3GPP TSG CN Plenary Meeting #23 **NP-040050**
10th – 12th March 2004 Phoenix, USA.

Source: TSG CN WG4

Title: Corrections on Location Service

Agenda item: 8.3

Document for: APPROVAL

Spec	CR	Rev	Doc-2nd-Level	Phase	Subject	Cat	Ver_C
29.002	710	2	N4-040326	Rel-5	Inclusion of UTRAN Positioning Data parameter	F	5.8.0
29.002	711	2	N4-040327	Rel-6	Inclusion of UTRAN Positioning Data parameter	A	6.4.0

3GPP TSG CN WG4 Meeting #22 **N4-040326**
Atlanta, USA, 16th – 20st February 2003

CR-Form-v7

CHANGE REQUEST

⌘ **29.002** **CR** **710** ⌘**rev** **2** ⌘ Current version: **5.8.0** ⌘

*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:	⌘	Inclusion of UTRAN Positioning Data parameter
Source:	⌘	CN4
Work item code:	⌘	LCS2
Date:	⌘	13/01/2004
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: ⌘

In CR's 500r5 (Rel-5) and 568r4 (Rel-6), changes were approved to introduce the Positioning Data parameter into MAP messaging so that the parameter can be passed on to the GMLC and ultimately to provide that information to the PSAP in North America to meet FCC requirments. However, at that time only the GERAN case was addressed, following an agreement that only GERAN access would be addressed in R5, and that the equivalent changes for UTRAN access required more work and so could not be addressed in any release earlier than R6.

Since that decision was made, RAN2 and RAN3 have approved changes to allow the transport of UTRAN Positioning Data to the Core Network in R5. CN4 approved CR 674 at CN4 #20 but now has a requirement to mirror that change into R5 version of 29.002, as communicated to CN4 in meeting #21 (N4-031291). Also, since CN4 #20, problems have been identified with the approach taken in CR674 which was to reuse the existing 'Positioning Data' parameter, because whilst the GERAN and UTRAN parameters have the same structure, they are encoded differently and so the GMLC is unable to determine whether to decode the parameter according to GERAN encoding rules or UTRAN encoding rules.

This change now addresses the required changes to R5 to support the transport of the matching information from the UTRAN network. Since the encoding of GERAN and UTRAN protocols are different, for MAP to pass the parameters for each RAT transparently to the GMLC, it is necessary for MAP to identify the source of the information. This is done by adding a new parameter to relevant MAP messages to contain the UTRAN Positiong Data.

This is an essential correction.

Summary of change:	⌘	UTRAN Positioning Data parameter is added to Provide Subscriber Location and Subscriber Location Report messaging. Notes on revisions: The RAN3 parameter is only included in UTRAN messages if the positioning attempt was successful. Therefore, for the UTRAN positioning method, unsuccessful attempts and related information are not included.
Consequences if not approved:	⌘	FCC regulatory requirements for networks with UTRAN access are not met. CN4 specifications are not aligned with those of RAN3.

Clauses affected:	⌘	7.6.11.11B (New), 13A.2, 13A.3, 17.7.13			
Other specs affected:	⌘	**Y**	**N**		
			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.

7.6.11.11A GERAN Positioning Data

This parameter provides positioning data associated with a successful or unsuccessful location attempt for a target MS as described in 3GPP TS 49.031 [59a].

7.6.11.11B UTRAN Positioning Data

This parameter provides positioning data associated with a successful ~~or unsuccessful~~ location attempt for a target MS as described in 3GPP TS 25.413 [120]. It contains the positioningDataDiscriminator and positioningDataSet parts of the RANAP PositionData element only.

****** *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-Referecne Number	C	C(=)		
LCS Codeword	C	C(=)		
LCS Service Type Id	C	C(=)		
Location Estimate			M	M(=)
GERAN Positioning Data			C	C(=)
UTRAN 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. 3GPP 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 3GPP TS 23.032 [122] are supported.

LCS-Reference Number

This parameter shall be included if a deferred mt-lr procedure is performed.

