TS 25.103 V2.0.0 (1999-10)

Technical Specification

3rd Generation Partnership Project (3GPP); Technical Specification Group (TSG) RAN; Working Group 4 (WG4);

RF Parameters in Support of Radio Resource Management

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<keyword[, keyword]>

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Foreword

This Technical Specification has been produced by the 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 this TS, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version 3.y.z

where:

x the first digit:

presented to TSG for information;

presented to TSG for approval;

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 specification;

1 Scope

This Technical Specification shall describe RF parameters and Requirements for the Radio Resource Management.

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

- A non-specific reference to an TS shall also be taken to refer to later versions published as an EN with the same number.

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

[2] 25.150 Introduction

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

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

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

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

[7] 25.103 RF parameters in support of RRM

[8] 25.141 Basestation conformance testing (FDD)

[9] 25.142 Basestation conformance testing (TDD)

[10] 25.113 Basestation EMC

[11] 25.942 RF System scenarios

[12] 25.922 RRM Strategies

3 Definitions, symbols and abbreviations

3.1 Definitions

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

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

3.2 Symbols

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

<symbol> <Explanation>

Symbol	**Explanation**

[…]	Values included in square bracket must be considered for further studies, because it means that a decision about that value was not taken;

3.3 Abbreviations

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

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

4 Idle Mode Tasks (FDD)

4.1 Introduction

[The requirements presented in these sections will be reviewed depending on the further progress in TSG RAN WG1 and TSG RAN WG2]

4.2 RF Cell Selection Scenario

4.2.1 Requirements for Cell Selection

4.2.1.1 Cell selection delay

The UE shall be capable of detecting, decoding, and camping on a suitable cell within [FFS] seconds from switch on with prior knowledge of cells. *[The exact definition of "prior knowledge of cells" will be further defined in details also in dependency with the work in progress in other TSG RAN WGs]*

4.2.2 RF Parameters used for Cell Selection

4.3 RF Cell Re-Selection Scenario

4.3.1 Requirements for Cell Re-Selection

4.3.1.1 Cell re-selection delay

The UE shall be capable of re-selecting and camping on a new cell (within the same location area) within [FFS] seconds from it becoming the candidate cell for cell re-selection.

4.3.1.2 Cell List Size

The number of the strongest cells recorded inside the UE shall be at least [FFS].

4.3.1.3 Maximum number of cells to be monitored

For re-selection purposes, the UE shall be capable of monitoring at least [FFS] neighboring cells given in the neighbor cell list. The exact number of cells to be monitored will be determined by the used cell re-selection strategy/algorithm.

4.3.1.4 Cell Re-selection reaction time

The UE shall be capable of recognising a new cell becoming the candidate cell for cell re-selection within [FFS] seconds.

4.3.2 RF Parameters used for Cell Re-Selection

4.4 PLMN Selection and Re-Selection Scenario

4.5 Location Registration Scenario

5 Idle Mode Tasks (TDD)

5.1 Introduction

[The requirements presented in these sections will be reviewed depending on the further progress in TSG RAN WG1 and TSG RAN WG2]

5.2 RF Cell Selection Scenario

5.2.1 Requirements for Cell Selection

5.2.1.1 Cell selection delay

The UE shall be capable of detecting, decoding, and camping on a suitable cell within [FFS] seconds from switch on with prior knowledge of cells. *[The exact definition of "prior knowledge of cells" will be further defined in details also in dependency with the work in progress in other TSG RAN WGs]*

5.2.2 RF Parameters used for Cell Selection

5.3 RF Cell Re-Selection Scenario

5.3.1 Requirements for Cell Re-Selection

5.3.1.1 Cell re-selection delay

The UE shall be capable of re-selecting and camping on a new cell (within the same location area) within [FFS] seconds from it becoming the candidate cell for cell re-selection.

5.3.1.2 Cell List Size

The number of the strongest cells recorded inside the UE shall be at least [FFS].

5.3.1.3 Maximum number of cells to be monitored

For re-selection purposes, the UE shall be capable of monitoring at least [FFS] neighboring cells given in the neighbor cell list. The exact number of cells to be monitored will be determined by the used cell re-selection strategy/algorithm.

