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*Technical Specification*

**3rd Generation Partnership Project;  
Technical Specification Group Radio Access Network;  
Requirements for support of radio resource management  
(FDD)  
(Release 1999)**

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Keywords

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## Foreword

This Technical Specification (TS) has been produced by the 3<sup>rd</sup> Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

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  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.



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## 1 Scope

The present document specifies requirements for support of Radio Resource Management for FDD. 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.

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## 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. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TS 25.304: "UE Procedures in Idle Mode and Procedures for Cell Reselection in Connected Mode".
- [2] 3GPP TS 25.211: "Physical channels and mapping of transport channels onto physical channels (FDD)".
- [3] 3GPP TS 25.101: "UE Radio transmission and reception (FDD)".
- [4] 3GPP TS 25.104: "UTRA (BS) FDD; Radio transmission and reception".
- [5] 3GPP TS 25.102: "UTRA (UE) TDD; Radio transmission and reception".
- [6] 3GPP TS 25.105: "UTRA (BS); Radio transmission and reception".
- [7] 3GPP TS 25.212: "Multiplexing and channel coding (FDD)".
- [8] 3GPP TS 25.141: "Base station conformance testing (FDD)".
- [9] 3GPP TS 25.142: "Base station conformance testing (TDD)".
- [10] 3GPP TS 25.113: "Base station EMC".
- [11] 3GPP TR 25.942: "RF System scenarios".
- [12] 3GPP TR 25.922: "Radio Resource Management Strategies".
- [13] 3GPP TS 25.215: "Physical Layer Measurements (FDD)".
- [14] 3GPP TS 25.225: "Physical Layer Measurements (TDD)".
- [15] 3GPP TS 25.302: "Services provided by Physical Layer".
- [16] 3GPP TS 25.331: "Radio Resource Control (RRC) Protocol Specification".
- [17] ETSI ETR 273-1-2: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement of radiated methods of measurement (using test sites) and evaluation of the corresponding measurement uncertainties; Part 1: Uncertainties in the measurement of mobile radio equipment characteristics; Sub-part 2: Examples and annexes"
- [18] 3GPP TS 25.214: "Physical layer procedures (FDD)"
- [19] 3GPP TS 25.321: "Medium Access Control (MAC) protocol specification"

- [20] 3GPP TS 25.303: "Interlayer procedures in Connected Mode"
- [21] 3GPP TS 05.08: "Digital cellular telecommunications system (Phase 2+); Radio subsystem link control"
- [22] 3GPP TS 05.05: "Digital cellular telecommunications system (Phase 2+); Radio transmission and reception"

## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

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

**Node B:** A logical node responsible for radio transmission / reception in one or more cells to/from the User Equipment. Terminates the Iub interface towards the RNC

**Power Spectral Density:** The units of Power Spectral Density (PSD) are extensively used in this document. PSD is a function of power versus frequency and when integrated across a given bandwidth, the function represents the mean power in such a bandwidth. When the mean power is normalised to (divided by) the chip-rate it represents the mean energy per chip. Some signals are directly defined in terms of energy per chip, (DPCH<sub>E<sub>c</sub></sub>, E<sub>c</sub>, OCNS<sub>E<sub>c</sub></sub> and S-CCPCH<sub>E<sub>c</sub></sub>) and others defined in terms of PSD (I<sub>o</sub>, I<sub>oc</sub>, I<sub>or</sub> and  $\hat{I}_{or}$ ). There also exist quantities that are a ratio of energy per chip to PSD (DPCH<sub>E<sub>c</sub></sub>/I<sub>or</sub>, E<sub>c</sub>/I<sub>or</sub> etc.). This is the common practice of relating energy magnitudes in communication systems.

It can be seen that if both energy magnitudes in the ratio are divided by time, the ratio is converted from an energy ratio to a power ratio, which is more useful from a measurement point of view. It follows that an energy per chip of X dBm/3.84 MHz can be expressed as a mean power per chip of X dBm. Similarly, a signal PSD of Y dBm/3.84 MHz can be expressed as a signal power of Y dBm.

### 3.2 Symbols

For the purposes of the present document, the following symbol applies:

|   |   |
|---|---|
| [...]   | Values included in square bracket must be considered for further studies, because it means that a decision about that value was not taken.  |
| CPICH <sub>E<sub>c</sub></sub>                  | Average energy per PN chip for the CPICH  |
| CPICH <sub>E<sub>c</sub></sub> /I <sub>or</sub> | The ratio of the transmit energy per PN chip of the CPICH to the total transmit power spectral density at the Node B antenna connector.   |
| CPICH <sub>E<sub>c</sub></sub> /I <sub>o</sub>  | The ratio of the received energy per PN chip for the CPICH to the total received power spectral density at the UE antenna connector.  |
| DPCH <sub>E<sub>c</sub></sub> /I <sub>or</sub>  | The ratio of the transmit energy per PN chip of the DPCH to the total transmit power spectral density at the Node B antenna connector.  |
| E <sub>c</sub>                                  | Average energy per PN chip.   |
| I <sub>o</sub>                                  | The total received power density, including signal and interference, as measured at the UE antenna connector.   |
| I <sub>oc</sub>                                 | The power spectral density (integrated in a noise bandwidth equal to the chip rate and normalized to the chip rate) of a band limited noise source (simulating interference from cells, which are not defined in a test procedure) as measured at the UE antenna connector. |
| I <sub>or</sub>                                 | The total transmit power spectral density (integrated in a bandwidth of (1+α) times the chip rate and normalized to the chip rate) of the downlink signal at the Node B antenna connector.  |
| $\hat{I}_{or}$                                  | The received power spectral density (integrated in a bandwidth of (1+α) times the chip rate and normalized to the chip rate) of the downlink signal as measured at the UE antenna connector.  |

|                               |  |
|-------------------------------|--|
| OCNS_Ec/Ior                   | The ratio of the transmit energy per PN chip of the OCNS to the total transmit power spectral density at the Node B antenna connector.                         |
| PCCPCH_Ec/Ior                 | The ratio of the transmit energy per PN chip of the PCCPCH to the total transmit power spectral density at the Node B antenna connector.                       |
| PENALTY_TIME                  | Defined in TS 25.304, subclause 5.2.6.1.5  |
| PICH_Ec/Ior                   | The ratio of the transmit energy per PN chip of the PICH to the total transmit power spectral density at the Node B antenna connector.                         |
| Qhyst                         | Defined in TS 25.304, subclause 5.2.6.1.5  |
| Qoffset <sub>s,n</sub>        | Defined in TS 25.304, subclause 5.2.6.1.5  |
| Qqualmin                      | Defined in TS 25.304, subclause 5.2.6.1.5  |
| Qrxlevmin                     | Defined in TS 25.304, subclause 5.2.6.1.5  |
| SCH_Ec/Ior                    | The ratio of the transmit energy per PN chip of the SCH to the total transmit power spectral density at the Node B antenna connector.                          |
| Sintersearch                  | Defined in TS 25.304, subclause 5.2.6.1.5  |
| Sintrasearch                  | Defined in TS 25.304, subclause 5.2.6.1.5  |
| SsearchRAT                    | Defined in TS 25.304, subclause 5.2.6.1.5  |
| T1                            | Time period 1  |
| T2                            | Time period 2  |
| TEMP_OFFSET                   | Defined in TS 25.304, subclause 5.2.6.1.5  |
| T <sub>RE-ESTABLISH-REQ</sub> | The RRC Re-establishment delay requirement, the time between the moment when erroneous CRCs are applied, to when the UE starts to send preambles on the PRACH. |
| Treselection                  | Defined in TS 25.304, subclause 5.2.6.1.5  |
| UE_TXPWR_MAX_RACH             | Defined in TS 25.304, subclause 5.2.3.1.2.   |

### 3.3 Abbreviations

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

|        |   |
|--------|---|
| BER    | Bit Error Ratio   |
| BLER   | Block Error Ratio   |
| BS     | Base Station  |
| CFN    | Connection Frame Number   |
| CPICH  | Common Pilot Channel  |
| DL     | Down link (forward link)  |
| DPCH   | Dedicated Physical Channel  |
| DRX    | Discontinuous Reception   |
| FDD    | Frequency Division Duplex   |
| OCNS   | Orthogonal Channel Noise Simulator, a mechanism used to simulate the users or control signals on the other orthogonal channels of a downlink. |
| PCCPCH | Primary Common Control Physical Channel   |
| PICH   | Paging Indicator Channel  |
| PIN    | Personal Identification Number  |
| PLMN   | Public Land Mobile Network  |
| RSCP   | Received Signal Code Power  |
| RRC    | Radio Resource Control  |
| RRM    | Radio Resource Management   |
| RSSI   | Received Signal Strength Indicator  |
| SCH    | Synchronisation Channel, power of SCH shall be divided equally between Primary and Secondary Synchronous channels.                            |
| SFN    | System Frame Number   |
| SIR    | Signal to Interference ratio  |
| TDD    | Time Division Duplex  |
| TPC    | Transmit Power Control  |
| UE     | User Equipment  |
| UL     | Up link (reverse link)  |
| USIM   | Universal Subscriber Identity Module  |
| UTRA   | Universal Terrestrial Radio Access  |
| UTRAN  | Universal Terrestrial Radio Access Network  |

## 3.4 Test tolerances

The requirements given in the present document make no allowance for measurement uncertainty. The test specification 34.121 and 25.141 define test tolerances. These test tolerances are individually calculated for each test. The test tolerances are then added to the limits in the present document to create test limits. The measurement results are compared against the test limits as defined by the shared risk principle.

Shared Risk is defined in ETR 273 Part 1 sub-part 2 section 6.5.

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# 4 Idle Mode Tasks

## 4.1 Cell Selection

### 4.1.1 Introduction

After a UE has switched on and a PLMN has been selected, the Cell selection process takes place, as described in TS25.304. This process allows the UE to select a suitable cell where to camp on in order to access available services. In this process the UE can use stored information (*Stored information cell selection*) or not (*Initial cell selection*).

## 4.2 Cell Re-selection

### 4.2.1 Introduction

The cell reselection procedure allows the UE to select a more suitable cell and camp on it.

When the UE is in either *Camped Normally* state or *Camped on Any Cell* state on a FDD cell, the UE shall attempt to detect, synchronise, and monitor intra-frequency, inter-frequency and inter-RAT cells indicated in the measurement control system information of the serving cell. UE measurement activity is also controlled by measurement rules defined in TS25.304, allowing the UE to limit its measurement activity if certain conditions are fulfilled.

### 4.2.2 Requirements

#### 4.2.2.1 Measurement and evaluation of cell selection criteria S of serving cell

The UE shall measure the CPICH Ec/Io and CPICH RSCP level of the serving cell and evaluate the cell selection criterion S defined in [1] for the serving cell at least every DRX cycle. The UE shall filter the CPICH Ec/Io and CPICH RSCP measurements of the serving cell using at least 2 measurements, which are taken so that the time difference between the measurements is at least  $T_{\text{measureFDD}}/2$  (see table 4.1).

If the UE has evaluated in  $N_{\text{serv}}$  consecutive DRX cycles that the serving cell does not fulfil the cell selection criterion S, the UE shall initiate the measurements of all neighbour cells indicated in the measurement control system information, regardless of the measurement rules currently limiting UE measurement activities.

If the UE has not found any new suitable cell based on searches and measurements of the neighbour cells indicated in the measurement control system information for 12 s, the UE shall initiate cell selection procedures for the selected PLMN as defined in [1]

After this 12 s period a UE in Cell:PCH or URA\_PCH is considered to be “out of service area” and shall perform actions according to 25.331.

On transition from CELL\_DCH to CELL\_PCH/URA\_PCH, if a UE cannot find a suitable UTRA cell, then it is considered to be “out of service area” and shall perform actions according to [16].

#### 4.2.2.2 Measurements of intra-frequency cells

The UE shall measure CPICH Ec/Io and CPICH RSCP at least every  $T_{\text{measureFDD}}$  (see table 4.1) for intra-frequency cells that are identified and measured according to the measurement rules.  $T_{\text{measureFDD}}$  is defined in Table 4.1. The UE shall filter CPICH Ec/Io and CPICH RSCP measurements of each measured intra-frequency cell using at least 2 measurements, which are taken so that the time difference between the measurements is at least  $T_{\text{measureFDD}}/2$ .

The filtering shall be such that the UE shall be capable of evaluating that an intra-frequency cell has become better ranked than the serving cell within  $T_{\text{evaluateFDD}}$  (see table 4.1), from the moment the intra-frequency cell became at least 3 dB better ranked than the current serving cell, provided that Treselection timer is set to zero and either CPICH Ec/Io or CPICH RSCP is used as measurement quantity for cell reselection.

If Treselection timer has a non zero value and the intra-frequency cell is better ranked than the serving cell, the UE shall evaluate this intra-frequency cell for the Treselection time. If this cell remains better ranked within this duration, then the UE shall reselect that cell.

#### 4.2.2.3 Measurements of inter-frequency FDD cells

The UE shall measure CPICH Ec/Io and CPICH RSCP at least every  $(N_{\text{carrier}}-1) * T_{\text{measureFDD}}$  (see table 4.1) for inter-frequency cells that are identified and measured according to the measurement rules. The parameter  $N_{\text{carrier}}$  is the number of carriers used for FDD cells. The UE shall filter CPICH Ec/Io and CPICH RSCP measurements of each measured inter-frequency cell using at least 2 measurements, which are taken so that the time difference between the measurements is at least  $T_{\text{measureFDD}}/2$ .

If CPICH Ec/Io is used as measurement quantity for cell reselection, the filtering shall be such that the UE shall be capable of evaluating that an already identified inter-frequency cell has become better ranked than the serving cell within  $(N_{\text{carrier}}-1) * T_{\text{evaluateFDD}}$  (see table 4.1) from the moment the inter-frequency cell became at least 3 dB better than the current serving cell provided that Treselection timer is set to zero. For non-identified inter-frequency cells, the filtering shall be such that the UE shall be capable of evaluating that inter-frequency cell has become better ranked than the serving cell within 30 s from the moment the inter-frequency cell became at least 3 dB better ranked than the current serving cell provided that Treselection timer is set to zero.

If CPICH RSCP is used as measurement quantity for cell reselection, the filtering shall be such that the UE shall be capable of evaluating that an already identified inter-frequency cell has become better ranked than the serving cell within  $(N_{\text{carrier}}-1) * T_{\text{evaluateFDD}}$  from the moment the inter-frequency cell became at least 5 dB better than the current serving cell provided that Treselection timer is set to zero. For non-identified inter-frequency cells, the filtering shall be such that the UE shall be capable of evaluating that inter-frequency cell has become better ranked than the serving cell within 30 s from the moment the inter-frequency cell became at least 5 dB better ranked than the current serving cell provided that Treselection timer is set to zero.

If Treselection timer has a non zero value and the inter-frequency cell is better ranked than the serving cell, the UE shall evaluate this inter-frequency cell for the Treselection time. If this cell remains better ranked within this duration, then the UE shall reselect that cell.

#### 4.2.2.4 Measurements of inter-frequency TDD cells

The requirements in this section shall apply to UE supporting FDD and TDD.

The UE shall measure P-CCPCH RSCP at least every  $N_{\text{carrierTDD}} * T_{\text{measureTDD}}$  (see table 4.1) for inter-frequency TDD cells that are identified and measured according to the measurement rules. The parameter  $N_{\text{carrierTDD}}$  is the number of carriers used for inter-frequency TDD cells. The UE shall filter P-CCPCH RSCP measurements of each measured inter-frequency TDD cell using at least 2 measurements, which are taken so that the time difference between the measurements is at least  $T_{\text{measureTDD}}/2$ .

The filtering of P-CCPCH RSCP shall be such that the UE shall be capable of evaluating that an already identified inter-frequency TDD cell has become better ranked than the serving cell within  $N_{\text{carrierTDD}} * T_{\text{evaluateTDD}}$  from the moment the inter-frequency TDD cell became at least 5 dB better ranked than the current serving cell provided that Treselection timer is set to zero. For non-identified inter-frequency TDD cells, the filtering shall be such that the UE shall be capable of evaluating that an inter-frequency TDD cell has become better ranked than the serving cell within 30 s from the moment the inter-frequency TDD cell became at least 5 dB better ranked than the current serving cell provided that Treselection timer is set to zero.

If Treselection timer has a non zero value and the inter-frequency TDD cell is better ranked than the serving cell, the UE shall evaluate this inter-frequency TDD cell for the Treselection time. If this cell remains better ranked within this duration, then the UE shall reselect that cell.

#### 4.2.2.5 Measurements of inter-RAT GSM cells

The UE shall measure the signal level of the GSM BCCH carrier of each GSM neighbour cell indicated in the measurement control system information of the serving cell, according to the measurement rules defined in TS25.304, at least every  $T_{\text{measureGSM}}$  (see table 4.1). The UE shall maintain a running average of 4 measurements for each GSM BCCH carrier. The measurement samples for each cell shall be as far as possible uniformly distributed over the averaging period.

If GSM measurement are required by the measurement rules in [1], the UE shall attempt to verify the BSIC at least every 30 seconds for each of the 4 strongest GSM BCCH carriers and rank the verified GSM BCCH cells according to the cell reselection criteria defined in [1]. If a change of BSIC is detected for one GSM cell then that GSM BCCH carrier shall be treated as a new GSM neighbour cell.

If the UE detects a BSIC, which is not indicated in the measurement control system information, the UE shall not consider that GSM BCCH carrier in cell reselection. The UE also shall not consider the GSM BCCH carrier in cell reselection, if the UE cannot demodulate the BSIC of that GSM BCCH carrier.

If Treselection timer has a non zero value and the inter-RAT GSM cell is better ranked than the serving cell, the UE shall evaluate this inter-RAT GSM cell for the Treselection time. If this cell remains better ranked within this duration, then the UE shall reselect that cell.

#### 4.2.2.6 Evaluation of cell re-selection criteria

The UE shall evaluate the cell re-selection criteria defined in [1] for the cells, which have new measurement results available, at least every DRX cycle.

UE shall perform cell reselection immediately after the UE has found a higher ranked suitable cell, unless less than 1 second has elapsed from the moment the UE started camping on the serving cell. The ranking of the cells shall be made according to the cell reselection criteria specified in TS25.304.

#### 4.2.2.7 Maximum interruption in paging reception

UE shall perform the cell re-selection with minimum interruption in monitoring downlink channels for paging reception.

At intra-frequency cell re-selection, the UE shall monitor the downlink of serving cell for paging reception until the UE is capable to start monitoring downlink channels of the target intra-frequency cell for paging reception. The interruption time shall not exceed 50 ms.

At inter-frequency and inter-RAT cell re-selection, the UE shall monitor the downlink of serving cell for paging reception until the UE is capable to start monitoring downlink channels for paging reception of the target inter-frequency cell. For inter-frequency cell re-selection the interruption time must not exceed  $T_{\text{SI}} + 50$  ms. For inter-RAT cell re-selection the interruption time must not exceed  $T_{\text{BCCH}} + 50$  ms.

$T_{\text{SI}}$  is the time required for receiving all the relevant system information data according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 25.331 for a UTRAN cell.

$T_{\text{BCCH}}$  is the maximum time allowed to read BCCH data from a GSM cell [21].

These requirements assume sufficient radio conditions, so that decoding of system information can be made without errors and does not take into account cell re-selection failure.

**Table 4.1:  $T_{\text{measureFDD}}$ ,  $T_{\text{evaluateFDD}}$ ,  $T_{\text{measureTDD}}$ ,  $T_{\text{evaluateTDD}}$ , and  $T_{\text{measureGSM}}$** 

| DRX cycle length [s] | $N_{\text{serv}}$<br>[number of DRX cycles] | $T_{\text{measureFDD}}$ [s]<br>(number of DRX cycles) | $T_{\text{evaluateFDD}}$ [s]<br>(number of DRX cycles) | $T_{\text{measureTDD}}$ [s]<br>(number of DRX cycles) | $T_{\text{evaluateTDD}}$ [s]<br>(number of DRX cycles) | $T_{\text{measureGSM}}$ [s]<br>(number of DRX cycles) |
|----------------------|---|---|--|---|--|---|
| 0.08                 | 4   | 0.64 (8 DRX cycles)                                   | 2.56 (32 DRX cycles)                                   | 0.64 (8 DRX cycles)                                   | 2.56 (32 DRX cycles)                                   | 2.56 (32 DRX cycles)                                  |
| 0.16                 | 4   | 0.64 (4)  | 2.56 (16)  | 0.64 (4)  | 2.56 (16)  | 2.56 (16)   |
| 0.32                 | 4   | 1.28 (4)  | 5.12 (16)  | 1.28 (4)  | 5.12 (16)  | 5.12 (16)   |
| 0.64                 | 4   | 1.28 (2)  | 5.12 (8)   | 1.28 (2)  | 5.12 (8)   | 5.12 (8)  |
| 1.28                 | 2   | 1.28 (1)  | 6.4 (5)  | 1.28 (1)  | 6.4 (5)  | 6.4 (5)   |
| 2.56                 | 2   | 2.56 (1)  | 7.68 (3)   | 2.56 (1)  | 7.68 (3)   | 7.68 (3)  |
| 5.12                 | 1   | 5.12 (1)  | 10.24 (2)  | 5.12 (1)  | 10.24 (2)  | 10.24 (2)   |

In idle mode, UE shall support DRX cycles lengths 0.64, 1.28, 2.56 and 5.12 s, according to [16].

#### 4.2.2.8 Number of cells in cell lists

For idle mode cell re-selection purposes, the UE shall be capable of monitoring:

- 32 intra-frequency cells (including serving cell), and
- 32 inter-frequency cells, including
  - FDD cells on maximum 2 additional carriers, and
  - Depending on UE capability, TDD cells distributed on up to 3 TDD carriers, and
  - Depending on UE capability, 32 GSM cells distributed on up to 32 GSM carriers,

as indicated in cell information lists sent in system information (BCCH).

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## 5 UTRAN Connected mode mobility

This section contains the requirements on the mobility procedures in UTRAN connected mode such as handover and cell re-selection.

Requirements related to the measurements in support of the execution of the UTRAN connected mode mobility procedures are specified, currently not necessarily for all UTRAN connected mode states, in section 8.

The radio links the UE shall use are controlled by UTRAN with RRC signalling.

UE behaviour in response to UTRAN RRC messages is described in TS25.331.

The purpose of Cell reselection in CELL\_FACH, CELL\_PCH and URA\_PCH states is that the UE shall select a better cell according to the cell reselection criteria in TS 25.304. CELL\_FACH, CELL\_PCH and URA\_PCH states are described in TS 25.331.

### 5.1 FDD/FDD Soft Handover

#### 5.1.1 Introduction

Soft handover is a function in which the UE is connected to several UTRAN access points at the same time. Addition and/or release of radio links are controlled by the ACTIVE SET UPDATE procedure.

The soft handover function includes a measurement phase, a decision algorithm in UTRAN and the ACTIVE SET UPDATE procedure.

## 5.1.2 Requirements

### 5.1.2.1 Active set dimension

The UE shall be capable of supporting at least 6 radio links in the active set.

### 5.1.2.2 Active set update delay

The active set update delay is defined as the time from when the UE has received the ACTIVE SET UPDATE message from UTRAN, or at the time stated through the activation time when to perform the active set update, to the time when the UE successfully uses the set of radio links stated in that message for power control.

The active set update delay is depending on the number of known cells referred to in the ACTIVE SET UPDATE message. A cell is known if either or both of the following conditions are true:

- the UE has had radio links connected to the cell in the previous (old) active set
- the cell has been measured by the UE during the last 5 seconds and the SFN of the cell has been decoded by the UE..

And the phase reference is the primary CPICH.

The active set update delay shall be less than  $50+10*KC+100*OC$  ms, where

KC is the number of known cells in the active set update message.

OC is the number of cells that are not known in the active set update message.

If the UE have radio links in the active set that it can not use for data detection (due to low signal level), the UE shall at least every 150 ms search for the radio link

### 5.1.2.3 Interruption Time

The UE shall not interrupt the data flow when adding, changing or removing radio links to the active set.

## 5.2 FDD/FDD Hard Handover

### 5.2.1 Introduction

The hard handover procedure is initiated from UTRAN with a RRC message that implies a hard handover, see TS 25.331 section 8.3.5.

### 5.2.2 Requirements

#### 5.2.2.1 Hard handover delay

Procedure delay for all procedures, that can command a hard handover, are specified in TS25.331 section 13.5.2.

When the UE receives a RRC message implying hard handover with the activation time "now" or earlier than RRC procedure delay seconds from the end of the last TTI containing the RRC command, the UE shall be ready to start the transmission of the new uplink DPCCH within  $D_{handover}$  seconds from the end of the last TTI containing the RRC command.

If the access is delayed to an indicated activation time later than RRC procedure delay seconds from the end of the last TTI containing the RRC command, the UE shall be ready to start the transmission of the new uplink DPCCH at the designated activation time + interruption time.

where:



$D_{\text{handover}}$  equals the RRC procedure delay defined in TS25.331 Section 13.5.2 plus the interruption time stated in section 5.2.2.2.

### 5.2.2.2 Interruption time

The interruption time, i.e. the time between the last TTI containing a transport block on the old DPDCH and the time the UE starts transmission of the new uplink DPCCH, is depending on whether the target cell is known for the UE or not.

If intra-frequency hard handover is commanded or inter-frequency hard handover is commanded when the UE does not need compressed mode to perform inter-frequency measurements, the interruption time shall be less than  $T_{\text{interrupt1}}$

$$T_{\text{interrupt1}} = T_{\text{IU}} + 40 + 20 * \text{KC} + 150 * \text{OC} + 10 * F_{\text{max}} \text{ ms}$$

where

$T_{\text{IU}}$  is the interruption uncertainty when changing the timing from the old to the new cell.  $T_{\text{IU}}$  can be up to one frame (10 ms).

KC is the number of known target cells in the message, and

OC is the number of target cells that are not known in the message.

$F_{\text{max}}$  denotes the maximum number of radio frames within the transmission time intervals of all transport channels that are multiplexed into the same CCTrCH.

NOTE: The figure 40 ms is the time required for measuring the downlink DPCCH channel as stated in TS 25.214 section 4.3.1.2.

In the interruption requirement  $T_{\text{interrupt1}}$  a cell is known if either or both of the following conditions are true:

- the UE has had radio links connected to the cell in the previous (old) active set
- the cell has been measured by the UE during the last 5 seconds and the SFN of the cell has been decoded by the UE.

If inter-frequency hard handover is commanded and the UE needs compressed mode to perform inter-frequency measurements, the interruption time shall be less than  $T_{\text{interrupt2}}$

$$T_{\text{interrupt2}} = T_{\text{IU}} + 40 + 50 * \text{KC} + 150 * \text{OC} + 10 * F_{\text{max}} \text{ ms}$$

In the interruption requirement  $T_{\text{interrupt2}}$  a cell is known if:

- the cell has been measured by the UE during the last 5 seconds.

The phase reference is the primary CPICH.

The requirements in this section assume that N312 has the smallest possible value i.e. only one insync is required.

## 5.3 FDD/TDD Handover

### 5.3.1 Introduction

The purpose of FDD/TDD handover is to change the radio access mode from FDD to TDD. The FDD/TDD handover procedure is initiated from UTRAN with a RRC message that implies a hard handover as described in [16].

### 5.3.2 Requirements

The requirements in this section shall apply to UE supporting FDD and TDD.

### 5.3.2.1 FDD/TDD handover delay

RRC procedure performance values for all RRC procedures that can command a hard handover are specified [16]

When the UE receives a RRC message implying FDD/TDD handover with the activation time "now" or earlier than RRC procedure delay seconds from the end of the last TTI containing the RRC command, the UE shall be ready to start the transmission of the new uplink DPCH within  $D_{\text{handover}}$  seconds from the end of the last TTI containing the RRC command.

If the access is delayed to an indicated activation time later than RRC procedure delay seconds from the end of the last TTI containing the RRC command, the UE shall be ready to start the transmission of the new uplink DPCH at the designated activation time + interruption time.

where:

$D_{\text{handover}}$  equals the RRC procedure performance value as defined in [16] plus the interruption time stated in section 5.3.2.2.