LCS Codeword

See definition in clause 7.6.11.18. The requirements for its presence are specified in 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 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.

GERAN Positioning Data

This parameter indicates the usage of each positioning method that was attempted to determine the location estimate either successfully or unsuccessfully. If Positioning Data received from the RAN contains no Positioning Methods,

GERAN Positioning Data is excluded from the MAP message. It may be included in the message only if the access network is GERAN, see 3GPP TS 23.271 [26a].

UTRAN Positioning Data

This parameter indicates the usage of each positioning method that was successfully attempted to determine the location estimate ~~either successfully or unsuccessfully~~. If Position Data received from the RAN contains no Positioning Methods, UTRAN Positioning Data is excluded from the MAP message. It may be included in the message only if the access network is UTRAN, see 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(=)		
UTRAN 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(=)		
LCS-Reference Number	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. 3GPP 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.

GERAN Positioning Data

This parameter indicates the usage of each positioning method that was attempted to determine the location estimate either successfully or unsuccessfully. If Positioning Data received from the RAN contains no Positioning Methods, GERAN Positioning Data is excluded from the MAP message. It may be included in the message only if the access network is GERAN, see 3GPP TS 23.271 [26a].

UTRAN Positioning Data

This parameter indicates the usage of each positioning method that was successfully attempted to determine the location estimate ~~either successfully or unsuccessfully~~. If Position Data received from the RAN contains no Positioning Methods, UTRAN Positioning Data is excluded from the MAP message. It may be included in the message only if the access network is UTRAN, see 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.

LCS-Reference Number

This parameter shall be included if the Subscriber Location Report is the reponse to a deferred MT location request.

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.

Provider error

These are defined in clause 7.6.1.

****** *Next Changed Section* ******

17.7.13 Location service data types

```
MAP-LCS-DataTypes {
   itu-t 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 {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-CommonDataTypes (18) version8 (8)}

   ExtensionContainer
FROM MAP-ExtensionDataTypes {
   itu-t 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 {
   itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1) modules (3)
   map-SS-DataTypes (14) version8 (8)}

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

   Additional-Number
FROM MAP-SM-DataTypes {
   itu-t 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,
     ...}
```

```
RoutingInfoForLCS-Res ::= SEQUENCE {
     targetMS                           [0] SubscriberIdentity,
     lcsLocationInfo                    [1] LCSLocationInfo,
     extensionContainer                 [2] ExtensionContainer            OPTIONAL,
     ...
}
```

```
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,
     lcs-ReferenceNumber               [10] LCS-ReferenceNumber          OPTIONAL,
     lcsServiceTypeID                  [11] LCSServiceTypeID             OPTIONAL,
     lcsCodeword                       [12] LCSCodeword                  OPTIONAL }

     -- one of imsi or msisdn is mandatory
     -- If a location estimate type indicates activate deferred location or cancel deferred
     -- location, a lcs-Reference number shall be included.
```

```
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 (1..maxRequestorIDStringLength))
```

```
maxRequestorIDStringLength  INTEGER ::= 63
```

```
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 3GPP 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 3GPP 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 3GPP TS 23.032 it supports.
-- exception handling: bits 7 to 15 shall be ignored if received.
```

```
LCS-ReferenceNumber::= OCTET STRING (SIZE(1))
```

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

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

```
maxLCSCodewordStringLength  INTEGER ::= 20
```

```
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,
     geranPpositioningData               [4] PositioningDataInformation    OPTIONAL,
     utranPositioningData                [x] UtranPositioningDataInfo      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 3GPP TS 23.032.
    -- This is composed of 1 or more octets with an internal structure according to
    -- 3GPP TS 23.032
    -- Octet 1: Type of shape, only the following shapes in 3GPP 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 3GPP 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 3GPP TS 23.032 to be included in later
    -- versions of 3GPP TS 29.002
```

```
PositioningDataInformation ::= OCTET STRING (SIZE (2..maxPositioningDataInformation))
    -- Refers to the Positioning Data defined in 3GPP TS 49.031.
    -- This is composed of 2 or more octets with an internal structure according to
    -- 3GPP TS 49.031.
```

