TSG-RAN Meeting #15 *RP-020080*

Jeju-do, Korea, 5 - 8 March 2002

Title: **Agreed CRs (Rel-4 and Rel-5 category A) to TS 25.305**

Source: **TSG-RAN WG2**

Agenda item: **7.2.4**

Doc-1st-	Status-	Spec	CR	Rev	Phase	Subject	Cat	Version	Versio	Workite
R2-020528	agreed	25.305	073	1	Rel-4	Corrections Relating to IPDL and Timing Advance for 1.28 Mcps TDD	F	4.2.0	4.3.0	LCRTDD-L23
R2-020529	agreed	25.305	074		Rel-5	Corrections Relating to IPDL and Timing Advance for 1.28 Mcps TDD	A	5.3.0	5.4.0	LCRTDD-L23

3GPP TSG-RAN WG2 Meeting#26 ***R2-020528***

Orlando, USA, 18-22 February 2002

CR-Form-v3

CHANGE REQUEST

⌘	**25.305**	**CR**	**073**	⌘	rev	**r1**	⌘	Current version:	**4.2.0** ⌘

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

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

Title:	⌘ Corrections Relating to IPDL and Timing Advance for 1.28 Mcps TDD			
Source:	⌘ TSG-RAN WG2			
Work item code:	⌘ LCRTDD-L23		***Date:*** ⌘	2. 02. 2002
Category:	⌘ **F**		***Release:*** ⌘	REL-4

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

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

Reason for change: ⌘	IPDL do not form part of the Release 4 specification of 1.28 Mcps TDD and, consequently, it should be indicated that TDD IPDL parameters relate only to 3.84 Mcps TDD. Some additional changes are made relating to timing measurement in TDD modes.
Summary of change: ⌘	The phrase ‘ in Release 99’ is removed from section 4.1. A sentence is added to section 4.3.2 to indicate that IPDL is not applied in 1.28 Mcps TDD for Release 4. A sentence is added in section 8.1 to indicate that the internal measurement ‘T_{ADV}’ can be used with 1.28 Mcps TDD to improve LCS accuracy. Text is added to tables 9.1, 9.5 to indicate that IPDL parameters do not apply to 1.28 Mcps TDD in release 4. Text is added to section 9.6 to indicate that the internal measurement T_{ADV} can be used with the OTDOA location process.
Consequences if not approved: ⌘	The operation of 1.28 Mcps TDD will not be described correctly for Release 4.

Clauses affected: ⌘	4.1, 4.3.2, 8.1, 9.5.1, 9.6

Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.305 v5.3.0, CR 074
Other comments:	⌘			

4 Main concepts and requirements

The stage 1 LCS description providing an overall service description and the core requirements for the LCS at the service level is given in [5]. The stage 2 LCS description providing a system functional model for the whole system, the LCS system architecture, state descriptions and message flows are described in [13].

By measuring radio signals the capability to determine the geographic position of the UE shall be provided. The position information may be requested by and reported to a client (application) associated with the UE, or by a client within or attached to the CN. The position information may also be utilised internally by UTRAN, for example, for location-assisted handover or to support other features such as home location billing. The position information shall be reported in standard formats, such as those for cell based or geographical co-ordinates, together with the time-of-day and the estimated errors (uncertainty) of the position of the UE. Restrictions on the geographic shape encoded within the 'position information' parameter may exist for certain LCS client types. The SRNC shall comply with any shape restrictions defined in GSM/UMTS and, in a particular country, with any shape restrictions defined for a specific LCS client type in relevant national standards. For example, in the US, national interim standard TIA/EIA/IS-J-STD-036 restricts the geographic shape for an emergency services LCS client to minimally either an "ellipsoid point" or an "ellipsoid point with uncertainty circle and confidence" as defined in [11].

It shall be possible for the majority of the UE (active or inactive) within a network to use the feature without compromising the radio transmission or signalling capabilities of the UTRAN.

The uncertainty of the position measurement shall be network implementation dependent at the choice of the network operator. The uncertainty may vary between networks as well as from one area within a network to another. The uncertainty may be hundreds of metres in some areas and only a few metres in others. In the event that the position measurement is also a UE-assisted process, the uncertainty may also depend on the capabilities of the UE. In some jurisdictions, there is a regulatory requirement for location service accuracy that is part of an emergency service. Further details of the accuracy requirements can be found in [5].

