TSG-RAN Meeting #8 **_RP-000218_**
Düsseldorf, Germany, 21 – 23 June 2000

Title: **Agreed CRs to TS 25.305**

Source: **TSG-RAN WG2**

Agenda item: **5.2.3**

Doc-1st-	Status-	Spec	CR	Rev	Subject	Cat	Version	Versio
R2-000913	agreed	25.305	013	2	Modifications to LCS text on cell-ID method	C	3.1.0	3.2.0
R2-000831	agreed	25.305	015		Editorial modifications of OTDOA descriptions for alignment with TDD	D	3.1.0	3.2.0
R2-000869	agreed	25.305	016		Update on clause 5	C	3.1.0	3.2.0
R2-001150	agreed	25.305	017	1	Editorial additions	D	3.1.0	3.2.0
R2-001136	agreed	25.305	018		Clarification of OTDOA signalling operation	D	3.1.0	3.2.0
R2-001222	agreed	25.305	019	1	Assisted GPS procedures	D	3.1.0	3.2.0

3GPP/RAN WG2 Meeting #12
Seoul, Korea, 10-14 April 2000

***Document* R2-000913**
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25.305 CR 013r2 Current Version: V3.1.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: TSG-RAN #8
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for approval	X	strategic	X	*(for SMG use only)*
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Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: (U)SIM [ ] ME [ ] UTRAN / Radio [X] Core Network [ ]
(at least one should be marked with an X)

Source: TSG-RAN WG2 **Date:** April 11, 2000

Subject: Modifications to LCS text on Cell ID method

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction		Phase 2	
A	Corresponds to a correction in an earlier release		Release 96	
B	Addition of feature		Release 97	
C	Functional modification of feature	X	Release 98	
D	Editorial modification		Release 99	X
			Release 00	

Release: see above

Reason for change: Changes are proposed to section 8 on the Cell-ID method to clarify the standardisation aspects, to clarify the English, and to remove material not required for standardisation.

Clauses affected: 8

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments: This CR includes both editorial suggestions and changes of technical substance. This CR is a merger of contributions R2-000788 with R2-000767 and editorial changes to R2-000876..

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8 Cell ID based location method

In the Cell ID based method, the S-RNC determines the identification of the cell providing coverage for the target UE. This subsection outlines the procedures for this location method. Sub-section 8.1 provides procedures for the determination of the cell ID depending on the operational status of the target UE. Sub-section 8.2 discusses the relation between the LCS location service and the Support of Localised Service Area (SoLSA) feature. Sub-section 8.3 provides a procedure for the mapping of the Cell ID to a corresponding Service Area Identifier (SAI) to be returned to the LCS application in the core network. The general flow to determine the cell ID is shown in figure 8.1.

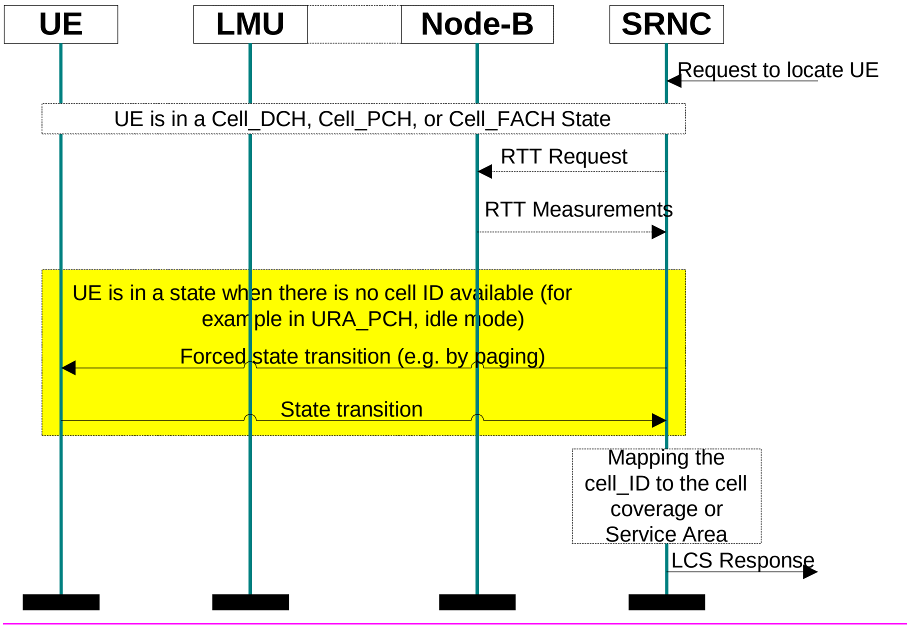


Figure 8.1: Cell ID Based Method

8.1 Cell ID determination

In order for the S-RNC to determine the cell ID when an LCS request is received, additional operations may be needed depending on the operational status of the UE.~~w~~

Figure 8.1 illustrates the procedure for the cell ID based location method when the UE is in different RRC states. When the LCS request is received from the core network the S-RNC checks the state of the target UE. If the UE is in a state where the cell ID is available, the target cell ID is chosen as the basis for the UE location. In states where the cell ID is not available, the UE is paged, so that S-RNC can establish the cell with which the target UE is associated. In order to improve the accuracy of the LCS response the S-RNC may also request RTT measurements from the Node B or LMU associated with the cell ID. The S-RNC may also map the cell ID to a corresponding Service Area Identifier (SAI) to match the service coverage information available in the core network.

The cell ID based method shall determine the location of the UE regardless of the RRC state, including URA_PCH, Cell_PCH, Cell_DCH, Cell_FACH, cell reselection, inter-system modes, as well as an idle mode.

8.1.1 UE Cell ID is not known

For UE for which the cell ID is not known at the time the LCS request is received at the S-RNC, the UE may be paged to locate its current cell ID. If the UE is in an idle mode and there is a need for it to be paged, then the paging may be initiated either by the core network or by the S-RNC in the UTRAN access network. For example, the UE can be forced to perform a transition to a Cell_FACH state to define the cell ID of its current cell.

If the UE is in an idle mode, Cell_PCH state or in any other state when there is a need to page for the UE to obtain the cell ID, the Core Network may initiate paging, authentication and ciphering, as specified in TS 23.171.

Alternatively, the cell ID may be determined as the one that was used during the last active connection to the UE. This determination should be accompanied by the time-of-day of the last connection in the cell.

8.1.2 UE Cell ID is known

8.1.2.1 UE not in Soft handover

The cell ID may be determined as the cell that is providing an active connection for the UE at the time of receiving the LCS request at the S-RNC.

8.1.~~1~~2.2 UE in Soft handover

In order for the S-RNC to provide the geographical co-ordinates of a target UE in soft handover, the S-RNC combines the information about all cells associated with the UE.~~cell ID(s) and map it to the corresponding Service Area Identifier (SAI) when it is requested for instance by LCS, additional operations may be needed if the UE is in a soft handover state, and there is no cell ID support in the RRC state.~~

In ~~a~~ soft handover ~~state~~, the UE may have several ~~different~~ signal branches connected to different cells, reporting different cell IDs. ~~Therefore a~~A reference cell ID ~~selection decision should~~ may be ~~made~~ determined ~~in~~by the S-RNC ~~to obtain~~ based on ~~more accurate location estimate when mapping~~ the coverage area of each cell~~ ID to the corresponding coverage area~~. The reference cell ID may be selected based on one or more of the following principles:

- The cell ID ~~is~~ may be selected based on the parameters defining the quality of the received signal branches. That is, the cell ID with the best quality signal branch is selected as the reference cell ID ~~reference to obtain the UE location estimates~~;~~.~~
- The cell ID may be selected that was ~~generated~~ used during connection set-up ~~proceedings~~ between the UE and the serving Node B;
- ~~The oldest cell ID the UE associates with.~~
- The ~~most recent~~ cell ID of the cell most recently associated with the UE ~~associates with~~may be selected;
- ~~The most recent cell ID of the cell to which the UE has been recently handed over from a previous cell.~~
- The cell ID of the latest "new" cell that the UE has started to receive, but has not yet been handed over to~~.~~ may be selected;
- The cell ID may be selected as the cell to which UE has the shortest distance (to the Node-B site);~~.~~
- The cell ID may be selected as the cell that provides an active connection for the UE at the time of receiving ~~a new~~the LCS request at the S-RNC.