5.3.1.4 Cell Re-selection reaction time

The UE shall be capable of recognising a new cell becoming the candidate cell for cell re-selection within [FFS] seconds.

5.3.2 RF Parameters used for Cell Re-Selection

5.4 PLMN Selection and Re-Selection Scenario

5.5 Location Registration Scenario

6 RRC Connection mobility

6.1 Handover

6.1.1 Introduction

The overall handover process shall be implemented in the UE and RNS. Measurement of serving radio connection downlink performance and candidate cells received signal strengths and quality must be made in the UE. These measurements shall be signalled to the RNS for assessment. The RNS measures the uplink performance for the UE being served. The RNC uses measurements in conjunction with defined thresholds and handover strategy to make a handover decision.

6.1.2 Requirements

The reliability of handover in all its different forms is essential to the successful operation of a network. In performing handover preparation and execution the minimum requirements shall be:

- Quick detection of candidate cells
- Quick synchronisation to candidate cells
- Reporting of sufficient number of candidate cells
- Quick detection of degradation of link quality
- Reliable measurement procedures of serving and target cells
- Reliable and quick reporting mechanisms
- Reliable synchronisation mechanism
- Quick and safe release of resource
- Safe guards for failed handoffs
- Minimal disruption to service
- Minimal degradation to link quality
- Minimal degradation to other users
- Full Flexibility and efficiency to seamlessly handle the spectrum in a multi-operator scenario

6.1.3 Handover 3G to 3G

6.1.3.1 FDD Soft/Softer Handover

[The requirements presented in these sections will be reviewed depending on the further progress in TSG RAN WG1 and TSG RAN WG2]

6.1.3.1.1 Requirements

6.1.3.1.1.1 Maximum number of cells to be monitored

For soft handover purposes, the UE shall be capable of monitoring at least [FFS] neighboring cells given in the neighbor cell list. The exact number of cells to be monitored will be determined by the used soft handover strategy/algorithm.

6.1.3.1.1.2 Measurement reporting delay

The measurement delay is defined as the time it takes to report a measurement to the decision entity. For soft handover purposes, the measurement reporting delay shall not exceed [FFS] seconds.

6.1.3.1.1.3 Active set dimension

The active set is defined as set of radio links simultaneously involved in a specific communication service between an User Equipment and a UTRAN access point. The system shall be capable of supporting a maximum number of [6] radio links in the active set.

6.1.3.1.1.4 Active set update time interval

An active set update of at least [FFS] seconds, after the reception of the UTRAN acknowledgement, shall be supported. The exact period will be determined by the used soft handover strategy/algorithm.

6.1.3.1.1.5 Frame offset Measurement Accuracy

For soft handover purposes, the frame offset between the serving BS and the new one has to be measured by the UE. This has to be measured with an accuracy of +-[FFS] chips.

6.1.3.1.2 RF Parameters

6.1.3.2 FDD Inter-Frequency Handover

There will be the need to perform inter-frequency hard handover between two carriers in FDD mode. This is in particularly for the case for networks that support Hierarchical Cell Structures (HCS), i.e., combinations of macro, micro, pico and other specific application cells.

It is known that the service provided by a specific layer will not be continuous. This means that there are trans-layer handovers where the UE will be handed over to a macro layer, before returning again to the micro layer.

This necessitates good performance and also introduces the fact that during soft handoff within one layer, the UE shall be able to monitor other FDD carriers for the purpose of inter-frequency handover.

From the system perspective, the inter-frequency hard handover must have comparable performance to that of soft handover.

6.1.3.2.1 Requirements

[The requirements presented in these sections will be reviewed depending on the further progress in TSG RAN WG1 and TSG RAN WG2]

6.1.3.2.1.1 Maximum number of cells/frequencies to be monitored

For hard handover purposes, the UE shall be capable of monitoring at least [FFS] frequencies. The exact number of frequencies to be monitored will be determined by the used hard handover strategy/algorithm.

6.1.3.2.1.2 Measurement reporting delay

For hard handover purposes, the measurement reporting delay shall not exceed [FFS] seconds.

6.1.3.2.1.3 Frame offset Measurement Accuracy

For hard handover purposes, the frame offset between the serving BS and the new one has to be measured by the UE. This has to be measured with an accuracy of +-[FFS] chips.

