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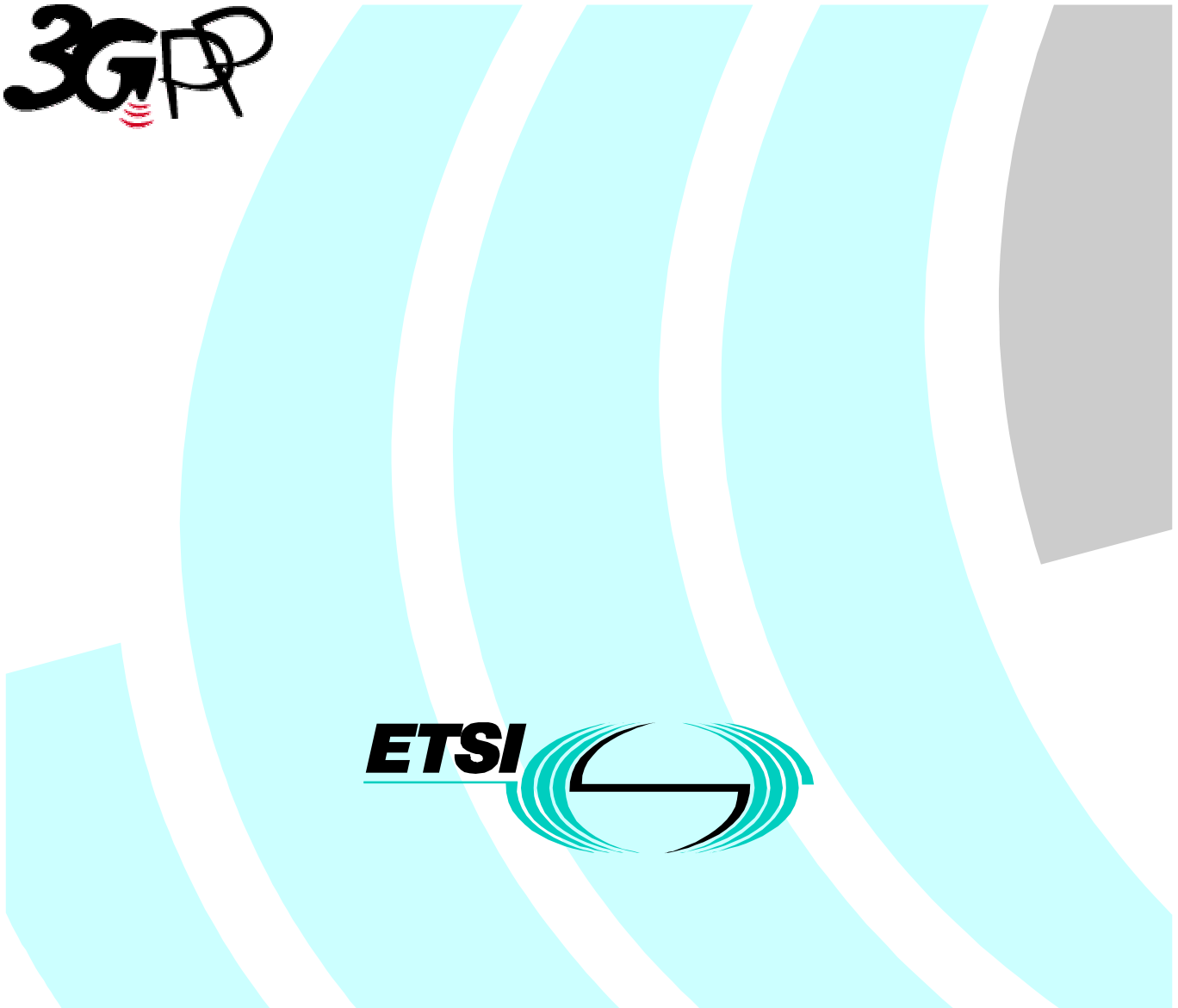
*Technical Specification*

**Universal Mobile Telecommunications System (UMTS);**
**Requirements for Support of Radio Resource Management (TTD)**
**(3G TS 25.123 version 3.0.0 Release 1999)**



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# Foreword

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# Contents

# Foreword

This Technical Specification has been produced by the 3GPP.

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x the first digit:

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z the third digit is incremented when editorial only changes have been incorporated in the specification.

# 1 Scope

This Technical Specification specifies requirements for support of Radio Resource Management for TDD. These requirements include requirements on measurements in UTRAN and the UE as well as requirements on node dynamical behaviour and interaction, in terms of delay and response characteristics.

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an TS shall also be taken to refer to later versions published as an EN with the same number.