~~Whenever t~~The selection ~~decision is~~may also be based on measurements of Round Trip Time, power levels and received signal strengths in UE and related Node B or LMU.~~ of one or several features of the signals between the mobile station and the respective base stations, it may happen that the measured feature, such as the signal strength or quality, changes rapidly. Therefore it may be advantageous to define a determination window or interval and to determine an average for the feature. The average will then be compared against the corresponding averages for the other signal branches, and the selection is made based on this comparison.~~

Other relevant mechanisms such as Idle Period Downlink, (IPDL) or Site Selection Diversity Transmit power control (SSDT) should also be taken into account when applying the cell ID selection procedure for UE in a soft handover mode.

~~If the selection of the cell ID is based on the signal power or strength, the determination may be based on use of a reference signal. This specific embodiment may be based on one or several of the following principles:~~

- In a soft handover state or otherwise when there is an active set signal that includes several signal branches, a signal branch is selected and used as a reference branch as long as the selected branch belongs to the active set. If the reference branch is deleted or replaced, the cell identifier can be determined based on the second best reference signal (branch).
- The selected cell identifier can be changed (updated) as soon as a Primary Common Pilot Channel (CPICH, in WCDMA) that is not included in the active set becomes better than a Primary CPICH that belongs to the active set.
- The selected cell identifier may also be changed as soon as a Primary CPICH becomes better than the previously best primary CPICH.
- The selected cell identifier may also be changed as soon as a primary CPICH becomes better than an absolute threshold that may be based on the signal levels of the other active branches or be otherwise determined.
- The selected cell identifier may be changed as soon as a Primary CPICH becomes worse than an absolute threshold.
- The selected cell identifier may be changed as soon as a Primary Common Control Physical Channel (CCPCH) becomes better than the previous best primary CCPCH.
- The selected cell identifier may be changed as soon as a SIR (Signal to Interference) value of a timeslot becomes worse than an absolute threshold value.
- The selected cell identifier may be changed as soon as a Interference on Signal Code Power (ISCP) value of a timeslot becomes worse than an absolute threshold.
- The selected cell identifier may be changed as soon as an ISCP value of a timeslot becomes better than a certain predefined threshold.
- In general, a LCS_MARGIN may be utilised in a cell identifier determination process. The LCS_MARGIN can be based on Time-To-Trigger, pending time, power level of the signal (offset), or any similar approaches. The LCS_MARGIN may be used to prevent the unnecessary cell identifier updating to avoid the system performance to impair. The LCS_MARGIN may be applied either in forbidding or allowing the cell identifier update triggering.

8.1.2 Localised Service Area

In case of inter-mode environment applications such asThe Support of Localiszed Service Area (SoLSA) feature is quite close to the location service in principle, but SoLSA is based, for example, on radio network cell coverage and cell configuration. SoLSA has been standardised in GSM and is being developed for UTRAN. Some SoLSA service features like Exclusive Access and LSA only Access may be less applicable in UTRAN due to the 1 frequency reuse.

It should be noted that the Service Area concept described in this specification is different from the Localised Service Area concept defined for SoLSA., customised applications for mobile network enhanced logic (CAMEL), etc. the cell identifier based LCS or generally LCS may be implemented using existing toolkits such as a SIM Application Toolkit (SAT) or CAMEL. CAMEL may be used to provide cell-based applications in a CAMEL Service Environment (CSE), which can be used with the SoLSA. CSE includes e.g. charging modifications and call barring based on cell information. However, since the network may be implemented by using several service platforms, CAMEL is described herein only as an example.

In these cases other advanced location features of a cellular system should be taken into account. These include Localized Service Area (LSA) priority, LSA Only Access, Exclusive Access, Preferential Access, and so on. The inter-mode environment may include different cellular systems with multi-layered cellular structures, including macro-cells, micro-cells, pico-cells, and home-cells. In the following some examples of such features are described in more detail.

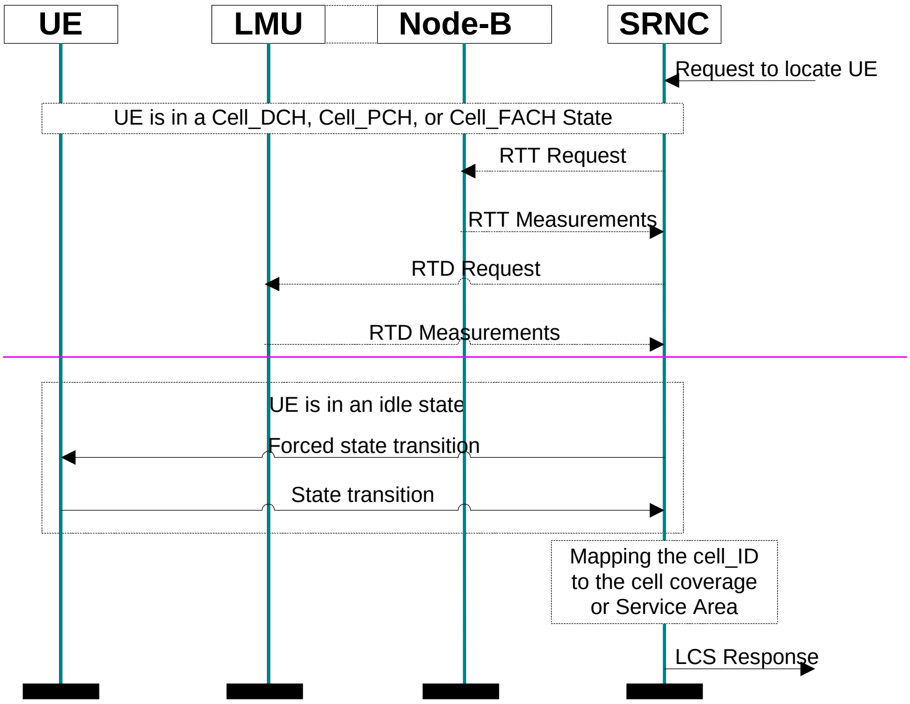
In addition, the other relevant mechanisms like Idle Period Downlink, (IPDL), Site Selection Diversity Transmit power control (SSDT), etc. should be taken into account when applying the cell ID selection procedure, for instance, in a soft or softer handover state.

The cell ID based method should support the UE location regardless of the UTRAN /RRC states, including URA_PCH, Cell_PCH, Cell_DCH, cell FACH, cell reselection, inter-system modes, as well as an idle mode.

~~8.1.3 UE in idle mode~~

~~The cell ID may not be obtained if the mobile station is not in an active state, i.e. there is no connection between the mobile station and at least one of the cells. For example, in the UMTS the cell ID can be provided only when a radio resource control (RRC) connection exists between the mobile station and at least one base station. Therefore, if the mobile station is in a mode where the cell identifier (or coverage) can not be provided then mobile station may be forced to a state where the cell identifier may be provided. For example, in a URA_PCH state the Cell identifier may not be available. The MS can be forced to Cell_FACH to define the cell identifier so that the cell identifier may be obtained whenever the LCS node needs it. Moreover, the network can prevent the MS to enter a URA update state in order to receive cell updates when the MS selects a new cell.~~

~~If the MS is in an idle mode and there is a need to page for it, then the paging triggering for LCS purposes may be originated either by the core network or the UTRAN access network.~~



~~Figure 8.1: Cell ID Based Method~~

8.~~2~~3 Mapping the Cell ID to Geographic Co-ordinates or ~~the~~a ~~Cell or~~ Service Area ~~Coverage~~

~~In UMTS system, the UTRAN aspects are preferably hidden from the core network. For example, in a 3rd generation system a~~A UTRAN cell~~ identifier~~ ID should be mapped to geographical coordinates or a Service Area ~~parameter~~Identifier (SAI) ~~to~~ before being ~~transported~~sent ~~over an Iu interface between a~~from UTRAN ~~network and~~ to the core network. The Service Area Identifier may include one or several cells. The mapping ~~can~~ may be accomplished either in the S-RNC, in a Network Management System (NMS, including Network Management Unit, NEMU) or by co-operation of various access network elements.

