



**Technical Document**

**EOTD RRLP**

**DESIGN SPEC**

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1. Initial version

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- [ISO 9000:2000] International Organization for Standardization. Quality management systems - Fundamentals and vocabulary. December 2000

## 0.1 References, Abbreviations, Terms

[3GPP_04.18]	3 <sup>rd</sup> Generation Partnership Project; Technical Specification Group GSM/EDGE Radio Access Network; Mobile radio interface layer 3 specification, Radio Resource Control Protocol, (V8.13.0 Release 1999)
[3GPP_04.31]	3 <sup>rd</sup> Generation Partnership Project; Technical Specification Group GSM EDGE Radio Access Network; Location Services (LCS); Mobile Station (MS) – Serving Mobile Location Centre (SMLC); Radio Resource LCS Protocol (RRLP), (V8.8.0 Release 1999)
[TI 7010.801]	7010.801, References and Vocabulary, Texas Instruments
[TI 8443.713]	E-OTD System Architecture, High level design specification, Texas Instruments
[CU0239]	Cursor Standard Log Format, Issue 1.0, January 2002

## 1 Introduction

This document defines the functionality of the RRLP entity in more detail. The overall E-OTD design on a general level is described in [TI 8443.713].

### 1.1 Block diagram

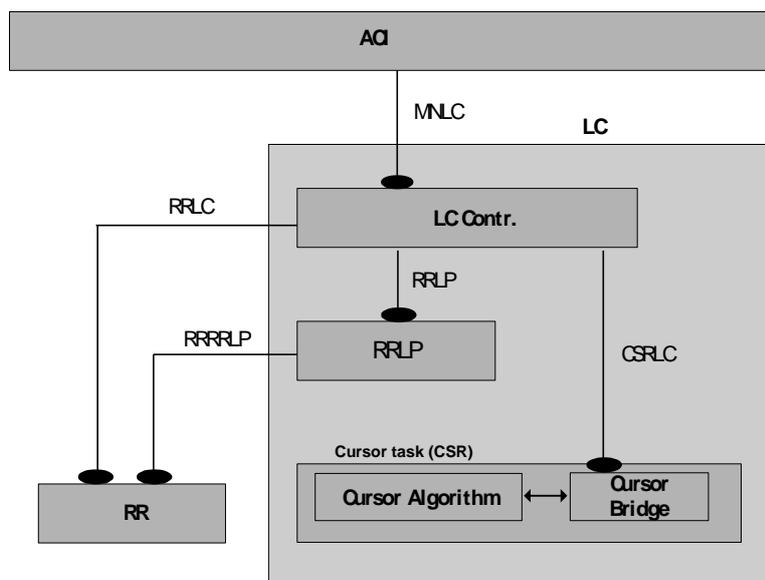


Figure 1: LC details

Figure 1 shows the details of the Location Service module. All positioning calculations and algorithms are based on the Cursor module, provided by CPS. It consists of two parts, the Cursor Algorithm and the Cursor Bridge code. To have a more generic approach for further developments, the LC controller co-ordinates the positioning requests to the appropriate implementation, e.g. E-OTD or GPS. The interface between LC controller and RRLP is primitive based with functional character in order to allow running RRLP in other task context, e.g. RR.

The RRRRLP SAP is used for transmitting RRLP data to and from the network. On receipt of an APDU containing an embedded 'RRLP Measure Position Request', RR forwards the information to the RRLP entity using the RRRRLP\_DATA\_IND primitive, provided at the RRLP SAP. On receipt of a

response to the 'RRLP Measure Position Request' (RRRRLP\_DATA\_REQ) RR forwards the 'RRLP Measure Position response' containing the E-OTD measurements. The APDU for RRLP is explained in more detail in 3GPP 04.18.

## 2 RRLP

According to CPS, no network today supports stand-alone Assistance Data over RRLP. This might change in the future and the feature is therefore considered in the design. However the network can support the MS with assistance data as part of the 'Measure Position Request' message.

### 2.1 States

The state machine diagram in section 2.3 is illustrating only the incoming messages leading to a state change. Following states are defined for the RRLP protocol:

RRLP_IDLE:	The RRLP sublayer is not active.
RRLP_ASSISTANCE_DATA_PENDING:	The RRLP sublayer has received first set of assistance data. The 'MoreAssDataToBeSent' component is indicating more assistance data to come.
RRLP_DEDICATED:	The RRLP sublayer has received a Measure Position Request either after the assistance data delivery procedure or directly.

The protocol is defined in detail in [3G 04.31].

Section 3 is providing various test scenarios for simulation testing.

### 2.2 State / event table

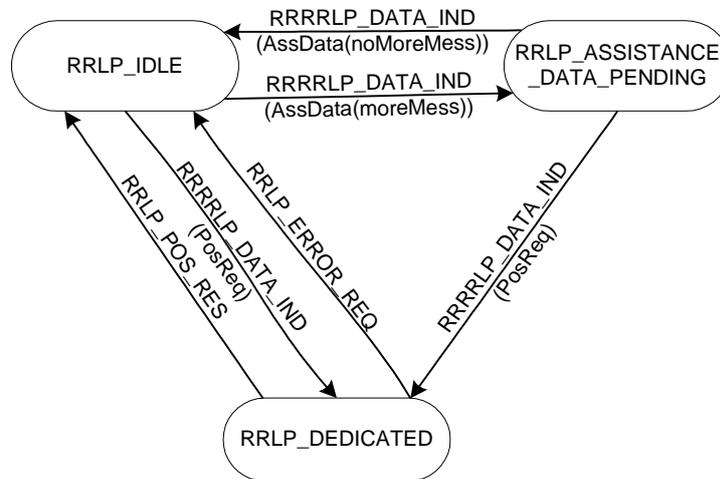
State	State Id Number
RRLP_IDLE	S1
RRLP_ASSISTANCE_DATA_PENDING	S2
RRLP_DEDICATED	S3

Event	State	S1	S2	S3
RRLP_POS_RES		D	D	S1
RRLP_ERROR_REQ		D	D	S1
RRRRLP_DATA_IND (Measure Position Request)		S3	S3	-
RRRRLP_DATA_IND (Assistance data with MoreAssDataToBeSent = moreMessagesOnTheWay)		S2/-	S1/-	D
RRRRLP_DATA_IND (Assistance data with MoreAssDataToBeSent = noMoreMessages)		-	S1	D
RRRRLP_DATA_IND (Protocol Error)		-	S1	S1

-: No state change.

