| | | |
|---|---|---|
| ***Title:*** | ⌘ | Reference measurement channels for UL RACH – Ratio of preamble power and total message power |
| ***Source:*** | ⌘ | RAN WG4 |
| ***Work item code:*** | ⌘ | TEI4 |
| ***Date:*** | ⌘ | 17/5/2002 |
| ***Category:*** | ⌘ | **F** |
| ***Release:*** | ⌘ | Rel-4 |

*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)*

| | | |
|---|---|---|
| ***Reason for change:*** | ⌘ | All simulations that form the basis for the RACH performance requirements were made with the ratio of preamble power and total message power set to 0 dB. The reason behind this was that at the cell border the UE would transmit using its maximum power and in that case it would be optimal to have the same output power in the preamble and in the message part. The current reference measurement channel description does not include the information of 0 dB power ratio. |
| ***Summary of change:*** | ⌘ | Adding the power ratio information to the reference measurement channels for UL RACH. |
| ***Consequences if not approved:*** | ⌘ | Since the requirements have been decided under these 0 dB power ratio conditions it is important to measure them under the same conditions to get relevant results. If the RACH performance is measured with other power ratio values than 0 dB the results will most likely look different. |

| | | |
|---|---|---|
| ***Clauses affected:*** | ⌘ | 8.8.3.1, 8.8.4.1, Annex A7 |
| ***Other specs affected:*** | ⌘ | ☐ Other core specifications ⌘<br>☐ Test specifications<br>☐ O&M Specifications |
| ***Other comments:*** | ⌘ | Equivalent CRs in other Releases: CR208 cat. A to 25.141 v5.2.0 |

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

## 8.8.3 Demodulation of RACH message in static propagation conditions

### 8.8.3.1 Definition and applicability

The performance requirement of RACH in static propagation conditions is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified $E_b/N_0$ limit. The BLER is calculated for each of the measurement channels supported by the base station.

~~The power on the preamble is set to meet or exceed the requirements on Pfa and Pd in subclauses 8.8.1 and 8.8.2.~~ The preamble threshold factor is chosen to fulfil the requirements on Pfa and Pd in subclauses 8.8.1 and 8.8.2. Only one signature is used and it is known by the receiver.

The requirement in this subclause shall apply to base stations intended for general-purpose applications.

## 8.8.4 Demodulation of RACH message in multipath fading case 3

### 8.8.4.1 Definition and applicability

The performance requirement of RACH in multipath fading case 3 is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified $E_b/N_0$ limit. The BLER is calculated for each of the measurement channels supported by the base station.

~~The power on the preamble is set to meet or exceed the requirements on Pfa and Pd in subclauses 8.8.1 and 8.8.2~~ The preamble threshold factor is chosen to fulfil the requirements on Pfa and Pd in subclauses 8.8.1 and 8.8.2. Only one signature is used and it is known by the receiver.

The requirement in this subclause shall apply to base stations intended for general-purpose applications.

# A.7 Reference measurement channels for UL RACH

The parameters for the UL RACH reference measurement channels are specified in Table A.7.

**Table A.7: Reference measurement channels for UL RACH**

| Parameter | | | Unit |
|---|---|---|---|
| RACH | CRC | 16 | bits |
| | Channel Coding | Rate ½ conv. coding | |
| | TTI | 20 | ms |
| | TB size | 168, 360 | bits |
| | Rate Matching | Repetition | |
| | Number of diversity antennas | 2 | |
| | Preamble detection window size | 256 | Chips |
| | Ratio of preamble power and total message power (*) | 0 | dB |
| Power ratio of RACH Control/Data TB = 168 | | -2.69 | dB |
| Power ratio of Control/Data TB = 360 | | -3.52 | dB |

(*) NOTE: If Delta Pp-m is used to adjust the power offset, Delta Pp-m shall be equal to –5 dB.

**3GPP TSG RAN WG4 Meeting #23** **R4-020778**

**Gyeongju, Korea 13th -17th May, 2002**

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# CHANGE REQUEST

⌘ **25.141** **CR** **208** ⌘ **rev** **-** ⌘ Current version: **5.2.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

***Proposed change affects:*** ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network [X] Core Network ☐

| | | |
|---|---|---|
| ***Title:*** | ⌘ | Reference measurement channels for UL RACH – Ratio of preamble power and total message power |
| ***Source:*** | ⌘ | RAN WG4 |
| ***Work item code:*** | ⌘ | TEI4 |
| ***Date:*** | ⌘ | 17/5/2002 |
| ***Category:*** | ⌘ | **A** |
| ***Release:*** | ⌘ | Rel-5 |

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***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)*

| | | |
|---|---|---|
| ***Reason for change:*** | ⌘ | All simulations that form the basis for the RACH performance requirements were made with the ratio of preamble power and total message power set to 0 dB. The reason behind this was that at the cell border the UE would transmit using its maximum power and in that case it would be optimal to have the same output power in the preamble and in the message part. The current reference measurement channel description does not include the information of 0 dB power ratio. |
| ***Summary of change:*** | ⌘ | Adding the power ratio information to the reference measurement channels for UL RACH. |
| ***Consequences if not approved:*** | ⌘ | Since the requirements have been decided under these 0 dB power ratio conditions it is important to measure them under the same conditions to get relevant results. If the RACH performance is measured with other power ratio values than 0 dB the results will most likely look different. |

| | | |
|---|---|---|
| ***Clauses affected:*** | ⌘ | 8.8.3.1, 8.8.4.1, Annex A7 |
| ***Other specs affected:*** | ⌘ | ☐ Other core specifications ⌘<br>☐ Test specifications<br>☐ O&M Specifications |
| ***Other comments:*** | ⌘ | Equivalent CRs in other Releases: CR207 cat. F to 25.141 v4.4.0 |

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

## 8.8.3 Demodulation of RACH message in static propagation conditions

### 8.8.3.1 Definition and applicability

The performance requirement of RACH in static propagation conditions is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified $E_b/N_0$ limit. The BLER is calculated for each of the measurement channels supported by the base station.

~~The power on the preamble is set to meet or exceed the requirements on Pfa and Pd in subclauses 8.8.1 and 8.8.2.~~ The preamble threshold factor is chosen to fulfil the requirements on Pfa and Pd in subclauses 8.8.1 and 8.8.2. Only one signature is used and it is known by the receiver.

The requirement in this subclause shall apply to base stations intended for general-purpose applications.

## 8.8.4 Demodulation of RACH message in multipath fading case 3

### 8.8.4.1 Definition and applicability

The performance requirement of RACH in multipath fading case 3 is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified $E_b/N_0$ limit. The BLER is calculated for each of the measurement channels supported by the base station.

~~The power on the preamble is set to meet or exceed the requirements on Pfa and Pd in subclauses 8.8.1 and 8.8.2~~ The preamble threshold factor is chosen to fulfil the requirements on Pfa and Pd in subclauses 8.8.1 and 8.8.2. Only one signature is used and it is known by the receiver.

The requirement in this subclause shall apply to base stations intended for general-purpose applications.

# A.7 Reference measurement channels for UL RACH

The parameters for the UL RACH reference measurement channels are specified in Table A.7.

**Table A.7: Reference measurement channels for UL RACH**

| Parameter | | | Unit |
|---|---|---|---|
| RACH | CRC | 16 | bits |
| | Channel Coding | Rate ½ conv. coding | |
| | TTI | 20 | ms |
| | TB size | 168, 360 | bits |
| | Rate Matching | Repetition | |
| | Number of diversity antennas | 2 | |
| | Preamble detection window size | 256 | Chips |
| | Ratio of preamble power and total message power (*) | 0 | dB |
| Power ratio of RACH Control/Data TB = 168 | | -2.69 | dB |
| Power ratio of Control/Data TB = 360 | | -3.52 | dB |

(*) NOTE: If Delta Pp-m is used to adjust the power offset, Delta Pp-m shall be equal to –5 dB.