The uncertainty of the position information is dependent on the method used, the position of the UE within the coverage area and the activity of the UE. Several design options of the UTRAN system (e.g. size of cell, adaptive antenna technique, path loss estimation, timing accuracy, Node B surveys) shall allow the network operator to choose a suitable and cost effective UE Positioning method for their market.

There are many different possible uses for the positioning information. The positioning functions may be used internally by the UTRAN, by value-added network services, by the UE itself or through the network, and by "third party" services. The feature may also be used by an emergency service (which may be mandated or "value-added"), but the location service is not exclusively for emergencies.

The UTRAN is a new radio system design without a pre-existing deployment of UE operating according to the radio interface. This freedom from legacy equipment enables the location service feature design to make use of appropriate techniques to provide the most accurate results. The technique must also be a cost-effective total solution, must allow evolution to meet evolving service requirements and be able to take advantage of advances in technology over the lifetime of UTRAN deployments.

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.

4.2 UE Positioning Methods

The UTRAN may utilise one or more positioning methods in order to determine the position of an UE.

Positioning the UE involves two main steps:

- signal measurements; and

- Position estimate computation based on the measurements.

The signal measurements may be made by the UE, the Node B or an LMU. The basic signals measured are typically the UTRA radio transmissions, however, some methods may make use of other transmissions such as general radio navigation signals.

The positioning function should not be limited to a single method or measurement. That is, it should be capable of utilising other standard methods and measurements, as are available and appropriate, to meet the required service needs of the location service client. This additional information could consist of readily available UTRAN measurements such as RTT in FDD or Rx Timing deviation measurement and knowledge of the UE timing advance, in TDD.

The position estimate computation may be made by the UE or by the UTRAN (i.e. SRNC).

4.3 Standard UE Positioning Methods

The standard positioning methods supported within UTRAN are:

- cell ID based method;

- OTDOA method that may be assisted by network configurable idle periods;

- network-assisted GPS methods.

4.3.1 Cell ID Based Method

In the cell ID based (i.e. cell coverage) method, the position of an UE is estimated with the knowledge of its serving Node B. The information about the serving Node B and cell may be obtained by paging, locating area update, cell update, URA update, or routing area update.

The cell coverage based positioning information can be indicated as the Cell Identity of the used cell, the Service Area Identity or as the geographical co-ordinates of a position related to the serving cell. The position information shall include a QoS estimate (e.g. regarding achieved accuracy).

When geographical co-ordinates are used as the position information, the estimated position of the UE can be a fixed geographical position within the serving cell (e.g. position of the serving Node B), the geographical centre of the serving cell coverage area, or some other fixed position within the cell coverage area. The geographical position can also be obtained by combining information on the cell specific fixed geographical position with some other available information, such as the signal RTT in FDD ([14]) or Rx Timing deviation measurement and knowledge of the UE timing advance, in TDD ([15]).

The operation of the cell ID based positioning method is described in clause 8.

4.3.2 OTDOA-IPDL Method with network configurable idle periods

The OTDOA-IPDL method involves measurements made by the UE and LMU of the UTRAN frame timing (e.g. SFN-SFN observed time difference). These measures are then sent to the SRNC where the position of the UE is calculated.

The simplest case of OTDOA-IPDL is without idle periods. In this case the method can be referred to as simply OTDOA. In this version of the standard, only ~~simply~~ OTDOA is supported for 1.28 Mcps TDD.

The Node B may provide idle periods in the downlink, in order to potentially improve the hearability of neighbouring Node Bs. The support of these idle periods in the UE is optional. Support of idle periods in the UE means that its OTDOA performance will improve when idle periods are available.

Alternatively, the UE may perform the calculation of the position using measurements and assistance data.

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

4.3.3 Network-assisted GPS Methods

These methods make use of UEs, which are equipped with radio receivers capable of receiving GPS signals.

The operation of the network-assisted GPS methods is described in clause 10.

