3GPP TSG-RAN Meeting #16
Marco Island, FL, U.S.A., 4 – 7, June, 2002

RP-020312

Title: **Agreed CRs (R99 and Rel-4/Rel-5 Category A) to TS 25.225**

Source: **TSG-RAN WG1**

Agenda item: **7.1.3**

No.	Spec	CR	Rev	R1 T-doc	Subject	Phase	Cat	Work Item	V_old	V_new
1	25.225	046	2	R1-02-0820	Clarification of UE measurements applicability	R99	F	TEI	3.9.0	3.10.0
2	25.225	047	2	R1-02-0820	Clarification of UE measurements applicability	Rel-4	A	TEI	4.3.0	4.4.0
3	25.225	050	2	R1-02-0820	Clarification of UE measurements applicability	Rel-5	A	TEI	5.0.0	5.1.0

3GPP TSG RAN Meeting #16
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R1-02-0820

CR-Form-v5

CHANGE REQUEST

z **25.225** **CR** **046** z **rev** **2** z Current version: **3.9.0** z

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

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

Title:	z	Clarification of UE measurements Applicability
Source:	z	TSG RAN WG1
Work item code:	z	TEI
Date:	z	Mai 14th 2002
Category:	z	**F**
Release:	z	R99

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

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	z	Application of the UE measurements is not clearly specified
Summary of change:	z	This CR clarifies for each UE measurement in which RRC state it can be requested from the mobile and on which type of cell (intra/inter frequency). This level of detail was agreed to be included in the RAN1 specifications at the joint RAN1/RAN2 meeting February 5th-6th in Sophia-Antipolis. In contrast to the first revision of the CR, the 'IDLE mode' is removed from the TS-ISCP measurement, because it was felt, that this is an introduction of a new feature rather than a clarification between RAN1 and RAN2, which would imply some extra workload in RAN4. Furthermore the applicability of "SFN-SFN type 1" for Idle Mode, Cell_PCH and URA_PCH state has been removed, since no benefit was seen by the companies, involved in the discussions. Forcing a UE to decode the SFN for this purpose was seen as the mayor problem in these states.
Consequences if not approved:	z	Ambiguous specifications of UE measurement applicability Isolated Impact Analysis: This is an isolated impact CR that corrects a functionality where the specification contained contradictions. This CR would not affect implementations behaving as indicated in the CR, would affect implementations supporting the corrected functionality otherwise.

Clauses affected:	z	2, 5.1 and subclauses
Other specs affected:	z	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications
	z	

Other comments: z

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 25.211: "Physical channels and mapping of transport channels onto physical channels (FDD)".

[2] 3GPP TS 25.212: "Multiplexing and channel coding (FDD)".

[3] 3GPP TS 25.213: "Spreading and modulation (FDD)".

[4] 3GPP TS 25.214: "Physical layer procedures (FDD)".

[5] 3GPP TS 25.215: "Physical layer measurements (FDD)".

[6] 3GPP TS 25.221: "Physical channels and mapping of transport channels onto physical channels (TDD)".

[7] 3GPP TS 25.222: "Multiplexing and channel coding (TDD)".

[8] 3GPP TS 25.223: "Spreading and modulation (TDD)".

[9] 3GPP TS 25.224: "Physical layer procedures (TDD)".

[10] 3GPP TS 25.301: "Radio Interface Protocol Architecture".

[11] 3GPP TS 25.302: "Services provided by the Physical layer".

[12] 3GPP TS 25.303: "UE functions and interlayer procedures in connected mode".

[13] 3GPP TS 25.304: "UE procedures in idle mode".

[14] 3GPP TS 25.331: "RRC Protocol Specification".

[15] 3GPP TR 25.922: "Radio Resource Management Strategies".

[16] 3GPP TR 25.923: "Report on Location Services (LCS)".

[17] 3G TS 25.102: “UTRA (UE) TDD; Radio transmission and Reception”

[18] 3G TS 25.105: “UTRA (BS) TDD; Radio transmission and Reception”

[19] 3G TS 25.123: “Requirements for Support of Radio Resources Management (TDD)”

5.1 UE measurement abilities

The structure of the table defining a UE measurement quantity is shown below.

Column field	Comment
Definition	Contains the definition of the measurement.
Applicable for	States in which RRC state according to [14] a measurement shall be possible to be performed. For RRC connected mode states information is also given on the possibility to perform the measurement on intra-frequency and/or inter-frequency. The following terms are used in the tables: Idle = Shall be possible to perform in idle mode; URA_PCH = Shall be possible to perform in URA_PCH; CELL_PCH = Shall be possible to perform in CELL_PCH; CELL_FACH = Shall be possible to perform in CELL_FACH; CELL_DCH = Shall be possible to perform in CELL_DCH; For all RRC connected mode states i.e. URA_PCH, CELL_PCH, CELL_FACH and CELL_DCH Intra appended to the RRC state = Shall be possible to perform in the corresponding RRC state on an intra-frequency cell; Inter appended to the RRC state = Shall be possible to perform in the corresponding RRC state on an inter-frequency cell. Inter-RAT appended to the RRC state = Shall be possible to perform in the corresponding RRC state on an inter-RAT cell.

NOTE 1: Measurements for TDD which are specified on the Primary CCPCH (P-CCPCH) are carried out on the P-CCPCH or on any other beacon channel, see [6].

NOTE 2: For the beacon channels [6], the received power measurements shall be based on the received power for midamble $m^{(1)}$ if no Space Code Transmit Diversity (SCTD) is applied to the P-CCPCH and on the sum of the received powers for midambles $m^{(1)}$ and $m^{(2)}$ if SCTD is applied to the P-CCPCH.

NOTE 3: The UTRAN has to take into account the UE capabilities when specifying the timeslots to be measured in the measurement control message.

NOTE 4: The line ‘applicable for’ indicates whether the measurement is applicable for inter-frequency and/or intra-frequency and furthermore for idle and/or connected mode.

