Source: TSG CN WG4

Title: Corrections on Location Services Release 5

Agenda item: 8.3

Document for: APPROVAL

Spec	CR	Rev	Doc-2nd-Level	Phase	Subject	Cat	Ver_C
29.002	500	3	N4-030253	Rel-5	Addition of Positioning Data IE to Provide Subscriber Location and Send Location Report	F	5.4.0
29.002	568	2	N4-030254	Rel-6	Addition of Positioning Data IE to Provide Subscriber Location and Send Location Report	A	6.0.0
29.002	527		N4-030062	Rel-5	LCS diagnostic alignment	F	5.4.0
29.002	528		N4-030063	Rel-6	LCS diagnostic alignment	A	6.0.0

CR-Form-v7

CHANGE REQUEST

⌘ **29.002** CR **500** ⌘rev **3** ⌘ Current version: **5.4.0** ⌘

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

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

Title: ⌘	Addition of Positioning Data IE to Provide Subscriber Location and Send Location Report	
Source: ⌘	CN4	
Work item code: ⌘	LCS	***Date:*** ⌘ 10/09/2002
Category: ⌘	**F**	***Release:*** ⌘ Rel-5

Use <u>one</u> 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 <u>one</u> of the following releases:
2   (GSM Phase 2)
R96   (Release 1996)
R97   (Release 1997)
R98   (Release 1998)
R99   (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change: ⌘	When reporting location information for emergency calls, there is no way of knowing what method was used to obtain the longtitude and latitude that has been returned. This information would be useful as it would give an indication as to the relative accuracy of that information to the emergency services, should they have to rely on it. This information could also be used to provide the ability for operators to provide value add services based on accurate location reporting.
Summary of change: ⌘	The Positioning Data parm is included in Provide Subscriber Location Res and Send Location Report Res. This parm is defined in 49.031.
Consequences if not approved: ⌘	There is no indication of the method used to obtain Location information or the relative accuracy of theat information available in the network.

Clauses affected: ⌘	7.6, 7.6.11 (new subsection added – 7.6.11.11A), 13A.2, 13A.3, 17.7.3

	Y	N		
Other specs affected: ⌘	X		Other core specifications ⌘	23.271 CR 153
		X	Test specifications	
		X	O&M Specifications	

Other comments: ⌘	

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

7. Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

7. Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

7. With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

7.6 Definition of parameters

Following is an alphabetic list of parameters used in the common MAP-services in clause 7.3:

Application context name	7.3.1	Refuse reason	7.3.1
Destination address	7.3.1	Release method	7.3.2
Destination reference	7.3.1	Responding address	7.3.1
Diagnostic information	7.3.4	Result	7.3.1
Originating address	7.3.1	Source	7.3.5
Originating reference	7.3.1	Specific information	7.3.1/7.3.2/7.3.4
Problem diagnostic	7.3.6	User reason	7.3.4
Provider reason	7.3.5		

Following is an alphabetic list of parameters contained in this clause:

Absent Subscriber Diagnostic SM	7.6.8.9	Invoke Id	7.6.1.1
Access connection status	7.6.9.3	ISDN Bearer Capability	7.6.3.41
		IST Alert Timer	7.6.3.66
		IST Information Withdrawn	7.6.3.68
		IST Support Indicator	7.6.3.69
		LCS Codeword	7.6.11.18
		LCS Information	7.6.3.60
		LCS Service Type Id	7.6.11.15
Access signalling information	7.6.9.5	Kc	7.6.7.4
Additional Absent Subscriber Diagnostic SM	7.6.8.12	Linked Id	7.6.1.2
Additional Location Estimate	7.6.11.21	LMSI	7.6.2.16
Additional number	7.6.2.46	Location Information	7.6.2.30
		Location Information for GPRS	7.6.2.30a
Additional signal info	7.6.9.10	Location update type	7.6.9.6
Additional SM Delivery Outcome	7.6.8.11	Long Forwarded-to Number	7.6.2.22A
		Long FTN Supported	7.6.2.22B
Age Indicator	7.6.3.72	Lower Layer Compatibility	7.6.3.42
		LSA Information	7.6.3.56
		LSA Information Withdraw	7.6.3.58
Alert Reason	7.6.8.8	MC Information	7.6.4.48
Alert Reason Indicator	7.6.8.10	MC Subscription Data	7.6.4.47
Alerting Pattern	7.6.3.44	Mobile Not Reachable Reason	7.6.3.51
All GPRS Data	7.6.3.53	Modification request for CSI	7.6.3.81
All Information Sent	7.6.1.5	Modification request for SS Information	7.6.3.82
AN-apdu	7.6.9.1	More Messages To Send	7.6.8.7
APN	7.6.2.42	MS ISDN	7.6.2.17
Authentication set list	7.6.7.1	MSC number	7.6.2.11
B-subscriber Address	7.6.2.36	MSIsdn-Alert	7.6.2.29
B subscriber Number	7.6.2.48	Multicall Bearer Information	7.6.2.52
B subscriber subaddress	7.6.2.49	Multiple Bearer Requested	7.6.2.53
Basic Service Group	7.6.4.40	Multiple Bearer Not Supported	7.6.2.54
Bearer service	7.6.4.38	MWD status	7.6.8.3

****** Text removed for clarity ******

7.6.11   Location Service Parameters

7.6.11.1   Age of Location Estimate

This parameter indicates how long ago the location estimate was obtained.

7.6.11.2 Deferred MT-LR Response Indicator

This parameter shows that this is a response to a deferred mt-lr request.

7.6.11.3 Deferred MT-LR Data

This parameter is used to report the deferred location event type, the location information and reason why the serving node aborted monitoring the event to the GMLC. The termination cause mt-lrRestart shall be used to trigger the GMLC to restart the location procedure in all the cases where the sending node detects that the location procedure cannot be successfully performed anymore by the sending node and that it could be successfully performed by another node (as for example when. Cancel Location or Send Identification has been received). The location information shall be included only if the termination cause is mt-lrRestart. The network node number contained in the location information refers to the node where the MS/UE has moved to and shall be included if available, like in case Send Identification has been received.

7.6.11.4 LCS Client ID

This parameter provides information related to the identity of an LCS client.

7.6.11.5 LCS Event

This parameter identifies an event associated with the triggering of a location estimate.

7.6.11.6 Void

7.6.11.7 LCS Priority

This parameter gives the priority of the location request.

7.6.11.8 LCS QoS

This parameter defines the Quality of Service (QoS) for any location request. It is composed of the following elements.

1) Response Time

    Indicates the category of response time – "low delay" or "delay tolerant".

2) Horizontal Accuracy

    Indicates the required horizontal accuracy of the location estimate.

3) Vertical Coordinate

    Indicates if a vertical coordinate is required (in addition to horizontal coordinates).

4) Vertical Accuracy

    Indicates the required vertical accuracy of the location estimate (inclusion is optional).

7.6.11.9 CS LCS Not Supported by UE

This parameter is used by the VLR to indicate to the HLR that the UE does not support neither UE Based nor UE Assisted positioning methds for Circuit Switched Location Services. VLR defines the presence of this parameter on the basis of the Classmark 3 information.

7.6.11.10 PS LCS Not Supported by UE

This parameter is used by the SGSN to indicate to the HLR that the UE does not support neither UE Based nor UE Assisted positioning methods for Packet Switched Location Services. SGSN defines the presence of this parameter on the basis of the UE capability information.

7.6.11.11   Location Estimate

This parameter gives an estimate of the location of an MS in universal coordinates and the accuracy of the estimate. The estimate is expressed in terms of the geographical shapes defined by ~~3G TS~~3GPP TS 23.032 [122]. and is composed of the type of shape plus the encoding of the shape itself. Any type of shape defined in ~~3G TS~~3GPP TS 23.032 [122] can be filled in in the Location Estimate parameter, but only the encoding of the following shapes shall be carried by Location Estimate:

- Ellipsoid point with uncertainty circle

- Ellipsoid point with uncertainty ellipse

- Ellipsoid point with altitude and uncertainty ellipsoid

- Ellipsoid arc

- Ellipsoid point

The encoding for the remaining types of shape, defined in the ~~3G TS~~3GPP TS 23.032 [122], shall be filled in ~~in~~ the Additional Location Estimate parameter.

7.6.11.11A   Positioning Data

This parameter provides positioning data associated with a successful or unsuccessful location attempt for a target MS as described in ~~3G TS~~3GPP TS 49.031 [59a]. ~~Note that the type and length indicator assigned in 49.031 are removed from the parameter.~~

7.6.11.12   Location Type

This parameter indicates the type of location estimate required by the LCS client. Possible location estimate types include:

- current location;

- current or last known location;

- initial location for an emergency services call;

- deferred location event type.

7.6.11.13   NA-ESRD

This parameter only applies to location for an emergency services call in North America and gives the North American Emergency Services Routing Digits.

7.6.11.14   NA-ESRK

This parameter only applies to location for an emergency services call in North America and gives the North American Emergency Services Routing Key.

7.6.11.15   LCS Service Type Id

This parameter defines the LCS Service Type of the current positioning request. The possible values are defined in ~~3G TS~~3GPP TS 22.071 [123]

7.6.11.16   Privacy Override

This parameter indicates if MS privacy is overridden by the LCS client when the GMLC and VMSC/SGSN for an MT-LR are in the same country.

7.6.11.17   Supported LCS Capability Sets

This parameter indicates which capability sets of LCS are supported in the VLR or SGSN.

7.6.11.18   LCS Codeword

This parameter contains the codeword associated to current positioning request as described in 3G TS3GPP TS 23.271 [26a].

7.6.11.19   LCS Codeword Applicability

This parameter indicates if codeword checks are applicable as described in 3G TS3GPP TS 23.271 [26a].

7.6.11.20   Supported GAD Shapes

This parameter indicates which of the shapes defined in 3G TS3GPP TS 23.032 [122] are supported. If the parameter is not provided then the receiving node shall assume that the sending entity supports the following shapes:

- Ellipsoid point with uncertainty circle

- Ellipsoid point with uncertainty ellipse

- Ellipsoid point with altitude and uncertainty ellipsoid

- Ellipsoid arc

- Ellipsoid point

7.6.11.21   Additional Location Estimate

This parameter gives an estimate of the location of an MS/UE in universal coordinates and the accuracy of the estimate. This parameter allows the location estimate to be expressed in any of the geographical shapes defined in 3G TS3GPP TS 23.032 [122].

7.6.11.22   LCS Codeword Notification

This parameter indicates if codeword shall be sent to the subscriber as described in 3G TS3GPP TS 23.271 [26a]

****** Next changed section ******

13A.2   MAP-PROVIDE-SUBSCRIBER-LOCATION Service

13A.2.1 Definition

This service is used by a GMLC to request the location of a target MS from the visited MSC or SGSN at any time. This is a confirmed service using the primitives from table 13A.2/1.