The core network may request the geographical co-ordinates or the SAI, or both for the target UE. The SAI may be used for routing of corresponding Emergency calls, or for CAMEL services to correspond to the usage of Cell ID in the core network of GSM. However, the MSC shall not send the Service Area Identity to GMLC.

Although the mapping of the cell(s) associated with the target UE into geographical co-ordinates by the S-RNC is not standardised, the response to the core network location request with geographical co-ordinates shall be as defined in TS 23.032.

It should be noted that the Service Area concept is different from the Localised Service Area concept used for SoLSA services.

In order to determine a cell coverage estimate and to map it to the geographical coordinates or Service Area ~~parameter~~Identity~~,~~, the S-RNC may use parameters such as the best reference signal,~~ a~~ Round Trip Tim~~ing ~~e~~Trip~~ (RTT), as well as antenna beam direction parameter~~s may be utilised in association with the related cell identifier(s)~~. ~~In this case, the S-RNC may use a reference signal or RTT that is measured by the base station BS either periodically or on demand.~~

Alternatively, the ~~range~~ service area coverage of a cell may be determined by using a reference signal power budget. Based on the reference signal power budget it is possible to obtain, for example, the base station transmitted power, isotropic path loss, coverage threshold at coverage area border for a given location probability, and a cell ~~range~~ radius for an indoor and outdoor coverage.

The S-RNC may use a reference signal link budget based cell ~~range (~~radius~~)~~ estimate, in conjunction with the cell identifier, to make a coverage estimation for the cell(s) related to the target UE~~a service area~~.

Additionally, the S-RNC may compare the received power levels~~ may be compared~~ ~~against~~ with the power budget, whereby more accurate information of the location of the UE may be provided. ~~Computation made by two or more elements may also be combined.~~

~~In any above-mentioned cases~~Also, the interaction between neighbouring cell coverage areas~~, including the error margin,~~ ~~can~~ may be used to determine ~~the~~ a more exact location of the~~ mobile station~~ UE.

3GPP/SMG Meeting RAN WG2 #12
Seoul, Korea, April 10-14, 2000

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GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

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Proposed change affects: (U)SIM [ ] ME [X] UTRAN / Radio [X] Core Network [ ]
(at least one should be marked with an X)

Source:	TSG-RAN WG2
Date:	07/04/2000
Subject:	Editorial modifications of OTDOA descriptions for alignment with TDD
Work item:	

Category: *(only one category shall be marked with an X)*

F	Correction	
A	Corresponds to a correction in an earlier release	
B	Addition of feature	
C	Functional modification of feature	
D	Editorial modification	X

Release:

Phase 2	
Release 96	
Release 97	
Release 98	
Release 99	X
Release 00	

Reason for change: At present, the 3G TS 25.305 contains some references to the "CPICH" physical channel (which is for FDD only) without mentioning an alternative for TDD. It is proposed that these references be replaced by the appropriate measurements for LCS as specified in the Physical Layer specifications TS 25.215 and TS 25.225 (e.g. "SFN-SFN observed time difference"). This makes the "Stage 2 Functional Specification of Location Services in UTRAN" independent of the UTRA mode.

Removal of some references to the "CPICH" physical channel. Introduction of LCS measurements at the appropriate places instead.

Clauses affected: 4.4.2, 9

Other specs Affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

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4.4.2 OTDOA-IPDL Method with network configurable idle periods

This method involves measurements made by the UE and LMU of the UTRA-frame timing (e.g. SFN-SFN observed time difference) ~~pilot signal (CPICH) radio transmissions~~. These measures are then sent to a Position Calculation Function (PCF) in the Serving RNC where the location of the UE is calculated.

Optionally, a PCF may be included in the UE, in which case the calculation of the location from the measurements may alternatively be performed in the UE.

The detailed description of the OTDOA-IPDL location method and its operation are described in clause 9.

9 OTDOA location method

The primary standard OTDOA measurement~~s~~ ~~are of~~ is the "SFN-SFN observed time difference" ~~of arrival (OTDOA) of downlink CPICH signals received~~ observed at the UE. These measurements, together with other information concerning the surveyed geographic location of the transmitters and the relative time difference (RTD) of the actual transmissions of the downlink signals may be used to calculate an estimate of the location of the UE. Each OTDOA measurement for a pair of downlink transmissions describes a line of constant difference (a hyperbola (see note 1)) along which the UE may be located. The UE's location is determined by the intersection of these lines for at least two pairs of base stations. The accuracy of the location estimates made with this technique depends on the precision of the timing measurements, the relative location of the base stations involved (see note 2), and is also subject to the effects of multipath radio propagation. This is illustrated in the figure 9.1.

NOTE 1: This is really a figure in three dimensions, a hyperboloid. For convenience here, this will be simplified to the hyperbola representing the intersection of this surface with the surface of the earth. For location service in three dimensions the hyperboloid must be considered.

NOTE 2: The geometry of the base station locations may affect the accuracy of the location estimate. The best results are when the base stations equally surround the UE. If they do not, there is a reduction in accuracy, which is sometimes termed the Geometric Dilution of Position (GDP).

The primary OTDOA measurements (made by the UE) are sent to the Position Calculation Function (PCF) in the serving RNC. These measures are sent via signalling over the Uu, Iub (and Iur) interfaces between the UE and the SRNC (PCF). The calculation function makes use of the measurements, the known locations of the transmitter sites and the relative time difference of the transmissions to estimate the UE's location.

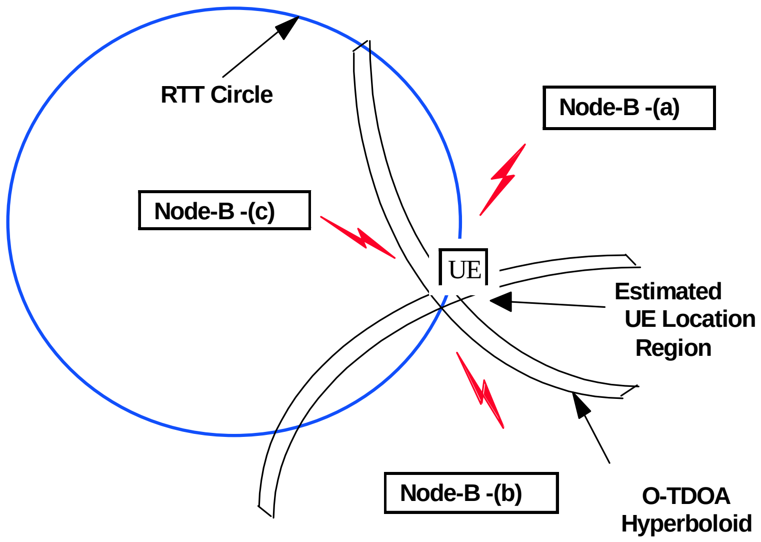

Figure 9.1: OTDOA Location Method

The OTDOA method may be operated in two modes: UE assisted OTDOA and UE based OTDOA. The two modes differ in where the actual location calculation is carried out. In the *UE assisted* mode, the UE measures the difference in time of arrival of several cells and signals the measurement results to the network, where a network element (the Position Calculation Function (PCF)) carries out the location calculation. In the *UE based* mode, the UE makes the measurements and also carries out the location calculation, and thus requires additional information (such as the location of the measured base stations) that is required for the location calculation. The signalling requirements for the two OTDOA modes are described in a later subclause. As the LCS involves measurements, there is always uncertainty in the results. Physical conditions, errors and resolution limits in the apparatus all contribute to uncertainty. To minimise the uncertainty in the LCS result, it is important that as many measurements of RTT and TDOA (and others) as are possible for a UE are provided to the PCF. Thus it is important that the standard method for LCS not be restricted to rely on a single measure. The UE thus provides OTDOA measures for as many pilot signals as it can receive. The pilot signals to be measured shall include those in the "cell reselection and monitoring set" and those in the "cell selection set".

