**3GPP TSG-RAN #14** ***Tdoc RP-010941***
**Kyoto, Japan, 11-15 December 2001**

**Source:** Nortel Networks

---

2 CRs to 25.331 on Correction of UE Positioning (R99 and Rel-4) are attached

**3GPP TSG-RAN WG2 Meeting #25**
**Makuhari, Japan, 26-30 November 2001**

*Tdoc R2-012755*

*CR-Form-v5*

# CHANGE REQUEST

⌘ **25.331** **CR** **1185** ⌘ **rev** **4** ⌘ Current version: **3.8.0** ⌘

*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:*** | ⌘ | Correction of UE Positioning |
| ***Source:*** | ⌘ | Nortel Networks |
| ***Work item code:*** | ⌘ | TEI |
| ***Date:*** | ⌘ | 26-11-2001 |
| ***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:*** ⌘ UE Positioning specification is not complete for all RRC states

***Summary of change:*** ⌘ The proposed changes are:

- in sections 8.1.1.6.15, 8.1.1.6.15.1, 8.1.1.6.15.2, 8.1.1.6.15.3 text was moved to 8.6.7.19.3 since this description applies for the GPS assistance data received in Sistem information or in Measurement Control or in Assistance Data Delivery meassages.

- in sections 8.1.1.6.15, 8.1.1.6.15.4 the handling of the ciphering info was moved to a new section 8.6.17.9.4

- in section 8.4.1.6, 8.4.1.7, 8.4.1.8 and 8.4.1.9 new description text was added to describe UE behavior when UP measurements are configured. This new text applies the principles proposed in Tdoc R2-012380 on handling of UP in RRC states

- in section 8.4.3 it is clarified that the Assistance Data Delivery procedure is initiated by UTRAn at the request from CN

- section 8.5.11 is updated to allow also to use the FACH measurement occasions for UP OTDOA when SFN-SFN type 2 on a different frequency is requested. The changes propose to keep the section 8.5.11 as a generic action and specify the case when the FACH measurement occasions shall be used in relevant sections in 8.4.1.6 and 8.4.1.9.

- section 8.6.7.1 is updated to include also the measurement validity for UP measurements

- section 8.6.7.19.1 is edited to be used as a pointer to new sections, e.g. 8.6.7.19.1a and 8.6.7.19.1b where it is specified who the UE will set the Measurement Report for UE assisted and UE-based methods

- sections 8.1.1.6.15.4, 8.6.7.19.2 and 2a, and tabular sections 10.2.48.8.18.4, 10.3.7.100, 10.3.7.103, 10.3.7.106, 10.3.7.108, and variable 13.4.28b are updated in order to allow the use of System information broadcast to be used for OTDOA

| | | |
|---|---|---|
| | | UE-based assistance data which may be ciphered and also for OTDOA UE-assisted methods<br><br>- new section 8.6.7.19.4 is added and variables 13.4.28a and 13.4.28c are updated in order to clarify the handling of deciphering keys. It is clarified also it is possible to have a couple of deciphering keys for each method, i.e. OTDOA or GPS.<br><br>- new section 8.6.7.19.6 and tabular 10.3.7.90 are updated in order to introduce the information for the refernce cell to be used for UE GPS Timing of cell frames measurement.<br><br>- section 8.6.7.20 clarifies that the measurement SFN-SFN type 2 should not be reported on RACH reporting<br><br>- tabular 10.3.7.88, 10.3.7.96 is updated to allow alignement between 25.133 and RRC of the measurement UTRAN reporting of cell frames<br><br>- tabular 10.3.7.93, 10.3.7.109 is updated allow alignement between 25.133 and RRC of the measurement UE reporting of cell frames<br><br>- tabular 10.3.7.105 is updated to introduce the frequency info for neighboring cell reporting<br><br>- tabular 10.3.7.108 is updated to remove the frequency info of the reference cell for OTDOA measurements since it is assumed to the same as the current frequency<br><br>- tabular 10.3.7.111 is updated to introduce the vertical accuracy and rename the accuracy in horizontal accuracy. this is in line with RANAP. it is alos propose to remove the multiple sets from the tabular as decided in last RAN2#24 meeting.<br><br>- section 14.7.3 description text added<br><br>Corrections to Rev1 (highlighted in "green"):<br><br>ASN.1 corrections are added according to the following principle.<br><br>All ASN.1 corrections are done using the non-critical extension mechanism for OTDOA UE assisted method. The other corrections are done in a straight forward corrections.<br><br>**-** added new SIB15.5 to broadcast Assistance data possibly ciphered for UE based OTDOA. SIB15.4 is left unciphered for UE-assisted OTDOA<br><br>- corrected the granularity and the mapping of Node B Clock drift and SFN-SFN time drift and alignment with RAN3<br><br>- corrected the handling of the Week Number for the Almanac<br><br>**Isolated analysis impact:**<br><br>The corrected functionality is UE positioning measurement configuration and measurement reporting.<br><br>• « Correction to a function where the specification was :<br><br>o Procedural text or rules were missing.<br><br>Would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise. » |
| ***Consequences if not approved:*** | ⌘ | UE behavior for UE Positioning is unclear and unspecified |

| | | |
|---|---|---|
| ***Clauses affected:*** | ⌘ | 8.1.1.1.2, 8.1.1.6.15, 8.1.1.6.15.1, 8.1.1.6.15.2, 8.1.1.6.15.3, 8.1.1.6.15.4, 8.1.1.6.15.5 (new), 8.4.1.3, 8.4.1.6.7, 8.4.1.7.5 (new), 8.4.1.8.5 (new), 8.4.1.9.5 |

| | | | | | |
|---|---|---|---|---|---|
| | | | (new), 8.4.1.9a.4 (new), 8.4.2.2, 8.4.3.2, 8.4.3.3, 8.5.11, 8.6.7.1, 8.6.7.18a (new), 8.6.7.19.0 (new) , 8.6.7.19.1, 8.6.7.19.1a (new) , 8.6.7.19.1b (new) , 8.6.7.19.2, 8.6.7.19.2a (new) , 8.6.7.19.3, 8.6.7.19.3.1, 8.6.7.19.3.2, 8.6.7.19.3.3, 8.6.7.19.3.3a (new) , 8.6.7.19.3.4, 8.6.7.19.3.5, 8.6.7.19.3.6, 8.6.7.19.3.7, 8.6.7.19.3.8, 8.6.7.19.4 (new) , 8.6.7.19.5 (new) , 8.6.7.19.6 (new), 8.6.7.21 (new), 10.2.4, 10.2.48.8.18.4, 10.2.48.8.18.4a (new), 10.3.3.45, 10.3.7.51, 10.3.7.86, 10.3.7.87, 10.3.7.88, 10.3.7.89, 10.3.7.90, 10.3.7.91, 10.3.7.93, 10.3.7.95a (new), 10.3.7.96, 10.3.7.99, 10.3.7.100, 10.3.7.101, 10.3.7.103, 10.3.7.103a (new) , 10.3.7.105, 10.3.7.106, 10.3.7.106a (new) , 10.3.7.108, 10.3.7.108a (new) , 10.3.7.109, 10.3.7.109a (new) , 10.3.7.111, 10.3.8.21, 10.3.8.22, 11.2, 11.3, 13.4.28a, 13.4.28b, 13.4.28c (new), 13.4.32, 14.7.3, 14.7.3.1, 14.7.3.2, 14.7.3.3 | |
| ***Other specs affected:*** | ⌘ | X<br>X<br> | Other core specifications<br>Test specifications<br>O&M Specifications | ⌘ | 25.331 v4.2.1, CR 1186 |
| ***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.

#### 8.1.1.1.2 System information blocks

Table 8.1.1 specifies all system information blocks and their characteristics.

The *area scope column* in table 8.1.1 specifies the area where a system information block's value tag is valid. If the area scope is *cell*, the UE shall consider the system information block to be valid only in the cell in which it was read. If system information blocks have been previously stored for this cell, the UE shall check whether the value tag for the system information block in the entered cell is different compared to the stored value tag. If the area scope is *PLMN*, the UE shall check the value tag for the system information block when a new cell is selected. If the value tag for the system information block in the new cell is different compared to the value tag for the system information block stored in the UE, the UE shall re-read the system information block.

For System information block types 15.2, 15.3 and 16, which may have multiple occurrences, each occurrence has its own independent value tag. The UE- shall re-read a particular occurrence if the value tag of this occurrence has changed compared to that stored in the UE.

The *UE mode/state column when block is valid* in Table 8.1.1 specifies in which UE mode or UE state the IEs in a system information block shall be regarded as valid by the UE. In other words, the indicated system information block becomes invalid upon change to a mode/state that is not included in this column. In some cases, the states are inserted in brackets to indicate that the validity is dependent on the broadcast of the associated System Information Blocks by the network as explained in the relevant procedure section.

The *UE mode/state column when block is read* in Table 8.1.1 specifies in which UE mode or UE state the IEs in a system information block may be read by the UE. The UE shall have the necessary information prior to execution of any procedure requiring information to be obtained from the appropriate system information block. The requirements on the UE in terms of when to read the system information may therefore be derived from the procedure specifications that specify which IEs are required in the different UE modes/states in conjunction with the different performance requirements that are specified. System Information Block type 10 shall only be read by the UE while in CELL_DCH.

NOTE: There are a number of system information blocks that include the same IEs while the UE mode/state in which the information is valid differs. This approach is intended to allows the use of different IE values in different UE mode/states.

The *Scheduling information* column in Table 8.1.1 specifies the position and repetition period for the SIB.

The *modification of system information* column in Table 8.1.1 specifies the update mechanisms applicable for a certain system information block. For system information blocks with a value tag, the UE shall update the information according to subclause 8.1.1.7.1 or 8.1.1.7.2. For system information blocks with an expiration timer, the UE shall, when the timer expires, perform an update of the information according to subclause 8.1.1.7.4.

**Table 8.1.1: Specification of system information block characteristics**

| System information block | Area scope | UE mode/state when block is valid | UE mode/state when block is read | Scheduling information | Modification of system information | Additional comment |
|---|---|---|---|---|---|---|
| Master information block | Cell | Idle mode, CELL_FACH, CELL_PCH, URA_PCH | Idle mode, CELL_FACH, CELL_PCH, URA_PCH | SIB_POS = 0<br>SIB_REP = 8 (FDD)<br>SIB_REP = 8, 16, 32 (TDD)<br>SIB_OFF=2 | Value tag | |
| Scheduling block 1 | Cell | Idle mode, CELL_FACH, CELL_PCH, URA_PCH | Idle mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" in MIB | Value tag | |
| Scheduling block 2 | Cell | Idle mode, CELL_FACH, CELL_PCH, URA_PCH | Idle mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" in MIB | Value tag | |
| System information block type 1 | PLMN | Idle mode CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH | Idle, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 2 | Cell | URA_PCH | URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 3 | Cell | Idle mode, (CELL_FACH, CELL_PCH, URA_PCH) | Idle mode, (CELL_FACH, CELL_PCH, URA_PCH) | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 4 | Cell | CELL_FACH, CELL_PCH, URA_PCH | CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | If System information block type 4 is not broadcast in a cell, the connected mode UE shall apply information in System information block type 3 in connected mode. |
| System information block type 5 | Cell | Idle mode, (CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH (TDD only)) | Idle mode, (CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH (TDD only)) | Specified by the IE "Scheduling information" | Value tag | |

| | | | | | | |
|---|---|---|---|---|---|---|
| System information block type 6 | Cell | CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH (TDD only) | CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH (TDD only) | Specified by the IE "Scheduling information" | Value tag | If system information block type 6 is not broadcast in a cell, the connected mode UE shall read System information block type 5.<br><br>If some of the optional IEs are not included in System information block type 6, the UE shall read the corresponding IEs in System information block type 5<br><br>In TDD mode system information block 6 shall only be read in CELL_DCH if required for open loop power control as specified in subclause 8.5.7 and/or if shared transport channels are assigned to the UE. If in these cases system information block type 6 is not broadcast the UE shall read system information block type 5. |
| System information block type 7 | Cell | Idle mode, CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH (TDD only) | Idle mode, CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH (TDD only) | Specified by the IE "Scheduling information" | Expiration timer = MAX(320 ms,SIB_REP * ExpirationTimeFactor) | In TDD mode system information block type 7 shall only be read in CELL_DCH if shared transport channels are assigned to the UE. |
| System information block type 8 | Cell | CELL_FACH, CELL_PCH, URA_PCH | CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 9 | Cell | CELL_FACH, CELL_PCH, URA_PCH | CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Expiration timer = SIB_REP | |
| System information block type 10 | Cell | CELL_DCH | CELL_DCH | Specified by the IE "Scheduling information" | Expiration timer = SIB_REP | |
| System information block type 11 | Cell | Idle mode (CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH) | Idle mode (CELL_FACH, CELL_PCH, URA_PCH) | Specified by the IE "Scheduling information" | Value tag | |

| | | | | | | |
|---|---|---|---|---|---|---|
| System information block type 12 | Cell | CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH | CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | If system information block type 12 is not broadcast in a cell, the connected mode UE shall read System information block type 11.<br>If some of the optional IEs are not included in System information block type 12, the UE shall read the corresponding IEs in System information block type 11. |
| System information block type 13 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 13.1 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 13.2 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 13.3 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 13.4 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 14 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH | Specified by the IE "Scheduling information" | Expiration timer = MAX([320 ms], SIB_REP * ExpirationTimeFactor) | This system information block is used in TDD mode only.<br>System information block type 14 shall only be read in CELL_DCH if required for open loop power control as specified in subclause 8.5.7. |
| System information block type 15 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 15.1 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 15.2 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | For this system information block there may be multiple occurrences |
| System information block type 15.3 | PLMN | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | For this system information block there may be multiple occurrences |
| System information block type 15.4 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |

| System information block type 15.5 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
|---|---|---|---|---|---|---|
| System information block type 16 | PLMN | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | For this system information block there may be multiple occurrences |
| System information block type 17 | Cell | CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH | CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH | Specified by the IE "Scheduling information" | Expiration timer = SIB_REP | This system information block is used in TDD mode only. System information block type 17 shall only be read if shared transport channels are assigned to the UE. |
| System Information Block type 18 | Cell | Idle mode, CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH | Idle mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |

The UE shall acquire all system information blocks except system information block type 10 on BCH. System Information Block type 10 shall be acquired on the FACH and only by UEs with support for simultaneous reception of one SCCPCH and one DPCH. If System Information Block type 10 is not broadcast in a cell, the DRAC procedures do not apply in this cell. System Information Block type 10 is used in FDD mode only.

### 8.1.1.6.15 System Information Block type 15

If the UE is in idle or connected mode, and supports GPS location services ~~and/or OTDOA location services~~ it should store all relevant IEs included in this system information block. The UE shall:

- if the IE "GPS Data ciphering info" is included:~~, and the UE has a full or reduced complexity GPS receiver functionality (the UE will know that the broadcast GPS data is ciphered in accordance with the Data Assistance Ciphering Algorithm detailed in [18]):~~

  - act as specified in the subclause 8.6.7.19.4;

  - ~~store the parameters contained within this IE (see 10.3.7.86 for details) in the IE "GPS Data ciphering info" in variable UE_POSITIONING_GPS_DATA; and~~

  - ~~use them to decipher the broadcast UE positioning GPS information contained within the System Information Block types 15.1, 15.2 and 15.3;~~

- ~~store~~act upon the received IE "Reference position" as specified in subclause 8.6.7.19.3.8;~~in the IE "UE positioning GPS reference UE position" in variable UE_POSITIONING_GPS_DATA and use it as a priori knowledge of the approximate location of the UE~~;

- act upon the received ~~store the~~ IE "GPS reference time" as specified in subclause 8.6.7.19.3.7~~in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as a reference GPS time~~;

  - ~~use "GPS TOW msec" as GPS Time of Week in milliseconds;~~

  - ~~if the IE "GPS TOW rem usec" is included in the IE "GPS reference time":~~

    - ~~store it in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and may use it as GPS Time of Week in microseconds;~~

  - ~~if the IE "NODE B Clock Drift" is included in the IE "GPS reference time":~~

    - ~~store it in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and may use it as an estimate of the drift rate of the NODE B clock relative to GPS time;~~

- ~~if the IE "NODE B Clock Drift" is not included in the IE "GPS reference time":~~

  - ~~assume the value 0;~~

- ~~if SFN is included in the IE "GPS reference time" and IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is not included:~~

  - ~~store it in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and may use it as the relationship between GPS time and air-interface timing of the NODE B transmission in the serving cell;~~

- ~~if SFN is included in IE "GPS reference time" and IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is also included:~~

  - ~~store it in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and may use it as the relationship between GPS time and air-interface timing of the NODE B transmission in the cell indicated by "Primary CPICH info" or "cell parameters id";~~

- if IE "Satellite information" is included:

  - act upon this list of bad satellites as specified in subclause 8.6.7.19.3.6.

NOTE: For efficiency purposes, the UTRAN should broadcast System Information Block type 15 if it is broadcasting System Information Block type 15.2.

#### 8.1.1.6.15.1 System Information Block type 15.1

The UE should store all the relevant IEs included in this system information block in variable UE_POSITIONING_GPS_DATA. The UE shall:

- ~~use "Status/Health" in the IE "DGPS Corrections" to determine the status of the differential corrections;~~

- act on "DGPS information" in the IE "DGPS Corrections" in a similar manner as specified in [13] except that the scale factors for PRC and RRC are different. In addition, the IE group DGPS information also includes Delta PRC2 and Delta RRC2. Delta PRC2 is the difference in the pseudorange correction between the satellite's ephemeris identified by IODE and the previous ephemeris two issues ago IODE –2. Delta RRC2 is the difference in the pseudorange rate-of-change correction between the satellite's ephemeris identified by IODE and IODE-2. These two additional IEs can extend the life of the raw ephemeris data up to 6 hours. If the IEs "Delta PRC3" and "Delta RRC3" are included, UE may use them as appropriate e.g. to extend the life of the raw ephemeris data up to 8 hours;

- act upon the received IE "UE Positioning GPS DGPS corrections" as specified in subclause 8.6.7.19.3.3.

#### 8.1.1.6.15.2 System Information Block type 15.2

For System Information Block type 15.2 multiple occurrences may be used; one occurrence for one satellite. To identify the different occurrences, the scheduling information for System Information Block type 15.2 includes IE "SIB occurrence identity and value tag". The UE should store all the relevant IEs included in this system information block in variable UE_POSITIONING_GPS_DATA. The UE shall:

- compare for each occurrence the value tag of the stored occurrence, if any, with the occurrence value tag included in the IE "SIB occurrence identity and value tag" for the occurrence of the SIB with the same occurrence identity;

- in case the UE has no SIB occurrence stored with the same identity or in case the occurrence value tag is different:

  - store the occurrence information together with its identity and value tag for later use;

- in case an occurrence with the same identity but different value tag was stored:

  - overwrite this one with the new occurrence read via system information for later use;

- interpret IE "Transmission TOW" as a very coarse estimate of the current time, i.e., the approximate GPS time-of-week when the message is broadcast;

- interpret IE "SatID" as the satellite ID of the data from which this message was obtained;
- act upon the received IEs "Sat ID" and "GPS Ephemeris and Clock Corrections Parameter" as specified in subclause 8.6.7.19.3.4;
- ~~act on the rest of the IEs in a manner similar to that specified in [12]. In addition, the UE can utilise these IEs for GPS time dissemination and sensitivity improvement.~~

The IE "Transmission TOW" may be different each time a particular SIB occurrence is transmitted. The UTRAN should not increment the value tag of the SIB occurrence if the IE "Transmission TOW" is the only IE that is changed.

The UE may not need to receive all occurrences before it can use the information from any one occurrence.

#### 8.1.1.6.15.3 System Information Block type 15.3

For System Information Block type 15.3 multiple occurrences may be used; one occurrence for each set of satellite data. To identify the different occurrences, the scheduling information for System Information Block type 15.3 includes IE "SIB occurrence identity and value tag". The UE should store all the relevant IEs included in this system information block in variable UE_POSITIONING_GPS_DATA. The UE shall:

- compare for each occurrence the value tag of the stored occurrence, if any, with the occurrence value tag included in the IE "SIB occurrence identity and value tag" for the occurrence of the SIB with the same occurrence identity;
- in case the UE has no SIB occurrence stored with the same identity or in case the occurrence value tag is different:
  - store the occurrence information together with its identity and value tag for later use;
- in case an occurrence with the same identity but different value tag was stored:
  - overwrite this one with the new occurrence read via system information for later use;
- interpret IE "Transmission TOW" as a very coarse estimate of the current time, i.e., the approximate GPS time-of-week when the message is broadcast;
- ~~interpret IE "SatMask" as the satellites that contain the pages being broadcast in this message;~~
- ~~interpret IE "LSB TOW" as the least significant 8 bits of the TOW ([12]);~~
- ~~interpret "Data ID" in the IE "UE positioning GPS almanac" as the Data ID field contained in the indicated subframe, word 3, most significant 2 bits, as defined by [12];~~
- if the IE "GPS Almanac and Satellite Health" is included:
  - interpret IE "SatMask" as the satellites that contain the pages being broadcast in this message;
  - interpret IE "LSB TOW" as the least significant 8 bits of the TOW ([12]);
  - act upon the received IE “GPS Almanac and Satellite Health” as specified in subclause 8.6.7.19.3.2;
- if the IE "GPS ionospheric model" is included:
  - act upon the received IE “GPS ionospheric model” as specified in subclause 8.6.7.19.3.5;
- if the IE "GPS UTC model" is included:
  - act upon the received IE “GPS UTC model” as specified in subclause 8.6.7.19.3.9;
- ~~act on the rest of the IEs in a similar manner as specified in [12]. In addition, the UE can utilise these IEs including non-information bits for GPS time dissemination and sensitivity improvement.~~

The IE "Transmission TOW" may be different each time a particular SIB occurrence is transmitted. The UTRAN should not increment the value tag of the SIB occurrence if the IE "Transmission TOW" is the only IE that is changed. One SIB occurrence value tag is assigned to the table of subclause 10.2.48.8.18.3.

The UE may not need to receive all occurrences before it can use the information for any one occurrence.

8.1.1.6.15.4 System Information Block type 15.4

~~If the UE is in idle or connected mode, and~~

- ~~if IE "OTDOA ciphering info" is included and supports the UE supports UE-based OTDOA UE positioning method the UE shall:~~
  - ~~act as specified in subclause 8.6.7.19.3.2;~~
  - ~~store IE "OTDOA ciphering info" in OTDOA Data ciphering info in variable UE_POSITIONING_OTDOA_DATA if it is included.~~
- ~~if IE "OTDOA ciphering info" is included and the UE does not support UE-based OTDOA positioning the UE shall:~~
  - ~~ignore System Information Block 15.4 and act as if no assistance data is broadcast~~
- ~~if IE "OTDOA ciphering info" is not included, the UE shall~~
  - ~~act as specified in subclause 8.6.7.19.2;~~

If the UE is in idle mode or connected mode, the UE shall:

- if the IE "OTDOA ciphering info" is included:
  - act as specified in subclause 8.6.7.19.4;

If the UE is in connected mode, the UE shall:

- act as specified in subclause 8.6.7.19.2.

8.1.1.6.15.5 System Information Block type 15.5

If the UE is in idle or connected mode, the UE shall:

- if the UE supports UE-based OTDOA positioning:
  - act as specified in subclause 8.6.7.19.2a;

~~If the UE is in idle or connected mode, the UE shall:~~

- ~~if the UE supports UE-based OTDOA positioning:~~
  - ~~if the IE "OTDOA assistance data for UE-based" is included:~~
    - ~~if the IE "OTDOA ciphering info" is included:~~
      - ~~act as specified in subclause 8.6.7.19.4;~~
    - ~~act as specified in subclause 8.6.7.19.2a;~~

~~If the UE is in connected mode, the UE shall:~~

- ~~if the UE does not support UE-based OTDOA positioning; or~~
- ~~if the UE does support UE-based OTDOA positioning but the IE "OTDOA assistance data for UE-based" is not included:~~
  - ~~if the IE " OTDOA assistance data for UE-assisted" is included:~~
    - ~~ignore this IE;~~
  - ~~act as specified in subclause 8.6.7.19.2.~~
  - ~~if the IE "OTDOA ciphering info" is not included:~~

~~:~~

# 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 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 monitored according to a neighbour list assigned by the UTRAN belong to the **monitored set.**

3. Cells detected by the UE, which are neither included in the active set nor in the monitored 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.

## 8.4.1 Measurement control


**Figure 56: Measurement Control, normal case**

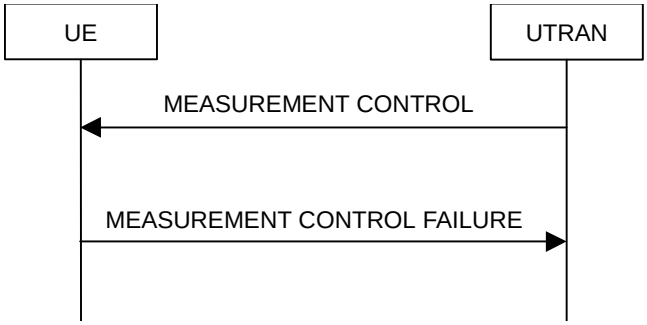


**Figure 57: Measurement Control, failure case**

### 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.

### 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:

- read the IE "Measurement command";
- if the IE "Measurement command" has the value "setup":
  - store this measurement in the variable MEASUREMENT_IDENTITY according to the IE "measurement identity", possibly overwriting the measurement previously stored with that identity;
  - for measurement types "inter-RAT measurement" or "inter-frequency measurement":
    - if, according to its measurement capabilities, the UE requires compressed mode to perform the measurements and a compressed mode pattern sequence with an appropriate measurement purpose is simultaneously activated by the IE "DPCH compressed mode status info"; or
    - if, according to its measurement capabilities, the UE does not require compressed mode to perform the measurements:
      - if the measurement is valid in the current RRC state of the UE:
        - begin measurements according to the stored control information for this measurement identity;

- for measurement type “UE positioning measurement”:
  - if the UE is in CELL_FACH state:
    - if IE “Positioning Method” is set to “OTDOA”:
      - if IE “Method Type” is set to “UE assisted”:
        - if IE “UE positioning OTDOA assistance data for UE assisted” is not included:
          - if System Information Block 15.4 is broadcast:
            - read System Information Block 15.4;
          - act as specified in section 8.6.7.19.2;
      - if IE “Method Type” is set to “UE based”:
        - if IE “UE positioning OTDOA assistance data for UE based” is not included:
          - if System Information Block 15.5 is broadcast:
            - read System Information Block 15.5;
          - act as specified in section 8.6.7.19.2a;

~~- for measurement type "UE positioning measurement":~~
  ~~- if the IE "Positioning method" is set to "GPS" and UE has neither received nor stored sufficient assistance data in variable UE_POSITIONING_GPS_DATA to perform the requested measurements:~~

~~- send a MEASUREMENT REPORT message to UTRAN, indicating the kind of assistance data which is necessary to fulfil the measurement request in the IE "UE positioning error";~~

- for any other measurement type:
  - if the measurement is valid in the current RRC state of the UE:
    - begin measurements according to the stored control information for this measurement identity.

- if the IE "Measurement command" has the value "modify":
  - for all measurement control present in the MEASUREMENT CONTROL message:
    - if a measurement was stored in the variable MEASUREMENT_IDENTITY associated to the identity by the IE "measurement identity":
      - replace the corresponding information stored in variable MEASUREMENT_IDENTITY associated to the identity indicated by the IE "measurement identity";
      - resume the measurements according to the new stored measurement control information.
    - otherwise:
      - set the variable CONFIGURATION_INCOMPLETE to TRUE;
- if the IE "measurement command" has the value "release":
  - terminate the measurement associated with the identity given in the IE "measurement identity";
  - clear all stored measurement control information related associated to this measurement identity in variable MEASUREMENT_IDENTITY.
- if the IE "DPCH Compressed Mode Status Info" is present,:
  - and 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):
    - set the variable CONFIGURATION_INCOMPLETE to TRUE;
  - if pattern sequence corresponding to IE "TGPSI" is already active (according to "TGPS Status Flag"):
    - deactivate this pattern sequence at the beginning of the frame indicated by IE "TGPS reconfiguration CFN" received in the message;
  - after the time indicated by IE "TGPS reconfiguration CFN" has elapsed:
    - 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
    - begin the inter-frequency and/or inter-RAT measurements corresponding to the pattern sequence measurement purpose of each activated pattern sequence;
    - if the values of IE "TGPS reconfiguration CFN" and IE "TGCFN" are equal:
      - start the concerned pattern sequence immediately at that CFN;
  - not alter pattern sequences stored in variable TGPS_IDENTITY, but not identitifed in IE "TGPSI"
- 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:
  - update the stored information with the traffic volume measurement control information in variable MEASUREMENT_IDENTITY; and
  - refrain from updating the traffic volume measurement control information associated with this measurement identity 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;

-- 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):

  - set the variable CONFIGURATION_INCOMPLETE to TRUE;

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

The UE may:

- if the IE "Measurement command" has the value "setup":
  - for measurement type “UE positioning measurement”:
    - if the UE is CELL_FACH state:
      - if IE “Positioning Method” is set to “GPS”:
        - if IE “UE positioning GPS assistance data” is not included and variable UE_POSITIONING_GPS_DATA is empty:
          - if System Information Block 15, 15.1, 15.2 and 15.3 are broadcast:
            - read System Information Block 15, 15.1, 15.2 and 15.3;
          - act as specified in section 8.6.7.19.3;

- 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:

- retain the measurement configuration that was valid before the MEASUREMENT CONTROL message was received;
- 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.
- set the cause value in IE "failure cause" to "unsupported measurement";
- submit the MEASUREMENT CONTROL FAILURE message to lower layers for transmission on the DCCH using AM RLC;
- continue with any ongoing processes and procedures as if the invalid MEASUREMENT CONTROL message has not been received;
- and the procedure ends.

### 8.4.1.4a Configuration Incomplete

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

- retain the measurement configuration that was valid before the MEASUREMENT CONTROL message was received;
- 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;
- clear the variable CONFIGURATION_INCOMPLETE;

- set the cause value in IE "failure cause" to "Configuration incomplete";
- submit the MEASUREMENT CONTROL FAILURE message to lower layers for transmission on the DCCH using AM RLC;
- continue with any ongoing processes and procedures as if the invalid MEASUREMENT CONTROL message has not been received;
- and the procedure ends.

#### ~~8.4.1.4b Configuration Invalid~~

~~If the variable CONFIGURATION_INVALID_CONFIGURATION is set to TRUE, the UE shall:~~

- ~~retain the measurement configuration that was valid before the MEASUREMENT CONTROL message was received;~~
- ~~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;~~
- ~~clear the variable CONFIGURATION_INVALID_CONFIGURATION;~~
- ~~set the cause value in IE "failure cause" to "invalid configuration";~~
- ~~submit the MEASUREMENT CONTROL FAILURE message to lower layers for transmission on the DCCH using AM RLC;~~
- ~~continue with any ongoing processes and procedures as if the invalid MEASUREMENT CONTROL message has not been received;~~
- ~~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:

- 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
- clear that entry.
- set the IE "failure cause" to the cause value "protocol error";
- include the IE "Protocol error information" with contents set to the value of the variable PROTOCOL_ERROR_INFORMATION;
- submit the MEASUREMENT CONTROL FAILURE message to lower layers for transmission on the DCCH using AM RLC;
- continue with any ongoing processes and procedures as if the invalid MEASUREMENT CONTROL message has not been received;
- 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:

- stop intra-frequency type measurement reporting assigned in a MEASUREMENT CONTROL message;
- 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
- 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
- if the transition is not due to a reconfiguration message:
  - delete the measurements of type intra-frequency associated with the variable MEASUREMENT_IDENTITY;
- 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);
- if the UE receives the IE "Intra-frequency reporting quantity for RACH Reporting" and the IE "Maximum number of Reported cells on RACH" IEs from System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11):
  - use this information for reporting measured results in RACH messages.

##### 8.4.1.6.2 Inter-frequency measurement

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

- stop the inter-frequency type measurement reporting assigned in a MEASUREMENT CONTROL message;
- 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
- 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
- if the transition is not due to a reconfiguration message:
  - delete the measurements of type inter-frequency associated with the variable MEASUREMENT_IDENTITY;
- 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);
- in CELL_FACH state:
  - 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:

- stop the inter-RAT type measurement reporting assigned in a MEASUREMENT CONTROL message;
- 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 another cell than indicated by this IE; or
- 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

- if the transition is not due to a reconfiguration message:
  - delete the measurements of type inter-RAT associated with the variable MEASUREMENT_IDENTITY;
- 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);
- in CELL_FACH state:
  - 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:

- stop quality type measurement reporting;
- 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:

- stop UE internal measurement type measurement reporting;
- 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:

- retrieve each set of measurement control information of measurement type "traffic volume" stored in the variable MEASUREMENT_IDENTITY; and
  - if the optional IE "measurement validity" for this measurement has not been included:
    - delete the measurement associated with the variable MEASUREMENT_IDENTITY;
  - if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "CELL_DCH":
    - stop measurement reporting;
    - store the measurement associated with the variable MEASUREMENT_IDENTITY to be used after the next transition to CELL_DCH state;
  - if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states":
    - continue measurement reporting;
  - if the IE "measurement validity" has been included and the IE "UE state" has been assigned to value "all states except CELL_DCH":
    - resume this measurement and associated reporting;
- if no traffic volume type measurements valid in CELL_FACH or CELL_PCH or URA_PCH states are stored in the variable MEASUREMENT_IDENTITY:
  - 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;
  - begin traffic volume measurement reporting according to the assigned information.

#### 8.4.1.6.7 UE positioning measurement

Note 1: Whether support for UE positioning measurement in CELL_PCH and URA_PCH states is mandatory or optional in Release 99 is FFS and pending ongoing work in RAN WG2 and RAN WG4

Note 2: The applicability for UE positioning measurements in CELL_PCH, URA_PCH and CELL_FACH need to be aligned in all relevant specifications

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

- retrieve each set of measurement control information of measurement type "UE positioning" stored in the variable MEASUREMENT_IDENTITY; and
  - if the optional IE "measurement validity" for this measurement has not been included:
    - delete the measurement associated with the variable MEASUREMENT_IDENTITY;
  - if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "CELL_DCH":
    - stop measurement reporting;
    - store the measurement associated with the variable MEASUREMENT_IDENTITY to be used after the next transition to CELL_DCH state;
  - if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states":
    - continue measurement reporting;
  - if the IE "measurement validity" has been included and the IE "UE state" has been assigned to value "all states except CELL_DCH":
    - resume this measurement and associated reporting;
- 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
- 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
- if the transition is not due to a reconfiguration message:
  - 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;
- if the IE "Positioning Methods" stored in the variable MEASUREMENT_IDENTITY is set to "OTDOA" or "OTDOA or GPS":
  - 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":
    - 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;
  - if the IE "Method type" stored in the variable MEASUREMENT_IDENTITY is set to "UE-assisted":
    - begin monitoring assistance data received in System Information Block type 15.4 according to subclause 8.1.1.6.15;
- if the UE is in CELL_FACH state:
  - 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:

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

The UE may:

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

  - 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;

- ~~begin monitoring assistance data received in System Information Block type 15 or System Information Block~~

### 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:

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

### 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:

- retrieve each set of measurement control information of measurement type "intra-frequency" stored in the variable MEASUREMENT_IDENTITY;
- if the IE "measurement validity" for a measurement has been assigned the value "CELL_DCH:
  - resume the measurement reporting;
- if no intra-frequency measurements applicable to CELL_DCH state are stored in the variable MEASUREMENT_IDENTITY:
  - 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);
  - 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):
    - send the MEASUREMENT REPORT message when reporting criteria in IE "Reporting information for CELL_DCH" are fulfilled;

#### 8.4.1.7.2 Inter-frequency measurement

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

- 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);
- retrieve each set of measurement control information of measurement type "inter-frequency" stored in the variable MEASUREMENT_IDENTITY; and
- if the IE "measurement validity" for a measurement has been assigned the value "CELL_DCH":
  - resume the measurement reporting.

#### 8.4.1.7.3 Inter-RAT measurement

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

- 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);
- retrieve each set of measurement control information of measurement type "inter-RAT" stored in the variable MEASUREMENT_IDENTITY; and
- if the IE "measurement validity" for a measurement has been assigned the value "CELL_DCH":
  - resume the measurement reporting.

#### 8.4.1.7.4 Traffic volume measurement

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

- retrieve each set of measurement control information of measurement type "traffic volume" stored in the variable MEASUREMENT_IDENTITY;
  - if the optional IE "measurement validity" for this measurement has not been included:
    - delete the measurement associated with the variable MEASUREMENT_IDENTITY;
  - 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":
    - stop measurement reporting; and
    - save the measurement associated with the variable MEASUREMENT_IDENTITY to be used after the next transition to CELL_FACH/CELL_PCH/URA_PCH state;
  - if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states":
    - continue measurement reporting;
  - if the IE "measurement validity" has been included and the IE "UE state" has been assigned to value "CELL_DCH":
    - resume this measurement and associated reporting;
- if no traffic volume type measurement has been assigned to the UE with a MEASUREMENT CONTROL message when transiting to CELL_DCH state:
  - 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);
- if the UE in CELL_DCH state receives a MEASUREMENT CONTROL message, which indicates the same measurement identity as that stored in variable MEASUREMENT_IDENTITY:
  - update the stored information with the traffic volume measurement control information in variable MEASUREMENT_IDENTITY.

#### 8.4.1.7.5 UE positioning measurement

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

- retrieve each set of measurement control information of measurement type "UE positioning" stored in the variable MEASUREMENT_IDENTITY; and
  - if the optional IE "Measurement validity" for this measurement has not been included:
    - delete the measurement associated with the variable MEASUREMENT_IDENTITY;

- 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":
  - stop measurement reporting; and
  - save the measurement associated with the variable MEASUREMENT_IDENTITY to be used after the next transition to CELL_FACH/CELL_PCH/URA_PCH state;
- if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states":
  - continue measurement reporting;
- if the IE "measurement validity" has been included and the IE "UE state" has been assigned to value "CELL_DCH":
  - resume this measurement and associated reporting;
- 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 15.54.

### 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:

- 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);
- 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):
  - 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:

- 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:

- 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:

- 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:

- 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:

- 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);
- if the UE receives the IE "Intra-frequency reporting quantity for RACH Reporting" and IE "Maximum number of Reported cells on RACH" from System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11):
  - use this information for reporting measured results in RACH messages.

#### 8.4.1.9.2 Inter-frequency measurement

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

- 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);
- 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:

- 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);
- 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:

- store the measurement control information from the IE "Traffic volume measurements 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;
- 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:

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

- 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:

  - 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:

- stop measurement reporting for all measurements stored in the variable MEASUREMENT_IDENTITY;
- clear the variable MEASUREMENT_IDENTITY;
- 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:

- 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);
- 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:

- 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);
- 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:

- 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);
- 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:

- 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 58: 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 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 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.

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

In CELL_PCH or URA_PCH state, the UE shall 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 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:

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

- set the IE "measured results" to include measurements according to the IE "reporting quantity" of that measurement stored in variable MEASUREMENT_IDENTITY; and
  - if all the reporting quantities are set to "false":
    - not set the IE "measured results";
- 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 IE "additional measurements" stored in variable MEASUREMENT_IDENTITY of the measurement that triggered the measurement report; and
  - if more than one additional measured results are to be included:
    - sort them in ascending order according to their IE "measurement identity" in the MEASUREMENT REPORT message;
- if the MEASUREMENT REPORT message was triggered by an event (i.e. not a periodical report):
  - set the IE "Event results" according to the event that triggered the report.

The UE shall:

- 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:

- the procedure ends.

## 8.4.3 Assistance Data Delivery


**Figure 59 Assistance Data Delivery**

### 8.4.3.1 General

The purpose of the assistance data delivery procedure is to transfer UE positioning related assistance data from the UTRAN to the UE.

### 8.4.3.2 Initiation

When requested by the Core Network ~~T~~the UTRAN may deliver UE positioning related assistance data with an ASSISTANCE DATA DELIVERY message, which is transmitted on the downlink DCCH using AM RLC

### 8.4.3.3 Reception of ASSISTANCE DATA DELIVERY message by the UE

Upon reception of a ASSISTANCE DATA DELIVERY message the UE shall:

- if IE "UE positioning OTDOA assistance data for UE-based " is included:

- ~~store the OTDOA assistance data;~~act as specified in subclause 8.6.7.19.2a;

- if IE "UE positioning GPS assistance data" is included:

  - ~~store the GPS assistance data.~~act as specified in subclause 8.6.7.19.3;

### 8.4.3.4 Invalid ASSISTANCE DATA DELIVERY message

If the UE receives a ASSISTANCE DATA DELIVERY message, which 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:

- transmit an RRC STATUS message on the uplink DCCH using AM RLC;
- include the IE "Identification of received message"; and
- set the IE "Received message type" to ASSISTANCE DATA DELIVERY; and
- set the IE "RRC transaction identifier" to the value of "RRC transaction identifier" in the entry for the ASSISTANCE DATA DELIVERY message in the table "Rejected transactions" in the variable TRANSACTIONS; and
- clear that entry;
- include the IE "Protocol error information" with contents set to the value of the variable PROTOCOL_ERROR_INFORMATION.
- when the RRC STATUS message has been submitted to lower layers for transmission:
  - continue with any ongoing processes and procedures as if the invalid ASSISTANCE DATA DELIVERY message has not been received.

## 8.5.11 FACH measurement occasion calculation

When in CELL_FACH state and when the variable C_RNTI is non-empty the UE in FDD mode shall perform ~~inter-frequency and inter system~~ measurements as specified in section 8.4.1.6 and 8.4.1.8 during the frame(s) with the SFN value fulfilling the following equation:

$$SFN \text{ div } N = C\_RNTI \bmod M\_REP + n * M\_REP$$

where

- N is the TTI (in number of 10ms frames) of the FACH having the largest TTI on the SCCPCH monitored by UE
- C_RNTI is the C-RNTI value of the UE stored in the variable C_RNTI
- M_REP is the Measurement Occasion cycle length. According to the equation above, a FACH Measurement Occasion of N frames will be repeated every N * M_REP frame, and $M\_REP = 2^k$.

  where,

  - k is the FACH Measurement occasion cycle length coefficient.
    The value of the FACH Measurement occasion cycle length coefficient is read in system information in "System Information Block type 11" or "System Information Block type 12" in the IE "FACH measurement occasion info".
- n = 0,1,2… as long as SFN is below its maximum value

The UE is allowed to measure on other occasions in case the UE moves "out of service" area or in case it can simultaneously perform the ordered measurements.

A UE in TDD mode shall use the frame(s) with the SFN value fulfilling the above equation for neighbour cells measurements.

### 8.6.7.1 Measurement validity

If the ~~optional~~ 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 ~~only~~ for traffic volume ~~type~~ measurement~~s~~ type and UE positioning measurement type. For traffic volume measurement type~~and~~ 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 ~~only~~ for traffic volume ~~type~~ measurement~~s~~ 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. After cell re-selection, the UE shall delete any ongoing intra-frequency or inter-frequency and inter-RAT type measurement associated with the variable MEASUREMENT_IDENTITY. Other measurement types shall, however, be continued regardless of cell reselection.

### 8.6.7.18a UE positioning measurement

If IE "UE positioning measurement" is received by the UE in a MEASUREMENT CONTROL message, where IE "measurement command" has the value "setup", but IE "UE positioning reporting quantity" or "CHOICE report criteria" is not received, the UE shall:

- clear all stored measurement control information related associated to this measurement identity in variable MEASUREMENT_IDENTITY;
- set the variable CONFIGURATION_INCOMPLETE to TRUE.

### 8.6.7.19 UE positioning

#### 8.6.7.19.0 UE positioning reporting criteria

If IE "UE positioning reporting criteria" is included, the UE shall,

- perform the necessary measurements and evaluate the event in the interval indicated in IE "Measurement Interval";
- If IE "Event ID" is set to "7a" and if IE "Report first fix" is set to TRUE,
  - if the IE "Method Type" included in the variable MEASUREMENT_IDENTITY is set to "UE based":
    - act as specified in section 8.6.7.19.1b;

#### 8.6.7.19.1 UE positioning reporting quantity

The UE shall:

- ignore IE "Multiple Sets";
- ignore IE "Response Time";
- if IE "Horizontal Accuracy" and/or IE "Vertical Accuracy" is included:
  - should try to achieve the requested level(s) of positioning accuracy with 67% confidence;
- if IE "Positioning Methods" is set to "Cell ID":
  - ~~and if UE is in CELL_DCH state~~
  - ~~perform the Rx-Tx time difference type 2 measurement on the reference cell indicated in the OTDOA assistance data~~act as specified in section 8.6.7.19.1a;
- if the IE "Method Type" is set to "UE based":
  - act as specified in section 8.6.7.19.1b;
  - ~~if the IE "Positioning Methods" is set to "GPS":~~
    - ~~when a measurement report is triggered:~~
      - ~~include the IE "UE positioning position estimate info" in the measurement report and set the contents of the IE as follows:~~
        - ~~if the UE supports the capability to provide the GPS timing of the cell, and~~
        - ~~if the IE "GPS timing of Cell wanted" is set to true:~~
          - ~~include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD; and~~
          - ~~include the IE "Reference SFN", the IE "GPS TOW msec"; and~~

~~- the UE may include the IE "GPS TOW rem usec";~~

~~- if the IE "Positioning Methods" is set to "OTDOA":~~

~~- when a measurement report is triggered:~~

~~- include the IE "UE positioning position estimate info" in the measurement report;~~

- if the IE "Method Type" is set to "UE assisted":

  - act as specified in section 8.6.7.19.1a;

- if the IE “Method Type” is set to “UE assisted preferred but UE based allowed” or “UE based preferred but UE assisted allowed”:

  - ~~act either~~ act either according to section 8.6.7.19.1a or 8.6.7.19.1b depending on the method type chosen by the UE.