13A.2.2 Service Primitives

Table 13A.2/1: Provide_Subscriber_Location

Parameter name	Request	Indication	Response	Confirm
Invoke id	M	M(=)	M(=)	M(=)
Location Type	M	M(=)		

MLC Number	M	M(=)		
LCS Client ID	M	M(=)		
Privacy Override	U	C(=)		
IMSI	C	C(=)		
MSISDN	C	C(=)		
LMSI	C	C(=)		
LCS Priority	C	C(=)		
LCS QoS	C	C(=)		
IMEI	U	C(=)		
Supported GAD Shapes	C	C(=)		
LCS Codeword	C	C(=)		
LCS Service Type Id	C	C(=)		
Location Estimate			M	M(=)
Positioning Data			C	C(=)
Age of Location Estimate			C	C(=)
Additional Location Estimate			C	C(=)
Deferred MT-LR Response Indicator			C	C(=)
User error			C	C(=)
Provider error				O

13A.2.3 Parameter Definition and Use

All parameters are defined in clause 7.6. The use of these parameters and the requirements for their presence are specified in. 3G TS3GPP TS 23.271 [26a]

Location Type

This parameter identifies the type of location information requested.

MLC Number

This is the E.164 number of the requesting GMLC.

LCS Client ID

This parameter provides information related to the identity of an LCS client.

Privacy Override

This parameter indicates if MS privacy is overridden by the LCS client when the GMLC and VMSC or SGSN for an MT-LR are in the same country.

IMSI

The IMSI is provided to identify the target MS. At least one of the IMSI or MSISDN is mandatory.

MSISDN

The MSISDN is provided to identify the target MS. At least one of the IMSI or MSISDN is mandatory.

LMSI

The LMSI shall be provided if previously supplied by the HLR. This parameter is only used in the case of the MT-LR for CS domain.

LCS Priority

This parameter indicates the priority of the location request.

LCS QoS

This parameter indicates the required quality of service in terms of response time and accuracy.

IMEI

Inclusion of the IMEI is optional.

Supported GAD Shapes

This parameter indicates which of the shapes defined in ~~3G TS~~3GPP TS 23.032 [122] are supported.

LCS Codeword

See definition in clause 7.6.11.18. The requirements for its presence are specified in ~~3G TS~~3GPP TS 23.271 [26a].

LCS Service Type Id

See definition in clause 7.6.11.15. The requirements for its presence are specified in ~~3G TS~~3GPP TS 23.271 [26a].

Location Estimate

This parameter provides the location estimate if this is encoded in one of the supported geographical shapes. Otherwise this parameter shall consist of one octet, which shall be discarded by the receiving node.

Positioning Data

This parameter indicates the usage of each positioning method that was attempted to determine the location estimate either successfully or unsuccessfully. It may~~shall only~~ be included in the message only if the access network is GERAN, see ~~3G TS~~3GPP TS 23.271 [26a].

Age of Location Estimate

This parameter indicates how long ago the location estimate was obtained.

Additional Location Estimate

This parameter provides the location estimate when not provided by the Location Estimate parameter. It may be sent only if the parameter Supported GAD Shapes has been received in the Provide Subscriber Location indication and the shape to be included is supported by the GMLC.

Deferred MT-LR Response Indicator

See definition in clause 7.6.11.2.

User error

This parameter is sent by the responder when the location request has failed or cannot proceed and if present, takes one of the following values defined in clause 7.6.1.

- System Failure;

- Data Missing;

- Unexpected Data Value;

- Facility Not Supported;

- Unidentified Subscriber;

- Illegal Subscriber;

- Illegal Equipment;

- Absent Subscriber (diagnostic information may also be provided);

- Unauthorised requesting network;

- Unauthorised LCS Client with detailed reason;

- Position method failure with detailed reason.

These are defined in clause 7.6.1.

13A.3 MAP-SUBSCRIBER-LOCATION-REPORT Service

13A.3.1 Definition

This service is used by a VMSC or SGSN to provide the location of a target MS to a GMLC when a request for location is either implicitly administered or made at some earlier time. This is a confirmed service using the primitives from table 13A.3/1.

13A.3.2 Service Primitives

Table 13A.3/1: Subscriber_Location_Report

Parameter name	Request	Indication	Response	Confirm
Invoke id	M	M(=)	M(=)	M(=)
LCS Event	M	M(=)		
LCS Client ID	M	M(=)		
Network Node Number	M	M(=)		
IMSI	C	C(=)		
MSISDN	C	C(=)		
NA-ESRD	C	C(=)		
NA-ESRK	C	C(=)		
IMEI	U	C(=)		
Location Estimate	C	C(=)		
Positioning Data	C	C(=)		
Age of Location Estimate	C	C(=)		
LMSI	U	C(=)		
GPRS Node Indicator	C	C(=)		
Additional Location Estimate	C	C(=)		
Deferred MT-LR Data	C	C(=)		
User error			C	C(=)
Provider error				O

13A.3.3 Parameter Definition and Use

All parameters are defined in clause 7.6. The use of these parameters and the requirements for their presence are specified in. 3G TS3GPP TS 23.271 [26a].

LCS Event

This parameter indicates the event that triggered the Subscriber Location Report.

LCS Client ID

This parameter provides information related to the identity of the recipient LCS client.

Network Node Number

See definition in clause 7.6.2. This parameter provides the address of the sending node.

IMSI

The IMSI shall be provided if available to the VMSC or SGSN.

MSISDN

The MSISDN shall be provided if available to the VMSC or SGSN.

NA-ESRD

If the target MS has originated an emergency service call in North America, the NA-ESRD shall be provided by the VMSC if available.

NA-ESRK

If the target MS has originated an emergency service call in North America, the NA-ESRK shall be provided by the VMSC if assigned.

IMEI

Inclusion of the IMEI is optional.

Location Estimate

This parameter provides the location estimate. The absence of this parameter implies that a location estimate was not available or could not be successfully obtained. If the obtained location estimate is not encoded in one of the supported geographical shapes then this parameter shall consist of one octet, which shall be discarded by the receiving node.

Positioning Data

This parameter indicates the usage of each positioning method that was attempted to determine the location estimate either successfully or unsuccessfully. It mayshall only be included in the message only if the access network is GERAN, see 3G TS3GPP TS 23.271 [26a].

 Age of Location Estimate

This parameter indicates how long ago the location estimate was obtained.

LMSI

The LMSI may be provided if assigned by the VLR.

GPRS Node Indicator

See definition in clause 7.6.8. This presence of this parameter is mandatory only if the SGSN number is sent in the Network Node Number.

Additional Location Estimate

This parameter provides the location estimate when not provided by the Location Estimate parameter..

Deferred MT-LR Data

See definition in clause 7.6.11.3.

User error

This parameter is sent by the responder when the received message contains an error, cannot be forwarded or stored for an LCS client or cannot be accepted for some other reason and if present, takes one of the following values defined in clause 7.6.1.

- System Failure;

- Data Missing;

- Unexpected Data Value;

- Resource Limitation;

- Unknown Subscriber;

- Unauthorised requesting network;

- Unknown or unreachable LCS Client.

<u>Provider error</u>

These are defined in clause 7.6.1.