D: Discard event.

## 2.3 State Machine RRLP



**Figure 2: State Machine for RRLP**

In case of an erroneous IE, the MS sends a Protocol Error message. The network may resend the original message or abort the procedure dependent on the 'MoreAssDataToBeSent' component. After reception of a Measure Position Request, but before responding with a Measure Position Response or a Protocol Error, the MS receives a new Measure Position Request. This request is, after verification, forwarded.

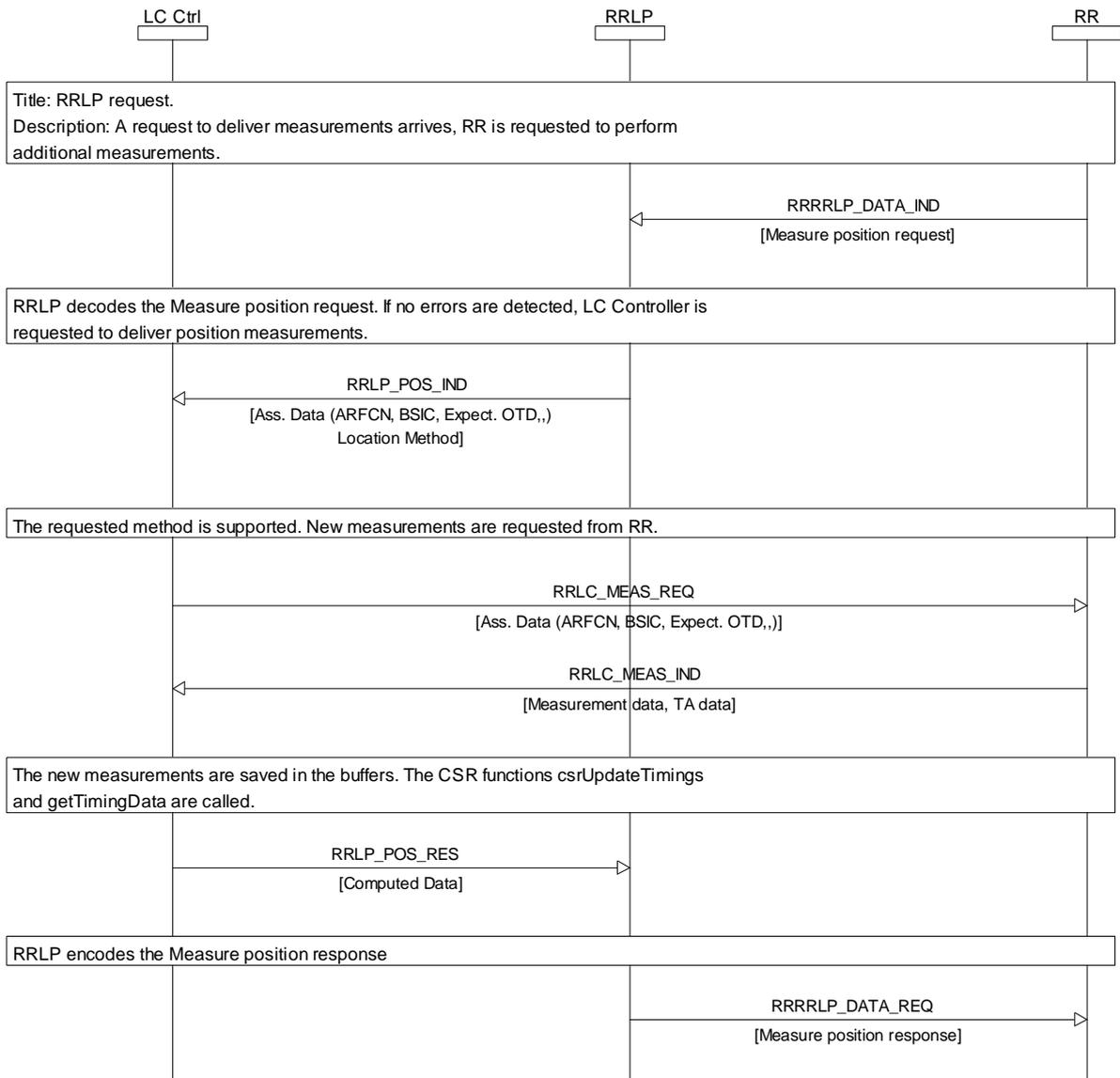
In case an internal error situation occurs the RRLP\_ERROR\_REQ is received and state Idle is entered. The error situation can be either reference BTS is not identical with serving BTS, requested Location Method is not supported or a handover occurs during measurements.