8.1 Cell ID determination

In order for the SRNC to determine the cell ID when an UE Positioning request is received, additional operations may be needed depending on the operational status of the UE.

Figure 8.1 illustrates the procedure for the cell ID based positioning method when the UE is in different RRC states. When the LCS request is received from the CN the SRNC 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 Positioning. In states where the cell ID is not available, the UE is paged, so that SRNC can establish the cell with which the target UE is associated. In order to improve the accuracy of the LCS response the SRNC may also request RTT (FDD only) or RX Timing Deviation (TDD only) measurements from the Node B or LMU associated with the cell ID. The SRNC may also map the cell ID to a corresponding SAI to match the service coverage information available in the CN. In the case of 1.28 Mcps TDD, in order to improve the accuracy of the LCS response, the SRNC may request that the UE reports the internal measured result ‘timing advance’. This step is not illustrated in Figure 8.1.

The cell ID based method shall determine the position of the UE regardless of the UE RRC mode (i.e. connected or idle).

9.5 OTDOA-IPDL and OTDOA Modes

There are two modes of operation for the OTDOA-IPDL and OTDOA methods.

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 the SRNC carries out the position calculation.

In the *UE-based* mode, the UE makes the measurements and also carries out the position calculation, and thus requires additional information (such as the position of the measured Node Bs) that is required for the position calculation. This information is provided by the System Information Broadcast.

9.5.1 Information to be transferred between UTRAN elements

Table 9.1 lists the required information for both UE-assisted and UE-based modes that may be sent from UTRAN to UE. The required information can be signalled to the UE either in a broadcast channel or partly also as dedicated signalling.

Table 9.1: Information to be transferred from UTRAN to UE ('Yes' = information required, 'No' = Information not required)

Information	UE-assisted	UE-based
Intra frequency Cell Info (neighbour list)	Yes	Yes
Ciphering information for UE Positioning (see note 1)	No	Yes
Measurement control information (idle period locations)	Yes	Yes
Sectorisation of the neighbouring cells	No	Yes
Measurements results needed for RTD values for Cells mentioned at Intra frequency Cell Info	No	Yes
RTD accuracy	No	Yes
Measured roundtrip delay for primary serving cell	No	Yes
Geographical position of the primary serving cell	No	Yes
Relative neighbour cell geographical position	No	Yes
Accuracy range of the geographic position values	No	Yes
IPDL parameters (see note 2)	Yes	Yes
IPDL-Alpha parameter for Open Loop Power Control when using IPDLs in TDD (see note 2)	Yes	Yes
Maximum Power increase the UE may use when using IPDLs in TDD (see note 2)	Yes	Yes
NOTE 1: The idea behind UE Positioning specific ciphering information is e.g. that the operator can sell information that the UE needs for calculating its position. For reference in the GSM world see [4]. NOTE 2: These parameters are not required for 1.28 Mcps TDD in this release.		

When IPDLs for 3.84 Mcps TDD are applied and the IPDLs occur in the slot carrying the PCCPCH, a special alpha parameter needs to be signalled from SRNC to the UE in order to take the impact of the IPDLs on the Open Loop Power Control into account. Additionally the UE shall not increase the transmit power by a certain value between an IPDL slot and the next slot carrying the PCCPCH when IPDLs are applied within a cell.

The information that may be signalled from UE to SRNC is listed in table 9.2.

Table 9.2: Information to be transferred from UE to SRNC

Information	UE-assisted	UE-based
OTDOA measurement results	Yes	No
OTDOA measurement accuracy	Yes	No
UE geographical position	No	Yes
Position accuracy indicator (based on the signalled and measurement accuracies)	No	Yes

Table 9.3 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 9.3: Information to be transferred from Node B/LMU to CRNC and between RNCs

Information	UE assisted	UE based
Measured UTRAN GPS timing of cell frames or SFN-SFN Observed Time Difference values for Cells mentioned at Intra frequency Cell Info	Yes	Yes
UTRAN GPS timing of cell frames or SFN-SFN Observed Time Difference accuracy	Yes	Yes

Table 9.4 shows the information that may be transferred from CRNC to Node B. If the CRNC is not the SRNC the information may also be sent from CRNC to SRNC. This does not apply in the case of 1.28 Mcps TDD for this version of the standard.

