

Agenda item:**Source:** TSG_N WG2**Title:** CRs to GSM 03.03, 03.07, 03.08, 03.16, 09.02, 3G TS 23.003, 23.007, 23.008, 23.016, 29.002 (Work Item Location Services)**Introduction:**

This document contains **10** CRs on **Work Item Location Services** agreed by **TSG_N WG2** and forwarded to **TSG_N Plenary** meeting #6 for approval.

TDoc	Spec	CR	Rev	Ph.	Cat	Old v.	New v.	Subject
N2-99K44	03.03	A034		R98	C	7.2.1	7.3.0	Support of VLR and HLR Data Restoration procedures with LCS
P-99-700	03.07	A009	1	R98	C	7.0.0	7.1.0	Support of VLR and HLR Data Restoration procedures with LCS
N2-99K46	03.08	A029		R98	C	7.1.0	7.2.0	Organization of Subscriber Data for LCS
N2-99K48	03.16	A038		R98	C	7.1.0	7.2.0	Support of Subscriber Data Management in the HLR and VLR for LCS
P-99-702	09.02	A273	1	R98	C	7.2.0	7.3.0	MAP Impacts for Location Services (LCS)
N2-99H65	23.003	011		R99	A	3.2.1	3.3.0	Support of VLR and HLR Data Restoration procedures with LCS
N2-99H89	23.007	003		R99	B	3.1.3	3.2.0	Support of VLR and HLR Data Restoration procedures with LCS
N2-99K56	23.008	011		R99	A	3.1.0	3.2.0	Organisation of subscriber data for LCS
N2-99H66	23.016	006		R99	A	3.2.1	3.3.0	Support of Subscriber Data Management in the HLR and VLR for LCS
N2-99K52	29.002	060	1	R99	A	3.2.0	3.3.0	MAP Impacts for Location Services (LCS)

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

03.03 CR A034

Current Version: **7.1.1**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **CN#06**
list expected approval meeting # here ↑

for approval
for information

strategic
non-strategic (for SMG use only)

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: <ftp://ftp.3gpp.org/Information/CR-Form-v2.doc>

Proposed change affects: (U)SIM ME UTRAN / Radio Core Network
(at least one should be marked with an X)

Source: TSG N2 **Date:** 5 Nov 1999

Subject: Support of VLR and HLR Data Restoration procedures with LCS

Work item: Location Services (LCS)

Category: <small>(only one category shall be marked with an X)</small>	Correction	<input type="checkbox"/>	Release:	Phase 2	<input type="checkbox"/>
	Corresponds to a correction in an earlier release	<input type="checkbox"/>		Release 96	<input type="checkbox"/>
	Addition of feature	<input type="checkbox"/>		Release 97	<input type="checkbox"/>
	Functional modification of feature	<input checked="" type="checkbox"/>		Release 98	<input checked="" type="checkbox"/>
	Editorial modification	<input type="checkbox"/>		Release 99	<input type="checkbox"/>
			Release 00	<input type="checkbox"/>	

Reason for change: Add new SCCP SSNs for LCS

Clauses affected: 8

Other specs affected:	Other 3G core specifications	<input type="checkbox"/>	→ List of CRs:	
	Other GSM core specifications	<input type="checkbox"/>	→ List of CRs:	
	MS test specifications	<input type="checkbox"/>	→ List of CRs:	
	BSS test specifications	<input type="checkbox"/>	→ List of CRs:	
	O&M specifications	<input type="checkbox"/>	→ List of CRs:	

Other comments: The MAP SSN for the SMLC is no longer needed. SSNs to support BSSAP-LE signaling (as defined in GSM 09.31) are needed for the SMLC, MSC and BSC

8 SCCP subsystem numbers

Subsystem numbers are used to identify applications within network entities which use SCCP signalling. In GSM, subsystem numbers may be used between PLMNs, in which case they are taken from the globally standardised range (1 - 31) or the part of the national network range (129 - 150) reserved for GSM use between PLMNs, or within a PLMN, in which case they are taken from the part of the national network range (32 - 128 & 151 - 254) not reserved for GSM use between PLMNs.

8.1 Globally standardised subsystem numbers used for GSM

The following globally standardised subsystem numbers have been allocated for use by GSM:

- 0000 0110 HLR (MAP);
- 0000 0111 VLR (MAP);
- 0000 1000 MSC (MAP);
- 0000 1001 EIR (MAP);
- 0000 1010 is allocated for evolution (possible Authentication centre).

8.2 National network subsystem numbers used for GSM

The following national network subsystem numbers have been allocated for use within GSM networks:

- 1111 1010 BSC (BSSAP-LE)
- 1111 1011 MSC (BSSAP-LE)
- 1111 1100 SMLC (BSSAP-LE)
- 1111 1101 BSS O&M (A interface);
- 1111 1110 BSSAP (A interface).

The following national network subsystem numbers have been allocated for use within and between GSM networks:

- ~~1001 0000 SMLC(MAP);~~
- 1001 0001 GMLC(MAP);
- 1001 0010 CAP;
- 1001 0011 gsmSCF(MAP);
- 1001 0100 SIWF(MAP);
- 1001 0101 SGSN(MAP);
- 1001 0110 GGSN(MAP).

CHANGE REQUEST

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03.07 CR A009r1 Current Version: **7.0.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **SMG#30**
list expected approval meeting # here ↑

for approval
for information

strategic
non-strategic (for SMG use only)

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: <http://ftp.3gpp.org/Information/CR-Form-v2.doc>

Proposed change affects: (U)SIM ME UTRAN / Radio Core Network
(at least one should be marked with an X)

Source: T1P1.5 **Date:** 5 Nov 1999

Subject: Support of VLR and HLR Data Restoration procedures with LCS

Work item: Location Services (LCS)

Category: Correction **Release:** Phase 2
(only one category shall be marked with an X) Corresponds to a correction in an earlier release
Addition of feature Release 96
Functional modification of feature Release 97
Editorial modification Release 98
Release 99
Release 00

Reason for change: Modify data restoration procedures for the new LCS phase 2 architecture.

Clauses affected: 1, 3, 4, 12, 13

Other specs affected: Other 3G core specifications → List of CRs:
Other GSM core specifications → List of CRs:
MS test specifications → List of CRs:
BSS test specifications → List of CRs:
O&M specifications → List of CRs:

Other comments: Changes made in this revision of the CR (editorial only) are shown with yellow highlighting.

1 Scope

The data stored in location registers are automatically updated in normal operation; the main information stored in a location register defines the location of each mobile station and the subscriber data required to handle traffic for each mobile subscriber. The loss or corruption of these data will seriously degrade the service offered to mobile subscribers; it is therefore necessary to define procedures to limit the effects of failure of a location register, and to restore the location register data automatically. The present document defines the necessary procedures.

The basic principle is that restoration should be based on radio contact to avoid faulty data being spread in the system.

Subscriber data for supplementary services must also be correctly restored, although the impact on service of corruption of supplementary service data is less severe.

Procedures for supporting these functions are defined in GSM 09.02 and 09.60.

The MAP operation "IMSI Attach" is used only in MAP version 1; in MAP version 2 the same function is performed by the MAP operation "Update Location Area". References in this specification to IMSI attach apply only to MAP version 1 network entities.

If the restoration of subscriber data in the VLR is triggered by Location Updating or IMSI Attach, the VLR retrieves subscriber data from the HLR by sending an "Update Location" request, which triggers one or more "Insert Subscriber Data" operations from the HLR. The "Update Location" request may also be used to send the LMSI to the HLR.

If the restoration of subscriber data in the VLR is triggered by a "Provide Roaming Number" request, the behaviour of the VLR depends on whether it is implemented according to MAP version 1 or MAP version 2. For MAP version 2, the VLR retrieves subscriber data from the HLR by sending a "Restore Data" request, which triggers one or more "Insert Subscriber Data" operations from the HLR. The "Restore Data" request is also used to send the LMSI to the HLR. For MAP version 1, the VLR retrieves subscriber data from the HLR by sending a "Send Parameters" request with parameter type "Subscriber Data", which cannot be used to send the LMSI to the HLR.

The VLR number and MSC number in the subscriber data in the HLR are updated by the "Update Location" procedure.

The GGSN (Gateway GPRS Support Node) is the point of PDN interconnection with the GSM PLMN supporting GPRS. The GGSN contains routing information for GPRS users with a PDP context active. The necessary procedures needed to restore GGSN data information after a restart are described in this document.

The SGSN (Serving GPRS Support Node) is the node that is serving the MS. The SGSN stores information regarding e.g. mobility management, routing and security. The necessary procedures needed to restore this SGSN information after a restart are described in this document.

~~The~~ A Type A LMU (Location Measurement Unit) is a network node, accessed over the GSM air interface, that is functionally similar to an MS. All requirements associated with a non-GPRS MS in this specification apply also to ~~an~~ A Type A LMU except where specified otherwise.

1.1 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.
- For this Release 1998 document, references to GSM documents are for Release 1998 versions (version 7.x.y).

[1] GSM 01.04: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".

- [2] GSM 03.05: "Digital cellular telecommunication system (Phase 2+): Technical performance objectives".
- [3] GSM 03.18: "Digital cellular telecommunications system (Phase 2+); Basic call handling; Technical realization".
- [4] GSM 03.22: "Digital cellular telecommunications system (Phase 2+); Functions related to Mobile Station (MS) in idle mode and group receive mode".
- [5] GSM 03.40: "Digital cellular telecommunications system (Phase 2+); Technical realization of the Short Message Service (SMS) Point-to-Point (PP)".
- [6] GSM 03.60: "Digital cellular telecommunication system (Phase 2+); Stage 2 Service Description of the General Packet Radio Service (GPRS)".
- [6a] GSM 03.71: "Digital cellular telecommunications system (Phase 2+); Location Services (LCS); Functional Description; Stage 2".
- [7] GSM 09.02: "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification".
- [8] GSM 09.18: "Digital cellular telecommunications system (Phase 2+); Serving GPRS Support Node (SGSN) - Visitors Location Register (VLR); Gs interface layer 3 specification".
- [9] GSM 09.60: "Digital cellular telecommunication system (Phase 2+); General Packet radio Service (GPRS); GPRS Tunneling Protocol (GTP) across the Gn and Gp Interface".
- [10] GSM 12.07: "Digital cellular telecommunications system (Phase 2); Operations and performance management".

1.2 Abbreviations

Abbreviations used in the present document are listed in GSM 01.04.

3 Restoration indicators in location registers and in GPRS support nodes

3.1 Restoration Indicators in the VLR

Three restoration indicators are provided in the VLR for each IMSI record: "Confirmed by Radio Contact", "Subscriber Data Confirmed by HLR" and "Location Information Confirmed in HLR". ~~A further restoration indicator is provided in the VLR for each IMSI record belonging to an LMU: "Location Information Confirmed in SMLC".~~

The indicator "Confirmed by Radio Contact" indicates whether the VLR's record of location area identity and MSC number for the mobile station is confirmed by radio contact.

The indicator "Confirmed by Radio Contact" in an IMSI record is set to the initial value "Not Confirmed" when the VLR receives a "Provide Roaming Number" request, an "Update Location Area" request or an "IMSI Attach" request for an MS for which the VLR does not have an IMSI record. The indicator "Confirmed by Radio Contact" in an IMSI record is also set to the initial value "Not Confirmed" when the VLR receives a Reset indication message from the SGSN serving the MS if the MS is attached to both GPRS and non-GPRS services.

The indicator "Confirmed by Radio Contact" is set to "Confirmed" when the radio contact that has been established with the MS is authenticated.

The indicator "Subscriber Data Confirmed by HLR" indicates whether the subscriber data set for the mobile station held by the VLR is consistent with that held by the HLR.

The indicator "Subscriber Data Confirmed by HLR" is set to the initial value "Not Confirmed" when the VLR receives a "Provide Roaming Number" request, an "Update Location Area" request or an "IMSI Attach" request for an MS for which the VLR does not have an IMSI record.

The indicator "Subscriber Data Confirmed by HLR" is set to "Confirmed" at either of the following events:

- The VLR successfully performs an "Update Location" to the HLR;
- The VLR successfully performs a "Restore Data" operation to the HLR.

The indicator "Location Information Confirmed in HLR" indicates whether the HLR's record of VLR number and MSC number for the mobile station is confirmed by radio contact.

The indicator "Location Information Confirmed in HLR" is set to "Not Confirmed" at any of the following events:

- The VLR receives an "Update Location Area" request or an "IMSI Attach" request for an MS for which the VLR has no IMSI record;
- A VLR which serves two or more MSCs receives a "Provide Roaming Number" request for an MS for which the VLR has no IMSI record;
- The VLR receives a "Reset" message from the HLR with which the MS is registered.

The indicator "Location Information Confirmed in HLR" is set to "Confirmed" at either of the following events:

- A VLR which serves only one MSC receives a "Provide Roaming Number" request for an MS for which the VLR has no IMSI record;
- Successful completion of the "Update Location" procedure triggered by authenticated radio contact.

~~The indicator "Location Information Confirmed in SMLC" indicates whether an SMLC's record of MSC number for a particular LMU is confirmed by radio contact.~~

The indicator "Location Information Confirmed in SMLC" is set to "Not Confirmed" at any of the following events:

- The VLR receives an "Update Location Area" request or an "IMSI Attach" request for an MS for which the VLR has no IMSI record. The indicator, in this case, becomes valid only if HLR subscriber data later indicates an LMU.
- The VLR receives an "LCS Reset" message from an SMLC where the message is targetted to either a specific LMU or all LMUs registered with the SMLC.
- The VLR receives an "IMSI Detach" from an LMU that is registered with an SMLC

The indicator "Location Information Confirmed in SMLC" is set to "Confirmed" at the following event:

- Successful completion of the "LCS Registration" procedure triggered by a successful location update
- Successful transfer of an LCS Information message from an SMLC to the LMU

3.2 Restoration Indicators in the HLR

As an implementation option, one restoration indicator may be provided in the HLR for each IMSI record: "Check SS".

The "Check SS" indicator is set to "Check Required" when the HLR restarts after a failure.

The "Check SS" indicator is checked whenever the HLR receives an "Update Location" request from a VLR. If it is set to "Check Required", after successful completion of subscriber data retrieval that ran embedded in the "Update Location" procedure the HLR sends a "Forward Check SS Indication" request message to the VLR and sets the "Check SS" indicator to "Check Not Required".

3.3 Restoration Indicators in the SGSN

Two restoration indicators are provided in the SGSN for each IMSI record: "Subscriber Data Confirmed by HLR" and "Location Information Confirmed in HLR".

The indicator "Subscriber Data Confirmed by HLR" indicates whether the subscriber data set for the mobile station held by the SGSN is consistent with that held by the HLR.

The indicator "Subscriber Data Confirmed by HLR" is set to the initial value "Not Confirmed" when the SGSN receives a Routing Area Update request or an IMSI- and/or GPRS Attach request for an MS for which the SGSN does not have an IMSI record.

The indicator "Subscriber Data Confirmed by HLR" is set to "Confirmed" at the following event:

- The SGSN successfully performs an Update GPRS Location to the HLR;

The indicator "Location Information Confirmed in HLR" indicates whether the HLRs record of the SGSN address for the mobile station is confirmed by radio contact.

The indicator "Location Information Confirmed in HLR" is set to "Not Confirmed" at any of the following events:

- The SGSN receives a Routing Area Update request or an IMSI- and/or GPRS Attach request for an MS for which the SGSN has no IMSI record;
- The SGSN receives a "Reset" message from the HLR with which the MS is registered.

The indicator "Location Information Confirmed in HLR" is set to "Confirmed" at the following event:

- Successful completion of the Update GPRS Location procedure to the HLR.

The indicator "VLR-Reliable" indicates whether the VLR serving the MS has performed a restart.

The indicator "VLR-Reliable" is set to the value "false" when the SGSN receives a Reset indication message from the VLR serving the MS if the MS is attached to both GPRS and non-GPRS services. The indicator "VLR-Reliable" is set

to the value "true" when the SGSN receives a confirmation from a VLR that a location update procedure to the affected VLR has been successfully performed.

The indicator "SGSN-Reset" indicates whether the SGSN has recently experienced a restart.

The indicator "SGSN-Reset" is set to the value "true" when the SGSN suffers a restart. This indicator is unique per SGSN. The indicator "SGSN-Reset" is set to the value "false" after a certain time specified by the operator. The value of the timer controlling the reset of the "SGSN-Reset" indicator shall be longer than the periodic routing area update timer value used by the MSs.

4 Restoration of data in the VLR

The effect on service of failure of a VLR is different from the effect of failure of an HLR. The procedures for restoration of a VLR and an HLR are therefore different.

4.1 Restart of the VLR

When a VLR restarts after a failure, all IMSI records affected by the failure are erased.

There will be no subscriber data or location information stored for an affected mobile station until after the VLR has received either a "Provide Roaming Number" request or an "Update location Area" request for that mobile station.

The VLR causes all affected TMSIs and all affected LMSIs to become invalid. "Invalid" in this context means that the TMSI and LMSI can no longer be regarded as accurate. The term is used to avoid unnecessary constraints on the implementation.

On receipt of either a "Provide Roaming Number" request or an "Update Location Area" request, restoration of subscriber data in the VLR is triggered individually for each IMSI record as described below.

4.2 Restoration Procedures

The objective of the restoration procedure is to handle all traffic for each mobile subscriber correctly. In order to meet this objective, the procedure must make the subscriber data in the VLR consistent with that in the HLR, and make the location information in the HLR and VLR reflect accurately the current location of the MS. ~~For an LMU, the procedure must also make the location information in the SMLC reflect accurately the current serving location of the LMU.~~

4.2.1 Incoming Call

a) Send Routing Information (GMSC->HLR)

The HLR sends "Provide Roaming Number" to the VLR as for normal operation. The LMSI is updated by the VLR when the VLR requests the transfer of subscriber data from the HLR using the "Restore Data" operation.

b) Provide Roaming Number (HLR->VLR)

- Regardless of whether the VLR has an IMSI record corresponding to the IMSI in the "Provide Roaming Number", it returns an MSRN. If no IMSI record exists, the VLR creates a skeleton IMSI record, sets the indicators "Subscriber Data Confirmed by Radio Contact" and "Confirmed by HLR" to "Not Confirmed" and (if IMSI Attach is used) marks the IMSI as attached. If the VLR serves two or more MSCs, the VLR sets the indicator "Location Information Confirmed in HLR" to "Not Confirmed". Otherwise, if the VLR serves only one MSC, the indicator "Location Information Confirmed in HLR" is set to the initial value "Confirmed".
- If the indicator "Subscriber Data Confirmed by HLR" is "Not Confirmed" the VLR requests authentication data, if required and still not available and subscriber data from the HLR. When the dialogue that covers the subscriber data retrieval procedure is completed successfully, the VLR sets the indicator "Subscriber Data Confirmed by HLR" to "Confirmed". The indicators "Confirmed by Radio Contact" and "Location Information Confirmed in HLR" remain unchanged.
- If the IMSI record for the MS is marked "Subscriber Data Confirmed by HLR" but "Not Confirmed by Radio Contact" the operator may choose an appropriate method to limit the number of "Search for MS" procedures for that MS.
- ~~If subscriber data from the HLR indicates an LMU, the indicator "Location Information Confirmed in SMLC" becomes applicable and is set to "not confirmed". The means by which this indicator is set to "confirmed" are described under "Incoming LCS Information Request" and "Outgoing LMU Request".~~

c) Send Information for I/C Call Setup (MSC->VLR)

- If the VLR has no IMSI record, or if the record is marked "Subscriber Data Not Confirmed by HLR" the VLR returns a "System Failure" error.
- If the VLR has an IMSI record marked "Subscriber Data Confirmed by HLR" and "Not Confirmed by Radio Contact", the VLR handles the request in the normal way, except that the "Search for MS" procedure is used instead of the "Page MS" procedure.
- If the VLR has an IMSI record marked "Subscriber Data Confirmed by HLR" and "Confirmed by Radio Contact", the VLR handles the request in the normal way; for this MS, VLR restoration is complete.
- The state of the indicator "Location Information Confirmed in HLR" does not affect the "Send Information for I/C Call Setup" procedure.

d) Process Access Request in Response to Search (MSC->VLR)

- If the MS responds to paging, the MSC sends a positive response to the search request and a "Process Access Request" to the VLR. After successful authentication, if required, the VLR sets the indicator "Confirmed by Radio Contact" to "Confirmed", sets the location area information for the MS, and handles the request in the normal way.
- The VLR checks the indicator "Location Information Confirmed in HLR". If it indicates "Not Confirmed" the VLR starts an "Update Location" procedure to the HLR. When this procedure is successfully completed the VLR sets the indicator "Location Information Confirmed in HLR" to "Confirmed".

For this MS, VLR restoration is complete.

4.2.2 Mobile Terminated Short Message

a) Send Routing Information for MT SMS (SMS-GMSC->HLR)

The HLR returns the MSC number as for normal operation.

b) Send Information for MT SMS (MSC->VLR) - MAP version 2

- If the VLR has no IMSI record, or if the record is marked "Subscriber Data Not Confirmed by HLR" the VLR returns an "Unidentified Subscriber" error. This causes the MSC to report a short message delivery failure, with cause "Unidentified Subscriber", to the SMS gateway MSC. The Gateway MSC sends a "Report SM Delivery Status" request, with a cause of "Absent Subscriber", to the HLR. This causes the HLR to set the "Mobile Station Not Reachable Flag" for the MS, as described in Technical Specifications GSM 03.40 and GSM 09.02.
- If the VLR has an IMSI record marked "Subscriber Data Confirmed by HLR" and "Not Confirmed by Radio Contact", the VLR handles the request in the normal way, except that the "Search for MS" procedure is used instead of the "Page MS" procedure.
- If the VLR has an IMSI record marked "Subscriber Data Confirmed by HLR" and "Confirmed by Radio Contact", the VLR handles the request in the normal way; for this MS, VLR restoration is complete.
- The state of the indicator "Location Information Confirmed in HLR" does not affect the "Send Information for MT SMS" procedure.

c) Send Information for I/C Call Setup (MSC->VLR) - MAP version 1

- If the VLR has no IMSI record, or if the record is marked "Subscriber Data Not Confirmed by HLR" the VLR returns a "System Failure" error. This causes the MSC to report a short message delivery failure, with cause "System Failure", to the SMS gateway MSC.
- If the VLR has an IMSI record marked "Subscriber Data Confirmed by HLR" and "Not Confirmed by Radio Contact", the VLR handles the request in the normal way, except that the "Search for MS" procedure is used instead of the "Page MS" procedure.
- If the VLR has an IMSI record marked "Subscriber Data Confirmed by HLR" and "Confirmed by Radio Contact", the VLR handles the request in the normal way; for this MS, VLR restoration is complete.

- The state of the indicator "Location Information Confirmed in HLR" does not affect the "Send Information for MT SMS" procedure.

d) Process Access Request in Response to Search (MSC->VLR)

- If the MS responds to paging, the MSC sends a positive response to the search request and a "Process Access Request" to the VLR. After successful authentication, if required, the VLR sets the indicator "Confirmed by Radio Contact" to "Confirmed", sets the location area information for the MS, and handles the request in the normal way.
- The VLR checks the indicator "Location Information Confirmed in HLR". If it indicates "Not Confirmed" the VLR starts an "Update Location" procedure to the HLR. When this procedure is successfully completed, the VLR sets the indicator "Location Information Confirmed in HLR" to "Confirmed".

For this MS, VLR restoration is complete.

4.2.3 Mobile Terminating Location Request (MT-LR)

Receipt of an MT-LR for a target MS identified by its IMSI in a serving MSC during VLR restoration is supported by the procedures below.

a) Provide Subscriber Location (GMLC->MSC/VLR)

- If the VLR has no IMSI record, or if the record is marked "Subscriber Data Not Confirmed by HLR" the VLR returns an "Unidentified Subscriber" error. This causes the MSC to report a location failure, with cause "Unidentified Subscriber", to the GMLC.
- If the VLR has an IMSI record marked "Subscriber Data Confirmed by HLR" and "Not Confirmed by Radio Contact", the VLR handles the request in the normal way, except that the "Search for MS" procedure is used instead of the "Page MS" procedure when paging for the MS.
- If the VLR has an IMSI record marked "Subscriber Data Confirmed by HLR" and "Confirmed by Radio Contact", the VLR handles the request in the normal way; for this MS, VLR restoration is complete.
- The state of the indicator "Location Information Confirmed in HLR" does not affect the "Provide Subscriber Location" procedure.

b) Process Access Request in Response to Search (MSC->VLR)

- If the MS responds to paging, the MSC sends a positive response to the search request and a "Process Access Request" to the VLR. After successful authentication, if required, the VLR sets the indicator "Confirmed by Radio Contact" to "Confirmed", sets the location area information for the MS, and handles the request in the normal way.
- The VLR checks the indicator "Location Information Confirmed in HLR". If it indicates "Not Confirmed" the VLR starts an "Update Location" procedure to the HLR. When this procedure is successfully completed, the VLR sets the indicator "Location Information Confirmed in HLR" to "Confirmed".

For this MS, VLR restoration is complete.

4.2.4 Incoming LCS Information Request

Receipt of an incoming ~~BSSMAP-LE LMU Connection Request~~ ~~LCS Information Request~~ from an SMLC directed to a specific Type A LMU is supported by the procedures below.

a) Request associated with an LMU (SMLC->MSC/VLR)

- If the VLR has no IMSI record, or if the record is marked "Subscriber Data Not Confirmed by HLR" ~~or if both the record is marked "Location Information not Confirmed in SMLC" and any IMSI supplied by the SMLC is incorrect~~, the VLR returns an "Unidentified Subscriber" error.

- If the VLR has an IMSI record for an LMU marked "Subscriber Data Confirmed by HLR" and "Not Confirmed by Radio Contact", the VLR handles the request in the normal way, except that the "Search for MS" procedure is used instead of the "Page MS" procedure when paging for the LMU.
- ~~If the VLR has an IMSI record marked "Subscriber Data Confirmed by HLR" and "Confirmed by Radio Contact" and "Location Information not Confirmed in SMLC", then if the VLR serves more than one MSC, the VLR verifies if the Location Area for the LMU belongs to the MSC to which the SMLC sent the LCS Information Request. If this is not verified, the VLR returns an "Unidentified subscriber" error. Otherwise, the VLR handles the request in the normal way and sets the "Location Information Confirmed in SMLC" indicator to "Confirmed". For this LMU, data restoration is complete.~~
- If the VLR has an IMSI record marked "Subscriber Data Confirmed by HLR" and "Confirmed by Radio Contact" and "Location Information Confirmed in SMLC", the VLR handles the request in the normal way. For this LMU, data restoration is complete.
- The state of the indicator "Location Information Confirmed in HLR" does not affect the incoming ~~LCS Information~~ LMU Connection Request.

b) Process Access Request in Response to Search (MSC->VLR)

- If the LMU responds to paging, the MSC sends a positive response to the search request and a "Process Access Request" to the VLR. After successful authentication, if required, the VLR sets the indicator "Confirmed by Radio Contact" to "Confirmed", ~~sets the indicator "Location Information Confirmed in SMLC" to "Confirmed" (if not already "Confirmed")~~, sets the location area information for the LMU, and handles the request in the normal way.
- The VLR checks the indicator "Location Information Confirmed in HLR". If it indicates "Not Confirmed" the VLR starts an "Update Location" procedure to the HLR. When this procedure is successfully completed, the VLR sets the indicator "Location Information Confirmed in HLR" to "Confirmed".

For this LMU, VLR restoration is complete.

4.2.5 Outgoing MS request

An outgoing request (MS originated call, mobile originated Short Message or call-independent supplementary service activity) from the MS causes the VLR to check its IMSI record for that MS.

- If the MS is unknown in this VLR (i.e. the VLR has no IMSI record for the MS) or there is an IMSI record marked "Subscriber Data Not Confirmed by HLR" the outgoing request is rejected with error cause "Unidentified Subscriber". This causes the MS to initiate the location registration procedure described below.
- If the VLR has an IMSI record for the MS marked "Subscriber Data Confirmed by HLR" the request is handled in the normal way, and after any necessary authentication and/or IMEI checking the record is marked "Confirmed by Radio Contact".
- The VLR checks the indicator "Location Information Confirmed in HLR". If it indicates "Not Confirmed" the VLR starts an "Update Location" procedure to the HLR. When this procedure is successfully completed the VLR sets the indicator "Location Information Confirmed in HLR" to "Confirmed".

For this MS, VLR restoration is complete.

4.2.6 Outgoing LMU Request

An outgoing request (CM ServiceRequest) for LCS from an Type A LMU causes the VLR to check its IMSI record for that LMU.

- If the LMU is unknown in this VLR (i.e. the VLR has no IMSI record for the LMU) or there is an IMSI record marked "Subscriber Data Not Confirmed by HLR" the outgoing request is rejected with error cause "Unidentified Subscriber". This causes the LMU to initiate the location registration procedure described below.
- ~~If the VLR has an IMSI record for the MS marked "Subscriber Data Confirmed by HLR" and "Location Information not Confirmed in SMLC", the outgoing request is rejected with the error cause "Not registered in SMLC". This causes the LMU to initiate the location registration procedure described below.~~
- ~~If the VLR has an IMSI record for the LMUMS marked "Subscriber Data Confirmed by HLR" and "Location Information Confirmed in SMLC", the request is handled in the normal way, and after any necessary authentication and/or IMEI checking the record is marked "Confirmed by Radio Contact".~~
- The VLR checks the indicator "Location Information Confirmed in HLR". If it indicates "Not Confirmed" the VLR starts an "Update Location" procedure to the HLR. When this procedure is successfully completed the VLR sets the indicator "Location Information Confirmed in HLR" to "Confirmed".

For this LMU, VLR restoration is complete.

4.2.7 Location Updating or IMSI Attach

A location registration request (location updating or IMSI attach) from an MS causes the VLR to check its IMSI record for that MS.

- If the MS is unknown in this VLR (i.e. the VLR has no IMSI record for the MS) the VLR creates a skeleton IMSI record for the MS and sets the indicators "Confirmed by Radio Contact", "Location Information Confirmed in HLR" and "Subscriber Data Confirmed by HLR" to "Not Confirmed". If authentication is required, the VLR retrieves authentication data. When the radio contact with the Mobile Station is authenticated, the VLR sets the indicator "Confirmed by Radio Contact" to "Confirmed". The VLR then performs an "Update Location" to the HLR. If this is successful, the VLR sets the indicators "Location Information Confirmed in HLR" and "Subscriber Data Confirmed by HLR" to "Confirmed". For this MS, VLR restoration is complete.
- If the VLR has an IMSI record for the MS, after successful authentication, if required, the VLR sets the indicator "Confirmed by Radio Contact" to "Confirmed". If the record is marked "Location Information Not Confirmed in HLR" or "Subscriber Data Not Confirmed by HLR" the VLR performs an "Update Location" to the HLR. If this is successful, the VLR sets the indicators "Location Information Confirmed in HLR" and "Subscriber Data Confirmed by HLR" to "Confirmed". For this MS, VLR restoration is complete.
- ~~If the VLR performs a successful "Update Location" and the IMSI record indicates an LMU with the indicator "Location Information Confirmed in SMLC" set to "Not Confirmed", the VLR performs an "LCS Registration" to the SMLC associated with either the IMSI or serving cell of the LMU. If this is successful, the VLR sets the indicator "Location Information Confirmed in SMLC" to "Confirmed". For this LMU, VLR restoration is complete.~~

4.2.8 Use of TMSI

After the VLR has restarted but before the next authenticated radio contact the TMSI known by the MS is invalid, as it was allocated before the VLR restarted. The VLR therefore uses the IMSI to identify the MS on the first radio contact during restoration.

- A VLR which initiates a "Search for Subscriber" procedure uses the IMSI to identify the MS.
- If an MS identifies itself by a TMSI in a "Location Registration" request, the VLR proceeds as follows:
 - a) The VLR checks the location area identity (LAI) of the previous location area sent by the MS. If this LAI is in a VLR different from the current one, the request is handled in the normal way.
 - b) If the LAI is in the current VLR, the status of the TMSI is checked.

- If the TMSI was allocated after the VLR restarted, and corresponds to a valid IMSI record, the request is handled as described in subclause 4.2.4.
- If the TMSI was allocated before the VLR restarted, or does not correspond to a valid IMSI record, the VLR requests the IMSI from the MS. If the MS returns an IMSI the VLR proceeds as described in subclause 4.2.4. If the MS does not return an IMSI the network aborts the location registration procedure.
- If an MS identifies itself by a TMSI in an outgoing MS request, the VLR proceeds as follows:
 - If the TMSI was allocated after the VLR restarted, and corresponds to a valid IMSI record, the request is handled as described in subclause 4.2.3.
 - If the TMSI was allocated before the VLR restarted, or does not correspond to a valid IMSI record, the VLR requests the IMSI from the MS. If the MS returns an IMSI the VLR proceeds as described in subclause 4.2.3. If the MS does not return an IMSI the network aborts the outgoing request.

4.2.9 SGSN associations

Based on configuration data, "Reset" messages are sent on the Gs-interface to the SGSNs in the Location Areas served by the VLR. The SGSNs mark all associations with the VLR as unreliable by setting the restoration indicator "VLR-Reliable" to "false" for the MSs served by that VLR. The associations will be re-initiated one by one by the SGSN at the next Routing Area update or combined RA/LA update from each MS.

12 Restoration of Data in an SMLC

12.1 Restart of an SMLC

When an SMLC restarts after a failure, it performs the following actions for those of its associated LMUs whose records have been affected by the fault:

- Reload all administered LMU data from non-volatile back-up
- ~~— Mark each LMU as “not registered”~~
- Reinitialize other temporary data for each LMU to indicate no ongoing measurement or diagnostic activities
- Perform data restoration for each affected Type A and Type B LMU as described below.
- ~~— Send an “LCS Reset” message containing no LMU identifier to each VLR where an LMU may be currently served~~

~~Any VLR receiving an “LCS Reset” containing no LMU identifier shall reset the indicator “Location Information Confirmed in SMLC” to “Not Confirmed” for each LMU registered with this SMLC. The VLR shall also request the serving MSC for each affected LMU to release any LCS signaling connection to this LMU with the cause “Not registered in SMLC”.~~

~~While the “Location Information Confirmed in SMLC” indicator remains “not Confirmed” for any LMU, the VLR shall react to any outgoing request from the LMU as follows~~

- ~~— For an outgoing request for LCS service, the VLR shall return an error response with cause “not registered in SMLC”. This shall cause the LMU to request a location update.~~
- ~~— For a location update request, the VLR shall behave as for a normal MS. Once any location update to the HLR is completed successfully, or if no location update to the HLR is needed, the VLR shall perform an “LCS Registration” to the SMLC. If this is successful, the indicator “Location Information Confirmed in SMLC” shall be set to “Confirmed”.~~

~~After an “LCS Registration” has been successfully completed, the SMLC may send an LCS Information Request to the LMU containing an LCS O&M Reset command. On receipt of this, the LMU shall cancel all active LCS measurement and O&M tasks previously ordered by the SMLC.~~

For this LMU, data restoration in the SMLC is complete.

12.2 Data Restoration for a Specific LMU

An SMLC may restore data for a specific LMU when the data in the SMLC or LMU is considered unreliable (e.g. if there is no communication between the SMLC and LMU for a long time or if messages received by the SMLC are inconsistent with the LMU state kept by the SMLC). To restore data for a specific LMU, the SMLC shall open a signaling connection to the LMU if this is Type A, as described in GSM 03.71. For both a Type A LMU and Type B LMU, the SMLC shall then send an LLP Reset message to the LMU. “LCS Reset” containing the identity of the LMU to the current serving VLR or to every VLR that may serve the LMU. On receiving an LLP Reset, an LMU shall cancel any LCS measurement and O&M tasks previously ordered by the SMLC and shall return an LLP Reset acknowledgment to the SMLC.

~~Any VLR receiving an “LCS Reset” containing a specific LMU identifier shall reset the indicator “Location Information Confirmed in SMLC” to “Not Confirmed” for this LMU and shall request the serving MSC to release any LCS signaling connection to this LMU with the cause “Not registered in SMLC”. Further actions by the MSC, LMU and SMLC are as described in section 12.1~~

13 Restoration of Data in an LMU

When an LMU restarts following a failure, it shall reinitialize all data concerning LCS measurement and O&M tasks to indicate that no tasks ordered by an SMLC are active. ~~The~~ A Type A LMU shall then perform an “IMSI Attach”. ~~Other actions are for further study.~~ A Type A LMU shall then open a signaling connection to its controlling SMLC as described in GSM 03.71. Both a Type A LMU and a Type B LMU shall send an LLP Status Update message to their controlling SMLC containing an indication that the LMU has restarted following a failure. The SMLC shall update its data regarding the state of the LMU and shall return an LLP Update Status acknowledgment to the LMU.

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

03.08 CR A029

Current Version: **7.1.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **CN#06**
list expected approval meeting # here ↑

for approval
for information

strategic
non-strategic (for SMG use only)

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: <ftp://ftp.3gpp.org/Information/CR-Form-v2.doc>

Proposed change affects: (U)SIM ME UTRAN / Radio Core Network
(at least one should be marked with an X)

Source: TSG N2 **Date:** 5 Nov 1999

Subject: Organization of Subscriber Data for LCS

Work item: Location Services (LCS)

Category: Correction **Release:** Phase 2
(only one category shall be marked with an X) Corresponds to a correction in an earlier release
Addition of feature Release 96
Functional modification of feature Release 97
Editorial modification Release 98
Release 99
Release 00

Reason for change: Change subscriber data for LCS

Clauses affected: 1, 2, 4

Other specs affected: Other 3G core specifications → List of CRs:
Other GSM core specifications → List of CRs:
MS test specifications → List of CRs:
BSS test specifications → List of CRs:
O&M specifications → List of CRs:

Other comments:

1 Introduction

1.1 Definition

The term subscriber data is used to designate all information associated with a subscription which is required for service provisions, identification, authentication, routing, call handling, GPRS mode transmission, charging, subscriber tracing, operation and maintenance purposes. Some subscriber data are referred to as permanent subscriber data, i.e. they can only be changed by administration means. Other data are temporary subscriber data which may change as a result of normal operation of the system.

Unless shown to be conditional, all data items are considered to be mandatory.

1.2 Storage facilities

The present document considers subscriber data stored in the following types of functional unit:

- Home location register (HLR) which contains all permanent subscriber data and all relevant temporary subscriber data for all mobile subscribers permanently registered in the HLR.
- Visitor location register (VLR) which contains all subscriber data required for call handling and other purposes for mobile subscribers currently located in the area controlled by the VLR.
- Serving GPRS Support Node (SGSN) which contains all subscriber data required for GPRS mode transmission and other purposes for mobile subscribers currently located in the area controlled by the SGSN.
- Gateway GPRS Support Node (GGSN) which contains all subscriber data required for GPRS mode transmission for mobile subscribers using any service provided by the GGSN.
- Gateway Mobile Location Center (GMLC) which contains all subscriber data required for external clients of the location services (LCS).
- Serving Mobile Location Center (SMLC) which contains all LMU data required to manage location measurements in LMUs. (Note: while a Type A LMU is a network entity, that it shares many of the attributes of an MS including subscription data in the HLR and identification using an IMSI).

In addition, subscriber data may also be stored in the following functional unit:

- Group Call Register (GCR) which contains all data required for configuration, set-up and handling of voice group and voice broadcast calls. This encompasses subscribers identities (mobile as well as fixed network) who are nominated as dispatchers for one or several groups within the area controlled by the GCR.

NOTE: The data stored in the GCR is not strictly “subscriber data”. Description of GCR data is therefore out of scope of the present document and is covered in the corresponding specifications for enhanced Multi Level Precedence and Pre-emption Service (eMLPP), Voice Group Call Service (VGCS) and Voice Broadcast Service (VBS) instead (GSM 03.67, GSM 03.68 and GSM 03.69).

1.3 Subscriber data in functional units other than the HLR, the VLR, the SGSN, the GGSN, the GMLC, the SMLC and the LMU

The individual Subscriber Authentication Key Ki defined in GSM 03.20 is stored in the Authentication Centre AuC; it is also stored in the SIM and therefore available in the MS. Version numbers of algorithms A3 and A8 may also be stored in the AuC.

NOTE: It is for further study whether or not other types of functional units containing mobile subscriber parameters are to be included in the present document. Such units could include encryption key distribution centres, maintenance centres, etc.

2 Definition of subscriber data

2.1 Data related to subscription, identification and numbering

2.1.1 Data defining the subscription profile

2.1.1.1 International Mobile Subscriber Identity (IMSI)

International mobile subscriber identity (IMSI) is defined in GSM 03.03.

IMSI is permanent subscriber data. IMSI is stored in HLR, VLR, SGSN, GGSN and SMLC. For Anonymous Access, IMSI is not used in SGSN nor in GGSN. The IMSI serves as the root of the subscriber data pseudo-tree.

2.1.1.2 Network Access Mode (NAM)

The Network Access Mode defines if the subscriber is registered to get access to the non-GPRS network, to the GPRS network or to both networks. NAM describes the first level of the subscriber data pseudo-tree below the IMSI root. It is permanent subscriber data stored in the HLR and the SGSN with the Gs interface option..

2.1.2 Mobile Station International ISDN Number (MSISDN)

Mobile Station International ISDN Number (MSISDN) is defined in GSM 03.03.

The MSISDN is permanent subscriber data and is stored in HLR, VLR and SGSN.