In order to support the OTDOA method, the locations of the UTRAN transmitters needs to be accurately known by the calculation function (PCF). This information may be measured by appropriate conventional surveying techniques (see note 3). The surveyed location should be the electrical centre of the transmitting antenna (and not the location of the radio equipment building). The use of antenna diversity, beamforming or beam steering techniques may cause the effective antenna location to change with time and this information will need to be communicated to the PCF to assist with its calculations. The methods of measuring the location of the UTRAN transmitters are outside the scope of the present document.

NOTE 3: These surveying methods may, for example, make use of a GPS receiver.

In order to support the OTDOA method, the relative time difference (RTD) of the downlink transmissions must also be known by the calculation function (PCF). If the UTRAN transmitters are unsynchronised, the RTD will change over time as the individual clocks drift. Thus, measurements of RTD may need to be made regularly and the calculation function updated appropriately. The measurement of the RTD is outside the scope of the present document (see note 4).

NOTE 4: One convenient method is to make use of an LMU at a fixed location. This unit measures the observed time differences of all the local transmitters and reports these to the PCF. These measures may then be converted (translated) into the actual (absolute) relative time difference for each of the transmitters by making use of the known location of the LMU and the transmitters.

In some conditions a sufficient number of downlink pilot signals may not be available for measure at the UE. This may occur, for example, if the UE is located quite close to the UTRAN transmitter and its receiver is blocked by the strong local transmissions. This is referred to as the "hearability" problem.

3GPP TSG RAN WG2 #12
Seoul, Korea, April 10th – 13th, 2000

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25.305 CR 016 Current Version: 3.1.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: TSG-RAN #8
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for approval	X	strategic		*(for SMG use only)*
for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)*

(U)SIM	ME	UTRAN / Radio	Core Network
	X	X	

Source: TSG-RAN WG2 **Date:** 10.04.2000

Subject: Update on clause 5

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	
A	Corresponds to a correction in an earlier release	
B	Addition of feature	
C	Functional modification of feature	X
D	Editorial modification	

Release:

Phase 2	
Release 96	
Release 97	
Release 98	
Release 99	X
Release 00	

Reason for change:

This CR replaces the figure in clause 5 with a more comprehensive picture taken from TS 23.002 and adds the requirement for determining the geographical co-ordinates in U-PCF for the cell ID based location method.

Clauses affected: 5, 5.3.3.2

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

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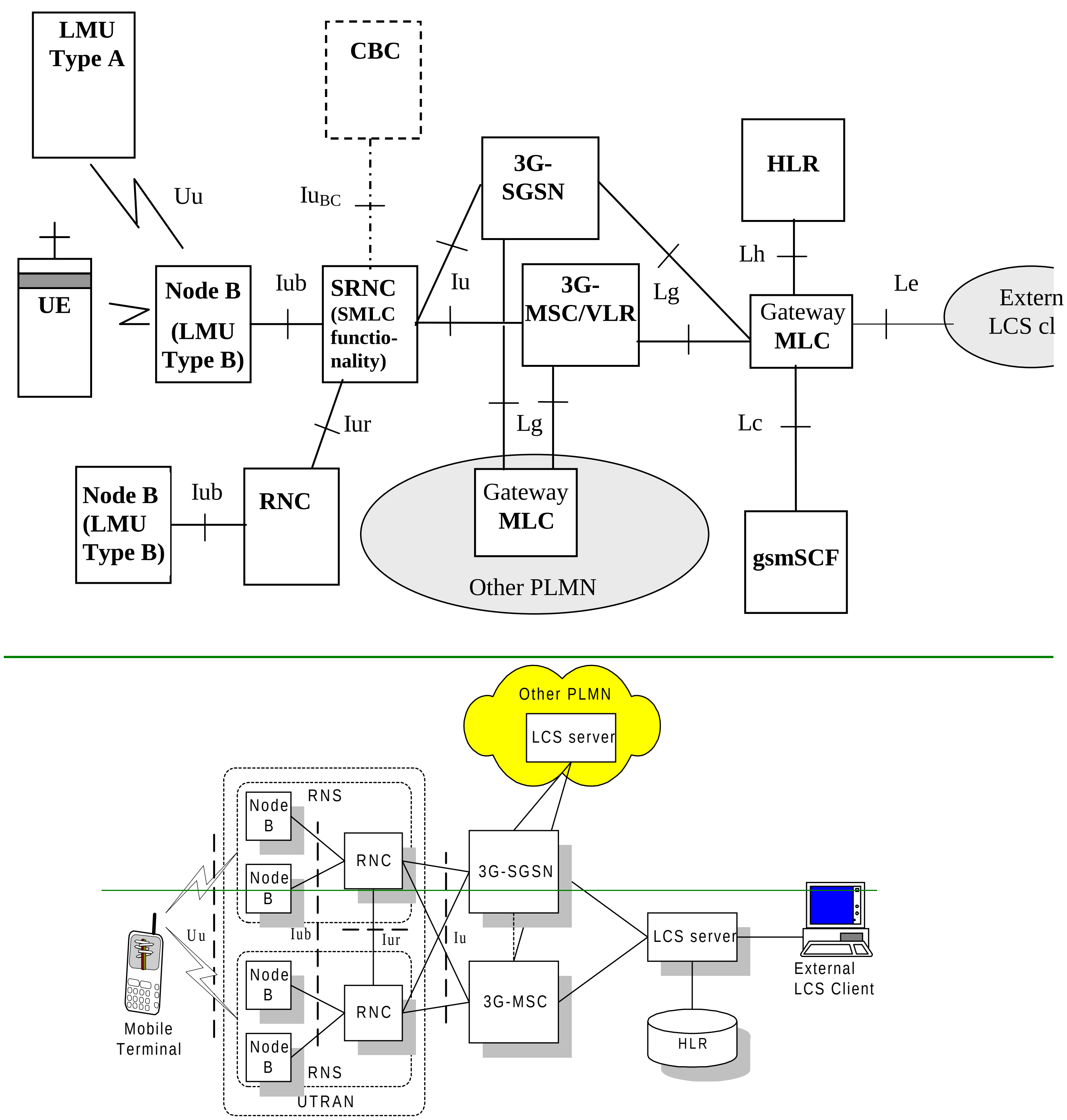
5 UTRAN LCS Architecture

Figure 5.1 shows the general arrangement of the Location Service feature. This illustrates, generally, the relation of LCS Clients and servers in the core network with the UTRAN. The definition and operation of LCS entities operating in the core network is outside the scope of the present document. The LCS entities within the UTRAN communicate with the Core Network (CN) across the Iu interface. Communication among the UTRAN LCS entities makes use of the messaging and signalling capabilities of the UTRAN.

As part of their service or operation, the LCS Clients may request the location information of User Equipment (UE) (UE without a valid SIM/USIM) or mobile stations. There may be more than one LCS client. These may be associated with the core network, associated with the UTRAN, operated as part of a UE application or accessed by the UE through its access to an application (e.g. through the Internet).

Within the UTRAN, typically the serving RNC, receives authenticated requests for LCS information from the core network across the Iu interface. LCS entities then manage the UTRAN resources, including the Node-Bs (base stations), LMU, the UE and calculation functions, to estimate the location of the UE and return the result to the CN.



NOTE: This figure ~~requires some revision and will be the same as in the system specification.~~is taken from TS 23.002, Network Architecture.

Figure 5.1: General arrangement of LCS in UMTS

5.3 UTRAN LCS Functional Entities

5.3.3 Positioning group

5.3.3.2 UTRAN Position Calculation Function (U-PCF)

The UTRAN Position Calculation Function is responsible for calculating the location of the UE (mobile unit). This function applies an algorithmic computation on the collected signal measurements to compute the final location estimate and accuracy.

The U-PCF may also support conversion of the location estimate between different geographic reference systems. It may obtain related data (e.g.: base station geographic co-ordinates) needed for the calculation. There may be more than one calculating function available within, or associated with, the calculation function of the UTRAN.