**3GPP TSG RAN WG4 Meeting #23** **R4-020817**

**Gyeongju, Korea 13th -17th May, 2002**

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# CHANGE REQUEST

⌘ **25.141** **CR** **219** ⌘ **rev** **-** ⌘ Current version: **4.4.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

***Proposed change affects:*** ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network **X** Core Network ☐

| | | |
|---|---|---|
| ***Title:*** | ⌘ | Test system uncertainties and test tolerances for RACH tests (Rel-4) |
| ***Source:*** | ⌘ | RAN WG4 |
| ***Work item code:*** | ⌘ | TEI4 |
| ***Date:*** | ⌘ | 17/5/2002 |
| ***Category:*** | ⌘ | **F** |
| ***Release:*** | ⌘ | Rel-4 |

*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)*
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Detailed explanations of the above categories can be found in 3GPP TR 21.900.

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*2 (GSM Phase 2)*
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*R97 (Release 1997)*
*R98 (Release 1998)*
*R99 (Release 1999)*
*REL-4 (Release 4)*
*REL-5 (Release 5)*

| | | |
|---|---|---|
| ***Reason for change:*** | ⌘ | There are no test system uncertainties or test tolerances in 25.141 for the RACH requirements in Clause 8 and the corresponding test requirements are without test tolerances |
| ***Summary of change:*** | ⌘ | Agreed test system uncertainties and test tolerances are introduced and the correct tests requirement are introduced by applying the test tolerance to the minimum requirement (from the core specification)<br>Isolated Impact Analysis: A Base Station fulfilling the existing requirements in Clause 8 will also fulfil the updated requirements. |
| ***Consequences if not approved:*** | ⌘ | The core specification values have been derived without consideration of test tolerance. If it is not applied, the tests will be incorrect. |

| | | |
|---|---|---|
| ***Clauses affected:*** | ⌘ | 4.1.4, 4.2.3, 8.8, Annex F |
| ***Other specs affected:*** | ⌘ | ☐ Other core specifications ⌘<br>☐ Test specifications<br>☐ O&M Specifications |
| ***Other comments:*** | ⌘ | Equivalent CRs in other Releases: CR220 cat. A to 25.141 v5.2.0 |

### 4.1.4 Measurement of performance requirement

**Table 4.1B: Maximum Test System Uncertainty for Performance Requirements**

| Subclause | Maximum Test System Uncertainty[1] | Derivation of Test System Uncertainty |
|---|---|---|
| 8.2, Demodulation in static propagation condition | ± 0.4dB | Wanted/AWGN: ± 0.4dB (relative uncertainty for $E_b/N_0$)<br>(AWGN: ±1dB) |
| 8.3, Demodulation of DCH in multipath fading conditions | ± 0.6dB | Fader: ± 0.5dB<br>Wanted/AWGN: ± 0.4dB (relative)<br>Combined relative uncertainty for $E_b/N_0$: ± 0.6dB |
| 8.4 Demodulation of DCH in moving propagation conditions | ± 0.6dB | Fader: ± 0.5dB<br>Wanted/AWGN: ± 0.4dB (relative)<br>Combined relative uncertainty for $E_b/N_0$: ± 0.6dB |
| 8.5 Demodulation of DCH in birth/death propagation conditions | ± 0.6dB | Fader: ± 0.5dB<br>Wanted/AWGN: ± 0.4dB (relative)<br>Combined relative uncertainty for $E_b/N_0$: ± 0.6dB |
| 8.8.1 RACH preamble detection in static propagation conditions | ± 0.4dB | Wanted/AWGN: ± 0.4dB (relative uncertainty for $E_c/N_0$)<br>(AWGN: ±1dB) |
| 8.8.2 RACH preamble detection in multipath fading case 3 | ± 0.6dB | Fader: ± 0.5dB<br>Wanted/AWGN: ± 0.4dB (relative)<br>Combined relative uncertainty for $E_c/N_0$: ± 0.6dB |
| 8.8.3 Demodulation of RACH message in static propagation conditions | ± 0.4dB | Wanted/AWGN: ± 0.4dB (relative uncertainty for $E_b/N_0$)<br>(AWGN: ±1dB) |
| 8.8.4 Demodulation of RACH message in multipath fading case 3 | ± 0.6dB | Fader: ± 0.5dB<br>Wanted/AWGN: ± 0.4dB (relative)<br>Combined relative uncertainty for $E_b/N_0$: ± 0.6dB |
| Note 1: Only the overall stimulus error is considered here. The effect of errors in the BER/FER measurements due to finite test duration is not considered. | | |

## 4.2 Test Tolerances (informative)

The Test Tolerances defined in this subclause have been used to relax the Minimum Requirements in this specification to derive the Test Requirements.

The Test Tolerances are derived from Test System uncertainties, regulatory requirements and criticality to system performance. As a result, the Test Tolerances may sometimes be set to zero.

The test tolerances should not be modified for any reason e.g. to take account of commonly known test system errors (such as mismatch, cable loss, etc.)

## 4.2.1 Transmitter

**Table 4.1C: Test Tolerances for transmitter tests.**

| Subclause | Test Tolerance[1] |
|---|---|
| 6.2.1 Maximum Output Power | 0.7 dB |
| 6.2.2 CPICH Power accuracy | 0.8 dB |
| 6.3.4 Frequency error | 12 Hz |
| 6.4.2 Power control steps | 0.1 dB |
| 6.4.3 Power dynamic range | 0.2 dB |
| 6.4.4 Total power dynamic range | 0.3 dB |
| 6.5.1 Occupied Bandwidth | 0 kHz |
| 6.5.2.1 Spectrum emission mask | 1.5 dB[3] |
| 6.5.2.2 ACLR | 0.8 dB |
| 6.5.3 Spurious emissions | 0 dB |
| 6.6 Transmit intermodulation (interferer requirements) | 0 dB[2] |
| 6.7.1 Frequency error | 12 Hz |
| 6.7.12 EVM | 0 % |
| 6.7.23 Peak code Domain error | 1.0dB |
| Note 1: Unless otherwise stated, The Test Tolerances are applied to the DUT Minimum Requirement. See Annex F.<br>Note 2: The Test Tolerance is applied to the stimulus signal(s). See Annex F.<br>Note 3: 0 dB test tolerance for the additional Band b requirements. | |

## 4.2.2 Receiver

**Table 4.1D: Test Tolerances for receiver tests.**

| Subclause | Test Tolerance[1] |
|---|---|
| 7.2 Reference sensitivity level | 0.7 dB |
| 7.3 Dynamic range | 1.2 dB |
| 7.4 Adjacent channel selectivity | 0 dB |
| 7.5 Blocking characteristics | 0 dB |
| 7.6 Intermod Characteristics | 0 dB |
| 7.7 Spurious Emissions | 0 dB[2] |
| Note 1: Unless otherwise stated, the Test Tolerances are applied to the stimulus signal(s). See Annex F.<br>Note 2: The Test Tolerance is applied to the DUT Minimum Requirement. See Annex F. | |

## 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 |
| Note 1: Unless otherwise stated, the Test Tolerances are applied to the stimulus signal(s). See Annex F. | |

# 8.8 RACH performance

## 8.8.1 RACH preamble detection in static propagation conditions

### 8.8.1.1 Definition and applicability

The performance requirement of RACH for preamble detection in static propagation conditions is determined by the two parameters probability of false detection of the preamble (Pfa) and the probability of detection of preamble (Pd). The performance is measured by the required $E_c/N_0$ at probability of detection, Pd of 0.99 and 0.999. Pfa is defined as a conditional probability of erroneous detection of the preamble when input is only noise (+interference). Pd is defined as conditional probability of detection of the preamble when the signal is present. Pfa shall be $10^{-3}$ or less. Only one signature is used and it is known by the receiver.

