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

RP-020337

Title: **Agreed CRs (Release '99 and Rel-4/Rel-5 category A) to TS 25.331 (8)**

Source: **TSG-RAN WG2**

Agenda item: **7.2.3**

Doc-1st-	Status-	Spec	CR	Rev	Phase	Subject	Cat	Version	Versio
R2-021484	agreed	25.331	1478	1	R99	Clarification of Measurement Validity and Valid Measurement Objects	F	3.10.0	3.11.0
R2-021485	agreed	25.331	1479	1	Rel-4	Clarification of Measurement Validity and Valid Measurement Objects	A	4.4.0	4.5.0
R2-021486	agreed	25.331	1480	1	Rel-5	Clarification of Measurement Validity and Valid Measurement Objects	A	5.0.0	5.1.0

3GPP TSG-RAN WG2 Meeting #29
Gyeongju, Korea, 13-17 May 2002

Tdoc R2-021419

CR-Form-v5

CHANGE REQUEST

⌘ **25.331** **CR** **1478** ⌘ **rev** **-** ⌘ Current version: **3.10.0** ⌘

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

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

Title: ⌘	Clarification of Measurement Validity and Valid Measurement Objects	
Source: ⌘	TSG-RAN WG2	
Work item code: ⌘	TEI	***Date:*** ⌘ 08.05.02
Category: ⌘	**F**	***Release:*** ⌘ 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: ⌘ The following deficiencies have been identified:

1. It is not clear which cells will be in CELL_INFO_LIST, and that the UE should maintain the 3 mutually exclusive cell categories.
2. It is not clear what the difference is between setup and modify for a measurement.
3. It is currently possible to specify different validities for measurements which are additional measurements.
4. The description of actions where measurement validity is not included is inconsistent between measurement types (compare 8.4.1.7.1 ~~with 8.x.x,~~ and 8.4.1.7.2 with 8.6.7.1~~x.x~~).
5. Traffic volume measurement on state change: Sections 8.4.1.6.6 and 8.4.1.7.4 appear to be inconsistent. It is not clear when traffic volume measurements in MEASUREMENT_IDENTITY should be updated with the values in SIB 11 / 12.
6. Measurement configuration when measurement objects become invalid is not clear.
7. ~~Additional measurement reports do not contain measurement identities. It is unclear whether measurements which are not on-going should be included or not, hence there is a good chance for misinterpretation.~~
8. It is unclear what measurement capabilities and requirements have to do with Periodical measurement reporting.
9. ~~Reporting cell status is not present in SIB11/12 but section 8.6.7.9 is not specific to MEASUREMENT CONTROL.~~
10. In Reporting Cell Status for event-triggered measurements, it is not clear that Reporting Cell Status included within each event criterion.
11. Optional IEs within Traffic Volume and Quality Measurement Results appear to have no reason to be optional.

Summary of change: ⌘

1. It is proposed to state that the 3 cell categories are mutually exclusive~~,~~ ~~and to clarify that the UE must maintain the categorisation~~. Definitions of active, monitored and detected set cells are clarified. It is also clarified that UTRAN may specify a subset of the monitored set for reporting

using the IE "Cells for measurement". It is further ~~hoped~~ clarified that cells not in CELL_INFO_LIST shall not be considered for measurement by the UE. ~~will always contain active set cells~~.

2. It is proposed to state that "modify" applies only to a measurement of given identity and type.
3. It is proposed to constrain additional measurements to have the same validity as their "parent".
4. Changes to ~~8.4.1.6.1, 8.4.1.6.2,~~ 8.4.1.7.1 and 8.4.1.7.2 are proposed to make the handling of measurement validity consistent for inter/intra frequency measurements.
5. It is proposed to modify the text to align 8.4.1.6.6 and 8.4.1.7.4 for the last bulleted action.
6. ~~It is proposed to have the network always modify measurements when transport channels are deleted in CELL_DCH for traffic volume and quality measurements. It is also proposed to clarify that the network should not delete cells from CELL_INFO_LIST which are needed by other measurements.~~ It is clarified that it is the UE's responsibility to delete measurement objects when all transport channels are deleted from both traffic volume and quality measurements. It is also clarified that the UTRAN must maintain a consistent set of cells for inter/intra frequency measurements.
7. ~~It is proposed to specify that additional measurements are only included in measurement results if they are on-going.~~
8. It is proposed to remove the 4th bullet of 8.6.7.8.
9. ~~It is proposed to make the text in 8.6.7.9 specific to the MEASUREMENT CONTROL message.~~
10. It is proposed to clarify that Reporting Cell Status is dependent on the event trigger using a note.
11. It is proposed to clarify that these IEs will always be present
12. Agreed changes from R2-021116 have been merged in: It is clarified that the UE shall trigger the same event with the same entity more than once, provided that the conditions that caused the MEASUREMENT REPORT message to be sent are not met anymore in any interval of time after the event has been triggered.

Impact Analysis:
Impact is isolated only to measurement functions:

- Correction to a function where the specification was
  - Unclear, and
  - Containing some contradictions.

Would not affect implementations behaving as indicated in the CR, would affect implementations supporting the corrected functionality otherwise.

Consequences if not approved:	⌘	The specification is unclear in many places, and inconsistent in some places.

Clauses affected:	⌘	8.4.0, 8.4.1.2, 8.4.1.3, 8.4.1.6.6, 8.4.1.7.1, 8.4.1.7.2, 8.4.1.7.4, 8.4.2.2, 8.6.7.8, 8.6.7.9, 10.3.7.58, 10.3.7.72, 14.4.2.1, 14.4.2.2, 14.6.2.1, 14.6.2.2, 14.6.2.3, 14.6.2.4, 14.6.2.5, 14.6.2.6, 14.6.2.7			
Other specs Affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.331 v4.4.0, CR 1479 25.331 v5.0.0, CR 1480	
Other comments:	⌘				

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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

8.4 Measurement procedures

8.4.0 Measurement related definitions

UTRAN may control a measurement in the UE either by broadcast of SYSTEM INFORMATION and/or by transmitting a MEASUREMENT CONTROL message.

The following information is used to control the UE measurements and the measurement results reporting:

1. Measurement identity: A reference number that should be used by the UTRAN when setting up, modifying or releasing the measurement and by the UE in the measurement report.
2. Measurement command: One out of three different measurement commands.
   - Setup: Setup a new measurement.
   - Modify: Modify a previously defined measurement, e.g. to change the reporting criteria.
   - Release: Stop a measurement and clear all information in the UE that are related to that measurement.
3. Measurement type: One of the types listed below describing what the UE shall measure.

Presence or absence of the following control information depends on the measurement type

4. Measurement objects: The objects on which the UE shall measure measurement quantities, and corresponding object information.
5. Measurement quantity: The quantity the UE shall measure on the measurement object. This also includes the filtering of the measurements.
6. Reporting quantities: The quantities the UE shall include in the report in addition to the quantities that are mandatory to report for the specific event.
7. Measurement reporting criteria: The triggering of the measurement report, e.g. periodical or event-triggered reporting.
8. Measurement Validity: Defines in which UE states the measurement is valid.
9. Measurement reporting mode: This specifies whether the UE shall transmit the measurement report using AM or UM RLC.
10. Additional measurement identities: A list of references to other measurements. When this measurement triggers a measurement report, the UE shall also include the reporting quantities for the measurements referenced by the additional measurement identities.

All these measurement parameters depend on the measurement type and are described in more detail in clause 14.

The different types of measurements are:

- Intra-frequency measurements: measurements on downlink physical channels at the same frequency as the active set. A measurement object corresponds to one cell. Detailed description is found in subclause 14.1.
- Inter-frequency measurements: measurements on downlink physical channels at frequencies that differ from the frequency of the active set. A measurement object corresponds to one cell. Detailed description is found in subclause 14.2.
- Inter-RAT measurements: measurements on downlink physical channels belonging to another radio access technology than UTRAN, e.g. GSM. A measurement object corresponds to one cell. Detailed description is found in subclause 14.3.
- Traffic volume measurements: measurements on uplink traffic volume. A measurement object corresponds to one cell. Detailed description is found in subclause 14.4.
- Quality measurements: Measurements of downlink quality parameters, e.g. downlink transport block error rate. A measurement object corresponds to one transport channel in case of BLER. A measurement object corresponds to one timeslot in case of SIR (TDD only). Detailed description is found in subclause 14.5.
- UE-internal measurements: Measurements of UE transmission power and UE received signal level. Detailed description is found in subclause 14.6.
- UE positioning measurements: Measurements of UE position. Detailed description is found in subclause 14.7.

The UE shall support a number of measurements running in parallel as specified in [19] and [20]. The UE shall also support that each measurement is controlled and reported independently of every other measurement.

Cells that the UE is monitoring are grouped in the UE into three ~~different~~ mutually exclusive categories:

1. Cells, which belong to the active set. User information is sent from all these cells. In FDD, the cells in the active set are involved in soft handover. In TDD the active set always comprises one cell only.
2. Cells, which are not included in the active set, but are ~~explicitly indicated to be measured by UTRAN~~ included in CELL_INFO_LIST belong to the monitored set.

~~NOTE: The cells explicitly indicated to be measured by UTRAN for a given intra-frequency (resp. inter-frequency, inter-RAT) measurement are:~~

~~- if the IE "Cells for measurement" has been received for this intra-frequency (resp inter-frequency, inter-RAT) measurement:~~

~~- the intra-frequency (resp. inter-frequency, inter-RAT) cells stored in the variable CELL_INFO_LIST and pointed at in the IE "Cells for measurement".~~

~~- otherwise:~~

~~- any of the intra-frequency (resp. inter-frequency, inter-RAT) cells stored in the variable CELL_INFO_LIST.~~

~~NOTE: cells stored in the CELL_INFO_LIST may either be in the monitored or active set. The UE shall maintain the category a cell included in CELL_INFO_LIST has.~~

3. Cells detected by the UE, which are ~~neither included in the active set nor in the monitored set~~ not in the CELL_INFO_LIST nor in the active set belong to the detected set. Reporting of measurements of the detected set is only applicable to intra-frequency measurements made by UEs in CELL_DCH state.

If the IE "Cells for measurement" has been included in MEASUREMENT CONTROL or SIB 11 or SIB 12, only monitored set cells explicitly indicated for a given intra frequency (resp. inter frequency, interRAT) measurement by the IE "Cells for measurement" shall be considered for measurement. If the IE "Cells for measurement" has not been included in MEASUREMENT CONTROL or SIB 11 or SIB 12, all of the intra frequency (resp. inter frequency, inter RAT) cells stored in the variable CELL_INFO_LIST shall be considered for measurement.

Active set cells which are not in the CELL_INFO_LIST shall not be considered for any measurement.

8.4.1 Measurement control

Figure 8.4.1-1: Measurement Control, normal case

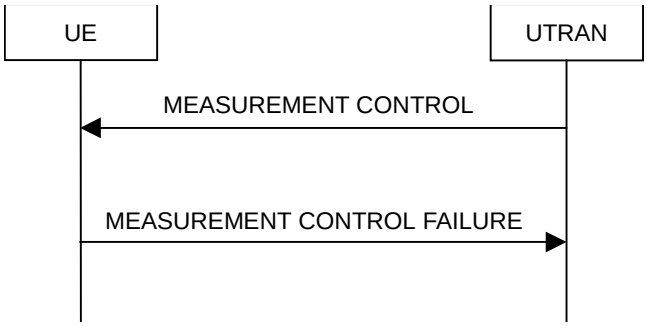

Figure 8.4.1-2: Measurement Control, failure case

8.4.1.1 General

The purpose of the measurement control procedure is to setup, modify or release a measurement in the UE.

8.4.1.2 Initiation

The UTRAN may request a measurement by the UE to be setup, modified or released with a MEASUREMENT CONTROL message, which is transmitted on the downlink DCCH using AM RLC.

The UTRAN should take the UE capabilities into account when a measurement is requested from the UE.

When a new measurement is created, UTRAN should set the IE "Measurement identity" to a value, which is not used for other measurements. UTRAN may use several

"Measurement identity" for the same "Measurement type". In case of setting several "Measurement identity" within a same "Measurement type", the measurement object or the list of measurement objects can be set differently for each measurement with different "Measurement identity ".

When a current measurement is modified or released, UTRAN should set the IE "Measurement identity" to the value, which is used for the measurement being modified or released. In case of modifying IEs within a "Measurement identity", it is not needed for UTRAN to indicate the IEs other than modified IEs, and the UE continues to use the current values of the IEs that are not modified. UTRAN should not use "modify" to change the type of measurement stored in the variable MEASUREMENT_IDNENTITY for a given measurement identity.

8.4.1.3 Reception of MEASUREMENT CONTROL by the UE

Upon reception of a MEASUREMENT CONTROL message the UE shall perform actions specified in subclause 8.6 unless otherwise specified below.

The UE shall:

1>read the IE "Measurement command";

1>if the IE "Measurement command" has the value "setup":

2>store this measurement in the variable MEASUREMENT_IDENTITY according to the IE "measurement identity", first releasing any previously stored measurement with that identity if that exists;

2>for measurement types "inter-RAT measurement" or "inter-frequency measurement":

3>if, according to its measurement capabilities, the UE requires compressed mode to perform that measurement type and a compressed mode pattern sequence with an appropriate measurement purpose is simultaneously activated by the IE "DPCH compressed mode status info"; or

3>if the IE "Inter-frequency cell info list" for that measurement identity is empty; or

3>if, according to its measurement capabilities, the UE does not require compressed mode to perform the measurements:

4>if the measurement is valid in the current RRC state of the UE:

5>begin measurements according to the stored control information for this measurement identity.

2>for measurement type "UE positioning measurement":

3>if the UE is in CELL_FACH state:

4>if IE "Positioning Method" is set to "OTDOA":

5>if IE "Method Type" is set to "UE assisted":

6>if IE "UE positioning OTDOA assistance data for UE assisted" is not included:

7>if System Information Block type 15.4 is broadcast:

8>read System Information Block type 15.4.

7>act as specified in subclause 8.6.7.19.2.

5>if IE "Method Type" is set to "UE based":

6>if IE "UE positioning OTDOA assistance data for UE based" is not included:

7>if System Information Block type 15.5 is broadcast:

8>read System Information Block type 15.5.

7>act as specified in subclause 8.6.7.19.2a.

2>for any other measurement type:

3>if the measurement is valid in the current RRC state of the UE:

4>begin measurements according to the stored control information for this measurement identity.

1>if the IE "Measurement command" has the value "modify":

2>for all IEs present in the MEASUREMENT CONTROL message:

3>if a measurement was stored in the variable MEASUREMENT_IDENTITY associated to the identity by the IE "measurement identity":

4>for measurement types "inter-frequency measurement" that require measurements on a frequency other than the actually used frequency, or that require measurements on another RAT:

5>if, according to its measurement capabilities, the UE requires compressed mode to perform that measurement type and a compressed mode pattern sequence with an appropriate measurement purpose is simultaneously activated by the IE "DPCH compressed mode status info"; and

5>if the IE "Inter-frequency cell info list" for that measurement identity is empty; or

5>if, according to its measurement capabilities, the UE does not require compressed mode to perform the measurements:

6>replace the corresponding information stored in variable MEASUREMENT_IDENTITY associated with the identity indicated by the IE "measurement identity" with the one received in the MEASUREMENT CONTROL message;

6>resume the measurements according to the new stored measurement control information.

4>for any other measurement type:

5>replace the corresponding information stored in variable MEASUREMENT_IDENTITY associated to the identity indicated by the IE "measurement identity" with the one received in the MEASUREMENT CONTROL message;

5>resume the measurements according to the new stored measurement control information.

3>otherwise:

4>set the variable CONFIGURATION_INCOMPLETE to TRUE.

2>for all optional IEs that are not present in the MEASUREMENT CONTROL message:

3>leave the currently stored information elements unchanged in the variable MEASUREMENT_IDENTITY if not stated otherwise for that IE.

1>if the IE "measurement command" has the value "release":

2>terminate the measurement associated with the identity given in the IE "measurement identity";

2>clear all stored measurement control information related associated to this measurement identity in variable MEASUREMENT_IDENTITY.

1>if the IE "DPCH Compressed Mode Status Info" is present:

2>if, as the result of this message, UE will have more than one transmission gap pattern sequence with the same measurement purpose active (according to IE 'TGMP' in variable TGPS_IDENTITY):

3>set the variable CONFIGURATION_INCOMPLETE to TRUE.

2>if pattern sequence corresponding to IE "TGPSI" is already active (according to "TGPS Status Flag"):

3>deactivate this pattern sequence at the beginning of the frame indicated by IE "TGPS reconfiguration CFN" received in the message.

2>after the time indicated by IE "TGPS reconfiguration CFN" has elapsed:

3>activate the pattern sequence stored in the variable TGPS_IDENTITY corresponding to each IE "TGPSI" for which the "TGPS status flag" is set to "active" at the time indicated by IE "TGCFN"; and

3>begin the inter-frequency and/or inter-RAT measurements corresponding to the pattern sequence measurement purpose of each activated pattern sequence;

3>if the values of IE "TGPS reconfiguration CFN" and IE "TGCFN" are equal:

4>start the concerned pattern sequence immediately at that CFN.

2>not alter pattern sequences stored in variable TGPS_IDENTITY, if the pattern sequence is not identitifed in IE "TGPSI" in the received message.

1>if the UE in CELL_FACH state receives a MEASUREMENT CONTROL message, which indicates the same measurement identity as that stored in the variable MEASUREMENT_IDENTITY:

2>update the stored information with the traffic volume measurement control information in variable MEASUREMENT_IDENTITY; and

2>refrain from updating the traffic volume measurement control information associated with this measurement identity in the variable

MEASUREMENT_IDENTITY with the information received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11) until this measurement is explicitly released with another MEASUREMENT CONTROL message.

1>if the IE "Read SFN indicator" included in the IE "Cell info" of an inter-frequency cell is set to TRUE and the variable UE_CAPABILITY_TRANSFERRED has the DL "Measurement capability" for "FDD measurements" set to TRUE (the UE requires DL compressed mode in order to perform measurements on FDD):

2>set the variable CONFIGURATION_INCOMPLETE to TRUE.

1>clear the entry for the MEASUREMENT CONTROL message in the table "Accepted transactions" in the variable TRANSACTIONS;

1>if the UE "Additional Measurement List" is present

2>if the received measurement configuration in this MEASUREMENT CONTROL message, or any measurement identities in the "Additional Measurement List" do not all have the same validity

3>set the variable CONFIGURATION_INCOMPLETE to TRUE.

The UE may:

1>if the IE "Measurement command" has the value "setup":

2>for measurement type "UE positioning measurement":

3>if the UE is CELL_FACH state:

4>if IE "Positioning Method" is set to "GPS":

5>if IE "UE positioning GPS assistance data" is not included and variable UE_POSITIONING_GPS_DATA is empty:

6>if System Information Block types 15, 15.1, 15.2 and 15.3 are broadcast:

7>read System Information Block types 15, 15.1, 15.2 and 15.3.

6>act as specified in subclause 8.6.7.19.3.

1>and the procedure ends.

8.4.1.4 Unsupported measurement in the UE

If UTRAN instructs the UE to perform a measurement that is not supported by the UE, the UE shall:

1>retain the measurement configuration that was valid before the MEASUREMENT CONTROL message was received;

1>set the IE "RRC transaction identifier" in the MEASUREMENT CONTROL FAILURE message to the value of "RRC transaction identifier" in the entry for the MEASUREMENT CONTROL message in the table "Accepted transactions" in the variable TRANSACTIONS; and

1>clear that entry.

1>set the cause value in IE "failure cause" to "unsupported measurement";

1> submit the MEASUREMENT CONTROL FAILURE message to lower layers for transmission on the DCCH using AM RLC;

1> continue with any ongoing processes and procedures as if the invalid MEASUREMENT CONTROL message has not been received;

1> and the procedure ends.

8.4.1.4a Configuration Incomplete

If the variable CONFIGURATION_INCOMPLETE is set to TRUE, the UE shall:

1> retain the measurement configuration that was valid before the MEASUREMENT CONTROL message was received;

1> set the IE "RRC transaction identifier" in the MEASUREMENT CONTROL FAILURE message to the value of "RRC transaction identifier" in the entry for the MEASUREMENT CONTROL message in the table "Accepted transactions" in the variable TRANSACTIONS and clear that entry;

1> clear the variable CONFIGURATION_INCOMPLETE;

1> set the cause value in IE "failure cause" to "Configuration incomplete";

1> submit the MEASUREMENT CONTROL FAILURE message to lower layers for transmission on the DCCH using AM RLC;

1> continue with any ongoing processes and procedures as if the invalid MEASUREMENT CONTROL message has not been received;

1> and the procedure ends.

8.4.1.5 Invalid MEASUREMENT CONTROL message

If the MEASUREMENT CONTROL message contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to clause 9, the UE shall perform procedure specific error handling as follows. The UE shall:

1> set the IE "RRC transaction identifier" in the MEASUREMENT CONTROL FAILURE message to the value of "RRC transaction identifier" in the entry for the MEASUREMENT CONTROL message in the table "Rejected transactions" in the variable TRANSACTIONS; and

1> clear that entry.

1> set the IE "failure cause" to the cause value "protocol error";

1> include the IE "Protocol error information" with contents set to the value of the variable PROTOCOL_ERROR_INFORMATION;

1> submit the MEASUREMENT CONTROL FAILURE message to lower layers for transmission on the DCCH using AM RLC;

1> continue with any ongoing processes and procedures as if the invalid MEASUREMENT CONTROL message has not been received;

1> and the procedure ends.

8.4.1.6 Measurements after transition from CELL_DCH to CELL_FACH/CELL_PCH/URA_PCH state

The UE shall apply the following rules for different measurement types after transiting from CELL_DCH to CELL_FACH/CELL_PCH/URA_PCH state:

8.4.1.6.1 Intra-frequency measurement

Upon transition from CELL_DCH to CELL_FACH/CELL_PCH/URA_PCH state, the UE shall:

1> stop intra-frequency type measurement reporting;

1> if the transition is due to a reconfiguration message which included the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD), and the UE selects a cell other than that indicated by this IE; or

1> if the transition is due to a reconfiguration message which does not include the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD); or

1> if the transition is not due to a reconfiguration message:

2> delete the measurements of type intra-frequency associated with the variable MEASUREMENT_IDENTITY.

~~1> if the optional IE "measurement validity" for this measurement has not been included:~~

~~2> delete the measurements of type intra-frequency associated with the variable MEASUREMENT_IDENTITY.~~

1> begin monitoring cells listed in the IE "intra-frequency cell info list" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11).

8.4.1.6.2 Inter-frequency measurement

Upon transition from CELL_DCH to CELL_FACH/ CELL_PCH/URA_PCH state, the UE shall:

1> stop the inter-frequency type measurement reporting assigned in a MEASUREMENT CONTROL message;

1> if the transition is due to a reconfiguration message which included the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD), and the UE selects a cell other than that indicated by this IE; or

1> if the transition is due to a reconfiguration message which does not include the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD); or

1> if the transition is not due to a reconfiguration message:

2> delete the measurements of type inter-frequency associated with the variable MEASUREMENT_IDENTITY.

1> begin monitoring cells listed in the IE "inter-frequency cell info list" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

~~1> if the optional IE "measurement validity" for this measurement has not been included:~~

~~2> delete the measurements of type inter-frequency associated with the variable MEASUREMENT_IDENTITY.~~

1> in CELL_FACH state:

2> perform measurements on other frequencies according to the IE "FACH measurement occasion info".

8.4.1.6.3 Inter-RAT measurement

Upon transition from CELL_DCH to CELL_FACH/CELL_PCH/URA_PCH state, the UE shall:

1> stop the inter-RAT type measurement reporting assigned in a MEASUREMENT CONTROL message;

1> delete the measurements of type inter-RAT associated with the variable MEASUREMENT_IDENTITY;

1> begin monitoring cells listed in the IE "inter-RAT cell info list" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

1> in CELL_FACH state:

2> perform measurements on other systems according to the IE "FACH measurement occasion info".

8.4.1.6.4 Quality measurement

Upon transition from CELL_DCH to CELL_FACH/CELL_PCH/URA_PCH state, the UE shall:

1> stop quality type measurement reporting;

1> delete all measurement control information of measurement type "quality" stored in the variable MEASUREMENT_IDENTITY.

8.4.1.6.5 UE internal measurement

Upon transition from CELL_DCH to CELL_FACH/CELL_PCH/URA_PCH state, the UE shall:

1> stop UE internal measurement type measurement reporting;

1> delete all measurement control information of measurement type "UE internal" stored in the variable MEASUREMENT_IDENTITY.

8.4.1.6.6 Traffic volume measurement

Upon transition from CELL_DCH to CELL_FACH or CELL_PCH or URA_PCH state, the UE shall:

1> retrieve each set of measurement control information of measurement type "traffic volume" stored in the variable MEASUREMENT_IDENTITY; and

2>if the optional IE "measurement validity" for this measurement has not been included:

3>delete the measurement associated with the variable MEASUREMENT_IDENTITY.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "CELL_DCH":

3>stop measurement reporting;

3>store the measurement associated with the variable MEASUREMENT_IDENTITY to be used after the next transition to CELL_DCH state.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states":

3>continue measurement reporting.

2>if the IE "measurement validity" has been included and the IE "UE state" has been assigned to value "all states except CELL_DCH":

3>resume this measurement and associated reporting.

1>if no traffic volume type measurement~~s~~ has been assigned to the UE ~~set up or modified through~~ with a MEASUREMENT CONTROL message ~~and~~ that is valid in CELL_FACH or CELL_PCH or URA_PCH states ~~are~~ (stored in the variable MEASUREMENT_IDENTITY) ~~with~~ which has the same identity as the one indicated in the IE "Traffic volume measurement system information":

2>store the measurement control information from the IE "Traffic volume measurement system information" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11) in the variable MEASUREMENT_IDENTITY;

2> begin traffic volume measurement reporting according to the assigned information.