In the cell ID based location method, the U-PCF shall determine the geographical co-ordinates corresponding to the cell(s) associated with the the target UE.

The Position Calculation Function is also responsible for estimating the accuracy of the location estimate. This accuracy estimate should include, for example, the effect of geometric dilution of precision (GDP), the capabilities of the signal measuring hardware, the effects of multipath propagation and the effects of timing and synchronisation unknowns. The accuracy should be returned as a measure of distance in the same units as the location estimate. The accuracy zone may be reported as the axis and orientation of an ellipse surrounding the location estimate.

3GPP TSG RAN WG2 #13
Oahu, HI, US, May 22nd – 26th, 2000

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25.305 CR 017r1 Current Version: 3.1.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: TSG-RAN #8
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for approval	X	strategic		*(for SMG use only)*
for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: (U)SIM [ ] ME [X] UTRAN / Radio [X] Core Network [ ]
(at least one should be marked with an X)

Source: TSG-RAN WG2 **Date:** 19.05.2000

Subject: Editorial additions

Work item:

Category:
(only one category shall be marked with an X)

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification	X		Release 99	X
				Release 00	

Reason for change:

- In clause 5.3.2.1 the term "Real-time-difference" was used, this has been replaced by "Relative Time Difference".
- In WG2 #10 the operation and specification of idle periods was updated based on TS 25.214 (tdoc R2-000210, source Ericsson). However, it seems unnecessary to have the same information present in both TS 25.305 and 25.214, and therefore it is proposed that the contents of clause 9.1.1 in 25.305 are replaced with a reference to 25.214.
- In clause 6 most of the empty clauses now include references to other clauses. The text in clause 6.1.2 is modified from GSM 03.71.

Clauses affected: 2.1, 2.2, 5.3.2.1, 6, 6.1.2, 6.2, 6.3, 6.4, 6.5, 6.6, 9.1, 9.1.1

Other specs affected:

Other 3G core specifications		→ List of CRs:	
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

help.doc

<--------- double-click here for help and instructions on how to create a CR.

2.1 Normative references

[1] 3G TS 23.171: "Functional stage 2 description of location services in UMTS".

[2] GSM 01.04 (ETR 350): "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".

[3] Technical Specification Group Services and System Aspects Service aspects; Terminology and Vocabulary within TSG-S1: Report and Recommendations, 28.7.99.

[4] GSM 02.71: "Digital cellular telecommunications system (Phase 2+); Location Services (LCS); Service description, Stage 1".

[5] GSM 03.71: "Digital cellular telecommunications system (Phase 2+); Location Services (LCS); (Functional description) - Stage 2".

[6] GSM 03.32: "Universal Geographical Area Description".

[7] 3G TS 22.100: "UMTS phase 1 Release 99".

[8] 3G TS 22.101: "Service principles".

[9] 3G TS 22.105: "Services and Service Capabilities".

[10] 3G TS 22.115: "Charging and Billing".

[11] 3G TS 22.121: "The Virtual Home Environment".

[12] 3G TS 23.110: "UMTS Access Stratum; Services and Functions".

[13] 3G TS 25.413: "UTRAN Iu interface RANAP signalling".

[14] 3G TS 25.423: "UTRAN Iur interface RNSAP signalling".

[15] 3G TS 25.433: "UTRAN Iub interface NBAP signalling".

[16] 3G TS 25.214: "Physical layer procedures (FDD)"

2.2 Informative references

[1~~6~~7] Third generation (3G) mobile communication system; Technical study report on the location services and technologies, ARIB ST9 December 1998.

[1~~7~~8] The North American Interest Group of the GSM MoU ASSOCIATION: Location Based Services, Service Requirements Document of the Services Working Group.

5.3.2.1 UTRAN Location System Control Function (U-LSCF)

The UTRAN Location System Control Function in RNC is responsible for co-ordinating location requests within the RNC handling entity. This function manages call-related and non-call-related location requests and allocates network resources for handling them. This function "insulates" the Location clients in the Core Network from the detailed operation of the location method in order that the UTRAN may be used by several types of core network and with several location methods.

The U-LSCF provides flow control between simultaneous location requests. Simultaneous location requests must be queued in a controlled manner to account for priority requests (e.g. for Emergency Clients). The details of the flow control, priority selection and queuing are beyond the scope of the present document.

The U-LSCF will select the appropriate location method based on the availability of resources and parameters of the location request. The U-LSCF co-ordinates resources and activities needed to obtain data (e.g. base station geographic co-ordinates) needed for the location method. It also records LCS RNC usage data for the location service request that may be passed to a Location System Recording Function (U-LSRF) or OA&M function in the Core Network.

If the location technique requires the broadcast of system information, the LSCF initiates and maintains this activity through the Position Radio Co-ordination Function (U-PRCF). Broadcast information (such as the geographic co-ordinates of the base stations) may be required, for example, to support a Position Calculation Function (U-PCF) located in the mobile unit (UE). These broadcasts may also include other information (such as currently observable satellites) that may assist a UE in the use of external location services.

The information to be broadcast is selected based on the location techniques offered for use by the LCS and the needs of the UE. This broadcast information may be specially coded (i.e. encrypted) to ensure its availability only to subscribers of the service. The use of broadcasts or other methods for signalling to the UE or the LMU may be selected based on the chosen location method.

The information to be broadcast could include, for example:

- identification and spreading codes of the neighbouring base stations (the channels that are used for measurements);
- Relativeal -Time -Difference (RTD), i.e. the timing offsets, asynchronity between base stations, could be based on measurement results obtained by LMUs;
- roundtrip delay estimates in connected mode;
- the geographic location, co-ordinates, of the neighbouring base stations;
- the idle period places within the frame structure for multiple base stations;
- the local time-of-day.

Some of this information may be broadcast to support other UTRAN operations (e.g. handover). The function of the LSCF is to ensure information is broadcast when needed for the LCS operations and the LSCF may make use of other UTRAN processes to do so.

If there are frequency differences between the (unsynchronised) base stations, the OTDOA measurements must be reported together with the time-of-day they were made (timestamp). This is necessary so that the appropriate value of the RTD may be used by the calculation function.

6 Signalling protocols and interfaces

NOTE: This clause describes the information flows, the detailed messages and protocols ~~is~~ are described in other clauses.

~~6.1 Generic signalling model for LCS~~

~~6.1.1 Protocol layering~~

~~6.1.2 Message segmentation~~

~~Message segmentation is needed to transport any large LCS message that exceeds the message size limitation supported by any interface over which transport is needed. The segmentation mechanisms are described in the respective interface specifications.~~

6.2 LCS signalling between SRNC and MSC/SGSN

~~Associated RNC~~LCS signalling ~~to a LMU in Node B~~between SRNC and MSC/SGSN is handled through the Iu interface, which is described in clause 6.7.3.

6.3 SRNC signalling to a target UE

SRNC signalling to a target UE is described in clause 6.7.4.1.

6.4 Associated RNC signalling to a standalone LMU

Associated RNC signalling to a standalone LMU is described in clause 6.7.4.2.

6.5 Associated RNC signalling to a LMU in Node B

Associated RNC signalling to a LMU in Node B is handled through the Iub interface, which is described in clause 6.7.1.

6.6 RNC-to-RNC signalling for LCS support

The RNC-to-RNC signalling for LCS support is handled through the Iur interface, which is described in clause 6.7.2.

9.1 Use of Idle Periods

For realising location based services the support of physical layer is a prerequisite, so that the measurements required for the terminal location calculation can be carried out. In UTRAN there are several factors that must be taken into account while considering the physical layer procedures related to location services:

- hearability: a basic consequence of a CDMA radio system is that a terminal near its serving base station cannot hear other base stations on the same frequency. In order to calculate terminal location the terminal should be able to receive at least three base stations. To facilitate this some special means are required;
- asynchronous network causes significant uncertainty to the time-difference-of-arrival (TDOA) measurements. To compensate for the effects of this, the relative time difference (the synchronicity) between base station transmissions must be measured, and used for correcting TDOA measurement;
- capacity loss: signalling related to location calculation may take capacity from other services. This capacity loss should be minimised.