Table 9.4: Information to be transferred from CRNC to Node B/LMU and between RNCs

Information	UE assisted	UE based
IPDL parameters	Yes	Yes

Table 9.5 shows the information that may be transferred between RNCs.

Table 9.5: Information to be transferred between RNCs

Information	UE assisted	UE based
Geographical position of the primary serving cell	Yes	Yes
Relative neighbour cell geographical position	Yes	Yes
Accuracy range of the geographic position values	Yes	Yes
IPDL-Alpha parameter for Open Loop Power Control when using IPDLs in 3.84 Mcps TDD	Yes	Yes
Maximum Power the UE may use when using IPDLs in 3.84 Mcps TDD	Yes	Yes

9.6 OTDOA network positioning procedures

The following diagram illustrates the operations for the OTDOA method for UE Positioning when the request for positioning information is initiated by an LCS application from the CN.

This illustration only includes the information flow related to UE Positioning 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 CN or a UE-based application.

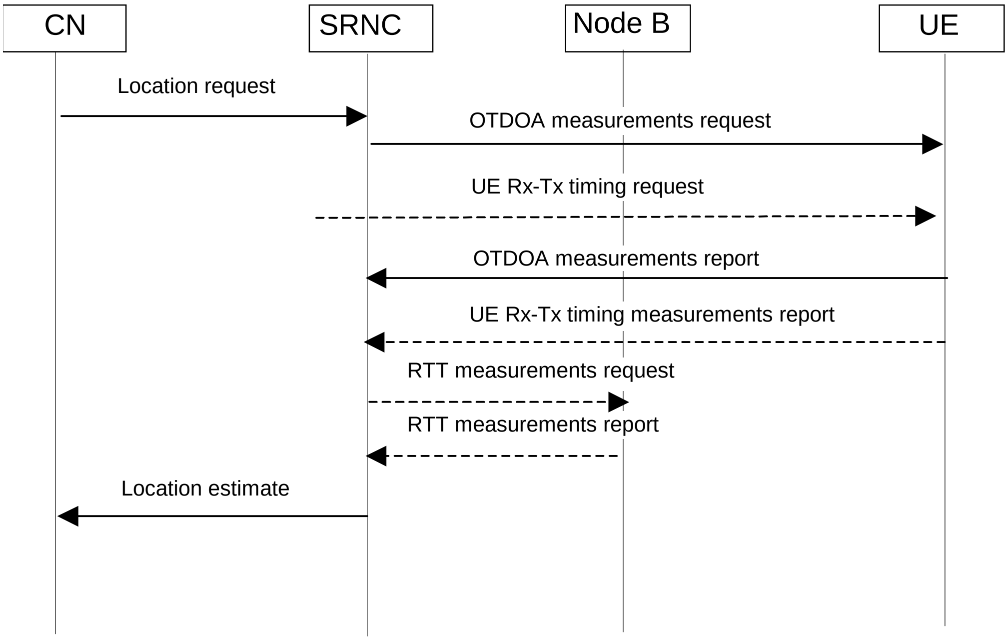

Figure 9.2: OTDOA Signalling Operations

1. The operation begins with an authenticated request for positioning information about a UE from an application in the CN being received at the SRNC. The SRNC considers the request and the UTRAN and UE capabilities.

2. The SRNC requests from the UE the measurement of the OTDOA for the signals in the active and neighbourhood sets. These measurements are made while the UE is in connected mode CELL_DCH state.

3. If it is considered advantageous to do so, the SRNC requests the UE Rx-Tx timing difference (FDD only) or UE timing advance, T_{ADV}, (1.28 Mcps TDD) information from the UE.

4. The UE returns the OTDOA measures to the SRNC. The SRNC receives the OTDOA information and co-ordinates obtaining other information to support the calculation request.

5. The UE returns the UE Rx-Tx timing difference(FDD only) or UE timing advance, T_{ADV}, (1.28 Mcps TDD) information to the SRNC, together with a time stamp of when the value was obtained.

6. If there are insufficient OTDOA measures, or it is otherwise considered advantageous to do so, the SRNC requests the RTT (in FDD) or Rx timing deviation (in TDD) measure for the UE from the serving Node B.