17.7.13 Location service data types

```
MAP-LCS-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-LCS-DataTypes (25) version8 (8)}

DEFINITIONS
IMPLICIT TAGS
::=
BEGIN

EXPORTS
   RoutingInfoForLCS-Arg,
   RoutingInfoForLCS-Res,
   ProvideSubscriberLocation-Arg,
   ProvideSubscriberLocation-Res,
   SubscriberLocationReport-Arg,
   SubscriberLocationReport-Res,
   LocationType,
   LCSClientName,
   LCS-QoS,
   Horizontal-Accuracy,
   ResponseTime,
   Ext-GeographicalInformation,
   SupportedGADShapes,
   Add-GeographicalInformation,
   LCSRequestorID,
   LCSCodeword
;

IMPORTS
   AddressString,
   ISDN-AddressString,
   IMEI,
   IMSI,
   LMSI,
   SubscriberIdentity,
   AgeOfLocationInformation,
   LCSClientExternalID,
   LCSClientInternalID,
   LCSServiceTypeID
FROM MAP-CommonDataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-CommonDataTypes (18) version8 (8)}

   ExtensionContainer
FROM MAP-ExtensionDataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version8 (8)}

   USSD-DataCodingScheme,
   USSD-String
FROM MAP-SS-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1) modules (3)
   map-SS-DataTypes (14) version8 (8)}

   APN
FROM MAP-MS-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-MS-DataTypes (11) version8 (8)}

   Additional-Number
FROM MAP-SM-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-SM-DataTypes (16) version8 (8)}
;
```

```
RoutingInfoForLCS-Arg ::= SEQUENCE {
    mlcNumber                        [0] ISDN-AddressString,
    targetMS                         [1] SubscriberIdentity,
    extensionContainer               [2] ExtensionContainer           OPTIONAL,
    ...,
    lcsCodewordApplicability          [3]  LCSCodewordApplicability    OPTIONAL }
```

```
LCSCodewordApplicability ::= ENUMERATED {
    codewordCheckApplicable         (0),
    codewordCheckNotApplicable      (1),
    ...}
--  exception handling:
--  unrecognized values shall be ignored by the receiver.
```

```
RoutingInfoForLCS-Res ::= SEQUENCE {
    targetMS                        [0] SubscriberIdentity,
    lcsLocationInfo                 [1] LCSLocationInfo,
    extensionContainer              [2] ExtensionContainer         OPTIONAL,
    ...,
    lcsCodewordNotification         [3]  NULL                      OPTIONAL
    -- lcsCodewordNotification may be present only if
    -- lcsCodewordApplicability was present in RoutingInfoForLCS-Arg.
    -- If received when lcsCodewordApplicability was not present in
    -- RoutingInfoForLCS-Arg then lcsCodewordNotification shall be ignored.
}
```

```
LCSLocationInfo ::= SEQUENCE {
    networkNode-Number                  ISDN-AddressString,
    -- NetworkNode-number can be either msc-number or sgsn-number
    lmsi                            [0] LMSI                        OPTIONAL,
    extensionContainer              [1] ExtensionContainer          OPTIONAL,
    ... ,
    gprsNodeIndicator               [2] NULL                        OPTIONAL,
    -- gprsNodeIndicator is set only if the SGSN number is sent as the Network Node Number
    additional-Number               [3] Additional-Number           OPTIONAL
    }
```

```
ProvideSubscriberLocation-Arg ::= SEQUENCE {
    locationType                        LocationType,
    mlc-Number                          ISDN-AddressString,
    lcs-ClientID                    [0] LCS-ClientID                OPTIONAL,
    privacyOverride                 [1] NULL                        OPTIONAL,
    imsi                            [2] IMSI                        OPTIONAL,
    msisdn                          [3] ISDN-AddressString          OPTIONAL,
    lmsi                            [4] LMSI                        OPTIONAL,
    imei                            [5] IMEI                        OPTIONAL,
    lcs-Priority                    [6] LCS-Priority                OPTIONAL,
    lcs-QoS                         [7] LCS-QoS                     OPTIONAL,
    extensionContainer              [8] ExtensionContainer          OPTIONAL,
    ... ,
    supportedGADShapes              [9]  SupportedGADShapes         OPTIONAL,
    lcsServiceTypeID                [10] LCSServiceTypeID           OPTIONAL,
    lcsCodeword                     [11] LCSCodeword                OPTIONAL }

    -- one of imsi or msisdn is mandatory
```

```
LocationType ::= SEQUENCE {
    locationEstimateType            [0] LocationEstimateType,
    ...,
    deferredLocationEventType       [1] DeferredLocationEventType   OPTIONAL }
```

```
LocationEstimateType ::= ENUMERATED {
    currentLocation                 (0),
    currentOrLastKnownLocation      (1),
    initialLocation                 (2),
    ...,
    activateDeferredLocation        (3),
    cancelDeferredLocation          (4) }
--  exception handling:
--  a ProvideSubscriberLocation-Arg containing an unrecognized LocationEstimateType
--  shall be rejected by the receiver with a return error cause of unexpected data value
```

```
DeferredLocationEventType ::= BIT STRING {
    msAvailable                     (0) } (SIZE (1..16))
-- exception handling
-- a ProvideSubscriberLocation-Arg containing other values than listed above in
-- DeferredLocationEventType shall be rejected by the receiver with a return error cause of
-- unexpected data value.
```

```
LCS-ClientID ::= SEQUENCE {
    lcsClientType                   [0] LCSClientType,
    lcsClientExternalID             [1] LCSClientExternalID         OPTIONAL,
    lcsClientDialedByMS             [2] AddressString               OPTIONAL,
    lcsClientInternalID             [3] LCSClientInternalID         OPTIONAL,
    lcsClientName                   [4] LCSClientName               OPTIONAL,
```

```
    ...,
    lcsAPN                               [5] APN                       OPTIONAL,
    lcsRequestorID                       [6] LCSRequestorID            OPTIONAL }
```

```
LCSClientType ::= ENUMERATED {
    emergencyServices               (0),
    valueAddedServices              (1),
    plmnOperatorServices            (2),
    lawfulInterceptServices         (3),
    ... }
    --   exception handling:
    --   unrecognized values may be ignored if the LCS client uses the privacy override
    --   otherwise, an unrecognized value shall be treated as unexpected data by a receiver
    --   a return error shall then be returned if received in a MAP invoke
```

```
LCSClientName ::= SEQUENCE {
    dataCodingScheme                [0] USSD-DataCodingScheme,
    nameString                      [2] NameString,
    ...}

-- The USSD-DataCodingScheme shall indicate use of the default alphabet through the
-- following encoding
--   bit  7 6 5 4 3 2 1 0
--        0 0 0 0 1 1 1 1
```

```
NameString ::= USSD-String (SIZE (1..maxNameStringLength))
```

```
maxNameStringLength   INTEGER ::= 63
```

```
LCSRequestorID ::= SEQUENCE {
    dataCodingScheme                [0] USSD-DataCodingScheme,
    requestorIDString               [1] RequestorIDString,
    ...}
```

```
RequestorIDString ::= USSD-String (SIZE (0..maxRequestorIDStringLength))
```

```
maxRequestorIDStringLength   INTEGER ::= 127
```

```
LCS-Priority ::= OCTET STRING (SIZE (1))
    -- 0 = highest priority
    -- 1 = normal priority
    -- all other values treated as 1
```

```
LCS-QoS ::= SEQUENCE {
    horizontal-accuracy             [0] Horizontal-Accuracy         OPTIONAL,
    verticalCoordinateRequest       [1] NULL                        OPTIONAL,
    vertical-accuracy               [2] Vertical-Accuracy           OPTIONAL,
    responseTime                    [3] ResponseTime                OPTIONAL,
    extensionContainer              [4] ExtensionContainer          OPTIONAL,
    ...}
```

```
Horizontal-Accuracy ::= OCTET STRING (SIZE (1))
    -- bit 8 = 0
    -- bits 7-1 = 7 bit Uncertainty Code defined in 3G TS3GPP TS 23.032. The horizontal
location
    -- error should be less than the error indicated by the uncertainty code with 67%
    -- confidence.
```

```
Vertical-Accuracy ::= OCTET STRING (SIZE (1))
    -- bit 8 = 0
    -- bits 7-1 = 7 bit Vertical Uncertainty Code defined in 3G TS3GPP TS 23.032.
    -- The vertical location error should be less than the error indicated
    -- by the uncertainty code with 67% confidence.
```

```
ResponseTime ::= SEQUENCE {
    responseTimeCategory            ResponseTimeCategory,
    ...}
--   note: an expandable SEQUENCE simplifies later addition of a numeric response time.
```

```
ResponseTimeCategory ::= ENUMERATED {
    lowdelay  (0),
    delaytolerant (1),
    ... }
--   exception handling:
--   an unrecognized value shall be treated the same as value 1 (delaytolerant)
```

```
SupportedGADShapes ::= BIT STRING {
     ellipsoidPoint  (0),
     ellipsoidPointWithUncertaintyCircle (1),
     ellipsoidPointWithUncertaintyEllipse (2),
     polygon (3),
     ellipsoidPointWithAltitude (4),
     ellipsoidPointWithAltitudeAndUncertaintyElipsoid (5),
     ellipsoidArc  (6) } (SIZE (7..16))
-- A node shall mark in the BIT STRING all Shapes defined in 3G TS3GPP TS 23.032 it supports.
-- exception handling: bits 7 to 15 shall be ignored if received.
```

```
LCSCodeword ::= SEQUENCE {
     dataCodingScheme                     [0] USSD-DataCodingScheme,
     lcsCodewordString                    [1] LCSCodewordString,
     ...}
```

```
LCSCodewordString ::= USSD-String (SIZE (1..maxLCSCodewordStringLength))
```

```
maxLCSCodewordStringLength  INTEGER ::= 127
```

```
ProvideSubscriberLocation-Res ::= SEQUENCE {
     locationEstimate                     Ext-GeographicalInformation,
     ageOfLocationEstimate                [0] AgeOfLocationInformation      OPTIONAL,
     extensionContainer                   [1] ExtensionContainer            OPTIONAL,
     ... ,
     add-LocationEstimate                 [2] Add-GeographicalInformation   OPTIONAL,
     deferredmt-lrResponseIndicator       [3] NULL                          OPTIONAL,
     positioningData                      [4] PositioningDataInformation    OPTIONAL }

--   if deferredmt-lrResponseIndicator is set, locationEstimate is ignored.

-- the add-LocationEstimate parameter shall not be sent to a node that did not indicate the
-- geographic shapes supported in the ProvideSubscriberLocation-Arg
-- The locationEstimate and the add-locationEstimate parameters shall not be sent if
-- the supportedGADShapes parameter has been received in ProvideSubscriberLocation-Arg
-- and the shape encoded in locationEstimate or add-LocationEstimate is not marked
-- as supported in supportedGADShapes. In such a case ProvideSubscriberLocation
-- shall be rejected with error FacilityNotSupported with additional indication
-- shapeOfLocationEstimateNotSupported
```

```
Ext-GeographicalInformation ::= OCTET STRING (SIZE (1..maxExt-GeographicalInformation))
    -- Refers to geographical Information defined in 3G TS3GPP TS 23.032.
    -- This is composed of 1 or more octets with an internal structure according to
    -- 3G TS3GPP TS 23.032
    -- Octet 1: Type of shape, only the following shapes in 3G TS3GPP TS 23.032 are allowed:
    --      (a) Ellipsoid point with uncertainty circle
    --      (b) Ellipsoid point with uncertainty ellipse
    --      (c) Ellipsoid point with altitude and uncertainty ellipsoid
    --      (d) Ellipsoid Arc
    --      (e) Ellipsoid Point
    -- Any other value in octet 1 shall be treated as invalid
    -- Octets 2 to 8 for case (a) – Ellipsoid point with uncertainty circle
    --          Degrees of Latitude                             3 octets
    --          Degrees of Longitude                            3 octets
    --          Uncertainty code                                1 octet
    -- Octets 2 to 11 for case (b) – Ellipsoid point with uncertainty ellipse:
    --          Degrees of Latitude                             3 octets
    --          Degrees of Longitude                            3 octets
    --          Uncertainty semi-major axis                     1 octet
    --          Uncertainty semi-minor axis                     1 octet
    --          Angle of major axis                             1 octet
    --          Confidence                                      1 octet
    -- Octets 2 to 14 for case (c) – Ellipsoid point with altitude and uncertainty ellipsoid
    --          Degrees of Latitude                             3 octets
    --          Degrees of Longitude                            3 octets
    --          Altitude                                        2 octets
    --          Uncertainty semi-major axis                     1 octet
    --          Uncertainty semi-minor axis                     1 octet
    --          Angle of major axis                             1 octet
    --          Uncertainty altitude                            1 octet
    --          Confidence                                      1 octet
    -- Octets 2 to 13 for case (d) – Ellipsoid Arc
    --          Degrees of Latitude                             3 octets
    --          Degrees of Longitude                            3 octets
    --          Inner radius                                    2 octets
    --          Uncertainty radius                              1 octet
    --          Offset angle                                    1 octet
    --          Included angle                                  1 octet
    --          Confidence                                      1 octet
    -- Octets 2 to 7 for case (e) – Ellipsoid Point
    --          Degrees of Latitude                             3 octets
    --          Degrees of Longitude                            3 octets

    --
    -- An Ext-GeographicalInformation parameter comprising more than one octet and
    -- containing any other shape or an incorrect number of octets or coding according
    -- to 3G TS3GPP TS 23.032 shall be treated as invalid data by a receiver.
    --
    -- An Ext-GeographicalInformation parameter comprising one octet shall be discarded
    -- by the receiver if an Add-GeographicalInformation parameter is received
    -- in the same message.
    --
    -- An Ext-GeographicalInformation parameter comprising one octet shall be treated as
    -- invalid data by the receiver if an Add-GeographicalInformation parameter is not
    -- received in the same message.
```

```
maxExt-GeographicalInformation  INTEGER ::= 20
    -- the maximum length allows for further shapes in 3G TS3GPP TS 23.032 to be included in later
    -- versions of 3G TS3GPP TS 29.002
```

```
PositioningDataInformation ::= OCTET STRING (SIZE (1..maxPositioningDataInformation))
    -- Refers to the Positioning Data defined in 3G TS3GPP TS 49.031.
    -- This is composed of 2 or more octets with an internal structure according to
    -- 3G TS3GPP TS 49.031.  Note that the IEI and Length parts of Positioning Data as
       defined in 49.031 are not included.
```

```
maxPositioningDataInformation INTEGER ::= 10
    --
```

```
Add-GeographicalInformation ::= OCTET STRING (SIZE (1..maxAdd-GeographicalInformation))
    -- Refers to geographical Information defined in 3G TS3GPP TS 23.032.
    -- This is composed of 1 or more octets with an internal structure according to
    -- 3G TS3GPP TS 23.032
    -- Octet 1: Type of shape, all the shapes defined in 3G TS3GPP TS 23.032 are allowed:
    -- Octets 2 to n (where n is the total number of octets necessary to encode the shape
    -- according to 3G TS3GPP TS 23.032) are used to encode the shape itself in accordance
with the
    -- encoding defined in 3G TS3GPP TS 23.032
    --
    -- An Add-GeographicalInformation parameter, whether valid or invalid, received
    -- together with a valid Ext-GeographicalInformation parameter in the same message
    -- shall be discarded.
    --
    -- An Add-GeographicalInformation parameter containing any shape not defined in
    -- 3G TS3GPP TS 23.032 or an incorrect number of octets or coding according to
    -- 3G TS3GPP TS 23.032 shall be treated as invalid data by a receiver if not received
    -- together with a valid Ext-GeographicalInformation parameter in the same message.
```

```
maxAdd-GeographicalInformation  INTEGER ::= 91
    -- the maximum length allows support for all the shapes currently defined in 3G TS3GPP TS
    -- 23.032
```

```
SubscriberLocationReport-Arg ::= SEQUENCE {
    lcs-Event                      LCS-Event,
    lcs-ClientID                   LCS-ClientID,
    lcsLocationInfo                LCSLocationInfo,
    msisdn                    [0] ISDN-AddressString           OPTIONAL,
    imsi                      [1] IMSI                         OPTIONAL,
    imei                      [2] IMEI                         OPTIONAL,
    na-ESRD                   [3] ISDN-AddressString           OPTIONAL,
    na-ESRK                   [4] ISDN-AddressString           OPTIONAL,
    locationEstimate          [5] Ext-GeographicalInformation  OPTIONAL,
    ageOfLocationEstimate     [6] AgeOfLocationInformation     OPTIONAL,
    extensionContainer        [7] ExtensionContainer           OPTIONAL,
    ... ,
    add-LocationEstimate      [8] Add-GeographicalInformation  OPTIONAL,
    deferredmt-lrData         [9] Deferredmt-lrData            OPTIONAL,
    positioningData           [10] PositioningDataInformation   OPTIONAL }

    -- one of msisdn or imsi is mandatory
    -- a location estimate that is valid for the locationEstimate parameter should
    -- be transferred in this parameter in preference to the add-LocationEstimate.
    -- the deferredmt-lrData parameter shall be included if and only if the lcs-Event
    -- indicates a deferredmt-lrResponse.
    -- if the lcs-Event indicates a deferredmt-lrResponse then the locationEstimate
    -- and the add-locationEstimate parameters shall not be sent if the
    -- supportedGADShapes parameter had been received in ProvideSubscriberLocation-Arg
    -- and the shape encoded in locationEstimate or add-LocationEstimate was not marked
    -- as supported in supportedGADShapes. In such a case terminationCause
    -- in deferredmt-lrData shall be present with value
    -- shapeOfLocationEstimateNotSupported.
```

```
Deferredmt-lrData ::= SEQUENCE {
    deferredLocationEventType      DeferredLocationEventType,
    terminationCause          [0] TerminationCause             OPTIONAL,
    lcsLocationInfo           [1] LCSLocationInfo              OPTIONAL,
    ...}
    -- lcsLocationInfo may be included only if a terminationCause is present
    -- indicating mt-lrRestart.
```

```
LCS-Event ::= ENUMERATED {
    emergencyCallOrigination  (0),
    emergencyCallRelease  (1),
    mo-lr  (2),
    ...,
    deferredmt-lrResponse  (3) }
    --   exception handling:
    --   a SubscriberLocationReport-Arg containing an unrecognized LCS-Event
    --   shall be rejected by a receiver with a return error cause of unexpected data value
```

```
TerminationCause ::= ENUMERATED {
    normal  (0),
    errorundefined  (1),
    internalTimeout  (2),
    congestion  (3),
    mt-lrRestart  (4),
    privacyViolation  (5),
    ...,
    shapeOfLocationEstimateNotSupported (6) }
-- mt-lrRestart shall be used to trigger the GMLC to restart the location procedure,
-- either because the sending node knows that the terminal has moved under coverage
-- of another MSC or SGSN (e.g. Send Identification received), or because the subscriber
-- has been deregistered due to a Cancel Location received from HLR.
--
-- exception handling
-- an unrecognized value shall be treated the same as value 1 (errorundefined)
```

```
SubscriberLocationReport-Res ::= SEQUENCE {
    extensionContainer                      ExtensionContainer                  OPTIONAL,
    ...}
```

