TSG-RAN Meeting #21 ***RP-030481***
Frankfurt, Germany, 16-19 September 2003

Title: **CRs (R'99 and linked Rel-4/Rel-5) to TS 25.305**

Source: **TSG-RAN WG2**

Agenda item: **7.3.3**

Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Version-New	Doc-2nd-Level	Workitem
25.305	090	-	R99	Correction to UE Positioning privacy procedures	F	3.9.0	3.10.0	R2-031863	TEI
25.305	091	-	Rel-4	Correction to UE Positioning privacy procedures	A	4.5.0	4.6.0	R2-031864	TEI
25.305	092	-	Rel-5	Correction to UE Positioning privacy procedures	A	5.6.0	5.7.0	R2-031865	TEI
25.305	093	-	R99	Alignment with 25.331 regarding A-GPS assistance data	F	3.9.0	3.10.0	R2-031869	TEI
25.305	094	-	Rel-4	Alignment with 25.331 regarding A-GPS assistance data	A	4.5.0	4.6.0	R2-031870	TEI
25.305	095	-	Rel-5	Alignment with 25.331 regarding A-GPS assistance data	A	5.6.0	5.7.0	R2-031871	TEI
25.305	096	-	R99	UE positioning support in the UE	F	3.9.0	3.10.0	R2-031989	TEI
25.305	097	-	Rel-4	UE positioning support in the UE	A	4.5.0	4.6.0	R2-031990	TEI
25.305	098	-	Rel-5	UE positioning support in the UE	A	5.6.0	5.7.0	R2-031991	TEI

3GPP TSG-RAN WG2 Meeting #37
Hungary, Budapest, 25th -29th August 2003

Tdoc ⌘R2-031863

CR-Form-v7

CHANGE REQUEST

⌘ **25.305** **CR** **090** ⌘ **rev** **-** ⌘ Current version: **3.9.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐ ME ☒ Radio Access Network ☐ Core Network ☐

Title:	⌘	Correction to UE Positioning privacy procedures.
Source:	⌘	RAN WG2
Work item code:	⌘	TEI
Date:	⌘	07/07/2003
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)
Rel-6 (Release 6)

Reason for change:	⌘	Section 6.6.4.1 indicates that a UE only performs UP measurements if the request meets the privacy criteria. This behaviour is not aligned with the privacy procedures described in the location services stage 2 in 23.171. The privacy procedures allow the user to reject a position request from an external party or application. The procedures use NAS signalling and following this signalling it is the responsibility of the core network to ensure that position information is provided only to authorised parties or applications. The RRC UP procedures have no part to play in the privacy process and the UE has no knowledge about why UP measurements are being requested by UTRAN. Therefore, the UE should never refuse to perform UP measurements based on privacy criteria.
Summary of change:	⌘	The incorrect sentence saying that the UE only performs UP measurements if the request meets the privacy criteria is deleted. **Isolated Impact Analysis** Functionality corrected: UE Positioning - all methods Isolated impact statement: Correction to a function where specification was containing a contradiction with another specification. Would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.
Consequences if not approved:	⌘	If the CR is not approved then some UE implementations may not perform UE positioning measurements in some situations. The worst case situation would be if the UE refused to perform UP measurements when the network is actually requested the measurements due to an emergency call.

Clauses affected:	⌘	6.6.4.1			
Other specs affected:	⌘	Y: X Y: Y:	N: N: X N: X	Other core specifications Test specifications O&M Specifications	⌘ 25.331 CR 1994
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/specs/CR.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.

6.6.4.1 Signalling between SRNC and Target UE

UE Positioning related signalling between an SRNC and a target UE is supported by the RRC protocol as specified in [18].

The positioning request to UE signalling flow is generic for all UE-based or UE-assisted positioning methods (OTDOA and Network-assisted GPS).

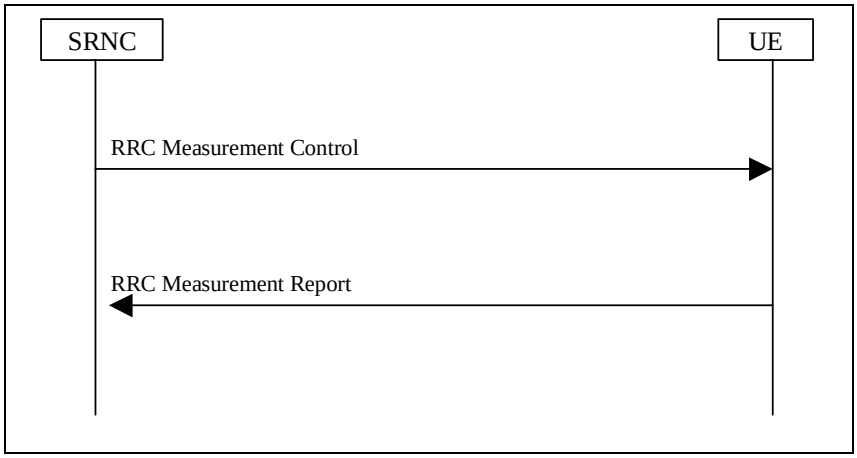

Figure 6.1: OTDOA /GPS Positioning Message Flow

1. The SRNC determines possible assistance data and sends a MEASUREMENT CONTROL request to the UE.

2. ~~Provided that the UE Positioning request meets the privacy criteria,~~ The UE performs the requested measurements. If the UE is able to calculate its own position, and this is requested, the UE computes a position estimate based on measurements. Assistance data necessary to perform these operations will either be provided in the MEASUREMENT CONTROL request and possibly in subsequent MEASUREMENT CONTROL messages or be available from broadcast sources. The resulting measurements or position estimate are returned to UTRAN in a MEASUREMENT REPORT response. If the UE cannot fulfil the request, a MEASUREMENT CONTROL FAILURE message is returned.

In case the UE is not able to fulfil the measurements because the assistance data stored in the UE is not sufficient or out of date the UE returns a MEASUREMENT REPORT requesting for more additional data.

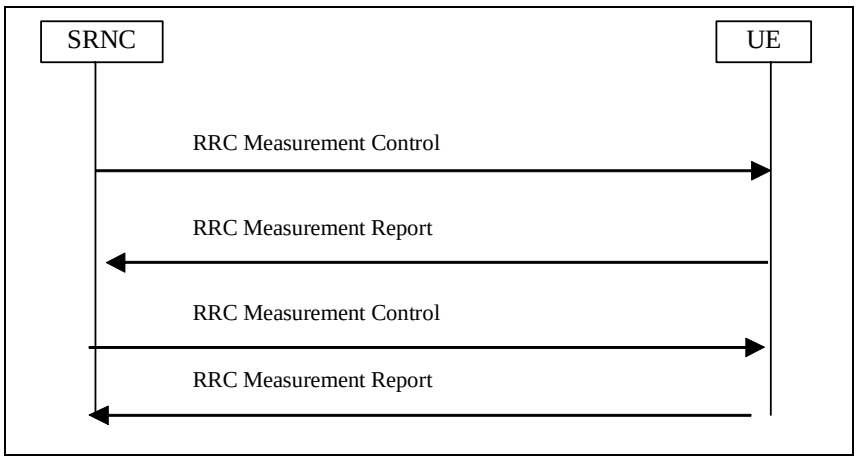

Figure 6.2: OTDOA /GPS Positioning Message Flow with additional assistance data request

1. The SRNC requests a UP measurement and may include some assistance data in the MEASUREMENT CONTROL.

2. The UE cannot fulfil the request because its assistance data is not sufficient, a MEASUREMENT REPORT message is returned requesting for additional assistance data.

3. The SRNC may send more assistance data based on UE request.
4. The requested measurement results are returned to the SRNC.