If the multinumbeing option applies, the MSISDN stored in the VLR and in the SGSN is the Basic MSISDN, see subclause 2.1.3.1.

2.1.3 MSISDNs for multinumbeing option

If the HPLMN allocates different MSISDNs for different Basic Services (see GSM 09.07), these numbers are conditionally stored as permanent data in the HLR.

2.1.3.1 The Basic MSISDN indicator

The Basic MSISDN is defined in GSM 03.12. The Basic MSISDN indicator marks the MSISDN to be used as Basic MSISDN.

It is permanent subscriber data stored conditionally in the HLR.

2.1.3.2 The MSISDN-Alert indicator

The MSISDN-Alert is defined in GSM 03.40. The MSISDN-Alert indicator marks the MSISDN to be used as MSISDN-Alert.

It is permanent subscriber data stored conditionally in the HLR.

2.1.4 Temporary mobile subscriber identity (TMSI)

Temporary mobile subscriber identity (TMSI) is defined in GSM 03.03.

The TMSI is temporary subscriber data and is conditionally stored in the VLR.

2.1.5 Packet-Temporary Mobile Subscriber Identity (P-TMSI)

Packet-Temporary Mobile Subscriber Identity (P-TMSI) is defined in GSM 03.03. Its usage is described in GSM 03.60. P-TMSI is accompanied by the P-TMSI Signature, cf. subclause 2.3.5.

The P-TMSI is temporary subscriber data and is conditionally stored in the SGSN.

2.1.6 Temporary Link Layer Identifier (TLLI)

Temporary Link Layer Identifier (TLLI) is defined in GSM 03.03. It is derived from the P-TMSI by the MS and occurs in the variants Local TLLI and Foreign TLLI. The TLLI is temporary subscriber data and is conditionally stored in the SGSN. For use of TLLI see GSM 03.60.

2.1.7 Random TLLI

Random TLLI is chosen randomly by the MS. It is defined in GSM 03.03. Random TLLI is short living temporary subscriber data and is conditionally stored in the SGSN. For use of Random TLLI see GSM 03.60.

A Random TLLI may be used if no valid P-TMSI is available.

2.1.8 Local Mobile Station Identity (LMSI)

Local Mobile Station Identity (LMSI) is defined in GSM 03.03. The LMSI is temporary subscriber data. The LMSI may be stored in the VLR; if it is received in the HLR or SMLC it must be stored there.

2.1.9 International Mobile Equipment Identity (IMEI)

International Mobile Equipment Identity (IMEI) is defined in GSM 03.03. The IMEI is temporary subscriber data and is conditionally stored in the SGSN.

2.2 Data related to Mobile Station types

2.2.1 Mobile Station Category

Mobile Station Category has a structure identical to that of "Calling Party's Category" defined in ISUP (CCITT Recommendation Q.763).

The following values of category shall be supported:

- ordinary subscriber.

The category is assigned per IMSI.

Mobile Station Category is permanent subscriber data and is stored in HLR and VLR.

2.2.2 LMU Identifier

The LMU identifier is part of the subscriber data for an Type A LMU, when associated with an NSS based SMLC, and serves to distinguish an Type A LMU from a normal MS.

**** NEXT MODIFIED SECTION ****

2.4 Data related to roaming

2.4.9 MLC number

The MLC number occurs as an SMLC number and as a GMLC number.

2.4.9.1 SMLC number

The SMLC number is the E.164 address of ~~the~~an NSS based SMLC.

The SMLC number is permanent data that may be stored in an MSC in association with either a set of IMSIs belonging to LMUs controlled by the SMLC or a set of cell identifiers belonging to the geographic area served by the SMLC.

2.4.9.2 GMLC number

The GMLC number is the E.164 address of the GMLC. One or more GMLC numbers may be stored in the MS subscriber data in the HLR and downloaded to the VLR. These GMLC numbers identify the ~~home-PLMN~~ GMLCs for the particular MS from which a location request for this MS may be confined for particular LCS clients.

**** NEXT MODIFIED SECTION ****

2.15 Data related to Location Services

2.15.1 Subscriber Data stored in HLR

2.15.1.1 Privacy Exception List

This data contains the privacy classes for any target MS which identify the LCS clients permitted to locate the MS. For a detailed definition of this data, refer to GSM 03.71.

2.15.1.2 ~~Home~~-GMLC Numbers

This data contains the ~~home-PLMN~~ GMLC addresses for an MS subscriber. These addresses may be used to verify that a location request from specific LCS clients is authorized for the~~has been sent from the home-PLMN of a target MS.~~

2.15.1.3 MO-LR List

This data contains the classes of MO-LR that are permitted for the MS subscriber. For a detailed definition of this data, refer to GSM 03.71.

2.15.2 Data stored in GMLC

The GMLC stores data related to LCS clients. Refer to GSM 03.71 for a detailed description.

2.15.3 Data stored in SMLC

The SMLC stores data related to associated Type A and Type B LMUs from which location measurements may be received. Refer to GSM 03.71 for a detailed description.

2.15.4 Data stored in LMU

The LMU stores data related to its LCS measurement and O&M capabilities and may store data related to LCS measurements and O&M reports that it is required to provide to its controlling SMLC. The nature and content of this data is not defined in GSM.

2.15.5 Data stored in the MSC

In order to support routing of connectionless LCS messages to an SMLC or a Type B LMU, the MSC may store permanent routing data for an SMLC or a Type B LMU in association with a specific location area identifier or location area identifier plus cell identifier.

2.15.6 Data stored in the BSC

In order to support routing of connectionless LCS messages to an SMLC or a Type B LMU, the BSC may store permanent routing data for an SMLC or a Type B LMU in association with a specific location area identifier or location area identifier plus cell identifier.

4 Accessing subscriber data

It shall be possible to retrieve or store subscriber data concerning a specific MS from the HLR by use of each of the following references:

- International Mobile Subscriber Identity (IMSI);
- Mobile Station ISDN Number (MSISDN)

It shall be possible to retrieve or store subscriber data concerning a specific MS from the VLR by use of each of the following references:

- International Mobile Subscriber Identity (IMSI);
- Temporary Mobile Subscriber Identity (TMSI).

It shall be possible to retrieve or store subscriber data concerning a specific MS from the SGSN by use of each of the following references:

- International Mobile Subscriber Identity (IMSI);

Table a Packet Temporary Mobile Subscriber identity (P-TMSI).

It shall be possible to retrieve or store subscriber data concerning a specific MS from the GGSN by use of each of the following references:

Table a International Mobile Subscriber Identity (IMSI);

See clause 3 for explanation of M, C, T and P in table 1 and table 2.

Table 1: Overview of data stored for non-GPRS Network Access Mode

PARAMETER	SUBCLAUSE	HLR	VLR	TYPE	
IMSI	2.1.1.1	M	M	P	Note
Network Access Mode	2.1.1.2	M	-	P	Note
International MS ISDN number	2.1.2	M	M	P	
multinumbering MSISDNs	2.1.3	C	-	P	Note
Basic MSISDN indicator	2.1.3.1	C	-	P	
MSISDN-Alert indicator	2.1.3.2	C	-	P	
TMSI	2.1.4	-	C	T	
LMSI	2.1.8	C	C	T	Note
Mobile Station Category	2.2.1	M	M	P	
LMU Identifier	2.2.1	C	C	P	
RAND, SRES and Kc	2.3.1	M	M	T	
Ciphering Key Sequence Number	2.3.2	-	M	T	
MSRN	2.4.1	-	C	T	Note
Location Area Identity	2.4.2	-	M	T	
VLR number	2.4.5	M	-	T	Note
MSC number	2.4.6	M	C	T	
HLR number	2.4.7	-	C	T	
Subscription restriction	2.4.9	C	-	P	
RSZI lists	2.4.10.1	C	-	P	
Zone Code List	2.4.10.2	-	C	P	
MSC area restricted flag	2.4.11	M	-	T	
LA not allowed flag	2.4.12	-	M	T	
ODB-induced barring data	2.4.15.1	C	-	T	
Roaming restriction due to unsupported feature	2.4.15.2	M	M	T	
Cell ID	2.4.16	-	C	T	
LSA Identity	2.4.X.1	C	C	P	
LSA Priority	2.4.X.2	C	C	P	
LSA Only Access Indicator	2.4.X.3	C	C	P	
LSA Active Mode Indicator	2.4.X.4	C	C	P	
VPLMN Identifier	2.4.X.5	C	-	P	
Provision of bearer service	2.5.1	M	M	P	
Provision of teleservice	2.5.2	M	M	P	
BC allocation	2.5.3	C	C	P	
IMSI detached flag	2.7.1	-	C	T	
Confirmed by Radio Contact indicator	2.7.4.1	-	M	T	
Subscriber Data Confirmed by HLR indicator	2.7.4.2	-	M	T	
Location Information Confirmed in HLR indicator	2.7.4.3	-	M	T	
Check SS indicator	2.7.4.4	M	-	T	
MS purged for non-GPRS flag	2.7.5	M	-	T	
MNRR	2.7.7	C	-	T	
Subscriber status	2.8.1	C	C	P	
Barring of outgoing calls	2.8.2.1	C	C	P	
Barring of incoming calls	2.8.2.2	C	-	P	
Barring of roaming	2.8.2.3	C	-	P	
Barring of premium rate calls	2.8.2.4	C	C	P	
Barring of supplementary service management	2.8.2.5	C	C	P	
Barring of registration of call forwarding	2.8.2.6	C	-	P	
Barring of invocation of call transfer	2.8.2.7	C	C	P	
Operator determined barring PLMN-specific data	2.8.3	C	C	P	
Handover Number	2.9.1	-	C	T	
Messages Waiting Data	2.10.1	C	-	T	
Mobile Station Not Reachable Flag	2.10.2	C	M	T	
Memory Capacity Exceeded Flag	2.10.3	C	-	T	

(continued)

Table 1 (concluded): Overview of data stored for non-GPRS Network Access Mode

PARAMETER	SUBCLAUSE	HLR	VLR	TYPE	
Trace Reference	2.11.1	C	C	P	
Trace Type	2.11.2	C	C	P	
Operations Systems Identity	2.11.3	C	C	P	
HLR Trace Type	2.11.4	C	-	P	
MAP Error On Trace	2.11.5	C	-	T	
Trace Activated in VLR	2.11.6	C	C	T	
Foreign Subscriber Registered in VLR	2.11.7	-	C	P	Note
VGCS Group Membership List	2.12.1	C	C	P	
VBS Group Membership List	2.12.2	C	C	P	
Broadcast Call Initiation Allowed List	2.12.2.1	C	C	P	
Originating CAMEL Subscription Information	2.14.1.1	C	C	P	
Terminating CAMEL Subscription Information	2.14.1.2	C	-	P	
Location Information/Subscriber state Information	2.14.1.3	C	-	P	
USSD CAMEL subscription information(U-CSI)	2.14.1.4	C	-	P	
SS invocation notification (SS-CSI)	2.14.1.5/3.2	C	C	P	
FTN translation information flag(TIF-CSI)	2.14.1.6	C	-	P	
USSD General CAMEL service information (UG-CSI)	2.14.2	C	-	P	
Negotiated CAMEL Capability Handling	2.14.2	C	-	T	
Privacy Exception List	2.15.1.1	C	C	P	
Home-GMLC Numbers	2.15.1.2	C	C	P	
MO-LR List	2.15.1.3	C	C	P	

CHANGE REQUEST

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03.16 CR A038

Current Version: **7.1.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **CN#06**
list expected approval meeting # here ↑

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for information

strategic
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Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: <ftp://ftp.3gpp.org/Information/CR-Form-v2.doc>

Proposed change affects: (U)SIM ME UTRAN / Radio Core Network
(at least one should be marked with an X)

Source: TSG N2 **Date:** 5 Nov 1999

Subject: Support of Subscriber Data Management in the HLR and VLR for LCS

Work item: Location Services (LCS)

Category: <small>(only one category shall be marked with an X)</small>	Correction	<input type="checkbox"/>	Release:	Phase 2	<input type="checkbox"/>
	Corresponds to a correction in an earlier release	<input type="checkbox"/>		Release 96	<input type="checkbox"/>
	Addition of feature	<input type="checkbox"/>		Release 97	<input type="checkbox"/>
	Functional modification of feature	<input checked="" type="checkbox"/>		Release 98	<input checked="" type="checkbox"/>
	Editorial modification	<input type="checkbox"/>		Release 99	<input type="checkbox"/>
			Release 00	<input type="checkbox"/>	

Reason for change: Modify Subscriber Data Management for LCS

Clauses affected: 3, 4

Other specs affected:	Other 3G core specifications	<input type="checkbox"/>	→ List of CRs:	
	Other GSM core specifications	<input type="checkbox"/>	→ List of CRs:	
	MS test specifications	<input type="checkbox"/>	→ List of CRs:	
	BSS test specifications	<input type="checkbox"/>	→ List of CRs:	
	O&M specifications	<input type="checkbox"/>	→ List of CRs:	

Other comments:

3 Definitions and abbreviations

3.1 Abbreviations

Abbreviations used in this specification are listed in GSM 01.04.

3.2 Definitions

Subscriber data to be stored in the HLR, VLR and SGSN are defined in GSM 03.08, GSM 03.71 and in GSM 03.6x, GSM 03.8x and GSM 03.9x-series of technical specifications.

Voice Broadcast Service (VBS), Voice Group Call Service (VGCS) and enhanced Multi Level Precedence and Pre-emption Service (eMLPP) Data related to group call area, cell or dispatcher attributes is only stored in the Group Call Register (GCR) which is linked to each MSC/VLR.

The GCR and its stored data is out of scope of this specification.

Subscriber related VBS, VGCS and eMLPP Data only concerns entitlement data for these-services and is seen as shared non-GPRS subscriber data.

GPRS and non-GPRS subscriber data:

The HLR has to download data to the VLR and to the SGSN. In this specification those data sent to the VLR are called non-GPRS subscriber data and those data sent to the SGSN are called GPRS subscriber data.

Whenever the refining identifier non-GPRS or GPRS is missing a common rule is addressed which hold for both kinds of subscriber data.

Subscriber data specific to non-GPRS shall only be sent from the HLR to the VLR. Subscriber data specific to GPRS shall only be sent from the HLR to the SGSN.

Subscriber data common to both non-GPRS and GPRS (regional subscription information) are downloaded from the HLR to both entities.

Shared non-GPRS subscriber data:

Common subset of subscriber data defined to be stored in both the HLR and VLR. Subscriber data only stored in the HLR is not part of shared subscriber data. Shared subscriber data includes:

- BS: Bearer Service (see GSM 02.02);
- TS: Teleservice (see GSM 02.03);
- BSG: Basic Service Group (see GSM 02.01, GSM 02.04 and GSM 03.11);
- EBSG: Elementary Basic Service Group (see GSM 03.11);
- CBSG: Collective Basic Service Group (see GSM 03.11).
- LSA Information: Localised Service Area Information (see GSM 03.73).

Shared GPRS subscriber data:

Common subset of subscriber data defined to be stored in both the HLR and SGSN. Subscriber data only stored in the HLR is not part of shared subscriber data. Shared GPRS subscriber data includes:

- TS: Teleservice (see GSM 02.03);
- PDP Context (see GSM 03.60).

LSA Information: Localised Service Area Information (see GSM 03.73).

Mandatory data:

Data required to form a self-consistent set of subscriber data. The context governs whether a specific parameter is mandatory, e.g. the data set for a specific service may be optional, however if data for this service is present, then parameters within this data set may be mandatory.

Mandatory data is defined by the service description (see e.g. GSM 03.6x, GSM 03.8x and GSM 03.9x-series of technical specifications and GSM 03.15, GSM 03.71) and by PLMN defined requirements.

NOTE 1: The above definition is seen from a semantic point of view. Semantically, mandatory parameters may be defined as syntactically optional or mandatory by the protocol.

Optional data:

Data which is defined as subscriber data, but which is not required to form a self-consistent set of subscriber data; the context governs whether a specific parameter is optional.

Optional data is data which is defined by the service description (see e.g. GSM 03.6x, GSM 03.8x and GSM 03.9x-series of technical specifications and GSM 03.15, GSM 03.71) or by PLMN defined requirements but is not defined as mandatory data.

NOTE 2: The above definition is seen from a semantic point of view. Semantically optional parameters are always defined as syntactically optional by the protocol.

Missing data:

Data which is mandatory in a given context but is not received nor is valid data available locally.

Unexpected data:

Data which is received and cannot be further processed. This may be either:

- optional data not required in a given context; or
- optional or mandatory data, required in this context but received with an unexpected value.

Overlapping data:

Two different cases of overlapping within subscriber data are possible:

- two or more parameters are to be stored at the same address in the data structure (see subclause 4.4);
- two or more BSGs within a BSG list include or are identical with one and the same EBSG.

The following **groups of non-GPRS subscriber information** are defined:

- subscriber information (Group A):
 - International Mobile Subscriber Identity (IMSI);
 - basic Mobile Station International ISDN Number (MSISDN);
 - category;
 - subscriber status,
 - LMU identifier
- basic service information (Group B):
 - Bearer Service list;
 - Teleservice list.

NOTE 3: VBS and VGCS entitlement data are subsumed under Teleservices

- Supplementary Service (SS) information (Group C):
 - forwarding information;
 - call barring information;
 - Closed User Group (CUG) information;
 - eMLPP data;
 - SS Data;
- Operator Determined Barring (ODB) information (Group D):
 - ODB Data for non-GPRS services;
- roaming restriction information (Group E):
 - roaming restriction due to unsupported feature;
- regional subscription information (Group F):
 - regional subscription data.
- VBS/VGCS subscription information (Group G):
 - VBS subscription data;
 - VGCS subscription data.
- CAMEL subscription information (Group H):
 - Originating CAMEL Subscription Information.
- LSA Information (Group I):
 - LSA data.
- Location Services (LCS) information (Group X)
 - ~~HPLMN~~-GMLC List
 - LCS Privacy Exception List
 - MO-LR List

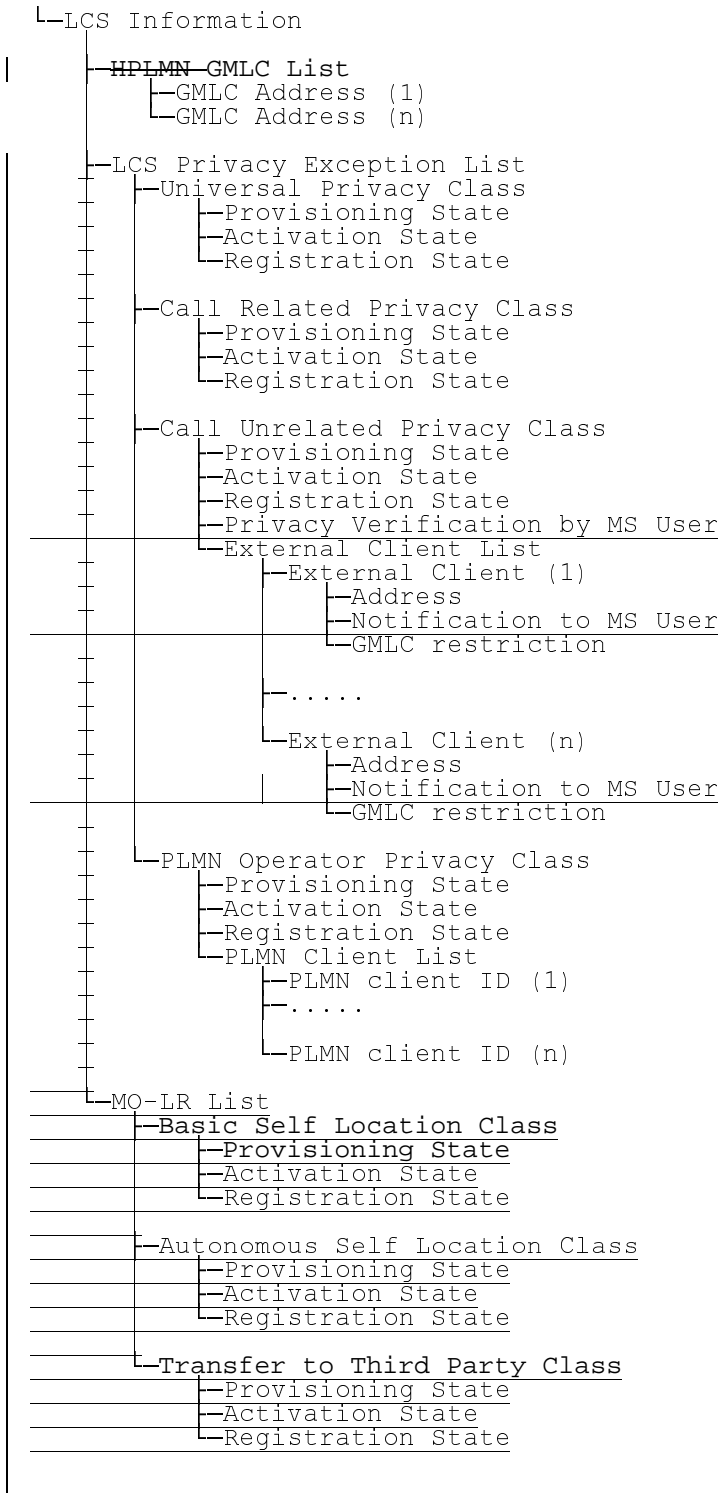
The following **groups of GPRS subscriber information** are defined:

- subscriber information (Group P1):
 - International Mobile Subscriber Identity (IMSI);
 - basic Mobile Station International ISDN Number (MSISDN);
 - subscriber status;
- basic service information (Group P2):
 - Teleservice list.
- Operator Determined Barring (ODB) information (Group P3):
 - ODB Data for GPRS services;
- roaming restriction information (Group P4):
 - roaming restriction in SGSN due to unsupported feature;

- regional subscription information (Group P5):
 - regional subscription data.
- GPRS subscription information (Group P6):
 - GPRS subscription data.
- LSA Information (Group P7):
 - LSA data.

4 General on handling of subscriber information

4.5.4 Consistency of supplementary service data



NOTE: For detailed information see GSM 03.71 and GSM 09.02.

Figure 13: LCS Information

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

09.02 CR A273r1

Current Version: **7.1.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **SMG#30**
list expected approval meeting # here ↑

for approval
for information

strategic
non-strategic (for SMG use only)

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: <ftp://ftp.3gpp.org/Information/CR-Form-v2.doc>

Proposed change affects: (U)SIM ME UTRAN / Radio Core Network
(at least one should be marked with an X)

Source: T1P1.5 **Date:** 5 Nov 1999

Subject: MAP Impacts for Location Services (LCS)

Work item: Location Services (LCS)

Category: Correction **Release:** Phase 2
(only one category shall be marked with an X) Corresponds to a correction in an earlier release
Addition of feature Release 96
Functional modification of feature Release 97
Editorial modification Release 98
Release 99
Release 00

Reason for change: Modification of MAP messages and parameters to support enhancements to the Location Services (LCS)

Clauses affected: 2, 4, 5, 6, 7, 8, 13A, 16, 17

Other specs affected: Other 3G core specifications → List of CRs:
Other GSM core specifications → List of CRs:
MS test specifications → List of CRs:
BSS test specifications → List of CRs:
O&M specifications → List of CRs:

Other comments: MAP changes are needed to support the addition of E-OTD and GPS positioning methods in LCS and for architectural changes defined in the LCS stage 2 (GSM 03.71) including removal of some LCS MAP operations.

Changes made in this revision of the CR are shown with yellow or blue highlighting and comprise:

- removal of change to add LCS Event Notification Request in a MAP Subscriber Location Report Ack.
- removal of velocity support
- addition of ellipsoid arc to Ext-GeographicalInformation
- addition of new error types (T1P1.5/99-713)
- restriction of LCS Client name length (T1P1.5/99-713)
- allow request for a vertical coordinate in the LCS QoS

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.
- For this Release 1998 document, references to GSM documents are for Release 1998 versions (version 7.x.y).

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4 Configuration of the mobile network

4.1 The entities of the mobile system

**** NEXT MODIFIED SECTION ****

4.1.17 The Serving Mobile Location Center (SMLC)

An SMLC is a database and processing entity that manages the procedures for obtaining the geographic location of a target MS in the coverage area served by the SMLC. In managing the location procedures, the SMLC chooses the positioning method and provides data and instructions to the LMUs or target MS that perform the actual location measurements associated with the chosen method. The SMLC also verifies any location estimate computed by the target MS or computes a location itself from measurements provided to it by the target MS or LMUs.

An SMLC also manages a set of LMUs in its coverage area whose purpose is to provide location measurements and location assistance data to the SMLC to compute, or assist in computing, location estimates for target MSs. Management functions performed by an SMLC on behalf of its LMUs include maintaining the status and current serving MSC of each LMU and supporting O&M procedures,

The database in an SMLC contains data necessary for choosing an appropriate position method and any parameters associated with this method for a target MS in any serving cell, for computing or verifying location estimates and for managing its LMUs.

An SMLC may be either NSS based or BSS based. An NSS based SMLC supports positioning and management of its LMUs via interaction with one or more MSCs using the Ls interface. A BSS based SMLC supports positioning and management of its LMUs via interaction with one or more BSCs using the Lb interface.

4.1.18 The Gateway Mobile Location Center (GMLC)

The GMLC provides access to location services (LCS) for LCS clients external to a PLMN. A GMLC may also support access to location services from LCS clients internal to its own PLMN. The GMLC allows an LCS client to issue location requests for certain target MSs; it then conveys these requests to the VMSC currently serving each target MS and passes back the location results to the LCSclient. Any target MS whose location is requested may belong to either the GMLC's own PLMN or another PLMN and may currently be served by either the GMLC's own PLMN or another PLMN.

4.1.19 The Location Measurement Unit (LMU)

The LMU is the logical network entity that performs location measurements in the VPLMN in order to either position a target MS or provide assistance data to be used in conjunction with other location measurements. An LMU is controlled by an SMLC in the VPLMN from which location commands can be received and to which any location measurements are returned.

**** NEXT MODIFIED SECTION ****

4.4 The interfaces within the mobile service

4.4.17 Interface between SGSN and MSC/VLR (Gs-interface)

The description of this interface is contained in the GSM 09.18.

4.4.17A Interface between SMLC and BSC (Lb interface)

This interface is used by a BSC when an SMLC is BSS based to request either the initiation of location procedures or the retrieval of location assistance data for a particular target MS in the coverage area served by the SMLC. The interface is also used to transfer LCS measurement and O&M information between an SMLC and LMU via the BSC. A description of this interface is contained in GSM 03.71 and GSM 09.31.

4.4.18 Interface between SMLC and MSC (Ls interface)

This interface is used by the MSC when an SMLC is NSS based to request either the initiation of location procedures or the retrieval of location assistance data for a particular target MS in the coverage area served by the SMLC. The interface is also used to transfer LCS measurement and O&M information between an SMLC and LMU or BSC via the MSC. A description of this interface is contained in GSM 03.71 and GSM 09.31.

~~4.4.19 Interface between SMLC and VLR (Lv interface)~~

~~This interface is used by the VLR to register or deregister an LMU in the SMLC.~~

4.4.18A Interface between SMLC and SMLC (Lp interface)

This interface is used by an SMLC to obtain LCS measurement information from an LMU controlled by another SMLC. A description of this interface is contained in GSM 03.71 and GSM 08.31.

4.4.20 Interface between GMLC and HLR (Lh interface)

This interface is used by the GMLC to request the address of the visited MSC for a particular target MS whose location has been requested.

4.4.21 Interface between GMLC and MSC (Lg interface)

This interface is used by the GMLC to convey a location request to the MSC currently serving a particular target MS whose location was requested. The interface is used by the MSC to return location results to the GMLC.

4.4.22 Interface between LCS Client and GMLC (Le interface)

This interface is used by a client of the Location Services (LCS) to request location information from a GMLC for certain target MSs. The interface is used by the GMLC to provide location information to an LCS client. This interface is external to a PLMN and is not defined within GSM.

5 Overload and compatibility overview

5.1 Overload control

****** NEXT MODIFIED SECTION ******

5.1.2 Overload control for MAP entities

Table 5.1/2: Priorities of Application Contexts for MSC/VLR as Responder

Responder = MSC/VLR	Initiating Entity
<i>Priority high</i>	
<u>Handover</u>	
handoverControl (prepareHandover/v2), (performHandover/v1)	MSC
<u>Mobility and Location Register Management</u>	
locationCancel (cancelLocation)	HLR
reset (reset)	HLR
interVlrInfoRetrieval (sendIdentification/v2), (sendParameters/v1)	VLR
subscriberDataMngt (insertSubscriberData), (deleteSubscriberData)	HLR
tracing (activateTraceMode), (deactivateTraceMode)	HLR
<u>Short Message Service</u>	
shortMsgMO-Relay (MO-ForwardSM v3) (forwardSM v1/v2)	MSC/SGSN
shortMsgMT-Relay (MT-ForwardSM v3) (forwardSM v1/v2)	MSC
shortMsgAlert (alertServiceCentre/v2), (alertServiceCentreWithoutResult/v1)	HLR
<u>Mobile Terminating Traffic</u>	
roamingNbEnquiry (provideRoamingNumber)	HLR
callControlTransfer (resumeCallHandling)	MSC
subscriberInfoEnquiry (provideSubscriberInformation)	HLR
reporting (remoteUserFree) (SetReportingState)	HLR
<u>Location Services</u>	
locationSvcLMUControl (lcsReset v3)	SMLC
locationSvcDataTransfer (lcsInformationRequest v3)	SMLC
locationSvcEnquiry (provideSubscriberLocation v3)	GMLC
<u>Network-Initiated USSD</u>	
networkUnstructuredSs (unstructuredSS-Request/v2), (unstructuredSS-Notify/v2)	HLR
<i>Priority low</i>	

NOTE: The application context name is the last component but one of the object identifier.
 Operation names are given in brackets for information with "/vn" appended to vn only operations.

Table 5.1/4: Priorities of Application Contexts for SMLC as Responder

Responder = SMLC	Initiating Entity
<i>Priority high</i>	
<u><i>Location Services</i></u>	
locationSveLMUControl	VLR
(lesRegistration v3)	
locationSveDataTransfer	MSC
(lesInformationReport v3)	
locationSvePositioning	MSC
(performLocation v3)	
<i>Priority low</i>	

NOTE: The application context name is the last component but one of the object identifier.
 Operation names are given in brackets for information with "/vn" appended to vn.

6 Requirements concerning the use of SCCP and TC

6.1 Use of SCCP

6.1.3 SCCP addressing

**** NEXT MODIFIED SECTION ****

6.1.3.1 Introduction

Within the GSM System there will be a need to communicate between entities within the same PLMN and in different PLMNs. Using the Mobile Application Part (MAP) for this function implies the use of Transaction Capabilities (TC) and the Signalling Connection Control Part (SCCP) of CCITT Signalling System No. 7.

Only the entities which should be addressed are described below. If the CCITT or ITU-T SCCP is used, the format and coding of address parameters carried by the SCCP for that purpose shall comply with CCITT Recommendation Q.713 with the following restrictions:

1) Intra-PLMN addressing

For communication between entities within the same PLMN, a MAP SSN shall always be included in the called and calling party addresses. All other aspects of SCCP addressing are network specific.

2) Inter-PLMN addressing

a) Called Party Address

- SSN indicator = 1 (MAP SSN always included);
- Global title indicator = 0100 (Global title includes translation type, numbering plan, encoding scheme and nature of address indicator);
- the translation type field will be coded "00000000" (Not used). For call related messages for non-optimal routed calls (as described in GSM 03.66) directed to another PLMN the translation type field may be coded "10000000" (CRMNP);
- Routing indicator = 0 (Routing on global title);

b) Calling Party Address

- SSN indicator = 1 (MAP SSNs always included);
- Point code indicator = 0;
- Global title indicator = 0100 (Global title includes translation type, numbering plan, encoding scheme and nature of address indicator);
- Numbering Plan = 0001 (ISDN Numbering Plan, E.164; In Case of Inter-PLMN Signalling, the dialogue initiating entity and dialogue responding entity shall always include its own E.164 Global Title as Calling Party Address);
- the translation type field will be coded "00000000" (Not used);
- Routing indicator = 0 (Routing on Global Title).

If ANSI T1.112 SCCP is used, the format and coding of address parameters carried by the SCCP for that purpose shall comply with ANSI specification T1.112 with the following restrictions:

1) Intra-PLMN addressing

For communication between entities within the same PLMN, a MAP SSN shall always be included in the called and calling party addresses. All other aspects of SCCP addressing are network specific.

2) Inter-PLMN addressing

a) Called Party Address

- SSN indicator = 1 (MAP SSN always included);
- Global title indicator = 0010 (Global title includes translation type);
- the Translation Type (TT) field will be coded as follows:

TT = 9, if IMSI is included,

TT = 14, if MSISDN is included,

Or TT = 10, if Network Element is included. (If TT=10, then Number Portability GTT is not invoked, if TT=14, then Number Portability GTT may be invoked.)

- Routing indicator = 0 (Routing on global title);

b) Calling Party Address

- SSN indicator = 1 (MAP SSNs always included);
- Point code indicator = 0;
- Global title indicator = 0010 (Global title includes translation type);

TT = 9, if IMSI is included,

TT = 14, if MSISDN is included,

Or TT = 10, if Network Element is included. (If TT=10, then Number Portability GTT is not invoked, if TT=14, then Number Portability GTT may be invoked.)

Routing indicator = 0 (Routing on Global Title).

If a Global Title translation is required for obtaining routing information, one of the numbering plans E.164, E.212 and E.214 is applicable.

- E.212 numbering plan

When CCITT or ITU-T SCCP is used, an E.212 number must not be included as Global Title in an SCCP UNITDATA message. The translation of an E.212 number into a Mobile Global Title is applicable in a dialogue initiating VLR, SGSN or GGSN if the routing information towards the HLR is derived from the subscriber's IMSI. In World Zone 1 when ANSI SCCP is used, the IMSI (E.212 number) is used as a Global Title to address the HLR. When an MS moves from one VLR service area to another, the new VLR may derive the address of the previous VLR from the Location Area Identification provided by the MS in the location registration request. The PLMN where the previous VLR is located is identified by the E.212 numbering plan elements of the Location Area Identification, ie the Mobile Country Code (MCC) and the Mobile Network Code (MNC).

- E.214 and E.164 numbering plans

When CCITT or ITU-T SCCP is used, only address information belonging to either E.214 or E.164 numbering plan is allowed to be included as Global Title in the Called and Calling Party Address. In World Zone 1 when ANSI SCCP is used, the IMSI (E.212 number) is used as a Global Title to address the HLR.

If the Calling Party Address associated with the dialogue initiating message contains a Global Title, the sending network entity shall include its E.164 entity number.

When receiving an SCCP UNITDATA message, SCCP shall accept either of the valid numbering plans in the Called Party Address and in the Calling Party Address.

When CCITT or ITU-T SCCP is used and an N-UNITDATA-REQUEST primitive from TC is received, SCCP shall accept an E.164 number or an E.214 number in the Called Address and in the Calling Address. In World Zone 1 when ANSI SCCP is used, the IMSI (E.212 number) is used instead of E.214 number.

The following subclauses describe the method of SCCP addressing appropriate for each entity both for the simple intra-PLMN case and where an inter-PLMN communication is required. The following entities are considered:

- the Mobile-services Switching Centre (MSC);
- the Home location Register (HLR);
- the Visitor Location Register (VLR);
- the Gateway Mobile-services Switching Centre (GMSC);
- the GSM Service Control Function (gsmSCF);
- the Interworking Mobile-services Switching Centre (IWMSC);
- the Shared Inter Working Function (SIWF);
- the Serving GPRS Support Node (SGSN);
- the Gateway GPRS Support Node (GGSN);
- ~~— the Serving Mobile Location Center (SMLC);~~
- the Gateway Mobile Location Center (GMLC).
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**** NEXT MODIFIED SECTION ****
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6.1.3.10 The Gateway MSC (GMSC) for Short Message Service

The GMSC provides interworking with the network to access the Short Message Service Centre, the mobile network and routing of Send Routing Info For SM. The GMSC has an E.164 address known in the HLR, SGSN or MSC

~~6.1.3.10A The Serving Mobile Location Center (SMLC)~~

~~There are several instances where an SMLC needs to be addressed.~~

~~6.1.3.10A.1 Registration (LMU)~~

~~When an LMU needs to register with a controlling SMLC, it may derive the identity of the SMLC from pre-administered data. The identity will be represented in this case by an international E.164 address.~~

~~6.1.3.10A.2 Instigation of Positioning (MSC)~~

~~When an MSC needs to instigate procedures to obtain location information for a target MS, it derives the identity of the SMLC for this MS from the MS's serving cell site. The identity of the SMLC shall be represented by either an SS7 signalling point code or an international E.164 address.~~

6.1.3.10B The Gateway Mobile Location Center (GMLC)

The GMLC initiates location requests on behalf of external clients. The E.164 address of the GMLC is provided to an HLR when the GMLC requests a serving MSC address from the HLR for a target MS. The E.164 address of the GMLC is also provided to a serving MSC when the GMLC requests the location of a target MS served by this MSC.

6.1.3.11 Summary table

The following tables summarize the SCCP address used for invoke operations. As a principle, within a PLMN either an SPC or a GT may be used (network operation option), whereas when addressing an entity outside the PLMN the GT must be used. The address type mentioned in the table (e.g. MSISDN) is used as GT or to derive the SPC.

For a response, the originating address passed in the invoke is used as SCCP Called Party Address. For extra-PLMN addressing the own E.164 entity address is used as SCCP Calling Party Address; for intra-PLMN addressing an SPC derived from the entity number may be used instead. When using an SPC, the SPC may be taken directly from MTP.

Table 6.1/1

to from	fixed net work	HLR	VLR	MSC	EIR	gsmSCF	SIWF	SGSN	GGSN
fixed network	---	E:GT T:MSISDN	---	---	---	---	---	---	---
home location register	---	---	I:SPC/GT E:GT T:VLR NUMBER	---	---	I:SPC/GT E:GT T:gsmSCF NUMBER	---	I:SPC/GT E:GT T:SGSN NUMBER	I:SPC/GT E:GT T:GGSN NUMBER
visitor location register	---	I:SPC/GT E:GT T:MGT (outside World Zone 1)/MSISDN (World Zone 1)/HLR NUMBER (note)	I:SPC/GT E:GT T:VLR NUMBER	---	---	---	---	---	---
mobile-services switching centre	---	I:SPC/GT E:GT T:MSISDN	I:SPC/GT E:GT T:VLR NUMBER	I:SPC/GT E:GT T:MSC NUMBER	I:SPC/GT E:GT T:EIR NUMBER	I:SPC/GT E:GT T:gsmSCF NUMBER	I:SPC/GT E:GT T:SIWF NUMBER	I:SPC/GT E:GT T:SGSN NUMBER	---
gsm Service Control Function	---	I:SPC/GT E:GT T:MSISDN	---	---	---	---	---	---	---
Shared Inter Working Function	---	---	---	I:SPC/GT E:GT T:MSC NUMBER	---	---	---	---	---
Serving GPRS Support Node	---	I:SPC/GT E:GT T:MGT/ MSISDN/HL R NUMBER	---	I:SPC/GT E:GT T:MSC NUMBER	I:SPC/GT E:GT T:EIR NUMBER	---	---	---	---
Gateway GPRS Support Node	---	I:SPC/GT E:GT T:MGT	---	---	---	---	---	---	---
Serving Mobile Location Centre	---	---	I:SPC/GT (E:GT) T:VLR NUMBER	I:SPC/GT (E:GT) T:MSC NUMBER	---	---	---	---	---
Gateway Mobile Location Center	---	I:SPC/GT E:GT T:MSISDN, MGT (outside World Zone 1) or IMSI (World Zone 1) (note)	---	I:SPC/GT E:GT T:MSC NUMBER	---	---	---	---	---

I: Intra-PLMN E: Extra(Inter)-PLMN T: Address Type

GT: Global Title MGT: E.214 Mobile Global Title SPC: Signalling Point Code

NOTE: For initiating the location updating procedure and an authentication information retrieval from the HLR preceding it, the VLR has to derive the HLR address from the IMSI of the MS. The result can be an SPC or an E.214 Mobile Global Title if CCITT or ITU-T SCCP is used, or IMSI itself if ANSI SCCP is used (ANSI SCCP is used in World Zone 1).. When continuing the established update location dialogue (as with any other dialogue) the VLR must derive the routing information towards the HLR from the Calling Party Address received with the first responding CONTINUE message until the dialogue terminating message is received.

For transactions invoked by the VLR after update location completion, the VLR may derive the information for addressing the HLR from addresses received in the course of the update location procedure (MSISDN or HLR number) or from the IMSI.

When invoking the Restore Data procedure and an authentication information retrieval from the HLR preceding it, the VLR must derive the information for addressing the HLR from the address information received in association with the roaming number request. This may be either the IMSI received as a parameter of the MAP message requesting the Roaming Number or the Calling Party Address associated with the MAP message requesting the Roaming Number.

The gsmSCF shall be addressed using more than one Global Title number. The first Global Title number is used to address a gsmSCF for MAP. The second Global Title number is used to address a gsmSCF for CAP.

For querying the HLR to obtain the VMSC address to support location services, the GMLC has to derive the HLR address from either the MSISDN or IMSI of the target MS. When using the IMSI, the result can be an SPC or an E.214 Mobile Global Title if CCITT or ITU-T SCCP is used, or IMSI itself if ANSI SCCP is used (ANSI SCCP is used in World Zone 1).