The requirement in this subclause shall apply to base stations intended for general-purpose applications.

### 8.8.1.2 ~~Conformance~~ Minimum requirement

The $P_d$ shall be above or equal to the limits for the $E_c/N_0$ specified in table 8.16.

**Table 8.16: Preamble detection requirements in AWGN channel**

| | $E_c/N_0$ for required Pd ≥ 0.99 ~~Pd = 0.99~~ | $E_c/N_0$ for required Pd ≥ 0.999 ~~Pd = 0.999~~ |
|---|---|---|
| ~~Required $E_c/N_0$~~ | -20.5 dB | -20.1 dB |

The reference for this requirement is TS 25.104 subclause 8.7.1.

### 8.8.1.3 Test purpose

The test shall verify the receiver's ability to detect RACH preambles under static propagation conditions.

### 8.8.1.4 Method of test

#### 8.8.1.4.1 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.

#### 8.8.1.4.2 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 8.17~~8.16~~ is achieved. To achieve the specified $E_c/N_O$, the ratio of the wanted signal level (of the preamble part) relative to the AWGN signal at the BS input should be adjusted to: ~~-84+~~$E_c/N_0$ [dB~~m~~]. ~~The wanted signal levels during transmission (of the preamble part) at the BS input for the specified $E_c/N_0$ levels in table 8.16 is found in table 8.17.~~

~~**Table 8.17: Wanted signal levels (of the preamble part) during transmission in AWGN channel**~~

| | ~~Pd = 0.99~~ | ~~Pd = 0.999~~ |
|---|---|---|
| ~~Wanted signal level during transmission~~ | ~~-104.5 dBm.~~ | ~~-104.1 dBm~~ |

4) The test signal generator sends a preamble and the receiver tries to detect the preamble. This pattern is repeated. Preamble detection should be made only on those access slots a preamble has been sent in.


**Figure 8.2: RACH test signal pattern**

### 8.8.1.5 Test requirements

The $P_d$ shall be above or equal to the Pd limits for the $E_c/N_0$ levels specified in table 8.178~~.16~~.

**Table 8.17: Preamble detection test requirements in AWGN channel**

| $E_c/N_0$ for required Pd ≥ 0.99 | $E_c/N_0$ for required Pd ≥ 0.999 |
|---|---|
| -20.1 dB | -19.7 dB |

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.

## 8.8.2 RACH preamble detection in multipath fading case 3

### 8.8.2.1 Definition and applicability

The performance requirement of RACH for preamble detection in in multipath fading case 3 is determined by the two parameters probability of false detection of the preamble (Pfa) and the probability of detection of preamble (Pd). The performance is measured by the required $E_c/N_0$ at probability of detection, Pd of 0.99 and 0.999. Pfa is defined as a conditional probability of erroneous detection of the preamble when input is only noise (+interference). Pd is defined as conditional probability of detection of the preamble when the signal is present. Pfa shall be $10^{-3}$ or less. Only one signature is used and it is known by the receiver.

The requirement in this subclause shall apply to base stations intended for general-purpose applications.

### 8.8.2.2 ~~Conformance~~ minimum requirement

The $P_d$ shall be above or equal to the limits for the $E_c/N_0$ specified in table 8.18.

**Table 8.18: Preamble detection requirements in fading case 3 channel**

| | $E_c/N_0$ for required Pd ≥ 0.99 ~~Pd = 0.99~~ | $E_c/N_0$ for required Pd ≥ 0.999 ~~Pd = 0.999~~ |
|---|---|---|
| ~~Required $E_c/N_0$~~ | -15.5 dB | -13.4 dB |

The reference for this requirement is TS 25.104 subclause 8.7.1.

### 8.8.2.3 Test purpose

The test shall verify the receiver's ability to detect RACH preambles under multipath fading case 3 propagation conditions.

### 8.8.2.4 Method of test

#### 8.8.2.4.1 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.

#### 8.8.2.4.2 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 8.198.18 is achieved. To achieve the specified $E_c/N_O$, the ratio of the wanted signal level (of the preamble part) relative to the AWGN signal at the BS input should be adjusted to: -84+$E_c/N_0$ [dBm]. The wanted signal levels during transmission (of the preamble part) at the BS input for the specified $E_c/N_0$ levels in table 8.18 is found in table 8.19.

**Table 8.19: Wanted signal levels (of the preamble part) during transmission in fading case 3 channels**

| | Pd = 0.99 | Pd = 0.999 |
|---|---|---|
| Wanted signal level during transmission | -99.5 dBm | -97,4 dBm |

5) The test signal generator sends a preamble and the receiver tries to detect the preamble. This pattern is repeated. Preamble detection should be made only on those access slots a preamble has been sent in.


**Figure 8.3: RACH test signal pattern**

### 8.8.2.5 Test requirements

The $P_d$ shall be above or equal to the Pd limits for the $E_c/N_0$ levels specified in table 8.198.18.

**Table 8.19: Preamble detection test requirements in fading case 3 channel**

| $E_c/N_0$ for required Pd ≥ 0.99 | $E_c/N_0$ for required Pd ≥ 0.999 |
|---|---|
| -14.9 dB | -12.8 dB |

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.

## 8.8.3 Demodulation of RACH message in static propagation conditions

### 8.8.3.1 Definition and applicability

The performance requirement of RACH in static propagation conditions is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified $E_b/N_0$ limit. The BLER is calculated for each of the measurement channels supported by the base station.

The power on the preamble is set to meet or exceed the requirements on Pfa and Pd in subclauses 8.8.1 and 8.8.2. Only one signature is used and it is known by the receiver.

The requirement in this subclause shall apply to base stations intended for general-purpose applications.

### 8.8.3.2 ~~Conformance~~ Minimum requirement

The BLER shall not exceed the limit for the $E_b/N_0$ specified in table 8.20.

**Table 8.20: Performance requirements in AWGN channel**

| Transport Block size TB and TTI in frames | $E_b/N_0$ for required BLER < $10^{-1}$ | $E_b/N_0$ for required BLER < $10^{-2}$ |
|---|---|---|
| 168 bits, TTI = 20 ms | 4.1 dB | 5.0 dB |
| 360 bits, TTI = 20 ms | 3.9 dB | 4.8 dB |

The reference for this requirement is TS 25.104 subclause 8.7.2.

### 8.8.3.3 Test purpose

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

### 8.8.3.4 Method of test

#### 8.8.3.4.1 Initial conditions

Test environment: normal; see subclause 4.4.1.

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

Preamble threshold factor: chosen to fulfil the requirements on Pfa and Pd in subclauses 8.8.1 and 8.8.2

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.

#### 8.8.3.4.2 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 $E_b/N_0$ specified in table 8.21~~8.20~~ is achieved. To achieve the specified $E_b/N_O$, the ratio of the wanted signal level (of the message part) relative to the AWGN signal at the BS input should be adjusted to:
~~-84+~~10*Log10(TB/(TTI*3.84*$10^6$))+$E_b/N_0$ [dB~~m~~]. ~~The wanted signal levels during transmission (of the message part) at the BS input for the specified $E_b/N_0$ levels in table 8.20 is found in table 8.21.~~

~~**Table 8.21: Wanted signal levels (of the message part) during transmission in AWGN channel**~~

| ~~Transport Block size TB and TTI in frames~~ | ~~Wanted signal level during transmission for required BLER<$10^{-1}$~~ | ~~Wanted signal level during transmission for required BLER<$10^{-2}$~~ |
|---|---|---|
| ~~168 bits, TTI = 20 ms~~ | ~~-106.5 dBm~~ | ~~-105.6 dBm~~ |
| ~~360 bits, TTI = 20 ms~~ | ~~-103.4 dBm~~ | ~~-102.5 dBm~~ |

4) The test signal generator sends a preamble followed by the actual RACH message. This pattern is repeated (see figure 8.4). The receiver tries to detect the preamble and the message. The block error rate is calculated for the messages that have been decoded. Messages following undetected preambles shall not be taken into account in the BLER measurement.