NOTE 5: The Interference part of the SIR measurement will be dependent on the receiver implementation, and will normally be different from the Timeslot ISCP measurement.

NOTE 6: The measurement ‘Timeslot ISCP’ is only a measure of the intercell interference.

NOTE 7: The term "antenna connector of the UE" used in this sub-clause to define the reference point for the UE measurements is defined in [17].

NOTE 8: Performance and reporting requirements for the UE measurements are defined in [19].

5.1.1 P-CCPCH RSCP

Definition	Received Signal Code Power, the received power on P-CCPCH of own or neighbour cell. The reference point for the RSCP shall be the antenna connector of the UE.
Applicable for	~~idle mode~~Idle, URA_PCH intra , URA_PCH inter, CELL_PCH intra, CELL_PCH inter, CELL_FACH intra, CELL_FACH inter, CELL_DCH intra, CELL_DCH inter~~connected mode (intra frequency & inter frequency)~~

5.1.2 CPICH RSCP

Definition	Received Signal Code Power, the received power on one code measured on the Primary CPICH. The reference point for the RSCP shall be the antenna connector of the UE. (This measurement is used in TDD for monitoring FDD cells while camping on a TDD cell). If Tx diversity is applied on the Primary CPICH the received code power from each antenna shall be separately measured and summed together in [W] to a total received code power on the Primary CPICH.
Applicable for	~~idle mode~~Idle, URA_PCH inter, CELL_PCH inter, CELL_FACH inter, CELL_DCH inter~~ connected mode (inter-frequency)~~

5.1.3 Timeslot ISCP

Definition	Interference Signal Code Power, the interference on the received signal in a specified timeslot measured on the midamble. The reference point for the ISCP shall be the antenna connector of the UE.
Applicable for	CELL_FACH intra, CELL_DCH intra~~connected mode (intra-frequency).~~

5.1.4 UTRA carrier RSSI

Definition	The received wide band power, including thermal noise and noise generated in the receiver, within the bandwidth defined by the receiver pulse shaping filter, for TDD within a specified timeslot. The reference point for the measurement shall be the antenna connector of the UE.
Applicable for	CELL_DCH intra, CELL_DCH inter ~~idle mode, connected mode (intra- & inter-frequency)~~

5.1.5 GSM carrier RSSI

Definition	Received Signal Strength Indicator, the wide-band received power within the relevant channel bandwidth Measurement shall be performed on a GSM BCCH carrier. The reference point for the RSSI shall be the antenna connector of the UE.
Applicable for	~~idle mode,~~Idle, URA_PCH inter-RAT, CELL_PCH inter-RAT, CELL_FACH inter-RAT, CELL_DCH inter-RAT~~connected mode (inter-frequency)~~

5.1.6 SIR

Definition	Signal to Interference Ratio, defined as: (RSCP/Interference)xSF. Where: RSCP = Received Signal Code Power, the received power on the code of a specified DPCH or PDSCH. Interference = The interference on the received signal in the same timeslot which can't be eliminated by the receiver. SF = The used spreading factor. The reference point for the SIR shall be the antenna connector of the UE.
Applicable for	CELL_FACH intra, CELL_DCH intra~~connected mode (intra-frequency)~~

5.1.7 CPICH Ec/No

Definition	The received energy per chip divided by the power density in the band. The CPICH Ec/No is identical to CPICH RSCP/UTRA Carrier RSSI. The measurement shall be performed on the Primary CPICH. The reference point for the CPICH Ec/No shall be the antenna connector of the UE. (This measurement is used in TDD for monitoring FDD cells while camping on a TDD cell) If Tx diversity is applied on the Primary CPICH the received energy per chip (Ec) from each antenna shall be separately measured and summed together in [Ws] to a total received chip energy per chip on the Primary CPICH, before calculating the Ec/No.
Applicable for	~~idle mode~~Idle, ~~connected mode (inter-frequency)~~ URA_PCH inter, CELL_PCH inter, CELL_FACH inter, CELL_DCH inter

5.1.8 Transport channel BLER

Definition	Estimation of the transport channel block error rate (BLER). The BLER estimation shall be based on evaluating the CRC on each transport block.
Applicable for	CELL_DCH intra~~connected mode (intra-frequency)~~

5.1.9 UE transmitted power

Definition	The total UE transmitted power on one carrier in a specified timeslot. The reference point for the UE transmitted power shall be the antenna connector of the UE.
Applicable for	CELL_FACH intra, CELL_DCH intra~~connected mode (intra-frequency).~~

5.1.10 SFN-SFN observed time difference

Definition	SFN-SFN observed time difference is the time difference of the reception times of frames from two cells (serving and target) measured in the UE and expressed in chips. It is distinguished by two types. Type 2 applies if the serving and the target cell have the same frame timing. The reference point for the SFN-SFN observed time difference type 1 and 2 shall be the antenna connector of the UE. **Type 1:** SFN-SFN observed time difference = OFF×38400 + T_m in chips, where: T_m = T_{RxSFNi} - T_{RxSFNk}, given in chip units with the range [0, 1, …, 38399] chips T_{RxSFNi} = time of start (defined by the first detected path in time) of the received frame SFN_i of the serving TDD cell i. T_{RxSFNk} = time of start (defined by the first detected path in time) of the received frame SFN_k of the target UTRA cell k received most recently in time before the time instant T_{RxSFNi} in the UE. If this frame SFN_k of the target UTRA cell is received exactly at T_{RxSFNi} then T_{RxSFNk}= T_{RxSFNi} (which leads to T_m=0). OFF = (SFN_i- SFN_k) mod 256, given in number of frames with the range [0, 1, …, 255] frames SFNi = system frame number for downlink frame from serving TDD cell i in the UE at the time T_{RxSFNi}. SFNk = system frame number for downlink frame from target UTRA cell k received in the UE at the time T_{RxSFNk}.(for FDD: the P-CCPCH frame) The reference point for the SFN-SFN observed time difference type 1 shall be the antenna connector of the UE. **Type 2:** SFN-SFN observed time difference = T_{RxTSk} - T_{RxTSi}, in chips, where T_{RxTSi} : time of start (defined by the first detected path in time) of a timeslot received from the serving TDD cell i. T_{RxTSk} : time of start (defined by the first detected path in time) of a timeslot received from the target UTRA cell k that is closest in time to the start of the timeslot of the serving TDD cell i. The reference point for the SFN-SFN observed time difference type 2 shall be the antenna connector of the UE.
Applicable for	**Type 1:** CELL_FACH intra, CELL_DCH intra **Type 2:** Idle, URA_PCH intra, URA_PCH inter, CELL_PCH intra, CELL_PCH inter, CELL_FACH intra, CELL_FACH inter, CELL_DCH intra, CELL_DCH interidle mode, connected mode (intra-frequency), connected mode (inter-frequency)