~~Inter-PLMN signalling from an SMLC to MSC is not defined in GSM 03.71; hence, the type of addressing is not significant.~~

Table 6.1/2

to from	SMLC	GMLC
fixed network	---	---
home location register	---	---
visitor location register	I:SPC/GT (E:GT) T:MLC NUMBER	---
mobile-services switching centre	I:SPC/GT (E:GT) T:MLC NUMBER	---
gsm Service Control Function	---	---
Shared Inter Working Function	---	---
Serving GPRS Support Node	---	---
Gateway GPRS Support Node	---	---
Serving Mobile Location Centre	---	---
Gateway Mobile Location Center	---	---

I: Intra-PLMN E: Extra(Inter)-PLMN T: Address Type
 GT: Global Title MGT: E.214 Mobile Global Title SPC: Signalling Point Code

~~NOTE: Inter-PLMN signalling from an MSC to SMLC is not defined in GSM 03.71; hence, the type of addressing is not significant.~~

7 General on MAP services

**** NEXT MODIFIED SECTION ****

7.6 Definition of parameters

Following is an alphabetic list of parameters used in the common MAP-services in subclause 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
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 number	7.6.2.46	LMSI	7.6.2.16
Additional signal info	7.6.9.10	Location Information	7.6.2.30
Additional SM Delivery Outcome	7.6.8.11	Location update type	7.6.9.6
Alert Reason	7.6.8.8	Lower Layer Compatibility	7.6.3.42
Alert Reason Indicator	7.6.8.10	LSA Information	7.6.3.56
Alerting Pattern	7.6.3.44	LSA Information Withdraw	7.6.3.58
All GPRS Data	7.6.3.53	Mobile Not Reachable Reason	7.6.3.51
All Information Sent	7.6.1.5	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	MWD status	7.6.8.3
B subscriber subaddress	7.6.2.49	Network Access Mode	7.6.3.50
Basic Service Group	7.6.4.40	Network node number	7.6.2.43
Bearer service	7.6.4.38	Network resources	7.6.10.1
BSS-apdu	7.6.9.1	Network signal information	7.6.9.8
Call barring feature	7.6.4.19	New password	7.6.4.20
Call barring information	7.6.4.18	No reply condition timer	7.6.4.7
Call Direction	7.6.5.8	North American Equal Access preferred Carrier Id	7.6.2.34
Call Info	7.6.9.9	Number Portability Status	7.6.5.14
Call reference	7.6.5.1	ODB General Data	7.6.3.9
Called number	7.6.2.24	ODB HPLMN Specific Data	7.6.3.10
Calling number	7.6.2.25	OMC Id	7.6.2.18
CAMEL Subscription Info Withdraw	7.6.3.38	Originally dialled number	7.6.2.26
Cancellation Type	7.6.3.52	Originating entity number	7.6.2.10
Category	7.6.3.1	Override Category	7.6.4.4
CCBS Feature	7.6.5.8	P-TMSI	7.6.2.47
Channel Type	7.6.5.9	PDP-Address	7.6.2.45
Chosen Channel	7.6.5.10	PDP-Context identifier	7.6.3.55
Ciphering mode	7.6.7.7	PDP-Type	7.6.2.44
Cksn	7.6.7.5	Previous location area Id	7.6.2.4
CLI Restriction	7.6.4.5	Protocol Id	7.6.9.7
CM service type	7.6.9.2	Provider error	7.6.1.3
Complete Data List Included	7.6.3.54	QoS-Subscribed	7.6.3.47
CUG feature	7.6.3.26	Rand	7.6.7.2
CUG index	7.6.3.25	Regional Subscription Data	7.6.3.11
CUG info	7.6.3.22	Regional Subscription Response	7.6.3.12
CUG interlock	7.6.3.24	Requested Info	7.6.3.31
CUG Outgoing Access indicator	7.6.3.8	Roaming number	7.6.2.19
CUG subscription	7.6.3.23	Roaming Restricted In SGSN Due To Unsupported Feature	7.6.3.49
CUG Subscription Flag	7.6.3.37	Roaming Restriction Due To Unsupported Feature	7.6.3.13
Current location area Id	7.6.2.6	Service centre address	7.6.2.27
Current password	7.6.4.21	Serving Cell Id	7.6.2.37
eMLPP Information	7.6.4.41	SGSN address	7.6.2.39
Equipment status	7.6.3.2	SGSN number	7.6.2.38
Extensible Basic Service Group	7.6.3.5	SIWF Number	7.6.2.35
Extensible Bearer service	7.6.3.3	SoLSA Support Indicator	7.6.3.57
Extensible Call barring feature	7.6.3.21	SM Delivery Outcome	7.6.8.6
Extensible Call barring information	7.6.3.20	SM-RP-DA	7.6.8.1
Extensible Forwarding feature	7.6.3.16	SM-RP-MTI	7.6.8.16
Extensible Forwarding info	7.6.3.15	SM-RP-OA	7.6.8.2
Extensible Forwarding Options	7.6.3.18	SM-RP-PRI	7.6.8.5
Extensible No reply condition timer	7.6.3.19	SM-RP-SMEA	7.6.8.17
Extensible SS-Data	7.6.3.29	SM-RP-UI	7.6.8.4
Extensible SS-Info	7.6.3.14	Sres	7.6.7.3
Extensible SS-Status	7.6.3.17	SS-Code	7.6.4.1
Extensible Teleservice	7.6.3.4	SS-Data	7.6.4.3

External Signal Information	7.6.9.4	SS-Event	7.6.4.42
Forwarded-to number	7.6.2.22	SS-Event-Data	7.6.4.43
Forwarded-to subaddress	7.6.2.23	SS-Info	7.6.4.24
Forwarding feature	7.6.4.16	SS-Status	7.6.4.2
Forwarding information	7.6.4.15	Stored location area Id	7.6.2.5
Forwarding Options	7.6.4.6	Subscriber State	7.6.3.30
GGSN address	7.6.2.40	Subscriber Status	7.6.3.7
GGSN number	7.6.2.41	Supported CAMEL Phases	7.6.3.36
GMSC CAMEL Subscription Info	7.6.3.34	Suppress T-CSI	7.6.3.33
GPRS Node Indicator	7.6.8.14	Suppression of Announcement	7.6.3.32
GPRS Subscription Data	7.6.3.46	Target cell Id	7.6.2.8
GPRS Subscription Data Withdraw	7.6.3.45	Target location area Id	7.6.2.7
GPRS Support Indicator	7.6.8.15	Target MSC number	7.6.2.12
Group Id	7.6.2.33	Teleservice	7.6.4.39
GSM bearer capability	7.6.3.6	TMSI	7.6.2.2
Guidance information	7.6.4.22	Trace reference	7.6.10.2
Handover number	7.6.2.21	Trace type	7.6.10.3
High Layer Compatibility	7.6.3.43	User error	7.6.1.4
HLR Id	7.6.2.15	USSD Data Coding Scheme	7.6.4.36
HLR number	7.6.2.13	USSD String	7.6.4.37
HO-Number Not Required	7.6.6.7	UU Data	7.6.5.12
IMEI	7.6.2.3	UUS CF Interaction	7.6.5.13
IMSI	7.6.2.1	VBS Data	7.6.3.40
Inter CUG options	7.6.3.27	VGCS Data	7.6.3.39
Intra CUG restrictions	7.6.3.28	VLR CAMEL Subscription Info	7.6.3.35
		VLR number	7.6.2.14
		VPLMN address allowed	7.6.3.48
		Zone Code	7.6.2.28

7.6.1 Common parameters

The following set of parameters are used in several MAP service-primitives:

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;
- 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;
 - subsequent handover failure, i.e. handover to a third MSC failed for some reason.
- 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 case of barring of Mobil Terminating Short Message, the additional information may indicate a barring condition due to «unauthorised Message Originator».
 - optimal routing not allowed, i.e. the entity which sends the error does not support optimal routing, or the HLR will not accept an optimal routing interrogation from the GMSC, or the call cannot be optimally routed because it would contravene optimal routing 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 GSM 04.80.

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 TS GSM 03.40, under SMS-SUBMIT-REPORT and SMS-DELIVERY-REPORT. If the SM entity which 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 GSM 03.40;
- 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:

- Unauthorized Requesting Network
- Unauthorized LCS Client with detailed reason as follows
- Unauthorized Privacy Class
- Unauthorized Call Unrelated External Client
- Unauthorized Call Related External Client
- Privacy override not applicable
- Position method failure with detailed reason as follows:
 - Congestion
 - Insufficient resources
 - Insufficient Measurement Data
 - Inconsistent Measurement Data
 - Location procedure not completed
 - Location procedure not supported by target MS
 - QoS not attainable

~~Position method failure with restart allowed~~

~~LMU Unknown or Offline~~

~~Traffic channel establishment failure~~

- Unknown or unreachable LCS Client

7.6.1.5 All Information Sent

This parameter indicates to the receiving entity when the sending entity has sent all necessary information.

****** NEXT MODIFIED SECTION ******

7.6.3 Subscriber management parameters

7.6.3.58 LSA Information Withdraw

This parameter indicates that LSA information shall be deleted from the VLR or the SGSN.

7.6.3.59 LMU Indicator

This parameter indicates the presence of an LMU.

7.6.3.60 LCS Information

This parameter defines the LCS related information for an MS subscriber and contains the following components:

- ~~HPLMN~~-GMLC List (see subclause 7.6.3.61)
- LCS Privacy Exception List (see subclause 7.6.3.62)

- MO-LR List (see subclause 7.6.3.65A)

7.6.3.61 ~~HPLMN~~-GMLC List

This parameter contains the addresses of all GMLCs ~~in the MS subscriber's HPLMN~~ that are permitted to issue a non-call related MT-LR location request for this MS. Usage of this parameter is defined in GSM 03.71.

7.6.3.62 LCS Privacy Exception List

This parameter defines the classes of LCS Client that are allowed to locate any target MS. For each class, the following information is provided:

- SS-Code (see subclause 7.6.4.1);
- a list of LCS privacy exception parameters (see subclause 7.6.3.63).

7.6.3.63 LCS Privacy Exception Parameters

This parameter gives the status of each LCS privacy exception class and any additional parameters relevant to this class. The parameter contains the following information:

- provisioned SS-Status (see subclause 7.6.3.17);
- privacy verification by MS user (see subclause 7.6.3.65B)
- external client List (see subclause 7.6.3.64);
- internal client List (see subclause 7.6.3.65)

7.6.3.64 External Client List

This parameter is only applicable to the non-call related privacy class and gives the identities of the external clients that are allowed to locate a target MS for a non-call related MT-LR. Each identity is an international (e.g.E.164) address. For each identified external client, GMLC restrictions may be defined. It may also be indicated if the MS shall be notified of a non-restricted MT-LR from each identified LCS client and, if so, whether notification only or notification with privacy verification shall apply. Usage of this parameter is defined in GSM 03.71.

7.6.3.65 Internal Client List

This parameter is only applicable to the PLMN operator privacy class and gives the identities of the internal PLMN operator clients that are allowed to locate a target MS for an NI-LR or MT-LR. Usage of this parameter is defined in GSM 03.71.

7.6.3.65A MO-LR List

This parameter defines the classes of MO-LR for which a subscription exists for a particular MS. For each class, the following information is provided:

- SS-Code (see subclause 7.6.4.1);

7.6.3.65B Privacy Verification By MS User

This parameter is applicable to the non-call related privacy class and indicates whether the MS user shall be notified for a non-call related MT-LR from any value added LCS client when the MT-LR is restricted and be enabled to accept or override the restriction.

7.6.3.65C GMLC List Withdraw

This parameter indicates whether the subscriber's LCS GMLC list shall be deleted from the VLR. The parameter does not apply to, and shall be ignored if received by, an SGSN.

7.6.4 Supplementary services parameters

7.6.4.1 SS-Code

This parameter may refer to one supplementary service or a set of supplementary services as defined in TS GSM 02.04. For MAP Release ~~'98~~'97 this includes:

- Calling Line Identification Presentation service (CLIP);
- Calling Line Identification Restriction service (CLIR);
- Connected Line Identification Presentation service (COLP);
- Connected Line Identification Restriction service (COLR);
- Calling Name Presentation (CNAP)
- All Call Forwarding services;
- Call Waiting (CW);
- Call Hold (HOLD);
- Multi-Party service (MPTY);
- Closed User Group (CUG);
- All Charging services;
- All Call Restriction services;
- Explicit Call Transfer service (ECT);
- enhanced Multi-Level Precedence and Pre-emption service (eMLPP);
- Completion of Calls to Busy Subscriber, originating side (CCBS-A);
- Completion of Calls to Busy Subscriber, destination side (CCBS-B);
- All LCS privacy exceptions (see subclause 7.6.4.44);
- Mobile Originating Location Request (MO-LR) (see subclause 7.6.4.44A).

****** NEXT MODIFIED SECTION ******

7.6.4.42 SS-event

This parameter indicates the Supplementary Service for which an invocation notification is sent towards the gsmSCF. It can indicate one of the following services:

- Explicit Call Transfer (ECT)
- Call Deflection (CD)
- Multi-Party call (MPTY)

7.6.4.43 SS-event data

This parameter contains additional information related to Supplementary Service invocation. Depending on the service invoked it can contain the following information:

ECT A list with all Called Party Numbers involved.

CDThe called Party number involved.

7.6.4.44 LCS Privacy Exceptions

Distinct SS codes are assigned to the following classes of LCS client in a target MS subscriber's privacy exception list.

- Universal Class
- Call related value added class
- Non-Call related value added class
- PLMN operator class

7.6.4.44A Mobile Originating Location Request (MO-LR)

Distinct SS codes are assigned to the following classes of MO-LR:

- Basic Self Location
- Autonomous Self Location
- Transfer to Third Party

**** NEXT MODIFIED SECTION ****

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 Report Error Indication~~

~~If present, this parameter requests an LCS Information Report error message from a serving MSC when an LCS Information message from an SMLC cannot be transferred to a target LMU.~~

~~7.6.11.3 LCS Cause~~

~~This parameter contains the reason why LCS data could not be transferred to an LMU.~~

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 LCS MLC Data

This parameter provides the identities of any ~~authorized home~~ GMLCs for a target MS. Only these GMLCs are allowed to send a location request for an external client when location requests are restricted to these ~~GMLCs home~~ PLMN.

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 – ~~“no delay”~~, “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 ~~LCS APDU~~

~~This parameter carries LCS-related data between an SMLC and a BSC or LMU. For data transfer to or from an LMU, it is identical to the Facility Information Element defined in GSM 04.71. For data transfer to or from a BSC, it is identical to the LCS Information parameter defined in GSM 08.71.~~

7.6.11.10 ~~LMU List~~

~~This parameter defines a list of LMUs sharing the same SMLC.~~

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.

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

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 Positioning Data~~

~~This parameter provides data on the positioning process for possible use in billing in location method evaluation. The data includes the following for each position method attempt:~~

- ~~——— positioning method~~
- ~~——— positioning result (success, failure)~~
- ~~——— positioning duration~~
- ~~——— resources used~~

7.6.11.16 Privacy Override

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

~~7.6.11.17 Radio Channel Type~~

~~This parameter identifies the type of radio channel currently assigned to or to be assigned to the target MS.~~

~~7.6.11.18 Registration Type~~

~~This parameter distinguishes LMU registration in an SMLC from LMU deregistration.~~

~~7.6.11.19 Release Forbidden~~

~~This parameter indicates if an LMU is forbidden to release a signaling channel to the serving MSC.~~

8 Mobility services

**** NEXT MODIFIED SECTION ****

8.8 Subscriber management services

8.8.1 MAP-INSERT-SUBSCRIBER-DATA service

8.8.1.2 Service primitives

Table 8.8/1: MAP-INSERT-SUBSCRIBER-DATA

Parameter name	Request	Indication	Response	Confirm
Invoke Id	M	M(=)	M(=)	M(=)
IMSI	C	C(=)		
MSISDN	C	C(=)		
Category	C	C(=)		
Subscriber Status	C	C(=)		
Bearer service List	C	C(=)	C	C(=)
Teleservice List	C	C(=)	C	C(=)
Forwarding information List	C	C(=)		
Call barring information List	C	C(=)		
CUG information List	C	C(=)		
SS-Data List	C	C(=)		
eMLPP Subscription Data	C	C(=)		
Operator Determined Barring General data	C	C(=)	C	C(=)
Operator Determined Barring HPLMN data	C	C(=)		
Roaming Restriction Due To Unsupported Feature	C	C(=)		
Regional Subscription Data	C	C(=)		
VLR CAMEL Subscription Info	C	C(=)		
Voice Broadcast Data	C	C(=)		
Voice Group Call Data	C	C(=)		
Network access mode	C	C(=)		
GPRS Subscription Data	C	C(=)		
Roaming Restricted In SGSN Due To Unsupported Feature	C	C(=)		
North American Equal Access preferred Carrier Id List	U	C(=)		
LSA Information	C	C(=)		
SS-Code List			C	C(=)
LMU Identifier	C	C(=)		
LCS Information	C	C(=)		
Regional Subscription Response			C	C(=)
Supported CAMEL Phases			C	C(=)
User error			U	C(=)
Provider error				O

8.8.1.3 Parameter use

North American Equal Access preferred Carrier Id List

A list of the preferred carrier identity codes that are subscribed to.

When the VLR receives this parameter from the HLR, it shall replace the previously stored preferred carrier identity codes with the received ones. It is not possible to delete all the preferred carrier identity codes from the VLR using this service. To delete all the preferred carrier identity codes from the VLR, the HLR shall use the MAP_CANCEL_LOCATION service.

LSA Information

If included in the ISD request, this parameter contains a list of localised service area identities a user might have subscribed to together with the priority of each localised service area; see subclause 7.6. The access right outside these localised service areas is also indicated. In all cases mentioned below, the LSA information shall only include LSA Data applicable to the VPLMN where the Subscriber is located. The VLR number, received in the MAP-UPDATE_LOCATION primitive, or the SGSN number, received in the MAP_UPDATE_GPRS_LOCATION primitive, can be used, alongside data stored in the HLR, to determine the LSA Data applicable to the VPLMN.

At restoration, location updating or GPRS location updating the HLR shall include the complete set of applicable LSA Information.

When there is a change in LSA data the HLR shall include at least the new and/or modified LSA data.

When there is a change in the access right outside the localised service areas the HLR shall include the LSA only access indicator.

When the SGSN or the VLR receives LSA information within a dialogue it shall check if the received data has to be considered as the entire LSA information. If so, it shall replace the stored LSA information with the received data set, otherwise it shall replace the data only for the modified LSA data (if any) and/or access right, and add the new LSA data (if any) to the stored LSA Information.

If the entire LSA information is received, it shall always include the LSA only access indicator value together with the LSA data applicable for the PLMN (if any).

If LSA Information is omitted in the Insert Subscriber Data operation the SGSN or the VLR shall keep the previously stored LSA Information.

If the SGSN or the VLR detects that there is overlapping in the information received within a dialogue, it shall send the error Unexpected Data Value. This parameter is used by the VLR and the SGSN.

LMU Identifier

This parameter indicates the presence of an LMU. This parameter is used only by the VLR and shall be ignored if received by an SGSN.

LCS Information

This parameter provides the following LCS related information for an MS subscriber:

- list of GMLCs in the HPLMN
- privacy exception list
- MO-LR list

At restoration and location updating, the HLR shall include the complete LCS data of the subscriber.

When there is a change in LCS subscriber data the HLR shall include at least the new and/or modified LCS data. LCS data that is not modified need not be included.

The VLR shall keep any previously stored LCS Information that is not included in an Insert Subscriber Data operation.

If the VLR detects that there is overlapping in the LCS information received within a dialogue, it shall send the error Unexpected Data Value.

This parameter is used only by the VLR and shall be ignored if received by an SGSN.

****** NEXT MODIFIED SECTION ******

8.8.2 MAP-DELETE-SUBSCRIBER-DATA service

8.8.2.2 Service primitives

Table 8.8/2: MAP-DELETE-SUBSCRIBER-DATA

Parameter name	Request	Indication	Response	Confirm
Invoke Id	M	M(=)	M(=)	M(=)
IMSI	M	M(=)		
Basic service List	C	C(=)		
SS-Code List	C	C(=)		
Roaming Restriction Due To Unsupported Feature	C	C(=)		
Camel Subscription Info Withdraw	C	C(=)		
Regional Subscription Data	C	C(=)		
VBS Group Indication	C	C(=)		
VGCS Group Indication	C	C(=)		
GPRS Subscription Data Withdraw	C	C(=)		
Roaming Restricted In SGSN Due To Unsupported Feature	C	C(=)		
LSA Information Withdraw	C	C(=)		
Regional Subscription Response			C	C(=)
<u>GMLC List Withdraw</u>	<u>C</u>	<u>C(=)</u>		
User error			C	C(=)
Provider error				O

8.8.2.3 Parameter use

All parameters are described in subclause 7.6. The following clarifications are applicable:

Basic service List

A list of Extensible Basic service parameters (Extensible Basic service is defined in subclause 7.6). It is used when one, several or all basic services are to be withdrawn from the subscriber. If the VLR or the SGSN receives a value for an Extensible Basic Service which it does not support, it shall ignore that value. This parameter is used by the VLR and by the SGSN.

SS-Code List

A list of SS-Code parameters (SS-Code is defined in subclause 7.6). It is used when several or all supplementary services are to be withdrawn from the subscriber.

There are three possible options:

- deletion of basic service(s);
The parameter Basic service List is only included.
- deletion of supplementary service(s);
The parameter SS-Code List is only included.
- deletion of basic and supplementary services;
Both Basic service List and SS-Code List are included.

This parameter is used only by the VLR and if the SGSN receives this parameter it shall ignore it.

Roaming Restriction Due To Unsupported Feature

This parameter is used if Roaming Restriction Due To Unsupported Feature is deleted from the subscriber data. This may occur if unsupported features or services are removed from the subscriber data in the HLR.

If this parameter is sent the VLR shall check if the current Location Area is possibly allowed now. This parameter is used only by the VLR and if the SGSN receives this parameter it shall ignore it.

CAMEL Subscription Info Withdraw

This parameter is used to indicate that CAMEL Subscription Info shall be deleted from the VLR. All CAMEL Subscription Info for the subscriber shall be deleted. This parameter is used only by the VLR and if the SGSN receives this parameter it shall ignore it.

Regional Subscription Identifier

Contains one single Zone Code (as defined subclause 7.6) and is used if all Zone Codes shall be deleted from the subscriber data. When all the Zone Codes are deleted, the VLR or the SGSN shall check for its location areas whether they are allowed or not. If the whole MSC area is restricted, VLR will report it to HLR by returning the Regional Subscription Response "MSC Area Restricted". If the whole SGSN area is restricted, SGSN will report it to HLR by returning the Regional Subscription Response "SGSN Area Restricted".

The binary coding of the Zone Code value received in a Delete Subscriber Data request shall not be checked by the VLR or by the SGSN.

Note that support of this parameter is a network operator option and it shall not be sent to networks which do not support Regional Subscription.

If Regional Subscription is not supported by the VLR or by the SGSN, the request for deletion of Zone Codes is refused by sending the Regional Subscription Response "Regional Subscription Not Supported" to the HLR.

If no Zone Codes are stored in the respective subscriber data record, the request for deleting all Zone Code information shall be ignored and no Regional Subscription Response shall be returned. This parameter is used by the VLR and by the SGSN.

VBS Group Indication

Contains an indication (flag) which is used if all Group Id's shall be deleted from the subscriber data for the Voice Broadcast teleservice.

If VBS is not supported in the VLR or no Group Ids are stored for VBS in the respective subscriber record, the request for deletion of all Group Ids shall be ignored. This parameter is used only by the VLR and if the SGSN receives this parameter it shall ignore it.

VGCS Group Indication

Contains an indication (flag) which is used if all Group Id's shall be deleted from the subscriber data for the Voice Group Call teleservice. This parameter is used only by the VLR and if the SGSN receives this parameter it shall ignore it.

If VGCS is not supported in the VLR or no Group Ids are stored for VGCS in the respective subscriber record, the request for deletion of all Group Ids shall be ignored.

GPRS Subscription Data Withdraw

This parameter is used to indicate whether all GPRS Subscription Data for the subscriber shall be deleted or if only a subset of the stored GPRS Subscription Data for the subscriber shall be deleted. In the latter case only those PDP context whose identifiers are included in the subsequent identifier list will be deleted. This parameter is used only by the SGSN and if the VLR receives this parameter it shall ignore it.

Roaming Restricted In SGSN Due To Unsupported Feature

This parameter is used if Roaming Restricted In SGSN Due To Unsupported Feature is deleted from the GPRS subscriber data. This may occur if unsupported features or services are removed from the GPRS subscriber data in the HLR.

If this parameter is sent the SGSN shall check if the current Location Area is possibly allowed now. This parameter is used only by the SGSN and if the VLR receives this parameter it shall ignore it.

LSA Information Withdraw

This parameter is used to indicate whether all LSA Information for the subscriber shall be deleted or if only a subset of the stored LSA Information for the subscriber shall be deleted. In the latter case only the LSA data whose LSA identities are included in the subsequent LSA data list will be deleted. This parameter is used by the VLR and the SGSN.

Regional Subscription Response

If included in the Delete Subscriber Data response this parameter indicates one of:

- MSC Area Restricted
- SGSN Area Restricted;
- Regional Subscription Not Supported.

This parameter is used by the VLR and by the SGSN.

GMLC List Withdraw

This parameter indicates that the subscriber's LCS GMLC List shall be deleted from the VLR.

This parameter is used only by the VLR and shall be ignored if received by an SGSN.

User error

Only one of the following values is applicable:

- Unidentified subscriber;
- Data missing;
- Unexpected data value.

****** NEXT MODIFIED SECTION ******

13A Location Service Management Services

13A.1 MAP-SEND-ROUTING-INFO-FOR-LCS Service

13A.1.1 Definition

This service is used between the GMLC and the HLR to retrieve the routing information needed for routing a location service request to the servicing VMSC. The MAP-SEND-ROUTING-INFO-FOR-LCS is a confirmed service using the primitives from table A.1/1.

13A.1.2 Service Primitives

The service primitives are shown in table 13A.1/1.

Table 13A.1/1: MAP-SEND-ROUTING-INFO-FOR-LCS

Parameter name	Request	Indication	Response	Confirm
Invoke Id	M	M(=)	M(=)	M(=)
MLC Number	M	M(=)		
MSISDN	C	C(=)	C	C(=)
IMSI	C	C(=)	C	C(=)
LMSI			C	C(=)
MSC Number			C	C(=)
User error			C	C(=)
Provider error				O

13A.1.3 Parameter Use

Invoke id:

See definition in subclause 7.6.1.

MLC Number:

See definition in subclause 7.6.2.

MSISDN:

See definition in subclause 7.6.2. The request shall carry either the IMSI or MSISDN. The response shall carry whichever of these was not included in the request (see GSM 03.71 for details).

IMSI:

See definition in subclause 7.6.2.

LMSI:

See definition in subclause 7.6.2. It is an operator option to provide this parameter from the VLR; it is mandatory for the HLR to include the LMSI in a successful response, if the VLR has used the LMSI.

MSC Number:

See definition in subclause 7.6.2. This parameter is provided in a successful response.

User error:

The following errors defined in subclause 7.6.1 may be used, depending on the nature of the fault:

- Unknown subscriber;
- Absent Subscriber;
- Facility Not Supported;
- System failure;
- Unexpected Data Value;
- Data missing;
- Unauthorized requesting network

Provider error:

For definition of provider errors see subclause 7.6.1.

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 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(=)		
NA-ESRK	C	C(=)		
IMEI	<u>U</u> C	C(=)		
Location Estimate			M	M(=)

Age of Location Estimate			C	C(=)
User error			C	C(=)
Provider error				O

13A.2.3 Parameter Definition and Use

All parameters are defined in section 7.6. The use of these parameters and the requirements for their presence are specified in GSM 03.71.

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 for an MR-LR are in the same country.

IMSI

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

MSISDN

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

LMSI

The LMSI shall be provided if previously supplied by the HLR

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.

NA-ESRK

~~This parameter only applies to North America and provides a North American Emergency Service Routing Key.~~

IMEI

~~Inclusion of the IMEI is optional The IMEI shall be provided if available when the target MS is identified by an NA-ESRK.~~

Location Estimate

This parameter provides the location estimate.

Age of Location Estimate

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

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 section 7.6.1.

- System Failure;
- Data Missing;
- Unexpected Data Value;
- ~~Unknown Subscriber~~
- **Facility Not Supported**;
- Unidentified Subscriber;
- Illegal Subscriber;
- Illegal Equipment;
- Absent Subscriber (diagnostic information may also be provided);
- Unauthorized requesting network;
- Unauthorized LCS Client with detailed reason;
- Position method failure with detailed reason.

Provider error

These are defined in subclause 7.6.1.

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

13A.3.1 Definition

This service is used by a VMSC 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(=)		
<u>MSC Number</u>	<u>M</u>	<u>M(=)</u>		
IMSI	C	C(=)		
MSISDN	C	C(=)		
NA-ESRD	C	C(=)		

NA-ESRK	C	C(=)		
IMEI	<u>C</u>	C(=)		
Location Estimate	C	C(=)		
Age of Location Estimate	C	C(=)		
<u>LMSI</u>	<u>U</u>	<u>C(=)</u>		
User error			C	C(=)
Provider error				O

13A.3.3 Parameter Definition and Use

All parameters are defined in section 7.6. The use of these parameters and the requirements for their presence are specified in GSM 03.71.

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.

MSC Number:

See definition in subclause 7.6.2. This parameter provides the address of the visited MSC for target MS.

IMSI

The IMSI shall be provided if available to the VMSC

MSISDN

The MSISDN shall be provided if available to the VMSC

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~~ may be provided by the VMSC if ~~assigned~~ available.

IMEI

~~Inclusion of the IMEI is optional. If the target MS has originated an emergency service call in North America, the IMEI may be provided by the VMSC.~~

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.

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.

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 section 7.6.1.

- System Failure;
- Data Missing;
- Unexpected Data Value;
- Resource Limitation;
- Unknown Subscriber;
- Unauthorized requesting network;
- Unknown or unreachable LCS Client;

Provider error

These are defined in subclause 7.6.1.

~~13A.4 MAP-PERFORM-LOCATION Service~~

~~13A.4.1 Definition~~

~~This service is used by a serving MSC to request location information from an SMLC for a target MS. This is a confirmed service using the primitives from table 13A.4/1.~~

~~13A.4.2 Service Primitives~~

Table 13A.4/1: Perform_Location

Parameter name	Request	Indication	Response	Confirm
Invoke-id	M	M(⇒)	M(⇒)	M(⇒)
Global-cell-Id	M	M(⇒)		
Radio-Channel-Type	Ⓒ	Ⓒ(⇒)		
LCS-Priority	Ⓒ	Ⓒ(⇒)		
LCS-QoS	Ⓒ	Ⓒ(⇒)		
LCS-APDU	Ⓒ	Ⓒ(⇒)		
Location-Estimate			Ⓒ	Ⓒ(⇒)
Positioning-Data			Ⓒ	Ⓒ(⇒)
User-error			Ⓒ	Ⓒ(⇒)
Provider-error				Ⓒ

13A.4.3 Parameter Definition and Use

All parameters are defined in section 7.6. The use of these parameters and the requirements for their presence are specified in GSM 03.71.

Global cell Id

This is the current cell location of the MS being located.

Radio Channel Type

This parameter gives the type of radio channel currently assigned to the MS.

LCS Priority

This parameter indicates the priority of the location request.

LCS QoS

This is the Quality of Service required for the location request in terms of response time and accuracy.

LCS APDU

This parameter contains LCS related information (e.g. Timing Advance) received from the BSC.

Location Estimate

This parameter gives an estimate of the MS location and the accuracy of the estimate.

Positioning Data

This parameter provides data on the positioning process including the result and resources used.

User error

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

- System Failure
- Data Missing;
- Unexpected Data Value
- Position method failure with detailed reason (restart not allowed)
- Position method failure with restart allowed

Provider error

These are defined in subclause 7.6.1.

13A.5 MAP-LCS Registration Service

13A.5.1 Definition

This service is used by a VLR to register or deregister an LMU in an SMLC. This is a confirmed service using the primitives from table 13A.5/1.

13A.5.2 Service Primitives

Table 13A.5/1: LCS Registration

Parameter name	Request	Indication	Response	Confirm
Invoke id	M	M(=)	M(=)	M(=)
IMSI	M	M(=)		
LMSI	U	C(=)		
Registration Type	M	M(=)		
MSC Number	C	C(=)		
User error			C	C(=)
Provider error				Ø

13A.5.3 Parameter Definition and Use

All parameters are defined in section 7.6. The use of these parameters and the requirements for their presence are specified in GSM 03.71.

IMSI

This is the E.212 IMSI identity of the LMU.

LMSI

The LMSI of the LMU shall be provided by the MSC if assigned in the VLR and if the registration type indicates registration.

Registration Type

The registration type distinguishes registration and deregistration.

MSC Number

This is the E.164 number of the MSC serving the LMU. Inclusion of the MSC number is mandatory if the registration type indicates registration.

User error

This parameter is sent by the SMLC when the registration procedure has failed and, if present, takes one of the following values defined in section 7.6.1.

- LMU unknown or offline;
- system failure;
- unexpected Data Value;
- Data Missing

Provider error

These are defined in subclause 7.6.1.

13A.6 MAP LCS INFORMATION REQUEST Service

13A.6.1 Definition

This service is used by an SMLC to transfer LCS related data to an MSC for onward transfer to an LMU or serving BSC. This is an unconfirmed service using the primitives from table 13A.6/1.

13A.6.2 Service Primitives

Table 13A.6/1: LCS Information Request

Parameter name	Request	Indication
Invoke id	M	M(⇒)
IMSI	C	C(⇒)
LMSI	C	C(⇒)
MLC Number	U	C(⇒)
Release Forbidden	U	C(⇒)
Report Error Indication	U	C(⇒)
LCS APDU	C	C(⇒)

13A.6.3 Parameter Definition and Use

All parameters are defined in section 7.6. The use of these parameters and the requirements for their presence are specified in GSM 03.71.

IMSI

This is the E.212 IMSI identity of an LMU. Inclusion of the IMSI is mandatory when the destination for the LCS data is an LMU. For other destinations, an IMSI shall not be included.

LMSI

When the destination is an LMU, the LMSI of the LMU shall be provided by the SMLC if previously supplied by the MSC.

MLC Number

This parameter contains the E.164 address for the SMLC. The inclusion of this parameter is optional.

Release Forbidden

This parameter is applicable only when the destination is an LMU. It indicates if an LMU is forbidden to release a signaling channel to the MSC.

Report Error Indication

If present, this parameter requests an LCS Information Report error message from the serving MSC if the LCS Information Request message cannot be transferred to the required destination.

LCS APDU

This parameter contains the LCS data to be sent on by the MSC to the required destination. For transfer to an LMU, the content of the data is defined in GSM 04.71. For transfer to a BSC, it is defined in GSM 08.71.

13A.7 MAP-LCS-INFORMATION-REPORT Service

13A.7.1 Definition

This service is used by an MSC to transfer LCS related data to an SMLC that was received from or intended for an LMU or BSC. This is an unconfirmed service using the primitives from table 13A.7/1. The message shall be transferred

to the SMLC using SCCP class 1.

13A.7.2 Service Primitives

Table 13A.7/1: LCS Information Report

Parameter name	Request	Indication
Invoke id	M	M(=)
IMSI	C	C(=)
LMSI	U	C(=)
LCS Cause	C	C(=)
LCS-APDU	C	C(=)

13A.7.3 Parameter Definition and Use

All parameters are defined in section 7.6. The use of these parameters and the requirements for their presence are specified in GSM 03.71.

IMSI

This is the E.212 IMSI identity of the LMU. Inclusion of the IMSI is mandatory for data transfer related to an LMU. An IMSI shall not be included for other types of data transfer.

LMSI

For data transfer related to an LMU, the MSC may include the LMSI if available in the VLR.

LCS Cause

This parameter contains the reason why LCS data received by the MSC in an LCS Information Request could not be transferred to its intended destination. This parameter shall be included if and only if the MSC is returning LCS data to the SMLC that could not be transferred to the intended destination.

LCS-APDU

This parameter contains the LCS data received from or intended for an LMU or BSC. The content of this parameter is defined in GSM 04.71 for an LMU and in GSM 08.71 for a BSC.

13A.8 MAP-LCS-RESET Service

13A.8.1 Definition

This service is used by an SMLC after either a restart or discovery of inconsistent data to request that a VLR instigate a reset for either all LMUs that are served by the VLR or just certain specific LMUs. This is an unconfirmed service using the primitives from table 13A.8/1.

13A.8.2 Service Primitives

Table 13A.8/1: LCS Reset

Parameter name	Request	Indication
Invoke id	M	M(=)

MLC number	M	M(⇒)
LMU List	U	C(⇒)

13A.8.3 Parameter Definition and Use

All parameters are defined in section 7.6. The use of these parameters and the requirements for their presence are specified in GSM 03.71.

MLC

This is the E.164 address for the SMLC.

LMU List

This is a list of LMUs sharing the same SMLC.

13A.9 ~~MAP LCS ASSIGN TRAFFIC CHANNEL~~ Service

13A.9.1 Definition

This service is used by an SMLC to request assignment of a traffic channel to the target MS by the visited MSC. This is a confirmed service using the primitives from table 13A.9/1.

13A.9.2 Service primitives

Table 13A.9/1: LCS Assign Traffic Channel

Parameter name	Request	Indication	Response	Confirm
Invoke id	M	M(⇒)	M(⇒)	M(⇒)
Radio Channel Type	M	M(⇒)		
User error			C	C(⇒)
Provider error				Ø

13A.9.3 Parameter definition and use

All parameters are defined in section 7.6. The use of these parameters and the requirements for their presence are specified in GSM 03.71.

Radio Channel Type

This parameter defines the type of traffic channel to be assigned.

User error

This parameter is sent by the MSC when the required type of traffic channel cannot be assigned and, if present, takes one of the following values defined in section 7.6.1.

- Traffic channel establishment failure;
- system failure;
- unexpected Data Value;

—data missing;

Provider error

These are defined in subclause 7.6.1.

16 Mapping on to TC services

16.2 Service specific procedures

Specific services are mapped to TC component handling services.

16.2.1 Directly mapped parameters

The Invoke Id parameter of the MAP request and indication primitive is directly mapped on to the Invoke Id parameter of the component handling primitives.

16.2.2 Use of other parameters of component handling primitives

16.2.2.4 Operation

When mapping a request primitive on to a Remote Operations PDU (invoke), the MAP PM shall set the operation code according to the mapping described in table 16.2/1.

When mapping a response primitive on to a Remote Operations service, the MAP PM shall set the operation code of the TC-RESULT-L/NL primitive (if required) to the same value as the one received at invocation time.