6.1.3.2.2 RF Parameters

6.1.3.3 FDD/TDD Handover

6.1.3.3.1 Requirements

6.1.3.3.2 RF Parameters

6.1.3.4 TDD/TDD Handover

6.1.3.4.1 Requirements

6.1.3.4.2 RF Parameters

6.1.4 Handover 3G to 2G

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

6.1.4.1 Handover to GSM

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

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

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

The MS shall be able synchronize to [6] carriers

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

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

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

6.1.4.1.1 Requirements

6.1.4.1.2. RF Parameters

6.2 Radio Link Management

6.2.1 Link adaptation

6.2.1.1 Definition of the function

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

6.2.1.2 Link adaptation delay minimum requirement

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

6.2.1.3 Link adaptation accuracy minimum requirement

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

6.3 Cell Update

6.4 URA Update

7 Admission control (FDD)

8 Admission control (TDD)

9 Radio Access Bearer Control (FDD)

10 Radio Access Bearer Control (TDD)

11 Dynamic Channel Allocation (FDD)

12 Dynamic Channel Allocation (TDD)

12.1 Introduction

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

12.2 Implementation Requirements

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

12.3 Number of timeslots to be measured

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

12.4 Measurement reporting delay

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

13 Power Management (FDD)

13.1 UE Output power dynamics

Power control is used to limit the interference level. The details on the Output Power Dynamics are specified in S25.101, "UTRA (UE) FDD; Radio Transmission and Reception".

13.1.1 Open Loop Power Control

Open loop power control is the ability of the UE transmitter to set its output power to a specific value.

The UE open loop power control tolerance is specified in S25.101 "UTRA (UE) FDD; Radio Transmission and Reception".

13.1.2 UE Inner Loop Power Control

13.1.2.1. Inner loop power control in Uplink

Inner loop power control in the Uplink is the ability of the UE transmitter to adjust its output power in accordance with the TPC symbols received in the downlink..

13.1.2.1.1 Power control steps

The power control step is the minimum step change in the UL- transmitter output power in response to a power control command.

13.1.2.1.1.1 Minimum requirement

The UE transmitter shall have the capability of setting the inner loop output power with a step sizes of 1, 2 and 3 dB

(a) The tolerance of the transmitter output power step due to inner loop power control shall be within the range shown in S25.101 "UTRA (UE) FDD; Radio Transmission and Reception".

(b) The tolerance of the transmitter average output power step due to inner loop power control shall be within the range shown in S25.101 "UTRA (UE) FDD; Radio Transmission and Reception".

13.1.2.2 Inner Loop Power Control in Downlink

Inner loop power control in the downlink is the ability of the UE receiver to estimate the received SIR, compare it with the SIR target and transmit the TPC symbols in accordance to the results of this comparison. The details on the UE implementation requirements are specified in S25.101, "UTRA (UE) FDD; Radio Transmission and Reception".

13.1.2.2.1 Minimum requirement

(c) The downlink tolerance of the SIR measurements shall be within the range shown in S25.101, "UTRA (UE) FDD; Radio Transmission and Reception".

(d) The dynamic range of the SIR measurement of the received signal in the downlink shall be better than shown in S25.101, "UTRA (UE) FDD; Radio Transmission and Reception".

(c) The transmitted TPC symbols must respond to a change in the received SIR within the time period specified in S25.101, "UTRA (UE) FDD; Radio Transmission and Reception".

13.2 BS Output Power Dynamics

Power control is used to limit the interference level. The transmitter uses a quality-based power control on both the uplink and downlink; The details on the Output Power Dynamics are specified in S25.104, "UTRA (BS) FDD; Radio Transmission and Reception".

13.2.1 BS Closed Loop Power Control

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

For closed loop correction on the Downlink Traffic Channel (with respect to the open loop estimate), the base station adjust its mean output power level in response to each valid power control bit received from MS on the Reverse Traffic Channel. The details on the BS Closed Loop Power Control are specified in S25.104, "UTRA (BS) FDD; Radio Transmission and Reception".

13.2.1.1 Power Control Steps

The power control step is the minimum step change in the power of one of the physical channels transmitted by the DL transmitter. The requirements on the Power Control Step are specified in S25.104, "UTRA (BS) FDD; Radio Transmission and Reception".