~~- if the IE "Positioning Methods" is set to "GPS":~~

~~- when a measurement report is triggered:~~

~~- include the IE "UE positioning GPS measured results" in the measurement report and set the contents of the IE as follows:~~

~~- if the UE supports the capability to provide the GPS timing of the cell, and~~

~~- if the IE "GPS timing of Cell wanted" is set to true:~~

~~- include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD; and~~

~~- include the IE "Reference SFN", the IE "GPS TOW msec"; and~~

~~- the UE may include the IE "GPS TOW rem usec";~~

~~- if the UE does not support the capability to provide the GPS timing of the cell:~~

~~- include the IE "GPS TOW msec";~~

~~- if the IE "Positioning Methods" is set to "OTDOA":~~

~~- when a measurement report is triggered:~~

~~- include the IE "UE positioning OTDOA measured results" in the measurement report.~~

If UE according to its capabilities supports Rx-Tx time difference type 2 measurement and if IE "Positioning Methods" is set to "Cell ID" and the IE "Measurement validity" stored in the variable MEASUREMENT_IDENTITY is other than "CELL_DCH", the UE shall:

- set the variable ~~INVALID_~~CONFIGURATION_INCOMPLETE to TRUE, and
- act as specified in subclause 8.4.1.4b.

The UE shall perform the following consistency check:

- if UE, according to its capabilities, does not support UE based OTDOA and if IE "Positioning Methods" is set to "OTDOA" and if IE "Method Type" is set to "UE based":

  - ~~act as specified in subclause 8.4.1.4~~set the variable CONFIGURATION_INCOMPLETE to TRUE;

- if UE, according to its capabilities, does not support UE based GPS and if IE "Positioning Methods" is set to "GPS" and if IE "Method Type" is set to "UE based":

  - set the variable CONFIGURATION_INCOMPLETE to TRUE~~act as specified in subclause 8.4.1.4~~;

- if UE, according to its capabilities, does not support UE assisted GPS and if IE "Positioning Methods" is set to "GPS" and if IE "Method Type" is set to "UE assisted":

- set the variable CONFIGURATION_INCOMPLETE to TRUEact as specified in subclause 8.4.1.4;

- if UE, according to its capabilities, does not support UE based positioning and if IE "Positioning Methods" is set to "OTDOAorGPS" and if IE "Method Type" is set to "UE based":

  - set the variable CONFIGURATION_INCOMPLETE to TRUEact as specified in subclause 8.4.1.4;

- if UE, according to its capabilities, does not support Rx-Tx time difference type 2 measurement and if IE "Positioning Methods" is set to "Cell ID":

  - set the variable CONFIGURATION_INCOMPLETE to TRUEact as specified in subclause 8.4.1.4.

- if UE, according to its capabilities, does not support UE GPS timing of cell frames measurement and if IE "GPS timing of Cell wanted" is set to TRUE:

  - set the variable CONFIGURATION_INCOMPLETE to TRUEact as specified in subclause 8.4.1.4.

- if UE according to its capabilities supports Rx-Tx time difference type 2 measurement and is in any other state than CELL_DCH state and if IE "Positioning Methods" is set to "Cell ID":

  - act as specified in subclause 8.4.1.4b.

## 8.6.7.19.1a UE positioning reporting for UE assisted methods

When a measurement report is triggered, and

- if higher layers have indicated that user permission is required for the locationpositioning request is permitted and the user has given his/her permission and

  - if the UE was able to perform measurements on is able to report measurement results from at least one neighbour cell in case of OTDOA or one satellite in case of GPS positioning, respectively, the UE shall

    - if the IE "Vertical Accuracy" is included:

      - interpret the presence of this IE to indicate that the UTRAN desires to compute a 3-dimensional position estimate.

    - if the IE "Positioning Methods" is set to "GPS":

      - include the IE "UE positioning GPS measured results" in the measurement report and set the contents of the IE as follows:

        - if the UE supports the capability to provide the GPS timing of the cell frames measurement, and

          - if the IE "GPS timing of Cell wanted" is set to TRUEtrue::

            - perform the UE GPS timing of cell frames measurement on the reference cell indicated in the IE “UE positioning GPS reference cell info”;

            - if the UE is unable to measure the GPS timing of cell frames of the reference cell indicated in the IE “UE positioning GPS reference cell info”:

              - perform the UE GPS timing of cell frames measurement on the serving cell or on one cell of the active set;

            - include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD; and

            - include the IE "Reference SFN" and, the IE "UE GPS timing of cell framesTOW msec"; and

            - the UE may include the IE "GPS TOW rem usec";

        - if the UE does not support the capability to provide the GPS timing of the cell, or

- if the IE "GPS timing of Cell wanted" is set to FALSE:
  - include the IE "GPS TOW msec";

- if the IE "Positioning Methods" is set to "OTDOA":

~~- not include the IE"UE positioning OTDOA measured results" in the measurement extension,~~

- include the IE "UE positioning OTDOA measured results ~~extension~~" in the measurement report and set the contents of the IE as follows:
  - set IE "SFN" to the SFN when the last measurement was performed
  - if the UE supports the capability to ~~is capable of~~ performing the Rx-Tx time difference type 2 measurement, and
    - if the UE is in CELL_DCH state:
      - if the measured value is equal to "1279.9375":
        - set the IE "Rx-Tx time difference type 2" in IE "UE positioning OTDOA measured results" for the reference cell to "1279.8750";

      ~~- otherwise:~~

      - set the IE "Rx-Tx time difference type 2" in IE "UE positioning OTDOA measured results" for the reference cell to the measured value;
      - include the IE group "Rx-Tx time difference type 2 info" for the reference cell and for each neighbour cell listed in variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED that belongs to the active set;

  - if the UE does not support the capability to perform the Rx-Tx time difference type 2 measurement:
    - set the IE "Rx-Tx time difference type 2" in IE "UE positioning OTDOA measured results" for the reference cell to value "1279.9375" to indicate that the measurement is not supported;
  - include IE group "Neighbour" for all neighbour cells listed in variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED on which the SFN-SFN observed time difference type 2 measurement could be performed;

- if IE "Positioning Methods" in the MEASUREMENT CONTROL message has been assigned to value "OTDOA or GPS":
  - the UE may choose to either act as if IE "Positioning Methods"is set to "GPS" or "OTDOA" depending on the method chosen by the UE.

- if the IE "Positioning Methods" is set to "CELL ID":
  - if the UE supports the capability to ~~is capable of~~ performing the Rx-Tx time difference type 2 measurement, and
  - if the UE is in CELL_DCH state:
    - perform the Rx-Tx time difference type 2 measurement on the reference cell indicated in the IE "UE positioning OTDOA assistance data", and
    - report the measurement results back to the network in the ~~RRC~~ MEASUREMENT REPORT by using IE "UE positioning OTDOA measured results ~~extension~~" excluding any measurements on neighbour cells in this IE

- if the UE is not able to report the requested~~any~~ measurement results, or ~~the UE shall~~

~~- include IE "UE positioning error" in the MEASUREMENT REPORT and set the contents of this IE as follows:~~

- ~~if the IE "Positioning Methods" in IE "UE positioning reporting quantity" has been assigned to value "OTDOA" and no neighbour cells could be received,~~

  - ~~set IE "Error reason" to "ER1";~~

- ~~if the IE "Positioning Methods" in IE "UE positioning reporting quantity" has been assigned to value "GPS" and~~

  - ~~if there were not enough GPS satellites to be received,~~

    - ~~set IE "Error reason" to "ER2";~~

  - ~~if some GPS assistance data was missing,~~

    - ~~set IE "Error reason" to "ER3";~~

  - ~~if the UE is in CELL_DCH state and the reference cell indicated in IE "UE positioning GPS reference time" is not in the active set,~~

    - ~~set IE "Error reason" to "ER7";~~

- ~~if higher layers have indicated that user permission is required for the location request and if the user has denied the positioning request,~~

  - ~~set IE "Error reason" to "ER5"~~

- ~~if higher layers have indicated that user permission is required for the location request and if the positioning request was not processed by the user and timed out,~~

  - ~~set IE "Error reason" to "ER6"~~

- if higher layers have indicated that the positioning request is not permitted, or

- if the positioning request was not processed by higher layers and timed out,

  - include IE "UE positioning error" in the MEASUREMENT REPORT and set the contents of this IE as specifiefied in section 8.6.7.19.5

## 8.6.7.19.1b UE positioning reporting for UE based methods

When a measurement report is triggered and

- if higher layers ~~have~~ indicated that ~~user permission is required for the location~~the positioning request is permitted~~and the user has given his/her permission~~ and

  - and if the UE has been able to calculate a position, the UE shall

    - include IE "UE positioning Position Estimate Info" in the MEASUREMENT REPORT and set the contents of the IE as follows:

      - if the UE supports the capability to ~~is capable of~~ performing the UE GPS timing of cell frames measurement and UTRAN has requested to report the GPS timing of cell frames, the UE shall

        - perform the UE GPS timing of cell frames measurement on the reference cell indicated in the IE "UE positioning GPS reference cell info"

        - if the UE is unable to measure the GPS timing of cell frames of the reference cell indicated in the IE "UE positioning GPS reference cell info":

          - perform the UE GPS timing of cell frames measurement on the serving cell or on one cell of the active set.

        - include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD;

        - include the SFN when the position was determined;

        - include the IE "UE GPS ~~TOW in msec~~timing of cell frames"; ~~and "GPS TOW in rem usec";~~

- if the UE does not supports the capability to perform the UE GPS timing of cell frames measurement, or
- if the IE "GPS timing of Cell wanted" is set to FALSE, the UE shall
  - include the IE “GPS TOW msec”;
- if IE “Vertical Accuracy” has been included in IE “UE positioning reporting quantity” and
  - if the IE “Vertical Accuracy” has been assigned to value “0” and
    - if the IE “Horizontal Accuracy” has been assigned a value “0”, the UE may
      - include IE “Ellipsoid point with altitude”;
    - if the IE “Horizontal Accuracy” has been assigned a value unequal to “0” and
    - if the UE has been able to calculate a 3-dimensional position, the UE shall
      - include IE “Ellipsoid point with altitude” or IE “Ellipsoid point with altitude and uncertainty ellipsoid” as the position estimate;
    - if the UE has not been able to calculate a 3-dimensional position, the UE may
      - act as if IE “Vertical Accuracy” was not included in IE “UE positioning reporting quantity”;
  - if the IE “Vertical Accuracy” has been assigned to a value unequal to “0” and
    - if the UE has been able to calculate a 3-dimensional position, the UE shall
      - include IE “Ellipsoid point with altitude and uncertainty ellipsoid” as the position estimate;
    - if the UE has not been able to calculate a 3-dimensional position, the UE shall
      - act as if IE “Vertical Accuracy” has not been included in IE “UE positioning reporting quantity”;
- if IE “Vertical Accuracy” has not been included in IE “UE positioning reporting quantity” and
  - if IE “Horizontal Accuracy” in IE “UE positioning reporting quantity” has been assigned to value “0”, the UE may:
    - include IE “Ellipsoid point”;
  - if IE “Horizontal Accuracy” in IE “UE positioning reporting quantity” has been assigned to a value unequal to 0, the UE shall
    - include either IE “Ellipsoid point with uncertainty circle” or IE “Ellipsoid point with uncertainty ellipse” or IE “Ellipsoid point with altitude and uncertainty ellipsoid” as the position estimate.

    ~~and~~

  - ~~if the UE is in CELL_DCH state and the reference cell indicated in IE “UE positioning GPS reference time” is not in the active set,~~
    - ~~set IE “Error reason” to “ER7”;~~

  NOTE1: ~~It is assumed that in any other than CELL_DCH state the UE should be able to find the timing between reference cell and GPS TOW. Is this assumption correct?~~

  NOTE2: ~~Is it possible that the UE is not able to perform measurements, because the GPS reference time could not be obtained?~~

- ~~if the IE “Positioning Methods” in IE “UE positioning reporting quantity” has been assigned to value “OTDOA or GPS”,~~

- act either as if IE "Positioning Methods" has been assigned to value "GPS" or "OTDOA" depending on the method chosen by the UE.

- if the UE was not able to calculate a position, or

- if higher layers have indicated that the positioning request is not permitted, or

- if the positioning request was not processed by higher layers and timed out, - if higher layers have indicated that user permission is required for the location request and if the user has denied the positioning request,

  - set IE "Error reason" to "ER5"

- if higher layers have indicated that user permission is required for the location request and if the positioning request was not processed by the user and timed out,

  - set IE "Error reason" to "ER6"include IE "UE positioning error" in the MEASUREMENT REPORT and set the contents of this IE as specifiefied in section 8.6.7.19.5

### 8.6.7.19.2 UE positioning OTDOA assistance data for UE-assisted

If IE "UE positioning OTDOA reference cell info for UE-assisted" is received in System Information Block type 15.4 or in the MEASUREMENT CONTROL message, the UE shall update the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED accordingly. The UE shall:

- store received cell information in the UE positioning reference cell info in the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED, overwriting any existing information.

If IE "UE positioning OTDOA neighbour cell list for UE assisted" is received in System Information Block type 15.4 or in the MEASUREMENT CONTROL message, the UE shall update the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED accordingly. The UE shall:

- store received cell information in the neighbour cell info list in the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTEDCELL_INFO_LIST, overwriting any existing information.

If, according to its capabilities, UE does not support IPDLs and if IE "IPDL parameters" is received for the reference or any of the neighbour cells, the UE shall:

- ignore this IE.

If IE "UE positioning measurement" is received in the MEASUREMENT CONTROL message, the UE shall also perform the following consistency checks:

- if IE "Positioning Methods" is set to "OTDOA" or "Cell ID":

  - if IE "UE positioning OTDOA reference cell info for UE assisted" is not included and if UE positioning OTDOA reference cell info for UE assisted in variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED is empty:

    - set the variable CONFIGURATION_INCOMPLETE to TRUE;

- if IE "Positioning Methods" is set to "OTDOA":

  - if IE "UE positioning OTDOA neighbour cell list for UE assisted" is not included and if less than two neighbour cells are stored in UE positioning OTDOA neighbour cell info list for UE assisted in variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED:

    - set the variable CONFIGURATION_INCOMPLETE to TRUE;

  - if IE "Method Type" is set to "UE based":

    - if IE "UE positioning OTDOA reference cell info" is included and if IE "Cell Position" for the reference cell is not included:

~~- set the variable CONFIGURATION_INCOMPLETE to TRUE;~~

~~- if the IE "UE positioning OTDOA neighbour cell list" is included and if cell position of less than two neighbour cells of the cells included in this IE and stored in variable UE_POSITIONING_OTDOA_DATA are different and if those cell positions are not different to the one of the reference cell stored in variable UE_POSITIONING_OTDOA_DATA:~~

~~- set the variable CONFIGURATION_INCOMPLETE to TRUE;~~

~~- if the IE "UE positioning OTDOA neighbouring cell list" is included and only two neighbour cells are included or stored in variable UE_POSITIONING_OTDOA_DATA and if the IE "Round Trip Time" is neither included for the neighbour cells nor for the reference cell info:~~

~~- set the variable CONFIGURATION_INCOMPLETE to TRUE.~~

### 8.6.7.19.2a UE positioning OTDOA assistance data for UE-based

If IE "UE positioning OTDOA reference cell info for UE-based" is received in System Information Block type 15.54 or in the MEASUREMENT CONTROL message or in the ASSISTANCE DATA DELIVERY, the UE shall update the variable UE_POSITIONING_OTDOA_DATA_UE_BASED accordingly. The UE shall:

- store received cell information in the UE positioning reference cell info for UE based in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED, overwriting any existing information.

If IE "UE positioning OTDOA neighbour cell list for UE basedassisted" is received in System Information Block type 15.54 or in the MEASUREMENT CONTROL message or in the ASSISTANCE DATA DELIVERY, the UE shall update the variable UE_POSITIONING_OTDOA_DATA_UE_BASED accordingly. The UE shall:

- store received cell information in the neighbour cell info list for UE based in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED, overwriting any existing information.

If, according to its capabilities, UE does not support IPDLs and if IE "IPDL parameters" is received for the reference or any of the neighbour cells, the UE shall:

- ignore this IE.

If IE "UE positioning measurement" is received in the MEASUREMENT CONTROL message, the UE shall also perform the following consistency checks:

- if IE "Positioning Methods" is set to "OTDOA" ~~or "Cell ID":~~

  - if IE "UE positioning OTDOA reference cell info for UE based" is not included and if UE positioning OTDOA reference cell info for UE based in variable UE_POSITIONING_OTDOA_DATA_UE_BASED is empty:

    - set the variable CONFIGURATION_INCOMPLETE to TRUE;

- if IE "Positioning Methods" is set to "OTDOA":

  - if IE "UE positioning OTDOA neighbour cell list for UE based" is not included and if less than two neighbour cells are stored in UE positioning OTDOA neighbour cell info list for UE based in variable UE_POSITIONING_OTDOA_DATA_UE_BASED:

    - set the variable CONFIGURATION_INCOMPLETE to TRUE;

  - if IE "Method Type" is set to "UE based":

    - if IE "UE positioning OTDOA reference cell info for UE based" is included and if IE "Cell Position" for the reference cell is not included:

      - set the variable CONFIGURATION_INCOMPLETE to TRUE;

    - if the IE "UE positioning OTDOA neighbour cell list for UE based" is included and if cell position of less than two neighbour cells of the cells included in this IE and stored in variable

UE_POSITIONING_OTDOA_DATA_UE_BASED are different and if those cell positions are not different to the one of the reference cell stored in variable UE_POSITIONING_OTDOA_DATA_UE_BASED:

- set the variable CONFIGURATION_INCOMPLETE to TRUE;

- if the IE "UE positioning OTDOA neighbouring cell list for UE-based " is included and only two neighbour cells are included or stored in variable UE_POSITIONING_OTDOA_DATA_UE_BASED and if the IE "Round Trip Time" is neither included for the neighbour cells nor for the reference cell info:

  - set the variable CONFIGURATION_INCOMPLETE to TRUE.

### 8.6.7.19.3 UE positioning GPS assistance data

The UE may receive GPS assistance data in System Information Block types 15, 15.1, 15.2, or 15.3, or in the ASSISTANCE DATA DELIVERY message, or in the MEASUREMENT CONTROL message.

#### 8.6.7.19.3.1 UE positioning GPS acquisition assistance

If the IE "UE positioning GPS acquisition assistance" is included, the UE shall:

- update the variable UE_POSITIONING_GPS_DATA as follows:
  - delete all information currently stored in the IE "UE positioning GPS acquisition assistance" in the variable UE_POSITIONING_GPS_DATA;
  - store the received acquisition assistance information in the IE "UE positioning GPS acquisition assistance" in the variable UE_POSITIONING_GPS_DATA;
- store the IE "GPS TOW msec" ~~:~~
  - ~~in the IE "UE positioning GPS acquisition assistance" ,~~in variable UE_POSITIONING_GPS_DATA and
  - ~~use it as an estimate of the current GPS Time-of-Week;~~
- if the IEs “SFN”and “UTRAN GPS timing of cell frames” ~~is~~are included:
  - if the UE is able to utilise these IEs:
    - store these~~is~~ IEs in the IE "UE positioning GPS acquisition assistance " in variable UE_POSITIONING_GPS_DATA;
    - if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is not included and
      - if the UE is not in CELL_DCH state:
        - use IEs “SFN” and “UTRAN GPS timing of cell frames” to estimate the relationship between GPS time and radio~~air~~-interface timing of the NODE B transmission in the serving cell;
      - if the UE is in CELL_DCH state:
        - ignore IEs “SFN” and “UTRAN GPS timing of cell frames”;
    - if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is also included:
      - store this IE in the IE “UE positioning acquisition assistance~~GPS reference time~~” in variable UE_POSITIONING_GPS_DATA;
      - use IEs “SFN” and “UTRAN GPS timing of cell frames” to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the cell indicated by "Primary CPICH info" or "cell parameters id";
- ~~use IE “GPS TOW msec” as an estimate of the current GPS Time-of-Week;~~

- ~~if the IEs "SFN" and "GPS TOW rem usec" are included and IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is not included:~~

  - ~~use them with IE "GPS TOW msec" to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the serving cell;~~

- ~~if the IEs "SFN" and "GPS TOW rem usec" are included and IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is also included:~~

  - ~~use them with IE "GPS TOW msec" to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the cell indicated by "Primary CPICH info" or "cell parameters id";~~

- ~~for each satellite:~~

  - ~~if the IE "SFN" is included, interpret the IE "Code Phase Search Window" to include the uncertainty between GPS time and UTRAN timing for the NODE B transmission of the cell concerned.~~

- ~~store IE "GPS reference time" in the IE "UE positioning reference time" in UE_POSITIONING_GPS_DATA;~~

- ~~for each satellite:~~

  - ~~update the variable UE_POSITIONING_GPS_DATA as follows:~~

    - ~~store received GPS acquisition assistance at the position indicated by the IE "Sat ID" in the IE "UE positioning GPS acquisition assistance" in the variable UE_POSITIONING_GPS_DATA, possibly overwriting any existing information in this position.~~

#### 8.6.7.19.3.2 UE positioning GPS Almanac

If the IE "UE positioning GPS Almanac" is included, ~~for each satellite,~~ the UE shall:

- ~~store IE "WNa" in the IE "UE positioning GPS Almanac" in variable UE_POSITIONING_GPS_DATA and interpret it to be the GPS week associated with the received almanac information;~~

- if the IE "SV Global Health" is included:

  - store this IE in the IE in the IE "SV Global Health" in the IE "UE positioning GPS Almanac" in variable UE_POSITIONING_GPS_DATA.

- for each satellite:

  - ~~update the variable UE_POSITIONING_GPS_DATA as follows:~~

  - ~~store IE "WNa" in the IE "WNa" at the position indicated by the IE "Sat ID" in the IE "UE positioning GPS almanac" in variable UE_POSITIONING_GPS_DATA and interpret it to be the GPS week associated with the received almanac information;~~

  - store received GPS almanac information at the position indicated by the IE "Sat ID" in the IE "UE positioning GPS Almanac" in the variable UE_POSITIONING_GPS_DATA, possibly overwriting any existing information in this position. [changed indentation]

  - interpret IE "Data ID" as the Data ID field contained in the indicated subframe, word 3, most significant 2 bits, as defined by [12];

  - act on the rest of the IEs in a similar manner as specified in [12].

#### 8.6.7.19.3.3 UE positioning D-GPS Corrections

If the IE "UE positioning GPS DGPS corrections" is included, the UE shall:

- update the variable UE_POSITIONING_GPS_DATA as follows:

  - delete all information currently stored in the IE "UE positioning GPS DGPS corrections" in the variable UE_POSITIONING_GPS_DATA;[changed indentation]

- store the received DGPS corrections in the IE "UE positioning GPS DGPS corrections" in the variable UE_POSITIONING_GPS_DATA.[changed indentation]

- use IE "GPS TOW sec" to determine when the differential corrections were calculated;

- use IE "Status/Health" to determine the status of the differential corrections;

- act on "DGPS information" in a similar manner as specified in [13] except that the scale factors for PRC and RRC are different, and

- use IEs Delta PRC2 and Delta RRC2 to extend the life of the ephemeris and clock correction data up to 6 hours;

- if IEs Delta PRC3 and Delta RRC3 are included:

  - use them to extend the life of the ephemeris and clock correction data up to 8 hours.

#### 8.6.7.19.3.3a UE positioning GPS Navigation Model

If the IE “UE positioning GPS Navigation Model” is included, for each satellite, the UE shall:

- use IE "Satellite Status” to determine if an update of IE “UE positioning GPS Ephemeris and Clock Correction parameters” has been provided for the satellite indicated by the IE “SatID”;

- if an update has been provided for this satellite

  - act as specified in subclause 8.6.7.19.3.4.

#### 8.6.7.19.3.4 UE positioning GPS Ephemeris and Clock Correction Parameters

If the IE "UE positioning GPS Ephemeris and Clock Correction parameters" is included, for each satellite, the UE shall:

- update the variable UE_POSITIONING_GPS_DATA as follows:

  - store this IE~~received GPS ephemeris information~~ at the position indicated by the IE "Sat ID" in the IE "UE positioning GPS Navigation Model" in the variable UE_POSITIONING_GPS_DATA, possibly overwriting any existing information in this position.

- act on these GPS ephemeris and clock correction parameters in a manner similar to that specified in [12].

#### 8.6.7.19.3.5 UE positioning GPS ionospheric model

If IE "UE positioning GPS ionospheric model" is included, the UE shall:

- store this IE in the IE "UE positioning GPS ionospheric model" in variable UE_POSITIONING_GPS_DATA

- act on these GPS ionospheric model parameters in a manner similar to that specified in [12].~~.~~

#### 8.6.7.19.3.6 UE positioning GPS real-time integrity

~~The GPS real-time integrity information element specified in subclause 10.3.7.95 is primarily intended for non-differential applications. The real-time integrity of the satellite constellation is of importance as there is no differential correction data by which the UE can determine the soundness of each satellite signal. The Real-Time GPS Satellite Integrity data communicates the health of the constellation to the mobile via a list of bad satellites. The UE shall consider the data associated with the satellites identified in this IE as invalid.~~

If this list of bad satellites is included~~, for each satellite,~~ the UE shall:

- update the variable UE_POSITIONING_GPS_DATA as follows

  - add the Sat IDs that are not yet included in the list of satellites in the IE "UE positioning GPS real time integrity" in the variable UE_POSITIONING_GPS_DATA; [changed indentation]

  - remove all Sat IDs in the list of satellites in the IE "UE positioning GPS real time integrity" in the variable UE_POSITIONING_GPS_DATA that are not included in IE UE positioning GPS real time integrity;~~.~~ [changed indentation]

- consider the data associated with the satellites identified in the variable UE_POSITIONING_GPS_DATA as invalid.

#### 8.6.7.19.3.7 UE positioning GPS reference time

If the IE "UE positioning GPS reference time" is included, the UE shall:

- store ~~this~~ IE "GPS Week" in "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as the current GPS week;

- store the IE "GPS TOW msec" ~~:~~

~~,~~ in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and

~~-~~ use it as an estimate of the current GPS Time-of-Week;

- if the IE "SFN"and IE "UTRAN GPS timing of cell frames" are included:

  - if the UE is able to utilise the IEs:

    - store these IEs in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA:

    - if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is not includedand~~:~~

      - if the UE is not in CELL_DCH state:

        - use IEs "SFN" and "UTRAN GPS timing of cell frames~~GPS TOW msec~~" to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the serving cell;

      - if the UE is in CELL_DCH state:

        - ignore IEs "SFN" and "UTRAN GPS timing of cell frames";

    - if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is also included:

      - store this IE in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA;

      - use IEs "SFN" and "UTRAN GPS timing of cell frames~~GPS TOW msec~~" to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the cell indicated by "Primary CPICH info" or "cell parameters id";

- if the IE "SFN-TOW Uncertainty" is included:

  - store this IE in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it to determine if the relationship between GPS time and air-interface timing of the NODE B transmission is known to within at least 10ms;

  ~~- if the IE "GPS TOW rem usec" is included:~~

    ~~- store this IE in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and may use it to refine the resolution of its GPS time estimate;~~

- if the IE "$T_{UTRAN-GPS}$ drift rate~~NODE B Clock Drift~~" is included:

  - store this IE in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and

  - may use it as an estimate of the drift rate of the NODE B clock relative to GPS time;

- if the IE "GPS TOW Assist" is included:

  - for each satellite: [indentation changed]

- delete all information currently stored in the IE "GPS TOW Assist" ~~store received GPS TOW assist information at the position indicated by the IE "Sat ID"~~ in the IE "UE positioning GPS reference time" in the variable UE_POSITIONING_GPS_DATA~~, possibly overwriting any existing information in this position~~. [indentation changed]

- store the received GPS TOW Assist information in the IE "UE positioning GPS reference time" in the variable UE_POSITIONING_GPS_DATA.

#### 8.6.7.19.3.8 UE positioning GPS reference UE position

If the IE "UE positioning GPS reference UE position" is included, the UE shall:

- store this IE in the IE "UE positioning GPS reference UE position" in variable UE_POSITIONING_GPS_DATA, and

- use it as a priori knowledge of the approximate location of the UE.

#### 8.6.7.19.3.9 UE positioning UTC model

If the IE "UE positioning GPS UTC model" is included, the UE shall:

- store this IE in the IE "UE positioning GPS UTC model" in variable UE_POSITIONING_GPS_DATA.

### 8.6.7.19.4 UE positioning Ciphering info

If deciphering information is received from higher layers for deciphering of GPS assistance data broadcast on system information, the UE shall:

- store the current key in IE "Current deciphering key" in variable UE_POSITIONING_GPS_DATA;

- store the next key in IE "Next deciphering key" in variable UE_POSITIONING_GPS_DATA;

- store the ciphering key flag in UE_POSITIONING_GPS_DATA.

If deciphering information is received from higher layers for deciphering of OTDOA assistance data broadcast on system information, the UE shall:

- store the current key in IE "Current deciphering key" in variable UE_POSITIONING_OTDOA_DATA_UE_BASED;

- store the next key in IE "Next deciphering key" in variable UE_POSITIONING_OTDOA_DATA_UE_BASED;

- store the ciphering key flag in UE_POSITIONING_OTDOA_DATA_UE_BASED.

If the IE "GPS Data ciphering info" is included in SIB15, the UE shall:

- select one of the two deciphering keys received and stored it in UE_POSITIONING_GPS_DATA according to the following:

  - if the value of the received IE "Ciphering Key Flag" is the same as the value of the IE "Ciphering Key Flag" stored in the variable UE_POSITIONING_GPS_DATA:

    - select the current deciphering key;

  - if the value of the received IE "Ciphering Key Flag" is different from the value of the IE "Ciphering Key Flag" stored in the variable UE_POSITIONING_GPS_DATA:

    - select the next deciphering key;

- store the received IE in the variable UE_POSITIONING_GPS_DATA;

- use the selected deciphering key to decipher the broadcast UE positioning GPS information contained within the System Information Block types 15.1, 15.2 and 15.3.

If the IE "OTDOA positioning ciphering info" is included in SIB15.4, the UE shall:

- select one of the two deciphering keys and stored it in UE_POSITIONING_OTDOA_DATA_UE_BASED according to the following:
  - if the value of the received IE "Ciphering Key Flag" is the same as the value of the IE "Ciphering Key Flag" stored in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED:
    - select the current deciphering key;
  - if the value of the received IE "Ciphering Key Flag" is different from the value of the IE "Ciphering Key Flag" stored in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED:
    - select the next deciphering key;
- store the received IE in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED;
- use the selected deciphering key to decipher the IE "OTDOA assistance data" included in the System Information Block types 15.4.

#### 8.6.7.19.5 UE positioning Error

The UE shall set the contents of the IE "UE positioning Error" as follows:

- if the IE “Positioning Methods” in IE “UE positioning reporting quantity” has been assigned to value “OTDOA” and no neighbour cells could be received,
  - set IE “Error reason” to “ER1”;
- if the IE “Positioning Methods” in IE “UE positioning reporting quantity” has been assigned to value “GPS” and
  - if there were not enough GPS satellites to be received,
    - set IE “Error reason” to “ER2”;
  - if some GPS assistance data was missing,
    - set IE “Error reason” to “ER3”, and
    - if the IE ""Additional Assistance Data Request" included in the IE "UE positioning reporting quantity" stored in the variable MEASUREMENT_IDENTITY is set to TRUE;
      - include the IE GPS Additional Assistance Data Request"
  - if the UE was not able to read the SFN of the reference cell included in the IE "UE positioning GPS reference time" or in the IE “UE positioning acquisition assistance”,
    - set IE “Error reason” to “ER7”;
  - if the UE was not able to measure the requested GPS timing of cell frames measurement,
    - set IE “Error reason” to “ER8”;
- if higher layers have indicated that the positioning request is not permitted,
  - set IE “Error reason” to “ER5”
- if the positioning request was not processed by higher layers and timed out,,
  - set IE “Error reason” to “ER6”
- if none of the conditions above are fulfilled,
  - set IE "Error reason" to "ER4"

#### 8.6.7.19.6 UE positioning GPS reference cell info

If IE "UE positioning GPS reference cell info" is received in the MEASUREMENT CONTROL message, the UE shall update the variable UE_POSITIONING_GPS_DATA accordingly. The UE shall:

- store received reference cell information in the IE “UE positioning GPS reference cell info” in the variable UE_POSITIONING_GPS_DATA, overwriting any existing information.

### 8.6.7.20 Void

### 8.6.7.21 Intra-frequency reporting quantity for RACH reporting

If the IE " Intra-frequency reporting quantity for RACH reporting" is included, the UE shall:

- if the IE "SFN-SFN observed time difference reporting indicator" has the value "type 2":
  - act as if the value of the IE "SFN-SFN observed time difference reporting indicator" is "no reporting".

## 10.2.4 ASSISTANCE DATA DELIVERY

This message is sent by UTRAN to convey UE positioning assistance data to the UE.

RLC-SAP: AM

Logical channel: DCCH

Direction: UTRAN→UE

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| Message Type | MP | | Message Type | |
| **UE information elements** | | | | |
| RRC transaction identifier | MP | | RRC transaction identifier 10.3.3.36 | |
| Integrity check info | CH | | Integrity check info 10.3.3.16 | |
| **Measurement Information elements** | | | | |
| UE positioning OTDOA assistance data for UE-based | OP | | UE positioning OTDOA assistance data for UE-based 10.3.7.103a | |
| UE positioning GPS assistance data | OP | | UE positioning GPS assistance data 10.3.7.90 | |

### 10.2.48.8.18 System Information Block type 15

The system information block type 15 contains information useful for UE-based or UE-assisted positioning methods.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| GPS Data ciphering info | OP | | UE positioning Cipher info 10.3.7.86 | If this IE is present then the SIB types 15.1, 15.2 & 15.3 are ciphered in accordance with the Data Assistance Ciphering Algorithm specified in [18] |
| Reference position | MP | | Ellipsoid point with altitude and uncertainty ellipsoid 10.3.8.4c | approximate position where the UE is located |
| GPS reference time | MP | | UE positioning GPS reference time 10.3.7.96 | |
| Satellite information | OP | 1 to <maxSat> | | This IE is present whenever bad (failed/failing) satellites are detected by UTRAN [18]. |
| >BadSatID | MP | | Enumerated( 0..63) | |

#### 10.2.48.8.18.1 System Information Block type 15.1

The system information block type 15.1 contains information useful for UE positioning DGPS Corrections. The DGPS Corrections message contents are based on a Type-1 message of DGPS specified in [13].

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| DGPS corrections | MP | | UE positioning GPS DGPS corrections 10.3.7.91 | |

#### 10.2.48.8.18.2 System Information Block type 15.2

The system information block type 15.2 contains information useful for GPS Navigation Model. These IE fields are based on information extracted from the subframes 1 to 3 of the GPS navigation message [12].

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| Transmission TOW | MP | | Integer (0..604799) | The approximate GPS time-of-week when the message is broadcast.<br>in seconds |
| SatID | MP | | Enumerated( 0..63) | Satellite ID |
| GPS Ephemeris and Clock Correction Parameters | MP | | UE positioning GPS Ephemeris and Clock Correction parameters 10.3.7.91a | |

### 10.2.48.8.18.3 System Information Block type 15.3

The system information block type 15.3 contains information useful for ionospheric delay, UTC offset, and Almanac. These IEs contain information extracted from the subframes 4 and 5 of the GPS navigation message, [12].

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| Transmission TOW | MP | | Integer (0..604799) | The approximate GPS time-of-week when the message is broadcast.<br>in seconds |
| GPS Almanac and Satellite Health | OP | | UE positioning GPS almanac 10.3.7.89 | |
| GPS ionospheric model | OP | | UE positioning GPS ionospheric model 10.3.7.92 | |
| GPS UTC model | OP | | UE positioning GPS UTC model 10.3.7.97 | |
| SatMask | CV-*Almanac* | | Bit string(1..32) | indicates the satellites that contain the pages being broadcast in this data set |
| LSB TOW | CV-*Almanac* | | Bit string(8) | |

| Condition | Explanation |
|---|---|
| *Almanac* | This IE is mandatory present if the IE "GPS Almanac and Satellite Health" is present |

### 10.2.48.8.18.4 System Information Block type 15.4

The system information block type 15.4 contains ciphering information for SIB 15.5 and information useful for OTDOA ~~based~~ assisted UE Positioning method.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| OTDOA Data ciphering info | OP | | UE positioning Ciphering info 10.3.7.86 | If this IE is present then ~~the IE "OTDOA Assistance Data for UE-based"~~the System Information Block 15.5 is ciphered in accordance with the Data Assistance Ciphering Algorithm specified in [18] |
| OTDOA assistance data for UE-assisted | OP~~MP~~ | | UE positioning OTDOA assistance data for UE assisted 10.3.7.103 | |

| ~~Condition~~ | ~~Explanation~~ |
|---|---|
| ~~*UEbased*~~ | ~~This IE is optional if the IE " OTDOA assistance data for UE-based " is included, otherwise the IE is not needed.~~ |

### 10.2.48.8.18.4a System Information Block type 15.5

The system information block type 15.5 contains information useful for OTDOA based UE Positioning method.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| OTDOA assistance data for UE-based | MP | | UE positioning OTDOA assistance data for UE-based 10.3.7.103a | |

### 10.3.3.45 UE positioning capability

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| Standalone location method(s) supported | MP | | Boolean | Defines if a UE can measure its location by some means unrelated to UTRAN<br>TRUE means supported |
| UE based OTDOA supported | MP | | Boolean | TRUE means supported |
| Network Assisted GPS support | MP | | Enumerated ('Network based', 'UE based', 'Both', 'None') | Defines if the UE supports network based or UE based GPS methods. |
| Support for UE GPS timing of cell frames measurement ~~reference time capable~~ | MP | | Boolean | Defines if a UE has the capability to perform the UE GPS timing of cell frames measurement ~~measure GPS reference time as defined in~~ [7].<br>TRUE means capable |
| Support for IPDL | MP | | Boolean | Defines if a UE has the capability to use IPDL to enhance its 'SFN-SFN observed time difference –type 2' measurement.<br>TRUE means supported |
| Support for Rx-Tx time difference type2 measurement | MP | | Boolean | TRUE means supported |

### 10.3.7.51 Measurement validity

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| UE state | MP | | Enumerated( CELL_DCH, all states except CELL_DCH, all states) | ~~Indicates the states, in which measurement reporting shall be conducted.~~<br>~~The values 'all states except CELL_DCH' and 'all states' are used for measurement type 'traffic volume reporting'.~~ |

### 10.3.7.86 UE positioning Ciphering info

This IE contains information for the ciphering of UE positioning assistance data broadcast in System Information.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| Ciphering Key Flag | MP | | Bit string(1) | ~~See note 1~~ |
| Ciphering Serial Number | MP | | Integer(0..65 535) | The serial number used in the DES ciphering algorithm |

~~NOTE 1: The UE always receives two (2) cipher keys during the location update procedure. One of the keys is time-stamped to be current one and the other is time-stamped to be the next one. Thus, the UE always has two cipher keys in memory. The Cipher Key Change Indicator in this broadcast message instructs the UE whether to use current or next cipher key for deciphering the received broadcast message. The UE shall interpret this IE as follows:~~

~~- **Ciphering Key Flag**(previous message) = **Ciphering Key Flag**(this message) => Deciphering Key not changed~~

~~- **Ciphering Key Flag**(previous message) <> **Ciphering Key Flag**(this message) => Deciphering Key changed~~

### 10.3.7.87 UE positioning Error

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| Error reason | MP | | Enumerated( ER1, ER2, ER3, ER4, ER5, ER6, ER7, ER8) | Note 1 |
| GPS Additional Assistance Data Request | OP | | UE positioning GPS Additional Assistance Data Request 10.3.7.88a | |

NOTE 1: The following table gives the mapping of the IE "Error reason"

| Value | Indication |
|---|---|
| ER1 | There were not enough cells to be received ~~when performing mobile-based OTDOA-IPDL.~~ |
| ER2 | There were not enough GPS satellites to be received~~, when performing UE-based GPS location.~~ |
| ER3 | ~~Location calculation~~ UE positioning GPS assistance data missing. |
| ~~ER4~~ | ~~Requested method not supported.~~ |
| ER4~~5~~ | Undefined error. |
| ER5~~6~~ | ~~Location~~ UE positioning request denied by upper layers~~the user~~. |
| ER6~~7~~ | ~~Location~~ UE positioning request not processed by upper layers~~the user~~ and timeout |
| ER7~~8~~ | ~~Reference cell for GPS is not the serving cell~~UE was not able to read the SFN of the reference cell |
| ER8 | UE was not able to accomplish the GPS timing of cell frames measurement. |

### 10.3.7.88 UE positioning GPS acquisition assistance

This IE contains parameters that enable fast acquisition of the GPS signals in UE-assisted GPS positioning.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| GPS TOW msec | MP | | Integer(0..6.048*10^8-1) | GPS Time of Week in milliseconds)rounded down to the nearest millisecond unit |
| >UTRAN GPS reference time | OP | | | ~~GPS Time of Week counted in microseconds, given as GPS TOW in milliseconds and GPS TOW remainder in microseconds. UTRAN reference time in units of 1/16th UMTS chip = 1000(3840 * 16 * GPS TOW msec) + (GPS TOW rem) usec~~ |
| ~~>>GPS TOW msec~~ | ~~MP~~ | | ~~Integer(0..6.048*10^8-1)~~ | ~~GPS Time of Week in units of 3840 UMTS chips (i.e., milliseconds) (rounded down to the nearest millisecond unit)~~ |
| >>UTRAN GPS timing of cell frames~~TOW rem usec~~ | MP | | Integer(0 ... 2322431999 9990..61439 999) | GPS ~~Time of Week~~ timing of cell frames in unitssteps of 1/16th chip~~UMTS chip MOD 61440 (where 61440 = 3840 * 16). microseconds MOD 1000.~~ |
| >>CHOICE *mode* | OP | | | |
| >>>FDD | | | | |
| >>>>Primary CPICH Info | M~~O~~P | | Primary CPICH Info 10.3.6.60 | Identifies the reference cell for the GPS TOW-SFN relationship |
| >>>TDD | | | | |
| >>>>cell parameters id | M~~O~~P | | Cell parameters id 10.3.6.9 | Identifies the reference cell for the GPS TOW-SFN relationship |
| >>SFN | MP | | Integer(0..4095) | The SFN which the UTRAN GPS timing of cell frames time stamps |
| ~~>GPS reference time only~~ | | | | |
| ~~>>GPS TOW msec~~ | ~~MP~~ | | ~~Integer(0..6.048*10^8-1)~~ | ~~GPS Time of Week in units of 3840 UMTS chips (i.e., milliseconds (rounded down to the nearest millisecond unit).~~ |
| Satellite information | MP | 1 to <maxSat> | | |
| >SatID | MP | | Integer (0..63) | |
| >Doppler (0th order term) | MP | | Real(-5120..5117.5 by step of 2.5) | Hz |
| >Extra Doppler | OP | | | |
| >>Doppler (1st order term) | MP | | Real (-0.966..0.483 by step of 0.023) | Scaling factor 1/42 |
| >>Doppler Uncertainty | MP | | Enumerated (12.5,25,50, 100,200) | Hz |
| >Code Phase | MP | | Integer(0..1022) | Chips, specifies the centre of the search window |
| >Integer Code Phase | MP | | Integer(0..19) | 1023 chip segments |
| >GPS Bit number | MP | | Integer(0..3) | Specifies GPS bit number (20 1023 chip segments) |
| >Code Phase Search Window | MP | | Integer(1023,1,2,3,4,6,8,12,16,24,32,48,64,96,128, 192) | Specifies the width of the search window. |

| | | | | |
|---|---|---|---|---|
| >Azimuth and Elevation | OP | | | |
| >>Azimuth | MP | | Real(0..348.75 by step of 11.25) | Degrees |
| >>Elevation | MP | | Real(0..78.75 by step of 11.25) | Degrees |

| **CHOICE *Reference time*** | **Condition under which the given *reference time* is chosen** |
|---|---|
| UTRAN reference time | The reference time is relating GPS time to UTRAN time (SFN) |
| GPS reference time only | The time gives the time for which the location estimate is valid |

## 10.3.7.88a UE positioning GPS Additional Assistance Data Request

| **Information Element/Group name** | **Need** | **Multi** | **Type and Reference** | **Semantics description** |
|---|---|---|---|---|
| Almanac | MP | | Boolean | TRUE means requested |
| UTC Model | MP | | Boolean | TRUE means requested |
| Ionospheric model | MP | | Boolean | TRUE means requested |
| Navigation Model | MP | | Boolean | TRUE means requested |
| DGPS Corrections | MP | | Boolean | TRUE means requested |
| Reference Location | MP | | Boolean | TRUE means requested |
| Reference Time | MP | | Boolean | TRUE means requested |
| Acquisition Assistance | MP | | Boolean | TRUE means requested |
| Real-Time Integrity | MP | | Boolean | TRUE means requested |
| Navigation Model Additional data | CV-*Navigation Model* | | | this IE is present only if "Navigation Model" is set to TRUE otherwise it is absent |
| >GPS Week | MP | | Integer (0..1023) | |
| >GPS_Toe | MP | | Integer (0..167) | GPS time of ephemeris in hours of the latest ephemeris set contained by the UE |
| >T-Toe limit | MP | | Integer (0..10) | ephemeris age tolerance of the UE to UTRAN in hours |
| >Satellites list related data | MP | 0 to <maxSat> | | |
| >>SatID | MP | | Integer (0..63) | |
| >>IODE | MP | | Integer (0..255) | Issue of Data Ephemeris for SatID |