8.4.1.6.7 UE positioning measurement

Upon transition from CELL_DCH to CELL_PCH or URA_PCH, the UE shall

1>if the UE does not support UE positioning measurement validity in CELL_PCH and URA_PCH states as indicated in the IE "UE positioning capability" included in the IE "UE Radio Access Capability":

2>stop UE positioning measurement reporting.

Upon transition from CELL_DCH to CELL_FACH, or upon transition from CELL_DCH to CELL_PCH or URA_PCH and if the UE supports UE positioning measurement validity in CELL_PCH and URA_PCH states as indicated in the IE "UE positioning capability" included in the IE "UE Radio Access Capability", the UE shall:

1>retrieve each set of measurement control information of measurement type "UE positioning" stored in the variable MEASUREMENT_IDENTITY; and

2>if the optional IE "measurement validity" for this measurement has not been included:

3>delete the measurement associated with the variable MEASUREMENT_IDENTITY.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "CELL_DCH":

3>stop measurement reporting;

3>store the measurement associated with the variable MEASUREMENT_IDENTITY to be used after the next transition to CELL_DCH state.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states":

3>upon transition from CELL_DCH to CELL_PCH or URA_PCH:

4>if the choice in the IE "Reporting Criteria" included the IE "UE Positioning" stored in the variable MEASUREMENT_IDENTITY is set to "UE positioning reporting criteria" and the value of the IE "Measurement interval " included in this IE is less than 64 seconds:

5>consider the value of the IE "Measurement interval " as being 64 seconds.

4>if the choice in the IE "Reporting Criteria" included the IE "UE Positioning" stored in the variable MEASUREMENT_IDENTITY is set to "Periodical Reporting Criteria" and the value of the IE "Reporting interval" included in this IE is less than 64 seconds:

5>consider the value of the IE "Reporting Interval" as being 64 seconds.

3>continue measurement reporting according to its UE positioning measurement reporting capability.

2>if the IE "measurement validity" has been included and the IE "UE state" has been assigned to value "all states except CELL_DCH":

3>upon transition from CELL_DCH to CELL_PCH or URA_PCH:

4>if the choice in the IE "Reporting Criteria" included the IE "UE Positioning" stored in the variable MEASUREMENT_IDENTITY is set to "UE positioning reporting criteria" and the value of the IE "Measurement interval " included in this IE is less than 64 seconds:

5>consider the value of the IE "Measurement interval " as being 64 seconds.

4>if the choice in the IE "Reporting Criteria" included the IE "UE Positioning" stored in the variable MEASUREMENT_IDENTITY is set to "Periodical Reporting Criteria" and the value of the IE "Reporting interval" included in this IE is less than 64 seconds:

5>consider the value of the IE "Reporting Interval" as being 64 seconds.

3>resume this measurement and associated reporting according to its UP measurement reporting capability.

1>if the transition is due to a reconfiguration message which included the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD), and the UE selects a cell other than that indicated by this IE; or

1> if the transition is due to a reconfiguration message which does not include the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD); or

1> if the transition is not due to a reconfiguration message:

2> delete the assistance data included in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED, UE_POSITIONING_OTDOA_DATA_UE_ASSISTED and UE_POSITIONING_GPS_DATA.

1> if the IE "Positioning Methods" stored in the variable MEASUREMENT_IDENTITY is set to "OTDOA" or "OTDOA or GPS":

2> if the IE "Method type" stored in the variable MEASUREMENT_IDENTITY is set to "UE-based" or "UE assisted preferred but UE-based allowed" or "UE-based preferred but UE-assisted allowed":

3> begin monitoring assistance data received in System Information Block type 15.4 and System Information Block type 15.5 according to subclause 8.1.1.6.15.

2> if the IE "Method type" stored in the variable MEASUREMENT_IDENTITY is set to "UE-assisted":

3> begin monitoring assistance data received in System Information Block type 15.4 according to subclause 8.1.1.6.15.

1> if the UE is in CELL_FACH state:

2> if the IE "UE positioning OTDOA neighbour cell list for UE assisted" stored in the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED or UE_POSITIONING_OTDOA_DATA_UE_BASED contains neighbour cells on other frequencies than the current frequency:

3> perform measurements on other frequencies according to the IE "FACH measurement occasion info".

The UE may:

1> if the IE "Positioning Methods" stored in the variable MEASUREMENT_IDENTITY is set to "GPS" or "OTDOA or GPS":

2> begin monitoring assistance data received in System Information Block type 15 and/or System Information Block type 15.1 and/or System Information Block type 15.2 and/or System Information Block type 15.3 according to subclause 8.1.1.6.15.

8.4.1.6a Actions in CELL_FACH/CELL_PCH/URA/PCH state upon cell re-selection

Upon cell reselection while in CELL_FACH/CELL_PCH/URA/PCH state and the cell reselection has occurred after the measurement control information was stored, the UE shall:

1> delete all measurements of type intra-frequency, inter-frequency, and inter-RAT associated with the variable MEASUREMENT_IDENTITY;

1> delete the traffic volume measurements that have not been set up or modified through a MEASUREMENT CONTROL message.

8.4.1.7 Measurements after transition from CELL_FACH to CELL_DCH state

The UE shall apply the following rules for different measurement types after transiting from CELL_FACH to CELL_DCH state:

8.4.1.7.1 Intra-frequency measurement

Upon transition from CELL_FACH to CELL_DCH state, the UE shall:

1> retrieve each set of measurement control information of measurement type "intra-frequency" stored in the variable MEASUREMENT_IDENTITY;

~~1> if the IE "measurement validity" for a measurement has been assigned the value "CELL_DCH:~~

~~2~~1> ~~-~~resume the measurement reporting.

1> if no intra-frequency measurements applicable to CELL_DCH state are stored in the variable MEASUREMENT_IDENTITY:

2> continue monitoring the list of neighbouring cells assigned in the IE "intra-frequency cell info list" in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

2> if the IE "intra-frequency measurement reporting criteria" was included in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11):

3> send the MEASUREMENT REPORT message when reporting criteria in IE "Reporting information for state CELL_DCH" are fulfilled.

8.4.1.7.2 Inter-frequency measurement

Upon transition from CELL_FACH to CELL_DCH state, the UE shall:

1> stop monitoring the list of cells assigned in the IE "inter-frequency cell info list" in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

1> retrieve each set of measurement control information of measurement type "inter-frequency" stored in the variable MEASUREMENT_IDENTITY; and

~~1> if the IE "measurement validity" for a measurement has been assigned the value "CELL_DCH":~~

~~2~~1> ~~-~~resume the measurement reporting.

8.4.1.7.3 Inter-RAT measurement

Upon transition from CELL_FACH to CELL_DCH state, the UE shall:

1> stop monitoring the list of cells assigned in the IE "inter-RAT cell info list" in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11).

8.4.1.7.4 Traffic volume measurement

Upon transition from CELL_FACH to CELL_DCH state, the UE shall:

1>retrieve each set of measurement control information of measurement type "traffic volume" stored in the variable MEASUREMENT_IDENTITY;

2>if the optional IE "measurement validity" for this measurement has not been included:

3>delete the measurement associated with the variable MEASUREMENT_IDENTITY.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states except CELL_DCH":

3>stop measurement reporting; and

3>save the measurement associated with the variable MEASUREMENT_IDENTITY to be used after the next transition to CELL_FACH/CELL_PCH/URA_PCH state.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states":

3>continue measurement reporting.

2>if the IE "measurement validity" has been included and the IE "UE state" has been assigned to value "CELL_DCH":

3>resume this measurement and associated reporting.

1>if no traffic volume type measurement has been assigned to the UE with a MEASUREMENT CONTROL message ~~when transiting to CELL_DCH state:~~ that is valid in CELL_DCH and has the same identity as the one indicated in the IE "Traffic volume measurement system information":

2>store the measurement control information from the IE "Traffic volume measurement system information" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11) in the variable MEASUREMENT_IDENTITY;

2> begin traffic volume measurement reporting according to the assigned information.

~~2>continue an ongoing traffic volume type measurement, assigned in System Information Block type 11 (or System Information Block type 12, according to subclause 8.1.1.6.11).~~

8.4.1.7.5 UE positioning measurement

Upon transition from CELL_FACH to CELL_DCH state, the UE shall:

1>retrieve each set of measurement control information of measurement type "UE positioning" stored in the variable MEASUREMENT_IDENTITY; and

2>if the optional IE "Measurement validity" for this measurement has not been included:

3>delete the measurement associated with the variable MEASUREMENT_IDENTITY.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states except CELL_DCH":

3>stop measurement reporting; and

3>save the measurement associated with the variable MEASUREMENT_IDENTITY to be used after the next transition to CELL_FACH/CELL_PCH/URA_PCH state.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states":

3>continue measurement reporting.

2>if the IE "measurement validity" has been included and the IE "UE state" has been assigned to value "CELL_DCH":

3>resume this measurement and associated reporting.

1>stop monitoring assistance data received in System Information Block type 15 or System Information Block type 15.1 or System Information Block type 15.2 or System Information Block type 15.3 or System Information Block type 15.4 or System Information Block 15.5.

8.4.1.8 Measurements after transition from idle mode to CELL_DCH state

The UE shall obey the following rules for different measurement types after transiting from idle mode to CELL_DCH state:

8.4.1.8.1 Intra-frequency measurement

Upon transition from idle mode to CELL_DCH state, the UE shall:

1>begin or continue monitoring the list of cells assigned in the IE "intra-frequency cell info list" in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

1>if the "intra-frequency measurement reporting criteria" IE was included in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11):

2>begin measurement reporting according to the IE.

8.4.1.8.2 Inter-frequency measurement

Upon transition from idle mode to CELL_DCH state, the UE shall:

1>stop monitoring the list of cells assigned in the IE "inter-frequency cell info list" in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11).

8.4.1.8.3 Inter-RAT measurement

Upon transition from idle mode to CELL_DCH state, the UE shall:

1>stop monitoring the list of cells assigned in the IE "inter-RAT cell info list" in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11).

8.4.1.8.4 Traffic volume measurement

Upon transition from idle mode to CELL_DCH state, the UE shall:

1> begin a traffic volume type measurement, assigned in System Information Block type 11 (or System Information Block type 12, according to subclause 8.1.1.6.11).

8.4.1.8.5 UE positioning measurement

Upon transition from idle mode to CELL_DCH state, the UE shall:

1> stop monitoring assistance data received in System Information Block type 15 or System Information Block type 15.1 or System Information Block type 15.2 or System Information Block type 15.3 or System Information Block type 15.4 or System Information Block type 15.5.

8.4.1.9 Measurements after transition from idle mode to CELL_FACH state

The UE shall obey the follow rules for different measurement types after transiting from idle mode to CELL_FACH state:

8.4.1.9.1 Intra-frequency measurement

Upon transition from idle mode to CELL_FACH state, the UE shall:

1> begin or continue monitoring cells listed in the IE "intra-frequency cell info list" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11).

8.4.1.9.2 Inter-frequency measurement

Upon transition from idle mode to CELL_FACH state, the UE shall:

1> begin or continue monitoring cells listed in the IE "inter-frequency cell info list" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

1> perform measurements on other frequencies according to the IE "FACH measurement occasion info".

8.4.1.9.3 Inter-RAT measurement

Upon transition from idle mode to CELL_FACH state, the UE shall:

1> begin or continue monitoring cells listed in the IE "inter-RAT cell info list" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

1> perform measurements on other systems according to the IE "FACH measurement occasion info".

8.4.1.9.4 Traffic volume measurement

Upon transition from idle mode to CELL_FACH state, the UE shall:

1> store the measurement control information from the IE "Traffic volume measurement system information" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11) in the variable MEASUREMENT_IDENTITY;

1> begin traffic volume measurement reporting according to the assigned information.

8.4.1.9.5 UE positioning measurement

Upon transition from idle mode to CELL_FACH state, the UE may:

1> begin or continue monitoring assistance data received in System Information Block type 15 or System Information Block type 15.1 or System Information Block type 15.2 or System Information Block type 15.3 or System Information Block type 15.4 or System Information Block type 15.5 according to subclause 8.1.1.6.15;

1> if the IE "UE positioning OTDOA neighbour cell list for UE assisted" stored in the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED; or

1> if the IE "UE positioning OTDOA neighbour cell list for UE based" stored in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED contains neighbour cells on other frequencies than the current frequency:

2> perform measurements on other frequencies according to the IE "FACH measurement occasion info".

8.4.1.9a Measurements after transition from connected mode to idle mode

Upon transition from connected mode to idle mode the UE shall:

1> stop measurement reporting for all measurements stored in the variable MEASUREMENT_IDENTITY;

1> clear the variable MEASUREMENT_IDENTITY;

1> apply the following rules for different measurement types.

8.4.1.9a.1 Intra-frequency measurement

Upon transition from connected mode to idle mode, the UE shall:

1> stop monitoring intra-frequency cells listed in the IE "intra-frequency cell info list" received in System Information Block type 12 (if System Information Block type 12 is transmitted in the cell, according to subclause 8.1.1.6.11);

1> begin monitoring intra-frequency cells listed in the IE "intra-frequency cell info list" received in System Information Block type 11.

8.4.1.9a.2 Inter-frequency measurement

Upon transition from connected mode to idle mode, the UE shall:

1> stop monitoring inter-frequency cells listed in the IE "inter-frequency cell info list" received in System Information Block type 12 (if System Information Block type 12 is transmitted in the cell, according to subclause 8.1.1.6.11);

1> begin monitoring inter-frequency cells listed in the IE "inter-frequency cell info list" received in System Information Block type 11.

8.4.1.9a.3 Inter-RAT measurement

Upon transition from connected mode to idle mode, the UE shall:

1> stop monitoring inter-RAT cells listed in the IE "inter-RAT cell info list" received in System Information Block type 12 (if System Information Block type 12 is transmitted in the cell, according to 8.1.1.6.11);

1> begin monitoring inter-RAT cells listed in the IE "inter-RAT cell info list" received in System Information Block type 11.

8.4.1.9a.4 UE positioning measurement

Upon transition from connected mode to idle mode, the UE may:

1> begin or continue monitoring assistance data received in System Information Block type 15 or System Information Block type 15.1 or System Information Block type 15.2 or System Information Block type 15.3 or System Information Block type 15.4 or System Information Block type 15.5.

8.4.1.10 Measurements when measurement object is no longer valid

8.4.1.10.1 Traffic volume measurement

If UE is no longer using the transport channel that is specified in the IE "Traffic volume measurement object", UE shall ignore any measurements that are assigned to that transport channel. If none of the transport channels that are specified in "traffic volume measurement object" is being used, UE shall delete that particular measurement and its measurement identity from the variable MEASUREMENT_IDENTITY.

8.4.2 Measurement report

Figure 8.4.2-1: Measurement report, normal case

8.4.2.1 General

The purpose of the measurement reporting procedure is to transfer measurement results from the UE to UTRAN.

8.4.2.2 Initiation

In CELL_DCH state, the UE shall:

1> transmit a MEASUREMENT REPORT message on the uplink DCCH when the reporting criteria stored in variable MEASUREMENT_IDENTITY are met for any ongoing measurements that are being performed in the UE.

In CELL_FACH state, the UE shall:

1> transmit a MEASUREMENT REPORT message on the uplink DCCH when the reporting criteria stored in variable MEASUREMENT_IDENTITY are met for any ongoing traffic volume measurement or UE positioning measurement that is being performed in the UE;

1> include a measurement report in the IE "Measured results on RACH", as specified in the IE "Intra-frequency reporting quantity for RACH reporting" and the IE "Maximum number of reported cells on RACH" in System Information Block type 12

(or "System Information Block Type 11" if "System Information Block Type 12" is not being broadcast);

1>include in the IE "Measured results on RACH" all requested reporting quantities for cells for which measurements are reported.

In TDD, if the Radio Bearer associated with the MEASUREMENT_IDENTITY fulfilling the reporting criteria for an ongoing traffic volume measurement is mapped on transport channel of type USCH, the UE shall:

1>initiate the "PUSCH CAPACITY REQUEST" procedure instead of transmitting a MEASUREMENT REPORT (TDD Only).

In CELL_PCH or URA_PCH state, the UE shall:

1>first perform the cell update procedure according to subclause 8.3.1, using the cause "uplink data transmission", in order to transit to CELL_FACH state; and then

1>transmit a MEASUREMENT REPORT message on the uplink DCCH when the reporting criteria stored in variable MEASUREMENT_IDENTITY are fulfilled for any ongoing traffic volume measurement or UE positioning measurement which is being performed in the UE.

The reporting criteria are fulfilled if either:

- the first measurement has been completed according to the requirements set in [19] or [20] for a newly initiated measurement with periodic reporting; or
- the time period indicated in the stored IE "Periodical reporting criteria" has elapsed since the last measurement report was submitted to lower layers for a given measurement; or
- an event in stored IE "Measurement reporting criteria" was triggered. Events and triggering of reports for different measurement types are described in detail in clause 14.

For the measurement, which triggered the MEASUREMENT REPORT message, the UE shall:

1>set the IE "measurement identity" to the measurement identity, which is associated with that measurement in variable MEASUREMENT_IDENTITY;

1>set the IE "measured results" to include measurements according to the IE "reporting quantity" of that measurement stored in variable MEASUREMENT_IDENTITY; and

2>if all the reporting quantities are set to "false":

3>not set the IE "measured results".

1>set the IE "Measured results" in the IE "Additional measured results" according to the IE "reporting quantity" for all measurements associated with the measurement identities included in the "Additional measurements list" stored in variable MEASUREMENT_IDENTITY of the measurement that triggered the measurement report; and

2>if more than one additional measured results are to be included:

3>~~for each on-going measurement~~ sort them in ascending order according to their IE "measurement identity" in the MEASUREMENT REPORT message.

1> if the MEASUREMENT REPORT message was triggered by an event (i.e. not a periodical report):

2> set the IE "Event results" according to the event that triggered the report.

The UE shall:

1> transmit the MEASUREMENT REPORT message on the uplink DCCH using either AM or UM RLC according to the stored IE "measurement reporting mode" associated with the measurement identity that triggered the report.

When the MEASUREMENT REPORT message has been submitted to lower layers for transmission:

1> the procedure ends.

8.6.7.1 Measurement validity

If the IE "measurement validity" for a given measurement has not been included in measurement control information, the UE shall delete the measurement associated with the variable MEASUREMENT_IDENTITY after the UE makes a transition to a new state.

If the IE "measurement validity" for this measurement has been included in measurement control information, the UE shall save the measurement associated with the variable MEASUREMENT_IDENTITY. The IE "UE state" defines the scope of resuming the measurement.

If the "UE state" is defined as "all states", the UE shall continue the measurement after making a transition to a new state. This scope is assigned for traffic volume measurement type and UE positioning measurement type. For traffic volume measurement type this scope can only be applied by the UE if the IE " traffic volume measurement object" has been included in measurement control information. If the IE " traffic volume measurement object" has not been included in measurement control information, the UE shall not save the measurement control information in variable MEASUREMENT_IDENTITY, but shall send a MEASUREMENT CONTROL FAILURE message to the UTRAN with failure cause "Configuration incomplete".

If the "UE state" is defined as "all states except CELL_DCH", the UE shall store the measurement to be resumed after a subsequent transition from CELL_DCH state to any of the other states in connected mode. This scope is assigned for traffic volume measurement type or UE positioning measurement type.

If the "UE state" is defined as "CELL_DCH", the UE shall store the measurement to be resumed after a subsequent transition to CELL_DCH state.

8.6.7.8 Periodical Reporting Criteria

If the IE "Periodical Reporting Criteria" is received by the UE, the UE shall:

1> store the contents of the IE "Amount of Reporting" and IE "Reporting interval" in the variable MEASUREMENT_IDENTITY.

For the first MEASUREMENT REPORT message, the UE shall:

1>send the MEASUREMENT REPORT at the end of the first reporting interval in which all requested reporting quantities are available according to the requirements and the measurement capabilities set in [19] and [20] for at least one measurement object stored in the variable MEASUREMENT_IDENTITY.

Following the first MEASUREMENT REPORT message, the UE shall:

1>send subsequent MEASUREMENT REPORT message with intervals specified by the IE "Reporting interval";

~~1>form the MEASUREMENT REPORT from the measurement objects stored in the variable MEASUREMENT_IDENTITY for which all requested reporting quantities are available according to the requirements and the measurement capabilities set in [19] and [20]; and~~

1>omit measurement results that were reported in a previous MEASUREMENT REPORT and for which new measurement results are not available in the present reporting interval.

After the UE has sent a total number of MEASUREMENT REPORT messages, which equal the value indicated in the IE "Amount of reporting", the UE shall:

1>terminate measurement reporting; and

1>delete all measurement information linked with the "Measurement identity" of the ongoing measurement from the variable MEASUREMENT_IDENTITY.

8.6.7.9 Reporting Cell Status

If the IE "Reporting Cell Status" is received, the UE shall set the IE "Measured Results" in MEASUREMENT REPORT as follows. The UE shall:

1>for intra-frequency measurement and inter-frequency measurement:

2>include the IE "Cell Measured Results" for cells (excluding cells of another RAT) that satisfy the condition (such as "Report cells within active set") specified in the IE "Reporting Cell Status", in descending order by the measurement quantity.

2>the maximum number of the IE "Cell Measured Results" to be included in the IE "Measured Results" is the number specified in the IE "Reporting Cell Status".

1>for inter-RAT measurement:

2>include the measurement results for cells of other RAT (e.g., GSM) that satisfy the condition specified in the IE "Reporting Cell Status", in descending order by the measurement quantity.

2>the maximum number of the IE "Measured GSM Cells" to be included in the IE "Measured Results" is the number specified in the IE "Reporting Cell Status".

If the IE "Reporting Cell Status" is not received for intra-frequency, inter-frequency measurement, or inter-RAT measurement, the UE shall:

1>for intra-frequency measurement and inter-frequency measurement~~s setup or modified by a MEASUREMENT CONTROL message~~:

2>exclude the IE "Cell Measured Results" for any cell in MEASUREMENT REPORT.

NOTE: The “Reporting Cell Status” IE within "Event Criteria List" defines whether "Cell Measured Results" is present for event-based reporting.

1>for inter-RAT measurement:

2>exclude the IE "Measured GSM Cells" for any cell in MEASUREMENT REPORT.

10.3.7.72 Traffic volume measurement reporting criteria

Contains the measurement reporting criteria information for a traffic volume measurement.

Event 4a: Transport Channel Traffic Volume [15] exceeds an absolute threshold.

Event 4b: Transport Channel Traffic Volume [15] becomes smaller than an absolute threshold.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Parameters sent for each transport channel	OP	1 to <maxTrCH>		This IE is always required, need is OP to align with ASN.1
>Uplink transport channel type	OP		Enumerated(DCH,RACHorCPCH,USCH)	USCH is TDD only. CPCH is FDD only. RACHorCPCH is the currently configured default in the uplink.
>UL Transport Channel ID	CV-*UL-DCH/USCH*		Transport channel identity 10.3.5.18	
>Parameters required for each Event	OP	1 to <maxMeasperEvent>		This IE is always required, need is OP to align with ASN.1
>>Traffic volume event identity	MP		Traffic volume event identity 10.3.7.66	
>>Reporting Threshold	MP		Enumerated(8,16,32,64,128,256,512,1024,2K,3K,4K,6K,8K,12K,16K,24K,32K,48K,64K,96K,128K,192K,256K,384K,512K,768K)	Threshold in bytes And N Kbytes = N*1024 bytes
>>Time to trigger	OP		Time to trigger 10.3.7.64	Indicates the period of time between the timing of event detection and the timing of sending Measurement Report. Time in ms
>>Pending time after trigger	OP		Integer(250, 500, 1000, 2000, 4000, 8000, 16000)	Indicates the period of time during which it is forbidden to send any new measurement reports with the same Traffic volume event identity even if the triggering condition is fulfilled. Time in milliseconds
>>Tx interruption after trigger	OP		Integer (250, 500, 1000, 2000, 4000, 8000, 16000)	Time in milliseconds. Indicates how long the UE shall block DTCH transmissions on the RACH after a measurement report is triggered.

Condition	Explanation
UL-DCH/USCH	If IE "Uplink transport channel type" is equal to "DCH" or "USCH" (TDD only) this IE is optional. Otherwise the IE is not needed.

10.3.7.41 Intra-frequency reporting quantity

Contains the reporting quantity information for an intra-frequency measurement.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Reporting quantities for active set cells	MP		Cell reporting quantities 10.3.7.5	
Reporting quantities for monitored set cells	MP		Cell reporting quantities 10.3.7.5	
Reporting quantities for detected set cells	OP		Cell reporting quantities 10.3.7.5	

10.3.7.58 Quality measurement reporting criteria

Event 5a: Number of bad CRCs on a certain transport channel exceeds a threshold.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Parameters sent for each transport channel	~~O~~MP	1 to <maxTrCH>		~~This IE is always required, need is OP to align with ASN.1~~
>DL Transport channel identity	MP		Transport channel identity 10.3.5.18	transport channel type = DCH
>Total CRC	MP		Integer(1..512)	Number of CRCs
>Bad CRC	MP		Integer(1..512)	Number of CRCs
>Pending after trigger	MP		Integer(1..512)	Number of CRCs

13.4 UE variables

13.4.0 CELL INFO LIST

This variable contains cell information on intra-frequency, inter-frequency and inter-RAT cells, as received in messages System Information Block Type 11, System Information Block Type 12, and MEASUREMENT CONTROL. ~~CELL_INFO_LIST will always include all cells in the active set.~~

The first position in Intra-frequency cell info list corresponds to Intra-frequency cell id 0, the second to Intra-frequency cell id 1, etc.

The first position in Inter-frequency cell info list corresponds to Inter-frequency cell id 0, the second to Inter-frequency cell id 1, etc.