Table 16.2/1: Mapping of MAP specific services on to MAP operations

MAP-SERVICE	operation
MAP-ACTIVATE-SS	activateSS
MAP-ACTIVATE-TRACE-MODE	activateTraceMode
MAP-ALERT-SERVICE-CENTRE	alertServiceCentre
MAP-ANY-TIME-INTERROGATION	anyTimeInterrogaton
MAP-CANCEL-LOCATION	cancelLocation
MAP-CHECK-IMEI	checkIMEI
MAP-DEACTIVATE-SS	deactivateSS
MAP-DEACTIVATE-TRACE-MODE	deactivateTraceMode
MAP-DELETE-SUBSCRIBER-DATA	deleteSubscriberData
MAP-ERASE-CC-ENTRY	eraseCC-Entry
MAP-ERASE-SS	eraseSS
MAP-FAILURE-REPORT	failureReport
MAP-FORWARD-ACCESS-SIGNALLING	forwardAccessSignalling
MAP-FORWARD-CHECK-SS-INDICATION	forwardCheckSsIndication
MAP-FORWARD-GROUP-CALL-SIGNALLING	forwardGroupCallSignalling
MAP-MT-FORWARD-SHORT-MESSAGE	mt-forwardSM
MAP-MO-FORWARD-SHORT-MESSAGE	mo-forwardSM
MAP-GET-PASSWORD	getPassword
MAP-INFORM-SERVICE-CENTRE	informServiceCentre
MAP-INSERT-SUBSCRIBER-DATA	insertSubscriberData
MAP-INTERROGATE-SS	interrogateSs
MAP_LCS_ASSIGN_TRAFFIC_CHANNEL	lcsAssignTrafficChannel
MAP_LCS_INFORMATION_REPORT	lcsInformationReport
MAP_LCS_INFORMATION_REQUEST	lcsInformationRequest
MAP_LCS_REGISTRATION	lcsRegistration
MAP_LCS_RESET	lcsReset
MAP-NOTE-MS-PRESENT-FOR-GPRS	noteMsPresentForGprs
MAP-PERFORM-LOCATION	performLocation
MAP-PREPARE-GROUP-CALL	prepareGroupCall
MAP-PREPARE-HANDOVER	prepareHandover
MAP-PREPARE-SUBSEQUENT-HANDOVER	prepareSubsequentHandover
MAP-PROCESS-ACCESS-SIGNALLING	processAccessSignalling
MAP-PROCESS-GROUP-CALL-SIGNALLING	processGroupCallSignalling
MAP-PROCESS-UNSTRUCTURED-SS-REQUEST	processUnstructuredSS-Request
MAP-PROVIDE-ROAMING-NUMBER	provideRoamingNumber
MAP-PROVIDE-SIWFS-NUMBER	provideSIWFSNumber
MAP-PROVIDE-SUBSCRIBER-LOCATION	provideSubscriberLocation
MAP-PROVIDE-SUBSCRIBER-INFO	provideSubscriberInfo
MAP-PURGE-MS	purgeMS
MAP-READY-FOR-SM	readyForSM
MAP-REGISTER-CC-ENTRY	registerCC-Entry
MAP-REGISTER-PASSWORD	registerPassword
MAP-REGISTER-SS	registerSS
MAP-REMOTE-USER-FREE	remoteUserFree
MAP-REPORT-SM-DELIVERY-STATUS	reportSmDeliveryStatus
MAP-RESET	reset
MAP-RESTORE-DATA	restoreData
MAP-SEND_GROUP-CALL_END_SIGNAL	sendGroupCallEndSignal
MAP-SEND-END-SIGNAL	sendEndSignal
MAP-SEND-AUTHENTICATION-INFO	sendAuthenticationInfo
MAP-SEND-IMSI	sendIMSI
MAP-SEND-IDENTIFICATION	sendIdentification
MAP-SEND-ROUTING-INFO-FOR-SM	sendRoutingInfoForSM
MAP-SEND-ROUTING-INFO-FOR-GPRS	sendRoutingInfoForGprs
MAP-SEND-ROUTING-INFO-FOR-LCS	sendRoutingInfoForLCS
MAP-SEND-ROUTING-INFORMATION	sendRoutingInfo
MAP-SET-REPORTING-STATE	setReportingState
MAP-SIWFS-SIGNALLING-MODIFY	SIWFSsignallingModify
MAP-STATUS-REPORT	statusReport
MAP-SUBSCRIBER-LOCATION-REPORT	subscriberLocationReport
MAP-SUPPLEMENTARY-SERVICE-INVOCATION-NOTIFICATION	ss-Invocation-Notification

MAP-UNSTRUCTURED-SS-NOTIFY	unstructuredSS-Notify
MAP-UNSTRUCTURED-SS-REQUEST	unstructuredSS-Request
MAP-UPDATE-GPRS-LOCATION	updateGprsLocation
MAP-UPDATE-LOCATION	updateLocation

17 Abstract syntax of the MAP protocol

17.1 General

17.1.6 Application Contexts

The following informative table lists the latest versions of the Application Contexts used in this specification, with the operations used by them and, where applicable, whether or not the operation description is exactly the same as for previous versions. Information in sections 17.6 & 17.7 relates only to the ACs in this table.

AC Name	AC Version	Operations Used	Comments *
locationCancellationContext	v3	cancelLocation	
equipmentMngtContext	v2	checkIMEI	
imsiRetrievalContext	v2	sendIMSI	
infoRetrievalContext	v2	sendAuthenticationInfo	
interVlrInfoRetrievalContext	v2	sendIdentification	
handoverControlContext	v2	prepareHandover forwardAccessSignalling sendEndSignal processAccessSignalling prepareSubsequentHandover	
mwdMngtContext	v3	readyForSM	
msPurgingContext	v3	purgeMS	
shortMsgAlertContext	v2	alertServiceCentre	
resetContext	v2	reset	
networkUnstructuredSsContext	v2	processUnstructuredSS-Request unstructuredSS-Request unstructuredSS-Notify	
tracingContext	v3	activateTraceMode deactivateTraceMode	
networkFunctionalSsContext	v2	registerSS eraseSS activateSS deactivateSS registerPassword interrogateSS getPassword	
shortMsgMO-RelayContext	v3	mo-forwardSM	
shortMsgMT-RelayContext	v3	mt-forwardSM	
shortMsgGatewayContext	v3	sendRoutingInfoForSM reportSM-DeliveryStatus InformServiceCentre	the syntax of this operation has been extended in comparison with release 96 version
networkLocUpContext	v3	updateLocation forwardCheckSs-Indication restoreData insertSubscriberData activateTraceMode	the syntax is the same in v1 & v2
gprsLocationUpdateContext	v3	updateGprsLocation insertSubscriberData activateTraceMode	
subscriberDataMngtContext	v3	insertSubscriberData	

		deleteSubscriberData	
roamingNumberEnquiryContext	v3	provideRoamingNumber	
locationInfoRetrievalContext	v3	sendRoutingInfo	
gprsNotifyContext	v3	noteMsPresentForGprs	
gprsLocationInfoRetrievalContext	v3	sendRoutingInfoForGprs	
failureReportContext	v3	failureReport	
callControlTransferContext	v4	resumeCallHandling	
subscriberInfoEnquiryContext	v3	provideSubscriberInfo	
anyTimeEnquiryContext	v3	anyTimeInterrogation	
ss-InvocationNotificationContext	v3	ss-InvocationNotification	
sIWFSAllocationContext	v3	provideSIWFSSNumber sIWFSsignallingModify	
groupCallControlContext	v3	prepareGroupCall processGroupCallSignalling forwardGroupCallSignalling sendGroupCallEndSignal	
reportingContext	v3	setReportingState statusReport remoteUserFree	
callCompletionContext	v3	registerCC-Entry eraseCC-Entry	
locationSvcLMUControlContext	v3	lcsRegistration lcsReset	
locationSvcDataTransferContext	v3	lcsInformationRequest lcsInformationReport	
locationSvcEnquiryContext	v3	provideSubscriberLocation subscriberLocationReport	
locationSvcGatewayContext	v3	sendRoutingInfoForLCS	
locationSvcPositioningContext	v3	lcsAssignTrafficChannel lcsInformationRequest lcsInformationReport performLocation	

NOTE (*): The syntax of the operations is not the same as in previous versions unless explicitly stated

17.2 Operation packages

**** NEXT MODIFIED SECTION ****

17.2.2 Packages specifications

17.2.2.43 Call Completion

This operation package includes the operations required for procedures between VLR and HLR for subscriber control of call completion services.

```

CallCompletionPackage-v3 ::= OPERATION-PACKAGE
  -- Supplier is HLR if Consumer is VLR
  CONSUMER INVOKES {
    registerCC-Entry,
    eraseCC-Entry}

```

This package is v3 only.

17.2.2.44 Location service gateway services

This operation package includes the operations required for location service gateway procedures between GMLC and HLR.

```

LocationSvcGatewayPackage-v3 ::= OPERATION-PACKAGE
  -- Supplier is HLR if Consumer is GMLC
  CONSUMER INVOKES {
    sendRoutingInfoForLCS}

```

This package is v3 only.

17.2.2.45 Location service enquiry

This operation package includes the operations required for the location service enquiry procedures between GMLC and MSC.

```

LocationSvcEnquiryPackage-v3 ::= OPERATION-PACKAGE
  -- Supplier is MSC if Consumer is GMLC
  CONSUMER INVOKES {
    provideSubscriberLocation}
  SUPPLIER INVOKES {
    subscriberLocationReport}

```

This package is v3 only.

17.2.2.46 Location service Positioning

This operation package includes the operations required for the location service positioning procedures between MSC and SMLC.

```

LocationSvcPositioningPackage-v3 ::= OPERATION-PACKAGE
  -- Supplier is SMLC if Consumer is MSC
  CONSUMER INVOKES {
    performLocation,
    lcsInformationReport}
  SUPPLIER INVOKES {
    lcsAssignTrafficChannel, lcsInformationRequest}

```

This package is v3 only.

17.2.2.47 Location service LMU Control

This operation package includes the operations required for the location service LMU control procedures between MSC and SMLC.

```

LocationSvcLMUControlPackage-v3 ::= OPERATION-PACKAGE
  -- Supplier is SMLC if Consumer is VLR
  CONSUMER INVOKES {
    lcsRegistration }
  SUPPLIER INVOKES {
    LcsReset}

```

This package is v3 only.

17.2.2.48 Location service Data Transfer

This operation package includes the operations required for the location service data transfer procedures between MSC and SMLC when performed in stand alone mode.

```

LocationSvcDataTransferPackage-v3 ::= OPERATION-PACKAGE
  -- Supplier is MSC if Consumer is SMLC
  CONSUMER INVOKES {
    lcsInformationRequest}
  SUPPLIER INVOKES {
    lcsInformationReport}

```

This package is v3 only.

17.3 Application contexts

17.3.2 Application context definitions

17.3.2.38 Call Completion

This application context is used between VLR and the HLR for subscriber control of call completion services.

```
callCompletionContext-v3 APPLICATION-CONTEXT
-- Responder is HLR if Initiator is VLR
INITIATOR CONSUMER OF {
    CallCompletionPackage-v3}
::= {map-ac callCompletion(8) version3(3)}
```

This application-context is v3 only.

17.3.2.39 Location Service Gateway

This application context is used for location service gateway procedures.

```
locationSvcGatewayContext-v3 APPLICATION-CONTEXT
-- Responder is HLR if Initiator is GMLC
INITIATOR CONSUMER OF {
    locationSvcGatewayPackage-v3}
 ::= {map-ac locationSvcGateway(37) version3(3)}
```

17.3.2.40 Location Service Enquiry

This application context is used for location service enquiry procedures.

```
locationSvcEnquiryContext-v3 APPLICATION-CONTEXT
-- Responder is MSC if Initiator is GMLC
INITIATOR CONSUMER OF {
    locationSvcEnquiryPackage-v3}
 ::= {map-ac locationSvcEnquiry(38) version3(3)}
```

17.3.2.41 Location Service Positioning

This application context is used for location service positioning procedures.

```
locationSvcPositioningContext-v3 APPLICATION-CONTEXT
-- Responder is SMLC if Initiator is MSC
INITIATOR CONSUMER OF {
    locationSvcPositioningPackage-v3}
 ::= {map-ac locationSvcPositioning(39) version3(3)}
```

17.3.2.42 Location Service LMU Control

This application context is used for location service LMU control procedures.

```
locationSvcLMUControlContext-v3 APPLICATION-CONTEXT
-- Responder is SMLC if Initiator is VLR
INITIATOR CONSUMER OF {
    locationSvcLMUControlPackage-v3}
 ::= {map-ac locationSvcLMUControl(40) version3(3)}
```

17.3.2.43 Location Service Data Transfer

This application context is used for location service data transfer procedures.

```
locationSvcDataTransferContext-v3 APPLICATION-CONTEXT
-- Responder is MSC if Initiator is SMLC
INITIATOR CONSUMER OF {
    locationSvcDataTransferPackage-v3}
 ::= {map-ac locationSvcDataTransfer(41) version3(3)}
```

1

2

**** NEXT MODIFIED SECTION ****

17.3.3 ASN.1 Module for application-context-names

The following ASN.1 module summarizes the application-context-name assigned to MAP application-contexts.

```
1 MAP-ApplicationContexts {
2   ccitt-identified-organization (4) etsi (0) mobileDomain (0)
3   gsm-Network (1) modules (3) map-ApplicationContexts (2) version5 (5)}
4
5 DEFINITIONS
6
7 ::=
```

```

8
9 BEGIN
10
11
12 -- EXPORTS everything
13
14
15 IMPORTS
16     gsm-NetworkId,
17     ac-Id
18 FROM MobileDomainDefinitions {
19     ccitt (0) identified-organization (4) etsi (0) mobileDomain (0)
20     mobileDomainDefinitions (0) version1 (1)}
21 ;
22
23 -- application-context-names
24
25 map-ac OBJECT IDENTIFIER ::= {gsm-NetworkId ac-Id}
26
27 networkLocUpContext-v3 OBJECT IDENTIFIER ::=
28     {map-ac networkLocUp(1) version3(3)}
29
30 locationCancellationContext-v3 OBJECT IDENTIFIER ::=
31     {map-ac locationCancel(2) version3(3)}
32
33 roamingNumberEnquiryContext-v3 OBJECT IDENTIFIER ::=
34     {map-ac roamingNbEnquiry(3) version3(3)}
35
36 locationInfoRetrievalContext-v3 OBJECT IDENTIFIER ::=
37     {map-ac locInfoRetrieval(5) version3(3)}
38
39 resetContext-v2 OBJECT IDENTIFIER ::=
40     {map-ac reset(10) version2(2)}
41
42 handoverControlContext-v2 OBJECT IDENTIFIER ::=
43     {map-ac handoverControl(11) version2(2)}
44
45 equipmentMngtContext-v2 OBJECT IDENTIFIER ::=
46     {map-ac equipmentMngt(13) version2(2)}
47
48 infoRetrievalContext-v2 OBJECT IDENTIFIER ::=
49     {map-ac infoRetrieval(14) version2(2)}
50
51 interVlrInfoRetrievalContext-v2 OBJECT IDENTIFIER ::=
52     {map-ac interVlrInfoRetrieval(15) version2(2)}
53
54 subscriberDataMngtContext-v3 OBJECT IDENTIFIER ::=
55     {map-ac subscriberDataMngt(16) version3(3)}
56
57 tracingContext-v3 OBJECT IDENTIFIER ::=
58     {map-ac tracing(17) version3(3)}
59
60 networkFunctionalSsContext-v2 OBJECT IDENTIFIER ::=
61     {map-ac networkFunctionalSs(18) version2(2)}
62
63 networkUnstructuredSsContext-v2 OBJECT IDENTIFIER ::=
64     {map-ac networkUnstructuredSs(19) version2(2)}
65
66 shortMsgGatewayContext-v3 OBJECT IDENTIFIER ::=
67     {map-ac shortMsgGateway(20) version3(3)}
68
69 shortMsgMO-RelayContext-v3 OBJECT IDENTIFIER ::=
70     {map-ac shortMsgMO-Relay(21) version3(3)}
71
72 shortMsgAlertContext-v2 OBJECT IDENTIFIER ::=
73     {map-ac shortMsgAlert(23) version2(2)}
74
75 mwdMngtContext-v3 OBJECT IDENTIFIER ::=
76     {map-ac mwdMngt(24) version3(3)}
77
78 shortMsgMT-RelayContext-v3 OBJECT IDENTIFIER ::=
79     {map-ac shortMsgMT-Relay(25) version3(3)}
80
81 imsiRetrievalContext-v2 OBJECT IDENTIFIER ::=
82     {map-ac imsiRetrieval(26) version2(2)}
83

```



```

84 msPurgingContext-v3 OBJECT IDENTIFIER ::=
85     {map-ac msPurging(27) version3(3)}
86
87 subscriberInfoEnquiryContext-v3 OBJECT IDENTIFIER ::=
88     {map-ac subscriberInfoEnquiry(28) version3(3)}
89
90 anyTimeInfoEnquiryContext-v3 OBJECT IDENTIFIER ::=
91     {map-ac anyTimeInfoEnquiry(29) version3(3)}
92
93 callControlTransferContext-v4 OBJECT IDENTIFIER ::=
94     {map-ac callControlTransfer(6) version4(4)}
95
96 ss-InvocationNotificationContext-v3 OBJECT IDENTIFIER ::=
97     {map-ac ss-InvocationNotification(36) version3(3)}
98
99 sIWFSAllocationContext-v3 OBJECT IDENTIFIER ::=
100     {map-ac sIWFSAllocation(12) version3(3)}
101
102 groupCallControlContext-v3 OBJECT IDENTIFIER ::=
103     {map-ac groupCallControl(31) version3(3)}
104
105 gprsLocationUpdateContext-v3 OBJECT IDENTIFIER ::=
106     {map-ac gprsLocationUpdate(32) version3(3)}
107
108 gprsLocationInfoRetrievalContext-v3 OBJECT IDENTIFIER ::=
109     {map-ac gprsLocationInfoRetrieval(33) version3(3)}
110
111 failureReportContext-v3 OBJECT IDENTIFIER ::=
112     {map-ac failureReport(34) version3(3)}
113
114 gprsNotifyContext-v3 OBJECT IDENTIFIER ::=
115     {map-ac gprsNotify(35) version3(3)}
116
117 reportingContext-v3 OBJECT IDENTIFIER ::=
118     {map-ac reporting(7) version3(3)}
119
120 callCompletionContext-v3 OBJECT IDENTIFIER ::=
121     {map-ac callCompletion(8) version3(3)}
122
123 locationSvcGatewayContext-v3 OBJECT IDENTIFIER ::=
124     {map-ac locationSvcGateway(37) version3(3)}
125
126 locationSvcEnquiryContext-v3 OBJECT IDENTIFIER ::=
127     {map-ac locationSvcEnquiry(38) version3(3)}
128
129 locationSvcPositioningContext-v3 OBJECT IDENTIFIER ::=
130     {map-ac locationSvcPositioning(39) version3(3)}
131
132 locationSvcLMUControlContext-v3 OBJECT IDENTIFIER ::=
133     {map-ac locationSvcLMUControl(40) version3(3)}
134
135 locationSvcDataTransferContext-v3 OBJECT IDENTIFIER ::=
136     {map-ac locationSvcDataTransfer(41) version3(3)}
137
138
139 -- The following Object Identifiers are reserved for application-
140 -- contexts existing in previous versions of the protocol
141

```

	Object Identifier	
142 -- AC Name & Version		
143 --		
144 -- networkLocUpContext-v1	map-ac networkLocUp (1)	version1 (1)
145 -- networkLocUpContext-v2	map-ac networkLocUp (1)	version2 (2)
146 -- locationCancellationContext-v1	map-ac locationCancellation (2)	version1 (1)
147 -- locationCancellationContext-v2	map-ac locationCancellation (2)	version2 (2)
148 -- roamingNumberEnquiryContext-v1	map-ac roamingNumberEnquiry (3)	version1 (1)
149 -- roamingNumberEnquiryContext-v2	map-ac roamingNumberEnquiry (3)	version2 (2)
150 -- locationInfoRetrievalContext-v1	map-ac locationInfoRetrieval (5)	version1 (1)
151 -- locationInfoRetrievalContext-v2	map-ac locationInfoRetrieval (5)	version2 (2)
152 -- resetContext-v1	map-ac reset (10)	version1 (1)
153 -- handoverControlContext-v1	map-ac handoverControl (11)	version1 (1)
154 -- equipmentMngtContext-v1	map-ac equipmentMngt (13)	version1 (1)
155 -- infoRetrievalContext-v1	map-ac infoRetrieval (14)	version1 (1)
156 -- subscriberDataMngtContext-v1	map-ac subscriberDataMngt (16)	version1 (1)
157 -- subscriberDataMngtContext-v2	map-ac subscriberDataMngt (16)	version2 (2)
158 -- tracingContext-v1	map-ac tracing (17)	version1 (1)
159 -- tracingContext-v2	map-ac tracing (17)	version2 (2)
160 -- networkFunctionalSsContext-v1	map-ac networkFunctionalSs (18)	version1 (1)
161 -- shortMsgGatewayContext-v1	map-ac shortMsgGateway (20)	version1 (1)
162 -- shortMsgGatewayContext-v2	map-ac shortMsgGateway (20)	version2 (2)
163 -- shortMsgRelayContext-v1	map-ac shortMsgRelay (21)	version1 (1)
164 -- shortMsgAlertContext-v1	map-ac shortMsgAlert (23)	version1 (1)
165 -- mwdMngtContext-v1	map-ac mwdMngt (24)	version1 (1)
166 -- mwdMngtContext-v2	map-ac mwdMngt (24)	version2 (2)
167 -- shortMsgMT-RelayContext-v2	map-ac shortMsgMT-Relay (25)	version2 (2)
168 -- msPurgingContext-v2	map-ac msPurging (27)	version2 (2)
169 -- callControlTransferContext-v3	map-ac callControlTransferContext (6)	version3 (3)
170		
171		
172 END		

**** NEXT MODIFIED SECTION ****

17.5 MAP operation and error codes

```

1  MAP-Protocol {
2      ccitt identified-organization (4) etsi (0) mobileDomain (0)
3      gsm-Network (1) modules (3) map-Protocol (4) version5 (5)}
4
5  DEFINITIONS
6
7  ::=
8
9  BEGIN
10
11  IMPORTS
12      UpdateLocation,
13      CancelLocation,
14      PurgeMS,
15      SendIdentification,
16      UpdateGprsLocation,
17      PrepareHandover,
18      SendEndSignal,
19      ProcessAccessSignalling,
20      ForwardAccessSignalling,
21      PrepareSubsequentHandover,
22      SendAuthenticationInfo,
23      CheckIMEI,
24      InsertSubscriberData,
25      DeleteSubscriberData,
26      Reset,
27      ForwardCheckSS-Indication,
28      RestoreData,
29      ProvideSubscriberInfo,
30      AnyTimeInterrogation,
31      SendRoutingInfoForGprs,
32      FailureReport,
33      NoteMsPresentForGprs
34
35
36  FROM MAP-MobileServiceOperations {

```

```

37 ccitt identified-organization (4) etsi (0) mobileDomain (0)
38 gsm-Network (1) modules (3) map-MobileServiceOperations (5)
39 version5 (5)}
40
41 ActivateTraceMode,
42 DeactivateTraceMode,
43 SendIMSI
44 FROM MAP-OperationAndMaintenanceOperations {
45 ccitt identified-organization (4) etsi (0) mobileDomain (0)
46 gsm-Network (1) modules (3) map-OperationAndMaintenanceOperations (6)
47 version5 (5)}
48
49 SendRoutingInfo,
50 ProvideRoamingNumber,
51 ResumeCallHandling,
52 ProvideSIWFSNumber,
53 SIWFSSignallingModify,
54 SetReportingState,
55 StatusReport,
56 RemoteUserFree
57 FROM MAP-CallHandlingOperations {
58 ccitt identified-organization (4) etsi (0) mobileDomain (0)
59 gsm-Network (1) modules (3) map-CallHandlingOperations (7)
60 version5 (5)}
61
62 RegisterSS,
63 EraseSS,
64 ActivateSS,
65 DeactivateSS,
66 InterrogateSS,
67 ProcessUnstructuredSS-Request,
68 UnstructuredSS-Request,
69 UnstructuredSS-Notify,
70 RegisterPassword,
71 GetPassword,
72 SS-InvocationNotification,
73 RegisterCC-Entry,
74 EraseCC-Entry
75 FROM MAP-SupplementaryServiceOperations {
76 ccitt identified-organization (4) etsi (0) mobileDomain (0)
77 gsm-Network (1) modules (3) map-SupplementaryServiceOperations (8)
78 version5 (5)}
79
80 SendRoutingInfoForSM,
81 MO-ForwardSM,
82 MT-ForwardSM,
83 ReportSM-DeliveryStatus,
84 AlertServiceCentre,
85 InformServiceCentre,
86 ReadyForSM
87 FROM MAP-ShortMessageServiceOperations {
88 ccitt identified-organization (4) etsi (0) mobileDomain (0)
89 gsm-Network (1) modules (3) map-ShortMessageServiceOperations (9)
90 version5 (5)}
91
92 PrepareGroupCall,
93 ProcessGroupCallSignalling,
94 ForwardGroupCallSignalling,
95 SendGroupCallEndSignal
96 FROM MAP-Group-Call-Operations {
97 ccitt identified-organization (4) etsi (0) mobileDomain (0)
98 gsm-Network (1) modules (3) map-Group-Call-Operations (22)
99 version5 (5)}
100
101 LCSAssignTrafficChannel,
102 LCSInformationReport,
103 LCSInformationRequest,
104 LCSRegistration,
105 LCSReset,
106 ProvideSubscriberLocation,
107 PerformLocation,
108 SendRoutingInfoForLCS,
109 SubscriberLocationReport
110 FROM MAP-LocationServiceOperations {
111 ccitt identified-organization (4) etsi (0) mobileDomain (0)
112 gsm-Network (1) modules (3) map-LocationServiceOperations (24)
113 version5 (5)}
114
115 SystemFailure,

```

```

116 DataMissing,
117 UnexpectedDataValue,
118 FacilityNotSupported,
119 UnknownSubscriber,
120 NumberChanged,
121 UnknownMSC,
122 UnidentifiedSubscriber,
123 UnknownEquipment,
124 RoamingNotAllowed,
125 IllegalSubscriber,
126 IllegalEquipment,
127 BearerServiceNotProvisioned,
128 TeleserviceNotProvisioned,
129 NoHandoverNumberAvailable,
130 SubsequentHandoverFailure,
131 TracingBufferFull,
132 OR-NotAllowed,
133 NoRoamingNumberAvailable,
134 AbsentSubscriber,
135 BusySubscriber,
136 NoSubscriberReply,
137 CallBarred,
138 ForwardingViolation,
139 ForwardingFailed,
140 CUG-Reject,
141 ATI-NotAllowed,
142 IllegalSS-Operation,
143 SS-ErrorStatus,
144 SS-NotAvailable,
145 SS-SubscriptionViolation,
146 SS-Incompatibility,
147 UnknownAlphabet,
148 USSD-Busy,
149 PW-RegistrationFailure,
150 NegativePW-Check,
151 NumberOfPW-AttemptsViolation,
152 SubscriberBusyForMT-SMS,
153 SM-DeliveryFailure,
154 MessageWaitingListFull,
155 AbsentSubscriberSM,
156 ResourceLimitation,
157 NoGroupCallNumberAvailable,
158 ShortTermDenial,
159 LongTermDenial,
160 IncompatibleTerminal,
161 UnauthorizedRequestingNetwork,
162 UnauthorizedLCSCClient,
163 PositionMethodFailure,
164 PositionMethodFailureWithRestart,
165 LMUUnknownOrOffline,
166 TrafficChannelEstablishmentFailure,
167 UnknownOrUnreachableLCSCClient
168
169 FROM MAP-Errors {
170     ccitt identified-organization (4) etsi (0) mobileDomain (0)
171     gsm-Network (1) modules (3) map-Errors (10) version5 (5)}
172 ;
173
174
175 -- location registration operation codes
176
177 updateLocation UpdateLocation ::= localValue 2
178 cancelLocation CancelLocation ::= localValue 3
179 purgeMS PurgeMS ::= localValue 67
180 sendIdentification SendIdentification ::= localValue 55
181
182
183 -- handover operation codes
184
185 prepareHandover PrepareHandover ::= localValue 68
186 sendEndSignal SendEndSignal ::= localValue 29
187 processAccessSignalling ProcessAccessSignalling ::= localValue 33
188 forwardAccessSignalling ForwardAccessSignalling ::= localValue 34
189 prepareSubsequentHandover PrepareSubsequentHandover ::=
190     localValue 69
191
192
193 -- authentication operation codes
194

```

```

195 sendAuthenticationInfo SendAuthenticationInfo ::= localValue 56
196
197
198 -- IMEI MANAGEMENT operation codes
199
200 checkIMEI CheckIMEI ::= localValue 43
201
202
203 -- subscriber management operation codes
204
205 insertSubscriberData InsertSubscriberData ::= localValue 7
206 deleteSubscriberData DeleteSubscriberData ::= localValue 8
207
208
209 -- fault recovery operation codes
210
211 reset Reset ::= localValue 37
212 forwardCheckSS-Indication ForwardCheckSS-Indication ::=
213     localValue 38
214 restoreData RestoreData ::= localValue 57
215
216
217 -- operation and maintenance operation codes
218
219 activateTraceMode ActivateTraceMode ::= localValue 50
220 deactivateTraceMode DeactivateTraceMode ::= localValue 51
221 sendIMSI SendIMSI ::= localValue 58
222
223
224 -- call handling operation codes
225
226 sendRoutingInfo SendRoutingInfo ::= localValue 22
227 provideRoamingNumber ProvideRoamingNumber ::= localValue 4
228 resumeCallHandling ResumeCallHandling ::= localValue 6
229 provideSIWFSNumber ProvideSIWFSNumber ::= localValue 31
230 SIWFSsignallingModify SIWFSsignallingModify ::= localValue 32
231 setReportingState SetReportingState ::= localValue 73
232 statusReport StatusReport ::= localValue 74
233 remoteUserFree RemoteUserFree ::= localValue 75
234
235
236 -- supplementary service handling operation codes
237
238 registerSS RegisterSS ::= localValue 10
239 eraseSS EraseSS ::= localValue 11
240 activateSS ActivateSS ::= localValue 12
241 deactivateSS DeactivateSS ::= localValue 13
242 interrogateSS InterrogateSS ::= localValue 14
243 processUnstructuredSS-Request ProcessUnstructuredSS-Request ::=
244     localValue 59
245 unstructuredSS-Request UnstructuredSS-Request ::= localValue 60
246 unstructuredSS-Notify UnstructuredSS-Notify ::= localValue 61
247 registerPassword RegisterPassword ::= localValue 17
248 getPassword GetPassword ::= localValue 18
249 registerCC-Entry RegisterCC-Entry ::= localValue 76
250 eraseCC-Entry EraseCC-Entry ::= localValue 77
251
252
253 -- short message service operation codes
254
255 sendRoutingInfoForSM SendRoutingInfoForSM ::= localValue 45
256 mo-forwardSM MO-ForwardSM ::= localValue 46
257 mt-forwardSM MT-ForwardSM ::= localValue 44
258 reportSM-DeliveryStatus ReportSM-DeliveryStatus ::= localValue 47
259 informServiceCentre InformServiceCentre ::= localValue 63
260 alertServiceCentre AlertServiceCentre ::= localValue 64
261 readyForSM ReadyForSM ::= localValue 66
262
263 -- provide subscriber info operation codes
264
265 provideSubscriberInfo ProvideSubscriberInfo ::= localValue 70
266
267 -- any time interrogation operation codes
268
269 anyTimeInterrogation AnyTimeInterrogation ::= localValue 71

```

```

270
271 -- supplementary service invocation notification operation codes
272
273 ss-InvocationNotification SS-InvocationNotification ::= localValue 72
274
275
276 --Group Call operation codes
277
278 prepareGroupCall PrepareGroupCall ::= localValue 39
279 sendGroupCallEndSignal SendGroupCallEndSignal ::= localValue 40
280 processGroupCallSignalling ProcessGroupCallSignalling ::= localValue 41
281 forwardGroupCallSignalling ForwardGroupCallSignalling ::= localValue 42
282
283
284 -- gprs location updating operation codes
285
286 updateGprsLocation UpdateGprsLocation ::= localValue 23
287
288 -- gprs location information retrieval operation codes
289
290 sendRoutingInfoForGprs SendRoutingInfoForGprs ::= localValue 24
291
292 -- failure reporting operation codes
293
294 failureReport FailureReport ::= localValue 25
295
296 -- GPRS notification operation codes
297
298 noteMsPresentForGprs NoteMsPresentForGprs ::= localValue 26
299
300 -- Location service operation codes
301
302 lcsAssignTrafficChannel LCSAssignTrafficChannel ::= localValue 78
303 lcsInformationReport LCSInformationReport ::= localValue 79
304 lcsInformationRequest LCSInformationRequest ::= localValue 80
305 lcsRegistration LCSRegistration ::= localValue 81
306 lcsReset LCSReset ::= localValue 82
307 provideSubscriberLocation ProvideSubscriberLocation ::= localValue 83
308 performLocation PerformLocation ::= localValue 84
309 sendRoutingInfoForLCS SendRoutingInfoForLCS ::= localValue 85
310 subscriberLocationReport SubscriberLocationReport ::= localValue 86
311
312
313 -- generic error codes
314
315 systemFailure SystemFailure ::= localValue 34
316 dataMissing DataMissing ::= localValue 35
317 unexpectedDataValue UnexpectedDataValue ::= localValue 36
318 facilityNotSupported FacilityNotSupported ::= localValue 21
319 incompatibleTerminal IncompatibleTerminal ::= localValue 28
320 resourceLimitation ResourceLimitation ::= localValue 51
321
322
323 -- identification and numbering error codes
324
325 unknownSubscriber UnknownSubscriber ::= localValue 1
326 numberChanged NumberChanged ::= localValue 44
327 unknownMSC UnknownMSC ::= localValue 3
328 unidentifiedSubscriber UnidentifiedSubscriber ::= localValue 5
329 unknownEquipment UnknownEquipment ::= localValue 7
330
331
332 -- subscription error codes
333
334 roamingNotAllowed RoamingNotAllowed ::= localValue 8
335 illegalSubscriber IllegalSubscriber ::= localValue 9
336 illegalEquipment IllegalEquipment ::= localValue 12
337 bearerServiceNotProvisioned BearerServiceNotProvisioned ::=
338     localValue 10
339 teleserviceNotProvisioned TeleserviceNotProvisioned ::=
340     localValue 11
341
342
343 -- handover error codes
344

```

```

345 noHandoverNumberAvailable NoHandoverNumberAvailable ::=
346     localValue 25
347 subsequentHandoverFailure SubsequentHandoverFailure ::=
348     localValue 26
349
350
351 -- operation and maintenance error codes
352
353 tracingBufferFull TracingBufferFull ::= localValue 40
354
355
356 -- call handling error codes
357
358 noRoamingNumberAvailable NoRoamingNumberAvailable ::= localValue 39
359 absentSubscriber AbsentSubscriber ::= localValue 27
360 busySubscriber BusySubscriber ::= localValue 45
361 noSubscriberReply NoSubscriberReply ::= localValue 46
362 callBarred CallBarred ::= localValue 13
363 forwardingFailed ForwardingFailed ::= localValue 47
364 or-NotAllowed OR-NotAllowed ::= localValue 48
365 forwardingViolation ForwardingViolation ::= localValue 14
366 cug-Reject CUG-Reject ::= localValue 15
367
368
369 -- any time interrogation error codes
370 ati-NotAllowed ATI-NotAllowed ::= localValue 49
371
372
373 -- Group Call error codes
374 noGroupCallNumberAvailable NoGroupCallNumberAvailable ::= localValue 50
375
376
377 -- supplementary service error codes
378
379 illegalSS-Operation IllegalSS-Operation ::= localValue 16
380 ss-ErrorStatus SS-ErrorStatus ::= localValue 17
381 ss-NotAvailable SS-NotAvailable ::= localValue 18
382 ss-SubscriptionViolation SS-SubscriptionViolation ::= localValue 19
383 ss-Incompatibility SS-Incompatibility ::= localValue 20
384 unknownAlphabet UnknownAlphabet ::= localValue 71
385 ussd-Busy USSD-Busy ::= localValue 72
386 pw-RegistrationFailure PW-RegistrationFailure ::= localValue 37
387 negativePW-Check NegativePW-Check ::= localValue 38
388 numberOfPW-AttemptsViolation NumberOfPW-AttemptsViolation ::=
389     localValue 43
390 shortTermDenial ShortTermDenial ::= localValue 29
391 longTermDenial LongTermDenial ::= localValue 30
392
393
394 -- short message service error codes
395
396 subscriberBusyForMT-SMS SubscriberBusyForMT-SMS ::= localValue 31
397 sm-DeliveryFailure SM-DeliveryFailure ::= localValue 32
398 messageWaitingListFull MessageWaitingListFull ::= localValue 33
399 absentSubscriberSM AbsentSubscriberSM ::= localValue 6
400
401 -- location service error codes
402
403 unauthorizedRequestingNetwork UnauthorizedRequestingNetwork ::= localValue 52
404 unauthorizedLCSCClient UnauthorizedLCSCClient ::= localValue 53
405 positionMethodFailure PositionMethodFailure ::= localValue 54
406 positionMethodFailureWithRestart PositionMethodFailureWithRestart ::= localValue 55
407 lmuUnknownOrOffline LMUUnknownOrOffline ::= localValue 56
408 trafficChannelEstablishmentFailure TrafficChannelEstablishmentFailure ::= localValue 57
409 unknownOrUnreachableLCSCClient UnknownOrUnreachableLCSCClient ::= localValue 58
410
411
412 -- The following operation codes are reserved for operations
413 -- existing in previous versions of the protocol
414

```

```

415 -- Operation Name          AC used          Oper. Code
416 --
417 -- sendParameters          map-ac infoRetrieval (14) version1 (1)    localValue 9
418 -- processUnstructuredSS-Data  map-ac networkFunctionalSs (18) version1 (1) localValue 19
419 -- performHandover          map-ac handoverControl (11) version1 (1)  localValue 28
420 -- performSubsequentHandover  map-ac handoverControl (11) version1 (1)  localValue 30
421 -- noteInternalHandover      map-ac handoverControl (11) version1 (1)  localValue 35
422 -- noteSubscriberPresent     map-ac mwdMngt (24) version1 (1)         localValue 48
423 -- alertServiceCentreWithoutResult  map-ac shortMsgAlert (23) version1 (1)   localValue 49
424 -- traceSubscriberActivity    map-ac handoverControl (11) version1 (1)  localValue 52
425 -- beginSubscriberActivity    map-ac networkFunctionalSs (18) version1 (1) localValue 54
426
427 -- The following error codes are reserved for errors
428 -- existing in previous versions of the protocol
429
430 -- Error Name              AC used          Error Code
431 --
432 -- unknownBaseStation      map-ac handoverControl (11) version1 (1)  localValue 2
433 -- invalidTargetBaseStation  map-ac handoverControl (11) version1 (1)  localValue 23
434 -- noRadioResourceAvailable  map-ac handoverControl (11) version1 (1)  localValue 24
435
436
437 END

```

1 17.6 MAP operation and error types

1

2 ****** NEXT MODIFIED SECTION ******

17.6.6 Errors

```

1 MAP-Errors {
2   ccitt identified-organization (4) etsi (0) mobileDomain (0)
3   gsm-Network (1) modules (3) map-Errors (10) version5 (5)}
4
5 DEFINITIONS
6
7 ::=
8
9 BEGIN
10
11 EXPORTS
12
13   -- generic errors
14   SystemFailure,
15   DataMissing,
16   UnexpectedDataValue,
17   FacilityNotSupported,
18   IncompatibleTerminal,
19   ResourceLimitation,
20
21   -- identification and numbering errors
22   UnknownSubscriber,
23   NumberChanged,
24   UnknownMSC,
25   UnidentifiedSubscriber,
26   UnknownEquipment,
27
28   -- subscription errors
29   RoamingNotAllowed,
30   IllegalSubscriber,
31   IllegalEquipment,
32   BearerServiceNotProvisioned,
33   TeleserviceNotProvisioned,
34
35   -- handover errors
36   NoHandoverNumberAvailable,
37   SubsequentHandoverFailure,
38
39   -- operation and maintenance errors
40   TracingBufferFull,
41
42   -- call handling errors
43   OR-NotAllowed,

```



```

44 NoRoamingNumberAvailable,
45 BusySubscriber,
46 NoSubscriberReply,
47 AbsentSubscriber,
48 CallBarred,
49 ForwardingViolation,
50 ForwardingFailed,
51 CUG-Reject,
52
53 -- any time interrogation errors
54 ATI-NotAllowed,
55
56 -- supplementary service errors
57 IllegalSS-Operation,
58 SS-ErrorStatus,
59 SS-NotAvailable,
60 SS-SubscriptionViolation,
61 SS-Incompatibility,
62 UnknownAlphabet,
63 USSD-Busy,
64 PW-RegistrationFailure,
65 NegativePW-Check,
66 NumberOfPW-AttemptsViolation,
67 ShortTermDenial,
68 LongTermDenial,
69
70 -- short message service errors
71 SubscriberBusyForMT-SMS,
72 SM-DeliveryFailure,
73 MessageWaitingListFull,
74 AbsentSubscriberSM,
75
76 -- Group Call errors
77 NoGroupCallNumberAvailable,
78
79 -- location service errors
80 UnauthorizedRequestingNetwork,
81 UnauthorizedLCSCClient,
82 PositionMethodFailure,
83 PositionMethodFailureWithRestart,
84 LMUUnknownOrOffline,
85 TrafficChannelEstablishmentFailure,
86 UnknownOrUnreachableLCSCClient
87
88 ;
89
90 IMPORTS
91 ERROR
92 FROM TCAPMessages {
93 ccitt recommendation q 773 modules (2) messages (1) version2 (2)}
94
95 SS-Status
96 FROM MAP-SS-DataTypes {
97 ccitt identified-organization (4) etsi (0) mobileDomain (0)
98 gsm-Network (1) modules (3) map-SS-DataTypes (14) version5 (5)}
99
100 SS-IncompatibilityCause,
101 PW-RegistrationFailureCause,
102 SM-DeliveryFailureCause,
103 SystemFailureParam,
104 DataMissingParam,
105 UnexpectedDataParam,
106 FacilityNotSupParam,
107 UnknownSubscriberParam,
108 NumberChangedParam,
109 UnidentifiedSubParam,
110 RoamingNotAllowedParam,
111 IllegalSubscriberParam,
112 IllegalEquipmentParam,
113 BearerServNotProvParam,
114 TeleservNotProvParam,
115 TracingBufferFullParam,
116 NoRoamingNbParam,
117 OR-NotAllowedParam,
118 AbsentSubscriberParam,
119 BusySubscriberParam,
120 NoSubscriberReplyParam,
121 CallBarredParam,
122 ForwardingViolationParam,

```

```

123 ForwardingFailedParam,
124 CUG-RejectParam,
125 ATI-NotAllowedParam,
126 SubBusyForMT-SMS-Param,
127 MessageWaitListFullParam,
128 AbsentSubscriberSM-Param,
129 ResourceLimitationParam,
130 NoGroupCallNbParam,
131 IncompatibleTerminalParam,
132 ShortTermDenialParam,
133 LongTermDenialParam,
134 UnauthorizedRequestingNetwork-Param,
135 UnauthorizedLCSCClient-Param,
136 PositionMethodFailure-Param,
137 PositionMethodFailureWithRestart-Param,
138 LMUUnknownOrOffline-Param,
139 TrafficChannelEstablishmentFailure-Param,
140 UnknownOrUnreachableLCSCClient-Param
141
142
143 FROM MAP-ER-DataTypes {
144     ccitt identified-organization (4) etsi (0) mobileDomain (0)
145     gsm-Network (1) modules (3) map-ER-DataTypes (17) version5 (5)}
146 ;
147
148
149 -- generic errors
150