## 10.3.7.89 UE positioning GPS almanac

This IE contains a reduced-precision subset of the ephemeris and clock correction parameters.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| $WN_a$ | MP | | Bit string(8) | |
| Satellite information | MP | 1 to <maxSat> | | |
| >DataID | MP | | Integer(0..3) | See [12] |
| >SatID | MP | | Enumerated( 0..63) | Satellite ID |
| >e | MP | | Bit string(16) | Eccentricity [12] |
| >$t_{oa}$ | MP | | Bit string(8) | Reference Time of AlmanacEphemeris [12] |
| >δi | MP | | Bit string(16) | |
| >OMEGADOT | MP | | Bit string(16) | Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles/sec) [12] |
| >SV Health | MP | | Bit string(8) | |
| >$A^{1/2}$ | MP | | Bit string(24) | Semi-Major Axis (meters)$^{1/2}$ [12] |
| >$OMEGA_0$ | MP | | Bit string(24) | Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles) [12] |
| >$M_0$ | MP | | Bit string(24) | Mean Anomaly at Reference Time (semi-circles) [12] |
| >ω | MP | | Bit string(24) | Argument of Perigee (semi-circles) [12] |
| >$af_0$ | MP | | Bit string(11) | apparent clock correction [12] |
| >$af_1$ | MP | | Bit string(11) | apparent clock correction [12] |
| SV Global Health | OP | | Bit string(364) | This enables GPS time recovery and possibly extended GPS correlation intervals. It is specified in page 25 of subframes 4 and 5 [12] |

### 10.3.7.90 UE positioning GPS assistance data

This IE contains GPS assistance data.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| UE positioning GPS reference time | OP | | UE positioning GPS reference time 10.3.7.96 | |
| UE positioning GPS reference UE position | OP | | Ellipsoid point with altitude and uncertainty ellipsoid 10.3.8.4c | A priori knowledge of UE 3-D position. |
| UE positioning GPS DGPS corrections | OP | | UE positioning GPS DGPS corrections 10.3.7.91 | |
| UE positioning GPS navigation model | OP | | UE positioning GPS navigation model 10.3.7.94 | |
| UE positioning GPS ionospheric model | OP | | UE positioning GPS ionospheric model 10.3.7.92 | |
| UE positioning GPS UTC model | OP | | UE positioning GPS UTC model 10.3.7.97 | |
| UE positioning GPS almanac | OP | | UE positioning GPS almanac 10.3.7.89 | |
| UE positioning GPS acquisition assistance | OP | | UE positioning GPS acquisition assistance 10.3.7.88 | |
| UE positioning GPS real-time integrity | OP | | UE positioning GPS real-time integrity 10.3.7.95 | |
| UE positioning GPS reference cell info | OP | | UE positioning GPS reference cell info 10.3.7.95a | Identifies reference cell associated with request for UE GPS timing of cell frames measurement |

### 10.3.7.90a Void

### 10.3.7.91 UE positioning GPS DGPS corrections

This IE contains DGPS corrections to be used by the UE.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| GPS TOW sec | MP | | Integer(0..604799) | seconds<br>GPS time-of-week when the DGPS corrections were calculated |
| Status/Health | MP | | Enumerated( UDRE scale 1.0, UDRE scale 0.75, UDRE scale 0.5, UDRE scale 0.3, UDRE scale 0.2, UDRE scale 0.1, no data, invalid data) | |
| ~~DPGS~~ DGPS information | CV-*Status/Health* | 1 to <maxSat> | | If the Cipher information is included these fields are ciphered. |
| >SatID | MP | | Enumerated (0…63) | |
| >IODE | MP | | Integer(0..255) | |
| >UDRE | MP | | Enumerated( UDRE ≤ 1.0 m, 1.0m < UDRE ≤ 4.0m, 4.0m < UDRE ≤ 8.0m, 8.0m < UDRE) | The value in this field shall be multiplied by the UDRE Scale Factor in the IE Status/Health to determine the final UDRE estimate for the particular satellite. |
| >PRC | MP | | Real(-655.04..655.04 by step of 0.32) | meters (different from [13]) |
| >RRC | MP | | Real(-4.064..4.064 by step of 0.032) | meters/sec (different from [13]) |
| >Delta PRC2 | MP | | Integer(-127..127) | meters |
| >Delta RRC2 | MP | | Real(-0.224..0.224 by step of 0.032) | meters/sec |
| >Delta PRC3 | CV-*DCCH* | | Integer(-127..127) | meters |
| >Delta RRC3 | CV-*DCCH* | | Real(-0.224..0.224 by step of 0.032) | meters/sec |

| Condition | Explanation |
|---|---|
| *Status/Health* | This IE is mandatory present if "status" is not equal to "no data" or "invalid data", otherwise the IE is not needed. |
| *DCCH* | This IE is mandatory present if the IE " UE positioning GPS DGPS corrections" it is included in the point-to-point message. It is optional if the IE "UE positioning GPS DGPS corrections" is included in the broadcast message. Otherwise it is not needed. |

### 10.3.7.91a UE positioning GPS Ephemeris and Clock Correction parameters

This IE contains information for GPS ephemeris and clock correction.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| C/A or P on L2 | MP | | Bit string(2) | Code(s) on L2 Channel [12] |
| URA Index | MP | | Bit string(4) | User Range Accuracy [12] |
| SV Health | MP | | Bit string(6) | [12] |
| IODC | MP | | Bit string(10) | Issue of Data, Clock [12] |
| L2 P Data Flag | MP | | Bit string(1) | [12] |
| SF 1 Reserved | MP | | Bit string(87) | [12] |
| $T_{GD}$ | MP | | Bit string(8) | Estimated group delay differential [12] |
| $t_{oc}$ | MP | | Bit string(16) | apparent clock correction [12] |
| $af_2$ | MP | | Bit string(8) | apparent clock correction [12] |
| $af_1$ | MP | | Bit string(16) | apparent clock correction [12] |
| $af_0$ | MP | | Bit string(22) | apparent clock correction [12] |
| $C_{rs}$ | MP | | Bit string(16) | Amplitude of the Sine Harmonic Correction Term to the Orbit Radius (meters) [12] |
| $\Delta n$ | MP | | Bit string(16) | Mean Motion Difference From Computed Value (semi-circles/sec) [12] |
| $M_0$ | MP | | Bit string(32) | Mean Anomaly at Reference Time (semi-circles) [12] |
| $C_{uc}$ | MP | | Bit string(16) | Amplitude of the Cosine Harmonic Correction Term To The Argument Of Latitude (radians) [12] |
| e | MP | | Bit string(32) | c |
| $C_{us}$ | MP | | Bit string(16) | Amplitude of the Sine Harmonic Correction Term To The Argument Of Latitude (radians) [12] |
| $(A)^{1/2}$ | MP | | Bit string(32) | Semi-Major Axis (meters)$^{1/2}$ [12] |
| $t_{oe}$ | MP | | Bit string(16) | Reference Time Ephemeris [12] |
| Fit Interval Flag | MP | | Bit string(1) | [12] |
| AODO | MP | | Bit string(5) | Age Of Data Offset [12] |
| $C_{ic}$ | MP | | Bit string(16) | Amplitude of the Cosine Harmonic Correction Term To The Angle Of Inclination (radians) [12] |
| $OMEGA_0$ | MP | | Bit string(32) | Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles) [12] |
| $C_{is}$ | MP | | Bit string(16) | Amplitude of the Sine Harmonic Correction Term To The Angle Of Inclination (radians) [12] |
| $i_0$ | MP | | Bit string(32) | Inclination Angle at Reference Time (semi-circles) [12] |
| $C_{rc}$ | MP | | Bit string(16) | Amplitude of the Cosine Harmonic Correction Term to the Orbit Radius (meters) [12] |
| $\omega$ | MP | | Bit string(32) | Argument of Perigee (semi-circles) [12] |
| OMEGAdot | MP | | Bit string(24) | Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles/sec) [12] |
| Idot | MP | | Bit string(14) | Rate of Inclination Angle (semi-circles/sec) [12] |

### 10.3.7.92 UE positioning GPS ionospheric model

The IE contains fields needed to model the propagation delays of the GPS signals through the ionosphere.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| $\alpha_0$ | MP | | Bit string(8) | Note 1 |
| $\alpha_1$ | MP | | Bit string(8) | Note 1 |
| $\alpha_2$ | MP | | Bit string(8) | Note 1 |
| $\alpha_3$ | MP | | Bit string(8) | Note 1 |
| $\beta_0$ | MP | | Bit string(8) | Note 2 |
| $\beta_1$ | MP | | Bit string(8) | Note 2 |
| $\beta_2$ | MP | | Bit string(8) | Note 2 |
| $\beta_3$ | MP | | Bit string(8) | Note 2 |

NOTE 1: The parameters $\alpha$n are the coefficients of a cubic equation representing the amplitude of the vertical delay [12].

NOTE 2: The parameters $\beta$n are the coefficients of a cubic equation representing the period of the ionospheric model [12].

### 10.3.7.93 UE positioning GPS measured results

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| CHOICE *Reference Time* | MP | | | |
| >UTRAN reference time | | | | |
| >>UE GPS timing of cell frames | MP | | Integer(0..3715891199 9999 | GPS Time of Week in units of 1/16th UMTS chips according to [19] |
| >>CHOICE *mode* | MP~~OP~~ | | | |
| >>>FDD | | | | |
| >>>>Primary CPICH Info | MP | | Primary CPICH Info 10.3.6.60 | Identifies the reference cell for the GPS TOW-SFN relationship |
| >>>TDD | | | | |
| >>cell parameters id | MP | | Cell parameters id 10.3.6.9 | Identifies the reference cell for the GPS TOW-SFN relationship |
| >>Reference SFN | MP~~OP~~ | | Integer(0..4095) | The SFN for which the location is valid. If UE GPS timing of cell frames is included this is also the SFN which is time stamped |
| >GPS reference time only | | | | |
| >>GPS TOW msec | MP | | Integer(0..6.048*10^8-1) | GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit). This time is the GPS TOW measured by the UE. ~~If the Reference SFN field is present it is the ms flank closest to the beginning of that frame. GPS Time of Week in microseconds = 1000 * GPS TOW msec + GPS TOW rem usec~~ |
| ~~UE GPS timing of cell frames TOW rem usec~~ | ~~OP~~ | | ~~Integer(0..3715891199 9999614399 99)~~ | ~~GPS Time of Week intiming of cell frames in steps of units of 1/16th chipsUMTS chip MOD 61440 (where 61440 = 3840 * 16). microseconds MOD 1000.~~ |
| Measurement Parameters | MP | 1 to <maxSat> | | |
| >Satellite ID | MP | | Enumerated(0..63) | |
| >$C/N_o$ | MP | | Integer(0..63) | the estimate of the carrier-to-noise ratio of the received signal from the particular satellite used in the measurement. It is given in unites of dB-Hz (typical levels will be in the range of 20 – 50 dB-Hz). |
| >Doppler | MP | | Integer(-32768..32768) | Hz, scale factor 0.2. |
| >Whole GPS Chips | MP | | Integer(0..1023~~3~~) | Unit in GPS chips |
| >Fractional GPS Chips | MP | | Integer(0..(2^10-1)) | Scale factor $2^{-10}$ |
| >Multipath Indicator | MP | | Enumerated(NM, low, medium, high) | See note 1 |
| >Pseudorange RMS Error | MP | | Enumerated(range index 0..range index 63) | See note 2 |

NOTE 1: The following table gives the mapping of the multipath indicator field.

| Value | Multipath Indication |
|---|---|
| NM | Not measured |
| Low | MP error < 5m |
| Medium | 5m < MP error < 43m |
| High | MP error > 43m |

NOTE 2: The following table gives the bitmapping of the Pseudorange RMS Error field.

| Range Index | Mantissa | Exponent | Floating-Point value, $x_i$ | Pseudorange value, P |
|---|---|---|---|---|
| 0 | 000 | 000 | 0.5 | P < 0.5 |
| 1 | 001 | 000 | 0.5625 | 0.5 <= P < 0.5625 |
| I | X | Y | $0.5 * (1 + x/8) * 2^y$ | $x_{i-1}$ <= P < $x_i$ |
| 62 | 110 | 111 | 112 | 104 <= P < 112 |
| 63 | 111 | 111 | -- | 112 <= P |

## 10.3.7.94 UE positioning GPS navigation model

This IE contain information required to manage the transfer of precise navigation data to the GPS-capable UE.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| Satellite information | MP | 1 to <maxSat> | | |
| >SatID | MP | | Enumerated( 0..63) | Satellite ID |
| >Satellite Status | MP | | Enumerated( NS_NN, ES_SN, ES_NN, REVD) | See note 1 |
| >GPS Ephemeris and Clock Correction parameters | CV-*Satellite status* | | UE positioning GPS Ephemeris and Clock Correction parameters 10.3.7.91a | |

NOTE 1: The UE shall interpret enumerated symbols as follows.

| Value | Indication |
|---|---|
| NS_NN | New satellite, new Navigation Model |
| ES_SN | Existing satellite, same Navigation Model |
| ES_NN | Existing satellite, new Navigation Model |
| REVD | Reserved |

| Condition | Explanation |
|---|---|
| *Satellite status* | The IE is not needed if the IE "Satellite status" is ES_SN and mandatory present otherwise. |

### 10.3.7.95 UE positioning GPS real-time integrity

This IE contains parameters that describe the real-time status of the GPS constellation.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| Satellite information | MP | 1 to <maxSat> | | |
| >BadSatID | MP | | Enumerated( 0..63) | |

### 10.3.7.95a UE positioning GPS reference cell info

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| CHOICE *mode* | MP | | | |
| >FDD | | | | |
| >>Primary CPICH info | MP | | Primary CPICH info 10.3.6.60 | |
| >TDD | | | | |
| >>cell ~~and channel ID~~parameters ID | MP | | Cell parameters id 10.3.6.9~~Cell and Channel Identity info 10.3.6.8a~~ | |

## 10.3.7.96 UE positioning GPS reference time

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| GPS Week | MP | | Integer(0..1023) | |
| CHOICE *Reference Time* | MP | | | |
| GPS TOW msec | MP | | Integer(0..6.048*10$^8$-1) | GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit). |
| >UTRAN GPS reference time | OP | | | |
| >>UTRAN GPS timing of cell framesTOW rem usec | MPOP | | Integer(0..2322431999999371589119999996143999) | UTRAN GPS Time of Weektiming of cell frames in stepsunits of 1/16$^{th}$ chipsUMTS chip MOD 61440 (where 61440 = 3840 * 16) microseconds MOD 1000. GPS Time of Week in units of 1/16$^{th}$ UMTS chip microseconds = 1000(3840 * 16 * GPS TOW msec) + (GPS TOW rem) usec |
| >>CHOICE *mode* | OP | | | |
| >>>FDD | | | | |
| >>>>Primary CPICH Info | MP | | Primary CPICH Info 10.3.6.60 | Identifies the reference cell for the GPS TOW-SFN relationship |
| >>>TDD | | | | |
| >>>>cell parameters id | MP | | Cell parameters id 10.3.6.9 | Identifies the reference cell for the GPS TOW-SFN relationship |
| >>SFN | MPOP | | Integer(0..4095) | The SFN which the UTRAN GPS timing of cell frames TOW time stamps. SFN and GPS TOW msec and GPS TOW rem usec are included if relation GPS TOW/SFN is known to at least 10 µs. |
| >>SFN-TOW Uncertainty | OP | | Enumerated (lessThan10, moreThan10) | This field indicates the uncertainty of the relation GPS TOW/SFN. lessThan10 means the relation is accurate to at least 10 ms. |
| >>Node B Clock Drift$T_{UTRAN-GPS}$ drift rate | OP | | Real(-0.09375..0.09375 by step of 0.0125Integer (0, 1, 2, 5, 10, 15, 25, 50, -1, -2, -5, -10, -15, -25, -50) | in 1/256µsecchips per /sec (ppm) |
| >GPS reference time only | | | | |
| >GPS TOW msec | MP | | Integer(0..6.048*10$^8$-1) | GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit). |
| GPS TOW Assist | OP | 1 to <maxSat> | | |
| >SatID | MP | | Enumerated(0..63) | |
| >TLM Message | MP | | Bit string(14) | |
| >TLM Reserved | MP | | Bit string(2) | |
| >Alert | MP | | Boolean | |
| >Anti-Spoof | MP | | Boolean | |

### 10.3.7.97 UE positioning GPS UTC model

The UTC Model field contains a set of parameters needed to relate GPS time to Universal Time Coordinate (UTC).

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| $A_1$ | MP | | Bit string(24) | sec/sec [12] |
| $A_0$ | MP | | Bit string(32) | seconds [12] |
| $t_{ot}$ | MP | | Bit string(8) | seconds [12] |
| $WN_t$ | MP | | Bit string(8) | weeks [12] |
| $\Delta t_{LS}$ | MP | | Bit string(8) | seconds [12] |
| $WN_{LSF}$ | MP | | Bit string(8) | weeks [12] |
| DN | MP | | Bit string(8) | days [12] |
| $\Delta t_{LSF}$ | MP | | Bit string(8) | seconds [12] |

### 10.3.7.98 UE positioning IPDL parameters

This IE contains parameters for the IPDL mode. The use of this parameters is described in [29].

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| IP spacing | MP | | Integer(5,7,10,15,20,30,40,50) | See [29] |
| IP length | MP | | Integer(5,10) | See [29] |
| IP offset | MP | | Integer(0..9) | Relates the BFN and SFN, should be same as T_cell defined in [10]; See [29] |
| Seed | MP | | Integer(0..63) | See [29] |
| Burst mode parameters | OP | | | |
| >Burst Start | MP | | Integer(0..15) | See [29] |
| >Burst Length | MP | | Integer(10..25) | See [29] |
| >Burst freq | MP | | Integer(1..16) | See [29] |

### 10.3.7.99 UE positioning measured results

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| UE positioning OTDOA measured results | OP | | UE positioning OTDOA measured results 10.3.7.105 | ~~This IE shall be not included~~ |
| ~~UE positioning OTDOA measured results extension~~ | ~~OP~~ | | ~~UE positioning OTDOA measured results extension 10.3.7.105 a~~ | |
| UE positioning Position estimate info | OP | | UE positioning Position estimate info 10.3.7.109 | |
| UE positioning GPS measured results | OP | | UE positioning GPS measured results 10.3.7.93 | |
| UE positioning error | OP | | UE positioning error 10.3.7.87 | Included if UE positioning error occurred |

## 10.3.7.100 UE positioning measurement

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| UE positioning reporting quantity | OPMP | | UE positioning reporting quantity 10.3.7.111 | |
| Measurement validity | OP | | Measurement validity 10.3.7.51 | |
| CHOICE *reporting criteria* | OPMP | | | |
| >UE positioning reporting criteria | | | UE positioning reporting criteria 10.3.7.110 | |
| >Periodical reporting criteria | | | Periodical reporting criteria 10.3.7.53 | |
| >No reporting | | | | (no data)<br>Chosen when this measurement only is used as additional measurement to another measurement |
| CHOICE *PositioningMode* | OP | | | |
| >UE-assisted | | | | |
| >>UE positioning OTDOA assistance data for UE-assisted | MOPCV-*OTDOA* | | UE positioning OTDOA assistance data 10.3.7.103 | |
| >UE-based | | | | |
| >>UE positioning OTDOA assistance data for UE-based | MOP | | UE positioning OTDOA assistance data for UE-based 10.3.7.103a | |
| UE positioning GPS assistance data | OP | | UE positioning GPS assistance data 10.3.7.90 | |

| Condition | Explanation |
|---|---|
| *OTDOA* | This IE is mandatory present if the IE "Positioning method" is set to "OTDOA" or "OTDOA or GPS" and not needed otherwise. |

## 10.3.7.101 UE positioning measurement event results

This IE contains the measurement event results that are reported to UTRAN for UE positioning measurements.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| CHOICE *Event ID* | MP | | | |
| >7a | | | | |
| >>UE positioning Position estimate info | MP | | UE positioning Position estimate info 10.3.7.109 | |
| >7b | | | | |
| >>UE positioning OTDOA measured resultsment | MP | | UE positioning OTDOA measured resultsment extension 10.3.7.105a | |
| >7c | | | | |
| >>UE positioning GPS measurement | MP | | UE positioning GPS measured resultsment 10.3.7.93 | |

## 10.3.7.102 Void

## 10.3.7.103 UE positioning OTDOA assistance data for UE-assisted

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| UE positioning OTDOA reference cell info for UE-assisted | OP | | UE positioning OTDOA reference cell info 10.3.7.108 | |
| UE positioning OTDOA neighbour cell list for UE-assisted | OP | 1 to <maxCellMeas> | | |
| >UE positioning OTDOA neighbour cell info for UE-assisted | MP | | UE positioning OTDOA neighbour cell info 10.3.7.106 | |

## 10.3.7.103a UE positioning OTDOA assistance data for UE-based

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| UE positioning OTDOA reference cell info for UE-based | OP | | UE positioning OTDOA reference cell info for UE-based 10.3.7.108a | |
| UE positioning OTDOA neighbour cell list for UE-based | OP | 1 to <maxCellMeas> | | |
| >UE positioning OTDOA neighbour cell info for UE-based | MP | | UE positioning OTDOA neighbour cell info for UE-based 10.3.7.106a | |

## 10.3.7.104 Void

## 10.3.7.105 UE positioning OTDOA measuremed resultsnt

~~The purpose of the OTDOA Measurement Information element is to provide OTDOA measurements of signals sent from the reference and neighbour cells.~~ This IE shall not be included.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| SFN | MP | | Integer(0..4095) | SFN during which the last measurement was performed |
| CHOICE *mode* | | | | |
| >FDD | | | | |
| >>Reference cell id | MP | | Primary CPICH info 10.3.6.60 | |
| >>UE Rx-Tx time difference type 2 info | MP | | | |
| >>>UE Rx-Tx time difference type 2 | MP | | UE Rx-Tx time difference type 2 10.3.7.84 | |
| >>>UE positioning OTDOA quality | MP | | UE positioning OTDOA quality 10.3.7.107 | Quality of the UE Rx-Tx time difference type 2 measurement from the reference cell. |
| >TDD | | | | (no data) |
| >>Reference cell id | MP | | Cell parameters ID 10.3.6.9 | |
| Neighbours | MP | 0 to <maxCellMeas> | | |
| >CHOICE *mode* | MP | | | |
| >>FDD | | | | |
| >>>Neighbour Identity | MD | | Primary CPICH info 10.3.6.60 | Default value is the same as in the first set of multiple sets. |
| >>>Frequency info | MD | | Frequency info 10.3.6.36 | Default value is the existing value of frequency information |
| >>>UE Rx-Tx time difference type 2 info | OP | | | Included if the neighbour is in the active set |
| >>>>UE Rx-Tx time difference type 2 | MP | | UE Rx-Tx time difference type 2 10.3.7.84 | |
| >>>>UE positioning OTDOA quality | MP | | UE positioning OTDOA quality 10.3.7.107 | Quality of the UE Rx-Tx time difference type 2 measurement from the neighbour cell. |
| >>TDD | | | | |
| >>>Cell and Channel ID | MD | | Cell and Channel Identity info 10.3.6.8a | Default value is the same as in the first set of multiple sets. |
| >UE positioning OTDOA quality | MP | | UE positioning OTDOA quality 10.3.7.107 | Quality of the SFN-SFN observed time difference type 2 measurement from the neighbour cell. |
| >SFN-SFN observed time difference type 2 | MP | | SFN-SFN observed time difference 10.3.7.63 | Gives the timing relative to the reference cell. Only type 2 is allowed. |

~~10.3.7.105a UE positioning OTDOA measured results extension~~

~~The purpose of the OTDOA Measurement Information element is to provide OTDOA measurements of signals sent from the reference and neighbour cells.~~

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| SFN | MP | | Integer(0..4095) | SFN during which the last measurement was performed |
| CHOICE *mode* | | | | |
| >FDD | | | | |
| >>Reference cell id | MP | | Primary CPICH info 10.3.6.60 | |
| >>UE Rx-Tx time difference type 2 info | OP | | | |
| >>>UE Rx-Tx time difference type 2 | MP | | UE Rx-Tx time difference type 2 10.3.7.84 | |
| >>>UE positioning OTDOA quality | MP | | UE positioning OTDOA quality 10.3.7.107 | Quality of the UE Rx-Tx time difference type 2 measurement from the reference cell. |
| >TDD | | | | (no data) |
| >>Reference cell id | MP | | Cell parameters ID 10.3.6.9 | |
| Neighbours | MP | 0 to <maxCellMeas> | | |
| >CHOICE *mode* | MP | | | |
| >>FDD | | | | |
| >>>Neighbour Identity | MP | | Primary CPICH info 10.3.6.60 | |
| >>>Frequency info | MD | | Frequency info 10.3.6.36 | Default value is the existing value of frequency information |
| >>>UE Rx-Tx time difference type 2 info | OP | | | Included if the neighbour is in the active set |
| >>>>UE Rx-Tx time difference type 2 | MP | | UE Rx-Tx time difference type 2 10.3.7.84 | |
| >>>>UE positioning OTDOA quality | MP | | UE positioning OTDOA quality 10.3.7.107 | Quality of the UE Rx-Tx time difference type 2 measurement from the neighbour cell. |
| >>TDD | | | | |
| >>>Cell and Channel ID | MD | | Cell and Channel Identity info 10.3.6.8a | Default value is the same as in the first set of multiple sets. |
| >UE positioning OTDOA quality | MP | | UE positioning OTDOA quality 10.3.7.107 | Quality of the SFN-SFN observed time difference type 2 measurement from the neighbour cell. |
| >SFN-SFN observed time difference type 2 | MP | | SFN-SFN observed time difference 10.3.7.63 | Gives the timing relative to the reference cell. Only type 2 is allowed. |

### 10.3.7.106 UE positioning OTDOA neighbour cell info

This IE gives approximate cell timing in order to decrease the search window.~~, as well as the cell locations and fine cell timing for UE based OTDOA.~~

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| CHOICE *mode* | MP | | | |
| >FDD | | | | |
| >>Primary CPICH info | MP | | Primary CPICH info 10.3.6.60 | |
| >TDD | | | | |
| >>cell and channel ID | MP | | Cell and Channel Identity info 10.3.6.8a | Identifies the channel to be measured on. |
| Frequency info | MD | | Frequency info 10.3.6.36 | Default value is the existing value of frequency information |
| IPDL parameters | CV-*IPDLs* | | UE positioning IPDL parameters 10.3.7.98 | |
| SFN offset | CV-*IPDLs* | | Integer (0 .. 4095) | Define Tref as the time of beginning of system frame number SFNref of the reference cell. Define Tnc as the beginning of a frame from the neighbour cell occurring immediately after the time Tref. Let the corresponding system frame number be SFNnc. Then SFNnc = SFNref-SFN offset modulo 4096. |
| SFN-SFN relative time difference | MP | | Integer(0.. 38399) | Gives the relative timing compared to the reference cell Equal to (Tnc-Tref)/(3.84*$10^6$) ⌋ where ⌊()⌋ denotes rounding to the nearest lower integer. in chips. |
| SFN-SFN drift | OP | | Integer~~Real~~ (0, -1, -2, -3, -4, -5, -8, -10, -15, -25, -35, -50, -65, -80, -100, 1, 2, 3, 4, 5, 8, 10, 15, 25, 35, 50, 65, 80, 100) ~~(0,+0.33,+0.66,+1,+1.33,+1.66,+2,+2.5,+3,+4,+5,+7,+9,+11,+13,+15,-0.33,-0.66,-1,-1.33,-1.66,-2,-2.5,-3,-4,-5,-7,-9,-11,-13,-15)~~ | ~~meters~~in 1/256 chips per~~/~~second |
| Search Window Size | MP | | Integer(20, 40, 80, 160, 320, 640, 1280, infinity) | in chips. If the value is X then the expected SFN-SFN observed time difference is in the range [RTD-X, RTD+X] where RTD is the value of the field SFN-SFN relative time difference. Infinity means that the |

| | | | | |
|---|---|---|---|---|
| | | | | uncertainty is larger than 1280 chips. |
| CHOICE *PositioningMode* | MP | | | |
| >UE based | | | | (no data) |
| ~~>>Cell Position~~ | ~~MD~~ | | | ~~Default is the same as previous cell~~ |
| ~~>>>Relative North~~ | ~~OP~~ | | ~~Integer(-20000..20000)~~ | ~~Seconds, scale factor 0.03. Relative position compared to reference cell.~~ |
| ~~>>>Relative East~~ | ~~OP~~ | | ~~Integer(-20000..20000)~~ | ~~Seconds, scale factor 0.03. Relative position compared to reference cell.~~ |
| ~~>>>Relative Altitude~~ | ~~OP~~ | | ~~Integer(-4000..4000)~~ | ~~Relative altitude in meters compared to ref. cell.~~ |
| ~~>>Fine SFN-SFN~~ | ~~MP~~ | | ~~Real(0..0.9375 in steps of 0.0625)~~ | ~~Gives finer resolution~~ |
| ~~>>UE positioning Relative Time Difference Quality~~ | ~~MP~~ | | ~~UE positioning OTDOA quality 10.3.7.109a~~ | ~~Quality of the relative time difference between neighbour and reference cell.~~ |
| ~~>>Round Trip Time~~ | ~~OP~~ | | ~~Real(876.00 .. 2923.875) in steps of 0.0625~~ | ~~In chips. Included if cell is in active set.~~ |
| >UE assisted | | | | (no data) |

| Condition | Explanation |
|---|---|
| *IPDLs* | This IE is mandatory present if IPDLs are applied and not needed otherwise. |

## 10.3.7.106a UE positioning OTDOA neighbour cell info for UE-based

This IE gives approximate cell timing in order to decrease the search window, as well as the cell locations and fine cell timing for UE based OTDOA.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| UE positioning OTDOA neighbour cell info | MP | | UE positioning OTDOA neighbour cell info 10.3.7.106 | |
| Cell Position | MD | | | Default is the same as previous cell |
| >Relative North | OP | | Integer(-20000..20000) | Seconds, scale factor 0.03. Relative position compared to reference cell. |
| >Relative East | OP | | Integer(-20000..20000) | Seconds, scale factor 0.03. Relative position compared to reference cell. |
| >Relative Altitude | OP | | Integer(-4000..4000) | Relative altitude in meters compared to ref. cell. |
| Fine SFN-SFN | MP | | Real(0..0.9375 in steps of 0.0625) | Gives finer resolution |
| UE positioning Relative Time Difference Quality | MP | | UE positioning OTDOA quality 10.3.7.109a | Quality of the relative time difference between neighbour and reference cell. |
| Round Trip Time | OP | | Real(876.00 .. 2923.875) in steps of 0.0625 | In chips. Included if cell is in active set. |

### 10.3.7.107 UE positioning OTDOA quality

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| Std Resolution | MP | | Bit string(2) | Std Resolution field includes the resolution used in Std of OTDOA Measurements field. Encoding on two bits as follows:<br>'00' 10 meters<br>'01' 20 meters<br>'10' 30 meters<br>'11' Reserved |
| Number of OTDOA Measurements | MP | | Bit string(3) | Number of measurements field is used together with Std of OTDOA Measurements field to define quality of a reported OTDOA measurement. The field indicates how many OTDOA measurements have been used in the UE to define the standard deviation of the measurements. Following 3 bit encoding is used:<br>'000' 0-4<br>'001' 5-9<br>'010' 10-14<br>'011' 15-24<br>'100' 25-34<br>'101' 35-44<br>'110' 45-54<br>'111' 55 or more |
| Std of OTDOA Measurements | MP | | Bit string(5) | Std of OTDOA Measurements field includes standard deviation of OTDOA measurements. Following linear 5 bit encoding is used:<br>'00000' 0 - (R*1-1) meters<br>'00001' R*1 – (R*2-1) meters<br>'00010' R*2 – (R*3-1) meters<br>…<br>'11111' R*31 meters or more<br>where R is the resolution defined by Std Resolution field. E.g. R=20 m corresponds to 0-19 m, 20-39 m,…,620+ m. |

### 10.3.7.108 UE positioning OTDOA reference cell info

This IE defines the cell used for time references in all OTDOA measurements.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| SFN | OP | | Integer (0..4095) | Time stamp (SFN of Reference Cell) of the SFN-SFN relative time differences and SFN-SFN drift rates. Included if any SFN-SFN drift value is included in IE UE positioning OTDOA neighbour cell info. |
| CHOICE *mode* | MP | | | |
| >FDD | | | | |
| >>Primary CPICH info | MP | | Primary CPICH info 10.3.6.60 | |
| >TDD | | | | |
| >>cell and channel ID | MP | | Cell and Channel Identity info 10.3.6.8a | Identifies the channel to be measured on. |
| Frequency info | MD | | Frequency info 10.3.6.36 | Default value is the existing value of frequency information.This IE shall always be set to default value |
| CHOICE *PositioningMode* | MP | | | |
| >UE based | | | | |
| ~~>>CHOICE *Cell Position*~~ | ~~OP~~ | | | ~~The position of the antenna that defines the cell. Used for the UE based method.~~ |
| ~~>>>Ellipsoid~~ | | | | |
| ~~>>>>Ellipsoid point~~ | ~~MP~~ | | ~~Ellipsoid point 10.3.8.4a~~ | |
| ~~>>>Ellipsoid with altitude~~ | | | | |
| ~~>>>>Ellipsoid point with altitude~~ | ~~MP~~ | | ~~Ellipsoid point with altitude 10.3.8.4b~~ | |
| ~~>>Round Trip Time~~ | ~~OP~~ | | ~~Real(876.00 .. 2923.875) in steps of 0.0625~~ | ~~In chips.~~ |
| >UE assisted | | | | (no data) |
| IPDL parameters | OP | | UE positioning IPDL parameters 10.3.7.98 | If this element is not included there are no idle periods present |

## 10.3.7.108a UE positioning OTDOA reference cell info for UE-based

This IE defines the cell used for time references in all OTDOA measurements for UE-based methods.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| UE positioning OTDOA reference cell info | MP | | UE positioning OTDOA reference cell info 10.3.7.108 | |
| CHOICE *Cell Position* | OP | | | The position of the antenna that defines the cell. Used for the UE based method. |
| >Ellipsoid | | | | |
| >>Ellipsoid point | MP | | Ellipsoid point 10.3.8.4a | |
| >Ellipsoid with altitude | | | | |
| >>Ellipsoid point with altitude | MP | | Ellipsoid point with altitude 10.3.8.4b | |
| Round Trip Time | OP | | Real(876.00 .. 2923.875) in steps of 0.0625 | In chips. |

## 10.3.7.109 UE positioning position estimate info

The purpose of this IE is to provide the position estimate from the UE to the network, if the UE is capable of determining its own position.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| CHOICE *Reference Time* | MP | | | |
| >UTRAN GPS reference time | | | | |
| >>UE GPS timing of cell frames | MP | | Integer(0..3715891199 9999) | GPS Time of Week in units of 1/16th UMTS chips according to [19]. |
| >>CHOICE *mode* | MP~~OP~~ | | | |
| >>>FDD | | | | |
| >>>>Primary CPICH Info | MP | | Primary CPICH Info 10.3.6.60 | Identifies the reference cell for the GPS TOW-SFN relationship |
| >>>TDD | | | | |
| >>cell parameters id | MP | | Cell parameters id 10.3.6.9 | Identifies the reference cell for the GPS TOW-SFN relationship |
| >>Reference SFN | MP~~OP~~ | | Integer(0..4095) | The SFN for which the location is valid and which the UTRAN GPS timing of cell frames time stamps |
| >GPS reference time only | | | | |
| >>GPS TOW msec | MP~~OP~~ | | Integer(0..6.048*10^8-1) | GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit). ~~This time-stamps the beginning of the frame defined in Reference SFN~~ ~~GPS Time of Week in units of 1/16th UMTS chip microseconds = 1000(3840 * 16 * GPS TOW msec) + (GPS TOW rem) usec~~ |
| >Cell timing | | | | |
| >>SFN | MP | | Integer(0..4095) | SFN during which the ~~last measurement~~position was ~~performed~~calculated. |
| >>CHOICE *mode* | MP | | | |
| >>>FDD | | | | |
| >>>>Primary CPICH Info | MP | | Primary CPICH Info 10.3.6.60 | Identifies the reference cell for SFN |
| >>>TDD | | | | |
| >>cell parameters id | MP | | Cell parameters id 10.3.6.9 | Identifies reference cell for SFN |
| ~~GPS TOW rem usec~~ | ~~OP~~ | | ~~Integer(0..61439999)~~ | ~~GPS Time of Week in units of 1/16th UMTS chip MOD 61440 (where 61440 = 3840 * 16) microseconds MOD 1000.~~ |
| CHOICE *Position estimate* | MP | | | |
| >Ellipsoid Point | | | Ellipsoid Point; 10.3.8.4a | |
| >Ellipsoid point with uncertainty circle | | | Ellipsoid point with uncertainty circle 10.3.8.4d | |
| >Ellipsoid point with uncertainty ellipse | | | Ellipsoid point with uncertainty ellipse 10.3.8.4e | |
| >Ellipsoid point with altitude | | | Ellipsoid point with altitude 10.3.8.4b | |

| | | | | |
|---|---|---|---|---|
| >Ellipsoid point with altitude and uncertainty ellipsoid | | | Ellipsoid point with altitude and uncertainty ellipsoid 10.3.8.4c | |

## 10.3.7.109a UE positioning Relative Time Difference quality

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| Relative Time Difference Std Resolution | MP | | Bit string(2) | Std Resolution field includes the resolution used in Std of Relative Time Difference field. Encoding on two bits as follows:<br>'00' 10 meters<br>'01' 20 meters<br>'10' 30 meters<br>'11' Reserved |
| Std of Relative Time Difference | MP | | Bit string(5) | Std of Relative Time difference field includes standard deviation of (SFN-SFN relative time difference + Fine SFN-SFN). Following linear 5 bit encoding is used:<br>'00000' 0 - (R*1-1) meters<br>'00001' R*1 – (R*2-1) meters<br>'00010' R*2 – (R*3-1) meters<br>...<br>'11111' R*31 meters or more<br>where R is the resolution defined by Std Resolution field. E.g. R=20 m corresponds to 0-19 m, 20-39 m,…,620+ m. |

## 10.3.7.110 UE positioning reporting criteria

The triggering of the event-triggered reporting for an UE positioning measurement.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| Parameters required for each event | OP | 1 to <maxMeasEvent> | | |
| >Amount of reporting | MP | | Integer(1, 2, 4, 8, 16, 32, 64,infinite) | |
| >Report first fix | MP | | Boolean | If true the UE reports the position once the measurement control is received, and then each time an event is triggered. |
| >Measurement interval | MP | | Integer(5,15,60,300,900,1800,3600,7200) | Indicates how often the UE should make the measurement In seconds |
| >CHOICE *Event ID* | MP | | | |
| >>7a | | | | |
| >>>Threshold Position Change | MP | | Integer(10,20,30,40,50,100,200,300,500,1000,2000,5000,10000,20000,50000,100000) | Indicated how much the position should change compared to last reported position fix in order to trigger the event. |
| >>7b | | | | |
| >>>Threshold SFN-SFN change | MP | | Real(0.25,0.5,1,2,3,4,5,10,20,50,100,200,500,1000,2000,5000) | Chips. Indicates how much the SFN-SFN measurement of ANY measured cell is allowed to change before the event is triggered. |
| >>7c | | | | |
| >>>Threshold SFN-GPS TOW | MP | | Integer(1,2,3,5,10,20,50,100) | Time in ms. When the GPS TOW and SFN timer has drifted apart more than the specified value the event is triggered) |

## 10.3.7.111 UE positioning reporting quantity

The purpose of the element is to express the allowed/required location method(s), and to provide information ~~requir~~ desired QoS.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| Method Type | MP | | Enumerated( UE assisted, UE based, UE based is preferred but UE assisted is allowed, UE assisted is preferred but UE based is allowed) | |
| Positioning Methods | MP | | Enumerated( OTDOA, GPS, OTDOA or GPS, Cell ID) | |
| Response Time | MP | | Integer(1,2,4, 8, 16, 32, 64, 128) | ~~in seconds~~This IE shall be ignored |
| Horizontal Accuracy | CV-*MethodType* | | Bit string(7) | The uncertainty is derived from the "uncertainty code" k by $r = 10*(1.1^{k}-1)$ |
| Vertical Accuracy | CV-*MethodType* | | Bit string(7) | The uncertainty is derived from the "uncertainty code" k by $r = 45\sout{10}*(1.025\sout{1}^{k}-1)$ |
| GPS timing of Cell wanted | MP | | Boolean | If true the SRNC wants the UE to report the SFN-GPS timing of the reference cell. This is however optional in the UE. |
| Multiple Sets | MP | | Boolean | ~~TRUE indicates that the UE is requested to send multiple *OTDOA/GPS Measurement Information Sets*. UE is expected to include the current measurement set.~~ This IE shall be ignored. |
| Additional Assistance Data Request | MP | | Boolean | TRUE indicates that the UE is requested to send the IE "Additional assistance Data Request" when the IE "UE positioning Error" is present in the UE positioning measured results. |
| Environment Characterisation | OP | | Enumerated( possibly heavy multipath and NLOS conditions, no or light multipath and usually LOS conditions, not defined or mixed environment) | |

| Condition | Explanation |
|---|---|
| *Method Type* | The IE is optional if the IE "Method Type" is "UE assisted"; otherwise it is mandatory present. |

### 10.3.8.21 SIB type

The SIB type identifies a specific system information block.

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| SIB type | MP | | Enumerated, see below | |

The list of values to encode is:

Master information block,

System Information Type 1,

System Information Type 2,

System Information Type 3,

System Information Type 4,

System Information Type 5,

System Information Type 6,

System Information Type 7,

System Information Type 8,

System Information Type 9,

System Information Type 10,

System Information Type 11,

System Information Type 12,

System Information Type 13,

System Information Type 13.1,

System Information Type 13.2,

System Information Type 13.3,

System Information Type 13.4,

System Information Type 14,

System Information Type 15,

System Information Type 15.1,

System Information Type 15.2,

System Information Type 15.3,

System Information Type 15.4,

System Information Type 15.5,

System Information Type 16,

System Information Type 17,

System Information Type 18,

Scheduling Block 1,

Scheduling Block 2.

In addition, at least one spare value, criticality: ignore, is needed.

### 10.3.8.22 SIB type SIBs only

The SIB type identifies a specific system information block.

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| SIB type SIBs only | MP | | Enumerated, see below | |

The list of values to encode is:

System Information Type 1,

System Information Type 2,

System Information Type 3,

System Information Type 4,

System Information Type 5,

System Information Type 6,

System Information Type 7,

System Information Type 8,

System Information Type 9,

System Information Type 10,

System Information Type 11,

System Information Type 12,

System Information Type 13,

System Information Type 13.1,

System Information Type 13.2,

System Information Type 13.3,

System Information Type 13.4,

System Information Type 14,

System Information Type 15,

System Information Type 15.1,

System Information Type 15.2,

System Information Type 15.3,

System Information Type 15.4,

System Information Type 15.5,

System Information Type 16,

System Information Type 17,

System Information Type 18.

In addition, at least one spare value, criticality: ignore, is needed.