### 5.3.2.2 Interruption time

The interruption time, i.e. the time between the end of the last TTI containing a transport block on the old DPDCH and the time the UE starts transmission of the new uplink DPCH, is dependent on whether the target cell is known for the UE or not.

If FDD/TDD handover is commanded, the interruption time shall be less than,

$$T_{\text{interrupt}} = T_{\text{offset}} + T_{\text{UL}} + 30 * F_{\text{SFN}} + 20 * \text{KC} + 180 * \text{UC} + 10 * F_{\text{max}} \text{ ms}$$

where,

|                     |   |
|---------------------|---|
| $T_{\text{offset}}$ | Equal to 10 ms, the frame timing uncertainty between the old cell and the target cell and the time that can elapse until the appearance of a Beacon channel |
| $T_{\text{UL}}$     | Equal to 10 ms, the time that can elapse until the appearance of the UL timeslot in the target cell   |
| $F_{\text{SFN}}$    | Equal to 1 if SFN decoding is required and equal to 0 otherwise   |
| KC                  | Equal to 1 if a known target cell is indicated in the RRC message implying FDD/TDD handover and equal to 0 otherwise  |
| UC                  | Equal to 1 if an unknown target cell is indicated in the RRC message implying FDD/TDD handover and equal to 0 otherwise                                     |
| $F_{\text{max}}$    | denotes the maximum number of radio frames within the transmission time intervals of all transport channels that are multiplexed into the same CCTrCH.      |

An inter-frequency TDD target cell shall be considered known by the UE, if the target cell has been measured by the UE during the last 5 seconds.

The interruption time requirements for an unknown target cell shall apply only if the signal quality of the unknown target cell is sufficient for successful synchronisation with one attempt.

## 5.4 FDD/GSM Handover

### 5.4.1 Introduction

The purpose of inter-RAT handover from UTRAN FDD to GSM is to transfer a connection between the UE and UTRAN FDD to GSM. The handover procedure is initiated from UTRAN with a RRC message (HANDOVER FROM UTRAN COMMAND). The procedure is described in TS25.331 section 8.3.7.

Compressed mode according to the UE Capability may be used to be able to make measurements on GSM.

## 5.4.2 Requirements

The requirements in this section shall apply to UE supporting FDD and GSM.

The requirements given below in Tables 5.2 and 5.3 for the case where the UE has not synchronised to the GSM cell before receiving the HANOVER FROM UTRAN COMMAND are valid when the signal quality of the GSM cell is sufficient for successful synchronisation with one attempt. If the UE is unable to synchronise to the GSM cell on the first attempt, it shall continue to search for synchronisation information for up to 800 ms. If after 800 ms the UE has not synchronised to the GSM cell it shall follow the handover failure procedure specified in [16].

### 5.4.2.1 Handover delay

When the UE receives a RRC HANOVER FROM UTRAN COMMAND with the activation time "now" or earlier than RRC procedure delay (see below) from the end of the last TTI containing the RRC command, the UE shall be ready to transmit (as specified in GSM 05.10) on the channel of the new RAT within the value in table 5.2 from the end of the last TTI containing the RRC command.

If the access is delayed to an indicated activation time later than RRC procedure delay from the end of the last TTI containing the RRC command, the UE shall be ready to transmit (as specified in GSM 05.10) on the channel of the new RAT at the designated activation time + interruption time.

The UE shall process the RRC procedures for the RRC HANOVER FROM UTRAN COMMAND within 50 ms, which is noted as RRC procedure delay. If the activation time is used, it corresponds to the CFN of the UTRAN channel.

**Table 5.2: FDD/GSM handover –handover delay**

| UE synchronisation status   | handover delay [ms] |
|---|---------------------|
| The UE has synchronised to the GSM cell before the HANOVER FROM UTRAN COMMAND is received     | 90                  |
| The UE has not synchronised to the GSM cell before the HANOVER FROM UTRAN COMMAND is received | 190                 |

### 5.4.2.2 Interruption time

The interruption time, i.e. the time between the end of the last TTI containing a transport block on the old channel and the time the UE is ready to transmit on the new channel, shall be less than The value in table 5.3.

**Table 5.3: FDD/GSM handover - interruption time**

| Synchronisation status  | Interruption time [ms] |
|---|------------------------|
| The UE has synchronised to the GSM cell before the HANOVER FROM UTRAN COMMAND is received     | 40                     |
| The UE has not synchronised to the GSM cell before the HANOVER FROM UTRAN COMMAND is received | 140                    |

## 5.5 Cell Re-selection in CELL\_FACH

### 5.5.1 Introduction

When a Cell Re-selection process is triggered according to TS 25.331, the UE shall evaluate the cell re-selection criteria specified in TS 25.304, based on radio measurements, and if a better cell is found that cell is selected.

### 5.5.2 Requirements

The Cell reselection delays specified below are applicable when the RRC parameter  $T_{\text{reselection}}$  is set to 0. Otherwise the Cell reselection delay is increased  $T_{\text{reselection}}$  s.

The measurements CPICH Ec/Io and CPICH RSCP shall be used for cell reselection in Cell-FACH state to another FDD cell, P-CCPCH RSCP shall be used for cell re-selection to a TDD cell and GSM carrier RSSI shall be used for cell re-selection to a GSM cell. The accuracies of the measurements used for a cell-reselection in an AWGN environment shall comply with the requirements in section 9. The measurements used for S-criteria and cell re-selection evaluation in CELL\_FACH shall be performed according to section 8.4.

### 5.5.2.1 Cell re-selection delay

For UTRA FDD the cell re-selection delay is defined as the time between the occurrence of an event which will trigger Cell Reselection process and the moment in time when the UE starts sending the the preambles on the PRACH for sending RRC CELL UPDATE message to the UTRAN.

For UTRA TDD, the cell re-selection delay is defined as the time between the occurrence of an event which will trigger the cell re-selection process and the moment in time when the UE starts sending the RRC CELL UPDATE message to the UTRAN on the RACH.

For GSM the cell re-selection delay is defined as the time between the occurrence of an event which will trigger Cell Reselection process and the moment in time when the UE starts sending the random access in the target cell of the new RAT.

#### 5.5.2.1.1 Intra frequency cell reselection

The cell re-selection delay in CELL\_FACH state to a cell in the same frequency shall be less than

$$T_{\text{reselection, intra}} = T_{\text{identify, intra}} + T_{\text{IU}} + 20 + T_{\text{SI}} + T_{\text{RA}} \text{ ms}$$

where

$T_{\text{identify, intra}}$  is specified in 8.4.2.2.1.

$T_{\text{IU}}$  is the interruption uncertainty when changing the timing from the old to the new cell.  $T_{\text{IU}}$  can be up to one frame (10 ms).

$T_{\text{SI}}$  = The time required for receiving all the relevant system information data according to the reception procedure and the RRC procedure delay of system information blocks defined in 25.331 for a UTRAN cell..

$T_{\text{RA}}$  = The additional delay caused by the random access procedure.

If a cell has been detectable at least  $T_{\text{identify, intra}}$ , the cell reselection delay in CELL\_FACH state to a cell in the same frequency shall be less than

$$T_{\text{reselection, intra}} = T_{\text{Measurement\_Period Intra}} + T_{\text{IU}} + 20 + T_{\text{SI}} + T_{\text{RA}} \text{ ms}$$

where

$T_{\text{Measurement\_Period Intra}}$  = Specified in 8.4.2.2.2.

These requirements assume radio conditions to be sufficient, so reading of system information can be done without errors.

#### 5.5.2.1.2 Inter frequency cell reselection

The cell re-selection delay in CELL\_FACH state to a FDD cell on a different frequency shall be less than

$$T_{\text{reselection, inter}} = T_{\text{identify, inter}} + T_{\text{IU}} + 20 + T_{\text{SI}} + T_{\text{RA}} \text{ ms}$$

.where

$T_{\text{identify, inter}}$  is specified in 8.4.2.3.1.

$T_{\text{IU}}$  is the interruption uncertainty when changing the timing from the old to the new cell.  $T_{\text{IU}}$  can be up to one frame (10 ms).

$T_{SI}$  = The time required for receiving all the relevant system information data according to the reception procedure and the RRC procedure delay of system information blocks defined in 25.331 for a UTRAN cell..

$T_{RA}$  = The additional delay caused by the random access procedure.

If a cell has been detectable at least  $T_{\text{identify,inter}}$ , the cell reselection delay in CELL\_FACH state to a FDD cell on a different frequency shall be less than

$$T_{\text{reselection,inter}} = T_{\text{Measurement inter}} + T_{IU} + 20 + T_{SI} + T_{RA} \text{ ms}$$

where

$$T_{\text{Measurement\_inter}} = \text{Specified in 8.4.2.3.2.}$$

These requirements assume radio conditions to be sufficient, so that reading of system information can be done without errors.

#### 5.5.2.1.3 FDD-TDD cell reselection

The requirements in this section shall apply to UE supporting FDD and TDD.

The cell re-selection delay in CELL\_FACH state in FDD to an inter-frequency TDD cell shall be less than

$$T_{\text{reselection,TDD}} = T_{\text{identify TDD inter}} + T_{IU} + 20 + T_{SI} + T_{RA} \text{ ms}$$

where

$T_{\text{identify,TDD inter}}$  is specified in 8.4.2.4.1.

$T_{IU}$  is the interruption uncertainty when changing the timing from the old to the new cell.  $T_{IU}$  can be up to one frame (10 ms).

$T_{SI}$  is the time required for receiving all the relevant system information data according to the reception procedure and the RRC procedure delay of system information blocks defined in [16] for a UTRAN cell.

$T_{RA}$  is the additional delay caused by the random access procedure.

If a cell has been detectable at least  $T_{\text{identify TDD inter}}$ , the cell re-selection delay in CELL\_FACH state to an inter-frequency TDD cell shall be less than,

$$T_{\text{reselection,TDD}} = T_{\text{Measurement TDD inter}} + T_{IU} + 20 + T_{SI} + T_{RA}$$

where

$T_{\text{Measurement TDD inter}}$  is specified in 8.4.2.4.1.

These requirements assume radio conditions to be sufficient, so that reading of system information can be done without errors.

#### 5.5.2.1.4 UTRAN-GSM Cell Reselection

The cell re-selection delay in CELL\_FACH state to a GSM cell shall be less than

$$T_{\text{reselection,GSM}} = T_{\text{identify,GSM}} + T_{\text{measurement,GSM}} + 40 + T_{BCCH} + T_{RA} \text{ ms}$$

where

$T_{BCCH}$  = is the maximum time allowed to read the BCCH data from a GSM cell [21].

$T_{RA}$  = the additional delay caused by the random access procedure.

a) For UE requiring measurement occasions.

$T_{\text{identify,GSM}}$  is specified in 8.4.2.5.2.1

$$T_{\text{measurement, GSM}} = \text{Max} \left\{ 8 \cdot \frac{N_{\text{carriers}}}{N_{\text{GSM carrier RSSI}}} \cdot T_{\text{meas}}, 4 * T_{\text{meas}}, 480 \text{ms} \right\}$$

where:

$N_{\text{carriers}}$  is the number of GSM carriers in the Inter-RAT cell info list

$N_{\text{GSM carrier RSSI}}$  is specified in 8.4.2.5.1.

b) For UE not requiring measurement occasions

$$T_{\text{identify, GSM}} = 150 \text{ ms}$$

$$T_{\text{measurement, GSM}} = 480 \text{ ms}$$

### 5.5.2.2 Interruption time

The requirements on interruption time below is valid when the signal quality of the serving cell is good enough to allow decoding of the FACH channel during the cell reselection.

#### 5.5.2.2.1 FDD-FDD cell reselection

The interruption time, i.e. the time between the last TTI the UE monitors the FACH channel on the serving cell and the time the UE starts transmit the preambles on the PRACH for sending the RRC CELL UPDATE message in the target cell.

- 1) When intra-frequency cell reselection, or inter-frequency cell reselection when the UE does not need measurement occasion to perform inter-frequency measurements, occurs the interruption time shall be less than  $T_{\text{interrupt1}}$

$$T_{\text{interrupt1}} = T_{\text{IU}} + 20 + T_{\text{RA}} \text{ ms}$$

where

$T_{\text{IU}}$  is the interruption uncertainty when changing the timing from the old to the new cell.  $T_{\text{IU}}$  can be up to one frame (10 ms).

$T_{\text{RA}}$  = The additional delay caused by the random access procedure.

- 2) When inter-frequency cell reselection occurs and the UE needs measurement occasions to perform inter-frequency measurements, the interruption time shall be less than  $T_{\text{interrupt2}}$

$$T_{\text{interrupt2}} = T_{\text{IU}} + 20 + T_{\text{SI}} + T_{\text{RA}} \text{ ms}$$

where

$T_{\text{SI}}$  = the time required for receiving all the relevant system information data according to the reception procedure and the RRC procedure delay of system information blocks defined in 25.331.

#### 5.5.2.2.2 FDD-TDD cell reselection

The requirements in this section shall apply to UE supporting FDD and TDD.

The interruption time, is defined as the time period between the last TTI the UE monitors the FACH on the serving cell and the time instant the UE starts to transmit the RRC CELL UPDATE message in the target inter frequency TDD cell on the RACH.

In case of inter-frequency cell reselection to a TDD cell and when the UE needs measurement occasions to perform inter-frequency TDD measurements, the interruption time shall be less than

$$T_{\text{interrupt1, TDD}} = T_{\text{IU}} + 20 + T_{\text{SI}} + T_{\text{RA}} \text{ ms}$$

In case of inter-frequency cell reselection to a TDD cell and when the UE does not need measurement occasions to perform inter-frequency TDD measurements, the interruption time shall be less than

$$T_{\text{interrupt2, TDD}} = T_{\text{IU}} + 20 + T_{\text{RA}} \text{ ms}$$

where

$T_{\text{IU}}$  is the interruption uncertainty when changing the timing from the old to the new cell.  $T_{\text{IU}}$  can be up to one frame (10 ms).

$T_{\text{SI}}$  is the time required for receiving all the relevant system information data according to the reception procedure and the RRC procedure delay of system information blocks defined in [16].

$T_{\text{RA}}$  is the additional delay caused by the random access procedure.

### 5.5.2.2.3 FDD-GSM cell reselection

The interruption time, i.e. the time between the last TTI the UE monitors the FACH channel and the time the UE starts transmit a RACH in the target GSM cell.

When FDD-GSM cell reselection occurs the interruption time shall be less than  $T_{\text{interrupt, GSM}}$

$$T_{\text{interrupt, GSM}} = 40 + T_{\text{BCCH}} + T_{\text{RA}} \text{ ms}$$

where

$T_{\text{BCCH}}$  = the maximum time allowed to read BCCH data from the GSM cell [21].

$T_{\text{RA}}$  = The additional delay caused by the random access procedure.

### 5.5.2.3 Measurement and evaluation of cell selection criteria S of serving cell

The S-criteria detection delay is defined as the time between the occurrence of an event which leads to that the cell selection criteria S for serving cell is not fulfilled and the moment in time when the UE detects that the cell selection criteria S for serving cell is not fulfilled.

The UE shall filter the CPICH Ec/Io and CPICH RSCP measurements used for cell selection criteria S evaluation of the serving cell over at least 3 measurement periods  $T_{\text{Measurement_Period Intra}}$ .

The S-criteria detection delay in CELL\_FACH state shall be less than:

$$T_{\text{S-criteria}} = 5 \times T_{\text{Measurement_Period Intra}} \text{ ms}$$

where

$T_{\text{Measurement_Period Intra}}$  = Specified in 8.4.2.2.2.

The UE is “out of service area” if the UE has evaluated for 4 s that that the serving cell does not fulfil the cell selection criterion S and if the UE has not found any new suitable cell based on searches and measurements of the neighbour cells indicated in the measurement control system information during these 4 s. When the UE is “out of service area” it shall initiate cell selection procedures for the selected PLMN as defined in [1].

On transition from CELL\_DCH to CELL\_FACH, if a UE cannot find a suitable UTRA cell, then it is considered to be “out of service area” and shall perform actions according to [16].

## 5.6 Cell Re-selection in CELL\_PCH

### 5.6.1 Introduction

The UE shall evaluate the cell re-selection criteria specified in TS 25.304, based on radio measurements, and if a better cell is found that cell is selected.

## 5.6.2 Requirements

Requirements for cell re-selection in CELL\_PCH are the same as for cell re-selection in idle mode, see section 4.2. UE shall support all DRX cycle lengths in table 4.1, according to [16].

## 5.7 Cell Re-selection in URA\_PCH

### 5.7.1 Introduction

The UE shall evaluate the cell re-selection criteria specified in TS 25.304, based on radio measurements, and if a better cell is found that cell is selected.

### 5.7.2 Requirements

Requirements for cell re-selection in CELL\_PCH are the same as for cell re-selection in idle mode, see section 4.2. UE shall support all DRX cycle lengths in table 4.1, according to [16].

## 5.8 RACH reporting

### 5.8.1 Introduction

The network may request the UE to report on RACH cell CPICH levels for the serving cell and up to 6 strongest monitored set cells and SFN-SFN observed time difference between the serving cell and up to 6 different monitored set cells.

### 5.8.2 Requirements

If all of the following conditions are true, the UE is allowed to have an additional delay of  $N_{\text{RACH}} * 50$  ms in RACH transmission compared to the normal RACH transmission delay.

- SFN-SFN observed time difference measurement results are required to be reported on RACH
- The set of cells on which the SFN-SFN observed time difference measurement is to be reported has not changed since the previous RACH measurement report
- The UE has not measured the SFN-SFN observed time differences for the cells to be reported on RACH in the CELL\_FACH state according to the requirements defined in Section 8.4.2.2

If at least one of the previous conditions is false, the UE shall be able to report the requested measurement results on RACH within a normal RACH transmission delay.

$N_{\text{RACH}}$  is the number of cells requiring SFN decoding prior to the reporting of SFN-SFN observed time difference measurement results on RACH.

## 5.9 Inter-RAT cell change order from UTRAN in CELL\_DCH and CELL\_FACH

### 5.9.1 Introduction

The purpose of inter-RAT cell change order from UTRAN FDD to GSM is to transfer a connection between the UE and UTRAN FDD to GSM. This procedure may be used in CELL\_DCH and CELL\_FACH state. The cell change order procedure is initiated from UTRAN with a RRC message (CELL CHANGE ORDER FROM UTRAN). The procedure is described in TS25.331 section 8.3.11.



## 5.9.2 Requirements

The requirements in this section shall apply to UE supporting FDD and GSM.

### 5.9.2.1 Delay

When the UE receives a RRC CELL CHANGE ORDER FROM UTRAN COMMAND with the activation time "now" or earlier than the value in table 5.4 from the end of the last TTI containing the RRC command, the UE shall start transmit the random access in the target cell of the new RAT within the value in table 5.4 from the end of the last TTI containing the RRC command.

If the access is delayed to an indicated activation time later than the value in table 5.4 from the end of the last TTI containing the RRC command, the UE shall start transmit the random access in the target cell of the new RAT at the designated activation time.

The UE shall process the RRC procedures for the RRC CELL CHANGE ORDER FROM UTRAN COMMAND within 50 ms. If the activation time is used, it corresponds to the CFN of the UTRAN channel.

**Table 5.4: Inter-RAT cell change order from UTRAN - delay**

| UE synchronisation status   | delay [ms]                |
|---|---------------------------|
| The UE has synchronised to the GSM cell before the CELL CHANGE ORDER FROM UTRAN COMMAND is received     | $90 + T_{BCCH} + T_{RA}$  |
| The UE has not synchronised to the GSM cell before the CELL CHANGE ORDER FROM UTRAN COMMAND is received | $190 + T_{BCCH} + T_{RA}$ |

where

$T_{BCCH}$  = the maximum time allowed to read BCCH data from the GSM cell [21].

$T_{RA}$  = the additional delay caused by the random access procedure

### 5.9.2.2 Interruption time

The requirements on interruption time below is valid when the signal quality of the serving cell is good enough to allow decoding of the old channel during the inter-RAT cell change order from UTRAN delay.

The interruption time, i.e. the time between the end of the last TTI containing a transport block that the UE is able to receive on the old channel and the time the UE starts transmit the random access in the target cell, shall be less than the value in table 5.5. The requirement in table 5.5 for the case, that UE is not synchronised to the GSM cell before the CELL CHANGE ORDER FROM UTRAN COMMAND is received, is valid when the signal quality of the GSM cell is good enough for successful synchronisation with one attempt.

**Table 5.5: Inter-RAT cell change order from UTRAN - interruption time**

| Synchronisation status  | Interruption time [ms]    |
|---|---------------------------|
| The UE has synchronised to the GSM cell before the CELL CHANGE ORDER FROM UTRAN COMMAND is received     | $40 + T_{BCCH} + T_{RA}$  |
| The UE has not synchronised to the GSM cell before the CELL CHANGE ORDER FROM UTRAN COMMAND is received | $140 + T_{BCCH} + T_{RA}$ |

where

$T_{BCCH}$  = the maximum time allowed to read BCCH data from the GSM cell [21].

$T_{RA}$  = the additional delay caused by the random access procedure

## 6 RRC Connection Control

### 6.1 RRC Re-establishment

#### 6.1.1 Introduction

RRC connection re-establishment is needed, when a UE in state CELL\_DCH loses radio connection due to radio link failure. The procedure when a radio link failure occurs in CELL\_DCH is specified in TS 25.331.

#### 6.1.2 Requirements

The requirements in this section are applicable when the UE performs a RRC Re-establishment to a cell belonging to any of the frequencies present in the previous (old) monitored set.

When the UE is in CELL\_DCH state, the UE shall be capable of sending a CELL UPDATE message using the cause "radio link failure" within  $T_{RE-ESTABLISH}$  seconds from when the radio link failure occurred.

$T_{RE-ESTABLISH}$  equals the RRC procedure delay ( $T_{RRC-RE-ESTABLISH}$ ) according to TS25.331 plus the UE Re-establishment delay ( $T_{UE-RE-ESTABLISH-REQ}$ ), specified in 6.1.2.1.

$$T_{RE-ESTABLISH} = T_{RRC-RE-ESTABLISH} + T_{UE-RE-ESTABLISH-REQ}$$

##### 6.1.2.1 UE Re-establishment delay requirement

The UE Re-establishment delay requirement ( $T_{UE-E-ESTABLISH-REQ}$ ) is defined as the time between the moment when radio link failure is considered by the UE, to when the UE starts to send preambles on the PRACH.

$T_{UE-RE-ESTABLISH-REQ}$  is depending on whether the target cell is known by the UE or not. A cell is known if either or both of the following conditions are true:

- the UE has had radio links connected to the cell in the previous (old) active set
- the cell has been measured by the UE during the last 5 seconds.

And the phase reference is the primary CPICH.

The UE Re-establishment delay requirement  $T_{UE-RE-ESTABLISH-REQ}$  shall be less than

$$T_{UE-RE-ESTABLISH-REQ-KNOWN} = 50\text{ms} + T_{\text{search}} + T_{SI} + T_{RA}$$

in case that the target cell is known, and

$$T_{UE-RE-ESTABLISH-REQ-UNKNOWN} = 50\text{ms} + T_{\text{search}} * NF + T_{SI} + T_{RA}$$

in case that the target cell is not known by the UE.

where  $T_{\text{search}}$  is the time it takes for the UE to search the cell.

$T_{\text{search}} = 100$  ms if the target cell is known by the UE, and

$T_{\text{search}} = 800$  ms if the target cell is not known by the UE.

where  $T_{SI}$  is the time required for receiving all the relevant system information data according to the reception procedure and the RRC procedure delay of system information blocks defined in 25.331 for a UTRAN cell (ms).

$T_{RA}$  = The additional delay caused by the random access procedure.

$NF$  is the number of different frequencies in the monitored set.

This requirement assumes radio conditions to be sufficient, so that reading of system information can be done without errors.

## 6.2 Void

## 6.3 Random Access

### 6.3.1 Introduction

The random access procedure is used when establishing the layer 1 communication between the UE and UTRAN. The random access shall provide a fast access but without disturbing ongoing connections. The random access is specified in section 6 of TS 25.214 and the control of the RACH transmission is specified in section 11.2 of TS 25.321. A random access transmit sequence is described in section 6.7.2 of TS 25.303.

### 6.3.2 Requirements

The UE shall have capability to calculate initial power according to the open loop algorithm and apply this power level at the first preamble and increase the power on additional preambles. The UE shall stop transmit preambles upon a ACK/NACK on the AICH has been received or if the maximum number of preambles within on cycle has been reached. Upon an ACK has been received the UE shall transmit a message otherwise the ramping procedure shall be repeated.

#### 6.3.2.1 Correct behaviour when receiving an ACK

The UE shall stop transmitting preambles upon a ACK on the AICH has been received and then transmit a message..

The absolute power applied to the first preamble shall have an accuracy as specified in table 6.3 of TS 25.101 [3]. The relative power applied to additional preambles shall have an accuracy as specified in section 6.5.2.1 of 25.101 [3].

#### 6.3.2.2 Correct behaviour when receiving an NACK

The UE shall stop transmitting preambles upon a NACK on the AICH has been received and then repeat the ramping procedure when the back off timer  $T_{B01}$  expires.

#### 6.3.2.3 Correct behaviour at Time-out

The UE shall stop transmit preambles when reaching the maximum number of preambles allowed in a cycle. The UE shall then repeat the ramping procedure until the maximum number of preamble ramping cycles are reached.

#### 6.3.2.4 Correct behaviour when reaching maximum transmit power

The UE shall not exceed the maximum allowed UL TX power configured by the UTRAN.

The absolute power of any preamble shall not exceed the maximum allowed UL TX power with more than specified in section 6.5.

## 6.4 Transport format combination selection in UE

### 6.4.1 Introduction

When the UE estimates that a certain TFC would require more power than the maximum transmit power, it shall limit the usage of transport format combinations for the assigned transport format set, according to the functionality specified in section 11.4 in TS25.321. This in order to make it possible for the network operator to maximise the coverage. Transport format combination selection is described in section 11.4 of TS 25.321.

## 6.4.2 Requirements

The UE shall continuously evaluate based on the *Elimination*, *Recovery* and *Blocking* criteria defined below, how TFCs on an uplink DPDCH can be used for the purpose of TFC selection. The evaluation shall be performed for every TFC in the TFCS using the estimated UE transmit power of a given TFC. The UE transmit power estimation for a given TFC shall be made using the UE transmitted power measured over the measurement period, defined in 9.1.6.1 as one slot, and the gain factors of the corresponding TFC.

The UE shall consider the *Elimination* criterion for a given TFC to be detected if the estimated UE transmit power needed for this TFC is greater than the Maximum UE transmitter power for at least X out of the last Y successive measurement periods immediately preceding evaluation. The MAC in the UE shall consider that the TFC is in Excess-Power state for the purpose of TFC selection.

MAC in the UE shall indicate the available bit rate for each logical channel to upper layers within  $T_{\text{notify}}$  from the moment the *Elimination* criterion was detected.

The UE shall consider the *Recovery* criterion for a given TFC to be detected if the estimated UE transmit power needed for this TFC has not been greater than the Maximum UE transmitter power for the last Z successive measurement periods immediately preceding evaluation. The MAC in the UE shall consider that the TFC is in Supported state for the purpose of TFC selection.

MAC in the UE shall indicate the available bitrate for each logical channel to upper layers within  $T_{\text{notify}}$  from the moment the *Recovery* criterion was detected.

The evaluation of the *Elimination* criterion and the *Recovery* criterion shall be performed at least once per radio frame.

The definitions of the parameters X,Y and Z which shall be used when evaluating the *Elimination* and the *Recovery* criteria when no compressed mode patterns are activated are given in Table 6.0.