13.2.1.2 Power Control Dynamic Range

The power control dynamic range is difference between the maximum and the minimum transmit output power of a traffic channel for a specified reference condition. The requirements on the Power Control Dynamic Range are specified in S25.104, "UTRA (BS) FDD; Radio Transmission and Reception".

14 Power Management (TDD)

14.1 UE Output Power Dynamics

Power Control is used to limit the interference level.

14.1.1 Open Loop Power Control

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

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

14.1.2 UE Closed Loop Power Control

Closed loop power control is the ability of the UE transmitter to adjust its output power in accordance to the TPC symbols received in the downlink.

14.1.2.1 Power Control Steps

The power control step is the step change in the UL transmitter output power in response to a TPC message. A set of power control steps is defined and specified in S25.102 "UTRA (UE) TDD; Radio Transmission and Reception".

14.2 BS Output Power Dynamics

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

14.2.1 Closed loop power control

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

For closed loop correction on the Downlink Channel (with respect to the open loop estimate), the base station adjust its mean output power level in response to each valid power control bit received from the UE on the Uplink Traffic Channel.

14.2.1.1 Power control steps

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

14.2.1.2 Power control dynamic range

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

15 Radio Link Surveillance (FDD)

16 Radio Link Surveillance (TDD)

17 Timing characterisitics

[This section shall be reviewed also in dependence on those parts of this specification which deal with the same issue]

17.1 Synchronisation Performance

17.1.1 Search of other Cells

Search for other cells is used to check whether the UE correctly searches and measures other BS(s) during the specified operation.

17.1.1.1 Minimum requirement

TBD

Table 36: Test Parameters for the Search of other Cells

Parameter	Unit	Channel 1		Channel 2	
		Time 1	Time 2	Time 1	Time 2
$PCCPCH\ \frac{E_c}{I_{or}}$	dB				
$\hat{I}_{or}/I_{oc}$	dB				
I_{oc}	dBm/3.84 MHz	-60			
$PCCPCH\ \frac{E_c}{I_o}$	dB				

17.2 Channel Timing Dependencies

The channel timing of the UE is determined during the specified operation. Relative timing between different code channels transmitted and received at the mobile station. This includes relative frame and slot timing requirements between the forward and reverse links, as well as among different channels.

Possible items to be covered are:

1. Long code timing offsets for each downlink physical channel

2. Requirements for accuracy

17.2.1 Minimum requirement

TBD

17.3 Reception Timing

The reception timing of the MS is determined during the specified operation.

17.3.1 Minimum requirement

TBD

18 Measurements Performance Requirements (FDD)

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

18.1 Measurements Performance Requirements of downlink channels

[The exact specification of the time averaging conditions for the evaluation of the accuracy for some of the parameters specified below is [F.F.S]]

18.1.1 CFN-SFN Observed time difference

The CFN-SFN Observed time difference to cell indicates the time difference which is measured by UE between Connecting Frame Number in the UE and the System Frame Number of the target neighboring cell. The exact definition

and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

For Handover the precision required for this parameter is [ ] chip unit.

18.1.2 Observed time difference to GSM cell

Time difference between the Primary CCPCH of the current cell and the timing of the GSM cell. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

For Handover the precision required for this parameter is [ ] microseconds.

18.1.3 Primary CCPCH RX E_c/I_0

UE. Primary CCPCH RX E_c/I_0: $-20\log_{10}(E_c/I_o)$ where E_c is the energy per chip of the Primary CCPCH measured in the searcher and I_o is the received spectral density . The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The absolute required precision for this parameter is [ ] dB.

The relative required precision for this parameter is [ ] dB.

18.1.4 Primary CCPCH Rx SIR

[This measurement was reported in accordance with the list of measurements reported in WG2 specification in S25.302 "Services Provided by the Physical Layer"; however this measurement is not covered yet inside WG1 specifications and discussion is ongoing there on this measurement. This section will be updated also taking into account the results of that discussion.]

This quantity is a ratio of the Primary CCPCH Received Signal Code Power (RSCP) to the Interference Signal Code Power (ISCP). The RSCP is the measured symbol power of the Primary CCPCH at the demodulator output and the ISCP is the measured interference symbol power. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The absolute required precision for this parameter is [ ] dB.