## 11.2 PDU definitions

```
...
-- **************************************************
--
-- Assistance Data Delivery
--
-- **************************************************

AssistanceDataDelivery ::= CHOICE {
    r3                              SEQUENCE {
        assistanceDataDelivery-r3       AssistanceDataDelivery-r3-IEs,
        nonCriticalExtensions           SEQUENCE {} OPTIONAL
    },
    later-than-r3                   SEQUENCE {
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        criticalExtensions              SEQUENCE {}
    }
}

AssistanceDataDelivery-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    -- Measurement Information Elements
    ue-positioning-GPS-AssistanceData           UE-Positioning-GPS-AssistanceData
    OPTIONAL,
ue-positioning-OTDOA-AssistanceData -UEB    UE-Positioning-OTDOA-AssistanceData -UEB        OPTIONAL
}

...

-- **************************************************
--
-- MEASUREMENT CONTROL
--
-- **************************************************

MeasurementControl ::= CHOICE {
    r3                              SEQUENCE {
        measurementControl-r3           MeasurementControl-r3-IEs,
        v390nonCriticalExtensions           SEQUENCE {
            measurementControl-v390ext      MeasurementControl-v390ext,
            nonCriticalExtensions           SEQUENCE{}                      OPTIONAL
        }   OPTIONAL
    },
    later-than-r3                   SEQUENCE {
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        criticalExtensions              SEQUENCE {}
    }
}

MeasurementControl-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    -- Measurement IEs
        measurementIdentity     MeasurementIdentity,
        measurementCommand              MeasurementCommand,
        -- TABULAR: The measurement type is included in MeasurementCommand.
        measurementReportingMode        MeasurementReportingMode            OPTIONAL,
        additionalMeasurementList       AdditionalMeasurementID-List        OPTIONAL,
    -- Physical channel IEs
        dpch-CompressedModeStatusInfo   DPCH-CompressedModeStatusInfo       OPTIONAL
}

MeasurementControl-v390ext ::= SEQUENCE {
        ue-Positioning-Measurement-v390ext      UE-Positioning-Measurement-v390ext  OPTIONAL
}
```

```
...

-- **************************************************
--
-- MEASUREMENT REPORT
--
-- **************************************************

MeasurementReport ::= SEQUENCE {
    -- Measurement IEs
        measurementIdentity     MeasurementIdentity,
        measuredResults                 MeasuredResults                     OPTIONAL,
        measuredResultsOnRACH           MeasuredResultsOnRACH               OPTIONAL,
        additionalMeasuredResults       MeasuredResultsList                 OPTIONAL,
        eventResults                    EventResults                        OPTIONAL,
    -- Extension mechanism for non- release99 information
        v390nonCriticalExtensions           SEQUENCE {
            measurementReport-v390ext       MeasurementReport-v390ext,
            nonCriticalExtensions           SEQUENCE {}                         OPTIONAL
        }       OPTIONAL
}

MeasurementReport-v390ext ::= SEQUENCE{
        measuredResults-v390ext         MeasuredResults-v390ext             OPTIONAL,
}
```

## 11.3 Information element definitions

```
-- **************************************************
--
--     USER EQUIPMENT INFORMATION ELEMENTS (10.3.3)
--
-- **************************************************

UE-Positioning-Capability ::=                   SEQUENCE {
    standaloneLocMethodsSupported       BOOLEAN,
    ue-BasedOTDOA-Supported             BOOLEAN,
    networkAssistedGPS-Supported        NetworkAssistedGPS-Supported,
    gps-ReferenceTimeCapablesSupportForUE-GPS-TimingOfCellFrames            BOOLEAN,
    supportForIPDL                      BOOLEAN
}
...

-- **************************************************
--
--     MEASUREMENT INFORMATION ELEMENTS (10.3.7)
--
-- **************************************************

EventResults ::=                    CHOICE {
    intraFreqEventResults               IntraFreqEventResults,
    interFreqEventResults               InterFreqEventResults,
    interRATEventResults                InterRATEventResults,
    trafficVolumeEventResults           TrafficVolumeEventResults,
    qualityEventResults                 QualityEventResults,
    ue-InternalEventResults             UE-InternalEventResults,
    ue-positioning-MeasurementEventResults          UE-Positioning-MeasurementEventResults
}



...

GPS-TOW-1msec ::=                   INTEGER (0..604799999)

GPS-TOW-Assist ::=                  SEQUENCE {
    satID                               SatID,
    tlm-Message                         BIT STRING (SIZE (14)),
    tlm-Reserved                        BIT STRING (SIZE (2)),
    alert                               BOOLEAN,
    antiSpoof                           BOOLEAN
}
```

```
GPS-TOW-AssistList ::=              SEQUENCE (SIZE (1..maxSat)) OF
                                        GPS-TOW-Assist

GPS-TOW-rem-usec ::=                INTEGER (0..999)


MeasuredResults ::=                 CHOICE {
    intraFreqMeasuredResultsList        IntraFreqMeasuredResultsList,
    interFreqMeasuredResultsList        InterFreqMeasuredResultsList,
    interRATMeasuredResultsList     InterRATMeasuredResultsList,
    trafficVolumeMeasuredResultsList    TrafficVolumeMeasuredResultsList,
    qualityMeasuredResults              QualityMeasuredResults,
    ue-InternalMeasuredResults          UE-InternalMeasuredResults,
    ue-positioning-MeasuredResults                  UE-Positioning-MeasuredResults
}

MeasuredResults-v390ext ::=                 SEQUENCE {
    ue-positioning-MeasuredResults-v390ext                  UE-Positioning-MeasuredResults-v390ext
}


Neighbour ::=                       SEQUENCE {
    modeSpecificInfo                CHOICE {
        fdd                             SEQUENCE {
            neighbourIdentity                   PrimaryCPICH-Info                   OPTIONAL,
            uE-RX-TX-TimeDifferenceType2Info    UE-RX-TX-TimeDifferenceType2Info    OPTIONAL
        },
        tdd                             SEQUENCE {
            neighbourAndChannelIdentity     CellAndChannelIdentity              OPTIONAL
        }
    },
    neighbourQuality                    NeighbourQuality,
    sfn-SFN-ObsTimeDifference2          SFN-SFN-ObsTimeDifference2
}

NeighbourList ::=                   SEQUENCE (SIZE (1..maxCellMeas)) OF
                                        Neighbour

Neighbour-v390ext ::=                       SEQUENCE {
    modeSpecificInfo                CHOICE {
        fdd                             SEQUENCE {
            frequencyInfo                       FrequencyInfo
        },
        tdd                             NULL
    }
            neighbourIdentity                   PrimaryCPICH-Info                   OPTIONAL,
            frequencyInfo                       FrequencyInfo                       OPTIONAL,
            uE-RX-TX-TimeDifferenceType2Info    UE-RX-TX-TimeDifferenceType2Info    OPTIONAL
        },
        tdd                             SEQUENCE {
            neighbourAndChannelIdentity     CellAndChannelIdentity              OPTIONAL
        }
    },
    neighbourQuality                    NeighbourQuality,
    sfn-SFN-ObsTimeDifference2          SFN-SFN-ObsTimeDifference2
}

NeighbourList-v390ext ::=                   SEQUENCE (SIZE (1..maxCellMeas)) OF
                                        Neighbour-v390ext
-- The order of the cells in IE NeighbourList-v390ext shall be the
-- same as the order in IE NeighbourList


-- Actual value = IE value * 0.0125 - 0.09375
NodeB-ClockDrift ::=                INTEGER (0..15)

SFN-SFN-Drift ::=                   ENUMERATED {
                                    sfnsfndrift0, sfnsfndrift1, sfnsfndrift2, sfnsfndrift3,
                                    sfnsfndrift4, sfnsfndrift5, sfnsfndrift8, sfnsfndrift10,
                                    sfnsfndrift15, sfnsfndrift25, sfnsfndrift35, sfnsfndrift50,
                                    sfnsfndrift65, sfnsfndrift80, sfnsfndrift100, sfnsfndrift-1,
                                    sfnsfndrift-2, sfnsfndrift-3, sfnsfndrift-4, sfnsfndrift-5,
                                    sfnsfndrift-8, sfnsfndrift-10, sfnsfndrift-15, sfnsfndrift-25,
                                    sfnsfndrift-35, sfnsfndrift-50, sfnsfndrift-65, sfnsfndrift-80,
                                    sfnsfndrift-100no-drift, sfnsfndrift0-33, sfnsfndrift0-66,
                                        sfnsfndrift1, sfnsfndrift1-33, sfnsfndrift1-66,
                                        sfnsfndrift2, sfnsfndrift2-5, sfnsfndrift3,
                                        sfnsfndrift4, sfnsfndrift5, sfnsfndrift7,
                                        sfnsfndrift9, sfnsfndrift11, sfnsfndrift13,
```

```
                                        sfnsfndrift15, sfnsfndrift-0-33, sfnsfndrift-0-66,
                                        sfnsfndrift-1, sfnsfndrift-1-33, sfnsfndrift-1-66,
                                        sfnsfndrift-2, sfnsfndrift-2-5, sfnsfndrift-3,
                                        sfnsfndrift-4, sfnsfndrift-5, sfnsfndrift-7,
                                        sfnsfndrift-9, sfnsfndrift-11, sfnsfndrift-13,
                                        sfnsfndrift-15 }


UE-Positioning-Accuracy ::=                 BIT STRING (SIZE (7))


UE-Positioning-CipherParameters ::=         SEQUENCE {
    cipheringKeyFlag                    BIT STRING (SIZE (1)),
    cipheringSerialNumber               INTEGER (0..65535)
}

UE-Positioning-Error ::=                        SEQUENCE {
    errorReason                         UE-Positioning-ErrorCause,
    ue-positioning-GPS-additionalAssistanceDataRequest          UE-Positioning-GPS-
AdditionalAssistanceDataRequest OPTIONAL
}

UE-Positioning-ErrorCause ::=                   ENUMERATED {
                                        notEnoughOTDOA-Cells,
                                        notEnoughGPS-Satellites,
                                        assistanceDataMissing,
                                        methodNotSupported,
                                        undefinedError,
                                        requestDeniedByUser,
                                        notProcessedAndTimeout,
                                        referenceCellNotServingCell }

UE-Positioning-EventParam ::=               SEQUENCE {
    reportingAmount                     ReportingAmount,
    reportFirstFix                      BOOLEAN,
    measurementInterval                 UE-Positioning-MeasurementInterval,
    eventSpecificInfo                   UE-Positioning-EventSpecificInfo
}

UE-Positioning-EventParamList ::=               SEQUENCE (SIZE (1..maxMeasEvent)) OF
                                        UE-Positioning-EventParam

UE-Positioning-EventSpecificInfo ::=            CHOICE {
    e7a                                 ThresholdPositionChange,
    e7b                                 ThresholdSFN-SFN-Change,
    e7c                                 ThresholdSFN-GPS-TOW
}

UE-Positioning-GPS-AcquisitionAssistance ::=    SEQUENCE {
    gps-ReferenceTime               INTEGER (0..604799999),
    utran-GPSReferenceTime              UTRAN-GPSReferenceTime          OPTIONAL,
    referenceTime                       CHOICE {
        utran-ReferenceTime                 UTRAN-ReferenceTime,
        gps-ReferenceTimeOnly               INTEGER (0..604799999)
    },
    satelliteInformationList            AcquisitionSatInfoList
}

UE-Positioning-GPS-AdditionalAssistanceDataRequest ::=      SEQUENCE {
    almanacRequest                      BOOLEAN,
    utcModelRequest                     BOOLEAN,
    ionosphericModelRequest             BOOLEAN,
    navigationModelRequest              BOOLEAN,
    dgpsCorrectionsRequest              BOOLEAN,
    referenceLocationRequest            BOOLEAN,
    referenceTimeRequest                BOOLEAN,
    aquisitionAssistanceRequest         BOOLEAN,
    realTimeIntegrityRequest            BOOLEAN,
    navModelAddDataRequest              UE-Positioning-GPS-NavModelAddDataReq       OPTIONAL
}

UE-Positioning-GPS-Almanac ::=                  SEQUENCE {
    wn-a                                BIT STRING (SIZE (8)),
    almanacSatInfoList                  AlmanacSatInfoList,
    sv-GlobalHealth                     BIT STRING (SIZE (364))             OPTIONAL
}
```

```
UE-Positioning-GPS-AssistanceData ::=           SEQUENCE {
    ue-positioning-GPS-ReferenceTime                UE-Positioning-GPS-ReferenceTime
    OPTIONAL,
    ue-positioning-GPS-ReferenceLocation            ReferenceLocation               OPTIONAL,
    ue-positioning-GPS-DGPS-Corrections             UE-Positioning-GPS-DGPS-Corrections
    OPTIONAL,
    ue-positioning-GPS-NavigationModel              UE-Positioning-GPS-NavigationModel
    OPTIONAL,
    ue-positioning-GPS-IonosphericModel             UE-Positioning-GPS-IonosphericModel
    OPTIONAL,
    ue-positioning-GPS-UTC-Model                    UE-Positioning-GPS-UTC-Model
    OPTIONAL,
    ue-positioning-GPS-Almanac                      UE-Positioning-GPS-Almanac
    OPTIONAL,
    ue-positioning-GPS-AcquisitionAssistance        UE-Positioning-GPS-AcquisitionAssistance
    OPTIONAL,
    ue-positioning-GPS-Real-timeIntegrity           BadSatList                              OPTIONAL
    ue-positioning-GPS-referenceCellInfo            UE-Positioning-GPS-rReferenceCellInfo
    OPTIONAL
}

UE-Positioning-GPS-DGPS-Corrections ::=     SEQUENCE {
    gps-TOW                             INTEGER (0..604799),
    statusHealth                        DiffCorrectionStatus,
    dgps-CorrectionSatInfoList          DGPS-CorrectionSatInfoList
}

UE-Positioning-GPS-IonosphericModel ::=     SEQUENCE {
    alfa0                               BIT STRING (SIZE (8)),
    alfa1                               BIT STRING (SIZE (8)),
    alfa2                               BIT STRING (SIZE (8)),
    alfa3                               BIT STRING (SIZE (8)),
    beta0                               BIT STRING (SIZE (8)),
    beta1                               BIT STRING (SIZE (8)),
    beta2                               BIT STRING (SIZE (8)),
    beta3                               BIT STRING (SIZE (8))
}

UE-Positioning-GPS-MeasurementResults ::=               SEQUENCE {
    referenceTime                       CHOICE {
        utran-GPSReferenceTimeResult            UTRAN-GPSReferenceTimeResult,
        gps-ReferenceTimeOnly                   INTEGER (0..604799999)
    },
    modeSpecificInfo                CHOICE {
        fdd                                 SEQUENCE {
            referenceIdentity                   PrimaryCPICH-Info
        },
        tdd                                 SEQUENCE {
            referenceIdentity                   CellParametersID
        }
    }                                                                           OPTIONAL,
    referenceSFN                        ReferenceSFN                            OPTIONAL,
    gps-TOW-1msec                       GPS-TOW-1msec,
    gps-TOW-rem-usec                    GPS-TOW-rem-usec                        OPTIONAL,
    gps-MeasurementParamList            GPS-MeasurementParamList
}

UE-Positioning-GPS-NavigationModel ::=          SEQUENCE {
    navigationModelSatInfoList          NavigationModelSatInfoList
}

UE-Positioning-GPS-NavModelAddDataReq ::=       SEQUENCE {
    gps-Week                            INTEGER (0..1023),
    gps-Toe                             INTEGER (0..167),
    tToeLimit                           INTEGER (0..10),
    satDataList                         SatDataList
}

UE-Positioning-GPS-RreferenceCellInfo ::=       SEQUENCE{
    modeSpecificInfo                CHOICE {
        fdd                                 SEQUENCE {
            referenceIdentity                   PrimaryCPICH-Info
        },
        tdd                                 SEQUENCE {
            referenceIdentity                   CellParametersID
        }
}
```

```
UE-Positioning-GPS-ReferenceTime ::=            SEQUENCE {
    gps-Week                            INTEGER (0..1023),
    gps-tow-1msec                       GPS-TOW-1msec,
    gps-tow-rem-usec                    GPS-TOW-rem-usec                    OPTIONAL,
    modeSpecificInfo                CHOICE {
        fdd                             SEQUENCE {
            referenceIdentity               PrimaryCPICH-Info
        },
        tdd                             SEQUENCE {
            referenceIdentity               CellParametersID
        }
    }                                                                       OPTIONAL,
    sfn                                 INTEGER (0..4095)                   OPTIONAL,
    utran-GPSReferenceTime              UTRAN-GPSReferenceTime              OPTIONAL,
    sfn-tow-Uncertainty                 SFN-TOW-Uncertainty                 OPTIONAL,
    utran-GPS-DriftRatenodeBClockDrift                      UTRAN-GPS-DriftRateNodeB-ClockDrift
            OPTIONAL,
    gps-TOW-AssistList                  GPS-TOW-AssistList                  OPTIONAL
}

UE-Positioning-GPS-UTC-Model ::=                SEQUENCE {
    a1                                  BIT STRING (SIZE (24)),
    a0                                  BIT STRING (SIZE (32)),
    t-ot                                BIT STRING (SIZE (8)),
    wn-t                                BIT STRING (SIZE (8)),
    delta-t-LS                          BIT STRING (SIZE (8)),
    wn-lsf                              BIT STRING (SIZE (8)),
    dn                                  BIT STRING (SIZE (8)),
    delta-t-LSF                         BIT STRING (SIZE (8))
}

UE-Positioning-IPDL-Parameters ::=              SEQUENCE {
    ip-Spacing                          IP-Spacing,
    ip-Length                           IP-Length,
    ip-Offset                           INTEGER (0..9),
    seed                                INTEGER (0..63),
    burstModeParameters                 BurstModeParameters     OPTIONAL
}

UE-Positioning-MeasuredResults ::=              SEQUENCE {
-- This IE is not used in this version of the specification and shall not be included.
-- IE "dummy" should be removed in later versions of the message including this IE
    ue-positioning-OTDOA-Measurement                UE-Positioning-OTDOA-Measurement
    OPTIONAL,
    ue-positioning-PositionEstimateInfo             UE-Positioning-PositionEstimateInfo
        OPTIONAL,
    ue-positioning-GPS-Measurement                  UE-Positioning-GPS-MeasurementResults
    OPTIONAL,
    ue-positioning-Error                            UE-Positioning-Error
    OPTIONAL
}

UE-Positioning-MeasuredResults-v390ext ::=              SEQUENCE {
    ue-Positioning-OTDOA-Measurement-v390ext                UE-Positioning-OTDOA-Measurement-v390ext
}


UE-Positioning-Measurement ::=                  SEQUENCE {
    ue-positioning-ReportingQuantity                UE-Positioning-ReportingQuantity,
    reportCriteria                      UE-Positioning-ReportCriteria,
    ue-positioning-OTDOA-AssistanceData         UE-Positioning-OTDOA-AssistanceData
    OPTIONAL,
    ue-positioning-GPS-AssistanceData               UE-Positioning-GPS-AssistanceData
    OPTIONAL
}


UE-Positioning-Measurement-v390ext ::=          SEQUENCE {
    ue-positioning-ReportingQuantity-v390ext        UE-Positioning-ReportingQuantity-v390ext
    OPTIONAL,
    measurementValidity                 MeasurementValidity                 OPTIONAL,
    ue-positioning-OTDOA-AssistanceData-UEB         UE-Positioning-OTDOA-AssistanceData-UEB
    OPTIONAL
}


UE-Positioning-MeasurementEventResults ::=      CHOICE {
    event7a                             UE-Positioning-PositionEstimateInfo,
```

```
    event7b                             UE-Positioning-OTDOA-Measurement-v390ext,
    event7c                             UE-Positioning-GPS-MeasurementResults
}

UE-Positioning-MeasurementInterval ::=          ENUMERATED {
                                        e5, e15, e60, e300,
                                        e900, e1800, e3600, e7200 }

UE-Positioning-MethodType ::=                   ENUMERATED {
                                        ue-Assisted,
                                        ue-Based,
                                        ue-BasedPreferred,
                                        ue-AssistedPreferred }

UE-Positioning-OTDOA-AssistanceData ::=     SEQUENCE {
    ue-positioning-OTDOA-ReferenceCellInfo          UE-Positioning-OTDOA-ReferenceCellInfo
    OPTIONAL,
    ue-positioning-OTDOA-NeighbourCellList              UE-Positioning-OTDOA-NeighbourCellList
        OPTIONAL
}


UE-Positioning-OTDOA-AssistanceData-UEB ::=     SEQUENCE {
    ue-positioning-OTDOA-ReferenceCellInfo-UEB          UE-Positioning-OTDOA-ReferenceCellInfo-UEB
            OPTIONAL,
    ue-positioning-OTDOA-NeighbourCellList-UEB              UE-Positioning-OTDOA-NeighbourCellList-
UEB             OPTIONAL
}

UE-Positioning-OTDOA-Measurement ::=            SEQUENCE {
    sfn                                 INTEGER (0..4095),
    modeSpecificInfo                CHOICE {
        fdd                             SEQUENCE {
            referenceCellIDentity               PrimaryCPICH-Info,
            ue-RX-TX-TimeDifferenceType2Info    UE-RX-TX-TimeDifferenceType2Info
        },
        tdd                             SEQUENCE {
            referenceCellIdentity           CellParametersID
        }   },
    neighbourList                       NeighbourList                       OPTIONAL
}


UE-Positioning-OTDOA-Measurement-v390ext ::=            SEQUENCE {
    sfn                                 INTEGER (0..4095),
    modeSpecificInfo                CHOICE {
        fdd                             SEQUENCE {
            referenceCellIDentity               PrimaryCPICH-Info,
            ue-RX-TX-TimeDifferenceType2Info    UE-RX-TX-TimeDifferenceType2Info    OPTIONAL
        },
        tdd                             SEQUENCE {
            referenceCellIdentity           CellParametersID
        }   },
    neighbourList-v390ext                       NeighbourList-v390ext                   OPTIONAL
}


UE-Positioning-OTDOA-NeighbourCellInfo  ::= SEQUENCE {
    modeSpecificInfo    CHOICE  {
        fdd                             SEQUENCE {
            primaryCPICH-Info                   PrimaryCPICH-Info
        },
        tdd                             SEQUENCE{
            cellAndChannelIdentity              CellAndChannelIdentity
        }
    },
    frequencyInfo                       FrequencyInfo                       OPTIONAL,
    ue-positioning-IPDL-Paremeters              UE-Positioning-IPDL-Parameters
    OPTIONAL,
    sfn-SFN-RelTimeDifference           SFN-SFN-RelTimeDifference1,
    sfn-SFN-Drift                       SFN-SFN-Drift       OPTIONAL,
    searchWindowSize                    OTDOA-SearchWindowSize,
    positioningMode     CHOICE{
        ueBased                             SEQUENCE {
            relativeNorth                       INTEGER (-20000..20000)             OPTIONAL,
            relativeEast                        INTEGER (-20000..20000)             OPTIONAL,
            relativeAltitude                    INTEGER (-4000..4000)               OPTIONAL,
            fineSFN-SFN                         FineSFN-SFN,
```

```
            -- actual value = (IE value * 0.0625) + 876
            roundTripTime                   INTEGER (0.. 32766)                 OPTIONAL
        },
        ueAssisted                          SEQUENCE {}
    }
}


UE-Positioning-OTDOA-NeighbourCellInfo-UEB  ::= SEQUENCE {
    modeSpecificInfo    CHOICE  {
        fdd                             SEQUENCE {
            primaryCPICH-Info                   PrimaryCPICH-Info
        },
        tdd                             SEQUENCE{
            cellAndChannelIdentity              CellAndChannelIdentity
        }
    },
    frequencyInfo                       FrequencyInfo                       OPTIONAL,
    ue-positioning-IPDL-Paremeters                  UE-Positioning-IPDL-Parameters
    OPTIONAL,
    sfn-SFN-RelTimeDifference           SFN-SFN-RelTimeDifference1,
    sfn-SFN-Drift                       SFN-SFN-Drift       OPTIONAL,
    searchWindowSize                    OTDOA-SearchWindowSize,
    relativeNorth                       INTEGER (-20000..20000)             OPTIONAL,
    relativeEast                        INTEGER (-20000..20000)             OPTIONAL,
    relativeAltitude                    INTEGER (-4000..4000)               OPTIONAL,
    fineSFN-SFN                         FineSFN-SFN,
    -- actual value = (IE value * 0.0625) + 876
    roundTripTime                       INTEGER (0.. 32766)                 OPTIONAL
}


UE-Positioning-OTDOA-NeighbourCellList ::= SEQUENCE (SIZE (1..maxCellMeas)) OF
                                        UE-Positioning-OTDOA-NeighbourCellInfo


UE-Positioning-OTDOA-NeighbourCellList-UEB ::= SEQUENCE (SIZE (1..maxCellMeas)) OF
                                        UE-Positioning-OTDOA-NeighbourCellInfo-UEB


UE-Positioning-OTDOA-Quality ::=            SEQUENCE {
    stdResolution                       BIT STRING (SIZE (2)),
    numberOfOTDOA-Measurements          BIT STRING (SIZE (3)),
    stdOfOTDOA-Measurements             BIT STRING (SIZE (5))
}

UE-Positioning-OTDOA-ReferenceCellInfo ::=          SEQUENCE {
    sfn                                 INTEGER (0..4095)
    OPTIONAL,
    modeSpecificInfo CHOICE {
        fdd                                     SEQUENCE {
            primaryCPICH-Info                   PrimaryCPICH-Info
        },
        tdd                                     SEQUENCE{
            cellAndChannelIdentity              CellAndChannelIdentity
        }
    },
    frequencyInfo                       FrequencyInfo                       OPTIONAL,
    positioningMode CHOICE {
        ueBased                                 SEQUENCE {
            cellPosition                                ReferenceCellPosition   OPTIONAL,
            -- actual value = (IE value * 0.0625) + 876
            roundTripTime                       INTEGER (0..32766)              OPTIONAL
        },
        ueAssisted                              SEQUENCE {}
    },
    ue-positioning-IPDL-Paremeters              UE-Positioning-IPDL-Parameters  OPTIONAL
}


UE-Positioning-OTDOA-ReferenceCellInfo-UEB ::=          SEQUENCE {
    sfn                                 INTEGER (0..4095)
    OPTIONAL,
    modeSpecificInfo CHOICE {
        fdd                                     SEQUENCE {
            primaryCPICH-Info                   PrimaryCPICH-Info
        },
```

```
        tdd                                     SEQUENCE{
            cellAndChannelIdentity              CellAndChannelIdentity
        }
    },
    frequencyInfo                       FrequencyInfo                       OPTIONAL,
    cellPosition                                ReferenceCellPosition   OPTIONAL,
    -- actual value = (IE value * 0.0625) + 876
    roundTripTime                       INTEGER (0..32766)              OPTIONAL
    ue-positioning-IPDL-Paremeters              UE-Positioning-IPDL-Parameters  OPTIONAL
}

UE-Positioning-PositionEstimateInfo ::=                 SEQUENCE {
    referenceTime                       CHOICE {
        utran-GPSReferenceTimeResult            UTRAN-GPSReferenceTimeResult,
        gps-ReferenceTimeOnly               INTEGER (0..604799999),
        cell-Timing                         SEQUENCE {
            sfn                                             INTEGER (0..4095),
            modeSpecificInfo CHOICE {
                fdd                                         SEQUENCE {
                    primaryCPICH-Info                       PrimaryCPICH-Info
                },
                tdd                                         SEQUENCE{
                    cellAndChannelIdentity                  CellAndChannelIdentity
                }
        }
    },
    modeSpecificInfo                CHOICE {
        fdd                                 SEQUENCE {
            referenceIdentity                   PrimaryCPICH-Info
        },
        tdd                                 SEQUENCE {
            referenceIdentity                   CellParametersID
        }
    }                                                           OPTIONAL,
    referenceSFN                        ReferenceSFN        OPTIONAL,
    gps-tow-1msec                       GPS-TOW-1msec       OPTIONAL,
    gps-tow-rem-usec                    GPS-TOW-rem-usec    OPTIONAL,
    positionEstimate                    PositionEstimate
}

UE-Positioning-ReportCriteria ::=               CHOICE {
    ue-positioning-ReportingCriteria                UE-Positioning-EventParamList,
    periodicalReportingCriteria         PeriodicalReportingCriteria,
    noReporting                         NULL
}


UE-Positioning-ReportingQuantity ::=            SEQUENCE {
    methodType                          UE-Positioning-MethodType,
    positioningMethod                   PositioningMethod,
-- This IE is not used in this version of the specification and should be ignored.
-- IE "dummy" should be removed in later versions of the message including this IE
    dummy responseTime                          UE-Positioning-ResponseTime,
    horizontal-Aaccuracy                            UE-Positioning-Accuracy
    OPTIONAL,
    gps-TimingOfCellWanted              BOOLEAN,
    -- This IE is not used in this version of the specification and should be ignored.
-- IE "dummy" should be removed in later versions of the message including this IE
    dummymultipleSets                           BOOLEAN,
    additionalAssistanceDataRequest     BOOLEAN,
    environmentCharacterisation         EnvironmentCharacterisation         OPTIONAL
}


UE-Positioning-ReportingQuantity-v390ext ::=        SEQUENCE {
    vertical-Accuracy                           UE-Positioning-Accuracy
    OPTIONAL,
}


UE-Positioning-ResponseTime ::=             ENUMERATED {
                                        s1, s2, s4, s8, s16,
                                        s32, s64, s128 }

UTRA-CarrierRSSI ::=                INTEGER (0..76)

UTRAN-GPS-DriftRate ::=             ENUMERATED {
```

```
                                    UTRAN-GPSDrift0, UTRAN-GPSDrift1, UTRAN-GPSDrift2, UTRAN-
                                    GPSDrift5, UTRAN-GPSDrift10, UTRAN-GPSDrift15, UTRAN-GPSDrift25,
                                    UTRAN-GPSDrift50, UTRAN-GPSDrift-1, UTRAN-GPSDrift-2, UTRAN-
                                    GPSDrift-5, UTRAN-GPSDrift-10, UTRAN-GPSDrift-15, UTRAN-
                                    GPSDrift-25, UTRAN-GPSDrift-50}

UTRAN-GPSReferenceTime ::=          SEQUENCE {
    gps-tow-1msec                   GPS-TOW-1msec,
    gps-tow-rem-usec                GPS-TOW-rem-usec,
    utran-GPSTimingOfCell           INTEGER(0..2322431999999),
    modeSpecificInfo                CHOICE {
        fdd                             SEQUENCE {
            referenceIdentity               PrimaryCPICH-Info       OPTIONAL
        },
        tdd                             SEQUENCE {
            referenceIdentity       CellParametersID            OPTIONAL
        }       OPTIONAL
    },
    sfn                                 INTEGER (0..4095)
}

UTRAN-GPSReferenceTimeResult ::=            SEQUENCE {
    ue-GPSTimingOfCell          INTEGER(0..37158911999999),
    modeSpecificInfo                CHOICE {
        fdd                             SEQUENCE {
            referenceIdentity               PrimaryCPICH-Info
        },
        tdd                             SEQUENCE {
            referenceIdentity       CellParametersID
        }
    },
    sfn                                 INTEGER (0..4095)
}

VarianceOfRLC-BufferPayload ::=     ENUMERATED {
                                        plv0, plv4, plv8, plv16, plv32, plv64,
                                        plv128, plv256, plv512, plv1024,
                                        plv2k, plv4k, plv8k, plv16k }

-- Actual value = IE value * 0.1
W ::=                               INTEGER (0..20)

...

-- ************************************************
--
--     OTHER INFORMATION ELEMENTS (10.3.8)
--
-- ************************************************

...

SIB-Type ::=                        ENUMERATED {
                                        masterInformationBlock,
                                        systemInformationBlockType1,
                                        systemInformationBlockType2,
                                        systemInformationBlockType3,
                                        systemInformationBlockType4,
                                        systemInformationBlockType5,
                                        systemInformationBlockType6,
                                        systemInformationBlockType7,
                                        systemInformationBlockType8,
                                        systemInformationBlockType9,
                                        systemInformationBlockType10,
                                        systemInformationBlockType11,
                                        systemInformationBlockType12,
                                        systemInformationBlockType13,
                                        systemInformationBlockType13-1,
                                        systemInformationBlockType13-2,
                                        systemInformationBlockType13-3,
                                        systemInformationBlockType13-4,
                                        systemInformationBlockType14,
                                        systemInformationBlockType15,
                                        systemInformationBlockType15-1,
                                        systemInformationBlockType15-2,
                                        systemInformationBlockType15-3,
                                        systemInformationBlockType16,
                                        systemInformationBlockType17,
```

```
                                    systemInformationBlockType15-4,
                                    systemInformationBlockType18,
                                    schedulingBlock1,
                                    schedulingBlock2,
                                    systemInformationBlockType15-5,
                                    spare1, spare2, spare3 }


SIB-TypeAndTag ::=                  CHOICE {
    sysInfoType1                        PLMN-ValueTag,
    sysInfoType2                        CellValueTag,
    sysInfoType3                        CellValueTag,
    sysInfoType4                        CellValueTag,
    sysInfoType5                        CellValueTag,
    sysInfoType6                        CellValueTag,
    sysInfoType7                        NULL,
    sysInfoType8                        CellValueTag,
    sysInfoType9                        NULL,
    sysInfoType10                       NULL,
    sysInfoType11                       CellValueTag,
    sysInfoType12                       CellValueTag,
    sysInfoType13                       CellValueTag,
    sysInfoType13-1                     CellValueTag,
    sysInfoType13-2                     CellValueTag,
    sysInfoType13-3                     CellValueTag,
    sysInfoType13-4                     CellValueTag,
    sysInfoType14                       NULL,
    sysInfoType15                       CellValueTag,
    sysInfoType16                       PredefinedConfigIdentityAndValueTag,
    sysInfoType17                       NULL,
    sysInfoType15-1                     CellValueTag,
    sysInfoType15-2                     SIBOccurrenceIdentityAndValueTag,
    sysInfoType15-3                     SIBOccurrenceIdentityAndValueTag,
    sysInfoType15-4                     CellValueTag,
    sysInfoType18                       CellValueTag,
    sysInfoType15-5                     CellValueTag
}

SIBSb-TypeAndTag ::=                    CHOICE {
    sysInfoType1                        PLMN-ValueTag,
    sysInfoType2                        CellValueTag,
    sysInfoType3                        CellValueTag,
    sysInfoType4                        CellValueTag,
    sysInfoType5                        CellValueTag,
    sysInfoType6                        CellValueTag,
    sysInfoType7                        NULL,
    sysInfoType8                        CellValueTag,
    sysInfoType9                        NULL,
    sysInfoType10                       NULL,
    sysInfoType11                       CellValueTag,
    sysInfoType12                       CellValueTag,
    sysInfoType13                       CellValueTag,
    sysInfoType13-1                     CellValueTag,
    sysInfoType13-2                     CellValueTag,
    sysInfoType13-3                     CellValueTag,
    sysInfoType13-4                     CellValueTag,
    sysInfoType14                       NULL,
    sysInfoType15                       CellValueTag,
    sysInfoType16                       PredefinedConfigIdentityAndValueTag,
    sysInfoType17                       NULL,
    sysInfoTypeSB1                      CellValueTag,
    sysInfoTypeSB2                      CellValueTag,
    sysInfoType15-1                     CellValueTag,
    sysInfoType15-2                     SIBOccurrenceIdentityAndValueTag,
    sysInfoType15-3                     SIBOccurrenceIdentityAndValueTag,
    sysInfoType15-4                     CellValueTag,
    sysInfoType18                       CellValueTag,
    sysInfoType15-5                     CellValueTag
}

...

SysInfoType15 ::=                   SEQUENCE {
    -- Measurement IEs

        ue-positioning-GPS-CipherParameters     UE-Positioning-CipherParameters     OPTIONAL,
```

```
        ue-positioning-GPS-ReferenceLocation    ReferenceLocation,
        ue-positioning-GPS-ReferenceTime        UE-Positioning-GPS-ReferenceTime,

        ue-positioning-GPS-Real-timeIntegrity       BadSatList                          OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}                     OPTIONAL
}

SysInfoType15-1 ::=                 SEQUENCE {
    -- DGPS corrections
        ue-positioning-GPS-DGPS-Corrections         UE-Positioning-GPS-DGPS-Corrections,

    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}             OPTIONAL
}

SysInfoType15-2 ::=                 SEQUENCE {
-- Ephemeris and clock corrections
    transmissionTOW                 INTEGER (0..604799),
    satID                           SatID,
    ephemerisParameter              EphemerisParameter,
-- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}         OPTIONAL
}

SysInfoType15-3 ::=                 SEQUENCE {
    -- Almanac and other data
        transmissionTOW                 INTEGER (0.. 604799),
        ue-positioning-GPS-Almanac                  UE-Positioning-GPS-Almanac
    OPTIONAL,
        ue-positioning-GPS-IonosphericModel         UE-Positioning-GPS-IonosphericModel
    OPTIONAL,
        ue-positioning-GPS-UTC-Model                UE-Positioning-GPS-UTC-Model
    OPTIONAL,
        satMask                         BIT STRING (SIZE (1..32))   OPTIONAL,
        lsbTOW                          BIT STRING (SIZE (8))       OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}                 OPTIONAL
}


SysInfoType15-4 ::=                 SEQUENCE {
    -- Measurement IEs
        ue-positioning-OTDOA-CipherParameters   UE-Positioning-CipherParameters         OPTIONAL,
        ue-positioning-OTDOA-AssistanceData     UE-Positioning-OTDOA-AssistanceData,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions       SEQUENCE {}                     OPTIONAL
}


SysInfoType15-5 ::=                 SEQUENCE {
    -- Measurement IEs
        ue-positioning-OTDOA-AssistanceData-UEB     UE-Positioning-OTDOA-AssistanceData-UEB,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions       SEQUENCE {}                     OPTIONAL
}
```

## 13.4.32 VALUE_TAG

This variable contains information about the value tag for the last received system information block of a given type, for all system information blocks using value tags. The UE shall maintain one instance of this variable for the current selected cell. The UE may store several instances of this variable, one for each cell, to be used if the UE returns to these cells.

All IEs in this variable shall be cleared when switched off and as well as at selection of a new PLMN.

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| MIB value tag | OP | | MIB value tag 10.3.8.9 | Value tag for the master information block |
| SB 1 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the scheduling block type 1 |
| SB 2 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the scheduling block type 2 |
| SIB 1 value tag | CV-*GSM* | | PLMN value tag 10.3.8.10 | Value tag for the system information block type 1 |
| SIB 2 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 2 |
| SIB 3 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 3 |
| SIB 4 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 4 |
| SIB 5 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 5 |
| SIB 6 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 6 |
| CHOICE *mode* | MP | | | |
| >FDD | | | | |
| >>SIB 8 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 8 |
| >TDD | | | | (no data) |
| SIB 11 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 11 |
| SIB 12 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 12 |
| SIB 13 value tag | CV-*ANSI* | | Cell value tag 10.3.8.4 | Value tag for the system information block type 13 |
| SIB 13.1 value tag | CV-*ANSI* | | Cell value tag 10.3.8.4 | Value tag for the system information block type 13.1 |
| SIB 13.2 value tag | CV-*ANSI* | | Cell value tag 10.3.8.4 | Value tag for the system information block type 13.2 |
| SIB 13.3 value tag | CV-*ANSI* | | Cell value tag 10.3.8.4 | Value tag for the system information block type 13.3 |
| SIB 13.4 value tag | CV-*ANSI* | | Cell value tag 10.3.8.4 | Value tag for the system information block type 13.4 |
| SIB 15 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 15 |
| SIB 15.1 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 15.1 |
| SIB 15.2 value tag list | OP | 1 to <maxSat> | | List of value tags for all stored occurrences of system information block type 15.2 |
| >SIB 15.2 value tag | MP | | Cell value tag 10.3.8.4 | |
| >SIB occurrence identity and value tag | MP | | SIB occurrence identity and value tag 10.3.8.20b | |
| SIB 15.3 value tag list | OP | 1 to <maxSat> | | List of value tags for all stored occurrences of system information block type 15.3 |
| >SIB 15.3 value tag | MP | | PLMN value tag 10.3.8.10 | Value tag for the system information block type 15.3 |
| >SIB occurrence identity and value tag | MP | | SIB occurrence identity and value tag 10.3.8.20b | |
| SIB 15.4 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 15.4 |
| SIB 15.5 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 15.4 |

| | | | | |
|---|---|---|---|---|
| SIB 16 value tag list | OP | 1 to <maxPredefConfig> | | List of value tags for all stored occurrences of the system information block type 16 |
| >Predefined configuration identity and value tag | MP | | Predefined configuration identity and value tag 10.3.8.11 | |
| SIB 18 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 18 |

| Condition | Explanation |
|---|---|
| *GSM* | This information is optional when the PLMN Type in the variable SELECTED_PLMN is "GSM-MAP" and never stored otherwise. |
| *ANSI* | This information is optional when the PLMN Type in the variable SELECTED_PLMN is "ANSI-41" and never stored otherwise. |

## 13.4.28a UE_POSITIONING_GPS_DATA

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| GPS Data ciphering info | OP | | UE positioning Ciphering info 10.3.7.86 | |
| GPS Deciphering Keys | OP | | | |
| >Current deciphering key | MP | | Bit string(56) | |
| >Next deciphering key | MP | | Bit string(56) | |
| UE positioning GPS reference time | OP | | UE positioning GPS reference time 10.3.7.96 | |
| UE positioning GPS reference UE position | OP | | Ellipsoid point with altitude and uncertainty ellipsoid 10.3.8.4c | A priori knowledge of UE 3-D position. |
| UE positioning GPS DGPS corrections | OP | | UE positioning GPS DGPS corrections 10.3.7.91 | |
| UE positioning GPS navigation model | OP | 1 to <maxSat> | | |
| >SatID | MP | | Enumerated( 0..63) | Satellite ID |
| >GPS Ephemeris and Clock Correction parameters | MP | | UE positioning GPS Ephemeris and Clock Correction parameters 10.3.7.91a | |
| UE positioning GPS ionospheric model | OP | | UE positioning GPS ionospheric model 10.3.7.92 | |
| UE positioning GPS UTC model | OP | | UE positioning GPS UTC model 10.3.7.97 | |
| UE positioning GPS almanac | OP | | ~~UE positioning GPS almanac 10.3.7.89~~ | |
| >SatID | MP | 1 to <maxSat> | | |
| >>$WN_a$ | MP | | | |
| >>DataID | MP | | | Same as IE in 10.3.7.89 |
| >>e | MP | | | Same as IE in 10.3.7.89 |
| >>$t_{oa}$ | MP | | | Same as IE in 10.3.7.89 |
| >>δi | MP | | | Same as IE in 10.3.7.89 |
| >>OMEGADOT | MP | | | Same as IE in 10.3.7.89 |
| >>SV Health | MP | | | Same as IE in 10.3.7.89 |
| >>$A^{1/2}$ | MP | | | Same as IE in 10.3.7.89 |

| | | | | |
|---|---|---|---|---|
| >>OMEGA$_0$ | MP | | | Same as IE in 10.3.7.89 |
| >>$M_0$ | MP | | | Same as IE in 10.3.7.89 |
| >>$\omega$ | MP | | | Same as IE in 10.3.7.89 |
| >>$af_0$ | MP | | | Same as IE in 10.3.7.89 |
| >>$af_1$ | MP | | | Same as IE in 10.3.7.89 |
| >SV Global Health | OP | | | Same as IE in 10.3.7.89 |
| UE positioning GPS acquisition assistance | OP | | UE positioning GPS acquisition assistance 10.3.7.88 | |
| UE positioning GPS real-time integrity | OP | | UE positioning GPS real-time integrity 10.3.7.95 | |
| UE positioning GPS reference cell info | OP | | UE positioning GPS reference cell info 10.3.7.95a | |

## 13.4.28b UE_POSITIONING_OTDOA_DATA_UE_ASSISTED

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| ~~OTDOA Data ciphering info~~ | ~~OP~~ | | ~~UE positioning Ciphering info 10.3.7.86~~ | |
| UE positioning OTDOA reference cell info for UE-assisted | OP | | UE positioning OTDOA reference cell info 10.3.7.108 | |
| UE positioning OTDOA neighbour cell list for UE-assisted | OP | 1 to <maxCellMeas> | | |
| >UE positioning OTDOA neighbour cell info for UE-assisted | MP | | UE positioning OTDOA neighbour cell info 10.3.7.106 | |

## 13.4.28c UE_POSITIONING_OTDOA_DATA_UE_BASED

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| OTDOA Deciphering Keys | OP | | | |
| >Current deciphering key | MP | | Bit string(56) | |
| >Next deciphering key | MP | | Bit string(56) | |
| OTDOA Data ciphering info | OP | | UE positioning Ciphering info 10.3.7.86 | |
| UE positioning OTDOA reference cell info for UE-based | OP | | UE positioning OTDOA reference cell info for UE-based 10.3.7.108a | |
| UE positioning OTDOA neighbour cell list for UE-based | OP | 1 to <maxCellMeas> | | |
| >UE positioning OTDOA neighbour cell info for UE-based | MP | | UE positioning OTDOA neighbour cell info for UE-based 10.3.7.106 | |

# 14.7 UE positioning measurements

## 14.7.1 UE positioning measurement quantities

The quantity to measure for UE positioning is dependent on the positioning method and the method type requested in the IE "UE positioning reporting quantity".

1 SFN-SFN observed time difference type 2, mandatory.

2 Rx-Tx time difference type 2, optional.

3 GPS timing of cell fames, optional.

The definition of other GPS measurements is not within the scope of this specification.

## 14.7.2 Void

## 14.7.3 UE positioning reporting events

In the IE "UE positioning reporting criteria" ~~field~~ in the Measurement Control messages, the UTRAN notifies the UE of which events should trigger a measurement report. UE positioning reporting events that can trigger a report are given below. The content of the measurement report is dependant on the ~~location~~ positioning method and method type requested in the IE "UE positioning reporting quantity" of the Measurement Control message and is described in detail in [18].

### 14.7.3.1 Reporting Event 7a: The UE position changes more than an absolute threshold

This event is used for UE-based methods only.