3GPP TSG-RAN WG2 Meeting #37
Hungary, Budapest, 25th -29th August 2003

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CR-Form-v7

CHANGE REQUEST

⌘ **25.305** **CR** **091** ⌘ **rev** **-** ⌘ Current version: **4.5.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐ ME ☒ Radio Access Network ☐ Core Network ☐

Title:	⌘	Correction to UE Positioning privacy procedures.
Source:	⌘	Motorola
Work item code:	⌘	TEI
Date:	⌘	07/07/2003
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)*
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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)*
Rel-6	*(Release 6)*

Reason for change: ⌘	Section 6.6.4.1 indicates that a UE only performs UP measurements if the request meets the privacy criteria. This behaviour is not aligned with the privacy procedures described in the location services stage 2 in 23.171. The privacy procedures allow the user to reject a position request from an external party or application. The procedures use NAS signalling and following this signalling it is the responsibility of the core network to ensure that position information is provided only to authorised parties or applications. The RRC UP procedures have no part to play in the privacy process and the UE has no knowledge about why UP measurements are being requested by UTRAN. Therefore, the UE should never refuse to perform UP measurements based on privacy criteria.
Summary of change: ⌘	The incorrect sentence saying that the UE only performs UP measurements if the request meets the privacy criteria is deleted. **Isolated Impact Analysis** Functionality corrected: UE Positioning - all methods Isolated impact statement: Correction to a function where specification was containing a contradiction with another specification. Would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.
Consequences if not approved: ⌘	If the CR is not approved then some UE implementations may not perform UE positioning measurements in some situations. The worst case situation would be if the UE refused to perform UP measurements when the network is actually requested the measurements due to an emergency call.

Clauses affected:	⌘	6.6.4.1				
Other specs affected:	⌘	**Y**	**N**	Other core specifications	⌘	25.331 CR 1995
		X				
			X	Test specifications		
			X	O&M Specifications		
Other comments:	⌘					

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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.

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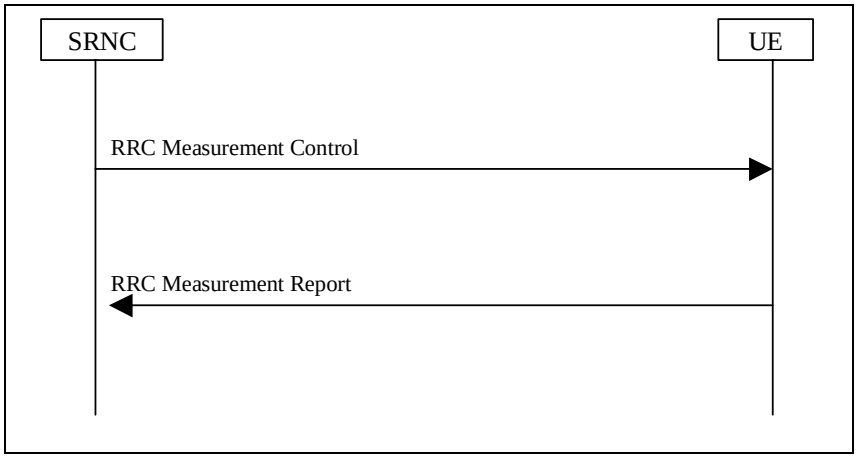

Figure 6.1: OTDOA /GPS Positioning Message Flow

1. The SRNC determines possible assistance data and sends a MEASUREMENT CONTROL request to the UE.

2. ~~Provided that the UE Positioning request meets the privacy criteria,~~ The UE performs the requested measurements. If the UE is able to calculate its own position, and this is requested, the UE computes a position estimate based on measurements. Assistance data necessary to perform these operations will either be provided in the MEASUREMENT CONTROL request and possibly in subsequent MEASUREMENT CONTROL messages or be available from broadcast sources. The resulting measurements or position estimate are returned to UTRAN in a MEASUREMENT REPORT response. If the UE cannot fulfil the request, a MEASUREMENT CONTROL FAILURE message is returned.

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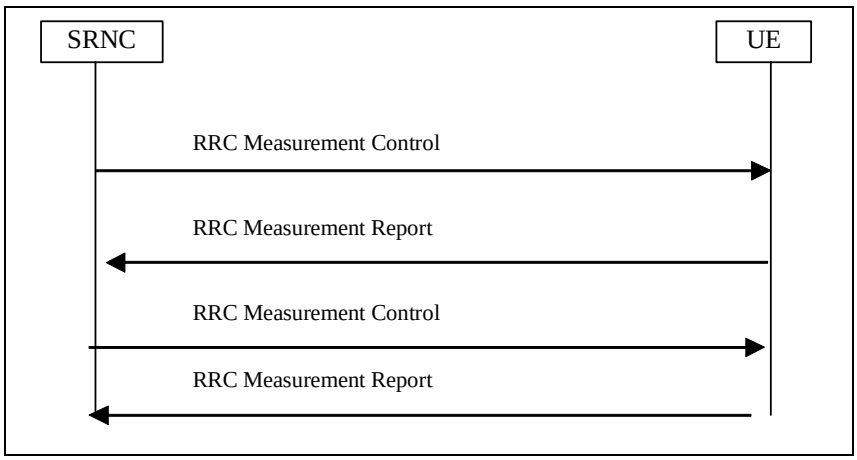

Figure 6.2: OTDOA /GPS Positioning Message Flow with additional assistance data request

1. The SRNC requests a UP measurement and may include some assistance data in the MEASUREMENT CONTROL.

2. The UE cannot fulfil the request because its assistance data is not sufficient, a MEASUREMENT REPORT message is returned requesting for additional assistance data.

3. The SRNC may send more assistance data based on UE request.
4. The requested measurement results are returned to the SRNC.

3GPP TSG-RAN WG2 Meeting #37
Hungary, Budapest, 25th -29th August 2003

Tdoc ⌘R2-031865

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CHANGE REQUEST

⌘ **25.305** **CR** **092** ⌘ **rev** **-** ⌘ Current version: **5.6.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐ ME ☒ Radio Access Network ☐ Core Network ☐

Title:	⌘	Correction to UE Positioning privacy procedures.
Source:	⌘	RAN WG2
Work item code:	⌘	TEI
Date:	⌘	07/07/2003
Category:	⌘	**A**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
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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)*
Rel-6 *(Release 6)*

Reason for change: ⌘

Section 6.6.4.1 indicates that a UE only performs UP measurements if the request meets the privacy criteria. This behaviour is not aligned with the privacy procedures described in the location services stage 2 in 23.171.

The privacy procedures allow the user to reject a position request from an external party or application. The procedures use NAS signalling and following this signalling it is the responsibility of the core network to ensure that position information is provided only to authorised parties or applications. The RRC UP procedures have no part to play in the privacy process and the UE has no knowledge about why UP measurements are being requested by UTRAN. Therefore, the UE should never refuse to perform UP measurements based on privacy criteria.

Summary of change: ⌘

The incorrect sentence saying that the UE only performs UP measurements if the request meets the privacy criteria is deleted.

Isolated Impact Analysis
Functionality corrected: UE Positioning - all methods

Isolated impact statement: Correction to a function where specification was containing a contradiction with another specification. Would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.

Consequences if not approved: ⌘

If the CR is not approved then some UE implementations may not perform UE positioning measurements in some situations. The worst case situation would be if the UE refused to perform UP measurements when the network is actually requested the measurements due to an emergency call.