## 3 Functionality

### 3.1 Measure Position request

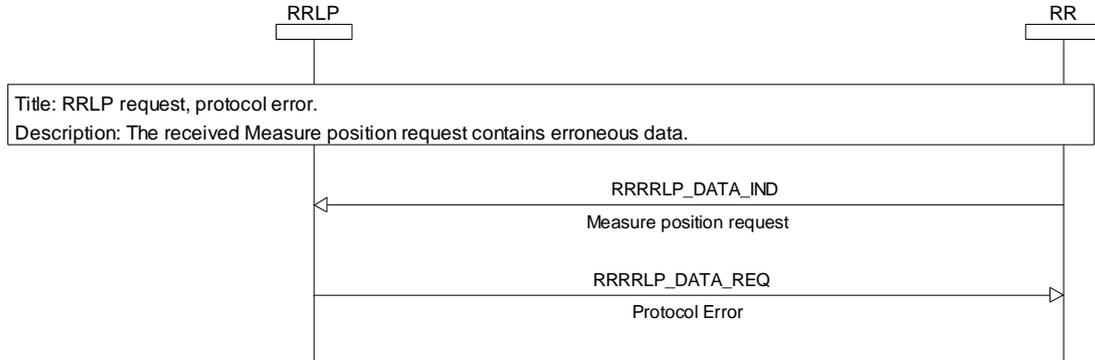
#### 3.1.1 Measure Position Request

The network starts a Measure Position Request. The MS process the request and send the Measure Position Response to the network.



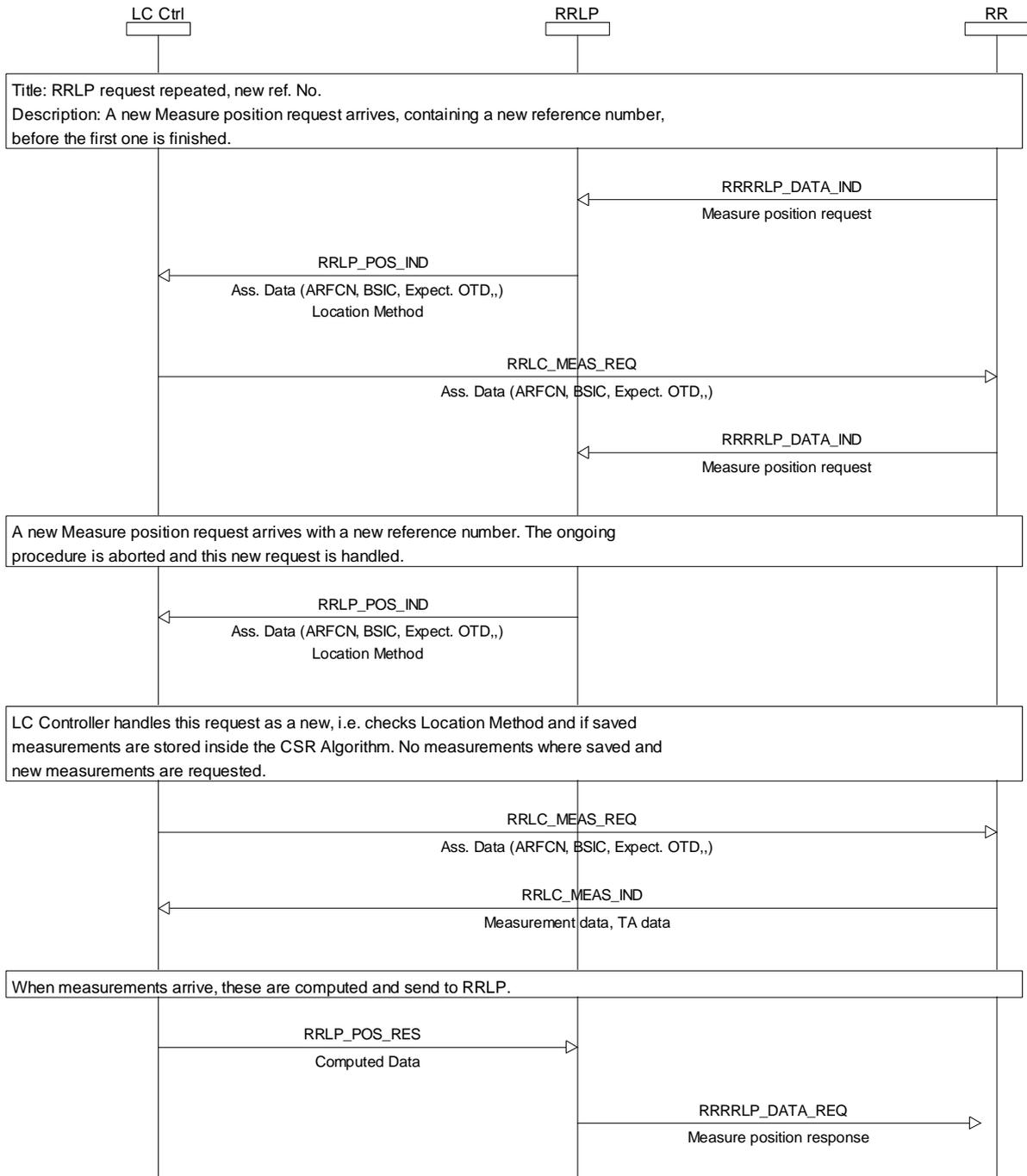
### 3.1.2 Measure Position Request – Erroneous

The network starts a Measure Position Request. The MS detects one erroneous component inside the request and terminate the request with a Protocol Error message.