```

```

151 SystemFailure ::= ERROR
152     PARAMETER
153     systemFailureParam          SystemFailureParam
154     -- optional

```

```

156 DataMissing ::= ERROR
157     PARAMETER
158     dataMissingParam           DataMissingParam
159     -- optional
160     -- dataMissingParam must not be used in version <3

```

```

162 UnexpectedDataValue ::= ERROR
163     PARAMETER
164     unexpectedDataParam        UnexpectedDataParam
165     -- optional
166     -- unexpectedDataParam must not be used in version <3

```

```

168 FacilityNotSupported ::= ERROR
169     PARAMETER
170     facilityNotSupParam        FacilityNotSupParam
171     -- optional
172     -- facilityNotSupParam must not be used in version <3

```

```

174 IncompatibleTerminal ::= ERROR
175     PARAMETER
176     incompatibleTerminalParam   IncompatibleTerminalParam
177     -- optional

```

```

179 ResourceLimitation ::= ERROR
180     PARAMETER
181     resourceLimitationParam     ResourceLimitationParam
182     -- optional

```

```

184 -- identification and numbering errors
185

```

```

186 UnknownSubscriber ::= ERROR
187     PARAMETER
188     unknownSubscriberParam      UnknownSubscriberParam
189     -- optional
190     -- unknownSubscriberParam must not be used in version <3

```

```

192 NumberChanged ::= ERROR
193     PARAMETER
194     numberChangedParam          NumberChangedParam
195     -- optional

```

```

197 UnknownMSC ::= ERROR

```

```

198

```

```

199 UnidentifiedSubscriber ::= ERROR
200     PARAMETER
201         unidentifiedSubParam          UnidentifiedSubParam
202         -- optional
203         -- unidentifiedSubParam must not be used in version <3
204
205 UnknownEquipment ::= ERROR
206
207
208 -- subscription errors
209
210 RoamingNotAllowed ::= ERROR
211     PARAMETER
212         roamingNotAllowedParam        RoamingNotAllowedParam
213
214 IllegalSubscriber ::= ERROR
215     PARAMETER
216         illegalSubscriberParam        IllegalSubscriberParam
217         -- optional
218         -- illegalSubscriberParam must not be used in version <3
219
220 IllegalEquipment ::= ERROR
221     PARAMETER
222         illegalEquipmentParam         IllegalEquipmentParam
223         -- optional
224         -- illegalEquipmentParam must not be used in version <3
225
226 BearerServiceNotProvisioned ::= ERROR
227     PARAMETER
228         bearerServNotProvParam        BearerServNotProvParam
229         -- optional
230         -- bearerServNotProvParam must not be used in version <3
231
232 TeleserviceNotProvisioned ::= ERROR
233     PARAMETER
234         teleservNotProvParam          TeleservNotProvParam
235         -- optional
236         -- teleservNotProvParam must not be used in version <3
237
238
239 -- handover errors
240
241 NoHandoverNumberAvailable ::= ERROR
242
243 SubsequentHandoverFailure ::= ERROR
244
245
246 -- operation and maintenance errors
247
248 TracingBufferFull ::= ERROR
249     PARAMETER
250         tracingBufferFullParam        TracingBufferFullParam
251         -- optional
252
253
254 -- call handling errors
255
256 NoRoamingNumberAvailable ::= ERROR
257     PARAMETER
258         noRoamingNbParam              NoRoamingNbParam
259         -- optional
260
261 AbsentSubscriber ::= ERROR
262     PARAMETER
263         absentSubscriberParam          AbsentSubscriberParam
264         -- optional
265
266         -- absentSubscriberParam must not be used in version <3
267
268 BusySubscriber ::= ERROR
269     PARAMETER
270         busySubscriberParam            BusySubscriberParam
271         -- optional
272

```

```

273 NoSubscriberReply ::= ERROR
274     PARAMETER
275         noSubscriberReplyParam          NoSubscriberReplyParam
276         -- optional
277
278 CallBarred ::= ERROR
279     PARAMETER
280         callBarredParam                CallBarredParam
281         -- optional
282
283 ForwardingViolation ::= ERROR
284     PARAMETER
285         forwardingViolationParam        ForwardingViolationParam
286         -- optional
287
288 ForwardingFailed ::= ERROR
289     PARAMETER
290         forwardingFailedParam           ForwardingFailedParam
291         -- optional
292
293 CUG-Reject ::= ERROR
294     PARAMETER
295         cug-RejectParam                 CUG-RejectParam
296         -- optional
297
298 OR-NotAllowed ::= ERROR
299     PARAMETER
300         or-NotAllowedParam              OR-NotAllowedParam
301         -- optional
302
303
304 -- any time interrogation errors
305 ATI-NotAllowed ::= ERROR
306     PARAMETER
307         ati-NotAllowedParam             ATI-NotAllowedParam
308         -- optional
309
310
311 -- supplementary service errors
312
313 IllegalSS-Operation ::= ERROR
314
315 SS-ErrorStatus ::= ERROR
316     PARAMETER
317         ss-Status                       SS-Status
318         -- optional
319
320 SS-NotAvailable ::= ERROR
321
322 SS-SubscriptionViolation ::= ERROR
323
324 SS-Incompatibility ::= ERROR
325     PARAMETER
326         ss-IncompatibilityCause         SS-IncompatibilityCause
327         -- optional
328
329 UnknownAlphabet ::= ERROR
330
331 USSD-Busy ::= ERROR
332
333 PW-RegistrationFailure ::= ERROR
334     PARAMETER
335         pw-RegistrationFailureCause     PW-RegistrationFailureCause
336
337 NegativePW-Check ::= ERROR
338
339 NumberOfPW-AttemptsViolation ::= ERROR
340
341 ShortTermDenial ::= ERROR
342     PARAMETER
343         shortTermDenialParam            ShortTermDenialParam
344         -- optional
345

```

```

346 LongTermDenial ::= ERROR
347     PARAMETER
348         longTermDenialParam                LongTermDenialParam
349         -- optional
350
351
352 -- short message service errors
353
354 SubscriberBusyForMT-SMS ::= ERROR
355     PARAMETER
356         subBusyForMT-SMS-Param            SubBusyForMT-SMS-Param
357         -- optional
358
359 SM-DeliveryFailure ::= ERROR
360     PARAMETER
361         sm-DeliveryFailureCause          SM-DeliveryFailureCause
362
363 MessageWaitingListFull ::= ERROR
364     PARAMETER
365         messageWaitListFullParam        MessageWaitListFullParam
366         -- optional
367
368 AbsentSubscriberSM ::= ERROR
369     PARAMETER
370         absentSubscriberSM-Param        AbsentSubscriberSM-Param
371         -- optional
372
373 -- Group Call errors
374
375 NoGroupCallNumberAvailable ::= ERROR
376     PARAMETER
377         noGroupCallNbParam              NoGroupCallNbParam
378         -- optional
379
380 -- location service errors
381
382 UnauthorizedRequestingNetwork ::= ERROR
383     PARAMETER
384         unauthorizedRequestingNetwork-Param  UnauthorizedRequestingNetwork-Param
385         -- optional
386
387 UnauthorizedLCSCClient ::= ERROR
388     PARAMETER
389         unauthorizedLCSCClient-Param        UnauthorizedLCSCClient-Param
390         -- optional
391
392 PositionMethodFailure ::= ERROR
393     PARAMETER
394         positionMethodFailure-Param        PositionMethodFailure-Param
395         -- optional
396
397 PositionMethodFailureWithRestart ::= ERROR
398      PARAMETER
399          positionMethodFailureWithRestart-Param    PositionMethodFailureWithRestart-Param
400          -- optional
401
402 LMUUnknownOrOffline ::= ERROR
403      PARAMETER
404          lmuUnknownOrOffline-Param    LMUUnknownOrOffline-Param
405          -- optional
406
407 TrafficChannelEstablishmentFailure ::= ERROR
408      PARAMETER
409          trafficChannelEstablishmentFailure    TrafficChannelEstablishmentFailure-Param
410          -- optional
411
412 UnknownOrUnreachableLCSCClient ::= ERROR
413     PARAMETER
414         unknownOrUnreachableLCSCClient-Param    UnknownOrUnreachableLCSCClient-Param
415         -- optional
416
417 END

```

1

2

**** NEXT MODIFIED SECTION ****

17.6.8 Location service operations

```
1
2 MAP-LocationServiceOperations {
3     ccitt identified-organization (4) etsi (0) mobileDomain (0)
4     gsm-Network (1) modules (3) map-LocationServiceOperations (24)
5     version5 (5)}
6
7 DEFINITIONS
8
9 ::=
10
11 BEGIN
12
13 EXPORTS
14 LCSAssignTrafficChannel,
15 LCSInformationReport,
16 LCSInformationRequest,
17 LCSRegistration,
18 LCSReset,
19     ProvideSubscriberLocation,
20 PerformLocation,
21     SendRoutingInfoForLCS,
22     SubscriberLocationReport
23 ;
24
25 IMPORTS
26     OPERATION
27 FROM TCAPMessages {
28     ccitt recommendation q 773 modules (2) messages (1) version2 (2)}
29
30     SystemFailure,
31     DataMissing,
32     UnexpectedDataValue,
33     FacilityNotSupported,
34     UnknownSubscriber,
35     AbsentSubscriber,
36     UnauthorizedRequestingNetwork,
37     UnauthorizedLCSClient,
38     PositionMethodFailure,
39 PositionMethodFailureWithRestart,
40 ResourceLimitation,
41 LMUUnknownOrOffline,
42 TrafficChannelEstablishmentFailure,
43     UnknownOrUnreachableLCSClient
44 FROM MAP-Errors {
45     ccitt identified-organization (4) etsi (0) mobileDomain (0)
46     gsm-Network (1) modules (3) map-Errors (10) version5 (5)}
47
48 LCSAssignTrafficChannel-Arg,
49 LCSAssignTrafficChannel-Res,
50 LCSInformationReport-Arg,
51 LCSInformationRequest-Arg,
52 LCSRegistration-Arg,
53 LCSRegistration-Res,
54 LCSReset-Arg,
55     RoutingInfoForLCS-Arg,
56     RoutingInfoForLCS-Res,
57     ProvideSubscriberLocation-Arg,
58     ProvideSubscriberLocation-Res,
59 PerformLocation-Arg,
60 PerformLocation-Res,
61     SubscriberLocationReport-Arg,
62     SubscriberLocationReport-Res
63 FROM MAP-LCS-DataTypes {
64     ccitt identified-organization (4) etsi (0) mobileDomain (0)
65     gsm-Network (1) modules (3) map-LCS-DataTypes (25) version5 (5)}
66 ;
67
```

```

68 SendRoutingInfoForLCS ::= OPERATION --Timer m
69 ARGUMENT
70 routingInfoForLCS-Arg RoutingInfoForLCS-Arg
71 RESULT
72 routingInfoForLCS-Res RoutingInfoForLCS-Res
73 ERRORS {
74 SystemFailure,
75 DataMissing,
76 UnexpectedDataValue,
77 FacilityNotSupported,
78 UnknownSubscriber,
79 AbsentSubscriber,
80 UnauthorizedRequestingNetwork }
81
82 ProvideSubscriberLocation ::= OPERATION --Timer ml
83 ARGUMENT
84 provideSubscriberLocation-Arg ProvideSubscriberLocation-Arg
85 RESULT
86 provideSubscriberLocation-Res ProvideSubscriberLocation-Res
87 ERRORS {
88 SystemFailure,
89 DataMissing,
90 UnexpectedDataValue,
91 FacilityNotSupported,
92 UnknownSubscriber,
93 UnidentifiedSubscriber,
94 IllegalSubscriber,
95 IllegalEquipment,
96 AbsentSubscriber,
97 UnauthorizedRequestingNetwork,
98 UnauthorizedLCSClient,
99 PositionMethodFailure }
100
101 SubscriberLocationReport ::= OPERATION --Timer m
102 ARGUMENT
103 subscriberLocationReport-Arg SubscriberLocationReport-Arg
104 RESULT
105 subscriberLocationReport-Res SubscriberLocationReport-Res
106 ERRORS {
107 SystemFailure,
108 DataMissing,
109 UnexpectedDataValue,
110 ResourceLimitation,
111 UnknownSubscriber,
112 UnauthorizedRequestingNetwork,
113 UnknownOrUnreachableLCSClient}
114
115 PerformLocation ::= OPERATION --Timer ml
116 ARGUMENT
117 performLocation-Arg PerformLocation-Arg
118 RESULT
119 performLocation-Res PerformLocation-Res
120 ERRORS {
121 SystemFailure,
122 DataMissing,
123 UnexpectedDataValue,
124 PositionMethodFailure,
125 PositionMethodFailureWithRestart }
126
127 LCSRegistration ::= OPERATION --Timer m
128 ARGUMENT
129 lcsRegistration-Arg LCSRegistration-Arg
130 RESULT
131 lcsRegistration-Res LCSRegistration-Res
132 ERRORS {
133 SystemFailure,
134 LMUUnknownOrOffline,
135 DataMissing,
136 UnexpectedDataValue }
137
138 LCSInformationRequest ::= OPERATION --Timer s
139 ARGUMENT
140 lcsInformationRequest-Arg LCSInformationRequest-Arg
141
142 LCSInformationReport ::= OPERATION --Timer s
143 ARGUMENT
144 lcsInformationReport-Arg LCSInformationReport-Arg
145

```

```

146 LCSReset ::= OPERATION -- Timer s
147 ARGUMENT
148 lcsReset-Arg LCSReset-Arg
149
150 LCSAssignTrafficChannel ::= OPERATION -- Timer m
151 ARGUMENT
152 lcsAssignTrafficChannel Arg LCSAssignTrafficChannel Arg
153 RESULT
154 lcsAssignTrafficChannel Res LCSAssignTrafficChannel Res
155 ERRORS {
156 SystemFailure,
157 DataMissing,
158 UnexpectedDataValue,
159 TrafficChannelEstablishmentFailure }
160
161 END
162

```

17.7 MAP constants and data types

**** NEXT MODIFIED SECTION ****

17.7.1 Mobile Service data types

```

1 MAP-MS-DataTypes {
2   ccitt identified-organization (4) etsi (0) mobileDomain (0)
3   gsm-Network (1) modules (3) map-MS-DataTypes (11) version5 (5)}
4
5 DEFINITIONS
6
7 IMPLICIT TAGS
8
9 ::=
10
11 BEGIN
12
13 EXPORTS
14
15   -- location registration types
16   UpdateLocationArg,
17   UpdateLocationRes,
18   CancelLocationArg,
19   CancelLocationRes,
20   PurgeMS-Arg,
21   PurgeMS-Res,
22   SendIdentificationRes,
23   UpdateGprsLocationArg,
24   UpdateGprsLocationRes,
25
26
27
28   -- handover types
29   PrepareHO-Arg,
30   PrepareHO-Res,
31   PrepareSubsequentHO-Arg,
32
33   -- authentication management types
34   SendAuthenticationInfoArg,
35   SendAuthenticationInfoRes,
36
37   -- security management types
38   EquipmentStatus,
39   Kc,
40
41   -- subscriber management types
42   InsertSubscriberDataArg,
43   InsertSubscriberDataRes,
44   DeleteSubscriberDataArg,
45   DeleteSubscriberDataRes,
46   SubscriberData,
47   ODB-Data,
48   SubscriberStatus,
49   ZoneCodeList,
50   maxNumOfZoneCodes,
51   O-CSI,

```



```

52     O-BcsmCamelTDPCriteriaList,
53     SS-CSI,
54     ServiceKey,
55     DefaultCallHandling,
56     CamelCapabilityHandling,
57     BasicServiceCriteria,
58     SupportedCamelPhases,
59     maxNumOfCamelTDPData,
60     CUG-Index,
61     CUG-Interlock,
62     InterCUG-Restrictions,
63     IntraCUG-Options,
64
65     -- fault recovery types
66     ResetArg,
67     RestoreDataArg,
68     RestoreDataRes,
69
70     -- subscriber information enquiry types
71     ProvideSubscriberInfoArg,
72     ProvideSubscriberInfoRes,
73     SubscriberInfo,
74     LocationInformation,
75     SubscriberState,
76
77     -- any time information enquiry types
78     AnyTimeInterrogationArg,
79     AnyTimeInterrogationRes,
80
81     -- gprs location information retrieval types
82     SendRoutingInfoForGprsArg,
83     SendRoutingInfoForGprsRes,
84
85     -- failure reporting types
86     FailureReportArg,
87     FailureReportRes,
88
89     -- gprs notification types
90     NoteMsPresentForGprsArg,
91     NoteMsPresentForGprsRes
92
93
94 ;
95
96 IMPORTS
97     maxNumOfSS,
98     SS-SubscriptionOption,
99     SS-List
100 FROM MAP-SS-DataTypes {
101     ccitt identified-organization (4) etsi (0) mobileDomain (0)
102     gsm-Network (1) modules (3) map-SS-DataTypes (14) version5 (5)}
103
104     SS-Code
105 FROM MAP-SS-Code {
106     ccitt identified-organization (4) etsi (0) mobileDomain (0)
107     gsm-Network (1) modules (3) map-SS-Code (15) version5 (5)}
108
109     Ext-BearerServiceCode
110 FROM MAP-BS-Code {
111     ccitt identified-organization (4) etsi (0) mobileDomain (0)
112     gsm-Network (1) modules (3) map-BS-Code (20) version5 (5)}
113
114     Ext-TeleserviceCode
115 FROM MAP-TS-Code {
116     ccitt identified-organization (4) etsi (0) mobileDomain (0)
117     gsm-Network (1) modules (3) map-TS-Code (19) version5 (5)}
118
119
120     ISDN-AddressString,
121     maxISDN-AddressLength,
122     ISDN-SubaddressString,
123     ExternalSignalInfo,
124     IMSI,
125     HLR-List,
126     LMSI,
127     Identity,
128     GlobalCellId,
129     CellIdOrLAI,
130     Ext-BasicServiceCode,

```

```

131 NAEA-PreferredCI,
132 EMLPP-Info,
133 SubscriberIdentity,
134 AgeOfLocationInformation,
135 LCSCClientExternalID,
136 LCSCClientInternalID
137
138
139
140 FROM MAP-CommonDataTypes {
141   ccitt identified-organization (4) etsi (0) mobileDomain (0)
142   gsm-Network (1) modules (3) map-CommonDataTypes (18) version5 (5)}
143
144   ExtensionContainer
145 FROM MAP-ExtensionDataTypes {
146   ccitt identified-organization (4) etsi (0) mobileDomain (0)
147   gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version5 (5)}
148
149   AbsentSubscriberDiagnosticSM
150 FROM MAP-ER-DataTypes {
151   ccitt identified-organization (4) etsi (0) mobileDomain (0)
152   gsm-Network (1) modules (3) map-ER-DataTypes (17) version5 (5)}
153
154
155 ;
156
157
158 -- location registration types
159

```

```

160 UpdateLocationArg ::= SEQUENCE {
161     imsi                IMSI,
162
163     msc-Number          [1] ISDN-AddressString,
164     vlr-Number          ISDN-AddressString,
165     lmsi                [10] LMSI OPTIONAL,
166     extensionContainer  ExtensionContainer          OPTIONAL,
167     ... ,
168     vlr-Capability      [6] VLR-Capability          OPTIONAL }
169

```

```

170 VLR-Capability ::= SEQUENCE{
171     supportedCamelPhases [0] SupportedCamelPhases  OPTIONAL,
172     extensionContainer   ExtensionContainer          OPTIONAL,
173     ... }
174

```

```

176 UpdateLocationRes ::= SEQUENCE {
177     hlr-Number          ISDN-AddressString,
178
179     extensionContainer  ExtensionContainer          OPTIONAL,
180     ... ,
181     solsaSupportIndicator [2] NULL                  OPTIONAL }
182

```

```

183 CancelLocationArg ::= [3] SEQUENCE {
184     identity            Identity,
185     cancellationType    CancellationType          OPTIONAL,
186     extensionContainer  ExtensionContainer          OPTIONAL,
187     ...}
188

```

```

190 CancellationType ::= ENUMERATED {
191     updateProcedure      (0),
192     subscriptionWithdraw (1),
193     ...}
194

```

```

196 CancelLocationRes ::= SEQUENCE {
197     extensionContainer  ExtensionContainer          OPTIONAL,
198     ...}
199

```

```

200 PurgeMS-Arg ::= [3] SEQUENCE {
201     imsi                IMSI,
202     vlr-Number          [0] ISDN-AddressString    OPTIONAL,
203     sgsn-Number         [1] ISDN-AddressString    OPTIONAL,
204     extensionContainer  ExtensionContainer          OPTIONAL,
205     ...}
206

```

```

207 PurgeMS-Res ::= SEQUENCE {
208     freezeTMSI [0] NULL OPTIONAL,
209     freezeP-TMSI [1] NULL OPTIONAL,
210     extensionContainer ExtensionContainer OPTIONAL,
211     ...}
212
213 SendIdentificationRes ::= SEQUENCE {
214     imsi IMSI,
215     authenticationSetList AuthenticationSetList OPTIONAL,
216     ...}
217
218 AuthenticationSetList ::= SEQUENCE SIZE (1..5) OF
219     AuthenticationSet
220
221 AuthenticationSet ::= SEQUENCE {
222     rand RAND,
223     sres SRES,
224     kc Kc,
225     ...}
226
227 RAND ::= OCTET STRING (SIZE (16))
228
229 SRES ::= OCTET STRING (SIZE (4))
230
231 Kc ::= OCTET STRING (SIZE (8))
232
233 -- gprs location registration types
234
235 UpdateGprsLocationArg ::= SEQUENCE {
236     imsi IMSI,
237     sgsn-Number ISDN-AddressString,
238     sgsn-Address GSN-Address,
239     extensionContainer ExtensionContainer OPTIONAL,
240     ... ,
241     sgsn-Capability [0] SGSN-Capability OPTIONAL }
242
243 SGSN-Capability ::= SEQUENCE{
244     solsaSupportIndicator NULL OPTIONAL,
245     extensionContainer [1] ExtensionContainer OPTIONAL,
246     ... }
247
248 GSN-Address ::= OCTET STRING (SIZE (5..17))
249 -- Octets are coded according to TS GSM 03.03
250
251 UpdateGprsLocationRes ::= SEQUENCE {
252     hlr-Number ISDN-AddressString,
253     extensionContainer ExtensionContainer OPTIONAL,
254     ...}
255
256 -- handover types
257
258 PrepareHO-Arg ::= SEQUENCE {
259     targetCellId GlobalCellId OPTIONAL,
260     ho-NumberNotRequired NULL OPTIONAL,
261     bss-APDU ExternalSignalInfo OPTIONAL,
262     ...}
263
264 PrepareHO-Res ::= SEQUENCE {
265     handoverNumber ISDN-AddressString OPTIONAL,
266     bss-APDU ExternalSignalInfo OPTIONAL,
267     ...}
268
269 PrepareSubsequentHO-Arg ::= SEQUENCE {
270     targetCellId GlobalCellId,
271     targetMSC-Number ISDN-AddressString,
272     bss-APDU ExternalSignalInfo,
273     ...}
274
275 -- authentication management types
276
277 SendAuthenticationInfoArg ::= IMSI
278
279 SendAuthenticationInfoRes ::= AuthenticationSetList
280
281

```

282 -- security management types

283

```
284 EquipmentStatus ::= ENUMERATED {
285     whiteListed (0),
286     blackListed (1),
287     greyListed (2)}
288
```

289 -- subscriber management types

290

```
291
292 InsertSubscriberDataArg ::= SEQUENCE {
293     imsi [0] IMSI OPTIONAL,
294     COMPONENTS OF SubscriberData,
295     extensionContainer [14] ExtensionContainer OPTIONAL,
296     ... ,
297     naea-PreferredCI [15] NAEA-PreferredCI OPTIONAL,
298     -- naea-PreferredCI is included at the discretion of the HLR operator.
299     gprsSubscriptionData [16] GPRSSubscriptionData OPTIONAL,
300     roamingRestrictedInSgsnDueToUnsupportedFeature [23] NULL
301     OPTIONAL,
302     networkAccessMode [24] NetworkAccessMode OPTIONAL,
303     lsaInformation [25] LSAInformation OPTIONAL,
304     lmu-Indicator [21] NULL OPTIONAL,
305     lcsInformation [22] LCSInformation OPTIONAL,
306 }
307 -- If the Network Access Mode parameter is sent, it shall be present only in
308 -- the first sequence if the segmentation is used
309
```

```
310 LCSInformation ::= SEQUENCE {
311     hplmn-GMLCGmlc-List [0] HPLMN-GMLC-List OPTIONAL,
312     lcs-PrivacyExceptionList [1] LCS-PrivacyExceptionList OPTIONAL,
313     molr-List [2] MOLR-List OPTIONAL,
314     ...}
315
```

```
316 HPLMN-GMLC-List ::= SEQUENCE SIZE (1..maxNumOfGMLC) OF
317     ISDN-AddressString
318 -- if segmentation is used, the complete GMLC-List shall be sent in one segment
319
```

```
320 maxNumOfGMLC INTEGER ::= 5
321
```

```
322
323 NetworkAccessMode ::= ENUMERATED {
324     bothMSCAndSGSN (0),
325     onlyMSC (1),
326     onlySGSN (2),
327     ...}
328 -- if unknown values are received in NetworkAccessMode
329 -- they shall be discarded.
330
```

```
331 GPRSDataList ::= SEQUENCE SIZE (1..maxNumOfPDP-Contexts) OF
332     PDP-Context
333
```

```
334 maxNumOfPDP-Contexts INTEGER ::= 50
335
```

```
336 PDP-Context ::= SEQUENCE {
337     pdp-ContextId ContextId,
338     pdp-Type [16] PDP-Type,
339     pdp-Address [17] PDP-Address OPTIONAL,
340     qos-Subscribed [18] QoS-Subscribed,
341     vplmnAddressAllowed [19] NULL OPTIONAL,
342     apn [20] APN ,
343     extensionContainer [21] ExtensionContainer OPTIONAL,
344     ...}
345
```

```
346 ContextId ::= INTEGER (1..maxNumOfPDP-Contexts)
347
```

```
348 GPRSSubscriptionData ::= SEQUENCE {
349     completeDataListIncluded NULL OPTIONAL,
350     -- If segmentation is used, completeDataListIncluded may only be present in the
351     -- first segment.
352     gprsDataList [1] GPRSDataList,
353     extensionContainer [2] ExtensionContainer OPTIONAL,
354     ...}
355
```

356

```
357 APN ::= OCTET STRING (SIZE (2..63))
358     -- Octets are coded according to TS GSM 03.03
359
```

```
361 PDP-Type ::= OCTET STRING (SIZE (2))
362     -- Octets are coded according to TS GSM 09.60
363
```

```
364 PDP-Address ::= OCTET STRING (SIZE (1..16))
365     -- Octets are coded according to TS GSM 09.60
366
367     -- The possible size values are:
368     -- 1-7 octets X.25 address type
369     -- 4 octets IPv4 address type
370     -- 16 octets IPv6 address type
371
```

```
372 QoS-Subscribed ::= OCTET STRING (SIZE (3))
373     -- Octets are coded according to TS GSM 04.08.
374
```

```
375 LSAOnlyAccessIndicator ::= ENUMERATED {
376     accessOutsideLSAsAllowed (0),
377     accessOutsideLSAsRestricted (1)}
378
```

```
379 LSADataList ::= SEQUENCE SIZE (1..maxNumOfLSAs) OF
380     LSAData
381
```

```
382 maxNumOfLSAs INTEGER ::= 20
383
```

```
384 LSAData ::= SEQUENCE {
385     lsaIdentity [0] LSAIdentity,
386     lsaPriority [1] LSAPriority,
387     lsaActiveModeIndicator [2] NULL OPTIONAL,
388     lsaActiveModeSupportIndicator [3] NULL OPTIONAL,
389     extensionContainer [4] ExtensionContainer OPTIONAL,
390     ...}
391
```

```
392 LSAInformation ::= SEQUENCE {
393     completeDataListIncluded NULL OPTIONAL,
394
395     -- If segmentation is used, completeDataListIncluded may only be present in the
396     -- first segment.
397     lsaOnlyAccessIndicator [1] LSAOnlyAccessIndicator OPTIONAL,
398     lsaDataList [2] LSADataList OPTIONAL,
399     extensionContainer [3] ExtensionContainer OPTIONAL,
400     ...}
401
```

```
402 LSAIdentity ::= OCTET STRING (SIZE (3))
403     -- Octets are coded according to TS GSM 03.03
404
```

```
405 LSAPriority ::= OCTET STRING (SIZE (1))
406     -- Octets are coded according to TS GSM 08.08
407
```

```
409 SubscriberData ::= SEQUENCE {
410     msisdn [1] ISDN-AddressString OPTIONAL,
411     category [2] Category OPTIONAL,
412     subscriberStatus [3] SubscriberStatus OPTIONAL,
413     bearerServiceList [4] BearerServiceList OPTIONAL,
414     -- The exception handling for reception of unsupported / not allocated
415     -- bearerServiceCodes is defined in section 6.8.1
416     teleserviceList [6] TeleserviceList OPTIONAL,
417     -- The exception handling for reception of unsupported / not allocated
418     -- teleserviceCodes is defined in section 6.8.1
419     provisionedSS [7] Ext-SS-InfoList OPTIONAL,
420     odb-Data [8] ODB-Data OPTIONAL,
421     roamingRestrictionDueToUnsupportedFeature [9] NULL OPTIONAL,
422     regionalSubscriptionData [10] ZoneCodeList OPTIONAL,
423     vbsSubscriptionData [11] VBSDataList OPTIONAL,
424     vgcsSubscriptionData [12] VGCSDataList OPTIONAL,
425     vlrCamelSubscriptionInfo [13] VlrCamelSubscriptionInfo OPTIONAL,
426     }
427
```

```

428 Category ::= OCTET STRING (SIZE (1))
429     -- The internal structure is defined in CCITT Rec Q.763.
430
431 SubscriberStatus ::= ENUMERATED {
432     serviceGranted (0),
433     operatorDeterminedBarring (1)}
434
435 BearerServiceList ::= SEQUENCE SIZE (1..maxNumOfBearerServices) OF
436     Ext-BearerServiceCode
437
438 maxNumOfBearerServices INTEGER ::= 50
439
440 TeleserviceList ::= SEQUENCE SIZE (1..maxNumOfTeleservices) OF
441     Ext-TeleserviceCode
442
443 maxNumOfTeleservices INTEGER ::= 20
444
445 ODB-Data ::= SEQUENCE {
446     odb-GeneralData ODB-GeneralData,
447     odb-HPLMN-Data ODB-HPLMN-Data OPTIONAL,
448     extensionContainer ExtensionContainer OPTIONAL,
449     ...}
450
451 ODB-GeneralData ::= BIT STRING {
452     allOG-CallsBarred (0),
453     internationalOGCallsBarred (1),
454     internationalOGCallsNotToHPLMN-CountryBarred (2),
455     interzonalOGCallsBarred (6),
456     interzonalOGCallsNotToHPLMN-CountryBarred (7),
457     interzonalOGCallsAndInternationalOGCallsNotToHPLMN-CountryBarred (8),
458     premiumRateInformationOGCallsBarred (3),
459     premiumRateEntertainmentOGCallsBarred (4),
460     ss-AccessBarred (5),
461     allECT-Barred (9),
462     chargeableECT-Barred (10),
463     internationalECT-Barred (11),
464     interzonalECT-Barred (12),
465     doublyChargeableECT-Barred (13),
466     multipleECT-Barred (14)} (SIZE (15..32))
467     -- exception handling: reception of unknown bit assignments in the
468     -- ODB-GeneralData type shall be treated like unsupported ODB-GeneralData
469
470 ODB-HPLMN-Data ::= BIT STRING {
471     plmn-SpecificBarringType1 (0),
472     plmn-SpecificBarringType2 (1),
473     plmn-SpecificBarringType3 (2),
474     plmn-SpecificBarringType4 (3)} (SIZE (4..32))
475     -- exception handling: reception of unknown bit assignments in the
476     -- ODB-HPLMN-Data type shall be treated like unsupported ODB-HPLMN-Data
477
478 Ext-SS-InfoList ::= SEQUENCE SIZE (1..maxNumOfSS) OF
479     Ext-SS-Info
480
481 Ext-SS-Info ::= CHOICE {
482     forwardingInfo [0] Ext-ForwInfo,
483     callBarringInfo [1] Ext-CallBarInfo,
484     cug-Info [2] CUG-Info,
485     ss-Data [3] Ext-SS-Data,
486     emlpp-Info [4] EMLPP-Info}
487
488
489 Ext-ForwInfo ::= SEQUENCE {
490     ss-Code SS-Code,
491     forwardingFeatureList Ext-ForwFeatureList,
492     extensionContainer [0] ExtensionContainer OPTIONAL,
493     ...}
494
495 Ext-ForwFeatureList ::= SEQUENCE SIZE (1..maxNumOfExt-BasicServiceGroups) OF
496     Ext-ForwFeature
497

```

```

498 Ext-ForwFeature ::= SEQUENCE {
499     basicService                               Ext-BasicServiceCode           OPTIONAL,
500     ss-Status [4] Ext-SS-Status,
501     forwardedToNumber                         [5] ISDN-AddressString         OPTIONAL,
502     -- When this data type is sent from an HLR which supports CAMEL Phase 2
503     -- to a VLR that supports CAMEL Phase 2 the VLR shall not check the
504     -- format of the number
505     forwardedToSubaddress                     [8] ISDN-SubaddressString      OPTIONAL,
506     forwardingOptions                         [6] Ext-ForwOptions            OPTIONAL,
507     noReplyConditionTime                     [7] Ext-NoRepCondTime         OPTIONAL,
508     extensionContainer                       [9] ExtensionContainer         OPTIONAL,
509     ...}

```

```

511 Ext-SS-Status ::= OCTET STRING (SIZE (1..5))
512
513     -- OCTET 1:
514     --
515     -- bits 8765: 0000 (unused)
516     -- bits 4321: Used to convey the "P bit", "R bit", "A bit" and "Q bit",
517     --             representing supplementary service state information
518     --             as defined in TS GSM 03.11
519
520     -- bit 4: "Q bit"
521
522     -- bit 3: "P bit"
523
524     -- bit 2: "R bit"
525
526     -- bit 1: "A bit"
527
528     -- OCTETS 2-5: reserved for future use. They shall be discarded if
529     -- received and not understood.

```

```

532 Ext-ForwOptions ::= OCTET STRING (SIZE (1..5))
533
534     -- OCTET 1:
535     --
536     -- bit 8: notification to forwarding party
537     -- 0 no notification
538     -- 1 notification
539
540     -- bit 7: redirecting presentation
541     -- 0 no presentation
542     -- 1 presentation
543
544     -- bit 6: notification to calling party
545     -- 0 no notification
546     -- 1 notification
547
548     -- bit 5: 0 (unused)
549
550     -- bits 43: forwarding reason
551     -- 00 ms not reachable
552     -- 01 ms busy
553     -- 10 no reply
554     -- 11 unconditional
555
556     -- bits 21: 00 (unused)
557
558     -- OCTETS 2-5: reserved for future use. They shall be discarded if
559     -- received and not understood.

