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Technical Specification

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LTE Positioning Protocol A (LPPa)
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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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1 Scope

The present document specifies the control plane radio network layer signalling procedures between eNB and E-SMLC. LPPa supports the concerned functions by signalling procedures defined in this document. LPPa is developed in accordance with the general principles stated in TS 36.401 [2].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 36.401: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Architecture Description".

[3] 3GPP TS 36.413: " Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol (S1AP)".

[4] ITU-T Recommendation X.691 (07/2002): "Information technology - ASN.1 encoding rules - Specification of Packed Encoding Rules (PER) ".

[5] 3GPP TS 36.104: " Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Base Station (BS) radio transmission and reception".

[6] 3GPP TS 36.211: " Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Physical Channels and Modulation".

[7] 3GPP TS 23.032: " Technical Specification Group Services and System Aspects; Universal Geographical Area Description (GAD)".

[8] 3GPP TS 36.133: " Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management ".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

Elementary Procedure: LPPa protocol consists of Elementary Procedures (EPs). A LPPa Elementary Procedure is a unit of interaction between the eNB and the E-SMLC. An EP consists of an initiating message and possibly a response message. Two kinds of EPs are used:

- **Class 1:** Elementary Procedures with response (success or failure),
- **Class 2:** Elementary Procedures without response.

3.2 Symbols

For the purposes of the present document, the following symbols apply:

<symbol> <Explanation>

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

CID	Cell-ID (positioning method)
DL	Downlink
E-CID	Enhanced Cell-ID (positioning method)
eNB	E-UTRAN NodeB
EP	Elementary Procedure
EPC	Evolved Packet Core
E-SMLC	Evolved Serving Mobile Location Centre
E-UTRAN	Evolved UTRAN
IE	Information Element
LCS	LoCation Services
LPP	LTE Positioning Protocol
LPPa	LTE Positioning Protocol Annex
MME	Mobility Management Entity
NW	Network
S1AP	S1 Application Protocol
UE	User Equipment
UL	Uplink

4 General

4.1 Procedure specification principles

The principle for specifying the procedure logic is to specify the functional behaviour of the terminating eNB exactly and completely. Any rule that specifies the behaviour of the originating eNB shall be possible to be verified with information that is visible within the system.

The following specification principles have been applied for the procedure text in clause 8:

- The procedure text discriminates between:

  1) Functionality which "shall" be executed

     The procedure text indicates that the receiving node "shall" perform a certain function Y under a certain condition. If the receiving node supports procedure X but cannot perform functionality Y requested in the initiating message of a Class 1 EP, the receiving node shall respond with the message used to report unsuccessful outcome for this procedure, containing an appropriate cause value.

  2) Functionality which "shall, if supported" be executed

     The procedure text indicates that the receiving node "shall, if supported," perform a certain function Y under a certain condition. If the receiving node supports procedure X, but does not support functionality Y, the receiving node shall proceed with the execution of the EP, possibly informing the requesting node about the not supported functionality.

- Any required inclusion of an optional IE in a response message is explicitly indicated in the procedure text. If the procedure text does not explicitly indicate that an optional IE shall be included in a response message, the optional IE shall not be included. For requirements on including *Criticality Diagnostics* IE, see section 10.

4.2 Forwards and backwards compatibility

The forwards and backwards compatibility of the protocol is assured by a mechanism where all current and future messages, and IEs or groups of related IEs, include ID and criticality fields that are coded in a standard format that will not be changed in the future. These parts can always be decoded regardless of the standard version.

4.3 Specification notations

For the purposes of the present document, the following notations apply:

Procedure	When referring to an elementary procedure in the specification the Procedure Name is written with the first letters in each word in upper case characters followed by the word "procedure", e.g. Handover Preparation procedure.
Message	When referring to a message in the specification the MESSAGE NAME is written with all letters in upper case characters followed by the word "message", e.g. ERROR INDICATION message.
IE	When referring to an information element (IE) in the specification the *Information Element Name* is written with the first letters in each word in upper case characters and all letters in Italic font followed by the abbreviation "IE", e.g. *Cause* IE.
Value of an IE	When referring to the value of an information element (IE) in the specification the "Value" is written as it is specified in sub clause 9.2 enclosed by quotation marks, e.g. "Value".

5 LPPa services

The present clause describes the services an eNB offers to the E-SMLC.

5.1 LPPa procedure modules

The procedures are divided into two modules as follows:

1. LPPa Location Information Transfer Procedures;
2. LPPa Management Procedures;

The LPPa Location Information Transfer Procedures module contains procedures used to handle the transfer of positioning related information between eNB and E-SMLC.

The Management Procedures module contains procedures that are not related specifically to positioning, i.e. error handling.

5.2 Parallel transactions

Unless explicitly indicated in the procedure specification, at any instance in time one protocol peer may have more than one ongoing LPPa procedure.

6 Services expected from lower layer

Within E-UTRAN, LPPa protocol uses the services provided by the S1AP protocol. An LPPa message is carried inside an S1AP message.

S1AP signalling is described in TS 36.413 [3].

7 Functions of LPPa

The LPPa protocol provides the following functions:

- E-CID Location Information Transfer. This function allows the eNB to exchange location information with the E-SMLC for the purpose of E-CID positioning.
- OTDOA Information Transfer. This function allows the eNB to exchange information with the E-SMLC for the purpose of OTDOA positioning.
- Reporting of General Error Situations. This function allows reporting of general error situations, for which function specific error messages have not been defined.

The mapping between the above functions and LPPa EPs is shown in the table below.

Table 7-1: Mapping between LPPa functions and LPPa EPs

Function	Elementary Procedure(s)
E-CID Location Information Transfer	a) E-CID Measurement Initiation b) E-CID Measurement Failure Indication c) E-CID Measurement Report d) E-CID Measurement Termination
OTDOA Information Transfer	OTDOA Information Exchange
Reporting of General Error Situations	Error Indication

8 LPPa procedures

8.1 Elementary procedures

In the following tables, all EPs are divided into Class 1 and Class 2 EPs.

Table 8.1-1: Class 1 Elementary Procedures

Elementary Procedure	Initiating Message	Successful Outcome	Unsuccessful Outcome
		Response message	Response message
E-CID Measurement Initiation	E-CID MEASUREMENT INITIATION REQUEST	E-CID MEASUREMENT INITIATION RESPONSE	E-CID MEASUREMENT INITIATION FAILURE
OTDOA Information Exchange	OTDOA INFORMATION REQUEST	OTDOA INFORMATION RESPONSE	OTDOA INFORMATION FAILURE

Table 8.1-2: Class 2 Elementary Procedures

Elementary Procedure	Initiating Message
E-CID Measurement Failure Indication	E-CID MEASUREMENT FAILURE INDICATION
E-CID Measurement Report	E-CID MEASUREMENT REPORT
E-CID Measurement Termination	E-CID MEASUREMENT TERMINATION COMMAND
Error Indication	ERROR INDICATION

8.2 Location Information Transfer Procedures

8.2.1 E-CID Measurement Initiation

8.2.1.1 General

The purpose of E-CID Measurement Initiation procedure is to allow the E-SMLC to request the eNB to report E-CID measurements used by E-SMLC to compute the location of the UE.

8.2.1.2 Successful Operation

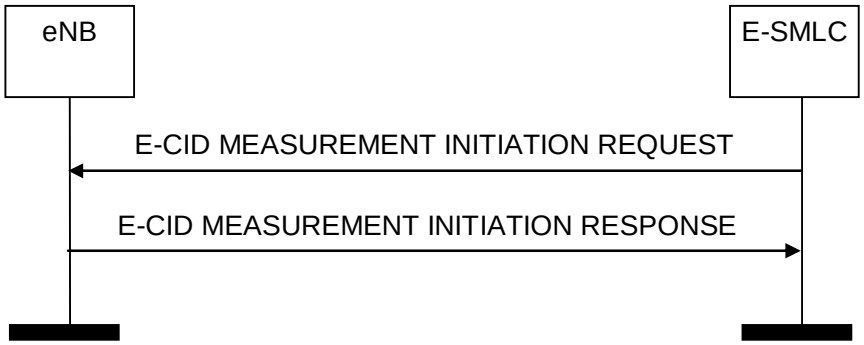

Figure 8.2.1.2-1: E-CID Measurement Initiation procedure. Successful operation.

The E-SMLC initiates the procedure by sending an E-CID MEASUREMENT INITIATION REQUEST message. If the eNB is able to initiate requested measurement, it shall reply with the E-CID MEASUREMENT INITIATION RESPONSE message.

If the *Report Characteristics* IE is set to "On Demand", the eNB shall return the result of the measurement in the E-CID MEASUREMENT INITIATION RESPONSE message, and the E-SMLC shall consider that the E-CID measurement for the UE has been terminated by the eNB.

If the *Report Characteristics* IE is set to "Periodic", the eNB shall initiate requested measurement and shall reply with the E-CID MEASUREMENT INITIATION RESPONSE message without measurement result. The eNB shall periodically initiate the E-CID Measurement Report procedure for this measurement, with the requested reporting periodicity.

If available, the eNB shall include the *E-UTRAN Access Point Position* IE which is the configured estimated serving antenna position in the *E-CID Measurement Result* IE within the E-CID MEASUREMENT INITIATION RESPONSE message. Upon reception of this *E-UTRAN Access Point Position* IE, the E-SMLC may use the value as the geographical position of the E-UTRAN access point.