[1] 3GPP Homepage: www.3GPP.org

[2] 25.150 Introduction

[3] 25.101 MS Radio transmission and reception (FDD)

[4] 25.104 BTS Radio transmission and reception (FDD)

[5] 25.102 MS Radio transmission and reception (TDD)

[6] 25.105 BTS Radio transmission and reception (TDD)

[7] 25.103 RF parameters in support of RRM

[8] 25.141 Basestation conformance testing (FDD)

[9] 25.142 Basestation conformance testing (TDD)

[10] 25.113 Basestation EMC

[11] 25.942 RF System scenarios

[12] 25.922 RRM Strategies

[13] 25.215 Physical Layer Measurements (FDD)

[14] 25.225 Physical Layer Measurements (TDD)

[15] 25.302 Services provided by Physical Layer

[16] 25.331 RRC Protocol Specification

[17] 25.224 Physical Layer Procedures (TDD)

[18] 25.304 UE procedures in Idle Mode

# 3 Definitions, symbols and abbreviations

## 3.1 Definitions

For the purpose of the present document the following definitions apply.

The main general definitions strictly related to the Transmission and Reception characteristics but important also for this specification can be found in [3] for UE FDD, in [4] for BS FDD, in [5] for UE TDD, in [6] for BS TDD.

## 3.2 Symbols

For the purposes of the present document, the following symbols apply:

<symbol> <Explanation>

| **Symbol** | **Explanation** |
|---|---|
| […] | Values included in square bracket must be considered for further studies, because it means that a decision about that value was not taken; |
| $\hat{I}_{or}$ | "RXLEV", see 25.101 or 25.102 section 3.3 and Annex C. |
| | |

## 3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

| | |
|---|---|
| **RRM** | Radio Resource Management |
| **ACPR** | Adjacent Channel Power Ratio |
| **BS** | Base Station |
| **CW** | Continuous wave (unmodulated signal) |
| **DL** | Down link (forward link) |
| **EIRP** | Equivalent Isotropic Radiated Power |
| **FDD** | Frequency Division Duplexing |
| **FER** | Frame Error Rate |
| **PPM** | Parts Per Million |
| **RSSI** | Received Signal Strength Indicator |
| **SIR** | Signal to Interference ratio |
| **TDD** | Time Division Duplexing |
| **TPC** | Transmit Power Control |
| **UE** | User Equipment |
| **UL** | Up link (reverse link) |
| **UTRA** | UMTS Terrestrial Radio Access |

# 4 Idle Mode Tasks

## 4.1 Introduction

*Note: The paging period and the repetition rate of relevant system information blocks needs to be defined.*

Whenever a PLMN has been selected the UE shall start to find a suitable cell to camp on, this is ‘cell selection’.

When camped on cell the UE regularly searches for a better cell depending on the cell reselection criteria, this is called ‘cell reselection’. The procedures for cell selection and reselection are described in 3GPP RAN TS 25.304 ‘UE procedures in idle mode’ and the measurements carried out by the UE are explained in specification 3GPP RAN TS 25.225 ‘Physical Layer Measurements (TDD)’. The measurements performance requirements are specified in section 11.

# 4.2 RF Cell Selection Scenario

*[Note: Some performance requirements in agreed scenarios are added into this section. More scenarios will be added later]*

## 4.2.1 Requirements for Cell Selection single carrier single cell case

### 4.2.1.1 Cell selection delay

The UE shall be capable of selecting a suitable cell within [5] seconds from switch on in the test case defined in following section in Table 4-1. The cell selection delay is defined as a time the UE needs for sending RRC Connection Request for Location Registration to UTRAN after the power has been switched on with a valid USIM and PIN is disabled.

### 4.2.1.2 Test Parameters

The stored information of the last registered PLMN is utilized in this test. The stored information includes UTRA RF CHANNEL NUMBER. The active cell in the test does not contain any neighbour cells in its measurement control information.

**Table 4-1:**

| **Parameter** | **Unit** | **Cell 1** |
|---|---|---|
| *UTRA RF Channel Number* | | Channel 1 |
| *PCCPCH_Ec/Ior* | dB | -12 |
| *SCH_Ec/Ior* | dB | -12 |
| *PICH_Ec/Ior* | dB | -15 |
| *OCNS* | dB | To Be Calculated |
| $\hat{I}_{or}/I_{oc}$ | dB | 0 |
| $I_{oc}$ | dBm/3.84 MHz | -60 |
| Propagation Condition | | AWGN |
| *Qmin* | dB | [ ] |
| *UE_TXPWR_MAX_RACH* | dBm | [ ] |

### 4.2.1.3 Performance Requirements

Correct cell selection shall be greater than [X%] with [Y%] confidence. Cell selection is correct if within [5 ] seconds the UE camps on the cell,.

## 4.2.2 Requirements for Cell Selection multicarrier carrier multi cell case

### 4.2.2.1 Cell selection delay

The UE shall be capable of selecting a suitable cell within [5+x] seconds from switch on in the test case defined in following section in Table 4-2. The cell selection delay is defined as a time the UE needs for sending RRC Connection Request for Location Registration message to UTRAN after the power has been switched on with a valid USIM and PIN is disabled.

#### 4.2.2.2 Test Parameters

The stored information of the last registered PLMN is utilized in this test. The stored information includes one of the UTRA RF CHANNEL NUMBERs used in the test. All the cells in the test are given in the measurement control information of each cell, which are on the RF carrier stored to the UE.