**Table 6.0: X, Y, Z parameters for TFC selection**

| X  | Y  | Z  |
|----|----|----|
| 15 | 30 | 30 |

The UE shall consider the *Blocking* criterion for a given TFC to be fulfilled at the latest at the start of the longest uplink TTI after the moment at which the TFC will have been in Excess-Power state for a duration of:

$$(T_{\text{notify}} + T_{\text{modify}} + T_{\text{L1\_proc}})$$

where:

$T_{\text{notify}}$  equals 15 ms

$T_{\text{modify}}$  equals  $\text{MAX}(T_{\text{adapt\_max}}, T_{\text{TTI}})$

$T_{\text{L1\_proc}}$  equals 15 ms

$T_{\text{adapt\_max}}$  equals  $\text{MAX}(T_{\text{adapt\_1}}, T_{\text{adapt\_2}}, \dots, T_{\text{adapt\_N}})$

N equals the number of logical channels that need to change rate

$T_{\text{adapt\_n}}$  equals the time it takes for higher layers to provide data to MAC in a new supported bitrate, for logical channel n. Table 6.1 defines  $T_{\text{adapt}}$  times for different services. For services where no codec is used  $T_{\text{adapt}}$  shall be considered to be equal to 0 ms.

**Table 6.1:  $T_{\text{adapt}}$**

| Service   | $T_{\text{adapt}}$ [ms] |
|-----------|-------------------------|
| UMTS AMR  | 40                      |
| UMTS AMR2 | 60                      |

$T_{\text{TTI}}$  equals the longest uplink TTI of the selected TFC (ms).

The Maximum UE transmitter power is defined as follows

Maximum UE transmitter power = MIN(Maximum allowed UL TX Power, UE maximum transmit power)

where

Maximum allowed UL TX Power is set by UTRAN and defined in [16], and

UE maximum transmit power is defined by the UE power class, and specified in [3].

## 6.5 Maximum allowed UL TX Power

UTRAN may limit the power the UE is using on the uplink by setting the maximum allowed UL TX power IE defined in TS25.331.

For each measurement period, the UE shall with the use of the UE transmitted power measurement, estimate if it has reached the Maximum allowed UL TX Power or not. With tolerances as defined for the UE transmitted power measurement accuracy (section 9.1.6.1), the UE output power shall not exceed the Maximum allowed UL TX Power, as set by the UTRAN.

For UE output powers that are outside the range covered by the UE transmitted power measurement the UE output power shall not exceed the Maximum allowed UL TX Power with more than the tolerances specified for the Open loop power control in TS 25.101 section 6.4.1.

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# 7 Timing and Signalling characteristics

## 7.1 UE Transmit Timing

### 7.1.1 Introduction

The UE shall have capability to follow the frame timing change of the connected Node B. The uplink DPCCH/DPDCH frame transmission takes place approximately  $T_0$  chips after the reception of the first detected path (in time) of the corresponding downlink DPCCH/DPDCH frame from the reference cell.  $T_0$  is defined in [2]. UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are defined in the following requirements.

### 7.1.2 Requirements

The UE initial transmission timing error shall be less than or equal to  $\pm 1.5$  Chip. The reference point for the UE initial transmit timing control requirement shall be the time when the first detected path (in time) of the corresponding downlink DPCCH/DPDCH frame is received from the reference cell plus  $T_0$  chips.  $T_0$  is defined in [2].

When the UE is not in soft handover, the reference cell shall be the one the UE has in the active set. The cell, which is selected as a reference cell, shall remain as a reference cell even if other cells are added to the active set. In case that the reference cell is removed from the active set the UE shall start adjusting its transmit timing no later than the time when the whole active set update message is available at the UE taking the RRC procedure delay into account.

The UE shall be capable of changing the transmission timing according the received downlink DPCCH/DPDCH frame. The maximum amount of the timing change in one adjustment shall be  $\frac{1}{4}$  Chip.

The minimum adjustment rate shall be 233ns per second. The maximum adjustment rate shall be  $\frac{1}{4}$  chip per 200ms. In particular, within any given  $800 \cdot d$  ms period, the UE transmit timing shall not change in excess of  $\pm d$  chip from the timing at the beginning of this  $800 \cdot d$  ms period, where  $0 \leq d \leq 1/4$ .

## 7.2 UE Receive - Transmit Time Difference

### 7.2.1 Introduction

The UE shall have the capability to be in soft handover with more than one cell. The downlink DPCCH frame timing shall take place approximately  $T_0$  chips before the transmission of the uplink DPDCH/DPCCH. The adjustment requirements for the uplink DPDCH/DPCCH timing are specified in 7.1.1. The valid range of the Receive to Transmit time difference at the UE is defined in the following requirements.

### 7.2.2 Requirements

A UE shall support reception, demodulation and combining of signals of a downlink DPCCH when the receive timing is within a window of  $T_0 \pm 148$  chip before the transmit timing where  $T_0$  is defined in [2]. A UE is only required to react to TPC commands with a transmit power adjustment in the immediate next slot if the downlink receive timing of all cells in the active set is within a window of  $T_0 \pm 148$  chip before the uplink transmit timing. If the downlink receive timing of one or more cells in the active set is outside the window of  $T_0 \pm 148$  chip, the UE may also react with a power adjustment one slot later. The receive timing is defined as the first detected path in time.

## 7.3 UE timer accuracy

### 7.3.1 Introduction

UE timers are used in different protocol entities to control the UE behaviour.

### 7.3.2 Requirements

For UE timers  $T_{3xx}$ ,  $T_{\text{barred}}$ ,  $T_{\text{reselection}}$ ,  $T_{\text{penalty\_time}}$ ,  $T_{\text{CRmax}}$ ,  $T_{\text{CRmaxHyst}}$  [16], UE shall comply with the timer accuracies according to Table 7.1.

The requirements are only related to the actual timing measurements internally in the UE. They do not include the following:

- Inaccuracy in the start and stop conditions of a timer (e.g. UE reaction time to detect that start and stop conditions of a timer is fulfilled), or
- Inaccuracies due to restrictions in observability of start and stop conditions of a UE timer (e.g. TTI alignment when UE sends messages at timer expiry).

**Table 7.1**

| Timer value [s]      | Accuracy    |
|----------------------|-------------|
| timer value <4       | $\pm 0.1$ s |
| timer value $\geq 4$ | $\pm 2.5$ % |

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## 8 UE Measurements Procedures

### 8.1 General Measurement Requirements in CELL\_DCH State

#### 8.1.1 Introduction

This section contains requirements on the UE regarding measurement reporting in CELL\_DCH state. The requirements are split in FDD intra frequency, FDD inter frequency, TDD and GSM measurements. These measurements may be used by the UTRAN, e.g. for handover decisions. The measurements are defined in TS 25.215, the measurement model is defined in TS 25.302 and measurement accuracies are specified in section 9. Control of measurement reporting is

specified in TS 25.331 and parallel measurements are specified in section 8.2. Compressed mode is specified in TS 25.215.

## 8.1.2 Requirements

### 8.1.2.1 UE Measurement Capability

In CELL\_DCH state the UE shall be able to monitor up to

- 32 intra frequency FDD cells (including active set), and
- 32 inter frequency cells, including
  - FDD cells distributed on up to 2 additional FDD carriers and
  - Depending on UE Capability, TDD cells, distributed on up to 3 TDD carriers and
- Depending on UE capability, 32 GSM cells distributed on up to 32 GSM carriers.
- Depending on UE capability, the UE shall be able to monitor up to 16 intra frequency cells during IPDL gaps.

If the UE utilises compressed mode for inter-frequency and/or inter-RAT measurements, in order for the requirements in the following subsections to apply the UTRAN must:

- provide transmission gap pattern sequences with TGPL1 > 1, and
- provide the patterns within a transmission gap pattern sequence that are identical (i.e., TGPL1 = TGPL2), and
- ensure that with the activation of one or more transmission gap pattern sequences, no more than two frames contain a transmission gap within any window of three consecutive frames, and
- ensure that there is a minimum of 8 slots between the end of the first transmission gap and the beginning of the second transmission gap in case of two successive compressed frames..

Performance requirements for different types of transmission gap pattern sequences and different number of cells is defined in the following sections.

The requirements in section 9 are applicable for a UE performing measurements according to this section.

The received CPICH  $E_c/I_o$  is defined as

$$\left( \frac{CPICH - E_c}{I_o} \right) \Big|_{in \text{ dB}} = \left( \frac{CPICH - E_c}{I_{or}} \right) \Big|_{in \text{ dB}} - \left( \frac{I_o}{\hat{I}_{or}} \right) \Big|_{in \text{ dB}}$$

and the received SCH  $E_c/I_o$  is defined as

$$\left( \frac{SCH - E_c}{I_o} \right) \Big|_{in \text{ dB}} = \left( \frac{SCH - E_c}{I_{or}} \right) \Big|_{in \text{ dB}} - \left( \frac{I_o}{\hat{I}_{or}} \right) \Big|_{in \text{ dB}}$$

### 8.1.2.2 FDD intra frequency measurements

During the CELL\_DCH state the UE shall continuously measure identified intra frequency cells and search for new intra frequency cells in the monitoring set. In case the network requests the UE to report detected set cells, the UE shall also search for intra frequency cells outside the monitored and active set. Cells, which are neither included in the active set nor in the monitored set, and are identified by the UE belong to the detected set according to TS 25.331. If compressed mode pattern sequences are activated, intra frequency measurements can be performed between the transmission gaps simultaneously for data reception from the active set cell/s.

The performance of intra frequency measurements when IPDL is active has not been studied.

### 8.1.2.2.1 Identification of a new cell

The UE shall be able to identify and decode the SFN of a new detectable cell belonging to the monitored set within

$$T_{\text{identify intra}} = \text{Max} \left\{ 800, T_{\text{basic identify FDD, intra}} \cdot \frac{T_{\text{Measurement Period, Intra}}}{T_{\text{Intra}}} \right\} \text{ms}$$

A cell shall be considered detectable when

- CPICH Ec/Io  $\geq$  -20 dB,
- SCH\_Ec/Io  $\geq$  -20 dB for at least one channel tap and SCH\_Ec/Ior is equally divided between primary synchronisation code and secondary synchronisation code.

When L3 filtering is used an additional delay can be expected.

In case of conflict when a compressed gap sequence is activated the UE may choose to prioritise the SFN decoding.

#### 8.1.2.2.1.1 Identification of a new cell using IPDL gaps

When the UE is supporting IPDL measurements and when idle periods with a length of 1 slot are scheduled the UE physical layer shall be capable to identify a new cell and report SFN-SFN observed time difference type 2 measurement within

$$T_{\text{identify,IPDL}} = \text{Max} \{ T_{\text{Measurement_Period Intra}}, T_{\text{IPDL}} \} \text{ms}$$

where

$T_{\text{Measurement_Period Intra}}$  = The measurement period for Intra frequency CPICH measurements defined in Section 8.1.2.2.2.

and

$T_{\text{IPDL}}$  depends on the Search Window Size given in UE positioning OTDOA neighbour cell info as given in Table 8.0

**Table 8.0:  $T_{\text{IPDL}}$**

| Search Window Size                 | $T_{\text{IPDL}}$                             |
|------------------------------------|---|
| less than or equal to +/- 40 chips | Time over which 4 consecutive IPDL gaps occur |
| +/- 80 chips                       | Time over which 8 consecutive IPDL gaps occur |

#### 8.1.2.2.2 UE CPICH measurement capability

In the CELL\_DCH state the measurement period for intra frequency measurements is 200 ms. When no transmission gap pattern sequence is activated, the UE shall be capable of performing CPICH measurements for 8 identified intra-frequency cells of the monitored set and/or the active set, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of 200 ms. When one or more transmission gap pattern sequences are activated, the UE shall be capable of performing CPICH measurements for at least  $Y_{\text{measurement intra}}$  cells, where  $Y_{\text{measurement intra}}$  is defined in the following equation. The measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.1 and 9.1.2. If the UE has identified more than  $Y_{\text{measurement intra}}$  cells, the UE shall perform measurements of all identified cells but the reporting rate of CPICH measurements of cells from UE physical layer to higher layers may be decreased.

$$Y_{\text{measurement intra}} = \text{Floor} \left\{ X_{\text{basic measurement FDD}} \cdot \frac{T_{\text{Intra}}}{T_{\text{Measurement Period, Intra}}} \right\} \text{ cells}$$

where

$$X_{\text{basic measurement FDD}} = 8 \text{ (cells)}$$



$T_{\text{Measurement\_Period Intra}} = 200$  ms. The measurement period for Intra frequency CPICH measurements.

$T_{\text{Intra}}$  : This is the minimum time that is available for intra frequency measurements, during the measurement period with an arbitrarily chosen timing.

$T_{\text{basic\_identify\_FDD, intra}} = 800$  ms. This is the time period used in the intra frequency equation where the maximum allowed time for the UE to identify a new FDD cell is defined.

#### 8.1.2.2.2.1 Capabilities for measurements during IPDL gaps

When idle periods with a length of 1 slot are scheduled, the UE physical layer shall be capable of reporting SFN-SFN observed time difference type 2 measurements to higher layers with measurement accuracy as specified in sub-clause 9.1.8.2.2 with measurement period given by

$$T_{\text{measurement IPDL}} = \text{Max}\{T_{\text{Measurement\_Period Intra}}, T_{4\text{IPDLs}}\} \text{ms}$$

where

$T_{\text{Measurement\_Period Intra}}$  = The measurement period for Intra frequency CPICH measurements defined in Section 8.1.2.2.2.

$T_{4\text{IPDLs}}$  = Time period over which 4 consecutive idle periods occur.

#### 8.1.2.2.3 Periodic Reporting

Reported measurements contained in periodically triggered measurement reports shall meet the requirements in section 9.

#### 8.1.2.2.4 Event-triggered Periodic Reporting

Reported measurements contained in event triggered periodic measurement reports shall meet the requirements in section 9.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in section 8.1.2.2.3 Event Triggered Reporting.

#### 8.1.2.2.5 Event Triggered Reporting

Reported measurements contained in event triggered measurement reports shall meet the requirements in section 9.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The measurement reporting delay is defined as the time between any event that will trigger a measurement report until the UE starts to transmit over the Uu interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH.

Editors Note: The test cases in section A.8 will need revisions to reflect the general requirements.

The event triggered measurement reporting delay, on cells belonging to monitored set, measured without L3 filtering, shall be less than the above defined  $T_{\text{identify intra}}$  defined in Section 8.1.2.2.1

If a cell, belonging to monitored set, which the UE has identified and measured at least once over the measurement period, becomes undetectable for a period  $< 5$  seconds and then the cell becomes detectable again and triggers an event, the measurement reporting delay shall be less than  $T_{\text{Measurement\_Period Intra}}$  ms provided the timing to that cell has not changed more than  $\pm 32$  chips, the UE CPICH measurement capabilities of section 8.1.2.2.2 are valid and L3 filtering has not been used. When L3 filtering is used an additional delay can be expected.

If a cell belonging to monitored set has been detectable at least for the time period  $T_{\text{identify intra}}$  and then enters or leaves the reporting range, the event triggered measurement reporting delay shall be less than  $T_{\text{Measurement\_Period Intra}}$  when the L3 filter has not been used and the UE CPICH measurement capabilities of Section 8.1.2.2.2 are valid.

### 8.1.2.3 FDD inter frequency measurements

In the CELL\_DCH state when a transmission gap pattern sequence with the "FDD measurements" purpose is provided by the network the UE shall continuously measure identified inter frequency cells and search for new inter frequency cells indicated in the measurement control information.

In order for the requirements in the following subsections to apply the UTRAN must provide a transmission gap pattern sequence with measurement purpose FDD measurement using the following combinations for TGL1, TGL2, TGD and Max TGPL:

**Table 8.1**

| TGL1 [slots] | TGL2 [slots] | TGD [slots] | Max TGPL [frames] |
|--------------|--------------|-------------|-------------------|
| 7            | -            | undefined   | 18                |
| 14           | -            | undefined   | 36                |
| 10           | -            | undefined   | 24                |
| 7            | 7            | 15...269    | 18 + ceil(TGD/15) |
| 14           | 14           | 45...269    | 36 + ceil(TGD/15) |

#### 8.1.2.3.1 Identification of a new cell

The UE shall be able to identify a new detectable cell belonging to the monitored set within

$$T_{\text{identify\_inter}} = \text{Max} \left\{ 5000, T_{\text{basic\_identify\_FDD\_inter}} \cdot \frac{T_{\text{Measurement\_Period\_Inter}}}{T_{\text{Inter}}} \cdot N_{\text{Freq}} \right\} \text{ms}$$

A cell shall be considered detectable when

- CPICH Ec/Io  $\geq$  -20 dB,
- SCH\_Ec/Io  $\geq$  -17 dB for at least one channel tap and SCH\_Ec/Ior is equally divided between primary synchronisation code and secondary synchronisation code.

When L3 filtering is used an additional delay can be expected.

#### 8.1.2.3.2 UE CPICH measurement capability

When transmission gaps are scheduled for FDD inter frequency measurements the UE physical layer shall be capable of reporting measurements to higher layers with measurement accuracy as specified in sub-clause 9.1.1 and 9.1.2 with measurement period given by

$$T_{\text{measurement\_inter}} = \text{Max} \left\{ T_{\text{Measurement\_Period\_Inter}}, T_{\text{basic\_measurement\_FDD\_inter}} \cdot \frac{T_{\text{Measurement\_Period\_Inter}}}{T_{\text{Inter}}} \cdot N_{\text{Freq}} \right\} \text{ms}$$

If the UE does not need compressed mode to perform inter-frequency measurements, the measurement period for inter frequency measurements is 480 ms.

The UE shall be capable of performing CPICH measurements for  $X_{\text{basic\_measurement\_FDD\_inter}}$  inter-frequency cells per FDD frequency of the monitored set or the virtual active set, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of  $T_{\text{Measurement\_Inter}}$ .

$$X_{\text{basic\_measurement\_FDD\_inter}} = 6$$

$T_{\text{Measurement\_Period\_Inter}} = 480$  ms. The period used for calculating the measurement period  $T_{\text{measurement\_inter}}$  for inter frequency CPICH measurements.

$T_{\text{Inter}}$ : This is the minimum time that is available for inter frequency measurements, during the period  $T_{\text{Measurement\_Period\_inter}}$  with an arbitrarily chosen timing. The minimum time per transmission gap is calculated by using the actual idle length within the transmission gap as given in the table 11 of Annex B in TS 25.212 and by assuming 2\*0.5 ms for implementation margin and after that taking only full slots into account in the calculation.

$T_{\text{basic\_identify\_FDD,inter}} = 800$  ms. This is the time period used in the inter frequency equation where the maximum allowed time for the UE to identify a new FDD cell is defined.

$T_{\text{basic\_measurement\_FDD inter}} = 50$  ms. This is the time period used in the equation for defining the measurement period for inter frequency CPICH measurements.

$N_{\text{Freq}}$ : Number of FDD frequencies indicated in the inter frequency measurement control information.

### 8.1.2.3.3 Periodic Reporting

Reported measurements in periodically triggered measurement reports shall meet the requirements in section 9.

### 8.1.2.3.4 Event Triggered Reporting

Reported measurements in event triggered measurement reports shall meet the requirements in section 9.

The UE shall not send any event triggered measurement reports, as long as the reporting criteria is not fulfilled.

The measurement reporting delay is defined as the time between any event that will trigger a measurement report until the UE starts to transmit the measurement report over the Uu interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than  $T_{\text{identify inter}}$  defined in Section 8.1.2.3.1 When L3 filtering is used an additional delay can be expected.

If a cell has been detectable at least for the time period  $T_{\text{identify inter}}$  and then enters or leaves the reporting range, the event triggered measurement reporting delay shall be less than  $T_{\text{Measurement\_Period Inter}}$  provided the timing to that cell has not changed more than +/-32 chips while transmission gap has not been available and the L3 filter has not been used.

### 8.1.2.4 TDD measurements

The requirements in this section shall apply to UE supporting FDD and TDD.

In the CELL\_DCH state when a transmission gap pattern sequence with the "TDD measurements" purpose is provided by the network, the UE shall continuously measure identified inter frequency TDD cells and search for new inter frequency TDD cells indicated in the measurement control information.

In order for the requirements in the following subsections to apply, the Beacon timeslots of the inter-frequency TDD cells indicated in the measurement control information shall either be synchronised or non-overlapping in time such that the UE can measure an inter-frequency TDD cell at least once in every transmission gap pattern as given in [7] for the slot allocation case in use in this cell and by assuming  $2 \times 0.5$  ms implementation margin per transmission gap.

UTRAN shall provide a transmission gap pattern sequence with measurement purpose TDD measurement using the combinations for TGL1, TGL2 and TGD in table 8.2:

**Table 8.2**

| TGL1 [slots] | TGL2 [slots] | TGD [slots] |
|--------------|--------------|-------------|
| 10           | -            | undefined   |
| 10           | 10           | 15...269    |
| 14           | 7            | 15...269    |

#### 8.1.2.4.1 Identification of a new cell

When transmission gaps are scheduled for inter-frequency TDD measurements, the UE shall be able to identify a new detectable inter frequency TDD cell belonging to the monitored set within

$$T_{\text{identify TDD inter}} = \text{Max} \left\{ 5000, N_{\text{basic identify TDD inter}} \cdot \frac{T_{\text{Measurement Period TDD inter}}}{N_{\text{TDD inter}}} \cdot N_{\text{Freq}} \right\} \text{ms}$$

If the UE does not need compressed mode to perform inter-frequency TDD measurements, the UE shall be able to identify a new detectable inter-frequency TDD cell belonging to the monitored set within 5000 ms.

When L3 filtering is used an additional delay can be expected.

An inter-frequency TDD cell shall be considered detectable when P-CCPCH  $E_c/I_o \geq -8$  dB and SCH  $E_c/I_o \geq -13$  dB.

The received P-CCPCH  $E_c/I_o$  is defined as

$$\left( \frac{P - \text{CCPCH} - E_c}{I_o} \right) \Big|_{\text{in dB}} = \left( \frac{P - \text{CCPCH} - E_c}{I_{or}} \right) \Big|_{\text{in dB}} - \left( \frac{I_o}{\hat{I}_{or}} \right) \Big|_{\text{in dB}}$$

and the received SCH  $E_c/I_o$  is defined as

$$\left( \frac{\text{SCH} - E_c}{I_o} \right) \Big|_{\text{in dB}} = \left( \frac{\text{SCH} - E_c}{I_{or}} \right) \Big|_{\text{in dB}} - \left( \frac{I_o}{\hat{I}_{or}} \right) \Big|_{\text{in dB}}$$

#### 8.1.2.4.2 P-CCPCH RSCP measurement period

When transmission gaps are scheduled for inter frequency TDD measurements the UE physical layer shall be capable of reporting measurements to higher layers with measurement accuracy as specified in sub-clause 9.1.11 and with a measurement period as given by

$$T_{\text{measurement TDD inter}} = \text{Max} \left\{ T_{\text{Measurement Period TDD inter}}, N_{\text{basic measurement TDD inter}} \cdot \frac{T_{\text{Measurement Period TDD inter}}}{N_{\text{TDD inter}}} \cdot N_{\text{Freq}} \right\} \text{ms}$$

If the UE does not need compressed mode to perform inter-frequency TDD measurements, the measurement period for inter-frequency TDD measurements shall be 480 ms.

The UE shall be capable of performing P-CCPCH RSCP measurements for  $X_{\text{basic measurement TDD inter}}$  inter-frequency TDD cells per TDD frequency of the monitored set and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of  $T_{\text{measurement TDD inter}}$ .

$$X_{\text{basic measurement TDD inter}} = 6 \text{ (cells)}$$

$T_{\text{Measurement Period TDD inter}} = 480$  ms. The time period used for calculating the measurement period  $T_{\text{measurement TDD inter}}$  for inter frequency P-CCPCH RSCP measurements.

$N_{\text{TDD inter}}$ : This is the smallest resulting integer number of transmission gap patterns in a transmission gap pattern sequence assigned to UE by UTRAN for inter frequency TDD measurements during the time period  $T_{\text{Measurement Period TDD inter}}$  with an arbitrarily chosen timing.

$N_{\text{basic identify TDD inter}} = 80$ . This is the number of transmission gap patterns in a transmission gap pattern sequence for inter-frequency TDD measurements during the time period used in the inter frequency TDD equation where the maximum allowed time for the UE to identify a new inter-frequency TDD cell is defined.

$N_{\text{basic measurement TDD inter}} = 5$ . This is the number of transmission gap patterns in a transmission gap pattern sequence for inter-frequency TDD measurements during the time period  $T_{\text{Measurement Period TDD inter}}$  with an arbitrarily chosen timing that is used in the inter-frequency TDD equation where the measurement period for inter-frequency P-CCPCH RSCP measurements is defined.

$N_{\text{Freq}}$ : This is the number of TDD frequencies indicated in the inter frequency measurement control information.

#### 8.1.2.4.3 Periodic Reporting

Reported measurements in periodically triggered measurement reports shall meet the requirements in section 9.

#### 8.1.2.4.4 Event Triggered Reporting

Reported measurements in event triggered measurement reports shall meet the requirements in section 9.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The measurement reporting delay is defined as the time between any event that will trigger a measurement report, until the UE starts to transmit the measurement report over the Uu interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH.. This measurement reporting delay excludes a delay uncertainty resulting when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than  $T_{\text{identify TDD inter}}$  defined in Section 8.1.2.4.1 When L3 filtering is used an additional delay can be expected.

#### 8.1.2.5 GSM measurements

The requirements in this section apply only to UE supporting FDD and GSM.

Measurements on GSM cells can be requested with BSIC verified or BSIC non-verified.

- a) In CELL\_DCH state when a transmission gap pattern sequence is provided by the UTRAN the UE shall continuously measure GSM cells and search for new GSM cells given in the monitored set.
- b) If the UE does not need compressed mode to perform GSM measurements:
  - the UE shall measure all GSM cells present in the monitored set
  - the relevant requirements for GSM dedicated mode when a TCH channel is assigned in TS 05.08 shall apply. This is further detailed in the following sub-sections.

##### 8.1.2.5.1 GSM carrier RSSI

- a) For a UE requiring compressed mode

A UE supporting GSM measurements using compressed mode shall meet the minimum number of GSM RSSI carrier measurements specified in table 8.4. This measurement shall be based on a transmission gap pattern sequence with purpose "GSM carrier RSSI measurements"

In order for the requirements in this subsection to apply the UTRAN must provide a transmission gap pattern sequence with measurement purpose GSM carrier RSSI measurements using the following combinations for TGL1, TGL2 and TGD:

**Table 8.3**

| TGL1 [slots] | TGL2 [slots] | TGD [slots] |
|--------------|--------------|-------------|
| 3            | -            | undefined   |
| 4            | -            | undefined   |
| 5            | -            | undefined   |
| 7            | -            | undefined   |
| 10           | -            | undefined   |
| 14           | -            | undefined   |
| 3            | 3            | 15...269    |
| 4            | 4            | 15...269    |
| 5            | 5            | 15...269    |
| 7            | 7            | 15...269    |
| 10           | 10           | 15...269    |
| 14           | 14           | 15...269    |

In the CELL\_DCH state the measurement period,  $T_{\text{Measurement Period, GSM}}$ , for the GSM carrier RSSI measurement is 480 ms.

The UE shall meet the measurement accuracy requirements stated for RXLEV in TS 05.08, when the given measurement time allows the UE to take at least 3 GSM carrier RSSI samples per GSM carrier in the monitored set during the measurement period.

**Table 8.4**

| TGL | Number of GSM carrier RSSI samples in each gap. |
|-----|---|
| 3   | 1   |
| 4   | 2   |
| 5   | 3   |
| 7   | 6   |
| 10  | 10  |
| 14  | 15  |

In case the UE is not able to acquire the required number of samples per GSM carrier during one measurement period, the UE shall measure as many GSM carriers as possible during that measurement period using at least 3 samples per GSM carrier. The GSM carriers that were not measured during that measurement period shall be measured in the following measurement periods. This means that, in this particular case, the L1 reporting period to higher layers of a GSM neighbour can be a multiple of the measurement period.

b) For a UE not requiring compressed mode

The samples allocated to each carrier shall as far as possible be uniformly distributed over each measurement period. At least 3 received signal level measurement samples are required per RSSI value. The measurement period is 480 ms.