The first position in Inter-RAT cell info list corresponds to Intra-frequency cell id 0, the second to Inter-RAT cell id 1, etc.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Intra-frequency cell info	OP	1..<maxCellMeas>		Note
>CHOICE *position status*	MP			
>>Occupied				
>>>Cell info	MP		Cell info 10.3.7.2	
>>Vacant				No data
Inter-frequency cell info	OP	1..<maxCellMeas>		Note
>CHOICE *position status*	MP			
>>Occupied				
>>>Frequency info	MP		Frequency info 10.3.6.36	
>>>Cell info	MP		Cell info 10.3.7.2	
>>Vacant				No data
Inter-RAT cell info	OP	1..<maxCellMeas>		Note
>CHOICE *position status*	MP			
>>Occupied				
>>>CHOICE *Radio Access Technology*				
>>>>GSM				
>>>>>Cell selection and re-selection info	MP		Cell selection and re-selection info for SIB11/12 10.3.2.4	
>>>>>BSIC	MP		BSIC 10.3.8.2	
>>>>>BCCH ARFCN	MP		Integer (0..1023)	[43]
>>>>IS-2000				
>>>>>System specific measurement info			enumerated (frequency, timeslot, colour code, output power, PN offset)	For IS-2000, use fields from TIA/EIA/IS-2000.5, subclause 3. 7.3.3.2.27, *Candidate Frequency Neighbour List Message*
>>Vacant				No data

NOTE: This IE shall be cleared when entering UTRA RRC connected mode, when leaving UTRA RRC connected mode, when switched off as well as at selection of a new PLMN.

14.4 Traffic Volume Measurements

14.4.1 Traffic Volume Measurement Quantity

In order to support a large variation of bit rates and RLC buffer size capabilities, a non-linear scale is used. Since, for each RB, the expected traffic includes both new and retransmitted RLC PDUs and potentially existing Control PDUs, all these should be included in the Buffer Occupancy measure. It should also be noted that traffic volume measurements are only applicable for acknowledged and unacknowledged mode.

According to what is stated in the Measurement Control message, the UE should support reporting of RLC Buffer Payload, Average of RLC Buffer Payload, and Variance of RLC Buffer Payload for RBs multiplexed onto the same Transport channel. The Reporting Quantities (i.e. RLC Buffer Payload, Average of RLC Buffer Payload, and Variance of RLC Buffer Payload of each RB) are indicated in the measurement control message. If Average of RLC Buffer Payload or Variance of RLC Buffer Payload is included as Reporting Quantity, the time interval to take an average or a variance shall be used. When the RLC buffer payload, Average of RLC buffer payload or Variance of RLC buffer payload is reported, the measured quantity shall be rounded upwards to the closest higher value possible to report.

14.4.2 Traffic Volume reporting triggers

Traffic volume can be reported in two different ways, periodical and event triggered. The reporting criteria are specified in the measurement control message.

For periodical reporting the UE simply determines the Reporting Quantities in number of bytes for each RB mapped onto the indicated transport channels and reports the results at the time interval and for the number of times specified.

For traffic volume measurements in the UE only one quantity is compared with the thresholds. This quantity is Transport Channel Traffic Volume [15] (which equals the sum of Buffer Occupancies of RBs multiplexed onto a transport channel) in number of bytes. Event triggered reporting is performed when the Transport Channel Traffic Volume exceeds an upper threshold or becomes smaller than a lower threshold. Every TTI, UE measures the Transport Channel Traffic Volume for each transport channel and compares it with the configured thresholds. If the value is out of range, the UE determines the Reporting Quantities for the RBs mapped onto that transport channel and reports the results.

14.4.2.1 Reporting event 4 A: Transport Channel Traffic Volume exceeds an absolute threshold

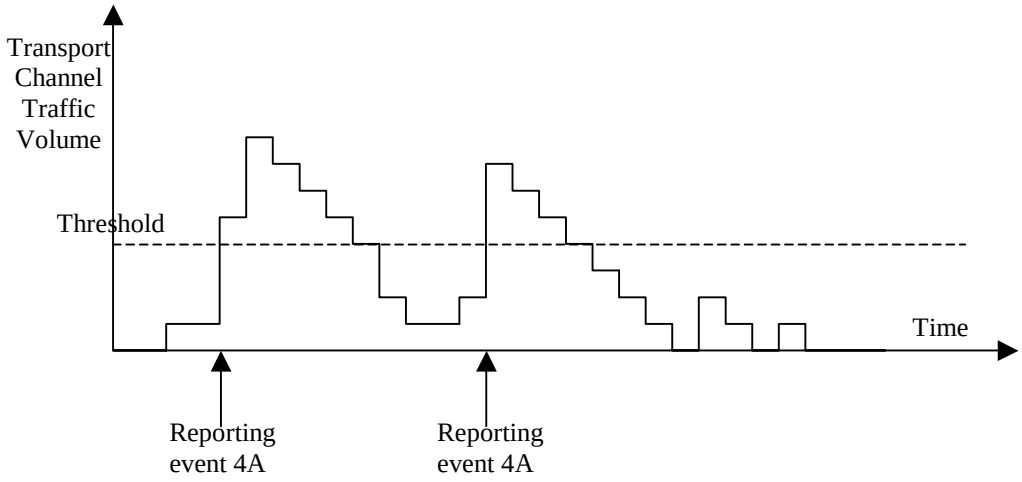

Figure 14.4.2.1-1: Event triggered report when Transport Channel Traffic Volume exceeds a certain threshold

If the monitored Transport Channel Traffic Volume (TCTV) [15] exceeds an absolute threshold, i.e. if TCTV~~F~~>Reporting threshold, this is an event that could trigger a report. The event could be triggered again only if TCTV becomes smaller than the Reporting threshold and later TCTV>Reporting threshold is verified again. The corresponding report specifies at least which measurement ID the event that triggered the report belongs to.

14.4.2.2 Reporting event 4 B: Transport Channel Traffic Volume becomes smaller than an absolute threshold

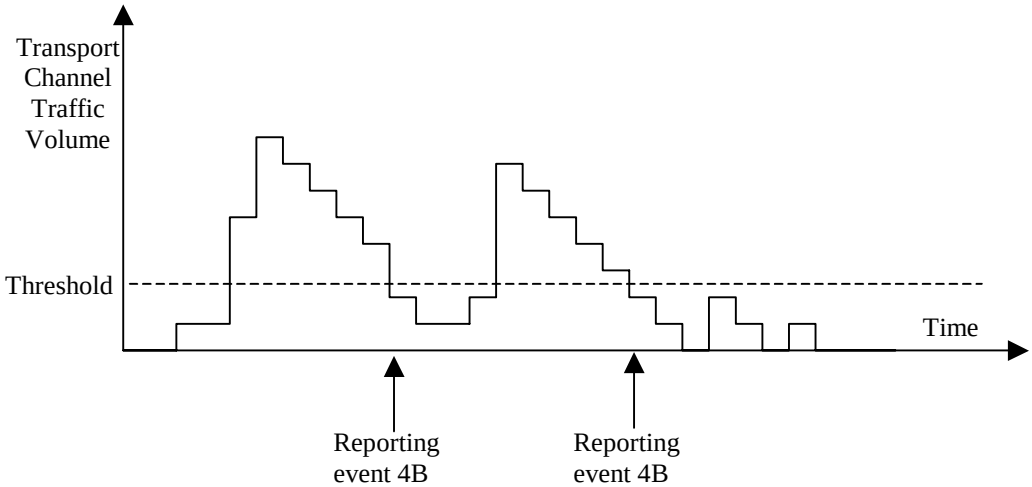

Figure 14.4.2.1-2: Event triggered report when Transport Channel Traffic Volume becomes smaller than certain threshold

If the monitored Transport Channel Traffic Volume [15] becomes smaller than an absolute threshold, i.e. if TCTV~~F~~<Reporting threshold, this is an event that could trigger a report. The event could be triggered again only if TCTV becomes bigger than the Reporting threshold and later TCTV<Reporting threshold is verified again. The corresponding report specifies at least which measurement ID the event that triggered the report belongs to.

14.4.3 Traffic volume reporting mechanisms

Traffic volume measurement triggering could be associated with both a *time-to-trigger* and a *pending time after trigger*. The time-to-trigger is used to get time domain hysteresis, i.e. the condition must be fulfilled during the time-to-trigger time before a report is sent. Pending time after trigger is used to limit consecutive reports when one traffic volume measurement report already has been sent. This is described in detail below.

14.4.3.1 Pending time after trigger

This timer is started in the UE when a measurement report has been triggered. The UE is then forbidden to send any new measurement reports with the same measurement ID during this time period even when the triggering condition is fulfilled again. Instead the UE waits until the timer has suspended. If the Transport Channel Traffic Volume [15] is still above the threshold when the timer has expired the UE sends a new measurement report, and the timer is restarted. Otherwise it waits for a new triggering.

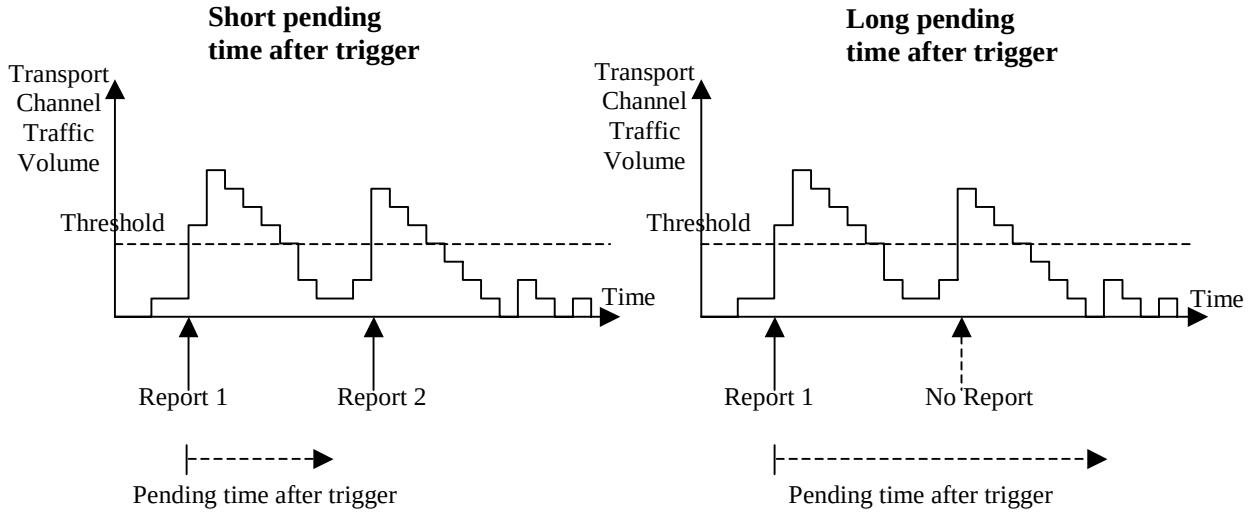

Figure 14.4.3.1-1: Pending time after trigger limits the amount of consecutive measurement reports

Figure 14.4.3.1-1 shows that by increasing the pending time after trigger a triggered second event does not result in a measurement report.

14.4.4 Interruption of user data transmission

A UE in CELL_FACH substate may be instructed by the UTRAN to cease transmission of user data on the RACH after a measurement report has been triggered. Before resuming transmission of user data,

1> the UE shall receive from the UTRAN either a message allocating a dedicated physical channel, and make a transition to CELL_DCH state; or

1> the UE shall receive an individually assigned measurement control message indicating that interruption of user data transmission is not be applied.

The transmission of signalling messages on the signalling bearer shall not be interrupted.

14.5 Quality Measurements

14.5.1 Quality reporting measurement quantities

For quality measurements, the following measurement quantities are used:

1. Downlink transport channel BLER
2. Timeslot SIR (TDD only)

14.5.2 Quality reporting events

14.5.2.1 Reporting event 5A: A predefined number of bad CRCs is exceeded

When this event is ordered by UTRAN in a measurement control message, the UE shall send a measurement report when the amount of bad CRCs during a predefined sliding window exceeds a predefined number.

The following three parameters are used in the scheme:

- Total CRC = the length of the sliding window over which the number of bad CRCs are counted.
- Bad CRC = the number of bad CRC that is required within the latest "Total CRC" received CRCs for the event to be triggered.
- Pending after trigger = a new event can not be triggered until "Pending after trigger" CRCs have been received,

When a DCH is established, the UE shall begin to count the number of bad CRCs within the last "Total CRC" received CRCs. No event can be triggered until at least "Total CRC" CRCs have been received. For each new received CRC, the UE shall compare the number of bad CRCs within the latest "Total CRC" received CRCs with the parameter "Bad CRC". An event shall be triggered if the number of bad CRCs is equal or larger than "Bad CRC".

At the time when the event is triggered a pending time after trigger timer is started with the length of "Pending after trigger" CRCs. A new event can not be triggered until Pending after trigger" CRCs have been received. When Pending after trigger" CRCs have been received the event evaluation start again and a new event can be triggered.

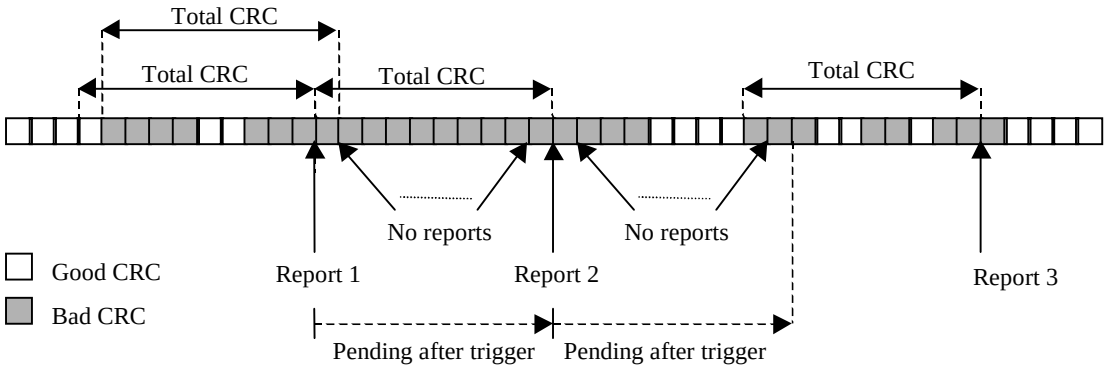

Figure 14.5.2.1-1: Event triggered CRC error reporting

14.6.2.1 Reporting event 6A: The UE Tx power becomes larger than an absolute threshold

When this event is ordered by UTRAN in a measurement control message, the UE shall send a measurement report whenever the UE transmission power (for TDD within a single TS) becomes larger than a predefined threshold. The corresponding report identifies the threshold that was exceeded.

14.6.2.2 Reporting event 6B: The UE Tx power becomes less than an absolute threshold

When this event is ordered by UTRAN in a measurement control message, the UE shall send a measurement report whenever the UE transmission power (for TDD within a single TS) becomes less than a predefined threshold. The corresponding report identifies the threshold that the UE Tx power went below.

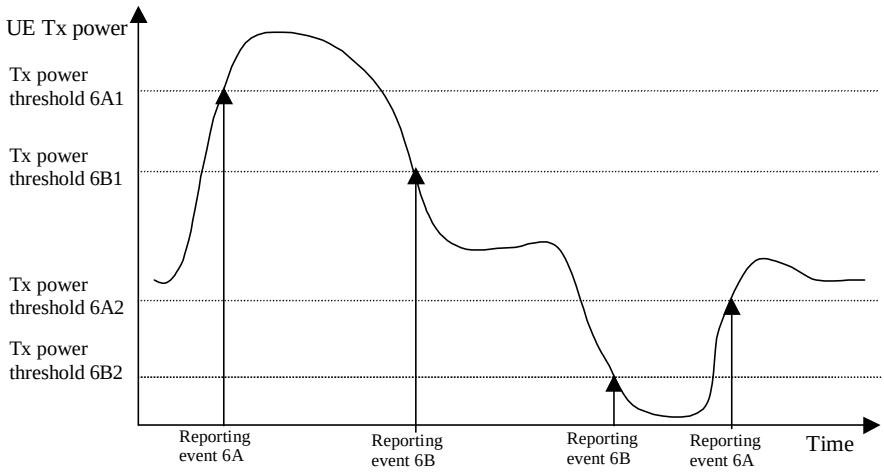

Figure 14.6.2.2-1: Event-triggered measurement reports when the UE Tx power becomes larger or less than absolute thresholds

14.6.2.3 Reporting event 6C: The UE Tx power reaches its minimum value

When this event is ordered by UTRAN in a measurement control message, the UE shall send a measurement report whenever the UE Tx power reaches its minimum value, for TDD its minimum value on a single timeslot.

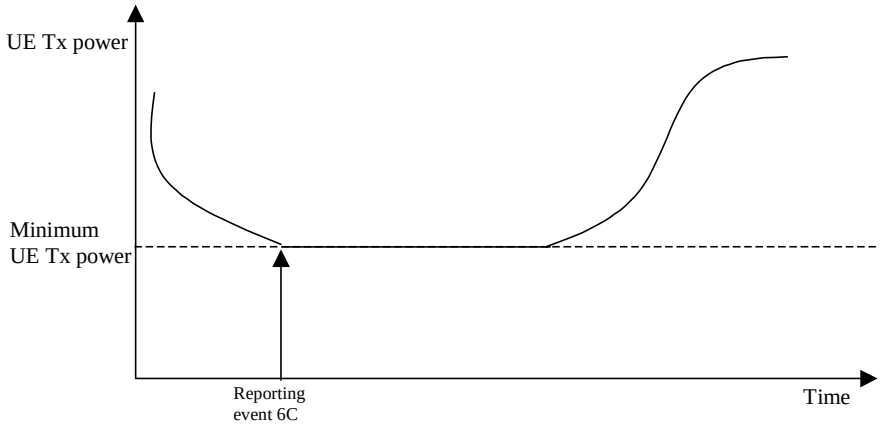

Figure 14.6.2.3-1: Event-triggered measurement report when the UE Tx power reaches its minimum value

14.6.2.4 Reporting event 6D: The UE Tx power reaches its maximum value

When this event is ordered by UTRAN in a measurement control message, the UE shall send a measurement report whenever the UE Tx power reaches its maximum value, for TDD its maximum value on a single timeslot.

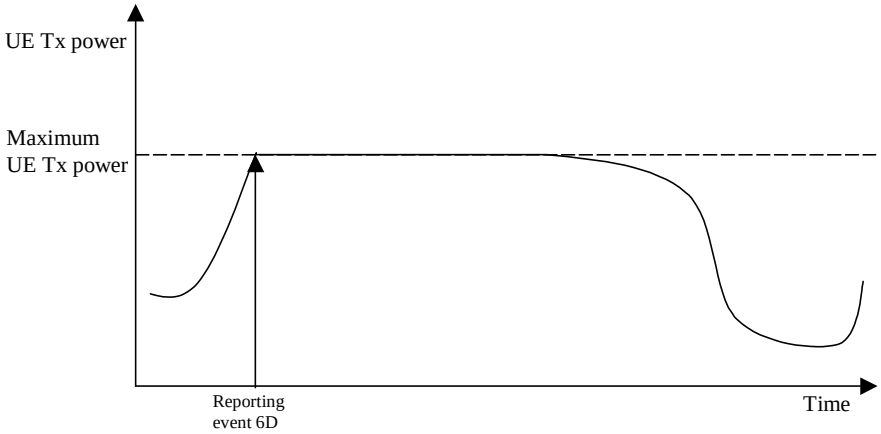

Figure 14.6.2.4-1: Event-triggered report when the UE Tx power reaches its maximum value

14.6.2.5 Reporting event 6E: The UE RSSI reaches the UE's dynamic receiver range

When this event is ordered by UTRAN in a measurement control message, the UE shall send a measurement report whenever the UE RSSI reaches the UE's dynamic receiver range.

14.6.2.6 Reporting event 6F: The UE Rx-Tx time difference for a RL included in the active set becomes larger than an absolute threshold

When this event is ordered by UTRAN in a MEASUREMENT CONTROL message, the UE shall send a MEASUREMENT REPORT message whenever the UE Rx-Tx time difference becomes larger than the threshold defined by the IE "UE Rx-Tx time difference threshold".

14.6.2.7 Reporting event 6G: The UE Rx-Tx time difference for a RL included in the active set becomes less than an absolute threshold

When this event is ordered by UTRAN in a MEASUREMENT CONTROL message, the UE shall send a MEASUREMENT REPORT whenever the UE Rx-Tx time difference becomes less than the threshold defined by the IE "UE Rx-Tx time difference threshold".

3GPP TSG-RAN WG2 Meeting #29
Gyeongju, Korea, 13-17 May 2002

Tdoc R2-021420

CR-Form-v5

CHANGE REQUEST

⌘ **25.331** **CR** **1479** ⌘ **rev** **-** ⌘ Current version: **4.4.0** ⌘

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

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

Title: ⌘	Clarification of Measurement Validity and Valid Measurement Objects	
Source: ⌘	TSG-RAN WG2	
Work item code: ⌘	TEI	***Date:*** ⌘ 08.05.02
Category: ⌘	**A**	***Release:*** ⌘ REL-4

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

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

Reason for change: ⌘ The following deficiencies have been identified:

1. It is not clear which cells will be in CELL_INFO_LIST, and that the UE should maintain the 3 mutually exclusive cell categories.
2. It is not clear what the difference is between setup and modify for a measurement.
3. It is currently possible to specify different validities for measurements which are additional measurements.
4. The description of actions where measurement validity is not included is inconsistent between measurement types (compare 8.4.1.7.1 ~~with 8.x.x,~~ and 8.4.1.7.2 with 8.6.7.1~~x.x~~).
5. Traffic volume measurement on state change: Sections 8.4.1.6.6 and 8.4.1.7.4 appear to be inconsistent. It is not clear when traffic volume measurements in MEASUREMENT_IDENTITY should be updated with the values in SIB 11 / 12.
6. Measurement configuration when measurement objects become invalid is not clear.
7. ~~Additional measurement reports do not contain measurement identities. It is unclear whether measurements which are not on-going should be included or not, hence there is a good chance for misinterpretation.~~
8. It is unclear what measurement capabilities and requirements have to do with Periodical measurement reporting.
9. ~~Reporting cell status is not present in SIB11/12 but section 8.6.7.9 is not specific to MEASUREMENT CONTROL.~~
10. In Reporting Cell Status for event-triggered measurements, it is not clear that Reporting Cell Status included within each event criterion.
11. Optional IEs within Traffic Volume and Quality Measurement Results appear to have no reason to be optional.

Summary of change: ⌘

1. It is proposed to state that the 3 cell categories are mutually exclusive~~,~~ ~~and to clarify that the UE must maintain the categorisation~~. Definitions of active, monitored and detected set cells are clarified. It is also clarified that UTRAN may specify a subset of the monitored set for reporting

using the IE "Cells for measurement". It is further ~~hoped~~ clarified that cells not in CELL_INFO_LIST shall not be considered for measurement by the UE ~~will always contain active set cells~~.

2. It is proposed to state that "modify" applies only to a measurement of given identity and type.
3. It is proposed to constrain additional measurements to have the same validity as their "parent".
4. Changes to ~~8.4.1.6.1, 8.4.1.6.2,~~ 8.4.1.7.1 and 8.4.1.7.2 are proposed to make the handling of measurement validity consistent for inter/intra frequency measurements.
5. It is proposed to modify the text to align 8.4.1.6.6 and 8.4.1.7.4 for the last bulleted action.
6. ~~It is proposed to have the network always modify measurements when transport channels are deleted in CELL_DCH for traffic volume and quality measurements. It is also proposed to clarify that the network should not delete cells from CELL_INFO_LIST which are needed by other measurements.~~ It is clarified that it is the UE's responsibility to delete measurement objects when all transport channels are deleted from both traffic volume and quality measurements. It is also clarified that the UTRAN must maintain a consistent set of cells for inter/intra frequency measurements.
7. ~~It is proposed to specify that additional measurements are only included in measurement results if they are on-going.~~
8. It is proposed to remove the 4th bullet of 8.6.7.8.
9. ~~It is proposed to make the text in 8.6.7.9 specific to the MEASUREMENT CONTROL message.~~
10. It is proposed to clarify that Reporting Cell Status is dependent on the event trigger using a note.
11. It is proposed to clarify that these IEs will always be present
12. Agreed changes from R2-021116 have been merged in: It is clarified that the UE shall trigger the same event with the same entity more than once, provided that the conditions that caused the MEASUREMENT REPORT message to be sent are not met anymore in any interval of time after the event has been triggered.

Impact Analysis:
Impact is isolated only to measurement functions:

- Correction to a function where the specification was
  - Unclear, and
  - Containing some contradictions.

Would not affect implementations behaving as indicated in the CR, would affect implementations supporting the corrected functionality otherwise.

Consequences if not approved:	⌘	The specification is unclear in many places, and inconsistent in some places.

Clauses affected:	⌘	8.4.0, 8.4.1.2, 8.4.1.3, 8.4.1.6.6, 8.4.1.7.1, 8.4.1.7.2, 8.4.1.7.4, 8.4.2.2, 8.6.7.8, 8.6.7.9, 10.3.7.58, 10.3.7.72, 14.4.2.1, 14.4.2.2, 14.6.2.1, 14.6.2.2, 14.6.2.3, 14.6.2.4, 14.6.2.5, 14.6.2.6, 14.6.2.7			
Other specs Affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.331 v3.10.0, CR 1478 25.331 v5.0.0, CR 1480	
Other comments:	⌘				

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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

8.4 Measurement procedures

8.4.0 Measurement related definitions

UTRAN may control a measurement in the UE either by broadcast of SYSTEM INFORMATION and/or by transmitting a MEASUREMENT CONTROL message.

The following information is used to control the UE measurements and the measurement results reporting:

1. Measurement identity: A reference number that should be used by the UTRAN when setting up, modifying or releasing the measurement and by the UE in the measurement report.
2. Measurement command: One out of three different measurement commands.
   - Setup: Setup a new measurement.
   - Modify: Modify a previously defined measurement, e.g. to change the reporting criteria.
   - Release: Stop a measurement and clear all information in the UE that are related to that measurement.
3. Measurement type: One of the types listed below describing what the UE shall measure.