8.2.1.3 Unsuccessful Operation

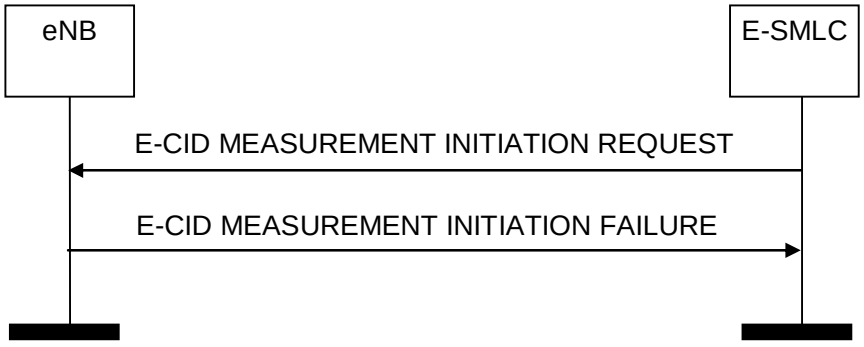

Figure 8.2.1.3-1: E-CID Measurement Initiation procedure. Successful operation.

If the eNB is not able to initiate the requested E-CID measurement, the eNB shall respond with an E-CID MEASUREMENT INITIATION FAILURE message.

8.2.1.4 Abnormal Conditions

Void

8.2.2 E-CID Measurement Failure Indication

8.2.2.1 General

This procedure is used by the eNB to notify the E-SMLC that a measurement previously requested with the E-CID Measurement Initiation procedure can no longer be reported.

8.2.2.2 Successful Operation

Figure 8.2.2.2-1: E-CID Measurement Failure Indication.

Upon reception of the E-CID MEASUREMENT FAILURE INDICATION message, the E-SMLC shall consider that the E-CID measurement for the UE has been terminated by the eNB.

8.2.2.3 Unsuccessful Operation

Not applicable.

8.2.2.4 Abnormal Conditions

Void.

8.2.3 E-CID Measurement Report

8.2.3.1 General

The purpose of E-CID Measurement Report procedure is for the eNB to provide the E-CID measurements for the UE to the E-SMLC.

8.2.3.2 Successful Operation

Figure 8.2.3.2-1: E-CID Measurement Reporting procedure.

The eNB initiates the procedure by sending an E-CID MEASUREMENT REPORT message. The E-CID MEASUREMENT REPORT message contains the E-CID measurement results according to the measurement configuration in the respective E-CID MEASUREMENT INITIATION REQUEST message.

If available, the eNB shall include the *E-UTRAN Access Point Position* IE which is the configured estimated serving antenna position in the *E-CID Measurement Result* IE within the E-CID MEASUREMENT REPORT message. Upon reception of this *E-UTRAN Access Point Position* IE, the E-SMLC may use the value as the geographical position of the E-UTRAN access point.

8.2.3.3 Unsuccessful Operation

Not applicable.

8.2.3.4 Abnormal Conditions

Void.

8.2.4 E-CID Measurement Termination

8.2.4.1 General

The purpose of E-CID Measurement Termination procedure is to terminate periodical E-CID measurements for the UE performed by the eNB.

8.2.4.2 Successful Operation

Figure 8.2.4.2-1: E-CID Measurement Reporting Control procedure.

The E-SMLC initiates the procedure by generating an E-CID MEASUREMENT TERMINATION COMMAND message.

8.2.4.3 Unsuccessful Operation

Not applicable.

8.2.4.4 Abnormal Conditions

Void.

8.2.5 OTDOA Information Exchange

8.2.5.1 General

The purpose of OTDOA Information Exchange procedure is to allow the E-SMLC to request the eNB to transfer OTDOA information to the E-SMLC.

8.2.5.2 Successful Operation

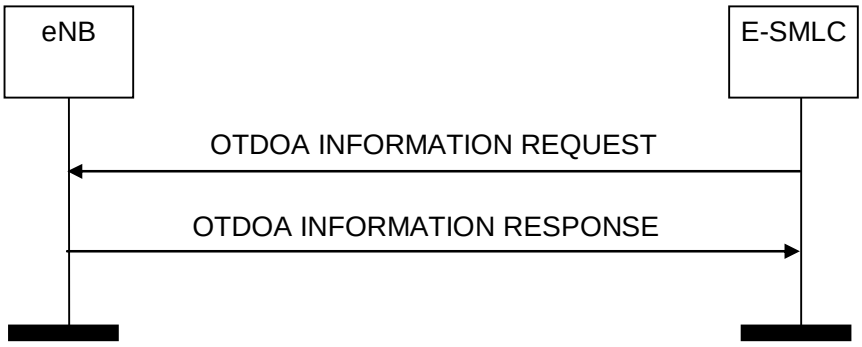

Figure 8.2.5.2-1: OTDOA Information Exchange procedure. Successful operation.

The E-SMLC initiates the procedure by sending an OTDOA INFORMATION REQUEST message. The eNB responds with OTDOA INFORMATION RESPONSE message that contains OTDOA information related to the relevant cells.

8.2.5.3 Unsuccessful Operation

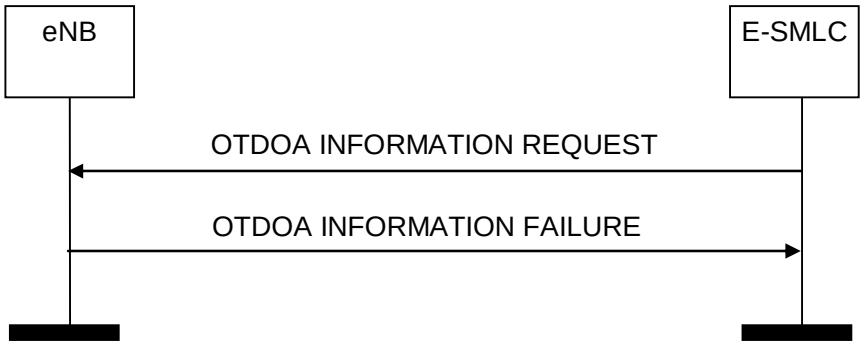

Figure 8.2.5.3-1: OTDOA Information Exchange procedure. Unsuccessful operation.

If the eNB does not have any OTDOA information to report, the eNB shall respond with an OTDOA INFORMATION FAILURE message.

8.2.5.4 Abnormal Conditions

Void.

8.3 Management Procedures

8.3.1 Error Indication

8.3.1.1 General

The Error Indication procedure is initiated by a node to report detected errors in one incoming message, provided they cannot be reported by an appropriate failure message.

8.3.1.2 Successful Operation

Figure 8.3.1.2-1: Error Indication procedure, E-SMLC originated. Successful operation.

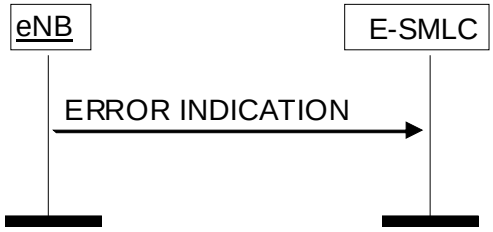

Figure 8.3.1.2-2: Error Indication procedure, eNB originated. Successful operation.

When the conditions defined in clause 10 are fulfilled, the Error Indication procedure is initiated by an ERROR INDICATION message sent from the receiving node.

The ERROR INDICATION message shall contain at least either the *Cause* IE or the *Criticality Diagnostics* IE.

8.3.1.3 Abnormal Conditions

Not applicable.

9 Elements for LPPa Communication

9.0 General

Sub clauses 9.1 and 9.2 describe the structure of the messages and information elements required for the LPPa protocol in tabular format. Sub clause 9.3 provides the corresponding ASN.1 definition.

The following attributes are used for the tabular description of the messages and information elements: Presence, Range Criticality and Assigned Criticality. Their definition and use can be found in TS 36.413 [3].

9.1 Message Functional Definition and Content

9.1.1 Messages for Location Information Transfer Procedures

9.1.1.1 E-CID MEASUREMENT INITIATION REQUEST

This message is sent by E-SMLC to eNB to initiate and report E-CID measurements.

Direction: E-SMLC → eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
LPPa Transaction ID	M		9.2.4		-	
E-SMLC Measurement ID			INTEGER(1..15,…)		YES	reject
Report Characteristics	M		ENUMERATED(OnDemand, Periodic,…)		YES	reject
Measurement Periodicity	C-ifReportCharacteristicsPeriodic		ENUMERATED(120ms, 240ms, 480ms, 640ms, 1024ms, 2048ms, 5120ms, 10240ms, 1min, 6min, 12min, 30min, 60min,…)		YES	reject
Measured Quantities		*1 to <maxnoMeas>*			EACH	reject
>Measured Quantities Item	M		ENUMERATED (Cell-ID, Angle of Arrival, Timing Advance Type 1, Timing Advance Type 2, RSRP, RSRQ,…)		-	-

Range bound	Explanation
maxnoofMeas	Maximum no. of measured quantities that can be configured and reported with one message. Value is 63.

Condition	Explanation
ifReportCharacteristicsPeriodic	This IE shall be present if the *Report Characteristics* IE is set to the value 'Periodic'.

9.1.1.2 E-CID MEASUREMENT INITIATION RESPONSE

This message is sent by eNB to indicate that the requested E-CID measurement is successfully initiated.

Direction: eNB → E-SMLC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
LPPa Transaction ID	M		9.2.4		-	
E-SMLC UE Measurement ID	M		INTEGER(1..15,…)		YES	reject
eNB UE Measurement ID	M		INTEGER(1..15,…)		YES	reject
E-CID Measurement Result	O		9.2.5		YES	ignore
Criticality Diagnostics	O		9.2.2		YES	ignore

9.1.1.3 E-CID MEASUREMENT INITIATION FAILURE

This message is sent by eNB to indicate that the requested E-CID measurement cannot be initiated.