5.1.11 SFN-CFN observed time difference

Definition	The SFN-CFN observed time difference is defined as: T_m for an FDD neighbour cell (i.e. the value is reported in chips), OFF for a TDD neighbour cell (i.e the value is reported in frames), where: T_m = T_{UETx} - T_{RxSFN}, given in chip units with the range [0, 1, …, 38399] chips. T_{UETx} = the time at the beginning of the frame with the connection frame number CFN_{TX} considering the transmission from the UE in the serving TDD cell. T_{RxSFN} = the time (defined by the first detected path in time) at the beginning of the frame with the system frame number SFN (for FDD neighbour cells: P-CCPCH frame is considered) received at the UE from a neighbour cell. T_{RxSFN} is the time instant most recent in time before the time instant T_{UETx} OFF = (SFN-CFN_{TX}) mod 256, given in number of frames with the range [0, 1, …, 255] frames. CFN_{Tx} = the connection frame number for the UE transmission. SFN = is the system frame number for the neighbouring cell frame (for FDD neighbour cells: P-CCPCH frame) received in the UE at the time instant T_{RxSFN}. The reference point for the SFN-CFN observed time difference shall be the antenna connector of the UE.
Applicable for	CELL_DCH intra, CELL_DCH inter~~connected mode (inter-frequency), connected mode (intra-frequency)~~

5.1.12 Observed time difference to GSM cell

Definition	Observed time difference to GSM cell is reported as the time difference T_m in ms, where T_m= T_{RxGSMk} - $T_{RxSFN0i}$ $T_{RxSFN0i}$: time of start (defined by the first detected path in time) of the received frame SFN=0 of the serving TDD cell i T_{RxGSMk}.: time of start of the GSM BCCH 51-multiframe of the considered target GSM frequency k received closest in time after the time $T_{RxSFN0i}$. If the next GSM BCCH 51-multiframe is received exactly at $T_{RxSFN0i}$ then T_{RxGSMk} = $T_{RxSFN0i}$ (which leads to T_m=0). The beginning of the GSM BCCH 51-multiframe is defined as the beginning of the first tail bit of the frequency correction burst in the first TDMA-frame of the GSM BCCH 51-multiframe, i.e. the TDMA-frame following the IDLE-frame. The reference point for the Observed time difference to GSM cell shall be the antenna connector of the UE. The reported time difference is calculated from the actual measurement in the UE. The actual measurement shall be based on: $T_{MeasGSM,j}$: The start of the first tail bit of the most recently received GSM SCH on frequency j $T_{MeasSFN,i}$: The start of the last frame received in TDD cell i before receiving the GSM SCH on frequency j For calculating the reported time difference, the frame lengths are always assumed to be 10 ms for UTRA and (60/13) ms for GSM.
Applicable for	Idle ~~mode~~, URA PCH inter-RAT, CELL_PCH inter-RAT, CELL_DCH Inter-RAT~~connected mode (inter-frequency)~~

5.1.13 UE GPS Timing of Cell Frames for UE positioning

Definition	$T_{UE-GPSj}$ is defined as the time of occurrence of a specified UTRAN event according to GPS Time Of Week. The specified UTRAN event is the beginning of a particular frame (identified through its SFN) in the first detected path (in time) of the cell j P-CCPCH. The reference point for $T_{UE-GPSj}$ shall be the antenna connector of the UE.
Applicable for	CELL_FACH intra, CELL_DCH intra~~connected mode (intra-frequency, inter-frequency)~~

R1-02-0820

CR-Form-v5

CHANGE REQUEST

z **25.225** **CR** **047** z **rev** **2** z Current version: **4.3.0** z

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

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

Title:	z	Clarification of UE measurements Applicability
Source:	z	TSG RAN WG1
Work item code:	z	TEI
Date:	z	Mai 14th 2002
Category:	z	**A**
Release:	z	REL-4

Use one of the following categories:
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A *(corresponds to a correction in an earlier release)*
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Reason for change:	z	Application of the UE measurements is not clearly specified
Summary of change:	z	This CR clarifies for each UE measurement in which RRC state it can be requested from the mobile and on which type of cell (intra/inter frequency). This level of detail was agreed to be included in the RAN1 specifications at the joint RAN1/RAN2 meeting February 5th-6th in Sophia-Antipolis. In contrast to the first revision of the CR, the 'IDLE mode' is removed from the TS-ISCP measurement, because it was felt, that this is an introduction of a new feature rather than a clarification between RAN1 and RAN2, which would imply some extra workload in RAN4. Furthermore the applicability of "SFN-SFN type 1" for Idle Mode, Cell_PCH and URA_PCH state has been removed, since no benefit was seen by the companies, involved in the discussions. Forcing a UE to decode the SFN for this purpose was seen as the mayor problem in these states.
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Other comments: z

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5.1 UE measurement abilities

The structure of the table defining a UE measurement quantity is shown below.

Column field	Comment
Definition	Contains the definition of the measurement.
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NOTE 1: Measurements for TDD which are specified on the Primary CCPCH (P-CCPCH) are carried out on the P-CCPCH or on any other beacon channel, see [6].