The relative required precision for this parameter is [ ] dB.

18.1.5 Primary CCPCH Rx RSCP

Received Signal Code Power, is received power on one code after despreading, defined on the pilot symbols. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The absolute required precision for this parameter is [ ] dB.

The relative required precision for this parameter is [ ] dB.

18.1.6 Primary CCPCH Rx ISCP

[This measurement was reported in accordance with the list of measurements reported in WG2 specification in S25.302 "Services Provided by the Physical Layer"; however this measurement is not covered yet inside WG1 specifications and discussion is ongoing there on this measurement. This section will be updated also taking into account the results of that discussion.]

Interference on Signal Code Power, is the interference on the mentioned received signal after despreading. Thereby only the non-orthogonal part of the interference is included. . The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The absolute required precision for this parameter is [ ] dB.

The relative required precision for this parameter is [ ] dB.

18.1.7 DPCCH SIR

The ratio of the measured symbol power at the demodulator output to the measured interference power at the demodulator output. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required absolute precision for this parameter shall be less than the [minimum DL power control step sizes].

The required relative precision for this parameter shall be less than [ ].

18.1.8 UTRA Cell Signal strength (RSSI)

Received Signal Strength Indicator, the wideband received power within the channel bandwidth averaged over [1 s] interval. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 “Services Provided by the Physical Layer”.

The required absolute precision for this parameter shall be [ ] dB.

The required relative precision for this parameter is [ ] dB.

18.1.9 Alternate mode Signal strength

18.1.9.1 GSM Signal Strength

This measure is mandatory for the UE if the service handover to GSM is to be supported. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is specified in GSM document 05.08.

18.1.10 Transport CH BLER

The error detection mechanism will determine whether or not a block error occurred. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is dependent on the transport channel

18.1.11 Physical CH BER

The estimate of the raw BER of the physical channel calculated only on the data part. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is [ ]%.

18.1.12 Total Tx Power

The total power emitted by the Node-B within the channel bandwidth averaged over an interval of [1]s. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is [ ] dB.

18.1.13 Code Tx Power

The total power emitted by the Node-B on one channelisation code for one UE averaged over [100 ms]. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is [ ] dB.

18.2 Measurements Performance Requirements on uplink channels

18.2.1 UL load

The total received signal power for a carrier within the cell. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is [ ] dB.

18.2.2 UE Tx Power

RRC (UE) – the total Tx power, measured at the antenna connector, averaged over [100 ms]. RRC (RNC) – indication of Tx power reaching threshold (for example, upper or lower power limits). The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is [ ] dB.

18.2.3 Transport CH BLER

The error detection mechanism will determine whether or not a block error occurred. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is dependent on the type of the transport channel.

18.2.4 Physical CH BER

The estimate of the raw BER of the physical channel calculated only on the data part. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is [ ]%.

18.3 Performance Requirements on Miscellaneous Measurements

18.3.1 Time of Arrival (TOA)

The time of arrival of the uplink transmissions in relation to the CCPCH timing reference. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is [ ] Chip.

18.3.2 SFN-SFN Observed time difference

Time difference between the Primary CCPCH of the current cell and the Primary CCPCH of a neighboring cell. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is [a fraction] of a chip.

18.3.3 Frequency Offset (FO)

The Frequency Offset (FO) measures the rate of change (drift) of the Relative Time Difference of the CCPCH transmissions of two Node-B. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is [ ] Hz.

19 Measurements Performance Requirements (TDD)

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

19.1 Measurements Performance Requirements of downlink channels

[The exact specification of the time averaging conditions for the evaluation of the accuracy for some of the parameters specified below is [F.F.S]]

19.1.1 CFN-SFN Observed time difference

The CFN-SFN Observed time difference to cell indicates the time difference which is measured by UE between Connecting Frame Number in the UE and the System Frame Number of the target neighboring cell. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

For Handover the precision required for this parameter is [ ] chip unit.

19.1.2 Observed time difference to GSM cell

Time difference between the Primary CCPCH of the current cell and the timing of the GSM cell. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

For Handover the precision required for this parameter is [ ]microseconds.