When this event is ordered by UTRAN in a measurement control message, the UE shall

- ~~-~~send a measurement report when the UE changes its position compared to the last reported position more than the~~a predefined~~ threshold defined by the IE "Threshold position change";~~. This event is used for UE-based methods only.~~
- act as specified in section 8.6.7.19.1b.
- if the value of IE “Amount of Reporting” in variable MEASUREMENT_IDENTITY for this event is greater than one,
  - decrease IE “Amount of Reporting” in variable MEASUREMENT_IDENTITY for this event by one;
- if the value of IE “Amount of Reporting” in variable MEASUREMENT_IDENTITY for this event is equal to one,
  - delete this event from the list of events in variable MEASUREMENT_IDENTITY

### 14.7.3.2 Reporting Event 7b: SFN-SFN measurement changes more than an absolute threshold

~~This event is primarily used for UE-assisted methods, but can be used also for UE-based methods.~~

When this event is ordered by UTRAN in a measurement control message, the UE shall

- ~~-~~send a measurement report when the SFN-SFN time difference measurement type 2 of any measured cell changes more than ~~a predefined~~ the threshold defined by the IE "Threshold SFN-SFN change", and~~.~~ ~~This event is primarily used for UE-assisted methods, but can be used also for UE-based methods.~~
- if UTRAN set IE “Method Type” in “UE positioning reporting quantity” in the MEASUREMENT CONTROL message to “UE based”,
  - act as specified in section 8.6.7.19.1b;
- if UTRAN set IE “Method Type” in “UE positioning reporting quantity” in the MEASUREMENT CONTROL message to “UE assisted”,
  - act as specified in section 8.6.7.19.1a;
- if UTRAN set IE “Method Type” in “UE positioning reporting quantity” in the MEASUREMENT CONTROL message to “UE assisted preferred but UE based allowed” or “UE based preferred but UE assisted allowed”,
  - the UE may choose to either act according to section 8.6.7.19.1a or 8.6.7.19.1b.
- if the value of IE “Amount of Reporting” in variable MEASUREMENT_IDENTITY for this event is greater than one,
  - decrease IE “Amount of Reporting” in variable MEASUREMENT_IDENTITY for this event by one;
- if the value of IE “Amount of Reporting” in variable MEASUREMENT_IDENTITY for this event is equal to one,
  - delete this event from the list of events in variable MEASUREMENT_IDENTITY;

### 14.7.3.3 Reporting Event 7c: GPS time and SFN time have drifted apart more than an absolute threshold

~~This event is primarily used for UE-assisted methods, but can be used also for UE-based methods.~~

When this event is ordered by UTRAN in a measurement control message, the UE shall

- ~~-~~send a measurement report when the GPS Time Of Week and the SFN timer have drifted apart more than ~~a predefined~~ the threshold defined by the IE "Threshold SFN-GPS TOW", and~~.~~ ~~This event is primarily used for UE-assisted methods, but can be used also for UE-based methods.~~

- if UTRAN set IE “Method Type” in “UE positioning reporting quantity” in the MEASUREMENT CONTROL message to “UE based”,

  - act as specified in section 8.6.7.19.1b;

- if UTRAN set IE “Method Type” in “UE positioning reporting quantity” in the MEASUREMENT CONTROL message to “UE assisted”,

  - act as specified in section 8.6.7.19.1a;

- if UTRAN set IE “Method Type” in UE positioning reporting quantity” in the MEASUREMENT CONTROL message to “UE assisted preferred but UE based allowed” or “UE based preferred but UE assisted allowed”,

  - act as specified in section 8.6.7.19.1a or in section 8.6.7.19.1b depending on the method type chosen by the UE.

- if the value of IE “Amount of Reporting” in variable MEASUREMENT_IDENTITY for this event is greater than one,

  - decrease IE “Amount of Reporting” in variable MEASUREMENT_IDENTITY for this event by one;

- if the value of IE “Amount of Reporting” in variable MEASUREMENT_IDENTITY for this event is equal to one,

  - delete this event from the list of events in variable MEASUREMENT_IDENTITY;

**3GPP TSG-RAN WG2 Meeting #25** ***Tdoc R2-012756***
**Makuhari, Japan, 26-30 November 2001**

*CR-Form-v5*

# CHANGE REQUEST

⌘ **25.331** **CR** **1186** ⌘ **rev** **1-** ⌘ Current version: **4.2.1** ⌘

*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:*** | ⌘ | Correction of UE Positioning |
| ***Source:*** | ⌘ | Nortel Networks |
| ***Work item code:*** | ⌘ | TEI |
| ***Date:*** | ⌘ | 26-11-2001 |
| ***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:*** ⌘ UE Positioning specification is not complete for all RRC states

***Summary of change:*** ⌘ The proposed changes are:

- in sections 8.1.1.6.15, 8.1.1.6.15.1, 8.1.1.6.15.2, 8.1.1.6.15.3 text was moved to 8.6.7.19.3 since this description applies for the GPS assistance data received in Sistem information or in Measurement Control or in Assistance Data Delivery meassages.

- in sections 8.1.1.6.15, 8.1.1.6.15.4 the handling of the ciphering info was moved to a new section 8.6.17.9.4

- in section 8.4.1.6, 8.4.1.7, 8.4.1.8 and 8.4.1.9 new description text was added to describe UE behavior when UP measurements are configured. This new text applies the principles proposed in Tdoc R2-012380 on handling of UP in RRC states

- in section 8.4.3 it is clarified that the Assistance Data Delivery procedure is initiated by UTRAn at the request from CN

- section 8.5.11 is updated to allow also to use the FACH measurement occasions for UP OTDOA when SFN-SFN type 2 on a different frequency is requested. The changes propose to keep the section 8.5.11 as a generic action and specify the case when the FACH measurement occasions shall be used in relevant sections in 8.4.1.6 and 8.4.1.9.

- section 8.6.7.1 is updated to include also the measurement validity for UP measurements

- section 8.6.7.19.1 is edited to be used as a pointer to new sections, e.g. 8.6.7.19.1a and 8.6.7.19.1b where it is specified who the UE will set the Measurement Report for UE assisted and UE-based methods

- sections 8.1.1.6.15.4, 8.6.7.19.2 and 2a, and tabular sections 10.2.48.8.18.4, 10.3.7.100, 10.3.7.103, 10.3.7.106, 10.3.7.108, and variable 13.4.28b are updated in order to allow the use of System information broadcast to be used for OTDOA

| | | |
|---|---|---|
| | | UE-based assistance data which may be ciphered and also for OTDOA UE-assisted methods<br><br>- new section 8.6.7.19.4 is added and variables 13.4.28a and 13.4.28c are updated in order to clarify the handling of deciphering keys. It is clarified also it is possible to have a couple of deciphering keys for each method, i.e. OTDOA or GPS.<br><br>- new section 8.6.7.19.6 and tabular 10.3.7.90 are updated in order to introduce the information for the refernce cell to be used for UE GPS Timing of cell frames measurement.<br><br>- section 8.6.7.20 clarifies that the measurement SFN-SFN type 2 should not be reported on RACH reporting<br><br>- tabular 10.3.7.88, 10.3.7.96 is updated to allow alignement between 25.133 and RRC of the measurement UTRAN reporting of cell frames<br><br>- tabular 10.3.7.93, 10.3.7.109 is updated allow alignement between 25.133 and RRC of the measurement UE reporting of cell frames<br><br>- tabular 10.3.7.105 is updated to introduce the frequency info for neighboring cell reporting<br><br>- tabular 10.3.7.108 is updated to remove the frequency info of the reference cell for OTDOA measurements since it is assumed to the same as the current frequency<br><br>- tabular 10.3.7.111 is updated to introduce the vertical accuracy and rename the accuracy in horizontal accuracy. this is in line with RANAP. it is alos propose to remove the multiple sets from the tabular as decided in last RAN2#24 meeting.<br><br>- section 14.7.3 description text added<br><br>Corrections to Rev1 (highlighted in "green"):<br><br>ASN.1 corrections are added according to the following principle.<br><br>All ASN.1 corrections are done using the non-critical extension mechanism for OTDOA UE assisted method. The other corrections are done in a straight forward corrections.<br><br>**-** added new SIB15.5 to broadcast Assistance data possibly ciphered for UE based OTDOA. SIB15.4 is left unciphered for UE-assisted OTDOA<br><br>- corrected the granularity and the mapping of Node B Clock drift and SFN-SFN time drift and alignment with RAN3<br><br>- corrected the handling of the Week Number for the Almanac |
| ***Consequences if not approved:*** | ⌘ | UE behavior for UE Positioning is unclear and unspecified |

| | | |
|---|---|---|
| ***Clauses affected:*** | ⌘ | 8.1.1.1.2, 8.1.1.6.15, 8.1.1.6.15.1, 8.1.1.6.15.2, 8.1.1.6.15.3, 8.1.1.6.15.4, 8.1.1.6.15.5 (new), 8.4.1.3, 8.4.1.6.7, 8.4.1.7.5 (new), 8.4.1.8.5 (new), 8.4.1.9.5 (new), 8.4.1.9a.4 (new), 8.4.2.2, 8.4.3.2, 8.4.3.3, 8.5.11, 8.6.7.1, 8.6.7.18a (new), 8.6.7.19.0 (new) , 8.6.7.19.1, 8.6.7.19.1a (new) , 8.6.7.19.1b (new) , 8.6.7.19.2, 8.6.7.19.2a (new) , 8.6.7.19.3, 8.6.7.19.3.1, 8.6.7.19.3.2, 8.6.7.19.3.3, 8.6.7.19.3.3a (new) , 8.6.7.19.3.4, 8.6.7.19.3.5, 8.6.7.19.3.6, 8.6.7.19.3.7, 8.6.7.19.3.8, 8.6.7.19.4 (new) , 8.6.7.19.5 (new) , 8.6.7.19.6 (new), 8.6.7.21 (new), 10.2.4, 10.2.48.8.18.4, 10.2.48.8.18.4a (new), 10.3.3.45, 10.3.7.51, 10.3.7.86, 10.3.7.87, 10.3.7.88, 10.3.7.89, 10.3.7.90, 10.3.7.91, 10.3.7.93, 10.3.7.95a (new), 10.3.7.96, 10.3.7.99, 10.3.7.100, 10.3.7.101, 10.3.7.103, 10.3.7.103a (new) , 10.3.7.105, 10.3.7.106, 10.3.7.106a (new) , 10.3.7.108, 10.3.7.108a (new) , 10.3.7.109, 10.3.7.109a (new) , 10.3.7.111, 10.3.8.21, 10.3.8.22, 11.2, 11.3, 13.4.28a, 13.4.28b, 13.4.28c (new), 13.4.32, 14.7.3, |

| | | | | | |
|---|---|---|---|---|---|
| | | 14.7.3.1, 14.7.3.2, 14.7.3.3 | | | |
| ***Other specs affected:*** | ⌘ | X | Other core specifications | ⌘ | 25.331 v3.8.0, CR 1185r3 |
| | | X | Test specifications | | |
| | | | O&M Specifications | | |
| ***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.

### 8.1.1.1.2 System information blocks

Table 8.1.1 specifies all system information blocks and their characteristics.

The *area scope column* in table 8.1.1 specifies the area where a system information block's value tag is valid. If the area scope is *cell*, the UE shall consider the system information block to be valid only in the cell in which it was read. If system information blocks have been previously stored for this cell, the UE shall check whether the value tag for the system information block in the entered cell is different compared to the stored value tag. If the area scope is *PLMN*, the UE shall check the value tag for the system information block when a new cell is selected. If the value tag for the system information block in the new cell is different compared to the value tag for the system information block stored in the UE, the UE shall re-read the system information block.

For System information block types 15.2, 15.3 and 16, which may have multiple occurrences, each occurrence has its own independent value tag. The UE- shall re-read a particular occurrence if the value tag of this occurrence has changed compared to that stored in the UE.

The *UE mode/state column when block is valid* in Table 8.1.1 specifies in which UE mode or UE state the IEs in a system information block shall be regarded as valid by the UE. In other words, the indicated system information block becomes invalid upon change to a mode/state that is not included in this column. In some cases, the states are inserted in brackets to indicate that the validity is dependent on the broadcast of the associated System Information Blocks by the network as explained in the relevant procedure section.

The *UE mode/state column when block is read* in Table 8.1.1 specifies in which UE mode or UE state the IEs in a system information block may be read by the UE. The UE shall have the necessary information prior to execution of any procedure requiring information to be obtained from the appropriate system information block. The requirements on the UE in terms of when to read the system information may therefore be derived from the procedure specifications that specify which IEs are required in the different UE modes/states in conjunction with the different performance requirements that are specified. System Information Block type 10 shall only be read by the UE while in CELL_DCH.

NOTE: There are a number of system information blocks that include the same IEs while the UE mode/state in which the information is valid differs. This approach is intended to allows the use of different IE values in different UE mode/states.

The *Scheduling information* column in Table 8.1.1 specifies the position and repetition period for the SIB.

The *modification of system information* column in Table 8.1.1 specifies the update mechanisms applicable for a certain system information block. For system information blocks with a value tag, the UE shall update the information according to subclause 8.1.1.7.1 or 8.1.1.7.2. For system information blocks with an expiration timer, the UE shall, when the timer expires, perform an update of the information according to subclause 8.1.1.7.4.

**Table 8.1.1: Specification of system information block characteristics**

| System information block | Area scope | UE mode/state when block is valid | UE mode/state when block is read | Scheduling information | Modification of system information | Additional comment |
|---|---|---|---|---|---|---|
| Master information block | Cell | Idle mode, CELL_FACH, CELL_PCH, URA_PCH | Idle mode, CELL_FACH, CELL_PCH, URA_PCH | SIB_POS = 0<br>SIB_REP = 8 (FDD)<br>SIB_REP = 8, 16, 32 (TDD)<br>SIB_OFF=2 | Value tag | |
| Scheduling block 1 | Cell | Idle mode, CELL_FACH, CELL_PCH, URA_PCH | Idle mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" in MIB | Value tag | |
| Scheduling block 2 | Cell | Idle mode, CELL_FACH, CELL_PCH, URA_PCH | Idle mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" in MIB | Value tag | |
| System information block type 1 | PLMN | Idle mode CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH | Idle, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 2 | Cell | URA_PCH | URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 3 | Cell | Idle mode, (CELL_FACH, CELL_PCH, URA_PCH) | Idle mode, (CELL_FACH, CELL_PCH, URA_PCH) | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 4 | Cell | CELL_FACH, CELL_PCH, URA_PCH | CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | If System information block type 4 is not broadcast in a cell, the connected mode UE shall apply information in System information block type 3 in connected mode. |
| System information block type 5 | Cell | Idle mode, (CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH (TDD only)) | Idle mode, (CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH (TDD only)) | Specified by the IE "Scheduling information" | Value tag | |

| | | | | | | |
|---|---|---|---|---|---|---|
| System information block type 6 | Cell | CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH (TDD only) | CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH (TDD only) | Specified by the IE "Scheduling information" | Value tag | If system information block type 6 is not broadcast in a cell, the connected mode UE shall read System information block type 5.<br><br>If some of the optional IEs are not included in System information block type 6, the UE shall read the corresponding IEs in System information block type 5<br><br>In TDD mode system information block 6 shall only be read in CELL_DCH if required for open loop power control as specified in subclause 8.5.7 and/or if shared transport channels are assigned to the UE. If in these cases system information block type 6 is not broadcast the UE shall read system information block type 5. |
| System information block type 7 | Cell | Idle mode, CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH (TDD only) | Idle mode, CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH (TDD only) | Specified by the IE "Scheduling information" | Expiration timer = MAX(320 ms,SIB_REP * ExpirationTimeFactor) | In TDD mode system information block type 7 shall only be read in CELL_DCH if shared transport channels are assigned to the UE. |
| System information block type 8 | Cell | CELL_FACH, CELL_PCH, URA_PCH | CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 9 | Cell | CELL_FACH, CELL_PCH, URA_PCH | CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Expiration timer = SIB_REP | |
| System information block type 10 | Cell | CELL_DCH | CELL_DCH | Specified by the IE "Scheduling information" | Expiration timer = SIB_REP | |
| System information block type 11 | Cell | Idle mode (CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH) | Idle mode (CELL_FACH, CELL_PCH, URA_PCH) | Specified by the IE "Scheduling information" | Value tag | |

| | | | | | | |
|---|---|---|---|---|---|---|
| System information block type 12 | Cell | CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH | CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | If system information block type 12 is not broadcast in a cell, the connected mode UE shall read System information block type 11.<br>If some of the optional IEs are not included in System information block type 12, the UE shall read the corresponding IEs in System information block type 11. |
| System information block type 13 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 13.1 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 13.2 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 13.3 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 13.4 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 14 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH | Specified by the IE "Scheduling information" | Expiration timer = MAX([320 ms], SIB_REP * ExpirationTimeFactor) | This system information block is used in TDD mode only.<br>System information block type 14 shall only be read in CELL_DCH if required for open loop power control as specified in subclause 8.5.7. |
| System information block type 15 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 15.1 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 15.2 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | For this system information block there may be multiple occurrences |
| System information block type 15.3 | PLMN | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | For this system information block there may be multiple occurrences |
| System information block type 15.4 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |

| | | | | | | |
|---|---|---|---|---|---|---|
| System information block type 15.5 | Cell | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |
| System information block type 16 | PLMN | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Idle Mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | For this system information block there may be multiple occurrences |
| System information block type 17 | Cell | CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH | CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH | Specified by the IE "Scheduling information" | Expiration timer = SIB_REP | This system information block is used in TDD mode only. System information block type 17 shall only be read if shared transport channels are assigned to the UE. |
| System Information Block type 18 | Cell | Idle mode, CELL_FACH, CELL_PCH, URA_PCH, CELL_DCH | Idle mode, CELL_FACH, CELL_PCH, URA_PCH | Specified by the IE "Scheduling information" | Value tag | |

The UE shall acquire all system information blocks except system information block type 10 on BCH. System Information Block type 10 shall be acquired on the FACH and only by UEs with support for simultaneous reception of one SCCPCH and one DPCH. If System Information Block type 10 is not broadcast in a cell, the DRAC procedures do not apply in this cell. System Information Block type 10 is used in FDD mode only.

### 8.1.1.6.15 System Information Block type 15

If the UE is in idle or connected mode, and supports GPS location services ~~and/or OTDOA location services~~ it should store all relevant IEs included in this system information block. The UE shall:

- if the IE "GPS Data ciphering info" is included~~, and the UE has a full or reduced complexity GPS receiver functionality (the UE will know that the broadcast GPS data is ciphered in accordance with the Data Assistance Ciphering Algorithm detailed in [18])~~:

  ~~- store the parameters contained within this IE (see 10.3.7.86 for details) in the IE "GPS Data ciphering info" in variable UE_POSITIONING_GPS_DATA; and~~

  ~~- use them to decipher the broadcast UE positioning GPS information contained within the System Information Block types 15.1, 15.2 and 15.3;~~ act as specified in the subclause 8.6.7.19.4;

- ~~store the~~ act upon the received IE "Reference position" as specified in subclause 8.6.7.19.3.8;~~in the IE "UE positioning GPS reference UE position" in variable UE_POSITIONING_GPS_DATA and use it as a priori knowledge of the approximate location of the UE;~~

- ~~store the~~ act upon the received IE "GPS reference time" as specified in subclause 8.6.7.19.3.~~ in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as a reference GPS time;~~

- ~~use "GPS TOW msec" as GPS Time of Week in milliseconds;~~

- ~~if the IE "GPS TOW rem usec" is included in the IE "GPS reference time":~~

  ~~- store it in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and may use it as GPS Time of Week in microseconds;~~

- ~~if the IE "NODE B Clock Drift" is included in the IE "GPS reference time":~~

  ~~- store it in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and may use it as an estimate of the drift rate of the NODE B clock relative to GPS time;~~

- ~~if the IE "NODE B Clock Drift" is not included in the IE "GPS reference time":~~

  ~~- assume the value 0;~~

- ~~if SFN is included in the IE "GPS reference time" and IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is not included:~~

  ~~- store it in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and may use it as the relationship between GPS time and air-interface timing of the NODE B transmission in the serving cell;~~

- ~~if SFN is included in IE "GPS reference time" and IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is also included:~~

  ~~- store it in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and may use it as the relationship between GPS time and air-interface timing of the NODE B transmission in the cell indicated by "Primary CPICH info" or "cell parameters id";~~

- if IE "Satellite information" is included:

  - act upon this list of bad satellites as specified in subclause 8.6.7.19.3.6.

NOTE: For efficiency purposes, the UTRAN should broadcast System Information Block type 15 if it is broadcasting System Information Block type 15.2.

#### 8.1.1.6.15.1 System Information Block type 15.1

The UE should store all the relevant IEs included in this system information block in variable UE_POSITIONING_GPS_DATA. The UE shall:

- ~~use "Status/Health" in the IE "DGPS Corrections" to determine the status of the differential corrections;~~

- act on "DGPS information" in the IE "DGPS Corrections" in a similar manner as specified in [13] except that the scale factors for PRC and RRC are different. In addition, the IE group DGPS information also includes Delta PRC2 and Delta RRC2. Delta PRC2 is the difference in the pseudorange correction between the satellite's ephemeris identified by IODE and the previous ephemeris two issues ago IODE –2. Delta RRC2 is the difference in the pseudorange rate-of-change correction between the satellite's ephemeris identified by IODE and IODE-2. These two additional IEs can extend the life of the raw ephemeris data up to 6 hours. If the IEs "Delta PRC3" and "Delta RRC3" are included, UE may use them as appropriate e.g. to extend the life of the raw ephemeris data up to 8 hours;

- act upon the received IE "UE Positioning GPS DGPS corrections" as specified in subclause 8.6.7.19.3.3.

#### 8.1.1.6.15.2 System Information Block type 15.2

For System Information Block type 15.2 multiple occurrences may be used; one occurrence for one satellite. To identify the different occurrences, the scheduling information for System Information Block type 15.2 includes IE "SIB occurrence identity and value tag". The UE should store all the relevant IEs included in this system information block in variable UE_POSITIONING_GPS_DATA. The UE shall:

- compare for each occurrence the value tag of the stored occurrence, if any, with the occurrence value tag included in the IE "SIB occurrence identity and value tag" for the occurrence of the SIB with the same occurrence identity;

- in case the UE has no SIB occurrence stored with the same identity or in case the occurrence value tag is different:

  - store the occurrence information together with its identity and value tag for later use;

- in case an occurrence with the same identity but different value tag was stored:

  - overwrite this one with the new occurrence read via system information for later use;

- interpret IE "Transmission TOW" as a very coarse estimate of the current time, i.e., the approximate GPS time-of-week when the message is broadcast;

- interpret IE "SatID" as the satellite ID of the data from which this message was obtained;

- act upon the received IEs "Sat ID" and "GPS Ephemeris and Clock Corrections Parameter" as specified in subclause 8.6.7.19.3.4;

- ~~act on the rest of the IEs in a manner similar to that specified in [12]. In addition, the UE can utilise these IEs for GPS time dissemination and sensitivity improvement.~~

The IE "Transmission TOW" may be different each time a particular SIB occurrence is transmitted. The UTRAN should not increment the value tag of the SIB occurrence if the IE "Transmission TOW" is the only IE that is changed.

The UE may not need to receive all occurrences before it can use the information from any one occurrence.

#### 8.1.1.6.15.3 System Information Block type 15.3

For System Information Block type 15.3 multiple occurrences may be used; one occurrence for each set of satellite data. To identify the different occurrences, the scheduling information for System Information Block type 15.3 includes IE "SIB occurrence identity and value tag". The UE should store all the relevant IEs included in this system information block in variable UE_POSITIONING_GPS_DATA. The UE shall:

- compare for each occurrence the value tag of the stored occurrence, if any, with the occurrence value tag included in the IE "SIB occurrence identity and value tag" for the occurrence of the SIB with the same occurrence identity;

- in case the UE has no SIB occurrence stored with the same identity or in case the occurrence value tag is different:

  - store the occurrence information together with its identity and value tag for later use;

- in case an occurrence with the same identity but different value tag was stored:

- overwrite this one with the new occurrence read via system information for later use;

- interpret IE "Transmission TOW" as a very coarse estimate of the current time, i.e., the approximate GPS time-of-week when the message is broadcast;

- ~~interpret IE "SatMask" as the satellites that contain the pages being broadcast in this message;~~

- ~~interpret IE "LSB TOW" as the least significant 8 bits of the TOW ([12]);~~

- ~~interpret "Data ID" in the IE "UE positioning GPS almanac" as the Data ID field contained in the indicated subframe, word 3, most significant 2 bits, as defined by [12];~~

- if the IE "GPS Almanac and Satellite Health" is included:

  - interpret IE "SatMask" as the satellites that contain the pages being broadcast in this message;

  - interpret IE "LSB TOW" as the least significant 8 bits of the TOW ([12]);

  - act upon the received IE “GPS Almanac and Satellite Health” as specified in subclause 8.6.7.19.3.2;

- if the IE "GPS UTC model" is included:

  - act upon the received IE “GPS UTC model” as specified in subclause 8.6.7.19.3.9;

- ~~act on the rest of the IEs in a similar manner as specified in [12]. In addition, the UE can utilise these IEs including non-information bits for GPS time dissemination and sensitivity improvement.~~

The IE "Transmission TOW" may be different each time a particular SIB occurrence is transmitted. The UTRAN should not increment the value tag of the SIB occurrence if the IE "Transmission TOW" is the only IE that is changed. One SIB occurrence value tag is assigned to the table of subclause 10.2.48.8.18.3.

The UE may not need to receive all occurrences before it can use the information for any one occurrence.

#### 8.1.1.6.15.4 System Information Block type 15.4

If the UE is in idle mode or connected mode, the UE shall:

- if the IE "OTDOA ciphering info" is included:

  - act as specified in subclause 8.6.7.19.4;

If the UE is in connected mode, the UE shall:

- act as specified in subclause 8.6.7.19.2.

~~If the UE is in idle or connected mode, and supports the UE-based OTDOA UE positioning method the UE shall:~~

- ~~act as specified in subclause 8.6.7.19.3.2;~~

- ~~store IE "OTDOA ciphering info" in OTDOA Data ciphering info in variable UE_POSITIONING_OTDOA_DATA if it is included.~~

#### 8.1.1.6.15.5 System Information Block type 15.5

If the UE is in idle or connected mode, the UE shall:

- if the UE supports UE-based OTDOA positioning:

  - act as specified in subclause 8.6.7.19.2a;

# 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 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 monitored according to a neighbour list assigned by the UTRAN belong to the **monitored set.**

3. Cells detected by the UE, which are neither included in the active set nor in the monitored 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.

## 8.4.1 Measurement control


**Figure 56: Measurement Control, normal case**

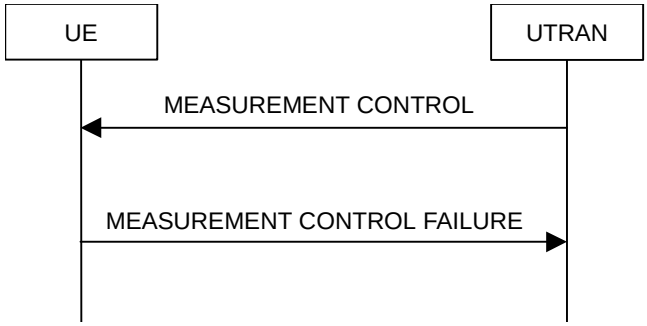


**Figure 57: Measurement Control, failure case**

### 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.

### 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:

- read the IE "Measurement command";
- if the IE "Measurement command" has the value "setup":
  - store this measurement in the variable MEASUREMENT_IDENTITY according to the IE "measurement identity", possibly overwriting the measurement previously stored with that identity;
  - for measurement types "inter-RAT measurement" or "inter-frequency measurement":
    - if, according to its measurement capabilities, the UE requires compressed mode to perform the measurements and a compressed mode pattern sequence with an appropriate measurement purpose is simultaneously activated by the IE "DPCH compressed mode status info"; or
    - if, according to its measurement capabilities, the UE does not require compressed mode to perform the measurements:
      - if the measurement is valid in the current RRC state of the UE:
        - begin measurements according to the stored control information for this measurement identity;
  - for measurement type “UE positioning measurement”:
    - if the UE is in CELL_FACH state:
      - if IE “Positioning Method” is set to “OTDOA”:
        - if IE “Method Type” is set to “UE assisted”:
          - if IE “UE positioning OTDOA assistance data for UE assisted” is not included:
            - if System Information Block 15.4 is broadcast:
              - read System Information Block 15.4;
            - act as specified in section 8.6.7.19.2;
        - if IE “Method Type” is set to “UE based”:
          - if IE “UE positioning OTDOA assistance data for UE based” is not included:
            - if System Information Block 15.5 is broadcast:
              - read System Information Block 15.5;
            - act as specified in section 8.6.7.19.2a;
  - ~~for measurement type "UE positioning measurement":~~
    - ~~if the IE "Positioning method" is set to "GPS" and UE has neither received nor stored sufficient assistance data in variable UE_POSITIONING_GPS_DATA to perform the requested measurements:~~

~~- send a MEASUREMENT REPORT message to UTRAN, indicating the kind of assistance data which is necessary to fulfil the measurement request in the IE "UE positioning error";~~

- for any other measurement type:
  - if the measurement is valid in the current RRC state of the UE:
    - begin measurements according to the stored control information for this measurement identity.

- if the IE "Measurement command" has the value "modify":
  - for all measurement control present in the MEASUREMENT CONTROL message:
    - if a measurement was stored in the variable MEASUREMENT_IDENTITY associated to the identity by the IE "measurement identity":
      - replace the corresponding information stored in variable MEASUREMENT_IDENTITY associated to the identity indicated by the IE "measurement identity";
      - resume the measurements according to the new stored measurement control information.
    - otherwise:
      - set the variable CONFIGURATION_INCOMPLETE to TRUE;
- if the IE "measurement command" has the value "release":
  - terminate the measurement associated with the identity given in the IE "measurement identity";
  - clear all stored measurement control information related associated to this measurement identity in variable MEASUREMENT_IDENTITY.
- if the IE "DPCH Compressed Mode Status Info" is present,:
  - and 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):
    - set the variable CONFIGURATION_INCOMPLETE to TRUE;
  - if pattern sequence corresponding to IE "TGPSI" is already active (according to "TGPS Status Flag"):
    - deactivate this pattern sequence at the beginning of the frame indicated by IE "TGPS reconfiguration CFN" received in the message;
  - after the time indicated by IE "TGPS reconfiguration CFN" has elapsed:
    - 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
    - begin the inter-frequency and/or inter-RAT measurements corresponding to the pattern sequence measurement purpose of each activated pattern sequence;
    - if the values of IE "TGPS reconfiguration CFN" and IE "TGCFN" are equal:
      - start the concerned pattern sequence immediately at that CFN;
  - not alter pattern sequences stored in variable TGPS_IDENTITY, but not identitifed in IE "TGPSI"
- 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:
  - update the stored information with the traffic volume measurement control information in variable MEASUREMENT_IDENTITY; and
  - refrain from updating the traffic volume measurement control information associated with this measurement identity 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;

- 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):
  - set the variable CONFIGURATION_INCOMPLETE to TRUE;
- clear the entry for the MEASUREMENT CONTROL message in the table "Accepted transactions" in the variable TRANSACTIONS;
- and the procedure ends.

The UE may:

- if the IE "Measurement command" has the value "setup":
  - for measurement type “UE positioning measurement”:
    - if the UE is CELL_FACH state:
      - if IE “Positioning Method” is set to “GPS”:
        - if IE “UE positioning GPS assistance data” is not included and variable UE_POSITIONING_GPS_DATA is empty:
          - if System Information Block 15, 15.1, 15.2 and 15.3 are broadcast:
            - read System Information Block 15, 15.1, 15.2 and 15.3;
          - act as specified in section 8.6.7.19.3;

### 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:

- retain the measurement configuration that was valid before the MEASUREMENT CONTROL message was received;
- 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.
- set the cause value in IE "failure cause" to "unsupported measurement";
- submit the MEASUREMENT CONTROL FAILURE message to lower layers for transmission on the DCCH using AM RLC;
- continue with any ongoing processes and procedures as if the invalid MEASUREMENT CONTROL message has not been received;
- and the procedure ends.

### 8.4.1.4a Configuration Incomplete

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

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

- clear the variable CONFIGURATION_INCOMPLETE;
- set the cause value in IE "failure cause" to "Configuration incomplete";
- submit the MEASUREMENT CONTROL FAILURE message to lower layers for transmission on the DCCH using AM RLC;
- continue with any ongoing processes and procedures as if the invalid MEASUREMENT CONTROL message has not been received;
- 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:

- 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
- clear that entry.
- set the IE "failure cause" to the cause value "protocol error";
- include the IE "Protocol error information" with contents set to the value of the variable PROTOCOL_ERROR_INFORMATION;
- submit the MEASUREMENT CONTROL FAILURE message to lower layers for transmission on the DCCH using AM RLC;
- continue with any ongoing processes and procedures as if the invalid MEASUREMENT CONTROL message has not been received;
- 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:

- stop intra-frequency type measurement reporting assigned in a MEASUREMENT CONTROL message;
- 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
- 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
- if the transition is not due to a reconfiguration message:
  - delete the measurements of type intra-frequency associated with the variable MEASUREMENT_IDENTITY;
- 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);
- if the UE receives the IE "Intra-frequency reporting quantity for RACH Reporting" and the IE "Maximum number of Reported cells on RACH" IEs from System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11):

- use this information for reporting measured results in RACH messages.

#### 8.4.1.6.2 Inter-frequency measurement

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

- stop the inter-frequency type measurement reporting assigned in a MEASUREMENT CONTROL message;
- 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
- 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
- if the transition is not due to a reconfiguration message:
  - delete the measurements of type inter-frequency associated with the variable MEASUREMENT_IDENTITY;
- 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);
- in CELL_FACH state:
  - 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:

- stop the inter-RAT type measurement reporting assigned in a MEASUREMENT CONTROL message;
- 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 another cell than indicated by this IE; or
- 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
- if the transition is not due to a reconfiguration message:
  - delete the measurements of type inter-RAT associated with the variable MEASUREMENT_IDENTITY;
- 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);
- in CELL_FACH state:
  - 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:

- stop quality type measurement reporting;
- 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:

- stop UE internal measurement type measurement reporting;
- 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:

- retrieve each set of measurement control information of measurement type "traffic volume" stored in the variable MEASUREMENT_IDENTITY; and
  - if the optional IE "measurement validity" for this measurement has not been included:
    - delete the measurement associated with the variable MEASUREMENT_IDENTITY;
  - if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "CELL_DCH":
    - stop measurement reporting;
    - store the measurement associated with the variable MEASUREMENT_IDENTITY to be used after the next transition to CELL_DCH state;
  - if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states":
    - continue measurement reporting;
  - if the IE "measurement validity" has been included and the IE "UE state" has been assigned to value "all states except CELL_DCH":
    - resume this measurement and associated reporting;
- if no traffic volume type measurements valid in CELL_FACH or CELL_PCH or URA_PCH states are stored in the variable MEASUREMENT_IDENTITY:
    - 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;
    - begin traffic volume measurement reporting according to the assigned information.

### 8.4.1.6.7 UE positioning measurement

Note : The applicability for UE positioning measurements in CELL_PCH, URA_PCH and CELL_FACH need to be aligned in all relevant specifications

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

- retrieve each set of measurement control information of measurement type "UE positioning" stored in the variable MEASUREMENT_IDENTITY; and
  - if the optional IE "measurement validity" for this measurement has not been included:
    - delete the measurement associated with the variable MEASUREMENT_IDENTITY;
  - if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "CELL_DCH":
    - stop measurement reporting;
    - store the measurement associated with the variable MEASUREMENT_IDENTITY to be used after the next transition to CELL_DCH state;
  - if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states":
    - continue measurement reporting;
  - if the IE "measurement validity" has been included and the IE "UE state" has been assigned to value "all states except CELL_DCH":

- resume this measurement and associated reporting;

- 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

- 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

- if the transition is not due to a reconfiguration message:

  - 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;

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

  - 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":

    - 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;

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

    - begin monitoring assistance data received in System Information Block type 15.4 according to subclause 8.1.1.6.15;

- if the UE is in CELL_FACH state:

  - 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:

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

The UE may:

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

  - 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:

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

### 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:

- retrieve each set of measurement control information of measurement type "intra-frequency" stored in the variable MEASUREMENT_IDENTITY;
- if the IE "measurement validity" for a measurement has been assigned the value "CELL_DCH:
  - resume the measurement reporting;
- if no intra-frequency measurements applicable to CELL_DCH state are stored in the variable MEASUREMENT_IDENTITY:
  - 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);
  - 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):
    - send the MEASUREMENT REPORT message when reporting criteria in IE "Reporting information for CELL_DCH" are fulfilled;

#### 8.4.1.7.2 Inter-frequency measurement

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

- 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);
- retrieve each set of measurement control information of measurement type "inter-frequency" stored in the variable MEASUREMENT_IDENTITY; and
- if the IE "measurement validity" for a measurement has been assigned the value "CELL_DCH":
  - resume the measurement reporting.

#### 8.4.1.7.3 Inter-RAT measurement

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

- 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);
- retrieve each set of measurement control information of measurement type "inter-RAT" stored in the variable MEASUREMENT_IDENTITY; and
- if the IE "measurement validity" for a measurement has been assigned the value "CELL_DCH":
  - resume the measurement reporting.

#### 8.4.1.7.4 Traffic volume measurement

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

- retrieve each set of measurement control information of measurement type "traffic volume" stored in the variable MEASUREMENT_IDENTITY;
  - if the optional IE "measurement validity" for this measurement has not been included:
    - delete the measurement associated with the variable MEASUREMENT_IDENTITY;
  - 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":
    - stop measurement reporting; and
    - save the measurement associated with the variable MEASUREMENT_IDENTITY to be used after the next transition to CELL_FACH/CELL_PCH/URA_PCH state;

- if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states":
  - continue measurement reporting;
- if the IE "measurement validity" has been included and the IE "UE state" has been assigned to value "CELL_DCH":
  - resume this measurement and associated reporting;

- if no traffic volume type measurement has been assigned to the UE with a MEASUREMENT CONTROL message when transiting to CELL_DCH state:
  - 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);
- if the UE in CELL_DCH state receives a MEASUREMENT CONTROL message, which indicates the same measurement identity as that stored in variable MEASUREMENT_IDENTITY:
  - update the stored information with the traffic volume measurement control information in variable MEASUREMENT_IDENTITY.

#### 8.4.1.7.5 UE positioning measurement

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

- retrieve each set of measurement control information of measurement type "UE positioning" stored in the variable MEASUREMENT_IDENTITY; and
  - if the optional IE "Measurement validity" for this measurement has not been included:
    - delete the measurement associated with the variable MEASUREMENT_IDENTITY;
  - 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":
    - stop measurement reporting; and
    - save the measurement associated with the variable MEASUREMENT_IDENTITY to be used after the next transition to CELL_FACH/CELL_PCH/URA_PCH state;
  - if the IE "measurement validity" for the measurement has been included, and the IE "UE state" has been assigned to value "all states":
    - continue measurement reporting;
  - if the IE "measurement validity" has been included and the IE "UE state" has been assigned to value "CELL_DCH":
    - resume this measurement and associated reporting;
- 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:

- 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);

- 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):

  - 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:

- 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:

- 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:

- 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:

- 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:

- 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);

- if the UE receives the IE "Intra-frequency reporting quantity for RACH Reporting" and IE "Maximum number of Reported cells on RACH" from System Information Block type 12 (or System Information Block type 11, according to subclause 8.1.1.6.11):

  - use this information for reporting measured results in RACH messages.

#### 8.4.1.9.2 Inter-frequency measurement

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

- 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);

- 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:

- 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);
- 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:

- store the measurement control information from the IE "Traffic volume measurements 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;
- 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:

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

- stop measurement reporting for all measurements stored in the variable MEASUREMENT_IDENTITY;
- clear the variable MEASUREMENT_IDENTITY;
- 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:

- 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);
- 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:

- 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);

- 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:

- 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);
- 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:

- 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 58: 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 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 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.

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

In CELL_PCH or URA_PCH state, the UE shall 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 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:

- set the IE "measurement identity" to the measurement identity, which is associated with that measurement in variable MEASUREMENT_IDENTITY;
- set the IE "measured results" to include measurements according to the IE "reporting quantity" of that measurement stored in variable MEASUREMENT_IDENTITY; and
  - if all the reporting quantities are set to "false":
    - not set the IE "measured results";
- 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 IE "additional measurements" stored in variable MEASUREMENT_IDENTITY of the measurement that triggered the measurement report; and
  - if more than one additional measured results are to be included:
    - sort them in ascending order according to their IE "measurement identity" in the MEASUREMENT REPORT message;
- if the MEASUREMENT REPORT message was triggered by an event (i.e. not a periodical report):
  - set the IE "Event results" according to the event that triggered the report.

The UE shall:

- 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:

- the procedure ends.

## 8.4.3 Assistance Data Delivery

**Figure 59 Assistance Data Delivery**

### 8.4.3.1 General

The purpose of the assistance data delivery procedure is to transfer UE positioning related assistance data from the UTRAN to the UE.

### 8.4.3.2 Initiation

When requested by the Core Network the~~The~~ UTRAN may deliver UE positioning related assistance data with a ASSISTANCE DATA DELIVERY message, which is transmitted on the downlink DCCH using AM RLC

### 8.4.3.3 Reception of ASSISTANCE DATA DELIVERY message by the UE

Upon reception of a ASSISTANCE DATA DELIVERY message the UE shall:

- if IE "UE positioning OTDOA assistance data for UE-based" is included:
  - act as specified in subclause 8.6.7.19.2a;~~store the OTDOA assistance data;~~
  - if IE "UE positioning GPS assistance data" is included:
  - act as specified in subclause 8.6.7.19.3;~~store the GPS assistance data.~~

### 8.4.3.4 Invalid ASSISTANCE DATA DELIVERY message

If the UE receives a ASSISTANCE DATA DELIVERY message, which 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:

- transmit an RRC STATUS message on the uplink DCCH using AM RLC;
- include the IE "Identification of received message"; and
- set the IE "Received message type" to ASSISTANCE DATA DELIVERY; and
- set the IE "RRC transaction identifier" to the value of "RRC transaction identifier" in the entry for the ASSISTANCE DATA DELIVERY message in the table "Rejected transactions" in the variable TRANSACTIONS; and
- clear that entry;
- include the IE "Protocol error information" with contents set to the value of the variable PROTOCOL_ERROR_INFORMATION.
- when the RRC STATUS message has been submitted to lower layers for transmission:
  - continue with any ongoing processes and procedures as if the invalid ASSISTANCE DATA DELIVERY message has not been received.

## 8.5.11 FACH measurement occasion calculation

When in CELL_FACH state and when the variable C_RNTI is non-empty the UE in FDD mode shall perform ~~inter-frequency and inter system~~ measurements as specified in section 8.4.1.6 and 8.4.1.8 during the frame(s) with the SFN value fulfilling the following equation:

$$SFN \text{ div } N = C\_RNTI \bmod M\_REP + n * M\_REP$$

where

- N is the TTI (in number of 10ms frames) of the FACH having the largest TTI on the SCCPCH monitored by UE
- C_RNTI is the C-RNTI value of the UE stored in the variable C_RNTI
- M_REP is the Measurement Occasion cycle length. According to the equation above, a FACH Measurement Occasion of N frames will be repeated every N * M_REP frame, and $M\_REP = 2^k$.

  where,

  - k is the FACH Measurement occasion cycle length coefficient.
    The value of the FACH Measurement occasion cycle length coefficient is read in system information in "System Information Block type 11" or "System Information Block type 12" in the IE "FACH measurement occasion info".
- n = 0,1,2… as long as SFN is below its maximum value

The UE is allowed to measure on other occasions in case the UE moves "out of service" area or in case it can simultaneously perform the ordered measurements.

A UE in TDD mode shall use the frame(s) with the SFN value fulfilling the above equation for neighbour cells measurements.

### 8.6.7.1 Measurement validity

If the ~~optional~~ 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 ~~only~~ for traffic volume ~~type~~ measurement~~s~~ type and 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 ~~only~~ for traffic volume ~~type~~ measurement~~s~~ 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. After cell re-selection, the UE shall delete any ongoing intra-frequency or inter-frequency and inter-RAT type measurement associated with the variable MEASUREMENT_IDENTITY. Other measurement types shall, however, be continued regardless of cell reselection.

### 8.6.7.18a UE positioning measurement

If IE "UE positioning measurement" is received by the UE in a MEASUREMENT CONTROL message, where IE "measurement command" has the value "setup", but IE "UE positioning reporting quantity" or "CHOICE report criteria" is not received, the UE shall:

- clear all stored measurement control information related associated to this measurement identity in variable MEASUREMENT_IDENTITY;
- set the variable CONFIGURATION_INCOMPLETE to TRUE.