Direction: eNB → E-SMLC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
LPPa Transaction ID	M		9.2.4		-	
E-SMLC UE Measurement ID	M		INTEGER(1..15,…)		YES	reject
Cause	M		9.2.1		YES	ignore
Criticality Diagnostics	O		9.2.2		YES	ignore

9.1.1.4 E-CID MEASUREMENT FAILURE INDICATION

This message is sent by eNB to indicate that the previously requested E-CID measurement can no longer be reported.

Direction: eNB → E-SMLC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	ignore
LPPa Transaction ID	M		9.2.4		-	
E-SMLC UE Measurement ID	M		INTEGER(1..15,…)		YES	reject
eNB UE Measurement ID	M		INTEGER(1..15,…)		YES	reject
Cause	M		9.2.1		YES	ignore

9.1.1.5 E-CID MEASUREMENT REPORT

This message is sent by eNB to report the results of the requested E-CID measurement.

Direction: eNB → E-SMLC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	ignore
LPPa Transaction ID	M		9.2.4		-	
E-SMLC UE Measurement ID	M		INTEGER(1..15,…)		YES	reject
eNB UE Measurement ID	M		INTEGER(1..15,…)		YES	reject
E-CID Measurement Result	M		9.2.5		YES	ignore

9.1.1.6 E-CID MEASUREMENT TERMINATION COMMAND

This message is sent by the E-SMLC to terminate the requested E-CID measurement.

Direction: E-SMLC → eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	ignore
LPPa Transaction ID	M		9.2.4		-	
E-SMLC UE Measurement ID	M		INTEGER(1..15,…)		YES	reject
eNB UE Measurement ID	M		INTEGER(1..15,…)		YES	reject

9.1.1.7 OTDOA INFORMATION REQUEST

This message is sent by E-SMLC to request OTDOA information.

Direction: E-SMLC → eNB.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
LPPa Transaction ID	M		9.2.4		-	
OTDOA Information Type		*1 to <maxnoOTDOAtypes>*			EACH	reject
>OTDOA Information Item	M		ENUMERATED (pci, cellid, tac, earfcn, prsBandwidth, prsConfigIndex, cpLength, noDlFrames, noAntennaPorts, sFNInitTime, …, e-UTRANAccessPointPosition, prsmutingconfiguration)		-	-

Range bound	Explanation
maxnoOTDOAtypes	Maximum no. of OTDOA information types that can be requested and reported with one message. Value is 63.

9.1.1.8 OTDOA INFORMATION RESPONSE

This message is sent by eNB to provide OTDOA information.

Direction: eNB → E-SMLC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
LPPa Transaction ID	M		9.2.4		-	
OTDOA Cells		*1 to maxCellineNB*		Served cells that broadcast PRS	GLOBAL	ignore
>OTDOA Cell Information	M		9.2.7		-	-
Criticality Diagnostics	O		9.2.2		YES	ignore

Range bound	Explanation
maxCellineNB	Maximum no. cells that can be served by an eNB. Value is 256.

9.1.1.9 OTDOA INFORMATION FAILURE

This message is sent by eNB to indicate that the OTDOA information cannot be provided.

Direction: eNB → E-SMLC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
LPPa Transaction ID	M		9.2.4		-	
Cause	M		9.2.1		YES	ignore
Criticality Diagnostics	O		9.2.2		YES	ignore

9.1.2 Messages for Management Procedures

9.1.2.1 ERROR INDICATION

This message is used to indicate that some error has been detected in the eNB or in the E-SMLC.

Direction: E-SMLC → eNB and eNB → E-SMLC

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	ignore
LPPa Transaction ID	M		9.2.4		–	
Cause	O		9.2.1		YES	ignore
Criticality Diagnostics	O		9.2.2		YES	ignore

9.2 Information Element definitions

9.2.0 General

When specifying information elements which are to be represented by bit strings, if not otherwise specifically stated in the semantics description of the concerned IE or elsewhere, the following principle applies with regards to the ordering of bits:

- The first bit (leftmost bit) contains the most significant bit (MSB);
- The last bit (rightmost bit) contains the least significant bit (LSB);
- When importing bit strings from other specifications, the first bit of the bit string contains the first bit of the concerned information.

9.2.1 Cause

The purpose of the cause information element is to indicate the reason for a particular event for the whole protocol.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE *Cause Group*	M			
>Radio Network Layer				
>>Radio Network Layer Cause	M		ENUMERATED (Unspecified, Requested Item not Supported, Requested Item Temporarily not Available, ...)	
>Protocol				
>>Protocol Cause	M		ENUMERATED (Transfer Syntax Error, Abstract Syntax Error (Reject), Abstract Syntax Error (Ignore and Notify), Message not Compatible with Receiver State, Semantic Error, Unspecified, Abstract Syntax Error (Falsely Constructed Message),...)	
>Misc				
>>Miscellaneous Cause	M		ENUMERATED (Unspecified, ...)	

The meaning of the different cause values is described in the following table. In general, "not supported" cause values indicate that the concerned capability is missing. On the other hand, "not available" cause values indicate that the concerned capability is present, but insufficient resources were available to perform the requested action.

Radio Network Layer cause	Meaning
Unspecified	Sent when none of the above cause values applies but still the cause is Radio Network Layer related
Requested Item not Supported	The eNB does not support the requested measurement object, or cannot provide the requested information item.
Requested Item Temporarily not Available	The eNB can temporarily not provide the requested measurement object or information item.

Protocol cause	Meaning
Abstract Syntax Error (Reject)	The received message included an abstract syntax error and the concerned criticality indicated "reject" (see sub clause 10.3)
Abstract Syntax Error (Ignore and Notify)	The received message included an abstract syntax error and the concerned criticality indicated "ignore and notify" (see sub clause 10.3)
Abstract syntax error (falsely constructed message)	The received message contained IEs or IE groups in wrong order or with too many occurrences (see sub clause 10.3)
Message not Compatible with Receiver State	The received message was not compatible with the receiver state (see sub clause 10.4)
Semantic Error	The received message included a semantic error (see sub clause 10.4)
Transfer Syntax Error	The received message included a transfer syntax error (see sub clause 10.2)
Unspecified	Sent when none of the above cause values applies but still the cause is Protocol related

Miscellaneous cause	Meaning
Unspecified	Sent when none of the above cause values applies and the cause is not related to any of the categories Radio Network Layer, Transport Network Layer or Protocol.

9.2.2 Criticality Diagnostics

The *Criticality Diagnostics* IE is sent by the eNB or E-SMLC when parts of a received message have not been comprehended or were missing, or if the message contained logical errors. When applicable, it contains information about which IEs were not comprehended or were missing.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Procedure Code	O		INTEGER (0..255)	Procedure Code is to be used if Criticality Diagnostics is part of Error Indication procedure, and not within the response message of the same procedure that caused the error
Triggering Message	O		ENUMERATED(initiating message, successful outcome, unsuccessful outcome)	The Triggering Message is used only if the Criticality Diagnostics is part of Error Indication procedure.
Procedure Criticality	O		ENUMERATED(reject, ignore, notify)	This Procedure Criticality is used for reporting the Criticality of the Triggering message (Procedure).
LPPa Transaction ID	O		9.2.4	
Information Element Criticality Diagnostics		0 to <maxNrOfErrors>		
>IE Criticality	M		ENUMERATED(reject, ignore, notify)	The IE Criticality is used for reporting the criticality of the triggering IE. The value "ignore"' shall not be used.
>IE ID	M		INTEGER (0..65535)	The IE ID of the not understood or missing IE
>Type Of Error	M		ENUMERATED(not understood, missing, …)	

Range bound	Explanation
maxNrOfErrors	Maximum no. of IE errors allowed to be reported with a single message. The value for maxnooferrors is 256.

9.2.3 Message Type

The *Message Type* IE uniquely identifies the message being sent. It is mandatory for all messages.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Procedure Code	M		INTEGER (0..255)	"0" = Error Indication "1" = Private Message "2" = E-CID Measurement Initiation "3" = E-CID Measurement Failure Indication "4" = E-CID Measurement Report "5" = E-CID Measurement Termination "6" = OTDOA Information Exchange
Type of Message	M		CHOICE (Initiating Message, Successful Outcome, Unsuccessful Outcome, …)	

9.2.4 LPPa Transaction ID

The *LPPa Transaction ID* IE is used to associate all the messages belonging to the same procedure. Messages belonging to the same procedure shall use the same LPPa Transaction ID.

The LPPa Transaction ID is determined by the initiating peer of a procedure.

