TSG-RAN Meeting #20   *RP-030290*
Hämeenlinna, Finland, 03-06 June 2003

Title: **CRs (Release '99 and Rel-4/Rel-5 category A) to TS 25.305**

Source: **TSG-RAN WG2**

Agenda item: **7.2.3**

Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Version-New	Doc-2nd-Level	Workitem
25.305	086	-	R99	Handling of UP Assistance Data	F	3.8.0	3.9.0	R2-031294	TEI
25.305	087	-	Rel-4	Handling of UP Assistance Data	A	4.4.0	4.5.0	R2-031295	TEI
25.305	088	-	Rel-5	Handling of UP Assistance Data	A	5.5.0	5.6.0	R2-031296	TEI

3GPP TSG-RAN2 Meeting #36
Paris, France, 19th-23rd May 2003

Tdoc R2-031294

CR-Form-v7

CHANGE REQUEST

⌘	**25.305** CR **86**	⌘**rev**	**-**	⌘	Current version:	**3.8.0**	⌘

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

Title:	⌘	Handling of UP Assistance Data	
Source:	⌘	RAN WG2	
Work item code:⌘	TEI	**Date:** ⌘	19-05-2003
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: ⌘ The GPS assistance data may be updated in the UE by means of System information broadcast or via dedicated RRC signalling. In some scenarios (e.g. UE in CELL_DCH or UE in CELL_FACH and SIB 15.X not present, etc.) the UE may not have enough data or the assistance data may be out of date. UTRAN may include some assistance data in the MEASUREMENT CONTROL. One possibility for UTRAN is to send as little as possible data in the MEASUREMENT CONTROL message in order to minimize the transfer delay over the SRB2 (to be noted that the assistance data could be quite big and therefore the SRB2 can be blocked for a significant period of time while other RRC messages can not be sent) and then rely on the UE to request for more additional data if needed. However in the current specification it is not clearly stated that it is in the UE responsibility to maintain valid GPS assistance data to perform the requested measurements. The RRC mechanisms to request additional assistance data are already supported in the RRC.

Summary of change:⌘ New text in added to clearly specify that it is in the UE responsibility to have enough and up to date assistance data in order to perform the requested UP measurements.

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Clauses affected:	⌘	6.6.4.1, 10.3, 10.6			

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

Other comments:	⌘	

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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).
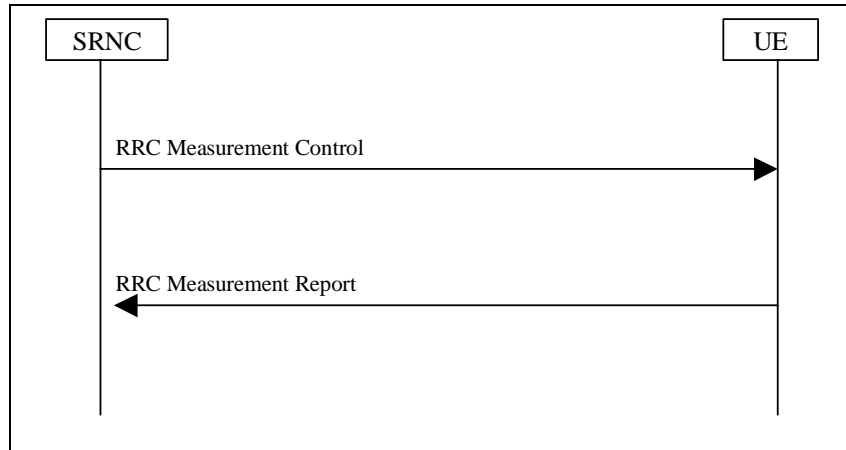
Figure 6.1: OTDOA /GPS Positioning Message Flow

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. ~~Any~~ Aassistance 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.

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10.3 GPS assistance data

The UE may receive GPS information through the UTRAN radio interface, using higher layer signalling. Once a UE Positioning measurement is setup by the SRNC the UE is responsible to maintain valid and up to date GPS assistance data in order to report the requested measurement results. In case that the UE has not sufficient assistance data or the data is out of date then the UE should indicate it to the SRNC and additionally request for assistance data.