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

```
UtranPositioningDataInfo ::= OCTET STRING (SIZE (3..maxUtranPositioningDataInfo))
    -- Refers to the Position Data defined in 3GPP TS 25.413.
    -- This is composed of the positioningDataDiscriminator and the positioningDataSet
    -- included in positionData as defined in 3GPP TS 25.413.
```

```
maxUtranPositioningDataInfo INTEGER ::= 11
    --
```

```
Add-GeographicalInformation ::= OCTET STRING (SIZE (1..maxAdd-GeographicalInformation))
     -- Refers to geographical Information defined in 3GPP TS 23.032.
     -- This is composed of 1 or more octets with an internal structure according to
     -- 3GPP TS 23.032
     -- Octet 1: Type of shape, all the shapes defined in 3GPP TS 23.032 are allowed:
     -- Octets 2 to n (where n is the total number of octets necessary to encode the shape
     -- according to 3GPP TS 23.032) are used to encode the shape itself in accordance with
the
     -- encoding defined in 3GPP 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
     -- 3GPP TS 23.032 or an incorrect number of octets or coding according to
     -- 3GPP 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 3GPP 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,
     lcs-ReferenceNumber                [10] LCS-ReferenceNumber          OPTIONAL,
     geranPpositioningData              [11] PositioningDataInformation   OPTIONAL,
     utranPositioningData               [x] UtranPositioningDataInfo      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.
     -- If a lcs event indicates deferred mt-lr response, the lcs-Reference number shall be
     -- included.
```

```
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

3GPP TSG CN WG4 Meeting #22 **N4-040327**
Atlanta, USA, 16th – 20st February 2003

CR-Form-v7

CHANGE REQUEST

⌘ **29.002** **CR** **711** ⌘ **rev** **2** ⌘ Current version: **6.4.0** ⌘

*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 ☐

Title:	⌘	Inclusion of UTRAN Positioning Data parameter			
Source:	⌘	CN4			
Work item code:	⌘	LCS2	***Date:*** ⌘	13/01/2004	
Category:	⌘	**F**	***Release:*** ⌘	Rel-6	
Use one of the following categories:			*Use one of the following releases:*		
F *(correction)*			*2*	*(GSM Phase 2)*	
A *(corresponds to a correction in an earlier release)*			*R96*	*(Release 1996)*	
B *(addition of feature),*			*R97*	*(Release 1997)*	
C *(functional modification of feature)*			*R98*	*(Release 1998)*	
D *(editorial modification)*			*R99*	*(Release 1999)*	
Detailed explanations of the above categories can be found in 3GPP TR 21.900.			*Rel-4*	*(Release 4)*	
			Rel-5	*(Release 5)*	
			Rel-6	*(Release 6)*	

Reason for change:	⌘	In CR's 500r5 (Rel-5) and 568r4 (Rel-6), changes were approved to introduce the Positioning Data parameter into MAP messaging so that the parameter can be passed on to the GMLC and ultimately to provide that information to the PSAP in North America to meet FCC requirments. However, at that time only the GERAN case was addressed, following an agreement that only GERAN access would be addressed in R5, and that the equivalent changes for UTRAN access required more work and so could not be addressed in any release earlier than R6. CN4 approved CR 674 at CN4 #20, but since then problems have been identified with the approach taken in CR674 which was to reuse the existing 'Positioning Data' parameter - whilst the GERAN and UTRAN parameters have the same structure, they are encoded differently and so the GMLC is unable to determine whether to decode the parameter according to GERAN encoding rules or UTRAN encoding rules. This change implements an alternative approach using separate parameters for the GERAN data and the UTRAN data, thus allowing the GMLC to determine which RAT is providing the data and enabling it to decode the parm accordingly. This is done by adding a new parameter to relevant MAP messages to contain the UTRAN Positiong Data. **This is an essential correction.**
Summary of change:	⌘	UTRAN Positioning Data parameter is added to Provide Subscriber Location and Subscriber Location Report messaging. Notes on revisions: The RAN3 parameter is only included in UTRAN messages

		if the positioning attempt was successful. Therefore, for the UTRAN positioning method, unsuccessful attempts and related information are not included.
Consequences if not approved:	⌘	FCC regulatory requirements for networks with UTRAN access are not met. Existing broken method for passing UTRAN data to GMLC remains in place.

Clauses affected:	⌘	7.6.11.11A, 7.6.11.11B (New), 13A.2, 13A.3, 17.7.13			
Other specs affected:	⌘	**Y**	**N**		
			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.

7.6.11.11A GERAN Positioning Data

This parameter provides positioning data associated with a successful or unsuccessful location attempt for a target MS. ~~For GERAN this parameter contains positioning data~~ as described in 3GPP TS 49.031 [59a]. ~~For UTRAN this parameter contains positioning data as described in 3GPP TS 25.413 [120].~~

7.6.11.11B UTRAN Positioning Data

This parameter provides positioning data associated with a successful ~~or unsuccessful~~ location attempt for a target MS as described in 3GPP TS 25.413 [120]. It contains the positioningDataDiscriminator and positioningDataSet parts of the RANAP PositionData element only.

****** *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-Reference Number	C	C(=)		
LCS Codeword	C	C(=)		
LCS Service Type Id	C	C(=)		
LCS Privacy Check	C	C(=)		