Presence or absence of the following control information depends on the measurement type

4. Measurement objects: The objects on which the UE shall measure measurement quantities, and corresponding object information.
5. Measurement quantity: The quantity the UE shall measure on the measurement object. This also includes the filtering of the measurements.
6. Reporting quantities: The quantities the UE shall include in the report in addition to the quantities that are mandatory to report for the specific event.
7. Measurement reporting criteria: The triggering of the measurement report, e.g. periodical or event-triggered reporting.
8. Measurement Validity: Defines in which UE states the measurement is valid.
9. Measurement reporting mode: This specifies whether the UE shall transmit the measurement report using AM or UM RLC.
10. Additional measurement identities: A list of references to other measurements. When this measurement triggers a measurement report, the UE shall also include the reporting quantities for the measurements referenced by the additional measurement identities.

All these measurement parameters depend on the measurement type and are described in more detail in clause 14.

The different types of measurements are:

- Intra-frequency measurements: measurements on downlink physical channels at the same frequency as the active set. A measurement object corresponds to one cell. Detailed description is found in subclause 14.1.
- Inter-frequency measurements: measurements on downlink physical channels at frequencies that differ from the frequency of the active set. A measurement object corresponds to one cell. Detailed description is found in subclause 14.2.
- Inter-RAT measurements: measurements on downlink physical channels belonging to another radio access technology than UTRAN, e.g. GSM. A measurement object corresponds to one cell. Detailed description is found in subclause 14.3.
- Traffic volume measurements: measurements on uplink traffic volume. A measurement object corresponds to one cell. Detailed description is found in subclause 14.4.
- Quality measurements: Measurements of downlink quality parameters, e.g. downlink transport block error rate. A measurement object corresponds to one transport channel in case of BLER. A measurement object corresponds to one timeslot in case of SIR (TDD only). Detailed description is found in subclause 14.5.
- UE-internal measurements: Measurements of UE transmission power and UE received signal level. Detailed description is found in subclause 14.6.
- UE positioning measurements: Measurements of UE position. Detailed description is found in subclause 14.7.

The UE shall support a number of measurements running in parallel as specified in [19] and [20]. The UE shall also support that each measurement is controlled and reported independently of every other measurement.

Cells that the UE is monitoring are grouped in the UE into three ~~different~~ mutually exclusive categories:

1. Cells, which belong to the active set. User information is sent from all these cells. In FDD, the cells in the active set are involved in soft handover. In TDD the active set always comprises one cell only.
2. Cells, which are not included in the active set, but are ~~explicitly indicated to be measured by UTRAN~~ included in CELL_INFO_LIST belong to the monitored set.

~~NOTE: The cells explicitly indicated to be measured by UTRAN for a given intra-frequency (resp. inter-frequency, inter-RAT) measurement are:~~

~~- if the IE "Cells for measurement" has been received for this intra-frequency (resp inter-frequency, inter-RAT) measurement:~~

~~- the intra-frequency (resp. inter-frequency, inter-RAT) cells stored in the variable CELL_INFO_LIST and pointed at in the IE "Cells for measurement".~~

~~- otherwise:~~

~~- any of the intra-frequency (resp. inter-frequency, inter-RAT) cells stored in the variable CELL_INFO_LIST.~~

~~NOTE: cells stored in the CELL_INFO_LIST may either be in the monitored or active set. The UE shall maintain the category a cell included in CELL_INFO_LIST has.~~

3. Cells detected by the UE, which are ~~neither included in the active set nor in the monitored set~~ not in the CELL_INFO_LIST nor in the active set belong to the detected set. Reporting of measurements of the detected set is only applicable to intra-frequency measurements made by UEs in CELL_DCH state.

If the IE "Cells for measurement" has been included in MEASUREMENT CONTROL or SIB 11 or SIB 12, only monitored set cells explicitly indicated for a given intra frequency (resp. inter frequency, interRAT) measurement by the IE "Cells for measurement" shall be considered for measurement. If the IE "Cells for measurement" has not been included in MEASUREMENT CONTROL or SIB 11 or SIB 12, all of the intra frequency (resp. inter frequency, inter RAT) cells stored in the variable CELL_INFO_LIST shall be considered for measurement.

Active set cells which are not in the CELL_INFO_LIST shall not be considered for any measurement.

8.4.1 Measurement control

Figure 8.4.1-1: Measurement Control, normal case

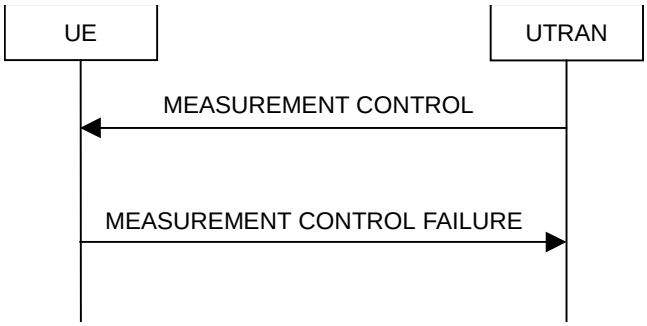

Figure 8.4.1-2: Measurement Control, failure case

8.4.1.1 General

The purpose of the measurement control procedure is to setup, modify or release a measurement in the UE.

8.4.1.2 Initiation

The UTRAN may request a measurement by the UE to be setup, modified or released with a MEASUREMENT CONTROL message, which is transmitted on the downlink DCCH using AM RLC.

The UTRAN should take the UE capabilities into account when a measurement is requested from the UE.

When a new measurement is created, UTRAN should set the IE "Measurement identity" to a value, which is not used for other measurements. UTRAN may use several

"Measurement identity" for the same "Measurement type". In case of setting several "Measurement identity" within a same "Measurement type", the measurement object or the list of measurement objects can be set differently for each measurement with different "Measurement identity ".

When a current measurement is modified or released, UTRAN should set the IE "Measurement identity" to the value, which is used for the measurement being modified or released. In case of modifying IEs within a "Measurement identity", it is not needed for UTRAN to indicate the IEs other than modified IEs, and the UE continues to use the current values of the IEs that are not modified. UTRAN should not use "modify" to change the type of measurement stored in the variable MEASUREMENT_IDENTITY for a given measurement identity.

8.4.1.3 Reception of MEASUREMENT CONTROL by the UE

Upon reception of a MEASUREMENT CONTROL message the UE shall perform actions specified in subclause 8.6 unless otherwise specified below.

The UE shall:

1>read the IE "Measurement command";

1>if the IE "Measurement command" has the value "setup":

2>store this measurement in the variable MEASUREMENT_IDENTITY according to the IE "measurement identity", first releasing any previously stored measurement with that identity if that exists;

2>for measurement types "inter-RAT measurement" or "inter-frequency measurement":

3>if, according to its measurement capabilities, the UE requires compressed mode to perform that measurement type and a compressed mode pattern sequence with an appropriate measurement purpose is simultaneously activated by the IE "DPCH compressed mode status info"; or

3>if the IE "Inter-frequency cell info list" for that measurement identity is empty; or

3>if, according to its measurement capabilities, the UE does not require compressed mode to perform the measurements:

4>if the measurement is valid in the current RRC state of the UE:

5>begin measurements according to the stored control information for this measurement identity.

2>for measurement type "UE positioning measurement":

3>if the UE is in CELL_FACH state:

4>if IE "Positioning Method" is set to "OTDOA":

5>if IE "Method Type" is set to "UE assisted":

6>if IE "UE positioning OTDOA assistance data for UE assisted" is not included:

7>if System Information Block type 15.4 is broadcast:

8>read System Information Block type 15.4.

7>act as specified in subclause 8.6.7.19.2.

5>if IE "Method Type" is set to "UE based":

6>if IE "UE positioning OTDOA assistance data for UE based" is not included:

7>if System Information Block type 15.5 is broadcast:

8>read System Information Block type 15.5.

7>act as specified in subclause 8.6.7.19.2a.

2>for any other measurement type:

3>if the measurement is valid in the current RRC state of the UE:

4>begin measurements according to the stored control information for this measurement identity.

1>if the IE "Measurement command" has the value "modify":

2>for all IEs present in the MEASUREMENT CONTROL message:

3>if a measurement was stored in the variable MEASUREMENT_IDENTITY associated to the identity by the IE "measurement identity":

4>for measurement types "inter-frequency measurement" that require measurements on a frequency other than the actually used frequency, or that require measurements on another RAT:

5>if, according to its measurement capabilities, the UE requires compressed mode to perform that measurement type and a compressed mode pattern sequence with an appropriate measurement purpose is simultaneously activated by the IE "DPCH compressed mode status info"; and

5>if the IE "Inter-frequency cell info list" for that measurement identity is empty; or

5>if, according to its measurement capabilities, the UE does not require compressed mode to perform the measurements:

6>replace the corresponding information stored in variable MEASUREMENT_IDENTITY associated with the identity indicated by the IE "measurement identity" with the one received in the MEASUREMENT CONTROL message;

6>resume the measurements according to the new stored measurement control information.

4>for any other measurement type:

5>replace the corresponding information stored in variable MEASUREMENT_IDENTITY associated to the identity indicated by the IE "measurement identity" with the one received in the MEASUREMENT CONTROL message;

5>resume the measurements according to the new stored measurement control information.

3>otherwise:

4>set the variable CONFIGURATION_INCOMPLETE to TRUE.

2>for all optional IEs that are not present in the MEASUREMENT CONTROL message:

3>leave the currently stored information elements unchanged in the variable MEASUREMENT_IDENTITY if not stated otherwise for that IE.

1>if the IE "measurement command" has the value "release":

2>terminate the measurement associated with the identity given in the IE "measurement identity";

2>clear all stored measurement control information related associated to this measurement identity in variable MEASUREMENT_IDENTITY.

1>if the IE "DPCH Compressed Mode Status Info" is present:

2>if, as the result of this message, UE will have more than one transmission gap pattern sequence with the same measurement purpose active (according to IE 'TGMP' in variable TGPS_IDENTITY):

3>set the variable CONFIGURATION_INCOMPLETE to TRUE.

2>if pattern sequence corresponding to IE "TGPSI" is already active (according to "TGPS Status Flag"):

3>deactivate this pattern sequence at the beginning of the frame indicated by IE "TGPS reconfiguration CFN" received in the message.

2>after the time indicated by IE "TGPS reconfiguration CFN" has elapsed:

3>activate the pattern sequence stored in the variable TGPS_IDENTITY corresponding to each IE "TGPSI" for which the "TGPS status flag" is set to "active" at the time indicated by IE "TGCFN"; and

3>begin the inter-frequency and/or inter-RAT measurements corresponding to the pattern sequence measurement purpose of each activated pattern sequence;

3>if the values of IE "TGPS reconfiguration CFN" and IE "TGCFN" are equal:

4>start the concerned pattern sequence immediately at that CFN.

2>not alter pattern sequences stored in variable TGPS_IDENTITY, if the pattern sequence is not identitifed in IE "TGPSI" in the received message.

1>if the UE in CELL_FACH state receives a MEASUREMENT CONTROL message, which indicates the same measurement identity as that stored in the variable MEASUREMENT_IDENTITY:

2>update the stored information with the traffic volume measurement control information in variable MEASUREMENT_IDENTITY; and

2>refrain from updating the traffic volume measurement control information associated with this measurement identity in the variable

MEASUREMENT_IDENTITY with the information received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11) until this measurement is explicitly released with another MEASUREMENT CONTROL message.

1>if the IE "Read SFN indicator" included in the IE "Cell info" of an inter-frequency cell is set to TRUE and the variable UE_CAPABILITY_TRANSFERRED has the DL "Measurement capability" for "FDD measurements" set to TRUE (the UE requires DL compressed mode in order to perform measurements on FDD):

2>set the variable CONFIGURATION_INCOMPLETE to TRUE.

1>clear the entry for the MEASUREMENT CONTROL message in the table "Accepted transactions" in the variable TRANSACTIONS;

1>if the UE "Additional Measurement List" is present

2>if the received measurement configuration in this MEASUREMENT CONTROL message, or any measurement identities in the "Additional Measurement List" do not all have the same validity

3>set the variable CONFIGURATION_INCOMPLETE to TRUE.

The UE may:

1>if the IE "Measurement command" has the value "setup":

2>for measurement type "UE positioning measurement":

3>if the UE is CELL_FACH state:

4>if IE "Positioning Method" is set to "GPS":

5>if IE "UE positioning GPS assistance data" is not included and variable UE_POSITIONING_GPS_DATA is empty:

6>if System Information Block types 15, 15.1, 15.2 and 15.3 are broadcast:

7>read System Information Block types 15, 15.1, 15.2 and 15.3.

6>act as specified in subclause 8.6.7.19.3.

1>and the procedure ends.

8.4.1.4 Unsupported measurement in the UE

If UTRAN instructs the UE to perform a measurement that is not supported by the UE, the UE shall:

1>retain the measurement configuration that was valid before the MEASUREMENT CONTROL message was received;

1>set the IE "RRC transaction identifier" in the MEASUREMENT CONTROL FAILURE message to the value of "RRC transaction identifier" in the entry for the MEASUREMENT CONTROL message in the table "Accepted transactions" in the variable TRANSACTIONS; and

1>clear that entry.

1>set the cause value in IE "failure cause" to "unsupported measurement";

1> submit the MEASUREMENT CONTROL FAILURE message to lower layers for transmission on the DCCH using AM RLC;

1> continue with any ongoing processes and procedures as if the invalid MEASUREMENT CONTROL message has not been received;

1> and the procedure ends.

8.4.1.4a Configuration Incomplete

If the variable CONFIGURATION_INCOMPLETE is set to TRUE, the UE shall:

1> retain the measurement configuration that was valid before the MEASUREMENT CONTROL message was received;

1> set the IE "RRC transaction identifier" in the MEASUREMENT CONTROL FAILURE message to the value of "RRC transaction identifier" in the entry for the MEASUREMENT CONTROL message in the table "Accepted transactions" in the variable TRANSACTIONS and clear that entry;

1> clear the variable CONFIGURATION_INCOMPLETE;

1> set the cause value in IE "failure cause" to "Configuration incomplete";

1> submit the MEASUREMENT CONTROL FAILURE message to lower layers for transmission on the DCCH using AM RLC;

1> continue with any ongoing processes and procedures as if the invalid MEASUREMENT CONTROL message has not been received;

1> and the procedure ends.

8.4.1.5 Invalid MEASUREMENT CONTROL message

If the MEASUREMENT CONTROL message contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to clause 9, the UE shall perform procedure specific error handling as follows. The UE shall:

1> set the IE "RRC transaction identifier" in the MEASUREMENT CONTROL FAILURE message to the value of "RRC transaction identifier" in the entry for the MEASUREMENT CONTROL message in the table "Rejected transactions" in the variable TRANSACTIONS; and

1> clear that entry.

1> set the IE "failure cause" to the cause value "protocol error";

1> include the IE "Protocol error information" with contents set to the value of the variable PROTOCOL_ERROR_INFORMATION;

1> submit the MEASUREMENT CONTROL FAILURE message to lower layers for transmission on the DCCH using AM RLC;

1> continue with any ongoing processes and procedures as if the invalid MEASUREMENT CONTROL message has not been received;

1> and the procedure ends.

8.4.1.6 Measurements after transition from CELL_DCH to CELL_FACH/CELL_PCH/URA_PCH state

The UE shall apply the following rules for different measurement types after transiting from CELL_DCH to CELL_FACH/CELL_PCH/URA_PCH state:

8.4.1.6.1 Intra-frequency measurement

Upon transition from CELL_DCH to CELL_FACH/CELL_PCH/URA_PCH state, the UE shall:

1> stop intra-frequency type measurement reporting;

1> if the transition is due to a reconfiguration message which included the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD), and the UE selects a cell other than that indicated by this IE; or

1> if the transition is due to a reconfiguration message which does not include the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD); or

1> if the transition is not due to a reconfiguration message:

2> delete the measurements of type intra-frequency associated with the variable MEASUREMENT_IDENTITY.

~~1> if the optional IE "measurement validity" for this measurement has not been included:~~

~~2> delete the measurements of type intra-frequency associated with the variable MEASUREMENT_IDENTITY.~~

1> begin monitoring cells listed in the IE "intra-frequency cell info list" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11).

8.4.1.6.2 Inter-frequency measurement

Upon transition from CELL_DCH to CELL_FACH/ CELL_PCH/URA_PCH state, the UE shall:

1> stop the inter-frequency type measurement reporting assigned in a MEASUREMENT CONTROL message;

1> if the transition is due to a reconfiguration message which included the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD), and the UE selects a cell other than that indicated by this IE; or

1> if the transition is due to a reconfiguration message which does not include the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD); or

1> if the transition is not due to a reconfiguration message:

2> delete the measurements of type inter-frequency associated with the variable MEASUREMENT_IDENTITY.

1> begin monitoring cells listed in the IE "inter-frequency cell info list" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

~~1> if the optional IE "measurement validity" for this measurement has not been included:~~

~~2> delete the measurements of type inter-frequency associated with the variable MEASUREMENT_IDENTITY.~~

1> in CELL_FACH state:

2> perform measurements on other frequencies according to the IE "FACH measurement occasion info".

8.4.1.6.3 Inter-RAT measurement

Upon transition from CELL_DCH to CELL_FACH/CELL_PCH/URA_PCH state, the UE shall:

1> stop the inter-RAT type measurement reporting assigned in a MEASUREMENT CONTROL message;

1> delete the measurements of type inter-RAT associated with the variable MEASUREMENT_IDENTITY;

1> begin monitoring cells listed in the IE "inter-RAT cell info list" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

1> in CELL_FACH state:

2> perform measurements on other systems according to the IE "FACH measurement occasion info".

8.4.1.6.4 Quality measurement

Upon transition from CELL_DCH to CELL_FACH/CELL_PCH/URA_PCH state, the UE shall:

1> stop quality type measurement reporting;

1> delete all measurement control information of measurement type "quality" stored in the variable MEASUREMENT_IDENTITY.

8.4.1.6.5 UE internal measurement

Upon transition from CELL_DCH to CELL_FACH/CELL_PCH/URA_PCH state, the UE shall:

1> stop UE internal measurement type measurement reporting;

1> delete all measurement control information of measurement type "UE internal" stored in the variable MEASUREMENT_IDENTITY.

8.4.1.6.6 Traffic volume measurement

Upon transition from CELL_DCH to CELL_FACH or CELL_PCH or URA_PCH state, the UE shall:

1> retrieve each set of measurement control information of measurement type "traffic volume" stored in the variable MEASUREMENT_IDENTITY; and

2>if the optional IE "measurement validity" for this measurement has not been included:

3>delete the measurement associated with the variable MEASUREMENT_IDENTITY.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "CELL_DCH":

3>stop measurement reporting;

3>store the measurement associated with the variable MEASUREMENT_IDENTITY to be used after the next transition to CELL_DCH state.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states":

3>continue measurement reporting.

2>if the IE "measurement validity" has been included and the IE "UE state" has been assigned to value "all states except CELL_DCH":

3>resume this measurement and associated reporting.

1>if no traffic volume type measurement~~s~~ has been assigned to the UE ~~set up or modified through~~with a MEASUREMENT CONTROL message ~~and~~that is valid in CELL_FACH or CELL_PCH or URA_PCH states ~~are~~ (stored in the variable MEASUREMENT_IDENTITY) ~~with~~ which has the same identity as the one indicated in the IE "Traffic volume measurement system information":

2>store the measurement control information from the IE "Traffic volume measurement system information" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11) in the variable MEASUREMENT_IDENTITY;

2>begin traffic volume measurement reporting according to the assigned information.

8.4.1.6.7 UE positioning measurement

Upon transition from CELL_DCH to CELL_PCH or URA_PCH, the UE shall:

1>if the UE does not support UP measurement validity in CELL_PCH and URA_PCH states as indicated in the IE "UE positioning capability" included in the IE "UE Radio Access Capability":

2>stop UE positioning measurement reporting.

Upon transition from CELL_DCH to CELL_FACH, or upon transition from CELL_DCH to CELL_PCH or URA_PCH and if the UE supports UP measurement validity in CELL_PCH and URA_PCH states as indicated in the IE "UE positioning capability" included in the IE "UE Radio Access Capability", the UE shall:

1>retrieve each set of measurement control information of measurement type "UE positioning" stored in the variable MEASUREMENT_IDENTITY; and

2>if the optional IE "measurement validity" for this measurement has not been included:

3>delete the measurement associated with the variable MEASUREMENT_IDENTITY.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "CELL_DCH":

3>stop measurement reporting;

3>store the measurement associated with the variable MEASUREMENT_IDENTITY to be used after the next transition to CELL_DCH state.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states":

3>upon transition from CELL_DCH to CELL_PCH or URA_PCH:

4>if the choice in the IE "Reporting Criteria" included the IE "UE Positioning" stored in the variable MEASUREMENT_IDENTITY is set to "UE positioning reporting criteria" and the value of the IE "Measurement interval" included in this IE is less than 64 seconds:

5>consider the value of the IE "Measurement interval " as being 64 seconds;

4>if the choice in the IE "Reporting Criteria" included the IE "UE Positioning" stored in the variable MEASUREMENT_IDENTITY is set to "Periodical Reporting Criteria" and the value of the IE "Reporting interval" included in this IE is less than 64 seconds:

5>consider the value of the IE "Reporting Interval" as being 64 seconds

3>continue measurement reporting according to its UE positioning measurement reporting capability..

2>if the IE "measurement validity" has been included and the IE "UE state" has been assigned to value "all states except CELL_DCH":

3>upon transition from CELL_DCH to CELL_PCH or URA_PCH:

4>if the choice in the IE "Reporting Criteria" included the IE "UE Positioning" stored in the variable MEASUREMENT_IDENTITY is set to "UE positioning reporting criteria" and the value of the IE "Measurement interval " included in this IE is less than 64 seconds:

5>consider the value of the IE "Measurement interval " as being 64 seconds.

4>if the choice in the IE "Reporting Criteria" included the IE "UE Positioning" stored in the variable MEASUREMENT_IDENTITY is set to "Periodical Reporting Criteria" and the value of the IE "Reporting interval" included in this IE is less than 64 seconds:

5>consider the value of the IE "Reporting Interval" as being 64 seconds.

3>resume this measurement and associated reporting according to its UE Positioning measurement reporting capability.

1>if the transition is due to a reconfiguration message which included the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD), and the UE selects a cell other than that indicated by this IE; or

1> if the transition is due to a reconfiguration message which does not include the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD); or

1> if the transition is not due to a reconfiguration message:

2> delete the assistance data included in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED, UE_POSITIONING_OTDOA_DATA_UE_ASSISTED and UE_POSITIONING_GPS_DATA.

1> if the IE "Positioning Methods" stored in the variable MEASUREMENT_IDENTITY is set to "OTDOA" or "OTDOA or GPS":

2> if the IE "Method type" stored in the variable MEASUREMENT_IDENTITY is set to "UE-based" or "UE assisted preferred but UE-based allowed" or "UE-based preferred but UE-assisted allowed":

3> begin monitoring assistance data received in System Information Block type 15.4 and System Information Block type 15.5 according to subclause 8.1.1.6.15.

2> if the IE "Method type" stored in the variable MEASUREMENT_IDENTITY is set to "UE-assisted":

3> begin monitoring assistance data received in System Information Block type 15.4 according to subclause 8.1.1.6.15.

1> if the UE is in CELL_FACH state:

2> if the IE "UE positioning OTDOA neighbour cell list for UE assisted" stored in the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED or UE_POSITIONING_OTDOA_DATA_UE_BASED contains neighbour cells on other frequencies than the current frequency:

3> perform measurements on other frequencies according to the IE "FACH measurement occasion info".

The UE may:

1> if the IE "Positioning Methods" stored in the variable MEASUREMENT_IDENTITY is set to "GPS" or "OTDOA or GPS":

2> begin monitoring assistance data received in System Information Block type 15 and/or System Information Block type 15.1 and/or System Information Block type 15.2 and/or System Information Block type 15.3 according to subclause 8.1.1.6.15.

8.4.1.6a Actions in CELL_FACH/CELL_PCH/URA/PCH state upon cell re-selection

Upon cell reselection while in CELL_FACH/CELL_PCH/URA/PCH state and the cell reselection has occurred after the measurement control information was stored, the UE shall:

1> delete all measurements of type intra-frequency, inter-frequency, and inter-RAT associated with the variable MEASUREMENT_IDENTITY;

1> delete the traffic volume measurements that have not been set up or modified through a MEASUREMENT CONTROL message.

8.4.1.7 Measurements after transition from CELL_FACH to CELL_DCH state

The UE shall apply the following rules for different measurement types after transiting from CELL_FACH to CELL_DCH state:

8.4.1.7.1 Intra-frequency measurement

Upon transition from CELL_FACH to CELL_DCH state, the UE shall:

1> retrieve each set of measurement control information of measurement type "intra-frequency" stored in the variable MEASUREMENT_IDENTITY;

~~1> if the IE "measurement validity" for a measurement has been assigned the value "CELL_DCH:~~

~~2~~1> resume the measurement reporting.

1> if no intra-frequency measurements applicable to CELL_DCH state are stored in the variable MEASUREMENT_IDENTITY:

2> continue monitoring the list of neighbouring cells assigned in the IE "intra-frequency cell info list" in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

2> if the IE "intra-frequency measurement reporting criteria" was included in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11):

3> send the MEASUREMENT REPORT message when reporting criteria in IE "Reporting information for state CELL_DCH" are fulfilled.

8.4.1.7.2 Inter-frequency measurement

Upon transition from CELL_FACH to CELL_DCH state, the UE shall:

1> stop monitoring the list of cells assigned in the IE "inter-frequency cell info list" in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

1> retrieve each set of measurement control information of measurement type "inter-frequency" stored in the variable MEASUREMENT_IDENTITY; and

~~1> if the IE "measurement validity" for a measurement has been assigned the value "CELL_DCH":~~

~~2~~1> resume the measurement reporting.