**Table 4-2:**

| Parameter | Unit | Cell 1 | Cell 2 | Cell 3 | Cell 4 | Cell 5 | Cell 6 |
|---|---|---|---|---|---|---|---|
| *UTRA RF Channel Number* | | Channel 1 | Channel 1 | Channel 1 | Channel 2 | Channel 2 | Channel 2 |
| *PCCPCH_Ec/Ior* | dB | -12 | -12 | -12 | -12 | -12 | -12 |
| *SCH_Ec/Ior* | dB | -12 | -12 | -12 | --12 | -12 | -12 |
| *PICH_Ec/Ior* | dB | -15 | -15 | -15 | -15 | -15 | -15 |
| OCNS | dB | To Be Calculated | To Be Calculated | To Be Calculated | To Be Calculated | To Be Calculated | To Be Calculated |
| $\hat{I}_{or}/I_{oc}$ | dB | 0 | -4.8 | -9.5 | -4.8 | 5.9 | -9.5 |
| $I_{oc}$ | dBm/3.84 MHz | -60 | | | -60 | | |
| Propagation Condition | | AWGN | | | AWGN | | |
| *Qmin* | dB | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] |
| *UE_TXPWR_MAX_RACH* | dBm | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] |

#### 4.2.2.3 Performance Requirements

Correct cell selection shall be greater than [X%] with [Y%] confidence. Cell selection is correct if within [5+x] seconds the UE camps on the cell, which fulfills the cell selection criteria .

## 4.3 RF Cell Re-Selection Scenario

*[Note: One performance requirement in agreed scenario is added into this section. More scenarios will be added later]*

### 4.3.1 Requirements for Cell Re-Selection single carrier multi cell case

#### 4.3.1.1 Cell re-selection delay

When the UE is camped on one of the cells, the UE shall be capable of re-selecting a new cell in the test case defined in the following section in Table 4-3within [5] seconds from it becoming a cell to be re-selected according the cell re-selection criteria. The cells, which are possible to be re-reselected during the test are belonging to different location areas. The cell re-selection delay is then defined as a time the UE needs for sending RRC Connection Request for Location Update message to UTRAN.

#### 4.3.1.2 Test Parameters

One of the 6 cells in Table 4-3 is serving cell and all others are given in the measurement control information of the serving cell. 2 of the cells are possible for cell re-selection and 4 of the cells are steady interfering cells.

**Table 4-3:**

| Parameter | Unit | Cell 1 | | Cell 2 | | Cell 3 | | Cell 4 | | Cell 5 | | Cell 6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T1 | T2 | T1 | T2 | T1 | T2 | T1 | T2 | T1 | T2 |
| *UTRA RF Channel Number* | | Channel 1 | | Channel 1 | | Channel 1 | | Channel 1 | | Channel 1 | | Channel 1 | |
| *PCCPCH_Ec/Ior* | dB | -12 | | -12 | | -12 | | -12 | | -12 | | -12 | |
| *SCH_Ec/Ior* | dB | -12 | | -12 | | -12 | | -12 | | -12 | | -12 | |
| *PICH_Ec/Ior* | dB | -15 | | -15 | | -15 | | -15 | | -15 | | -15 | |
| $\hat{I}_{or}/I_{oc}$ | dB | -4.8 | 0 | 0 | -4.8 | -9.5 | | -9.5 | | -9.5 | | -9.5 | |
| $I_{oc}$ | dBm/3.84 MHz | -60 | | | | | | | | | | | |
| Propagation Condition | | AWGN | | | | | | | | | | | |
| Qoffset | | [ ] | | [ ] | | [ ] | | [ ] | | [ ] | | [ ] | |
| Qhyst | dBm | [ ] | | [ ] | | [ ] | | [ ] | | [ ] | | [ ] | |
| Treselection | | [ ] | | [ ] | | [ ] | | [ ] | | [ ] | | [ ] | |
| Qintrasearch | dB | [ ] | | [ ] | | [ ] | | [ ] | | [ ] | | [ ] | |

Time T1 is X seconds and T2 is Y seconds.

Note: T1 and T2 need to be defined so that cell re-selection reaction time is taken into account.

#### 4.3.1.3 Performance Requirements

Correct cell re-selection shall be greater than [X%] with [Y%] confidence. Cell re-selection is correct if within [5] seconds the UE re-reselects a new cell, which fulfills the cell re-selection criteria.

#### 4.3.1.4 Cell List Size

[The UE shall be capable of recording at least [6] of the strongest cells according to the cell re-selection criteria. The number of the strongest cells recorded inside the UE shall be at least [6].]

#### 4.3.1.5 Maximum number of cells to be monitored

For re-selection purposes, the UE shall be capable of monitoring at least up to 32 neighboring cells given in the measurement control information. The exact number of cells to be monitored will be determined by the measurement control information broadcast in the serving cell.

## 4.4 PLMN Selection and Re-Selection Scenario

## 4.5 Location Registration Scenario

# 5 RRC Connection mobility

## 5.1 Handover

### 5.1.1 Introduction

The handover process should be implemented in both the UE and UTRAN. The UE measurements and which radio links the UE shall use is controlled by UTRAN with RRC signalling.

Measurements are specified in TS25.225 and UE behaviour in response to UTRAN RRC messages is described in TS25.331.