Clauses affected:	⌘	6.6.4.1				
Other specs affected:	⌘	**Y**	**N**	Other core specifications	⌘	25.331 CR 1996
			X	Test specifications		
			X	O&M Specifications		
Other comments:	⌘					

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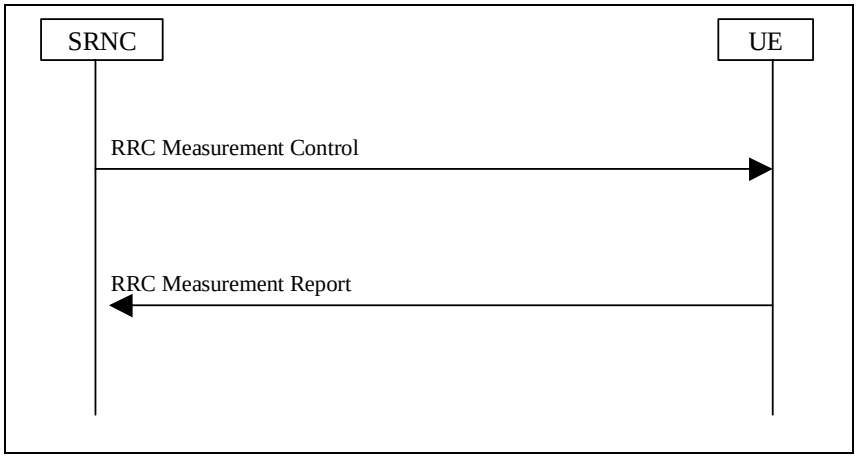

Figure 6.1: OTDOA /GPS Positioning Message Flow

1. The SRNC determines possible assistance data and sends a MEASUREMENT CONTROL request to the UE. In networks that include an SAS, the assistance data is generated within the SRNC or in the SAS and passed to the SRNC over the Iupc interface. If both an SAS and an SRNC with SMLC internal functionality are available, selection is based on SRNC configuration.

2. ~~Provided that the UE Positioning request meets the privacy criteria, T~~the UE performs the requested measurements. If the UE is able to calculate its own position, and this is requested, the UE computes a position estimate based on measurements. Assistance data necessary to perform these operations will either be provided in the MEASUREMENT CONTROL request and possibly in subsequent MEASUREMENT CONTROL messages or be available from broadcast sources. The resulting measurements or position estimate are returned to UTRAN in a MEASUREMENT REPORT response. If the UE cannot fulfil the request, a MEASUREMENT CONTROL FAILURE message is returned.

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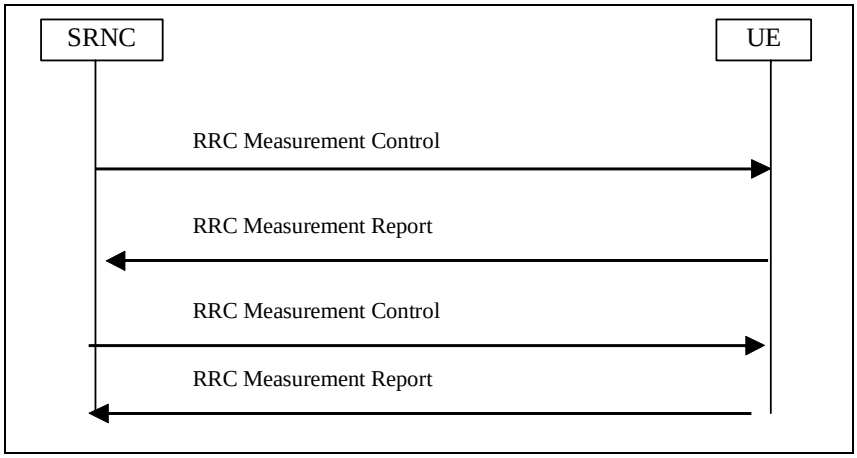

Figure 6.2: OTDOA /GPS Positioning Message Flow with additional assistance data request

1. The SRNC requests a UP measurement and may include some assistance data in the MEASUREMENT CONTROL.

2. The UE cannot fulfil the request because its assistance data is not sufficient, a MEASUREMENT REPORT message is returned requesting for additional assistance data

3. The SRNC may send more assistance data based on UE request

4. The requested measurement results are returned to the SRNC.

3GPP TSG-RAN WG2 Meeting #37
Budapest, Hungary, 25-29 August 2003

Tdoc ⌘R2-031869

CR-Form-v7

CHANGE REQUEST

⌘ **25.305** **CR** **093** ⌘ **rev** **-** ⌘ Current version: **3.9.0** ⌘

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

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	Alignment with 25.331 regarding A-GPS assistance data
Source:	⌘	RAN WG2
Work item code:	⌘	TEI
Date:	⌘	18/08/2003
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),*
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D *(editorial modification)*
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R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*

Reason for change: ⌘

25.305 contains outdated or erroneous information on A-GPS assistance data:
1. Delta PRC2, Delta RRC2, Delta PRC3, Delta RRC3 are not anymore used in 25.331 (CR1907).
2. The Reference Location (ie. “UE positioning GPS reference UE position” in 25.331 10.3.7.90) contains the uncertainty ellipsoid. 25.305 10.5.1.8 incorrectly claims that this information is provided without uncertainty.

Summary of change: ⌘

1. Delta PRC2, Delta RRC2, Delta PRC3, Delta RRC3 are deleted.
2. It is corrected that the Reference Location is provided with uncertainty.

Isolated Impact Analysis
Functionality corrected: A-GPS UE Positioning
Correction to a function where specification was containing contradictions with the stage 3.

Consequences if not approved: ⌘

The specification remains unaligned with the existing RRC signalling. This may lead to interoperability problems.
A UE not implementing this CR:
- might use the parameters that have been deleted
- would not expect the uncertainty value, leading to a UE behaviour which is unspecified.

A UTRAN not implementing this CR:
- might send the parameters that have been deleted
- would not send the uncertainty value or send some dummy value.

Clauses affected: ⌘ 10.5.1.2, 10.5.1.8

		Y	N			
Other specs affected:	⌘		X	Other core specifications	⌘	
			X	Test specifications		
			X	O&M Specifications		
Other comments:	⌘					

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10.5 Position determination

There are two types of network-assisted GPS methods, namely UE-based and UE-assisted, which differ according to where the actual position calculation is carried out.

Computation of the position fix can either be performed in UTRAN (i.e. SRNC) for UE-assisted or in the UE for UE-based.

The UE-based method maintains a full GPS receiver functionality in the UE, and the position calculation is carried out by the UE, thus allowing stand-alone position fixes.

In the UE-assisted method, the UE employs a reduced complexity GPS receiver functionality. This carries out the pseudorange (code phase) measurements. These are signalled, using higher layer signalling, to the specific network element that estimates the position of the UE and carries out the remaining GPS operations. In this method, accurately timed code phase signalling (as specified in [15] and [16]) is required on the downlink. If DGPS is performed in the UE, then differential corrections must be signalled to it. On the other hand, DGPS corrections can be applied to the final result in the network to improve the position accuracy without extra signalling to the UE.

10.5.1 Information to be transferred between UTRAN elements

Table 10.1 lists information for both UE-assisted and UE-based modes that may be sent from SRNC to UE. This information can be signalled to the UE either in a broadcast channel or as dedicated signalling.

Table 10.1: Information that may be transferred from UTRAN to UE('Yes' = information applicable 'No' = information not applicable

Information	UE-assisted	UE-based
Number of satellites for which assistance is provided	Yes	Yes
reference time for GPS ($T_{UTRAN-GPS}$) (specified in [15] and [16])	Yes	Yes
3-d reference position (specified in [11])	No	Yes
ionospheric corrections	No	Yes
satellite ID for identifying the satellites for which assistance data is provided	Yes	Yes
Ephemeris & clock corrections	Yes	Yes
UTC offset	No	Yes
DGPS corrections	No	Yes
almanac data	Yes	Yes
real-time integrity (e.g. a list of unusable satellites)	No	Yes
doppler (0^{th} order term)	Yes	No
Doppler Search Window width	Yes	No
doppler (1^{st} order term)	Yes	No
azimuth	Yes	No
elevation	Yes	No
code phase	Yes	No
code phase centre and search window width	Yes	No

The information that may be signalled from UE to SRNC is listed in table 10.2.