### 8.6.7.19 UE positioning

#### 8.6.7.19.0 UE positioning reporting criteria

If IE “UE positioning reporting criteria” is included, the UE shall,

- perform the necessary measurements and evaluate the event in the interval indicated in IE “Measurement Interval”;
- If IE “Event ID” is set to “7a” and if IE “Report first fix” is set to TRUE,
  - if the IE "Method Type" included in the variable MEASUREMENT_IDENTITY is set to "UE based":
    - act as specified in section 8.6.7.19.1b;

### 8.6.7.19.1 UE positioning reporting quantity

The UE shall:

- ignore IE "Multiple Sets";
- ignore IE "Response Time";
- if IE "Horizontal Accuracy" and/or IE "Vertical Accuracy" is included:
  - should try to achieve the requested level(s) of positioning accuracy with 67% confidence;
- if IE "Positioning Methods" is set to "Cell ID":
  - ~~perform the Rx-Tx time difference type 2 measurement on the reference cell indicated in the OTDOA assistance data;~~act as specified in section 8.6.7.19.1a;
- if the IE "Method Type" is set to "UE based":
  - act as specified in section 8.6.7.19.1b;
  - ~~if the IE "Positioning Methods" is set to "GPS":~~
    - ~~when a measurement report is triggered:~~
      - ~~include the IE "UE positioning position estimate info" in the measurement report and set the contents of the IE as follows:~~
        - ~~if the UE supports the capability to provide the GPS timing of the cell, and~~
        - ~~if the IE "GPS timing of Cell wanted" is set to true:~~
          - ~~include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD; and~~
          - ~~include the IE "Reference SFN", the IE "GPS TOW msec"; and~~
          - ~~the UE may include the IE "GPS TOW rem usec";~~
  - ~~if the IE "Positioning Methods" is set to "OTDOA":~~
    - ~~when a measurement report is triggered:~~
      - ~~include the IE "UE positioning position estimate info" in the measurement report;~~
- if the IE "Method Type" is set to "UE assisted":
  - act as specified in section 8.6.7.19.1a~~- if the IE "Positioning Methods" is set to "GPS":~~
    - ~~when a measurement report is triggered:~~
      - ~~include the IE "UE positioning GPS measured results" in the measurement report and set the contents of the IE as follows:~~

~~- if the UE supports the capability to provide the GPS timing of the cell, and~~

~~- if the IE "GPS timing of Cell wanted" is set to true:~~

~~- include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD; and~~

~~- include the IE "Reference SFN", the IE "GPS TOW msec"; and~~

~~- the UE may include the IE "GPS TOW rem usec";~~

~~- if the UE does not support the capability to provide the GPS timing of the cell:~~

~~- include the IE "GPS TOW msec";~~

~~- if the IE "Positioning Methods" is set to "OTDOA":~~

~~- when a measurement report is triggered:~~

~~- include the IE "UE positioning OTDOA measured results" in the measurement report.~~

- if the IE “Method Type” is set to “UE assisted preferred but UE based allowed” or “UE based preferred but UE assisted allowed”:

  - act either according to section 8.6.7.19.1a or 8.6.7.19.1b depending on the method type chosen by the UE.

If UE according to its capabilities supports Rx-Tx time difference type 2 measurement and if IE "Positioning Methods" is set to "Cell ID" and the IE "Measurement validity" stored in the variable MEASUREMENT_IDENTITY is other than "CELL_DCH", the UE shall:

- set the variable CONFIGURATION_INCOMPLETE to TRUE, and

- act as specified in subclause 8.4.1.4b.

The UE shall perform the following consistency check:

- if UE, according to its capabilities, does not support UE based OTDOA and if IE "Positioning Methods" is set to "OTDOA" and if IE "Method Type" is set to "UE based":

  - set the variable CONFIGURATION_INCOMPLETE to TRUE~~act as specified in subclause 8.4.1.4~~;

- if UE, according to its capabilities, does not support UE based GPS and if IE "Positioning Methods" is set to "GPS" and if IE "Method Type" is set to "UE based":

  - set the variable CONFIGURATION_INCOMPLETE to TRUE~~act as specified in subclause 8.4.1.4~~;

- if UE, according to its capabilities, does not support UE assisted GPS and if IE "Positioning Methods" is set to "GPS" and if IE "Method Type" is set to "UE assisted":

  - set the variable CONFIGURATION_INCOMPLETE to TRUE~~act as specified in subclause 8.4.1.4~~;

- if UE, according to its capabilities, does not support UE based positioning and if IE "Positioning Methods" is set to "OTDOAorGPS" and if IE "Method Type" is set to "UE based":

  - set the variable CONFIGURATION_INCOMPLETE to TRUE~~act as specified in subclause 8.4.1.4~~;

- if UE, according to its capabilities, does not support Rx-Tx time difference type 2 measurement and if IE "Positioning Methods" is set to "Cell ID":

  - set the variable CONFIGURATION_INCOMPLETE to TRUE~~act as specified in subclause 8.4.1.4~~.

### 8.6.7.19.1a UE positioning reporting for UE assisted methods

When a measurement report is triggered, and

- if higher layers indicated that the positioning request is permitted and

- if the UE was able to perform measurements on at least one neighbour cell in case of OTDOA or one satellite in case of GPS positioning, respectively, the UE shall
  - if the IE "Vertical Accuracy" is included:
    - interpret the presence of this IE to indicate that the UTRAN desires to compute a 3-dimensional position estimate.
  - if the IE "Positioning Methods" is set to "GPS":
    - include the IE "UE positioning GPS measured results" in the measurement report and set the contents of the IE as follows:
      - if the UE supports the capability to provide the GPS timing of the cell frames measurement, and
        - if the IE "GPS timing of Cell wanted" is set to TRUE:
          - perform the UE GPS timing of cell frames measurement on the reference cell indicated in the IE “UE positioning GPS reference cell info”;
          - if the UE is unable to measure the GPS timing of cell frames of the reference cell indicated in the IE “UE positioning GPS reference cell info”:
            - perform the UE GPS timing of cell frames measurement on the serving cell or on one cell of the active set;
          - include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD; and
          - include the IE "Reference SFN" and the IE "UE GPS timing of cell frames";
      - if the UE does not support the capability to provide the GPS timing of the cell, or
      - if the IE "GPS timing of Cell wanted" is set to FALSE:
        - include the IE "GPS TOW msec";
  - if the IE "Positioning Methods" is set to "OTDOA":
    - include the IE "UE positioning OTDOA measured results " in the measurement report and set the contents of the IE as follows:
      - set IE “SFN” to the SFN when the last measurement was performed
      - if the UE supports the capability to perform the Rx-Tx time difference type 2 measurement, and
        - if the UE is in CELL_DCH state:
          - if the measured value is equal to “1279.9375”:
            - set the IE “Rx-Tx time difference type 2” in IE “UE positioning OTDOA measured results” for the reference cell to “1279.8750”;
          - otherwise:
          - set the IE “Rx-Tx time difference type 2” in IE “UE positioning OTDOA measured results” for the reference cell to the measured value;
          - include the IE group “Rx-Tx time difference type 2 info” for the reference cell and for each neighbour cell listed in variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED that belongs to the active set;
      - if the UE does not support the capability to perform the Rx-Tx time difference type 2 measurement:
        - set the IE “Rx-Tx time difference type 2” in IE “UE positioning OTDOA measured results” for the reference cell to value “1279.9375” to indicate that the measurement is not supported;

- include IE group “Neighbour” for all neighbour cells listed in variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED on which the SFN-SFN observed time difference type 2 measurement could be performed;

- if IE “Positioning Methods” in the MEASUREMENT CONTROL message has been assigned to value “OTDOA or GPS”:

  - the UE may choose to either act as if IE “Positioning Methods”is set to “GPS” or “OTDOA” depending on the method chosen by the UE.

- if the IE "Positioning Methods" is set to "CELL ID":

  - if the UE supports the capability to perform the Rx-Tx time difference type 2 measurement, and

  - if the UE is in CELL_DCH state:

    - perform the Rx-Tx time difference type 2 measurement on the reference cell indicated in the IE "UE positioning OTDOA assistance data", and

    - report the measurement results back to the network in the MEASUREMENT REPORT by using IE “UE positioning OTDOA measured results” excluding any measurements on neighbour cells in this IE

- if the UE is not able to report the requestedmeasurement results, or

- if higher layers have indicated that the positioning request is not permitted, or

- if the positioning request was not processed by higher layers and timed out,

  - include IE “UE positioning error” in the MEASUREMENT REPORT and set the contents of this IE as specifiefied in section 8.6.7.19.5

### 8.6.7.19.1b UE positioning reporting for UE based methods

When a measurement report is triggered and

- if higher layers indicated that the positioning request is permitted and

  - and if the UE has been able to calculate a position, the UE shall

    - include IE “UE positioning Position Estimate Info” in the MEASUREMENT REPORT and set the contents of the IE as follows:

      - if the UE supports the capability to perform the UE GPS timing of cell frames measurement and UTRAN has requested to report the GPS timing of cell frames, the UE shall

        - perform the UE GPS timing of cell frames measurement on the reference cell indicated in the IE “UE positioning GPS reference cell info”

        - if the UE is unable to measure the GPS timing of cell frames of the reference cell indicated in the IE “UE positioning GPS reference cell info”:

          - perform the UE GPS timing of cell frames measurement on the serving cell or on one cell of the active set.

        - include the IE "Primary CPICH Info" for FDD or the IE "cell parameters id" for TDD;

        - include the SFN when the position was determined;

        - include the IE “UE GPS timing of cell frames”;

      - if the UE does not supports the capability to perform the UE GPS timing of cell frames measurement, or

      - if the IE "GPS timing of Cell wanted" is set to FALSE, the UE shall

        - include the IE “GPS TOW msec”;

- if IE “Vertical Accuracy” has been included in IE “UE positioning reporting quantity” and
  - if the IE “Vertical Accuracy” has been assigned to value “0” and
    - if the IE “Horizontal Accuracy” has been assigned a value “0”, the UE may
      - include IE “Ellipsoid point with altitude”;
    - if the IE “Horizontal Accuracy” has been assigned a value unequal to “0” and
    - if the UE has been able to calculate a 3-dimensional position, the UE shall
      - include IE “Ellipsoid point with altitude” or IE “Ellipsoid point with altitude and uncertainty ellipsoid” as the position estimate;
    - if the UE has not been able to calculate a 3-dimensional position, the UE may
      - act as if IE “Vertical Accuracy” was not included in IE “UE positioning reporting quantity”;
  - if the IE “Vertical Accuracy” has been assigned to a value unequal to “0” and
    - if the UE has been able to calculate a 3-dimensional position, the UE shall
      - include IE “Ellipsoid point with altitude and uncertainty ellipsoid” as the position estimate;
    - if the UE has not been able to calculate a 3-dimensional position, the UE shall
      - act as if IE “Vertical Accuracy” has not been included in IE “UE positioning reporting quantity”;
- if IE “Vertical Accuracy” has not been included in IE “UE positioning reporting quantity” and
  - if IE “Horizontal Accuracy” in IE “UE positioning reporting quantity” has been assigned to value “0”, the UE may:
    - include IE “Ellipsoid point”;
  - if IE “Horizontal Accuracy” in IE “UE positioning reporting quantity” has been assigned to a value unequal to 0, the UE shall
    - include either IE “Ellipsoid point with uncertainty circle” or IE “Ellipsoid point with uncertainty ellipse” or IE “Ellipsoid point with altitude and uncertainty ellipsoid” as the position estimate.

- if the UE was not able to calculate a position, or
- if higher layers have indicated that the positioning request is not permitted, or
  - if the positioning request was not processed by higher layers and timed out, - include IE “UE positioning error” in the MEASUREMENT REPORT and set the contents of this IE as specifiefied in section 8.6.7.19.5

### 8.6.7.19.2 UE positioning OTDOA assistance data for UE-assisted

If IE "UE positioning OTDOA reference cell info for UE-assisted " is received in System Information Block type 15.4 or in the MEASUREMENT CONTROL message, the UE shall update the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED accordingly. The UE shall:

- store received cell information in the UE positioning reference cell info in the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED, overwriting any existing information.

If IE "UE positioning OTDOA neighbour cell list for UE assisted " is received in System Information Block type 15.4 or in the MEASUREMENT CONTROL message, the UE shall update the variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED accordingly. The UE shall:

- store received cell information in the neighbour cell info list in the variable ~~CELL_INFO_LIST~~ UE_POSITIONING_OTDOA_DATA_UE_ASSISTED, overwriting any existing information.

If, according to its capabilities, UE does not support IPDLs and if IE "IPDL parameters" is received for the reference or any of the neighbour cells, the UE shall:

- ignore this IE.

If IE "UE positioning measurement" is received in the MEASUREMENT CONTROL message, the UE shall also perform the following consistency checks:

- if IE "Positioning Methods" is set to "OTDOA" or "Cell ID":
  - if IE "UE positioning OTDOA reference cell info for UE assisted " is not included and if UE positioning OTDOA reference cell info in variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED is empty:
    - set the variable CONFIGURATION_INCOMPLETE to TRUE;
- if IE "Positioning Methods" is set to "OTDOA":
  - if IE "UE positioning OTDOA neighbour cell list for UE assisted " is not included and if less than two neighbour cells are stored in UE positioning OTDOA neighbour cell info list in variable UE_POSITIONING_OTDOA_DATA_UE_ASSISTED:
    - set the variable CONFIGURATION_INCOMPLETE to TRUE;
  - ~~if IE "Method Type" is set to "UE based":~~
    - ~~if IE "UE positioning OTDOA reference cell info" is included and if IE "Cell Position" for the reference cell is not included:~~
      - ~~set the variable CONFIGURATION_INCOMPLETE to TRUE;~~
    - ~~if the IE "UE positioning OTDOA neighbour cell list" is included and if cell position of less than two neighbour cells of the cells included in this IE and stored in variable UE_POSITIONING_OTDOA_DATA are different and if those cell positions are not different to the one of the reference cell stored in variable UE_POSITIONING_OTDOA_DATA:~~
      - ~~set the variable CONFIGURATION_INCOMPLETE to TRUE;~~
    - ~~if the IE "UE positioning OTDOA neighbouring cell list" is included and only two neighbour cells are included or stored in variable UE_POSITIONING_OTDOA_DATA and if the IE "Round Trip Time" is neither included for the neighbour cells nor for the reference cell info:~~
      - ~~set the variable CONFIGURATION_INCOMPLETE to TRUE.~~

### 8.6.7.19.2a UE positioning OTDOA assistance data for UE-based

If IE "UE positioning OTDOA reference cell info for UE-based" is received in System Information Block type 15.5 or in the MEASUREMENT CONTROL message or in the ASSISTANCE DATA DELIVERY, the UE shall update the variable UE_POSITIONING_OTDOA_DATA_UE_BASED accordingly. The UE shall:

- store received cell information in the UE positioning reference cell info for UE based in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED, overwriting any existing information.

If IE "UE positioning OTDOA neighbour cell list for UE based" is received in System Information Block type 15.5 or in the MEASUREMENT CONTROL message or in the ASSISTANCE DATA DELIVERY, the UE shall update the variable UE_POSITIONING_OTDOA_DATA_UE_BASED accordingly. The UE shall:

- store received cell information in the neighbour cell info list for UE based in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED, overwriting any existing information.

If, according to its capabilities, UE does not support IPDLs and if IE "IPDL parameters" is received for the reference or any of the neighbour cells, the UE shall:

- ignore this IE.

If IE "UE positioning measurement" is received in the MEASUREMENT CONTROL message, the UE shall also perform the following consistency checks:

- if IE "Positioning Methods" is set to "OTDOA":
  - if IE "UE positioning OTDOA reference cell info for UE based" is not included and if UE positioning OTDOA reference cell info for UE based in variable UE_POSITIONING_OTDOA_DATA_UE_BASED is empty:
    - set the variable CONFIGURATION_INCOMPLETE to TRUE;
- if IE "Positioning Methods" is set to "OTDOA":
  - if IE "UE positioning OTDOA neighbour cell list for UE based" is not included and if less than two neighbour cells are stored in UE positioning OTDOA neighbour cell info list for UE based in variable UE_POSITIONING_OTDOA_DATA_UE_BASED:
    - set the variable CONFIGURATION_INCOMPLETE to TRUE;
  - if IE "Method Type" is set to "UE based":
    - if IE "UE positioning OTDOA reference cell info for UE based" is included and if IE "Cell Position" for the reference cell is not included:
      - set the variable CONFIGURATION_INCOMPLETE to TRUE;
    - if the IE "UE positioning OTDOA neighbour cell list for UE based" is included and if cell position of less than two neighbour cells of the cells included in this IE and stored in variable UE_POSITIONING_OTDOA_DATA_UE_BASED are different and if those cell positions are not different to the one of the reference cell stored in variable UE_POSITIONING_OTDOA_DATA_UE_BASED:
      - set the variable CONFIGURATION_INCOMPLETE to TRUE;
    - if the IE "UE positioning OTDOA neighbouring cell list for UE-based " is included and only two neighbour cells are included or stored in variable UE_POSITIONING_OTDOA_DATA_UE_BASED and if the IE "Round Trip Time" is neither included for the neighbour cells nor for the reference cell info:
      - set the variable CONFIGURATION_INCOMPLETE to TRUE.

### 8.6.7.19.3 UE positioning GPS assistance data

The UE may receive GPS assistance data in System Information Block types 15, 15.1, 15.2, or 15.3, or in the ASSISTANCE DATA DELIVERY message, or in the MEASUREMENT CONTROL message.

#### 8.6.7.19.3.1 UE positioning GPS acquisition assistance

If the IE "UE positioning GPS acquisition assistance" is included, the UE shall:

- update the variable UE_POSITIONING_GPS_DATA as follows:
  - delete all information currently stored in the IE "UE positioning GPS acquisition assistance" in the variable UE_POSITIONING_GPS_DATA;
  - store the received acquisition assistance information in the IE "UE positioning GPS acquisition assistance" in the variable UE_POSITIONING_GPS_DATA;
  - store the IE "GPS TOW msec" in the IE "UE positioning GPS acquisition assistance" in variable UE_POSITIONING_GPS_DATA anduse it as an estimate of the current GPS Time-of-Week;
- if the IEs "SFN"and "UTRAN GPS timing of cell frames" are included:
  - if the UE is able to utilise these IEs:

- store these IEs in the IE "UE positioning GPS acquisition assistance " in variable UE_POSITIONING_GPS_DATA;
- if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is not included and
  - if the UE is not in CELL_DCH state:
    - use IEs “SFN” and “UTRAN GPS timing of cell frames” to estimate the relationship between GPS time and radiointerface timing of the NODE B transmission in the serving cell;
  - if the UE is in CELL_DCH state:
    - ignore IEs “SFN” and “UTRAN GPS timing of cell frames”;
- if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is also included:
  - store this IE in the IE “UE positioning acquisition assistance” in variable UE_POSITIONING_GPS_DATA;
  - use IEs “SFN” and “UTRAN GPS timing of cell frames” to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the cell indicated by "Primary CPICH info" or "cell parameters id";

~~- store IE "GPS reference time" in the IE "UE positioning reference time" in UE_POSITIONING_GPS_DATA;~~

~~- for each satellite:~~

~~- update the variable UE_POSITIONING_GPS_DATA as follows:~~

~~- store received GPS acquisition assistance at the position indicated by the IE "Sat ID" in the IE "UE positioning GPS acquisition assistance" in the variable UE_POSITIONING_GPS_DATA, possibly overwriting any existing information in this position.~~

#### 8.6.7.19.3.2 UE positioning GPS Almanac

If the IE "UE positioning GPS Almanac" is included, ~~for each satellite~~, the UE shall:

- if the IE “SV Global Health” is included:
  - store this IE in the IE in the IE “SV Global Health” in the IE “UE positioning GPS Almanac” in variable UE_POSITIONING_GPS_DATA.
- for each satellite:
  - store received GPS almanac information at the position indicated by the IE "Sat ID" in the IE "UE positioning GPS Almanac" in the variable UE_POSITIONING_GPS_DATA, possibly overwriting any existing information in this position. [changed indentation]
  - interpret IE "Data ID" as the Data ID field contained in the indicated subframe, word 3, most significant 2 bits, as defined by [12];
  - act on the rest of the IEs in a similar manner as specified in [12].

~~- update the variable UE_POSITIONING_GPS_DATA as follows:~~

- store received GPS almanac information at the position indicated by the IE "Sat ID" in the IE "UE positioning GPS Almanac" in the variable UE_POSITIONING_GPS_DATA, possibly overwriting any existing information in this position.
- interpret IE "Data ID" as the Data ID field contained in the indicated subframe, word 3, most significant 2 bits, as defined by [12];
- act on the rest of the IEs in a similar manner as specified in [12].

#### 8.6.7.19.3.3 UE positioning D-GPS Corrections

If the IE "UE positioning GPS DGPS corrections" is included, the UE shall:

- update the variable UE_POSITIONING_GPS_DATA as follows:
  - delete all information currently stored in the IE "UE positioning GPS DGPS corrections" in the variable UE_POSITIONING_GPS_DATA; [changed indentation]
  - store the received DGPS corrections in the IE "UE positioning GPS DGPS corrections" in the variable UE_POSITIONING_GPS_DATA. [changed indentation]
- use IE "GPS TOW sec" to determine when the differential corrections were calculated;
- use IE "Status/Health" to determine the status of the differential corrections;

#### 8.6.7.19.3.3a UE positioning GPS Navigation Model

If the IE “UE positioning GPS Navigation Model” is included, for each satellite, the UE shall:

- use IE "Satellite Status” to determine if an update of IE “UE positioning GPS Ephemeris and Clock Correction parameters” has been provided for the satellite indicated by the IE “SatID”;
- if an update has been provided for this satellite
  - act as specified in subclause 8.6.7.19.3.4.

#### 8.6.7.19.3.4 UE positioning GPS Ephemeris and Clock Correction Parameters

If the IE "UE positioning GPS Ephemeris and Clock Correction parameters" is included, for each satellite, the UE shall:

- update the variable UE_POSITIONING_GPS_DATA as follows:
  - store this IE ~~received GPS ephemeris information~~ at the position indicated by the IE "Sat ID" in the IE "UE positioning GPS Navigation Model" in the variable UE_POSITIONING_GPS_DATA, possibly overwriting any existing information in this position.
- act on these GPS ephemeris and clock correction parameters in a manner similar to that specified in [12].

#### 8.6.7.19.3.5 UE positioning GPS ionospheric model

If IE "UE positioning GPS ionospheric model" is included, the UE shall:

- store this IE in the IE "UE positioning GPS ionospheric model" in variable UE_POSITIONING_GPS_DATA
- act on these GPS ionospheric model parameters in a manner similar to that specified in [12].~~.~~

#### 8.6.7.19.3.6 UE positioning GPS real-time integrity

~~The GPS real-time integrity information element specified in subclause 10.3.7.95 is primarily intended for non-differential applications. The real-time integrity of the satellite constellation is of importance as there is no differential correction data by which the UE can determine the soundness of each satellite signal. The Real-Time GPS Satellite Integrity data communicates the health of the constellation to the mobile via a list of bad satellites. The UE shall consider the data associated with the satellites identified in this IE as invalid.~~

If this list of bad satellites is included, ~~for each satellite,~~ the UE shall:

- update the variable UE_POSITIONING_GPS_DATA as follows
  - add the Sat IDs that are not yet included in the list of satellites in the IE "UE positioning GPS real time integrity" in the variable UE_POSITIONING_GPS_DATA; [changed indentation]
  - remove all Sat IDs in the list of satellites in the IE "UE positioning GPS real time integrity" in the variable UE_POSITIONING_GPS_DATA that are not included in IE UE positioning GPS real time integrity. [changed indentation]

- consider the data associated with the satellites identified in the variable UE_POSITIONING_GPS_DATA as invalid.

#### 8.6.7.19.3.7 UE positioning GPS reference time

If the IE "UE positioning GPS reference time" is included, the UE shall:

- store ~~this~~ IE "GPS Week" in "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as the current GPS week;
- store the IE "GPS TOW msec" in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA anduse it as an estimate of the current GPS Time-of-Week;
- if the IE “SFN”and IE “UTRAN GPS timing of cell frames” are included:
  - if the UE is able to utilise the IEs:
    - store these IEs in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA;
    - if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is not includedand
      - if the UE is not in CELL_DCH state:
        - use IEs “SFN” and “UTRAN GPS timing of cell frames” to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the serving cell;
      - if the UE is in CELL_DCH state:
        - ignore IEs “SFN” and “UTRAN GPS timing of cell frames”;
    - if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is also included:
      - store this IE in the IE “UE positioning GPS reference time” in variable UE_POSITIONING_GPS_DATA;
      - use IEs “SFN” and “UTRAN GPS timing of cell frames” to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the cell indicated by "Primary CPICH info" or "cell parameters id";
- if the IE “SFN-TOW Uncertainty” is included:
  - store this IE in the IE “UE positioning GPS reference time” in variable UE_POSITIONING_GPS_DATA and use it to determine if the relationship between GPS time and air-interface timing of the NODE B transmission is known to within at least 10ms;
- if the IE “$T_{UTRAN-GPS}$ drift rate” is included:
  - store this IE in the IE “UE positioning GPS reference time” in variable UE_POSITIONING_GPS_DATA and
  - may use it as an estimate of the drift rate of the NODE B clock relative to GPS time;
- if the IE “GPS TOW Assist” is included:
  - for each satellite: [indentation changed]
    - delete all information currently stored in the IE “GPS TOW Assist” ~~store received GPS TOW assist at the position indicated by the IE "Sat ID"~~ in the IE "UE positioning GPS reference time" in the variable UE_POSITIONING_GPS_DATA, ~~possibly overwriting any existing information in this position.~~ [indentation changed]
    - store the received GPS TOW Assist information in the IE “UE positioning GPS reference time” in the variable UE_POSITIONING_GPS_DATA.

#### 8.6.7.19.3.8 UE positioning GPS reference UE position

If the IE "UE positioning GPS reference UE position" is included, the UE shall:

- store this IE in the IE "UE positioning GPS reference UE position" in variable UE_POSITIONING_GPS_DATA, and.
- use it as a priori knowledge of the approximate location of the UE.

#### 8.6.7.19.3.9 UE positioning UTC model

If the IE "UE positioning GPS UTC model" is included, the UE shall:

- store this IE in the IE "UE positioning GPS UTC model" in variable UE_POSITIONING_GPS_DATA.

### ~~8.6.7.20 Void~~8.6.7.19.4 UE positioning Ciphering info

If deciphering information is received from higher layers for deciphering of GPS assistance data broadcast on system information, the UE shall:

- store the current key in IE “Current deciphering key” in variable UE_POSITIONING_GPS_DATA;
- store the next key in IE “Next deciphering key” in variable UE_POSITIONING_GPS_DATA;
- store the ciphering key flag in UE_POSITIONING_GPS_DATA.

If deciphering information is received from higher layers for deciphering of OTDOA assistance data broadcast on system information, the UE shall:

- store the current key in IE “Current deciphering key” in variable UE_POSITIONING_OTDOA_DATA_UE_BASED;
- store the next key in IE “Next deciphering key” in variable UE_POSITIONING_OTDOA_DATA_UE_BASED;
- store the ciphering key flag in UE_POSITIONING_OTDOA_DATA_UE_BASED.

If the IE "GPS Data ciphering info" is included in SIB15, the UE shall:

- select one of the two deciphering keys received and store it in UE_POSITIONING_GPS_DATA according to the following:
  - if the value of the received IE "Ciphering Key Flag" is the same as the value of the IE "Ciphering Key Flag" stored in the variable UE_POSITIONING_GPS_DATA:
    - select the current deciphering key;
  - if the value of the received IE "Ciphering Key Flag" is different from the value of the IE "Ciphering Key Flag" stored in the variable UE_POSITIONING_GPS_DATA:
    - select the next deciphering key;
- store the received IE in the variable UE_POSITIONING_GPS_DATA;
- use the selected deciphering key to decipher the broadcast UE positioning GPS information contained within the System Information Block types 15.1, 15.2 and 15.3.

If the IE "OTDOA positioning ciphering info" is included in SIB15.4, the UE shall:

- select one of the two deciphering keys and store it in UE_POSITIONING_OTDOA_DATA_UE_BASED according to the following:
  - if the value of the received IE "Ciphering Key Flag" is the same as the value of the IE "Ciphering Key Flag" stored in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED:
    - select the current deciphering key;

- if the value of the received IE "Ciphering Key Flag" is different from the value of the IE "Ciphering Key Flag" stored in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED:

  - select the next deciphering key;

- store the received IE in the variable UE_POSITIONING_OTDOA_DATA_UE_BASED;

- use the selected deciphering key to decipher the IE "OTDOA assistance data" included in the System Information Block types 15.4.

### 8.6.7.19.5 UE positioning Error

The UE shall set the contents of the IE "UE positioning Error" as follows:

- if the IE “Positioning Methods” in IE “UE positioning reporting quantity” has been assigned to value “OTDOA” and no neighbour cells could be received,

  - set IE “Error reason” to “ER1”;

- if the IE “Positioning Methods” in IE “UE positioning reporting quantity” has been assigned to value “GPS” and

  - if there were not enough GPS satellites to be received,

    - set IE “Error reason” to “ER2”;

  - if some GPS assistance data was missing,

    - set IE “Error reason” to “ER3”, and

    - if the IE ""Additional Assistance Data Request" included in the IE "UE positioning reporting quantity" stored in the variable MEASUREMENT_IDENTITY is set to TRUE;

      - include the IE GPS Additional Assistance Data Request"

  - if the UE was not able to read the SFN of the reference cell included in the IE "UE positioning GPS reference time" or in the IE “UE positioning acquisition assistance”,

    - set IE “Error reason” to “ER7”;

  - if the UE was not able to measure the requested GPS timing of cell frames measurement,

    - set IE “Error reason” to “ER8”;

- if higher layers have indicated that the positioning request is not permitted,

  - set IE “Error reason” to “ER5”

- if the positioning request was not processed by higher layers and timed out,,

  - set IE “Error reason” to “ER6”

- if none of the conditions above are fulfilled,

  - set IE "Error reason" to "ER4"

### 8.6.7.19.6 UE positioning GPS reference cell info

If IE "UE positioning GPS reference cell info" is received in the MEASUREMENT CONTROL message, the UE shall update the variable UE_POSITIONING_GPS_DATA accordingly. The UE shall:

- store received reference cell information in the IE “UE positioning GPS reference cell info” in the variable UE_POSITIONING_GPS_DATA, overwriting any existing information.

### 8.6.7.21 Intra-frequency reporting quantity for RACH reporting

If the IE " Intra-frequency reporting quantity for RACH reporting" is included, the UE shall:

- if the IE "SFN-SFN observed time difference reporting indicator" has the value "type 2":
  - act as if the value of the IE "SFN-SFN observed time difference reporting indicator" is "no reporting".

## 10.2.4 ASSISTANCE DATA DELIVERY

This message is sent by UTRAN to convey UE positioning assistance data to the UE.

RLC-SAP: AM

Logical channel: DCCH

Direction: UTRAN→UE

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| Message Type | MP | | Message Type | |
| **UE information elements** | | | | |
| RRC transaction identifier | MP | | RRC transaction identifier 10.3.3.36 | |
| Integrity check info | CH | | Integrity check info 10.3.3.16 | |
| **Measurement Information elements** | | | | |
| UE positioning OTDOA assistance data for UE-based | OP | | UE positioning OTDOA assistance data for UE-based 10.3.7.103a | |
| UE positioning GPS assistance data | OP | | UE positioning GPS assistance data 10.3.7.90 | |

### 10.2.48.8.18 System Information Block type 15

The system information block type 15 contains information useful for UE-based or UE-assisted positioning methods.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| GPS Data ciphering info | OP | | UE positioning Cipher info 10.3.7.86 | If this IE is present then the SIB types 15.1, 15.2 & 15.3 are ciphered in accordance with the Data Assistance Ciphering Algorithm specified in [18] |
| Reference position | MP | | Ellipsoid point with altitude and uncertainty ellipsoid 10.3.8.4c | approximate position where the UE is located |
| GPS reference time | MP | | UE positioning GPS reference time 10.3.7.96 | |
| Satellite information | OP | 1 to <maxSat> | | This IE is present whenever bad (failed/failing) satellites are detected by UTRAN [18]. |
| >BadSatID | MP | | Enumerated( 0..63) | |

#### 10.2.48.8.18.1 System Information Block type 15.1

The system information block type 15.1 contains information useful for UE positioning DGPS Corrections. The DGPS Corrections message contents are based on a Type-1 message of DGPS specified in [13].

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| DGPS corrections | MP | | UE positioning GPS DGPS corrections 10.3.7.91 | |

#### 10.2.48.8.18.2 System Information Block type 15.2

The system information block type 15.2 contains information useful for GPS Navigation Model. These IE fields are based on information extracted from the subframes 1 to 3 of the GPS navigation message [12].

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| Transmission TOW | MP | | Integer (0..604799) | The approximate GPS time-of-week when the message is broadcast.<br>in seconds |
| SatID | MP | | Enumerated( 0..63) | Satellite ID |
| GPS Ephemeris and Clock Correction Parameters | MP | | UE positioning GPS Ephemeris and Clock Correction parameters 10.3.7.91a | |

### 10.2.48.8.18.3 System Information Block type 15.3

The system information block type 15.3 contains information useful for ionospheric delay, UTC offset, and Almanac. These IEs contain information extracted from the subframes 4 and 5 of the GPS navigation message, [12].

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| Transmission TOW | MP | | Integer (0..604799) | The approximate GPS time-of-week when the message is broadcast.<br>in seconds |
| GPS Almanac and Satellite Health | OP | | UE positioning GPS almanac 10.3.7.89 | |
| GPS ionospheric model | OP | | UE positioning GPS ionospheric model 10.3.7.92 | |
| GPS UTC model | OP | | UE positioning GPS UTC model 10.3.7.97 | |
| SatMask | CV-*Almanac* | | Bit string(1..32) | indicates the satellites that contain the pages being broadcast in this data set |
| LSB TOW | CV-*Almanac* | | Bit string(8) | |

| Condition | Explanation |
|---|---|
| *Almanac* | This IE is mandatory present if the IE "GPS Almanac and Satellite Health" is present |

### 10.2.48.8.18.4 System Information Block type 15.4

The system information block type 15.4 contains ciphering information for SIB 15.5 and information useful for ~~OTDOA based~~ UE-assisted OTDOA Positioning method.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| OTDOA Data ciphering info | OP | | UE positioning Ciphering info 10.3.7.86 | If this IE is present then the the System Information Block 15.5 ~~IE "OTDOA Assistance Data"~~ is ciphered in accordance with the Data Assistance Ciphering Algorithm specified in [18] |
| OTDOA assistance data for UE-assisted | MP | | UE positioning OTDOA assistance data for UE-assisted 10.3.7.103 | |

10.2.48.8.18.4a System Information Block type 15.5

The system information block type 15.5 contains information useful for OTDOA based UE Positioning method.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| OTDOA assistance data for UE-based | MP | | UE positioning OTDOA assistance data for UE-based 10.3.7.103a | |

## 10.3.3.45 UE positioning capability

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| Standalone location method(s) supported | MP | | Boolean | Defines if a UE can measure its location by some means unrelated to UTRAN<br>TRUE means supported |
| UE based OTDOA supported | MP | | Boolean | TRUE means supported |
| Network Assisted GPS support | MP | | Enumerated ('Network based', 'UE based', 'Both', 'None') | Defines if the UE supports network based or UE based GPS methods. |
| Support for UE GPS timing of cell frames measurement~~GPS reference time capable~~ | MP | | Boolean | Defines if a UE has the capability to perform the UE GPS timing of cell frames measurement ~~measure GPS reference time as defined in~~ [7].<br>TRUE means capable |
| Support for IPDL | MP | | Boolean | Defines if a UE has the capability to use IPDL to enhance its 'SFN-SFN observed time difference –type 2' measurement.<br>TRUE means supported |
| Support for Rx-Tx time difference type2 measurement | MP | | Boolean | TRUE means supported |

### 10.3.7.51 Measurement validity

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| UE state | MP | | Enumerated( CELL_DCH, all states except CELL_DCH, all states) | ~~Indicates the states, in which measurement reporting shall be conducted.~~<br>~~The values 'all states except CELL_DCH' and 'all states' are used for measurement type 'traffic volume reporting'.~~ |

## 10.3.7.86 UE positioning Ciphering info

This IE contains information for the ciphering of UE positioning assistance data broadcast in System Information.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| Ciphering Key Flag | MP | | Bit string(1) | ~~See note 1~~ |
| Ciphering Serial Number | MP | | Integer(0..65 535) | The serial number used in the DES ciphering algorithm |

~~NOTE 1: The UE always receives two (2) cipher keys during the location update procedure. One of the keys is time-stamped to be current one and the other is time-stamped to be the next one. Thus, the UE always has two cipher keys in memory. The Cipher Key Change Indicator in this broadcast message instructs the UE whether to use current or next cipher key for deciphering the received broadcast message. The UE shall interpret this IE as follows:~~

~~- **Ciphering Key Flag**(previous message) = **Ciphering Key Flag**(this message) => Deciphering Key not changed~~

~~- **Ciphering Key Flag**(previous message) <> **Ciphering Key Flag**(this message) => Deciphering Key changed~~

## 10.3.7.87 UE positioning Error

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| Error reason | MP | | Enumerated( ER1, ER2, ER3, ER4, ER5, ER6, ER7, ER8) | Note 1 |
| GPS Additional Assistance Data Request | OP | | UE positioning GPS Additional Assistance Data Request 10.3.7.88a | |

NOTE 1: The following table gives the mapping of the IE "Error reason"

| Value | Indication |
|---|---|
| ER1 | There were not enough cells to be received ~~when performing mobile-based OTDOA-IPDL.~~ |
| ER2 | There were not enough GPS satellites to be received~~, when performing UE-based GPS location.~~ |
| ER3 | ~~Location calculation~~ UE Positioning assistance data missing. |
| ~~ER4~~ | ~~Requested method not supported.~~ |
| ER4~~5~~ | Undefined error. |
| ER5~~6~~ | ~~Location~~ UE positioning request denied by ~~the user.~~upper layers |
| ER6~~7~~ | UE positioning~~Location~~ request not processed by ~~the user~~ upper layers and timeout |
| ER7~~8~~ | UE was not able to read the SFN of the reference cell~~Reference cell for GPS is not the serving cell~~ |
| ER8 | UE was not able to accomplish the GPS timing of cell frames measurement. |

## 10.3.7.88 UE positioning GPS acquisition assistance

This IE contains parameters that enable fast acquisition of the GPS signals in UE-assisted GPS positioning.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| GPS TOW msec | MP | | Integer(0..6.048*10^8-1) | GPS Time of Week in milliseconds)rounded down to the nearest millisecond unit |
| ~~CHOICE *Reference Time*~~ | ~~MP~~ | | | |
| >UTRAN reference time | OP | | | ~~GPS Time of Week counted in microseconds, given as GPS TOW in milliseconds and GPS TOW remainder in microseconds, UTRAN reference time = 1000 * GPS TOW msec + GPS TOW rem usec~~ |
| >UTRAN GPS timing of cell frames | MP | | Integer(0 ... 2322431999999) | GPS timing of cell frames in steps of 1chip |
| ~~>>GPS TOW msec~~ | ~~MP~~ | | ~~Integer(0..6.048*10^8-1)~~ | ~~GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit)~~ |
| ~~>>GPS TOW rem usec~~ | ~~MP~~ | | ~~Integer(0..999)~~ | ~~GPS Time of Week in microseconds MOD 1000.~~ |
| >>CHOICE *mode* | | | | |
| >>>FDD | | | | |
| >>>>Primary CPICH Info | MP~~OP~~ | | Primary CPICH Info 10.3.6.60 | Identifies the reference cell for the GPS TOW-SFN relationship |
| >>>TDD | | | | |
| >>>>cell parameters id | MP~~OP~~ | | Cell parameters id 10.3.6.9 | Identifies the reference cell for the GPS TOW-SFN relationship |
| >>SFN | MP | | Integer(0..4095) | The SFN which the UTRAN GPS timing of cell frames time stamps |
| ~~>GPS reference time only~~ | | | | |
| ~~>>GPS TOW msec~~ | ~~MP~~ | | ~~Integer(0..6.048*10^8-1)~~ | ~~GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit).~~ |
| Satellite information | MP | 1 to <maxSat> | | |
| >SatID | MP | | Integer (0..63) | |
| >Doppler ($0^{th}$ order term) | MP | | Real(-5120..5117.5 by step of 2.5) | Hz |
| >Extra Doppler | OP | | | |
| >>Doppler ($1^{st}$ order term) | MP | | Real (-0.966..0.483 by step of 0.023) | Scaling factor 1/42 |
| >>Doppler Uncertainty | MP | | Enumerated (12.5,25,50, 100,200) | Hz |
| >Code Phase | MP | | Integer(0..1022) | Chips, specifies the centre of the search window |
| >Integer Code Phase | MP | | Integer(0..19) | 1023 chip segments |
| >GPS Bit number | MP | | Integer(0..3) | Specifies GPS bit number (20 1023 chip segments) |
| >Code Phase Search Window | MP | | Integer(1023,1,2,3,4,6,8,12,16,24,32,48,64,96,128, 192) | Specifies the width of the search window. |
| >Azimuth and Elevation | OP | | | |
| >>Azimuth | MP | | Real(0..348. | Degrees |

| | | | | |
|---|---|---|---|---|
| | | | 75 by step of 11.25) | |
| >>Elevation | MP | | Real(0..78.75 by step of 11.25) | Degrees |

| CHOICE *Reference time* | Condition under which the given *reference time* is chosen |
|---|---|
| UTRAN reference time | The reference time is relating GPS time to UTRAN time (SFN) |
| GPS reference time only | The time gives the time for which the location estimate is valid |

## 10.3.7.88a UE positioning GPS Additional Assistance Data Request

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| Almanac | MP | | Boolean | TRUE means requested |
| UTC Model | MP | | Boolean | TRUE means requested |
| Ionospheric model | MP | | Boolean | TRUE means requested |
| Navigation Model | MP | | Boolean | TRUE means requested |
| DGPS Corrections | MP | | Boolean | TRUE means requested |
| Reference Location | MP | | Boolean | TRUE means requested |
| Reference Time | MP | | Boolean | TRUE means requested |
| Acquisition Assistance | MP | | Boolean | TRUE means requested |
| Real-Time Integrity | MP | | Boolean | TRUE means requested |
| Navigation Model Additional data | CV-*Navigation Model* | | | this IE is present only if "Navigation Model" is set to TRUE otherwise it is absent |
| >GPS Week | MP | | Integer (0..1023) | |
| >GPS_Toe | MP | | Integer (0..167) | GPS time of ephemeris in hours of the latest ephemeris set contained by the UE |
| >T-Toe limit | MP | | Integer (0..10) | ephemeris age tolerance of the UE to UTRAN in hours |
| >Satellites list related data | MP | 0 to <maxSat> | | |
| >>SatID | MP | | Integer (0..63) | |
| >>IODE | MP | | Integer (0..255) | Issue of Data Ephemeris for SatID |

## 10.3.7.89 UE positioning GPS almanac

This IE contains a reduced-precision subset of the ephemeris and clock correction parameters.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| $WN_a$ | MP | | Bit string(8) | |
| Satellite information | MP | 1 to <maxSat> | | |
| >DataID | MP | | Integer(0..3) | See [12] |
| >SatID | MP | | Enumerated( 0..63) | Satellite ID |
| >e | MP | | Bit string(16) | Eccentricity [12] |
| >$t_{oa}$ | MP | | Bit string(8) | Reference Time of AlmanacEphemeris [12] |
| >δi | MP | | Bit string(16) | |
| >OMEGADOT | MP | | Bit string(16) | Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles/sec) [12] |
| >SV Health | MP | | Bit string(8) | |
| >$A^{1/2}$ | MP | | Bit string(24) | Semi-Major Axis (meters)$^{1/2}$ [12] |
| >$OMEGA_0$ | MP | | Bit string(24) | Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles) [12] |
| >$M_0$ | MP | | Bit string(24) | Mean Anomaly at Reference Time (semi-circles) [12] |
| >ω | MP | | Bit string(24) | Argument of Perigee (semi-circles) [12] |
| >$af_0$ | MP | | Bit string(11) | apparent clock correction [12] |
| >$af_1$ | MP | | Bit string(11) | apparent clock correction [12] |
| SV Global Health | OP | | Bit string(364) | This enables GPS time recovery and possibly extended GPS correlation intervals. It is specified in page 25 of subframes 4 and 5 [12] |

### 10.3.7.90 UE positioning GPS assistance data

This IE contains GPS assistance data.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| UE positioning GPS reference time | OP | | UE positioning GPS reference time 10.3.7.96 | |
| UE positioning GPS reference UE position | OP | | Ellipsoid point with altitude and uncertainty ellipsoid 10.3.8.4c | A priori knowledge of UE 3-D position. |
| UE positioning GPS DGPS corrections | OP | | UE positioning GPS DGPS corrections 10.3.7.91 | |
| UE positioning GPS navigation model | OP | | UE positioning GPS navigation model 10.3.7.94 | |
| UE positioning GPS ionospheric model | OP | | UE positioning GPS ionospheric model 10.3.7.92 | |
| UE positioning GPS UTC model | OP | | UE positioning GPS UTC model 10.3.7.97 | |
| UE positioning GPS almanac | OP | | UE positioning GPS almanac 10.3.7.89 | |
| UE positioning GPS acquisition assistance | OP | | UE positioning GPS acquisition assistance 10.3.7.88 | |
| UE positioning GPS real-time integrity | OP | | UE positioning GPS real-time integrity 10.3.7.95 | |
| UE positioning GPS reference cell info | OP | | UE positioning GPS reference cell info 10.3.7.95a | Identifies reference cell associated with request for UE GPS timing of cell frames measurement |

10.3.7.90a Void

## 10.3.7.91 UE positioning GPS DGPS corrections

This IE contains DGPS corrections to be used by the UE.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| GPS TOW sec | MP | | Integer(0..604799) | seconds<br>GPS time-of-week when the DGPS corrections were calculated |
| Status/Health | MP | | Enumerated( UDRE scale 1.0, UDRE scale 0.75, UDRE scale 0.5, UDRE scale 0.3, UDRE scale 0.2, UDRE scale 0.1, no data, invalid data) | |
| DGPS~~DPGS~~ information | CV-*Status/Health* | 1 to <maxSat> | | If the Cipher information is included these fields are ciphered. |
| >SatID | MP | | Enumerated (0…63) | |
| >IODE | MP | | Integer(0..255) | |
| >UDRE | MP | | Enumerated( UDRE ≤ 1.0 m, 1.0m < UDRE ≤ 4.0m, 4.0m < UDRE ≤ 8.0m, 8.0m < UDRE) | The value in this field shall be multiplied by the UDRE Scale Factor in the IE Status/Health to determine the final UDRE estimate for the particular satellite. |
| >PRC | MP | | Real(-655.04..655.04 by step of 0.32) | meters (different from [13]) |
| >RRC | MP | | Real(-4.064..4.064 by step of 0.032) | meters/sec (different from [13]) |
| >Delta PRC2 | MP | | Integer(-127..127) | meters |
| >Delta RRC2 | MP | | Real(-0.224..0.224 by step of 0.032) | meters/sec |
| >Delta PRC3 | CV-*DCCH* | | Integer(-127..127) | meters |
| >Delta RRC3 | CV-*DCCH* | | Real(-0.224..0.224 by step of 0.032) | meters/sec |

| Condition | Explanation |
|---|---|
| *Status/Health* | This IE is mandatory present if "status" is not equal to "no data" or "invalid data", otherwise the IE is not needed. |
| *DCCH* | This IE is mandatory present if the IE " UE positioning GPS DGPS corrections" it is included in the point-to-point message. It is optional if the IE "UE positioning GPS DGPS corrections" is included in the broadcast message. Otherwise it is not needed. |

### 10.3.7.91a UE positioning GPS Ephemeris and Clock Correction parameters

This IE contains information for GPS ephemeris and clock correction.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| C/A or P on L2 | MP | | Bit string(2) | Code(s) on L2 Channel [12] |
| URA Index | MP | | Bit string(4) | User Range Accuracy [12] |
| SV Health | MP | | Bit string(6) | [12] |
| IODC | MP | | Bit string(10) | Issue of Data, Clock [12] |
| L2 P Data Flag | MP | | Bit string(1) | [12] |
| SF 1 Reserved | MP | | Bit string(87) | [12] |
| $T_{GD}$ | MP | | Bit string(8) | Estimated group delay differential [12] |
| $t_{oc}$ | MP | | Bit string(16) | apparent clock correction [12] |
| $af_2$ | MP | | Bit string(8) | apparent clock correction [12] |
| $af_1$ | MP | | Bit string(16) | apparent clock correction [12] |
| $af_0$ | MP | | Bit string(22) | apparent clock correction [12] |
| $C_{rs}$ | MP | | Bit string(16) | Amplitude of the Sine Harmonic Correction Term to the Orbit Radius (meters) [12] |
| $\Delta n$ | MP | | Bit string(16) | Mean Motion Difference From Computed Value (semi-circles/sec) [12] |
| $M_0$ | MP | | Bit string(32) | Mean Anomaly at Reference Time (semi-circles) [12] |
| $C_{uc}$ | MP | | Bit string(16) | Amplitude of the Cosine Harmonic Correction Term To The Argument Of Latitude (radians) [12] |
| e | MP | | Bit string(32) | c |
| $C_{us}$ | MP | | Bit string(16) | Amplitude of the Sine Harmonic Correction Term To The Argument Of Latitude (radians) [12] |
| $(A)^{1/2}$ | MP | | Bit string(32) | Semi-Major Axis (meters)$^{1/2}$ [12] |
| $t_{oe}$ | MP | | Bit string(16) | Reference Time Ephemeris [12] |
| Fit Interval Flag | MP | | Bit string(1) | [12] |
| AODO | MP | | Bit string(5) | Age Of Data Offset [12] |
| $C_{ic}$ | MP | | Bit string(16) | Amplitude of the Cosine Harmonic Correction Term To The Angle Of Inclination (radians) [12] |
| $OMEGA_0$ | MP | | Bit string(32) | Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles) [12] |
| $C_{is}$ | MP | | Bit string(16) | Amplitude of the Sine Harmonic Correction Term To The Angle Of Inclination (radians) [12] |
| $i_0$ | MP | | Bit string(32) | Inclination Angle at Reference Time (semi-circles) [12] |
| $C_{rc}$ | MP | | Bit string(16) | Amplitude of the Cosine Harmonic Correction Term to the Orbit Radius (meters) [12] |
| $\omega$ | MP | | Bit string(32) | Argument of Perigee (semi-circles) [12] |
| OMEGAdot | MP | | Bit string(24) | Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles/sec) [12] |
| Idot | MP | | Bit string(14) | Rate of Inclination Angle (semi-circles/sec) [12] |

## 10.3.7.92 UE positioning GPS ionospheric model

The IE contains fields needed to model the propagation delays of the GPS signals through the ionosphere.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| $\alpha_0$ | MP | | Bit string(8) | Note 1 |
| $\alpha_1$ | MP | | Bit string(8) | Note 1 |
| $\alpha_2$ | MP | | Bit string(8) | Note 1 |
| $\alpha_3$ | MP | | Bit string(8) | Note 1 |
| $\beta_0$ | MP | | Bit string(8) | Note 2 |
| $\beta_1$ | MP | | Bit string(8) | Note 2 |
| $\beta_2$ | MP | | Bit string(8) | Note 2 |
| $\beta_3$ | MP | | Bit string(8) | Note 2 |

NOTE 1: The parameters αn are the coefficients of a cubic equation representing the amplitude of the vertical delay [12].