**Figure 8.4: RACH test signal pattern**

### 8.8.3.5 Test requirements

The BLER measured according the subclause 8.8.3.4.2 shall not exceed the BLER limits for the $E_b/N_0$ levels specified in table 8.21~~8.20~~.

**Table 8.21: Test requirements in AWGN channel**

| Transport Block size TB and TTI in frames | $E_b/N_0$ for required BLER < $10^{-1}$ | $E_b/N_0$ for required BLER < $10^{-2}$ |
|---|---|---|
| 168 bits, TTI = 20 ms | 4.5 dB | 5.4 dB |
| 360 bits, TTI = 20 ms | 4.3 dB | 5.2 dB |

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.

## 8.8.4 Demodulation of RACH message in multipath fading case 3

### 8.8.4.1 Definition and applicability

The performance requirement of RACH in multipath fading case 3 is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified $E_b/N_0$ limit. The BLER is calculated for each of the measurement channels supported by the base station.

The power on the preamble is set to meet or exceed the requirements on Pfa and Pd in subclauses 8.8.1 and 8.8.2. Only one signature is used and it is known by the receiver.

The requirement in this subclause shall apply to base stations intended for general-purpose applications.

### 8.8.4.2 ~~Conformance~~ Minimum requirement

The BLER shall not exceed the limit for the $E_b/N_0$ specified in table 8.22.

**Table 8.22: Performance requirements in fading case 3 channel**

| Transport Block size TB and TTI in frames | $E_b/N_0$ for required BLER < $10^{-1}$ | $E_b/N_0$ for required BLER < $10^{-2}$ |
|---|---|---|
| 168 bits, TTI = 20 ms | 7.4 dB | 8.5 dB |
| 360 bits, TTI = 20 ms | 7.3 dB | 8.3 dB |

The reference for this requirement is TS 25.104 subclause 8.7.2.

### 8.8.4.3 Test purpose

The test shall verify the receiver's ability to receive the test signal under multipath fading case 3 propagation conditions with a BLER not exceeding a specified limit.

### 8.8.4.4 Method of test

#### 8.8.4.4.1 Initial conditions

Test environment: normal; see subclause 4.4.1.

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

Preamble threshold factor: chosen to fulfil the requirements on Pfa and Pd in subclauses 8.8.1 and 8.8.2

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.

#### 8.8.4.4.2 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 $E_b/N_0$ specified in table 8.238.22 is achieved. To achieve the specified $E_b/N_O$, the ratio of the wanted signal level (of the message part) relative to the AWGN signal at the BS input should be adjusted to:
-84+10*Log10(TB/(TTI*3.84*$10^6$))+$E_b/N_0$ [dBm]. The wanted signal levels during transmission (of the message part) at the BS input for the specified $E_b/N_0$ levels in table 8.22 is found in table 8.23.

**Table 8.23: Wanted signal levels (of the message part) during transmission in fading case 3 channel**

| Transport Block size TB and TTI in frames | Wanted signal level during transmission for required BLER<$10^{-1}$ | Wanted signal level during transmission for required BLER<$10^{-2}$ |
|---|---|---|
| 168 bits, TTI = 20 ms | -103.2 dBm | -102.1 dBm |
| 360 bits, TTI = 20 ms | -100 dBm | -99 dBm |

5) The test signal generator sends a preamble followed by the actual RACH message. This pattern is repeated (see figure 8.5). The receiver tries to detect the preamble and the message. The block error rate is calculated for the messages that have been decoded. Messages following undetected preambles shall not be taken into account in the BLER measurement.

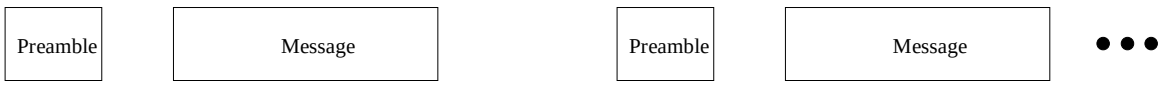


**Figure 8.5: RACH test signal pattern**

### 8.8.4.5 Test requirements

The BLER measured according to subclause 8.8.4.4.2 shall not exceed the BLER limits for the $E_b/N_0$ levels specified in table 8.238.22.

**Table 8.23: Test requirements in fading case 3 channel**

| Transport Block size TB and TTI in frames | $E_b/N_0$ for required BLER < $10^{-1}$ | $E_b/N_0$ for required BLER < $10^{-2}$ |
|---|---|---|
| 168 bits, TTI = 20 ms | 8.0 dB | 9.1 dB |
| 360 bits, TTI = 20 ms | 7.9 dB | 8.9 dB |

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.

# Annex F (informative): Derivation of Test Requirements

The Test Requirements in this specification have been calculated by relaxing the Minimum Requirements of the core specification using the Test Tolerances defined in subclause 4.2. When the Test Tolerance is zero, the Test Requirement will be the same as the Minimum Requirement. When the Test Tolerance is non-zero, the Test Requirements will differ from the Minimum Requirements, and the formula used for this relaxation is given in tables F.1, F.2 and F.3

Note that a formula for applying Test Tolerances is provided for all tests, even those with a test tolerance of zero. This is necessary in the case that the Test System uncertainty is greater than that allowed in subclause 4.1. In this event, the excess error shall be subtracted from the defined test tolerance in order to generate the correct tightened Test Requirements as defined in subclause 4.3.

For example, a Test System having 0.9 dB accuracy for test 6.2.1 Base Station maximum output power (which is 0.2 dB above the limit specified in subclause 4.) would subtract 0.2 dB from the Test Tolerance of 0.7 dB defined in subclause 4.2. This new test tolerance of 0.5 dB would then be applied to the Minimum Requirement using the formula defined in Table F.1 to give a new range of ±2.5 dB of the manufacturer's rated output power.

Using this same approach for the case where a test had a test tolerance of 0 dB, an excess error of 0.2 dB would result in a modified test tolerance of –0.2 dB.