19.1.3 Primary CCPCH RX E_c/I_0

UE. Primary CCPCH RX E_c/I_0: $-20\log_{10}(E_c/I_o)$ where E_c is the energy per chip of the Primary CCPCH measured in the searcher and I_o is the received spectral density . The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The absolute required precision for this parameter is [ ] dB.

The relative required precision for this parameter is [ ] dB.

19.1.4 Primary CCPCH Rx SIR

This quantity is a ratio of the Primary CCPCH Received Signal Code Power (RSCP) to the Interference Signal Code Power (ISCP). The RSCP is the measured symbol power of the Primary CCPCH at the demodulator output and the ISCP is the measured interference symbol power. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The absolute required precision for this parameter is [ ] dB.

The relative required precision for this parameter is [ ] dB.

19.1.5 Primary CCPCH Rx RSCP

Received Signal Code Power, is received power on one code after despreading, defined on the pilot symbols. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The absolute required precision for this parameter is [ ] dB.

The relative required precision for this parameter is [ ] dB.

19.1.6 Primary CCPCH Rx ISCP

Interference on Signal Code Power, is the interference on the mentioned received signal after despreading. Thereby only the non-orthogonal part of the interference is included. . The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The absolute required precision for this parameter is [ ] dB.

The relative required precision for this parameter is [ ] dB.

19.1.7 DPCCH SIR

The ratio of the measured symbol power at the demodulator output to the measured interference power at the demodulator output. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required absolute precision for this parameter shall be less than the [minimum DL power control step sizes].

The required relative precision for this parameter shall be less than [ ].

19.1.8 UTRA Cell Signal strength (RSSI)

Received Signal Strength Indicator, the wideband received power within the channel bandwidth averaged over [1 s] interval. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required absolute precision for this parameter shall be [ ] dB.

The required relative precision for this parameter is [ ] dB.

19.1.9 Alternate mode Signal strength

19.1.9.1 GSM Signal Strength

This measure is mandatory for the UE if the service handover to GSM is to be supported. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is specified in GSM document 05.08.

19.1.10 Transport CH BLER

The error detection mechanism will determine whether or not a block error occurred. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is dependent on the transport channel

19.1.11 Physical CH BER

The estimate of the raw BER of the physical channel calculated only on the data part. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is [ ]%.

19.1.12 Total Tx Power

The total power emitted by the Node-B within the channel bandwidth averaged over an interval of [1]s. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is [ ] dB.

19.1.13 Code Tx Power

The total power emitted by the Node-B on one channelisation code for one UE averaged over [100 ms]. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is [ ] dB.

19.2 Measurements Performance Requirements on uplink channels

19.2.1 UL load

The total received signal power for a carrier within the cell. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is [ ] dB.

19.2.2 UE Tx Power

RRC (UE) – the total Tx power, measured at the antenna connector, averaged over [100 ms]. RRC (RNC) – indication of Tx power reaching threshold (for example, upper or lower power limits). The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is [ ] dB.

19.2.3 Transport CH BLER

The error detection mechanism will determine whether or not a block error occurred. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is dependent on the type of the transport channel.

19.2.4 Physical CH BER

The estimate of the raw BER of the physical channel calculated only on the data part. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is [ ]%.

19.3 Performance Requirements on Miscellaneous Measurements

19.3.1 Time of Arrival (TOA)

The time of arrival of the uplink transmissions in relation to the CCPCH timing reference. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is [ ] Chip.

19.3.2 SFN-SFN Observed time difference

Time difference between the Primary CCPCH of the current cell and the Primary CCPCH of a neighboring cell. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is [a fraction] of a chip.

19.3.3 Frequency Offset (FO)

The Frequency Offset (FO) measures the rate of change (drift) of the Relative Time Difference of the CCPCH transmissions of two Node-B. The exact definition and further details on this parameter is contained in Chapter 9 of the TS25.302 "Services Provided by the Physical Layer".

The required precision for this parameter is [ ] Hz.