NOTE 2: For the beacon channels [6], the received power measurements shall be based on the received power for midamble $m^{(1)}$ if no Space Code Transmit Diversity (SCTD) is applied to the P-CCPCH and on the sum of the received powers for midambles $m^{(1)}$ and $m^{(2)}$ if SCTD is applied to the P-CCPCH.

NOTE 3: The UTRAN has to take into account the UE capabilities when specifying the timeslots to be measured in the measurement control message.

NOTE 4: The line ‘applicable for’ indicates whether the measurement is applicable for inter-frequency and/or intra-frequency and furthermore for idle and/or connected mode.

NOTE 5: The Interference part of the SIR measurement will be dependent on the receiver implementation, and will normally be different from the Timeslot ISCP measurement.

NOTE 6: The measurement ‘Timeslot ISCP’ is only a measure of the intercell interference.

NOTE 7: The term "antenna connector of the UE" used in this sub-clause to define the reference point for the UE measurements is defined in [17].

NOTE 8: Performance and reporting requirements for the UE measurements are defined in [19].

5.1.1 P-CCPCH RSCP

Definition	Received Signal Code Power, the received power on P-CCPCH of own or neighbour cell. The reference point for the RSCP shall be the antenna connector of the UE.
Applicable for	~~idle mode~~Idle, URA_PCH intra , URA_PCH inter, CELL_PCH intra, CELL_PCH inter, CELL_FACH intra, CELL_FACH inter, CELL_DCH intra, CELL_DCH inter~~connected mode (intra-frequency & inter-frequency)~~

5.1.2 CPICH RSCP

Definition	Received Signal Code Power, the received power on one code measured on the Primary CPICH. The reference point for the RSCP shall be the antenna connector of the UE. (This measurement is used in TDD for monitoring FDD cells while camping on a TDD cell). If Tx diversity is applied on the Primary CPICH the received code power from each antenna shall be separately measured and summed together in [W] to a total received code power on the Primary CPICH.
Applicable for	~~idle mode~~Idle, URA_PCH inter, CELL_PCH inter, CELL_FACH inter, CELL_DCH inter~~ connected mode (inter-frequency)~~

5.1.3 Timeslot ISCP

Definition	Interference Signal Code Power, the interference on the received signal in a specified timeslot measured on the midamble. The reference point for the ISCP shall be the antenna connector of the UE.
Applicable for	CELL_FACH intra, CELL_DCH intra~~connected mode (intra-frequency).~~

5.1.4 UTRA carrier RSSI

Definition	The received wide band power, including thermal noise and noise generated in the receiver, within the bandwidth defined by the receiver pulse shaping filter, for TDD within a specified timeslot. The reference point for the measurement shall be the antenna connector of the UE.
Applicable for	CELL_DCH intra, CELL_DCH inter ~~idle mode, connected mode (intra- & inter-frequency)~~

5.1.5 GSM carrier RSSI

Definition	Received Signal Strength Indicator, the wide-band received power within the relevant channel bandwidth Measurement shall be performed on a GSM BCCH carrier. The reference point for the RSSI shall be the antenna connector of the UE.
Applicable for	~~idle mode,~~Idle, URA_PCH inter-RAT, CELL_PCH inter-RAT, CELL_FACH inter-RAT, CELL_DCH inter-RAT~~connected mode (inter-frequency)~~

5.1.6 SIR

Definition	Signal to Interference Ratio, defined as: (RSCP/Interference)xSF. Where: RSCP = Received Signal Code Power, the received power on the code of a specified DPCH or PDSCH. Interference = The interference on the received signal in the same timeslot which can't be eliminated by the receiver. SF = The used spreading factor. The reference point for the SIR shall be the antenna connector of the UE.
Applicable for	CELL_FACH intra, CELL_DCH intra~~connected mode (intra-frequency)~~

5.1.7 CPICH Ec/No

Definition	The received energy per chip divided by the power density in the band. The CPICH Ec/No is identical to CPICH RSCP/UTRA Carrier RSSI. The measurement shall be performed on the Primary CPICH. The reference point for the CPICH Ec/No shall be the antenna connector of the UE. (This measurement is used in TDD for monitoring FDD cells while camping on a TDD cell) If Tx diversity is applied on the Primary CPICH the received energy per chip (Ec) from each antenna shall be separately measured and summed together in [Ws] to a total received chip energy per chip on the Primary CPICH, before calculating the Ec/No.
Applicable for	~~idle mode~~Idle, ~~connected mode (inter-frequency)~~ URA_PCH inter, CELL_PCH inter, CELL_FACH inter, CELL_DCH inter

5.1.8 Transport channel BLER

Definition	Estimation of the transport channel block error rate (BLER). The BLER estimation shall be based on evaluating the CRC on each transport block.
Applicable for	CELL_DCH intra~~connected mode (intra-frequency)~~

5.1.9 UE transmitted power

Definition	The total UE transmitted power on one carrier in a specified timeslot. The reference point for the UE transmitted power shall be the antenna connector of the UE.
Applicable for	CELL_FACH intra, CELL_DCH intra~~connected mode (intra-frequency).~~