The LPPa Transaction ID shall uniquely identify a procedure among all ongoing parallel procedures using the same procedure code, and initiated by the same protocol peer.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
LPPa Transaction ID	M		INTEGER (0..32767)	

9.2.5 E-CID Measurement Result

The purpose of the E-CID Measurement Result information element is to provide the E-CID measurement result.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Serving Cell ID	M		ECGI 9.2.6	E-UTRAN Cell Identifier of the serving cell
Serving Cell TAC	M		OCTET STRING(2)	Tracking Area Code of the serving cell
E-UTRAN Access Point Position	O		9.2.8	The geographical position of the E-UTRAN access point.
Measured Results		*0 to maxnoMeas*		
>CHOICE Measured *Results Value*	M			
>>Value Angle of Arrival	M		INTEGER (0..719)	According to mapping in TS 36.133 [8]
>>Value Timing Advance Type 1	M		INTEGER (0..7690)	According to mapping in TS 36.133 [8]
>>Value Timing Advance Type 2	M		INTEGER (0..7690)	According to mapping in TS 36.133 [8]
>>**Result RSRP**		*1 to maxCellReport*		
>>>PCI	M		INTEGER (0..503, …)	Physical Cell Identifier of the reported cell
>>>EARFCN	M		INTEGER (0..65535)	Corresponds to NDL for FDD and NDL/UL for TDD in ref. TS 36.104 [5]
>>>ECGI	O		ECGI 9.2.6	E-UTRAN Cell Global Identifier of the reported cell
>>>Value RSRP	M		INTEGER(0..97, …)	
>>**Result RSRQ**	M	*1 to maxCellReport*		
>>>PCI	M		INTEGER (0..503, …)	Physical Cell Identifier of the reported cell
>>>EARFCN	M		INTEGER (0..65535)	Corresponds to NDL for FDD and NDL/UL for TDD in ref. TS 36.104 [5]
>>>ECGI	O		ECGI 9.2.6	E-UTRAN Cell Global Identifier of the reported cell
>>>Value RSRQ	M		INTEGER(0..34, …)	

Range bound	Explanation
maxnoMeas	Maximum no. of measured quantities that can be configured and reported with one message. Value is 63.
maxCellReport	Maximum no. of cells that can be reported with one message. Value is 9.

9.2.6 ECGI

The E-UTRAN Cell Global Identifier (ECGI) is used to globally identify a cell.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
PLMN identity	M		OCTET STRING (SIZE (3))	PLMN identity - digits 0 to 9, encoded 0000 to 1001, - 1111 used as filler digit, two digits per octet, - bits 4 to 1 of octet n encoding digit 2n-1 - bits 8 to 5 of octet n encoding digit 2n -The Selected PLMN identity consists of 3 digits from MCC followed by either -a filler digit plus 2 digits from MNC (in case of 2 digit MNC) or -3 digits from MNC (in case of a 3 digit MNC).
E-UTRAN Cell Identifier	M		BIT STRING (28)	

9.2.7 OTDOA Cell Information

This IE contains OTDOA information of a cell.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
OTDOA Cell Information		*1 to <maxnoOTDOAtypes>*		
>CHOICE *OTDOA Cell Information Item*	M			
>>PCI	M		INTEGER (0..503, …)	Physical Cell ID
>>Cell ID	M		ECGI 9.2.6	
>>TAC	M		OCTET STRING(2)	Tracking Area Code
>>EARFCN	M		INTEGER (0..65535)	Corresponds to N_{DL} for FDD and $N_{DL/UL}$ for TDD in ref. TS 36.104 [5]
>>PRS Bandwidth	M		ENUMERATED (bw6, bw15, bw25, bw50, bw75, bw100, ...)	Transmission bandwidth of PRS
>>PRS Configuration Index	M		INTEGER (0..4095)	PRS Configuration Index, ref TS 36.211 [6]
>>CP Length	M		ENUMERATED (Normal, Extended,...)	Cyclic prefix length of the PRS
>>Number of DL Frames	M		ENUMERATED (sf1, sf2, sf4, sf6,…)	Number of consecutive downlink subframes N_{PRS} with PRS, ref TS 36.211 [6]
>>Number of Antenna Ports	M		ENUMERATED(n1-or-n2, n4,…)	Number of used antenna ports, where n1-or-n2 corresponds to 1 or 2 ports, n4 corresponds to 4 ports
>>SFN Initialisation Time	M		BIT STRING (64)	Time in seconds relative to 00:00:00 on 1 January 1900 where the integer part is in the first 32 bits and the fraction part in the last 32 bits
>>E-UTRAN Access Point Position	M		9.2.8	The configured estimated geographical position of the antenna of the cell.
>>PRS Muting Configuration	M		9.2.9	The configuration of positioning reference signals muting pattern, when applicable

Range bound	Explanation
maxnoOTDOAtypes	Maximum no. of OTDOA information types that can be requested and reported with one message. Value is 63.

9.2.8 E-UTRAN Access Point Position

E-UTRAN Access Point Position IE is used to identify the geographical position of an E-UTRAN Access Point. It is expressed as ellipsoid point with altitude and uncertainty ellipsoid according to TS 23.032 [7].

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Latitude Sign	M		ENUMERATED (North, South)	
Degrees Of Latitude	M		INTEGER ($0..2^{23}-1$)	The IE value (N) is derived by this formula: $N \leq 2^{23} X /90 < N+1$ X being the latitude in degree (0°.. 90°)
Degrees Of Longitude	M		INTEGER ($-2^{23}..2^{23}-1$)	The IE value (N) is derived by this formula: $N \leq 2^{24} X /360 < N+1$ X being the longitude in degree (-180°..+180°)
Direction of Altitude	M		ENUMERATED (Height, Depth)	
Altitude	M		INTEGER ($0..2^{15}-1$)	The relation between the value (N) and the altitude (a) in meters it describes is $N \leq a < N+1$, except for $N=2^{15}-1$ for which the range is extended to include all greater values of (a).
Uncertainty semi-major	M		INTEGER (0..127)	The uncertainty "r" is derived from the "uncertainty code" k by $r = 10x(1.1^{k}-1)$
Uncertainty semi-minor	M		INTEGER (0..127)	The uncertainty "r" is derived from the "uncertainty code" k by $r = 10x(1.1^{k}-1)$
Orientation of major axis	M		INTEGER (0..179)	
Uncertainty Altitude	M		INTEGER (0..127)	The uncertainty altitude 'h' expressed in metres is derived from the 'Uncertainty Altitude' k, by: $h=45x(1.025k-1)$
Confidence	M		INTEGER (0..100)	In percentage

9.2.9 PRS Muting Configuration

The *PRS Muting Configuration* IE is used to describe the configuration of PRS muting patterns for the concerned cell, according to TS 36.211 [6] and TS 36.133 [8].

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE *PRS Muting Configuration*	M			
> *Two*	M		BIT STRING (2)	If a bit is set to "0", it indicates that the PRS is muted in the corresponding PRS positioning occasion (numbering from any sub frame for which SFN=0) in a periodic cycle of length equal to the length of the bit string
> *Four*	M		BIT STRING (4)	Same as above
> *Eight*	M		BIT STRING (8)	Same as above
> *Sixteen*	M		BIT STRING (16)	Same as above

9.3 Message and Information Element Abstract Syntax (with ASN.1)

9.3.1 General

Sub clause 9.3 presents the Abstract Syntax of the LPPa protocol with ASN.1. In case there is contradiction between the ASN.1 definition in this sub clause and the tabular format in sub clause 9.1 and 9.2, the ASN.1 shall take precedence, except for the definition of conditions for the presence of conditional elements, in which the tabular format shall take precedence.

The ASN.1 definition specifies the structure and content of LPPa messages. LPPa messages can contain any IEs specified in the object set definitions for that message without the order or number of occurrence being restricted by ASN.1. However, for this version of the standard, a sending entity shall construct a LPPa message according to the PDU definitions module and with the following additional rules (Note that in the following IE means an IE in the object set with an explicit id. If one IE needed to appear more than once in one object set, then the different occurrences have different IE ids):

- IEs shall be ordered (in an IE container) in the order they appear in object set definitions.
- Object set definitions specify how many times IEs may appear. An IE shall appear exactly once if the presence field in an object has value "mandatory". An IE may appear at most once if the presence field in an object has value "optional" or "conditional". If in a tabular format there is multiplicity specified for an IE (i.e. an IE list) then in the corresponding ASN.1 definition the list definition is separated into two parts. The first part defines an IE container list in which the list elements reside. The second part defines list elements. The IE container list appears as an IE of its own. For this version of the standard an IE container list may contain only one kind of list elements.

If a LPPa message that is not constructed as defined above is received, this shall be considered as Abstract Syntax Error, and the message shall be handled as defined for Abstract Syntax Error in clause 10.

9.3.2 Usage of Private Message Mechanism for Non-standard Use

The private message mechanism for non-standard use may be used:

- for special operator (and/or vendor) specific features considered not to be part of the basic functionality, i.e. the functionality required for a complete and high-quality specification in order to guarantee multivendor inter-operability.
- by vendors for research purposes, e.g. to implement and evaluate new algorithms/features before such features are proposed for standardisation.

The private message mechanism shall not be used for basic functionality. Such functionality shall be standardised.