For the handover preparation the UE receives from the UTRAN a list of cells (e.g. TDD, FDD or GSM).which the UE shall monitor (see 'monitored set' in 3GPP RAN TS 25.331 'RRC Protocol Specification' ) in its idle timeslots.

At the beginning of the measurement process the UE shall find synchronization to the cell to measure using the synchronization channel. This is described under 'cell search' in 3GPP RAN TS 25.224 'Physical layer procedures (TDD)' if the monitored cell is a TDD cell and in 3GPP RAN TS 25.214 'Physical layer procedures (FDD)' if it is an FDD cell.

For a TDD cell to monitor after this procedure the exact timing of the midamble of the P-CCPCH is known and the measurements can be performed. Depending on the UE implementation and if timing information about the cell to monitor is available, the UE may perform the measurements on the P-CCPCH directly without prior SCH synchronization.

### 5.1.2 Handover 3G to 3G

#### 5.1.2.1 TDD/TDD Handover

For the search for other cells the UE is provided by a handover monitoring set by the UTRAN.

The handover procedure is initiated from UTRAN with an active set update message.

For the requirements in this section, all cells are assumed to be unsynchronized.

##### 5.1.2.1.1 Requirements

###### 5.1.2.1.1.1 Maximum number of cells to be monitored

The UE shall be capable of measuring at least [6] cells given in a measurement control message(s).

###### 5.1.2.1.1.2 Measurement reporting delay

The measurement reporting delay start is defined as the time from when a report is triggered at the physical layer, and in the end of an available sufficiently large measurement slot, according to the event or periodic mechanism set to trigger the measurement report. The measurement reporting delay end is defined as the time when the UE tries to transmit the measurement report over the Uu interface.

The measurement reporting delay is defined as the time between the measurement reporting delay start and the measurement reporting delay stop.

For all possible events defined in the measurement control messages as measurement reporting criteria, the measurement reporting delay shall not exceed the time stated in the table below.

**Table 5-1**

| TTI for DCCH carrying measurement report [ms] | Maximum measurement reporting delay [ms] |
|---|---|
| 10 | |
| 20 | |
| 40 | |
| 80 | |

#### 5.1.2.1.1.2.1 System Level Requirement on Measurement Reporting Delay

*[This Section specifies a system level requirement on measurement reporting delay for the network scenario described; when the values in*

*Table* 5-1 *in Section 5.1.2.2.1.2 will be specified, also the requirement described in this section will be taken into account; in this way a merge between the two sections will be possible]*

For handover purposes, the measurement reporting delay shall not exceed [5] seconds under the following network conditions: Initial serving cell at $\hat{I}_{or}$ = -70 dBm/3.84MHz, with 6 neighbours at $\hat{I}_{or}$ = -75 dBm/3.84MHz. Then the new cell is switched on at $\hat{I}_{or}$ = -60 dBm/3.84MHz, all steady signals.

#### 5.1.2.1.1.3 Handover Delay

The handover delay is defined as the time from when the UE receives the handover command message from UTRAN, until the UE successfully uses the entire set of radio links stated in that message for power control.

The handover delay is stated in the table below. There is different requirement on the handover delay depending on if the cell has been within the monitored set of cells for the last [FFS] [s] or not.

**Table 5-2**

| Number of new cells present in the handover command message | Maximum update delay [ms] | |
|---|---|---|
| | Cells within monitored set | Cells outside monitored set |
| 1-6… | | |

### 5.1.2.2 TDD/FDD Handover

#### 5.1.1.2.1 Requirements

#### 5.1.1.2.2 RF Parameters

## 5.1.4 Handover 3G to 2G

In the early days of UMTS deployment it can be anticipated that the service area will not be as contiguous and extensive as existing second generation systems. It is also anticipated that UMTS network will be an overlay on the 2nd generation network and utilise the latter, in the minimum case, as a fall back to ensure continuity of service and maintain a good QoS as perceived by the user.

#### 5.1.4.1 Handover to GSM

This section presents some of the important aspects of GSM handover required to be performed by the UE. For the full specifications reference should be made the GSM recommendations.

The underlying requirement is to ensure continuity of service to the UMTS user. The handover requirements for 3G to GSM should be comparable to GSM to GSM handover requirements.

The MS (GSM terminology) shall be able to monitor up to [32] carriers.

The MS shall be able synchronize to [6] carriers

The MS shall be able to report back to the network on the [6] strongest cells with correctly identified BSIC.

The MS shall be able to perform this task at levels down to the reference sensitivity level or reference interference levels as specified in GSM 05.05.

The MS shall demodulate the SCH on the BCCH carrier of each surrounding cell and decode the BSIC as often as possible, and as a minimum at least once every [10 seconds].

## 5.2 Radio Link Management

### 5.2.1 Link adaptation

#### 5.2.1.1 Definition of the function

Radio link adaptation is the ability of UE to select the suitable transport format combination from the assigned transport format combination set, in order to maintain Inner Loop power control, in the case of reaching its maximum transmit power.