Table 10.2: Information that may be transferred from UE to SRNC

Information	UE-assisted	UE-based
reference time for GPS (T_{UE-GPS}) (specified in [15] and [16])	Yes	Yes
serving cell information	No	Yes
Latitude/Longitude/Altitude/Error ellipse	No	Yes
velocity estimate in the UE	No	Yes
satellite ID for which measurement data is valid	Yes	No
Whole/Fractional chips for information about the code-phase measurement	Yes	No
C/N_0 of the received signal from the particular satellite used in the measurements	Yes	No
doppler frequency measured by the UE for the particular satellite	Yes	No
pseudorange RMS error	Yes	No
multipath indicator	Yes	No
number of Pseudoranges	Yes	No

Table 10.3 shows the information that may be transferred from Node B to its CRNC. If the CRNC is not the SRNC the information is also forwarded from CRNC to SRNC.

Table 10.3: Information that may be transferred from Node B/LMU to CRNC and between RNCs

Information	UE-assisted	UE-based
reference time for GPS ($T_{UTRAN-GPS}$) (specified in [15] and [16])	Yes	Yes

10.5.1.1 Almanac data

The almanac parameters specify the coarse, long-term model of the satellite positions and clocks. These parameters are a subset of the ephemeris and clock correction parameters in the Navigation Model, although with reduced resolution and accuracy. The almanac model is useful for receiver tasks that require coarse accuracy, such as determining satellite visibility. The model is valid for up to one year, typically. Since it is a long-term model, the field should be provided for all satellites in the GPS constellation.

Optionally, "SV Global Health" information may accompany this almanac information. This additional information is composed of the sequence of all non-parity data bits contained in words 3-10 of page 25 of subframe 4 of the GPS navigation message followed by the sequence of all non-parity bits contained in words 3-10 of page 25 of subframe 5 of the GPS navigation message. The following GPS navigation message fields are excluded when constructing these sequences: "Data ID", "SV (Page) ID", and "t".

10.5.1.2 DGPS corrections

In order to allow a UE to estimate its position more accurate, biases in the pseudorange measurements may be provided to the UE.

Status/Health

This information indicates the status of the differential corrections contained in the message.

IODE

This is the sequence number for the ephemeris for the particular satellite. The UE can use this information to determine if new ephemeris is used for calculating the corrections that are provided in the broadcast message. This eight-bit IE is incremented for each new set of ephemeris for the satellite and may occupy the numerical range of [0, 239] during normal operations. More information about this field can be found from [24].

User Differential Range Error (UDRE)

The UDRE provides an estimate of the uncertainty (1-σ) in the corrections for the particular satellite. The value in this field shall be multiplied by the UDRE Scale Factor in the common Corrections Status/Health field to determine the final UDRE estimate for the particular satellite. More information about this field can be found from [24].

Pseudo-Range Correction (PRC)

The PRC indicates the correction to the pseudorange for the particular satellite at the GPS Reference Time, t_0. The PRC definition here is different from the one given in [24].

Pseudo-Range Rate Correction (RRC)

This information indicates the rate-of-change of the pseudorange correction for the particular satellite, using the satellite ephemeris identified by the IODE IE. The RRC definition here is different from the one given in [24].

~~**Delta Pseudo-Range Correction 2 (Delta PRC2)**~~

~~This information indicates the difference in the pseudorange correction between the satellite's ephemeris identified by IODE and the previous ephemeris two issues ago IODE -2.~~

~~**Delta Pseudo-Range Rate Correction 2 (Delta RRC2)**~~

~~This information indicates the difference in the pseudorange rate-of-change correction between the satellite's ephemeris identified by IODE and IODE -2.~~

~~**Delta Pseudo-Range Correction 3 (Delta PRC3)**~~

~~This information indicates the difference in the pseudorange correction between the satellite's ephemeris identified by IODE and the previous ephemeris three issues ago IODE -3.~~

~~**Delta Pseudo-Range Rate Correction 3 (Delta RRC3)**~~

~~This information indicates the difference in the pseudorange rate-of-change correction between the satellite's ephemeris identified by IODE and IODE -3.~~

10.5.1.3 Ionospheric corrections

The Ionospheric Model contains information needed to model the propagation delays of the GPS signals through the ionosphere. Proper use of these information allows a single-frequency GPS receiver to remove approximately 50% of the ionospheric delay from the range measurements. The Ionospheric Model is valid for the entire constellation and changes slowly relative to the Navigation Model.

10.5.1.4 Ephemeris data and clock correction

Ephemeris data and clock corrections provide an accurate model of the satellite positions to the UE.

10.5.1.5 Real Time integrity monitor function

An Integrity Monitor (IM) function in the network should detect unhealthy (i.e., failed/failing) satellites. Excessively large pseudo range errors, as evidenced by the magnitude of the corresponding DGPS correction determined by the IM, may be used to detect unhealthy satellites. Unhealthy satellites should be detected very close to the occurrence of the satellite failure (e.g. 10 seconds) and marked in an unhealthy satellite list as unusable/bad. When unhealthy satellites are detected, the assistance and/or DGPS correction data should not be supplied for these satellites. Upon receiving the list of unhealthy satellites from the SRNC, the UE shall consider the data associated with these satellites to be invalid.

The IM function should also inform the UE of measurement quality in DGPS modes when satellites are healthy. This can be done by computing the position of the DGPS reference receiver using its derived pseudo ranges and differential corrections at the IM, and differencing the IM computed position with the known location of the DGPS reference receiver to compute a position error. When the error in the IM computed position is excessive for solutions based upon healthy satellites only, DGPS users should be informed of measurement quality through the supplied User Differential Range Error (UDRE) adjusted values based on the operation of the IM. The UE should use the measurement quality as a factor in weighing data obtained from associated satellites in its position calculation.

NOTE: UDRE is one of the IEs contained in the DGPS information ([19]).

The real-time Integrity Monitor function provides the following information to a UE:

- BadSATid;
- UDRE value adjusted based on the measurement quality.

BadSATid is a lit of unhealthy (i.e., failed/failing) satellites. The UE shall consider any assistance or DGPS data of these satellites as invalid.

Adjusted UDRE value reports the measurement quality of the corresponding satellites. The UE should consider the quality while calculating its position.

10.5.1.6 GPS reference time

GPS reference time may be used to provide a mapping between UTRAN and GPS time.

GPS TOW Assist

This information contains several fields in the Telemetry (TLM) Word and Handover Word (HOW) that are currently being broadcast by the respective GPS satellites. Combining this information with GPS TOW helps the UE with time-recovery needed to predict satellite signal.

TLM Message

This information contains a 14-bit value representing the Telemetry Message (TLM) being broadcast by the GPS satellite identified by the particular SatID, with the MSB occurring first in the satellite transmission.

Anti-Spoof/Alert

These information contain the Anti-Spoof and Alert flags that are being broadcast by the GPS satellite identified by SatID.

TLM Reserved

These information contain the two reserved bits in the TLM Word being broadcast by the GPS satellite identified by SatID, with the MSB occurring first in the satellite transmission.

10.5.1.7 UTC

UTC parameters may be used to provide Coordinated Universal Time to the UE.

10.5.1.8 Reference Location

The Reference Location contains a 3-D location (with~~out~~ uncertainty) specified as per [11]. The purpose of this field is to provide the UE with a priori knowledge of its position in order to improve GPS receiver performance.