When the UE is unable to detect a sufficient number of satellites, the assisted GPS method can be combined with other positioning methods. Altitude assistance can compensate for one satellite measurement.

The assistance data signalled to the UE may include all information listed below or a selected subset:

- data assisting the measurements; e.g. reference time, visible satellite list, satellite signal Doppler, code phase, Doppler and code phase search windows. This data can be valid for a few minutes (e.g., less than 5 minutes) or longer depending on the code phase and Doppler search window size that can be accommodated by the UE;

- data providing means for position calculation; e.g. reference time, reference position, satellite ephemeris, clock corrections. Satellite ephemeris and clock corrections data can be used for up to six hours.

NOTE: Certain types of GPS Assistance data may be derived, wholly or partially, from other types of GPS Assistance data.

If DGPS is utilised, then differential corrections may also be transmitted. If Selective Availability is turned off, these corrections can be valid for a few minutes or more. The DGPS data is valid for a large geographical area, so one centrally located reference receiver can be used to service this large region.

10.6 Network Assisted GPS positioning Procedure

The diagram in Figure 10.1 illustrates the operations for the network assisted GPS when the request for position information is initiated by a LCS application signalled from the Core Network. A detailed description of the positioning procedure is given as follows. Note that the procedure is for illustration purpose and actual implementations may vary.
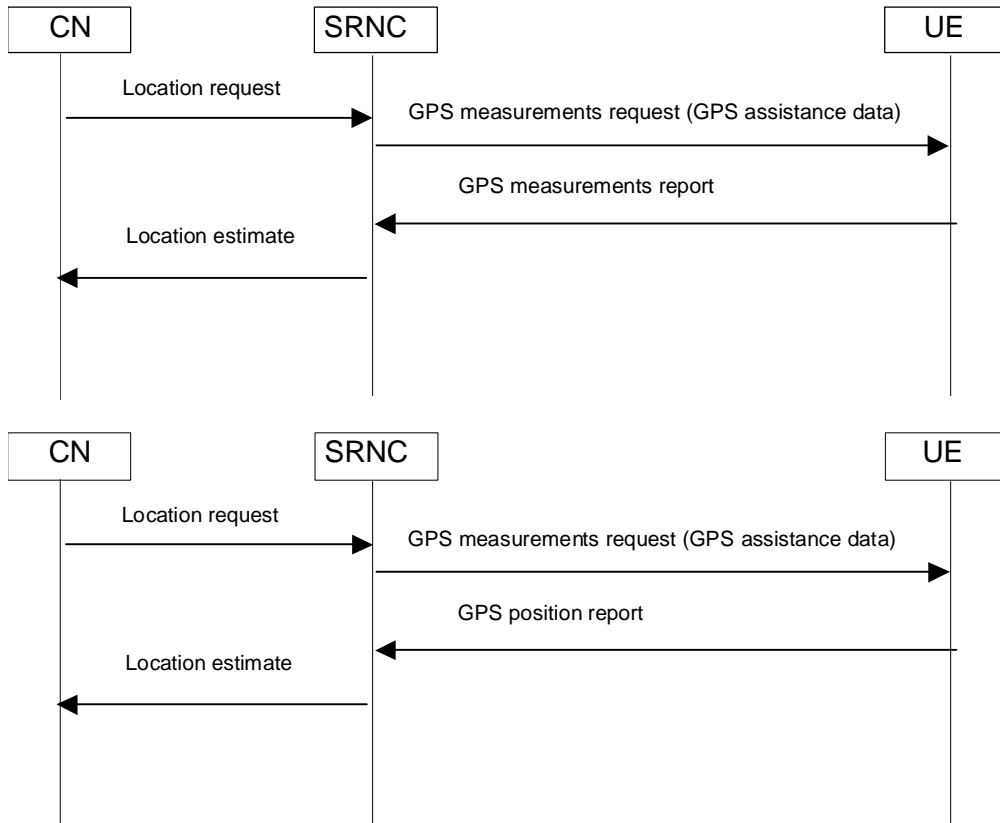

Figure 10.1: Network-assisted GPS methods

1. The operation begins with an authenticated request for positioning information about a UE from an application in the core network being received at the SRNC. The SRNC acts as interface between the Core Network and the UE Positioning entities in the UTRAN. The SRNC considers the request and the capabilities of the UE and the network.