Area Event Info	C	C(=)		
H-GMLC Address	C	C(=)		
R-GMLC Address	C	C(=)		
Location Estimate			M	M(=)
GERAN Positioning Data			C	C(=)
UTRAN Positioning Data			C	C(=)
Age of Location Estimate			C	C(=)
Additional Location Estimate			C	C(=)
Deferred MT-LR Response Indicator			C	C(=)
Cell Id Or SAI			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. 3GPP 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 3GPP TS 23.032 [122] are supported.

LCS-Reference Number

This parameter shall be included if a deferred MT-LR procedure is performed for a UE available event or an area event.

LCS Codeword

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

LCS Privacy Check

See definition in clause 7.6.11. The requirements for its and its components presence are specified in 3GPP TS 23.271 [26a].

Area Event Info

See definition in clause 7.6.11. The parameter shall be included if a deferred MT-LR procedure is performed for an area event.

H-GMLC address

See definition in clause 7.6.2. The parameter shall be included if a deferred MT-LR procedure is performed for an area event.

R-GMLC address

See definition in clause 7.6.2. The parameter shall be included if a deferred MT-LR procedure is performed for an area event and the R-GMLC is not the H-GMLC.

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.

GERAN Positioning Data

This parameter indicates the usage of each positioning method that was attempted to determine the location estimate either successfully or unsuccessfully. If Positioning Data received from the RAN contains no Positioning Methods, Positioning Data is excluded from the MAP message. It may be included in the message only if the access network is GERAN, see 3GPP TS 23.271 [26a].

UTRAN Positioning Data

This parameter indicates the usage of each positioning method that was successfully attempted to determine the location estimate ~~either successfully or unsuccessfully~~. If Position Data received from the RAN contains no Positioning Methods, UTRAN Positioning Data is excluded from the MAP message. It may be included in the message only if the access network is UTRAN, see 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.

Cell Id Or SAI

For GERAN access, this parameter indicates Global Cell Identifier of the cell that the served subscriber is currently attached to. For UTRAN access, this parameter contains the Service Area Identifier for the cell that the subscriber is currently attached to. This parameter is included only for North American Emergency Calls as described in 3GPP TS 23.271 [26a].

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(=)	C	C(=)
IMEI	U	C(=)		
Location Estimate	C	C(=)		
GERAN Positioning Data	C	C(=)		
UTRAN 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(=)		
LCS-Reference Number	C	C(=)		
NA-ESRK Request	C	C(=)		
Cell Id Or SAI	C	C(=)		
H-GMLC Address	C	C(=)		
R-GMLC Address	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. 3GPP 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.

If the target MS has originated an emergency service call in North America and NA-ESRK Request is included in Subscriber_Location_Report-Arg, NA-ESRK may also be included in the response to the MSC, see 3GPP TS 23.271 [26a].

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.

GERAN Positioning Data

This parameter indicates the usage of each positioning method that was attempted to determine the location estimate either successfully or unsuccessfully. If Positioning Data received from the RAN contains no Positioning Methods, Positioning Data is excluded from the MAP message. It may be included in the message only if the access network is GERAN, see 3GPP TS 23.271 [26a].

UTRAN Positioning Data

This parameter indicates the usage of each positioning method that was successfullyattempted to determine the location estimate ~~either successfully or unsuccessfully~~. If Position Data received from the RAN contains no Positioning Methods, UTRAN Positioning Data is excluded from the MAP message. It may be included in the message only if the access network is UTRAN, see 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.

LCS-Reference Number

This parameter shall be included if the Subscriber Location Report is the response to a deferred MT location request.

NA-ESRK Request

If the target MS has originated an emergency service call in North America, NA-ESRK Request may be included to indicate that the MSC is able to accept NA-ESRK in the Response message, see section 7.6.11.19.

Cell Id Or SAI

For GERAN access, this parameter indicates Global Cell Identifier of the cell that the served subscriber is currently attached to. For UTRAN access, this parameter contains the Service Area Identifier for the cell that the subscriber is currently attached to. This parameter is included only for North American Emergency Calls as described in 3GPP TS 23.271 [26a].

H-GMLC address

See definition in clause 7.6.2. The parameter shall be included if the Subscriber Location Report is the response to a deferred MT location request for an area event.

R-GMLC address

See definition in clause 7.6.2. The parameter shall be included if the parameter was received from the UE and if the Subscriber Location Report is the response to a deferred MT location request for an area event.

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.

Provider error

These are defined in clause 7.6.1.

******* Next Changed Section *******

17.7.13 Location service data types