10.5.1.9 Additional non-GPS related information

Additional non-GPS measurements performed by UTRAN or UE may be used by the SRNC to improve the performance of the UE-assisted GPS method. This information may be RTT in FDD or Rx Timing Deviation in TDD, UE receiving transmitting time (UE Rx-Tx), SFN-SFN observed time difference or CPICH Ec/No. All the additional measurements are defined in [15] and [16] and can be made available through RRC signalling for UE measurements or NBAP signalling for UTRAN measurements.

Furthermore, to those UE technologies requiring externally provided sensitivity and time aiding data, some navigation bits may be sent from UTRAN to UE for sensitivity assistance and time recovery.

3GPP TSG-RAN WG2 Meeting #37
Budapest, Hungary, 25-29 August 2003

Tdoc ⌘R2-031870

CR-Form-v7

CHANGE REQUEST

⌘ **25.305** **CR** **094** ⌘ **rev** **-** ⌘ Current version: **4.5.0** ⌘

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

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	Alignment with 25.331 regarding A-GPS assistance data
Source:	⌘	RAN WG2
Work item code:	⌘	TEI
Date:	⌘	18/08/2003
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)*
Rel-6 *(Release 6)*

Reason for change: ⌘
25.305 contains outdated or erroneous information on A-GPS assistance data:
1. Delta PRC2, Delta RRC2, Delta PRC3, Delta RRC3 are not anymore used in 25.331 (CR1907).
2. The Reference Location (ie. “UE positioning GPS reference UE position” in 25.331 10.3.7.90) contains the uncertainty ellipsoid. 25.305 10.5.1.8 incorrectly claims that this information is provided without uncertainty.

Summary of change: ⌘
1. Delta PRC2, Delta RRC2, Delta PRC3, Delta RRC3 are deleted.
2. It is corrected that the Reference Location is provided with uncertainty.

Isolated Impact Analysis
Functionality corrected: A-GPS UE Positioning
Correction to a function where specification was containing contradictions with the stage 3.

Consequences if not approved: ⌘
The specification remains unaligned with the existing RRC signalling. This may lead to interoperability problems.
A UE not implementing this CR:
- might use the parameters that have been deleted
- would not expect the uncertainty value, leading to a UE behaviour which is unspecified.

A UTRAN not implementing this CR:
- might send the parameters that have been deleted
- would not send the uncertainty value or send some dummy value.

Clauses affected: ⌘ 10.5.1.2, 10.5.1.8

		Y	N			
Other specs affected:	⌘		X	Other core specifications	⌘	
			X	Test specifications		
			X	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/specs/CR.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.

10.5 Position determination

There are two types of network-assisted GPS methods, namely UE-based and UE-assisted, which differ according to where the actual position calculation is carried out.

Computation of the position fix can either be performed in UTRAN (i.e. SRNC) for UE-assisted or in the UE for UE-based.

The UE-based method maintains a full GPS receiver functionality in the UE, and the position calculation is carried out by the UE, thus allowing stand-alone position fixes.

In the UE-assisted method, the UE employs a reduced complexity GPS receiver functionality. This carries out the pseudorange (code phase) measurements. These are signalled, using higher layer signalling, to the specific network element that estimates the position of the UE and carries out the remaining GPS operations. In this method, accurately timed code phase signalling (as specified in [15] and [16]) is required on the downlink. If DGPS is performed in the UE, then differential corrections must be signalled to it. On the other hand, DGPS corrections can be applied to the final result in the network to improve the position accuracy without extra signalling to the UE.

10.5.1 Information to be transferred between UTRAN elements

Table 10.1 lists information for both UE-assisted and UE-based modes that may be sent from SRNC to UE. This information can be signalled to the UE either in a broadcast channel or as dedicated signalling.

Table 10.1: Information that may be transferred from UTRAN to UE('Yes' = information applicable 'No' = information not applicable

Information	UE-assisted	UE-based
Number of satellites for which assistance is provided	Yes	Yes
reference time for GPS ($T_{UTRAN-GPS}$) (specified in [15] and [16])	Yes	Yes
3-d reference position (specified in [11])	No	Yes
ionospheric corrections	No	Yes
satellite ID for identifying the satellites for which assistance data is provided	Yes	Yes
Ephemeris & clock corrections	Yes	Yes
UTC offset	No	Yes
DGPS corrections	No	Yes
almanac data	Yes	Yes
real-time integrity (e.g. a list of unusable satellites)	No	Yes
doppler (0^{th} order term)	Yes	No
Doppler Search Window width	Yes	No
doppler (1^{st} order term)	Yes	No
azimuth	Yes	No
elevation	Yes	No
code phase	Yes	No
code phase centre and search window width	Yes	No

The information that may be signalled from UE to SRNC is listed in table 10.2.

Table 10.2: Information that may be transferred from UE to SRNC

Information	UE-assisted	UE-based
reference time for GPS (T_{UE-GPS}) (specified in [15] and [16])	Yes	Yes
serving cell information	No	Yes
Latitude/Longitude/Altitude/Error ellipse	No	Yes
velocity estimate in the UE	No	Yes
satellite ID for which measurement data is valid	Yes	No
Whole/Fractional chips for information about the code-phase measurement	Yes	No
C/N_0 of the received signal from the particular satellite used in the measurements	Yes	No
doppler frequency measured by the UE for the particular satellite	Yes	No
pseudorange RMS error	Yes	No
multipath indicator	Yes	No
number of Pseudoranges	Yes	No

Table 10.3 shows the information that may be transferred from Node B to its CRNC. If the CRNC is not the SRNC the information is also forwarded from CRNC to SRNC.

Table 10.3: Information that may be transferred from Node B/LMU to CRNC and between RNCs

Information	UE-assisted	UE-based
reference time for GPS ($T_{UTRAN-GPS}$) (specified in [15] and [16])	Yes	Yes

10.5.1.1 Almanac data

The almanac parameters specify the coarse, long-term model of the satellite positions and clocks. These parameters are a subset of the ephemeris and clock correction parameters in the Navigation Model, although with reduced resolution and accuracy. The almanac model is useful for receiver tasks that require coarse accuracy, such as determining satellite visibility. The model is valid for up to one year, typically. Since it is a long-term model, the field should be provided for all satellites in the GPS constellation.

Optionally, "SV Global Health" information may accompany this almanac information. This additional information is composed of the sequence of all non-parity data bits contained in words 3-10 of page 25 of subframe 4 of the GPS navigation message followed by the sequence of all non-parity bits contained in words 3-10 of page 25 of subframe 5 of the GPS navigation message. The following GPS navigation message fields are excluded when constructing these sequences: "Data ID", "SV (Page) ID", and "t".

10.5.1.2 DGPS corrections

In order to allow a UE to estimate its position more accurate, biases in the pseudorange measurements may be provided to the UE.

Status/Health

This information indicates the status of the differential corrections contained in the message.

IODE

This is the sequence number for the ephemeris for the particular satellite. The UE can use this information to determine if new ephemeris is used for calculating the corrections that are provided in the broadcast message. This eight-bit IE is incremented for each new set of ephemeris for the satellite and may occupy the numerical range of [0, 239] during normal operations. More information about this field can be found from [24].

User Differential Range Error (UDRE)

The UDRE provides an estimate of the uncertainty (1-σ) in the corrections for the particular satellite. The value in this field shall be multiplied by the UDRE Scale Factor in the common Corrections Status/Health field to determine the final UDRE estimate for the particular satellite. More information about this field can be found from [24].

Pseudo-Range Correction (PRC)

The PRC indicates the correction to the pseudorange for the particular satellite at the GPS Reference Time, t_0. The PRC definition here is different from the one given in [24].

Pseudo-Range Rate Correction (RRC)

This information indicates the rate-of-change of the pseudorange correction for the particular satellite, using the satellite ephemeris identified by the IODE IE. The RRC definition here is different from the one given in [24].