19.4 Measurement accuracy of quantities for network Optimisation

In addition to these mandatory measurements there are a number of measurements which may serve the network operators in extending the DCA algorithm and therefore optimising their network. The quantities are the received CCPCH signal strength of neighbouring Node Bs, the received signal strength (RSSI) on selected timeslots, the block/bit error rate on the transport channel, and the channelisation code transmit power on selected timeslots in Node B with following accuracy:

RSCP of Primary CCPCH of other Node Bs: +-[FFS] dB

RSSI: +-[FFS] dB

DCH BLER: +-[FFS] %

DCH BER: +-[FFS] %

Code TX power: +-[FFS] dB

Annex A RF Power Management Scenario

Annex B RF Handover Scenario

Annex C (Informative) Open Items:

Section number	Section description	Status
Section number	**Section description**	**Status**
4	Idle Mode Tasks (FDD)	Values for the requirements present in this part are needed.
5	Idle Mode Tasks (TDD)	Values for the requirements present in this part are needed.
6	RRC Connection Mobility	Values for the requirements present in this part are needed.
6.1.3.3	FDD/TDD Handover	Requirements for this section are needed.
6.1.3.4	TDD/TDD Handover	Requirements for this section are needed.
6.2	Radio Link Adaptation	During Ran WG4 it was decided to add a requirement on radio link adaptation to express the concept that the higher

		rate will be returned to when sufficient power is available. Text to take into account this requirement will be proposedfor RAN4#8.
7	Admission Control (FDD)	Requirements for this section are needed.
8	Admission Control (TDD)	Requirements for this section are needed.
9	Radio Access Bearer Control (FDD)	Requirements for this section are needed.
10	Radio Access Bearer Control (TDD)	Requirements for this section are needed.
11	Dynamic Channel Allocation (FDD)	Requirements for this section are needed.
12	Dynamic Channel Allocation (TDD)	Requirements for this section are needed.
13	Radio Link surveillance (FDD)	Requirements for this section are needed.
14	Radio Link Surveillance (TDD)	Requirements for this section are needed.

History

Document history		
TS 25.103 V2.0.0	10-1999	Endorsed by TSG-RAN
S25.103v2.0.0	09-1999	A requirement related to “Cell Re-selection reaction time” proposed by Tdoc R499-539 was included in Section 4 and 5. Two new chapters on “ Measurements Performance Requirements ” for FDD and TDD were added as proposed in Tdoc R499-471. The changes proposed by Tdoc R499-540 were included. The dimension of active set proposed by Tdoc R499491 was included. Requirements on radio Link adaptation were included in accordance with contribution R499-492. The content of Tdoc R499-483 was included. The editorial changes proposed by Tdoc R4-99538 were included.
S25.103v1.1.1	08-1999	Only Editorial changes related to the 3GPP Template were applied.
S25.103v1.1.0	08-1999	Section 8.7 “Timing characteristics” of S25.101 “UE Radio Transmission and Reception FDD” was moved in this specification. This new section was included in Section 20 of this specification with an Editor’s Note, discussed during the last meeting , that highlights the necessity of reviewing this chapter also in dependence on those parts of this specification which deal with the same subject.
S25.103 v1.0.0	06-1999	The content of Tdoc R499-353 was included. Document Status was raised to version 1.0.0 and noted by TSG RAN as version 1.0.0.
S25.103 v0.1.0	05-1999	The document was submitted to the RAN and noted as version 0.1.0.

S25.103 v2.0.0	04-1999	In section 10.1.4.1 some values were put in square bracket in accordance with the comments received on the reflector; the new numbering S25.103 for the document was introduced. Moreover Section 4 about references was changed in accordance with the new numbering of WG4 documents. The document was approved by reflector and raised to v2.0.0.
S25.403 v1.0.0	04-1999	Document status raised to v1.0.0. The document numbering was changed to S25.403 in accordance to the 3GPP indication also if this numbering is still provisional. In Section 17 references to S4.01 were added.
S4.03 v0.0.4	03-1999	A new Table of Contents and structure based on Td R499-106 were included; moreover some parts from S4.01 were included for discussion.
S4.03 v0.03	03-1999	The Title and Scope of the Specification has been updated in accordance to the 3GPP TSG RAN decision.
S4.03 v0.02	02-1999	In Section 6.6 the last requirement was extended to a multi-operator scenario. In Section 6.8.1 10 seconds was put in square bracket.
S4.03 v 0.01	02-1999	Output from WG4 drafting session on the S4.03 content. The structure of the document was proposed from document TSGW4#2(99)30. Some sections of the document TSGW4#2(99)68 were included in section 6 of this document.

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This document is written in Microsoft Word 7