5.1.10 SFN-SFN observed time difference

Definition	SFN-SFN observed time difference is the time difference of the reception times of frames from two cells (serving and target) measured in the UE and expressed in chips. It is distinguished by two types. Type 2 applies if the serving and the target cell have the same frame timing. The reference point for the SFN-SFN observed time difference type 1 and 2 shall be the antenna connector of the UE. **Type 1:** SFN-SFN observed time difference = $\begin{cases} \text{OFF} \times 12800 + T_m \text{ in chips} & \text{for } 1.28 \text{ Mcps TDD} \\ \text{OFF} \times 38400 + T_m \text{ in chips} & \text{for } 3.84 \text{ Mcps TDD} \end{cases}$ where: T_m = T_{RxSFNi} - T_{RxSFNk}, given in chip units with the range $\begin{cases} [0,1,\ldots,12799] \text{ chips} & \text{for } 1.28 \text{ Mcps TDD} \\ [0,1,\ldots,38399] \text{chips} & \text{for } 3.84 \text{ Mcps TDD} \end{cases}$ T_{RxSFNi} = time of start (defined by the first detected path in time) of the received frame SFN_i of the serving TDD cell i. T_{RxSFNk} = time of start (defined by the first detected path in time) of the received frame SFN_k of the target UTRA cell k received most recently in time before the time instant T_{RxSFNi} in the UE. If this frame SFN_k of the target UTRA cell is received exactly at T_{RxSFNi} then $T_{RxSFNk} = T_{RxSFNi}$ (which leads to T_m=0). OFF = (SFN_i- SFN_k) mod 256, given in number of frames with the range [0, 1, …, 255] frames SFNi = system frame number for downlink frame from serving TDD cell i in the UE at the time T_{RxSFNi}. SFNk = system frame number for downlink frame from target UTRA cell k received in the UE at the time T_{RxSFNk}.(for FDD: the P-CCPCH frame) The reference point for the SFN-SFN observed time difference type 1 shall be the antenna connector of the UE. **Type 2:** SFN-SFN observed time difference = T_{RxTSk} - T_{RxTSi}, in chips, where T_{RxTSi} : time of start (defined by the first detected path in time) of a timeslot received from the serving TDD cell i. T_{RxTSk} : time of start (defined by the first detected path in time) of a timeslot received from the target UTRA cell k that is closest in time to the start of the timeslot of the serving TDD cell i. The reference point for the SFN-SFN observed time difference type 2 shall be the antenna connector of the UE.
Applicable for	**Type 1:** CELL_FACH intra, CELL_DCH intra **Type 2:** Idle, URA_PCH intra, URA_PCH inter, CELL_PCH intra, CELL_PCH inter, CELL_FACH intra, CELL_FACH inter, CELL_DCH intra, CELL_DCH interidle mode, connected mode (intra-frequency), connected mode (inter-frequency)

5.1.11 SFN-CFN observed time difference

Definition	The SFN-CFN observed time difference is defined as: T_m for an FDD neighbour cell (i.e. the value is reported in chips), OFF for a TDD neighbour cell (i.e the value is reported in frames), where: T_m = T_{UETx} - T_{RxSFN}, given in chip units with the range [0, 1, …, 38399] chips. T_{UETx} = the time at the beginning of the frame with the connection frame number CFN_{TX} considering the transmission from the UE in the serving TDD cell. T_{RxSFN} = the time (defined by the first detected path in time) at the beginning of the frame with the system frame number SFN (for FDD neighbour cells: P-CCPCH frame is considered) received at the UE from a neighbour cell. T_{RxSFN} is the time instant most recent in time before the time instant T_{UETx} OFF = (SFN-CFN_{TX}) mod 256, given in number of frames with the range [0, 1, …, 255] frames. CFN_{Tx} = the connection frame number for the UE transmission. SFN = is the system frame number for the neighbouring cell frame (for FDD neighbour cells: P-CCPCH frame) received in the UE at the time instant T_{RxSFN}. The reference point for the SFN-CFN observed time difference shall be the antenna connector of the UE.
Applicable for	CELL_DCH intra, CELL_DCH inter~~connected mode (inter-frequency), connected mode (intra-frequency)~~

5.1.12 Observed time difference to GSM cell

Definition	Observed time difference to GSM cell is reported as the time difference T_m in ms, where T_m= T_{RxGSMk} - $T_{RxSFN0i}$ $T_{RxSFN0i}$: time of start (defined by the first detected path in time) of the received frame SFN=0 of the serving TDD cell i $T_{RxGSMk.}$: time of start of the GSM BCCH 51-multiframe of the considered target GSM frequency k received closest in time after the time $T_{RxSFN0i.}$ If the next GSM BCCH 51-multiframe is received exactly at $T_{RxSFN0i}$ then T_{RxGSMk} = $T_{RxSFN0i}$ (which leads to T_m=0). The beginning of the GSM BCCH 51-multiframe is defined as the beginning of the first tail bit of the frequency correction burst in the first TDMA-frame of the GSM BCCH 51-multiframe, i.e. the TDMA-frame following the IDLE-frame. The reference point for the Observed time difference to GSM cell shall be the antenna connector of the UE. The reported time difference is calculated from the actual measurement in the UE. The actual measurement shall be based on: $T_{MeasGSM,j}$: The start of the first tail bit of the most recently received GSM SCH on frequency j $T_{MeasSFN,i}$: The start of the last frame received in TDD cell i before receiving the GSM SCH on frequency j For calculating the reported time difference, the frame lengths are always assumed to be 10 ms for UTRA and (60/13) ms for GSM.
Applicable for	Idle ~~mode~~, URA PCH inter-RAT, CELL_PCH inter-RAT, CELL_DCH Inter-RAT~~connected mode (inter-frequency)~~

5.1.13 UE GPS Timing of Cell Frames for UE positioning

Definition	$T_{UE-GPSj}$ is defined as the time of occurrence of a specified UTRAN event according to GPS Time Of Week. The specified UTRAN event is the beginning of a particular frame (identified through its SFN) in the first detected path (in time) of the cell j P-CCPCH. The reference point for $T_{UE-GPSj}$ shall be the antenna connector of the UE.
Applicable for	CELL_FACH intra, CELL_DCH intra~~connected mode (intra-frequency, inter-frequency)~~

5.1.14 Timing Advance (T_{ADV}) for 1.28 Mcps TDD

Definition	The 'timing advance (T_{ADV})' is the time difference $T_{ADV} = T_{RX} - T_{TX}$ Where T_{RX}: calculated beginning time of the first uplink time slot in the first subframe used by the UE with the UE timing according to the reception of a certain downlink time slot (for the timing it is assumed that the time slots within a sub-frame are scheduled like given in the frame structure described in 25.221 chapter 6.1) T_{TX}: time of the beginning of the same uplink time slot by the UE (for the timing it is assumed that the time slots within a sub-frame are scheduled like given in the frame structure described in 25.221 chapter 6.1)
Applicable for	CELL FACH intra, CELL DCH intra