~~**Delta Pseudo-Range Correction 2 (Delta PRC2)**~~

~~This information indicates the difference in the pseudorange correction between the satellite's ephemeris identified by IODE and the previous ephemeris two issues ago IODE -2.~~

~~**Delta Pseudo-Range Rate Correction 2 (Delta RRC2)**~~

~~This information indicates the difference in the pseudorange rate-of-change correction between the satellite's ephemeris identified by IODE and IODE -2.~~

~~**Delta Pseudo-Range Correction 3 (Delta PRC3)**~~

~~This information indicates the difference in the pseudorange correction between the satellite's ephemeris identified by IODE and the previous ephemeris three issues ago IODE -3.~~

~~**Delta Pseudo-Range Rate Correction 3 (Delta RRC3)**~~

~~This information indicates the difference in the pseudorange rate-of-change correction between the satellite's ephemeris identified by IODE and IODE -3.~~

10.5.1.3 Ionospheric corrections

The Ionospheric Model contains information needed to model the propagation delays of the GPS signals through the ionosphere. Proper use of these information allows a single-frequency GPS receiver to remove approximately 50% of the ionospheric delay from the range measurements. The Ionospheric Model is valid for the entire constellation and changes slowly relative to the Navigation Model.

10.5.1.4 Ephemeris data and clock correction

Ephemeris data and clock corrections provide an accurate model of the satellite positions to the UE.

10.5.1.5 Real Time integrity monitor function

An Integrity Monitor (IM) function in the network should detect unhealthy (i.e., failed/failing) satellites. Excessively large pseudo range errors, as evidenced by the magnitude of the corresponding DGPS correction determined by the IM, may be used to detect unhealthy satellites. Unhealthy satellites should be detected very close to the occurrence of the satellite failure (e.g. 10 seconds) and marked in an unhealthy satellite list as unusable/bad. When unhealthy satellites are detected, the assistance and/or DGPS correction data should not be supplied for these satellites. Upon receiving the list of unhealthy satellites from the SRNC, the UE shall consider the data associated with these satellites to be invalid.

The IM function should also inform the UE of measurement quality in DGPS modes when satellites are healthy. This can be done by computing the position of the DGPS reference receiver using its derived pseudo ranges and differential corrections at the IM, and differencing the IM computed position with the known location of the DGPS reference receiver to compute a position error. When the error in the IM computed position is excessive for solutions based upon healthy satellites only, DGPS users should be informed of measurement quality through the supplied User Differential Range Error (UDRE) adjusted values based on the operation of the IM. The UE should use the measurement quality as a factor in weighing data obtained from associated satellites in its position calculation.

NOTE: UDRE is one of the IEs contained in the DGPS information ([19]).

The real-time Integrity Monitor function provides the following information to a UE:

- BadSATid;
- UDRE value adjusted based on the measurement quality.

BadSATid is a lit of unhealthy (i.e., failed/failing) satellites. The UE shall consider any assistance or DGPS data of these satellites as invalid.

Adjusted UDRE value reports the measurement quality of the corresponding satellites. The UE should consider the quality while calculating its position.

10.5.1.6 GPS reference time

GPS reference time may be used to provide a mapping between UTRAN and GPS time.

GPS TOW Assist

This information contains several fields in the Telemetry (TLM) Word and Handover Word (HOW) that are currently being broadcast by the respective GPS satellites. Combining this information with GPS TOW helps the UE with time-recovery needed to predict satellite signal.

TLM Message

This information contains a 14-bit value representing the Telemetry Message (TLM) being broadcast by the GPS satellite identified by the particular SatID, with the MSB occurring first in the satellite transmission.

Anti-Spoof/Alert

These information contain the Anti-Spoof and Alert flags that are being broadcast by the GPS satellite identified by SatID.

TLM Reserved

These information contain the two reserved bits in the TLM Word being broadcast by the GPS satellite identified by SatID, with the MSB occurring first in the satellite transmission.

10.5.1.7 UTC

UTC parameters may be used to provide Coordinated Universal Time to the UE.

10.5.1.8 Reference Location

The Reference Location contains a 3-D location (with~~out~~ uncertainty) specified as per [11]. The purpose of this field is to provide the UE with a priori knowledge of its position in order to improve GPS receiver performance.

10.5.1.9 Additional non-GPS related information

Additional non-GPS measurements performed by UTRAN or UE may be used by the SRNC to improve the performance of the UE-assisted GPS method. This information may be RTT in FDD or Rx Timing Deviation in TDD, UE receiving transmitting time (UE Rx-Tx), SFN-SFN observed time difference or CPICH Ec/No. All the additional measurements are defined in [15] and [16] and can be made available through RRC signalling for UE measurements or NBAP signalling for UTRAN measurements.

Furthermore, to those UE technologies requiring externally provided sensitivity and time aiding data, some navigation bits may be sent from UTRAN to UE for sensitivity assistance and time recovery.

3GPP TSG-RAN WG2 Meeting #37
Budapest, Hungary, 25-29 August 2003

Tdoc ⌘R2-031871

CR-Form-v7

CHANGE REQUEST

⌘ **25.305** **CR** **095** ⌘ **rev** **-** ⌘ Current version: **5.6.0** ⌘

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

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	Alignment with 25.331 regarding A-GPS assistance data
Source:	⌘	RAN WG2
Work item code:	⌘	TEI
Date:	⌘	18/08/2003
Category:	⌘	**A**
Release:	⌘	Rel-5

Use one of the following categories:
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A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
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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)*
Rel-6 *(Release 6)*

Reason for change:	⌘	25.305 contains outdated or erroneous information on A-GPS assistance data: 1. Delta PRC2, Delta RRC2, Delta PRC3, Delta RRC3 are not anymore used in 25.331 (CR1907). 2. The Reference Location (ie. "UE positioning GPS reference UE position" in 25.331 10.3.7.90) contains the uncertainty ellipsoid. 25.305 10.5.1.8 incorrectly claims that this information is provided without uncertainty.
Summary of change:	⌘	1. Delta PRC2, Delta RRC2, Delta PRC3, Delta RRC3 are deleted. 2. It is corrected that the Reference Location is provided with uncertainty. **Isolated Impact Analysis** Functionality corrected: A-GPS UE Positioning Correction to a function where specification was containing contradictions with the stage 3.
Consequences if not approved:	⌘	The specification remains unaligned with the existing RRC signalling. This may lead to interoperability problems. A UE not implementing this CR: - might use the parameters that have been deleted - would not expect the uncertainty value, leading to a UE behaviour which is unspecified. A UTRAN not implementing this CR: - might send the parameters that have been deleted - would not send the uncertainty value or send some dummy value.

Clauses affected:	⌘	10.5.1.2, 10.5.1.8

		Y	N			
Other specs affected:	⌘		X	Other core specifications	⌘	
			X	Test specifications		
			X	O&M Specifications		
Other comments:	⌘					

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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.

10.5 Position determination

There are two types of network-assisted GPS methods, namely UE-based and UE-assisted, which differ according to where the actual position calculation is carried out.

Computation of the position fix can either be performed in UTRAN (i.e. SRNC or SAS) for UE-assisted or in the UE for UE-based.

The UE-based method maintains a full GPS receiver functionality in the UE, and the position calculation is carried out by the UE, thus allowing stand-alone position fixes.

In the UE-assisted method, the UE employs a reduced complexity GPS receiver functionality. This carries out the pseudorange (code phase) measurements. These are signalled, using higher layer signalling, to the specific network element that estimates the position of the UE and carries out the remaining GPS operations. In this method, accurately timed code phase signalling (as specified in [15] and [16]) is required on the downlink. If DGPS is performed in the UE, then differential corrections must be signalled to it. On the other hand, DGPS corrections can be applied to the final result in the network to improve the position accuracy without extra signalling to the UE.