2. Depending on the UE capabilities, the SRNC sends to the UE certain GPS assistance information. This information may include: the reference time for GPS, the satellite IDs, the Doppler frequency, the search window and its centre, the ephemeris and clock corrections, the almanac, and other information specified in 10.5.1. If the UE has not enough assistance data to perform the measurements, the UE should indicate it to the SRNC and additionally request for assistance data.

   For UE-based method, jump to step 8.

   For UE-assisted method, the SRNC may optionally request the following information before sending the assistance message(s) to the UE: the LMU update*, the RTT measurements (from the Node Bs in the active set) to compensate for the one-way propagation delays. The LMU (associated or stand-alone) returns the information containing the time difference between the Node B and the GPS (e.g. UTRAN GPS timing of cell frames or SFN-SFN Observed Time Difference) to the CRNC. The Node B returns its RTT measurement to the CRNC. If the CRNC is not the SRNC, the CRNC forwards these information to SRNC.

4. The SRNC requests from the UE the measurement of GPS satellite pseudoranges and other information specified in 10.5.1. These measurements may be made while the UE is in RRC connected mode CELL_DCH state. The SRNC may request SFN-SFN Observed Time Difference measurements and Rx-Tx timing difference information from the UE to support the processing related to the RTT measurements.

5. The UE returns to the SRNC the measurement of GPS satellite pseudoranges and other information specified in 10.5.1. If requested, the UE may also return the SFN-SFN measurements and the Rx-Tx time difference information, together with a time stamp of when these values were obtained.

6   The UE position is calculated in the SRNC.

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8. In case of UE based method, UE returns the position estimate to the SRNC. This estimate includes the position, the estimated accuracy of the results and the time of the estimate.

9. The SRNC passes the position estimate to the CN.

NOTE: The LMU update (of the time difference between the GPS and the Node B) may be performed on a per-request basis (with respect to each UE Positioning request) or be performed timely that is independent of individual UE Positioning request. The latter is preferable when there is a large volume of UE Positioning requests.

3GPP TSG-RAN2 Meeting #36
Paris, France, 19ᵗʰ-23ʳᵈ May 2003

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CHANGE REQUEST	

⌘ **25.305 CR 87** ⌘**rev -** ⌘ Current version: **4.4.0** ⌘

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

Title:	⌘	Handling of UP Assistance Data
Source:	⌘	RAN WG2

Work item code: ⌘	TEI	**Date:** ⌘	19-05-2003

Category:	⌘	**A**	**Release:** ⌘	REL-4

Use one of the following categories:
F (correction)
A (corresponds to a correction in an earlier release)
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C (functional modification of feature)
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Rel-4 (Release 4)
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Clauses affected:	⌘ 6.6.4.1, 10.3, 10.6

Other specs affected:	⌘	**Y**	**N**		⌘	
			X	Other core specifications		
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Other comments:	⌘	

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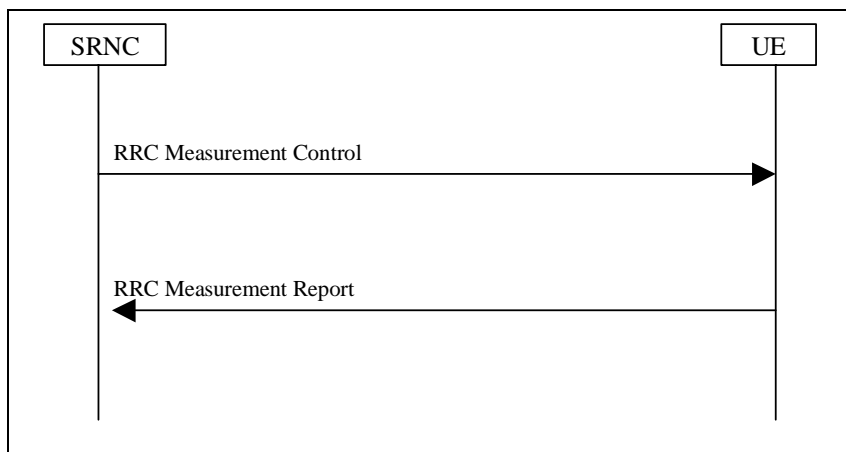