#### 8.1.2.5.2 BSIC verification

a) For a UE requiring compressed mode

In order for the requirements in the following subsections to apply the UTRAN must provide a transmission gap pattern sequence with measurement purpose GSM Initial BSIC identification or with measurement purpose GSM BSIC re-confirmation, using the following combinations for TGL1, TGL2 and TGD:

**Table 8.5**

| TGL1 [slots] | TGL2 [slots] | TGD [slots] |
|--------------|--------------|-------------|
| 5            | -            | undefined   |
| 7            | -            | undefined   |
| 10           | -            | undefined   |
| 14           | -            | undefined   |
| 5            | 5            | 15...269    |
| 7            | 7            | 15...269    |
| 10           | 10           | 15...269    |
| 14           | 14           | 15...269    |

The procedure for BSIC verification on a GSM cell can be divided into the following two tasks:

##### **Initial BSIC identification**

Includes searching for the BSIC and decoding the BSIC for the first time when there is no knowledge about the relative timing between the FDD and GSM cell. The UE shall trigger the initial BSIC identification within the available transmission gap pattern sequence with purpose "GSM Initial BSIC identification". The requirements for Initial BSIC identification can be found in 8.1.2.5.2.1.

##### **BSIC re-confirmation**

Tracking and decoding the BSIC of a GSM cell after initial BSIC identification is performed. The UE shall trigger the BSIC re-confirmation within the available transmission gap pattern sequence with purpose "GSM BSIC re-confirmation". The requirements for BSIC re-confirmation can be found in 8.1.2.5.2.2.

Measurements on a GSM cell can be requested with BSIC verified or BSIC non-verified. If GSM measurements are requested with BSIC verified the UE shall be able to report the GSM cells with BSIC verified for those cells where the verification of BSIC has been successful.

If the network requests measurements on a GSM cell with BSIC verified, the UE shall behave as follows:

- The UE shall perform GSM carrier RSSI measurements according to Section 8.1.2.5.1 when ever a transmission gap pattern sequence with the purposes “GSM carrier RSSI measurements” is provided and the UE shall perform measurement reporting as defined in Section 8.6.7.6 of [16].
- The UE shall perform BSIC identification according to Section 8.1.2.5.2.1 when a “GSM Initial BSIC identification” transmission gap pattern sequence is activated. The UE shall use the last available GSM carrier RSSI measurement results for arranging GSM cells in signal strength order for performing BSIC identification.
- The UE shall perform BSIC re-confirmation according to Section 8.1.2.5.2.2 when a “GSM BSIC re-confirmation” transmission gap pattern sequence is activated.
- If a “GSM BSIC re-confirmation” transmission gap pattern sequence is not activated in parallel to a “GSM Initial BSIC identification” transmission gap pattern sequence or within one frame from the deactivation of a “GSM Initial BSIC identification” transmission gap pattern sequence, the BSIC shall be considered to be non-verified after the UE has performed one event evaluation or periodic reporting evaluation with verified BSIC and the corresponding reporting if reporting is required after the evaluation.

The UE shall perform event evaluation for event-triggered reporting after the BSIC has been verified for a GSM cell. The UE shall use the last available GSM carrier RSSI measurement results in event evaluation and event-triggered reporting. Periodic reports shall be triggered according to the given reporting period even if the BSIC of a GSM cell has not been verified as defined in Sections 8.6.7.5 and 8.6.7.6 of [16]. Non verified BSIC shall be indicated in the measurement report.

The BSIC of a GSM cell is considered to be "verified" if the UE has decoded the SCH of the BCCH carrier and identified the BSIC at least one time (initial BSIC identification) and from that moment the BSIC shall be re-confirmed at least once every  $T_{\text{re-confirm\_abort}}$  seconds. Otherwise the BSIC of the GSM cell is considered as "non-verified". If a transmission gap pattern sequence with a purpose “GSM BSIC re-confirmation ” is not activated by the network after BSIC identified or the “GSM BSIC re-confirmation ” transmission gap pattern sequence is deactivated, the UE shall behave as described previously in this section.

The parameters  $N_{\text{identify\_abort}}$  and  $T_{\text{re-confirm\_abort}}$  are defined by higher layers and are signalled to the UE together with the transmission gap pattern sequence.  $N_{\text{identify\_abort}}$  indicates the maximum number of patterns that the UE shall use to attempt to decode the unknown BSIC of the GSM cell in the initial BSIC identification procedure.  $T_{\text{re-confirm\_abort}}$  indicates the maximum time allowed for the re-confirmation of the BSIC of one GSM cell in the BSIC re-confirmation procedure.

The UE shall be able to decode a BSIC within a transmission gap when the time difference between the middle of the received GSM synchronisation burst at the UE and the middle of the effective transmission gap is within the limits specified in table 8.6.

The effective transmission gap is calculated by assuming both UL and DL compressed mode and applying the worst-case values for UL/DL timing offset and pilot field length of last DL gap slot.

**Table 8.6: The gap length and maximum time difference for BSIC verification**

| Gap length [slots] | Maximum time difference [ $\mu\text{s}$ ] |
|--------------------|---|
| 5                  | $\pm 500$                                 |
| 7                  | $\pm 1200$                                |
| 10                 | $\pm 2200$                                |
| 14                 | $\pm 3500$                                |

The UE shall be able to perform BSIC verification at levels down to the reference sensitivity level or reference interference levels as specified in TS 05.05.

- b) For a UE not requiring compressed mode

If a BSIC is decoded and matches the expected value, it is considered as “verified”, else it is considered as “non verified”.

The UE shall be able to perform BSIC verification at levels down to the reference sensitivity level or reference interference levels as specified in TS 05.05.

#### 8.1.2.5.2.1 Initial BSIC identification

This measurement shall be based on a transmission gap pattern sequence with the purpose "GSM Initial BSIC identification"

For GSM cells that are requested with BSIC verified the UE shall attempt to decode the SCH on the BCCH carrier of the 8 strongest BCCH carriers of the GSM cells indicated in the measurement control information. The UE shall give priority for BSIC decoding attempts in decreasing signal strength order to BSIC carriers with unknown BSIC. The strongest BCCH carrier is defined as the BCCH carrier having the highest measured GSM carrier RSSI value after layer 3 filtering. The GSM signal strength levels used in BSIC identification for arranging GSM cells in signal strength order shall be based on the latest GSM carrier RSSI measurement results available.

When the UE attempts to decode the BSIC of one GSM BCCH carrier with unknown BSIC, the UE shall use all available transmission gaps, within the transmission gap pattern sequence with the purpose "GSM Initial BSIC identification", to attempt to decode the BSIC from that GSM BCCH carrier.

If the BSIC of the GSM BCCH carrier has been successfully decoded the UE shall immediately continue BSIC identification with the next GSM BCCH carrier, in signal strength order, with unknown BSIC. The GSM cell for which the BSIC has been successfully identified shall be moved to the BSIC re-confirmation procedure.

If the UE has not successfully decoded the BSIC of the GSM BCCH carrier within  $N_{\text{identify\_abort}}$  successive patterns, the UE shall abort the BSIC identification attempts for that GSM BCCH carrier. The UE shall continue to try to perform BSIC identification of the next GSM BCCH carrier in signal strength order. The GSM BCCH carrier for which the BSIC identification failed shall not be re-considered for BSIC identification until BSIC identification attempts have been made for all the rest of the 8 strongest GSM BCCH carriers in the monitored set with unknown BSIC.

$N_{\text{identify\_abort}}$  values are given for a set of reference patterns in table 8.7.  $T_{\text{identify\_abort}}$  is the elapsed time during  $N_{\text{identify\_abort}}$  transmission gap patterns (informative). The figures given in table 8.7 represent the number of patterns required to guarantee at least two attempts to decode the BSIC for one GSM BCCH carrier.

**Table 8.7: The worst-case time for identification of one previously not identified GSM cell**

|           | TGL1<br>[slots] | TGL2<br>[slots] | TGD<br>[slots] | TGPL1<br>[frames] | TGPL2<br>[frames] | $T_{\text{identify\_abort}}$<br>[s] | $N_{\text{identify\_abort}}$<br>[patterns] |
|-----------|-----------------|-----------------|----------------|-------------------|-------------------|-------------------------------------|--|
| Pattern 1 | 7               | -               | undefined      | 3                 | TGPL1             | 1.56                                | 52   |
| Pattern 2 | 7               | -               | undefined      | 8                 | TGPL1             | 5.28                                | 66   |
| Pattern 3 | 7               | 7               | 47             | 8                 | TGPL1             | 2.88                                | 36   |
| Pattern 4 | 7               | 7               | 38             | 12                | TGPL1             | 2.88                                | 24   |
| Pattern 5 | 14              | -               | undefined      | 8                 | TGPL1             | 1.84                                | 23   |
| Pattern 6 | 14              | -               | undefined      | 24                | TGPL1             | 5.28                                | 22   |
| Pattern 7 | 14              | 14              | 45             | 12                | TGPL1             | 1.44                                | 12   |
| Pattern 8 | 10              | -               | undefined      | 8                 | TGPL1             | 2.88                                | 36   |
| Pattern 9 | 10              | 10              | 75             | 12                | TGPL1             | 2.88                                | 24   |

#### 8.1.2.5.2.2 BSIC re-confirmation

The requirements of this section are applicable for BSIC re-confirmation.

The UE shall maintain the timing information of 8 identified GSM cells. Initial timing information is obtained from the initial BSIC identification. The timing information shall be updated every time the BSIC is decoded.

For each transmission gap of a transmission gap pattern sequence with the measurement purpose "GSM BSIC re-confirmation", the UE shall attempt to decode the BSIC falling within the effective gap duration. If more than one BSIC can be decoded within the same gap, priority shall be given to the least recently decoded BSIC.

If the UE fails to decode the BSIC after two successive attempts or if the UE has not been able to re-confirm the BSIC for a GSM cell within  $T_{\text{re-confirm\_abort}}$  seconds, the UE shall abort the BSIC re-confirmation attempts for that GSM cell.



The GSM cell shall be treated as a new GSM cell with unidentified BSIC and the GSM cell shall be moved to the initial BSIC identification procedure, see section 8.1.2.5.2.1. The UE shall be able to make BSIC re-confirmation attempts for the 8 strongest GSM cells in the monitored list.

$N_{\text{re-confirm\_abort}}$  is the number of transmission gap patterns executed during  $T_{\text{re-confirm\_abort}}$  (informative).

**Table 8.8: The worst-case time for BSIC re-confirmation of one GSM cell**

|            | TGL1<br>[slots] | TGL2<br>[slots] | TGD<br>[slots] | TGPL1<br>[frames] | TGPL2<br>[frames] | $T_{\text{re-confirm\_abort}}$<br>[s] | $N_{\text{re-confirm\_abort}}$<br>[patterns] |
|------------|-----------------|-----------------|----------------|-------------------|-------------------|---------------------------------------|--|
| Pattern 1  | 7               | -               | undefined      | 3                 | TGPL1             | 1.32                                  | 44   |
| Pattern 2  | 7               | -               | undefined      | 8                 | TGPL1             | 5.04                                  | 63   |
| Pattern 3  | 7               | -               | undefined      | 15                | TGPL1             | 8.1                                   | 54   |
| Pattern 4  | 7               | 7               | 69             | 23                | TGPL1             | 10.12                                 | 44   |
| Pattern 5  | 7               | 7               | 69             | 8                 | TGPL1             | 2.64                                  | 33   |
| Pattern 6  | 14              | -               | undefined      | 8                 | TGPL1             | 1.6                                   | 20   |
| Pattern 7  | 14              | 14              | 60             | 8                 | TGPL1             | 0.80                                  | 10   |
| Pattern 8  | 10              | -               | undefined      | 8                 | TGPL1             | 2.64                                  | 33   |
| Pattern 9  | 10              | -               | undefined      | 23                | TGPL1             | 8.05                                  | 35   |
| Pattern 10 | 7               | 7               | 47             | 8                 | TGPL1             | 2.64                                  | 33   |
| Pattern 11 | 7               | 7               | 38             | 12                | TGPL1             | 2.64                                  | 22   |
| Pattern 12 | 14              | -               | undefined      | 24                | TGPL1             | 5.04                                  | 21   |
| Pattern 13 | 14              | 14              | 45             | 12                | TGPL1             | 1.20                                  | 10   |
| Pattern 14 | 10              | -               | undefined      | 13                | TGPL1             | 4.94                                  | 38   |
| Pattern 15 | 10              | 10              | 75             | 12                | TGPL1             | 2.64                                  | 22   |

### 8.1.2.5.3 Periodic Reporting

Reported measurements in periodically triggered measurement reports shall meet the requirements in section 9.

### 8.1.2.5.4 Event Triggered Reporting

Reported measurements in event triggered measurement reports shall meet the requirements in section 9.

The UE shall not send any event triggered measurement reports, as long as the reporting criteria is not fulfilled.

The measurement reporting delay is defined as the time between any event that will trigger a measurement report until the UE starts to transmit the measurement report over the Uu interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is twice the TTI of the uplink DCCH.

The event triggered reporting delay requirement is valid when the UE for each GSM carrier in the monitored set can take the required number of samples during the measurement period  $T_{\text{Measurement Period, GSM}}$  (see section 8.1.2.5.1).

The event triggered measurement reporting delay for a GSM cell with verified BSIC, measured without L3 filtering shall be less than  $2 \cdot T_{\text{Measurement Period, GSM}}$ , where  $T_{\text{Measurement Period, GSM}}$  is defined in Section 8.1.2.5.1. When L3 filtering is used an additional delay can be expected. For a GSM cell with non-verified BSIC an additional delay according to section 8.1.2.5.2.1 Initial BSIC identification can be expected.

## 8.2 Measurements in CELL\_DCH State with special requirements

### 8.2.1 Introduction

This section contains specific requirements for certain measurements beyond those specified in section 8.1. The measurements are defined in TS 25.215, the measurement model is defined in TS 25.302 and measurement accuracies are specified in section 9. Control of measurement reporting is specified in TS 25.331. Compressed mode is specified in TS 25.215.

## 8.2.2 Requirements

The requirements in section 9 are applicable for a UE performing measurements according to this section.

The UE shall be able to perform measurements according to table 8.9.

In addition to the requirements in table 8.9 the UE shall in parallel, in state CELL\_DCH, also be able to measure and report the quantities according to section 8.1.

**Table 8.9: Parallel measurement requirements**

| Measurement quantity                    | Number of parallel measurements possible to request from the UE |
|---|---|
| Transport channel BLER                  | 1 per Transport Channel   |
| UE transmitted power                    | 1   |
| UE Rx-Tx time difference                | 1 including timing to all radio links in active set             |
| SFN-SFN observed time difference type 2 | ∅   |
| UE GPS Timing of Cell Frames for LCS    | ∅   |

Editors Note: The presence of the measurements for location services needs to be revised.

## 8.3 Capabilities for Support of Event Triggering and Reporting Criteria in CELL\_DCH state

### 8.3.1 Introduction

This section contains requirements on UE capabilities for support of event triggering and reporting criteria.

The UE can be requested to make measurements under different measurement identity numbers. With each identity number there may be associated multiple number of events. The purpose of this section is to set some limits on the number of different reporting criteria the UE may be requested to track in parallel.

### 8.3.2 Requirements

In this section reporting criteria can be either event triggered reporting criteria or periodic reporting criteria.

The UE shall be able to support in parallel per category up to  $E_{cat}$  reporting criteria according to Table 8.10. The same type of events (e.g. events 1A) are counted as different events if either any of the parameters related to the events or their neighbour cell lists differ from each other. For the measurement categories: Intra-frequency, Inter frequency, Inter frequency (virtual active set), and Inter-RAT the UE need not support more than 18 reporting criteria in total. For the measurement categories Traffic volume and Quality measurements the UE need not support more than 16 reporting criteria in total.

**Table 8.10: Requirements for reporting criteria per measurement category**

| Measurement category                | $E_{cat}$                     | Note   |
|-------------------------------------|-------------------------------|--|
| Intra-frequency                     | 8                             | Applicable for periodic reporting or FDD events (1A-1F). |
| Inter-frequency                     | 6                             | Applicable for periodic reporting or Event 2A-2F         |
| Inter-frequency, virtual active set | 4                             | Applicable for periodic reporting or Event 1A-1C         |
| Inter-RAT                           | 4                             | Only applicable for UE with this capability              |
| UE internal measurements            | 8                             |  |
| Traffic volume measurements         | 2 + (2 per Transport Channel) |  |
| Quality measurements                | 2 per Transport Channel       |  |
| UP measurements                     | 2                             | Only applicable for UE with this capability.             |

## 8.4 Measurements in CELL\_FACH State

### 8.4.1 Introduction

This section contains requirements on the UE regarding cell reselection and measurement reporting in CELL\_FACH state. The requirements for cell re-selection are split in FDD intra frequency, FDD inter frequency, TDD and GSM measurements. The measurements are defined in TS 25.215, the measurement model is defined in TS 25.302 and measurement accuracies are specified in section 9. Control of measurement reporting is specified in TS 25.331. Measurement occasions in CELL\_FACH state are described in TS 25.331.

### 8.4.2 Requirements

#### 8.4.2.1 UE Measurement Capability

In CELL\_FACH state, the UE shall be able to monitor up to

- 32 intra frequency FDD cells and
- 32 inter frequency cells, including
  - FDD cells distributed on up to 2 additional FDD carriers and
  - Depending on UE Capability, TDD mode cells, distributed on up to 3 TDD carriers, and
- Depending on UE capability, 32 GSM cells distributed on up to 32 GSM carriers.
- Depending on UE capability, the UE shall be able to monitor up to 16 intra frequency cells during IPDL gaps.

The requirements in section 9 on CPICH Ec/Io and RSCP measurements are applicable for a UE performing measurements according to this section. For inter-frequency FDD, TDD and GSM cell re-selection, measurement occasions as specified in TS 25.331 are used to find and measure on other cells.

It is defined below how the measurements on different systems and modes are performed given the time allocated to that system. The requirements in this section are based on an assumption that the time during the measurement occasions that is allocated to each of the different modes and systems shall be equally shared by the modes which the UE has capability for and that are in the monitored set signalled by the network.

For this three parameters are defined:

$N_{FDD}$  is 0 or 1. If there are inter-frequency FDD cells in the neighbour list  $N_{FDD}=1$ , otherwise  $N_{FDD}=0$ .

$N_{TDD}$  is 0 or 1. If the UE is capable of TDD and there are TDD cells in the neighbour list  $N_{TDD}=1$  otherwise  $N_{TDD}=0$ .

$N_{GSM}$  is 0 or 1. If the UE is capable of GSM and there are GSM cells in the neighbour list,  $N_{GSM}=1$ , otherwise  $N_{GSM}=0$ .

The measurement time  $T_{meas}$  is then defined as

$$T_{meas} = [(N_{FDD} + N_{TDD} + N_{GSM}) \cdot N_{TTI} \cdot M\_REP \cdot 10] \text{ms}$$

where

- M\_REP is the Measurement Occasion cycle length where K is given in table 8.10A. K is the FACH measurement occasion length coefficient as specified in TS25.331
- The FACH Measurement Occasion of  $N_{TTI}$  frames will be repeated every  $N_{TTI} \cdot M\_REP$  frame.
- $N_{TTI}$  is the number of frames in each measurement occasion, equal to the length of the largest TTI on the SCCPCH monitored by the UE.

**Table 8.10A: K values for each  $N_{TTI}$  value**

| $N_{TTI}$ | K       |
|-----------|---------|
| 1         | 3,4,5,6 |
| 2         | 2,3,4,5 |
| 4         | 2,3,4   |
| 8         | 1,2,3   |

The UE is assumed to measure periodically once every time period  $T_{meas}$  on each of the modes and systems, FDD interfrequency cells, TDD interfrequency cells and GSM carriers for which the corresponding parameter  $N_{FDD}$ ,  $N_{TDD}$  and  $N_{GSM}$  is set to 1.

#### 8.4.2.2 FDD intra frequency measurements

During the CELL\_FACH state the UE shall continuously measure identified intra frequency cells and search for new intra frequency cells in the monitoring set. If a measurement occasion is activated, intra frequency measurements can be performed between the measurement occasions.

The performance of intra frequency measurements when IPDL is active has not been studied.

##### 8.4.2.2.1 Identification of a new cell

The UE shall be able to identify a new detectable cell belonging to the monitored set within

$$T_{\text{identify, intra}} = \text{Max} \left\{ 800, \text{Ceil} \left\{ \frac{T_{\text{basic identify FDD, intra}}}{N_{TTI} \cdot (M\_REP - 1) \cdot 10} \right\} \cdot N_{TTI} \cdot M\_REP \cdot 10 \right\} \text{ms}$$

where

$T_{\text{basic identify FDD, intra}}$  is specified in section 8.1.2.2.2,

$N_{TTI}$  and M\_REP is specified in section 8.4.2.1.

A cell shall be considered detectable when

- CPICH Ec/Io  $\geq$  -20 dB,
- SCH\_Ec/Io  $\geq$  -20 dB for at least one channel tap and SCH\_Ec/Ior is equally divided between primary synchronisation code and secondary synchronisation code.

In case of conflict when a measurement occasion is activated the UE may choose to prioritise the SFN decoding.

##### 8.4.2.2.1.1 Identification of a new cell using IPDL gaps

When the UE is supporting IPDL measurements and when idle periods with a length of 1 slot are scheduled the UE physical layer shall be capable to identify a new cell and report SFN-SFN observed time difference type 2 measurement within

$$T_{\text{identify, IPDL}} = \text{Max} \{ T_{\text{Measurement_Period Intra}}, T_{\text{IPDL}} \} \text{ms}$$

where

$T_{\text{Measurement\_Period Intra}}$  = The measurement period for Intra frequency CPICH measurements defined in Section 8.1.2.2.2.

and

$T_{\text{IPDL}}$  depends on the Search Window Size given in UE positioning OTDOA neighbour cell info as given in Table 8.10B

**Table 8.10B:  $T_{\text{IPDL}}$**

| Search Window Size                 | $T_{\text{IPDL}}$                             |
|------------------------------------|---|
| less than or equal to +/- 40 chips | Time over which 4 consecutive IPDL gaps occur |
| +/- 80 chips                       | Time over which 8 consecutive IPDL gaps occur |

#### 8.4.2.2.2 UE CPICH measurement capability

In the CELL\_FACH state the measurement period for intra frequency measurements is 200 ms. When no measurement occasion cycle is activated, the UE shall be capable of performing CPICH measurements for 8 identified intra-frequency cells of the monitored set and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of 200 ms. When a measurement occasion cycle is activated, the UE shall be capable of performing CPICH measurements for the  $Y_{\text{measurement intra}}$  strongest cells, where  $Y_{\text{measurement intra}}$  is defined in the following equation. The measurement accuracy for all measured cells shall be as specified in the sub-clause 9.1.1 and 9.1.2. If the UE has identified more than  $Y_{\text{measurement intra}}$  cells, the UE shall perform measurements of all identified cells but the reporting rate of CPICH measurements of cells from UE physical layer to higher layers may be decreased.

$$Y_{\text{measurement intra}} = \text{Floor} \left\{ X_{\text{basic measurement FDD}} \cdot \frac{T_{\text{Measurement\_Period Intra}} - \text{Ceil} \left\{ \frac{T_{\text{Measurement\_Period Intra}}}{N_{\text{TTI}} \cdot M_{\text{REP}} \cdot 10 \text{ ms}} \right\} \cdot N_{\text{TTI}} \cdot 10 \text{ ms}}{T_{\text{Measurement\_Period Intra}}} \right\} \text{ cells}$$

where

$X_{\text{basic measurement FDD}}$  is specified in section 8.1.2.2.2,

$T_{\text{Measurement\_Period Intra}}$  is specified in section 8.1.2.2.2,

$M_{\text{REP}}$  and  $N_{\text{TTI}}$  is specified in section 8.4.2.1.

#### 8.4.2.2.2.1 Capabilities for measurements during IPDL gaps.

When idle periods with a length of 1 slot are scheduled UE physical layer shall be capable of reporting SFN-SFN observed time difference type 2 measurements to higher layers with measurement accuracy as specified in sub-clause 9.1.8.2.2 with measurement period given by

$$T_{\text{measurement IPDL}} = \text{Max} \{ T_{\text{Measurement\_Period Intra}}, T_{4 \text{ IPDLs}} \} \text{ms}$$

where

$T_{\text{Measurement\_Period Intra}}$  = The measurement period for Intra frequency CPICH measurements defined in Section 8.1.2.2.2.

and

$T_{4 \text{ IPDLs}}$  = Time period over which 4 consecutive idle periods occur.

#### 8.4.2.2.3 RACH reporting

Reporting measurements in the measurement reports sent on the RACH shall meet the requirements in section 9.

### 8.4.2.3 FDD inter frequency measurements

In the CELL\_FACH state when a measurement occasion cycle is provided by the network the UE shall continuously measure identified inter frequency cells and search for new inter frequency cells indicated in the measurement control information.

#### 8.4.2.3.1 Identification of a new cell

The UE shall be able to identify a new detectable cell belonging to the monitored set within

$$T_{\text{identify, inter}} = \text{Max} \left\{ 5000, \text{Ceil} \left\{ \frac{T_{\text{basic identify FDD inter}}}{T_{\text{Inter FACH}}} \right\} \cdot T_{\text{meas}} \cdot N_{\text{Freq, FDD}} \right\} \text{ ms}$$

where

$T_{\text{basic identify FDD, inter}}$  is specified in 8.1.2.3.2.

$N_{\text{Freq, FDD}}$ : Number of FDD frequencies in the Inter-frequency cell info list

$T_{\text{Meas}}$  and  $M_{\text{REP}}$  are specified in 8.4.2.1.

$T_{\text{Inter FACH}} = (N_{\text{TTI}} * 10 - 2 * 0.5) \text{ ms}$

A cell shall be considered detectable when

- CPICH  $E_c/I_o \geq -20$  dB,
- SCH  $E_c/I_o \geq -17$  dB for at least one channel tap and SCH  $E_c/I_o$  is equally divided between primary synchronisation code and secondary synchronisation code.

#### 8.4.2.3.2 UE CPICH measurement capability

When a measurement occasion cycle is scheduled for FDD inter frequency measurements the UE physical layer shall be capable of reporting measurements to higher layers with measurement accuracy as specified in sub-clause 9.1.2 with measurement period is given by

$$T_{\text{measurement inter}} = \text{Max} \left\{ T_{\text{Measurement_Period Inter}}, 2 \cdot T_{\text{meas}}, \text{Ceil} \left\{ \frac{T_{\text{basic measurement FDD inter}}}{T_{\text{Inter FACH}}} \right\} \cdot T_{\text{meas}} \cdot N_{\text{Freq, FDD}} \right\} \text{ ms}$$

where

$T_{\text{basic measurement FDD, inter}}$  is specified in section 8.1.2.3.2.

$T_{\text{Measurement_Period Inter}}$  is specified in section 8.1.2.3.2.

$T_{\text{Meas}}$  is specified in section 8.4.2.1.

$N_{\text{Freq, FDD}}$  and  $T_{\text{Inter FACH}}$  are specified in section 8.4.2.3.1

If the UE does not need measurement occasions to perform inter-frequency measurements, the measurement period for inter frequency measurements is 480 ms.

The UE shall be capable of performing CPICH measurements for  $X_{\text{basic measurement FDD inter}}$  inter-frequency cells per FDD frequency of the monitored set, and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of  $T_{\text{Measurement_ Inter}}$ .

$X_{\text{basic measurement FDD inter}}$  is defined in section 8.1.2.3.2

### 8.4.2.4 TDD measurements

The requirements in this section shall apply to UE supporting FDD and TDD.

In the CELL\_FACH state when a measurement occasion cycle is provided by the network the UE shall continuously measure identified inter frequency TDD cells and search for new inter-frequency TDD cells indicated in the measurement control information.

#### 8.4.2.4.1 Identification of a new cell

The UE shall be able to identify a new detectable inter-frequency TDD cell belonging to the monitored set within

$$T_{\text{identify, TDD}} = \text{Max} \left\{ 5000, \text{Ceil} \left\{ \frac{T_{\text{basic identify TDD inter}}}{T_{\text{Inter FACH}}} \right\} \cdot T_{\text{meas}} \cdot N_{\text{Freq, TDD}} \right\} \text{ ms}$$

where

$T_{\text{basic\_identify\_TDD,inter}} = 800$  ms

$N_{\text{Freq, TDD}}$ : Number of TDD frequencies indicated in the inter-frequency cell info list

$T_{\text{Meas}}$  is specified in section 8.4.2.1.