**Table F.1: Derivation of Test Requirements (Transmitter tests)**

| Test | Minimum Requirement in TS 25.104 | Test Tolerance (TT) | Test Requirement in TS 25.141 |
|---|---|---|---|
| 6.2.1 Base station maximum output power | In normal conditions … within +2 dB and -2 dB of the manufacturer's rated output power<br>In extreme conditions… within +2.5 dB and –2.5 dB of the manufacturer's rated output power | 0.7 dB | Formula: Upper limit + TT<br>Lower limit – TT<br>In normal conditions … within +2.7 dB and –2.7 dB of the manufacturer's rated output power<br>In extreme conditions… within +3.2 dB and –3.2 dB of the manufacturer's rated output power |
| 6.2.2 CPICH Power accuracy | CPICH power shall be within ±2.1dB | 0.8 dB | Formula: Upper limit + TT<br>Lower limit – TT<br>CPICH power shall be within ±2.9dB |
| 6.3.4 Frequency error | Frequency error limit = 0.05 ppm | 12 Hz | Formula: Frequency Error limit + TT<br><br>Frequency Error limit = 0.05 ppm + 12 Hz |
| 6.4.2 Power control steps | Lower and upper limits as specified in tables 6.9 and 6.10a | 0.1 dB | Formula: Upper limits + TT<br>Lower limits – TT<br>0.1 dB applied as above to tables 6.9 and 6.10a |
| 6.4.3 Power dynamic range | maximum power limit = BS maximum output power -3 dB<br>minimum power limit = BS maximum output power –28 dB | 0.2 dB | Formula: maximum power limit – TT<br>minimum power limit + TT<br>maximum power limit = BS maximum output power –3.2 dB<br>minimum power limit = BS maximum output power –27.8 dB |
| 6.4.4 Total power dynamic range | total power dynamic range limit = 18 dB | 0.3 dB | Formula: total power dynamic range limit – TT<br>total power dynamic range limit = 17.7 dB |
| 6.5.1 Occupied Bandwidth | occupied bandwidth limit = 5 MHz | 0 kHz | Formula: Occupied bandwidth limit + TT<br>Occupied bandwidth limit = 5 MHz |
| 6.5.2.1 Spectrum emission mask | Maximum level defined in tables 6.11, 6.12, 6.13 and 6.14: | 1.5 dB (0 dB for the additional Band b requirements) | Formula: Maximum level + TT<br>Add 1.5 to Maximum level entries in tables 6.11, 6.12, 6.13 and 6.14. |
| 6.5.2.2 Adjacent Channel Leakage power Ratio (ACLR) | ACLR limit = 45 dB at 5 MHz<br><br>ACLR limit = 50 dB at 10 MHz | 0.8 dB | Formula: ACLR limit – TT<br><br>ACLR limit = 44.2 dB at 5 MHz<br>ACLR limit = 49.2 dB at 10 MHz |
| 6.5.3 Spurious emissions | Maximum level defined in tables 6.16 to 6.26 | 0 dB | Formula: Maximum limit + TT<br><br>Add 0 to Maximum level in tables 6.16 to 6.26 |
| 6.6 Transmit intermodulation (interferer requirements)<br>This tolerance applies to the stimulus and not the measurements defined in 6.5.2.1, 6.5.2.2 and 6.5.3. | Wanted signal level – interferer level = 30 dB | 0 dB | Formula: Ratio + TT<br><br>Wanted signal level – interferer level = 30 + 0 dB |
| 6.7.1 EVM | EVM limit =17.5 % | 0 % | Formula: EVM limit + TT<br><br>EVM limit = 17.5% |
| 6.7.2 Peak code Domain error | Peak code domain error limit = -33 dB | 1.0 dB | Formula: Peak code domain error limit + TT<br><br>Peak code domain error limit = -32 dB |

**Table F.2: Derivation of Test Requirements (Receiver tests)**

| Test | Minimum Requirement in TS 25.104 | Test Tolerance (TT) | Test Requirement in TS 25.141 |
|---|---|---|---|
| 7.2 Reference sensitivity | Reference sensitivity level = -121 dBm<br><br>FER/BER limit = 0.001 | 0.7 dB | Formula: Reference sensitivity level + TT<br><br>Reference sensitivity level = -120.3 dBm<br><br>FER/BER limit is not changed |
| 7.3 Dynamic range | Wanted signal level = -91 dBm<br>AWGN level = -73 dBm/3.84 MHz | 1.2 dB | Formula: Wanted signal level + TT<br>AWGN level unchanged<br><br>Wanted signal level = -89.8 dBm |
| 7.4 Adjacent channel selectivity | Wanted signal level = -115 dBm<br>W-CDMA interferer level = -52 dBm | 0 dB | Formula: Wanted signal level + TT<br>W-CDMA interferer level unchanged<br><br>Wanted signal level = -115 dBm |
| 7.5 Blocking characteristics | Wanted signal level = -115 dBm<br>Interferer level See table 7.4a / 7.4b | 0 dB | Formula: Wanted signal level + TT<br>Interferer level unchanged<br><br>Wanted signal level = -115 dBm |
| 7.6 Intermod Characteristics | Wanted signal level = -115 dBm<br>Interferer1 level (10 MHz offset CW) = -48 dBm<br>Interferer2 level (20 MHz offset W-CDMA Modulated) = -48 dBm | 0 dB | Formula: Wanted signal level + TT<br>Interferer1 level unchanged<br>Interferer2 level unchanged<br><br>Wanted signal level = -115 dBm |
| 7.7 Spurious Emissions | Maximum level defined in Table 7.7 | 0 dB | Formula: Maximum level + TT<br><br>Add TT to Maximum level in table 7.7 |

**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 condition | Received $E_b/N_0$ values | 0.4 dB | Minimum requirement + TT |
| 8.3, Demodulation of DCH in multipath fading conditions | 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 |

**3GPP TSG RAN WG4 Meeting #23** **R4-020818**

**Gyeongju, Korea 13th -17th May, 2002**

*CR-Form-v5*

# CHANGE REQUEST

⌘ **25.141** **CR** **220** ⌘ **rev** **-** ⌘ Current version: **5.2.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

***Proposed change affects:*** ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☒ Core Network ☐

| | | |
|---|---|---|
| ***Title:*** | ⌘ | Test system uncertainties and test tolerances for RACH tests |
| ***Source:*** | ⌘ | RAN WG4 |
| ***Work item code:*** | ⌘ | TEI4 |
| ***Date:*** | ⌘ | 17/5/2002 |
| ***Category:*** | ⌘ | **A** |
| ***Release:*** | ⌘ | Rel-5 |

*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)* |

| | | |
|---|---|---|
| ***Reason for change:*** | ⌘ | There are no test system uncertainties or test tolerances in 25.141 for the RACH requirements in Clause 8 and the corresponding test requirements are without test tolerances |
| ***Summary of change:*** | ⌘ | Agreed test system uncertainties and test tolerances are introduced and the correct tests requirement are introduced by applying the test tolerance to the minimum requirement (from the core specification)<br><br>Isolated Impact Analysis: A Base Station fulfilling the existing requirements in Clause 8 will also fulfil the updated requirements. |
| ***Consequences if not approved:*** | ⌘ | The core specification values have been derived without consideration of test tolerance. If it is not applied, the tests will be incorrect. |

| | | |
|---|---|---|
| ***Clauses affected:*** | ⌘ | 4.1.4, 4.2.3, 8.8, Annex F |
| ***Other specs affected:*** | ⌘ | ☐ Other core specifications ⌘<br>☐ Test specifications<br>☐ O&M Specifications |
| ***Other comments:*** | ⌘ | Equivalent CRs in other Releases: CR219 cat. F to 25.141 v4.4.0 |

### 4.1.4 Measurement of performance requirement

**Table 4.1B: Maximum Test System Uncertainty for Performance Requirements**

| Subclause | Maximum Test System Uncertainty[1] | Derivation of Test System Uncertainty |
|---|---|---|
| 8.2, Demodulation in static propagation condition | ± 0.4dB | Wanted/AWGN: ± 0.4dB (relative uncertainty for $E_b/N_0$)<br>(AWGN: ±1dB) |
| 8.3, Demodulation of DCH in multipath fading conditions | ± 0.6dB | Fader: ± 0.5dB<br>Wanted/AWGN: ± 0.4dB (relative)<br>Combined relative uncertainty for $E_b/N_0$: ± 0.6dB |
| 8.4 Demodulation of DCH in moving propagation conditions | ± 0.6dB | Fader: ± 0.5dB<br>Wanted/AWGN: ± 0.4dB (relative)<br>Combined relative uncertainty for $E_b/N_0$: ± 0.6dB |
| 8.5 Demodulation of DCH in birth/death propagation conditions | ± 0.6dB | Fader: ± 0.5dB<br>Wanted/AWGN: ± 0.4dB (relative)<br>Combined relative uncertainty for $E_b/N_0$: ± 0.6dB |
| 8.8.1 RACH preamble detection in static propagation conditions | ± 0.4dB | Wanted/AWGN: ± 0.4dB (relative uncertainty for $E_c/N_0$)<br>(AWGN: ±1dB) |
| 8.8.2 RACH preamble detection in multipath fading case 3 | ± 0.6dB | Fader: ± 0.5dB<br>Wanted/AWGN: ± 0.4dB (relative)<br>Combined relative uncertainty for $E_c/N_0$: ± 0.6dB |
| 8.8.3 Demodulation of RACH message in static propagation conditions | ± 0.4dB | Wanted/AWGN: ± 0.4dB (relative uncertainty for $E_b/N_0$)<br>(AWGN: ±1dB) |
| 8.8.4 Demodulation of RACH message in multipath fading case 3 | ± 0.6dB | Fader: ± 0.5dB<br>Wanted/AWGN: ± 0.4dB (relative)<br>Combined relative uncertainty for $E_b/N_0$: ± 0.6dB |
| Note 1: Only the overall stimulus error is considered here. The effect of errors in the BER/FER measurements due to finite test duration is not considered. | | |

## 4.2 Test Tolerances (informative)

The Test Tolerances defined in this subclause have been used to relax the Minimum Requirements in this specification to derive the Test Requirements.