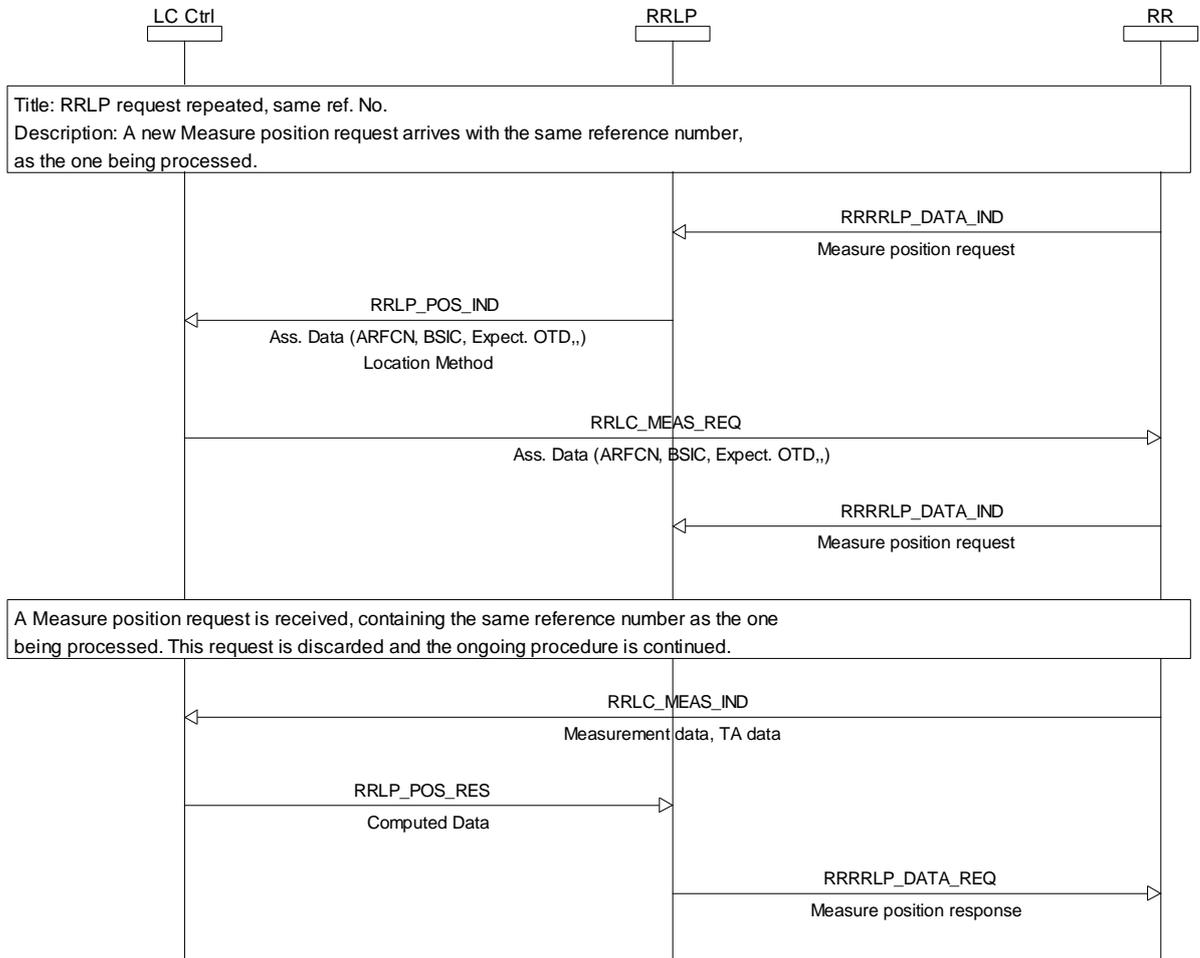
### 3.1.3 Measure Position Request – Repeated Component – New Reference number

The network starts a Measure Position Request. Before the MS finishes the request the network sends a new request. The MS initiates a measurement procedure if the second request has a newer reference number than the first and responds to that. This is only one example; the second request can arise any time between the first request and the corresponding response message.



### 3.1.4 Measure Position Request – Repeated Component – Old Reference number

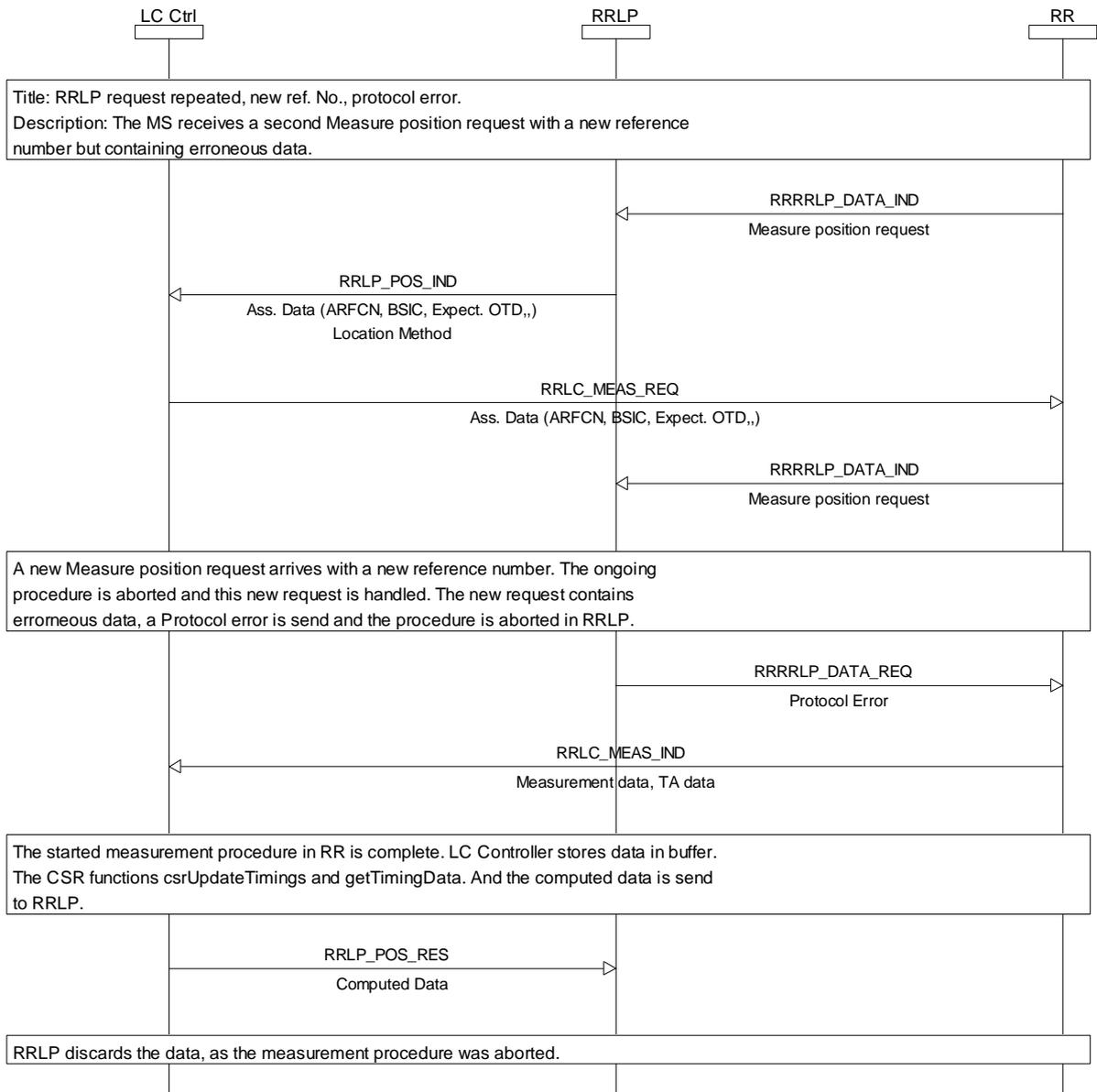
The network starts a Measure Position Request. Before the MS finishes the request the network sends a new request. The MS discards the second request because the reference number is older than the first request. This is only one example; the second request can arise any time between the first request and the corresponding response message.