END

CR-Form-v7

CHANGE REQUEST

| ⌘ | **29.002** CR **527** | ⌘rev | **-** | ⌘ | Current version: | **5.4.0** | ⌘ |

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

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

Title: ⌘	LCS diagnostic alignment	
Source: ⌘	CN4	
Work item code: ⌘	LCS1	***Date:*** ⌘ 14/01/2003
Category: ⌘ **F**		***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)*
Rel-6 *(Release 6)*

Reason for change: ⌘	To align chapters 7.6.1.4 and the ASN.1 definitions
Summary of change: ⌘	Add detailed diagnostics for the Unauthorized LCS Client error defined in section 7.6.1.4 to the ASN.1 definition in section 17.7.7and vice versa.
Consequences if not approved: ⌘	Missalignment between chapter 7.6.1.4 and 17.7.7

Clauses affected: ⌘	7.6.1.4, 17.7.7

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

Other comments: ⌘	

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

7.6.1.4 User error

This parameter can take values as follows:

NOTE: The values are grouped in order to improve readability; the grouping has no other significance.

a) Generic error:

- system failure, i.e. a task cannot be performed because of a problem in another entity. The type of entity or network resource may be indicated by use of the network resource parameter;

- data missing, i.e. an optional parameter required by the context is missing;

- unexpected data value, i.e. the data type is formally correct but its value or presence is unexpected in the current context;

- resource limitation;

- initiating release, i.e. the receiving entity has started the release procedure;

- facility not supported, i.e. the requested facility is not supported by the PLMN with detailed reasons as follows:

- Shape of location estimate not supported;

- Needed LCS capability not supported in serving node;

- incompatible terminal, i.e. the requested facility is not supported by the terminal.

b) Identification or numbering problem:

- unknown subscriber, i.e. no such subscription exists;

- number changed, i.e. the subscription does not exist for that number any more;

- unknown MSC;

- unidentified subscriber, i.e. if the subscriber is not contained in the database and it has not or cannot be established whether or not a subscription exists;

- unallocated roaming number;

- unknown equipment;

- unknown location area.

c) Subscription problem:

- roaming not allowed, i.e. a location updating attempt is made in an area not covered by the subscription;

- illegal subscriber, i.e. illegality of the access has been established by use of authentication procedure;

- bearer service not provisioned;

- teleservice not provisioned;

- illegal equipment, i.e. the IMEI check procedure has shown that the IMEI is blacklisted or not whitelisted.

d) Handover problem:

- no handover number available, i.e. the VLR cannot allocate a number for handover or cannot allocate the required amount of numbers for relocation;

- subsequent handover failure, i.e. handover to a third MSC failed for some reason;

- target cell outside group call area.

e) Operation and maintenance problem:

- tracing buffer full, i.e. tracing cannot be performed because the tracing capacity is exceeded.

f) Call set-up problem:

- no roaming number available, i.e. a roaming number cannot be allocated because all available numbers are in use;

- absent subscriber, i.e. the subscriber has activated the detach service or the system detects the absence condition. This error may be qualified to indicate whether the subscriber was IMSI detached, in a restricted area or did not respond to paging;

- busy subscriber. This error may be qualified to indicate that the subscriber was busy due to CCBS and that CCBS is possible;

- no subscriber reply;

- forwarding violation, i.e. the call has already been forwarded the maximum number of times that is allowed;

- CUG reject, i.e. the call does not pass a CUG check; additional information may also be given in order to indicate rejection due to e.g. incoming call barred or non-CUG membership;

- call barred. Optionally, additional information may be included for indicating either that the call meets a barring condition set by the subscriber or that the call is barred for operator reasons. In the case of barring of Mobile Terminating Short Message, the additional information may indicate a barring condition due to "Unauthorised Message Originator";

- optimal routeing not allowed, i.e. the entity which sends the error does not support optimal routeing, or the HLR will not accept an optimal routeing interrogation from the GMSC, or the call cannot be optimally routed because it would contravene optimal routeing constraints;

- forwarding failed, i.e. the GMSC interrogated the HLR for forwarding information but the HLR returned an error.

g) Supplementary services problem:

- call barred;

- illegal SS operation;

- SS error status;

- SS not available;

- SS subscription violation;

- SS incompatibility;

- negative password check;

- password registration failure;

- Number of Password Attempts;

- USSD Busy;

- Unknown Alphabet;

- short term denial;

- long term denial.

For definition of these errors see 3GPP TS 24.080 [38].

h) Short message problem:

- SM delivery failure with detailed reason as follows:

    - memory capacity exceeded;

    - MS protocol error;

    - MS not equipped;

    - unknown service centre (SC);

    - SC congestion;

    - invalid SME address;

    - subscriber is not an SC subscriber;

    - and possibly detailed diagnostic information, coded as specified in 3GPP TS 23.140, under SMS-SUBMIT-REPORT and SMS-DELIVERY-REPORT. If the SM entity that returns the SM Delivery Failure error includes detailed diagnostic information, it shall be forwarded in the MAP_MO_FORWARD_SHORT_MESSAGE and in the MAP_MT_FORWARD_SHORT_MESSAGE response.

- message waiting list full, i.e. no further SC address can be added to the message waiting list.

- Subscriber busy for MT SMS, i.e. the mobile terminated short message transfer cannot be completed because:

    - another mobile terminated short message transfer is going on and the delivery node does not support message buffering; or

    - another mobile terminated short message transfer is going on and it is not possible to buffer the message for later delivery; or

    - the message was buffered but it is not possible to deliver the message before the expiry of the buffering time defined in 3GPP TS 23.140;

- Absent Subscriber SM, i.e. the mobile terminated short message transfer cannot be completed because the network cannot contact the subscriber. Diagnostic information regarding the reason for the subscriber's absence may be included with this error.

i) Location services problem:

- Unauthorised Requesting Network

- Unauthorised LCS Client with detailed reasons as follows:

    - NoAdditional Information

    - Client not in MS Privacy Exception List

    - Call to Client not setup

    - Disallowed by Local Regulatory Requirements

    - Unauthorised Privacy Class

    - Unauthorised Call/Session Unrelated External Client

    - Unauthorised Call/Session Related External Client

    - Privacy override not applicable

- Position method failure with detailed reasons as follows:

    - Congestion

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- Insufficient resources

- Insufficient Measurement Data

- Inconsistent Measurement Data

- Location procedure not completed

- QoS not attainable

- Position Method Not Available in Network

- Position Method Not Available in Location Area

- Unknown or unreachable LCS Client.

j) Problem detected by an application using secure transport:

  - Secure transport error. This error indicates that the application using secure transport returned an error. The parameter of the error indicates:

    - The protected payload, which carries the result of applying the protection function specified in 3GPP TS 33.200 to the encoding of the parameter of the original error.