8.4.1.7.3 Inter-RAT measurement

Upon transition from CELL_FACH to CELL_DCH state, the UE shall:

1> stop monitoring the list of cells assigned in the IE "inter-RAT cell info list" in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11).

8.4.1.7.4 Traffic volume measurement

Upon transition from CELL_FACH to CELL_DCH state, the UE shall:

1>retrieve each set of measurement control information of measurement type "traffic volume" stored in the variable MEASUREMENT_IDENTITY;

2>if the optional IE "measurement validity" for this measurement has not been included:

3>delete the measurement associated with the variable MEASUREMENT_IDENTITY.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states except CELL_DCH":

3>stop measurement reporting; and

3>save the measurement associated with the variable MEASUREMENT_IDENTITY to be used after the next transition to CELL_FACH/CELL_PCH/URA_PCH state.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states":

3>continue measurement reporting.

2>if the IE "measurement validity" has been included and the IE "UE state" has been assigned to value "CELL_DCH":

3>resume this measurement and associated reporting.

1>if no traffic volume type measurement has been assigned to the UE with a MEASUREMENT CONTROL message ~~when transiting to CELL_DCH state:~~ that is valid in CELL_DCH and has the same identity as the one indicated in the IE "Traffic volume measurement system information":

2>store the measurement control information from the IE "Traffic volume measurement system information" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11) in the variable MEASUREMENT_IDENTITY;

2> begin traffic volume measurement reporting according to the assigned information.

~~2>continue an ongoing traffic volume type measurement, assigned in System Information Block type 11 (or System Information Block type 12, according to subclause 8.1.1.6.11).~~

8.4.1.7.5 UE positioning measurement

Upon transition from CELL_FACH to CELL_DCH state, the UE shall:

1>retrieve each set of measurement control information of measurement type "UE positioning" stored in the variable MEASUREMENT_IDENTITY; and

2>if the optional IE "Measurement validity" for this measurement has not been included:

3>delete the measurement associated with the variable MEASUREMENT_IDENTITY.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states except CELL_DCH":

3>stop measurement reporting; and

3>save the measurement associated with the variable MEASUREMENT_IDENTITY to be used after the next transition to CELL_FACH/CELL_PCH/URA_PCH state.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states":

3>continue measurement reporting.

2>if the IE "measurement validity" has been included and the IE "UE state" has been assigned to value "CELL_DCH":

3>resume this measurement and associated reporting.

1>stop monitoring assistance data received in System Information Block type 15 or System Information Block type 15.1 or System Information Block type 15.2 or System Information Block type 15.3 or System Information Block type 15.4 or System Information Block 15.5.

8.4.1.8 Measurements after transition from idle mode to CELL_DCH state

The UE shall obey the following rules for different measurement types after transiting from idle mode to CELL_DCH state:

8.4.1.8.1 Intra-frequency measurement

Upon transition from idle mode to CELL_DCH state, the UE shall:

1>begin or continue monitoring the list of cells assigned in the IE "intra-frequency cell info list" in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

1>if the "intra-frequency measurement reporting criteria" IE was included in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11):

2>begin measurement reporting according to the IE.

8.4.1.8.2 Inter-frequency measurement

Upon transition from idle mode to CELL_DCH state, the UE shall:

1>stop monitoring the list of cells assigned in the IE "inter-frequency cell info list" in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11).

8.4.1.8.3 Inter-RAT measurement

Upon transition from idle mode to CELL_DCH state, the UE shall:

1>stop monitoring the list of cells assigned in the IE "inter-RAT cell info list" in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11).

8.4.1.8.4 Traffic volume measurement

Upon transition from idle mode to CELL_DCH state, the UE shall:

1> begin a traffic volume type measurement, assigned in System Information Block type 11 (or System Information Block type 12, according to subclause 8.1.1.6.11).

8.4.1.8.5 UE positioning measurement

Upon transition from idle mode to CELL_DCH state, the UE shall:

1> stop monitoring assistance data received in System Information Block type 15 or System Information Block type 15.1 or System Information Block type 15.2 or System Information Block type 15.3 or System Information Block type 15.4 or System Information Block type 15.5.

8.4.1.9 Measurements after transition from idle mode to CELL_FACH state

The UE shall obey the follow rules for different measurement types after transiting from idle mode to CELL_FACH state:

8.4.1.9.1 Intra-frequency measurement

Upon transition from idle mode to CELL_FACH state, the UE shall:

1> begin or continue monitoring cells listed in the IE "intra-frequency cell info list" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11).

8.4.1.9.2 Inter-frequency measurement

Upon transition from idle mode to CELL_FACH state, the UE shall:

1> begin or continue monitoring cells listed in the IE "inter-frequency cell info list" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

1> perform measurements on other frequencies according to the IE "FACH measurement occasion info".

8.4.1.9.3 Inter-RAT measurement

Upon transition from idle mode to CELL_FACH state, the UE shall:

1> begin or continue monitoring cells listed in the IE "inter-RAT cell info list" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

1> perform measurements on other systems according to the IE "FACH measurement occasion info".

8.4.1.9.4 Traffic volume measurement

Upon transition from idle mode to CELL_FACH state, the UE shall:

1> store the measurement control information from the IE "Traffic volume measurement system information" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11) in the variable MEASUREMENT_IDENTITY;

1> begin traffic volume measurement reporting according to the assigned information.

8.4.1.9.5 UE positioning measurement

Upon transition from idle mode to CELL_FACH state, the UE may:

1> begin or continue monitoring assistance data received in System Information Block type 15 or System Information Block type 15.1 or System Information Block type 15.2 or System Information Block type 15.3 or System Information Block type 15.4 or System Information Block type 15.5 according to subclause 8.1.1.6.15;

1> if the IE "UE positioning OTDOA neighbour cell list for UE assisted" stored in the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED; or

1> if the IE "UE positioning OTDOA neighbour cell list for UE based" stored in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED contains neighbour cells on other frequencies than the current frequency:

2> perform measurements on other frequencies according to the IE "FACH measurement occasion info".

8.4.1.9a Measurements after transition from connected mode to idle mode

Upon transition from connected mode to idle mode the UE shall:

1> stop measurement reporting for all measurements stored in the variable MEASUREMENT_IDENTITY;

1> clear the variable MEASUREMENT_IDENTITY;

1> apply the following rules for different measurement types.

8.4.1.9a.1 Intra-frequency measurement

Upon transition from connected mode to idle mode, the UE shall:

1> stop monitoring intra-frequency cells listed in the IE "intra-frequency cell info list" received in System Information Block type 12 (if System Information Block type 12 is transmitted in the cell, according to subclause 8.1.1.6.11);

1> begin monitoring intra-frequency cells listed in the IE "intra-frequency cell info list" received in System Information Block type 11.

8.4.1.9a.2 Inter-frequency measurement

Upon transition from connected mode to idle mode, the UE shall:

1> stop monitoring inter-frequency cells listed in the IE "inter-frequency cell info list" received in System Information Block type 12 (if System Information Block type 12 is transmitted in the cell, according to subclause 8.1.1.6.11);

1> begin monitoring inter-frequency cells listed in the IE "inter-frequency cell info list" received in System Information Block type 11.

8.4.1.9a.3 Inter-RAT measurement

Upon transition from connected mode to idle mode, the UE shall:

1> stop monitoring inter-RAT cells listed in the IE "inter-RAT cell info list" received in System Information Block type 12 (if System Information Block type 12 is transmitted in the cell, according to 8.1.1.6.11);

1> begin monitoring inter-RAT cells listed in the IE "inter-RAT cell info list" received in System Information Block type 11.

8.4.1.9a.4 UE positioning measurement

Upon transition from connected mode to idle mode, the UE may:

1> begin or continue monitoring assistance data received in System Information Block type 15 or System Information Block type 15.1 or System Information Block type 15.2 or System Information Block type 15.3 or System Information Block type 15.4 or System Information Block type 15.5.

8.4.1.10 Measurements when measurement object is no longer valid

8.4.1.10.1 Traffic volume measurement

If UE is no longer using the transport channel that is specified in the IE "Traffic volume measurement object", UE shall ignore any measurements that are assigned to that transport channel. If none of the transport channels that are specified in "traffic volume measurement object" is being used, UE shall delete that particular measurement and its measurement identity from the variable MEASUREMENT_IDENTITY.

8.4.2 Measurement report

Figure 8.4.2-1: Measurement report, normal case

8.4.2.1 General

The purpose of the measurement reporting procedure is to transfer measurement results from the UE to UTRAN.

8.4.2.2 Initiation

In CELL_DCH state, the UE shall:

1> transmit a MEASUREMENT REPORT message on the uplink DCCH when the reporting criteria stored in variable MEASUREMENT_IDENTITY are met for any ongoing measurements that are being performed in the UE.

In CELL_FACH state, the UE shall:

1> transmit a MEASUREMENT REPORT message on the uplink DCCH when the reporting criteria stored in variable MEASUREMENT_IDENTITY are met for any ongoing traffic volume measurement or UE positioning measurement that is being performed in the UE;

1> include a measurement report in the IE "Measured results on RACH", as specified in the IE "Intra-frequency reporting quantity for RACH reporting" and the IE "Maximum number of reported cells on RACH" in System Information Block type 12

(or "System Information Block Type 11" if "System Information Block Type 12" is not being broadcast);

1>include in the IE "Measured results on RACH" all requested reporting quantities for cells for which measurements are reported.

In TDD, if the Radio Bearer associated with the MEASUREMENT_IDENTITY fulfilling the reporting criteria for an ongoing traffic volume measurement is mapped on transport channel of type USCH, the UE shall:

1>initiate the "PUSCH CAPACITY REQUEST" procedure instead of transmitting a MEASUREMENT REPORT (TDD Only).

In CELL_PCH or URA_PCH state, the UE shall:

1>first perform the cell update procedure according to subclause 8.3.1, using the cause "uplink data transmission", in order to transit to CELL_FACH state; and then

1>transmit a MEASUREMENT REPORT message on the uplink DCCH when the reporting criteria stored in variable MEASUREMENT_IDENTITY are fulfilled for any ongoing traffic volume measurement or UE positioning measurement which is being performed in the UE.

The reporting criteria are fulfilled if either:

- the first measurement has been completed according to the requirements set in [19] or [20] for a newly initiated measurement with periodic reporting; or
- the time period indicated in the stored IE "Periodical reporting criteria" has elapsed since the last measurement report was submitted to lower layers for a given measurement; or
- an event in stored IE "Measurement reporting criteria" was triggered. Events and triggering of reports for different measurement types are described in detail in clause 14.

For the measurement, which triggered the MEASUREMENT REPORT message, the UE shall:

1>set the IE "measurement identity" to the measurement identity, which is associated with that measurement in variable MEASUREMENT_IDENTITY;

1>set the IE "measured results" to include measurements according to the IE "reporting quantity" of that measurement stored in variable MEASUREMENT_IDENTITY; and

2>if all the reporting quantities are set to "false":

3>not set the IE "measured results".

1>set the IE "Measured results" in the IE "Additional measured results" according to the IE "reporting quantity" for all measurements associated with the measurement identities included in the "Additional measurements list" stored in variable MEASUREMENT_IDENTITY of the measurement that triggered the measurement report; and

2>if more than one additional measured results are to be included:

3>~~for each on-going measurement~~ sort them in ascending order according to their IE "measurement identity" in the MEASUREMENT REPORT message.

1>if the MEASUREMENT REPORT message was triggered by an event (i.e. not a periodical report):

2>set the IE "Event results" according to the event that triggered the report.

The UE shall:

1>transmit the MEASUREMENT REPORT message on the uplink DCCH using either AM or UM RLC according to the stored IE "measurement reporting mode" associated with the measurement identity that triggered the report.

When the MEASUREMENT REPORT message has been submitted to lower layers for transmission:

1>the procedure ends.

8.6.7.8 Periodical Reporting Criteria

If the IE "Periodical Reporting Criteria" is received by the UE, the UE shall:

1>store the contents of the IE "Amount of Reporting" and IE "Reporting interval" in the variable MEASUREMENT_IDENTITY.

For the first MEASUREMENT REPORT message, the UE shall:

1>send the MEASUREMENT REPORT at the end of the first reporting interval in which all requested reporting quantities are available according to the requirements and the measurement capabilities set in [19] and [20] for at least one measurement object stored in the variable MEASUREMENT_IDENTITY.

Following the first MEASUREMENT REPORT message, the UE shall:

1>send subsequent MEASUREMENT REPORT message with intervals specified by the IE "Reporting interval";

~~1>form the MEASUREMENT REPORT from the measurement objects stored in the variable MEASUREMENT_IDENTITY for which all requested reporting quantities are available according to the requirements and the measurement capabilities set in [19] and [20]; and~~

1>omit measurement results that were reported in a previous MEASUREMENT REPORT and for which new measurement results are not available in the present reporting interval.

After the UE has sent a total number of MEASUREMENT REPORT messages, which equal the value indicated in the IE "Amount of reporting", the UE shall:

1>terminate measurement reporting; and

1>delete all measurement information linked with the "Measurement identity" of the ongoing measurement from the variable MEASUREMENT_IDENTITY.

8.6.7.9 Reporting Cell Status

If the IE "Reporting Cell Status" is received, the UE shall set the IE "Measured Results" in MEASUREMENT REPORT as follows. The UE shall:

1>for intra-frequency measurement and inter-frequency measurement:

2>include the IE "Cell Measured Results" for cells (excluding cells of another RAT) that satisfy the condition (such as "Report cells within active set") specified in the IE "Reporting Cell Status", in descending order by the measurement quantity.

2>the maximum number of the IE "Cell Measured Results" to be included in the IE "Measured Results" is the number specified in the IE "Reporting Cell Status".

1>for inter-RAT measurement:

2>include the measurement results for cells of other RAT (e.g., GSM) that satisfy the condition specified in the IE "Reporting Cell Status", in descending order by the measurement quantity.

2>the maximum number of the IE "Measured GSM Cells" to be included in the IE "Measured Results" is the number specified in the IE "Reporting Cell Status".

If the IE "Reporting Cell Status" is not received for intra-frequency, inter-frequency measurement, or inter-RAT measurement, the UE shall:

1>for intra-frequency measurement and inter-frequency measurement~~s setup or modified by a MEASUREMENT CONTROL message~~:

2>exclude the IE "Cell Measured Results" for any cell in MEASUREMENT REPORT.

NOTE: The “Reporting Cell Status” IE within "Event Criteria List" defines whether "Cell Measured Results" is present for event-based reporting.

1>for inter-RAT measurement:

2>exclude the IE "Measured GSM Cells" for any cell in MEASUREMENT REPORT.

10.3.7.58 Quality measurement reporting criteria

Event 5a: Number of bad CRCs on a certain transport channel exceeds a threshold.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Parameters sent for each transport channel	~~O~~MP	1 to <maxTrCH>		~~This IE is always required, need is OP to align with ASN.1~~
>DL Transport channel identity	MP		Transport channel identity 10.3.5.18	transport channel type = DCH
>Total CRC	MP		Integer(1..512)	Number of CRCs
>Bad CRC	MP		Integer(1..512)	Number of CRCs
>Pending after trigger	MP		Integer(1..512)	Number of CRCs

10.3.7.72 Traffic volume measurement reporting criteria

Contains the measurement reporting criteria information for a traffic volume measurement.

Event 4a: Transport Channel Traffic Volume [15] exceeds an absolute threshold.

Event 4b: Transport Channel Traffic Volume [15] becomes smaller than an absolute threshold.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Parameters sent for each transport channel	OP	1 to <maxTrCH>		This IE is always required, need is OP to align with ASN.1
>Uplink transport channel type	OP		Enumerated(DCH,RACHorCPCH,USCH)	USCH is TDD only. CPCH is FDD only. RACHorCPCH is the currently configured default in the uplink.
>UL Transport Channel ID	CV-*UL-DCH/USCH*		Transport channel identity 10.3.5.18	
>Parameters required for each Event	OP	1 to <maxMeasperEvent>		This IE is always required, need is OP to align with ASN.1
>>Traffic volume event identity	MP		Traffic volume event identity 10.3.7.66	
>>Reporting Threshold	MP		Enumerated(8,16,32,64,128,256,512,1024,2K,3K,4K,6K,8K,12K,16K,24K,32K,48K,64K,96K,128K,192K,256K,384K,512K,768K)	Threshold in bytes And N Kbytes = N*1024 bytes
>>Time to trigger	OP		Time to trigger 10.3.7.64	Indicates the period of time between the timing of event detection and the timing of sending Measurement Report. Time in ms
>>Pending time after trigger	OP		Integer(250, 500, 1000, 2000, 4000, 8000, 16000)	Indicates the period of time during which it is forbidden to send any new measurement reports with the same Traffic volume event identity even if the triggering condition is fulfilled. Time in milliseconds
>>Tx interruption after trigger	OP		Integer (250, 500, 1000, 2000, 4000, 8000, 16000)	Time in milliseconds. Indicates how long the UE shall block DTCH transmissions on the RACH after a measurement report is triggered.

Condition	Explanation
UL-DCH/USCH	If IE "Uplink transport channel type" is equal to "DCH" or "USCH" (TDD only) this IE is optional. Otherwise the IE is not needed.

13.4 UE variables

13.4.0 CELL INFO LIST

This variable contains cell information on intra-frequency, inter-frequency and inter-RAT cells, as received in messages System Information Block Type 11, System Information Block Type 12, and MEASUREMENT CONTROL. ~~CELL_INFO_LIST will always include all cells in the active set.~~

The first position in Intra-frequency cell info list corresponds to Intra-frequency cell id 0, the second to Intra-frequency cell id 1, etc.

The first position in Inter-frequency cell info list corresponds to Inter-frequency cell id 0, the second to Inter-frequency cell id 1, etc.

The first position in Inter-RAT cell info list corresponds to Intra-frequency cell id 0, the second to Inter-RAT cell id 1, etc.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Intra-frequency cell info	OP	1..<maxCellMeas>		Note
>CHOICE *position status*	MP			
>>Occupied				
>>>Cell info	MP		Cell info 10.3.7.2	
>>Vacant				No data
Inter-frequency cell info	OP	1..<maxCellMeas>		Note
>CHOICE *position status*	MP			
>>Occupied				
>>>Frequency info	MP		Frequency info 10.3.6.36	
>>>Cell info	MP		Cell info 10.3.7.2	
>>Vacant				No data
Inter-RAT cell info	OP	1..<maxCellMeas>		Note
>CHOICE *position status*	MP			
>>Occupied				
>>>CHOICE *Radio Access Technology*				
>>>>GSM				
>>>>>Cell selection and re-selection info	MP		Cell selection and re-selection info for SIB11/12 10.3.2.4	
>>>>>BSIC	MP		BSIC 10.3.8.2	
>>>>>BCCH ARFCN	MP		Integer (0..1023)	[43]
>>>>IS-2000				
>>>>>System specific measurement info			enumerated (frequency,	For IS-2000, use fields from TIA/EIA/IS-2000.5,

Information Element/Group name	Need	Multi	Type and reference	Semantics description
			timeslot, colour code, output power, PN offset)	subclause 3. 7.3.3.2.27, *Candidate Frequency Neighbour List Message*
>>Vacant				No data

NOTE: This IE shall be cleared when entering UTRA RRC connected mode, when leaving UTRA RRC connected mode, when switched off as well as at selection of a new PLMN.

14.4 Traffic Volume Measurements

14.4.1 Traffic Volume Measurement Quantity

In order to support a large variation of bit rates and RLC buffer size capabilities, a non-linear scale is used. Since, for each RB, the expected traffic includes both new and retransmitted RLC PDUs and potentially existing Control PDUs, all these should be included in the Buffer Occupancy measure. It should also be noted that traffic volume measurements are only applicable for acknowledged and unacknowledged mode.

According to what is stated in the Measurement Control message, the UE should support reporting of RLC Buffer Payload, Average of RLC Buffer Payload, and Variance of RLC Buffer Payload for RBs multiplexed onto the same Transport channel. The Reporting Quantities (i.e. RLC Buffer Payload, Average of RLC Buffer Payload, and Variance of RLC Buffer Payload of each RB) are indicated in the measurement control message. If Average of RLC Buffer Payload or Variance of RLC Buffer Payload is included as Reporting Quantity, the time interval to take an average or a variance shall be used. When the RLC buffer payload, Average of RLC buffer payload or Variance of RLC buffer payload is reported, the measured quantity shall be rounded upwards to the closest higher value possible to report.

14.4.2 Traffic Volume reporting triggers

Traffic volume can be reported in two different ways, periodical and event triggered. The reporting criteria are specified in the measurement control message.

For periodical reporting the UE simply determines the Reporting Quantities in number of bytes for each RB mapped onto the indicated transport channels and reports the results at the time interval and for the number of times specified.

For traffic volume measurements in the UE only one quantity is compared with the thresholds. This quantity is Transport Channel Traffic Volume [15] (which equals the sum of Buffer Occupancies of RBs multiplexed onto a transport channel) in number of bytes. Event triggered reporting is performed when the Transport Channel Traffic Volume exceeds an upper threshold or becomes smaller than a lower threshold. Every TTI, UE measures the Transport Channel Traffic Volume for each transport channel and compares it with the configured thresholds. If the value is out of range, the UE determines the Reporting Quantities for the RBs mapped onto that transport channel and reports the results.

14.4.2.1 Reporting event 4 A: Transport Channel Traffic Volume exceeds an absolute threshold

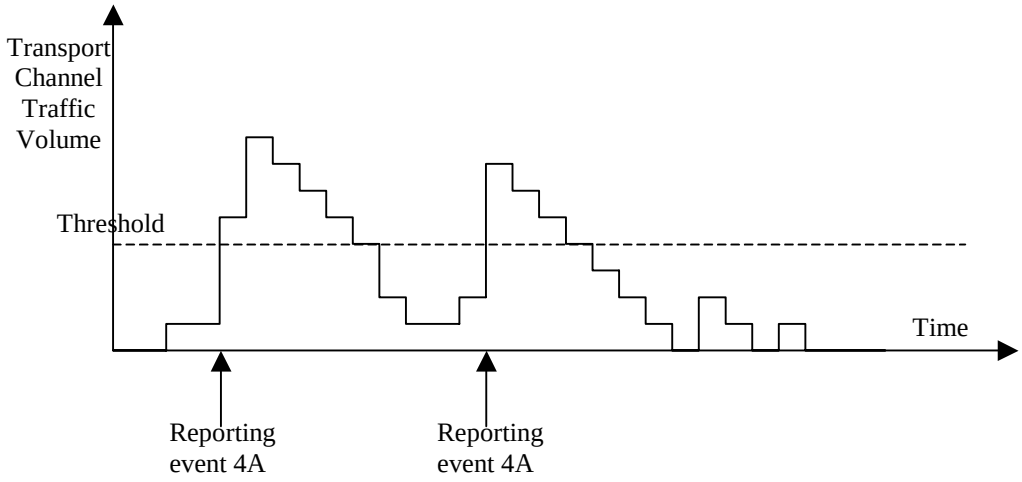

Figure 14.4.2.1-1: Event triggered report when Transport Channel Traffic Volume exceeds a certain threshold

If the monitored Transport Channel Traffic Volume (TCTV) [15] exceeds an absolute threshold, i.e. if TCTV~~F~~>Reporting threshold, this is an event that could trigger a report. The event could be triggered again only if TCTV becomes smaller than the Reporting threshold and later TCTV>Reporting threshold is verified again. The corresponding report specifies at least which measurement ID the event that triggered the report belongs to.

14.4.2.2 Reporting event 4 B: Transport Channel Traffic Volume becomes smaller than an absolute threshold

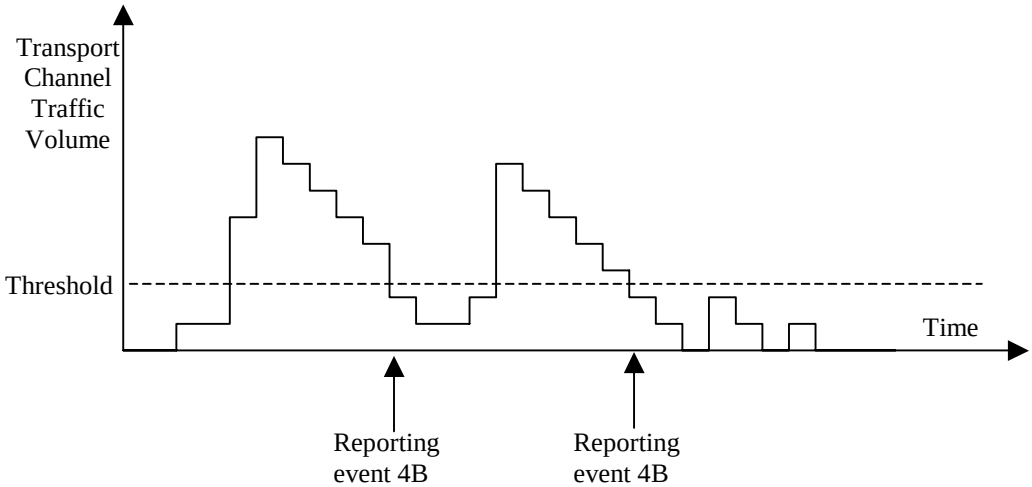

Figure 14.4.2.1-2: Event triggered report when Transport Channel Traffic Volume becomes smaller than certain threshold

If the monitored Transport Channel Traffic Volume [15] becomes smaller than an absolute threshold, i.e. if TCTV~~F~~<Reporting threshold, this is an event that could trigger a report. The event could be triggered again only if TCTV becomes bigger than the Reporting threshold and later TCTV<Reporting threshold is verified again. The corresponding report specifies at least which measurement ID the event that triggered the report belongs to.