### 3.1.5 Measure Position Request - Repeated Component Erroneous – New Reference number

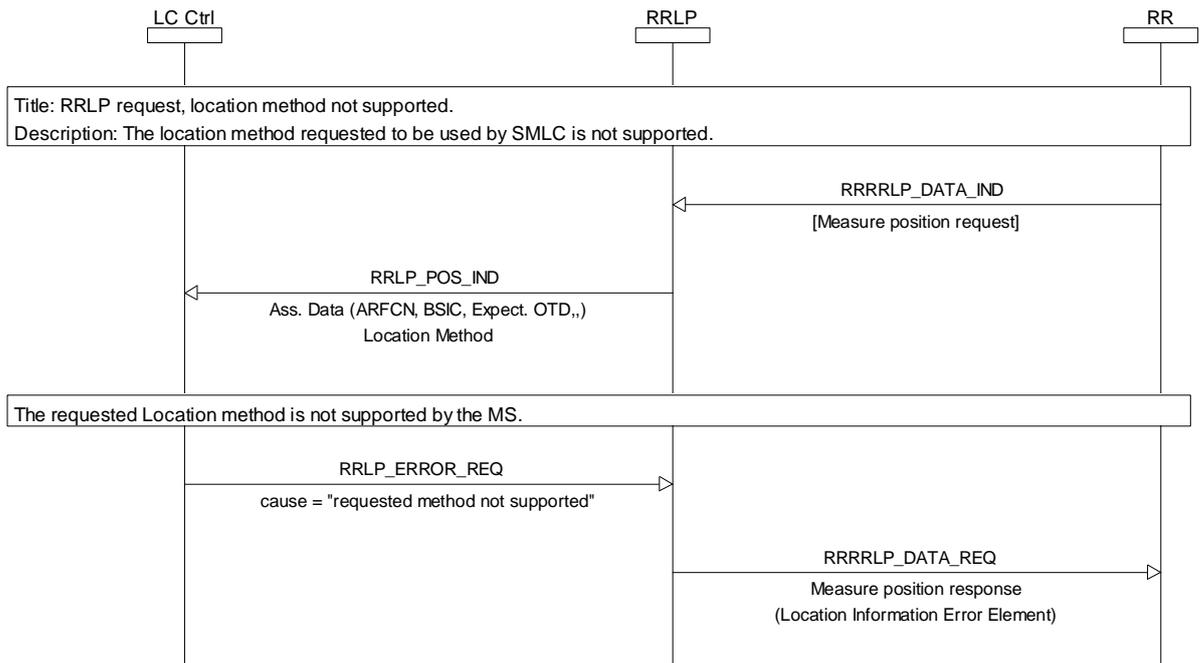
The network starts a Measure Position Request. Before the MS finishes the request the network sends a new request. The second request received has a newer reference number than the first but at least one component is erroneous and the MS terminates the request with a Protocol Error message.

The first request fails and the response is not send to the network. This is only one example; the second request can arise any time between the first request and the corresponding response message.