*******************Next modification***************************

17.7.7   Error data types

• • • • •

```
UnauthorizedLCSClient-Diagnostic ::= ENUMERATED {
    noAdditionalInformation (0),
    clientNotInMSPrivacyExceptionList (1),
    callToClientNotSetup (2),
    privacyOverrideNotApplicable (3),
    disallowedByLocalRegulatoryRequirements (4),
    ...,
    unauthorizedPrivacyClass (5),
    unauthorizedCallSessionUnrelatedExternalClient (6),
    unauthorizedCallSessionRelatedExternalClient (7) }
-- exception handling:
-- any unrecognized value shall be ignored
```

CR-Form-v7

CHANGE REQUEST

| | ⌘ | **29.002** CR **528** | ⌘**rev** | **-** | ⌘ | Current version: | **6.0.0** | ⌘ |

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

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

Title: ⌘	LCS diagnostic alignment	
Source: ⌘	CN4	
Work item code:⌘	LCS1	**Date:** ⌘ 24/01/2003
Category: ⌘ **A**		**Release:** ⌘ Rel-6

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
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Use one of the following releases:
   2   *(GSM Phase 2)*
   R96   *(Release 1996)*
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   R98   *(Release 1998)*
   R99   *(Release 1999)*
   Rel-4 *(Release 4)*
   Rel-5 *(Release 5)*
   Rel-6 *(Release 6)*

Reason for change: ⌘	To align chapters 7.6.1.4 and the ASN.1 definitions
Summary of change:⌘	Add detailed diagnostics for the Unautorized LCS Client error defined in section 7.6.1.4 to the ASN.1 definition in section 17.7.7and vice versa.
Consequences if not approved: ⌘	Missalignment between chapter 7.6.1.4 and 17.7.7

Clauses affected: ⌘	7.6.1.4, 17.7.7

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

Other comments: ⌘	

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7.6.1.4 User error

This parameter can take values as follows:

> NOTE: The values are grouped in order to improve readability; the grouping has no other significance.

a) Generic error:

- system failure, i.e. a task cannot be performed because of a problem in another entity. The type of entity or network resource may be indicated by use of the network resource parameter;

- data missing, i.e. an optional parameter required by the context is missing;

- unexpected data value, i.e. the data type is formally correct but its value or presence is unexpected in the current context;

- resource limitation;

- initiating release, i.e. the receiving entity has started the release procedure;

- facility not supported, i.e. the requested facility is not supported by the PLMN with detailed reasons as follows:

  - Shape of location estimate not supported;

  - Needed LCS capability not supported in serving node;

- incompatible terminal, i.e. the requested facility is not supported by the terminal.

b) Identification or numbering problem:

- unknown subscriber, i.e. no such subscription exists;

- number changed, i.e. the subscription does not exist for that number any more;

- unknown MSC;

- unidentified subscriber, i.e. if the subscriber is not contained in the database and it has not or cannot be established whether or not a subscription exists;

- unallocated roaming number;

- unknown equipment;

- unknown location area.

c) Subscription problem:

- roaming not allowed, i.e. a location updating attempt is made in an area not covered by the subscription;

- illegal subscriber, i.e. illegality of the access has been established by use of authentication procedure;

- bearer service not provisioned;

- teleservice not provisioned;

- illegal equipment, i.e. the IMEI check procedure has shown that the IMEI is blacklisted or not whitelisted.

d) Handover problem:

- no handover number available, i.e. the VLR cannot allocate a number for handover or cannot allocate the required amount of numbers for relocation;

- subsequent handover failure, i.e. handover to a third MSC failed for some reason;

CR page 3

- target cell outside group call area.

e) Operation and maintenance problem:

- tracing buffer full, i.e. tracing cannot be performed because the tracing capacity is exceeded.

f) Call set-up problem:

- no roaming number available, i.e. a roaming number cannot be allocated because all available numbers are in use;

- absent subscriber, i.e. the subscriber has activated the detach service or the system detects the absence condition. This error may be qualified to indicate whether the subscriber was IMSI detached, in a restricted area or did not respond to paging;

- busy subscriber. This error may be qualified to indicate that the subscriber was busy due to CCBS and that CCBS is possible;

- no subscriber reply;

- forwarding violation, i.e. the call has already been forwarded the maximum number of times that is allowed;

- CUG reject, i.e. the call does not pass a CUG check; additional information may also be given in order to indicate rejection due to e.g. incoming call barred or non-CUG membership;

- call barred. Optionally, additional information may be included for indicating either that the call meets a barring condition set by the subscriber or that the call is barred for operator reasons. In the case of barring of Mobile Terminating Short Message, the additional information may indicate a barring condition due to "Unauthorised Message Originator";

- optimal routeing not allowed, i.e. the entity which sends the error does not support optimal routeing, or the HLR will not accept an optimal routeing interrogation from the GMSC, or the call cannot be optimally routed because it would contravene optimal routeing constraints;

- forwarding failed, i.e. the GMSC interrogated the HLR for forwarding information but the HLR returned an error.

g) Supplementary services problem:

- call barred;

- illegal SS operation;

- SS error status;

- SS not available;

- SS subscription violation;

- SS incompatibility;

- negative password check;

- password registration failure;

- Number of Password Attempts;

- USSD Busy;

- Unknown Alphabet;

- short term denial;

- long term denial.

For definition of these errors see 3GPP TS 24.080 [38].

h) Short message problem:

- SM delivery failure with detailed reason as follows:

  - memory capacity exceeded;

  - MS protocol error;

  - MS not equipped;

  - unknown service centre (SC);

  - SC congestion;

  - invalid SME address;

  - subscriber is not an SC subscriber;

  - and possibly detailed diagnostic information, coded as specified in 3GPP TS 23.140, under SMS-SUBMIT-REPORT and SMS-DELIVERY-REPORT. If the SM entity that returns the SM Delivery Failure error includes detailed diagnostic information, it shall be forwarded in the MAP_MO_FORWARD_SHORT_MESSAGE and in the MAP_MT_FORWARD_SHORT_MESSAGE response.

- message waiting list full, i.e. no further SC address can be added to the message waiting list.

- Subscriber busy for MT SMS, i.e. the mobile terminated short message transfer cannot be completed because:

  - another mobile terminated short message transfer is going on and the delivery node does not support message buffering; or

  - another mobile terminated short message transfer is going on and it is not possible to buffer the message for later delivery; or

  - the message was buffered but it is not possible to deliver the message before the expiry of the buffering time defined in 3GPP TS 23.140;

- Absent Subscriber SM, i.e. the mobile terminated short message transfer cannot be completed because the network cannot contact the subscriber. Diagnostic information regarding the reason for the subscriber's absence may be included with this error.

i) Location services problem:

- Unauthorised Requesting Network

- Unauthorised LCS Client with detailed reasons as follows:

  - NoAdditional Information

  - Client not in MS Privacy Exception List

  - Call to Client not setup

  - Disallowed by Local Regulatory Requirements

  - Unauthorised Privacy Class

  - Unauthorised Call/Session Unrelated External Client

  - Unauthorised Call/Session Related External Client

  - Privacy override not applicable

- Position method failure with detailed reasons as follows:

  - Congestion

- Insufficient resources

- Insufficient Measurement Data

- Inconsistent Measurement Data

- Location procedure not completed

- QoS not attainable

- Position Method Not Available in Network

- Position Method Not Available in Location Area

- Unknown or unreachable LCS Client.

j) Problem detected by an application using secure transport:

- Secure transport error. This error indicates that the application using secure transport returned an error. The parameter of the error indicates:

  - The protected payload, which carries the result of applying the protection function specified in 3GPP TS 33.200 to the encoding of the parameter of the original error.

********************Next modification****************************

17.7.7 Error data types

• • • • •

```
UnauthorizedLCSClient-Diagnostic ::= ENUMERATED {
    noAdditionalInformation (0),
    clientNotInMSPrivacyExceptionList (1),
    callToClientNotSetup (2),
    privacyOverrideNotApplicable (3),
    disallowedByLocalRegulatoryRequirements (4),
    ...,
    unauthorizedPrivacyClass (5),
    unauthorizedCallSessionUnrelatedExternalClient (6),
    unauthorizedCallSessionRelatedExternalClient (7) }
--  exception handling:
--  any unrecognized value shall be ignored
```

CR-Form-v7

CHANGE REQUEST

⌘ **29.002 CR 568** ⌘**rev 2** ⌘ Current version: **6.0.0** ⌘

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

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

Title: ⌘	Addition of Positioning Data IE to Provide Subscriber Location and Send Location Report
Source: ⌘	CN4
Work item code: ⌘	LCS ***Date:*** ⌘ 10/09/2002
Category: ⌘ **A**	***Release:*** ⌘ Rel-6

Use <u>one</u> 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 <u>one</u> of the following releases:
2   (GSM Phase 2)
R96   (Release 1996)
R97   (Release 1997)
R98   (Release 1998)
R99   (Release 1999)
Rel-4   (Release 4)
Rel-5   (Release 5)
Rel-6   (Release 6)

Reason for change: ⌘	When reporting location information for emergency calls, there is no way of knowing what method was used to obtain the longtitude and latitude that has been returned. This information would be useful as it would give an indication as to the relative accuracy of that information to the emergency services, should they have to rely on it. This information could also be used to provide the ability for operators to provide value add services based on accurate location reporting.
Summary of change: ⌘	The Positioning Data parm is included in Provide Subscriber Location Res and Send Location Report Res. This parm is defined in 49.031.
Consequences if not approved: ⌘	There is no indication of the method used to obtain Location information or the relative accuracy of theat information available in the network.

Clauses affected: ⌘	7.6, 7.6.11 (new subsection added – 7.6.11.11A), 13A.2, 13A.3, 17.7.3

	Y	N		
Other specs affected: ⌘	X		Other core specifications ⌘	23.271 CR 154
		X	Test specifications	
		X	O&M Specifications	
Other comments: ⌘				

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

7. Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

7. Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

7. With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

7.6   Definition of parameters

Following is an alphabetic list of parameters used in the common MAP-services in clause 7.3:

Application context name	7.3.1	Refuse reason	7.3.1
Destination address	7.3.1	Release method	7.3.2
Destination reference	7.3.1	Responding address	7.3.1
Diagnostic information	7.3.4	Result	7.3.1
Originating address	7.3.1	Source	7.3.5
Originating reference	7.3.1	Specific information	7.3.1/7.3.2/7.3.4
Problem diagnostic	7.3.6	User reason	7.3.4
Provider reason	7.3.5		

Following is an alphabetic list of parameters contained in this clause:

Absent Subscriber Diagnostic SM	7.6.8.9	Invoke Id	7.6.1.1
Access connection status	7.6.9.3	ISDN Bearer Capability	7.6.3.41
		IST Alert Timer	7.6.3.66
		IST Information Withdrawn	7.6.3.68
		IST Support Indicator	7.6.3.69
		LCS Codeword	7.6.11.18
		LCS Information	7.6.3.60
		LCS Service Type Id	7.6.11.15
Access signalling information	7.6.9.5	Kc	7.6.7.4
Additional Absent Subscriber Diagnostic SM	7.6.8.12	Linked Id	7.6.1.2
Additional Location Estimate	7.6.11.21	LMSI	7.6.2.16
Additional number	7.6.2.46	Location Information	7.6.2.30
		Location Information for GPRS	7.6.2.30a
Additional signal info	7.6.9.10	Location update type	7.6.9.6
Additional SM Delivery Outcome	7.6.8.11	Long Forwarded-to Number	7.6.2.22A
		Long FTN Supported	7.6.2.22B
Age Indicator	7.6.3.72	Lower Layer Compatibility	7.6.3.42
		LSA Information	7.6.3.56
		LSA Information Withdraw	7.6.3.58
Alert Reason	7.6.8.8	MC Information	7.6.4.48
Alert Reason Indicator	7.6.8.10	MC Subscription Data	7.6.4.47
Alerting Pattern	7.6.3.44	Mobile Not Reachable Reason	7.6.3.51
All GPRS Data	7.6.3.53	Modification request for CSI	7.6.3.81
All Information Sent	7.6.1.5	Modification request for SS Information	7.6.3.82
AN-apdu	7.6.9.1	More Messages To Send	7.6.8.7
APN	7.6.2.42	MS ISDN	7.6.2.17
Authentication set list	7.6.7.1	MSC number	7.6.2.11
B-subscriber Address	7.6.2.36	MSIsdn-Alert	7.6.2.29
B subscriber Number	7.6.2.48	Multicall Bearer Information	7.6.2.52
B subscriber subaddress	7.6.2.49	Multiple Bearer Requested	7.6.2.53
Basic Service Group	7.6.4.40	Multiple Bearer Not Supported	7.6.2.54
Bearer service	7.6.4.38	MWD status	7.6.8.3

****** Text removed for clarity ******

7.6.11   Location Service Parameters

7.6.11.1   Age of Location Estimate

This parameter indicates how long ago the location estimate was obtained.