~~Note: This measurement can be used for UE positioning.~~

5.1.15 UE GPS code phase

Definition	The whole and fractional phase of the spreading code of the i^{th} GPS satellite signal. The reference point for the GPS code phase shall be the antenna connector of the UE.
Applicable for	Void (this measurement is not related to UTRAN/GSM signals; its applicability is therefore independent of the UE RRC state)~~connected mode (intra frequency)~~

3GPP TSG RAN Meeting #16
Marco Island, FL, U.S.A., 4 – 7, June 2002

R1-02-0820

CR-Form-v5

CHANGE REQUEST

z **25.225** **CR** **050** z **rev** **2** z Current version: **5.0.0** z

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

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

Title:	z	Clarification of UE measurements Applicability
Source:	z	TSG RAN WG1
Work item code:	z	TEI
Date:	z	May 14th 2002
Category:	z	**A**
Release:	z	REL-5

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

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	z	Application of the UE measurements is not clearly specified
Summary of change:	z	This CR clarifies for each UE measurement in which RRC state it can be requested from the mobile and on which type of cell (intra/inter frequency). This level of detail was agreed to be included in the RAN1 specifications at the joint RAN1/RAN2 meeting February 5th-6th in Sophia-Antipolis. In contrast to the first revision of the CR, the 'IDLE mode' is removed from the TS-ISCP measurement, because it was felt, that this is an introduction of a new feature rather than a clarification between RAN1 and RAN2, which would imply some extra workload in RAN4. Furthermore the applicability of "SFN-SFN type 1" for Idle Mode, Cell_PCH and URA_PCH state has been removed, since no benefit was seen by the companies, involved in the discussions. Forcing a UE to decode the SFN for this purpose was seen as the mayor problem in these states.
Consequences if not approved:	z	Ambiguous specifications of UE measurement applicability Isolated Impact Analysis: This is an isolated impact CR that corrects a functionality where the specification contained contradictions. This CR would not affect implementations behaving as indicated in the CR, would affect implementations supporting the corrected functionality otherwise.

Clauses affected:	z	2, 5.1 and subclauses
Other specs affected:	z	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications
	z	

Other comments: z

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 25.211: "Physical channels and mapping of transport channels onto physical channels (FDD)".

[2] 3GPP TS 25.212: "Multiplexing and channel coding (FDD)".

[3] 3GPP TS 25.213: "Spreading and modulation (FDD)".

[4] 3GPP TS 25.214: "Physical layer procedures (FDD)".

[5] 3GPP TS 25.215: "Physical layer measurements (FDD)".

[6] 3GPP TS 25.221: "Physical channels and mapping of transport channels onto physical channels (TDD)".

[7] 3GPP TS 25.222: "Multiplexing and channel coding (TDD)".

[8] 3GPP TS 25.223: "Spreading and modulation (TDD)".

[9] 3GPP TS 25.224: "Physical layer procedures (TDD)".

[10] 3GPP TS 25.301: "Radio Interface Protocol Architecture".

[11] 3GPP TS 25.302: "Services provided by the Physical layer".

[12] 3GPP TS 25.303: "UE functions and interlayer procedures in connected mode".

[13] 3GPP TS 25.304: "UE procedures in idle mode".

[14] 3GPP TS 25.331: "RRC Protocol Specification".

[15] 3GPP TR 25.922: "Radio Resource Management Strategies".

[16] 3GPP TR 25.923: "Report on Location Services (LCS)".

[17] 3G TS 25.102: “UTRA (UE) TDD; Radio transmission and Reception”

[18] 3G TS 25.105: “UTRA (BS) TDD; Radio transmission and Reception”

[19] 3G TS 25.123: “Requirements for Support of Radio Resources Management (TDD)”

5.1 UE measurement abilities

The structure of the table defining a UE measurement quantity is shown below.

Column field	Comment
Definition	Contains the definition of the measurement.
Applicable for	States in which RRC state according to [14] a measurement shall be possible to be performed. For RRC connected mode states information is also given on the possibility to perform the measurement on intra-frequency and/or inter-frequency. The following terms are used in the tables: Idle = Shall be possible to perform in idle mode; URA_PCH = Shall be possible to perform in URA_PCH; CELL_PCH = Shall be possible to perform in CELL_PCH; CELL_FACH = Shall be possible to perform in CELL_FACH; CELL_DCH = Shall be possible to perform in CELL_DCH; For all RRC connected mode states i.e. URA_PCH, CELL_PCH, CELL_FACH and CELL_DCH Intra appended to the RRC state = Shall be possible to perform in the corresponding RRC state on an intra-frequency cell; Inter appended to the RRC state = Shall be possible to perform in the corresponding RRC state on an inter-frequency cell. Inter-RAT appended to the RRC state = Shall be possible to perform in the corresponding RRC state on an inter-RAT cell.

NOTE 1: Measurements for TDD which are specified on the Primary CCPCH (P-CCPCH) are carried out on the P-CCPCH or on any other beacon channel, see [6].

NOTE 2: For the beacon channels [6], the received power measurements shall be based on the received power for midamble $m^{(1)}$ if no Space Code Transmit Diversity (SCTD) is applied to the P-CCPCH and on the sum of the received powers for midambles $m^{(1)}$ and $m^{(2)}$ if SCTD is applied to the P-CCPCH.

NOTE 3: The UTRAN has to take into account the UE capabilities when specifying the timeslots to be measured in the measurement control message.

NOTE 4: The line ‘applicable for’ indicates whether the measurement is applicable for inter-frequency and/or intra-frequency and furthermore for idle and/or connected mode.