```
MAP-LCS-DataTypes {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-LCS-DataTypes (25) version9 (9)}

DEFINITIONS
IMPLICIT TAGS
::=
BEGIN

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

IMPORTS
   AddressString,
   ISDN-AddressString,
   IMEI,
   IMSI,
   LMSI,
   SubscriberIdentity,
   AgeOfLocationInformation,
   LCSClientExternalID,
   LCSClientInternalID,
   LCSServiceTypeID,
   CellGlobalIdOrServiceAreaIdOrLAI
FROM MAP-CommonDataTypes {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-CommonDataTypes (18) version9 (9)}

   ExtensionContainer
FROM MAP-ExtensionDataTypes {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version9 (9)}

   USSD-DataCodingScheme,
   USSD-String
FROM MAP-SS-DataTypes {
   itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1) modules (3)
   map-SS-DataTypes (14) version9 (9)}

   APN,
   GSN-Address,
   SupportedLCS-CapabilitySets
FROM MAP-MS-DataTypes {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-MS-DataTypes (11) version9 (9)}

   Additional-Number
FROM MAP-SM-DataTypes {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-SM-DataTypes (16) version9 (9)}
;
```

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

```
RoutingInfoForLCS-Res ::= SEQUENCE {
     targetMS                          [0] SubscriberIdentity,
     lcsLocationInfo                   [1] LCSLocationInfo,
     extensionContainer                [2] ExtensionContainer          OPTIONAL,
     ...,
     v-gmlc-Address                    [3]  GSN-Address                OPTIONAL,
     h-gmlc-Address                    [4]  GSN-Address                OPTIONAL,
     ppr-Address                       [5]  GSN-Address                OPTIONAL }
```