14.4.3 Traffic volume reporting mechanisms

Traffic volume measurement triggering could be associated with both a *time-to-trigger* and a *pending time after trigger*. The time-to-trigger is used to get time domain hysteresis, i.e. the condition must be fulfilled during the time-to-trigger time before a report is sent. Pending time after trigger is used to limit consecutive reports when one traffic volume measurement report already has been sent. This is described in detail below.

14.4.3.1 Pending time after trigger

This timer is started in the UE when a measurement report has been triggered. The UE is then forbidden to send any new measurement reports with the same measurement ID during this time period even when the triggering condition is fulfilled again. Instead the UE waits until the timer has suspended. If the Transport Channel Traffic Volume [15] is still above the threshold when the timer has expired the UE sends a new measurement report, and the timer is restarted. Otherwise it waits for a new triggering.

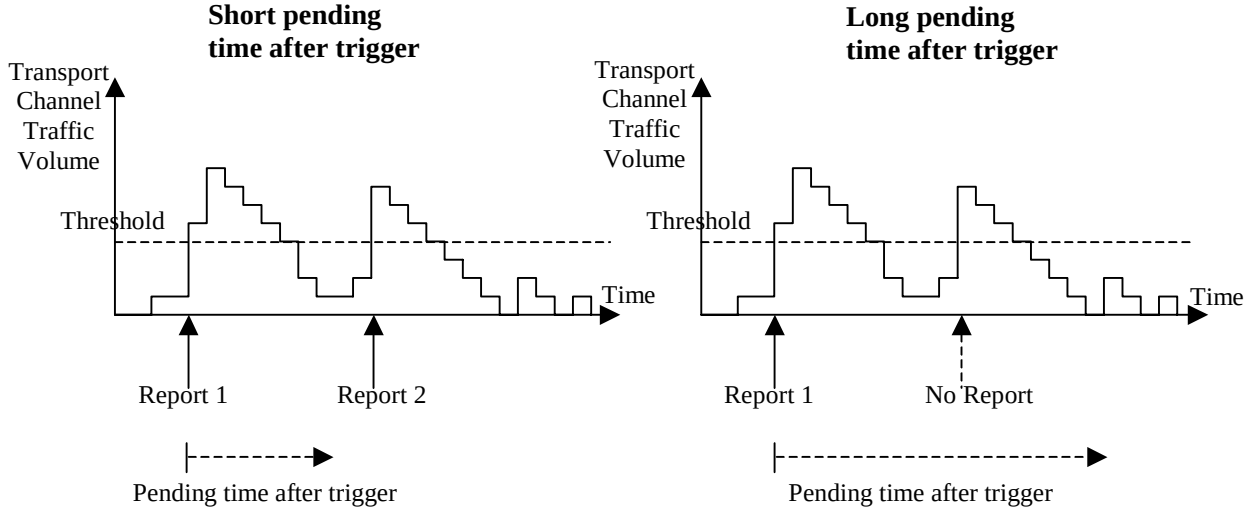

Figure 14.4.3.1-1: Pending time after trigger limits the amount of consecutive measurement reports

Figure 14.4.3.1-1 shows that by increasing the pending time after trigger a triggered second event does not result in a measurement report.

14.4.4 Interruption of user data transmission

A UE in CELL_FACH substate may be instructed by the UTRAN to cease transmission of user data on the RACH after a measurement report has been triggered. Before resuming transmission of user data,

1> the UE shall receive from the UTRAN either a message allocating a dedicated physical channel, and make a transition to CELL_DCH state; or

1> the UE shall receive an individually assigned measurement control message indicating that interruption of user data transmission is not be applied.

The transmission of signalling messages on the signalling bearer shall not be interrupted.

14.6.2.1 Reporting event 6A: The UE Tx power becomes larger than an absolute threshold

When this event is ordered by UTRAN in a measurement control message, the UE shall send a measurement report whenever the UE transmission power (for TDD within a single TS) becomes larger than a predefined threshold. The corresponding report identifies the threshold that was exceeded.

14.6.2.2 Reporting event 6B: The UE Tx power becomes less than an absolute threshold

When this event is ordered by UTRAN in a measurement control message, the UE shall send a measurement report whenever the UE transmission power (for TDD within a single TS) becomes less than a predefined threshold. The corresponding report identifies the threshold that the UE Tx power went below.

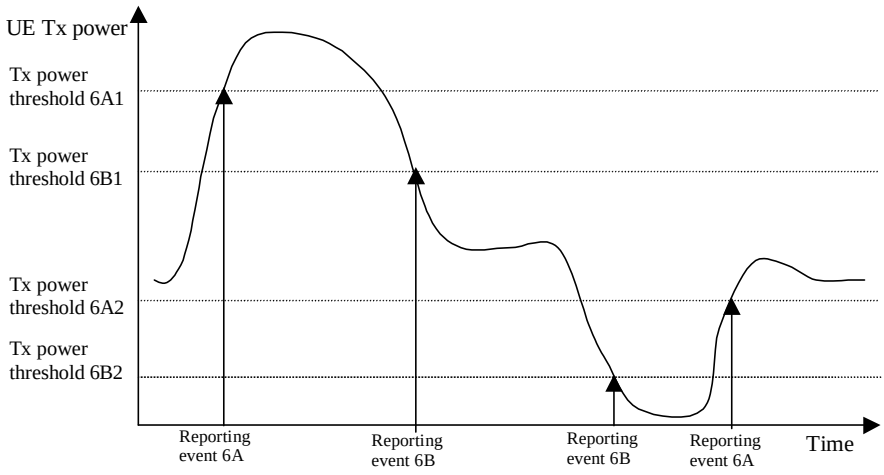

Figure 14.6.2.2-1: Event-triggered measurement reports when the UE Tx power becomes larger or less than absolute thresholds

14.6.2.3 Reporting event 6C: The UE Tx power reaches its minimum value

When this event is ordered by UTRAN in a measurement control message, the UE shall send a measurement report whenever the UE Tx power reaches its minimum value, for TDD its minimum value on a single timeslot.

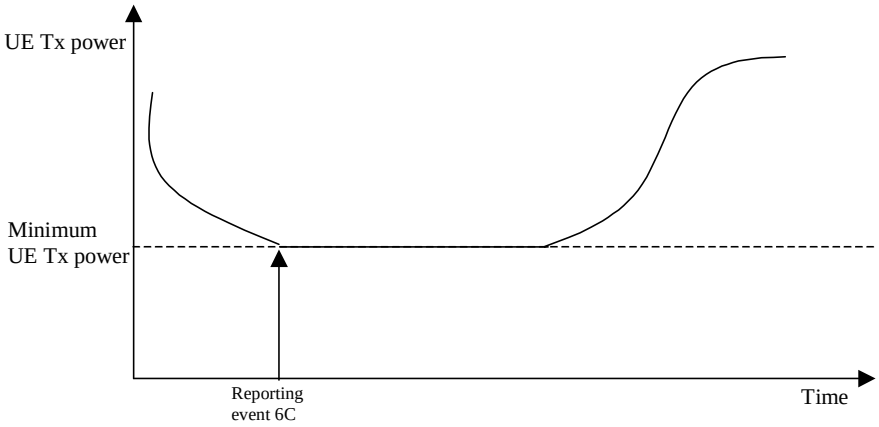

Figure 14.6.2.3-1: Event-triggered measurement report when the UE Tx power reaches its minimum value

14.6.2.4 Reporting event 6D: The UE Tx power reaches its maximum value

When this event is ordered by UTRAN in a measurement control message, the UE shall send a measurement report whenever the UE Tx power reaches its maximum value, for TDD its maximum value on a single timeslot.

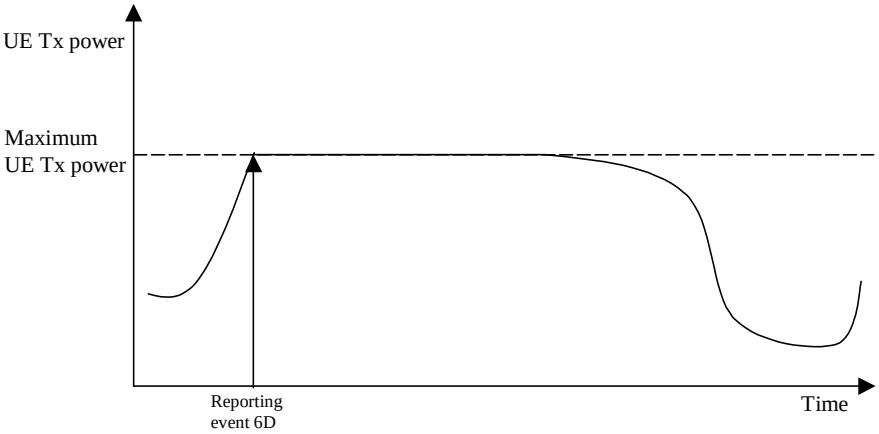

Figure 14.6.2.4-1: Event-triggered report when the UE Tx power reaches its maximum value

14.6.2.5 Reporting event 6E: The UE RSSI reaches the UE's dynamic receiver range

When this event is ordered by UTRAN in a measurement control message, the UE shall send a measurement report whenever the UE RSSI reaches the UE's dynamic receiver range.

14.6.2.6 Reporting event 6F (FDD): The UE Rx-Tx time difference for a RL included in the active set becomes larger than an absolute threshold

When this event is ordered by UTRAN in a MEASUREMENT CONTROL message, the UE shall send a MEASUREMENT REPORT message whenever the UE Rx-Tx time difference becomes larger than the threshold defined by the IE "UE Rx-Tx time difference threshold".

14.6.2.6a Reporting event 6F (1.28 Mcps TDD): The time difference indicated by T_{ADV} becomes larger than an absolute threshold

When this event is ordered by UTRAN in a MEASUREMENT CONTROL message, the UE shall send a MEASUREMENT REPORT message whenever the T_{ADV} changes compared to the last reported value more than a predefined threshold as configured with IE " T_{ADV} Threshold".

The UE shall set the IE "T_{ADV}" to the measured value and the IE "SFN" to the SFN during which the measurement was performed in the IE "T_{ADV} Info".

14.6.2.7 Reporting event 6G: The UE Rx-Tx time difference for a RL included in the active set becomes less than an absolute threshold

When this event is ordered by UTRAN in a MEASUREMENT CONTROL message, the UE shall send a MEASUREMENT REPORT whenever the UE Rx-Tx time difference becomes less than the threshold defined by the IE "UE Rx-Tx time difference threshold".

3GPP TSG-RAN WG2 Meeting #29
Gyeongju, Korea, 13-17 May 2002

Tdoc R2-021421

CR-Form-v5

CHANGE REQUEST

⌘ **25.331** **CR** **1480** ⌘ **rev** **-** ⌘ Current version: **5.0.0** ⌘

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

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

Title:	⌘	Clarification of Measurement Validity and Valid Measurement Objects
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	09.05.02
Category:	⌘	**A**
Release:	⌘	REL-5

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

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

Reason for change: ⌘

The following deficiencies have been identified:

1. It is not clear which cells will be in CELL_INFO_LIST, and that the UE should maintain the 3 mutually exclusive cell categories.
2. It is not clear what the difference is between setup and modify for a measurement.
3. It is currently possible to specify different validities for measurements which are additional measurements.
4. The description of actions where measurement validity is not included is inconsistent between measurement types (compare 8.4.1.7.1 ~~with 8.x.x,~~ and 8.4.1.7.2 with 8.6.7.1~~x.x~~).
5. Traffic volume measurement on state change: Sections 8.4.1.6.6 and 8.4.1.7.4 appear to be inconsistent. It is not clear when traffic volume measurements in MEASUREMENT_IDENTITY should be updated with the values in SIB 11 / 12.
6. Measurement configuration when measurement objects become invalid is not clear.
7. ~~Additional measurement reports do not contain measurement identities. It is unclear whether measurements which are not on-going should be included or not, hence there is a good chance for misinterpretation.~~
8. It is unclear what measurement capabilities and requirements have to do with Periodical measurement reporting.
9. ~~Reporting cell status is not present in SIB11/12 but section 8.6.7.9 is not specific to MEASUREMENT CONTROL.~~
10. In Reporting Cell Status for event-triggered measurements, it is not clear that Reporting Cell Status included within each event criterion.
11. Optional IEs within Traffic Volume and Quality Measurement Results appear to have no reason to be optional.

Summary of change: ⌘

1. It is proposed to state that the 3 cell categories are mutually exclusive~~,~~ ~~and to clarify that the UE must maintain the categorisation~~. Definitions of active, monitored and detected set cells are clarified. It is also clarified that UTRAN may specify a subset of the monitored set for reporting

using the IE "Cells for measurement". It is further ~~hoped~~ clarified that cells not in CELL_INFO_LIST shall not be considered for measurement by the UE.~~will always contain active set cells.~~

2. It is proposed to state that "modify" applies only to a measurement of given identity and type.
3. It is proposed to constrain additional measurements to have the same validity as their "parent".
4. Changes to ~~8.4.1.6.1, 8.4.1.6.2,~~ 8.4.1.7.1 and 8.4.1.7.2 are proposed to make the handling of measurement validity consistent for inter/intra frequency measurements.
5. It is proposed to modify the text to align 8.4.1.6.6 and 8.4.1.7.4 for the last bulleted action.
6. ~~It is proposed to have the network always modify measurements when transport channels are deleted in CELL_DCH for traffic volume and quality measurements. It is also proposed to clarify that the network should not delete cells from CELL_INFO_LIST which are needed by other measurements.~~ It is clarified that it is the UE's responsibility to delete measurement objects when all transport channels are deleted from both traffic volume and quality measurements. It is also clarified that the UTRAN must maintain a consistent set of cells for inter/intra frequency measurements.
7. ~~It is proposed to specify that additional measurements are only included in measurement results if they are on-going.~~
8. It is proposed to remove the 4th bullet of 8.6.7.8.
9. ~~It is proposed to make the text in 8.6.7.9 specific to the MEASUREMENT CONTROL message.~~
10. It is proposed to clarify that Reporting Cell Status is dependent on the event trigger using a note.
11. It is proposed to clarify that these IEs will always be present
12. Agreed changes from R2-021116 have been merged in: It is clarified that the UE shall trigger the same event with the same entity more than once, provided that the conditions that caused the MEASUREMENT REPORT message to be sent are not met anymore in any interval of time after the event has been triggered.

Impact Analysis:
Impact is isolated only to measurement functions:

- Correction to a function where the specification was
  - Unclear, and
  - Containing some contradictions.

Would not affect implementations behaving as indicated in the CR, would affect implementations supporting the corrected functionality otherwise.

Consequences if not approved:	⌘	The specification is unclear in many places, and inconsistent in some places.

Clauses affected:	⌘	8.4.0, 8.4.1.2, 8.4.1.3, 8.4.1.6.6, 8.4.1.7.1, 8.4.1.7.2, 8.4.1.7.4, 8.4.2.2, 8.6.7.8, 8.6.7.9, 10.3.7.58, 10.3.7.72, 14.4.2.1, 14.4.2.2, 14.6.2.1, 14.6.2.2, 14.6.2.3, 14.6.2.4, 14.6.2.5, 14.6.2.6, 14.6.2.7			
Other specs Affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.331 v3.10.0, CR 1478 25.331 v4.4.0, CR 1479	
Other comments:	⌘				

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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

8.4 Measurement procedures

8.4.0 Measurement related definitions

UTRAN may control a measurement in the UE either by broadcast of SYSTEM INFORMATION and/or by transmitting a MEASUREMENT CONTROL message.

The following information is used to control the UE measurements and the measurement results reporting:

1. Measurement identity: A reference number that should be used by the UTRAN when setting up, modifying or releasing the measurement and by the UE in the measurement report.
2. Measurement command: One out of three different measurement commands.
   - Setup: Setup a new measurement.
   - Modify: Modify a previously defined measurement, e.g. to change the reporting criteria.
   - Release: Stop a measurement and clear all information in the UE that are related to that measurement.
3. Measurement type: One of the types listed below describing what the UE shall measure.

Presence or absence of the following control information depends on the measurement type

4. Measurement objects: The objects on which the UE shall measure measurement quantities, and corresponding object information.
5. Measurement quantity: The quantity the UE shall measure on the measurement object. This also includes the filtering of the measurements.
6. Reporting quantities: The quantities the UE shall include in the report in addition to the quantities that are mandatory to report for the specific event.
7. Measurement reporting criteria: The triggering of the measurement report, e.g. periodical or event-triggered reporting.
8. Measurement Validity: Defines in which UE states the measurement is valid.
9. Measurement reporting mode: This specifies whether the UE shall transmit the measurement report using AM or UM RLC.
10. Additional measurement identities: A list of references to other measurements. When this measurement triggers a measurement report, the UE shall also include the reporting quantities for the measurements referenced by the additional measurement identities.

All these measurement parameters depend on the measurement type and are described in more detail in clause 14.

The different types of measurements are:

- Intra-frequency measurements: measurements on downlink physical channels at the same frequency as the active set. A measurement object corresponds to one cell. Detailed description is found in subclause 14.1.
- Inter-frequency measurements: measurements on downlink physical channels at frequencies that differ from the frequency of the active set. A measurement object corresponds to one cell. Detailed description is found in subclause 14.2.
- Inter-RAT measurements: measurements on downlink physical channels belonging to another radio access technology than UTRAN, e.g. GSM. A measurement object corresponds to one cell. Detailed description is found in subclause 14.3.
- Traffic volume measurements: measurements on uplink traffic volume. A measurement object corresponds to one cell. Detailed description is found in subclause 14.4.
- Quality measurements: Measurements of downlink quality parameters, e.g. downlink transport block error rate. A measurement object corresponds to one transport channel in case of BLER. A measurement object corresponds to one timeslot in case of SIR (TDD only). Detailed description is found in subclause 14.5.
- UE-internal measurements: Measurements of UE transmission power and UE received signal level. Detailed description is found in subclause 14.6.
- UE positioning measurements: Measurements of UE position. Detailed description is found in subclause 14.7.

The UE shall support a number of measurements running in parallel as specified in [19] and [20]. The UE shall also support that each measurement is controlled and reported independently of every other measurement.

Cells that the UE is monitoring are grouped in the UE into three ~~different~~ mutually exclusive categories:

1. Cells, which belong to the active set. User information is sent from all these cells. In FDD, the cells in the active set are involved in soft handover. In TDD the active set always comprises one cell only.
2. Cells, which are not included in the active set, but are ~~explicitly indicated to be measured by UTRAN~~ included in CELL_INFO_LIST belong to the monitored set.

~~NOTE: The cells explicitly indicated to be measured by UTRAN for a given intra-frequency (resp. inter-frequency, inter-RAT) measurement are:~~

~~- if the IE "Cells for measurement" has been received for this intra-frequency (resp inter-frequency, inter-RAT) measurement:~~

~~- the intra-frequency (resp. inter-frequency, inter-RAT) cells stored in the variable CELL_INFO_LIST and pointed at in the IE "Cells for measurement".~~

~~- otherwise:~~

~~- any of the intra-frequency (resp. inter-frequency, inter-RAT) cells stored in the variable CELL_INFO_LIST.~~

~~NOTE: cells stored in the CELL_INFO_LIST may either be in the monitored or active set. The UE shall maintain the category a cell included in CELL_INFO_LIST has.~~

3. Cells detected by the UE, which are ~~neither included in the active set nor in the monitored set~~ not in the CELL_INFO_LIST nor in the active set belong to the detected set. Reporting of measurements of the detected set is only applicable to intra-frequency measurements made by UEs in CELL_DCH state.

If the IE "Cells for measurement" has been included in MEASUREMENT CONTROL or SIB 11 or SIB 12, only monitored set cells explicitly indicated for a given intra frequency (resp. inter frequency, interRAT) measurement by the IE "Cells for measurement" shall be considered for measurement. If the IE "Cells for measurement" has not been included in MEASUREMENT CONTROL or SIB 11 or SIB 12, all of the intra frequency (resp. inter frequency, inter RAT) cells stored in the variable CELL_INFO_LIST shall be considered for measurement.

Active set cells which are not in the CELL_INFO_LIST shall not be considered for any measurement.

8.4.1 Measurement control

Figure 8.4.1-1: Measurement Control, normal case

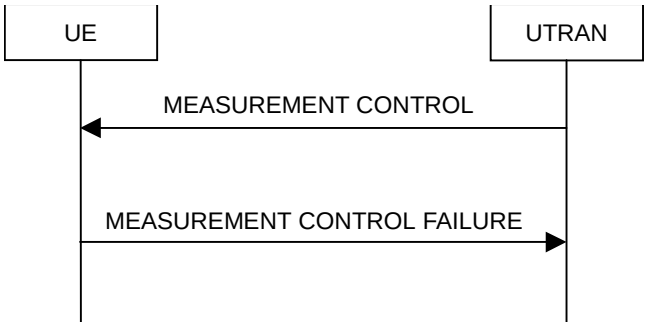

Figure 8.4.1-2: Measurement Control, failure case

8.4.1.1 General

The purpose of the measurement control procedure is to setup, modify or release a measurement in the UE.

8.4.1.2 Initiation

The UTRAN may request a measurement by the UE to be setup, modified or released with a MEASUREMENT CONTROL message, which is transmitted on the downlink DCCH using AM RLC.

The UTRAN should take the UE capabilities into account when a measurement is requested from the UE.

When a new measurement is created, UTRAN should set the IE "Measurement identity" to a value, which is not used for other measurements. UTRAN may use several

"Measurement identity" for the same "Measurement type". In case of setting several "Measurement identity" within a same "Measurement type", the measurement object or the list of measurement objects can be set differently for each measurement with different "Measurement identity ".

When a current measurement is modified or released, UTRAN should set the IE "Measurement identity" to the value, which is used for the measurement being modified or released. In case of modifying IEs within a "Measurement identity", it is not needed for UTRAN to indicate the IEs other than modified IEs, and the UE continues to use the current values of the IEs that are not modified. UTRAN should not use "modify" to change the type of measurement stored in the variable MEASUREMENT_IDENTITY for a given measurement identity.

8.4.1.3 Reception of MEASUREMENT CONTROL by the UE

Upon reception of a MEASUREMENT CONTROL message the UE shall perform actions specified in subclause 8.6 unless otherwise specified below.

The UE shall:

1>read the IE "Measurement command";

1>if the IE "Measurement command" has the value "setup":

2>store this measurement in the variable MEASUREMENT_IDENTITY according to the IE "measurement identity", first releasing any previously stored measurement with that identity if that exists;

2>for measurement types "inter-RAT measurement" or "inter-frequency measurement":

3>if, according to its measurement capabilities, the UE requires compressed mode to perform that measurement type and a compressed mode pattern sequence with an appropriate measurement purpose is simultaneously activated by the IE "DPCH compressed mode status info"; or

3>if the IE "Inter-frequency cell info list" for that measurement identity is empty; or

3>if, according to its measurement capabilities, the UE does not require compressed mode to perform the measurements:

4>if the measurement is valid in the current RRC state of the UE:

5>begin measurements according to the stored control information for this measurement identity.

2>for measurement type "UE positioning measurement":

3>if the UE is in CELL_FACH state:

4>if IE "Positioning Method" is set to "OTDOA":

5>if IE "Method Type" is set to "UE assisted":

6>if IE "UE positioning OTDOA assistance data for UE assisted" is not included:

7>if System Information Block type 15.4 is broadcast:

8>read System Information Block type 15.4.

7>act as specified in subclause 8.6.7.19.2.

5>if IE "Method Type" is set to "UE based":

6>if IE "UE positioning OTDOA assistance data for UE based" is not included:

7>if System Information Block type 15.5 is broadcast:

8>read System Information Block type 15.5.

7>act as specified in subclause 8.6.7.19.2a.

2>for any other measurement type:

3>if the measurement is valid in the current RRC state of the UE:

4>begin measurements according to the stored control information for this measurement identity.

1>if the IE "Measurement command" has the value "modify":

2>for all IEs present in the MEASUREMENT CONTROL message:

3>if a measurement was stored in the variable MEASUREMENT_IDENTITY associated to the identity by the IE "measurement identity":

4>for measurement types "inter-frequency measurement" that require measurements on a frequency other than the actually used frequency, or that require measurements on another RAT:

5>if, according to its measurement capabilities, the UE requires compressed mode to perform that measurement type and a compressed mode pattern sequence with an appropriate measurement purpose is simultaneously activated by the IE "DPCH compressed mode status info"; and

5>if the IE "Inter-frequency cell info list" for that measurement identity is empty; or

5>if, according to its measurement capabilities, the UE does not require compressed mode to perform the measurements:

6>replace the corresponding information stored in variable MEASUREMENT_IDENTITY associated with the identity indicated by the IE "measurement identity" with the one received in the MEASUREMENT CONTROL message;

6>resume the measurements according to the new stored measurement control information.

4>for any other measurement type:

5>replace the corresponding information stored in variable MEASUREMENT_IDENTITY associated to the identity indicated by the IE "measurement identity" with the one received in the MEASUREMENT CONTROL message;

5>resume the measurements according to the new stored measurement control information.

3>otherwise:

4>set the variable CONFIGURATION_INCOMPLETE to TRUE.

2>for all optional IEs that are not present in the MEASUREMENT CONTROL message:

3>leave the currently stored information elements unchanged in the variable MEASUREMENT_IDENTITY if not stated otherwise for that IE.

1>if the IE "measurement command" has the value "release":

2>terminate the measurement associated with the identity given in the IE "measurement identity";

2>clear all stored measurement control information related associated to this measurement identity in variable MEASUREMENT_IDENTITY.

1>if the IE "DPCH Compressed Mode Status Info" is present:

2>if, as the result of this message, UE will have more than one transmission gap pattern sequence with the same measurement purpose active (according to IE 'TGMP' in variable TGPS_IDENTITY):

3>set the variable CONFIGURATION_INCOMPLETE to TRUE.

2>if pattern sequence corresponding to IE "TGPSI" is already active (according to "TGPS Status Flag"):

3>deactivate this pattern sequence at the beginning of the frame indicated by IE "TGPS reconfiguration CFN" received in the message.