NOTE 5: The Interference part of the SIR measurement will be dependent on the receiver implementation, and will normally be different from the Timeslot ISCP measurement.

NOTE 6: The measurement ‘Timeslot ISCP’ is only a measure of the intercell interference.

NOTE 7: The term "antenna connector of the UE" used in this sub-clause to define the reference point for the UE measurements is defined in [17].

NOTE 8: Performance and reporting requirements for the UE measurements are defined in [19].

5.1.1 P-CCPCH RSCP

Definition	Received Signal Code Power, the received power on P-CCPCH of own or neighbour cell. The reference point for the RSCP shall be the antenna connector of the UE.
Applicable for	~~idle mode~~Idle, URA_PCH intra , URA_PCH inter, CELL_PCH intra, CELL_PCH inter, CELL_FACH intra, CELL_FACH inter, CELL_DCH intra, CELL_DCH inter~~connected mode (intra-frequency & inter-frequency)~~

5.1.2 CPICH RSCP

Definition	Received Signal Code Power, the received power on one code measured on the Primary CPICH. The reference point for the RSCP shall be the antenna connector of the UE. (This measurement is used in TDD for monitoring FDD cells while camping on a TDD cell). If Tx diversity is applied on the Primary CPICH the received code power from each antenna shall be separately measured and summed together in [W] to a total received code power on the Primary CPICH.
Applicable for	~~idle mode~~Idle, URA_PCH inter, CELL_PCH inter, CELL_FACH inter, CELL_DCH inter~~ connected mode (inter-frequency)~~

5.1.3 Timeslot ISCP

Definition	Interference Signal Code Power, the interference on the received signal in a specified timeslot measured on the midamble. The reference point for the ISCP shall be the antenna connector of the UE.
Applicable for	CELL_FACH intra, CELL_DCH intra~~connected mode (intra-frequency).~~

5.1.4 UTRA carrier RSSI

Definition	The received wide band power, including thermal noise and noise generated in the receiver, within the bandwidth defined by the receiver pulse shaping filter, for TDD within a specified timeslot. The reference point for the measurement shall be the antenna connector of the UE.
Applicable for	CELL_DCH intra, CELL_DCH inter ~~idle mode, connected mode (intra- & inter-frequency)~~

5.1.5 GSM carrier RSSI

Definition	Received Signal Strength Indicator, the wide-band received power within the relevant channel bandwidth Measurement shall be performed on a GSM BCCH carrier. The reference point for the RSSI shall be the antenna connector of the UE.
Applicable for	~~idle mode,~~Idle, URA_PCH inter-RAT, CELL_PCH inter-RAT, CELL_FACH inter-RAT, CELL_DCH inter-RAT~~connected mode (inter-frequency)~~

5.1.6 SIR

Definition	Signal to Interference Ratio, defined as: (RSCP/Interference)xSF. Where: RSCP = Received Signal Code Power, the received power on the code of a specified DPCH or PDSCH. Interference = The interference on the received signal in the same timeslot which can't be eliminated by the receiver. SF = The used spreading factor. The reference point for the SIR shall be the antenna connector of the UE.
Applicable for	CELL_FACH intra, CELL_DCH intra~~connected mode (intra-frequency)~~

5.1.7 CPICH Ec/No

Definition	The received energy per chip divided by the power density in the band. The CPICH Ec/No is identical to CPICH RSCP/UTRA Carrier RSSI. The measurement shall be performed on the Primary CPICH. The reference point for the CPICH Ec/No shall be the antenna connector of the UE. (This measurement is used in TDD for monitoring FDD cells while camping on a TDD cell) If Tx diversity is applied on the Primary CPICH the received energy per chip (Ec) from each antenna shall be separately measured and summed together in [Ws] to a total received chip energy per chip on the Primary CPICH, before calculating the Ec/No.
Applicable for	~~idle mode~~Idle, ~~connected mode (inter-frequency)~~ URA_PCH inter, CELL_PCH inter, CELL_FACH inter, CELL_DCH inter

5.1.8 Transport channel BLER

Definition	Estimation of the transport channel block error rate (BLER). The BLER estimation shall be based on evaluating the CRC on each transport block.
Applicable for	CELL_DCH intra~~connected mode (intra-frequency)~~

5.1.9 UE transmitted power

Definition	The total UE transmitted power on one carrier in a specified timeslot. The reference point for the UE transmitted power shall be the antenna connector of the UE.
Applicable for	CELL_FACH intra, CELL_DCH intra~~connected mode (intra-frequency).~~

5.1.10 SFN-SFN observed time difference

Definition	SFN-SFN observed time difference is the time difference of the reception times of frames from two cells (serving and target) measured in the UE and expressed in chips. It is distinguished by two types. Type 2 applies if the serving and the target cell have the same frame timing. The reference point for the SFN-SFN observed time difference type 1 and 2 shall be the antenna connector of the UE. **Type 1:** SFN-SFN observed time difference = $\begin{cases} \text{OFF} \times 12800 + T_m \text{ in chips} & \text{for } 1.28 \text{ Mcps TDD} \\ \text{OFF} \times 38400 + T_m \text{ in chips} & \text{for } 3.84 \text{ Mcps TDD} \end{cases}$ where: T_m = T_{RxSFNi} - T_{RxSFNk}, given in chip units with the range $\begin{cases} [0,1,\ldots,12799] \text{ chips} & \text{for } 1.28 \text{ Mcps TDD} \\ [0,1,\ldots,38399] \text{chips} & \text{for } 3.84 \text{ Mcps TDD} \end{cases}$ T_{RxSFNi} = time of start (defined by the first detected path in time) of the received frame SFN_i of the serving TDD cell i. T_{RxSFNk} = time of start (defined by the first detected path in time) of the received frame SFN_k of the target UTRA cell k received most recently in time before the time instant T_{RxSFNi} in the UE. If this frame SFN_k of the target UTRA cell is received exactly at T_{RxSFNi} then $T_{RxSFNk} = T_{RxSFNi}$ (which leads to T_m=0). OFF = $(SFN_i - SFN_k)$ mod 256, given in number of frames with the range [0, 1, …, 255] frames SFNi = system frame number for downlink frame from serving TDD cell i in the UE at the time T_{RxSFNi}. SFNk = system frame number for downlink frame from target UTRA cell k received in the UE at the time T_{RxSFNk}.(for FDD: the P-CCPCH frame) The reference point for the SFN-SFN observed time difference type 1 shall be the antenna connector of the UE. **Type 2:** SFN-SFN observed time difference = T_{RxTSk} - T_{RxTSi}, in chips, where T_{RxTSi} : time of start (defined by the first detected path in time) of a timeslot received from the serving TDD cell i. T_{RxTSk} : time of start (defined by the first detected path in time) of a timeslot received from the target UTRA cell k that is closest in time to the start of the timeslot of the serving TDD cell i. The reference point for the SFN-SFN observed time difference type 2 shall be the antenna connector of the UE.
Applicable for	**Type 1:** CELL_FACH intra, CELL_DCH intra **Type 2:** Idle, URA_PCH intra, URA_PCH inter, CELL_PCH intra, CELL_PCH inter, CELL_FACH intra, CELL_FACH inter, CELL_DCH intra, CELL_DCH interidle mode, connected mode (intra-frequency), connected mode (inter-frequency)