#### 5.2.1.2 Link adaptation delay minimum requirement

When maximum transmit power has been reached and Inner Loop PC can no longer be maintained, UE shall start to use the transport format combination corresponding to the next lower bit rate within the assigned transport format set, within the maximum delay of [FFS]ms.

#### 5.2.1.3 Link adaptation accuracy minimum requirement

UE shall not adapt to a lower transport format if the Inner Loop PC command requires its average output power over [FFS] ms to stay within [+FFS] dB of UE's maximum output power.

## 5.3 Cell Update

## 5.4 URA Update

# 6 RRC Connection Control

*[Editor's Note: This Section specifies triggering requirements on the RRC Connection re-establishment Procedure]*

## 6.1 Radio Access Bearer Control

*[Editor's Note: Radio Access Bearer Control Procedures are a series of mechanisms used to control the UE and system resources. Some of these procedures cause Physical Channel Reconfiguration and Transport Channel Reconfiguration.*

*This section specifies time delay requirements on Physical Channel Reconfiguration and Transport Channel configuration in different reconfiguration cases.]*

# 7 Dynamic Channel Allocation

## 7.1 Introduction

The channel assignment algorithm will be implemented on network side in the RNC. It will be distributed, interference adapted approach where each base station makes the channel assignment based on local signal strength measurements performed in the UE and the Node B. A priori knowledge about the used channels of the other base stations in the vicinity can be implicitly used without additional signalling traffic.

## 7.2 Implementation Requirements

The purpose of DCA is on one side the limitation of the interference (keeping required QoS) and on the other side to maximise the system capacity due to minimising reuse distance. The details on channel assignment policy are given in [12].

## 7.3 Number of timeslots to be measured

The number of down link timeslots to be measured in the UE is broadcasted on the BCH in each cell. In general, the number of downlink timeslots in question will be less than 14, but in worst case the UE shall be capable to measure 14 downlink timeslots. In case of “simple UE” [FFS] timeslots shall at least be measured.

## 7.4 Measurement reporting delay

In order to save battery life time, in idle mode no measurements are performed for DCA. ISCP measurements are started at call establishment. Taking into account that the measured interference of the timeslots is preferable averaged over [FFS] frames, the measurement reporting delay in connecting phase shall not exceed [FFS] milliseconds.

# 8 Power Management

## 8.1 UE Output Power Dynamics

Power Control is used to limit the interference level.

### 8.1.1 UE Power Control

Open loop power control is the ability of the UE transmitter to sets its output power to a specified value. For the TDD mode the reciprocity of the channel allows accurate estimation of the required open loop transmit power.

The UE open loop power control error is specified in, S25.102 "UTRA (UE) TDD; Radio Transmission and Reception".

## 8.2 BS Output Power Dynamics

Power control is used to limit the interference level. The transmitter uses a quality-based power control on the downlink.

### 8.2.1 Inner loop power control

Inner loop power control is the ability of the BS transmitter to adjust its output power in response to the UL received signal.

For inner loop correction on the Downlink Channel, the base station adjust its mean output power level in response to each valid power control bit received from the UE on the Uplink Traffic Channel. Inner Loop Control is based on SIR measurements at the UE receiver and the corresponding TPC command are generated by the UE.

#### 8.2.1.1 Power control steps

The power control step is the step change in the DL transmitter output power in response to a TPC message from the UE. The reuirements on the Power Control Steps are specified in S25.105 "UTRA (BS) TDD; Radio Transmission and Reception".

#### 8.2.1.2 Power control dynamic range

The power control dynamic range is the difference between the maximum and the minimum transmit output power for a specified reference condition. The requirements related to power Control Dynamic Range are specified in in S25.105 "UTRA (BS) TDD; Radio Transmission and Reception".

# 9 Radio Link Surveillance

# 10 Timing characterisitics

## 10.1 Timing Advance (TA) Requirements

To update timing advance of a moving UE the UTRAN measures ‘RX Timing deviation’. The measurements are reported to higher layers, where timing advance values are calculated and signaled to the UE. The measurement for timing advance is defined inTS25.225 “Physical Layer Measurements (TDD)”, the requirements on the measurement is specified in section 11.2.9 ‘RX Timing Deviation’.

# 11 Measurements Performance Requirements

One of the key services provided by the physical layer is the measurement of various quantities which are used to trigger or perform a multitude of functions. Both the UE and the UTRAN are required to perform a variety of measurements. The complete list of measurements is specified in TSG RAN WG2 S25.302 "Services Provided by Physical Layer". The physical layer measurements for TDD are described and defined in TSG RAN WG1 TS25.225 “Physical layer – Measurements (TDD)”. In this section for TDD, per each measurement the relevant requirements on performance in terms of accuracy are reported.

All measurements in this section are defined using the 12.2kbps reference channel.

Unless explicitly stated, all measurements shall be reported within the defined requirements in 90% of the cases with 95% confidence.