2>after the time indicated by IE "TGPS reconfiguration CFN" has elapsed:

3>activate the pattern sequence stored in the variable TGPS_IDENTITY corresponding to each IE "TGPSI" for which the "TGPS status flag" is set to "active" at the time indicated by IE "TGCFN"; and

3>begin the inter-frequency and/or inter-RAT measurements corresponding to the pattern sequence measurement purpose of each activated pattern sequence;

3>if the values of IE "TGPS reconfiguration CFN" and IE "TGCFN" are equal:

4>start the concerned pattern sequence immediately at that CFN.

2>not alter pattern sequences stored in variable TGPS_IDENTITY, if the pattern sequence is not identitifed in IE "TGPSI" in the received message.

1>if the UE in CELL_FACH state receives a MEASUREMENT CONTROL message, which indicates the same measurement identity as that stored in the variable MEASUREMENT_IDENTITY:

2>update the stored information with the traffic volume measurement control information in variable MEASUREMENT_IDENTITY; and

2>refrain from updating the traffic volume measurement control information associated with this measurement identity in the variable

MEASUREMENT_IDENTITY with the information received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11) until this measurement is explicitly released with another MEASUREMENT CONTROL message.

1>if the IE "Read SFN indicator" included in the IE "Cell info" of an inter-frequency cell is set to TRUE and the variable UE_CAPABILITY_TRANSFERRED has the DL "Measurement capability" for "FDD measurements" set to TRUE (the UE requires DL compressed mode in order to perform measurements on FDD):

2>set the variable CONFIGURATION_INCOMPLETE to TRUE.

1>clear the entry for the MEASUREMENT CONTROL message in the table "Accepted transactions" in the variable TRANSACTIONS;

1>if the UE "Additional Measurement List" is present

2>if the received measurement configuration in this MEASUREMENT CONTROL message, or any measurement identities in the "Additional Measurement List" do not all have the same validity

3>set the variable CONFIGURATION_INCOMPLETE to TRUE.

The UE may:

1>if the IE "Measurement command" has the value "setup":

2>for measurement type "UE positioning measurement":

3>if the UE is CELL_FACH state:

4>if IE "Positioning Method" is set to "GPS":

5>if IE "UE positioning GPS assistance data" is not included and variable UE_POSITIONING_GPS_DATA is empty:

6>if System Information Block types 15, 15.1, 15.2 and 15.3 are broadcast:

7>read System Information Block types 15, 15.1, 15.2 and 15.3.

6>act as specified in subclause 8.6.7.19.3.

1>and the procedure ends.

8.4.1.4 Unsupported measurement in the UE

If UTRAN instructs the UE to perform a measurement that is not supported by the UE, the UE shall:

1>retain the measurement configuration that was valid before the MEASUREMENT CONTROL message was received;

1>set the IE "RRC transaction identifier" in the MEASUREMENT CONTROL FAILURE message to the value of "RRC transaction identifier" in the entry for the MEASUREMENT CONTROL message in the table "Accepted transactions" in the variable TRANSACTIONS; and

1>clear that entry.

1>set the cause value in IE "failure cause" to "unsupported measurement";

1> submit the MEASUREMENT CONTROL FAILURE message to lower layers for transmission on the DCCH using AM RLC;

1> continue with any ongoing processes and procedures as if the invalid MEASUREMENT CONTROL message has not been received;

1> and the procedure ends.

8.4.1.4a Configuration Incomplete

If the variable CONFIGURATION_INCOMPLETE is set to TRUE, the UE shall:

1> retain the measurement configuration that was valid before the MEASUREMENT CONTROL message was received;

1> set the IE "RRC transaction identifier" in the MEASUREMENT CONTROL FAILURE message to the value of "RRC transaction identifier" in the entry for the MEASUREMENT CONTROL message in the table "Accepted transactions" in the variable TRANSACTIONS and clear that entry;

1> clear the variable CONFIGURATION_INCOMPLETE;

1> set the cause value in IE "failure cause" to "Configuration incomplete";

1> submit the MEASUREMENT CONTROL FAILURE message to lower layers for transmission on the DCCH using AM RLC;

1> continue with any ongoing processes and procedures as if the invalid MEASUREMENT CONTROL message has not been received;

1> and the procedure ends.

8.4.1.5 Invalid MEASUREMENT CONTROL message

If the MEASUREMENT CONTROL message contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to clause 9, the UE shall perform procedure specific error handling as follows. The UE shall:

1> set the IE "RRC transaction identifier" in the MEASUREMENT CONTROL FAILURE message to the value of "RRC transaction identifier" in the entry for the MEASUREMENT CONTROL message in the table "Rejected transactions" in the variable TRANSACTIONS; and

1> clear that entry.

1> set the IE "failure cause" to the cause value "protocol error";

1> include the IE "Protocol error information" with contents set to the value of the variable PROTOCOL_ERROR_INFORMATION;

1> submit the MEASUREMENT CONTROL FAILURE message to lower layers for transmission on the DCCH using AM RLC;

1> continue with any ongoing processes and procedures as if the invalid MEASUREMENT CONTROL message has not been received;

1> and the procedure ends.

8.4.1.6 Measurements after transition from CELL_DCH to CELL_FACH/CELL_PCH/URA_PCH state

The UE shall apply the following rules for different measurement types after transiting from CELL_DCH to CELL_FACH/CELL_PCH/URA_PCH state:

8.4.1.6.1 Intra-frequency measurement

Upon transition from CELL_DCH to CELL_FACH/CELL_PCH/URA_PCH state, the UE shall:

1> stop intra-frequency type measurement reporting;

1> if the transition is due to a reconfiguration message which included the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD), and the UE selects a cell other than that indicated by this IE; or

1> if the transition is due to a reconfiguration message which does not include the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD); or

1> if the transition is not due to a reconfiguration message:

2> delete the measurements of type intra-frequency associated with the variable MEASUREMENT_IDENTITY.

~~1> if the optional IE "measurement validity" for this measurement has not been included:~~

~~2> delete the measurements of type intra-frequency associated with the variable MEASUREMENT_IDENTITY.~~

1> begin monitoring cells listed in the IE "intra-frequency cell info list" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11).

8.4.1.6.2 Inter-frequency measurement

Upon transition from CELL_DCH to CELL_FACH/ CELL_PCH/URA_PCH state, the UE shall:

1> stop the inter-frequency type measurement reporting assigned in a MEASUREMENT CONTROL message;

1> if the transition is due to a reconfiguration message which included the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD), and the UE selects a cell other than that indicated by this IE; or

1> if the transition is due to a reconfiguration message which does not include the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD); or

1> if the transition is not due to a reconfiguration message:

2> delete the measurements of type inter-frequency associated with the variable MEASUREMENT_IDENTITY.

1> begin monitoring cells listed in the IE "inter-frequency cell info list" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

~~1> if the optional IE "measurement validity" for this measurement has not been included:~~

~~2> delete the measurements of type inter-frequency associated with the variable MEASUREMENT_IDENTITY.~~

1> in CELL_FACH state:

2> perform measurements on other frequencies according to the IE "FACH measurement occasion info".

8.4.1.6.3 Inter-RAT measurement

Upon transition from CELL_DCH to CELL_FACH/CELL_PCH/URA_PCH state, the UE shall:

1> stop the inter-RAT type measurement reporting assigned in a MEASUREMENT CONTROL message;

1> delete the measurements of type inter-RAT associated with the variable MEASUREMENT_IDENTITY;

1> begin monitoring cells listed in the IE "inter-RAT cell info list" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

1> in CELL_FACH state:

2> perform measurements on other systems according to the IE "FACH measurement occasion info".

8.4.1.6.4 Quality measurement

Upon transition from CELL_DCH to CELL_FACH/CELL_PCH/URA_PCH state, the UE shall:

1> stop quality type measurement reporting;

1> delete all measurement control information of measurement type "quality" stored in the variable MEASUREMENT_IDENTITY.

8.4.1.6.5 UE internal measurement

Upon transition from CELL_DCH to CELL_FACH/CELL_PCH/URA_PCH state, the UE shall:

1> stop UE internal measurement type measurement reporting;

1> delete all measurement control information of measurement type "UE internal" stored in the variable MEASUREMENT_IDENTITY.

8.4.1.6.6 Traffic volume measurement

Upon transition from CELL_DCH to CELL_FACH or CELL_PCH or URA_PCH state, the UE shall:

1> retrieve each set of measurement control information of measurement type "traffic volume" stored in the variable MEASUREMENT_IDENTITY; and

2>if the optional IE "measurement validity" for this measurement has not been included:

3>delete the measurement associated with the variable MEASUREMENT_IDENTITY.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "CELL_DCH":

3>stop measurement reporting;

3>store the measurement associated with the variable MEASUREMENT_IDENTITY to be used after the next transition to CELL_DCH state.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states":

3>continue measurement reporting.

2>if the IE "measurement validity" has been included and the IE "UE state" has been assigned to value "all states except CELL_DCH":

3>resume this measurement and associated reporting.

1>if no traffic volume type measurement~~s~~ has been assigned to the UE ~~set up or modified through~~ with a MEASUREMENT CONTROL message ~~and~~that is valid in CELL_FACH or CELL_PCH or URA_PCH states ~~are~~ (stored in the variable MEASUREMENT_IDENTITY) ~~with~~which has the same identity as the one indicated in the IE "Traffic volume measurement system information":

2>store the measurement control information from the IE "Traffic volume measurement system information" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11) in the variable MEASUREMENT_IDENTITY;

2>begin traffic volume measurement reporting according to the assigned information.

8.4.1.6.7 UE positioning measurement

Upon transition from CELL_DCH to CELL_PCH or URA_PCH, the UE shall:

1>if the UE does not support UP measurement validity in CELL_PCH and URA_PCH states as indicated in the IE "UE positioning capability" included in the IE "UE Radio Access Capability":

2>stop UE positioning measurement reporting.

Upon transition from CELL_DCH to CELL_FACH, or upon transition from CELL_DCH to CELL_PCH or URA_PCH and if the UE supports UP measurement validity in CELL_PCH and URA_PCH states as indicated in the IE "UE positioning capability" included in the IE "UE Radio Access Capability", the UE shall:

1>retrieve each set of measurement control information of measurement type "UE positioning" stored in the variable MEASUREMENT_IDENTITY; and

2>if the optional IE "measurement validity" for this measurement has not been included:

3>delete the measurement associated with the variable MEASUREMENT_IDENTITY.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "CELL_DCH":

3>stop measurement reporting;

3>store the measurement associated with the variable MEASUREMENT_IDENTITY to be used after the next transition to CELL_DCH state.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states":

3>upon transition from CELL_DCH to CELL_PCH or URA_PCH:

4>if the choice in the IE "Reporting Criteria" included the IE "UE Positioning" stored in the variable MEASUREMENT_IDENTITY is set to "UE positioning reporting criteria" and the value of the IE "Measurement interval" included in this IE is less than 64 seconds:

5>consider the value of the IE "Measurement interval " as being 64 seconds;

4>if the choice in the IE "Reporting Criteria" included the IE "UE Positioning" stored in the variable MEASUREMENT_IDENTITY is set to "Periodical Reporting Criteria" and the value of the IE "Reporting interval" included in this IE is less than 64 seconds:

5>consider the value of the IE "Reporting Interval" as being 64 seconds

3>continue measurement reporting according to its UE positioning measurement reporting capability..

2>if the IE "measurement validity" has been included and the IE "UE state" has been assigned to value "all states except CELL_DCH":

3>upon transition from CELL_DCH to CELL_PCH or URA_PCH:

4>if the choice in the IE "Reporting Criteria" included the IE "UE Positioning" stored in the variable MEASUREMENT_IDENTITY is set to "UE positioning reporting criteria" and the value of the IE "Measurement interval " included in this IE is less than 64 seconds:

5>consider the value of the IE "Measurement interval " as being 64 seconds.

4>if the choice in the IE "Reporting Criteria" included the IE "UE Positioning" stored in the variable MEASUREMENT_IDENTITY is set to "Periodical Reporting Criteria" and the value of the IE "Reporting interval" included in this IE is less than 64 seconds:

5>consider the value of the IE "Reporting Interval" as being 64 seconds.

3>resume this measurement and associated reporting according to its UE Positioning measurement reporting capability.

1>if the transition is due to a reconfiguration message which included the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD), and the UE selects a cell other than that indicated by this IE; or

1> if the transition is due to a reconfiguration message which does not include the IE "Primary CPICH info" (for FDD) or "Primary CCPCH info" (for TDD); or

1> if the transition is not due to a reconfiguration message:

2> delete the assistance data included in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED, UE_POSITIONING_OTDOA_DATA_UE_ASSISTED and UE_POSITIONING_GPS_DATA.

1> if the IE "Positioning Methods" stored in the variable MEASUREMENT_IDENTITY is set to "OTDOA" or "OTDOA or GPS":

2> if the IE "Method type" stored in the variable MEASUREMENT_IDENTITY is set to "UE-based" or "UE assisted preferred but UE-based allowed" or "UE-based preferred but UE-assisted allowed":

3> begin monitoring assistance data received in System Information Block type 15.4 and System Information Block type 15.5 according to subclause 8.1.1.6.15.

2> if the IE "Method type" stored in the variable MEASUREMENT_IDENTITY is set to "UE-assisted":

3> begin monitoring assistance data received in System Information Block type 15.4 according to subclause 8.1.1.6.15.

1> if the UE is in CELL_FACH state:

2> if the IE "UE positioning OTDOA neighbour cell list for UE assisted" stored in the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED or UE_POSITIONING_OTDOA_DATA_UE_BASED contains neighbour cells on other frequencies than the current frequency:

3> perform measurements on other frequencies according to the IE "FACH measurement occasion info".

The UE may:

1> if the IE "Positioning Methods" stored in the variable MEASUREMENT_IDENTITY is set to "GPS" or "OTDOA or GPS":

2> begin monitoring assistance data received in System Information Block type 15 and/or System Information Block type 15.1 and/or System Information Block type 15.2 and/or System Information Block type 15.3 according to subclause 8.1.1.6.15.

8.4.1.6a Actions in CELL_FACH/CELL_PCH/URA/PCH state upon cell re-selection

Upon cell reselection while in CELL_FACH/CELL_PCH/URA/PCH state and the cell reselection has occurred after the measurement control information was stored, the UE shall:

1> delete all measurements of type intra-frequency, inter-frequency, and inter-RAT associated with the variable MEASUREMENT_IDENTITY;

1> delete the traffic volume measurements that have not been set up or modified through a MEASUREMENT CONTROL message.

8.4.1.7 Measurements after transition from CELL_FACH to CELL_DCH state

The UE shall apply the following rules for different measurement types after transiting from CELL_FACH to CELL_DCH state:

8.4.1.7.1 Intra-frequency measurement

Upon transition from CELL_FACH to CELL_DCH state, the UE shall:

1> retrieve each set of measurement control information of measurement type "intra-frequency" stored in the variable MEASUREMENT_IDENTITY;

~~1> if the IE "measurement validity" for a measurement has been assigned the value "CELL_DCH:~~

~~2~~1> resume the measurement reporting.

1> if no intra-frequency measurements applicable to CELL_DCH state are stored in the variable MEASUREMENT_IDENTITY:

2> continue monitoring the list of neighbouring cells assigned in the IE "intra-frequency cell info list" in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

2> if the IE "intra-frequency measurement reporting criteria" was included in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11):

3> send the MEASUREMENT REPORT message when reporting criteria in IE "Reporting information for state CELL_DCH" are fulfilled.

8.4.1.7.2 Inter-frequency measurement

Upon transition from CELL_FACH to CELL_DCH state, the UE shall:

1> stop monitoring the list of cells assigned in the IE "inter-frequency cell info list" in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

1> retrieve each set of measurement control information of measurement type "inter-frequency" stored in the variable MEASUREMENT_IDENTITY; and

~~1> if the IE "measurement validity" for a measurement has been assigned the value "CELL_DCH":~~

~~2~~1> resume the measurement reporting.

8.4.1.7.3 Inter-RAT measurement

Upon transition from CELL_FACH to CELL_DCH state, the UE shall:

1> stop monitoring the list of cells assigned in the IE "inter-RAT cell info list" in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11).

8.4.1.7.4 Traffic volume measurement

Upon transition from CELL_FACH to CELL_DCH state, the UE shall:

1>retrieve each set of measurement control information of measurement type "traffic volume" stored in the variable MEASUREMENT_IDENTITY;

2>if the optional IE "measurement validity" for this measurement has not been included:

3>delete the measurement associated with the variable MEASUREMENT_IDENTITY.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states except CELL_DCH":

3>stop measurement reporting; and

3>save the measurement associated with the variable MEASUREMENT_IDENTITY to be used after the next transition to CELL_FACH/CELL_PCH/URA_PCH state.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states":

3>continue measurement reporting.

2>if the IE "measurement validity" has been included and the IE "UE state" has been assigned to value "CELL_DCH":

3>resume this measurement and associated reporting.

1>if no traffic volume type measurement has been assigned to the UE with a MEASUREMENT CONTROL message ~~when transiting to CELL_DCH state:~~ that is valid in CELL_DCH and has the same identity as the one indicated in the IE "Traffic volume measurement system information":

2>store the measurement control information from the IE "Traffic volume measurement system information" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11) in the variable MEASUREMENT_IDENTITY;

2> begin traffic volume measurement reporting according to the assigned information.

~~2>continue an ongoing traffic volume type measurement, assigned in System Information Block type 11 (or System Information Block type 12, according to subclause 8.1.1.6.11).~~

8.4.1.7.5 UE positioning measurement

Upon transition from CELL_FACH to CELL_DCH state, the UE shall:

1>retrieve each set of measurement control information of measurement type "UE positioning" stored in the variable MEASUREMENT_IDENTITY; and

2>if the optional IE "Measurement validity" for this measurement has not been included:

3>delete the measurement associated with the variable MEASUREMENT_IDENTITY.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states except CELL_DCH":

3>stop measurement reporting; and

3>save the measurement associated with the variable MEASUREMENT_IDENTITY to be used after the next transition to CELL_FACH/CELL_PCH/URA_PCH state.

2>if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states":

3>continue measurement reporting.

2>if the IE "measurement validity" has been included and the IE "UE state" has been assigned to value "CELL_DCH":

3>resume this measurement and associated reporting.

1>stop monitoring assistance data received in System Information Block type 15 or System Information Block type 15.1 or System Information Block type 15.2 or System Information Block type 15.3 or System Information Block type 15.4 or System Information Block 15.5.

8.4.1.8 Measurements after transition from idle mode to CELL_DCH state

The UE shall obey the following rules for different measurement types after transiting from idle mode to CELL_DCH state:

8.4.1.8.1 Intra-frequency measurement

Upon transition from idle mode to CELL_DCH state, the UE shall:

1>begin or continue monitoring the list of cells assigned in the IE "intra-frequency cell info list" in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

1>if the "intra-frequency measurement reporting criteria" IE was included in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11):

2>begin measurement reporting according to the IE.

8.4.1.8.2 Inter-frequency measurement

Upon transition from idle mode to CELL_DCH state, the UE shall:

1>stop monitoring the list of cells assigned in the IE "inter-frequency cell info list" in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11).

8.4.1.8.3 Inter-RAT measurement

Upon transition from idle mode to CELL_DCH state, the UE shall:

1>stop monitoring the list of cells assigned in the IE "inter-RAT cell info list" in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11).

8.4.1.8.4 Traffic volume measurement

Upon transition from idle mode to CELL_DCH state, the UE shall:

1> begin a traffic volume type measurement, assigned in System Information Block type 11 (or System Information Block type 12, according to subclause 8.1.1.6.11).

8.4.1.8.5 UE positioning measurement

Upon transition from idle mode to CELL_DCH state, the UE shall:

1> stop monitoring assistance data received in System Information Block type 15 or System Information Block type 15.1 or System Information Block type 15.2 or System Information Block type 15.3 or System Information Block type 15.4 or System Information Block type 15.5.

8.4.1.9 Measurements after transition from idle mode to CELL_FACH state

The UE shall obey the follow rules for different measurement types after transiting from idle mode to CELL_FACH state:

8.4.1.9.1 Intra-frequency measurement

Upon transition from idle mode to CELL_FACH state, the UE shall:

1> begin or continue monitoring cells listed in the IE "intra-frequency cell info list" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11).

8.4.1.9.2 Inter-frequency measurement

Upon transition from idle mode to CELL_FACH state, the UE shall:

1> begin or continue monitoring cells listed in the IE "inter-frequency cell info list" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

1> perform measurements on other frequencies according to the IE "FACH measurement occasion info".

8.4.1.9.3 Inter-RAT measurement

Upon transition from idle mode to CELL_FACH state, the UE shall:

1> begin or continue monitoring cells listed in the IE "inter-RAT cell info list" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11);

1> perform measurements on other systems according to the IE "FACH measurement occasion info".

8.4.1.9.4 Traffic volume measurement

Upon transition from idle mode to CELL_FACH state, the UE shall:

1> store the measurement control information from the IE "Traffic volume measurement system information" received in System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11) in the variable MEASUREMENT_IDENTITY;

1> begin traffic volume measurement reporting according to the assigned information.

8.4.1.9.5 UE positioning measurement

Upon transition from idle mode to CELL_FACH state, the UE may:

1> begin or continue monitoring assistance data received in System Information Block type 15 or System Information Block type 15.1 or System Information Block type 15.2 or System Information Block type 15.3 or System Information Block type 15.4 or System Information Block type 15.5 according to subclause 8.1.1.6.15;

1> if the IE "UE positioning OTDOA neighbour cell list for UE assisted" stored in the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED; or

1> if the IE "UE positioning OTDOA neighbour cell list for UE based" stored in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED contains neighbour cells on other frequencies than the current frequency:

2> perform measurements on other frequencies according to the IE "FACH measurement occasion info".

8.4.1.9a Measurements after transition from connected mode to idle mode

Upon transition from connected mode to idle mode the UE shall:

1> stop measurement reporting for all measurements stored in the variable MEASUREMENT_IDENTITY;

1> clear the variable MEASUREMENT_IDENTITY;

1> apply the following rules for different measurement types.

8.4.1.9a.1 Intra-frequency measurement

Upon transition from connected mode to idle mode, the UE shall:

1> stop monitoring intra-frequency cells listed in the IE "intra-frequency cell info list" received in System Information Block type 12 (if System Information Block type 12 is transmitted in the cell, according to subclause 8.1.1.6.11);

1> begin monitoring intra-frequency cells listed in the IE "intra-frequency cell info list" received in System Information Block type 11.

8.4.1.9a.2 Inter-frequency measurement

Upon transition from connected mode to idle mode, the UE shall:

1> stop monitoring inter-frequency cells listed in the IE "inter-frequency cell info list" received in System Information Block type 12 (if System Information Block type 12 is transmitted in the cell, according to subclause 8.1.1.6.11);

1> begin monitoring inter-frequency cells listed in the IE "inter-frequency cell info list" received in System Information Block type 11.

8.4.1.9a.3 Inter-RAT measurement

Upon transition from connected mode to idle mode, the UE shall:

1> stop monitoring inter-RAT cells listed in the IE "inter-RAT cell info list" received in System Information Block type 12 (if System Information Block type 12 is transmitted in the cell, according to 8.1.1.6.11);

1> begin monitoring inter-RAT cells listed in the IE "inter-RAT cell info list" received in System Information Block type 11.

8.4.1.9a.4 UE positioning measurement

Upon transition from connected mode to idle mode, the UE may:

1> begin or continue monitoring assistance data received in System Information Block type 15 or System Information Block type 15.1 or System Information Block type 15.2 or System Information Block type 15.3 or System Information Block type 15.4 or System Information Block type 15.5.

8.4.1.10 Measurements when measurement object is no longer valid

8.4.1.10.1 Traffic volume measurement

If UE is no longer using the transport channel that is specified in the IE "Traffic volume measurement object", UE shall ignore any measurements that are assigned to that transport channel. If none of the transport channels that are specified in "traffic volume measurement object" is being used, UE shall delete that particular measurement and its measurement identity from the variable MEASUREMENT_IDENTITY.

8.4.2 Measurement report

Figure 8.4.2-1: Measurement report, normal case

8.4.2.1 General

The purpose of the measurement reporting procedure is to transfer measurement results from the UE to UTRAN.

8.4.2.2 Initiation

In CELL_DCH state, the UE shall:

1> transmit a MEASUREMENT REPORT message on the uplink DCCH when the reporting criteria stored in variable MEASUREMENT_IDENTITY are met for any ongoing measurements that are being performed in the UE.

In CELL_FACH state, the UE shall:

1> transmit a MEASUREMENT REPORT message on the uplink DCCH when the reporting criteria stored in variable MEASUREMENT_IDENTITY are met for any ongoing traffic volume measurement or UE positioning measurement that is being performed in the UE;

1> include a measurement report in the IE "Measured results on RACH", as specified in the IE "Intra-frequency reporting quantity for RACH reporting" and the IE "Maximum number of reported cells on RACH" in System Information Block type 12

(or "System Information Block Type 11" if "System Information Block Type 12" is not being broadcast);

1>include in the IE "Measured results on RACH" all requested reporting quantities for cells for which measurements are reported.

In TDD, if the Radio Bearer associated with the MEASUREMENT_IDENTITY fulfilling the reporting criteria for an ongoing traffic volume measurement is mapped on transport channel of type USCH, the UE shall:

1>initiate the "PUSCH CAPACITY REQUEST" procedure instead of transmitting a MEASUREMENT REPORT (TDD Only).

In CELL_PCH or URA_PCH state, the UE shall:

1>first perform the cell update procedure according to subclause 8.3.1, using the cause "uplink data transmission", in order to transit to CELL_FACH state; and then

1>transmit a MEASUREMENT REPORT message on the uplink DCCH when the reporting criteria stored in variable MEASUREMENT_IDENTITY are fulfilled for any ongoing traffic volume measurement or UE positioning measurement which is being performed in the UE.