7. In FDD, the SRNC requests the RTD values for the associated transmitters from the associated 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.

8. The Node B returns the RTT (in FDD) or Rx Timing Deviation (in TDD) measures to the SRNC if they were requested.

9. The SRNC performs a position calculation using the OTDOA, RTD and, if necessary, RTT (in FDD) or Rx timing deviation and UE timing advance (in TDD) information. The calculation may include a co-ordinate transformation to the geographic system requested by the application. The position estimate includes the position, the estimated

accuracy of the results and the time of day of the estimate. In networks that include the SAS, the SAS may perform the position calculation and then pass the position estimate to the SRNC.

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

3GPP TSG-RAN WG2 Meeting#26 ***R2-020529***

Orlando, USA, 18-22 February 2002

CR-Form-v3

CHANGE REQUEST

⌘	**25.305**	**CR**	**074**	⌘ rev		⌘ Current version:	**5.3.0** ⌘

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

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

Title:	⌘	Corrections Relating to IPDL and Timing Advance for 1.28 Mcps TDD		
Source:	⌘	TSG-RAN WG2		
Work item code:	⌘	LCRTDD-L23	***Date:*** ⌘	22. 02. 2002
Category:	⌘	**A**	***Release:*** ⌘	REL-5
		Use one of the following categories: ***F*** *(correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(Addition of feature),* ***C*** *(Functional modification of feature)* ***D*** *(Editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change:	⌘	Some changes are made relating to timing measurement in TDD modes.
Summary of change:	⌘	The phrase ' in Release 99' is removed from section 4.1. A sentence is added in section 8.1 to indicate that the internal measurement 'T_{ADV}' can be used with 1.28 Mcps TDD to improve LCS accuracy. Text is added to tables 9.1, 9.5 to indicate that IPDL parameters do not apply to 1.28 Mcps TDD in release 4. Text is added to section 9.6 to indicate that the internal measurement T_{ADV} can be used with the OTDOA location process.
Consequences if not approved:	⌘	The operation of 1.28 Mcps TDD will not be described correctly for Release 5.

Clauses affected:	⌘	4.1, 8.1, 9.5, 9.6		
Other specs affected:	⌘	[ ] Other core specifications [ ] Test specifications [ ] O&M Specifications	⌘	25.305 v4.2.0, CR 073r1
Other comments:	⌘			

4 Main concepts and requirements

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4.3 Standard UE Positioning Methods

The standard positioning methods supported within UTRAN are:

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- OTDOA method that may be assisted by network configurable idle periods;

- network-assisted GPS methods.

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The operation of the cell ID based positioning method is described in clause 8.

4.3.2 OTDOA-IPDL Method with network configurable idle periods

The OTDOA-IPDL method involves measurements made by the UE and LMU of the UTRAN frame timing (e.g. SFN-SFN observed time difference). These measures are then sent to the SRNC where the position of the UE is calculated.

The simplest case of OTDOA-IPDL is without idle periods. In this case the method can be referred to as simply OTDOA.

The Node B may provide idle periods in the downlink, in order to potentially improve the hearability of neighbouring Node Bs. The support of these idle periods in the UE is optional. Support of idle periods in the UE means that its OTDOA performance will improve when idle periods are available.

Alternatively, the UE may perform the calculation of the position using measurements and assistance data.

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

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These methods make use of UEs, which are equipped with radio receivers capable of receiving GPS signals.

The operation of the network-assisted GPS methods is described in clause 10.

8.1 Cell ID determination

In order for the SRNC to determine the cell ID when an UE Positioning request is received, additional operations may be needed depending on the operational status of the UE.

Figure 8.1 illustrates the procedure for the cell ID based positioning method when the UE is in different RRC states. When the LCS request is received from the CN the SRNC 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 Positioning. In states where the cell ID is not available, the UE is paged, so that SRNC can establish the cell with which the target UE is associated. In order to improve the accuracy of the LCS response the SRNC may also request RTT (FDD only) or RX Timing Deviation (TDD only) measurements from the Node B or LMU associated with the cell ID. The SRNC may also map the cell ID to a corresponding SAI to match the service coverage information available in the CN. In the case of 1.28 Mcps TDD, in order to improve the accuracy of the LCS response, the SRNC may request that the UE reports the internal measured result 'timing advance'. This step is not illustrated in Figure 8.1.