```

```

561 Ext-NoRepCondTime ::= INTEGER (1..100)
562     -- Only values 5-30 are used.
563     -- Values in the ranges 1-4 and 31-100 are reserved for future use
564     -- If received:
565     --     values 1-4 shall be mapped on to value 5
566     --     values 31-100 shall be mapped on to value 30

```

```

568 Ext-CallBarInfo ::= SEQUENCE {
569     ss-Code                               SS-Code,
570     callBarringFeatureList                Ext-CallBarFeatureList,
571     extensionContainer                    ExtensionContainer           OPTIONAL,
572     ...}

```

```

574 Ext-CallBarFeatureList ::= SEQUENCE SIZE (1..maxNumOfExt-BasicServiceGroups) OF
575                               Ext-CallBarringFeature
576
577 Ext-CallBarringFeature ::= SEQUENCE {
578     basicService                Ext-BasicServiceCode                OPTIONAL,
579     ss-Status [4] Ext-SS-Status,
580     extensionContainer          ExtensionContainer                  OPTIONAL,
581     ...}
582
583 CUG-Info ::= SEQUENCE {
584     cug-SubscriptionList        CUG-SubscriptionList,
585     cug-FeatureList            CUG-FeatureList                OPTIONAL,
586     extensionContainer          [0] ExtensionContainer            OPTIONAL,
587     ...}
588
589 CUG-SubscriptionList ::= SEQUENCE SIZE (0..maxNumOfCUG) OF
590                               CUG-Subscription
591
592 CUG-Subscription ::= SEQUENCE {
593     cug-Index CUG-Index,
594     cug-Interlock              CUG-Interlock,
595     intraCUG-Options           IntraCUG-Options,
596     basicServiceGroupList      Ext-BasicServiceGroupList    OPTIONAL,
597     extensionContainer          [0] ExtensionContainer            OPTIONAL,
598     ...}
599
600 CUG-Index ::= INTEGER (0..32767)
601     -- The internal structure is defined in ETS 300 138.
602
603 CUG-Interlock ::= OCTET STRING (SIZE (4))
604
605 IntraCUG-Options ::= ENUMERATED {
606     noCUG-Restrictions (0),
607     cugIC-CallBarred (1),
608     cugOG-CallBarred (2)}
609
610 maxNumOfCUG INTEGER ::= 10
611
612 CUG-FeatureList ::= SEQUENCE SIZE (1..maxNumOfExt-BasicServiceGroups) OF
613                               CUG-Feature
614
615 Ext-BasicServiceGroupList ::= SEQUENCE SIZE (1..maxNumOfExt-BasicServiceGroups) OF
616                               Ext-BasicServiceCode
617
618 maxNumOfExt-BasicServiceGroups INTEGER ::= 32
619
620 CUG-Feature ::= SEQUENCE {
621     basicService                Ext-BasicServiceCode                OPTIONAL,
622     preferentialCUG-Indicator   CUG-Index OPTIONAL,
623     interCUG-Restrictions       InterCUG-Restrictions,
624     extensionContainer          ExtensionContainer                  OPTIONAL,
625     ...}
626
627 InterCUG-Restrictions ::= OCTET STRING (SIZE (1))
628
629     -- bits 876543: 000000 (unused)
630     -- Exception handling:
631     -- bits 876543 shall be ignored if received and not understood
632
633     -- bits 21
634     -- 00 CUG only facilities
635     -- 01 CUG with outgoing access
636     -- 10 CUG with incoming access
637     -- 11 CUG with both outgoing and incoming access
638

```



```

639 Ext-SS-Data ::= SEQUENCE {
640     ss-Code                               SS-Code,
641     ss-Status [4] Ext-SS-Status,
642     ss-SubscriptionOption                 SS-SubscriptionOption           OPTIONAL,
643     basicServiceGroupList                 Ext-BasicServiceGroupList         OPTIONAL,
644     extensionContainer                     [5] ExtensionContainer             OPTIONAL,
645     ...}
646
647 LCS-PrivacyExceptionList ::= SEQUENCE SIZE (1..maxNumOfPrivacyClass) OF
648     LCS-PrivacyClass
649
650 maxNumOfPrivacyClass INTEGER ::= 4
651
652 LCS-PrivacyClass ::= SEQUENCE {
653     ss-Code                               SS-Code,
654     ss-Status                             Ext-SS-Status,
655     privacyVerificationByMSuser            [0] NULL                           OPTIONAL,
656     -- privacyVerificationByMSuser is expected only for SS-code = callunrelated
657     externalClientList                     [10] ExternalClientList             OPTIONAL,
658     -- externalClientList is expected only for SS-code = callunrelated
659     plmnClientList                         [21] PLMNClientList                 OPTIONAL,
660     -- plmnClientList is expected only for SS-code - plmn
661     extensionContainer                     [32] ExtensionContainer             OPTIONAL,
662     ...}
663     -- if segmentation is used, the complete LCS-PrivacyClass shall be sent in one segment
664
665 ExternalClientList ::= SEQUENCE SIZE (0+..maxNumOfExternalClient) OF
666     ExternalClient
667
668 maxNumOfExternalClient INTEGER ::= 5
669
670 PLMNClientList ::= SEQUENCE SIZE (1..maxNumOfPLMNClient) OF
671     LCSCClientInternalID
672
673 maxNumOfPLMNClient INTEGER ::= 5
674
675 ExternalClient ::= SEQUENCE {
676     clientIdentity                         LCSCClientExternalID,
677     gmlc-Restriction                       [0] GMLC-Restriction               OPTIONAL,
678     notificationToMSUser                   [1] NotificationToMSUser           OPTIONAL,
679     extensionContainer                     [21] ExtensionContainer             OPTIONAL,
680     ... }
681
682 GMLC-Restriction ::= ENUMERATED {
683     hplmngmlc-List                         (0),
684     home-Country                           (1)}
685
686 NotificationToMSUser ::= ENUMERATED {
687     notification                           (0),
688     notificationWithPrivacyVerification     (1)}
689
690 MOLR-List ::= SEQUENCE SIZE (1..maxNumOfMOLR-Class) OF
691     MOLR-Class
692
693 maxNumOfMOLR-Class INTEGER ::= 3
694
695 MOLR-Class ::= SEQUENCE {
696     ss-Code                               SS-Code,
697     ss-Status                             Ext-SS-Status,
698     extensionContainer                     [0] ExtensionContainer             OPTIONAL,
699     ...}
700
701 ZoneCodeList ::= SEQUENCE SIZE (1..maxNumOfZoneCodes)
702     OF ZoneCode
703
704 ZoneCode ::= OCTET STRING (SIZE (2))
705     -- internal structure is defined in TS GSM 03.03
706
707 maxNumOfZoneCodes INTEGER ::= 10
708

```

```

709 InsertSubscriberDataRes ::= SEQUENCE {
710     teleserviceList          [1] TeleserviceList          OPTIONAL,
711     bearerServiceList       [2] BearerServiceList       OPTIONAL,
712     ss-List                  [3] SS-List                  OPTIONAL,
713     odb-GeneralData         [4] ODB-GeneralData         OPTIONAL,
714     regionalSubscriptionResponse [5]
715         RegionalSubscriptionResponse OPTIONAL,
716     supportedCamelPhases    [6] SupportedCamelPhases    OPTIONAL,
717     extensionContainer       [7] ExtensionContainer       OPTIONAL,
718     ...}
719
720 RegionalSubscriptionResponse ::= ENUMERATED {
721     networkNode-AreaRestricted (0),
722     tooManyZoneCodes          (1),
723     zoneCodesConflict         (2),
724     regionalSubscNotSupported (3)}
725
726 DeleteSubscriberDataArg ::= SEQUENCE {
727     imsi                      [0] IMSI,
728     basicServiceList         [1] BasicServiceList         OPTIONAL,
729     -- The exception handling for reception of unsupported/not allocated
730     -- basicServiceCodes is defined in section 6.8.2
731     ss-List                   [2] SS-List                   OPTIONAL,
732     roamingRestrictionDueToUnsupportedFeature [4] NULL
733     regionalSubscriptionIdentifier [5] ZoneCode
734     vbsGroupIndication        [7] NULL
735     vgcsGroupIndication       [8] NULL OPTIONAL,
736     camelSubscriptionInfoWithdraw [9] NULL OPTIONAL,
737     extensionContainer        [6] ExtensionContainer OPTIONAL,
738     ...,
739     gprsSubscriptionDataWithdraw [10] GPRSSubscriptionDataWithdraw OPTIONAL,
740     roamingRestrictedInSgsnDueToUnsupportedFeature [11] NULL
741     lsaInformationWithdraw     [12] LSAInformationWithdraw OPTIONAL,
742     gmlc-ListWithdraw         [13] NULL
743     EDITORIAL NOTE: gmlc-ListWithdraw ASN.1 tag for Release 99 is 14
744 GPRSSubscriptionDataWithdraw ::= CHOICE {
745     allGPRSData              NULL,
746     contextIdList            ContextIdList}
747
748 ContextIdList ::= SEQUENCE SIZE (1..maxNumOfPDP-Contexts) OF
749     ContextId
750
751 LSAInformationWithdraw ::= CHOICE {
752     allLSAData              NULL,
753     lsaIdentityList         LSAIdentityList }
754
755 LSAIdentityList ::= SEQUENCE SIZE (1..maxNumOfLSAs) OF
756     LSAIdentity
757
758 BasicServiceList ::= SEQUENCE SIZE (1..maxNumOfBasicServices) OF
759     Ext-BasicServiceCode
760
761 maxNumOfBasicServices INTEGER ::= 70
762
763 DeleteSubscriberDataRes ::= SEQUENCE {
764     regionalSubscriptionResponse [0]
765     RegionalSubscriptionResponse OPTIONAL,
766     extensionContainer           ExtensionContainer
767     ExtensionContainer          OPTIONAL,
768     ...}
769
770 VlrCamelSubscriptionInfo ::= SEQUENCE {
771     o-CSI                    [0] O-CSI                    OPTIONAL,
772     extensionContainer        [1] ExtensionContainer        OPTIONAL,
773     ...,
774     ss-CSI                    [2] SS-CSI                    OPTIONAL,
775     o-BcsmCamelTDP-CriteriaList [4] O-BcsmCamelTDPCriteriaList OPTIONAL,
776     tif-CSI                    [3] NULL                    OPTIONAL
777     }
778
779 SS-CSI ::= SEQUENCE {
780     ss-CamelData              SS-CamelData,
781     extensionContainer        ExtensionContainer
782     ExtensionContainer        OPTIONAL,
783     ...}

```

```

783 SS-CamelData ::= SEQUENCE {
784     ss-EventList          SS-EventList,
785     gsmSCF-Address        ISDN-AddressString,
786     extensionContainer    [0] ExtensionContainer    OPTIONAL,
787     ...
788 }
789
790 SS-EventList ::= SEQUENCE SIZE (1..maxNumOfCamelSSEvents) OF SS-Code
791 -- Actions for the following SS-Code values are defined in CAMEL Phase 2:
792 -- ect          SS-Code ::= '00110001'B
793 -- multiPTY     SS-Code ::= '01010001'B
794 -- cd           SS-Code ::= '00100100'B
795 -- all other SS codes shall be ignored
796
797 maxNumOfCamelSSEvents INTEGER ::= 10
798
799 O-CSI ::= SEQUENCE {
800     o-BcsmCamelTDPDataList O-BcsmCamelTDPDataList,
801     extensionContainer      ExtensionContainer      OPTIONAL,
802     ...,
803     camelCapabilityHandling [0] CamelCapabilityHandling OPTIONAL
804 }
805
806 O-BcsmCamelTDPDataList ::= SEQUENCE SIZE (1..maxNumOfCamelTDPData) OF
807     O-BcsmCamelTDPData
808 --- O-BcsmCamelTDPDataList shall not contain more than one instance of
809 --- O-BcsmCamelTDPData containing the same value for o-BcsmTriggerDetectionPoint.
810 --- For CAMEL Phase 2, this means that only one instance of O-BcsmCamelTDPData is allowed
811 --- with o-BcsmTriggerDetectionPoint being equal to DP2.
812
813 maxNumOfCamelTDPData INTEGER ::= 10
814
815 O-BcsmCamelTDPData ::= SEQUENCE {
816     o-BcsmTriggerDetectionPoint O-BcsmTriggerDetectionPoint,
817     serviceKey                   ServiceKey,
818     gsmSCF-Address               [0] ISDN-AddressString,
819     defaultCallHandling          [1] DefaultCallHandling,
820     extensionContainer            [2] ExtensionContainer    OPTIONAL,
821     ...
822 }
823
824 ServiceKey ::= INTEGER (0..2147483647)
825
826 O-BcsmTriggerDetectionPoint ::= ENUMERATED {
827     collectedInfo (2),
828     ... }
829 -- exception handling:
830 -- For O-BcsmCamelTDPData sequences containing this parameter with any
831 -- other value than the ones listed the receiver shall ignore the whole
832 -- O-BcsmCamelTDPData sequence.
833
834 O-BcsmCamelTDPCriteriaList ::= SEQUENCE SIZE (1..maxNumOfCamelTDPData) OF
835     O-BcsmCamelTDP-Criteria
836
837 O-BcsmCamelTDP-Criteria ::= SEQUENCE {
838     o-BcsmTriggerDetectionPoint O-BcsmTriggerDetectionPoint,
839     destinationNumberCriteria   [0] DestinationNumberCriteria    OPTIONAL,
840     basicServiceCriteria        [1] BasicServiceCriteria        OPTIONAL,
841     callTypeCriteria            [2] CallTypeCriteria            OPTIONAL,
842     ... }
843
844 DestinationNumberCriteria ::= SEQUENCE {
845     matchType [0] MatchType,
846     destinationNumberList [1] DestinationNumberList    OPTIONAL,
847     destinationNumberLengthList [2] DestinationNumberLengthList    OPTIONAL,
848     ... }
849
850 DestinationNumberList ::= SEQUENCE SIZE (1..maxNumOfCamelDestinationNumbers) OF
851     ISDN-AddressString
852 -- The receiving entity shall not check the format of a number in
853 -- the dialled number list
854
855 DestinationNumberLengthList ::= SEQUENCE SIZE (1..maxNumOfCamelDestinationNumberLengths) OF
856     INTEGER(1..maxNumOfISDN-AddressDigits)
857

```

```

858 BasicServiceCriteria ::= SEQUENCE SIZE(1..maxNumOfCamelBasicServiceCriteria) OF
859     Ext-BasicServiceCode
860
861 maxNumOfISDN-AddressDigits INTEGER ::= 15
862
863 maxNumOfCamelDestinationNumbers INTEGER ::= 10
864
865 maxNumOfCamelDestinationNumberLengths INTEGER ::= 3
866
867 maxNumOfCamelBasicServiceCriteria INTEGER ::= 5
868
869 CallTypeCriteria ::= ENUMERATED {
870     forwarded (0),
871     notForwarded (1)}
872
873 MatchType ::= ENUMERATED {
874     inhibiting (0),
875     enabling (1)}
876
877
878 DefaultCallHandling ::= ENUMERATED {
879     continueCall (0) ,
880     releaseCall (1) ,
881     ...}
882 -- exception handling:
883 -- reception of values in range 2-31 shall be treated as "continueCall"
884 -- reception of values greater than 31 shall be treated as "releaseCall"
885
886 CamelCapabilityHandling ::= INTEGER(1..16)
887 -- value 1 = CAMEL phase 1,
888 -- value 2 = CAMEL phase 2:
889 -- reception of values greater than 2 shall be treated as CAMEL phase 2
890
891 SupportedCamelPhases ::= BIT STRING {
892     phase1 (0),
893     phase2 (1) } (SIZE (1..16))
894
895
896 -- gprs location information retrieval types
897
898 SendRoutingInfoForGprsArg ::= SEQUENCE {
899     imsi [0] IMSI,
900     ggsn-Address [1] GSN-Address OPTIONAL,
901     extensionContainer [2] ExtensionContainer OPTIONAL,
902     ...}
903
904 SendRoutingInfoForGprsRes ::= SEQUENCE {
905     sgsn-Address [0] GSN-Address,
906     ggsn-Address [1] GSN-Address OPTIONAL,
907     mobileNotReachableReason [2] AbsentSubscriberDiagnosticSM OPTIONAL,
908     extensionContainer [3] ExtensionContainer OPTIONAL,
909     ...}
910
911 -- failure report types
912
913 FailureReportArg ::= SEQUENCE {
914     imsi [0] IMSI,
915     ggsn-Number [1] ISDN-AddressString ,
916     ggsn-Address [2] GSN-Address OPTIONAL,
917     extensionContainer [3] ExtensionContainer OPTIONAL,
918     ...}
919
920 FailureReportRes ::= SEQUENCE {
921     extensionContainer [0] ExtensionContainer OPTIONAL,
922     ...}
923
924 -- gprs notification types
925
926 NoteMsPresentForGprsArg ::= SEQUENCE {
927     imsi [0] IMSI,
928     sgsn-Address [1] GSN-Address OPTIONAL,
929     ggsn-Address [2] GSN-Address OPTIONAL,
930     extensionContainer [3] ExtensionContainer OPTIONAL,
931     ...}
932

```

```

933 NoteMsPresentForGprsRes ::= SEQUENCE {
934     extensionContainer          [0] ExtensionContainer    OPTIONAL,
935     ...}
936
937
938 -- fault recovery types
939
940 ResetArg ::= SEQUENCE {
941     hlr-Number                  ISDN-AddressString,
942     hlr-List                    HLR-List                OPTIONAL,
943     ...}
944
945 RestoreDataArg ::= SEQUENCE {
946     imsi                        IMSI,
947     lmsi                        LMSI                    OPTIONAL,
948     extensionContainer          ExtensionContainer        OPTIONAL,
949     ... ,
950     vlr-Capability              [6] VLR-Capability        OPTIONAL }
951
952 RestoreDataRes ::= SEQUENCE {
953     hlr-Number                  ISDN-AddressString,
954     msNotReachable              NULL                  OPTIONAL,
955     extensionContainer          ExtensionContainer        OPTIONAL,
956     ...}
957
958 -- VBS/VGCS types
959 VBSDataList ::= SEQUENCE SIZE (1..maxNumOfVBSSGroupIds) OF
960     VoiceBroadcastData
961
962 VGCSDataList ::= SEQUENCE SIZE (1..maxNumOfVGCSGroupIds) OF
963     VoiceGroupCallData
964
965 maxNumOfVBSSGroupIds INTEGER ::= 50
966
967 maxNumOfVGCSGroupIds INTEGER ::= 50
968
969 VoiceGroupCallData ::= SEQUENCE {
970     groupId                      GroupId,
971     extensionContainer            ExtensionContainer        OPTIONAL,
972     ...}
973
974 VoiceBroadcastData ::= SEQUENCE {
975     groupid                      GroupId,
976     broadcastInitEntitlement      NULL                  OPTIONAL,
977     extensionContainer            ExtensionContainer        OPTIONAL,
978     ...}
979
980 GroupId ::= OCTET STRING (SIZE (3))
981     -- Refers to the Group Identification as specified in GSM TS 03.03
982     -- and 03.68/ 03.69
983
984 -- provide subscriber info types
985
986 ProvideSubscriberInfoArg ::= SEQUENCE {
987     imsi        [0] IMSI,
988     lmsi        [1] LMSI                    OPTIONAL,
989     requestedInfo [2] RequestedInfo,
990     extensionContainer [3] ExtensionContainer        OPTIONAL,
991     ...}
992
993 ProvideSubscriberInfoRes ::= SEQUENCE {
994     subscriberInfo      SubscriberInfo,
995     extensionContainer  ExtensionContainer        OPTIONAL,
996     ...}
997
998 SubscriberInfo ::= SEQUENCE {
999     locationInformation [0] LocationInformation    OPTIONAL,
1000    subscriberState     [1] SubscriberState        OPTIONAL,
1001    extensionContainer   [2] ExtensionContainer    OPTIONAL,
1002    ...}
1003

```

```

1004 RequestedInfo ::= SEQUENCE {
1005     locationInformation          [0] NULL                OPTIONAL,
1006     subscriberState             [1] NULL                OPTIONAL,
1007     extensionContainer          [2] ExtensionContainer  OPTIONAL,
1008     ...}
1009
1010 LocationInformation ::= SEQUENCE {
1011     ageOfLocationInformation     AgeOfLocationInformation  OPTIONAL,
1012     geographicalInformation      [0] GeographicalInformation  OPTIONAL,
1013     vlr-number                  [1] ISDN-AddressString    OPTIONAL,
1014     locationNumber              [2] LocationNumber          OPTIONAL,
1015     cellIdOrLAI                 [3] CellIdOrLAI          OPTIONAL,
1016     extensionContainer          [4] ExtensionContainer  OPTIONAL,
1017     ...}
1018
1019 GeographicalInformation ::= OCTET STRING (SIZE (8))
1020 -- Refers to geographical Information defined in GSM 03.32.
1021 -- Only the description of an ellipsoid point with uncertainty circle
1022 --as specified in GSM 03.32 is allowed to be used
1023 -- The internal structure according to GSM 03.32 is as follows:
1024 --     Type of shape (ellipsoid point with uncertainty circle)      1 octet
1025 --     Degrees of Latitude                                           3 octets
1026 --     Degrees of Longitude                                          3 octets
1027 --     Uncertainty code                                             1 octet
1028
1029 LocationNumber ::= OCTET STRING (SIZE (2..10))
1030 -- the internal structure is defined in CCITT Rec Q.763
1031
1032 SubscriberState ::= CHOICE {
1033     assumedIdle                 [0] NULL,
1034     camelBusy [1] NULL,
1035     netDetNotReachable          NotReachableReason,
1036     notProvidedFromVLR         [2] NULL}
1037
1038 NotReachableReason ::= ENUMERATED {
1039     msPurged (0),
1040     imsiDetached (1),
1041     restrictedArea (2),
1042     notRegistered (3)}
1043
1044 -- any time interrogation info types
1045
1046 AnyTimeInterrogationArg ::= SEQUENCE {
1047     subscriberIdentity          [0] SubscriberIdentity,
1048     requestedInfo               [1] RequestedInfo,
1049     gsmSCF-Address              [3] ISDN-AddressString,
1050     extensionContainer          [2] ExtensionContainer          OPTIONAL,
1051     ...}
1052
1053 AnyTimeInterrogationRes ::= SEQUENCE {
1054     subscriberInfo              SubscriberInfo,
1055     extensionContainer          ExtensionContainer          OPTIONAL,
1056     ...}
1057
1058
1059 END

```

**** NEXT MODIFIED SECTION ****

17.7.5 Supplementary service codes

```

1 MAP-SS-Code {
2     ccitt identified-organization (4) etsi (0) mobileDomain (0)
3     gsm-Network (1) modules (3) map-SS-Code (15) version5 (5)}
4
5 DEFINITIONS
6
7 ::=
8
9 BEGIN
10

```

```

11 SS-Code ::= OCTET STRING (SIZE (1))
12   -- This type is used to represent the code identifying a single
13   -- supplementary service, a group of supplementary services, or
14   -- all supplementary services. The services and abbreviations
15   -- used are defined in TS GSM 02.04. The internal structure is
16   -- defined as follows:
17   --
18   -- bits 87654321: group (bits 8765), and specific service
19   -- (bits 4321)
20
21 allSS SS-Code ::= '00000000'B
22   -- reserved for possible future use
23   -- all SS
24
25 allLineIdentificationSS SS-Code ::= '00010000'B
26   -- reserved for possible future use
27   -- all line identification SS
28 clip SS-Code ::= '00010001'B
29   -- calling line identification presentation
30 clir SS-Code ::= '00010010'B
31   -- calling line identification restriction
32 colp SS-Code ::= '00010011'B
33   -- connected line identification presentation
34 colr SS-Code ::= '00010100'B
35   -- connected line identification restriction
36 mci SS-Code ::= '00010101'B
37   -- reserved for possible future use
38   -- malicious call identification
39
40 allNameIdentificationSS SS-Code ::= '00011000'B
41   -- all name identification SS
42 cnap SS-Code ::= '00011001'B
43   -- calling name presentation
44
45   -- SS-Codes '00011010'B to '00011111'B are reserved for future
46   -- NameIdentification Supplementary Service use.
47
48 allForwardingSS SS-Code ::= '00100000'B
49   -- all forwarding SS
50 cfu SS-Code ::= '00100001'B
51   -- call forwarding unconditional
52 allCondForwardingSS SS-Code ::= '00101000'B
53   -- all conditional forwarding SS
54 cfb SS-Code ::= '00101001'B
55   -- call forwarding on mobile subscriber busy
56 cfnry SS-Code ::= '00101010'B
57   -- call forwarding on no reply
58 cfnrc SS-Code ::= '00101011'B
59   -- call forwarding on mobile subscriber not reachable
60 cd SS-Code ::= '00100100'B
61   -- call deflection
62
63 allCallOfferingSS SS-Code ::= '00110000'B
64   -- reserved for possible future use
65   -- all call offering SS includes also all forwarding SS
66 ect SS-Code ::= '00110001'B
67   -- explicit call transfer
68 mah SS-Code ::= '00110010'B
69   -- reserved for possible future use
70   -- mobile access hunting
71
72 allCallCompletionSS SS-Code ::= '01000000'B
73   -- reserved for possible future use
74   -- all Call completion SS
75 cw SS-Code ::= '01000001'B
76   -- call waiting
77 hold SS-Code ::= '01000010'B
78   -- call hold
79 ccbs-A SS-Code ::= '01000011'B
80   -- completion of call to busy subscribers, originating side
81 ccbs-B SS-Code ::= '01000100'B
82   -- completion of call to busy subscribers, destination side
83   -- this SS-Code is used only in InsertSubscriberData
84

```

85	allMultiPartySS	SS-Code ::= '01010000'B
86	-- reserved for possible future use	
87	-- all multiparty SS	
88	multiPTY	SS-Code ::= '01010001'B
89	-- multiparty	
90		
91	allCommunityOfInterest-SS	SS-Code ::= '01100000'B
92	-- reserved for possible future use	
93	-- all community of interest SS	
94	cug	SS-Code ::= '01100001'B
95	-- closed user group	
96		
97	allChargingSS	SS-Code ::= '01110000'B
98	-- reserved for possible future use	
99	-- all charging SS	
100	aoci	SS-Code ::= '01110001'B
101	-- advice of charge information	
102	aocc	SS-Code ::= '01110010'B
103	-- advice of charge charging	
104		
105	allAdditionalInfoTransferSS	SS-Code ::= '10000000'B
106	-- reserved for possible future use	
107	-- all additional information transfer SS	
108	uus1	SS-Code ::= '10000001'B
109	-- UUS1 user-to-user signalling	
110	uus2	SS-Code ::= '10000010'B
111	-- UUS2 user-to-user signalling	
112	uus3	SS-Code ::= '10000011'B
113	-- UUS3 user-to-user signalling	
114		
115	allBarringSS	SS-Code ::= '10010000'B
116	-- all barring SS	
117	barringOfOutgoingCalls	SS-Code ::= '10010001'B
118	-- barring of outgoing calls	
119	baoc	SS-Code ::= '10010010'B
120	-- barring of all outgoing calls	
121	boic	SS-Code ::= '10010011'B
122	-- barring of outgoing international calls	
123	boicExHC	SS-Code ::= '10010100'B
124	-- barring of outgoing international calls except those directed	
125	-- to the home PLMN	
126	barringOfIncomingCalls	SS-Code ::= '10011001'B
127	-- barring of incoming calls	
128	baic	SS-Code ::= '10011010'B
129	-- barring of all incoming calls	
130	bicRoam	SS-Code ::= '10011011'B
131	-- barring of incoming calls when roaming outside home PLMN	
132	-- Country	
133		
134	allPLMN-specificSS	SS-Code ::= '11110000'B
135	plmn-specificSS-1	SS-Code ::= '11110001'B
136	plmn-specificSS-2	SS-Code ::= '11110010'B
137	plmn-specificSS-3	SS-Code ::= '11110011'B
138	plmn-specificSS-4	SS-Code ::= '11110100'B
139	plmn-specificSS-5	SS-Code ::= '11110101'B
140	plmn-specificSS-6	SS-Code ::= '11110110'B
141	plmn-specificSS-7	SS-Code ::= '11110111'B
142	plmn-specificSS-8	SS-Code ::= '11111000'B
143	plmn-specificSS-9	SS-Code ::= '11111001'B
144	plmn-specificSS-A	SS-Code ::= '11111010'B
145	plmn-specificSS-B	SS-Code ::= '11111011'B
146	plmn-specificSS-C	SS-Code ::= '11111100'B
147	plmn-specificSS-D	SS-Code ::= '11111101'B
148	plmn-specificSS-E	SS-Code ::= '11111110'B
149	plmn-specificSS-F	SS-Code ::= '11111111'B
150		
151	allCallPrioritySS	SS-Code ::= '10100000'B
152	-- reserved for possible future use	
153	-- all call priority SS	
154	emlpp	SS-Code ::= '10100001'B
155	-- enhanced Multilevel Precedence Pre-emption (EMLPP) service	
156		


```

157 allLCSPrivacyException          SS-Code ::= '10110000'B
158     -- all LCS Privacy Exception Classes
159 universal                        SS-Code ::= '10110001'B
160     -- allow location by any LCS client
161 callrelated                      SS-Code ::= '10110010'B
162     -- allow location by any value added LCS client to which a call
163     -- is established from the target MS
164 callunrelated                   SS-Code ::= '10110011'B
165     -- allow location by designated external value added LCS clients
166 plmnoperator                    SS-Code ::= '10110100'B
167     -- allow location by designated PLMN operator LCS clients
168
169 allMOLR-SS                      SS-Code ::= '10110000'B
170     -- all Mobile Originating Location Request Classes
171 basicSelfLocation              SS-Code ::= '10110001'B
172     -- allow an MS to request its own location
173 autonomousSelfLocation        SS-Code ::= '10110010'B
174     -- allow an MS to perform self location without interaction
175     -- with the PLMN for a predetermined period of time
176 transferToThirdParty          SS-Code ::= '10110011'B
177     -- allow an MS to request transfer of its location to another LCS client
178 EDITORIAL NOTE: the above MOLR codes have just been assigned
179
180 END

```

**** NEXT MODIFIED SECTION ****

17.7.7 Error data types

```

1  MAP-ER-DataTypes {
2     ccitt identified-organization (4) etsi (0) mobileDomain (0)
3     gsm-Network (1) modules (3) map-ER-DataTypes (17) version5 (5)}
4
5  DEFINITIONS
6
7  IMPLICIT TAGS
8
9  ::=
10
11 BEGIN
12
13 EXPORTS
14     RoamingNotAllowedParam,
15     CallBarredParam,
16     CUG-RejectParam,
17     SS-IncompatibilityCause,
18     PW-RegistrationFailureCause,
19     SM-DeliveryFailureCause,
20     SystemFailureParam,
21     DataMissingParam,
22     UnexpectedDataParam,
23     FacilityNotSupParam,
24     OR-NotAllowedParam,
25     UnknownSubscriberParam,
26     NumberChangedParam,
27     UnidentifiedSubParam,
28     IllegalSubscriberParam,
29     IllegalEquipmentParam,
30     BearerServNotProvParam,
31     TeleservNotProvParam,
32     TracingBufferFullParam,
33     NoRoamingNbParam,
34     AbsentSubscriberParam,
35     BusySubscriberParam,
36     NoSubscriberReplyParam,
37     ForwardingViolationParam,
38     ForwardingFailedParam,
39     ATI-NotAllowedParam,
40     SubBusyForMT-SMS-Param,
41     MessageWaitListFullParam,
42     AbsentSubscriberSM-Param,
43     AbsentSubscriberDiagnosticSM,

```

```

44 ResourceLimitationParam,
45 NoGroupCallNbParam,
46 IncompatibleTerminalParam,
47 ShortTermDenialParam,
48 LongTermDenialParam,
49 UnauthorizedRequestingNetwork-Param,
50 UnauthorizedLCSCClient-Param,
51 PositionMethodFailure-Param,
52 PositionMethodFailureWithRestart-Param,
53 LMUUnknownOrOffline-Param,
54 TrafficChannelEstablishmentFailure-Param,
55 UnknownOrUnreachableLCSCClient-Param
56
57
58 ;
59
60 IMPORTS
61 SS-Status
62 FROM MAP-SS-DataTypes {
63 ccitt identified-organization (4) etsi (0) mobileDomain (0)
64 gsm-Network (1) modules (3) map-SS-DataTypes (14) version5 (5)}
65
66 SignalInfo,
67 BasicServiceCode,
68 NetworkResource
69 FROM MAP-CommonDataTypes {
70 ccitt identified-organization (4) etsi (0) mobileDomain (0)
71 gsm-Network (1) modules (3) map-CommonDataTypes (18) version5 (5)}
72
73 SS-Code
74 FROM MAP-SS-Code {
75 ccitt identified-organization (4) etsi (0) mobileDomain (0)
76 gsm-Network (1) modules (3) map-SS-Code (15) version5 (5)}
77
78 ExtensionContainer
79 FROM MAP-ExtensionDataTypes {
80 ccitt identified-organization (4) etsi (0) mobileDomain (0)
81 gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version5 (5)}
82 ;
83
84 RoamingNotAllowedParam ::= SEQUENCE {
85     roamingNotAllowedCause          RoamingNotAllowedCause,
86     extensionContainer              ExtensionContainer          OPTIONAL,
87     ...}
88
89 RoamingNotAllowedCause ::= ENUMERATED {
90     plmnRoamingNotAllowed (0),
91     operatorDeterminedBarring (3)}
92
93 CallBarredParam ::= CHOICE {
94     callBarringCause          CallBarringCause,
95     -- call BarringCause must not be used in version 3
96     extensibleCallBarredParam ExtensibleCallBarredParam
97     -- extensibleCallBarredParam must not be used in version <3
98     }
99
100 CallBarringCause ::= ENUMERATED {
101     barringServiceActive (0),
102     operatorBarring (1)}
103
104 ExtensibleCallBarredParam ::= SEQUENCE {
105     callBarringCause          CallBarringCause          OPTIONAL,
106     extensionContainer        ExtensionContainer          OPTIONAL,
107     ... ,
108     unauthorisedMessageOriginator [1] NULL              OPTIONAL }
109
110 CUG-RejectParam ::= SEQUENCE {
111     cug-RejectCause          CUG-RejectCause          OPTIONAL,
112     extensionContainer        ExtensionContainer          OPTIONAL,
113     ...}
114
115 CUG-RejectCause ::= ENUMERATED {
116     incomingCallsBarredWithinCUG (0),
117     subscriberNotMemberOfCUG (1),
118     requestedBasicServiceViolatesCUG-Constraints (5),
119     calledPartySS-InteractionViolation (7)}
120

```

```

121 SS-IncompatibilityCause ::= SEQUENCE {
122     ss-Code [1] SS-Code OPTIONAL,
123     basicService BasicServiceCode OPTIONAL,
124     ss-Status [4] SS-Status OPTIONAL,
125     ...}
126
127 PW-RegistrationFailureCause ::= ENUMERATED {
128     undetermined (0),
129     invalidFormat (1),
130     newPasswordsMismatch (2)}
131
132
133 SM-EnumeratedDeliveryFailureCause ::= ENUMERATED {
134     memoryCapacityExceeded (0),
135     equipmentProtocolError (1),
136     equipmentNotSM-Equipped (2),
137     unknownServiceCentre (3),
138     sc-Congestion (4),
139     invalidSME-Address (5),
140     subscriberNotSC-Subscriber (6)}
141
142 SM-DeliveryFailureCause ::= SEQUENCE {
143     sm-EnumeratedDeliveryFailureCause SM-EnumeratedDeliveryFailureCause,
144     diagnosticInfo SignalInfo OPTIONAL,
145     extensionContainer ExtensionContainer OPTIONAL,
146     ...}
147
148 AbsentSubscriberSM-Param ::= SEQUENCE {
149     absentSubscriberDiagnosticSM AbsentSubscriberDiagnosticSM OPTIONAL,
150     -- AbsentSubscriberDiagnosticSM can be either for non-GPRS
151     -- or for GPRS
152     extensionContainer ExtensionContainer OPTIONAL,
153     ...,
154     additionalAbsentSubscriberDiagnosticSM [0] AbsentSubscriberDiagnosticSM OPTIONAL }
155     -- if received, additionalAbsentSubscriberDiagnosticSM
156     -- is for GPRS and absentSubscriberDiagnosticSM is
157     -- for non-GPRS
158
159 AbsentSubscriberDiagnosticSM ::= INTEGER (0..255)
160     -- AbsentSubscriberDiagnosticSM values are defined in ETS 300 536 (GSM 03.40)
161
162 SystemFailureParam ::= CHOICE {
163     networkResource NetworkResource,
164     -- networkResource must not be used in version 3
165     extensibleSystemFailureParam ExtensibleSystemFailureParam
166     -- extensibleSystemFailureParam must not be used in version <3
167 }
168
169 ExtensibleSystemFailureParam ::= SEQUENCE {
170     networkResource NetworkResource OPTIONAL,
171     extensionContainer ExtensionContainer OPTIONAL,
172     ...}
173
174 DataMissingParam ::= SEQUENCE {
175     extensionContainer ExtensionContainer OPTIONAL,
176     ...}
177
178 UnexpectedDataParam ::= SEQUENCE {
179     extensionContainer ExtensionContainer OPTIONAL,
180     ...}
181
182 FacilityNotSupParam ::= SEQUENCE {
183     extensionContainer ExtensionContainer OPTIONAL,
184     ...}
185
186 OR-NotAllowedParam ::= SEQUENCE {
187     extensionContainer ExtensionContainer OPTIONAL,
188     ...}
189
190 UnknownSubscriberParam ::= SEQUENCE {
191     extensionContainer ExtensionContainer OPTIONAL,
192     ...,
193     unknownSubscriberDiagnostic UnknownSubscriberDiagnostic OPTIONAL}
194

```

```

195 UnknownSubscriberDiagnostic ::= ENUMERATED {
196     imsiUnknown (0),
197     gprsSubscriptionUnknown (1),
198     ...}
199 -- if unknown values are received in
200 -- unknownSubscriberDiagnostic they shall be discarded
201
202
203 NumberChangedParam ::= SEQUENCE {
204     extensionContainer          ExtensionContainer          OPTIONAL,
205     ...}
206
207 UnidentifiedSubParam ::= SEQUENCE {
208     extensionContainer          ExtensionContainer          OPTIONAL,
209     ...}
210
211 IllegalSubscriberParam ::= SEQUENCE {
212     extensionContainer          ExtensionContainer          OPTIONAL,
213     ...}
214
215 IllegalEquipmentParam ::= SEQUENCE {
216     extensionContainer          ExtensionContainer          OPTIONAL,
217     ...}
218
219 BearerServNotProvParam ::= SEQUENCE {
220     extensionContainer          ExtensionContainer          OPTIONAL,
221     ...}
222
223 TeleservNotProvParam ::= SEQUENCE {
224     extensionContainer          ExtensionContainer          OPTIONAL,
225     ...}
226
227 TracingBufferFullParam ::= SEQUENCE {
228     extensionContainer          ExtensionContainer          OPTIONAL,
229     ...}
230
231 NoRoamingNbParam ::= SEQUENCE {
232     extensionContainer          ExtensionContainer          OPTIONAL,
233     ...}
234
235 AbsentSubscriberParam ::= SEQUENCE {
236     extensionContainer          ExtensionContainer          OPTIONAL,
237     ...,
238     absentSubscriberReason     [0] AbsentSubscriberReason OPTIONAL}
239
240 AbsentSubscriberReason ::= ENUMERATED {
241     imsiDetach (0),
242     restrictedArea (1),
243     noPageResponse (2),
244     ...}
245 -- exception handling: at reception of other values than the ones listed the
246 -- AbsentSubscriberReason shall be ignored.
247
248 BusySubscriberParam ::= SEQUENCE {
249     extensionContainer          ExtensionContainer          OPTIONAL,
250     ...,
251     ccbs-Possible              [0] NULL                  OPTIONAL,
252     ccbs-Busy [1] NULL          OPTIONAL}
253
254 NoSubscriberReplyParam ::= SEQUENCE {
255     extensionContainer          ExtensionContainer          OPTIONAL,
256     ...}
257
258 ForwardingViolationParam ::= SEQUENCE {
259     extensionContainer          ExtensionContainer          OPTIONAL,
260     ...}
261
262 ForwardingFailedParam ::= SEQUENCE {
263     extensionContainer          ExtensionContainer          OPTIONAL,
264     ...}
265
266 ATI-NotAllowedParam ::= SEQUENCE {
267     extensionContainer          ExtensionContainer          OPTIONAL,
268     ...}
269

```

```

270 SubBusyForMT-SMS-Param ::= SEQUENCE {
271     extensionContainer          ExtensionContainer          OPTIONAL,
272     ... ,
273     gprsConnectionSuspended    NULL          OPTIONAL }
274 -- If GprsConnectionSuspended is not understood it shall
275 -- be discarded
276
277 MessageWaitListFullParam ::= SEQUENCE {
278     extensionContainer          ExtensionContainer          OPTIONAL,
279     ... }
280
281 ResourceLimitationParam ::= SEQUENCE {
282     extensionContainer          ExtensionContainer          OPTIONAL,
283     ... }
284
285 NoGroupCallNbParam ::= SEQUENCE {
286     extensionContainer          ExtensionContainer          OPTIONAL,
287     ... }
288
289 IncompatibleTerminalParam ::= SEQUENCE {
290     extensionContainer          ExtensionContainer          OPTIONAL,
291     ... }
292
293 ShortTermDenialParam ::= SEQUENCE {
294     ... }
295
296 LongTermDenialParam ::= SEQUENCE {
297     ... }
298
299 UnauthorizedRequestingNetwork-Param ::= SEQUENCE {
300     extensionContainer          ExtensionContainer          OPTIONAL,
301     ... }
302
303 UnauthorizedLCSCClient-Param ::= SEQUENCE {
304     unauthorizedLCSCClient-Diagnostic [0] UnauthorizedLCSCClient-Diagnostic OPTIONAL,
305     extensionContainer                [1] ExtensionContainer          OPTIONAL,
306     ... }
307
308 UnauthorizedLCSCClient-Diagnostic ::= ENUMERATED {
309     noAdditionalInformation (0),
310     clientNotInMSPrivacyExceptionList (1),
311     callToClientNotSetup (2),
312     privacyOverrideNotApplicable (3),
313     disallowedByLocalRegulatoryRequirements (4),
314     ... }
315 -- exception handling:
316 -- any unrecognized value shall be ignored
317
318 PositionMethodFailure-Param ::= SEQUENCE {
319     positionMethodFailure-Diagnostic [0] PositionMethodFailure-Diagnostic OPTIONAL,
320     extensionContainer                [1] ExtensionContainer          OPTIONAL,
321     ... }
322
323 PositionMethodFailure-Diagnostic ::= ENUMERATED {
324     congestion (0),
325     insufficientResources (1),
326     insufficientMeasurementData (2),
327     inconsistentMeasurementData (3),
328     locationProcedureNotCompleted (4),
329     locationProcedureNotSupportedByTargetMS (5),
330     qosNotAttainable (6),
331     ... }
332 -- exception handling:
333 -- any unrecognized value shall be ignored
334
335 PositionMethodFailureWithRestart-Param ::= SEQUENCE {
336     extensionContainer          ExtensionContainer          OPTIONAL,
337     ... }
338
339 EMUUnknownOrOffline-Param ::= SEQUENCE {
340     extensionContainer          ExtensionContainer          OPTIONAL,
341     ... }
342

```

```

343 TrafficChannelEstablishmentFailure-Param ::= SEQUENCE {
344     extensionContainer      ExtensionContainer      OPTIONAL,
345     ...}
346
347 UnknownOrUnreachableLCSClient-Param ::= SEQUENCE {
348     extensionContainer      ExtensionContainer      OPTIONAL,
349     ...}
350
351
352 END

```

**** NEXT MODIFIED SECTION ****

17.7.8 Common data types

```

1  MAP-CommonDataTypes {
2      ccitt identified-organization (4) etsi (0) mobileDomain (0)
3      gsm-Network (1) modules (3) map-CommonDataTypes (18) version5 (5)}
4
5  DEFINITIONS
6
7  IMPLICIT TAGS
8
9  ::=
10
11 BEGIN
12
13 EXPORTS
14
15     -- general data types and values
16     AddressString,
17     ISDN-AddressString,
18     maxISDN-AddressLength,
19     ISDN-SubaddressString,
20     ExternalSignalInfo,
21     Ext-ExternalSignalInfo,
22     SignalInfo,
23     maxSignalInfoLength,
24     AlertingPattern,
25
26     -- data types for numbering and identification
27     IMSI,
28     TMSI,
29     Identity,
30     SubscriberId,
31     IMEI,
32     HLR-List,
33     LMSI,
34     GlobalCellId,
35     NetworkResource,
36     NAEA-PreferredCI,
37     NAEA-CIC,
38     ASCI-CallReference,
39     SubscriberIdentity,
40
41     -- data types for CAMEL
42     CellIdOrLAI,
43
44     -- data types for subscriber management
45     BasicServiceCode,
46     Ext-BasicServiceCode,
47     EMLPP-Info,
48     EMLPP-Priority,
49
50     -- data types for geographic location
51     AgeOfLocationInformation,
52     LCSClientExternalID,
53     LCSClientInternalID
54 ;
55
56 IMPORTS
57     TeleserviceCode,
58     Ext-TeleserviceCode
59 FROM MAP-TS-Code {
60     ccitt identified-organization (4) etsi (0) mobileDomain (0)

```

```

61     gsm-Network (1) modules (3) map-TS-Code (19) version5 (5)}
62
63     BearerServiceCode,
64     Ext-BearerServiceCode
65 FROM MAP-BS-Code {
66     ccitt identified-organization (4) etsi (0) mobileDomain (0)
67     gsm-Network (1) modules (3) map-BS-Code (20) version5 (5)}
68
69     ExtensionContainer
70 FROM MAP-ExtensionDataTypes {
71     ccitt identified-organization (4) etsi (0) mobileDomain (0)
72     gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version5 (5)}
73 ;
74
75
76 -- general data types
77

```

```

78 TBCD-STRING ::= OCTET STRING
79 -- This type (Telephony Binary Coded Decimal String) is used to
80 -- represent several digits from 0 through 9, *, #, a, b, c, two
81 -- digits per octet, each digit encoded 0000 to 1001 (0 to 9),
82 -- 1010 (*), 1011 (#), 1100 (a), 1101 (b) or 1110 (c); 1111 used
83 -- as filler when there is an odd number of digits.
84
85 -- bits 8765 of octet n encoding digit 2n
86 -- bits 4321 of octet n encoding digit 2(n-1) +1
87

```

```

88 AddressString ::= OCTET STRING (SIZE (1..maxAddressLength))
89 -- This type is used to represent a number for addressing
90 -- purposes. It is composed of
91 -- a) one octet for nature of address, and numbering plan
92 -- indicator.
93 -- b) digits of an address encoded as TBCD-String.
94
95 -- a) The first octet includes a one bit extension indicator, a
96 -- 3 bits nature of address indicator and a 4 bits numbering
97 -- plan indicator, encoded as follows:
98
99 -- bit 8: 1 (no extension)
100
101 -- bits 765: nature of address indicator
102 -- 000 unknown
103 -- 001 international number
104 -- 010 national significant number
105 -- 011 network specific number
106 -- 100 subscriber number
107 -- 101 reserved
108 -- 110 abbreviated number
109 -- 111 reserved for extension
110
111 -- bits 4321: numbering plan indicator
112 -- 0000 unknown
113 -- 0001 ISDN/Telephony Numbering Plan (Rec CCITT E.164)
114 -- 0010 spare
115 -- 0011 data numbering plan (CCITT Rec X.121)
116 -- 0100 telex numbering plan (CCITT Rec F.69)
117 -- 0101 spare
118 -- 0110 land mobile numbering plan (CCITT Rec E.212)
119 -- 0111 spare
120 -- 1000 national numbering plan
121 -- 1001 private numbering plan
122 -- 1111 reserved for extension
123
124 -- all other values are reserved.
125
126 -- b) The following octets representing digits of an address
127 -- encoded as a TBCD-STRING.
128

```

```

129 maxAddressLength INTEGER ::= 20
130

```

```

131 ISDN-AddressString ::=
132     AddressString (SIZE (1..maxISDN-AddressLength))
133 -- This type is used to represent ISDN numbers.
134

```

```

135 maxISDN-AddressLength INTEGER ::= 9
136

```

```

137 ISDN-SubaddressString ::=
138     OCTET STRING (SIZE (1..maxISDN-SubaddressLength))
139     -- This type is used to represent ISDN subaddresses.
140     -- It is composed of
141     -- a) one octet for type of subaddress and odd/even indicator.
142     -- b) 20 octets for subaddress information.
143
144     -- a) The first octet includes a one bit extension indicator, a
145     --     3 bits type of subaddress and a one bit odd/even indicator,
146     --     encoded as follows:
147
148     -- bit 8: 1 (no extension)
149
150     -- bits 765: type of subaddress
151     --     000 NSAP (X.213/ISO 8348 AD2)
152     --     010 User Specified
153     --     All other values are reserved
154
155     -- bit 4: odd/even indicator
156     --     0 even number of address signals
157     --     1 odd number of address signals
158     --     The odd/even indicator is used when the type of subaddress
159     --     is "user specified" and the coding is BCD.
160
161     -- bits 321: 000 (unused)
162
163     -- b) Subaddress information.
164     -- The NSAP X.213/ISO8348AD2 address shall be formatted as specified
165     -- by octet 4 which contains the Authority and Format Identifier
166     -- (AFI). The encoding is made according to the "preferred binary
167     -- encoding" as defined in X.213/ISO834AD2. For the definition
168     -- of this type of subaddress, see CCITT Rec I.334.
169
170     -- For User-specific subaddress, this field is encoded according
171     -- to the user specification, subject to a maximum length of 20
172     -- octets. When interworking with X.25 networks BCD coding should
173     -- be applied.