$T_{\text{Inter FACH}}$  is specified in section 8.4.2.3.1

If the UE does not need measurement occasions to perform inter-frequency TDD measurements, the UE shall be able to identify a new detectable inter-frequency TDD cell belonging to the monitored set within 5000 ms.

When L3 filtering is used an additional delay can be expected.

An inter-frequency TDD cell shall be considered detectable when  $P\text{-CCPCH}_{\text{Ec/I}_0} \geq -8$  dB and  $SCH_{\text{Ec/I}_0} \geq -13$  dB.

The received  $P\text{-CCPCH}_{\text{Ec/I}_0}$  is defined as

$$\left( \frac{P - \text{CCPCH} - E_c}{I_o} \right) \Big|_{\text{in dB}} = \left( \frac{P - \text{CCPCH} - E_c}{I_{or}} \right) \Big|_{\text{in dB}} - \left( \frac{I_o}{\hat{I}_{or}} \right) \Big|_{\text{in dB}}$$

and the received  $SCH_{\text{Ec/I}_0}$  is defined as

$$\left( \frac{SCH - E_c}{I_o} \right) \Big|_{\text{in dB}} = \left( \frac{SCH - E_c}{I_{or}} \right) \Big|_{\text{in dB}} - \left( \frac{I_o}{\hat{I}_{or}} \right) \Big|_{\text{in dB}}$$

#### 8.4.2.4.2 P-CCPCH RSCP measurement period

When a measurement occasion cycle as previously described is scheduled for inter frequency TDD measurements the UE physical layer shall be capable of reporting measurements to higher layers with measurement accuracy as specified in sub-clause 9.1.1 and with a measurement period as given by

$$T_{\text{measurement TDD}} = \text{Max} \left\{ T_{\text{Measurement\_Period TDD inter}}, 2 \cdot T_{\text{meas}}, \text{Ceil} \left\{ \frac{T_{\text{basic measurement TDD inter}}}{T_{\text{Inter FACH}}} \right\} \cdot T_{\text{meas}} \cdot N_{\text{Freq, TDD}} \right\}$$

where

$T_{\text{basic measurement TDD inter}} = 50$  ms.

$T_{\text{Measurement\_Period TDD inter}}$  is specified in section 8.1.2.4.2.

$T_{\text{Meas}}$  is specified in section 8.4.2.1.

$T_{\text{Inter FACH}}$  is specified in section 8.4.2.3.1

$N_{\text{Freq, TDD}}$ : This is the number of TDD frequencies indicated in the inter-frequency cell info list

If the UE does not need measurement occasions to perform inter-frequency TDD measurements, the measurement period for inter frequency TDD measurements is 480 ms.

The UE shall be capable of performing P-CCPCH RSCP measurements for  $X_{\text{basic measurement TDD inter}}$  inter-frequency TDD cells per TDD frequency of the monitored set and the UE physical layer shall be capable of reporting measurements to higher layers with the measurement period of  $T_{\text{Measurement TDD}}$ .

$X_{\text{basic measurement TDD inter}}$  is defined in section 8.1.2.4.2

### 8.4.2.5 GSM measurements

The requirements in this section apply only to UE supporting FDD and GSM.

To support cell reselection the UE shall always perform BSIC verification in Cell FACH state.

- a) In CELL\_FACH state when measurement occasions are provided by the UTRAN the UE shall continuously measure GSM cells and search for new GSM cells given in the monitored set.
  - In section 8.4.2.1 the split of measurements between different modes and systems is defined. Every second measurement occasion scheduled for GSM measurements, as given by 8.4.2.1 shall be allocated for GSM initial BSIC identification.
  - The remaining measurements occasions scheduled for GSM measurements shall be used as follows. 3 occasions out of 4 shall be allocated for GSM carrier RSSI measurements and 1 out of 4 shall be allocated for GSM BSIC reconfirmation. The scheduling of measurement occasions between GSM carrier RSSI measurements and GSM BSIC reconfirmation is up to the UE.
- b) If the UE does not need measurement occasions to perform GSM measurements:
  - the UE shall measure all GSM cells present in the monitored set
  - the relevant requirements for GSM dedicated mode when a TCH channel is assigned in TS 05.08 shall apply. This is further detailed in the following sub-sections.

#### 8.4.2.5.1 GSM carrier RSSI

- a) For a UE requiring measurement occasions.

A UE supporting GSM measurements using measurement occasions shall meet the minimum number of GSM carrier RSSI measurements specified in Table 8.11. This measurement shall be based on measurement occasions allocated for GSM carrier RSSI measurements as described in 8.4.2.5. In the CELL\_FACH state the measurement period for the GSM carrier RSSI measurement is 480 ms.

The UE shall meet the measurement accuracy requirements stated for RXLEV in TS 05.08, when the given measurement time allows the UE to take at least 3 GSM carrier RSSI samples per GSM carrier in the monitored set during the measurement period.

**Table 8.11**

| Length of measurement occasion (frames) | Number of GSM carrier RSSI samples in each measurement occasion, $N_{\text{GSM carrier RSSI}}$ |
|---|--|
| 1                                       | 16   |
| 2                                       | 32   |
| 4                                       | 64   |
| 8                                       | 128  |

In case the UE is not able to acquire the required number of samples per GSM carrier during one measurement period, the UE shall measure as many GSM carriers as possible during that measurement period using at least 3 samples per GSM carrier. The GSM carriers that were not measured during that measurement period shall be measured in the following measurement periods.

- b) For a UE not requiring measurement occasions



The samples allocated to each carrier shall as far as possible be uniformly distributed over each measurement period. At least 3 received signal level measurement samples are required per RSSI value. The measurement period is 480 ms.

In case UTRA RACH procedure prevents the UE from acquiring the required number of samples per GSM carrier during one measurement period, the GSM carriers that were not measured during that measurement period shall be measured in the following measurement periods.

#### 8.4.2.5.2 BSIC verification

a) For a UE requiring measurement occasions.

The procedure for BSIC verification on a GSM cell can be divided into the following two tasks:

##### Initial BSIC identification

Includes searching for the BSIC and decoding the BSIC for the first time when there is no knowledge about the relative timing between the FDD and GSM cell. The UE shall trigger the initial BSIC identification within 50% of the available measurement occasions used for GSM measurements as specified in 8.4.2.1. The requirements for Initial BSIC identification can be found in 8.4.2.5.2.1.

##### BSIC re-confirmation

Tracking and decoding the BSIC of a GSM cell after initial BSIC identification is performed. The UE shall trigger the BSIC re-confirmation within the available measurement occasions used for GSM as specified in 8.4.2.1. The requirements for BSIC re-confirmation can be found in 8.4.2.5.2.2.

The BSIC of a GSM cell is considered to be "verified" if the UE has decoded the SCH of the BCCH carrier and identified the BSIC at least one time (initial BSIC identification) and from that moment the BSIC shall be re-confirmed at least once every 6 times  $T_{\text{re-confirm\_GSM}}$  seconds. Otherwise the BSIC of the GSM cell is considered as "non-verified".

$T_{\text{re-confirm\_GSM}}$  indicates the maximum time allowed for the re-confirmation of the BSIC of one GSM cell in the BSIC re-confirmation procedure according to section 8.4.2.5.2.2.

The UE shall be able to decode a BSIC within a measurement occasion when the time difference between the middle of the received GSM synchronisation burst at the UE and the middle of the measurement occasion is within the limits specified in table 8.12.

**Table 8.12: The measurement occasion length and maximum time difference for BSIC verification**

| Measurement occasion length [frames] | Maximum time difference [ $\mu\text{s}$ ] |
|--------------------------------------|---|
| 1                                    | $\pm 4100$                                |
| 2                                    | $\pm 9100$                                |
| 4                                    | $\pm 19100$                               |
| 8                                    | $\pm 39100$                               |

The UE shall be able to perform BSIC verification at levels down to the reference sensitivity level or reference interference levels as specified in TS 05.05.

b) For a UE not requiring measurement occasions

The UE shall attempt to check the BSIC for at least the 6 strongest GSM carriers at least every 10 seconds, to confirm that it is monitoring the same cell, as far as UTRA RACH procedure does not prevent UE from decoding BSIC.

If a BSIC is decoded and matches the expected value, it is considered as "verified", else it is considered as "non verified".

The UE shall be able to perform BSIC verification at levels down to the reference sensitivity level or reference interference levels as specified in TS 05.05.

#### 8.4.2.5.2.1 Initial BSIC identification

This measurement shall be based on the measurement occasions allocated for Initial BSIC identification as described in 8.4.2.5.

The UE shall continuously attempt to decode the BSIC of SCH on the BCCH carrier of the 6 strongest BCCH carriers of the GSM cells indicated in the Inter-RAT cell info list. The UE shall give priority for BSIC decoding attempts in decreasing signal strength order to BCCH carriers with unknown BSIC. The strongest BCCH carrier is defined as the BCCH carrier having the highest measured GSM carrier RSSI value.

When the UE attempts to decode the BSIC of one GSM BCCH carrier with unknown BSIC, the UE shall use all available measurements occasions allocated for GSM initial BSIC identification according section 8.4.2.5 to attempt to decode the BSIC from that GSM BCCH carrier.

If the BSIC of the GSM BCCH carrier has been successfully decoded the UE shall immediately continue BSIC identification with the next GSM BCCH carrier, in signal strength order, with unknown BSIC. The GSM cell for which the BSIC has been successfully identified shall be moved to the BSIC re-confirmation procedure.

If the UE has not successfully decoded the BSIC of the GSM BCCH carrier within  $T_{\text{identify\_GSM}}$  ms, the UE shall abort the BSIC identification attempts for that GSM BCCH carrier. The UE shall continue to try to perform BSIC identification of the next GSM BCCH carrier in signal strength order. The GSM BCCH carrier for which the BSIC identification failed shall not be re-considered for BSIC identification until BSIC identification attempts have been made for all the rest of the 6 strongest GSM BCCH carriers in the monitored set with unknown BSIC.

$T_{\text{identify\_GSM}}$  is given for the combinations of  $T_{\text{meas}}$  and  $N_{\text{TTI}}$  that are given in table 8.13. The values given in table 8.13 represent the number of patterns required to guarantee at least two attempts to decode the BSIC for one GSM BCCH carrier.

**Table 8.13: The worst-case time for identification of one previously not identified GSM cell**

| $T_{\text{meas}}$<br>(ms) | $N_{\text{TTI}}=1$ frame<br>$T_{\text{identify,GSM}}(\text{ms})$ | $N_{\text{TTI}}=2$ frames<br>$T_{\text{identify,GSM}}(\text{ms})$ | $N_{\text{TTI}}=4$ frames<br>$T_{\text{identify,GSM}}(\text{ms})$ | $N_{\text{TTI}}=8$ frames<br>$T_{\text{identify,GSM}}(\text{ms})$ |
|---------------------------|--|---|---|---|
| 80                        | 2880   | 1280  |   | -   |
| 160                       | 7680   | 2880  | 1280  | 640   |
| 240                       | 29760  | 5280  |   | -   |
| 320                       | 14080  | 6400  | 2560  | 1280  |
| 480                       | 34560  | 12480   | 2880  | 1920  |
| 640                       | 34560  | 12800   | 5120  | 2560  |
| 960                       | *  | 24960   | 5760  | 3840  |
| 1280                      | *  | 20480   | 10240   | 5120  |
| 1920                      | *  | 34560   | 15360   | 7680  |

\* Note: There are no performance requirements for these combinations of parameters because they result in long identification time.

#### 8.4.2.5.2.2 BSIC re-confirmation

The requirements of this section are applicable for BSIC re-confirmation.

The UE shall maintain the timing information of 6 identified GSM cells. Initial timing information is obtained from the initial BSIC identification. The timing information shall be updated every time the BSIC is decoded.

For each measurement occasion allocated for GSM BSIC reconfirmation as described in 8.4.2.5, the UE shall attempt to decode the BSIC falling within the measurement occasion duration according to table 8.12. When the UE has to select one out of several possible GSM cells to reconfirm within the possible allocation of measurement occasions, according to 8.4.2.5, priority shall be given to the least recently decoded BSIC.

If the UE fails to decode the BSIC after two successive attempts the UE shall abort the BSIC re-confirmation attempts for that GSM cell. The GSM cell shall be treated as a new GSM cell with unidentified BSIC and the GSM cell shall be moved to the initial BSIC identification procedure, see section 8.4.2.5.2.1. The UE shall be able to make BSIC re-confirmation attempts for the 6 strongest GSM cells in the monitored list.

$T_{\text{re-confirm\_GSM}}$  is given for the combinations of  $T_{\text{meas}}$  and  $N_{\text{TTI}}$  that are given in table 8.14. The values given in table 8.14 represent the number of patterns required to guarantee at least two attempts to decode the BSIC for one GSM BCCH

carrier. Different values for  $T_{re-confirm, GSM}$  might apply when more than one GSM cell is in the BSIC reconfirmation procedure at the same time.

**Table 8.14: The worst-case time for reconfirmation of one previously identified GSM cell**

| T_meas (ms) | N_TTI=1 frame<br>T <sub>re-confirm,GSM</sub> (ms) | N_TTI=2 frames<br>T <sub>re-confirm,GSM</sub> (ms) | N_TTI=4 frames<br>T <sub>re-confirm,GSM</sub> (ms) | N_TTI=8 frames<br>T <sub>re-confirm,GSM</sub> (ms) |
|-------------|---|--|--|--|
| 80          | 2880  | 1600   | -  | -  |
| 160         | 6400  | 3200   | 2240   | 1600   |
| 240         | 17280   | 4800   | -  | -  |
| 320         | 14080   | 6400   | 4480   | 3200   |
| 480         | 22080   | 9600   | 6720   | 4800   |
| 640         | 26880   | 12800  | 10240  | 6400   |
| 960         | *   | 17280  | 13440  | 9600   |
| 1280        | *   | 33280  | 17920  | 12800  |
| 1920        | *   | *  | 26880  | 19200  |

\* Note: There are no performance requirements for these combinations of parameters because they result in long reconfirmation time.

## 8.5 Capabilities for Support of Event Triggering and Reporting Criteria in CELL\_FACH state

### 8.5.1 Introduction

This section contains requirements on UE capabilities for support of event triggering and reporting criteria.

### 8.5.2 Requirements

In this section reporting criteria can be either event triggered reporting criteria or periodic reporting criteria.

**Table 8.15: Requirements for reporting criteria per measurement category**

| Measurement category        | E <sub>cat</sub> | Note |
|-----------------------------|------------------|------|
| Traffic volume measurements | □                |      |

## 9 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 physical layer measurement model and a complete list of measurements is specified in TS 25.302 "Services Provided by Physical Layer". The physical layer measurements for FDD are described and defined in TS25.215 "Physical layer - Measurements (FDD)". In this clause for each measurement the relevant requirements on the measurement period, reporting range, granularity and performance in terms of accuracy are specified.

The accuracy requirements in this clause are applicable for AWGN radio propagation conditions.

### 9.1 Measurement Performance for UE

The requirements in this clause are applicable for a UE:

- in state CELL\_DCH and/or state CELL\_FACH.
- performing measurements according to section 8.
- that is synchronised to the cell that is measured.

The reported measurement result after layer 1 filtering shall be an estimate of the average value of the measured quantity over the measurement period. The reference point for the measurement result after layer 1 filtering is referred to as point B in the measurement model described in TS25.302.

The accuracy requirements in this clause are valid for the reported measurement result after layer 1 filtering. The accuracy requirements are verified from the measurement report at point D in the measurement model having the layer 3 filtering disabled.

NOTE: It needs to be clarified how the accuracy requirements shall be handled when the UE is measuring on cells using IPDL.

## 9.1.1 CPICH RSCP

NOTE: This measurement is for handover evaluation, DL open loop power control, UL open loop power control and for the calculation of pathloss.

### 9.1.1.1 Intra frequency measurements accuracy

The measurement period for CELL\_DCH state can be found in sub clause 8.1.2.2. The measurement period for CELL\_FACH state can be found in sub clause 8.4.2.2.

#### 9.1.1.1.1 Absolute accuracy requirement

The accuracy requirements in table 9.1 are valid under the following conditions:

$$CPICH\_RSCP1|_{dBm} \geq -114 \text{ dBm.}$$

$$\left| \frac{I_o}{\hat{I}_{or}} \right|_{in \text{ dB}} - \left( \frac{CPICH - E_c}{I_{or}} \right)_{in \text{ dB}} \leq 20dB$$

**Table 9.1: CPICH\_RSCP Intra frequency absolute accuracy**

| Parameter  | Unit | Accuracy [dB]    |                   | Conditions<br>Io [dBm/3.84<br>MHz] |
|------------|------|------------------|-------------------|------------------------------------|
|            |      | Normal condition | Extreme condition |                                    |
| CPICH_RSCP | dBm  | ± 6              | ± 9               | -94...-70                          |
|            | dBm  | ± 8              | ± 11              | -70...-50                          |

#### 9.1.1.1.2 Relative accuracy requirement

The relative accuracy of CPICH RSCP is defined as the CPICH RSCP measured from one cell compared to the CPICH RSCP measured from another cell on the same frequency

The accuracy requirements in table 9.2 are valid under the following conditions:

$$CPICH\_RSCP1,2|_{dBm} \geq -114 \text{ dBm.}$$

$$\left| CPICH\_RSCP1|_{in \text{ dBm}} - CPICH\_RSCP2|_{in \text{ dBm}} \right| \leq 20dB$$

$$\left| \frac{I_o}{\hat{I}_{or}} \right|_{in \text{ dB}} - \left( \frac{CPICH - E_c}{I_{or}} \right)_{in \text{ dB}} \leq 20dB$$

**Table 9.2: CPICH\_RSCP Intra frequency relative accuracy**

| Parameter  | Unit | Accuracy [dB]    |                   | Conditions        |
|------------|------|------------------|-------------------|-------------------|
|            |      | Normal condition | Extreme condition | Io [dBm/3.84 MHz] |
| CPICH_RSCP | dBm  | ± 3              | ± 3               | -94...-50         |

### 9.1.1.2 Inter frequency measurement accuracy

The measurement period for CELL\_DCH state can be found in sub clause 8.1.2.3. The measurement period for CELL\_FACH state can be found in sub clause 8.4.2.3.

#### 9.1.1.2.1 Relative accuracy requirement

The relative accuracy of CPICH RSCP in inter frequency case is defined as the CPICH RSCP measured from one cell compared to the CPICH RSCP measured from another cell on a different frequency.

The accuracy requirements in table 9.3 are valid under the following conditions:

$$CPICH\_RSCP_{1,2}|_{dBm} \geq -114 \text{ dBm.}$$

$$\left| CPICH\_RSCP1|_{in \text{ dBm}} - CPICH\_RSCP2|_{in \text{ dBm}} \right| \leq 20 \text{ dB}$$

$$| \text{Channel 1\_Io}|_{dBm/3.84 \text{ MHz}} - \text{Channel 2\_Io}|_{dBm/3.84 \text{ MHz}} | \leq 20 \text{ dB.}$$

$$\left( \frac{I_o}{I_{or}} \right) |_{in \text{ dB}} - \left( \frac{CPICH\_E_c}{I_{or}} \right) |_{in \text{ dB}} \leq 20 \text{ dB}$$

**Table 9.3: CPICH\_RSCP Inter frequency relative accuracy**

| Parameter  | Unit | Accuracy [dB]    |                   | Conditions        |
|------------|------|------------------|-------------------|-------------------|
|            |      | Normal condition | Extreme condition | Io [dBm/3.84 MHz] |
| CPICH_RSCP | dBm  | ± 6              | ± 6               | -94...-50         |

### 9.1.1.3 CPICH RSCP measurement report mapping

The reporting range is for CPICH RSCP is from 115 ...-25 dBm.

In table 9.4 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.4**

| Reported value    | Measured quantity value  | Unit |
|-------------------|--------------------------|------|
| CPICH_RSCP_LEV_00 | CPICH RSCP < -115        | dBm  |
| CPICH_RSCP_LEV_01 | -115 ≤ CPICH RSCP < -114 | dBm  |
| CPICH_RSCP_LEV_02 | -114 ≤ CPICH RSCP < -113 | dBm  |
| ...               | ...                      | ...  |
| CPICH_RSCP_LEV_89 | -27 ≤ CPICH RSCP < -26   | dBm  |
| CPICH_RSCP_LEV_90 | -26 ≤ CPICH RSCP < -25   | dBm  |
| CPICH_RSCP_LEV_91 | -25 ≤ CPICH RSCP         | dBm  |

## 9.1.2 CPICH Ec/Io

NOTE: This measurement is for Cell selection/re-selection and for handover evaluation.

### 9.1.2.1 Intra frequency measurements accuracy

The measurement period for CELL\_DCH state can be found in sub clause 8.1.2.2. The measurement period for CELL\_FACH state can be found in sub clause 8.4.2.2.

#### 9.1.2.1.1 Absolute accuracy requirement

The accuracy requirements in table 9.5 are valid under the following conditions:

$$CPICH\_RSCP1|_{dBm} \geq -114 \text{ dBm.}$$

$$\left| \frac{I_o}{\hat{I}_{or}} \right|_{in \text{ dB}} - \left( \frac{CPICH - E_c}{I_{or}} \right)_{in \text{ dB}} \leq 20 \text{ dB}$$

**Table 9.5: CPICH\_Ec/Io Intra frequency absolute accuracy**

| Parameter   | Unit | Accuracy [dB]   |                   | Conditions<br>Io [dBm/3.84 MHz] |
|-------------|------|---|-------------------|---------------------------------|
|             |      | Normal condition  | Extreme condition |                                 |
| CPICH_Ec/Io | dB   | ± 1.5 for -14 ≤ CPICH Ec/Io<br>± 2 for -16 ≤ CPICH Ec/Io < -14<br>± 3 for -20 ≤ CPICH Ec/Io < -16 | ± 3               | -94...-50                       |

#### 9.1.2.1.2 Relative accuracy requirement

The relative accuracy of CPICH Ec/Io is defined as the CPICH Ec/Io measured from one cell compared to the CPICH Ec/Io measured from another cell on the same frequency.

The accuracy requirements in table 9.6 are valid under the following conditions:

$$CPICH\_RSCP1,2|_{dBm} \geq -114 \text{ dBm.}$$

$$\left| CPICH\_RSCP1|_{in \text{ dBm}} - CPICH\_RSCP2|_{in \text{ dBm}} \right| \leq 20 \text{ dB}$$

$$\left| \frac{I_o}{\hat{I}_{or}} \right|_{in \text{ dB}} - \left( \frac{CPICH - E_c}{I_{or}} \right)_{in \text{ dB}} \leq 20 \text{ dB}$$

**Table 9.6: CPICH\_Ec/Io Intra frequency relative accuracy**

| Parameter   | Unit | Accuracy [dB]   |                   | Conditions<br>Io [dBm/3.84 MHz] |
|-------------|------|---|-------------------|---------------------------------|
|             |      | Normal condition  | Extreme condition |                                 |
| CPICH_Ec/Io | dB   | ± 1.5 for -14 ≤ CPICH Ec/Io<br>± 2 for -16 ≤ CPICH Ec/Io < -14<br>± 3 for -20 ≤ CPICH Ec/Io < -16 | ± 3               | -94...-50                       |

### 9.1.2.2 Inter frequency measurement accuracy

The measurement period for CELL\_DCH state can be found in sub clause 8.1.2.3. The measurement period for CELL\_FACH state can be found in sub clause 8.4.2.3.

#### 9.1.2.2.1 Absolute accuracy requirement

The accuracy requirements in table 9.7 are valid under the following conditions:

$$CPICH\_RSCP1|_{dBm} \geq -114 \text{ dBm.}$$

$$\left| \frac{I_o}{\hat{I}_{or}} \right|_{in\ dB} - \left( \frac{CPICH - E_c}{I_{or}} \right)_{in\ dB} \leq 20dB$$

**Table 9.7: CPICH\_Ec/Io Inter frequency absolute accuracy**

| Parameter   | Unit | Accuracy [dB]   |                   | Conditions        |
|-------------|------|---|-------------------|-------------------|
|             |      | Normal condition  | Extreme condition | Io [dBm/3.84 MHz] |
| CPICH_Ec/Io | dB   | ± 1.5 for -14 ≤ CPICH Ec/Io<br>± 2 for -16 ≤ CPICH Ec/Io < -14<br>± 3 for -20 ≤ CPICH Ec/Io < -16 | ± 3               | -94...-50         |

### 9.1.2.2.2 Relative accuracy requirement

The relative accuracy of CPICH Ec/Io in the inter frequency case is defined as the CPICH Ec/Io measured from one cell compared to the CPICH Ec/Io measured from another cell on a different frequency

The accuracy requirements in table 9.8 are valid under the following conditions:

$$CPICH\_RSCP1,2|_{dBm} \geq -114\ dBm.$$

$$\left| CPICH\_RSCP1|_{in\ dBm} - CPICH\_RSCP2|_{in\ dBm} \right| \leq 20dB$$

$$| Channel\ 1\_Io|_{dBm/3.84\ MHz} - Channel\ 2\_Io|_{dBm/3.84\ MHz} | \leq 20\ dB.$$

$$\left| \frac{I_o}{\hat{I}_{or}} \right|_{in\ dB} - \left( \frac{CPICH - E_c}{I_{or}} \right)_{in\ dB} \leq 20dB$$

**Table 9.8: CPICH\_Ec/Io Inter frequency relative accuracy**

| Parameter   | Unit | Accuracy [dB]   |                   | Conditions        |
|-------------|------|---|-------------------|-------------------|
|             |      | Normal condition  | Extreme condition | Io [dBm/3.84 MHz] |
| CPICH_Ec/Io | dB   | ± 1.5 for -14 ≤ CPICH Ec/Io<br>± 2 for -16 ≤ CPICH Ec/Io < -14<br>± 3 for -20 ≤ CPICH Ec/Io < -16 | ± 3               | -94...-50         |

### 9.1.2.3 CPICH Ec/Io measurement report mapping

The reporting range is for CPICH Ec/Io is from -24 ...0 dB.

In table 9.9 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.9**

| Reported value | Measured quantity value   | Unit |
|----------------|---------------------------|------|
| CPICH_Ec/No_00 | CPICH Ec/Io < -24         | dB   |
| CPICH_Ec/No_01 | -24 ≤ CPICH Ec/Io < -23.5 | dB   |
| CPICH_Ec/No_02 | -23.5 ≤ CPICH Ec/Io < -23 | dB   |
| ...            | ...                       | ...  |
| CPICH_Ec/No_47 | -1 ≤ CPICH Ec/Io < -0.5   | dB   |
| CPICH_Ec/No_48 | -0.5 ≤ CPICH Ec/Io < 0    | dB   |
| CPICH_Ec/No_49 | 0 ≤ CPICH Ec/Io           | dB   |

### 9.1.3 UTRA Carrier RSSI

NOTE: This measurement is for Inter-frequency handover evaluation.

The measurement period is equal to the measurement period for UE CPICH measurements. For CELL\_DCH state the measurement period can be found in sub clause 8.1.2.2 for intra frequency measurements and in sub clause 8.1.2.3 for inter frequency measurements.

#### 9.1.3.1 Absolute accuracy requirement

**Table 9.10: UTRA Carrier RSSI Inter frequency absolute accuracy**

| Parameter         | Unit | Accuracy [dB]    |                   | Conditions        |
|-------------------|------|------------------|-------------------|-------------------|
|                   |      | Normal condition | Extreme condition | Io [dBm/3.84 MHz] |
| UTRA Carrier RSSI | dBm  | ± 4              | ± 7               | -94...-70         |
|                   | dBm  | ± 6              | ± 9               | -70...-50         |

#### 9.1.3.2 Relative accuracy requirement

The relative accuracy requirement is defined as the UTRA Carrier RSSI measured from one frequency compared to the UTRA Carrier RSSI measured from another frequency.