7.6.11.2 Deferred MT-LR Response Indicator

This parameter shows that this is a response to a deferred mt-lr request.

7.6.11.3 Deferred MT-LR Data

This parameter is used to report the deferred location event type, the location information and reason why the serving node aborted monitoring the event to the GMLC. The termination cause mt-lrRestart shall be used to trigger the GMLC to restart the location procedure in all the cases where the sending node detects that the location procedure cannot be successfully performed anymore by the sending node and that it could be successfully performed by another node (as for example when. Cancel Location or Send Identification has been received). The location information shall be included only if the termination cause is mt-lrRestart. The network node number contained in the location information refers to the node where the MS/UE has moved to and shall be included if available, like in case Send Identification has been received.

7.6.11.4 LCS Client ID

This parameter provides information related to the identity of an LCS client.

7.6.11.5 LCS Event

This parameter identifies an event associated with the triggering of a location estimate.

7.6.11.6 Void

7.6.11.7 LCS Priority

This parameter gives the priority of the location request.

7.6.11.8 LCS QoS

This parameter defines the Quality of Service (QoS) for any location request. It is composed of the following elements.

1) Response Time

   Indicates the category of response time – "low delay" or "delay tolerant".

2) Horizontal Accuracy

   Indicates the required horizontal accuracy of the location estimate.

3) Vertical Coordinate

   Indicates if a vertical coordinate is required (in addition to horizontal coordinates).

4) Vertical Accuracy

   Indicates the required vertical accuracy of the location estimate (inclusion is optional).

7.6.11.9 CS LCS Not Supported by UE

This parameter is used by the VLR to indicate to the HLR that the UE does not support neither UE Based nor UE Assisted positioning methods for Circuit Switched Location Services. VLR defines the presence of this parameter on the basis of the Classmark 3 information.

7.6.11.10 PS LCS Not Supported by UE

This parameter is used by the SGSN to indicate to the HLR that the UE does not support neither UE Based nor UE Assisted positioning methods for Packet Switched Location Services. SGSN defines the presence of this parameter on the basis of the UE capability information.

7.6.11.11 Location Estimate

This parameter gives an estimate of the location of an MS in universal coordinates and the accuracy of the estimate. The estimate is expressed in terms of the geographical shapes defined by 3G TS3GPP TS 23.032 [122]. and is composed of the type of shape plus the encoding of the shape itself. Any type of shape defined in 3G TS3GPP TS 23.032 [122] can be filled in in the Location Estimate parameter, but only the encoding of the following shapes shall be carried by Location Estimate:

- Ellipsoid point with uncertainty circle

- Ellipsoid point with uncertainty ellipse

- Ellipsoid point with altitude and uncertainty ellipsoid

- Ellipsoid arc

- Ellipsoid point

The encoding for the remaining types of shape, defined in the 3G TS3GPP TS 23.032 [122], shall be filled in in the Additional Location Estimate parameter.

7.6.11.11A Positioning Data

This parameter provides positioning data associated with a successful or unsuccessful location attempt for a target MS as described in 3G TS3GPP TS 49.031 [59a]. Note that the type and length indicator assigned in 49.031 are removed from the parameter.

7.6.11.12 Location Type

This parameter indicates the type of location estimate required by the LCS client. Possible location estimate types include:

- current location;

- current or last known location;

- initial location for an emergency services call;

- deferred location event type.

7.6.11.13 NA-ESRD

This parameter only applies to location for an emergency services call in North America and gives the North American Emergency Services Routing Digits.

7.6.11.14 NA-ESRK

This parameter only applies to location for an emergency services call in North America and gives the North American Emergency Services Routing Key.

7.6.11.15 LCS Service Type Id

This parameter defines the LCS Service Type of the current positioning request. The possible values are defined in 3G TS3GPP TS 22.071 [123]

7.6.11.16 Privacy Override

This parameter indicates if MS privacy is overridden by the LCS client when the GMLC and VMSC/SGSN for an MT-LR are in the same country.

7.6.11.17   Supported LCS Capability Sets

This parameter indicates which capability sets of LCS are supported in the VLR or SGSN.

7.6.11.18   LCS Codeword

This parameter contains the codeword associated to current positioning request as described in ~~3G TS~~3GPP TS 23.271 [26a].

7.6.11.19   LCS Codeword Applicability

This parameter indicates if codeword checks are applicable as described in ~~3G TS~~3GPP TS 23.271 [26a].

7.6.11.20   Supported GAD Shapes

This parameter indicates which of the shapes defined in ~~3G TS~~3GPP TS 23.032 [122] are supported. If the parameter is not provided then the receiving node shall assume that the sending entity supports the following shapes:

- Ellipsoid point with uncertainty circle

- Ellipsoid point with uncertainty ellipse

- Ellipsoid point with altitude and uncertainty ellipsoid

- Ellipsoid arc

- Ellipsoid point

7.6.11.21   Additional Location Estimate

This parameter gives an estimate of the location of an MS/UE in universal coordinates and the accuracy of the estimate. This parameter allows the location estimate to be expressed in any of the geographical shapes defined in ~~3G TS~~3GPP TS 23.032 [122].

7.6.11.22   LCS Codeword Notification

This parameter indicates if codeword shall be sent to the subscriber as described in ~~3G TS~~3GPP TS 23.271 [26a]

****** Next changed section ******

13A.2   MAP-PROVIDE-SUBSCRIBER-LOCATION Service

13A.2.1 Definition

This service is used by a GMLC to request the location of a target MS from the visited MSC or SGSN at any time. This is a confirmed service using the primitives from table 13A.2/1.

13A.2.2 Service Primitives

Table 13A.2/1: Provide_Subscriber_Location

Parameter name	Request	Indication	Response	Confirm
Invoke id	M	M(=)	M(=)	M(=)
Location Type	M	M(=)		

MLC Number	M	M(=)		
LCS Client ID	M	M(=)		
Privacy Override	U	C(=)		
IMSI	C	C(=)		
MSISDN	C	C(=)		
LMSI	C	C(=)		
LCS Priority	C	C(=)		
LCS QoS	C	C(=)		
IMEI	U	C(=)		
Supported GAD Shapes	C	C(=)		
LCS Codeword	C	C(=)		
LCS Service Type Id	C	C(=)		
Location Estimate			M	M(=)
Positioning Data			C	C(=)
Age of Location Estimate			C	C(=)
Additional Location Estimate			C	C(=)
Deferred MT-LR Response Indicator			C	C(=)
User error			C	C(=)
Provider error				O

13A.2.3 Parameter Definition and Use

All parameters are defined in clause 7.6. The use of these parameters and the requirements for their presence are specified in. 3G TS3GPP TS 23.271 [26a]

Location Type

This parameter identifies the type of location information requested.

MLC Number

This is the E.164 number of the requesting GMLC.

LCS Client ID

This parameter provides information related to the identity of an LCS client.

Privacy Override

This parameter indicates if MS privacy is overridden by the LCS client when the GMLC and VMSC or SGSN for an MT-LR are in the same country.

IMSI

The IMSI is provided to identify the target MS. At least one of the IMSI or MSISDN is mandatory.

MSISDN

The MSISDN is provided to identify the target MS. At least one of the IMSI or MSISDN is mandatory.

LMSI

The LMSI shall be provided if previously supplied by the HLR. This parameter is only used in the case of the MT-LR for CS domain.

LCS Priority

This parameter indicates the priority of the location request.

LCS QoS

This parameter indicates the required quality of service in terms of response time and accuracy.

IMEI

Inclusion of the IMEI is optional.

Supported GAD Shapes

This parameter indicates which of the shapes defined in ~~3G TS~~3GPP TS 23.032 [122] are supported.

LCS Codeword

See definition in clause 7.6.11.18. The requirements for its presence are specified in ~~3G TS~~3GPP TS 23.271 [26a].

LCS Service Type Id

See definition in clause 7.6.11.15. The requirements for its presence are specified in ~~3G TS~~3GPP TS 23.271 [26a].

Location Estimate

This parameter provides the location estimate if this is encoded in one of the supported geographical shapes. Otherwise this parameter shall consist of one octet, which shall be discarded by the receiving node.

Positioning Data

This parameter indicates the usage of each positioning method that was attempted to determine the location estimate either successfully or unsuccessfully. It may~~shall only~~ be included in the message only if the access network is GERAN, see ~~3G TS~~3GPP TS 23.271 [26a].

Age of Location Estimate

This parameter indicates how long ago the location estimate was obtained.

Additional Location Estimate

This parameter provides the location estimate when not provided by the Location Estimate parameter. It may be sent only if the parameter Supported GAD Shapes has been received in the Provide Subscriber Location indication and the shape to be included is supported by the GMLC.

Deferred MT-LR Response Indicator

See definition in clause 7.6.11.2.

User error

This parameter is sent by the responder when the location request has failed or cannot proceed and if present, takes one of the following values defined in clause 7.6.1.

- System Failure;

- Data Missing;

- Unexpected Data Value;

- Facility Not Supported;

- Unidentified Subscriber;

- Illegal Subscriber;

- Illegal Equipment;

- Absent Subscriber (diagnostic information may also be provided);

- Unauthorised requesting network;

- Unauthorised LCS Client with detailed reason;

- Position method failure with detailed reason.

Provider error

These are defined in clause 7.6.1.

13A.3 MAP-SUBSCRIBER-LOCATION-REPORT Service

13A.3.1 Definition

This service is used by a VMSC or SGSN to provide the location of a target MS to a GMLC when a request for location is either implicitly administered or made at some earlier time. This is a confirmed service using the primitives from table 13A.3/1.