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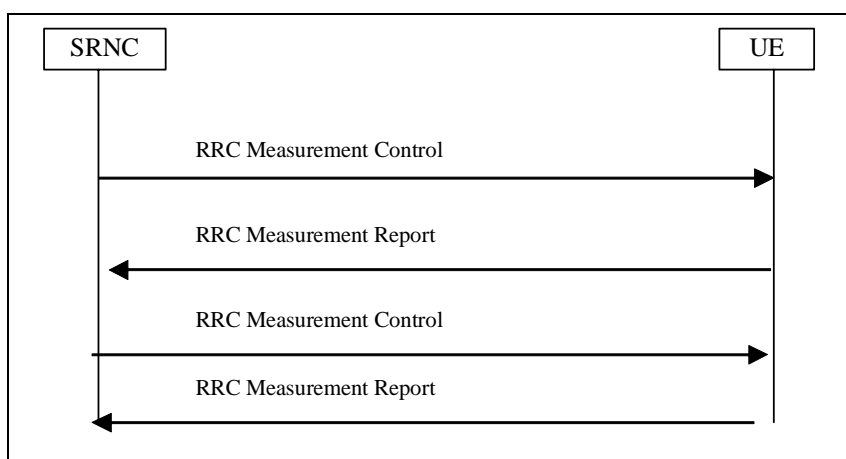

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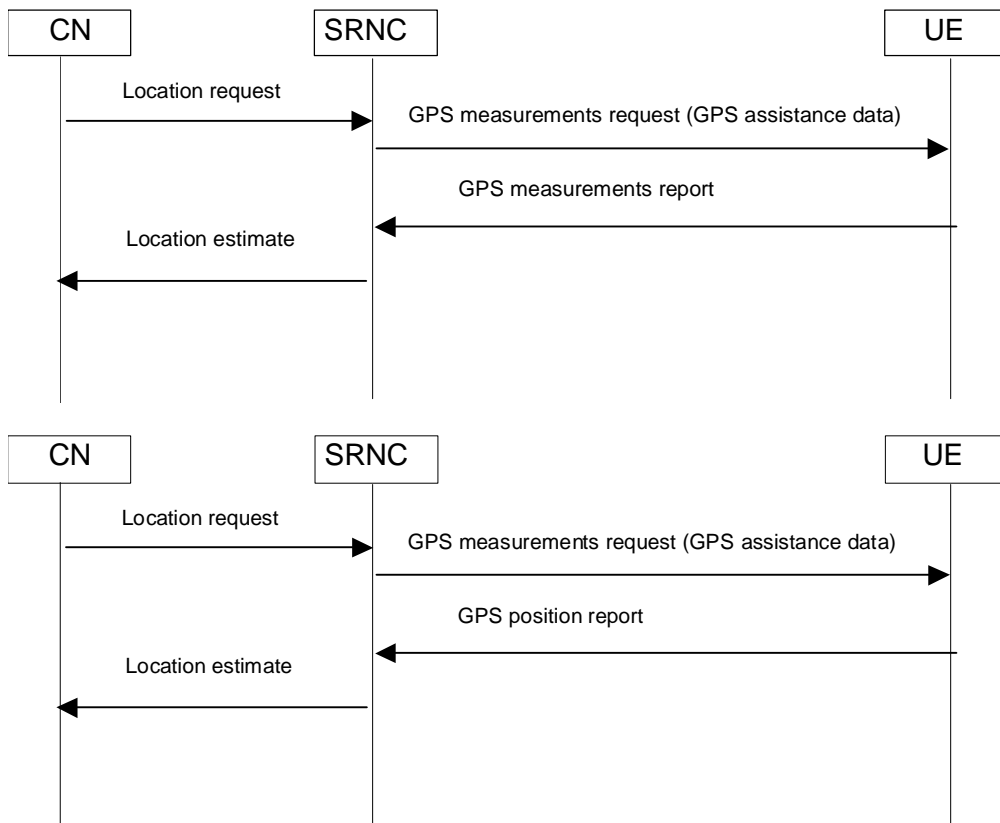