The accuracy requirements in table 9.11 are valid under the following condition:

$$| \text{Channel 1 } I_{o|_{\text{dBm}/3.84 \text{ MHz}}} - \text{Channel 2 } I_{o|_{\text{dBm}/3.84 \text{ MHz}}} | < 20 \text{ dB.}$$

**Table 9.11: UTRA Carrier RSSI Inter frequency relative accuracy**

| Parameter         | Unit | Accuracy [dB]    |                   | Conditions        |
|-------------------|------|------------------|-------------------|-------------------|
|                   |      | Normal condition | Extreme condition | Io [dBm/3.84 MHz] |
| UTRA Carrier RSSI | dBm  | ± 7              | ± 11              | -94...-50         |

#### 9.1.3.3 UTRA Carrier RSSI measurement report mapping

The reporting range for *UTRA carrier RSSI* is from -100 ...-25 dBm.

In table 9.12 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.12**

| Reported value           | Measured quantity value        | Unit |
|--------------------------|--------------------------------|------|
| UTRA_carrier_RSSI_LEV_00 | UTRA carrier RSSI < -100       | dBm  |
| UTRA_carrier_RSSI_LEV_01 | -100 ≤ UTRA carrier RSSI < -99 | dBm  |
| UTRA_carrier_RSSI_LEV_02 | -99 ≤ UTRA carrier RSSI < -98  | dBm  |
| ...                      | ...                            | ...  |
| UTRA_carrier_RSSI_LEV_74 | -27 ≤ UTRA carrier RSSI < -26  | dBm  |
| UTRA_carrier_RSSI_LEV_75 | -26 ≤ UTRA carrier RSSI < -25  | dBm  |
| UTRA_carrier_RSSI_LEV_76 | -25 ≤ UTRA carrier RSSI        | dBm  |

### 9.1.4 GSM carrier RSSI

NOTE: This measurement is for handover between UTRAN and GSM.

The requirements in this section are valid for terminals supporting this capability.



The measurement period for CELL\_DCH state can be found in section 8.1.2.5. The measurement period for CELL\_FACH state can be found in section 8.4.2.5.

If the UE, in CELL\_DCH state, does not need compressed mode to perform GSM measurements, the measurement accuracy requirements for RXLEV in TS 05.08 shall apply.

If the UE, in CELL\_DCH state, needs compressed mode to perform GSM measurements, the GSM measurement procedure and measurement accuracy requirement is stated in section 8.1.2.5 shall apply.

If the UE, in CELL\_FACH state, does not need measurement occasions to perform GSM measurements, the measurement accuracy requirements for RXLEV in TS 05.08 shall apply.

If the UE, in CELL\_FACH state, needs measurement occasions to perform GSM measurements, the GSM measurement procedure and measurement accuracy requirement stated in section 8.4.2.5 shall apply.

The reporting range and mapping specified for RXLEV in TS 05.08 shall apply.

## 9.1.5 Transport channel BLER

### 9.1.5.1 BLER measurement requirement

Transport channel BLER value shall be calculated from a window with the size equal to the IE Reporting interval as specified in section 10.3.7.53 Periodical reporting criteria in TS 25.331.

### 9.1.5.2 Transport channel BLER measurement report mapping

The *Transport channel BLER* reporting range is from 0 to 1.

In table 9.13 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.13**

| Reported value | Measured quantity value  | Unit |
|----------------|--|------|
| BLER_LOG_00    | Transport channel BLER = 0   | -    |
| BLER_LOG_01    | $-\infty < \text{Log}_{10}(\text{Transport channel BLER}) < -4.03$   | -    |
| BLER_LOG_02    | $-4.03 \leq \text{Log}_{10}(\text{Transport channel BLER}) < -3.965$ | -    |
| BLER_LOG_03    | $-3.965 \leq \text{Log}_{10}(\text{Transport channel BLER}) < -3.9$  | -    |
| ...            | ...  | ...  |
| BLER_LOG_61    | $-0.195 \leq \text{Log}_{10}(\text{Transport channel BLER}) < -0.13$ | -    |
| BLER_LOG_62    | $-0.13 \leq \text{Log}_{10}(\text{Transport channel BLER}) < -0.065$ | -    |
| BLER_LOG_63    | $-0.065 \leq \text{Log}_{10}(\text{Transport channel BLER}) \leq 0$  | -    |

## 9.1.6 UE transmitted power

### 9.1.6.1 Accuracy requirement

The measurement period in CELL\_DCH state is 1 slot.

**Table 9.14 UE transmitted power absolute accuracy**

| Parameter                               | Unit | Accuracy [dB]   |                 |
|---|------|-----------------|-----------------|
|   |      | PUEMAX<br>24dBm | PUEMAX<br>21dBm |
| UE transmitted power=PUEMAX             | dBm  | +1/-3           | ±2              |
| UE transmitted power=PUEMAX-1           | dBm  | +1.5/-3.5       | ±2.5            |
| UE transmitted power=PUEMAX-2           | dBm  | +2/-4           | ±3              |
| UE transmitted power=PUEMAX-3           | dBm  | +2.5/-4.5       | ±3.5            |
| PUEMAX-10≤UE transmitted power<PUEMAX-3 | dBm  | +3/-5           | ±4              |

NOTE 1: User equipment maximum output power, PUEMAX, is the maximum output power level without tolerance defined for the power class of the UE in TS 25.101 [3] section 6.2.1.

NOTE 2: UE transmitted power is the reported value.

For each empty slot created by compressed mode, no value shall be reported by the UE L1 for those slots

### 9.1.6.2 UE transmitted power measurement report mapping

The reporting range for *UE transmitted power* is from -50 ...+33 dBm.

In table 9.15 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.15**

| Reported value  | Measured quantity value          | Unit |
|-----------------|----------------------------------|------|
| UE_TX_POWER_021 | -50 ≤ UE transmitted power < -49 | dBm  |
| UE_TX_POWER_022 | -49 ≤ UE transmitted power < -48 | dBm  |
| UE_TX_POWER_023 | -48 ≤ UE transmitted power < -47 | dBm  |
| ...             | ...                              | ...  |
| UE_TX_POWER_102 | 31 ≤ UE transmitted power < 32   | dBm  |
| UE_TX_POWER_103 | 32 ≤ UE transmitted power < 33   | dBm  |
| UE_TX_POWER_104 | 33 ≤ UE transmitted power < 34   | dBm  |

### 9.1.7 SFN-CFN observed time difference

Note: This measurement is for handover timing purposes to identify active cell and neighbour cell time difference.

#### 9.1.7.1 Intra frequency measurement requirement

The measurement period for CELL\_DCH state can be found in sub clause 8.1.2.2.

The accuracy requirement in table 9.16 is valid under the following conditions:

$$CPICH\_RSCP_{1,2}|_{dBm} \geq -114 \text{ dBm.}$$

$$\left| CPICH\_RSCP1|_{in \text{ dBm}} - CPICH\_RSCP2|_{in \text{ dBm}} \right| \leq 20 \text{ dB}$$

$$\left( \frac{I_o}{\hat{I}_{or}} \right) |_{in \text{ dB}} - \left( \frac{CPICH\_E_c}{I_{or}} \right) |_{in \text{ dB}} \leq 20 \text{ dB}$$

$$\left( \frac{I_o}{\hat{I}_{or}} \right)_{in\ dB} - \left( \frac{P - CCPCH - E_c}{I_{or}} \right)_{in\ dB} \text{ is low enough to ensure successful SFN decoding.}$$

Table 9.16

| Parameter                        | Unit | Accuracy [chip] | Conditions        |
|----------------------------------|------|-----------------|-------------------|
|                                  |      |                 | Io [dBm/3.84 MHz] |
| SFN-CFN observed time difference | chip | ± 1             | -94...-50         |

### 9.1.7.2 Inter frequency measurement requirement

The measurement period for CELL\_DCH state can be found in sub clause 8.1.2.3.

The accuracy requirement in table 9.17 is valid under the following conditions:

$$CPICH\_RSCP1,2|_{dBm} \geq -114\ dBm.$$

$$\left| CPICH\_RSCP1|_{in\ dBm} - CPICH\_RSCP2|_{in\ dBm} \right| \leq 20\ dB$$

$$\left| Channel\ 1\_Io|_{dBm/3.84\ MHz} - Channel\ 2\_Io|_{dBm/3.84\ MHz} \right| \leq 20\ dB.$$

$$\left( \frac{I_o}{\hat{I}_{or}} \right)_{in\ dB} - \left( \frac{CPICH - E_c}{I_{or}} \right)_{in\ dB} \leq 20\ dB$$

Table 9.17

| Parameter                        | Unit | Accuracy [chip] | Conditions        |
|----------------------------------|------|-----------------|-------------------|
|                                  |      |                 | Io [dBm/3.84 MHz] |
| SFN-CFN observed time difference | chip | ± 1             | -94...-50         |

### 9.1.7.3 SFN-CFN observed time difference measurement report mapping

The reporting range is for *CFN-SFN observed time difference* is from 0 ... 9830400 chip.

In table 9.18 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

Table 9.18

| Reported value       | Measured quantity value                              | Unit |
|----------------------|--|------|
| SFN-CFN_TIME_0000000 | 0 ≤ SFN-CFN observed time difference < 1             | chip |
| SFN-CFN_TIME_0000001 | 1 ≤ SFN-CFN observed time difference < 2             | chip |
| SFN-CFN_TIME_0000002 | 2 ≤ SFN-CFN observed time difference < 3             | chip |
| ...                  | ...  | ...  |
| SFN-CFN_TIME_9830397 | 9830397 ≤ SFN-CFN observed time difference < 9830398 | chip |
| SFN-CFN_TIME_9830398 | 9830398 ≤ SFN-CFN observed time difference < 9830399 | chip |
| SFN-CFN_TIME_9830399 | 9830399 ≤ SFN-CFN observed time difference < 9830400 | chip |

## 9.1.8 SFN-SFN observed time difference

### 9.1.8.1 SFN-SFN observed time difference type 1

NOTE: This measurement is for identifying time difference between two cells.

#### 9.1.8.1.1 Measurement requirement

The measurement period for CELL\_FACH state can be found in sub clause 8.4.2.2.

The accuracy requirement in table 9.19 is valid under the following conditions:

$$CPICH\_RSCP1,2|_{dBm} \geq -114 \text{ dBm.}$$

$$\left| CPICH\_RSCP1|_{in \text{ dBm}} - CPICH\_RSCP2|_{in \text{ dBm}} \right| \leq 20 \text{ dB}$$

$$\left( \frac{I_o}{\hat{I}_{or}} \right)_{in \text{ dB}} - \left( \frac{CPICH\_E_c}{I_{or}} \right)_{in \text{ dB}} \leq 20 \text{ dB}$$

$$\left( \frac{I_o}{\hat{I}_{or}} \right)_{in \text{ dB}} - \left( \frac{P - CCPCH\_E_c}{I_{or}} \right)_{in \text{ dB}} \text{ is low enough to ensure successful SFN decoding.}$$

**Table 9.19**

| Parameter                              | Unit | Accuracy [chip] | Conditions        |
|--|------|-----------------|-------------------|
|  |      |                 | Io [dBm/3.84 MHz] |
| SFN-SFN observed time difference type1 | chip | $\pm 1$         | -94...-50         |

#### 9.1.8.1.2 SFN-SFN observed time difference type 1 measurement report mapping

The reporting range is for *SFN-SFN observed time difference type 1* is from 0 ... 9830400 chip.

In table 9.20 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.20**

| Reported value           | Measured quantity value  | Unit |
|--------------------------|--|------|
| T1_SFN-SFN_TIME _0000000 | $0 \leq$ SFN-SFN observed time difference type 1 $< 1$             | chip |
| T1_SFN-SFN_TIME _0000001 | $1 \leq$ SFN-SFN observed time difference type 1 $< 2$             | chip |
| T1_SFN-SFN_TIME _0000002 | $2 \leq$ SFN-SFN observed time difference type 1 $< 3$             | chip |
| ...                      | ...  | ...  |
| T1_SFN-SFN_TIME _9830397 | $9830397 \leq$ SFN-SFN observed time difference type 1 $< 9830398$ | chip |
| T1_SFN-SFN_TIME _9830398 | $9830398 \leq$ SFN-SFN observed time difference type 1 $< 9830399$ | chip |
| T1_SFN-SFN_TIME _9830399 | $9830399 \leq$ SFN-SFN observed time difference type 1 $< 9830400$ | chip |

### 9.1.8.2 SFN-SFN observed time difference type 2

NOTE: This measurement is for location service purposes to identify time difference between two cells.

It is optional for terminal to support the use of IPDL periods together with SFN-SFN observed time difference type 2. The support of IPDL depends on the supported UE positioning methods.

NOTE: Requirement on the UE shall be reconsidered when the state of the art technology progress.

#### 9.1.8.2.1 Intra frequency measurement requirement accuracy without IPDL period active

The measurement period for CELL\_DCH state can be found in sub clause 8.1.2.2. The measurement period for CELL\_FACH state can be found in sub clause 8.4.2.2.

The accuracy requirement in table 9.21 is valid under the following conditions:

$$CPICH\_RSCP_{1,2}|_{dBm} \geq -114 \text{ dBm.}$$

$$\left| \frac{I_o}{\hat{I}_{or}} \right|_{in \text{ dB}} - \left( \frac{CPICH - E_c}{I_{or}} \right)_{in \text{ dB}} \leq 20dB$$

**Table 9.21**

| Parameter                              | Unit | Accuracy [chip] | Conditions        |
|--|------|-----------------|-------------------|
|  |      |                 | Io [dBm/3.84 MHz] |
| SFN-SFN observed time difference type2 | chip | ± 0.5           | -94...-50         |

#### 9.1.8.2.2 Intra frequency measurement requirement accuracy with IPDL period active

This requirement is valid only for UEs supporting IPDL measurements.

The measurement period for CELL\_DCH state can be found in sub clause 8.1.2.2. The measurement period for CELL\_FACH state can be found in sub clause 8.4.2.2.

The accuracy requirement in table 9.22 is valid under the following conditions:

$$CPICH\_RSCP_{x,y}|_{dBm} \geq -114 \text{ dBm.}$$

$$\left| \frac{I_o}{\hat{I}_{or}} \right|_{in \text{ dB}} - \left( \frac{CPICH - E_c}{I_{or}} \right)_{in \text{ dB}} \leq 20dB$$

Additionally the accuracy requirement in table 9.22 is also valid for neighbour cells for which the following conditions apply to during idle periods provided idle periods have a length of 1 slot:

$$CPICH\_RSCP_{x,y}|_{dBm} \geq -114 \text{ dBm.}$$

$$\left| \frac{I_{o\_idle\_period}}{\hat{I}_{or}} \right|_{in \text{ dB}} - \left( \frac{CPICH - E_c}{I_{or}} \right)_{in \text{ dB}} \leq 20dB,$$

where  $x$  and  $y$  represent cells measured using idle periods and  $I_{o\_idle\_period}$  is the total received power during the idle period.

NOTE: Additional general conditions are needed for the requirements in table 9.22 to be valid.

**Table 9.22**

| Parameter                               | Unit | Accuracy [chip] | Conditions        |
|---|------|-----------------|-------------------|
|   |      |                 | Io [dBm/3.84 MHz] |
| SFN-SFN observed time difference type 2 | chip | ± 0.5           | -94...-50         |

### 9.1.8.2.3 Inter frequency measurement requirement accuracy

The measurement period for CELL\_DCH state can be found in sub clause 8.1.2.3. The measurement period for CELL\_FACH state can be found in sub clause 8.4.2.3.

The accuracy requirement in table 9.23 is valid under the following conditions:

$$CPICH\_RSCP_{1,2}|_{dBm} \geq -114 \text{ dBm.}$$

$$| \text{Channel 1 } I_{o}|_{dBm/3.84 \text{ MHz}} - \text{Channel 2 } I_{o}|_{dBm/3.84 \text{ MHz}} | \leq 20 \text{ dB.}$$

$$\left( \frac{I_o}{\hat{I}_{or}} \right)_{in \text{ dB}} - \left( \frac{CPICH\_E_c}{I_{or}} \right)_{in \text{ dB}} \leq 20 \text{ dB}$$

**Table 9.23**

| Parameter                               | Unit | Accuracy [chip] | Conditions        |
|---|------|-----------------|-------------------|
|   |      |                 | Io [dBm/3.84 MHz] |
| SFN-SFN observed time difference type 2 | chip | ± 1             | -94...-50         |

### 9.1.8.2.4 SFN-SFN observed time difference type 2 measurement report mapping

The reporting range is for *SFN-SFN observed time difference type 2* is from -1280 ... +1280 chip.

In table 9.24 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.24**

| Reported value        | Measured quantity value   | Unit |
|-----------------------|---|------|
| T2_SFN-SFN_TIME_00000 | SFN-SFN observed time difference type 2 < -1280.0000              | chip |
| T2_SFN-SFN_TIME_00001 | -1280.0000 ≤ SFN-SFN observed time difference type 2 < -1279.9375 | chip |
| T2_SFN-SFN_TIME_00002 | -1279.9375 ≤ SFN-SFN observed time difference type 2 < -1279.8750 | chip |
| ...                   | ...   | ...  |
| T2_SFN-SFN_TIME_40959 | 1279.8750 ≤ SFN-SFN observed time difference type 2 < 1279.9375   | chip |
| T2_SFN-SFN_TIME_40960 | 1279.9375 ≤ SFN-SFN observed time difference type 2 < 1280.0000   | chip |
| T2_SFN-SFN_TIME_40961 | 1280.0000 ≤ SFN-SFN observed time difference type 2               | chip |

## 9.1.9 UE Rx-Tx time difference

### 9.1.9.1 UE Rx-Tx time difference type 1

NOTE: This measurement is used for call set up purposes to compensate propagation delay of DL and UL.

The measurement period in CELL\_DCH state is 100 ms

#### 9.1.9.1.1 Measurement requirement

**Table 9.25**

| Parameter                | Unit | Accuracy [chip] | Conditions        |
|--------------------------|------|-----------------|-------------------|
|                          |      |                 | Io [dBm/3.84 MHz] |
| UE RX-TX time difference | chip | ± 1.5           | -94...-50         |

### 9.1.9.1.2 UE Rx-Tx time difference type 1 measurement report mapping

The reporting range is for *UE Rx-Tx time difference type 1* is from 768 ... 1280 chip.

In table 9.26 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.26**

| Reported value  | Measured quantity value                            | Unit |
|-----------------|--|------|
| RX-TX_TIME_768  | UE Rx-Tx Time difference type 1 < 768              | chip |
| RX-TX_TIME_769  | $768 \leq$ UE Rx-Tx Time difference type 1 < 769   | chip |
| RX-TX_TIME_770  | $769 \leq$ UE Rx-Tx Time difference type 1 < 770   | chip |
| RX-TX_TIME_771  | $770 \leq$ UE Rx-Tx Time difference type 1 < 771   | chip |
| ...             | ...  | ...  |
| RX-TX_TIME_1277 | $1276 \leq$ UE Rx-Tx Time difference type 1 < 1277 | chip |
| RX-TX_TIME_1278 | $1277 \leq$ UE Rx-Tx Time difference type 1 < 1278 | chip |
| RX-TX_TIME_1279 | $1278 \leq$ UE Rx-Tx Time difference type 1 < 1279 | chip |
| RX-TX_TIME_1280 | $1279 \leq$ UE Rx-Tx Time difference type 1        | chip |

### 9.1.9.2 UE Rx-Tx time difference type 2

NOTE: This measurement is used for UE positioning purposes.

It is optional for a terminal to support a subset of UE positioning methods. This measurement represents an instantaneous value that is time stamped as defined in the IE description in TS 25.331 [16].

#### 9.1.9.2.1 Measurement requirement

**Table 9.27**

| Parameter                | Unit | Accuracy [chip] | Conditions        |
|--------------------------|------|-----------------|-------------------|
|                          |      |                 | Io [dBm/3.84 MHz] |
| UE RX-TX time difference | chip | $\pm 1.0$       | -94...-50         |

#### 9.1.9.2.2 UE Rx-Tx time difference type 2 measurement report mapping

The reporting range is for *UE Rx-Tx time difference type2* is from 768 ... 1280 chip.

In table 9.28 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.28**

| Reported value  | Measured quantity value                                      | Unit |
|-----------------|--|------|
| RX-TX_TIME_0000 | UE Rx-Tx Time difference type 2 < 768.000                    | chip |
| RX-TX_TIME_0001 | $768.000 \leq$ UE Rx-Tx Time difference type 2 < 768.0625    | chip |
| RX-TX_TIME_0002 | $768.0625 \leq$ UE Rx-Tx Time difference type 2 < 768.1250   | chip |
| RX-TX_TIME_0003 | $768.1250 \leq$ UE Rx-Tx Time difference type 2 < 768.1875   | chip |
| ...             | ...  | ...  |
| RX-TX_TIME_8189 | $1279.7500 \leq$ UE Rx-Tx Time difference type 2 < 1279.8125 | chip |
| RX-TX_TIME_8190 | $1279.8125 \leq$ UE Rx-Tx Time difference type 2 < 1279.8750 | chip |
| RX-TX_TIME_8191 | $1279.8750 \leq$ UE Rx-Tx Time difference type 2             | chip |

### 9.1.10 Observed time difference to GSM cell

NOTE: This measurement is used to determine the system time difference between UTRAN and GSM cells.

The requirements in this section are valid for terminals supporting UTRA and GSM.

### 9.1.10.1 Measurement requirement

The measurement period for CELL\_DCH state is equal to the maximum time between two successive BSIC re-confirmations for one particular GSM cell according to sub clause 8.1.2.5.2.

NOTE: The conditions for which the accuracy requirement in table 9.29 is valid are FFS.

**Table 9.29**

| Parameter                            | Unit | Accuracy [chip] | Conditions |
|--------------------------------------|------|-----------------|------------|
| Observed time difference to GSM cell | ms   | ± 20            |            |

### 9.1.10.2 Observed time difference to GSM cell measurement report mapping

The reporting range is for *Observed time difference to GSM cell* is from 0 ... 3060/13 ms.

In table 9.30 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.30**

| Reported value | Measured quantity value  | Unit |
|----------------|--|------|
| GSM_TIME _0000 | $0 \leq \text{Observed time difference to GSM cell} < 1 \times 3060 / (4096 \times 13)$                                      | ms   |
| GSM_TIME _0001 | $1 \times 3060 / (4096 \times 13) \leq \text{Observed time difference to GSM cell} < 2 \times 3060 / (4096 \times 13)$       | ms   |
| GSM_TIME _0002 | $2 \times 3060 / (4096 \times 13) \leq \text{Observed time difference to GSM cell} < 3 \times 3060 / (4096 \times 13)$       | ms   |
| GSM_TIME _0003 | $3 \times 3060 / (4096 \times 13) \leq \text{Observed time difference to GSM cell} < 4 \times 3060 / (4096 \times 13)$       | ms   |
| ...            | ...  | ...  |
| GSM_TIME _4093 | $4093 \times 3060 / (4096 \times 13) \leq \text{Observed time difference to GSM cell} < 4094 \times 3060 / (4096 \times 13)$ | ms   |
| GSM_TIME _4094 | $4094 \times 3060 / (4096 \times 13) \leq \text{Observed time difference to GSM cell} < 4095 \times 3060 / (4096 \times 13)$ | ms   |
| GSM_TIME _4095 | $4095 \times 3060 / (4096 \times 13) \leq \text{Observed time difference to GSM cell} < 3060 / 13$                           | ms   |

### 9.1.11 P-CCPCH RSCP

NOTE: This measurement is used for handover between UTRA FDD and UTRA TDD.

The requirements in this section are valid for terminals supporting this capability.

The measurement period for CELL\_DCH state can be found in sub clause 8.1.2.4. The measurement period for CELL\_FACH state can be found in sub clause 8.4.2.4.

#### 9.1.11.1 Absolute accuracy requirements

The accuracy requirement in table 9.31 is valid under the following conditions:

P-CCPCH\_RSCP ≥ -102 dBm.

$$\left| \frac{I_o}{\hat{I}_{or}} \right|_{in \text{ dB}} - \left( \frac{P - CCPCH - E_c}{I_{or}} \right)_{in \text{ dB}} \leq 8 \text{ dB}$$

**Table 9.31: P-CCPCH\_RSCP Inter frequency absolute accuracy**

| Parameter    | Unit | Accuracy [dB]     |                    | Conditions<br>Io [dBm/3.84 MHz] |
|--------------|------|-------------------|--------------------|---------------------------------|
|              |      | Normal conditions | Extreme conditions |                                 |
| P-CCPCH_RSCP | dBm  | ± 6               | ± 9                | -94...-70                       |
|              | dBm  | ± 8               | ± 11               | -70...-50                       |



### 9.1.11.2 P-CCPCH RSCP measurement report mapping

The reporting range is for *P-CCPCH RSCP* is from -115 ... -25 dBm.

In table 9.32 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.32**

| Reported value     | Measured quantity value   | Unit |
|--------------------|---------------------------|------|
| PCCPCH_RSCP_LEV_00 | PCCPCH RSCP < -115        | dBm  |
| PCCPCH_RSCP_LEV_01 | -115 ≤ PCCPCH RSCP < -114 | dBm  |
| PCCPCH_RSCP_LEV_02 | -114 ≤ PCCPCH RSCP < -113 | dBm  |
| PCCPCH_RSCP_LEV_03 | -113 ≤ PCCPCH RSCP < -112 | dBm  |
| ...                | ...                       | ...  |
| PCCPCH_RSCP_LEV_89 | -27 ≤ PCCPCH RSCP < -26   | dBm  |
| PCCPCH_RSCP_LEV_90 | -26 ≤ PCCPCH RSCP < -25   | dBm  |
| PCCPCH_RSCP_LEV_91 | -25 ≤ PCCPCH RSCP         | dBm  |

### 9.1.12 UE GPS Timing of Cell Frames for UE positioning

The requirements in this section are valid for terminals supporting this capability:

**Table 9.33**

| Parameter                                       | Unit | Accuracy [chip] | Conditions |
|---|------|-----------------|------------|
| UE GPS Timing of Cell Frames for UE positioning | chip | [ ]             |            |

#### 9.1.12.1 UE GPS timing of Cell Frames for UE positioning measurement report mapping

The reporting range is for UE GPS timing of Cell Frames for UE positioning is from 0 ... 2322432000000 chip.

In table 9.34 the mapping of measured quantity is defined.

**Table 9.34**

| Reported value          | Measured quantity value  | Unit |
|-------------------------|--|------|
| GPS_TIME_00000000000000 | UE GPS timing of Cell Frames for UE positioning < 0.0625                                 | chip |
| GPS_TIME_00000000000001 | 0.0625 ≤ UE GPS timing of Cell Frames for UE positioning < 0.1250                        | chip |
| GPS_TIME_00000000000002 | 0.1250 ≤ UE GPS timing of Cell Frames for UE positioning < 0.1875                        | chip |
| ...                     | ...  | ...  |
| GPS_TIME_37158911999997 | 232243199999.8125 ≤ UE GPS timing of Cell Frames for UE positioning < 232243199999.8750  | chip |
| GPS_TIME_37158911999998 | 232243199999.8750 ≤ UE GPS timing of Cell Frames for UE positioning < 232243199999.9375  | chip |
| GPS_TIME_37158911999999 | 232243199999.9375 ≤ UE GPS timing of Cell Frames for UE positioning < 2322432000000.0000 | chip |

## 9.2 Measurements Performance for UTRAN

The reported measurement result after layer 1 filtering shall be an estimate of the average value of the measured quantity over the measurement period. The reference point for the measurement result after layer 1 filtering is referred to as point B in the measurement model described in TS 25.302.

The accuracy requirements in this clause are valid for the reported measurement result after layer 1 filtering. The accuracy requirements are verified from the measurement report at point D in the measurement model having the layer 3 filtering disabled.

### 9.2.1 Received total wideband power

The measurement period shall be 100 ms.

#### 9.2.1.1 Absolute accuracy requirement

**Table 9.35**

| Parameter | Unit         | Accuracy [dB] | Conditions                            |
|-----------|--------------|---------------|---------------------------------------|
|           |              |               | Range                                 |
| Io        | dBm/3.84 MHz | $\pm 4$       | $-103 \leq I_o \leq -74$ dBm/3.84 MHz |

#### 9.2.1.2 Relative accuracy requirement

The relative accuracy is defined as the Received total wideband power measured at one frequency compared to the Received total wideband power measured from the same frequency at a different time.