9.3.3 Elementary Procedure Definitions

```
-- ********************************************************************
--
-- Elementary Procedure definitions
--
-- ********************************************************************

LPPA-PDU-Descriptions {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) lppa (6) version1 (1) lppa-PDU-Descriptions (0) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- ********************************************************************
--
-- IE parameter types from other modules.
--
-- ********************************************************************

IMPORTS
    Criticality,
    ProcedureCode,
    LPPATransactionID

FROM LPPA-CommonDataTypes


    ErrorIndication,
    PrivateMessage,
    E-CIDMeasurementInitiationRequest,
    E-CIDMeasurementInitiationResponse,
    E-CIDMeasurementInitiationFailure,
    E-CIDMeasurementFailureIndication,
    E-CIDMeasurementReport,
    E-CIDMeasurementTerminationCommand,
    OTDOAInformationRequest,
    OTDOAInformationResponse,
    OTDOAInformationFailure


FROM LPPA-PDU-Contents

    id-errorIndication,
    id-privateMessage,
    id-e-CIDMeasurementInitiation,
    id-e-CIDMeasurementFailureIndication,
    id-e-CIDMeasurementReport,
    id-e-CIDMeasurementTermination,
    id-oTDOAInformationExchange


FROM LPPA-Constants;
```

```
-- ********************************************************
--
-- Interface Elementary Procedure Class
--
-- ********************************************************

LPPA-ELEMENTARY-PROCEDURE ::= CLASS {
    &InitiatingMessage              ,
    &SuccessfulOutcome              OPTIONAL,
    &UnsuccessfulOutcome                OPTIONAL,
    &procedureCode          ProcedureCode   UNIQUE,
    &criticality            Criticality     DEFAULT ignore
}
WITH SYNTAX {
    INITIATING MESSAGE      &InitiatingMessage
    [SUCCESSFUL OUTCOME     &SuccessfulOutcome]
    [UNSUCCESSFUL OUTCOME       &UnsuccessfulOutcome]
    PROCEDURE CODE          &procedureCode
    [CRITICALITY            &criticality]
}

-- ********************************************************
--
-- Interface PDU Definition
--
-- ********************************************************

LPPA-PDU ::= CHOICE {
    initiatingMessage   InitiatingMessage,
    successfulOutcome   SuccessfulOutcome,
    unsuccessfulOutcome UnsuccessfulOutcome,
    ...
}

InitiatingMessage ::= SEQUENCE {
    procedureCode       LPPA-ELEMENTARY-PROCEDURE.&procedureCode        ({LPPA-ELEMENTARY-PROCEDURES}),
    criticality         LPPA-ELEMENTARY-PROCEDURE.&criticality          ({LPPA-ELEMENTARY-PROCEDURES}{@procedureCode}),
    lppatransactionID   LPPATransactionID,
    value               LPPA-ELEMENTARY-PROCEDURE.&InitiatingMessage    ({LPPA-ELEMENTARY-PROCEDURES}{@procedureCode})
}

SuccessfulOutcome ::= SEQUENCE {
    procedureCode       LPPA-ELEMENTARY-PROCEDURE.&procedureCode        ({LPPA-ELEMENTARY-PROCEDURES}),
    criticality         LPPA-ELEMENTARY-PROCEDURE.&criticality          ({LPPA-ELEMENTARY-PROCEDURES}{@procedureCode}),
    lppatransactionID   LPPATransactionID,
    value               LPPA-ELEMENTARY-PROCEDURE.&SuccessfulOutcome    ({LPPA-ELEMENTARY-PROCEDURES}{@procedureCode})
}

UnsuccessfulOutcome ::= SEQUENCE {
    procedureCode       LPPA-ELEMENTARY-PROCEDURE.&procedureCode        ({LPPA-ELEMENTARY-PROCEDURES}),
    criticality         LPPA-ELEMENTARY-PROCEDURE.&criticality          ({LPPA-ELEMENTARY-PROCEDURES}{@procedureCode}),
    lppatransactionID   LPPATransactionID,
    value               LPPA-ELEMENTARY-PROCEDURE.&UnsuccessfulOutcome  ({LPPA-ELEMENTARY-PROCEDURES}{@procedureCode})
}
```

```
-- ********************************************************************
--
-- Interface Elementary Procedure List
--
-- ********************************************************************

LPPA-ELEMENTARY-PROCEDURES LPPA-ELEMENTARY-PROCEDURE ::= {
    LPPA-ELEMENTARY-PROCEDURES-CLASS-1          |
    LPPA-ELEMENTARY-PROCEDURES-CLASS-2          ,
    ...
}

LPPA-ELEMENTARY-PROCEDURES-CLASS-1 LPPA-ELEMENTARY-PROCEDURE ::= {
    e-CIDMeasurementInitiation |
    oTDOAInformationExchange   ,
    ...
}

LPPA-ELEMENTARY-PROCEDURES-CLASS-2 LPPA-ELEMENTARY-PROCEDURE ::= {
    e-CIDMeasurementFailureIndication       |
    e-CIDMeasurementReport                  |
    e-CIDMeasurementTermination             |
    errorIndication                         |
    privateMessage                          ,
    ...
}


-- ********************************************************************
--
-- Interface Elementary Procedures
--
-- ********************************************************************

e-CIDMeasurementInitiation LPPA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      E-CIDMeasurementInitiationRequest
    SUCCESSFUL OUTCOME      E-CIDMeasurementInitiationResponse
    UNSUCCESSFUL OUTCOME    E-CIDMeasurementInitiationFailure
    PROCEDURE CODE          id-e-CIDMeasurementInitiation
    CRITICALITY             reject
}

e-CIDMeasurementFailureIndication LPPA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      E-CIDMeasurementFailureIndication
    PROCEDURE CODE          id-e-CIDMeasurementFailureIndication
    CRITICALITY             ignore
}

e-CIDMeasurementReport LPPA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      E-CIDMeasurementReport
    PROCEDURE CODE          id-e-CIDMeasurementReport
    CRITICALITY             ignore
```

```
}

e-CIDMeasurementTermination LPPA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      E-CIDMeasurementTerminationCommand
    PROCEDURE CODE          id-e-CIDMeasurementTermination
    CRITICALITY             reject
}

oTDOAInformationExchange LPPA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      OTDOAInformationRequest
    SUCCESSFUL OUTCOME      OTDOAInformationResponse
    UNSUCCESSFUL OUTCOME    OTDOAInformationFailure
    PROCEDURE CODE          id-oTDOAInformationExchange
    CRITICALITY             reject
}


errorIndication LPPA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      ErrorIndication
    PROCEDURE CODE          id-errorIndication
    CRITICALITY             ignore
}


privateMessage          LPPA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PrivateMessage
    PROCEDURE CODE          id-privateMessage
    CRITICALITY             ignore
}

END
```