```
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,
     supportedLCS-CapabilitySets       [4]  SupportedLCS-CapabilitySets  OPTIONAL,
     additional-LCS-CapabilitySets     [5]  SupportedLCS-CapabilitySets  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,
     lcs-ReferenceNumber               [10] LCS-ReferenceNumber        OPTIONAL,
     lcsServiceTypeID                  [11] LCSServiceTypeID           OPTIONAL,
     lcsCodeword                       [12] LCSCodeword                OPTIONAL,
     lcs-PrivacyCheck                  [13] LCS-PrivacyCheck           OPTIONAL,
     areaEventInfo                     [14] AreaEventInfo              OPTIONAL,
     h-gmlc-Address                    [15] GSN-Address                OPTIONAL,
     r-gmlc-Address                    [16] GSN-Address                OPTIONAL }

     -- one of imsi or msisdn is mandatory
     -- If a location estimate type indicates activate deferred location or cancel deferred
     -- location, a lcs-Reference number shall be included.
```

```
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) ,
     enteringIntoArea                  (1),
     leavingFromArea                   (2),
     beingInsideArea                   (3) } (SIZE (1..16))
-- beingInsideArea is always treated as oneTimeEvent regardless of the possible value
-- of occurrenceInfo inside areaEventInfo.
-- 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,
    ...,
    lcs-FormatIndicator                 [3] LCS-FormatIndicator          OPTIONAL }

-- 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,
    ...,
    lcs-FormatIndicator                 [2] LCS-FormatIndicator          OPTIONAL }
```

```
RequestorIDString ::= USSD-String (SIZE (1..maxRequestorIDStringLength))
```

```
maxRequestorIDStringLength  INTEGER ::= 63
```

```
LCS-FormatIndicator ::= ENUMERATED {
    logicalName                         (0),
    e-mailAddress                       (1),
    msisdn                              (2),
    url                                 (3),
    sipUrl                              (4),
    ... }
```

```
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 3GPP 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 3GPP 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 3GPP TS 23.032 it supports.
-- exception handling: bits 7 to 15 shall be ignored if received.
```

```
LCS-ReferenceNumber::= OCTET STRING (SIZE(1))
```

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

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

```
maxLCSCodewordStringLength  INTEGER ::= 20
```

```
LCS-PrivacyCheck ::= SEQUENCE {
     callSessionUnrelated                [0] PrivacyCheckRelatedAction,
     callSessionRelated                  [1] PrivacyCheckRelatedAction     OPTIONAL,
     ...}
```

```
PrivacyCheckRelatedAction ::= ENUMERATED {
     allowedWithoutNotification (0),
     allowedWithNotification (1),
     allowedIfNoResponse (2),
     restrictedIfNoResponse (3),
     notAllowed (4),
     ...}
--   exception handling:
--   a ProvideSubscriberLocation-Arg containing an unrecognized PrivacyCheckRelatedAction
--   shall be rejected by the receiver with a return error cause of unexpected data value
```

```
AreaEventInfo ::= SEQUENCE {
     areaDefinition                      [0]  AreaDefinition,
     occurrenceInfo                      [1]  OccurrenceInfo               OPTIONAL,
     intervalTime                        [2]  IntervalTime                 OPTIONAL,
     ...}
```

```
AreaDefinition ::= SEQUENCE {
     areaList                            [0]  AreaList,
     ...}
```

```
AreaList ::= SEQUENCE SIZE (1..maxNumOfAreas) OF Area
```

```
maxNumOfAreas  INTEGER ::= 10
```

```
Area ::= SEQUENCE {
     areaType                            [0]  AreaType,
     areaIdentification                  [1]  AreaIdentification,
     ...}
```

```
AreaType ::= ENUMERATED {
     countryCode                        (0),
     plmnId                             (1),
     locationAreaId                     (2),
     routingAreaId                      (3),
     cellGlobalId                       (4),
     ...}
```