The cell ID based method shall determine the position of the UE regardless of the UE RRC mode (i.e. connected or idle).

9.5 OTDOA-IPDL and OTDOA Modes

There are two modes of operation for the OTDOA-IPDL and OTDOA methods.

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 the SRNC carries out the position calculation.

In the *UE-based* mode, the UE makes the measurements and also carries out the position calculation, and thus requires additional information (such as the position of the measured Node Bs) that is required for the position calculation. This information is provided by the System Information Broadcast.

9.5.1 Information to be transferred between UTRAN elements

Table 9.1 lists the required information for both UE-assisted and UE-based modes that may be sent from UTRAN to UE. The required information can be signalled to the UE either in a broadcast channel or partly also as dedicated signalling.

Table 9.1: Information to be transferred from UTRAN to UE ('Yes' = information required, 'No' = Information not required)

Information	UE-assisted	UE-based
Intra frequency Cell Info (neighbour list)	Yes	Yes
Ciphering information for UE Positioning (see note 1)	No	Yes
Measurement control information (idle period locations)	Yes	Yes
Sectorisation of the neighbouring cells	No	Yes
Measurements results needed for RTD values for Cells mentioned at Intra frequency Cell Info	No	Yes
RTD accuracy	No	Yes
Measured roundtrip delay for primary serving cell	No	Yes
Geographical position of the primary serving cell	No	Yes
Relative neighbour cell geographical position	No	Yes
Accuracy range of the geographic position values	No	Yes
IPDL parameters	Yes	Yes
IPDL-Alpha parameter for Open Loop Power Control when using IPDLs in TDD (see note 2)	Yes	Yes
Maximum Power increase the UE may use when using IPDLs in TDD (see note 2)	Yes	Yes
NOTE 1: The idea behind UE Positioning specific ciphering information is e.g. that the operator can sell information that the UE needs for calculating its position. For reference in the GSM world see [4]. NOTE 2: These parameters are not required for 1.28 Mcps TDD in this release.		

When IPDLs for 3.84 Mcps TDD are applied and the IPDLs occur in the slot carrying the PCCPCH, a special alpha parameter needs to be signalled from SRNC to the UE in order to take the impact of the IPDLs on the Open Loop Power Control into account. Additionally the UE shall not increase the transmit power by a certain value between an IPDL slot and the next slot carrying the PCCPCH when IPDLs are applied within a cell.

The information that may be signalled from UE to SRNC is listed in table 9.2.

Table 9.2: Information to be transferred from UE to SRNC

Information	UE-assisted	UE-based
OTDOA measurement results	Yes	No
OTDOA measurement accuracy	Yes	No
UE geographical position	No	Yes
Position accuracy indicator (based on the signalled and measurement accuracies)	No	Yes

Table 9.3 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 9.3: Information to be transferred from Node B/LMU to CRNC and between RNCs

Information	UE assisted	UE based
Measured UTRAN GPS timing of cell frames or SFN-SFN Observed Time Difference values for Cells mentioned at Intra frequency Cell Info	Yes	Yes
UTRAN GPS timing of cell frames or SFN-SFN Observed Time Difference accuracy	Yes	Yes

Table 9.4 shows the information that may be transferred from CRNC to Node B. If the CRNC is not the SRNC the information may also be sent from CRNC to SRNC.

Table 9.4: Information to be transferred from CRNC to Node B/LMU and between RNCs

Information	UE assisted	UE based
IPDL parameters	Yes	Yes

Table 9.5 shows the information that may be transferred between RNCs.

Table 9.5: Information to be transferred between RNCs

Information	UE assisted	UE based
Geographical position of the primary serving cell	Yes	Yes
Relative neighbour cell geographical position	Yes	Yes
Accuracy range of the geographic position values	Yes	Yes
IPDL-Alpha parameter for Open Loop Power Control when using IPDLs in 3.84 Mcps TDD	Yes	Yes
Maximum Power the UE may use when using IPDLs in 3.84 Mcps TDD	Yes	Yes

9.6 OTDOA network positioning procedures

The following diagram illustrates the operations for the OTDOA method for UE Positioning when the request for positioning information is initiated by an LCS application from the CN.