9.3.4 PDU Definitions

```
-- **************************************************************
--
-- PDU definitions for LPPa.
--
-- **************************************************************

LPPA-PDU-Contents {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) lppa (6) version1 (1) lppa-PDU-Contents (1) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- **************************************************************
--
-- IE parameter types from other modules.
--
-- **************************************************************
```

```
IMPORTS

    Cause,
    CriticalityDiagnostics,
    E-CID-MeasurementResult,
    OTDOACells,
    OTDOA-Information-Item,
    Measurement-ID,
    MeasurementPeriodicity,
    MeasurementQuantities,
    ReportCharacteristics

FROM LPPA-IEs

    PrivateIE-Container{},
    ProtocolExtensionContainer{},
    ProtocolIE-Container{},
    ProtocolIE-ContainerList{},
    ProtocolIE-ContainerPair{},
    ProtocolIE-ContainerPairList{},
    ProtocolIE-Single-Container{},
    LPPA-PRIVATE-IES,
    LPPA-PROTOCOL-EXTENSION,
    LPPA-PROTOCOL-IES,
    LPPA-PROTOCOL-IES-PAIR
FROM LPPA-Containers


    maxnoOTDOAtypes,
    id-Cause,
    id-CriticalityDiagnostics,
    id-E-SMLC-UE-Measurement-ID,
    id-OTDOACells,
    id-OTDOA-Information-Type-Group,
    id-OTDOA-Information-Type-Item,
    id-ReportCharacteristics,
    id-MeasurementPeriodicity,
    id-MeasurementQuantities,
    id-eNB-UE-Measurement-ID,
    id-E-CID-MeasurementResult


FROM LPPA-Constants;

-- **************************************************************
--
-- E-CID MEASUREMENT INITIATION REQUEST
--
-- **************************************************************

E-CIDMeasurementInitiationRequest ::= SEQUENCE {
    protocolIEs                     ProtocolIE-Container       {{E-CIDMeasurementInitiationRequest-IEs}},
    ...
```

```
}

E-CIDMeasurementInitiationRequest-IEs LPPA-PROTOCOL-IES ::= {
    { ID id-E-SMLC-UE-Measurement-ID    CRITICALITY reject  TYPE Measurement-ID                PRESENCE mandatory}|
    { ID id-ReportCharacteristics       CRITICALITY reject  TYPE ReportCharacteristics         PRESENCE mandatory}|
    { ID id-MeasurementPeriodicity      CRITICALITY reject  TYPE MeasurementPeriodicity        PRESENCE conditional}|
-- The IE shall be present if the Report Characteritics IE is set to 'periodic' --
    { ID id-MeasurementQuantities       CRITICALITY reject  TYPE MeasurementQuantities         PRESENCE mandatory},
    ...
}


-- **************************************************************
--
-- E-CID MEASUREMENT INITIATION RESPONSE
--
-- **************************************************************

E-CIDMeasurementInitiationResponse ::= SEQUENCE {
    protocolIEs                     ProtocolIE-Container       {{E-CIDMeasurementInitiationResponse-IEs}},
    ...
}

E-CIDMeasurementInitiationResponse-IEs LPPA-PROTOCOL-IES ::= {
    { ID id-E-SMLC-UE-Measurement-ID    CRITICALITY reject  TYPE Measurement-ID                PRESENCE mandatory}|
    { ID id-eNB-UE-Measurement-ID       CRITICALITY reject  TYPE Measurement-ID                PRESENCE mandatory}|
    { ID id-E-CID-MeasurementResult     CRITICALITY ignore  TYPE E-CID-MeasurementResult        PRESENCE optional}|
    { ID id-CriticalityDiagnostics      CRITICALITY ignore  TYPE CriticalityDiagnostics         PRESENCE optional},
    ...
}



-- **************************************************************
--
-- E-CID MEASUREMENT INITIATION FAILURE
--
-- **************************************************************

E-CIDMeasurementInitiationFailure ::= SEQUENCE {
    protocolIEs                     ProtocolIE-Container        {{E-CIDMeasurementInitiationFailure-IEs}},
    ...
}


E-CIDMeasurementInitiationFailure-IEs LPPA-PROTOCOL-IES ::= {
    { ID id-E-SMLC-UE-Measurement-ID        CRITICALITY reject  TYPE Measurement-ID             PRESENCE mandatory}|
    { ID id-Cause                           CRITICALITY ignore  TYPE Cause                      PRESENCE mandatory}|
    { ID id-CriticalityDiagnostics          CRITICALITY ignore  TYPE CriticalityDiagnostics     PRESENCE optional },
    ...
}


-- **************************************************************
```

```
--
-- E-CID MEASUREMENT FAILURE INDICATION
--
-- **************************************************************

E-CIDMeasurementFailureIndication ::= SEQUENCE {
    protocolIEs                     ProtocolIE-Container        {{E-CIDMeasurementFailureIndication-IEs}},
    ...
}


E-CIDMeasurementFailureIndication-IEs LPPA-PROTOCOL-IES ::= {
    { ID id-E-SMLC-UE-Measurement-ID        CRITICALITY reject  TYPE Measurement-ID            PRESENCE mandatory}|
    { ID id-eNB-UE-Measurement-ID           CRITICALITY reject  TYPE Measurement-ID            PRESENCE mandatory}|
    { ID id-Cause                           CRITICALITY ignore  TYPE Cause                     PRESENCE mandatory},
    ...
}

-- **************************************************************
--
-- E-CID MEASUREMENT REPORT
--
-- **************************************************************

E-CIDMeasurementReport ::= SEQUENCE {
    protocolIEs                     ProtocolIE-Container        {{E-CIDMeasurementReport-IEs}},
    ...
}


E-CIDMeasurementReport-IEs LPPA-PROTOCOL-IES ::= {
    { ID id-E-SMLC-UE-Measurement-ID        CRITICALITY reject  TYPE Measurement-ID            PRESENCE mandatory}|
    { ID id-eNB-UE-Measurement-ID           CRITICALITY reject  TYPE Measurement-ID            PRESENCE mandatory}|
    { ID id-E-CID-MeasurementResult         CRITICALITY ignore  TYPE E-CID-MeasurementResult    PRESENCE mandatory},
    ...
}

-- **************************************************************
--
-- E-CID MEASUREMENT TERMINATION
--
-- **************************************************************

E-CIDMeasurementTerminationCommand ::= SEQUENCE {
    protocolIEs                     ProtocolIE-Container        {{E-CIDMeasurementTerminationCommand-IEs}},
    ...
}


E-CIDMeasurementTerminationCommand-IEs LPPA-PROTOCOL-IES ::= {
    { ID id-E-SMLC-UE-Measurement-ID        CRITICALITY reject  TYPE Measurement-ID            PRESENCE mandatory}|
    { ID id-eNB-UE-Measurement-ID           CRITICALITY reject  TYPE Measurement-ID            PRESENCE mandatory},
    ...
}
```

```
-- ********************************************************
--
-- OTDOA INFORMATION REQUEST
--
-- ********************************************************

OTDOAInformationRequest ::= SEQUENCE {
    protocolIEs                     ProtocolIE-Container       {{OTDOAInformationRequest-IEs}},
    ...
}

OTDOAInformationRequest-IEs LPPA-PROTOCOL-IES ::= {
    { ID id-OTDOA-Information-Type-Group        CRITICALITY reject  TYPE OTDOA-Information-Type      PRESENCE mandatory},
    ...
}

OTDOA-Information-Type ::= SEQUENCE (SIZE(1..maxnoOTDOAtypes)) OF ProtocolIE-Single-Container { { OTDOA-Information-TypeIEs} }

OTDOA-Information-TypeIEs   LPPA-PROTOCOL-IES ::= {
    { ID id-OTDOA-Information-Type-Item CRITICALITY reject  TYPE OTDOA-Information-Type-Item    PRESENCE mandatory },
    ...
}

OTDOA-Information-Type-Item ::= SEQUENCE {
    oTDOA-Information-Type-Item     OTDOA-Information-Item,
    iE-Extensions                   ProtocolExtensionContainer { { OTDOA-Information-Type-ItemExtIEs} } OPTIONAL,
    ...
}

OTDOA-Information-Type-ItemExtIEs LPPA-PROTOCOL-EXTENSION ::= {
    ...
}

-- ********************************************************
--
-- OTDOA INFORMATION RESPONSE
--
-- ********************************************************

OTDOAInformationResponse ::= SEQUENCE {
    protocolIEs                     ProtocolIE-Container       {{OTDOAInformationResponse-IEs}},
    ...
}

OTDOAInformationResponse-IEs LPPA-PROTOCOL-IES ::= {
    { ID id-OTDOACells                      CRITICALITY ignore  TYPE OTDOACells                 PRESENCE mandatory}|
    { ID id-CriticalityDiagnostics          CRITICALITY ignore  TYPE CriticalityDiagnostics     PRESENCE optional },
    ...
}

-- ********************************************************
--
```

```
-- OTDOA INFORMATION FAILURE
--
-- **************************************************************

OTDOAInformationFailure ::= SEQUENCE {
    protocolIEs                     ProtocolIE-Container        {{OTDOAInformationFailure-IEs}},
    ...
}


OTDOAInformationFailure-IEs LPPA-PROTOCOL-IES ::= {
    { ID id-Cause                           CRITICALITY ignore  TYPE Cause                      PRESENCE mandatory}|
    { ID id-CriticalityDiagnostics          CRITICALITY ignore  TYPE CriticalityDiagnostics     PRESENCE optional },
    ...
}


-- **************************************************************
--
-- ERROR INDICATION
--
-- **************************************************************

ErrorIndication ::= SEQUENCE {
    protocolIEs                     ProtocolIE-Container       {{ErrorIndication-IEs}},
    ...
}

ErrorIndication-IEs LPPA-PROTOCOL-IES ::= {

    { ID id-Cause                       CRITICALITY ignore  TYPE Cause                      PRESENCE optional} |
    { ID id-CriticalityDiagnostics      CRITICALITY ignore  TYPE CriticalityDiagnostics     PRESENCE optional} ,
    ...
}

-- **************************************************************
--
-- PRIVATE MESSAGE
--
-- **************************************************************

PrivateMessage ::= SEQUENCE {
    privateIEs      PrivateIE-Container  {{PrivateMessage-IEs}},
    ...
}

PrivateMessage-IEs LPPA-PRIVATE-IES ::= {
    ...
}

END
```