The reporting criteria are fulfilled if either:

- the first measurement has been completed according to the requirements set in [19] or [20] for a newly initiated measurement with periodic reporting; or
- the time period indicated in the stored IE "Periodical reporting criteria" has elapsed since the last measurement report was submitted to lower layers for a given measurement; or
- an event in stored IE "Measurement reporting criteria" was triggered. Events and triggering of reports for different measurement types are described in detail in clause 14.

For the measurement, which triggered the MEASUREMENT REPORT message, the UE shall:

1>set the IE "measurement identity" to the measurement identity, which is associated with that measurement in variable MEASUREMENT_IDENTITY;

1>set the IE "measured results" to include measurements according to the IE "reporting quantity" of that measurement stored in variable MEASUREMENT_IDENTITY; and

2>if all the reporting quantities are set to "false":

3>not set the IE "measured results".

1>set the IE "Measured results" in the IE "Additional measured results" according to the IE "reporting quantity" for all measurements associated with the measurement identities included in the "Additional measurements list" stored in variable MEASUREMENT_IDENTITY of the measurement that triggered the measurement report; and

2>if more than one additional measured results are to be included:

3>for each on-going measurement sort them in ascending order according to their IE "measurement identity" in the MEASUREMENT REPORT message.

1>if the MEASUREMENT REPORT message was triggered by an event (i.e. not a periodical report):

2>set the IE "Event results" according to the event that triggered the report.

The UE shall:

1>transmit the MEASUREMENT REPORT message on the uplink DCCH using either AM or UM RLC according to the stored IE "measurement reporting mode" associated with the measurement identity that triggered the report.

When the MEASUREMENT REPORT message has been submitted to lower layers for transmission:

1>the procedure ends.

8.6.7.8 Periodical Reporting Criteria

If the IE "Periodical Reporting Criteria" is received by the UE, the UE shall:

1>store the contents of the IE "Amount of Reporting" and IE "Reporting interval" in the variable MEASUREMENT_IDENTITY.

For the first MEASUREMENT REPORT message, the UE shall:

1>send the MEASUREMENT REPORT at the end of the first reporting interval in which all requested reporting quantities are available according to the requirements and the measurement capabilities set in [19] and [20] for at least one measurement object stored in the variable MEASUREMENT_IDENTITY.

Following the first MEASUREMENT REPORT message, the UE shall:

1>send subsequent MEASUREMENT REPORT message with intervals specified by the IE "Reporting interval";

~~1>form the MEASUREMENT REPORT from the measurement objects stored in the variable MEASUREMENT_IDENTITY for which all requested reporting quantities are available according to the requirements and the measurement capabilities set in [19] and [20]; and~~

1>omit measurement results that were reported in a previous MEASUREMENT REPORT and for which new measurement results are not available in the present reporting interval.

After the UE has sent a total number of MEASUREMENT REPORT messages, which equal the value indicated in the IE "Amount of reporting", the UE shall:

1>terminate measurement reporting; and

1>delete all measurement information linked with the "Measurement identity" of the ongoing measurement from the variable MEASUREMENT_IDENTITY.

8.6.7.9 Reporting Cell Status

If the IE "Reporting Cell Status" is received, the UE shall set the IE "Measured Results" in MEASUREMENT REPORT as follows. The UE shall:

1>for intra-frequency measurement and inter-frequency measurement:

2>include the IE "Cell Measured Results" for cells (excluding cells of another RAT) that satisfy the condition (such as "Report cells within active set") specified in the IE "Reporting Cell Status", in descending order by the measurement quantity.

2>the maximum number of the IE "Cell Measured Results" to be included in the IE "Measured Results" is the number specified in the IE "Reporting Cell Status".

1>for inter-RAT measurement:

2>include the measurement results for cells of other RAT (e.g., GSM) that satisfy the condition specified in the IE "Reporting Cell Status", in descending order by the measurement quantity.

2>the maximum number of the IE "Measured GSM Cells" to be included in the IE "Measured Results" is the number specified in the IE "Reporting Cell Status".

If the IE "Reporting Cell Status" is not received for intra-frequency, inter-frequency measurement, or inter-RAT measurement, the UE shall:

1>for intra-frequency measurement and inter-frequency measurements setup or modified by a MEASUREMENT CONTROL message:

2>exclude the IE "Cell Measured Results" for any cell in MEASUREMENT REPORT.

NOTE: The “Reporting Cell Status” IE within "Event Criteria List" defines whether "Cell Measured Results" is present for event-based reporting.

1>for inter-RAT measurement:

2>exclude the IE "Measured GSM Cells" for any cell in MEASUREMENT REPORT.

10.3.7.58 Quality measurement reporting criteria

Event 5a: Number of bad CRCs on a certain transport channel exceeds a threshold.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Parameters sent for each transport channel	OP	1 to <maxTrCH>		This IE is always required, need is OP to align with ASN.1
>DL Transport channel identity	MP		Transport channel identity 10.3.5.18	transport channel type = DCH
>Total CRC	MP		Integer(1..512)	Number of CRCs
>Bad CRC	MP		Integer(1..512)	Number of CRCs
>Pending after trigger	MP		Integer(1..512)	Number of CRCs

10.3.7.72 Traffic volume measurement reporting criteria

Contains the measurement reporting criteria information for a traffic volume measurement.

Event 4a: Transport Channel Traffic Volume [15] exceeds an absolute threshold.

Event 4b: Transport Channel Traffic Volume [15] becomes smaller than an absolute threshold.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Parameters sent for each transport channel	OP	1 to <maxTrCH>		This IE is always required, need is OP to align with ASN.1
>Uplink transport channel type	OP		Enumerated(DCH,RACHorCPCH,USCH)	USCH is TDD only. CPCH is FDD only. RACHorCPCH is the currently configured default in the uplink.
>UL Transport Channel ID	CV-*UL-DCH/USCH*		Transport channel identity 10.3.5.18	
>Parameters required for each Event	OP	1 to <maxMeasperEvent>		This IE is always required, need is OP to align with ASN.1
>>Traffic volume event identity	MP		Traffic volume event identity 10.3.7.66	
>>Reporting Threshold	MP		Enumerated(8,16,32,64,128,256,512,1024,2K,3K,4K,6K,8K,12K,16K,24K,32K,48K,64K,96K,128K,192K,256K,384K,512K,768K)	Threshold in bytes And N Kbytes = N*1024 bytes
>>Time to trigger	OP		Time to trigger 10.3.7.64	Indicates the period of time between the timing of event detection and the timing of sending Measurement Report. Time in ms

>>Pending time after trigger	OP		Integer(250, 500, 1000, 2000, 4000, 8000, 16000)	Indicates the period of time during which it is forbidden to send any new measurement reports with the same Traffic volume event identity even if the triggering condition is fulfilled. Time in milliseconds
>>Tx interruption after trigger	OP		Integer (250, 500, 1000, 2000, 4000, 8000, 16000)	Time in milliseconds. Indicates how long the UE shall block DTCH transmissions on the RACH after a measurement report is triggered.

Condition	Explanation
UL-DCH/USCH	If IE "Uplink transport channel type" is equal to "DCH" or "USCH" (TDD only) this IE is optional. Otherwise the IE is not needed.

13.4 UE variables

13.4.0 CELL INFO LIST

This variable contains cell information on intra-frequency, inter-frequency and inter-RAT cells, as received in messages System Information Block Type 11, System Information Block Type 12, and MEASUREMENT CONTROL. ~~CELL_INFO_LIST will always include all cells in the active set.~~

The first position in Intra-frequency cell info list corresponds to Intra-frequency cell id 0, the second to Intra-frequency cell id 1, etc.

The first position in Inter-frequency cell info list corresponds to Inter-frequency cell id 0, the second to Inter-frequency cell id 1, etc.

The first position in Inter-RAT cell info list corresponds to Intra-frequency cell id 0, the second to Inter-RAT cell id 1, etc.

Information Element/Group name	Need	Multi	Type and reference	Semantics description
Intra-frequency cell info	OP	1..<maxCellMeas>		Note
>CHOICE *position status*	MP			
>>Occupied				
>>>Cell info	MP		Cell info 10.3.7.2	
>>Vacant				No data
Inter-frequency cell info	OP	1..<maxCellMeas>		Note
>CHOICE *position status*	MP			
>>Occupied				
>>>Frequency info	MP		Frequency info 10.3.6.36	
>>>Cell info	MP		Cell info 10.3.7.2	
>>Vacant				No data
Inter-RAT cell info	OP	1..<maxCellMeas>		Note
>CHOICE *position status*	MP			
>>Occupied				
>>>CHOICE *Radio Access Technology*				

Information Element/Group name	Need	Multi	Type and reference	Semantics description
>>>>GSM				
>>>>>Cell selection and re-selection info	MP		Cell selection and re-selection info for SIB11/12 10.3.2.4	
>>>>>BSIC	MP		BSIC 10.3.8.2	
>>>>>BCCH ARFCN	MP		Integer (0..1023)	[43]
>>>>IS-2000				
>>>>>System specific measurement info			enumerated (frequency, timeslot, colour code, output power, PN offset)	For IS-2000, use fields from TIA/EIA/IS-2000.5, subclause 3. 7.3.3.2.27, *Candidate Frequency Neighbour List Message*
>>Vacant				No data

NOTE: This IE shall be cleared when entering UTRA RRC connected mode, when leaving UTRA RRC connected mode, when switched off as well as at selection of a new PLMN.

14.4 Traffic Volume Measurements

14.4.1 Traffic Volume Measurement Quantity

In order to support a large variation of bit rates and RLC buffer size capabilities, a non-linear scale is used. Since, for each RB, the expected traffic includes both new and retransmitted RLC PDUs and potentially existing Control PDUs, all these should be included in the Buffer Occupancy measure. It should also be noted that traffic volume measurements are only applicable for acknowledged and unacknowledged mode.

According to what is stated in the Measurement Control message, the UE should support reporting of RLC Buffer Payload, Average of RLC Buffer Payload, and Variance of RLC Buffer Payload for RBs multiplexed onto the same Transport channel. The Reporting Quantities (i.e. RLC Buffer Payload, Average of RLC Buffer Payload, and Variance of RLC Buffer Payload of each RB) are indicated in the measurement control message. If Average of RLC Buffer Payload or Variance of RLC Buffer Payload is included as Reporting Quantity, the time interval to take an average or a variance shall be used. When the RLC buffer payload, Average of RLC buffer payload or Variance of RLC buffer payload is reported, the measured quantity shall be rounded upwards to the closest higher value possible to report.

14.4.2 Traffic Volume reporting triggers

Traffic volume can be reported in two different ways, periodical and event triggered. The reporting criteria are specified in the measurement control message.

For periodical reporting the UE simply determines the Reporting Quantities in number of bytes for each RB mapped onto the indicated transport channels and reports the results at the time interval and for the number of times specified.

For traffic volume measurements in the UE only one quantity is compared with the thresholds. This quantity is Transport Channel Traffic Volume [15] (which equals the

sum of Buffer Occupancies of RBs multiplexed onto a transport channel) in number of bytes. Event triggered reporting is performed when the Transport Channel Traffic Volume exceeds an upper threshold or becomes smaller than a lower threshold. Every TTI, UE measures the Transport Channel Traffic Volume for each transport channel and compares it with the configured thresholds. If the value is out of range, the UE determines the Reporting Quantities for the RBs mapped onto that transport channel and reports the results.

14.4.2.1 Reporting event 4 A: Transport Channel Traffic Volume exceeds an absolute threshold

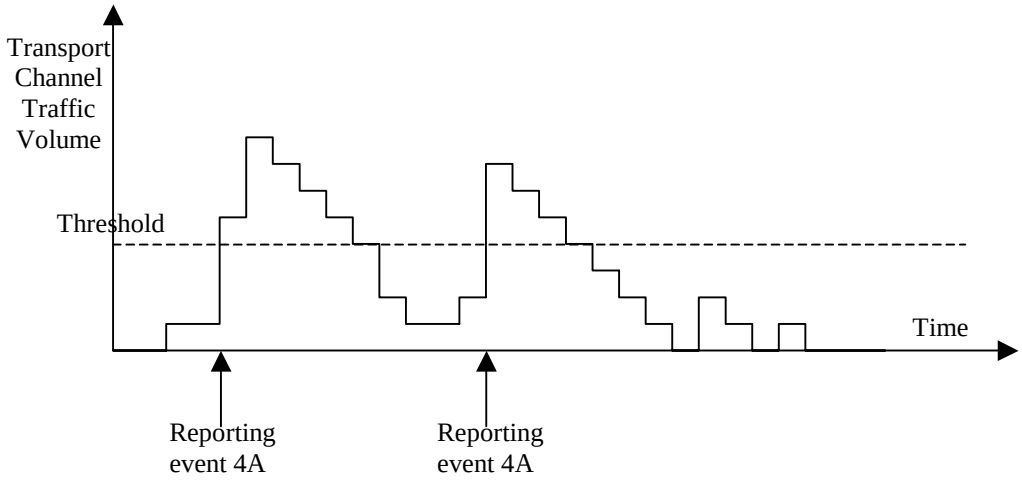

Figure 14.4.2.1-1: Event triggered report when Transport Channel Traffic Volume exceeds a certain threshold

If the monitored Transport Channel Traffic Volume (TCTV) [15] exceeds an absolute threshold, i.e. if TCTV~~F~~>Reporting threshold, this is an event that could trigger a report. The event could be triggered again only if TCTV becomes smaller than the Reporting threshold and later TCTV>Reporting threshold is verified again. The corresponding report specifies at least which measurement ID the event that triggered the report belongs to.

14.4.2.2 Reporting event 4 B: Transport Channel Traffic Volume becomes smaller than an absolute threshold

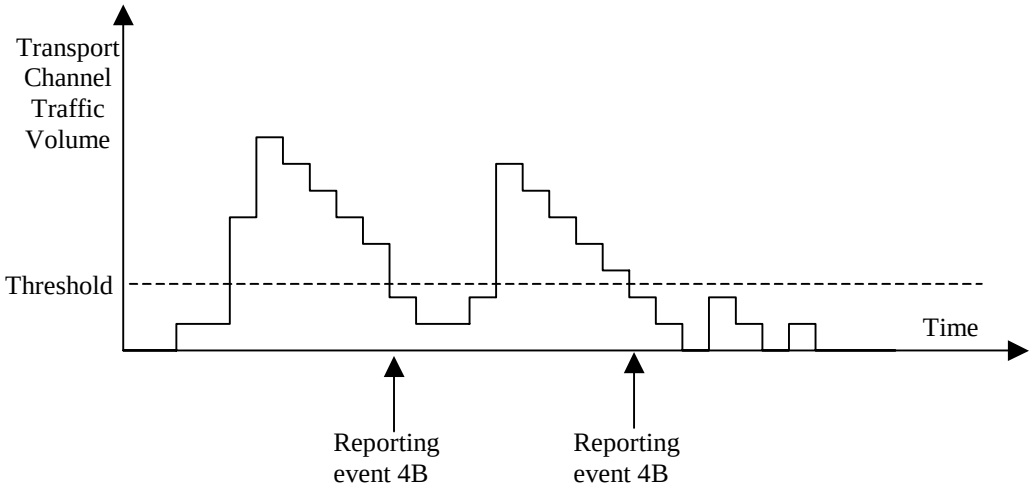

Figure 14.4.2.1-2: Event triggered report when Transport Channel Traffic Volume becomes smaller than certain threshold

If the monitored Transport Channel Traffic Volume [15] becomes smaller than an absolute threshold, i.e. if TCTV~~F~~<Reporting threshold, this is an event that could trigger a report. The event could be triggered again only if TCTV becomes bigger than the Reporting threshold and later TCTV<Reporting threshold is verified again. The corresponding report specifies at least which measurement ID the event that triggered the report belongs to.

14.4.3 Traffic volume reporting mechanisms

Traffic volume measurement triggering could be associated with both a *time-to-trigger* and a *pending time after trigger*. The time-to-trigger is used to get time domain hysteresis, i.e. the condition must be fulfilled during the time-to-trigger time before a report is sent. Pending time after trigger is used to limit consecutive reports when one traffic volume measurement report already has been sent. This is described in detail below.

14.4.3.1 Pending time after trigger

This timer is started in the UE when a measurement report has been triggered. The UE is then forbidden to send any new measurement reports with the same measurement ID during this time period even when the triggering condition is fulfilled again. Instead the UE waits until the timer has suspended. If the Transport Channel Traffic Volume [15] is still above the threshold when the timer has expired the UE sends a new measurement report, and the timer is restarted. Otherwise it waits for a new triggering.

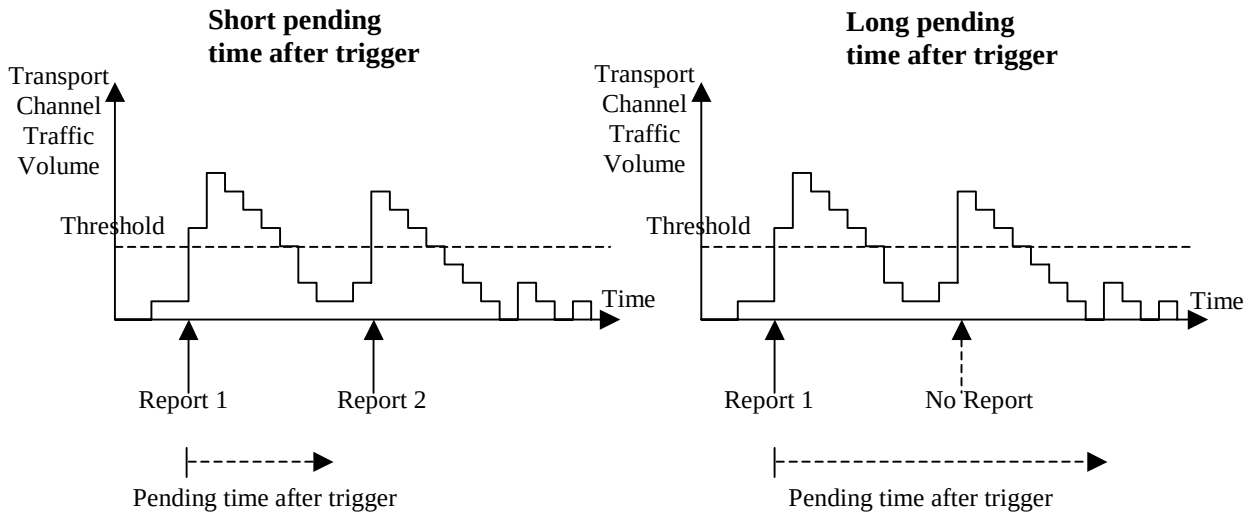

Figure 14.4.3.1-1: Pending time after trigger limits the amount of consecutive measurement reports

Figure 14.4.3.1-1 shows that by increasing the pending time after trigger a triggered second event does not result in a measurement report.

14.4.4 Interruption of user data transmission

A UE in CELL_FACH substate may be instructed by the UTRAN to cease transmission of user data on the RACH after a measurement report has been triggered. Before resuming transmission of user data,

1> the UE shall receive from the UTRAN either a message allocating a dedicated physical channel, and make a transition to CELL_DCH state; or

1>the UE shall receive an individually assigned measurement control message indicating that interruption of user data transmission is not be applied.

The transmission of signalling messages on the signalling bearer shall not be interrupted.

14.6.2.1 Reporting event 6A: The UE Tx power becomes larger than an absolute threshold

When this event is ordered by UTRAN in a measurement control message, the UE shall send a measurement report whenever the UE transmission power (for TDD within a single TS) becomes larger than a predefined threshold. The corresponding report identifies the threshold that was exceeded.

14.6.2.2 Reporting event 6B: The UE Tx power becomes less than an absolute threshold

When this event is ordered by UTRAN in a measurement control message, the UE shall send a measurement report whenever the UE transmission power (for TDD within a single TS) becomes less than a predefined threshold. The corresponding report identifies the threshold that the UE Tx power went below.

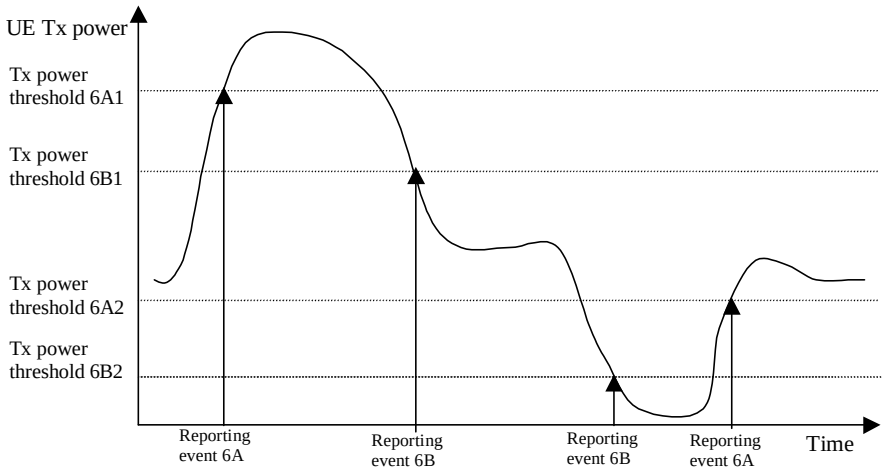

Figure 14.6.2.2-1: Event-triggered measurement reports when the UE Tx power becomes larger or less than absolute thresholds

14.6.2.3 Reporting event 6C: The UE Tx power reaches its minimum value

When this event is ordered by UTRAN in a measurement control message, the UE shall send a measurement report whenever the UE Tx power reaches its minimum value, for TDD its minimum value on a single timeslot.

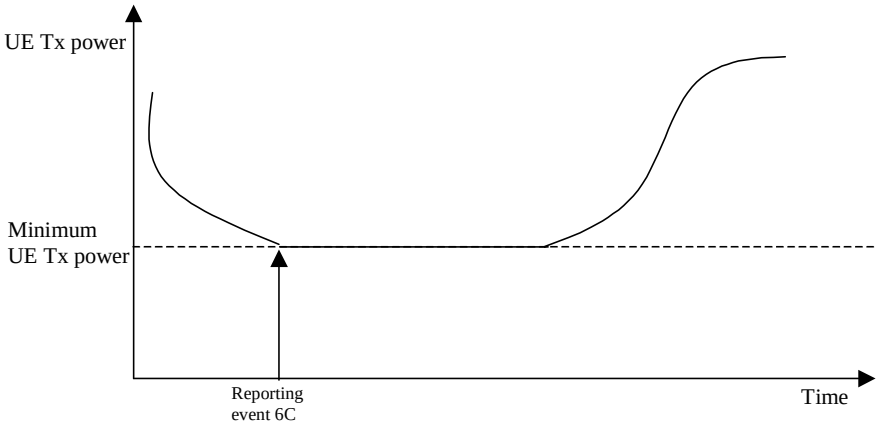

Figure 14.6.2.3-1: Event-triggered measurement report when the UE Tx power reaches its minimum value

14.6.2.4 Reporting event 6D: The UE Tx power reaches its maximum value

When this event is ordered by UTRAN in a measurement control message, the UE shall send a measurement report whenever the UE Tx power reaches its maximum value, for TDD its maximum value on a single timeslot.

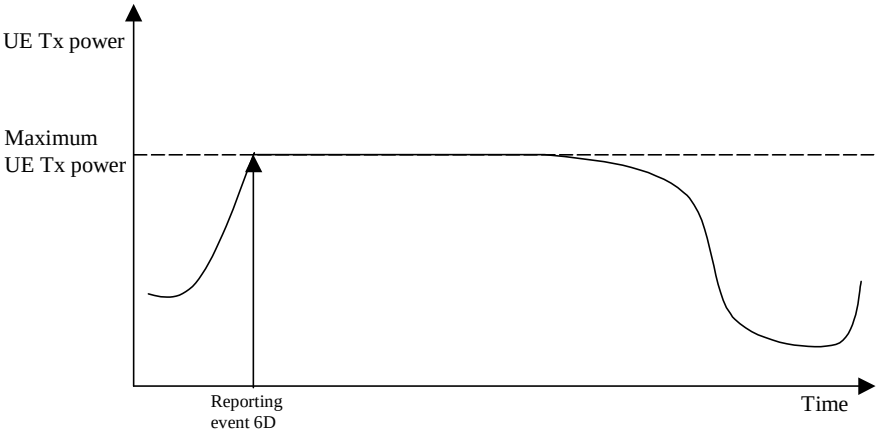

Figure 14.6.2.4-1: Event-triggered report when the UE Tx power reaches its maximum value

14.6.2.5 Reporting event 6E: The UE RSSI reaches the UE's dynamic receiver range

When this event is ordered by UTRAN in a measurement control message, the UE shall send a measurement report whenever the UE RSSI reaches the UE's dynamic receiver range.

14.6.2.6 Reporting event 6F (FDD): The UE Rx-Tx time difference for a RL included in the active set becomes larger than an absolute threshold

When this event is ordered by UTRAN in a MEASUREMENT CONTROL message, the UE shall send a MEASUREMENT REPORT message whenever the UE Rx-Tx time difference becomes larger than the threshold defined by the IE "UE Rx-Tx time difference threshold".

14.6.2.6a Reporting event 6F (1.28 Mcps TDD): The time difference indicated by T_{ADV} becomes larger than an absolute threshold

When this event is ordered by UTRAN in a MEASUREMENT CONTROL message, the UE shall send a MEASUREMENT REPORT message whenever the T_{ADV} changes compared to the last reported value more than a predefined threshold as configured with IE " T_{ADV} Threshold".

The UE shall set the IE "T_{ADV}" to the measured value and the IE "SFN" to the SFN during which the measurement was performed in the IE "T_{ADV} Info".

14.6.2.7 Reporting event 6G: The UE Rx-Tx time difference for a RL included in the active set becomes less than an absolute threshold

When this event is ordered by UTRAN in a MEASUREMENT CONTROL message, the UE shall send a MEASUREMENT REPORT whenever the UE Rx-Tx time difference becomes less than the threshold defined by the IE "UE Rx-Tx time difference threshold".