NOTE 2: The parameters βn are the coefficients of a cubic equation representing the period of the ionospheric model [12].

### 10.3.7.93 UE positioning GPS measured results

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| CHOICE *Reference Time* | MP | | | |
| >UTRAN reference time | | | | |
| >>UE GPS timing of cell frames | MP | | Integer(0..3715891199 9999 | GPS Time of Week in units of 1/16th UMTS chips according to [19] |
| >>CHOICE *mode* | MP~~OP~~ | | | |
| >>>FDD | | | | |
| >>>>Primary CPICH Info | MP | | Primary CPICH Info 10.3.6.60 | Identifies the reference cell for the GPS TOW-SFN relationship |
| >>>TDD | | | | |
| >>>>cell parameters id | MP | | Cell parameters id 10.3.6.9 | Identifies the reference cell for the GPS TOW-SFN relationship |
| >>Reference SFN | MP~~OP~~ | | Integer(0..4095) | The SFN for which the location is valid. If UE GPS timing of cell frames is included this is also the SFN which is time stamped |
| >GPS reference time only | | | | |
| >>GPS TOW msec | MP | | Integer(0..6.048*10^8-1) | GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit). This time is the GPS TOW measured by the UE. ~~If the Reference SFN field is present it is the ms flank closest to the beginning of that frame. GPS Time of Week in microseconds = 1000 * GPS TOW msec + GPS TOW rem usec~~ |
| ~~GPS TOW rem usec~~ | ~~OP~~ | | ~~Integer(0..999)~~ | ~~GPS Time of Week in microseconds MOD 1000.~~ |
| Measurement Parameters | MP | 1 to <maxSat> | | |
| >Satellite ID | MP | | Enumerated(0..63) | |
| >$C/N_o$ | MP | | Integer(0..63) | the estimate of the carrier-to-noise ratio of the received signal from the particular satellite used in the measurement. It is given in unites of dB-Hz (typical levels will be in the range of 20 – 50 dB-Hz). |
| >Doppler | MP | | Integer(-32768..32768) | Hz, scale factor 0.2. |
| >Whole GPS Chips | MP | | Integer(0..1023~~3~~) | Unit in GPS chips |
| >Fractional GPS Chips | MP | | Integer(0..($2^{10}$-1)) | Scale factor $2^{-10}$ |
| >Multipath Indicator | MP | | Enumerated(NM, low, medium, high) | See note 1 |
| >Pseudorange RMS Error | MP | | Enumerated(range index 0..range index 63) | See note 2 |

NOTE 1: The following table gives the mapping of the multipath indicator field.

| Value | Multipath Indication |
|---|---|
| NM | Not measured |
| Low | MP error < 5m |
| Medium | 5m < MP error < 43m |
| High | MP error > 43m |

NOTE 2: The following table gives the bitmapping of the Pseudorange RMS Error field.

| Range Index | Mantissa | Exponent | Floating-Point value, $x_i$ | Pseudorange value, P |
|---|---|---|---|---|
| 0 | 000 | 000 | 0.5 | P < 0.5 |
| 1 | 001 | 000 | 0.5625 | 0.5 <= P < 0.5625 |
| I | X | Y | $0.5 * (1 + x/8) * 2^y$ | $x_{i-1}$ <= P < $x_i$ |
| 62 | 110 | 111 | 112 | 104 <= P < 112 |
| 63 | 111 | 111 | -- | 112 <= P |

## 10.3.7.94 UE positioning GPS navigation model

This IE contain information required to manage the transfer of precise navigation data to the GPS-capable UE.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| Satellite information | MP | 1 to <maxSat> | | |
| >SatID | MP | | Enumerated( 0..63) | Satellite ID |
| >Satellite Status | MP | | Enumerated( NS_NN, ES_SN, ES_NN, REVD) | See note 1 |
| >GPS Ephemeris and Clock Correction parameters | CV-*Satellite status* | | UE positioning GPS Ephemeris and Clock Correction parameters 10.3.7.91a | |

NOTE 1: The UE shall interpret enumerated symbols as follows.

| Value | Indication |
|---|---|
| NS_NN | New satellite, new Navigation Model |
| ES_SN | Existing satellite, same Navigation Model |
| ES_NN | Existing satellite, new Navigation Model |
| REVD | Reserved |

| Condition | Explanation |
|---|---|
| *Satellite status* | The IE is not needed if the IE "Satellite status" is ES_SN and mandatory present otherwise. |

## 10.3.7.95 UE positioning GPS real-time integrity

This IE contains parameters that describe the real-time status of the GPS constellation.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| Satellite information | MP | 1 to <maxSat> | | |
| >BadSatID | MP | | Enumerated( 0..63) | |

## 10.3.7.95a UE positioning GPS reference cell info

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| CHOICE *mode* | MP | | | |
| >FDD | | | | |
| >>Primary CPICH info | MP | | Primary CPICH info 10.3.6.60 | |
| >TDD | | | | |
| >>cell parameters ID | MP | | Cell parameters id 10.3.6.9 | |

## 10.3.7.96 UE positioning GPS reference time

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| GPS Week | MP | | Integer(0..1023) | |
| GPS TOW msec | MP | | Integer(0..6.048*10^8-1) | GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit). |
| UTRAN GPS reference time | OP | | | |
| >UTRAN GPS timing of cell frames | MP | | Integer(0..2322431999999) | UTRAN GPS timing of cell frames in steps of 1/16th chips |
| ~~GPS TOW rem usec~~ | ~~OP~~ | | ~~Integer(0..999)~~ | ~~GPS Time of Week in microseconds MOD 1000. GPS Time of Week in microseconds = 1000 * GPS TOW msec + GPS TOW rem usec~~ |
| >CHOICE *mode* | OP | | | |
| >>FDD | | | | |
| >>>Primary CPICH Info | MP | | Primary CPICH Info 10.3.6.60 | Identifies the reference cell for the GPS TOW-SFN relationship |
| >>TDD | | | | |
| >>>cell parameters id | MP | | Cell parameters id 10.3.6.9 | Identifies the reference cell for the GPS TOW-SFN relationship |
| >SFN | MP~~OP~~ | | Integer(0..4095) | The SFN which the UTRAN GPS timing of cell frames ~~GPS TOW~~ time stamps. ~~SFN and GPS TOW msec and GPS TOW rem usec are included if relation GPS TOW/SFN is known to at least 10 µs.~~ |
| SFN-TOW Uncertainty | OP | | Enumerated (lessThan10, moreThan10) | This field indicates the uncertainty of the relation GPS TOW/SFN. lessThan10 means the relation is accurate to at least 10 ms. |
| $T_{UTRAN-GPS}$ drift rate~~Node B Clock Drift~~ | OP~~OP~~ | | Integer (0, 1, 2, 5, 10, 15, 25, 50, -1, -2, -5, -10, -15, -25, -50)~~Real(-0.09375..0.09375 by step of 0.0125)~~ | in 1/256 chips per sec ~~µ sec/sec (ppm)~~ |
| GPS TOW Assist | OP | 1 to <maxSat> | | |
| >SatID | MP | | Enumerated(0..63) | |
| >TLM Message | MP | | Bit string(14) | |
| >TLM Reserved | MP | | Bit string(2) | |
| >Alert | MP | | Boolean | |
| >Anti-Spoof | MP | | Boolean | |

## 10.3.7.97 UE positioning GPS UTC model

The UTC Model field contains a set of parameters needed to relate GPS time to Universal Time Coordinate (UTC).

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| $A_1$ | MP | | Bit string(24) | sec/sec [12] |
| $A_0$ | MP | | Bit string(32) | seconds [12] |
| $t_{ot}$ | MP | | Bit string(8) | seconds [12] |
| $WN_t$ | MP | | Bit string(8) | weeks [12] |
| $\Delta t_{LS}$ | MP | | Bit string(8) | seconds [12] |
| $WN_{LSF}$ | MP | | Bit string(8) | weeks [12] |
| DN | MP | | Bit string(8) | days [12] |
| $\Delta t_{LSF}$ | MP | | Bit string(8) | seconds [12] |

## 10.3.7.98 UE positioning IPDL parameters

This IE contains parameters for the IPDL mode. The use of this parameters is described in [29].

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description | Version |
|---|---|---|---|---|---|
| CHOICE *mode* | | | | | REL-4 |
| >FDD | | | | | REL-4 |
| >>IP spacing | MP | | Integer(5,7,10,15,20,30,40,50) | See [29] | |
| >>IP length | MP | | Integer(5,10) | See [29] | |
| >>IP offset | MP | | Integer(0..9) | Relates the BFN and SFN, should be same as T_cell defined in [10]; See [29] | |
| >>Seed | MP | | Integer(0..63) | See [29] | |
| >TDD | | | | | REL-4 |
| >>IP spacing | MP | | Integer(30,40,50,70,100) | See [33] | REL-4 |
| >>IP_Start | MP | | Integer(0..4095) | See [33] | REL-4 |
| >>IP_Slot | MP | | Integer(0..14) | See [33] | REL-4 |
| >>IP_PCCPCH | CV-*channel* | | Boolean | See [33] | REL-4 |
| Burst mode parameters | OP | | | | |
| >Burst Start | MP | | Integer(0..15) | See [29] and [33] | |
| >Burst Length | MP | | Integer(10..25) | See [29] and [33] | |
| >Burst freq | MP | | Integer(1..16) | See [29] and [33] | |

| Condition | Explanation |
|---|---|
| *channel* | This IE is present only if the idle slot carries the PCCPCH |

### 10.3.7.99 UE positioning measured results

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| UE positioning OTDOA measured results | OP | | UE positioning OTDOA measured results 10.3.7.105 | |
| UE positioning Position estimate info | OP | | UE positioning Position estimate info 10.3.7.109 | |
| UE positioning GPS measured results | OP | | UE positioning GPS measured results 10.3.7.93 | |
| UE positioning error | OP | | UE positioning error 10.3.7.87 | Included if UE positioning error occurred |

## 10.3.7.100 UE positioning measurement

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| UE positioning reporting quantity | MP | | UE positioning reporting quantity 10.3.7.111 | |
| Measurement validity | OP | | Measurement validity 10.3.7.51 | |
| CHOICE *reporting criteria* | MP | | | |
| >UE positioning reporting criteria | | | UE positioning reporting criteria 10.3.7.110 | |
| >Periodical reporting criteria | | | Periodical reporting criteria 10.3.7.53 | |
| >No reporting | | | | (no data)<br>Chosen when this measurement only is used as additional measurement to another measurement |
| UE positioning OTDOA assistance data for UE-assisted | ~~CV-OTDOA~~OP | | UE positioning OTDOA assistance data for UE-assisted 10.3.7.103 | |
| UE positioning OTDOA assistance data for UE-based | OP | | UE positioning OTDOA assistance data for UE-based 10.3.7.103a | |
| UE positioning GPS assistance data | OP | | UE positioning GPS assistance data 10.3.7.90 | |

| ~~Condition~~ | ~~Explanation~~ |
|---|---|
| ~~*OTDOA*~~ | ~~This IE is mandatory present if the IE "Positioning method" is set to "OTDOA" or "OTDOA or GPS" and not needed otherwise.~~ |

## 10.3.7.101 UE positioning measurement event results

This IE contains the measurement event results that are reported to UTRAN for UE positioning measurements.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| CHOICE *Event ID* | MP | | | |
| >7a | | | | |
| >>UE positioning Position estimate info | MP | | UE positioning Position estimate info 10.3.7.109 | |
| >7b | | | | |
| >>UE positioning OTDOA measured results~~ment~~ | MP | | UE positioning OTDOA measured reults~~ment~~ 10.3.7.105 | |
| >7c | | | | |
| >>UE positioning GPS measuremed results~~nt~~ | MP | | UE positioning GPS measureme d results~~nt~~ 10.3.7.93 | |

## 10.3.7.102 Void

## 10.3.7.103 UE positioning OTDOA assistance data for UE-assisted

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| UE positioning OTDOA reference cell info for UE-assisted | OP | | UE positioning OTDOA reference cell info 10.3.7.108 | |
| UE positioning OTDOA neighbour cell list for UE-assisted | OP | 1 to <maxCellMeas> | | |
| >UE positioning OTDOA neighbour cell info for UE-assisted | MP | | UE positioning OTDOA neighbour cell info 10.3.7.106 | |

## 10.3.7.103a UE positioning OTDOA assistance data for UE-based

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| UE positioning OTDOA reference cell info for UE-based | OP | | UE positioning OTDOA reference cell info for UE-based 10.3.7.108a | |
| UE positioning OTDOA neighbour cell list for UE-based | OP | 1 to <maxCellMeas> | | |
| >UE positioning OTDOA neighbour cell info for UE-based | MP | | UE positioning OTDOA neighbour cell info for UE-based 10.3.7.106a | |

## 10.3.7.104 Void

## 10.3.7.105 UE positioning OTDOA measured results~~ment~~

The purpose of the OTDOA Measurement Information element is to provide OTDOA measurements of signals sent from the reference and neighbour cells.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| SFN | MP | | Integer(0..4095) | SFN during which the last measurement was performed |
| CHOICE *mode* | | | | |
| >FDD | | | | |
| >>Reference cell id | MP | | Primary CPICH info 10.3.6.60 | |
| >>UE Rx-Tx time difference type 2 info | MP | | | |
| >>>UE Rx-Tx time difference type 2 | MP | | UE Rx-Tx time difference type 2 10.3.7.84 | |
| >>>UE positioning OTDOA quality | MP | | UE positioning OTDOA quality 10.3.7.107 | Quality of the UE Rx-Tx time difference type 2 measurement from the reference cell. |
| >TDD | | | | (no data) |
| >>Reference cell id | MP | | Cell parameters ID 10.3.6.9 | |
| Neighbours | MP | 0 to <maxCellMeas> | | |
| >CHOICE *mode* | MP | | | |
| >>FDD | | | | |
| >>>Neighbour Identity | MD | | Primary CPICH info 10.3.6.60 | Default value is the same as in the first set of multiple sets. |
| >>>Frequency info | MD | | Frequency info 10.3.6.36 | Default value is the existing value of frequency information |
| >>>UE Rx-Tx time difference type 2 info | OP | | | Included if the neighbour is in the active set |
| >>>>UE Rx-Tx time difference type 2 | MP | | UE Rx-Tx time difference type 2 10.3.7.84 | |
| >>>>UE positioning OTDOA quality | MP | | UE positioning OTDOA quality 10.3.7.107 | Quality of the UE Rx-Tx time difference type 2 measurement from the neighbour cell. |
| >>TDD | | | | |
| >>>Cell and Channel ID | MD | | Cell and Channel Identity info 10.3.6.8a | Default value is the same as in the first set of multiple sets. |
| >UE positioning OTDOA quality | MP | | UE positioning OTDOA quality 10.3.7.107 | Quality of the SFN-SFN observed time difference type 2 measurement from the neighbour cell. |
| >SFN-SFN observed time difference type 2 | MP | | SFN-SFN observed time difference 10.3.7.63 | Gives the timing relative to the reference cell. Only type 2 is allowed. |

### 10.3.7.106 UE positioning OTDOA neighbour cell info

This IE gives approximate cell timing in order to decrease the search window., ~~as well as the cell locations and fine cell timing for UE based OTDOA.~~

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| CHOICE *mode* | MP | | | |
| >FDD | | | | |
| >>Primary CPICH info | MP | | Primary CPICH info 10.3.6.60 | |
| >TDD | | | | |
| >>cell and channel ID | MP | | Cell and Channel Identity info 10.3.6.8a | Identifies the channel to be measured on. |
| Frequency info | MD | | Frequency info 10.3.6.36 | Default value is the existing value of frequency information |
| IPDL parameters | CV-*IPDLs* | | UE positioning IPDL parameters 10.3.7.98 | |
| SFN offset | CV-*IPDLs* | | Integer (0 .. 4095) | Define Tref as the time of beginning of system frame number SFNref of the reference cell. Define Tnc as the beginning of a frame from the neighbour cell occurring immediately after the time Tref. Let the corresponding system frame number be SFNnc. Then SFNnc = SFNref-SFN offset modulo 4096. |
| SFN-SFN relative time difference | MP | | Integer(0.. 38399) | Gives the relative timing compared to the reference cell Equal to (Tnc-Tref)/(3.84*$10^6$) ⌋ where ⌊()⌋ denotes rounding to the nearest lower integer. in chips. |
| SFN-SFN drift | OP | | ~~Real(0,+0.33,+0.66,+1,+1.33,+1.66,+2,+2.5,+3,+4,+5,+7,+9,+11,+13,+15,-0.33,-0.66,-1,-1.33,-1.66,-2,-2.5,-3,-4,-5,-7,-9,-11,-13,-15)~~ Integer (0, -1, -2, -3, -4, -5, -8, -10, -15, -25, -35, -50, -65, -80, -100, 1, 2, 3, 4, 5, 8, 10, 15, 25, 35, 50, 65, 80, 100) | in 1/256 chips per second ~~meters/sec~~ |
| Search Window Size | MP | | Integer(20, 40, 80, 160, 320, 640, 1280, infinity) | in chips. If the value is X then the expected SFN-SFN observed time difference is in the range [RTD-X, RTD+X] where RTD is the value of the field SFN-SFN relative time difference. Infinity means that the |

| | | | | |
|---|---|---|---|---|
| | | | | uncertainty is larger than 1280 chips. |
| CHOICE *PositioningMode* | MP | | | |
| >UE based | | | | (no data) |
| ~~>>Cell Position~~ | ~~MD~~ | | | ~~Default is the same as previous cell~~ |
| ~~>>>Relative North~~ | ~~OP~~ | | ~~Integer(-20000..20000)~~ | ~~Seconds, scale factor 0.03. Relative position compared to reference cell.~~ |
| ~~>>>Relative East~~ | ~~OP~~ | | ~~Integer(-20000..20000)~~ | ~~Seconds, scale factor 0.03. Relative position compared to reference cell.~~ |
| ~~>>>Relative Altitude~~ | ~~OP~~ | | ~~Integer(-4000..4000)~~ | ~~Relative altitude in meters compared to ref. cell.~~ |
| ~~>>Fine SFN-SFN~~ | ~~MP~~ | | ~~Real(0..0.9375 in steps of 0.0625)~~ | ~~Gives finer resolution~~ |
| ~~>>Round Trip Time~~ | ~~OP~~ | | ~~Real(876.00 .. 2923.875) in steps of 0.0625~~ | ~~In chips. Included if cell is in active set.~~ |
| >UE assisted | | | | (no data) |

| Condition | Explanation |
|---|---|
| *IPDLs* | This IE is mandatory present if IPDLs are applied and not needed otherwise. |

## 10.3.7.106a UE positioning OTDOA neighbour cell info for UE-based

This IE gives approximate cell timing in order to decrease the search window, as well as the cell locations and fine cell timing for UE based OTDOA.

| **Information Element/Group name** | **Need** | **Multi** | **Type and Reference** | **Semantics description** |
|---|---|---|---|---|
| UE positioning OTDOA neighbour cell info | MP | | UE positioning OTDOA neighbour cell info 10.3.7.106 | |
| Cell Position | MD | | | Default is the same as previous cell |
| >Relative North | OP | | Integer(-20000..20000) | Seconds, scale factor 0.03. Relative position compared to reference cell. |
| >Relative East | OP | | Integer(-20000..20000) | Seconds, scale factor 0.03. Relative position compared to reference cell. |
| >Relative Altitude | OP | | Integer(-4000..4000) | Relative altitude in meters compared to ref. cell. |
| Fine SFN-SFN | MP | | Real(0..0.9375 in steps of 0.0625) | Gives finer resolution |
| UE positioning Relative Time Difference Quality | MP | | UE positioning OTDOA quality 10.3.7.109a | Quality of the relative time difference between neighbour and reference cell. |
| Round Trip Time | OP | | Real(876.00 .. 2923.875) in steps of 0.0625 | In chips. Included if cell is in active set. |

## 10.3.7.107 UE positioning OTDOA quality

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| Std Resolution | MP | | Bit string(2) | Std Resolution field includes the resolution used in Std of OTDOA Measurements field. Encoding on two bits as follows:<br>'00' 10 meters<br>'01' 20 meters<br>'10' 30 meters<br>'11' Reserved |
| Number of OTDOA Measurements | MP | | Bit string(3) | Number of measurements field is used together with Std of OTDOA Measurements field to define quality of a reported OTDOA measurement. The field indicates how many OTDOA measurements have been used in the UE to define the standard deviation of the measurements. Following 3 bit encoding is used:<br>'000' 0-4<br>'001' 5-9<br>'010' 10-14<br>'011' 15-24<br>'100' 25-34<br>'101' 35-44<br>'110' 45-54<br>'111' 55 or more |
| Std of OTDOA Measurements | MP | | Bit string(5) | Std of OTDOA Measurements field includes standard deviation of OTDOA measurements. Following linear 5 bit encoding is used:<br>'00000' 0 - (R*1-1) meters<br>'00001' R*1 – (R*2-1) meters<br>'00010' R*2 – (R*3-1) meters<br>…<br>'11111' R*31 meters or more<br>where R is the resolution defined by Std Resolution field. E.g. R=20 m corresponds to 0-19 m, 20-39 m,…,620+ m. |

## 10.3.7.108 UE positioning OTDOA reference cell info

This IE defines the cell used for time references in all OTDOA measurements.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| SFN | OP | | Integer (0..4095) | Time stamp (SFN of Reference Cell) of the SFN-SFN relative time differences and SFN-SFN drift rates. Included if any SFN-SFN drift value is included in IE UE positioning OTDOA neighbour cell info. |
| CHOICE *mode* | MP | | | |
| >FDD | | | | |
| >>Primary CPICH info | MP | | Primary CPICH info 10.3.6.60 | |
| >TDD | | | | |
| >>cell and channel ID | MP | | Cell and Channel Identity info 10.3.6.8a | Identifies the channel to be measured on. |
| Frequency info | MD | | Frequency info 10.3.6.36 | Default value is the existing value of frequency information. This IE shall always be set to default value |
| CHOICE *PositioningMode* | MP | | | |
| >UE based | | | | (no data) |
| ~~>>CHOICE *Cell Position*~~ | ~~OP~~ | | | ~~The position of the antenna that defines the cell. Used for the UE based method.~~ |
| ~~>>>Ellipsoid~~ | | | | |
| ~~>>>>Ellipsoid point~~ | ~~MP~~ | | ~~Ellipsoid point 10.3.8.4a~~ | |
| ~~>>>Ellipsoid with altitude~~ | | | | |
| ~~>>>>Ellipsoid point with altitude~~ | ~~MP~~ | | ~~Ellipsoid point with altitude 10.3.8.4b~~ | |
| ~~>>Round Trip Time~~ | ~~OP~~ | | ~~Real(876.00 .. 2923.875) in steps of 0.0625~~ | ~~In chips.~~ |
| >UE assisted | | | | (no data) |
| IPDL parameters | OP | | UE positioning IPDL parameters 10.3.7.98 | If this element is not included there are no idle periods present |

## 10.3.7.108a UE positioning OTDOA reference cell info for UE-based

This IE defines the cell used for time references in all OTDOA measurements for UE-based methods.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| UE positioning OTDOA reference cell info | MP | | UE positioning OTDOA reference cell info 10.3.7.108 | |
| CHOICE *Cell Position* | OP | | | The position of the antenna that defines the cell. Used for the UE based method. |
| >Ellipsoid | | | | |
| >>Ellipsoid point | MP | | Ellipsoid point 10.3.8.4a | |
| >Ellipsoid with altitude | | | | |
| >>Ellipsoid point with altitude | MP | | Ellipsoid point with altitude 10.3.8.4b | |
| Round Trip Time | OP | | Real(876.00 .. 2923.875) in steps of 0.0625 | In chips. |

## 10.3.7.109 UE positioning position estimate info

The purpose of this IE is to provide the position estimate from the UE to the network, if the UE is capable of determining its own position.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| CHOICE *Reference Time* | MP | | | |
| >UTRAN GPS reference time | | | | |
| >>UE GPS timing of cell frames | MP | | Integer(0..3715891199 9999) | GPS Time of Week in units of 1/16th UMTS chips according to [19]. |
| >>CHOICE *mode* | MP~~OP~~ | | | |
| >>>FDD | | | | |
| >>>>Primary CPICH Info | MP | | Primary CPICH Info 10.3.6.60 | Identifies the reference cell for the GPS TOW-SFN relationship |
| >>>TDD | | | | |
| >>>>cell parameters id | MP | | Cell parameters id 10.3.6.9 | Identifies the reference cell for the GPS TOW-SFN relationship |
| >>Reference SFN | MP~~OP~~ | | Integer(0..4095) | The SFN for which the location is valid and which the UTRAN GPS timing of cell frames time stamps |
| >GPS reference time only | | | | |
| >>GPS TOW msec | MP~~OP~~ | | Integer(0..6.048*10^8-1) | GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit). ~~This time-stamps the beginning of the frame defined in Reference SFN~~ ~~GPS Time of Week in microseconds = 1000 * GPS TOW msec + GPS TOW rem usec~~ |
| >Cell timing | | | | |
| >>SFN | MP | | Integer(0..4095) | SFN during which the position was calculated |
| >>CHOICE *mode* | MP | | | |
| >>>FDD | | | | |
| >>>>Primary CPICH Info | MP | | Primary CPICH Info 10.3.6.60 | Identifies the reference cell for SFN |
| >>>TDD | | | | |
| >>>>cell parameters id | MP | | Cell parameters id 10.3.6.9 | Identifies reference cell for SFN |
| ~~GPS TOW rem usec~~ | ~~OP~~ | | ~~Integer(0..999)~~ | ~~GPS Time of Week in microseconds MOD 1000.~~ |
| CHOICE *Position estimate* | MP | | | |
| >Ellipsoid Point | | | Ellipsoid Point; 10.3.8.4a | |
| >Ellipsoid point with uncertainty circle | | | Ellipsoid point with uncertainty circle 10.3.8.4d | |
| >Ellipsoid point with uncertainty ellipse | | | Ellipsoid point with uncertainty ellipse 10.3.8.4e | |
| >Ellipsoid point with altitude | | | Ellipsoid point with altitude 10.3.8.4b | |

| | | | | |
|---|---|---|---|---|
| >Ellipsoid point with altitude and uncertainty ellipsoid | | | Ellipsoid point with altitude and uncertainty ellipsoid 10.3.8.4c | |

## 10.3.7.109a UE positioning Relative Time Difference quality

| **Information Element/Group name** | **Need** | **Multi** | **Type and Reference** | **Semantics description** |
|---|---|---|---|---|
| Relative Time Difference Std Resolution | MP | | Bit string(2) | Std Resolution field includes the resolution used in Std of Relative Time Difference field. Encoding on two bits as follows:<br>'00' 10 meters<br>'01' 20 meters<br>'10' 30 meters<br>'11' Reserved |
| Std of Relative Time Difference | MP | | Bit string(5) | Std of Relative Time difference field includes standard deviation of (SFN-SFN relative time difference + Fine SFN-SFN). Following linear 5 bit encoding is used:<br>'00000' 0 - (R*1-1) meters<br>'00001' R*1 – (R*2-1) meters<br>'00010' R*2 – (R*3-1) meters<br>...<br>'11111' R*31 meters or more<br>where R is the resolution defined by Std Resolution field. E.g. R=20 m corresponds to 0-19 m, 20-39 m,…,620+ m. |

## 10.3.7.110 UE positioning reporting criteria

The triggering of the event-triggered reporting for an UE positioning measurement.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| Parameters required for each event | OP | 1 to <maxMeasEvent> | | |
| >Amount of reporting | MP | | Integer(1, 2, 4, 8, 16, 32, 64,infinite) | |
| >Report first fix | MP | | Boolean | If true the UE reports the position once the measurement control is received, and then each time an event is triggered. |
| >Measurement interval | MP | | Integer(5,15, 60,300,900,1800,3600,7200) | Indicates how often the UE should make the measurement In seconds |
| >CHOICE *Event ID* | MP | | | |
| >>7a | | | | |
| >>>Threshold Position Change | MP | | Integer(10,20,30,40,50,100,200,300,500,1000,2000,5000,10000,20000,50000,100000) | Indicated how much the position should change compared to last reported position fix in order to trigger the event. |
| >>7b | | | | |
| >>>Threshold SFN-SFN change | MP | | Real(0.25,0.5,1,2,3,4,5,10,20,50,100, 200,500,1000,2000,5000) | Chips. Indicates how much the SFN-SFN measurement of ANY measured cell is allowed to change before the event is triggered. |
| >>7c | | | | |
| >>>Threshold SFN-GPS TOW | MP | | Integer(1,2,3,5,10,20,50,100) | Time in ms. When the GPS TOW and SFN timer has drifted apart more than the specified value the event is triggered) |

## 10.3.7.111 UE positioning reporting quantity

The purpose of the element is to express the allowed/required location method(s), and to provide information ~~required~~ desired QoS.

| Information Element/Group name | Need | Multi | Type and Reference | Semantics description |
|---|---|---|---|---|
| Method Type | MP | | Enumerated( UE assisted, UE based, UE based is preferred but UE assisted is allowed, UE assisted is preferred but UE based is allowed) | |
| Positioning Methods | MP | | Enumerated( OTDOA, GPS, OTDOA or GPS, Cell ID) | |
| Response Time | MP | | Integer(1,2,4, 8, 16, 32, 64, 128) | This IE shall be ignored~~in seconds~~ |
| Horizontal Accuracy | CV-*MethodType* | | Bit string(7) | The uncertainty is derived from the "uncertainty code" k by $r = 10*(1.1^k-1)$ |
| Vertical Accuracy | CV-*MethodType* | | Bit string(7) | The uncertainty is derived from the "uncertainty code" k by $r = 45*(1.025^k-1)$ |
| GPS timing of Cell wanted | MP | | Boolean | If true the SRNC wants the UE to report the SFN-GPS timing of the reference cell. This is however optional in the UE. |
| Multiple Sets | MP | | Boolean | This IE shall be ignored.~~TRUE indicates that the UE is requested to send multiple *OTDOA/GPS Measurement Information Sets*. UE is expected to include the current measurement set.~~ |
| Additional Assistance Data Request | MP | | Boolean | TRUE indicates that the UE is requested to send the IE "Additional assistance Data Request" when the IE "UE positioning Error" is present in the UE positioning measured results. |
| Environment Characterisation | OP | | Enumerated( possibly heavy multipath and NLOS conditions, no or light multipath and usually LOS conditions, not defined or mixed environment) | |

| Condition | Explanation |
|---|---|
| *Method Type* | The IE is optional if the IE "Method Type" is "UE assisted"; otherwise it is mandatory present. |

### 10.3.8.21 SIB type

The SIB type identifies a specific system information block.

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| SIB type | MP | | Enumerated, see below | |

The list of values to encode is:

Master information block,

System Information Type 1,

System Information Type 2,

System Information Type 3,

System Information Type 4,

System Information Type 5,

System Information Type 6,

System Information Type 7,

System Information Type 8,

System Information Type 9,

System Information Type 10,

System Information Type 11,

System Information Type 12,

System Information Type 13,

System Information Type 13.1,

System Information Type 13.2,

System Information Type 13.3,

System Information Type 13.4,

System Information Type 14,

System Information Type 15,

System Information Type 15.1,

System Information Type 15.2,

System Information Type 15.3,

System Information Type 15.4,

System Information Type 15.5,

System Information Type 16,

System Information Type 17,

System Information Type 18,

Scheduling Block 1,

Scheduling Block 2.

In addition, at least one spare value, criticality: ignore, is needed.

### 10.3.8.22 SIB type SIBs only

The SIB type identifies a specific system information block.

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| SIB type SIBs only | MP | | Enumerated, see below | |

The list of values to encode is:

System Information Type 1,

System Information Type 2,

System Information Type 3,

System Information Type 4,

System Information Type 5,

System Information Type 6,

System Information Type 7,

System Information Type 8,

System Information Type 9,

System Information Type 10,

System Information Type 11,

System Information Type 12,

System Information Type 13,

System Information Type 13.1,

System Information Type 13.2,

System Information Type 13.3,

System Information Type 13.4,

System Information Type 14,

System Information Type 15,

System Information Type 15.1,

System Information Type 15.2,

System Information Type 15.3,

System Information Type 15.4,

System Information Type 15.5,

System Information Type 16,

System Information Type 17,

System Information Type 18.

In addition, at least one spare value, criticality: ignore, is needed.

# 11.2 PDU definitions

```
…

-- ****************************************************
--
-- Assistance Data Delivery
--
-- ****************************************************

AssistanceDataDelivery ::= CHOICE {
    r3                              SEQUENCE {
        assistanceDataDelivery-r3       AssistanceDataDelivery-r3-IEs,
        nonCriticalExtensions           SEQUENCE {
            assistanceDataDelivery-r3-r4-ext
                                            AssistanceDataDelivery-r3-r4-ext-IEs,
            nonCriticalExtensions           SEQUENCE {}                     OPTIONAL
        }   OPTIONAL
    },
    later-than-r3                   SEQUENCE {
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        criticalExtensions              SEQUENCE {}
    }
}

AssistanceDataDelivery-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    -- Measurement Information Elements
    ue-positioning-GPS-AssistanceData           UE-Positioning-GPS-AssistanceData
    OPTIONAL,
    ue-positioning-OTDOA-AssistanceData-UEB         UE-Positioning-OTDOA-AssistanceData-UEB
    OPTIONAL
}

AssistanceDataDelivery-r3-r4-ext-IEs ::= SEQUENCE {
    ue-Positioning-OTDOA-AssistanceData-r4ext   UE-Positioning-OTDOA-AssistanceData-r4ext   OPTIONAL
}
…

-- ****************************************************
--
-- MEASUREMENT CONTROL
--
-- ****************************************************

MeasurementControl ::= CHOICE {
    r3                              SEQUENCE {
        measurementControl-r3           MeasurementControl-r3-IEs,
        v390nonCriticalExtensions           SEQUENCE {
            measurementControl-v390ext      MeasurementControl-v390ext,
            nonCriticalExtensions           SEQUENCE{
                measurementControl-r3-r4-ext    MeasurementControl-r3-r4-ext-IEs,
                nonCriticalExtensions           SEQUENCE {}                     OPTIONAL
            }                           OPTIONAL
        }                                                                   OPTIONAL
    },
    later-than-r3                   SEQUENCE {
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        criticalExtensions              CHOICE {
            r4                              SEQUENCE {
                measurementControl-r4           MeasurementControl-r4-IEs,
                nonCriticalExtensions           SEQUENCE {}     OPTIONAL
            },
            criticalExtensions              SEQUENCE {}
        }
    }
}

MeasurementControl-r3-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    -- Measurement IEs
        measurementIdentity     MeasurementIdentity,
        measurementCommand              MeasurementCommand,
        -- TABULAR: The measurement type is included in MeasurementCommand.
        measurementReportingMode        MeasurementReportingMode            OPTIONAL,
```

```
        additionalMeasurementList       AdditionalMeasurementID-List        OPTIONAL,
    -- Physical channel IEs
        dpch-CompressedModeStatusInfo   DPCH-CompressedModeStatusInfo       OPTIONAL
}

MeasurementControl-r3-r4-ext-IEs ::= SEQUENCE {
    ue-Positioning-OTDOA-AssistanceData-r4ext   UE-Positioning-OTDOA-AssistanceData-r4ext   OPTIONAL
}

MeasurementControl-v390ext ::= SEQUENCE {
        ue-Positioning-Measurement-v390ext      UE-Positioning-Measurement-v390ext  OPTIONAL
}

 MeasurementControl-r4-IEs ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    -- Measurement IEs
        measurementIdentity     MeasurementIdentity,
        measurementCommand              MeasurementCommand-r4,
        -- TABULAR: The measurement type is included in MeasurementCommand.
        measurementReportingMode        MeasurementReportingMode            OPTIONAL,
        additionalMeasurementList       AdditionalMeasurementID-List        OPTIONAL,
    -- Physical channel IEs
        dpch-CompressedModeStatusInfo   DPCH-CompressedModeStatusInfo       OPTIONAL
}

-- **************************************************
--
-- MEASUREMENT CONTROL FAILURE
--
-- **************************************************

MeasurementControlFailure ::= SEQUENCE {
    -- User equipment IEs
        rrc-TransactionIdentifier       RRC-TransactionIdentifier,
        failureCause                    FailureCauseWithProtErr,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}     OPTIONAL
}

-- **************************************************
--
-- MEASUREMENT REPORT
--
-- **************************************************

MeasurementReport ::= SEQUENCE {
    -- Measurement IEs
        measurementIdentity     MeasurementIdentity,
        measuredResults                 MeasuredResults                     OPTIONAL,
        measuredResultsOnRACH           MeasuredResultsOnRACH               OPTIONAL,
        additionalMeasuredResults       MeasuredResultsList                 OPTIONAL,
        eventResults                    EventResults                        OPTIONAL,
    -- Extension mechanism for non- release99 information
        v390nonCriticalExtensions           SEQUENCE {
            measurementReport-v390ext       MeasurementReport-v390ext,
            nonCriticalExtensions           SEQUENCE {
                measurementReport-r3-r4-ext     MeasurementReport-r3-r4-ext-IEs,
                nonCriticalExtensions           SEQUENCE {}                 OPTIONAL
            }                               OPTIONAL
        }                                                                   OPTIONAL
}


MeasurementReport-v390ext ::= SEQUENCE{
        measuredResults-v390ext         MeasuredResults-v390ext             OPTIONAL,
}

MeasurementReport-r3-r4-ext-IEs ::= SEQUENCE {
    interFreqEventResults-LCR       InterFreqEventResults-LCR-r4-ext        OPTIONAL,
    additionalMeasuredResults-LCR   MeasuredResultsList-LCR-r4-ext          OPTIONAL
}
…
```