```
AreaIdentification ::= OCTET STRING (SIZE (2..7))
     -- The internal structure is defined as follows:
     -- octet 1 bits 4321               Mobile Country Code 1st digit
     --         bits 8765               Mobile Country Code 2nd digit
     -- octet 2 bits 4321               Mobile Country Code 3rd digit
     --         bits 8765               Mobile Network Code 3rd digit if 3 digit MNC included
     --                                 or filler (1111)
     -- octet 3 bits 4321               Mobile Network Code 1st digit
     --         bits 8765               Mobile Network Code 2nd digit
     -- octets 4 and 5                  Location Area Code (LAC)
     -- octet 6                         Routing Area Code (RAC) for Routing Area Id
     -- octets 6 and 7                  Cell Identity (CI) for Cell Global Id
```

```
OccurrenceInfo ::= ENUMERATED {
     oneTimeEvent                       (0),
     multipleTimeEvent                  (1),
     ...}
```

```
IntervalTime ::= INTEGER (1..32767)
     -- minimum interval time between area reports in seconds
```

```
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,
     geranPpositioningData              [4] PositioningDataInformation    OPTIONAL,
     utranPositioningData               [x] UtranPositioningDataInfo      OPTIONAL,
     cellIdOrSai                        [5] CellGlobalIdOrServiceAreaIdOrLAI   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 3GPP TS 23.032.
    -- This is composed of 1 or more octets with an internal structure according to
    -- 3GPP TS 23.032
    -- Octet 1: Type of shape, only the following shapes in 3GPP 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 3GPP 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 3GPP TS 23.032 to be included in later
    -- versions of 3GPP TS 29.002
```

```
PositioningDataInformation ::= OCTET STRING (SIZE (2..maxPositioningDataInformation))
    -- Refers to the Positioning Data defined in 3GPP TS 49.031 for GERAN or 3GPP TS 25.413
    -- for UTRAN.
    -- This is composed of 2 or more octets with an internal structure according to
    -- 3GPP TS 49.031 for GERAN and 25.413 for UTRAN. Note that the internal structure
    -- of the parameter is identical for GERAN and UTRAN, but the defined code points differ
    -- for GERAN and UTRAN to allow for Radio Technology specific location methods.
```

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

```
UtranPositioningDataInfo ::= OCTET STRING (SIZE (3..maxUtranPositioningDataInfo))
    -- Refers to the Position Data defined in 3GPP TS 25.413.
    -- This is composed of the positioningDataDiscriminator and the positioningDataSet
    -- included in positionData as defined in 3GPP TS 25.413.
```

```
maxUtranPositioningDataInfo INTEGER ::= 11
     --
```

```
Add-GeographicalInformation ::= OCTET STRING (SIZE (1..maxAdd-GeographicalInformation))
     -- Refers to geographical Information defined in 3GPP TS 23.032.
     -- This is composed of 1 or more octets with an internal structure according to
     -- 3GPP TS 23.032
     -- Octet 1: Type of shape, all the shapes defined in 3GPP TS 23.032 are allowed:
     -- Octets 2 to n (where n is the total number of octets necessary to encode the shape
     -- according to 3GPP TS 23.032) are used to encode the shape itself in accordance with
the
     -- encoding defined in 3GPP 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
     -- 3GPP TS 23.032 or an incorrect number of octets or coding according to
     -- 3GPP 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 3GPP 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,
     lcs-ReferenceNumber                [10] LCS-ReferenceNumber          OPTIONAL,
     geranPpositioningData              [11] PositioningDataInformation   OPTIONAL,
     utranPositioningData               [x] UtranPositioningDataInfo      OPTIONAL,
     na-ESRK-Request                    [12] NULL                         OPTIONAL,
     cellIdOrSai                        [13] CellGlobalIdOrServiceAreaIdOrLAI  OPTIONAL,
     h-gmlc-Address                     [14] GSN-Address                  OPTIONAL,
     r-gmlc-Address                     [15] GSN-Address                  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.
     -- If a lcs event indicates deferred mt-lr response, the lcs-Reference number shall be
     -- included.
```

```
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,
     ...,
     na-ESRK                             [0] ISDN-AddressString            OPTIONAL }
```

```
END
```