The Test Tolerances are derived from Test System uncertainties, regulatory requirements and criticality to system performance. As a result, the Test Tolerances may sometimes be set to zero.

The test tolerances should not be modified for any reason e.g. to take account of commonly known test system errors (such as mismatch, cable loss, etc.)

### 4.2.1 Transmitter

**Table 4.1C: Test Tolerances for transmitter tests.**

| Subclause | Test Tolerance[1] |
|---|---|
| 6.2.1 Maximum Output Power | 0.7 dB |
| 6.2.2 CPICH Power accuracy | 0.8 dB |
| 6.3.4 Frequency error | 12 Hz |
| 6.4.2 Power control steps | 0.1 dB |
| 6.4.3 Power dynamic range | 0.2 dB |
| 6.4.4 Total power dynamic range | 0.3 dB |
| 6.5.1 Occupied Bandwidth | 0 kHz |
| 6.5.2.1 Spectrum emission mask | 1.5 dB[3] |
| 6.5.2.2 ACLR | 0.8 dB |
| 6.5.3 Spurious emissions | 0 dB |
| 6.6 Transmit intermodulation (interferer requirements) | 0 dB[2] |
| 6.7.1 Frequency error | 12 Hz |
| 6.7.12 EVM | 0 % |
| 6.7.23 Peak code Domain error | 1.0dB |
| Note 1: Unless otherwise stated, The Test Tolerances are applied to the DUT Minimum Requirement. See Annex F.<br>Note 2: The Test Tolerance is applied to the stimulus signal(s). See Annex F.<br>Note 3: 0 dB test tolerance for the additional Band b requirements. | |

### 4.2.2 Receiver

**Table 4.1D: Test Tolerances for receiver tests.**

| Subclause | Test Tolerance[1] |
|---|---|
| 7.2 Reference sensitivity level | 0.7 dB |
| 7.3 Dynamic range | 1.2 dB |
| 7.4 Adjacent channel selectivity | 0 dB |
| 7.5 Blocking characteristics | 0 dB |
| 7.6 Intermod Characteristics | 0 dB |
| 7.7 Spurious Emissions | 0 dB[2] |
| Note 1: Unless otherwise stated, the Test Tolerances are applied to the stimulus signal(s). See Annex F.<br>Note 2: The Test Tolerance is applied to the DUT Minimum Requirement. See Annex F. | |

### 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 |
| Note 1: Unless otherwise stated, the Test Tolerances are applied to the stimulus signal(s). See Annex F. | |

# 8.8 RACH performance

## 8.8.1 RACH preamble detection in static propagation conditions

### 8.8.1.1 Definition and applicability

The performance requirement of RACH for preamble detection in static propagation conditions is determined by the two parameters probability of false detection of the preamble (Pfa) and the probability of detection of preamble (Pd). The performance is measured by the required $E_c/N_0$ at probability of detection, Pd of 0.99 and 0.999. Pfa is defined as a conditional probability of erroneous detection of the preamble when input is only noise (+interference). Pd is defined as conditional probability of detection of the preamble when the signal is present. Pfa shall be $10^{-3}$ or less. Only one signature is used and it is known by the receiver.

The requirement in this subclause shall apply to base stations intended for general-purpose applications.

### 8.8.1.2 ~~Conformance~~ Minimum requirement

The $P_d$ shall be above or equal to the limits for the $E_c/N_0$ specified in table 8.16.

**Table 8.16: Preamble detection requirements in AWGN channel**

| | $E_c/N_0$ for required Pd ≥ 0.99 ~~Pd = 0.99~~ | $E_c/N_0$ for required Pd ≥ 0.999 ~~Pd = 0.999~~ |
|---|---|---|
| ~~Required $E_c/N_0$~~ | -20.5 dB | -20.1 dB |

The reference for this requirement is TS 25.104 subclause 8.7.1.

### 8.8.1.3 Test purpose

The test shall verify the receiver's ability to detect RACH preambles under static propagation conditions.

### 8.8.1.4 Method of test

#### 8.8.1.4.1 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.

#### 8.8.1.4.2 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 8.17~~8.16~~ is achieved. To achieve the specified $E_c/N_O$, the ratio of the wanted signal level (of the preamble part) relative to the AWGN signal at the BS input should be adjusted to: ~~-84+~~$E_c/N_0$ [dB~~m~~]. ~~The wanted signal levels during transmission (of the preamble part) at the BS input for the specified $E_c/N_0$ levels in table 8.16 is found in table 8.17.~~

~~**Table 8.17: Wanted signal levels (of the preamble part) during transmission in AWGN channel**~~

| | ~~Pd = 0.99~~ | ~~Pd = 0.999~~ |
|---|---|---|
| ~~Wanted signal level during transmission~~ | ~~-104.5 dBm.~~ | ~~-104.1 dBm~~ |

4) The test signal generator sends a preamble and the receiver tries to detect the preamble. This pattern is repeated. Preamble detection should be made only on those access slots a preamble has been sent in.


**Figure 8.2: RACH test signal pattern**

### 8.8.1.5 Test requirements

The $P_d$ shall be above or equal to the Pd limits for the $E_c/N_0$ levels specified in table 8.178~~.16~~.

**Table 8.17: Preamble detection test requirements in AWGN channel**

| $E_c/N_0$ for required Pd ≥ 0.99 | $E_c/N_0$ for required Pd ≥ 0.999 |
|---|---|
| -20.1 dB | -19.7 dB |

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.

## 8.8.2 RACH preamble detection in multipath fading case 3

### 8.8.2.1 Definition and applicability

The performance requirement of RACH for preamble detection in in multipath fading case 3 is determined by the two parameters probability of false detection of the preamble (Pfa) and the probability of detection of preamble (Pd). The performance is measured by the required $E_c/N_0$ at probability of detection, Pd of 0.99 and 0.999. Pfa is defined as a conditional probability of erroneous detection of the preamble when input is only noise (+interference). Pd is defined as conditional probability of detection of the preamble when the signal is present. Pfa shall be $10^{-3}$ or less. Only one signature is used and it is known by the receiver.

The requirement in this subclause shall apply to base stations intended for general-purpose applications.

### 8.8.2.2 ~~Conformance~~ minimum requirement

The $P_d$ shall be above or equal to the limits for the $E_c/N_0$ specified in table 8.18.

**Table 8.18: Preamble detection requirements in fading case 3 channel**

| | $E_c/N_0$ for required Pd ≥ 0.99 ~~Pd = 0.99~~ | $E_c/N_0$ for required Pd ≥ 0.999 ~~Pd = 0.999~~ |
|---|---|---|
| ~~Required $E_c/N_0$~~ | -15.5 dB | -13.4 dB |

The reference for this requirement is TS 25.104 subclause 8.7.1.

### 8.8.2.3 Test purpose

The test shall verify the receiver's ability to detect RACH preambles under multipath fading case 3 propagation conditions.

### 8.8.2.4 Method of test

#### 8.8.2.4.1 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.

#### 8.8.2.4.2 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 8.198.18 is achieved. To achieve the specified $E_c/N_O$, the ratio of the wanted signal level (of the preamble part) relative to the AWGN signal at the BS input should be adjusted to: -84+$E_c/N_0$ [dBm]. The wanted signal levels during transmission (of the preamble part) at the BS input for the specified $E_c/N_0$ levels in table 8.18 is found in table 8.19.