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Tdoc R2-031296

⌘ *CR-Form-v7*

CHANGE REQUEST

⌘ **25.305** CR **88** ⌘ **rev** **-** ⌘ Current version: **5.5.0** ⌘

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Source: ⌘	RAN WG2	
Work item code: ⌘	TEI	**Date:** ⌘ 19-05-2003
Category: ⌘ **A**		**Release:** ⌘ REL-5

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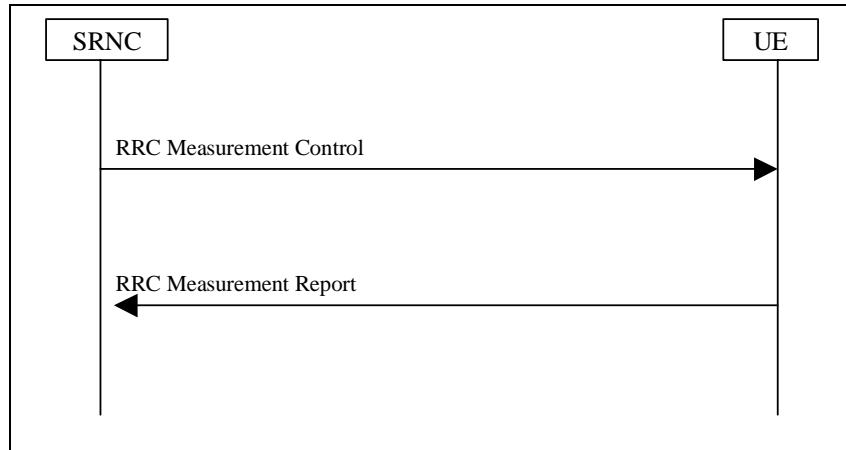

Figure 6.1: OTDOA /GPS Positioning Message Flow

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, 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. ~~Any a~~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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# 10.3	GPS assistance data

The UE may receive GPS information through the UTRAN radio interface, using higher layer signalling. Once a UE Positioning measurement is setup by the SRNC the UE is responsible to maintain valid and up to date GPS assistance data in order to report the requested measurement results. In case that the UE has not sufficient assistance data or the data is out of date then the UE should indicate it to the SRNC and additionally request for assistance data.

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If DGPS is utilised, then differential corrections may also be transmitted. If Selective Availability is turned off, these corrections can be valid for a few minutes or more. The DGPS data is valid for a large geographical area, so one centrally located reference receiver can be used to service this large region.