Based on the results of the work done in ARIB SWG2/ST9 (see reference [17~~6~~]) a solution for the above mentioned hearability problem is the IPDL (Idle Period DownLink) method. In this method each base station ceases its transmission for short periods of time (idle periods). During an idle period of a base station, terminals within the cell can measure other base stations and the hearability problem is reduced. Also, during idle periods the real time difference measurements can be carried out. Because the IPDL method is based on forward link (downlink) the location service can be provided efficiently to a large number of terminals simultaneously.

The specification and operation of the IPDL technique are provided in the following subclause.

9.1.1 ~~9.1.1~~ Operation and specification of idle periods

The operation and specification of idle periods can be found from TS 25.214 (reference [16]).

~~To support time difference measurements that need to be made for location services there may need to be Idle Periods created in the DownLink (IPDL) during which time transmissions on all channels from a node B are temporally halted. During these Idle Periods the visibility of neighbour base stations from the UE is improved thus allowing the measurements to be performed.~~

~~The Idle Periods are arranged in a predetermined pseudo random fashion according to higher layer parameters. These parameters are used by layer 1 to arrange and use these Idle Periods. Idle Periods differ from compressed mode in that they are shorter in duration, all channels are silent simultaneously, and no attempt is made to prevent data loss.~~

~~In general there are two modes for these Idle Periods:~~

- ~~continuous mode; and~~
- ~~burst mode.~~

~~In continuous mode the Idle Periods are active all the time. In burst mode the Idle Periods are arranged in bursts where each burst contains enough Idle Periods to allow a UE to make sufficient measurements for its location to be calculated. The bursts are separated by a period where no Idle Periods occur.~~

The following are the parameters for the idle periods (IP).

Table 9.0

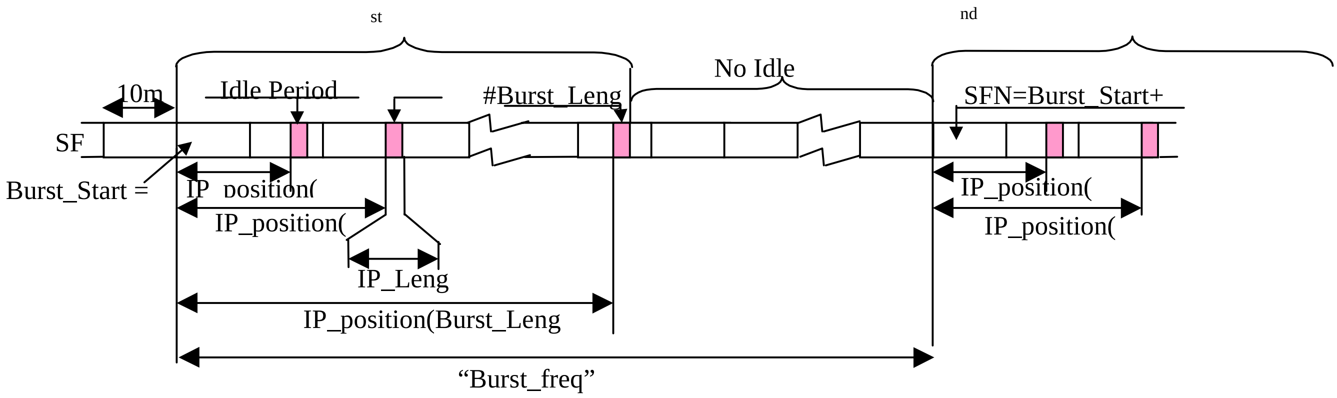
Parameter	Min value	Max value	Bits Required	Units (see note 1)	Description
IP_spacing	2^2+1	2^6	4	frames	Number of frames between Idle Periods.
IP_status	0	1	1	Logic Value	0 = Idle Periods active in continuous mode 1 = Idle Periods active in burst mode
IP_length	5	10	1	symbols	Length of Idle Periods
IP_offset	0	15	4	Symbols	A cell specific offset (can be used to synchronise Idle Periods from different sectors within a node B).
Max_dev	140	145	0 (depends on IP length)	symbols	Maximum deviation in time from beginning of frame
Seed	0 – 63			(no units)	Seed for random function "rand(x)"
rand(x)	= (106.rand(x-1) + 1283)%6075, rand(0)=seed				Random function used in the calculation of the Idle Periods. Note: rand(0) = Seed.
IP_position(x)	= x*IP_spacing*150 + rand(xmod64)modMax_dev+IP_offset			symbols	Function for generating the exact positions of the x^{th} Idle Period. (see notes 2 & 4 below)
Extra parameters used in the case of burst mode operation (i.e. IP_status = 1)					
Burst_Start	[0]	$[2^4\text{-}1]*256$	[4]	SFN (in steps of 256 frames)	The frame number where the 1^{st} Idle Period Burst occurs within an SFN cycle.
Burst_Length	[10]	$[10+2^4]$	[4]	IPs	Number of Idle Periods in a 'burst' of Idle Periods
Burst_freq	$[2^8]$	$[2^{12}]$	[4]	frames	Number of 10ms frames between consecutive Idle Period bursts.

NOTE 1: The unit 'symbol' refers to symbols on the CPiCH channel.

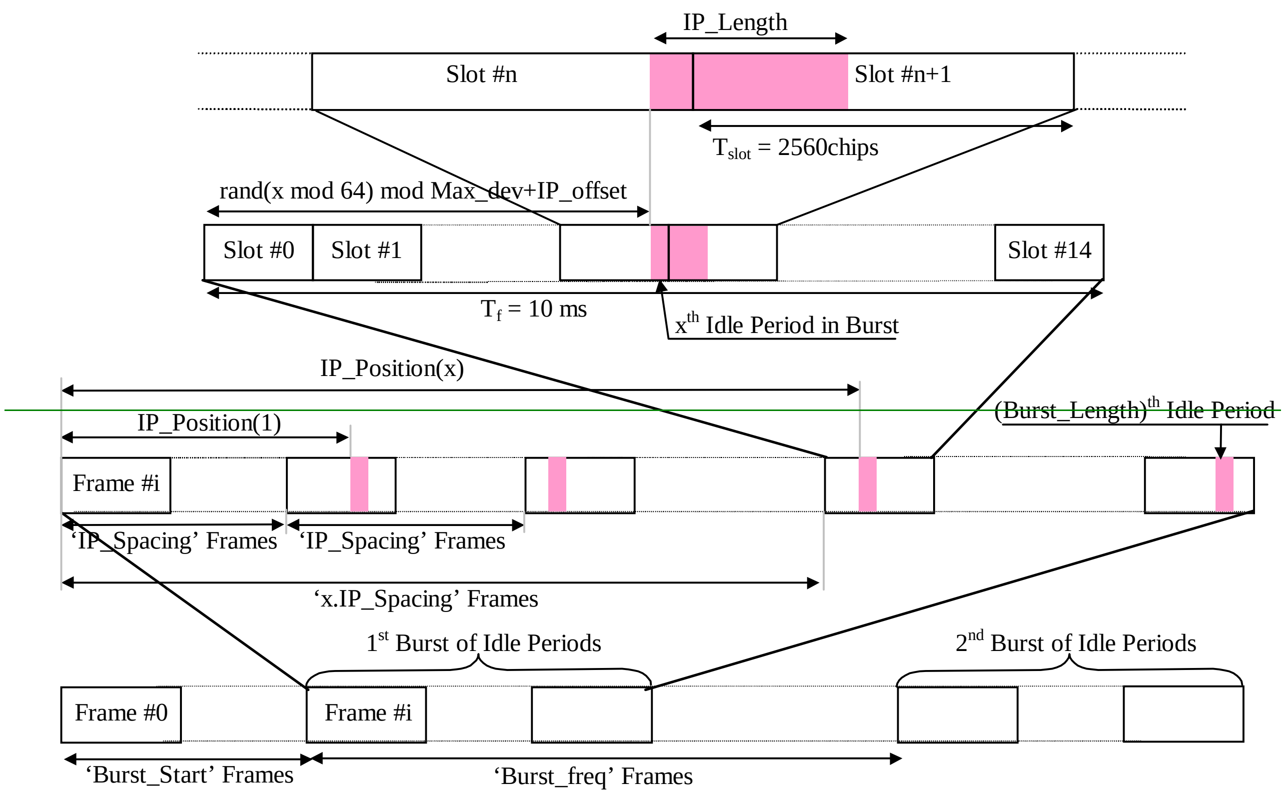
NOTE 2: The function IP_position(x) yields the position of the x^{th} Idle Period relative to a) the start of the SFN cycle when in continuous mode or b) the start of a burst when in burst mode.