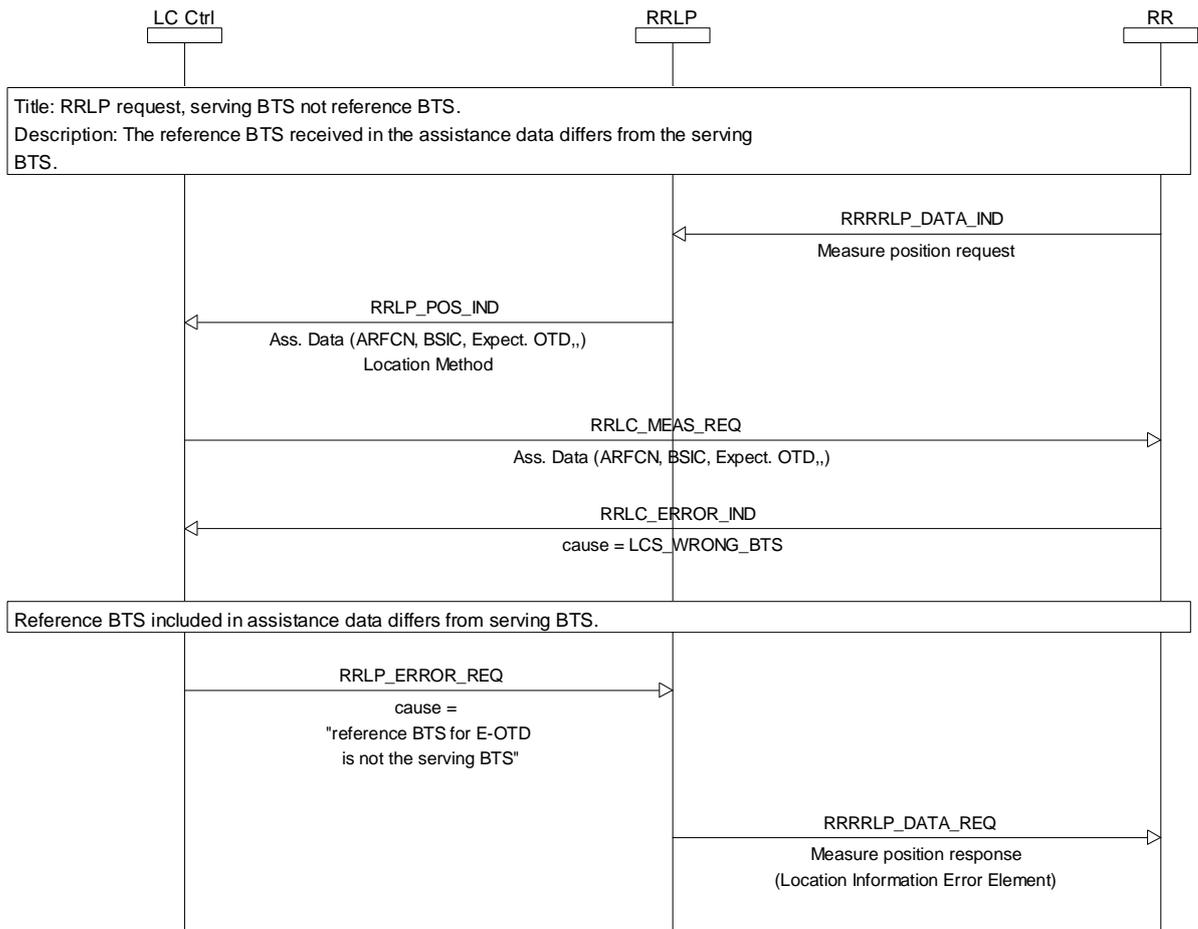
### 3.1.6 Measure Position Request - Location method – Erroneous

In case of a non-supported location method is requested from the network, then a RRLP message response is generated with a location error.



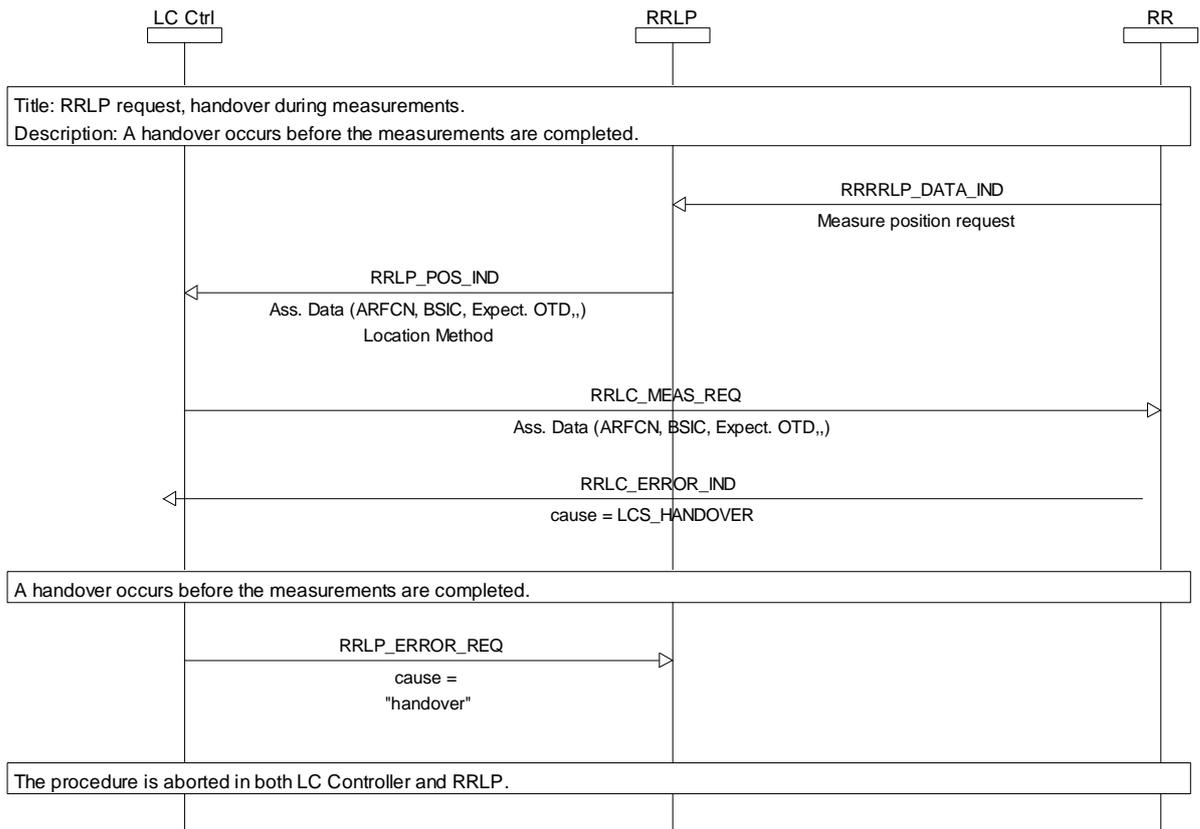
### 3.1.7 Measure Position Request - Serving cell - Erroneous

In case of that the reference BTS for the E-OTD service is different than the serving BTS, then a RRLP message response is generated with a location error. The BTS comparison is done in the RR entity.