10.6　　Network Assisted GPS positioning Procedure

The diagram in Figure 10.3 and Figure 10.2 illustrate the operations for the network assisted GPS when the request for position information is initiated by a LCS application signalled from the Core Network. A detailed description of the positioning procedure is given as follows. Note that the procedure is for illustration purpose and actual implementations may vary.
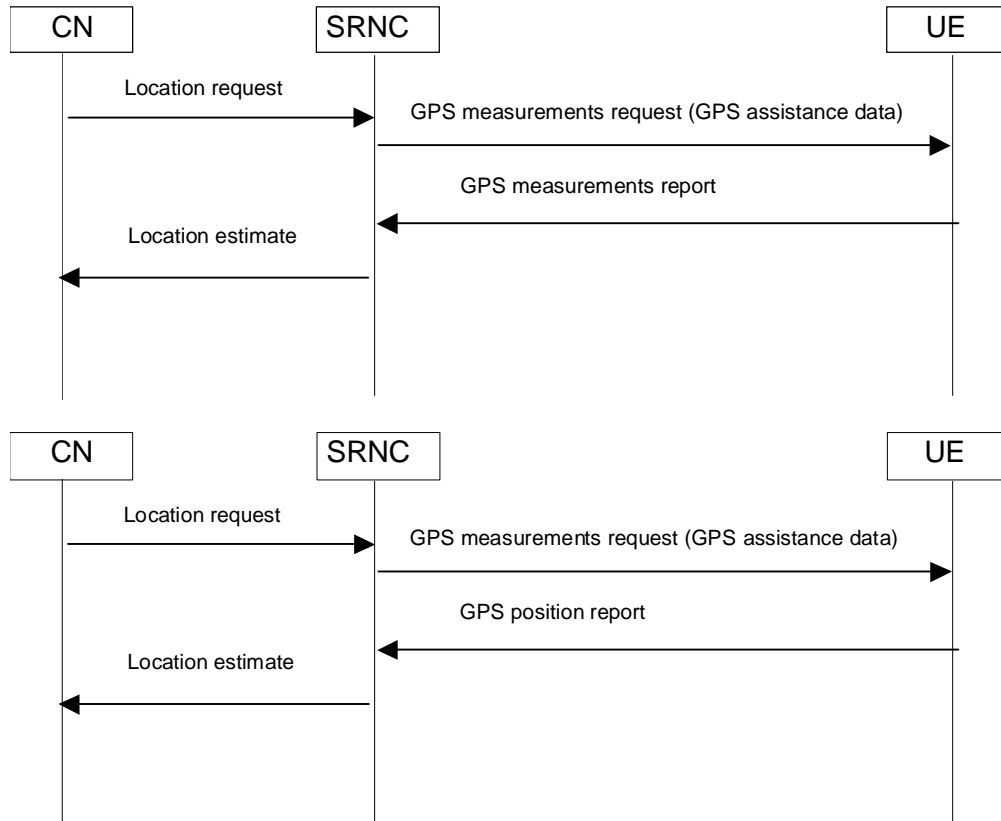
Figure 10.3: Network-assisted GPS methods

1. The operation begins with an authenticated request for positioning information about a UE from an application in the core network being received at the SRNC. The SRNC acts as interface between the Core Network and the UE Positioning entities in the UTRAN. The SRNC considers the request and the capabilities of the UE and the UTRAN. In networks that include the SAS, the SRNC may invoke the SAS via the Iupc interface.

2. Depending on the UE capabilities, the network sends to the UE certain GPS assistance information. This information may include: the reference time for GPS, the satellite IDs, the Doppler frequency, the search window and its centre, the ephemeris and clock corrections, the almanac, and other information specified in 10.5.1. If the UE has not enough assistance data to perform the measurements, the UE should indicate it to the SRNC and additionally request for assistance data.

   For UE-based method, jump to step 8.

   For UE-assisted method, the SRNC may optionally request the following information before the assistance message(s) is (are) sent to the UE: the LMU update*, the RTT measurements (from the Node Bs in the active set) to compensate for the one-way propagation delays. The LMU (associated or stand-alone) returns the information containing the time difference between the Node B and the GPS (e.g. UTRAN GPS timing of cell frames or SFN-SFN Observed Time Difference) to the CRNC. The Node B returns its RTT measurement to the CRNC. If the CRNC is not the SRNC, the CRNC forwards these information to SRNC.

4. The network requests from the UE the measurement of GPS satellite pseudoranges and other information specified in 10.5.1. These measurements may be made while the UE is in RRC connected mode CELL_DCH state. The SRNC may request SFN-SFN Observed Time Difference measurements and Rx-Tx timing difference information from the UE to support the processing related to the RTT measurements.

5. The UE returns to the network the measurement of GPS satellite pseudoranges and other information specified in 10.5.1. If requested, the UE returns to the SRNC SFN-SFN measurements and the Rx-Tx time difference information, together with a time stamp of when these values were obtained.

6 The UE position is calculated in the network.

7. If there is insufficient information to yield a UE positioning estimate, the SRNC may start a new process from step 3.

8. In case of UE based method, UE returns the position estimate to the SRNC. This estimate includes the position, the estimated accuracy of the results and the time of the estimate.

9. In networks that include the SAS, the SAS passes the position estimate to the SRNC.

10. The SRNC passes the position estimate to the CN.

NOTE: The LMU update (of the time difference between the GPS and the Node B) may be performed on a per-request basis (with respect to each UE Positioning request) or be performed timely that is independent of individual UE Positioning request. The latter is preferable when there is a large volume of UE Positioning requests.