*[Note: all the measurement accuracy values shall be harmonised with the FDD values reported in Section 10 of TS 25.133]*

# 11.1 Measurements Performance for UE

## 11.1.1 P-CCPCH RSCP

| | |
|---|---|
| **Requirement** | **Absolute accuracy:**<br>**Normal Conditions**<br>+/-[4]dB for levels below –[70]dBm;<br>+/-[6]dB over the full range<br>Valid for UTRA carrier RSSI >= -[95]dBm.<br>**Extreme Conditions**<br>+/-[7]dB for levels below –[70]dBm;<br>+/-[9]dB over the full range<br>Valid for UTRA carrier RSSI >= -[95]dBm.<br><br>**Relative accuracy:**<br>+-[2] dB for intra-frequency<br>Valid when the minimum level > -[115] dBm, the difference in signal level < [20] dB and UTRA carrier RSSI>=-[95]dBm. |

## 11.1.2 CPICH RSCP

| | |
|---|---|
| **Requirement** | **Absolute accuracy:**<br>**Normal Conditions**<br>+/-[6]dB for levels below –[70]dBm;<br>+/-[8]dB over the full range<br>Valid for UTRA carrier RSSI >= -[95]dBm.<br>**Extreme Conditions**<br>+/-[9]dB for levels below –[70]dBm;<br>+/-[11]dB over the full range<br>Valid for UTRA carrier RSSI >= -[95]dBm.<br><br>**Relative accuracy:**<br>+-[12] dB for intra-frequency<br>+-[8] dB for inter-frequency<br>Valid when the minimum level > -[115] dBm, the difference in signal level < [20] dB and UTRA carrier RSSI>=-[95]dBm. |

### 11.1.3 RSCP

| | |
|---|---|
| **Requirement** | **Absolute accuracy:**<br>**Normal Conditions**<br>+/-[4]dB for levels below –[70]dBm;<br>+/-[6]dB over the full range<br>Valid for UTRA carrier RSSI >= -[95]dBm.<br>**Extreme Conditions**<br>+/-[7]dB for levels below –[70]dBm;<br>+/-[9]dB over the full range<br>Valid for UTRA carrier RSSI >= -[95]dBm.<br><br>**Relative accuracy:**<br>+-[2] dB for intra-frequency<br>Valid when the minimum level > -[115] dBm, the difference in signal level < [20] dB and UTRA carrier RSSI>=-[95]dBm. |

### 11.1.4 Timeslot ISCP

| | |
|---|---|
| **Requirement** | **Absolute accuracy:**<br>**Normal Conditions**<br>+/-[4]dB for levels below –[70]dBm;<br>+/-[6]dB over the full range<br>Valid for UTRA carrier RSSI >= -[95]dBm.<br>**Extreme Conditions**<br>+/-[7]dB for levels below –[70]dBm;<br>+/-[9]dB over the full range<br>Valid for UTRA carrier RSSI >= -[95]dBm.<br><br>**Relative accuracy:**<br>+-[2] dB for intra-frequency<br>Valid when the minimum level > -[115] dBm, the difference in signal level < [20] dB and UTRA carrier RSSI>=-[95]dBm. |

### 11.1.5 UTRA carrier RSSI

| | |
|---|---|
| **Requirement** | **Absolute accuracy:**<br><br>**Normal Conditions**<br><br>+/-[4]dB for levels below –[70]dBm<br>+/-[6]dB over the full range<br><br>Valid for levels >-[95]dBm.<br><br>**Extreme Conditions**<br><br>+/-[7]dB for levels below –[70]dBm<br>+/-[9]dB over the full range<br><br>Valid for levels >-[95]dBm.<br><br>**Relative accuracy** (between measurements on two carriers):<br><br>+-[4] dB over the full range<br><br>Valid when the minimum level > -[95] dBm and the difference < [20] dB. |

### 11.1.6 GSM carrier RSSI

| | |
|---|---|
| **Requirement** | According to the definition of RXLEV in GSM 05.08. |

### 11.1.7 SIR

| | |
|---|---|
| **Requirement** | |

### 11.1.8 CPICH Ec/No

| | |
|---|---|
| **Requirement** | **Absolute accuracy** (measured on one code):<br><br>+/-[3]dB over the full range when UTRA carrier RSSI>= -[95]dBm and CPICH RSCP >= -[115]dBm.<br><br>**Relative accuracy** (between measurements on two codes):<br><br>+-[3] dB for intra-frequency<br>+-[6] dB for inter-frequency<br><br>When UTRA carrier RSSI>=-[95]dBm and CPICH RSCP >= -[115]dBm. |

### 11.1.9 Physical channel BER

| | |
|---|---|
| **Requirement** | |

### 11.1.10 Transport channel BLER

| | |
|---|---|
| **Requirement** | |

### 11.1.11 UE transmitted power

| | |
|---|---|
| **Requirement** | **Absolute accuracy:**<br>**Normal Conditions**<br>+-[9]dB over the full range.<br>**Extreme Conditions**<br>+-[12]dB over the full range. |

### 11.1.12 SFN-SFN observed time difference

| | |
|---|---|
| **Requirement** | +/-[0.5] chips period for both type 1 and type 2. |