NOTE 3: The operator "%" denotes the modulo operator

NOTE 4: Regardless of mode of operation, the Idle Period pattern is reset at the start of every SFN cycle.



NOTE 5: Continuous mode can be considered as a specific case of the burst mode with just one burst spanning the whole SFN cycle. Note also that x will be reset to x=1 for the first idle period in a SFN cycle for both continuous and burst modes and will also, in the case of burst mode, be reset for the first Idle Period in every burst.



~~Figure 9.2: IPDL Timing~~

3GPP RAN WG 2 Meeting #13
Oahu, Hawaii, USA 22 - 26 May 2000

Document R2-001136

CHANGE REQUEST

25.305	**CR**	**018**	Current Version:	3.1.0

For submission to:	TSG-RAN #8	for approval	X	strategic	
↑		for information		non-strategic	

Proposed change affects: *(at least one should be marked with an X)*	(U)SIM		ME	X	UTRAN / Radio	X	Core Network

Source: TSG-RAN WG2 **Date:** 2000-05-22

Subject: Clarification of OTDOA signalling operation

Work item:

Category:

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification	X		Release 99	X
				Release 00	

Reason for change:

Several error sources contribute to RTT measurements including inaccuracies in UE frequency reference as well as non-line-of-sight radio propagation environments. However, a major source or error is that a UE may adjust its transmission timing. This means that a UE does not delay its UE transmission time compared to DL reception time by a fixed T0=1024 chip time period, but this delay is a function of time. The value of T0 may be diferent from 1024 chip time period very often. Typically this happens when a UE connectes to a new BTS in soft handover. If the network does not have any knowledge of the T0 value, estimation of UE location based on RTT values will be erroneous. This will create an uncertainty to location estimation that uses RTT or round trip propagation delay.

To solve the problem presented above, measurement reporting of the UE Tx-Rx timing difference is added for clarification to the sequence describing the OTDOA signalling method. The measurement reporting as such is already supported in TS 25.331 and is, therefore, not a new feature.

Clauses affected: 7.4

Other specs affected:

Other 3G core specifications		→ List of CRs:	
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

7.4 General network location procedures

The following diagram illustrates the operations for the OTDOA-LCS when the request for location information is initiated by an LCS application signalled from the Core Network. As these operations are internal to the RNC, this diagram is to illustrate information flow and implementations may use alternate arrangements.

This illustration only includes the information flow related to LCS operations and does not indicate other operations that may be required, for example, to establish a signalling connection between the UE and the SRNC. Also not illustrated is the signalling used to initiate the location service request (from the Location Client Function) from the Core Network or a UE based application.

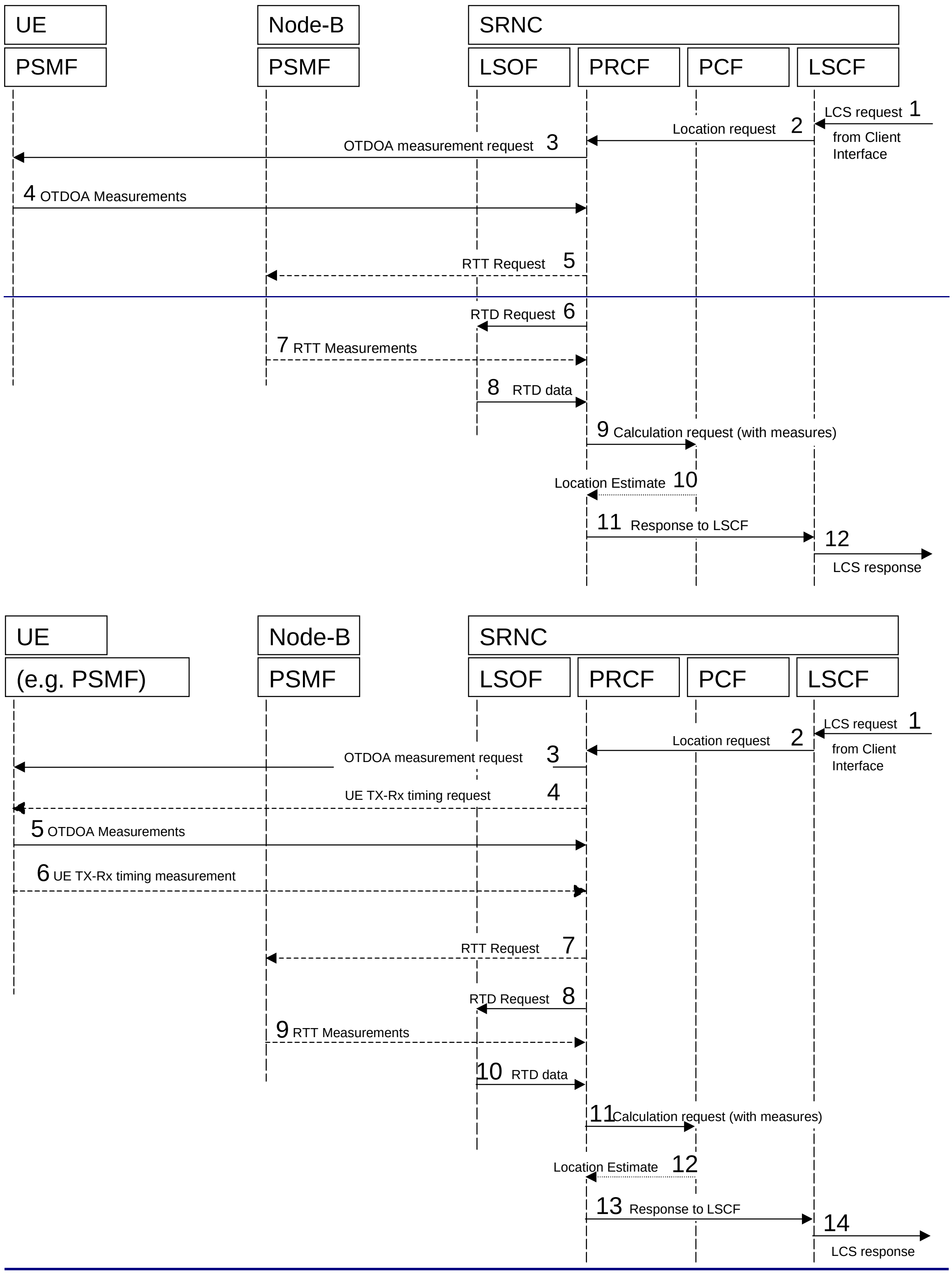


Figure 7.1: OTDOA Signalling Operations

1. The operation begins with an authenticated request for location information about a UE from an application in the core network being received at the LSCF. The LSCF acts as interface between the Core Network and the LCS entities in the UTRAN.

2. The LSCF considers the request and the capabilities of the UE and the network and forwards the request to the appropriate PRCF in the Serving RNC.

3. ~~3.~~ The PRCF requests from the UE the measurement of the OTDOA for the signals in the active and neighbourhood sets. These measurements may be made while the UE is in the idle state or while it is connected.

4. If it is considered advantageous to do so, the PRCF requests the UE TX-Rx timing difference information from the UE.

5. ~~4.~~ The UE returns the OTDOA measures to the PRCF. The PRCF receives the OTDOA information and co-ordinates obtaining other information to support the calculation request (not illustrated).

6. The UE returns the UE TX-Rx timing difference information to the PRCF, together with a time stamp of when the value was obtained.