**Table 9.36**

| Parameter | Unit         | Accuracy [dB] | Conditions  |
|-----------|--------------|---------------|---|
|           |              |               | Range   |
| Io        | dBm/3.84 MHz | $\pm 0.5$     | For changes $\leq \pm 5.0$ dB and $-103 \leq I_o \leq -74$ dBm/3.84 MHz |

#### 9.2.1.3 Received total wideband power measurement report mapping

The reporting range for *Received total wideband power (RTWP)* is from -112 ... -50 dBm.

In table 9.37 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.37**

| Reported value | Measured quantity value     | Unit |
|----------------|-----------------------------|------|
| RTWP_LEV_000   | $RTWP < -112.0$             | dBm  |
| RTWP_LEV_001   | $-112.0 \leq RTWP < -111.9$ | dBm  |
| RTWP_LEV_002   | $-111.9 \leq RTWP < -111.8$ | dBm  |
| ...            | ...                         | ...  |
| RTWP_LEV_619   | $-50.2 \leq RTWP < -50.1$   | dBm  |
| RTWP_LEV_620   | $-50.1 \leq RTWP < -50.0$   | dBm  |
| RTWP_LEV_621   | $-50.0 \leq RTWP$           | dBm  |

## 9.2.2 SIR

The measurement period shall be 80 ms.

### 9.2.2.1 Accuracy requirement

**Table 9.38**

| Parameter | Unit | Accuracy [dB] | Conditions   |
|-----------|------|---------------|--|
|           |      |               | Range  |
| SIR       | dB   | $\pm 3$       | For $-7 < \text{SIR} < 20$ dB when $l_0 > -105$ dBm/3.84 MHz |

### 9.2.2.2 SIR measurement report mapping

The reporting range for *SIR* is from -11 ... 20 dB.

In table 9.39 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.39**

| Reported value | Measured quantity value         | Unit |
|----------------|---------------------------------|------|
| UTRAN_SIR_00   | $\text{SIR} < -11.0$            | dB   |
| UTRAN_SIR_01   | $-11.0 \leq \text{SIR} < -10.5$ | dB   |
| UTRAN_SIR_02   | $-10.5 \leq \text{SIR} < -10.0$ | dB   |
| ...            | ...                             | ...  |
| UTRAN_SIR_61   | $19.0 \leq \text{SIR} < 19.5$   | dB   |
| UTRAN_SIR_62   | $19.5 \leq \text{SIR} < 20.0$   | dB   |
| UTRAN_SIR_63   | $20.0 \leq \text{SIR}$          | dB   |

## 9.2.3 $\text{SIR}_{\text{error}}$

The measurement period shall be 80 ms.

NOTE: The measurement period is the same as for the SIR measurement in section 9.2.2.  $\text{SIR}_{\text{error}}$  is calculated from SIR and  $\text{SIR}_{\text{targets}}$ , see TS 25.215.

### 9.2.3.1 Accuracy requirement

**Table 9.40**

| Parameter                   | Accuracy   | Range  |
|-----------------------------|------------|--|
| $\text{SIR}_{\text{error}}$ | $\pm 3$ dB | The accuracy requirement for $\text{SIR}_{\text{error}}$ is valid for SIR within the guaranteed accuracy range specified in section 9.2.2. |

NOTE: The accuracy requirement for  $\text{SIR}_{\text{error}}$  is the same as for the SIR measurement specified in section 9.2.2.  $\text{SIR}_{\text{error}}$  is calculated from SIR and  $\text{SIR}_{\text{targets}}$ , see TS 25.215.

### 9.2.3.2 $\text{SIR}_{\text{error}}$ measurement report mapping

The reporting range for  $\text{SIR}_{\text{error}}$  is from -31 ... 31 dB.

In table 9.41 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

Table 9.41

| Reported value      | Measured quantity value          | Unit |
|---------------------|----------------------------------|------|
| UTRAN_SIR_ERROR_000 | $SIR_{error} < -31.0$            | dB   |
| UTRAN_SIR_ERROR_001 | $-31.0 \leq SIR_{error} < -30.5$ | dB   |
| UTRAN_SIR_ERROR_002 | $-30.5 \leq SIR_{error} < -30.0$ | dB   |
| ...                 | ...                              | ...  |
| UTRAN_SIR_ERROR_062 | $-0.5 \leq SIR_{error} < 0.0$    | dB   |
| UTRAN_SIR_ERROR_063 | $0.0 \leq SIR_{error} < 0.5$     | dB   |
| ...                 | ...                              | ...  |
| UTRAN_SIR_ERROR_123 | $30.0 \leq SIR_{error} < 30.5$   | dB   |
| UTRAN_SIR_ERROR_124 | $30.5 \leq SIR_{error} < 31.0$   | dB   |
| UTRAN_SIR_ERROR_125 | $31.0 \leq SIR_{error}$          | dB   |

## 9.2.4 Transmitted carrier power

The measurement period shall be 100 ms.

### 9.2.4.1 Accuracy requirement

Table 9.42

| Parameter        | Unit | Accuracy [% units] | Conditions   |
|------------------|------|--------------------|--|
|                  |      |                    | Range  |
| P <sub>tot</sub> | %    | ± 5                | For $5\% \leq$ Transmitted carrier power $\leq 95\%$ |

### 9.2.4.2 Transmitted carrier power measurement report mapping

The reporting range for *Transmitted carrier power* is from 0 ... 100 %.

In table 9.43 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

Table 9.43

| Reported value     | Measured quantity value                          | Unit |
|--------------------|--|------|
| UTRAN_TX_POWER_000 | Transmitted carrier power = 0                    | %    |
| UTRAN_TX_POWER_001 | $0 < \text{Transmitted carrier power} \leq 1$    | %    |
| UTRAN_TX_POWER_002 | $1 < \text{Transmitted carrier power} \leq 2$    | %    |
| UTRAN_TX_POWER_003 | $2 < \text{Transmitted carrier power} \leq 3$    | %    |
| ...                | ...  | ...  |
| UTRAN_TX_POWER_098 | $97 < \text{Transmitted carrier power} \leq 98$  | %    |
| UTRAN_TX_POWER_099 | $98 < \text{Transmitted carrier power} \leq 99$  | %    |
| UTRAN_TX_POWER_100 | $99 < \text{Transmitted carrier power} \leq 100$ | %    |

## 9.2.5 Transmitted code power

The measurement period shall be 100 ms.

### 9.2.5.1 Absolute accuracy requirement

Table 9.44

| Parameter         | Unit | Accuracy [dB] | Conditions          |
|-------------------|------|---------------|---------------------|
|                   |      |               | Range               |
| P <sub>code</sub> | dBm  | ± 3           | Over the full range |

### 9.2.5.2 Relative accuracy requirement

The relative accuracy of Transmitted code power is defined as the Transmitted code power measured at one dedicated radio link compared to the Transmitted code power measured from a different dedicated radio link in the same cell.

**Table 9.45**

| Parameter | Unit | Accuracy [dB] | Conditions          |
|-----------|------|---------------|---------------------|
|           |      |               | Range               |
| Pcode     | dBm  | $\pm 2$       | Over the full range |

### 9.2.5.3 Transmitted code power measurement report mapping

The reporting range for *Transmitted code power* is from -10 ... 46 dBm.

In table 9.46 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

**Table 9.46**

| Reported value       | Measured quantity value                           | Unit |
|----------------------|---|------|
| UTRAN_CODE_POWER_010 | $-10.0 \leq \text{Transmitted code power} < -9.5$ | dBm  |
| UTRAN_CODE_POWER_011 | $-9.5 \leq \text{Transmitted code power} < -9.0$  | dBm  |
| UTRAN_CODE_POWER_012 | $-9.0 \leq \text{Transmitted code power} < -8.5$  | dBm  |
| ...                  | ...   | ...  |
| UTRAN_CODE_POWER_120 | $45.0 \leq \text{Transmitted code power} < 45.5$  | dBm  |
| UTRAN_CODE_POWER_121 | $45.5 \leq \text{Transmitted code power} < 46.0$  | dBm  |
| UTRAN_CODE_POWER_122 | $46.0 \leq \text{Transmitted code power} < 46.5$  | dBm  |

## 9.2.6 Void

### 9.2.7 Physical channel BER

The measurement period shall be equal to the TTI of the transport channel, to which the Physical channel BER is associated via the IE QE-Selector, see TS 25.433. Each reported Physical channel BER measurement shall be an estimate of the BER averaged over one measurement period only.

#### 9.2.7.1 Accuracy requirement

The average of consecutive Physical channel BER measurements is required to fulfil the accuracy stated in table 9.47 if the total number of erroneous bits during these measurements is at least 500 and the absolute BER value for each of the measurements is within the range given in table 9.47.

**Table 9.47**

| Parameter | Unit | Accuracy [% of absolute BER value] | Conditions                         |
|-----------|------|------------------------------------|------------------------------------|
|           |      |                                    | Range                              |
| PhyBER    | -    | $\pm 10$                           | for absolute BER value $\leq 30\%$ |

#### 9.2.7.2 Physical channel BER measurement report mapping

The *Physical channel BER* reporting range is from 0 to 1.

In table 9.48 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

Table 9.48

| Reported value   | Measured quantity value  | Unit |
|------------------|--|------|
| PhCh_BER_LOG_000 | Physical channel BER = 0   | -    |
| PhCh_BER_LOG_001 | $-\infty < \text{Log}_{10}(\text{Physical channel BER}) < -2.06375$      | -    |
| PhCh_BER_LOG_002 | $-2.06375 \leq \text{Log}_{10}(\text{Physical channel BER}) < -2.055625$ | -    |
| PhCh_BER_LOG_003 | $-2.055625 \leq \text{Log}_{10}(\text{Physical channel BER}) < -2.0475$  | -    |
| ...              | ...  | ...  |
| PhCh_BER_LOG_253 | $-0.024375 \leq \text{Log}_{10}(\text{Physical channel BER}) < -0.01625$ | -    |
| PhCh_BER_LOG_254 | $-0.01625 \leq \text{Log}_{10}(\text{Physical channel BER}) < -0.008125$ | -    |
| PhCh_BER_LOG_255 | $-0.008125 \leq \text{Log}_{10}(\text{Physical channel BER}) \leq 0$     | -    |

## 9.2.8 Round trip time

The measurement period shall be 100 ms.

### 9.2.8.1 Absolute accuracy requirement

Table 9.49

| Parameter | Unit | Accuracy [chip] | Conditions        |
|-----------|------|-----------------|-------------------|
|           |      |                 | Range [chips]     |
| RTT       | chip | +/- 0.5         | 876, ..., 2923.50 |

### 9.2.8.2 Round trip time measurement report mapping

The *Round trip time* reporting range is from 876.0000 ... 2923.8750 chip.

In table 9.50 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

Table 9.50

| Reported value | Measured quantity value                             | Unit |
|----------------|---|------|
| RT_TIME_0000   | Round trip time < 876.0000                          | chip |
| RT_TIME_0001   | $876.0000 \leq \text{Round trip time} < 876.0625$   | chip |
| RT_TIME_0002   | $876.0625 \leq \text{Round trip time} < 876.1250$   | chip |
| RT_TIME_0003   | $876.1250 \leq \text{Round trip time} < 876.1875$   | chip |
| ...            | ...   | ...  |
| RT_TIME_32764  | $2922.6875 \leq \text{Round trip time} < 2923.7500$ | chip |
| RT_TIME_32765  | $2923.7500 \leq \text{Round trip time} < 2923.8125$ | chip |
| RT_TIME_32766  | $2923.8125 \leq \text{Round trip time} < 2923.8750$ | chip |
| RT_TIME_32767  | $2923.8750 \leq \text{Round trip time}$             | chip |

## 9.2.9 Transport Channel BER

The measurement period shall be equal to the TTI of the transport channel. Each reported Transport channel BER measurement shall be an estimate of the BER averaged over one measurement period only.

### 9.2.9.1 Accuracy requirement

The average of consecutive Transport channel BER measurements is required to fulfil the accuracy stated in table 9.51 if the total number of erroneous bits during these measurements is at least 500 and the absolute BER value for each of the measurements is within the range given in table 9.51.

Table 9.51

| Parameter | Unit | Accuracy [% of the absolute BER value] | Conditions   |
|-----------|------|--|--|
|           |      |  | Range  |
| TrpBER    | -    | +/- 10                                 | Convolutional coding 1/3 <sup>rd</sup> with any amount of repetition or a maximum of 25% puncturing:<br>for absolute BER value $\leq$ 15%<br>Convolutional coding 1/2 with any amount of repetition or no puncturing:<br>for absolute BER value $\leq$ 15%<br>Turbo coding 1/3 <sup>rd</sup> with any amount of repetition or a maximum of 20% puncturing:<br>for absolute BER value $\leq$ 15%. |

### 9.2.9.2 Transport channel BER measurement report mapping

The *Transport channel BER* reporting range is from 0 to 1.

In table 9.52 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

Table 9.52

| Reported value   | Measured quantity value   | Unit |
|------------------|---|------|
| TrCh_BER_LOG_000 | Transport channel BER = 0   | -    |
| TrCh_BER_LOG_001 | $-\infty < \text{Log}_{10}(\text{Transport channel BER}) < -2.06375$      | -    |
| TrCh_BER_LOG_002 | $-2.06375 \leq \text{Log}_{10}(\text{Transport channel BER}) < -2.055625$ | -    |
| TrCh_BER_LOG_003 | $-2.055625 \leq \text{Log}_{10}(\text{Transport channel BER}) < -2.0475$  | -    |
| ...              | ...   | ...  |
| TrCh_BER_LOG_253 | $-0.024375 \leq \text{Log}_{10}(\text{Transport channel BER}) < -0.01625$ | -    |
| TrCh_BER_LOG_254 | $-0.01625 \leq \text{Log}_{10}(\text{Transport channel BER}) < -0.008125$ | -    |
| TrCh_BER_LOG_255 | $-0.008125 \leq \text{Log}_{10}(\text{Transport channel BER}) \leq 0$     | -    |

### 9.2.10 UTRAN GPS Timing of Cell Frames for UE positioning

Table 9.53

| Parameter  | Unit | Accuracy [chip] | Conditions |
|--|------|-----------------|------------|
| UTRAN GPS Timing of Cell Frames for UE positioning | chip | [ ]             |            |

#### 9.2.10.1 UTRAN GPS timing of Cell Frames for UE positioning measurement report mapping

The reporting range is for UTRAN GPS timing of Cell Frames for UE positioning is from 0 ... 2322432000000 chip.

In table 9.54 the mapping of measured quantity is defined.

Table 9.54

| Reported value          | Measured quantity value   | Unit |
|-------------------------|---|------|
| GPS_TIME_00000000000000 | UTRAN GPS timing of Cell Frames for UE positioning < 0.0625   | chip |
| GPS_TIME_00000000000001 | $0.0625 \leq$ UTRAN GPS timing of Cell Frames for UE positioning < 0.1250                           | chip |
| GPS_TIME_00000000000002 | $0.1250 \leq$ UTRAN GPS timing of Cell Frames for UE positioning < 0.1875                           | chip |
| ...                     | ...   | ...  |
| GPS_TIME_37158911999997 | $2322431999999.8125 \leq$ UTRAN GPS timing of Cell Frames for UE positioning < $2322431999999.8750$ | chip |
| GPS_TIME_37158911999998 | $2322431999999.8750 \leq$ UTRAN GPS timing of Cell Frames for UE positioning < $2322431999999.9375$ | chip |
| GPS_TIME_37158911999999 | $2322431999999.9375 \leq$ UTRAN GPS timing of Cell Frames for UE positioning < $2322432000000.0000$ | chip |

## 9.2.11 PRACH/PCPCH Propagation delay

### 9.2.11.1 Accuracy requirement

Table 9.55

| Parameter | Unit | Accuracy [chip] | Conditions |
|-----------|------|-----------------|------------|
|           |      |                 | Range      |
| PropDelay | chip | +/- []          |            |

### 9.2.11.2 PRACH/PCPCH Propagation delay measurement report mapping

The *PRACH/PCPCH Propagation delay* reporting range is from 0 ... 765 chip.

In table 9.56 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

Table 9.56

| Reported value | Measured quantity value                        | Unit |
|----------------|--|------|
| PROP_DELAY_000 | $0 \leq$ PRACH/PCPCH Propagation delay < 3     | chip |
| PROP_DELAY_001 | $3 \leq$ PRACH/PCPCH Propagation delay < 6     | chip |
| PROP_DELAY_002 | $6 \leq$ PRACH/PCPCH Propagation delay < 9     | chip |
| ...            | ...  | ...  |
| PROP_DELAY_252 | $756 \leq$ PRACH/PCPCH Propagation delay < 759 | chip |
| PROP_DELAY_253 | $759 \leq$ PRACH/PCPCH Propagation delay < 762 | chip |
| PROP_DELAY_254 | $762 \leq$ PRACH/PCPCH Propagation delay < 765 | chip |
| PROP_DELAY_255 | $765 \leq$ PRACH/PCPCH Propagation delay       | chip |

## 9.2.12 Acknowledged PRACH preambles

The measurement period shall be 20 ms.

### 9.2.12.1 Acknowledged PRACH preambles measurement report mapping

The *Acknowledged PRACH preambles* reporting range is from 0 ... 240 acknowledgements.

In table 9.57 the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.



Table 9.57

| Reported value         | Measured quantity value            | Unit |
|------------------------|------------------------------------|------|
| ACK_PRACH_PREAMBLE_000 | Acknowledged PRACH preambles = 0   | -    |
| ACK_PRACH_PREAMBLE_001 | Acknowledged PRACH preambles = 1   | -    |
| ACK_PRACH_PREAMBLE_002 | Acknowledged PRACH preambles = 2   | -    |
| ...                    | ...                                | ...  |
| ACK_PRACH_PREAMBLE_237 | Acknowledged PRACH preambles = 237 | -    |
| ACK_PRACH_PREAMBLE_238 | Acknowledged PRACH preambles = 238 | -    |
| ACK_PRACH_PREAMBLE_239 | Acknowledged PRACH preambles = 239 | -    |
| ACK_PRACH_PREAMBLE_240 | Acknowledged PRACH preambles = 240 | -    |

## 9.2.13 Detected PCPCH access preambles

The measurement period shall be 20 ms.

### 9.2.13.1 Detected PCPCH access preambles measurement report mapping

The *Detected PCPCH access preambles* reporting range is 0 ... 240.

In Table 9.58, the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

Table 9.58

| Reported value      | Measured quantity value               | Unit |
|---------------------|---------------------------------------|------|
| DETECT_PCPCH_AP_000 | Detected PCPCH access preambles = 0   | -    |
| DETECT_PCPCH_AP_001 | Detected PCPCH access preambles = 1   | -    |
| DETECT_PCPCH_AP_002 | Detected PCPCH access preambles = 2   | -    |
| ...                 | ...                                   | ...  |
| DETECT_PCPCH_AP_237 | Detected PCPCH access preambles = 237 | -    |
| DETECT_PCPCH_AP_238 | Detected PCPCH access preambles = 238 | -    |
| DETECT_PCPCH_AP_239 | Detected PCPCH access preambles = 239 | -    |
| DETECT_PCPCH_AP_240 | Detected PCPCH access preambles = 240 | -    |

## 9.2.14 Acknowledged PCPCH access preambles

The measurement period shall be 20 ms.

### 9.2.14.1 Acknowledged PCPCH access preambles measurement report mapping

The *Acknowledged PCPCH access preambles* reporting range is 0 ... 15.

In Table 9.59, the mapping of measured quantity is defined. The range in the signalling may be larger than the guaranteed accuracy range.

Table 9.59

| Reported value  | Measured quantity value                  | Unit |
|-----------------|--|------|
| ACK_PCPCH_AP_00 | Acknowledged PCPCH access preambles = 0  | -    |
| ACK_PCPCH_AP_01 | Acknowledged PCPCH access preambles = 1  | -    |
| ACK_PCPCH_AP_02 | Acknowledged PCPCH access preambles = 2  | -    |
| ...             | ...                                      | ...  |
| ACK_PCPCH_AP_12 | Acknowledged PCPCH access preambles = 12 | -    |
| ACK_PCPCH_AP_13 | Acknowledged PCPCH access preambles = 13 | -    |
| ACK_PCPCH_AP_14 | Acknowledged PCPCH access preambles = 14 | -    |
| ACK_PCPCH_AP_15 | Acknowledged PCPCH access preambles = 15 | -    |

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## Annex A (normative): Test Cases

### A.1 Purpose of Annex

This Annex specifies test specific parameters for some of the functional requirements in chapters 4 to 9. The tests provide additional information to how the requirements should be interpreted for the purpose of conformance testing. The tests in this Annex are described such that one functional requirement may be tested in one or several test and one test may verify several requirements. Some requirements may lack a test.

The conformance tests are specified in TS34.121.

For this release all test cases can now be found in the equivalent release of TS 34.121.

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### A.2 Void

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### A.3 Void

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### A.4 Void

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### A.5 Void

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### A.6 Void

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### A.7 Void

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### A.8 Void

## A.9 Void

## Annex B (informative): Change History

Initial version at TSG-RAN#6 (December 1999): 3.0.0

**Table B.1: CRs approved by TSG-RAN#7.**

| RAN Doc   | Spec   | CR  | R | Ph  | Subject  | Cat | Curr  | New   |
|-----------|--------|-----|---|-----|--|-----|-------|-------|
| RP-000021 | 25.133 | 001 |   | R99 | Modification of RL Failure Requirement                       | F   | 3.0.0 | 3.1.0 |
| RP-000021 | 25.133 | 002 |   | R99 | Idle Mode Tasks  | C   | 3.0.0 | 3.1.0 |
| RP-000021 | 25.133 | 003 |   | R99 | Revised UE handover requirements                             | F   | 3.0.0 | 3.1.0 |
| RP-000021 | 25.133 | 004 |   | R99 | Editorial corrections  | D   | 3.0.0 | 3.1.0 |
| RP-000021 | 25.133 | 005 |   | R99 | UE measurement requirement update                            | F   | 3.0.0 | 3.1.0 |
| RP-000021 | 25.133 | 006 |   | R99 | TDD Measurements Performance Requirements for TS25.133 (FDD) | B   | 3.0.0 | 3.1.0 |
| RP-000021 | 25.133 | 007 |   | R99 | UTRAN measurement requirement update                         | F   | 3.0.0 | 3.1.0 |
| RP-000021 | 25.133 | 008 |   | R99 | Requirements on parallel measurements                        | F   | 3.0.0 | 3.1.0 |
| RP-000021 | 25.133 | 009 |   | R99 | Inclusion on transport channel BER.                          | F   | 3.0.0 | 3.1.0 |

Note: On implementation of CR 25.133-003: On page 16 there is a dotted line above title 5.1.2.1.4 ACTIVE SET DIMENSION. The text following is a duplication of version 3.0.0 to the point of sub-clause 5.1.2.2.1.3. HARD HANDOVER DELAY. Therefore all text from page 16 starting from 5.1.2.1.4 ACTIVE SET DIMENSION is moved to sub-clause 5.1.2.2.1.3 HARD HANDOVER DELAY on page 19.

**Table B.2: CRs approved by TSG-RAN#8.**

| RAN Doc   | Spec   | CR  | R | Ph  | Subject  | Cat | Curr  | New   |
|-----------|--------|-----|---|-----|--|-----|-------|-------|
| RP-000210 | 25.133 | 010 |   | R99 | Measurement period for UTRAN SIR   | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 011 |   | R99 | Measurement period for UE BLER   | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 013 |   | R99 | Measurement delay reporting  | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 015 |   | R99 | Correction - Propagation conditions  | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 016 |   | R99 | Remove requirements on SSDT from 5.1.1.8.                                  | D   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 017 |   | R99 | Update of test parameters to P-CCPCH Measurements performance requirements | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 018 |   | R99 | Repetition Period of System Information                                    | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 019 |   | R99 | Alignment of Cell Selection/reselection test scenario parameters           | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 020 |   | R99 | Editorial corrections for TS25.133   | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 021 |   | R99 | Removal of Annex A   | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 022 |   | R99 | Requirement for UE Tx Power Measurement                                    | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 023 |   | R99 | Insertion of Range/Mapping from TS 25.215 revised                          | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 024 |   | R99 | Signalling response delay  | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 025 |   | R99 | Missing measurement periods  | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 026 |   | R99 | RRC Connection mobility in CELL_FACH, CELL_PCH and URA_PCH                 | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 027 |   | R99 | Switching delay requirement for inter-system handover                      | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 028 |   | R99 | UE Chip time measurements  | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 029 |   | R99 | UE Transmit Timing Adjustment  | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 030 |   | R99 | Add GPS timing measurements to TS 25.133                                   | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 031 |   | R99 | Test scenario for UTRAN to GSM cell re-selection                           | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 032 |   | R99 | Proposed test case for random access procedure (FDD)                       | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 033 |   | R99 | Inclusion of measurement granularities and ranges                          | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 034 |   | R99 | Parallel measurement requirements  | F   | 3.1.0 | 3.2.0 |
| RP-000210 | 25.133 | 035 |   | R99 | UE Hard handover switching time  | F   | 3.1.0 | 3.2.0 |

Table B.3: CRs approved by TSG-RAN#9

| RAN Doc   | Spec   | CR  | R | Ph  | Subject  | Cat | Curr  | New   |
|-----------|--------|-----|---|-----|--|-----|-------|-------|
| RP-000400 | 25.133 | 036 |   | R99 | Corrections to definitions, symbols and abbreviations  | F   | 3.2.0 | 3.3.0 |
| RP-000400 | 25.133 | 037 |   | R99 | Handling of measurement uncertainties in Base station conformance testing (FDD) for RRM measurements | F   | 3.2.0 | 3.3.0 |
| RP-000400 | 25.133 | 038 |   | R99 | Proposal for section 4   | F   | 3.2.0 | 3.3.0 |
| RP-000400 | 25.133 | 039 |   | R99 | Proposal for section 5   | F   | 3.2.0 | 3.3.0 |
| RP-000400 | 25.133 | 040 |   | R99 | Proposal for section 8   | F   | 3.2.0 | 3.3.0 |
| RP-000400 | 25.133 | 041 |   | R99 | Proposal for section 9   | F   | 3.2.0 | 3.3.0 |
| RP-000497 | 25.133 | 042 | 1 | R99 | Revision of requirement and range of measurement for CPCH  | F   | 3.2.0 | 3.3.0 |
| RP-000497 | 25.133 | 043 | 1 | R99 | Inclusion of UTRAN measurements in 25.133  | F   | 3.2.0 | 3.3.0 |
| RP-000400 | 25.133 | 044 |   | R99 | Proposal for section 7 and A.7   | F   | 3.2.0 | 3.3.0 |
| RP-000400 | 25.133 | 045 |   | R99 | Text proposal for section A.1, A.2 and A.3   | F   | 3.2.0 | 3.3.0 |
| RP-000400 | 25.133 | 046 |   | R99 | Proposal for section 6   | F   | 3.2.0 | 3.3.0 |