5.1.11 SFN-CFN observed time difference

Definition	The SFN-CFN observed time difference is defined as: T_m for an FDD neighbour cell (i.e. the value is reported in chips), OFF for a TDD neighbour cell (i.e the value is reported in frames), where: T_m = T_{UETx} - T_{RxSFN}, given in chip units with the range [0, 1, …, 38399] chips. T_{UETx} = the time at the beginning of the frame with the connection frame number CFN_{TX} considering the transmission from the UE in the serving TDD cell. T_{RxSFN} = the time (defined by the first detected path in time) at the beginning of the frame with the system frame number SFN (for FDD neighbour cells: P-CCPCH frame is considered) received at the UE from a neighbour cell. T_{RxSFN} is the time instant most recent in time before the time instant T_{UETx} OFF = (SFN-CFN_{TX}) mod 256, given in number of frames with the range [0, 1, …, 255] frames. CFN_{Tx} = the connection frame number for the UE transmission. SFN = is the system frame number for the neighbouring cell frame (for FDD neighbour cells: P-CCPCH frame) received in the UE at the time instant T_{RxSFN}. The reference point for the SFN-CFN observed time difference shall be the antenna connector of the UE.
Applicable for	CELL_DCH intra, CELL_DCH inter~~connected mode (inter-frequency), connected mode (intra-frequency)~~

5.1.12 Observed time difference to GSM cell

Definition	Observed time difference to GSM cell is reported as the time difference T_m in ms, where T_m= T_{RxGSMk} - $T_{RxSFN0i}$ $T_{RxSFN0i}$: time of start (defined by the first detected path in time) of the received frame SFN=0 of the serving TDD cell i $T_{RxGSMk.}$: time of start of the GSM BCCH 51-multiframe of the considered target GSM frequency k received closest in time after the time $T_{RxSFN0i.}$ If the next GSM BCCH 51-multiframe is received exactly at $T_{RxSFN0i}$ then T_{RxGSMk} = $T_{RxSFN0i}$ (which leads to T_m=0). The beginning of the GSM BCCH 51-multiframe is defined as the beginning of the first tail bit of the frequency correction burst in the first TDMA-frame of the GSM BCCH 51-multiframe, i.e. the TDMA-frame following the IDLE-frame. The reference point for the Observed time difference to GSM cell shall be the antenna connector of the UE. The reported time difference is calculated from the actual measurement in the UE. The actual measurement shall be based on: $T_{MeasGSM,j}$: The start of the first tail bit of the most recently received GSM SCH on frequency j $T_{MeasSFN,i}$: The start of the last frame received in TDD cell i before receiving the GSM SCH on frequency j For calculating the reported time difference, the frame lengths are always assumed to be 10 ms for UTRA and (60/13) ms for GSM.
Applicable for	Idle ~~mode~~, URA PCH inter-RAT, CELL_PCH inter-RAT, CELL_DCH Inter-RAT~~connected mode (inter-frequency)~~

5.1.13 UE GPS Timing of Cell Frames for UE positioning

Definition	$T_{UE-GPSj}$ is defined as the time of occurrence of a specified UTRAN event according to GPS Time Of Week. The specified UTRAN event is the beginning of a particular frame (identified through its SFN) in the first detected path (in time) of the cell j P-CCPCH. The reference point for $T_{UE-GPSj}$ shall be the antenna connector of the UE.
Applicable for	CELL_FACH intra, CELL_DCH intra~~connected mode (intra-frequency, inter-frequency)~~

5.1.14 Timing Advance (T_{ADV}) for 1.28 Mcps TDD

Definition	The 'timing advance (T_{ADV})' is the time difference $T_{ADV} = T_{RX} - T_{TX}$ Where T_{RX}: calculated beginning time of the first uplink time slot in the first subframe used by the UE with the UE timing according to the reception of a certain downlink time slot (for the timing it is assumed that the time slots within a sub-frame are scheduled like given in the frame structure described in 25.221 chapter 6.1) T_{TX}: time of the beginning of the same uplink time slot by the UE (for the timing it is assumed that the time slots within a sub-frame are scheduled like given in the frame structure described in 25.221 chapter 6.1)
Applicable for	CELL FACH intra, CELL DCH intra

~~Note: This measurement can be used for UE positioning.~~

5.1.15 UE GPS code phase

Definition	The whole and fractional phase of the spreading code of the i^{th} GPS satellite signal. The reference point for the GPS code phase shall be the antenna connector of the UE.
Applicable for	Void (this measurement is not related to UTRAN/GSM signals; its applicability is therefore independent of the UE RRC state)~~connected mode (intra frequency)~~