9.3.5 Information Element definitions

```
-- **************************************************************
--
-- Information Element Definitions
--
-- **************************************************************

LPPA-IEs {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) lppa (6) version1 (1) lppa-IEs (2) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

    id-MeasurementQuantities-Item,
    maxCellineNB,
    maxCellReport,
    maxNrOfErrors,
    maxNoMeas,
    maxnoOTDOAtypes

FROM LPPA-Constants

    Criticality,
    LPPATransactionID,
    ProcedureCode,
    ProtocolIE-ID,
    TriggeringMessage

FROM LPPA-CommonDataTypes

    ProtocolExtensionContainer{},
    ProtocolIE-Single-Container{},

    LPPA-PROTOCOL-EXTENSION,
    LPPA-PROTOCOL-IES
FROM LPPA-Containers;

-- A
-- B

-- C

Cause ::= CHOICE {
    radioNetwork        CauseRadioNetwork,
    protocol            CauseProtocol,
    misc                CauseMisc,
    ...
}
```

```
CauseMisc ::= ENUMERATED {
    unspecified,
    ...
}

CauseProtocol ::= ENUMERATED {
    transfer-syntax-error,
    abstract-syntax-error-reject,
    abstract-syntax-error-ignore-and-notify,
    message-not-compatible-with-receiver-state,
    semantic-error,
    unspecified,
    abstract-syntax-error-falsely-constructed-message,
    ...
}

CauseRadioNetwork ::= ENUMERATED {
    unspecified,
    requested-item-not-supported,
    requested-item-temporarily-not-available,
    ...

}

CPLength ::= ENUMERATED {
    normal,
    extended,
    ...
}

CriticalityDiagnostics ::= SEQUENCE {
    procedureCode                   ProcedureCode                                                   OPTIONAL,
    triggeringMessage               TriggeringMessage                                               OPTIONAL,
    procedureCriticality            Criticality                                                     OPTIONAL,
    lppatransactionID               LPPATransactionID                                               OPTIONAL,
    iEsCriticalityDiagnostics       CriticalityDiagnostics-IE-List                                  OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { {CriticalityDiagnostics-ExtIEs} }  OPTIONAL,
    ...
}


CriticalityDiagnostics-ExtIEs LPPA-PROTOCOL-EXTENSION ::= {
    ...
}

CriticalityDiagnostics-IE-List ::= SEQUENCE (SIZE (1..maxNrOfErrors)) OF
    SEQUENCE {
        iECriticality           Criticality,
        iE-ID                   ProtocolIE-ID,
        typeOfError             TypeOfError,
        iE-Extensions           ProtocolExtensionContainer { {CriticalityDiagnostics-IE-List-ExtIEs} } OPTIONAL,
        ...
}
```

```
CriticalityDiagnostics-IE-List-ExtIEs LPPA-PROTOCOL-EXTENSION ::= {
    ...
}

-- D
-- E

E-CID-MeasurementResult ::= SEQUENCE {
    servingCell-ID                  ECGI,
    servingCellTAC                  TAC,
    e-UTRANAccessPointPosition      E-UTRANAccessPointPosition  OPTIONAL,
    measuredResults                 MeasuredResults     OPTIONAL,
    ...
}

ECGI ::= SEQUENCE {
    pLMN-Identity               PLMN-Identity,
    eUTRANcellIdentifier        EUTRANCellIdentifier,
    iE-Extensions               ProtocolExtensionContainer { {ECGI-ExtIEs} } OPTIONAL,
    ...
}

ECGI-ExtIEs LPPA-PROTOCOL-EXTENSION ::= {
    ...
}

EUTRANCellIdentifier ::= BIT STRING (SIZE (28))

EARFCN ::= INTEGER (0..65535, ...)

E-UTRANAccessPointPosition ::= SEQUENCE {
    latitudeSign                ENUMERATED {north, south},
    latitude                    INTEGER (0..8388607),
    longitude                   INTEGER (-8388608..8388607),
    directionOfAltitude         ENUMERATED {height, depth},
    altitude                    INTEGER (0..32767),
    uncertaintySemi-major       INTEGER (0..127),
    uncertaintySemi-minor       INTEGER (0..127),
    orientationOfMajorAxis      INTEGER (0..179),
    uncertaintyAltitude         INTEGER (0..127),
    confidence                  INTEGER (0..100),
    ...
}

-- F
-- G
-- H
-- I
-- J
-- K
-- L
-- M

Measurement-ID ::= INTEGER (1..15, ...)
```

```
MeasurementPperiodicity ::= ENUMERATED {
    ms120,
    ms240,
    ms480,
    ms640,
    ms1024,
    ms2048,
    ms5120,
    ms10240,
    min1,
    min6,
    min12,
    min30,
    min60,
    ...
}

MeasurementQuantities ::= SEQUENCE (SIZE (1.. maxNoMeas)) OF ProtocolIE-Single-Container { {MeasurementQuantities-ItemIEs} }

MeasurementQuantities-ItemIEs LPPA-PROTOCOL-IES ::= {
    { ID id-MeasurementQuantities-Item  CRITICALITY reject  TYPE MeasurementQuantities-Item     PRESENCE mandatory  }
}

MeasurementQuantities-Item ::= SEQUENCE {
    measurementQuantitiesValue                          MeasurementQuantitiesValue,
    iE-Extensions                                       ProtocolExtensionContainer { { MeasurementQuantitiesValue-ExtIEs} } OPTIONAL,
    ...
}

MeasurementQuantitiesValue-ExtIEs LPPA-PROTOCOL-EXTENSION ::= {
    ...
}

MeasurementQuantitiesValue ::= ENUMERATED {
    cell-ID,
    angleOfArrival,
    timingAdvanceType1,
    timingAdvanceType2,
    rSRP,
    rSRQ,
    ...
}

MeasuredResults ::= SEQUENCE (SIZE (1.. maxNoMeas)) OF MeasuredResultsValue


MeasuredResultsValue ::= CHOICE {
    valueAngleOfArrival             INTEGER (0..719),
    valueTimingAdvanceType1         INTEGER (0..7690),
    valueTimingAdvanceType2         INTEGER (0..7690),
    resultRSRP                      ResultRSRP,
    resultRSRQ                      ResultRSRQ,
    ...
```

```
}

-- N

NumberOfAntennaPorts ::= ENUMERATED {
        n1-or-n2,
        n4,
        ...
}

NumberOfDlFrames ::= ENUMERATED {
        sf1,
        sf2,
        sf4,
        sf6,
        ...
}

-- O

OTDOACells ::= SEQUENCE (SIZE (1.. maxCellineNB)) OF SEQUENCE {
    oTDOACellInfo                   OTDOACell-Information,
    iE-Extensions                   ProtocolExtensionContainer { {OTDOACells-ExtIEs} } OPTIONAL,
    ...
}

OTDOACells-ExtIEs LPPA-PROTOCOL-EXTENSION ::= {
    ...
}

OTDOACell-Information ::= SEQUENCE (SIZE (1..maxnoOTDOAtypes)) OF OTDOACell-Information-Item

OTDOACell-Information-Item ::= CHOICE {
    pCI                         PCI,
    cellId                      ECGI,
    tAC                         TAC,
    eARFCN                      EARFCN,
    pRS-Bandwidth               PRS-Bandwidth,
    pRS-ConfigurationIndex      PRS-Configuration-Index,
    cPLength                    CPLength,
    numberOfDlFrames            NumberOfDlFrames,
    numberOfAntennaPorts        NumberOfAntennaPorts,
    sFNInitialisationTime       SFNInitialisationTime,
    e-UTRANAccessPointPosition  E-UTRANAccessPointPosition,
    ...,
    pRSMutingConfiguration      PRSMutingConfiguration
}

OTDOA-Information-Item ::= ENUMERATED {
        pci,
        cellid,
        tac,
        earfcn,
        prsBandwidth,
```

```
        prsConfigIndex,
        cpLength,
        noDlFrames,
        noAntennaPorts,
        sFNInitTime,
        ...,
        e-UTRANAccessPointPosition,
        prsmutingconfiguration
}

-- P

PCI ::= INTEGER (0..503, ...)

PLMN-Identity ::= OCTET STRING (SIZE(3))

PRS-Bandwidth ::= ENUMERATED {
        bw6,
        bw15,
        bw25,
        bw50,
        bw75,
        bw100,
        ...
}

PRS-Configuration-Index ::= INTEGER (0..4095, ...)

PRSMutingConfiguration ::= CHOICE {
    two             BIT STRING (SIZE (2)),
    four            BIT STRING (SIZE (4)),
    eight           BIT STRING (SIZE (8)),
    sixteen         BIT STRING (SIZE (16)),
    ...
}


-- Q
-- R

ReportCharacteristics ::= ENUMERATED {
    onDemand,
    periodic,
    ...
}

ResultRSRP ::= SEQUENCE (SIZE (1.. maxCellReport)) OF ResultRSRP-Item

ResultRSRP-Item ::= SEQUENCE {
    pCI             PCI,
    eARFCN          EARFCN,
    eCGI            ECGI OPTIONAL,
    valueRSRP       ValueRSRP,
    iE-Extensions   ProtocolExtensionContainer { { ResultRSRP-Item-ExtIEs} } OPTIONAL,
```

```
    ...
}

ResultRSRP-Item-ExtIEs LPPA-PROTOCOL-EXTENSION ::= {
    ...
}

ResultRSRQ ::= SEQUENCE (SIZE (1.. maxCellReport)) OF ResultRSRQ-Item

ResultRSRQ-Item ::= SEQUENCE {
    pCI             PCI,
    eARFCN          EARFCN,
    eCGI            ECGI OPTIONAL,
    valueRSRQ       ValueRSRQ,
    iE-Extensions   ProtocolExtensionContainer { { ResultRSRQ-Item-ExtIEs} } OPTIONAL,
    ...
}

ResultRSRQ-Item-ExtIEs LPPA-PROTOCOL-EXTENSION ::= {
    ...
}

-- S

SFNInitialisationTime ::= BIT STRING (SIZE (64))

-- T

TAC ::= OCTET STRING (SIZE(2))


TypeOfError ::= ENUMERATED {
    not-understood,
    missing,
    ...
}



-- U
-- V

ValueRSRP ::= INTEGER (0..97, ...)

ValueRSRQ ::= INTEGER (0..34, ...)

-- W
-- X
-- Y
-- Z

END
```

9.3.6 Common definitions

```
-- **************************************************************
--
-- Common definitions
--
-- **************************************************************

LPPA-CommonDataTypes {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) lppa (6) version1 (1) lppa-CommonDataTypes (3)  }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- **************************************************************
--
-- Extension constants
--
-- **************************************************************

maxPrivateIEs                                   INTEGER ::= 65535
maxProtocolExtensions                           INTEGER ::= 65535
maxProtocolIEs                                  INTEGER ::= 65535

-- **************************************************************
--
-- Common Data Types
--
-- **************************************************************

Criticality     ::= ENUMERATED { reject, ignore, notify }

LPPATransactionID       ::= INTEGER (0..32767)


Presence        ::= ENUMERATED { optional, conditional, mandatory }

PrivateIE-ID    ::= CHOICE {
    local               INTEGER (0.. maxPrivateIEs),
    global              OBJECT IDENTIFIER
}

ProcedureCode       ::= INTEGER (0..255)


ProtocolIE-ID       ::= INTEGER (0..maxProtocolIEs)
```

```
TriggeringMessage   ::= ENUMERATED { initiating-message, successful-outcome, unsuccessful-outcome}

END
```

9.3.7 Constant definitions

```
-- **************************************************************
--
-- Constant definitions
--
-- **************************************************************

LPPA-Constants {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) lppa (6) version1 (1) lppa-Constants (4) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
    ProcedureCode,
    ProtocolIE-ID
FROM LPPA-CommonDataTypes;

-- **************************************************************
--
-- Elementary Procedures
--
-- **************************************************************

id-errorIndication                                      ProcedureCode ::= 0
id-privateMessage                                       ProcedureCode ::= 1
id-e-CIDMeasurementInitiation                           ProcedureCode ::= 2
id-e-CIDMeasurementFailureIndication                    ProcedureCode ::= 3
id-e-CIDMeasurementReport                               ProcedureCode ::= 4
id-e-CIDMeasurementTermination                          ProcedureCode ::= 5
id-oTDOAInformationExchange                             ProcedureCode ::= 6




-- **************************************************************
--
-- Lists
--
-- **************************************************************

maxNrOfErrors                           INTEGER ::= 256
maxCellineNB                            INTEGER ::= 256
maxNoMeas                               INTEGER ::= 63
```

```
maxCellReport                                   INTEGER ::= 9
maxnoOTDOAtypes                                 INTEGER ::= 63



-- **************************************************************
--
-- IEs
--
-- **************************************************************

id-Cause                                                                ProtocolIE-ID ::= 0
id-CriticalityDiagnostics                                               ProtocolIE-ID ::= 1
id-E-SMLC-UE-Measurement-ID                                             ProtocolIE-ID ::= 2
id-ReportCharacteristics                                                ProtocolIE-ID ::= 3
id-MeasurementPeriodicity                                               ProtocolIE-ID ::= 4
id-MeasurementQuantities                                                ProtocolIE-ID ::= 5
id-eNB-UE-Measurement-ID                                                ProtocolIE-ID ::= 6
id-E-CID-MeasurementResult                                              ProtocolIE-ID ::= 7
id-OTDOACells                                                           ProtocolIE-ID ::= 8
id-OTDOA-Information-Type-Group                                         ProtocolIE-ID ::= 9
id-OTDOA-Information-Type-Item                                          ProtocolIE-ID ::= 10
id-MeasurementQuantities-Item                                           ProtocolIE-ID ::= 11


END
```