### 3.1.8 Measure Position Request - Handover – Erroneous

If a Handover BTS interrupts the measurement procedure then the LC controller receives an indication about this. The LC controller then informs the RRLP entity about this. The RRLP does not create a RRLP error message for this scenario as it is assumed that the RRLP request is received again after the handover procedure is finished.

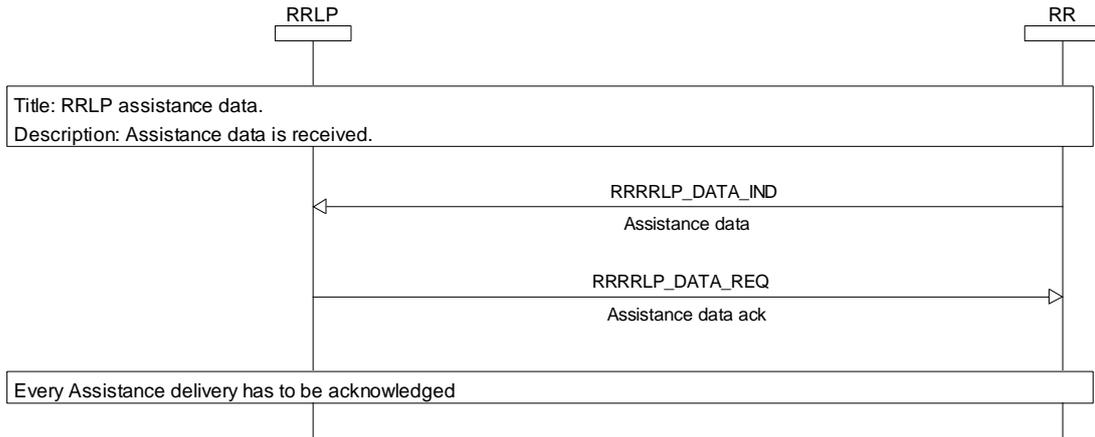


## 3.2 Assistance Data

Stand-alone Assistance data collection functionality is postponed to a future release. However the implications on the design has been considered to some extent.

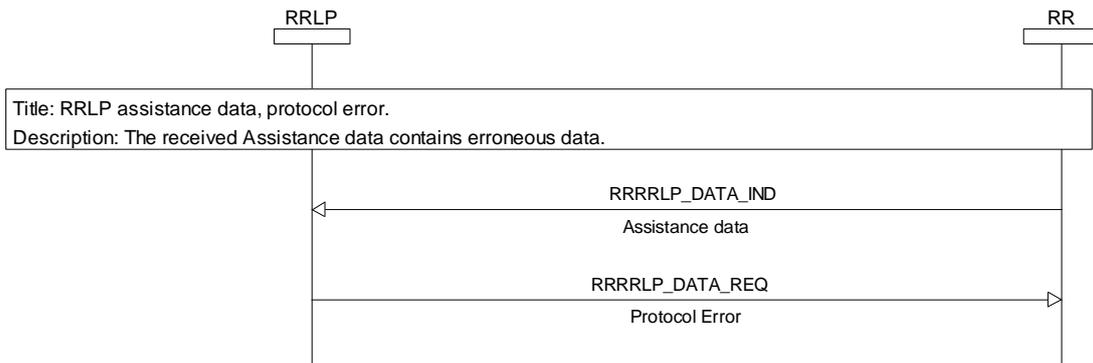
### 3.2.1 Assistance Data - Non-consecutive

The network sends Assistance Data to the MS. The MS processes them and sends an Assistance Data Acknowledge to the network.