13A.3.2 Service Primitives

Table 13A.3/1: Subscriber_Location_Report

Parameter name	Request	Indication	Response	Confirm
Invoke id	M	M(=)	M(=)	M(=)
LCS Event	M	M(=)		
LCS Client ID	M	M(=)		
Network Node Number	M	M(=)		
IMSI	C	C(=)		
MSISDN	C	C(=)		
NA-ESRD	C	C(=)		
NA-ESRK	C	C(=)		
IMEI	U	C(=)		
Location Estimate	C	C(=)		
Positioning Data	C	C(=)		
Age of Location Estimate	C	C(=)		
LMSI	U	C(=)		
GPRS Node Indicator	C	C(=)		
Additional Location Estimate	C	C(=)		
Deferred MT-LR Data	C	C(=)		
User error			C	C(=)
Provider error				O

13A.3.3 Parameter Definition and Use

All parameters are defined in clause 7.6. The use of these parameters and the requirements for their presence are specified in. 3G TS3GPP TS 23.271 [26a].

LCS Event

This parameter indicates the event that triggered the Subscriber Location Report.

LCS Client ID

This parameter provides information related to the identity of the recipient LCS client.

Network Node Number

See definition in clause 7.6.2. This parameter provides the address of the sending node.

IMSI

The IMSI shall be provided if available to the VMSC or SGSN.

MSISDN

The MSISDN shall be provided if available to the VMSC or SGSN.

NA-ESRD

If the target MS has originated an emergency service call in North America, the NA-ESRD shall be provided by the VMSC if available.

NA-ESRK

If the target MS has originated an emergency service call in North America, the NA-ESRK shall be provided by the VMSC if assigned.

IMEI

Inclusion of the IMEI is optional.

Location Estimate

This parameter provides the location estimate. The absence of this parameter implies that a location estimate was not available or could not be successfully obtained. If the obtained location estimate is not encoded in one of the supported geographical shapes then this parameter shall consist of one octet, which shall be discarded by the receiving node.

Positioning Data

This parameter indicates the usage of each positioning method that was attempted to determine the location estimate either successfully or unsuccessfully. It may~~shall only~~ be included in the message only if the access network is GERAN, see ~~3G TS~~3GPP TS 23.271 [26a].

 Age of Location Estimate

This parameter indicates how long ago the location estimate was obtained.

LMSI

The LMSI may be provided if assigned by the VLR.

GPRS Node Indicator

See definition in clause 7.6.8. This presence of this parameter is mandatory only if the SGSN number is sent in the Network Node Number.

Additional Location Estimate

This parameter provides the location estimate when not provided by the Location Estimate parameter..

Deferred MT-LR Data

See definition in clause 7.6.11.3.

User error

This parameter is sent by the responder when the received message contains an error, cannot be forwarded or stored for an LCS client or cannot be accepted for some other reason and if present, takes one of the following values defined in clause 7.6.1.

- System Failure;

- Data Missing;

- Unexpected Data Value;

- Resource Limitation;

- Unknown Subscriber;

- Unauthorised requesting network;

- Unknown or unreachable LCS Client.

<u>Provider error</u>

These are defined in clause 7.6.1.