**Table 8.19: Wanted signal levels (of the preamble part) during transmission in fading case 3 channels**

| | Pd = 0.99 | Pd = 0.999 |
|---|---|---|
| Wanted signal level during transmission | -99.5 dBm | -97,4 dBm |

5) The test signal generator sends a preamble and the receiver tries to detect the preamble. This pattern is repeated. Preamble detection should be made only on those access slots a preamble has been sent in.


**Figure 8.3: RACH test signal pattern**

### 8.8.2.5 Test requirements

The $P_d$ shall be above or equal to the Pd limits for the $E_c/N_0$ levels specified in table 8.198.18.

**Table 8.19: Preamble detection test requirements in fading case 3 channel**

| $E_c/N_0$ for required Pd ≥ 0.99 | $E_c/N_0$ for required Pd ≥ 0.999 |
|---|---|
| -14.9 dB | -12.8 dB |

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.

## 8.8.3 Demodulation of RACH message in static propagation conditions

### 8.8.3.1 Definition and applicability

The performance requirement of RACH in static propagation conditions is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified $E_b/N_0$ limit. The BLER is calculated for each of the measurement channels supported by the base station.

The power on the preamble is set to meet or exceed the requirements on Pfa and Pd in subclauses 8.8.1 and 8.8.2. Only one signature is used and it is known by the receiver.

The requirement in this subclause shall apply to base stations intended for general-purpose applications.

### 8.8.3.2 ~~Conformance~~ Minimum requirement

The BLER shall not exceed the limit for the $E_b/N_0$ specified in table 8.20.

**Table 8.20: Performance requirements in AWGN channel**

| Transport Block size TB and TTI in frames | $E_b/N_0$ for required BLER < $10^{-1}$ | $E_b/N_0$ for required BLER < $10^{-2}$ |
|---|---|---|
| 168 bits, TTI = 20 ms | 4.1 dB | 5.0 dB |
| 360 bits, TTI = 20 ms | 3.9 dB | 4.8 dB |

The reference for this requirement is TS 25.104 subclause 8.7.2.

### 8.8.3.3 Test purpose

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

### 8.8.3.4 Method of test

#### 8.8.3.4.1 Initial conditions

Test environment: normal; see subclause 4.4.1.

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

Preamble threshold factor: chosen to fulfil the requirements on Pfa and Pd in subclauses 8.8.1 and 8.8.2

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.

#### 8.8.3.4.2 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 $E_b/N_0$ specified in table 8.21~~8.20~~ is achieved. To achieve the specified $E_b/N_O$, the ratio of the wanted signal level (of the message part) relative to the AWGN signal at the BS input should be adjusted to:
~~-84+~~10*Log10(TB/(TTI*3.84*$10^6$))+$E_b/N_0$ [dB~~m~~]. ~~The wanted signal levels during transmission (of the message part) at the BS input for the specified $E_b/N_0$ levels in table 8.20 is found in table 8.21.~~

~~**Table 8.21: Wanted signal levels (of the message part) during transmission in AWGN channel**~~

| ~~Transport Block size TB and TTI in frames~~ | ~~Wanted signal level during transmission for required BLER<$10^{-1}$~~ | ~~Wanted signal level during transmission for required BLER<$10^{-2}$~~ |
|---|---|---|
| ~~168 bits, TTI = 20 ms~~ | ~~-106.5 dBm~~ | ~~-105.6 dBm~~ |
| ~~360 bits, TTI = 20 ms~~ | ~~-103.4 dBm~~ | ~~-102.5 dBm~~ |

4) The test signal generator sends a preamble followed by the actual RACH message. This pattern is repeated (see figure 8.4). The receiver tries to detect the preamble and the message. The block error rate is calculated for the messages that have been decoded. Messages following undetected preambles shall not be taken into account in the BLER measurement.


**Figure 8.4: RACH test signal pattern**

### 8.8.3.5 Test requirements

The BLER measured according the subclause 8.8.3.4.2 shall not exceed the BLER limits for the $E_b/N_0$ levels specified in table 8.21~~8.20~~.

**Table 8.21: Test requirements in AWGN channel**

| Transport Block size TB and TTI in frames | $E_b/N_0$ for required BLER < $10^{-1}$ | $E_b/N_0$ for required BLER < $10^{-2}$ |
|---|---|---|
| 168 bits, TTI = 20 ms | 4.5 dB | 5.4 dB |
| 360 bits, TTI = 20 ms | 4.3 dB | 5.2 dB |

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.

## 8.8.4 Demodulation of RACH message in multipath fading case 3

### 8.8.4.1 Definition and applicability

The performance requirement of RACH in multipath fading case 3 is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified $E_b/N_0$ limit. The BLER is calculated for each of the measurement channels supported by the base station.

The power on the preamble is set to meet or exceed the requirements on Pfa and Pd in subclauses 8.8.1 and 8.8.2. Only one signature is used and it is known by the receiver.

The requirement in this subclause shall apply to base stations intended for general-purpose applications.

### 8.8.4.2 ~~Conformance~~ Minimum requirement

The BLER shall not exceed the limit for the $E_b/N_0$ specified in table 8.22.

**Table 8.22: Performance requirements in fading case 3 channel**

| Transport Block size TB and TTI in frames | $E_b/N_0$ for required BLER < $10^{-1}$ | $E_b/N_0$ for required BLER < $10^{-2}$ |
|---|---|---|
| 168 bits, TTI = 20 ms | 7.4 dB | 8.5 dB |
| 360 bits, TTI = 20 ms | 7.3 dB | 8.3 dB |

The reference for this requirement is TS 25.104 subclause 8.7.2.

### 8.8.4.3 Test purpose

The test shall verify the receiver's ability to receive the test signal under multipath fading case 3 propagation conditions with a BLER not exceeding a specified limit.

### 8.8.4.4 Method of test

#### 8.8.4.4.1 Initial conditions

Test environment: normal; see subclause 4.4.1.

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

Preamble threshold factor: chosen to fulfil the requirements on Pfa and Pd in subclauses 8.8.1 and 8.8.2

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.

#### 8.8.4.4.2 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 $E_b/N_0$ specified in table 8.238~~.22~~ is achieved. To achieve the specified $E_b/N_O$, the ratio of the wanted signal level (of the message part) relative to the AWGN signal at the BS input should be adjusted to:
~~-84+~~10*Log10(TB/(TTI*3.84*$10^6$))+$E_b/N_0$ [dB~~m~~]. ~~The wanted signal levels during transmission (of the message part) at the BS input for the specified $E_b/N_0$ levels in table 8.22 is found in table 8.23.~~

~~**Table 8.23: Wanted signal levels (of the message part) during transmission in fading case 3 channel**~~

| ~~Transport Block size TB and TTI in frames~~ | ~~Wanted signal level during transmission for required BLER<$10^{-1}$~~ | ~~Wanted signal level during transmission for required BLER<$10^{-2}$~~ |
|---|---|---|
| ~~168 bits, TTI = 20 ms~~ | ~~-103.2 dBm~~ | ~~-102.1 dBm~~ |
| ~~360 bits, TTI = 20 ms~~ | ~~-100 dBm~~ | ~~-99 dBm~~ |

5) The test signal generator sends a preamble followed by the actual RACH message. This pattern is repeated (see figure 8.5). The receiver tries to detect the preamble and the message. The block error rate is calculated for the messages that have been decoded. Messages following undetected preambles shall not be taken into account in the BLER measurement.

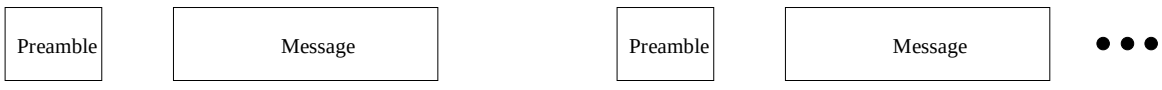


**Figure 8.5: RACH test signal pattern**

### 8.8.4.5 Test requirements

The BLER measured according to subclause 8.8.4.4.2 shall not exceed the BLER limits for the $E_b/N_0$ levels specified in table 8.238~~.22~~.