# 11.3 Information element definitions

```
…

-- ************************************************
--
--     USER EQUIPMENT INFORMATION ELEMENTS (10.3.3)
--
-- ************************************************
…

UE-Positioning-Capability ::=                   SEQUENCE {
    standaloneLocMethodsSupported       BOOLEAN,
    ue-BasedOTDOA-Supported             BOOLEAN,
    networkAssistedGPS-Supported        NetworkAssistedGPS-Supported,
    supportForUE-GPS-TimingOfCellFramesgps-ReferenceTimeCapable         BOOLEAN,
    supportForIPDL                      BOOLEAN
}
…

-- ************************************************
--
--     MEASUREMENT INFORMATION ELEMENTS (10.3.7)
--
-- ************************************************
…

GPS-TOW-rem-usec ::=                INTEGER (0..999)


…

MeasuredResults ::=                 CHOICE {
    intraFreqMeasuredResultsList        IntraFreqMeasuredResultsList,
    interFreqMeasuredResultsList        InterFreqMeasuredResultsList,
    interRATMeasuredResultsList     InterRATMeasuredResultsList,
    trafficVolumeMeasuredResultsList    TrafficVolumeMeasuredResultsList,
    qualityMeasuredResults              QualityMeasuredResults,
    ue-InternalMeasuredResults          UE-InternalMeasuredResults,
    ue-positioning-MeasuredResults                  UE-Positioning-MeasuredResults
}

MeasuredResults-v390ext ::=                 SEQUENCE {
    ue-positioning-MeasuredResults-v390ext                  UE-Positioning-MeasuredResults-v390ext
}

MeasuredResults-LCR-r4 ::=          CHOICE {
    intraFreqMeasuredResultsList        IntraFreqMeasuredResultsList,
    interFreqMeasuredResultsList        InterFreqMeasuredResultsList,
    interRATMeasuredResultsList     InterRATMeasuredResultsList,
    trafficVolumeMeasuredResultsList    TrafficVolumeMeasuredResultsList,
    qualityMeasuredResults              QualityMeasuredResults,
    ue-InternalMeasuredResults          UE-InternalMeasuredResults-LCR-r4,
    ue-positioniing-MeasuredResults     UE-Positioning-MeasuredResults
}

MeasuredResultsList ::=             SEQUENCE (SIZE (1..maxAdditionalMeas)) OF
                                        MeasuredResults

MeasuredResultsList-LCR-r4-ext ::=  SEQUENCE (SIZE (1..maxAdditionalMeas)) OF
                                        MeasuredResults-LCR-r4


…

Neighbour ::=                       SEQUENCE {
    modeSpecificInfo                CHOICE {
        fdd                             SEQUENCE {
            neighbourIdentity                   PrimaryCPICH-Info                   OPTIONAL,
            uE-RX-TX-TimeDifferenceType2Info    UE-RX-TX-TimeDifferenceType2Info    OPTIONAL
        },
        tdd                             SEQUENCE {
            neighbourAndChannelIdentity     CellAndChannelIdentity                  OPTIONAL
        }
    },
    neighbourQuality                    NeighbourQuality,
    sfn-SFN-ObsTimeDifference2          SFN-SFN-ObsTimeDifference2}
```

```
NeighbourList ::=                   SEQUENCE (SIZE (1..maxCellMeas)) OF
                                        Neighbour

Neighbour-v390ext ::=                       SEQUENCE {
    modeSpecificInfo                CHOICE {
        fdd                             SEQUENCE {
            frequencyInfo                       FrequencyInfo
        },
        tdd                             NULL
    }
}

NeighbourList-v390ext ::=                   SEQUENCE (SIZE (1..maxCellMeas)) OF
                                        Neighbour-v390ext
-- The order of the cells in IE NeighbourList-v390ext shall be the
-- same as the order in IE NeighbourList

…
-- Actual value = IE value * 0.0125 – 0.09375
NodeB-ClockDrift ::=                INTEGER (0..15)


    SFN-SFN-Drift ::=                   ENUMERATED { sfnsfndrift0, sfnsfndrift1, sfnsfndrift2,
                                        sfnsfndrift3, sfnsfndrift4, sfnsfndrift5, sfnsfndrift8,
                                        sfnsfndrift10, sfnsfndrift15, sfnsfndrift25, sfnsfndrift35,
                                        sfnsfndrift50, sfnsfndrift65, sfnsfndrift80, sfnsfndrift100,
                                        sfnsfndrift-1, sfnsfndrift-2, sfnsfndrift-3, sfnsfndrift-4,
                                        sfnsfndrift-5, sfnsfndrift-8, sfnsfndrift-10, sfnsfndrift-
                                        15, sfnsfndrift-25, sfnsfndrift-35, sfnsfndrift-50,
                                        sfnsfndrift-65, sfnsfndrift-80, sfnsfndrift-100no-drift,
                                        sfnsfndrift0-33, sfnsfndrift0-66,
                                        sfnsfndrift1, sfnsfndrift1-33, sfnsfndrift1-66,
                                        sfnsfndrift2, sfnsfndrift2-5, sfnsfndrift3,
                                        sfnsfndrift4, sfnsfndrift5, sfnsfndrift7,
                                        sfnsfndrift9, sfnsfndrift11, sfnsfndrift13,
                                        sfnsfndrift15, sfnsfndrift-0-33, sfnsfndrift-0-66,
                                        sfnsfndrift-1, sfnsfndrift-1-33, sfnsfndrift-1-66,
                                        sfnsfndrift-2, sfnsfndrift-2-5, sfnsfndrift-3,
                                        sfnsfndrift-4, sfnsfndrift-5, sfnsfndrift-7,
                                        sfnsfndrift-9, sfnsfndrift-11, sfnsfndrift-13,
                                        sfnsfndrift-15}

…


UE-Positioning-GPS-AcquisitionAssistance ::=    SEQUENCE {
    gps-ReferenceTime               INTEGER (0..604799999),
    utran-GPSReferenceTime              UTRAN-GPSReferenceTime          OPTIONAL,
    referenceTime                       CHOICE {
        utran-ReferenceTime                 UTRAN-ReferenceTime,
        gps-ReferenceTimeOnly               INTEGER (0..604799999)
    },
    satelliteInformationList            AcquisitionSatInfoList
}
…

UE-Positioning-GPS-AssistanceData ::=           SEQUENCE {
    ue-positioning-GPS-ReferenceTime                UE-Positioning-GPS-ReferenceTime
    OPTIONAL,
    ue-positioning-GPS-ReferenceLocation            ReferenceLocation               OPTIONAL,
    ue-positioning-GPS-DGPS-Corrections             UE-Positioning-GPS-DGPS-Corrections
    OPTIONAL,
    ue-positioning-GPS-NavigationModel              UE-Positioning-GPS-NavigationModel
    OPTIONAL,
    ue-positioning-GPS-IonosphericModel             UE-Positioning-GPS-IonosphericModel
    OPTIONAL,
    ue-positioning-GPS-UTC-Model                    UE-Positioning-GPS-UTC-Model
    OPTIONAL,
    ue-positioning-GPS-Almanac                      UE-Positioning-GPS-Almanac
    OPTIONAL,
    ue-positioning-GPS-AcquisitionAssistance        UE-Positioning-GPS-AcquisitionAssistance
    OPTIONAL,
    ue-positioning-GPS-Real-timeIntegrity           BadSatList                          OPTIONAL
    ue-positioning-GPS-referenceCellInfo            UE-Positioning-GPS-ReferenceCellInfo
    OPTIONAL
}

..
```

```
UE-Positioning-GPS-MeasurementResults ::=       SEQUENCE {
    referenceTime                           CHOICE {
        utran-GPSReferenceTimeResult            UTRAN-GPSReferenceTimeResult,
        gps-ReferenceTimeOnly               INTEGER (0..604799999)
    },
    modeSpecificInfo                    CHOICE {
        fdd                                 SEQUENCE {
            referenceIdentity                   PrimaryCPICH-Info
        },
        tdd                                 SEQUENCE {
            referenceIdentity                   CellParametersID
        }
    }                                                                   OPTIONAL,
    referenceSFN                            ReferenceSFN                OPTIONAL,
    gps-TOW-1msec                           GPS-TOW-1msec,
    gps-TOW-rem-usec                        GPS-TOW-rem-usec            OPTIONAL,
    gps-MeasurementParamList            GPS-MeasurementParamList
}
..

UE-Positioning-GPS-ReferenceCellInfo ::=        SEQUENCE{
    modeSpecificInfo                CHOICE {
        fdd                             SEQUENCE {
            referenceIdentity               PrimaryCPICH-Info
        },
        tdd                             SEQUENCE {
            referenceIdentity               CellParametersID
        }
}


UE-Positioning-GPS-ReferenceTime ::=            SEQUENCE {
    gps-Week                            INTEGER (0..1023),
    gps-tow-1msec                       GPS-TOW-1msec,
    gps-tow-rem-usec                    GPS-TOW-rem-usec            OPTIONAL,
    modeSpecificInfo                    CHOICE {
        fdd                                 SEQUENCE {
            referenceIdentity                   PrimaryCPICH-Info
        },
        tdd                                 SEQUENCE {
            referenceIdentity                   CellParametersID
        }
    }                                                               OPTIONAL,
    sfn                                 INTEGER (0..4095)           OPTIONAL,
    utran-GPSReferenceTime              UTRAN-GPSReferenceTime      OPTIONAL,
    sfn-tow-Uncertainty                 SFN-TOW-Uncertainty         OPTIONAL,
    nodeBClockDrift                     NodeB-ClockDrift            OPTIONAL,
    utran-GPS-DriftRate                 UTRAN-GPS-DriftRate         OPTIONAL,
    gps-TOW-AssistList                  GPS-TOW-AssistList          OPTIONAL
}

UE-Positioning-GPS-UTC-Model ::=                SEQUENCE {
    a1                                  BIT STRING (SIZE (24)),
    a0                                  BIT STRING (SIZE (32)),
    t-ot                                BIT STRING (SIZE (8)),
    wn-t                                BIT STRING (SIZE (8)),
    delta-t-LS                          BIT STRING (SIZE (8)),
    wn-lsf                              BIT STRING (SIZE (8)),
    dn                                  BIT STRING (SIZE (8)),
    delta-t-LSF                         BIT STRING (SIZE (8))
}

UE-Positioning-IPDL-Parameters ::=              SEQUENCE {
    ip-Spacing                          IP-Spacing,
    ip-Length                           IP-Length,
    ip-Offset                           INTEGER (0..9),
    seed                                INTEGER (0..63),
    burstModeParameters                 BurstModeParameters         OPTIONAL
}

UE-Positioning-IPDL-Parameters-r4 ::=           SEQUENCE {
    modeSpecificInfo                    CHOICE {
        fdd                                 SEQUENCE {
            ip-Spacing                          IP-Spacing,
            ip-Length                           IP-Length,
            ip-Offset                           INTEGER (0..9),
            seed                                INTEGER (0..63)
```

```
        },
        tdd                                 SEQUENCE {
            ip-Spacing-TDD                      IP-Spacing-TDD,
            ip-slot                             INTEGER (0..14),
            ip-Start                            INTEGER (0..4095),
            ip-PCCPCG                           IP-PCCPCH-r4            OPTIONAL
        }
    },
    burstModeParameters                 BurstModeParameters
}

UE-Positioning-IPDL-Parameters-TDD-r4-ext ::=   SEQUENCE {
    ip-Spacing                          IP-Spacing-TDD,
    ip-slot                             INTEGER (0..14),
    ip-Start                            INTEGER (0..4095),
    ip-PCCPCG                           IP-PCCPCH-r4                    OPTIONAL,
    burstModeParameters                 BurstModeParameters
}

UE-Positioning-MeasuredResults ::=              SEQUENCE {
    ue-positioning-OTDOA-Measurement                UE-Positioning-OTDOA-Measurement
    OPTIONAL,
    ue-positioning-PositionEstimateInfo             UE-Positioning-PositionEstimateInfo
        OPTIONAL,
    ue-positioning-GPS-Measurement                  UE-Positioning-GPS-MeasurementResults
        OPTIONAL,
    ue-positioning-Error                            UE-Positioning-Error
    OPTIONAL
}

UE-Positioning-Measurement ::=                  SEQUENCE {
    ue-positioning-ReportingQuantity                UE-Positioning-ReportingQuantity,
    reportCriteria                      UE-Positioning-ReportCriteria,
    ue-positioning-OTDOA-AssistanceData         UE-Positioning-OTDOA-AssistanceData
    OPTIONAL,
    ue-positioning-GPS-AssistanceData               UE-Positioning-GPS-AssistanceData
    OPTIONAL
}

UE-Positioning-Measurement-v390ext ::=          SEQUENCE {
    ue-positioning-ReportingQuantity-v390ext        UE-Positioning-ReportingQuantity-v390ext
    OPTIONAL,
    measurementValidity                 MeasurementValidity                 OPTIONAL,
    ue-positioning-OTDOA-AssistanceData-UEB         UE-Positioning-OTDOA-AssistanceData-UEB
    OPTIONAL
}

UE-Positioning-Measurement-r4 ::=               SEQUENCE {
    ue-positioning-ReportingQuantity                UE-Positioning-ReportingQuantity,
    reportCriteria                                  UE-Positioning-ReportCriteria,
    ue-positioning-OTDOA-AssistanceData             UE-Positioning-OTDOA-AssistanceData-r4
    OPTIONAL,
    ue-positioning-GPS-AssistanceData               UE-Positioning-GPS-AssistanceData
    OPTIONAL
}

UE-Positioning-MeasurementEventResults ::=      CHOICE {
    event7a                             UE-Positioning-PositionEstimateInfo,
    event7b                             UE-Positioning-OTDOA-Measurement,
    event7c                             UE-Positioning-GPS-MeasurementResults
}

UE-Positioning-MeasurementInterval ::=          ENUMERATED {
                                        e5, e15, e60, e300,
                                        e900, e1800, e3600, e7200 }

UE-Positioning-MethodType ::=                   ENUMERATED {
                                        ue-Assisted,
                                        ue-Based,
                                        ue-BasedPreferred,
                                        ue-AssistedPreferred }

UE-Positioning-OTDOA-AssistanceData ::=     SEQUENCE {
    ue-positioning-OTDOA-ReferenceCellInfo          UE-Positioning-OTDOA-ReferenceCellInfo
    OPTIONAL,
    ue-positioning-OTDOA-NeighbourCellList              UE-Positioning-OTDOA-NeighbourCellList
        OPTIONAL
}
```

```
UE-Positioning-OTDOA-AssistanceData-UEB ::=     SEQUENCE {
    ue-positioning-OTDOA-ReferenceCellInfo-UEB          UE-Positioning-OTDOA-ReferenceCellInfo-UEB
                OPTIONAL,
    ue-positioning-OTDOA-NeighbourCellList-UEB              UE-Positioning-OTDOA-NeighbourCellList-
UEB             OPTIONAL
}

UE-Positioning-OTDOA-AssistanceData-r4 ::=  SEQUENCE {
    ue-positioning-OTDOA-ReferenceCellInfo          UE-Positioning-OTDOA-ReferenceCellInfo-r4
        OPTIONAL,
    ue-positioning-OTDOA-NeighbourCellList          UE-Positioning-OTDOA-NeighbourCellList-r4
        OPTIONAL
}

UE-Positioning-OTDOA-AssistanceData-r4ext ::= SEQUENCE {
    -- In case of TDD these IPDL parameters shall be used for the reference cell instead of
    -- IPDL Parameters in IE UE-Positioning-OTDOA-ReferenceCellInfo
    ue-Positioning-IPDL-Parameters-TDD-r4-ext       UE-Positioning-IPDL-Parameters-TDD-r4-ext
    OPTIONAL,
    -- These IPDL parameters shall be used for the neighbour cells in case of TDD instead of
    -- IPDL Parameters in IE UE-Positioning-OTDOA-NeighbourCellInfoList. The cells shall be
    -- listed in the same order as in IE UE-Positioning-OTDOA-NeighbourCellInfoList
    ue-Positioning-IPDL-Parameters-TDDList-r4-ext   UE-Positioning-IPDL-Parameters-TDDList-r4-ext
    OPTIONAL
}

UE-Positioning-IPDL-Parameters-TDDList-r4-ext ::=   SEQUENCE (SIZE (1..maxCellMeas)) OF
                                        UE-Positioning-IPDL-Parameters-TDD-r4-ext

UE-Positioning-OTDOA-Measurement ::=            SEQUENCE {
    sfn                                 INTEGER (0..4095),
    modeSpecificInfo                CHOICE {
        fdd                                 SEQUENCE {
            referenceCellIDentity               PrimaryCPICH-Info,
            ue-RX-TX-TimeDifferenceType2Info    UE-RX-TX-TimeDifferenceType2Info
        },
        tdd                                 SEQUENCE {
            referenceCellIdentity           CellParametersID
        }
    },
    neighbourList                       NeighbourList                       OPTIONAL
}

UE-Positioning-OTDOA-Measurement-v390ext ::=            SEQUENCE {
    neighbourList-v390ext                       NeighbourList-v390ext
}


UE-Positioning-OTDOA-NeighbourCellInfo  ::= SEQUENCE {
    modeSpecificInfo    CHOICE  {
        fdd                                 SEQUENCE {
            primaryCPICH-Info                   PrimaryCPICH-Info
        },
        tdd                                 SEQUENCE{
            cellAndChannelIdentity              CellAndChannelIdentity
        }
    },
    frequencyInfo                       FrequencyInfo                       OPTIONAL,
    ue-positioning-IPDL-Paremeters                  UE-Positioning-IPDL-Parameters
    OPTIONAL,
    sfn-SFN-RelTimeDifference           SFN-SFN-RelTimeDifference1,
    sfn-SFN-Drift                       SFN-SFN-Drift                       OPTIONAL,
    searchWindowSize                    OTDOA-SearchWindowSize,
    positioningMode     CHOICE{
        ueBased                                 SEQUENCE {
            relativeNorth                       INTEGER (-20000..20000)             OPTIONAL,
            relativeEast                        INTEGER (-20000..20000)             OPTIONAL,
            relativeAltitude                    INTEGER (-4000..4000)               OPTIONAL,
            fineSFN-SFN                         FineSFN-SFN,
            -- actual value = (IE value * 0.0625) + 876
            roundTripTime                       INTEGER (0.. 32766)                 OPTIONAL
        },
        ueAssisted                              SEQUENCE {}
    }
}

UE-Positioning-OTDOA-NeighbourCellInfo-r4  ::= SEQUENCE {
```

```
    modeSpecificInfo    CHOICE  {
        fdd                             SEQUENCE {
            primaryCPICH-Info                   PrimaryCPICH-Info
        },
        tdd                             SEQUENCE{
            cellAndChannelIdentity              CellAndChannelIdentity
        }
    },
    frequencyInfo                       FrequencyInfo                       OPTIONAL,
    ue-positioning-IPDL-Paremeters                  UE-Positioning-IPDL-Parameters-r4
    OPTIONAL,
    sfn-SFN-RelTimeDifference           SFN-SFN-RelTimeDifference1,
    sfn-SFN-Drift                       INTEGER (0..30),
    searchWindowSize                    OTDOA-SearchWindowSize,
    positioningMode     CHOICE{
        ueBased                                 SEQUENCE {
            relativeNorth                       INTEGER (-20000..20000)             OPTIONAL,
            relativeEast                        INTEGER (-20000..20000)             OPTIONAL,
            relativeAltitude                    INTEGER (-4000..4000)               OPTIONAL,
            fineSFN-SFN                         FineSFN-SFN                         OPTIONAL,
            -- actual value = (IE value * 0.0625) + 876
            roundTripTime                       INTEGER (0.. 32766)                 OPTIONAL
        },
        ueAssisted                              SEQUENCE {}
    }
}

UE-Positioning-OTDOA-NeighbourCellInfo-UEB  ::= SEQUENCE {
    modeSpecificInfo    CHOICE  {
        fdd                             SEQUENCE {
            primaryCPICH-Info                   PrimaryCPICH-Info
        },
        tdd                             SEQUENCE{
            cellAndChannelIdentity              CellAndChannelIdentity
        }
    },
    frequencyInfo                       FrequencyInfo                       OPTIONAL,
    ue-positioning-IPDL-Paremeters                  UE-Positioning-IPDL-Parameters
    OPTIONAL,
    sfn-SFN-RelTimeDifference           SFN-SFN-RelTimeDifference1,
    sfn-SFN-Drift                       SFN-SFN-Drift       OPTIONAL,
    searchWindowSize                    OTDOA-SearchWindowSize,
    relativeNorth                       INTEGER (-20000..20000)             OPTIONAL,
    relativeEast                        INTEGER (-20000..20000)             OPTIONAL,
    relativeAltitude                    INTEGER (-4000..4000)               OPTIONAL,
    fineSFN-SFN                         FineSFN-SFN,
    -- actual value = (IE value * 0.0625) + 876
    roundTripTime                       INTEGER (0.. 32766)                 OPTIONAL
}

UE-Positioning-OTDOA-NeighbourCellList ::= SEQUENCE (SIZE (1..maxCellMeas)) OF
                                        UE-Positioning-OTDOA-NeighbourCellInfo

UE-Positioning-OTDOA-NeighbourCellList-UEB ::= SEQUENCE (SIZE (1..maxCellMeas)) OF
                                        UE-Positioning-OTDOA-NeighbourCellInfo-UEB

UE-Positioning-OTDOA-NeighbourCellList-r4 ::= SEQUENCE (SIZE (1..maxCellMeas)) OF
                                            UE-Positioning-OTDOA-NeighbourCellInfo-r4

UE-Positioning-OTDOA-Quality ::=            SEQUENCE {
    stdResolution                       BIT STRING (SIZE (2)),
    numberOfOTDOA-Measurements          BIT STRING (SIZE (3)),
    stdOfOTDOA-Measurements             BIT STRING (SIZE (5))
}

UE-Positioning-OTDOA-ReferenceCellInfo ::=          SEQUENCE {
    sfn                                 INTEGER (0..4095)
    OPTIONAL,
    modeSpecificInfo CHOICE {
        fdd                                     SEQUENCE {
            primaryCPICH-Info                   PrimaryCPICH-Info
        },
        tdd                                     SEQUENCE{
            cellAndChannelIdentity              CellAndChannelIdentity
        }
    },
```

```
    frequencyInfo                       FrequencyInfo                       OPTIONAL,
    positioningMode CHOICE {
        ueBased                                 SEQUENCE {
            cellPosition                                ReferenceCellPosition   OPTIONAL,
            -- actual value = (IE value * 0.0625) + 876
            roundTripTime                       INTEGER (0..32766)              OPTIONAL
        },
        ueAssisted                              SEQUENCE {}
    },
    ue-positioning-IPDL-Paremeters              UE-Positioning-IPDL-Parameters  OPTIONAL
}

UE-Positioning-OTDOA-ReferenceCellInfo-r4 ::=   SEQUENCE {
    sfn                                 INTEGER (0..4095)
    OPTIONAL,
    modeSpecificInfo CHOICE {
        fdd                                     SEQUENCE {
            primaryCPICH-Info                   PrimaryCPICH-Info
        },
        tdd                                     SEQUENCE{
            cellAndChannelIdentity              CellAndChannelIdentity
        }
    },
    frequencyInfo                       FrequencyInfo                       OPTIONAL,
    positioningMode CHOICE {
        ueBased                                 SEQUENCE {
            cellPosition                                ReferenceCellPosition   OPTIONAL,
            -- actual value = (IE value * 0.0625) + 876
            roundTripTime                       INTEGER (0..32766)              OPTIONAL
        },
        ueAssisted                              SEQUENCE {}
    },
    ue-positioning-IPDL-Paremeters              UE-Positioning-IPDL-Parameters-r4   OPTIONAL
}

UE-Positioning-OTDOA-ReferenceCellInfo-UEB ::=          SEQUENCE {
    sfn                                 INTEGER (0..4095)
    OPTIONAL,
    modeSpecificInfo CHOICE {
        fdd                                     SEQUENCE {
            primaryCPICH-Info                   PrimaryCPICH-Info
        },
        tdd                                     SEQUENCE{
            cellAndChannelIdentity              CellAndChannelIdentity
        }
    },
    frequencyInfo                       FrequencyInfo                       OPTIONAL,
    cellPosition                                ReferenceCellPosition   OPTIONAL,
    -- actual value = (IE value * 0.0625) + 876
    roundTripTime                       INTEGER (0..32766)              OPTIONAL
    ue-positioning-IPDL-Paremeters              UE-Positioning-IPDL-Parameters  OPTIONAL
}


UE-Positioning-PositionEstimateInfo ::=                 SEQUENCE {
    modeSpecificInfo                CHOICE {
        fdd                                 SEQUENCE {
            referenceIdentity                   PrimaryCPICH-Info
        },
        tdd                                 SEQUENCE {
            referenceIdentity                   CellParametersID
        }
    }                                                               OPTIONAL,
    referenceTime                       CHOICE {
        utran-GPSReferenceTimeResult                UTRAN-GPSReferenceTimeResult,
        gps-ReferenceTimeOnly               INTEGER (0..604799999),
        cell-Timing                         SEQUENCE {
            sfn                                         INTEGER (0..4095),
            modeSpecificInfo CHOICE {
                fdd                                     SEQUENCE {
                    primaryCPICH-Info                   PrimaryCPICH-Info
                },
                tdd                                     SEQUENCE{
                    cellAndChannelIdentity              CellAndChannelIdentity
                }
    },
    referenceSFN                        ReferenceSFN        OPTIONAL,
```

```
    gps-tow-1msec                       GPS-TOW-1msec       OPTIONAL,
    gps-tow-rem-usec                    GPS-TOW-rem-usec    OPTIONAL,
    positionEstimate                    PositionEstimate
}

UE-Positioning-ReportCriteria ::=           CHOICE {
    ue-positioning-ReportingCriteria            UE-Positioning-EventParamList,
    periodicalReportingCriteria         PeriodicalReportingCriteria,
    noReporting                         NULL
}

UE-Positioning-ReportingQuantity ::=            SEQUENCE {
    methodType                          UE-Positioning-MethodType,
    positioningMethod                   PositioningMethod,
    responseTimedummy                       UE-Positioning-ResponseTime,
-- This IE is not used in this version of the specification and should be ignored.
-- IE "dummy" should be removed in later versions of the message including this IE
    accuracy                            UE-Positioning-Accuracy                 OPTIONAL,
    gps-TimingOfCellWanted              BOOLEAN,
    multipleSetsdummy                       BOOLEAN,
-- This IE is not used in this version of the specification and should be ignored.
-- IE "dummy" should be removed in later versions of the message including this IE
    additionalAssistanceDataReq         BOOLEAN,
    environmentCharacterisation         EnvironmentCharacterisation         OPTIONAL
}



UE-Positioning-ReportingQuantity-v390ext ::=        SEQUENCE {
    vertical-Accuracy                           UE-Positioning-Accuracy }

UE-Positioning-ResponseTime ::=             ENUMERATED {
                                        s1, s2, s4, s8, s16,
                                        s32, s64, s128 }

UTRA-CarrierRSSI ::=                INTEGER (0..76)

UTRAN-GPS-DriftRate ::=             ENUMERATED {
                                    UTRAN-GPSDrift0, UTRAN-GPSDrift1, UTRAN-GPSDrift2, UTRAN-
                                    GPSDrift5, UTRAN-GPSDrift10, UTRAN-GPSDrift15, UTRAN-GPSDrift25,
                                    UTRAN-GPSDrift50, UTRAN-GPSDrift-1, UTRAN-GPSDrift-2, UTRAN-
                                    GPSDrift-5, UTRAN-GPSDrift-10, UTRAN-GPSDrift-15, UTRAN-
                                    GPSDrift-25, UTRAN-GPSDrift-50}

UTRAN-GPSReferenceTime ::=              SEQUENCE {
    gps-tow-1msec                       GPS-TOW-1msec,
    gps-tow-rem-usec                    GPS-TOW-rem-usec,
    utran-GPSTimingOfCell               INTEGER(0..2322431999999),
    modeSpecificInfo                    CHOICE {
        fdd                                 SEQUENCE {
            referenceIdentity                   PrimaryCPICH-Info               OPTIONAL
        },
        tdd                                 SEQUENCE {
            referenceIdentity           CellParametersID            OPTIONAL
        }       OPTIONAL
    },
    sfn                                 INTEGER (0..4095)
}

..
UTRAN-GPSReferenceTimeResult ::=                SEQUENCE {
    ue-GPSTimingOfCell          INTEGER(0..37158911999999),
    modeSpecificInfo                CHOICE {
        fdd                             SEQUENCE {
            referenceIdentity               PrimaryCPICH-Info
        },
        tdd                             SEQUENCE {
            referenceIdentity       CellParametersID
        }
    },
    sfn                                 INTEGER (0..4095)
}

-- **************************************************
--
--     OTHER INFORMATION ELEMENTS (10.3.8)
--
```

```
-- **************************************************
..

SIB-Type ::=                        ENUMERATED {
                                        masterInformationBlock,
                                        systemInformationBlockType1,
                                        systemInformationBlockType2,
                                        systemInformationBlockType3,
                                        systemInformationBlockType4,
                                        systemInformationBlockType5,
                                        systemInformationBlockType6,
                                        systemInformationBlockType7,
                                        systemInformationBlockType8,
                                        systemInformationBlockType9,
                                        systemInformationBlockType10,
                                        systemInformationBlockType11,
                                        systemInformationBlockType12,
                                        systemInformationBlockType13,
                                        systemInformationBlockType13-1,
                                        systemInformationBlockType13-2,
                                        systemInformationBlockType13-3,
                                        systemInformationBlockType13-4,
                                        systemInformationBlockType14,
                                        systemInformationBlockType15,
                                        systemInformationBlockType15-1,
                                        systemInformationBlockType15-2,
                                        systemInformationBlockType15-3,
                                        systemInformationBlockType16,
                                        systemInformationBlockType17,
                                        systemInformationBlockType15-4,
                                        systemInformationBlockType18,
                                        schedulingBlock1,
                                        schedulingBlock2,
                                        systemInformationBlockType15-5,
                                        spare1, spare2, spare3 }

SIB-TypeAndTag ::=                  CHOICE {
    sysInfoType1                        PLMN-ValueTag,
    sysInfoType2                        CellValueTag,
    sysInfoType3                        CellValueTag,
    sysInfoType4                        CellValueTag,
    sysInfoType5                        CellValueTag,
    sysInfoType6                        CellValueTag,
    sysInfoType7                        NULL,
    sysInfoType8                        CellValueTag,
    sysInfoType9                        NULL,
    sysInfoType10                       NULL,
    sysInfoType11                       CellValueTag,
    sysInfoType12                       CellValueTag,
    sysInfoType13                       CellValueTag,
    sysInfoType13-1                     CellValueTag,
    sysInfoType13-2                     CellValueTag,
    sysInfoType13-3                     CellValueTag,
    sysInfoType13-4                     CellValueTag,
    sysInfoType14                       NULL,
    sysInfoType15                       CellValueTag,
    sysInfoType16                       PredefinedConfigIdentityAndValueTag,
    sysInfoType17                       NULL,
    sysInfoType15-1                     CellValueTag,
    sysInfoType15-2                     SIBOccurrenceIdentityAndValueTag,
    sysInfoType15-3                     SIBOccurrenceIdentityAndValueTag,
    sysInfoType15-4                     CellValueTag,
    sysInfoType18                       CellValueTag,
    sysInfoType15-5                     CellValueTag
}

SIBSb-TypeAndTag ::=                    CHOICE {
    sysInfoType1                        PLMN-ValueTag,
    sysInfoType2                        CellValueTag,
    sysInfoType3                        CellValueTag,
    sysInfoType4                        CellValueTag,
    sysInfoType5                        CellValueTag,
    sysInfoType6                        CellValueTag,
    sysInfoType7                        NULL,
    sysInfoType8                        CellValueTag,
    sysInfoType9                        NULL,
    sysInfoType10                       NULL,
    sysInfoType11                       CellValueTag,
```

```
    sysInfoType12                       CellValueTag,
    sysInfoType13                       CellValueTag,
    sysInfoType13-1                     CellValueTag,
    sysInfoType13-2                     CellValueTag,
    sysInfoType13-3                     CellValueTag,
    sysInfoType13-4                     CellValueTag,
    sysInfoType14                       NULL,
    sysInfoType15                       CellValueTag,
    sysInfoType16                       PredefinedConfigIdentityAndValueTag,
    sysInfoType17                       NULL,
    sysInfoTypeSB1                      CellValueTag,
    sysInfoTypeSB2                      CellValueTag,
    sysInfoType15-1                     CellValueTag,
    sysInfoType15-2                     SIBOccurrenceIdentityAndValueTag,
    sysInfoType15-3                     SIBOccurrenceIdentityAndValueTag,
    sysInfoType15-4                     CellValueTag,
    sysInfoType18                       CellValueTag,
    sysInfoType15-5                     CellValueTag
}
..

SysInfoType15 ::=                   SEQUENCE {
    -- Measurement IEs

        ue-positioning-GPS-CipherParameters     UE-Positioning-CipherParameters     OPTIONAL,
        ue-positioning-GPS-ReferenceLocation    ReferenceLocation,
        ue-positioning-GPS-ReferenceTime        UE-Positioning-GPS-ReferenceTime,

        ue-positioning-GPS-Real-timeIntegrity       BadSatList                          OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {
            sysInfoType15-r3-r4-ext         SysInfoType15-r3-r4-ext-IEs,
        -- Extension mechanism for non- release4 information
            nonCriticalExtensions           SEQUENCE {}             OPTIONAL
        }                               OPTIONAL
}

SysInfoType15-r3-r4-ext-IEs ::= SEQUENCE {
    up-Ipdl-Parameters-TDD          UE-Positioning-IPDL-Parameters-TDD-r4-ext   OPTIONAL
}

SysInfoType15-1 ::=                 SEQUENCE {
    -- DGPS corrections
        ue-positioning-GPS-DGPS-Corrections         UE-Positioning-GPS-DGPS-Corrections,

    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}             OPTIONAL
}

SysInfoType15-2 ::=                 SEQUENCE {
-- Ephemeris and clock corrections
    transmissionTOW                 INTEGER (0..604799),
    satID                           SatID,
    ephemerisParameter              EphemerisParameter,

-- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}         OPTIONAL
}

SysInfoType15-3 ::=                 SEQUENCE {
    -- Almanac and other data
        transmissionTOW                 INTEGER (0.. 604799),
        ue-positioning-GPS-Almanac                  UE-Positioning-GPS-Almanac
    OPTIONAL,
        ue-positioning-GPS-IonosphericModel         UE-Positioning-GPS-IonosphericModel
    OPTIONAL,
        ue-positioning-GPS-UTC-Model                UE-Positioning-GPS-UTC-Model
    OPTIONAL,
        satMask                         BIT STRING (SIZE (1..32))   OPTIONAL,
        lsbTOW                          BIT STRING (SIZE (8))       OPTIONAL,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions           SEQUENCE {}                 OPTIONAL
}

SysInfoType15-4 ::=                 SEQUENCE {
    -- Measurement IEs
        ue-positioning-OTDOA-CipherParameters   UE-Positioning-CipherParameters         OPTIONAL,
        ue-positioning-OTDOA-AssistanceData     UE-Positioning-OTDOA-AssistanceData,
```

```
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions       SEQUENCE {
            sysInfoType15-4-r4ext                   SysInfoType15-4-r4ext       OPTIONAL,
            nonCriticalExtensions       SEQUENCE {}
        }                       OPTIONAL
}

SysInfoType15-4-r4ext ::= SEQUENCE {
    ue-Positioning-OTDOA-AssistanceData-r4ext   UE-Positioning-OTDOA-AssistanceData-r4ext   OPTIONAL
}

SysInfoType15-5 ::=                 SEQUENCE {
    -- Measurement IEs
        ue-positioning-OTDOA-AssistanceData-UEB     UE-Positioning-OTDOA-AssistanceData-UEB,
    -- Extension mechanism for non- release99 information
        nonCriticalExtensions       SEQUENCE {
            sysInfoType15-5-r4ext                   SysInfoType15-5-r4ext       OPTIONAL,
            nonCriticalExtensions       SEQUENCE {}
        }                       OPTIONAL
}

..
```

## 13.4.32 VALUE_TAG

This variable contains information about the value tag for the last received system information block of a given type, for all system information blocks using value tags. The UE shall maintain one instance of this variable for the current selected cell. The UE may store several instances of this variable, one for each cell, to be used if the UE returns to these cells.

All IEs in this variable shall be cleared when switched off and as well as at selection of a new PLMN.

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| MIB value tag | OP | | MIB value tag 10.3.8.9 | Value tag for the master information block |
| SB 1 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the scheduling block type 1 |
| SB 2 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the scheduling block type 2 |
| SIB 1 value tag | CV-*GSM* | | PLMN value tag 10.3.8.10 | Value tag for the system information block type 1 |
| SIB 2 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 2 |
| SIB 3 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 3 |
| SIB 4 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 4 |
| SIB 5 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 5 |
| SIB 6 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 6 |
| CHOICE *mode* | MP | | | |
| >FDD | | | | |
| >>SIB 8 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 8 |
| >TDD | | | | (no data) |
| SIB 11 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 11 |
| SIB 12 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 12 |
| SIB 13 value tag | CV-*ANSI* | | Cell value tag 10.3.8.4 | Value tag for the system information block type 13 |
| SIB 13.1 value tag | CV-*ANSI* | | Cell value tag 10.3.8.4 | Value tag for the system information block type 13.1 |
| SIB 13.2 value tag | CV-*ANSI* | | Cell value tag 10.3.8.4 | Value tag for the system information block type 13.2 |
| SIB 13.3 value tag | CV-*ANSI* | | Cell value tag 10.3.8.4 | Value tag for the system information block type 13.3 |
| SIB 13.4 value tag | CV-*ANSI* | | Cell value tag 10.3.8.4 | Value tag for the system information block type 13.4 |
| SIB 15 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 15 |
| SIB 15.1 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 15.1 |
| SIB 15.2 value tag list | OP | 1 to <maxSat> | | List of value tags for all stored occurrences of system information block type 15.2 |
| >SIB 15.2 value tag | MP | | Cell value tag 10.3.8.4 | |
| >SIB occurrence identity and value tag | MP | | SIB occurrence identity and value tag 10.3.8.20b | |
| SIB 15.3 value tag list | OP | 1 to <maxSat> | | List of value tags for all stored occurrences of system information block type 15.3 |
| >SIB 15.3 value tag | MP | | PLMN value tag 10.3.8.10 | Value tag for the system information block type 15.3 |
| >SIB occurrence identity and value tag | MP | | SIB occurrence identity and value tag 10.3.8.20b | |
| SIB 15.4 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 15.4 |
| SIB 15.5 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 15.4 |

| | | | | |
|---|---|---|---|---|
| SIB 16 value tag list | OP | 1 to <maxPredefConfig> | | List of value tags for all stored occurrences of the system information block type 16 |
| >Predefined configuration identity and value tag | MP | | Predefined configuration identity and value tag 10.3.8.11 | |
| SIB 18 value tag | OP | | Cell value tag 10.3.8.4 | Value tag for the system information block type 18 |

| Condition | Explanation |
|---|---|
| *GSM* | This information is optional when the PLMN Type in the variable SELECTED_PLMN is "GSM-MAP" and never stored otherwise. |
| *ANSI* | This information is optional when the PLMN Type in the variable SELECTED_PLMN is "ANSI-41" and never stored otherwise. |

## 13.4.28a UE_POSITIONING_GPS_DATA

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| GPS Data ciphering info | OP | | UE positioning Ciphering info 10.3.7.86 | |
| GPS Deciphering Keys | OP | | | |
| >Current deciphering key | MP | | Bit string(56) | |
| >Next deciphering key | MP | | Bit string(56) | |
| UE positioning GPS reference time | OP | | UE positioning GPS reference time 10.3.7.96 | |
| UE positioning GPS reference UE position | OP | | Ellipsoid point with altitude and uncertainty ellipsoid 10.3.8.4c | A priori knowledge of UE 3-D position. |
| UE positioning GPS DGPS corrections | OP | | UE positioning GPS DGPS corrections 10.3.7.91 | |
| UE positioning GPS navigation model | OP | 1 to <maxSat> | | |
| >SatID | MP | | Enumerated( 0..63) | Satellite ID |
| >GPS Ephemeris and Clock Correction parameters | MP | | UE positioning GPS Ephemeris and Clock Correction parameters 10.3.7.91a | |
| UE positioning GPS ionospheric model | OP | | UE positioning GPS ionospheric model 10.3.7.92 | |
| UE positioning GPS UTC model | OP | | UE positioning GPS UTC model 10.3.7.97 | |
| UE positioning GPS almanac | OP | | ~~UE positioning GPS almanac 10.3.7.89~~ | |
| >SatID | MP | 1 to <maxSat> | | |
| >>$WN_a$ | MP | | | |
| >>DataID | MP | | | Same as IE in 10.3.7.89 |
| >>e | MP | | | Same as IE in 10.3.7.89 |
| >>$t_{oa}$ | MP | | | Same as IE in 10.3.7.89 |
| >>δI | MP | | | Same as IE in 10.3.7.89 |
| >>OMEGADOT | MP | | | Same as IE in 10.3.7.89 |
| >>SV Health | MP | | | Same as IE in 10.3.7.89 |
| >>$A^{1/2}$ | MP | | | Same as IE in 10.3.7.89 |

| | | | | |
|---|---|---|---|---|
| >>OMEGA$_0$ | MP | | | Same as IE in 10.3.7.89 |
| >>$M_0$ | MP | | | Same as IE in 10.3.7.89 |
| >>$\omega$ | MP | | | Same as IE in 10.3.7.89 |
| >>$af_0$ | MP | | | Same as IE in 10.3.7.89 |
| >>$af_1$ | MP | | | Same as IE in 10.3.7.89 |
| >SV Global Health | OP | | | Same as IE in 10.3.7.89 |
| UE positioning GPS acquisition assistance | OP | | UE positioning GPS acquisition assistance 10.3.7.88 | |
| UE positioning GPS real-time integrity | OP | | UE positioning GPS real-time integrity 10.3.7.95 | |
| UE positioning GPS reference cell info | OP | | UE positioning GPS reference cell info 10.3.7.95a | |

## 13.4.28b UE_POSITIONING_OTDOA_DATA_UE_ASSISTED

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| ~~OTDOA Data ciphering info~~ | ~~OP~~ | | ~~UE positioning Ciphering info 10.3.7.86~~ | |
| UE positioning OTDOA reference cell info for UE-assisted | OP | | UE positioning OTDOA reference cell info 10.3.7.108 | |
| UE positioning OTDOA neighbour cell list for UE-assisted | OP | 1 to <maxCellMeas> | | |
| >UE positioning OTDOA neighbour cell info for UE-assisted | MP | | UE positioning OTDOA neighbour cell info 10.3.7.106 | |

## 13.4.28c UE_POSITIONING_OTDOA_DATA_UE_BASED

| Information Element/Group name | Need | Multi | Type and reference | Semantics description |
|---|---|---|---|---|
| OTDOA Deciphering Keys | OP | | | |
| >Current deciphering key | MP | | Bit string(56) | |
| >Next deciphering key | MP | | Bit string(56) | |
| OTDOA Data ciphering info | OP | | UE positioning Ciphering info 10.3.7.86 | |
| UE positioning OTDOA reference cell info for UE-based | OP | | UE positioning OTDOA reference cell info for UE-based 10.3.7.108a | |
| UE positioning OTDOA neighbour cell list for UE-based | OP | 1 to <maxCellMeas> | | |
| >UE positioning OTDOA neighbour cell info for UE-based | MP | | UE positioning OTDOA neighbour cell info for UE-based 10.3.7.106 | |

# 14.7 UE positioning measurements

## 14.7.1 UE positioning measurement quantities

The quantity to measure for UE positioning is dependent on the positioning method and the method type requested in the IE "UE positioning reporting quantity".

1 SFN-SFN observed time difference type 2, mandatory.

2 Rx-Tx time difference type 2, optional.

3 GPS timing of cell fames, optional.

The definition of other GPS measurements is not within the scope of this specification.

## 14.7.2 Void

## 14.7.3 UE positioning reporting events

In the IE "UE positioning reporting criteria" ~~field~~ in the Measurement Control messages, the UTRAN notifies the UE of which events should trigger a measurement report. UE positioning reporting events that can trigger a report are given below. The content of the measurement report is dependant on the ~~location~~ positioning method and method type requested in the IE "UE positioning reporting quantity" of the Measurement Control message and is described in detail in [18].

### 14.7.3.1 Reporting Event 7a: The UE position changes more than an absolute threshold

This event is used for UE-based methods only.

When this event is ordered by UTRAN in a measurement control message, the UE shall

- ~~-~~send a measurement report when the UE changes its position compared to the last reported position more than the~~a~~ predefined threshold defined by the IE "Threshold position change";~~. This event is used for UE-based methods only.~~

- act as specified in section 8.6.7.19.1b;

- if the value of IE “Amount of Reporting” in variable MEASUREMENT_IDENTITY for this event is greater than one,

  - decrease IE “Amount of Reporting” in variable MEASUREMENT_IDENTITY for this event by one;

- if the value of IE “Amount of Reporting” in variable MEASUREMENT_IDENTITY for this event is equal to one,

  - delete this event from the list of events in variable MEASUREMENT_IDENTITY.

### 14.7.3.2 Reporting Event 7b: SFN-SFN measurement changes more than an absolute threshold

When this event is ordered by UTRAN in a measurement control message, the UE shall:

- send a measurement report when the SFN-SFN time difference measurement type 2 of any measured cell changes more than the threshold defined by the IE "Threshold SFN-SFN change", and - if UTRAN set IE “Method Type” in “UE positioning reporting quantity” in the MEASUREMENT CONTROL message to “UE based”,

  - act as specified in section 8.6.7.19.1b;

- if UTRAN set IE “Method Type” in “UE positioning reporting quantity” in the MEASUREMENT CONTROL message to “UE assisted”,

  - act as specified in section 8.6.7.19.1a;

- if UTRAN set IE “Method Type” in “UE positioning reporting quantity” in the MEASUREMENT CONTROL message to “UE assisted preferred but UE based allowed” or “UE based preferred but UE assisted allowed”,

  - the UE may choose to either act according to section 8.6.7.19.1a or 8.6.7.19.1b.

- if the value of IE “Amount of Reporting” in variable MEASUREMENT_IDENTITY for this event is greater than one,

  - decrease IE “Amount of Reporting” in variable MEASUREMENT_IDENTITY for this event by one;

- if the value of IE “Amount of Reporting” in variable MEASUREMENT_IDENTITY for this event is equal to one,

  - delete this event from the list of events in variable MEASUREMENT_IDENTITY.

~~send a measurement report when the SFN-SFN time difference measurement of any measured cell changes more than a predefined threshold. This event is primarily used for UE-assisted methods, but can be used also for UE-based methods.~~

### 14.7.3.3 Reporting Event 7c: GPS time and SFN time have drifted apart more than an absolute threshold

When this event is ordered by UTRAN in a measurement control message, the UE shall:

~~send a measurement report when the GPS Time Of Week and the SFN timer have drifted apart more than a predefined threshold. This event is primarily used for UE-assisted methods, but can be used also for UE-based methods.~~

- send a measurement report when the GPS Time Of Week and the SFN timer have drifted apart more than the threshold defined by the IE "Threshold SFN-GPS TOW", and

- if UTRAN set IE “Method Type” in “UE positioning reporting quantity” in the MEASUREMENT CONTROL message to “UE based”,

  - act as specified in section 8.6.7.19.1b;

- if UTRAN set IE “Method Type” in “UE positioning reporting quantity” in the MEASUREMENT CONTROL message to “UE assisted”,

  - act as specified in section 8.6.7.19.1a;

- if UTRAN set IE “Method Type” in UE positioning reporting quantity” in the MEASUREMENT CONTROL message to “UE assisted preferred but UE based allowed” or “UE based preferred but UE assisted allowed”,

  - act as specified in section 8.6.7.19.1a or in section 8.6.7.19.1b depending on the method type chosen by the UE.

- if the value of IE “Amount of Reporting” in variable MEASUREMENT_IDENTITY for this event is greater than one,

  - decrease IE “Amount of Reporting” in variable MEASUREMENT_IDENTITY for this event by one;

- if the value of IE “Amount of Reporting” in variable MEASUREMENT_IDENTITY for this event is equal to one,

  - delete this event from the list of events in variable MEASUREMENT_IDENTITY.