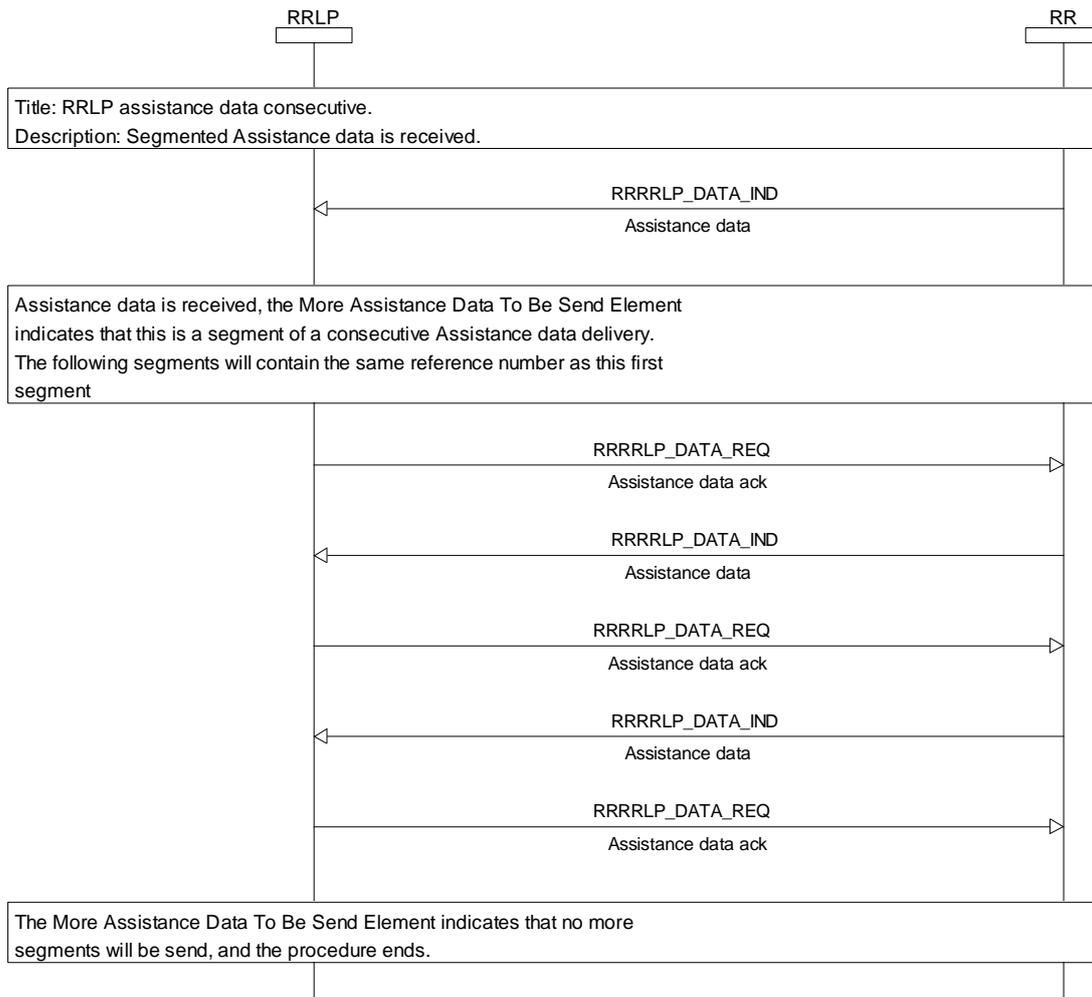
### 3.2.2 Assistance Data – Erroneous

In case of erroneous assistance data the MS sends a Protocol Error message to the network.



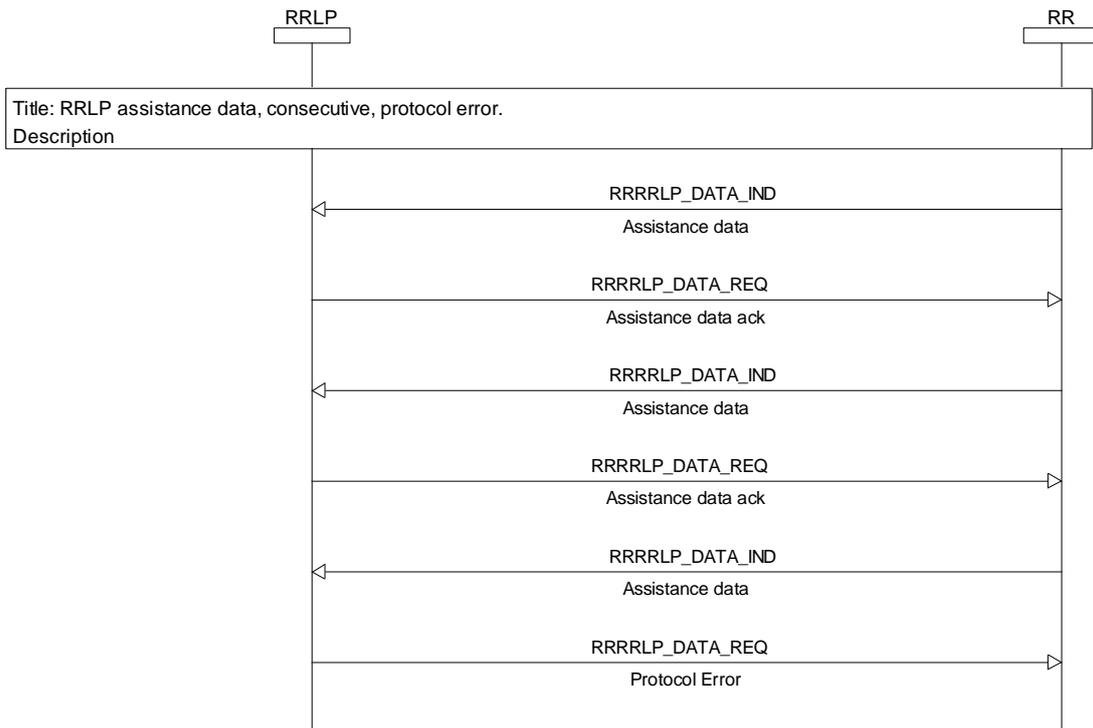
### 3.2.3 Assistance Data - Consecutive

If the entire Assistance Data set is distributed in consecutive sets the network sends consecutive Assistance Data messages until variable MoreAssDataToBeSent is equal zero.



### 3.2.4 Assistance Data Consecutive – Erroneous

If the entire Assistance Data set is distributed in consecutive sets the network sends consecutive Assistance Data messages until variable MoreAssDataToBeSent is equal zero.



## Appendices

### A. Acronyms

**DS-WCDMA** Direct Sequence/Spread Wideband Code Division Multiple Access

### B. Glossary

**International Mobile Telecommunication 2000 (IMT-2000/ITU-2000)** Formerly referred to as FPLMTS (Future Public Land-Mobile Telephone System), this is the ITU's specification/family of standards for 3G. This initiative provides a global infrastructure through both satellite and terrestrial systems, for fixed and mobile phone users. The family of standards is a framework comprising a mix/blend of systems providing global roaming. <URL: <http://www.imt-2000.org/>>