**Table 8.23: Test requirements in fading case 3 channel**

| Transport Block size TB and TTI in frames | $E_b/N_0$ for required BLER < $10^{-1}$ | $E_b/N_0$ for required BLER < $10^{-2}$ |
|---|---|---|
| 168 bits, TTI = 20 ms | 8.0 dB | 9.1 dB |
| 360 bits, TTI = 20 ms | 7.9 dB | 8.9 dB |

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.

# Annex F (informative): Derivation of Test Requirements

The Test Requirements in this specification have been calculated by relaxing the Minimum Requirements of the core specification using the Test Tolerances defined in subclause 4.2. When the Test Tolerance is zero, the Test Requirement will be the same as the Minimum Requirement. When the Test Tolerance is non-zero, the Test Requirements will differ from the Minimum Requirements, and the formula used for this relaxation is given in tables F.1, F.2 and F.3

Note that a formula for applying Test Tolerances is provided for all tests, even those with a test tolerance of zero. This is necessary in the case that the Test System uncertainty is greater than that allowed in subclause 4.1. In this event, the excess error shall be subtracted from the defined test tolerance in order to generate the correct tightened Test Requirements as defined in subclause 4.3.

For example, a Test System having 0.9 dB accuracy for test 6.2.1 Base Station maximum output power (which is 0.2 dB above the limit specified in subclause 4.) would subtract 0.2 dB from the Test Tolerance of 0.7 dB defined in subclause 4.2. This new test tolerance of 0.5 dB would then be applied to the Minimum Requirement using the formula defined in Table F.1 to give a new range of ±2.5 dB of the manufacturer's rated output power.

Using this same approach for the case where a test had a test tolerance of 0 dB, an excess error of 0.2 dB would result in a modified test tolerance of –0.2 dB.

**Table F.1: Derivation of Test Requirements (Transmitter tests)**

| Test | Minimum Requirement in TS 25.104 | Test Tolerance (TT) | Test Requirement in TS 25.141 |
|---|---|---|---|
| 6.2.1 Base station maximum output power | In normal conditions … within +2 dB and -2 dB of the manufacturer's rated output power<br>In extreme conditions… within +2.5 dB and –2.5 dB of the manufacturer's rated output power | 0.7 dB | Formula: Upper limit + TT<br>Lower limit – TT<br>In normal conditions … within +2.7 dB and –2.7 dB of the manufacturer's rated output power<br>In extreme conditions… within +3.2 dB and –3.2 dB of the manufacturer's rated output power |
| 6.2.2 CPICH Power accuracy | CPICH power shall be within ±2.1dB | 0.8 dB | Formula: Upper limit + TT<br>Lower limit – TT<br>CPICH power shall be within ±2.9dB |
| 6.3.4 Frequency error | Frequency error limit = 0.05 ppm | 12 Hz | Formula: Frequency Error limit + TT<br><br>Frequency Error limit = 0.05 ppm + 12 Hz |
| 6.4.2 Power control steps | Lower and upper limits as specified in tables 6.9 and 6.10a | 0.1 dB | Formula: Upper limits + TT<br>Lower limits – TT<br>0.1 dB applied as above to tables 6.9 and 6.10a |
| 6.4.3 Power dynamic range | maximum power limit = BS maximum output power -3 dB<br>minimum power limit = BS maximum output power –28 dB | 0.2 dB | Formula: maximum power limit – TT<br>minimum power limit + TT<br>maximum power limit = BS maximum output power –3.2 dB<br>minimum power limit = BS maximum output power –27.8 dB |
| 6.4.4 Total power dynamic range | total power dynamic range limit = 18 dB | 0.3 dB | Formula: total power dynamic range limit – TT<br>total power dynamic range limit = 17.7 dB |
| 6.5.1 Occupied Bandwidth | occupied bandwidth limit = 5 MHz | 0 kHz | Formula: Occupied bandwidth limit + TT<br>Occupied bandwidth limit = 5 MHz |
| 6.5.2.1 Spectrum emission mask | Maximum level defined in tables 6.11, 6.12, 6.13 and 6.14: | 1.5 dB (0 dB for the additional Band b requirements) | Formula: Maximum level + TT<br>Add 1.5 to Maximum level entries in tables 6.11, 6.12, 6.13 and 6.14. |
| 6.5.2.2 Adjacent Channel Leakage power Ratio (ACLR) | ACLR limit = 45 dB at 5 MHz<br><br>ACLR limit = 50 dB at 10 MHz | 0.8 dB | Formula: ACLR limit – TT<br><br>ACLR limit = 44.2 dB at 5 MHz<br>ACLR limit = 49.2 dB at 10 MHz |
| 6.5.3 Spurious emissions | Maximum level defined in tables 6.16 to 6.26 | 0 dB | Formula: Maximum limit + TT<br><br>Add 0 to Maximum level in tables 6.16 to 6.26 |
| 6.6 Transmit intermodulation (interferer requirements)<br>This tolerance applies to the stimulus and not the measurements defined in 6.5.2.1, 6.5.2.2 and 6.5.3. | Wanted signal level – interferer level = 30 dB | 0 dB | Formula: Ratio + TT<br><br>Wanted signal level – interferer level = 30 + 0 dB |
| 6.7.1 EVM | EVM limit =17.5 % | 0 % | Formula: EVM limit + TT<br><br>EVM limit = 17.5% |
| 6.7.2 Peak code Domain error | Peak code domain error limit = -33 dB | 1.0 dB | Formula: Peak code domain error limit + TT<br><br>Peak code domain error limit = -32 dB |

**Table F.2: Derivation of Test Requirements (Receiver tests)**

| Test | Minimum Requirement in TS 25.104 | Test Tolerance (TT) | Test Requirement in TS 25.141 |
|---|---|---|---|
| 7.2 Reference sensitivity | Reference sensitivity level = -121 dBm<br><br>FER/BER limit = 0.001 | 0.7 dB | Formula: Reference sensitivity level + TT<br><br>Reference sensitivity level = -120.3 dBm<br><br>FER/BER limit is not changed |
| 7.3 Dynamic range | Wanted signal level = -91 dBm<br>AWGN level = -73 dBm/3.84 MHz | 1.2 dB | Formula: Wanted signal level + TT<br>AWGN level unchanged<br><br>Wanted signal level = -89.8 dBm |
| 7.4 Adjacent channel selectivity | Wanted signal level = -115 dBm<br>W-CDMA interferer level = -52 dBm | 0 dB | Formula: Wanted signal level + TT<br>W-CDMA interferer level unchanged<br><br>Wanted signal level = -115 dBm |
| 7.5 Blocking characteristics | Wanted signal level = -115 dBm<br>Interferer level See table 7.4a / 7.4b | 0 dB | Formula: Wanted signal level + TT<br>Interferer level unchanged<br><br>Wanted signal level = -115 dBm |
| 7.6 Intermod Characteristics | Wanted signal level = -115 dBm<br>Interferer1 level (10 MHz offset CW) = -48 dBm<br>Interferer2 level (20 MHz offset W-CDMA Modulated) = -48 dBm | 0 dB | Formula: Wanted signal level + TT<br>Interferer1 level unchanged<br>Interferer2 level unchanged<br><br>Wanted signal level = -115 dBm |
| 7.7 Spurious Emissions | Maximum level defined in Table 7.7 | 0 dB | Formula: Maximum level + TT<br><br>Add TT to Maximum level in table 7.7 |

**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 condition | Received $E_b/N_0$ values | 0.4 dB | Minimum requirement + TT |
| 8.3, Demodulation of DCH in multipath fading conditions | 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 |