9.3.8 Container definitions

```
-- **************************************************************
--
-- Container definitions
--
-- **************************************************************

LPPA-Containers {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) lppa (6) version1 (1) lppa-Containers (5)  }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- **************************************************************
--
-- IE parameter types from other modules.
--
-- **************************************************************
```

```
IMPORTS
    maxPrivateIEs,
    maxProtocolExtensions,
    maxProtocolIEs,
    Criticality,
    Presence,
    PrivateIE-ID,
    ProtocolIE-ID
FROM LPPA-CommonDataTypes;

-- **************************************************************
--
-- Class Definition for Protocol IEs
--
-- **************************************************************

LPPA-PROTOCOL-IES ::= CLASS {
    &id             ProtocolIE-ID           UNIQUE,
    &criticality    Criticality,
    &Value,
    &presence       Presence
}
WITH SYNTAX {
    ID              &id
    CRITICALITY     &criticality
    TYPE            &Value
    PRESENCE        &presence
}

-- **************************************************************
--
-- Class Definition for Protocol IEs
--
-- **************************************************************

LPPA-PROTOCOL-IES-PAIR ::= CLASS {
    &id                     ProtocolIE-ID       UNIQUE,
    &firstCriticality       Criticality,
    &FirstValue,
    &secondCriticality      Criticality,
    &SecondValue,
    &presence               Presence
}
WITH SYNTAX {
    ID                      &id
    FIRST CRITICALITY       &firstCriticality
    FIRST TYPE              &FirstValue
    SECOND CRITICALITY      &secondCriticality
    SECOND TYPE             &SecondValue
    PRESENCE                &presence
}

-- **************************************************************
```

```
--
-- Class Definition for Protocol Extensions
--
-- ************************************************************

LPPA-PROTOCOL-EXTENSION ::= CLASS {
    &id                 ProtocolIE-ID       UNIQUE,
    &criticality        Criticality,
    &Extension,
    &presence           Presence
}
WITH SYNTAX {
    ID                  &id
    CRITICALITY         &criticality
    EXTENSION           &Extension
    PRESENCE            &presence
}

-- ************************************************************
--
-- Class Definition for Private IEs
--
-- ************************************************************

LPPA-PRIVATE-IES ::= CLASS {
    &id                 PrivateIE-ID,
    &criticality        Criticality,
    &Value,
    &presence           Presence
}
WITH SYNTAX {
    ID                  &id
    CRITICALITY         &criticality
    TYPE                &Value
    PRESENCE            &presence
}

-- ************************************************************
--
-- Container for Protocol IEs
--
-- ************************************************************

ProtocolIE-Container { LPPA-PROTOCOL-IES : IEsSetParam} ::=
    SEQUENCE (SIZE (0..maxProtocolIEs)) OF
    ProtocolIE-Field {{IEsSetParam}}

ProtocolIE-Single-Container { LPPA-PROTOCOL-IES : IEsSetParam} ::=
    ProtocolIE-Field {{IEsSetParam}}

ProtocolIE-Field { LPPA-PROTOCOL-IES : IEsSetParam} ::= SEQUENCE {
    id              LPPA-PROTOCOL-IES.&id                   ({IEsSetParam}),
    criticality     LPPA-PROTOCOL-IES.&criticality          ({IEsSetParam}{@id}),
    value           LPPA-PROTOCOL-IES.&Value                ({IEsSetParam}{@id})
```

```
}

-- **************************************************************
--
-- Container for Protocol IE Pairs
--
-- **************************************************************

ProtocolIE-ContainerPair { LPPA-PROTOCOL-IES-PAIR : IEsSetParam} ::=
    SEQUENCE (SIZE (0..maxProtocolIEs)) OF
    ProtocolIE-FieldPair {{IEsSetParam}}

ProtocolIE-FieldPair { LPPA-PROTOCOL-IES-PAIR : IEsSetParam} ::= SEQUENCE {
    id                  LPPA-PROTOCOL-IES-PAIR.&id                  ({IEsSetParam}),
    firstCriticality    LPPA-PROTOCOL-IES-PAIR.&firstCriticality    ({IEsSetParam}{@id}),
    firstValue          LPPA-PROTOCOL-IES-PAIR.&FirstValue          ({IEsSetParam}{@id}),
    secondCriticality   LPPA-PROTOCOL-IES-PAIR.&secondCriticality   ({IEsSetParam}{@id}),
    secondValue         LPPA-PROTOCOL-IES-PAIR.&SecondValue         ({IEsSetParam}{@id})
}

-- **************************************************************
--
-- Container Lists for Protocol IE Containers
--
-- **************************************************************

ProtocolIE-ContainerList {INTEGER : lowerBound, INTEGER : upperBound, LPPA-PROTOCOL-IES : IEsSetParam} ::=
    SEQUENCE (SIZE (lowerBound..upperBound)) OF
    ProtocolIE-Container {{IEsSetParam}}

ProtocolIE-ContainerPairList {INTEGER : lowerBound, INTEGER : upperBound, LPPA-PROTOCOL-IES-PAIR : IEsSetParam} ::=
    SEQUENCE (SIZE (lowerBound..upperBound)) OF
    ProtocolIE-ContainerPair {{IEsSetParam}}

-- **************************************************************
--
-- Container for Protocol Extensions
--
-- **************************************************************

ProtocolExtensionContainer { LPPA-PROTOCOL-EXTENSION : ExtensionSetParam} ::=
    SEQUENCE (SIZE (1..maxProtocolExtensions)) OF
    ProtocolExtensionField {{ExtensionSetParam}}

ProtocolExtensionField { LPPA-PROTOCOL-EXTENSION : ExtensionSetParam} ::= SEQUENCE {
    id                  LPPA-PROTOCOL-EXTENSION.&id             ({ExtensionSetParam}),
    criticality         LPPA-PROTOCOL-EXTENSION.&criticality    ({ExtensionSetParam}{@id}),
    extensionValue      LPPA-PROTOCOL-EXTENSION.&Extension      ({ExtensionSetParam}{@id})
}

-- **************************************************************
--
-- Container for Private IEs
--
```

```
-- ************************************************************

PrivateIE-Container { LPPA-PRIVATE-IES : IEsSetParam} ::=
    SEQUENCE (SIZE (1..maxPrivateIEs)) OF
    PrivateIE-Field {{IEsSetParam}}

PrivateIE-Field { LPPA-PRIVATE-IES : IEsSetParam} ::= SEQUENCE {
    id              LPPA-PRIVATE-IES.&id            ({IEsSetParam}),
    criticality     LPPA-PRIVATE-IES.&criticality   ({IEsSetParam}{@id}),
    value           LPPA-PRIVATE-IES.&Value         ({IEsSetParam}{@id})
}

END
```

9.4 Message transfer syntax

LPPa shall use the ASN.1 Basic Packed Encoding Rules (BASIC-PER) Aligned Variant as transfer syntax as specified in ref. ITU-T Rec. X.691 [4].

9.5 Timers

Void.

10 Handling of unknown, unforeseen and erroneous protocol data

Section 10 of TS 36.413 [3] is applicable for the purposes of the present document, with the following additions:

- In case of Abstract Syntax Error, when reporting the *Criticality Diagnostics* IE for not comprehended IE/IEgroups or missing IE/IE groups, the *Transaction ID* IE shall also be included;
- In case of Logical Error, when reporting the *Criticality Diagnostics* IE, the *Transaction ID* IE shall also be included.

Annex A (informative): Change History

TSG #	TSG Doc.	CR	Rev	Subject/Comment	New
11/2009				First version is created	0.0.0
12/2009				Increasing the version to 2.0.0 for approval at RAN#46	2.0.0
46	RP-091213			Approved at RAN#46	9.0.0
47	RP-100225	0001	3	Inclusion of Geographical Area and E-UTRAN Access Point Position information	9.1.0
47	RP-100225	0003	1	Introduction of new cause values in LPPa	9.1.0
47	RP-100225	0004		Introduction of EARFCN information in E-CID measurement results over LPPa	9.1.0
47	RP-100225	0007		Rapporteur"s update of LPPa protocol	9.1.0
48	RP-100600	0010	1	Clarification on E-CID MEASUREMENT INITIATION procedure	9.2.0
48	RP-100600	0011		Correction of signalling of E-UTRAN Access Point Position	9.2.0
48	RP-100600	0013	2	Addition of PRS Muting Configuration information to LPPa	9.2.0
48	RP-100600	0015	2	Access Point reporting for OTDOA	9.2.0
49	RP-100906	0016		Rapporteur"s update	9.3.0
50	RP-101270	0017		Object ID for LPPa modules	9.4.0
SP-49	SP-100629			Clarification on the use of References (TS 21.801 CR#0030)	9.4.1

History

Document history		
V9.0.0	February 2010	Publication
V9.1.0	April 2010	Publication
V9.2.0	June 2010	Publication
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V9.4.0	January 2011	Publication (Withdrawn)
V9.4.1	May 2011	Publication