```

```

175 maxISDN-SubaddressLength INTEGER ::= 21

```

```

177 ExternalSignalInfo ::= SEQUENCE {
178     protocolId          ProtocolId,
179     signalInfo          SignalInfo,
180     -- Information about the internal structure is given in
181     -- subclause 7.6.9.
182     extensionContainer  ExtensionContainer OPTIONAL,
183     -- extensionContainer must not be used in version 2
184     ...}

```

```

186 SignalInfo ::= OCTET STRING (SIZE (1..maxSignalInfoLength))

```

```

188 maxSignalInfoLength INTEGER ::= 200
189 -- This NamedValue represents the theoretical maximum number of
190 -- octets which are available to carry a single data type,
191 -- without requiring segmentation to cope with the network layer
192 -- service. However, the actual maximum size available for a data
193 -- type may be lower, especially when other information elements
194 -- have to be included in the same component.

```

```

196 ProtocolId ::= ENUMERATED {
197     gsm-0408 (1),
198     gsm-0806 (2),
199     gsm-BSSMAP (3),
200     -- Value 3 is reserved and must not be used
201     ets-300102-1 (4)}

```

```

203 Ext-ExternalSignalInfo ::= SEQUENCE {
204     ext-ProtocolId      Ext-ProtocolId,
205     signalInfo          SignalInfo,
206     -- Information about the internal structure is given in
207     -- subclause 7.6.9.10
208     extensionContainer  ExtensionContainer OPTIONAL,
209     ...}

```

210


```

211 Ext-ProtocolId ::= ENUMERATED {
212     ets-300356 (1),
213     ...
214     gsm-0471 (2),
215     -- Value 2 refers to the smlc-lmu messages defined in GSM 04.71
216     gsm-0871 (3)
217     -- Value 3 refers to the SMLC-BSC messages defined in GSM 08.71
218     }
219 -- exception handling:
220 -- For Ext-ExternalSignalInfo sequences containing this parameter with any
221 -- other value than the ones listed the receiver shall ignore the whole
222 -- Ext-ExternalSignalInfo sequence.
223
224 AlertingPattern ::= OCTET STRING (SIZE (1) )
225 -- This type is used to represent Alerting Pattern
226
227 -- bits 8765 : 0000 (unused)
228
229 -- bits 43 : type of Pattern
230 --     00 level
231 --     01 category
232 --     10 category
233 --     all other values are reserved.
234
235 -- bits 21 : type of alerting
236
237 alertingLevel-0 AlertingPattern ::= '00000000'B
238 alertingLevel-1 AlertingPattern ::= '00000001'B
239 alertingLevel-2 AlertingPattern ::= '00000010'B
240 -- all other values of Alerting level are reserved
241 -- Alerting Levels are defined in GSM 02.07
242
243 alertingCategory-1 AlertingPattern ::= '00000100'B
244 alertingCategory-2 AlertingPattern ::= '00000101'B
245 alertingCategory-3 AlertingPattern ::= '00000110'B
246 alertingCategory-4 AlertingPattern ::= '00000111'B
247 alertingCategory-5 AlertingPattern ::= '00001000'B
248 -- all other values of Alerting Category are reserved
249 -- Alerting categories are defined in GSM 02.07
250
251
252 -- data types for numbering and identification
253
254 IMSI ::= TBCD-STRING (SIZE (3..8))
255 -- digits of MCC, MNC, MSIN are concatenated in this order.
256
257 Identity ::= CHOICE {
258     imsi                               IMSI,
259     imsi-WithLMSI                     IMSI-WithLMSI}
260
261 IMSI-WithLMSI ::= SEQUENCE {
262     imsi                               IMSI,
263     lmsi                               LMSI,
264     -- a special value 00000000 indicates that the LMSI is not in use
265     ...}
266
267 ASCII-CallReference ::= TBCD-STRING (SIZE (1..8))
268 -- digits of VGCS/VBC-area,Group-ID are concatenated in this order.
269
270
271 TMSI ::= OCTET STRING (SIZE (1..4))
272
273 SubscriberId ::= CHOICE {
274     imsi                               [0] IMSI,
275     tmsi                               [1] TMSI}
276
277 IMEI ::= TBCD-STRING (SIZE (8))
278 -- Refers to International Mobile Station Equipment Identity
279 -- and Software Version Number (SVN) defined in TS GSM 03.03.
280 -- If the SVN is not present the last octet shall contain the
281 -- digit 0 and a filler.
282 -- If present the SVN shall be included in the last octet.
283
284 HLR-Id ::= IMSI
285 -- leading digits of IMSI, i.e. (MCC, MNC, leading digits of
286 -- MSIN) forming HLR Id defined in TS GSM 03.03.
287

```

```

288 HLR-List ::= SEQUENCE SIZE (1..maxNumOfHLR-Id) OF
289 HLR-Id
290
291 maxNumOfHLR-Id INTEGER ::= 50
292
293 IMSI ::= OCTET STRING (SIZE (4))
294
295 GlobalCellId ::= OCTET STRING (SIZE (5..7))
296 -- Refers to Cell Global Identification defined in TS GSM 03.03.
297 -- The internal structure is defined as follows:
298 -- octet 1 bits 4321 Mobile Country Code 1st digit
299 -- bits 8765 Mobile Country Code 2nd digit
300 -- octet 2 bits 4321 Mobile Country Code 3rd digit
301 -- bits 8765 Mobile Network Code 3rd digit
302 -- or filler (1111) for 2 digit MNCs
303 -- octet 3 bits 4321 Mobile Network Code 1st digit
304 -- bits 8765 Mobile Network Code 2nd digit
305 -- octets 4 and 5 Location Area Code according to TS GSM 04.08
306 -- octets 6 and 7 Cell Identity (CI) according to TS GSM 04.08
307
308 NetworkResource ::= ENUMERATED {
309 plmn (0),
310 hlr (1),
311 vlr (2),
312 pvlr (3),
313 controllingMSC (4),
314 vmsc (5),
315 eir (6),
316 rss (7)}
317
318 NAEA-PreferredCI ::= SEQUENCE {
319 naea-PreferredCIC [0] NAEA-CIC,
320 extensionContainer [1] ExtensionContainer OPTIONAL,
321 ...}
322
323 NAEA-CIC ::= OCTET STRING (SIZE (3))
324 -- The internal structure is defined by the Carrier Identification
325 -- parameter in ANSI T1.113.3. Carrier codes between "000" and "999" may
326 -- be encoded as 3 digits using "000" to "999" or as 4 digits using
327 -- "0000" to "0999". Carrier codes between "1000" and "9999" are encoded
328 -- using 4 digits.
329
330 SubscriberIdentity ::= CHOICE {
331 imsi [0] IMSI,
332 msisdn [1] ISDN-AddressString
333 }
334
335 LCSCClientExternalID ::= SEQUENCE {
336 externalAddress [0] AddressString OPTIONAL,
337 extensionContainer [1] ExtensionContainer OPTIONAL,
338 ...}
339
340 LCSCClientInternalID ::= ENUMERATED {
341 broadcastService (0),
342 o-andM-HPLMN (1),
343 o-andM-VPLMN (2),
344 anonymousLocation (3),
345 targetMSSubscribedService (4),
346 ...}
347
348
349 -- data types for CAMEL
350
351 CellIdOrLAI ::= CHOICE {
352 cellIdFixedLength [0] CellIdFixedLength,
353 laiFixedLength [1] LAIFixedLength}
354

```

```

355 CellIdFixedLength ::= OCTET STRING (SIZE (7))
356 -- Refers to Cell Global Identification defined in TS GSM 03.03.
357 -- The internal structure is defined as follows:
358 -- octet 1 bits 4321      Mobile Country Code 1st digit
359 --      bits 8765      Mobile Country Code 2nd digit
360 -- octet 2 bits 4321      Mobile Country Code 3rd digit
361 --      bits 8765      Mobile Network Code 3rd digit
362 --                          or filler (1111) for 2 digit MNCs
363 -- octet 3 bits 4321      Mobile Network Code 1st digit
364 --      bits 8765      Mobile Network Code 2nd digit
365 -- octets 4 and 5      Location Area Code according to TS GSM 04.08
366 -- octets 6 and 7      Cell Identity (CI) according to TS GSM 04.08
367

```

```

368 LAIFixedLength ::= OCTET STRING (SIZE (5))
369 -- Refers to Location Area Identification defined in TS GSM 03.03.
370 -- The internal structure is defined as follows:
371 -- octet 1 bits 4321      Mobile Country Code 1st digit
372 --      bits 8765      Mobile Country Code 2nd digit
373 -- octet 2 bits 4321      Mobile Country Code 3rd digit
374 --      bits 8765      Mobile Network Code 3rd digit
375 --                          or filler (1111) for 2 digit MNCs
376 -- octet 3 bits 4321      Mobile Network Code 1st digit
377 --      bits 8765      Mobile Network Code 2nd digit
378 -- octets 4 and 5      Location Area Code according to TS GSM 04.08
379

```

```

380 -- data types for subscriber management
381

```

```

383 BasicServiceCode ::= CHOICE {
384     bearerService      [2] BearerServiceCode,
385     teleservice        [3] TeleserviceCode}
386

```

```

387 Ext-BasicServiceCode ::= CHOICE {
388     ext-BearerService  [2] Ext-BearerServiceCode,
389     ext-Teleservice   [3] Ext-TeleserviceCode}
390

```

```

391 EMLPP-Info ::= SEQUENCE {
392     maximumentitledPriority  EMLPP-Priority,
393     defaultPriority          EMLPP-Priority,
394     extensionContainer       ExtensionContainer          OPTIONAL,
395     ...}
396

```

```

397 EMLPP-Priority ::= INTEGER (0..15)
398 -- The mapping from the values A,B,0,1,2,3,4 to the integer-value is
399 -- specified as follows where A is the highest and 4 is the lowest
400 -- priority level
401 -- the integer values 7-15 are spare and shall be mapped to value 4
402

```

```

403 priorityLevelA      EMLPP-Priority ::= 6
404 priorityLevelB      EMLPP-Priority ::= 5
405 priorityLevel0      EMLPP-Priority ::= 0
406 priorityLevel1      EMLPP-Priority ::= 1
407 priorityLevel2      EMLPP-Priority ::= 2
408 priorityLevel3      EMLPP-Priority ::= 3
409 priorityLevel4      EMLPP-Priority ::= 4
410

```

```

411 -- data types for geographic location
412

```

```

414 AgeOfLocationInformation ::= INTEGER (0..32767)
415 -- the value represents the elapsed time in minutes since the last
416 -- network contact of the mobile station (i.e. the actuality of the
417 -- location information).
418 -- value "0" indicates that the MS is currently in contact with the
419 -- network
420 -- value "32767" indicates that the location information is at least
421 -- 32767 minutes old
422

```

```

423 END

```

1

2

**** NEXT MODIFIED SECTION ****

|

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) version5 (5)}

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
PerformLocation-Arg,
PerformLocation-Res,
LCSRegistration-Arg,
LCSRegistration-Res,
LCSInformationRequest-Arg,
LCSInformationReport-Arg,
LCSReset-Arg,
LCSAssignTrafficChannel-Arg,
LCSAssignTrafficChannel-Res
;

IMPORTS
    AddressString,
    ISDN-AddressString,
    IMEI,
    IMSI,
    LMSI,
Identity,
    SubscriberIdentity,
    GlobalCellId,
Ext-ExternalSignalInfo,
    AgeOfLocationInformation,
    LCSClientExternalID,
    LCSClientInternalID
FROM MAP-CommonDataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-CommonDataTypes (18) version5 (5)}

    ExtensionContainer
FROM MAP-ExtensionDataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version5 (5)}

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) version5 (5)}
;

```

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 {
    msc-Number                ISDN-AddressString,
    lmsi                       [0] LMSI                                OPTIONAL,
    extensionContainer         [1] ExtensionContainer                OPTIONAL,
    ... }

```

```

ProvideSubscriberLocation-Arg ::= SEQUENCE {
    locationType               LocationType,
    msc-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,
na-ESRK                     [6] ISDN-AddressString              OPTIONAL,
    lcs-Priority               [67] LCS-Priority                    OPTIONAL,
    lcs-QoS                    [78] LCS-QoS                          OPTIONAL,
    extensionContainer         [89] ExtensionContainer                OPTIONAL,
    ... }

-- one of imsi or7 msisdn or7 na-ESRK is mandatory
-- na-ESRK is applicable only to North American PLMNs

```

EDITORIAL NOTE: the ASN.1 TAG for extensionContainer should be 8

```

LocationType ::= SEQUENCE {
    locationEstimateType      [0] LocationEstimateType,
    ... }

```

```

LocationEstimateType ::= ENUMERATED {
    currentLocation           (0),
    currentOrLastKnownLocation (1),
    initialLocation           (2),
    ... }

-- exception handling:
-- a ProvideSubscriberLocation-Arg containing an unrecognized LocationEstimateType
-- 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,
    ... }

```

```

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

```

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 GSM 03.32

```

```

Vertical-Accuracy ::= OCTET STRING (SIZE (1))
-- bit 8 = 0
-- bits 7-1 = 7 bit Vertical Uncertainty Code defined in GSM 03.32

```

```

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

```

```

ResponseTimeCategory ::= ENUMERATED {
    nodelay (0),
    lowdelay (01),
    delaytolerant (12),
    ... }
-- exception handling:
-- an unrecognized value shall be treated the same as value 12 (delaytolerant)

```

```

ProvideSubscriberLocation-Res ::= SEQUENCE {
    locationEstimate            Ext-GeographicalInformation,
    ageOfLocationEstimate      [0] AgeOfLocationInformation      OPTIONAL,
    extensionContainer          [1] ExtensionContainer            OPTIONAL,
    ...}

```

```

Ext-GeographicalInformation ::= OCTET STRING (SIZE (1..maxExt-GeographicalInformation))
-- Refers to geographical information defined in GSM 03.32.
-- This is composed of 1 or more octets with an internal structure according to GSM 03.32
-- Octet 1: Type of shape, only the following shapes in GSM 03.32 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
-- 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
--
-- An Ext-GeographicalInformation parameter containing any other shape or an incorrect number
-- of octets or coding according to GSM 03.32 shall be treated as invalid data by a receiver

```

```
maxExt-GeographicalInformation INTEGER ::= 20
-- the maximum length allows for further shapes in GSM 03.32 to be included in later versions
-- of GSM 09.02
```

```
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,
    ...}

```

```
-- one of msisdn_or_7, imsi, or na-ESRK is mandatory
-- in North America, the na-ESRD is mandatory
```

```
LCS-Event ::= ENUMERATED {
    emergencyCallOrigination (0),
    emergencyCallRelease (1),
    mo-lr (2),
    ... }
-- 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
```

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

```

```
PerformLocation-Arg ::= SEQUENCE {
    globalCellId             GlobalCellId,
    radioChannelType         [0] RadioChannelType           OPTIONAL,
    lcs-Priority              [1] LCS-Priority               OPTIONAL,
    lcs-QoS                   [2] LCS-QoS                   OPTIONAL,
    lcs-APDU                 [3] Ext-ExternalSignalInfo     OPTIONAL,
    extensionContainer        [4] ExtensionContainer          OPTIONAL,
    ...}

```

```
RadioChannelType ::= ENUMERATED {
    sdech (0),
    tch-fr (1),
    tch-hr (2),
    ... }
-- exception handling
-- an unrecognized value shall be treated as unexpected data
-- a return error shall be returned if received in a MAP invoke
```

```
PerformLocation-Res ::= SEQUENCE {
    locationEstimate         Ext-GeographicalInformation,
    positioningData          [0] PositioningDataList         OPTIONAL,
    extensionContainer        [1] ExtensionContainer          OPTIONAL,
    ...}

```

```
PositioningDataList ::= SEQUENCE SIZE (1..maxNumOfPositionAttempts) OF
    PositioningData
-- list of positioning data for each positioning attempt
-- first in list = first attempt, last in list = last attempt
```

```
maxNumOfPositionAttempts INTEGER ::= 5
```

```
PositioningData ::= SEQUENCE {
    positionMethod           PositionMethod,
    positionResult           PositionResult,
    duration                 [0] Duration                   OPTIONAL,
    toa-LMU-data             [1] TOA-LMU-Data               OPTIONAL,
    extensionContainer        [2] ExtensionContainer          OPTIONAL,
    ...}

```

```
-- Positioning data need not be provided to an LCS client but may be useful to the PLMN
-- for billing, accounting and statistical purposes
```



```

PositionMethod ::= ENUMERATED {
  timingAdvance (0),
  toa (1),
  ... }
exception handling
an unrecognized value may be stored in billing or accounting records
an unrecognized value shall not cause rejection of any associated location estimate

```

```

PositionResult ::= ENUMERATED {
  failure (0),
  success-NoDeliveryToClient (1),
  success-DeliveryToClient (2) }

```

```

Duration ::= INTEGER (0..250)
duration of location attempt in units of 100ms
250 : duration >= 25 seconds

```

```

TOA-LMU-Data ::= SEQUENCE {
  numberOfAssignedLMUs INTEGER (0..12),
  numberOfLMUsWithValidMeasurements INTEGER (0..12),
  extensionContainer [0] ExtensionContainer OPTIONAL,
  ... }

```

```

LCSRegistration-Arg ::= SEQUENCE {
  lmuIdentity Identity,
  registrationType RegistrationType,
  mscNumber [0] ISDN-AddressString OPTIONAL,
  extensionContainer [1] ExtensionContainer OPTIONAL,
  ... }

```

```

RegistrationType ::= ENUMERATED {
  registration (0),
  deRegistration (1) }

```

```

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

```

```

LCSInformationRequest-Arg ::= SEQUENCE {
  lcs-Entity LCS-Entity,
  mscNumber [0] ISDN-AddressString OPTIONAL,
  release-forbidden [1] NULL OPTIONAL,
  reportError-request [2] NULL OPTIONAL,
  lcs-apdu [3] Ext-ExternalSignalInfo OPTIONAL,
  lcs apdu carries either the Facility Information Element defined in GSM 04.71
  or the Location Information parameter defined in GSM 08.71
  extensionContainer [4] ExtensionContainer OPTIONAL,
  ... }

```

```

LCS-Entity ::= SEQUENCE {
  entityType EntityType,
  entityIdentity [0] EntityIdentity OPTIONAL,
  ... }

```

```

EntityType ::= ENUMERATED {
  lmu (0),
  serving-BSC (1),
  ... }
Exception handling
an unrecognized value for the Entity Type shall cause any associated LCS APDU to be
discarded; the Report Error procedure in GSM 03.71 may also be invoked if requested in
an LCSInformationRequest-Arg.

```

```

EntityIdentity ::= SEQUENCE {
  lmuIdentity Identity OPTIONAL,
  ... }

```

```

LCSInformationReport-Arg ::= SEQUENCE {
  lcs-Entity                LCS-Entity,
  lcsCause                  [0] LCSCause                OPTIONAL,
  -- lcsCause is included if and only if the MSC is returning an lcs-apdu to the SMLC
  -- that could not be successfully transferred to its destination LCS entity.
  lcs-apdu                  [1] Ext-ExternalSignalInfo   OPTIONAL,
  -- lcs-apdu carries either the Facility Information Element defined in GSM 04.71
  -- or the Location Information parameter defined in GSM 08.71
  extensionContainer       [2] ExtensionContainer       OPTIONAL,
  ...}

```

```

LCSCause ::= ENUMERATED {
  undefined                  (0),
  unknownLCSEntity         (1),
  noPagingResponse         (2),
  errorInAuthentication     (3),
  errorInServingMSC        (4),
  ...}
-- exception handling:
-- an unrecognized value shall be treated the same as value 0 (undefined)

```

```

LCSReset-Arg ::= SEQUENCE {
  mscNumber                 ISDN-AddressString,
  lmu-List                  [0] LMU-List                OPTIONAL,
  extensionContainer       [1] ExtensionContainer       OPTIONAL,
  ...}

```

```

LMU-Id ::= IMSI
-- leading digits of IMSI, i.e. (MCC, MNC, leading digits of
-- MSIN) defining a set of LMUs sharing the same SMLC

```

```

LMU-List ::= SEQUENCE SIZE (1..maxNumOfLMU-Id) OF
  LMU-Id

```

```

maxNumOfLMU-Id INTEGER ::= 10

```

```

LCSAssignTrafficChannel-Arg ::= SEQUENCE {
  radioChannelType         RadioChannelType,
  extensionContainer       [0] ExtensionContainer       OPTIONAL,
  ...}

```

```

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

```

END

3GPP TSG CN WG2
Phoenix AZ, 15-19 Nov 1999

Document N2-99H65

e.g. for 3GPP use the format TP-99xxx
 or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

23.003 CR 011

Current Version: **3.2.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **TSG CN#06**
list expected approval meeting # here ↑

for approval
 for information

strategic (for SMG use only)
 non-strategic

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc

Proposed change affects: (U)SIM ME UTRAN / Radio Core Network
(at least one should be marked with an X)

Source: TSG N2 **Date:** 15 Nov 1999

Subject: Mirror CR to that for GSM 03.03 v.7.1.1 - support of VLR and HLR Data Restoration procedures with LCS

Work item: Location Services (LCS)

Category: <small>(only one category shall be marked with an X)</small>	Correction	<input type="checkbox"/>	Release:	Phase 2	<input type="checkbox"/>
	Corresponds to a correction in an earlier release	<input type="checkbox"/>		Release 96	<input type="checkbox"/>
	Addition of feature	<input type="checkbox"/>		Release 97	<input type="checkbox"/>
	Functional modification of feature	<input checked="" type="checkbox"/>		Release 98	<input type="checkbox"/>
	Editorial modification	<input type="checkbox"/>		Release 99	<input checked="" type="checkbox"/>
			Release 00	<input type="checkbox"/>	

Reason for change: Add new SCCP SSNs for LCS

Clauses affected: 8

Other specs affected:	Other 3G core specifications	<input type="checkbox"/>	→ List of CRs:	
	Other GSM core specifications	<input type="checkbox"/>	→ List of CRs:	
	MS test specifications	<input type="checkbox"/>	→ List of CRs:	
	BSS test specifications	<input type="checkbox"/>	→ List of CRs:	
	O&M specifications	<input type="checkbox"/>	→ List of CRs:	

Other comments:

8 SCCP subsystem numbers

Subsystem numbers are used to identify applications within network entities which use SCCP signalling. In GSM, subsystem numbers may be used between PLMNs, in which case they are taken from the globally standardised range (1 - 31) or the part of the national network range (129 - 150) reserved for GSM use between PLMNs, or within a PLMN, in which case they are taken from the part of the national network range (32 - 128 & 151 - 254) not reserved for GSM use between PLMNs.

8.1 Globally standardised subsystem numbers used for GSM

The following globally standardised subsystem numbers have been allocated for use by GSM:

- 0000 0110 HLR (MAP);
- 0000 0111 VLR (MAP);
- 0000 1000 MSC (MAP);
- 0000 1001 EIR (MAP);
- 0000 1010 is allocated for evolution (possible Authentication centre).

8.2 National network subsystem numbers used for GSM

The following national network subsystem numbers have been allocated for use within GSM networks:

- 1111 1010 BSC (BSSAP-LE)
- 1111 1011 MSC (BSSAP-LE)
- 1111 1100 SMLC (BSSAP-LE)
- 1111 1101 BSS O&M (A interface);
- 1111 1110 BSSAP (A interface).

The following national network subsystem numbers have been allocated for use within and between GSM networks:

- 1000 1110 RANAP;
- 1000 1111 RNSAP;
- 1001 0001 GMLC(MAP);
- 1001 0010 CAP;
- 1001 0011 gsmSCF(MAP);
- 1001 0100 SIWF(MAP);
- 1001 0101 SGSN(MAP);
- 1001 0110 GGSN(MAP);

3G CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

23.007 CR 003

Current Version: **3.1.0**

3G specification number ↑

↑ CR number as allocated by 3G support team

For submission to TSG **CN#06** for approval (only one box should
list TSG meeting no. here ↑ for information be marked with an X)

Form: 3G CR cover sheet, version 1.0 The latest version of this form is available from: <ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf>

Proposed change affects: USIM ME UTRAN Core Network
(at least one should be marked with an X)

Source: TSG N2 **Date:** 9/11/1999

Subject: Support of VLR and HLR Data Restoration procedures with LCS

3G Work item: LCS

Category: F Correction
(only one category shall be marked with an X) A Corresponds to a correction in a 2G specification
B Addition of feature
C Functional modification of feature
D Editorial modification

Reason for change: Provide description of data restoration in LCS entities (LMU, SMLC) and the interaction of data restoration in the VLR with LCS.

Clauses affected: 1, 3, 4, 12, 13

Other specs affected: Other 3G core specifications → List of CRs:
Other 2G core specifications → List of CRs:
MS test specifications → List of CRs:
BSS test specifications → List of CRs:
O&M specifications → List of CRs:

Other comments:



<----- double-click here for help and instructions on how to create a CR.

1 Scope

The data stored in location registers are automatically updated in normal operation; the main information stored in a location register defines the location of each mobile station and the subscriber data required to handle traffic for each mobile subscriber. The loss or corruption of these data will seriously degrade the service offered to mobile subscribers; it is therefore necessary to define procedures to limit the effects of failure of a location register, and to restore the location register data automatically. This TS defines the necessary procedures.

The basic principle is that restoration should be based on radio contact to avoid faulty data being spread in the system.

Subscriber data for supplementary services must also be correctly restored, although the impact on service of corruption of supplementary service data is less severe.

Procedures for supporting these functions are defined in GSM 09.02 and 09.60.

The MAP operation "IMSI Attach" is used only in MAP version 1; in MAP version 2 the same function is performed by the MAP operation "Update Location Area". References in this specification to IMSI attach apply only to MAP version 1 network entities.

If the restoration of subscriber data in the VLR is triggered by Location Updating or IMSI Attach, the VLR retrieves subscriber data from the HLR by sending an "Update Location" request, which triggers one or more "Insert Subscriber Data" operations from the HLR. The "Update Location" request may also be used to send the LMSI to the HLR.

If the restoration of subscriber data in the VLR is triggered by a "Provide Roaming Number" request, the behaviour of the VLR depends on whether it is implemented according to MAP version 1 or MAP version 2. For MAP version 2, the VLR retrieves subscriber data from the HLR by sending a "Restore Data" request, which triggers one or more "Insert Subscriber Data" operations from the HLR. The "Restore Data" request is also used to send the LMSI to the HLR. For MAP version 1, the VLR retrieves subscriber data from the HLR by sending a "Send Parameters" request with parameter type "Subscriber Data", which cannot be used to send the LMSI to the HLR.

The VLR number and MSC number in the subscriber data in the HLR are updated by the "Update Location" procedure.

The GGSN (Gateway GPRS Support Node) is the point of PDN interconnection with the GSM PLMN supporting GPRS. The GGSN contains routing information for GPRS users with a PDP context active. The necessary procedures needed to restore GGSN data information after a restart are described in this document.

The SGSN (Serving GPRS Support Node) is the node that is serving the MS. The SGSN stores information regarding e.g. mobility management, routing and security. The necessary procedures needed to restore this SGSN information after a restart are described in this document.

The LMU (Location Measurement Unit) is a network node, accessed over the GSM air interface, that is functionally similar to an MS. All requirements associated with a non-GPRS MS in this specification apply also to an LMU except where specified otherwise.

1.1 Normative references

References may be made to:

- a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or
- b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or
- c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or
- d) publications without mention of a specific version, in which case the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] GSM 01.04: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".
- [2] GSM 03.05: "Digital cellular telecommunication system (Phase 2+): Technical performance objectives".
- [3] GSM 03.18: "Digital cellular telecommunications system (Phase 2+); Basic call handling; Technical realization".
- [4] GSM 03.22: "Digital cellular telecommunications system (Phase 2+); Functions related to Mobile Station (MS) in idle mode and group receive mode".
- [5] GSM 03.40: "Digital cellular telecommunications system (Phase 2+); Technical realization of the Short Message Service (SMS) Point-to-Point (PP)".
- [6] GSM 03.60: "Digital cellular telecommunication system (Phase 2+); Stage 2 Service Description of the General Packet Radio Service (GPRS)".
- [6a] GSM 03.71: "Digital cellular telecommunications system (Phase 2+); Location Services (LCS); Functional Description; Stage 2".
- [7] GSM 09.02: "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification".
- [8] GSM 09.18: "Digital cellular telecommunications system (Phase 2+); Serving GPRS Support Node (SGSN) - Visitors Location Register (VLR); Gs interface layer 3 specification".
- [9] GSM 09.60: "Digital cellular telecommunication system (Phase 2+); General Packet radio Service (GPRS); GPRS Tunneling Protocol (GTP) across the Gn and Gp Interface".
- [10] GSM 12.07: "Digital cellular telecommunications system (Phase 2); Operations and performance management".

1.2 Abbreviations

Abbreviations used in this TS are listed in GSM 01.04.

2 Design objectives

To avoid loss of all the data stored in a location register when part of the equipment of the location register fails, a regime must be implemented to secure the data. This regime can include replication of volatile storage units and periodic back-up of data to non-volatile storage. If the data security regime ensures the integrity of the data in spite of failure of part of the location register equipment then there will be no impact on service. This Technical Specification describes the procedures to be used when the integrity of data in the location register cannot be ensured; that situation is referred to below as "failure".

The VLR and SGSN shall erase all IMSI records affected by the failure when it restarts after a failure. The GGSN shall erase all non-static PDP records affected by the failure and restore static PDP records when it restarts after a failure.

For the HLR, periodic back-up of data to non-volatile storage is mandatory.

The reliability objectives of location registration are listed in GSM 03.05 and GSM 12.07.

3 Restoration indicators in location registers and in GPRS support nodes

3.1 Restoration Indicators in the VLR

Three restoration indicators are provided in the VLR for each IMSI record: "Confirmed by Radio Contact", "Subscriber Data Confirmed by HLR" and "Location Information Confirmed in HLR". A further restoration indicator is provided in the VLR for each IMSI record belonging to an LMU: "Location Information Confirmed in SMLC".

The indicator "Confirmed by Radio Contact" indicates whether the VLR's record of location area identity and MSC number for the mobile station is confirmed by radio contact.

The indicator "Confirmed by Radio Contact" in an IMSI record is set to the initial value "Not Confirmed" when the VLR receives a "Provide Roaming Number" request, an "Update Location Area" request or an "IMSI Attach" request for an MS for which the VLR does not have an IMSI record. The indicator "Confirmed by Radio Contact" in an IMSI record is also set to the initial value "Not Confirmed" when the VLR receives a Reset indication message from the SGSN serving the MS if the MS is attached to both GPRS and non-GPRS services.

The indicator "Confirmed by Radio Contact" is set to "Confirmed" when the radio contact that has been established with the MS is authenticated.

The indicator "Subscriber Data Confirmed by HLR" indicates whether the subscriber data set for the mobile station held by the VLR is consistent with that held by the HLR.

The indicator "Subscriber Data Confirmed by HLR" is set to the initial value "Not Confirmed" when the VLR receives a "Provide Roaming Number" request, an "Update Location Area" request or an "IMSI Attach" request for an MS for which the VLR does not have an IMSI record.

The indicator "Subscriber Data Confirmed by HLR" is set to "Confirmed" at either of the following events:

- The VLR successfully performs an "Update Location" to the HLR;
- The VLR successfully performs a "Restore Data" operation to the HLR.

The indicator "Location Information Confirmed in HLR" indicates whether the HLR's record of VLR number and MSC number for the mobile station is confirmed by radio contact.

The indicator "Location Information Confirmed in HLR" is set to "Not Confirmed" at any of the following events:

- The VLR receives an "Update Location Area" request or an "IMSI Attach" request for an MS for which the VLR has no IMSI record;
- A VLR which serves two or more MSCs receives a "Provide Roaming Number" request for an MS for which the VLR has no IMSI record;
- The VLR receives a "Reset" message from the HLR with which the MS is registered.

The indicator "Location Information Confirmed in HLR" is set to "Confirmed" at either of the following events:

- A VLR which serves only one MSC receives a "Provide Roaming Number" request for an MS for which the VLR has no IMSI record;
- Successful completion of the "Update Location" procedure triggered by authenticated radio contact.

The indicator "Location Information Confirmed in SMLC" indicates whether an SMLC's record of MSC number for a particular LMU is confirmed by radio contact.

The indicator "Location Information Confirmed in SMLC" is set to "Not Confirmed" at any of the following events:

- The VLR receives an "Update Location Area" request or an "IMSI Attach" request for an MS for which the VLR has no IMSI record. The indicator, in this case, becomes valid only if HLR subscriber data later indicates an LMU.
- The VLR receives an "LCS Reset" message from an SMLC where the message is targeted to either a specific LMU or all LMUs registered with the SMLC.
- The VLR receives an "IMSI Detach" from an LMU that is registered with an SMLC

The indicator "Location Information Confirmed in SMLC" is set to "Confirmed" at the following event:

- Successful completion of the "LCS Registration" procedure triggered by a successful location update
- Successful transfer of an LCS Information message from an SMLC to the LMU

3.2 Restoration Indicators in the HLR

As an implementation option, one restoration indicator may be provided in the HLR for each IMSI record: "Check SS".

The "Check SS" indicator is set to "Check Required" when the HLR restarts after a failure.

The "Check SS" indicator is checked whenever the HLR receives an "Update Location" request from a VLR. If it is set to "Check Required", after successful completion of subscriber data retrieval that ran embedded in the "Update Location" procedure the HLR sends a "Forward Check SS Indication" request message to the VLR and sets the "Check SS" indicator to "Check Not Required".

3.3 Restoration Indicators in the SGSN

Two restoration indicators are provided in the SGSN for each IMSI record: "Subscriber Data Confirmed by HLR" and "Location Information Confirmed in HLR".

The indicator "Subscriber Data Confirmed by HLR" indicates whether the subscriber data set for the mobile station held by the SGSN is consistent with that held by the HLR.

The indicator "Subscriber Data Confirmed by HLR" is set to the initial value "Not Confirmed" when the SGSN receives a Routing Area Update request or an IMSI- and/or GPRS Attach request for an MS for which the SGSN does not have an IMSI record.

The indicator "Subscriber Data Confirmed by HLR" is set to "Confirmed" at the following event:

- The SGSN successfully performs an Update GPRS Location to the HLR;

The indicator "Location Information Confirmed in HLR" indicates whether the HLR's record of the SGSN address for the mobile station is confirmed by radio contact.

The indicator "Location Information Confirmed in HLR" is set to "Not Confirmed" at any of the following events:

- The SGSN receives a Routing Area Update request or an IMSI- and/or GPRS Attach request for an MS for which the SGSN has no IMSI record;
- The SGSN receives a "Reset" message from the HLR with which the MS is registered.

The indicator "Location Information Confirmed in HLR" is set to "Confirmed" at the following event:

- Successful completion of the Update GPRS Location procedure to the HLR.

The indicator "VLR-Reliable" indicates whether the VLR serving the MS has performed a restart.

The indicator "VLR-Reliable" is set to the value "false" when the SGSN receives a Reset indication message from the VLR serving the MS if the MS is attached to both GPRS and non-GPRS services. The indicator "VLR-Reliable" is set

to the value "true" when the SGSN receives a confirmation from a VLR that a location update procedure to the affected VLR has been successfully performed.

The indicator "SGSN-Reset" indicates whether the SGSN has recently experienced a restart.

The indicator "SGSN-Reset" is set to the value "true" when the SGSN suffers a restart. This indicator is unique per SGSN. The indicator "SGSN-Reset" is set to the value "false" after a certain time specified by the operator. The value of the timer controlling the reset of the "SGSN-Reset" indicator shall be longer than the periodic routing area update timer value used by the MSs.

4 Restoration of data in the VLR

The effect on service of failure of a VLR is different from the effect of failure of an HLR. The procedures for restoration of a VLR and an HLR are therefore different.

4.1 Restart of the VLR

When a VLR restarts after a failure, all IMSI records affected by the failure are erased.

There will be no subscriber data or location information stored for an affected mobile station until after the VLR has received either a "Provide Roaming Number" request or an "Update location Area" request for that mobile station.

The VLR causes all affected TMSIs and all affected LMSIs to become invalid. "Invalid" in this context means that the TMSI and LMSI can no longer be regarded as accurate. The term is used to avoid unnecessary constraints on the implementation.

On receipt of either a "Provide Roaming Number" request or an "Update Location Area" request, restoration of subscriber data in the VLR is triggered individually for each IMSI record as described below.

4.2 Restoration Procedures

The objective of the restoration procedure is to handle all traffic for each mobile subscriber correctly. In order to meet this objective, the procedure must make the subscriber data in the VLR consistent with that in the HLR, and make the location information in the HLR and VLR reflect accurately the current location of the MS. For an LMU, the procedure must also make the location information in the SMLC reflect accurately the current serving location of the LMU.

4.2.1 Incoming Call

a) Send Routing Information (GMSC->HLR)

The HLR sends "Provide Roaming Number" to the VLR as for normal operation. The LMSI is updated by the VLR when the VLR requests the transfer of subscriber data from the HLR using the "Restore Data" operation.

b) Provide Roaming Number (HLR->VLR)

- Regardless of whether the VLR has an IMSI record corresponding to the IMSI in the "Provide Roaming Number", it returns an MSRN. If no IMSI record exists, the VLR creates a skeleton IMSI record, sets the indicators "Subscriber Data Confirmed by Radio Contact" and "Confirmed by HLR" to "Not Confirmed" and (if IMSI Attach is used) marks the IMSI as attached. If the VLR serves two or more MSCs, the VLR sets the indicator "Location Information Confirmed in HLR" to "Not Confirmed". Otherwise, if the VLR serves only one MSC, the indicator "Location Information Confirmed in HLR" is set to the initial value "Confirmed".
- If the indicator "Subscriber Data Confirmed by HLR" is "Not Confirmed" the VLR requests authentication data, if required and still not available and subscriber data from the HLR. When the dialogue that covers the subscriber data retrieval procedure is completed successfully, the VLR sets the indicator "Subscriber Data Confirmed by HLR" to "Confirmed". The indicators "Confirmed by Radio Contact" and "Location Information Confirmed in HLR" remain unchanged.