10.5.1 Information to be transferred between UTRAN elements

Table 10.1 lists information for both UE-assisted and UE-based modes that may be sent from the network to UE. This information can be signalled to the UE either in a broadcast channel or as dedicated signalling.

Table 10.1: Information that may be transferred from the network to UE('Yes' = information applicable 'No' = information not applicable

Information	UE-assisted	UE-based
Number of satellites for which assistance is provided	Yes	Yes
reference time for GPS ($T_{UTRAN-GPS}$) (specified in [15] and [16])	Yes	Yes
3-d reference position (specified in [11])	No	Yes
ionospheric corrections	No	Yes
satellite ID for identifying the satellites for which assistance data is provided	Yes	Yes
Ephemeris & clock corrections	Yes	Yes
UTC offset	No	Yes
DGPS corrections	No	Yes
almanac data	Yes	Yes
real-time integrity (e.g. a list of unusable satellites)	No	Yes
doppler (0^{th} order term)	Yes	No
Doppler Search Window width	Yes	No
doppler (1^{st} order term)	Yes	No
azimuth	Yes	No
elevation	Yes	No
code phase	Yes	No
code phase centre and search window width	Yes	No

The information that may be signalled from UE to the network is listed in table 10.2.

Table 10.2: Information that may be transferred from UE to the network

Information	UE-assisted	UE-based
reference time for GPS (T_{UE-GPS}) (specified in [15] and [16])	Yes	Yes
serving cell information	No	Yes
Latitude/Longitude/Altitude/Error ellipse	No	Yes
velocity estimate in the UE	No	Yes
satellite ID for which measurement data is valid	Yes	No
Whole/Fractional chips for information about the code-phase measurement	Yes	No
C/N_0 of the received signal from the particular satellite used in the measurements	Yes	No
doppler frequency measured by the UE for the particular satellite	Yes	No
pseudorange RMS error	Yes	No
multipath indicator	Yes	No
number of Pseudoranges	Yes	No

Table 10.3 shows the information that may be transferred from Node B to its CRNC. If the CRNC is not the SRNC the information is also forwarded from CRNC to SRNC.

Table 10.3: Information that may be transferred from Node B/LMU to CRNC and between RNCs

Information	UE-assisted	UE-based
reference time for GPS ($T_{UTRAN-GPS}$) (specified in [15] and [16])	Yes	Yes

10.5.1.1 Almanac data

The almanac parameters specify the coarse, long-term model of the satellite positions and clocks. These parameters are a subset of the ephemeris and clock correction parameters in the Navigation Model, although with reduced resolution and accuracy. The almanac model is useful for receiver tasks that require coarse accuracy, such as determining satellite visibility. The model is valid for up to one year, typically. Since it is a long-term model, the field should be provided for all satellites in the GPS constellation.

Optionally, "SV Global Health" information may accompany this almanac information. This additional information is composed of the sequence of all non-parity data bits contained in words 3-10 of page 25 of subframe 4 of the GPS navigation message followed by the sequence of all non-parity bits contained in words 3-10 of page 25 of subframe 5 of the GPS navigation message. The following GPS navigation message fields are excluded when constructing these sequences: "Data ID", "SV (Page) ID", and "t".

10.5.1.2 DGPS corrections

In order to allow a UE to estimate its position more accurate, biases in the pseudorange measurements may be provided to the UE.

Status/Health

This information indicates the status of the differential corrections contained in the message.

IODE

This is the sequence number for the ephemeris for the particular satellite. The UE can use this information to determine if new ephemeris is used for calculating the corrections that are provided in the broadcast message. This eight-bit IE is incremented for each new set of ephemeris for the satellite and may occupy the numerical range of [0, 239] during normal operations. More information about this field can be found from [24].

User Differential Range Error (UDRE)

The UDRE provides an estimate of the uncertainty (1-σ) in the corrections for the particular satellite. The value in this field shall be multiplied by the UDRE Scale Factor in the common Corrections Status/Health field to determine the final UDRE estimate for the particular satellite. More information about this field can be found from [24].

Pseudo-Range Correction (PRC)

The PRC indicates the correction to the pseudorange for the particular satellite at the GPS Reference Time, t_0. The PRC definition here is different from the one given in [24].

Pseudo-Range Rate Correction (RRC)

This information indicates the rate-of-change of the pseudorange correction for the particular satellite, using the satellite ephemeris identified by the IODE IE. The RRC definition here is different from the one given in [24].

~~**Delta Pseudo-Range Correction 2 (Delta PRC2)**~~

~~This information indicates the difference in the pseudorange correction between the satellite's ephemeris identified by IODE and the previous ephemeris two issues ago IODE -2.~~

~~**Delta Pseudo-Range Rate Correction 2 (Delta RRC2)**~~

~~This information indicates the difference in the pseudorange rate-of-change correction between the satellite's ephemeris identified by IODE and IODE -2.~~

~~**Delta Pseudo-Range Correction 3 (Delta PRC3)**~~

~~This information indicates the difference in the pseudorange correction between the satellite's ephemeris identified by IODE and the previous ephemeris three issues ago IODE -3.~~

~~**Delta Pseudo-Range Rate Correction 3 (Delta RRC3)**~~

~~This information indicates the difference in the pseudorange rate-of-change correction between the satellite's ephemeris identified by IODE and IODE -3.~~

10.5.1.3 Ionospheric corrections

The Ionospheric Model contains information needed to model the propagation delays of the GPS signals through the ionosphere. Proper use of these information allows a single-frequency GPS receiver to remove approximately 50% of the ionospheric delay from the range measurements. The Ionospheric Model is valid for the entire constellation and changes slowly relative to the Navigation Model.

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Ephemeris data and clock corrections provide an accurate model of the satellite positions to the UE.

10.5.1.5 Real Time integrity monitor function

An Integrity Monitor (IM) function in the network should detect unhealthy (i.e., failed/failing) satellites. Excessively large pseudo range errors, as evidenced by the magnitude of the corresponding DGPS correction determined by the IM, may be used to detect unhealthy satellites. Unhealthy satellites should be detected very close to the occurrence of the satellite failure (e.g. 10 seconds) and marked in an unhealthy satellite list as unusable/bad. When unhealthy satellites are detected, the assistance and/or DGPS correction data should not be supplied for these satellites. Upon receiving the list of unhealthy satellites from the SRNC, the UE shall consider the data associated with these satellites to be invalid.

The IM function should also inform the UE of measurement quality in DGPS modes when satellites are healthy. This can be done by computing the position of the DGPS reference receiver using its derived pseudo ranges and differential corrections at the IM, and differencing the IM computed position with the known location of the DGPS reference receiver to compute a position error. When the error in the IM computed position is excessive for solutions based upon healthy satellites only, DGPS users should be informed of measurement quality through the supplied User Differential Range Error (UDRE) adjusted values based on the operation of the IM. The UE should use the measurement quality as a factor in weighing data obtained from associated satellites in its position calculation.

NOTE: UDRE is one of the IEs contained in the DGPS information ([19]).

The real-time Integrity Monitor function provides the following information to a UE:

- BadSATid;
- UDRE value adjusted based on the measurement quality.

BadSATid is a lit of unhealthy (i.e., failed/failing) satellites. The UE shall consider any assistance or DGPS data of these satellites as invalid.

Adjusted UDRE value reports the measurement quality of the corresponding satellites. The UE should consider the quality while calculating its position.

10.5.1.6 GPS reference time

GPS reference time may be used to provide a mapping between UTRAN and GPS time.

GPS TOW Assist

This information contains several fields in the Telemetry (TLM) Word and Handover Word (HOW) that are currently being broadcast by the respective GPS satellites. Combining this information with GPS TOW helps the UE with time-recovery needed to predict satellite signal.