17.7.13   Location service data types

```
MAP-LCS-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-LCS-DataTypes (25) version8 (8)}

DEFINITIONS
IMPLICIT TAGS
::=
BEGIN

EXPORTS
   RoutingInfoForLCS-Arg,
   RoutingInfoForLCS-Res,
   ProvideSubscriberLocation-Arg,
   ProvideSubscriberLocation-Res,
   SubscriberLocationReport-Arg,
   SubscriberLocationReport-Res,
   LocationType,
   LCSClientName,
   LCS-QoS,
   Horizontal-Accuracy,
   ResponseTime,
   Ext-GeographicalInformation,
   SupportedGADShapes,
   Add-GeographicalInformation,
   LCSRequestorID,
   LCSCodeword
;

IMPORTS
   AddressString,
   ISDN-AddressString,
   IMEI,
   IMSI,
   LMSI,
   SubscriberIdentity,
   AgeOfLocationInformation,
   LCSClientExternalID,
   LCSClientInternalID,
   LCSServiceTypeID
FROM MAP-CommonDataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-CommonDataTypes (18) version8 (8)}

   ExtensionContainer
FROM MAP-ExtensionDataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version8 (8)}

   USSD-DataCodingScheme,
   USSD-String
FROM MAP-SS-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1) modules (3)
   map-SS-DataTypes (14) version8 (8)}

   APN
FROM MAP-MS-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-MS-DataTypes (11) version8 (8)}

   Additional-Number
FROM MAP-SM-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-SM-DataTypes (16) version8 (8)}
;


RoutingInfoForLCS-Arg ::= SEQUENCE {
    mlcNumber                       [0] ISDN-AddressString,
    targetMS                        [1] SubscriberIdentity,
    extensionContainer              [2] ExtensionContainer          OPTIONAL,
    ...,
    lcsCodewordApplicability        [3]  LCSCodewordApplicability   OPTIONAL }
```

```
LCSCodewordApplicability ::= ENUMERATED {
    codewordCheckApplicable         (0),
    codewordCheckNotApplicable      (1),
    ...}
--   exception handling:
--   unrecognized values shall be ignored by the receiver.
```

```
RoutingInfoForLCS-Res ::= SEQUENCE {
    targetMS                        [0] SubscriberIdentity,
    lcsLocationInfo                 [1] LCSLocationInfo,
    extensionContainer              [2] ExtensionContainer          OPTIONAL,
    ...,
    lcsCodewordNotification         [3]  NULL                       OPTIONAL
    -- lcsCodewordNotification may be present only if
    -- lcsCodewordApplicability was present in RoutingInfoForLCS-Arg.
    -- If received when lcsCodewordApplicability was not present in
    -- RoutingInfoForLCS-Arg then lcsCodewordNotification shall be ignored.
}
```

```
LCSLocationInfo ::= SEQUENCE {
    networkNode-Number              ISDN-AddressString,
    -- NetworkNode-number can be either msc-number or sgsn-number
    lmsi                            [0] LMSI                        OPTIONAL,
    extensionContainer              [1] ExtensionContainer          OPTIONAL,
    ... ,
    gprsNodeIndicator               [2] NULL                        OPTIONAL,
    -- gprsNodeIndicator is set only if the SGSN number is sent as the Network Node Number
    additional-Number               [3] Additional-Number          OPTIONAL
    }
```

```
ProvideSubscriberLocation-Arg ::= SEQUENCE {
    locationType                    LocationType,
    mlc-Number                      ISDN-AddressString,
    lcs-ClientID                    [0] LCS-ClientID               OPTIONAL,
    privacyOverride                 [1] NULL                        OPTIONAL,
    imsi                            [2] IMSI                        OPTIONAL,
    msisdn                          [3] ISDN-AddressString          OPTIONAL,
    lmsi                            [4] LMSI                        OPTIONAL,
    imei                            [5] IMEI                        OPTIONAL,
    lcs-Priority                    [6] LCS-Priority                OPTIONAL,
    lcs-QoS                         [7] LCS-QoS                     OPTIONAL,
    extensionContainer              [8] ExtensionContainer          OPTIONAL,
    ... ,
    supportedGADShapes              [9]  SupportedGADShapes         OPTIONAL,
    lcsServiceTypeID                [10] LCSServiceTypeID           OPTIONAL,
    lcsCodeword                     [11] LCSCodeword                OPTIONAL }

    -- one of imsi or msisdn is mandatory
```

```
LocationType ::= SEQUENCE {
    locationEstimateType            [0] LocationEstimateType,
    ...,
    deferredLocationEventType       [1] DeferredLocationEventType   OPTIONAL }
```

```
LocationEstimateType ::= ENUMERATED {
    currentLocation                 (0),
    currentOrLastKnownLocation      (1),
    initialLocation                 (2),
    ...,
    activateDeferredLocation        (3),
    cancelDeferredLocation          (4) }
--   exception handling:
--   a ProvideSubscriberLocation-Arg containing an unrecognized LocationEstimateType
--   shall be rejected by the receiver with a return error cause of unexpected data value
```

```
DeferredLocationEventType ::= BIT STRING {
    msAvailable                     (0) } (SIZE (1..16))
-- exception handling
-- a ProvideSubscriberLocation-Arg containing other values than listed above in
-- DeferredLocationEventType shall be rejected by the receiver with a return error cause of
-- unexpected data value.
```

```
LCS-ClientID ::= SEQUENCE {
    lcsClientType                   [0] LCSClientType,
    lcsClientExternalID             [1] LCSClientExternalID         OPTIONAL,
    lcsClientDialedByMS             [2] AddressString               OPTIONAL,
    lcsClientInternalID             [3] LCSClientInternalID         OPTIONAL,
    lcsClientName                   [4] LCSClientName               OPTIONAL,
```

```
    ...,
    lcsAPN                              [5] APN                      OPTIONAL,
    lcsRequestorID                      [6] LCSRequestorID           OPTIONAL }
```

```
LCSClientType ::= ENUMERATED {
    emergencyServices               (0),
    valueAddedServices              (1),
    plmnOperatorServices            (2),
    lawfulInterceptServices         (3),
    ... }
    --  exception handling:
    --  unrecognized values may be ignored if the LCS client uses the privacy override
    --  otherwise, an unrecognized value shall be treated as unexpected data by a receiver
    --  a return error shall then be returned if received in a MAP invoke
```

```
LCSClientName ::= SEQUENCE {
    dataCodingScheme                [0] USSD-DataCodingScheme,
    nameString                      [2] NameString,
    ...}

-- The USSD-DataCodingScheme shall indicate use of the default alphabet through the
-- following encoding
--   bit  7 6 5 4 3 2 1 0
--        0 0 0 0 1 1 1 1
```

```
NameString ::= USSD-String (SIZE (1..maxNameStringLength))
```

```
maxNameStringLength   INTEGER ::= 63
```

```
LCSRequestorID ::= SEQUENCE {
    dataCodingScheme                [0] USSD-DataCodingScheme,
    requestorIDString               [1] RequestorIDString,
    ...}
```

```
RequestorIDString ::= USSD-String (SIZE (0..maxRequestorIDStringLength))
```

```
maxRequestorIDStringLength   INTEGER ::= 127
```

```
LCS-Priority ::= OCTET STRING (SIZE (1))
    -- 0 = highest priority
    -- 1 = normal priority
    -- all other values treated as 1
```

```
LCS-QoS ::= SEQUENCE {
    horizontal-accuracy             [0] Horizontal-Accuracy        OPTIONAL,
    verticalCoordinateRequest       [1] NULL                       OPTIONAL,
    vertical-accuracy               [2] Vertical-Accuracy          OPTIONAL,
    responseTime                    [3] ResponseTime               OPTIONAL,
    extensionContainer              [4] ExtensionContainer         OPTIONAL,
    ...}
```

```
Horizontal-Accuracy ::= OCTET STRING (SIZE (1))
    -- bit 8 = 0
    -- bits 7-1 = 7 bit Uncertainty Code defined in 3G TS3GPP TS 23.032. The horizontal
location
    -- error should be less than the error indicated by the uncertainty code with 67%
    -- confidence.
```

```
Vertical-Accuracy ::= OCTET STRING (SIZE (1))
    -- bit 8 = 0
    -- bits 7-1 = 7 bit Vertical Uncertainty Code defined in 3G TS3GPP TS 23.032.
    -- The vertical location error should be less than the error indicated
    -- by the uncertainty code with 67% confidence.
```

```
ResponseTime ::= SEQUENCE {
    responseTimeCategory                ResponseTimeCategory,
    ...}
--  note: an expandable SEQUENCE simplifies later addition of a numeric response time.
```

```
ResponseTimeCategory ::= ENUMERATED {
    lowdelay  (0),
    delaytolerant (1),
    ... }
--  exception handling:
--  an unrecognized value shall be treated the same as value 1 (delaytolerant)
```

```
SupportedGADShapes ::= BIT STRING {
     ellipsoidPoint  (0),
     ellipsoidPointWithUncertaintyCircle (1),
     ellipsoidPointWithUncertaintyEllipse (2),
     polygon (3),
     ellipsoidPointWithAltitude (4),
     ellipsoidPointWithAltitudeAndUncertaintyElipsoid (5),
     ellipsoidArc  (6) } (SIZE (7..16))
-- A node shall mark in the BIT STRING all Shapes defined in 3G TS3GPP TS 23.032 it supports.
-- exception handling: bits 7 to 15 shall be ignored if received.
```

```
LCSCodeword ::= SEQUENCE {
     dataCodingScheme                     [0] USSD-DataCodingScheme,
     lcsCodewordString                    [1] LCSCodewordString,
     ...}
```

```
LCSCodewordString ::= USSD-String (SIZE (1..maxLCSCodewordStringLength))
```

```
maxLCSCodewordStringLength  INTEGER ::= 127
```

```
ProvideSubscriberLocation-Res ::= SEQUENCE {
     locationEstimate                     Ext-GeographicalInformation,
     ageOfLocationEstimate                [0] AgeOfLocationInformation      OPTIONAL,
     extensionContainer                   [1] ExtensionContainer           OPTIONAL,
     ... ,
     add-LocationEstimate                 [2] Add-GeographicalInformation  OPTIONAL,
     deferredmt-lrResponseIndicator       [3] NULL                         OPTIONAL,
     positioningData                      [4] PositioningDataInformation   OPTIONAL }

--   if deferredmt-lrResponseIndicator is set, locationEstimate is ignored.

-- the add-LocationEstimate parameter shall not be sent to a node that did not indicate the
-- geographic shapes supported in the ProvideSubscriberLocation-Arg
-- The locationEstimate and the add-locationEstimate parameters shall not be sent if
-- the supportedGADShapes parameter has been received in ProvideSubscriberLocation-Arg
-- and the shape encoded in locationEstimate or add-LocationEstimate is not marked
-- as supported in supportedGADShapes. In such a case ProvideSubscriberLocation
-- shall be rejected with error FacilityNotSupported with additional indication
-- shapeOfLocationEstimateNotSupported
```

```
Ext-GeographicalInformation ::= OCTET STRING (SIZE (1..maxExt-GeographicalInformation))
      -- Refers to geographical Information defined in 3G TS3GPP TS 23.032.
      -- This is composed of 1 or more octets with an internal structure according to
      -- 3G TS3GPP TS 23.032
      -- Octet 1: Type of shape, only the following shapes in 3G TS3GPP TS 23.032 are allowed:
      --        (a) Ellipsoid point with uncertainty circle
      --        (b) Ellipsoid point with uncertainty ellipse
      --        (c) Ellipsoid point with altitude and uncertainty ellipsoid
      --        (d) Ellipsoid Arc
      --        (e) Ellipsoid Point
      -- Any other value in octet 1 shall be treated as invalid
      -- Octets 2 to 8 for case (a) – Ellipsoid point with uncertainty circle
      --          Degrees of Latitude                              3 octets
      --          Degrees of Longitude                             3 octets
      --          Uncertainty code                                 1 octet
      -- Octets 2 to 11 for case (b) – Ellipsoid point with uncertainty ellipse:
      --          Degrees of Latitude                              3 octets
      --          Degrees of Longitude                             3 octets
      --          Uncertainty semi-major axis                      1 octet
      --          Uncertainty semi-minor axis                      1 octet
      --          Angle of major axis                              1 octet
      --          Confidence                                       1 octet
      -- Octets 2 to 14 for case (c) – Ellipsoid point with altitude and uncertainty ellipsoid
      --          Degrees of Latitude                              3 octets
      --          Degrees of Longitude                             3 octets
      --          Altitude                                         2 octets
      --          Uncertainty semi-major axis                      1 octet
      --          Uncertainty semi-minor axis                      1 octet
      --          Angle of major axis                              1 octet
      --          Uncertainty altitude                             1 octet
      --          Confidence                                       1 octet
      -- Octets 2 to 13 for case (d) – Ellipsoid Arc
      --          Degrees of Latitude                              3 octets
      --          Degrees of Longitude                             3 octets
      --          Inner radius                                     2 octets
      --          Uncertainty radius                               1 octet
      --          Offset angle                                     1 octet
      --          Included angle                                   1 octet
      --          Confidence                                       1 octet
      -- Octets 2 to 7 for case (e) – Ellipsoid Point
      --          Degrees of Latitude                              3 octets
      --          Degrees of Longitude                             3 octets

      --
      -- An Ext-GeographicalInformation parameter comprising more than one octet and
      -- containing any other shape or an incorrect number of octets or coding according
      -- to 3G TS3GPP TS 23.032 shall be treated as invalid data by a receiver.
      --
      -- An Ext-GeographicalInformation parameter comprising one octet shall be discarded
      -- by the receiver if an Add-GeographicalInformation parameter is received
      -- in the same message.
      --
      -- An Ext-GeographicalInformation parameter comprising one octet shall be treated as
      -- invalid data by the receiver if an Add-GeographicalInformation parameter is not
      -- received in the same message.
```

```
maxExt-GeographicalInformation  INTEGER ::= 20
      -- the maximum length allows for further shapes in 3G TS3GPP TS 23.032 to be included in later
      -- versions of 3G TS3GPP TS 29.002
```

```
PositioningDataInformation ::= OCTET STRING (SIZE (1..maxPositioningDataInformation))
      -- Refers to the Positioning Data defined in 3G TS3GPP TS 49.031.
      -- This is composed of 2 or more octets with an internal structure according to
      -- 3G TS3GPP TS 49.031.  Note that the IEI and Length parts of Positioning Data as
           defined in 49.031 are not included.
```

```
maxPositioningDataInformation INTEGER ::= 10
      --
```

```
Add-GeographicalInformation ::= OCTET STRING (SIZE (1..maxAdd-GeographicalInformation))
    -- Refers to geographical Information defined in 3G TS3GPP TS 23.032.
    -- This is composed of 1 or more octets with an internal structure according to
    -- 3G TS3GPP TS 23.032
    -- Octet 1: Type of shape, all the shapes defined in 3G TS3GPP TS 23.032 are allowed:
    -- Octets 2 to n (where n is the total number of octets necessary to encode the shape
    -- according to 3G TS3GPP TS 23.032) are used to encode the shape itself in accordance
with the
    -- encoding defined in 3G TS3GPP TS 23.032
    --
    -- An Add-GeographicalInformation parameter, whether valid or invalid, received
    -- together with a valid Ext-GeographicalInformation parameter in the same message
    -- shall be discarded.
    --
    -- An Add-GeographicalInformation parameter containing any shape not defined in
    -- 3G TS3GPP TS 23.032 or an incorrect number of octets or coding according to
    -- 3G TS3GPP TS 23.032 shall be treated as invalid data by a receiver if not received
    -- together with a valid Ext-GeographicalInformation parameter in the same message.
```

```
maxAdd-GeographicalInformation  INTEGER ::= 91
    -- the maximum length allows support for all the shapes currently defined in 3G TS3GPP TS
    -- 23.032
```

```
SubscriberLocationReport-Arg ::= SEQUENCE {
    lcs-Event                       LCS-Event,
    lcs-ClientID                    LCS-ClientID,
    lcsLocationInfo                 LCSLocationInfo,
    msisdn                          [0] ISDN-AddressString          OPTIONAL,
    imsi                            [1] IMSI                        OPTIONAL,
    imei                            [2] IMEI                        OPTIONAL,
    na-ESRD                         [3] ISDN-AddressString          OPTIONAL,
    na-ESRK                         [4] ISDN-AddressString          OPTIONAL,
    locationEstimate                [5] Ext-GeographicalInformation OPTIONAL,
    ageOfLocationEstimate           [6] AgeOfLocationInformation    OPTIONAL,
    extensionContainer              [7] ExtensionContainer          OPTIONAL,
    ... ,
    add-LocationEstimate            [8] Add-GeographicalInformation OPTIONAL,
    deferredmt-lrData               [9] Deferredmt-lrData           OPTIONAL,
    positioningData                 [10] PositioningDataInformation  OPTIONAL }

    -- one of msisdn or imsi is mandatory
    -- a location estimate that is valid for the locationEstimate parameter should
    -- be transferred in this parameter in preference to the add-LocationEstimate.
    -- the deferredmt-lrData parameter shall be included if and only if the lcs-Event
    -- indicates a deferredmt-lrResponse.
    -- if the lcs-Event indicates a deferredmt-lrResponse then the locationEstimate
    -- and the add-locationEstimate parameters shall not be sent if the
    -- supportedGADShapes parameter had been received in ProvideSubscriberLocation-Arg
    -- and the shape encoded in locationEstimate or add-LocationEstimate was not marked
    -- as supported in supportedGADShapes. In such a case terminationCause
    -- in deferredmt-lrData shall be present with value
    -- shapeOfLocationEstimateNotSupported.
```

```
Deferredmt-lrData ::= SEQUENCE {
    deferredLocationEventType       DeferredLocationEventType,
    terminationCause                [0] TerminationCause            OPTIONAL,
    lcsLocationInfo                 [1] LCSLocationInfo             OPTIONAL,
    ...}
    -- lcsLocationInfo may be included only if a terminationCause is present
    -- indicating mt-lrRestart.
```

```
LCS-Event ::= ENUMERATED {
    emergencyCallOrigination  (0),
    emergencyCallRelease  (1),
    mo-lr  (2),
    ...,
    deferredmt-lrResponse  (3) }
    --   exception handling:
    --   a SubscriberLocationReport-Arg containing an unrecognized LCS-Event
    --   shall be rejected by a receiver with a return error cause of unexpected data value
```

```
TerminationCause ::= ENUMERATED {
    normal  (0),
    errorundefined  (1),
    internalTimeout  (2),
    congestion  (3),
    mt-lrRestart  (4),
    privacyViolation  (5),
    ...,
    shapeOfLocationEstimateNotSupported (6) }
-- mt-lrRestart shall be used to trigger the GMLC to restart the location procedure,
-- either because the sending node knows that the terminal has moved under coverage
-- of another MSC or SGSN (e.g. Send Identification received), or because the subscriber
-- has been deregistered due to a Cancel Location received from HLR.
--
-- exception handling
-- an unrecognized value shall be treated the same as value 1 (errorundefined)
```

```
SubscriberLocationReport-Res ::= SEQUENCE {
    extensionContainer              ExtensionContainer              OPTIONAL,
    ...}
```

END