7. ~~5.~~ If there are insufficient OTDOA measures, or it is otherwise considered advantageous to do so, the PRCF requests the RTT measure for the UE from the PSMF in the serving Node-B.

8. ~~6.~~ The PRCF requests the RTD measures for the associated transmitters from the LSOF (database). These may be stored locally if they are constant over time, otherwise they must be updated to represent the RTD timing at the time-of-day the OTDOA measurements were made.

9. ~~7.~~ The PSMF in the Node-B returns the RTT measures to the PRCF if they were requested.

10. ~~8.~~ The LSOF returns the RTD information to the PRCF.

11. ~~9.~~ The PRCF passes the OTDOA, RTD and, if necessary, RTT information to the PCF and requests a location calculation. The calculation may include a co-ordinate transformation to the geographic system requested by the application.

12. ~~10.~~ The PCF returns the location estimate to the PRCF. This estimate includes the location, the estimated accuracy of the results and the time of day of the estimate.

13. ~~11.~~ The PRCF passes the location estimate to the LSCF.

14. ~~12.~~ The LSCF passes the location estimate to the Core Network.

3GPP RAN WG2 Meeting #13
Oahu, Hawaii, USA, 22-26 May 2000

Document ***R2-001222***
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

25.305 CR 019r1 Current Version: 3.1.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: TSG-RAN #8	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑	for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: (U)SIM [ ] ME [X] UTRAN / Radio [X] Core Network [ ]
(at least one should be marked with an X)

Source: TSG-RAN WG2 **Date:** 22 May, 2000

Subject: Assisted GPS Procedures.

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification	X		Release 99	X
				Release 00	

Reason for change: One of the aims of the LCS work within 3GPP has been to align the assisted GPS method with that used in GSM, as defined by ETSI and T1P1.5. At the ETSI SMG#31bis on 17th April 2000, a number of changes to the assisted GPS method for GSM Release 98 and 99 were approved (GSM 04.31 and GSM 04.35). This CR proposes to make corresponding changes to the 3GPP specifications in order to maintain alignment with the GSM specifications.

Clauses affected: 5.3.3.2, 6.7.4.1.3, 10.3, 10.5.1, 10.5.2

Other specs affected:

Other 3G core specifications		→ List of CRs:	
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

help.doc

<--------- double-click here for help and instructions on how to create a CR.

***** NEXT MODIFIED SECTION******

5.3.3.2 UTRAN Position Calculation Function (U-PCF)

The UTRAN Position Calculation Function is responsible for calculating the location of the UE (mobile unit). This function applies an algorithmic computation on the collected signal measurements to compute the final location estimate and accuracy.

The U-PCF may also support conversion of the location estimate between different geographic reference systems. It may obtain related data (e.g.: base station geographic co-ordinates) needed for the calculation. There may be more than one calculating function available within, or associated with, the calculation function of the UTRAN.

The Position Calculation Function is also responsible for estimating the accuracy of the location estimate. This accuracy estimate should include, for example, the effect of geometric dilution of precision (GDOP), the capabilities of the signal measuring hardware, the effects of multipath propagation and the effects of timing and synchronisation unknowns. The accuracy should be returned as a measure of distance in the same units as the location estimate. The accuracy zone may be reported as the axis and orientation of an ellipse surrounding the location estimate.

***** NEXT MODIFIED SECTION******

6.7.4.1.3 Broadcast of Assistance Data

In the UE Based OTDOA or Network Assisted GPS methods, where the measurements and/or location calculation is done in the UE, assistance data may be broadcast to the UE.

The assistance data to be broadcast for UE Based OTDOA contains the Relative Time Difference (RTD) values (e.g. in case of a non-synchronised network) and base station co-ordinates. In addition, the broadcast data may contain other information to simplify the OTDOA measurements. The length of the message depends on how many neighbours are included in the assistance data. Part of the broadcast message (e.g. the serving and neighbour base station geographic co-ordinates) may be ciphered.

Part of the broadcast message (e.g. the GPS differential corrections, ephemeris and clock corrections, almanac and other data) may be ciphered.

The broadcast channel that is used for the OTDOA and GPS assistance data makes use of the common UTRAN broadcast service.

***** NEXT MODIFIED SECTION******

10.3 Data assistance

The UE may receive GPS information through the UTRAN air interface, using higher layer signalling.

When the UE is unable to detect 4 or more satellites, the assisted GPS method can be combined with other location methods.

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 iscan be valid for a few minutes (e.g., less than 5 minutes)hours (2-4 hrs);
- data providing means for location calculation; e.g. reference time, reference location, satellite ephemeris, clock corrections. This data is valid for four hours.

Note that 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. They are valid for about 30 seconds. The DGPS data is valid for a large geographical area, so one centrally located reference receiver can be used to service this large region.

***** NEXT MODIFIED SECTION******

10.5.1 UE-based method

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

If the location was requested by an application in the network, then the calculated location is signalled to the proper network element.

~~The UE-based method maintains a full GPS receiver in the UE, thus allowing stand-alone location fixes.~~

~~If the location was requested by an application in the network, then the calculated location is signalled to the proper network element.~~

The following information may be signalled from the UTRAN (LSIF) to the UE:

- number of satellites for which assistance is provided;
- reference time for GPS ($T_{UTRAN-GPS}$) (specified in TS 25.215);
- reference location;
- ionospheric corrections;
- satellite ID for identifying the satellites for which the assistance is provided;
- ~~IODE: sequence number for the ephemeris for the particular satellite;~~
- ephemeris and clock corrections to accurately model the orbit of the particular satellite and information when this becomes valid;
- UTC offset~~clock corrections~~;
- DGPS ~~and clock~~ corrections;
- almanac data,
- real-time integrity ~~such as~~ (e.g., a list of unusalbe~~bad~~ satellites).

The following information may be signalled from the UE to the UTRAN (LSIF):

- reference time for GPS;
- serving cell information;
- Latitude/Longitude/Altitude/Error ellipse;
- velocity estimate of the UE;
- satellite ID for which the measurement data is valid;
- Whole/Fractional chips for information about the code-phase measurements;
- C/N_0 of the received signal from the particular satellite used in the measurements;
- doppler frequency measured by the UE for the particular satellite signal;
- pseudorange RMS error;
- multipath indicator.

10.5.2 UE-assisted method

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 location of the UE and carries out the remaining GPS operations. In this method, accurately timed code phase signalling (as specified in TS 25.215) is required on the downlink. The signalling load in the uplink direction can be larger than in the UE-based method. 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 location accuracy without extra signalling to the UE. ~~Note that the UE-assisted information may be derived directly from the UE-based information. For example, Doppler (0^{th} order and 1^{st} order term) and code phase~~

(centre and search window width) can be derived directly from the reference time, approximate location, ephemeris and almanac without being provided by the UTRAN (LSIF). This will in turn simplify the network implementation.

The following information may be signalled from the UTRAN (LSIF) to the UE:

- number of satellites for which assistance is provided;
- reference time for GPS ($T_{UTRAN-GPS}$) (specified in TS 25.215);
- satellite ID for identifying the satellites for which the assistance is provided;
- doppler (0^{th} order term);
- doppler (1^{st} order term);
- code phase;
- code phase centre and Search Window width;
- ephemeris;
- azimuth;
- elevation.

The following information may be signalled from the UE to the UTRAN (LSIF):

- reference time for GPS (T_{UE-GPS}) (specified in TS 25.215);
- number of Pseudoranges;
- SVID;
- satellite C/No;
- doppler;
- satellite Code Phase;
- multipath Indicator;
- pseudorange RMS Error.

Additional parameters, such as round trip time (RTT), UE receiving transmitting time (UE RxTx), SFN-SFN observed time difference and CPICH Ec/No, may be used to improve the performance of UE-assisted GPS. All the additional parameters are defined in TS 25.215 and can be made available through RRC signalling. Furthermore, to those UE technologies requiring externally provided sensitivity and time aiding data, some navigation bits, in addition to ephemeris data, may be sent from UTRAN to UE for sensitivity assistance and time recovery, which can also been done at the UE itself without transmitting the assistance data.