Table B.4: CRs approved by TSG RAN#10

| RAN Doc   | Spec   | CR | R | Ph  | Subject   | Cat | Curr  | New   |
|-----------|--------|----|---|-----|---|-----|-------|-------|
| RP-000591 | 25.133 | 47 |   | R99 | Received total wideband power   | F   | 3.3.0 | 3.4.0 |
| RP-000591 | 25.133 | 48 |   | R99 | Removal of cell selection delay requirements                                  | F   | 3.3.0 | 3.4.0 |
| RP-000591 | 25.133 | 49 |   | R99 | Clarification of the random access requirements                               | F   | 3.3.0 | 3.4.0 |
| RP-000591 | 25.133 | 50 |   | R99 | Correction of RRC re-establishment requirements                               | F   | 3.3.0 | 3.4.0 |
| RP-000591 | 25.133 | 51 |   | R99 | Event triggered reporting in AWGN conditions                                  | F   | 3.3.0 | 3.4.0 |
| RP-000591 | 25.133 | 52 |   | R99 | Inter frequency measurements in AWGN  | F   | 3.3.0 | 3.4.0 |
| RP-000591 | 25.133 | 53 | 1 | R99 | Physical channel BER accuracy   | F   | 3.3.0 | 3.4.0 |
| RP-000591 | 25.133 | 54 | 1 | R99 | Event triggered reporting in fading conditions                                | F   | 3.3.0 | 3.4.0 |
| RP-000591 | 25.133 | 55 |   | R99 | Periodic reporting in AWGN  | F   | 3.3.0 | 3.4.0 |
| RP-000591 | 25.133 | 56 |   | R99 | Introduction of UE Rx-Tx time difference type 1 & 2                           | F   | 3.3.0 | 3.4.0 |
| RP-000591 | 25.133 | 57 |   | R99 | Correction of UE Tx timing adjustment   | F   | 3.3.0 | 3.4.0 |
| RP-000591 | 25.133 | 58 |   | R99 | Alignment of intra frequency CPICH Ec/Io measurement requirements in TS25.133 | F   | 3.3.0 | 3.4.0 |
| RP-000591 | 25.133 | 59 |   | R99 | Multiple neighbour test cases   | F   | 3.3.0 | 3.4.0 |
| RP-000591 | 25.133 | 60 |   | R99 | Correction of intra- and inter frequency measurement requirement.             | F   | 3.3.0 | 3.4.0 |
| RP-000591 | 25.133 | 61 |   | R99 | Correction of TDD measurement requirements.                                   | F   | 3.3.0 | 3.4.0 |
| RP-000591 | 25.133 | 62 |   | R99 | General cell re-selection requirements  | F   | 3.3.0 | 3.4.0 |
| RP-000591 | 25.133 | 63 |   | R99 | BSIC verification requirements in TS25.133                                    | F   | 3.3.0 | 3.4.0 |
| RP-000591 | 25.133 | 64 |   | R99 | GSM RSSI measurement  | F   | 3.3.0 | 3.4.0 |
| RP-000591 | 25.133 | 65 |   | R99 | Clarification of parallel measurement section                                 | F   | 3.3.0 | 3.4.0 |

Table B.5: CRs approved by TSG RAN#11

| RAN Doc   | Spec   | CR | R | Ph  | Subject   | Cat | Curr  | New   |
|-----------|--------|----|---|-----|---|-----|-------|-------|
| RP-010091 | 25.133 | 66 |   | R99 | General idle mode requirements  | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 67 |   | R99 | Removal of Signalling Delay Requirements  | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 68 |   | R99 | FDD/GSM handover  | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 69 |   | R99 | Revised Correction of hard handover delay requirements  | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 70 |   | R99 | Cell-Reselection, Measurements of inter-frequency TDD cells                                     | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 71 |   | R99 | Correction of number of events that should be handled by the UE                                 | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 72 |   | R99 | Revised limitations to the usage of compressed mode patterns                                    | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 73 |   | R99 | Measurements on FDD and TDD in Cell-FACH state  | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 74 |   | R99 | Measurements on GSM in Cell-FACH state  | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 75 |   | R99 | Cell re-selection in Cell-FACH state  | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 76 |   | R99 | General Measurement Requirements in CELL_DCH State  | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 77 |   | R99 | GSM Measurements  | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 78 |   | R99 | Cell reselection performance  | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 79 |   | R99 | CPICH Ec/lo mapping   | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 80 |   | R99 | UTRAN transport channel BLER measurement  | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 81 |   | R99 | UTRAN physical channel BER measurement  | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 82 |   | R99 | Test case for FDD/TDD cell re-selection .   | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 83 |   | R99 | Requirements for event triggered reporting in fading conditions                                 | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 84 |   | R99 | Modification of soft handover requirements  | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 85 |   | R99 | Clarifications of TDD measurements and the use of compressed mode pattern for TDD measurements. | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 86 |   | R99 | UE transmit Timing  | F   | 3.4.0 | 3.5.0 |
| RP-010091 | 25.133 | 87 |   | R99 | Correction of the FDD/TDD handover requirement in connected mode.                               | F   | 3.4.0 | 3.5.0 |

Table B.6: Release 99 CRs approved by TSG RAN#12

| RAN Doc   | Spec   | CR  | R | Ph  | Title  | Cat | Curr  | New   |
|-----------|--------|-----|---|-----|--|-----|-------|-------|
| RP-010353 | 25.133 | 89  |   | R99 | Correction of FDD/TDD handover requirement.                            | F   | 3.5.0 | 3.6.0 |
| RP-010353 | 25.133 | 91  |   | R99 | Extraction of TGSN_proposed  | F   | 3.5.0 | 3.6.0 |
| RP-010353 | 25.133 | 93  |   | R99 | Corrections to cell re-selection requirements                          | F   | 3.5.0 | 3.6.0 |
| RP-010353 | 25.133 | 95  |   | R99 | UTRAN to GSM cell reselection delay in CELL_FACH state                 | F   | 3.5.0 | 3.6.0 |
| RP-010353 | 25.133 | 97  |   | R99 | Corrections for idle mode section                                      | F   | 3.5.0 | 3.6.0 |
| RP-010353 | 25.133 | 99  |   | R99 | Cell-reselection test cases in CELL_PCH and URA_PCH                    | F   | 3.5.0 | 3.6.0 |
| RP-010353 | 25.133 | 101 |   | R99 | Idle mode cell-reselection test cases                                  | F   | 3.5.0 | 3.6.0 |
| RP-010353 | 25.133 | 103 |   | R99 | Measurements in CELL_FACH State  | F   | 3.5.0 | 3.6.0 |
| RP-010353 | 25.133 | 105 |   | R99 | Cell-reselection test cases in CELL_FACH                               | F   | 3.5.0 | 3.6.0 |
| RP-010353 | 25.133 | 107 |   | R99 | GSM measurements in CELL_DCH state                                     | F   | 3.5.0 | 3.6.0 |
| RP-010354 | 25.133 | 111 |   | R99 | Corrections for multiple neighbour test cases                          | F   | 3.5.0 | 3.6.0 |
| RP-010354 | 25.133 | 113 |   | R99 | Corrections for Section 5  | F   | 3.5.0 | 3.6.0 |
| RP-010354 | 25.133 | 115 |   | R99 | RRC Connection re-establishment  | F   | 3.5.0 | 3.6.0 |
| RP-010354 | 25.133 | 117 |   | R99 | Corrections for Section 9  | F   | 3.5.0 | 3.6.0 |
| RP-010354 | 25.133 | 119 |   | R99 | Correction for a CPICH_Ec/lo definition                                | F   | 3.5.0 | 3.6.0 |
| RP-010354 | 25.133 | 121 |   | R99 | Detection and measurements of new cells not belonging to monitored set | F   | 3.5.0 | 3.6.0 |
| RP-010495 | 25.133 | 124 | 2 | R99 | Requirements for TFC selection at the maximum power                    | F   | 3.5.0 | 3.6.0 |

Table B.7: Release 99 CRs approved by TSG RAN#13

| RAN Doc   | Spec   | CR  | R | Ph    | Title  | Cat | Curr  | New   |
|-----------|--------|-----|---|-------|--|-----|-------|-------|
| RP-010619 | 25.133 | 126 |   | Rel99 | Clarifications on TDD measurements and related accuracy requirements | F   | 3.6.0 | 3.7.0 |
| RP-010619 | 25.133 | 128 |   | Rel99 | Handover delay correction  | F   | 3.6.0 | 3.7.0 |
| RP-010619 | 25.133 | 130 |   | Rel99 | Corrections to intra-frequency test case A.8.1.1                     | F   | 3.6.0 | 3.7.0 |
| RP-010619 | 25.133 | 132 |   | Rel99 | Cell Re-selection - requirement for Camped on Any Cell state         | F   | 3.6.0 | 3.7.0 |
| RP-010619 | 25.133 | 134 |   | Rel99 | FDD/FDD Hard Handover Testcase                                       | F   | 3.6.0 | 3.7.0 |
| RP-010619 | 25.133 | 136 |   | Rel99 | Success rates in test cases  | F   | 3.6.0 | 3.7.0 |
| RP-010619 | 25.133 | 138 |   | Rel99 | FDD/GSM Handover test case   | F   | 3.6.0 | 3.7.0 |
| RP-010619 | 25.133 | 142 |   | Rel99 | TFC selection in the UE  | F   | 3.6.0 | 3.7.0 |
| RP-010619 | 25.133 | 144 |   | Rel99 | Periodic and event triggered reporting of GSM cells in CELL_DCH      | F   | 3.6.0 | 3.7.0 |
| RP-010620 | 25.133 | 146 |   | Rel99 | Test conditions for GSM Carrier RSSI                                 | F   | 3.6.0 | 3.7.0 |
| RP-010620 | 25.133 | 148 |   | Rel99 | Transport Channel BER accuracy requirement                           | F   | 3.6.0 | 3.7.0 |
| RP-010620 | 25.133 | 150 |   | Rel99 | Clarification to Requirement classification for statistical testing  | F   | 3.6.0 | 3.7.0 |
| RP-010620 | 25.133 | 152 |   | Rel99 | Correction to FDD/TDD cell re-selection test case                    | F   | 3.6.0 | 3.7.0 |
| RP-010620 | 25.133 | 154 |   | Rel99 | Editorial corrections to UTRAN measurements in section 9.2           | F   | 3.6.0 | 3.7.0 |
| RP-010620 | 25.133 | 156 |   | Rel99 | RACH reporting   | F   | 3.6.0 | 3.7.0 |
| RP-010620 | 25.133 | 158 |   | Rel99 | Correction for Test Case A.8.1.3                                     | F   | 3.6.0 | 3.7.0 |
| RP-010620 | 25.133 | 160 |   | Rel99 | UTRAN to GSM cell re-selection test cases                            | F   | 3.6.0 | 3.7.0 |
| RP-010620 | 25.133 | 162 |   | Rel99 | Requirement for the monitor list                                     | F   | 3.6.0 | 3.7.0 |
| RP-010620 | 25.133 | 164 |   | Rel99 | Correction for event triggered report                                | F   | 3.6.0 | 3.7.0 |
| RP-010621 | 25.133 | 166 |   | Rel99 | Cell Re-selection in CELL_FACH test case                             | F   | 3.6.0 | 3.7.0 |
| RP-010621 | 25.133 | 168 |   | Rel99 | Correction for RRC re-establishment delay                            | F   | 3.6.0 | 3.7.0 |
| RP-010621 | 25.133 | 170 |   | Rel99 | Correction for section 5   | F   | 3.6.0 | 3.7.0 |
| RP-010621 | 25.133 | 172 |   | Rel99 | Section 4  | F   | 3.6.0 | 3.7.0 |
| RP-010621 | 25.133 | 174 |   | Rel99 | Section 8  | F   | 3.6.0 | 3.7.0 |
| RP-010621 | 25.133 | 176 |   | Rel99 | Cell reselection test cases in CELL_FACH state                       | F   | 3.6.0 | 3.7.0 |
| RP-010621 | 25.133 | 178 |   | Rel99 | Correction for FDD to TDD HO requirement                             | F   | 3.6.0 | 3.7.0 |
| RP-010621 | 25.133 | 180 |   | Rel99 | Correction of UE positioning measurements                            | F   | 3.6.0 | 3.7.0 |
| RP-010621 | 25.133 | 185 |   | Rel99 | TFC state change description   | F   | 3.6.0 | 3.7.0 |

Table B.8: Release 99 CRs approved by TSG RAN#14

| RAN Doc   | Spec   | CR  | R | Ph    | Title  | Cat | Curr  | New   |
|-----------|--------|-----|---|-------|--|-----|-------|-------|
| RP-010782 | 25.133 | 187 |   | Rel99 | S-criteria evaluation in CELL_FACH state   | F   | 3.7.0 | 3.8.0 |
| RP-010782 | 25.133 | 190 |   | Rel99 | Correction of random access requirements and test case                                 | F   | 3.7.0 | 3.8.0 |
| RP-010782 | 25.133 | 193 |   | Rel99 | Correction of RRC connection re-establishment test case                                | F   | 3.7.0 | 3.8.0 |
| RP-010782 | 25.133 | 196 |   | Rel99 | Correction of reference for UTRAN SIRerror measurement                                 | F   | 3.7.0 | 3.8.0 |
| RP-010782 | 25.133 | 199 |   | Rel99 | FDD/FDD hard handover test cases   | F   | 3.7.0 | 3.8.0 |
| RP-010782 | 25.133 | 202 |   | Rel99 | UTRAN GSM reselection  | F   | 3.7.0 | 3.8.0 |
| RP-010791 | 25.133 | 205 |   | Rel99 | Test conditions for UE Tx power measurement  | F   | 3.7.0 | 3.8.0 |
| RP-010791 | 25.133 | 208 |   | Rel99 | Correction to general requirements for support of compressed mode                      | F   | 3.7.0 | 3.8.0 |
| RP-010791 | 25.133 | 211 |   | Rel99 | UE Tx Timing rate  | F   | 3.7.0 | 3.8.0 |
| RP-010791 | 25.133 | 214 |   | Rel99 | Requirements and test parameters for UE measurements                                   | F   | 3.7.0 | 3.8.0 |
| RP-010791 | 25.133 | 217 |   | Rel99 | Clarifications on requirements for reporting criteria per measurement category         | F   | 3.7.0 | 3.8.0 |
| RP-010791 | 25.133 | 220 |   | Rel99 | "Inconsistent use of ""sets of cells"" with respect to definition of RRC specs."       | F   | 3.7.0 | 3.8.0 |
| RP-010792 | 25.133 | 223 |   | Rel99 | UE CPICH measurement capability for inter-frequency FDD.                               | F   | 3.7.0 | 3.8.0 |
| RP-010792 | 25.133 | 226 |   | Rel99 | Definition of identification of a cell and SFN decoding                                | F   | 3.7.0 | 3.8.0 |
| RP-010792 | 25.133 | 229 |   | Rel99 | CELL_FACH measurements for GSM   | F   | 3.7.0 | 3.8.0 |
| RP-010792 | 25.133 | 232 |   | Rel99 | CELL_DCH measurements for GSM  | F   | 3.7.0 | 3.8.0 |
| RP-010792 | 25.133 | 236 |   | Rel99 | Correction to the mapping of UE and UTRAN GPS Timing of Cell Frames for UE positioning | F   | 3.7.0 | 3.8.0 |
| RP-010913 | 25.133 | 241 |   | Rel99 | Correction to the mapping of UE Rx-Tx time difference type 2                           | F   | 3.7.0 | 3.8.0 |

Table B.9: Release 99 CRs approved by TSG RAN#15

| RAN Doc   | Spec   | CR  | R | Ph  | Title  | Cat | Curr  | New   |
|-----------|--------|-----|---|-----|--|-----|-------|-------|
| RP-020021 | 25.133 | 250 | 1 | R99 | FDD/FDD Soft Handover delay test case                      | F   | 3.8.0 | 3.9.0 |
| RP-020021 | 25.133 | 253 | 1 | R99 | Inter-frequency hard handover test case                    | F   | 3.8.0 | 3.9.0 |
| RP-020020 | 25.133 | 256 |   | R99 | Clarification of measurement period for UTRA Carrier RSSI  | F   | 3.8.0 | 3.9.0 |
| RP-020020 | 25.133 | 259 | 1 | R99 | Mapping of UE Rx-Tx time difference type 1                 | F   | 3.8.0 | 3.9.0 |
| RP-020021 | 25.133 | 262 | 1 | R99 | Inter-frequency measurements in CELL_FACH                  | F   | 3.8.0 | 3.9.0 |
| RP-020022 | 25.133 | 268 | 1 | R99 | Correction of Cell reselection in CELL_FACH                | F   | 3.8.0 | 3.9.0 |
| RP-020021 | 25.133 | 277 | 1 | R99 | Corrections to RRC connection re-establishment requirement | F   | 3.8.0 | 3.9.0 |
| RP-020021 | 25.133 | 280 | 1 | R99 | Corrections to RRC connection re-establishment test cases  | F   | 3.8.0 | 3.9.0 |
| RP-020021 | 25.133 | 283 | 1 | R99 | Correction of hard handover test cases                     | F   | 3.8.0 | 3.9.0 |
| RP-020020 | 25.133 | 291 | 1 | R99 | FDD inter frequency measurements and test cases            | F   | 3.8.0 | 3.9.0 |
| RP-020022 | 25.133 | 292 | 1 | R99 | UE Tx Timing in soft handover                              | F   | 3.8.0 | 3.9.0 |
| RP-020022 | 25.133 | 300 | 1 | R99 | SFN decoding for identification of a new cell              | F   | 3.8.0 | 3.9.0 |
| RP-020020 | 25.133 | 303 |   | R99 | UTRAN GSM Cell Reselection                                 | F   | 3.8.0 | 3.9.0 |
| RP-020022 | 25.133 | 307 | 1 | R99 | Correction of power spectral density                       | F   | 3.8.0 | 3.9.0 |
| RP-020020 | 25.133 | 312 | 1 | R99 | Inclusion of AMR 2 requirement (R99)                       | F   | 3.8.0 | 3.9.0 |
| RP-020020 | 25.133 | 315 |   | R99 | Requirement for Blind HO from UTRAN to GSM (R99)           | F   | 3.8.0 | 3.9.0 |
| RP-020022 | 25.133 | 325 |   | R99 | Corrections to section 9                                   | F   | 3.8.0 | 3.9.0 |
| RP-020022 | 25.133 | 328 |   | R99 | Correction of Cell Reselection in idle mode test case      | F   | 3.8.0 | 3.9.0 |

Table B.10: Release 99 CRs approved by TSG RAN#16

| RAN Tdoc  | Spec   | CR  | R | Ph  | Title   | Cat | Curr  | New    |
|-----------|--------|-----|---|-----|---|-----|-------|--------|
| RP-020284 | 25.133 | 340 | 1 | R99 | GSM measurement test cases  | F   | 3.9.0 | 3.10.0 |
| RP-020284 | 25.133 | 346 |   | R99 | Removal of test case "Correct reporting of neighbors in Fading propagation condition" | F   | 3.9.0 | 3.10.0 |
| RP-020284 | 25.133 | 358 | 1 | R99 | Corrections to FDD-GSM cell re-selection test case                                    | F   | 3.9.0 | 3.10.0 |
| RP-020284 | 25.133 | 361 |   | R99 | Corrections to UTRAN carrier RSSI measurement accuracy requirement                    | F   | 3.9.0 | 3.10.0 |
| RP-020284 | 25.133 | 364 | 1 | R99 | Corrections to cell re-selection test cases   | F   | 3.9.0 | 3.10.0 |
| RP-020285 | 25.133 | 367 | 1 | R99 | FDD-GSM cell reselection test correction - scenario 1                                 | F   | 3.9.0 | 3.10.0 |
| RP-020285 | 25.133 | 389 | 1 | R99 | TFC selection   | F   | 3.9.0 | 3.10.0 |
| RP-020285 | 25.133 | 392 | 1 | R99 | GSM re-selection  | F   | 3.9.0 | 3.10.0 |
| RP-020285 | 25.133 | 401 |   | R99 | Corrections to FDD-TDD requirements and test cases                                    | F   | 3.9.0 | 3.10.0 |
| RP-020285 | 25.133 | 422 | 1 | R99 | Definition of out of service  | F   | 3.9.0 | 3.10.0 |

Table B.11: Release 99 CRs approved by TSG RAN#17

| RAN Tdoc  | Spec   | CR  | R | Ph  | Title   | Cat | Curr   | New    |
|-----------|--------|-----|---|-----|---|-----|--------|--------|
| RP-020475 | 25.133 | 434 | 1 | R99 | Correction of Identification times in CELL_FACH state for BSIC identification | F   | 3.10.0 | 3.11.0 |
| RP-020475 | 25.133 | 446 | 1 | R99 | Accuracy requirement of UE Rx-Tx time difference type 2                       | F   | 3.10.0 | 3.11.0 |
| RP-020475 | 25.133 | 449 |   | R99 | Correction of CELL_FACH test case   | F   | 3.10.0 | 3.11.0 |
| RP-020475 | 25.133 | 458 | 1 | R99 | Correction of SCH side conditions and corrections of test cases               | F   | 3.10.0 | 3.11.0 |
| RP-020529 | 25.133 | 469 | 2 | R99 | Definition of valid range for Rx-Tx time difference                           | F   | 3.10.0 | 3.11.0 |

Table B.12: Release 99 CRs approved by TSG RAN#18

| RAN Tdoc  | Spec   | CR  | R | Ph  | Title   | Cat | Curr   | New    |
|-----------|--------|-----|---|-----|---|-----|--------|--------|
| RP-020780 | 25.133 | 437 | 1 | R99 | Correction of interruption time in FDD/FDD Hard Handover                        | F   | 3.11.0 | 3.12.0 |
| RP-020780 | 25.133 | 476 |   | R99 | Correction of UE Transmitted Power requirements in case of Compressed Mode gaps | F   | 3.11.0 | 3.12.0 |
| RP-020780 | 25.133 | 478 | 1 | R99 | Correction of Measurement Occasion Patterns for BSIC Reconfirmation             | F   | 3.11.0 | 3.12.0 |
| RP-020780 | 25.133 | 480 | 2 | R99 | Required Window size for measurements using IPDL                                | F   | 3.11.0 | 3.12.0 |
| RP-020780 | 25.133 | 482 | 1 | R99 | UE Timer accuracy   | F   | 3.11.0 | 3.12.0 |
| RP-020780 | 25.133 | 504 |   | R99 | Correction of UE parameters for Random Access Test                              | F   | 3.11.0 | 3.12.0 |



**Table B.13: Release 99 CRs approved by TSG RAN#19**

| RAN Tdoc  | Spec   | CR  | R | Ph  | Title   | Cat | Curr   | New    |
|-----------|--------|-----|---|-----|---|-----|--------|--------|
| RP-030027 | 25.133 | 510 |   | R99 | Correction of interruption time in FDD/TDD Hard Handover      | F   | 3.12.0 | 3.13.0 |
| RP-030027 | 25.133 | 514 |   | R99 | Applicability of Timer T-reselection for 2G cell reselection. | F   | 3.12.0 | 3.13.0 |
| RP-030027 | 25.133 | 528 |   | R99 | Correction of Hard HO test case                               | F   | 3.12.0 | 3.13.0 |
| RP-030027 | 25.133 | 544 |   | R99 | Constant Value in Random Access Test requirements             | F   | 3.12.0 | 3.13.0 |
| RP-030031 | 25.133 | 548 |   | R99 | Correction of UE parameters for Random Access test            | F   | 3.12.0 | 3.13.0 |

Note: Changes to tables 8.7 and 8.8 in CR392r1 (approved in TSG RAN#16) which were not fully implemented in v3.10.0 are included in v3.13.0

**Table B.14: Release 99 CRs approved by TSG RAN#20**

| RAN Tdoc  | Spec   | CR  | R | Ph  | Title  | Cat | Curr   | New    |
|-----------|--------|-----|---|-----|--|-----|--------|--------|
| RP-030209 | 25.133 | 564 | 2 | R99 | UE soft handover delay requirements  | F   | 3.13.0 | 3.14.0 |
| RP-030209 | 25.133 | 570 | 1 | R99 | Correction to CPICH Ec/lo in correct reporting of neighbours in AWGN propagation condition test case | F   | 3.13.0 | 3.14.0 |
| RP-030209 | 25.133 | 574 |   | R99 | SFN-SFN observed time difference type 1  | F   | 3.13.0 | 3.14.0 |
| RP-030209 | 25.133 | 577 |   | R99 | Correction to CPCH RSCP Test case A.9.1.1  | F   | 3.13.0 | 3.14.0 |
| RP-030210 | 25.133 | 585 |   | R99 | Correction to RRC Re-establishment delay test case in Section A.6.1                                  | F   | 3.13.0 | 3.14.0 |
| RP-030210 | 25.133 | 589 | 1 | R99 | TGPL limitations for inter-frequency measurements  | F   | 3.13.0 | 3.14.0 |
| RP-030210 | 25.133 | 599 |   | R99 | Correction to SFN-CFN observed time difference   | F   | 3.13.0 | 3.14.0 |

**Table B.15: Release 99 CRs approved by TSG RAN#21**

| RAN Tdoc  | Spec   | CR  | R | Ph  | Title  | Cat | Curr   | New    |
|-----------|--------|-----|---|-----|--|-----|--------|--------|
| RP-030540 | 25.133 | 613 |   | R99 | CELL_DCH to CELL_FACH/CELL_PCH/URA_PCH transition when suitable UTRA cell is not found | F   | 3.14.0 | 3.15.0 |

**Table B.16: Release 99 CRs approved by TSG RAN#22**

| RAN Tdoc  | Spec   | CR  | R | Ph  | Title   | Cat | Curr   | New    |
|-----------|--------|-----|---|-----|---|-----|--------|--------|
| RP-030592 | 25.133 | 619 | 1 | R99 | GSM test case on correct reporting of GSM neighbors | F   | 3.15.0 | 3.16.0 |
| RP-030592 | 25.133 | 632 |   | R99 | Correction to Random Access test case               | F   | 3.15.0 | 3.16.0 |
| RP-030592 | 25.133 | 637 | 1 | R99 | CPICH Ec/lo relative accuracy                       | F   | 3.15.0 | 3.16.0 |

**Table B.17: Release 99 CR approved by TSG RAN#23**

| RAN Tdoc  | Spec   | CR  | R | Ph  | Title                                 | Cat | Curr   | New    |
|-----------|--------|-----|---|-----|---------------------------------------|-----|--------|--------|
| RP-040034 | 25.133 | 651 | 1 | R99 | Inter system HO from UTRAN FDD to GSM | F   | 3.16.0 | 3.17.0 |

**Table B.18: Release 99 CRs approved by TSG RAN#24**

| RAN Tdoc  | Spec   | CR  | R | Ph  | Title  | Cat | Curr   | New    |
|-----------|--------|-----|---|-----|--|-----|--------|--------|
| RP-040226 | 25.133 | 655 | 3 | R99 | Change of test cases using event triggered reporting with event 1B | F   | 3.17.0 | 3.18.0 |
| RP-040226 | 25.133 | 673 |   | R99 | Correction of erroneous implementation of CR#211                   | F   | 3.17.0 | 3.18.0 |

**Table B.19: Release 99 CRs approved at TSG RAN#25**

| RAN Tdoc  | Spec   | CR  | R | Ph  | Title   | Cat | Curr   | New    |
|-----------|--------|-----|---|-----|---|-----|--------|--------|
| RP-040283 | 25.133 | 676 |   | R99 | Redrafting of alignment of the activation time definition between TS 25.133 and TS 25.331 | F   | 3.18.0 | 3.19.0 |
| RP-040283 | 25.133 | 682 |   | R99 | Removal of Cell_FACH requirements for GSM observed time difference measurement            | F   | 3.18.0 | 3.19.0 |
| RP-040283 | 25.133 | 690 |   | R99 | Change of test parameter for event triggered reporting with event 1B                      | F   | 3.18.0 | 3.19.0 |

**Table B.20: Release 99 CR approved at TSG RAN#27**

| RAN Tdoc  | Spec   | CR  | R | Ph  | Title   | Cat | Curr   | New    |
|-----------|--------|-----|---|-----|---|-----|--------|--------|
| RP-050037 | 25.133 | 724 | 2 | R99 | Correction to DPCH_Ec/Ior level in A.7.1 UE Transmit Timing | F   | 3.19.0 | 3.20.0 |

**Table B.21: Release 99 CRs approved at TSG RAN#28**

| RAN Tdoc  | Spec   | CR  | R | Ph  | Title  | Cat | Curr   | New    |
|-----------|--------|-----|---|-----|--|-----|--------|--------|
| RP-050201 | 25.133 | 733 |   | R99 | Removing of event triggered reporting testcase in fading A.8.1.4 | F   | 3.20.0 | 3.21.0 |
| RP-050201 | 25.133 | 744 |   | R99 | Removal of UTRA carrier RSSI relative accuracy testcase          | F   | 3.20.0 | 3.21.0 |

**Table B.22: Release 99 CR approved at TSG RAN#29**

| RAN Tdoc  | Spec   | CR   | R | Ph  | Title               | Cat | Curr   | New    |
|-----------|--------|------|---|-----|---------------------|-----|--------|--------|
| RP-050490 | 25.133 | 0799 |   | R99 | Deletion of Annex A | C   | 3.21.0 | 3.22.0 |