This illustration only includes the information flow related to UE Positioning 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 CN or a UE-based application.

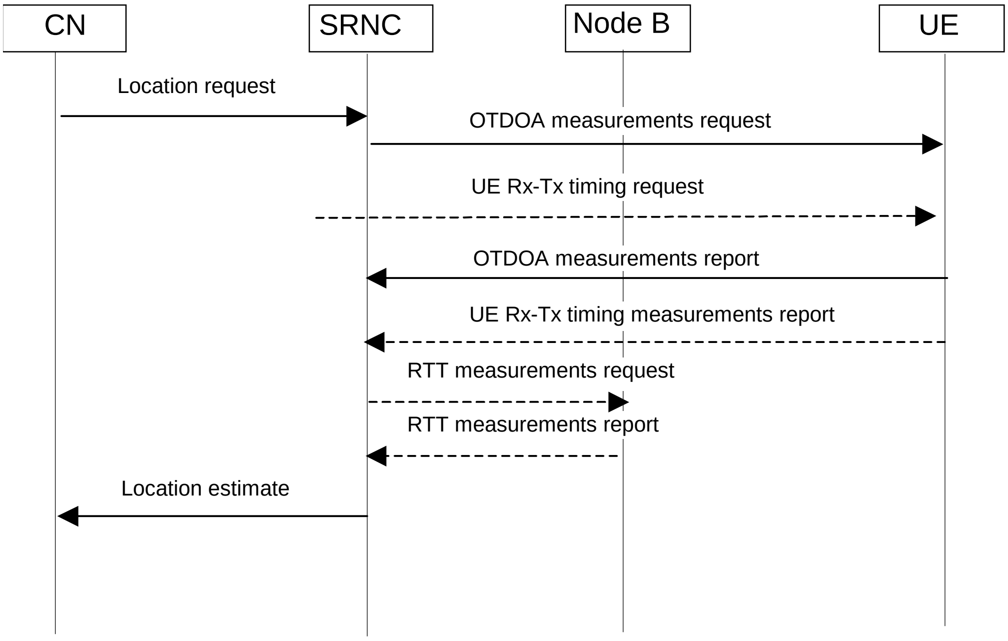

Figure 9.2: OTDOA Signalling Operations

1. The operation begins with an authenticated request for positioning information about a UE from an application in the CN being received at the SRNC. The SRNC considers the request and the UTRAN and UE capabilities.

2. The SRNC requests from the UE the measurement of the OTDOA for the signals in the active and neighbourhood sets. These measurements are made while the UE is in connected mode CELL_DCH state.

3. If it is considered advantageous to do so, the SRNC requests the UE Rx-Tx timing difference (FDD only) or UE timing advance, T_{ADV}, (1.28 Mcps TDD) information from the UE.

4. The UE returns the OTDOA measures to the SRNC. The SRNC receives the OTDOA information and co-ordinates obtaining other information to support the calculation request.

5. The UE returns the UE Rx-Tx timing difference(FDD only) or UE timing advance, T_{ADV}, (1.28 Mcps TDD) information to the SRNC, together with a time stamp of when the value was obtained.

6. If there are insufficient OTDOA measures, or it is otherwise considered advantageous to do so, the SRNC requests the RTT (in FDD) or Rx timing deviation (in TDD) measure for the UE from the serving Node B.

7. In FDD, the SRNC requests the RTD values for the associated transmitters from the associated 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.

8. The Node B returns the RTT (in FDD) or Rx Timing Deviation (in TDD) measures to the SRNC if they were requested.

9. The SRNC performs a position calculation using the OTDOA, RTD and, if necessary, RTT (in FDD) or Rx timing deviation and UE timing advance (in TDD) information. The calculation may include a co-ordinate transformation to the geographic system requested by the application. The position estimate includes the position, the estimated

accuracy of the results and the time of day of the estimate. In networks that include the SAS, the SAS may perform the position calculation and then pass the position estimate to the SRNC.

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