TLM Message

This information contains a 14-bit value representing the Telemetry Message (TLM) being broadcast by the GPS satellite identified by the particular SatID, with the MSB occurring first in the satellite transmission.

Anti-Spoof/Alert

These information contain the Anti-Spoof and Alert flags that are being broadcast by the GPS satellite identified by SatID.

TLM Reserved

These information contain the two reserved bits in the TLM Word being broadcast by the GPS satellite identified by SatID, with the MSB occurring first in the satellite transmission.

10.5.1.7 UTC

UTC parameters may be used to provide Coordinated Universal Time to the UE.

10.5.1.8 Reference Location

The Reference Location contains a 3-D location (with~~out~~ uncertainty) specified as per [11]. The purpose of this field is to provide the UE with a priori knowledge of its position in order to improve GPS receiver performance.

10.5.1.9 Additional non-GPS related information

Additional non-GPS measurements performed by UTRAN or UE may be used by the SRNC to improve the performance of the UE-assisted GPS method. This information may be RTT in FDD or Rx Timing Deviation in TDD, UE receiving transmitting time (UE Rx-Tx), SFN-SFN observed time difference or CPICH Ec/No. All the additional measurements are defined in [15] and [16] and can be made available through RRC signalling for UE measurements or NBAP signalling for UTRAN measurements.

Furthermore, to those UE technologies requiring externally provided sensitivity and time aiding data, some navigation bits may be sent from UTRAN to UE for sensitivity assistance and time recovery.

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Hungary, Budapest, 25th -29th August 2003

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CR-Form-v7

CHANGE REQUEST

⌘ **25.305** **CR** **096** ⌘ **rev** **-** ⌘ Current version: **3.9.0** ⌘

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

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	UE positioning support in the UE
Source:	⌘	RAN WG2
Work item code:	⌘	TEI
Date:	⌘	27/08/2003
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)
Rel-6 (Release 6)

Reason for change:	⌘	At RAN#20, RAN2 was requested to revisit UE capabilities for UE positioning following proposals to make the SFN-SFN observed time difference type 2 measurement an optional capability. The proposed changes are captured in CRs to 25.331 and 25.306.
Summary of change:	⌘	The statements that SFN-SFN observed time difference type 2 for the network based OTDOA method is mandatory is removed
Consequences if not approved:	⌘	If the CR is not approved the stage 2 description will be misaligned with the stage 3 requirements.

Clauses affected:	⌘	4.1			
Other specs affected:	⌘	Y: X / N:	Other core specifications	⌘	25.331 CR 2055, 25.306 CR 076
		Y: / N:	Test specifications		
		Y: / N:	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/specs/CR.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.

4.1 Assumptions

As a basis for the operation of UE Positioning in UTRAN the following assumptions apply:

- ~~the UE shall support SFN-SFN observed time difference type 2 measurements, thus support of Network-based OTDOA without idle periods is mandatory in the UE;~~
- both TDD and FDD will be supported in Release '99;
- the provision of the UE Positioning function in UTRAN is optional through support of the specified method(s) in Node B and the RNC;
- UE Positioning is applicable to any target UE whether or not the UE supports LCS, but with restrictions on use of certain positioning method depending on UE capability as defined in [17];
- the positioning information may be used for internal system operations to improve system performance;
- different types of LMU are defined, e.g. a standalone LMU and/or LMU integrated in Node B;
- the UE Positioning architecture and functions shall include the option to accommodate several techniques of measurement and processing to ensure evolution to follow changing service requirements and to take advantage of advancing technology;
- the RNC manages the overall coordination and scheduling of resources required to perform positioning of a UE. It may also calculates the final position estimate and accuracy.

3GPP TSG-RAN WG2 Meeting #37
Hungary, Budapest, 25th -29th August 2003

Tdoc ⌘R2-031990

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CHANGE REQUEST

⌘ **25.305** **CR** **097** ⌘ **rev** **-** ⌘ Current version: **4.5.0** ⌘

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

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	UE positioning support in the UE
Source:	⌘	RAN WG2
Work item code:	⌘	TEI
Date:	⌘	27/08/2003
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)*
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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)*
Rel-6	*(Release 6)*

Reason for change:	⌘	At RAN#20, RAN2 was requested to revisit UE capabilities for UE positioning following proposals to make the SFN-SFN observed time difference type 2 measurement an optional capability. The proposed changes are captured in CRs to 25.331 and 25.306.
Summary of change:	⌘	The statements that SFN-SFN observed time difference type 2 for the network based OTDOA method is mandatory is removed
Consequences if not approved:	⌘	If the CR is not approved the stage 2 description will be misaligned with the stage 3 requirements.

Clauses affected:	⌘	4.1			
Other specs affected:	⌘	Y: X / N:	Other core specifications	⌘	25.331 CR 2056, 25.306 CR 077
			Test specifications		
			O&M Specifications		
Other comments:	⌘				

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As a basis for the operation of UE Positioning in UTRAN the following assumptions apply:

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- the provision of the UE Positioning function in UTRAN is optional through support of the specified method(s) in Node B and the RNC;
- UE Positioning is applicable to any target UE whether or not the UE supports LCS, but with restrictions on use of certain positioning method depending on UE capability as defined in [17];
- the positioning information may be used for internal system operations to improve system performance;
- different types of LMU are defined, e.g. a standalone LMU and/or LMU integrated in Node B;
- the UE Positioning architecture and functions shall include the option to accommodate several techniques of measurement and processing to ensure evolution to follow changing service requirements and to take advantage of advancing technology;
- the RNC manages the overall coordination and scheduling of resources required to perform positioning of a UE. It may also calculates the final position estimate and accuracy.

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Hungary, Budapest, 25th -29th August 2003

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CHANGE REQUEST

⌘ **25.305** **CR** **098** ⌘ **rev** **-** ⌘ Current version: **5.6.0** ⌘

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

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	UE positioning support in the UE
Source:	⌘	RAN WG2
Work item code:	⌘	TEI
Date:	⌘	27/08/2003
Category:	⌘	**A**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
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Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
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Consequences if not approved:	⌘	If the CR is not approved the stage 2 description will be misaligned with the stage 3 requirements.

Clauses affected:	⌘	4.1			
Other specs affected:	⌘	Y: X / N:	Other core specifications	⌘	25.331 CR 2057, 25.306 CR 078
		Y: / N:	Test specifications		
		Y: / N:	O&M Specifications		
Other comments:	⌘				

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As a basis for the operation of UE Positioning in UTRAN the following assumptions apply:

- ~~the UE shall support SFN-SFN observed time difference type 2 measurements, thus support of Network-based OTDOA without idle periods is mandatory in the UE;~~
- both TDD and FDD will be supported;
- the provision of the UE Positioning function in UTRAN is optional through support of the specified method(s) in Node B, the SAS, and the RNC;
- UE Positioning is applicable to any target UE whether or not the UE supports LCS, but with restrictions on use of certain positioning method depending on UE capability as defined in [17];
- The SMLC may be either a stand-alone network element (SAS) or an internal function of the RNC;
- UE Positioning information is transported between RNCs via the Iur interface independent of whether the SMLC is a stand-alone network element (SAS) or an internal function of the RNC;
- the positioning information may be used for internal system operations to improve system performance;
- different types of LMU are defined, e.g. a standalone LMU and/or LMU integrated in Node B;
- the UE Positioning architecture and functions shall include the option to accommodate several techniques of measurement and processing to ensure evolution to follow changing service requirements and to take advantage of advancing technology;

- the RNC manages the overall coordination and scheduling of resources required to perform positioning of a UE. It may also calculates the final position estimate and accuracy.