### 11.1.13 Observed time difference to GSM cell

| | |
|---|---|
| **Requirement** | +- [20] chips. |

## 11.2 Measurements Performance for UTRAN

### 11.2.1 RSCP

| | |
|---|---|
| **Requirement** | **Absolute accuracy:**<br>**Normal Conditions**<br>+/-[4]dB for levels below –70dBm;<br>+/-[6]dB over the full range<br>**Extreme Conditions**<br>+/-[7]dB for levels below –70dBm;<br>+/-[9]dB over the full range<br><br>**Relative accuracy:**<br>+-[2] dB for intra-frequency |

## 11.2.2 Timeslot ISCP

| | |
|---|---|
| **Requirement** | **Absolute accuracy:**<br>**Normal Conditions**<br>+/-[4]dB for levels below –70dBm;<br>+/-[6]dB over the full range<br>**Extreme Conditions**<br>+/-[7]dB for levels below –70dBm;<br>+/-[9]dB over the full range<br><br>**Relative accuracy:**<br>+-[2] dB for intra-frequency |

## 11.2.3 RSSI

| | |
|---|---|
| **Requirement** | **Absolute accuracy:**<br>+/-[4]dB over the full range. |

## 11.2.4 SIR

| | |
|---|---|
| **Requirement** | **Absolute accuracy**:<br>+/- [3]dB for 0<SIR<10 dB<br>when RSSI>=-[105]dBm. |

### 11.2.5 Physical channel BER

| | |
|---|---|
| **Requirement** | |

### 11.2.6 Transport channel BLER

| | |
|---|---|
| **Requirement** | |

### 11.2.7 Transmitted carrier power

| | |
|---|---|
| **Requirement** | **Absolute accuracy:**<br>+-[3]dB over the full range.<br><br>**Relative accuracy** (relative to the maximum transmit power):<br>+- [2]dB over the full range. |

### 11.2.8 Transmitted code power

| | |
|---|---|
| **Requirement** | **Absolute accuracy:**<br>+-[3]dB over the full range.<br><br>**Relative accuracy** (relative to the maximum transmit power):<br>+- [2]dB over the full range. |

### 11.2.9 RX Timing Deviation

| | |
|---|---|
| **Requirement** | +/-[0.5] chips period |

Note: This measurement can be used for timing advance calculation or location services.

# 12 Annex A Measurement Definition (Informative)

In this Annex the definitions of those Measurements whose requirements are specified in Section 11 of this specification are reported for information. The complete list of measurements is specified in TSG RAN WG2 TS25.302 "Services Provided by Physical Layer". ". The physical layer measurements for TDD are described and defined in TSG RAN WG1 TS25.225 “Physical layer – Measurements (TDD)”.

## 12.1 Measurements Performance for UE

### 12.1.1 P-CCPCH RSCP

| | |
|---|---|
| **Definition** | Received Signal Code Power, the received power on P-CCPCH of own or neighbour cell after despreading. The reference point for the RSCP is the antenna connector at the UE. |

### 12.1.2 CPICH RSCP

| | |
|---|---|
| **Definition** | Received Signal Code Power, the received power on the CPICH code after despreading. The reference point for the RSCP is the antenna connector at the UE. |

### 12.1.3 RSCP

| | |
|---|---|
| **Definition** | Received Signal Code Power, the received power on the code of a specified DPCH or PDSCH after despreading. The reference point for the RSCP is the antenna connector at the UE. |

### 12.1.4 Timeslot ISCP

| | |
|---|---|
| **Definition** | Interference Signal Code Power, the interference on the received signal in a specified timeslot after despreading. Only the non-orthogonal part of the interference is included in the measurement. The reference point for the ISCP is the antenna connector at the UE. |

### 12.1.5 UTRA carrier RSSI

| | |
|---|---|
| **Definition** | Received Signal Strength Indicator, the wide-band received power within the relevant channel bandwidth in a specified timeslot. Measurement shall be performed on a UTRAN DL carrier. The reference point for the RSSI is the antenna connector at the UE. |

### 12.1.6 GSM carrier RSSI

| | |
|---|---|
| **Definition** | Received Signal Strength Indicator, the wide-band received power within the relevant channel bandwidth in a specified timeslot. Measurement shall be performed on a GSM BCCH carrier. The reference point for the RSSI is the antenna connector at the UE. |

### 12.1.7 SIR

| | |
|---|---|
| **Definition** | Signal to Interference Ratio, defined as the RSCP of a DPCH or PDSCH divided by ISCP of the same timeslot. The reference point for the SIR is the antenna connector of the UE. |

### 12.1.8 CPICH Ec/No

| | |
|---|---|
| **Definition** | The received energy per chip divided by the power density in the band. The Ec/No is identical to RSCP/RSSI. The reference point for Ec/No is the antenna connector at the UE. |

### 12.1.9 Physical channel BER

| | |
|---|---|
| **Definition** | The physical channel BER is an estimation of the average bit error rate (BER) before channel decoding of the data. |

### 12.1.10 Transport channel BLER

| | |
|---|---|
| **Definition** | Estimation of the transport channel block error rate (BLER). The BLER estimation shall be based on evaluating the CRC on each transport block. |

### 12.1.11 UE transmitted power

| | |
|---|---|
| **Definition** | The total UE transmitted power on one carrier measured in a timeslot. The reference point for the UE transmitted power shall be the UE antenna connector. |

### 12.1.12 SFN-SFN observed time difference

| **Definition** | SFN-SFN observed time difference is the time difference of the reception times of frames from two cells (serving and target) measured in the UE and expressed in chips. It is distinguished in two types: Type 2 applies if the serving and the target cell have the same frame timing and SFN numbering. Type 1 applies in all other cases.<br><br>**Type 1:**<br>SFN-SFN observed time difference = OFF×38400+ $T_m$ in chips, where:<br>$T_m$= $T_{RxSFNk}$ - $T_{RxSFNi}$, given in chip units with the range [0, 1, …, 38399] chips<br>$T_{RxSFNi}$: time of start of the received frame $SFN_i$ of the serving TDD cell i.<br>$T_{RxSFNk}$: time of start of the received frame $SFN_k$ of the target UTRA cell k after the time instant $T_{RxSFNi}$ in the UE. If the next frame of the target UTRA cell is received exactly at $T_{RxSFNi}$ then $T_{RxSFNk}$= $T_{RxSFNi}$ (which leads to $T_m$=0).<br>OFF=($SFN_k$- $SFN_i$) mod 256, given in number of frames with the range [0, 1, …, 255] frames<br>SFNi : system frame number for downlink frame from serving TDD cell i in the UE at the time $T_{RxSFNi}$.<br>SFNk : system frame number for downlink frame from target UTRA cell k received in the UE at the time $T_{RxSFNk}$.(for FDD: the P-CCPCH frame)<br><br>**Type 2:**<br>SFN-SFN observed time difference = $T_{RxTSk}$ - $T_{RxTSi}$, in chips, where<br>$T_{RxTSi}$: time of start of a timeslot received of the serving TDD cell i.<br>$T_{RxTSk}$: time of start of a timeslot received from the target UTRA cell k that is closest in time to the start of the timeslot of the serving TDD cell i. |
|---|---|

## 12.1.13 Observed time difference to GSM cell

| **Definition** | Observed time difference to GSM cell is the time difference $T_m$ in ms, where<br><br>$T_m$= $T_{RxGSMk}$ - $T_{RxSFN0i}$<br>$T_{RxSFN0i}$: time of start of the received frame SFN=0 of the serving TDD cell i<br><br>$T_{RxGSMk}$: time of start of the received 51-GSM-multiframe of the considered target GSM beacon frequency k which is following next after the start of frame SFN=0 of the serving TDD cell. |
|---|---|

# 12.2 Measurements Performance for UTRAN

## 12.2.1 RSCP

| **Definition** | Received Signal Code Power, the received power on one DPCH, PRACH or PUSCH code after despreading. The reference point for the RSCP shall be the antenna connector. |
|---|---|

## 12.2.2 Timeslot ISCP

| | |
|---|---|
| **Definition** | Interference Signal Code Power, the interference on the received signal in a specified timeslot after despreading. Only the non-orthogonal part of the interference is included in the measurement. The reference point for the ISCP shall be the antenna connector. |

### 12.2.3 RSSI

| | |
|---|---|
| **Definition** | Received Signal Strength Indicator, the wide-band received power within the UTRAN UL channel bandwidth in a specified timeslot. The reference point for the RSSI shall be the antenna connector. |

### 12.2.4 SIR

| | |
|---|---|
| **Definition** | Signal to Interference Ratio, defined as the RSCP of the DPCH or PUSCH divided by ISCP of the same timeslot. The reference point for the SIR shall be the antenna connector. |

### 12.2.5 Physical channel BER

| | |
|---|---|
| **Definition** | The physical channel BER is an estimation of the average bit error rate (BER) of a DPCH or PUSCH before channel decoding of the data. |

### 12.2.6 Transport channel BLER

| | |
|---|---|
| **Definition** | Estimation of the transport channel block error rate (BLER) of a DCH or USCH. The BLER estimation shall be based on evaluating the CRC on each transport block. |

### 12.2.7 Transmitted carrier power

| | |
|---|---|
| **Definition** | Transmitted carrier power, is the total transmitted power on one DL carrier from one UTRAN access point measured in a timeslot. The reference point for the UTRAN total transmitted power measurement shall be the antenna connector. |

### 12.2.8 Transmitted code power

| | |
|---|---|
| **Definition** | Transmitted Code Power, is the transmitted power on one carrier and one channelisation code in one timeslot. The reference point for the transmitted code power measurement shall be the antenna connector at the UTRAN access point cabinet. |

## 12.2.9 RX Timing Deviation

| | |
|---|---|
| **Definition** | 'RX Timing Deviation' is the time difference $T_{RXdev} = T_{TS} - T_{RXpath}$ in chips, with<br>$T_{RXpath}$ : time of the reception in the Node B of the first significant uplink path to be used in the detection process<br>$T_{TS}$ : time of the beginning of the respective slot according to the Node B internal timing |

Note: This measurement can be used for timing advance calculation or location services.

# History

| Document history | | |
|---|---|---|
| V3.0.0 | January 2000 | Publication |
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