- If the IMSI record for the MS is marked "Subscriber Data Confirmed by HLR" but "Not Confirmed by Radio Contact" the operator may choose an appropriate method to limit the number of "Search for MS" procedures for that MS.
- If subscriber data from the HLR indicates an LMU, the indicator "Location Information Confirmed in SMLC" becomes applicable and is set to "not confirmed". The means by which this indicator is set to "confirmed" are described under "Incoming LCS Information Request" and "Outgoing LMU Request".

c) Send Information for I/C Call Setup (MSC->VLR)

- If the VLR has no IMSI record, or if the record is marked "Subscriber Data Not Confirmed by HLR" the VLR returns a "System Failure" error.
- If the VLR has an IMSI record marked "Subscriber Data Confirmed by HLR" and "Not Confirmed by Radio Contact", the VLR handles the request in the normal way, except that the "Search for MS" procedure is used instead of the "Page MS" procedure.
- If the VLR has an IMSI record marked "Subscriber Data Confirmed by HLR" and "Confirmed by Radio Contact", the VLR handles the request in the normal way; for this MS, VLR restoration is complete.
- The state of the indicator "Location Information Confirmed in HLR" does not affect the "Send Information for I/C Call Setup" procedure.

d) Process Access Request in Response to Search (MSC->VLR)

- If the MS responds to paging, the MSC sends a positive response to the search request and a "Process Access Request" to the VLR. After successful authentication, if required, the VLR sets the indicator "Confirmed by Radio Contact" to "Confirmed", sets the location area information for the MS, and handles the request in the normal way.
- The VLR checks the indicator "Location Information Confirmed in HLR". If it indicates "Not Confirmed" the VLR starts an "Update Location" procedure to the HLR. When this procedure is successfully completed the VLR sets the indicator "Location Information Confirmed in HLR" to "Confirmed".

For this MS, VLR restoration is complete.

4.2.2 Mobile Terminated Short Message

a) Send Routing Information for MT SMS (SMS-GMSC->HLR)

The HLR returns the MSC number as for normal operation.

b) Send Information for MT SMS (MSC->VLR) - MAP version 2

- If the VLR has no IMSI record, or if the record is marked "Subscriber Data Not Confirmed by HLR" the VLR returns an "Unidentified Subscriber" error. This causes the MSC to report a short message delivery failure, with cause "Unidentified Subscriber", to the SMS gateway MSC. The Gateway MSC sends a "Report SM Delivery Status" request, with a cause of "Absent Subscriber", to the HLR. This causes the HLR to set the "Mobile Station Not Reachable Flag" for the MS, as described in Technical Specifications GSM 03.40 and GSM 09.02.
- If the VLR has an IMSI record marked "Subscriber Data Confirmed by HLR" and "Not Confirmed by Radio Contact", the VLR handles the request in the normal way, except that the "Search for MS" procedure is used instead of the "Page MS" procedure.
- If the VLR has an IMSI record marked "Subscriber Data Confirmed by HLR" and "Confirmed by Radio Contact", the VLR handles the request in the normal way; for this MS, VLR restoration is complete.
- The state of the indicator "Location Information Confirmed in HLR" does not affect the "Send Information for MT SMS" procedure.

c) Send Information for I/C Call Setup (MSC->VLR) - MAP version 1

- If the VLR has no IMSI record, or if the record is marked "Subscriber Data Not Confirmed by HLR" the VLR returns a "System Failure" error. This causes the MSC to report a short message delivery failure, with cause "System Failure", to the SMS gateway MSC.
- If the VLR has an IMSI record marked "Subscriber Data Confirmed by HLR" and "Not Confirmed by Radio Contact", the VLR handles the request in the normal way, except that the "Search for MS" procedure is used instead of the "Page MS" procedure.
- If the VLR has an IMSI record marked "Subscriber Data Confirmed by HLR" and "Confirmed by Radio Contact", the VLR handles the request in the normal way; for this MS, VLR restoration is complete.
- The state of the indicator "Location Information Confirmed in HLR" does not affect the "Send Information for MT SMS" procedure.

d) Process Access Request in Response to Search (MSC->VLR)

- If the MS responds to paging, the MSC sends a positive response to the search request and a "Process Access Request" to the VLR. After successful authentication, if required, the VLR sets the indicator "Confirmed by Radio Contact" to "Confirmed", sets the location area information for the MS, and handles the request in the normal way.
- The VLR checks the indicator "Location Information Confirmed in HLR". If it indicates "Not Confirmed" the VLR starts an "Update Location" procedure to the HLR. When this procedure is successfully completed, the VLR sets the indicator "Location Information Confirmed in HLR" to "Confirmed".

For this MS, VLR restoration is complete.

4.2.A Mobile Terminating Location Request (MT-LR)

Receipt of an MT-LR for a target MS identified by its IMSI in a serving MSC during VLR restoration is supported by the procedures below.

a) Provide Subscriber Location (GMLC->MSC/VLR)

- If the VLR has no IMSI record, or if the record is marked "Subscriber Data Not Confirmed by HLR" the VLR returns an "Unidentified Subscriber" error. This causes the MSC to report a location failure, with cause "Unidentified Subscriber", to the GMLC.
- If the VLR has an IMSI record marked "Subscriber Data Confirmed by HLR" and "Not Confirmed by Radio Contact", the VLR handles the request in the normal way, except that the "Search for MS" procedure is used instead of the "Page MS" procedure when paging for the MS.
- If the VLR has an IMSI record marked "Subscriber Data Confirmed by HLR" and "Confirmed by Radio Contact", the VLR handles the request in the normal way; for this MS, VLR restoration is complete.
- The state of the indicator "Location Information Confirmed in HLR" does not affect the "Provide Subscriber Location" procedure.

b) Process Access Request in Response to Search (MSC->VLR)

- If the MS responds to paging, the MSC sends a positive response to the search request and a "Process Access Request" to the VLR. After successful authentication, if required, the VLR sets the indicator "Confirmed by Radio Contact" to "Confirmed", sets the location area information for the MS, and handles the request in the normal way.
- The VLR checks the indicator "Location Information Confirmed in HLR". If it indicates "Not Confirmed" the VLR starts an "Update Location" procedure to the HLR. When this procedure is successfully completed, the VLR sets the indicator "Location Information Confirmed in HLR" to "Confirmed".

For this MS, VLR restoration is complete.

4.2.B Incoming LCS Information Request

Receipt of an incoming LCS Information Request from an SMLC directed to a specific LMU is supported by the procedures below.

a) Request associated with an LMU (SMLC->MSC/VLR)

- If the VLR has no IMSI record, or if the record is marked "Subscriber Data Not Confirmed by HLR" or if both the record is marked "Location Information not Confirmed in SMLC" and any LMSI supplied by the SMLC is incorrect, the VLR returns an "Unidentified Subscriber" error.
- If the VLR has an IMSI record for an LMU marked "Subscriber Data Confirmed by HLR" and "Not Confirmed by Radio Contact", the VLR handles the request in the normal way, except that the "Search for MS" procedure is used instead of the "Page MS" procedure when paging for the LMU.
- If the VLR has an IMSI record marked "Subscriber Data Confirmed by HLR" and "Confirmed by Radio Contact" and "Location Information not Confirmed in SMLC", then if the VLR serves more than one MSC, the VLR verifies if the Location Area for the LMU belongs to the MSC to which the SMLC sent the LCS Information Request. If this is not verified, the VLR returns an "Unidentified subscriber" error. Otherwise, the VLR handles the request in the normal way and sets the "Location Information Confirmed in SMLC" indicator to "Confirmed". For this LMU, data restoration is complete.
- If the VLR has an IMSI record marked "Subscriber Data Confirmed by HLR" and "Confirmed by Radio Contact" and "Location Information Confirmed in SMLC", the VLR handles the request in the normal way. For this LMU, data restoration is complete.
- The state of the indicator "Location Information Confirmed in HLR" does not affect the incoming LCS Information Request.

b) Process Access Request in Response to Search (MSC->VLR)

- If the LMU responds to paging, the MSC sends a positive response to the search request and a "Process Access Request" to the VLR. After successful authentication, if required, the VLR sets the indicator "Confirmed by Radio Contact" to "Confirmed", sets the indicator "Location Information Confirmed in SMLC" to "Confirmed" (if not already "Confirmed"), sets the location area information for the LMU, and handles the request in the normal way.
- The VLR checks the indicator "Location Information Confirmed in HLR". If it indicates "Not Confirmed" the VLR starts an "Update Location" procedure to the HLR. When this procedure is successfully completed, the VLR sets the indicator "Location Information Confirmed in HLR" to "Confirmed".

For this LMU, VLR restoration is complete.

4.2.3 Outgoing MS request

An outgoing request (MS originated call, mobile originated Short Message or call-independent supplementary service activity) from the MS causes the VLR to check its IMSI record for that MS.

- If the MS is unknown in this VLR (i.e. the VLR has no IMSI record for the MS) or there is an IMSI record marked "Subscriber Data Not Confirmed by HLR" the outgoing request is rejected with error cause "Unidentified Subscriber". This causes the MS to initiate the location registration procedure described below.
- If the VLR has an IMSI record for the MS marked "Subscriber Data Confirmed by HLR" the request is handled in the normal way, and after any necessary authentication and/or IMEI checking the record is marked "Confirmed by Radio Contact".
- The VLR checks the indicator "Location Information Confirmed in HLR". If it indicates "Not Confirmed" the VLR starts an "Update Location" procedure to the HLR. When this procedure is successfully completed the VLR sets the indicator "Location Information Confirmed in HLR" to "Confirmed".

For this MS, VLR restoration is complete.

4.2.C Outgoing LMU Request

An outgoing request (CM ServiceRequest) for LCS from an LMU causes the VLR to check its IMSI record for that LMU.

- If the LMU is unknown in this VLR (i.e. the VLR has no IMSI record for the LMU) or there is an IMSI record marked "Subscriber Data Not Confirmed by HLR" the outgoing request is rejected with error cause "Unidentified Subscriber". This causes the LMU to initiate the location registration procedure described below.
- If the VLR has an IMSI record for the MS marked "Subscriber Data Confirmed by HLR" and "Location Information not Confirmed in SMLC", the outgoing request is rejected with the error cause "Not registered in SMLC". This causes the LMU to initiate the location registration procedure described below.
- If the VLR has an IMSI record for the MS marked "Subscriber Data Confirmed by HLR" and "Location Information Confirmed in SMLC", the request is handled in the normal way, and after any necessary authentication and/or IMEI checking the record is marked "Confirmed by Radio Contact".
- The VLR checks the indicator "Location Information Confirmed in HLR". If it indicates "Not Confirmed" the VLR starts an "Update Location" procedure to the HLR. When this procedure is successfully completed the VLR sets the indicator "Location Information Confirmed in HLR" to "Confirmed".

For this LMU, VLR restoration is complete.

4.2.4 Location Updating or IMSI Attach

A location registration request (location updating or IMSI attach) from an MS causes the VLR to check its IMSI record for that MS.

- If the MS is unknown in this VLR (i.e. the VLR has no IMSI record for the MS) the VLR creates a skeleton IMSI record for the MS and sets the indicators "Confirmed by Radio Contact", "Location Information Confirmed in HLR" and "Subscriber Data Confirmed by HLR" to "Not Confirmed". If authentication is required, the VLR retrieves authentication data. When the radio contact with the Mobile Station is authenticated, the VLR sets the indicator "Confirmed by Radio Contact" to "Confirmed". The VLR then performs an "Update Location" to the HLR. If this is successful, the VLR sets the indicators "Location Information Confirmed in HLR" and "Subscriber Data Confirmed by HLR" to "Confirmed". For this MS, VLR restoration is complete.
- If the VLR has an IMSI record for the MS, after successful authentication, if required, the VLR sets the indicator "Confirmed by Radio Contact" to "Confirmed". If the record is marked "Location Information Not Confirmed in HLR" or "Subscriber Data Not Confirmed by HLR" the VLR performs an "Update Location" to the HLR. If this is successful, the VLR sets the indicators "Location Information Confirmed in HLR" and "Subscriber Data Confirmed by HLR" to "Confirmed". For this MS, VLR restoration is complete.
- If the VLR performs a successful "Update Location" and the IMSI record indicates an LMU with the indicator "Location Information Confirmed in SMLC" set to "Not Confirmed", the VLR performs an "LCS Registration" to the SMLC associated with either the IMSI or serving cell of the LMU. If this is successful, the VLR sets the indicator "Location Information Confirmed in SMLC" to "Confirmed". For this LMU, VLR restoration is complete.

4.2.5 Use of TMSI

After the VLR has restarted but before the next authenticated radio contact the TMSI known by the MS is invalid, as it was allocated before the VLR restarted. The VLR therefore uses the IMSI to identify the MS on the first radio contact during restoration.

- A VLR which initiates a "Search for Subscriber" procedure uses the IMSI to identify the MS.
- If an MS identifies itself by a TMSI in a "Location Registration" request, the VLR proceeds as follows:

- a) The VLR checks the location area identity (LAI) of the previous location area sent by the MS. If this LAI is in a VLR different from the current one, the request is handled in the normal way.
- b) If the LAI is in the current VLR, the status of the TMSI is checked.
 - If the TMSI was allocated after the VLR restarted, and corresponds to a valid IMSI record, the request is handled as described in subclause 4.2.4.
 - If the TMSI was allocated before the VLR restarted, or does not correspond to a valid IMSI record, the VLR requests the IMSI from the MS. If the MS returns an IMSI the VLR proceeds as described in subclause 4.2.4. If the MS does not return an IMSI the network aborts the location registration procedure.
 - If an MS identifies itself by a TMSI in an outgoing MS request, the VLR proceeds as follows:
 - If the TMSI was allocated after the VLR restarted, and corresponds to a valid IMSI record, the request is handled as described in subclause 4.2.3.
 - If the TMSI was allocated before the VLR restarted, or does not correspond to a valid IMSI record, the VLR requests the IMSI from the MS. If the MS returns an IMSI the VLR proceeds as described in subclause 4.2.3. If the MS does not return an IMSI the network aborts the outgoing request.

4.2.6 SGSN associations

Based on configuration data, "Reset" messages are sent on the Gs-interface to the SGSNs in the Location Areas served by the VLR. The SGSNs mark all associations with the VLR as unreliable by setting the restoration indicator "VLR-Reliable" to "false" for the MSs served by that VLR. The associations will be re-initiated one by one by the SGSN at the next Routing Area update or combined RA/LA update from each MS.

5 Restoration of data in the HLR

The loss or corruption of subscriber data in the HLR has an impact not only in the HLR's own PLMN but also on the service for its mobiles in other PLMNs. Restoration of the data in the HLR requires co-operation from all the VLRs to which its mobiles have roamed.

5.1 Restart of the HLR

When an HLR restarts after failure it performs the following actions for the subscriber data records that have been affected by the HLR fault:

- Reload all data from the non-volatile back-up;
- Reset all "MS Purged" flags;
- Mark each subscriber record "SS Check Required" by setting the "Check SS" indicator if the "Forward Check SS Indication" service is implemented;
- Send a "Reset" message to each VLR where one or more of its MSs are registered. This causes each VLR concerned to mark each relevant subscriber record "Location Information Not Confirmed in HLR";

Send to each SGSN where one or more of its MSs are registered a "Reset" message. This causes the SGSN to mark the relevant MM contexts record "Location Information Not Confirmed in HLR".

5.2 Procedures During Restoration

5.2.1 Mobile terminated call

If the VLR receives a "Process Access Request" request in response to a "Page" or "Search for MS" operation, after successful authentication, if required, it checks the indicator "Location Information Confirmed in HLR". If this indicates "Not Confirmed" the VLR triggers an "Update Location" to the HLR as described in subclause 4.2.1.d).

When the HLR receives the "Update Location" request it stores the VLR number, MSC number and LMSI in the subscriber record as for normal operation.

If the "Forward Check SS Indication" service is implemented, the HLR checks the indicator "Check SS". If this indicates "Check Required", after successful completion of the subscriber data retrieval procedure that ran embedded in the "Update Location" procedure the HLR sends a "Forward Check SS Indication" to the VLR and marks the subscriber record "Check Not Required. When the VLR receives the "Forward Check SS Indication" request it forwards an indication to the MS to alert the user that supplementary service parameters should be checked.

5.2.2 Mobile Originated Activity

When the VLR receives a request from an MS (MS originated call, mobile originated Short Message, call-independent supplementary service activity or location registration request) whose IMSI record is marked "Location Information Not Confirmed in HLR", it will perform an "Update Location" to the HLR as described in subclauses 4.2.3 and 4.2.4 above.

When the HLR receives an "Update Location" request from the VLR, it proceeds as described in subclause 5.2.1.

6 Periodic location updating

The time taken to confirm the location of an MS after location register failure is governed by the frequency with which the MS establishes radio contact with the network. The location information for an MS which remains silent for a long time will remain doubtful for a long time.

A method of reducing this time is to require the MS to establish radio contact with the network at intervals, purely to confirm its location, if the MS does not move to a new location area (which would lead to a normal location registration) or respond to paging for a mobile terminated call or request a mobile originated call or call-independent supplementary service activity.

The interval between successive periodic location updating is controlled by a timer in the MS; this timer is reset to its initial value at the end of each successfully established radio contact between the MS and the network.

The use of the periodic location update timer is described in GSM 03.22.

7 Periodic routing area updating

All GPRS-attached MSs, except MSs in class-B mode of operation engaged in CS communication, shall perform periodic RA updates. For MSs that are both IMSI-attached and GPRS-attached, the periodic updates depend on whether the Gs interface is installed or not:

- If the Gs interface is installed, periodic RA updates shall be performed, and periodic LA updates shall not be performed. If the SGSN has the indicator "VLR-reliable" set to 'false' the SGSN shall perform a location area update procedure towards the VLR
- If the Gs interface is not installed, both periodic RA updates and periodic LA updates shall be performed independently. RA updates are performed via the Gb interface, and LA updates are performed via the A interface.

The periodic routing area updating method can be used for re-establishment of SGSN and GGSN PDP contexts.

The periodic routing area update is described in detail in GSM 03.60.

8 Stand-alone operation of the VLR

If no unused authentication triplets are available in the VLR for an IMSI record when authentication is required, the VLR may reuse already used authentication triplets. It is an operator option to define how many times an authentication triplets may be reused in the VLR.

If the Update Location response contains an error different from "Unknown Subscriber" or "Roaming Not Allowed" or if there is a parameter problem (e.g. no HLR number included), no error shall be indicated to the MSC and the IMSI record in the VLR shall not be affected, provided that the associated "Subscriber Data Confirmed by HLR" indicator is in the "Confirmed" status.

9 Stand-alone operation of the SGSN

If no unused authentication triplets are available in the SGSN for an IMSI record when authentication is required, the SGSN may reuse already used authentication triplets. It is an operator option to define how many times an authentication triplets may be reused in the SGSN.

10 Restoration of data in the GGSN

10.1 Restart of the GGSN

After a GGSN restart, all the PDP contexts stored in the GGSN and affected by the restart become invalid and may be deleted. GGSN storage of data is volatile except as specified in this subclause. The GGSN maintains in volatile memory an SGSN Restart counter for each SGSN with which the GGSN is in contact, and in non-volatile memory a GGSN Restart counter. The GGSN Restart counter shall be incremented and all the SGSN Restart counters cleared immediately after the GGSN has restarted. The SGSN performs a polling function (echo request and echo response) towards the GGSN's with which the SGSN is in contact. The GGSN Restart counter shall be included in the echo response. If the value received in the SGSN differs from the one stored for that GGSN, the SGSN will consider that the GGSN has restarted (see GSM 09.60). The SGSN Restart counters shall be updated in the GGSN to the value received in the first echo message coming from each SGSN after the GGSN has restarted.

When the SGSN detects a restart in a GGSN with which it has any PDP context activated, it shall deactivate all these PDP contexts and request the MS to reactivate them. Also, the new value of the GGSN Restart counter received in the echo response from the GGSN restarted shall be updated in the SGSN.

10.2 Restoration Procedures

10.2.1 Mobile terminated transmission

When the GGSN receives a terminated PDU for which no valid PDP context exists the GGSN discards the received PDU and may also return an appropriate Error message depending on the protocol used. No further actions are performed by the GGSN. Alternatively, if the GGSN has static PDP information about the PDP address, the GGSN may try to deliver the PDP PDU by initiating the Network Requested PDP Context Activation procedure (see GSM 03.60).

10.2.2 Mobile originated transmission

When the GGSN receives a tunnel PDU for which no PDP context exists it discards the tunnel PDU and sends an Error indication message to the originating SGSN. The SGSN deactivates the PDP context and sends an Error indication to the MS. The MS may then re-activate the PDP context.

11 Restoration of data in the SGSN

11.1 Restart of the SGSN

After an SGSN restart, the SGSN deletes all MM and PDP contexts affected by the restart. SGSN storage of data is volatile except as specified in this subclause. The SGSN maintains in volatile memory a GGSN Restart counter for each GGSN with which the SGSN is in contact, and in non-volatile memory an SGSN Restart counter. The SGSN Restart counter shall be incremented and all the GGSN Restart counters cleared immediately after the SGSN has restarted. Optionally, the SGSN may broadcast a Reset message within the SGSN area. This causes the MS to reinitiate Attach and Activate PDP context procedures. The re-attach shall be performed after a random calculated time in each MS to avoid network congestion. At the next RA Update from the marked MS the SGSN performs an Update Location to the HLR as in the Attach or Inter-SGSN RA Update procedures.

The GGSN performs a polling function (echo request and echo response) towards the SGSNs with which the GGSN is in contact. The SGSN Restart counter shall be included in the echo response. If the value received in the GGSN differs from the one stored for that SGSN, the GGSN will consider that the SGSN has restarted (see GSM 09.60). The GGSN Restart counters shall be updated in the SGSN to the value received in the first echo message coming from each GGSN after the SGSN has restarted.

When the GGSN detects a restart in an SGSN with which it has any PDP context activated, it shall delete all these PDP contexts. Also, the new value of the SGSN Restart counter received in the echo response from the SGSN restarted shall be updated in the GGSN.

11.2 Restoration Procedures

11.2.1 Mobile terminated transmission

When the SGSN receives a tunnel PDU for which no PDP context exists it discards the tunnel PDU and sends an Error indication message to the originating GGSN. The SGSN may search for the MS by paging with the IMSI in the SGSN area if there is no MM context for the MS. When the MS contacts the SGSN, the SGSN shall command the MS to perform a GPRS attach procedure.

11.2.2 Mobile terminated services requested by the MSC/VLR

When the SGSN receives a request for CS paging from an MSC/VLR for an IMSI unknown by the SGSN, if the "SGSN-Reset" indicator is set to "true", the SGSN sends the paging request with the location information provided by the VLR. If no such location information is provided, the SGSN shall page for the MS in all the routing areas corresponding to that SGSN. If the "SGSN-Reset" indicator is set to "false" and the IMSI is unknown or the MS is marked as GPRS or non-GPRS detached by the SGSN, the paging request is rejected. If the "SGSN-Reset" indicator is set to "false" and the IMSI is known and the MS is marked as GPRS and non-GPRS attached by the SGSN, the paging request shall be sent to the MS. The association will be re-initiated by the SGSN, at the next Routing Area update or combined RA/LA update.

11.2.3 Mobile terminated SMS over GPRS

- a) Send Routing Information for MT SMS (SMS-GMSC -> HLR)

The HLR returns the SGSN number as for normal operation.

- b) Send Information for MT SMS

When the SGSN receives a mobile terminated SMS for an unknown MM context for the MS, or if the SGSN indicator "Subscriber Data Confirmed by HLR" is marked "Not Confirmed" it rejects the SMS request and returns a failure report with cause value "Unidentified Subscriber" to the SMS gateway MSC indicating unsuccessful delivery of the SMS. The Gateway MSC sends a "Report SM Delivery Status" request, with a cause of "Absent Subscriber", to the HLR. This causes the HLR to set the "Mobile Station Not Reachable for GPRS Flag" for the MS, as described in the Technical Specifications GSM 03.40 and GSM 09.02.

If the SGSN has the indicator "Subscriber Data Confirmed by HLR" set to "Confirmed", the SGSN handles the SMS request in the normal way.

The state of the indicator "Location Information Confirmed in HLR" does not affect the Mobile Terminated SMS procedure.

11.2.4 Mobile originated transmission

A mobile originated transmission causes the SGSN to check its MM context for the MS.

11.2.4.1 Mobile originated Location Updating or Attach

If the MS is unknown in the SGSN (i.e. the SGSN has no MM context for the MS) the SGSN creates a MM context for the MS and sets the indicators "Location Information Confirmed in HLR" and "Subscriber Data Confirmed by HLR" to "Not Confirmed". If authentication is required, the SGSN retrieves authentication data. The SGSN then performs an "Update GPRS Location" to the HLR. If this is successful, the SGSN sets the indicators "Location Information Confirmed in HLR" and "Subscriber Data Confirmed by HLR" to "Confirmed".

If the SGSN has an MM context for the MS, and the indicators "Location Information Confirmed in HLR" or "Subscriber Data Confirmed by HLR" is set to "Not Confirmed" the SGSN performs an "Update GPRS Location" to the HLR. If this is successful, the SGSN sets the indicators "Location Information Confirmed in HLR" and "Subscriber Data Confirmed by HLR" to "Confirmed".

If the SGSN has an MM context for the MS with the indicator "Subscriber Data Confirmed by HLR" marked "Confirmed" the originated transmission is handled in the normal way.

The SGSN retrieves subscriber data from the HLR by sending an "Update GPRS Location" request, which triggers one or more "Insert Subscriber Data" operations from the HLR.

11.2.4.2 Mobile originated LLC PDU frame

At a mobile originated transmission the SGSN rejects a MS which has no MM context by sending a MM Disconnect message to the MS. The SGSN will use the incoming address field of the rejected frame to address the MS. This causes the MS to initiate Attach and Activate PDP context procedures which re-activate the PDP contexts at the SGSN and GGSN.

11.3 Use of TLLI

After the SGSN has restarted but before the next authenticated radio contact the TLLI known by the MS is invalid, as it was allocated before the SGSN restarted. The SGSN may request the MS to identify itself with the IMSI in order to make a relationship between the IMSI and the received old TLLI. The SGSN shall allocate a new TLLI for that MS.

If an MS identifies itself by a TLLI in an MS originating transmission or a "Location Registration" request, the SGSN proceeds as follows:

a) The SGSN checks the routing area identity (RAI) of the previous routing area sent by the MS. If this previous sent RAI belongs to a SGSN different from the current one, the request is MS's that identifies themselves with an old TLLI from before the restart.

handled in the normal way.

b) If the previous sent RAI belongs to the current SGSN, the status of the TLLI is checked.

- If the TLLI was allocated after the SGSN restarted, and corresponds to a valid IMSI record, the request is handled in the normal way.
- If the TLLI was allocated before the SGSN restarted, or does not correspond to a valid IMSI record, the SGSN requests the IMSI from the MS. If the MS returns an IMSI the SGSN proceeds in the normal way. If the MS does not return an IMSI the network aborts the originating transmission request or location registration procedure.

11.4 VLR associations

All associations with VLRs affected by the restart of an SGSN are marked as unreliable and may be deleted. Based on configuration data, "Reset" messages are sent on the Gs-interface to the VLRs in the Location Areas served by the SGSN. The VLRs mark all associations with the SGSN as unreliable by setting the restoration indicator "Confirmed by radio contact" to "Not Confirmed" for the MSs served by that SGSN. The associations will be re-initiated one by one by the SGSN at the next Routing Area update, or combined RA/LA update from each MS.

12 Restoration of Data in an SMLC

12.1 Restart of an SMLC

When an SMLC restarts after a failure, it performs the following actions for those of its associated LMUs whose records have been affected by the fault:

- Reload all administered LMU data from non-volatile back-up
- Mark each LMU as "not registered"
- Reinitialize other temporary data for each LMU to indicate no ongoing measurement or diagnostic activities
- Send an "LCS Reset" message containing no LMU identifier to each VLR where an LMU may be currently served

Any VLR receiving an "LCS Reset" containing no LMU identifier shall reset the indicator "Location Information Confirmed in SMLC" to "Not Confirmed" for each LMU registered with this SMLC. The VLR shall also request the serving MSC for each affected LMU to release any LCS signaling connection to this LMU with the cause "Not registered in SMLC".

While the "Location Information Confirmed in SMLC" indicator remains "not Confirmed" for any LMU, the VLR shall react to any outgoing request from the LMU as follows

- For an outgoing request for LCS service, the VLR shall return an error response with cause "not registered in SMLC". This shall cause the LMU to request a location update.
- For a location update request, the VLR shall behave as for a normal MS. Once any location update to the HLR is completed successfully, or if no location update to the HLR is needed, the VLR shall perform an "LCS Registration" to the SMLC. If this is successful, the indicator "Location Information Confirmed in SMLC" shall be set to "Confirmed".

After an "LCS Registration" has been successfully completed, the SMLC may send an LCS Information Request to the LMU containing an LCS O&M Reset command. On receipt of this, the LMU shall cancel all active LCS measurement and O&M tasks previously ordered by the SMLC.

For this LMU, data restoration in the SMLC is complete.

12.2 Data Restoration for a Specific LMU

An SMLC may restore data for a specific LMU when the data in the SMLC or LMU is considered unreliable (e.g. if there is no communication between the SMLC and LMU for a long time or if messages received by the SMLC are inconsistent with the LMU state kept by the SMLC). To restore data for a specific LMU, the SMLC shall send an "LCS Reset" containing the identity of the LMU to the current serving VLR or to every VLR that may serve the LMU.

Any VLR receiving an "LCS Reset" containing a specific LMU identifier shall reset the indicator "Location Information Confirmed in SMLC" to "Not Confirmed" for this LMU and shall request the serving MSC to release any LCS signaling

connection to this LMU with the cause “Not registered in SMLC”. Further actions by the MSC, LMU and SMLC are as described in section 12.1

13 Restoration of Data in an LMU

When an LMU restarts following a failure, it shall reinitialize all data concerning LCS measurement and O&M tasks to indicate that no tasks ordered by an SMLC are active. The LMU shall then perform an “IMSI Attach”. Other actions are for further study.

Annex A (informative): Change history

SPEC	SMG#	TDoc	CR	PHASE	RE V	VERS	NEW_VERS	SUBJECT
03.07	s23	97-691	A001	R97		5.0.0	5.1.0	Restauration procedures GPRS
03.07	s25	98-0092	A002	R97		5.1.0	6.0.0	Modification of Restoration Procedures for GPRS
03.07	s26	98-0412	A003	R97	2	6.0.0	6.1.0	Alignment with the latest revisions of GSM 03.60 and GSM 09.60
03.07	s26	98-0412	A004	R97	1	6.0.0	6.1.0	Alignment of restoration procedures for GPRS to GSM 09.18

History

Document history		
V6.1.0	July 1998	Publication

TSG CN2 B
Phoenix, AZ, 15-19 November, 1999

Document N2-99K56

e.g. for 3GPP use the format TP-99xxx
 or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

23.008 CR 011

Current Version: **3.1.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **TSG CN#6**
 list expected approval meeting # here ↑

for approval
 for information

strategic
 non-strategic (for SMG use only)

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: <ftp://ftp.3gpp.org/Information/CR-Form-v2.doc>

Proposed change affects: (U)SIM ME UTRAN / Radio Core Network
 (at least one should be marked with an X)

Source: TSG N2 **Date:** 8 Dec 1999

Subject: Organization of Subscriber Data for LCS

Work item: Location Services (LCS)

Category: Correction **Release:** Phase 2
 Corresponds to a correction in an earlier release Release 96
 Addition of feature Release 97
 Functional modification of feature Release 98
 Editorial modification Release 99
 Release 00

(only one category shall be marked with an X)

Reason for change: Mirror CR to Release 98 – to change subscriber data for LCS

Clauses affected: 0, 1, 2, 4

Other specs affected: Other 3G core specifications → List of CRs:
 Other GSM core specifications → List of CRs:
 MS test specifications → List of CRs:
 BSS test specifications → List of CRs:
 O&M specifications → List of CRs:

Other comments: This is a mirror CR for Release 99 combining the LCS changes against GSM 03.08 v.7.0.0 approved at SMG#29 and against GSM 03.08 v.7.1.0 (CR A029) approved by CN WG2 in Phoenix, November 18, 1999.

0 Scope

The scope of this specification is to provide details concerning information to be stored in home location registers, visitor location registers and GPRS Support Nodes concerning mobile subscriber.

Clause 2 contains all details concerning the definition of the parameters, often given by reference to other specifications, and where the parameter is to be stored.

Table 1 in clause 3 gives a summary overview and clause 4 identifies the reference information required for accessing the information.

0.1 Normative references

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] GSM 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".
- [2] GSM 02.02: "Digital cellular telecommunications system (Phase 2+); Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN)".
- [3] GSM 02.03: "Digital cellular telecommunications system (Phase 2+); Teleservices supported by a GSM Public Land Mobile Network (PLMN)".
- [4] GSM 02.04: "Digital cellular telecommunications system (Phase 2+); General on supplementary services".
- [5] GSM 03.03: "Digital cellular telecommunications system (Phase 2+); Numbering, addressing and identification".
- [6] GSM 03.07: "Digital cellular telecommunications system (Phase 2+); Restoration procedures".
- [7] GSM 03.09: "Digital cellular telecommunications system (Phase 2+); Handover procedures".
- [8] GSM 03.12: "Digital cellular telecommunications system (Phase 2+); Location registration procedures".
- [9] GSM 03.15: "Digital cellular telecommunications system (Phase 2+); Technical realization of operator determined barring".
- [10] GSM 03.20: "Digital cellular telecommunications system (Phase 2+); Security related network functions".
- [11] GSM 03.40: "Digital cellular telecommunications system (Phase 2+); Technical realization of the Short Message Service (SMS) Point-to-Point (PP)".
- [12] GSM 03.67: "Digital cellular telecommunications system (Phase 2+); enhanced Multi-Level Precedence and Pre-emption service (eMLPP) - Stage 2".

- [13] GSM 03.68: "Digital cellular telecommunications system (Phase 2+); Voice Group Call Service (VGCS) - Stage 2".
- [14] GSM 03.69: "Digital cellular telecommunications system (Phase 2+); Voice Broadcast Service (VBS) - Stage 2".
- [14a] GSM 03.71: "Digital cellular telecommunications system (Phase 2+); Location Services (LCS); Functional Description; Stage 2".
- [15] GSM 03.78: "Digital cellular telecommunications system (Phase 2+); Customised Applications for Mobile network Enhanced Logic (CAMEL) - Stage 2".
- [16] GSM 03.81: "Digital cellular telecommunications system (Phase 2+); Line identification supplementary services - Stage 2".
- [17] GSM 03.82: "Digital cellular telecommunications system (Phase 2+); Call Forwarding (CF) supplementary services - Stage 2".
- [18] GSM 03.83: "Digital cellular telecommunications system (Phase 2+); Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 2".
- [19] GSM 03.84: "Digital cellular telecommunications system (Phase 2+); Multi Party (MPTY) supplementary services - Stage 2".
- [20] GSM 03.85: "Digital cellular telecommunications system (Phase 2+); Closed User Group (CUG) supplementary services - Stage 2".
- [21] GSM 03.86: "Digital cellular telecommunications system (Phase 2+); Advice of Charge (AoC) supplementary services - Stage 2".
- [22] GSM 03.88: "Digital cellular telecommunications system (Phase 2+); Call Barring (CB) supplementary services - Stage 2".
- [23] GSM 03.90: "Digital cellular telecommunications system (Phase 2+); Unstructured Supplementary Service Data (USSD) - Stage 2".
- [24] GSM 04.08: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification".
- [25] GSM 09.02: "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification".
- [26] GSM 09.07: "Digital cellular telecommunications system (Phase 2+); General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".
- [27] GSM 12.03: "Digital cellular telecommunications system (Phase 2); Security management".
- [28] GSM 12.08: "Digital cellular telecommunications system (Phase 2); Subscriber and Equipment Trace".
- [29] CCITT Recommendation Q.763: "Specifications of Signalling System No.7; Formats and codes".
- [30] ANSI T1.113 "Signalling System No7 (SS7) Integrated Services Digital Network (ISDN) User Part"
- [31] GSM 02.60: "Digital cellular telecommunications system (Phase 2+); "General Packet Radio Service (GPRS) Stage 1".
- [32] GSM 03.60: "Digital cellular telecommunications system (Phase 2+); "General Packet Radio Service (GPRS) Stage 2".
- [33] GSM 02.32: "Digital cellular telecommunications system (Phase 2+); Immediate Service Termination (IST) Service Description - Stage 1".

- [34] GSM 03.35: "Digital cellular telecommunications system (Phase 2+); Immediate Service Termination (IST) Stage 2".

0.2 Abbreviations

Abbreviations used in this specification are listed in GSM 01.04.

1 Introduction

1.1 Definition

The term subscriber data is used to designate all information associated with a subscription which is required for service provisions, identification, authentication, routing, call handling, GPRS mode transmission, charging, subscriber tracing, operation and maintenance purposes. Some subscriber data are referred to as permanent subscriber data, i.e. they can only be changed by administration means. Other data are temporary subscriber data which may change as a result of normal operation of the system.

Unless shown to be conditional, all data items are considered to be mandatory.

1.2 Storage facilities

This specification considers subscriber data stored in ~~the following two~~ types of functional unit:

- Home location register (HLR) which contains all permanent subscriber data and all relevant temporary subscriber data for all mobile subscribers permanently registered in the HLR.
- Visitor location register (VLR) which contains all subscriber data required for call handling and other purposes for mobile subscribers currently located in the area controlled by the VLR.
- Serving GPRS Support Node (SGSN) which contains all subscriber data required for GPRS mode transmission and other purposes for mobile subscribers currently located in the area controlled by the SGSN.
- Gateway GPRS Support Node (GGSN) which contains all subscriber data required for GPRS mode transmission for mobile subscribers using any service provided by the GGSN.
- Gateway Mobile Location Center (GMLC) which contains all subscriber data required for external clients of the location services (LCS).
- Serving Mobile Location Center (SMLC) which contains all LMU data required to manage location measurements in LMUs. (Note: a Type A LMU is a network entity that shares many of the attributes of an MS including subscription data in the HLR and identification using an IMSI).

In addition, subscriber data may also be stored in the following functional unit:

- Group Call Register (GCR) which contains all data required for configuration, set-up and handling of voice group and voice broadcast calls. This encompasses subscribers identities (mobile as well as fixed network) who are nominated as dispatchers for one or several groups within the area controlled by the GCR.

NOTE: The data stored in the GCR is not strictly "subscriber data". Description of GCR data is therefore out of scope of this specification and is covered in the corresponding specifications for enhanced Multi Level Precedence and Pre-emption Service (eMLPP), Voice Group Call Service (VGCS) and Voice Broadcast Service (VBS) instead (GSM 03.67, GSM 03.68 and GSM 03.69).

1.3 Subscriber data in functional units other than the HLR, the VLR, the SGSN, ~~and~~ the GGSN, the GMLC, the SMLC and the LMU

The individual Subscriber Authentication Key Ki defined in GSM 03.20 is stored in the Authentication Centre AuC; it is also stored in the SIM and therefore available in the MS. Version numbers of algorithms A3 and A8 may also be stored in the AuC.

NOTE: It is for further study whether or not other types of functional units containing mobile subscriber parameters are to be included in this specification. Such units could include encryption key distribution centres, maintenance centres, etc.

2 Definition of subscriber data

2.1 Data related to subscription, identification and numbering

2.1.1 Data defining the subscription profile

2.1.1.1 International Mobile Subscriber Identity (IMSI)

International Mobile Subscriber Identity (IMSI) is defined in GSM 03.03.

IMSI is permanent subscriber data. IMSI is stored in HLR, VLR, SGSN, ~~and~~ GGSN [and SMLC](#). For Anonymous Access, IMSI is not used in SGSN nor in GGSN. The IMSI serves as the root of the subscriber data pseudo-tree.

2.1.1.2 Network Access Mode (NAM)

The Network Access Mode defines if the subscriber is registered to get access to the non-GPRS network, to the GPRS network or to both networks. NAM describes the first level of the subscriber data pseudo-tree below the IMSI root. It is permanent subscriber data stored in the HLR and the SGSN with the Gs interface option..

2.1.2 Mobile Station International ISDN Number (MSISDN)

Mobile Station ISDN Number (MSISDN) is defined in GSM 03.03.

The MSISDN is permanent subscriber data and is stored in HLR, VLR and SGSN.

If the mult numbering option applies, the MSISDN stored in the VLR and in the SGSN is the Basic MSISDN, see subclause 2.1.3.1.

2.1.3 MSISDNs for mult numbering option

If the HPLMN allocates different MSISDNs for different Basic Services (see GSM 09.07), these numbers are conditionally stored as permanent data in the HLR.

2.1.3.1 The Basic MSISDN indicator

The Basic MSISDN is defined in GSM 03.12. The Basic MSISDN indicator marks the MSISDN to be used as Basic MSISDN.

It is permanent subscriber data stored conditionally in the HLR.

2.1.3.2 The MSISDN-Alert indicator

The MSISDN-Alert is defined in GSM 03.40. The MSISDN-Alert indicator marks the MSISDN to be used as MSISDN-Alert.

It is permanent subscriber data stored conditionally in the HLR.

2.1.4 Temporary mobile subscriber identity (TMSI)

Temporary mobile subscriber identity (TMSI) is defined in GSM 03.03.

The TMSI is temporary subscriber data and is conditionally stored in the VLR.

2.1.5 Packet-Temporary Mobile Subscriber Identity (P-TMSI)

Packet-Temporary Mobile Subscriber Identity (P-TMSI) is defined in GSM 03.03. Its usage is described in GSM 03.60. P-TMSI is accompanied by the P-TMSI Signature, see subclause 2.3.5.

The P-TMSI is temporary subscriber data and is conditionally stored in the SGSN.

2.1.6 Temporary Link Layer Identifier (TLLI)

Temporary Link Layer Identifier (TLLI) is defined in GSM 03.03. It is derived from the P-TMSI by the MS and occurs in the variants Local TLLI and Foreign TLLI. The TLLI is temporary subscriber data and is conditionally stored in the SGSN. For use of TLLI see GSM 03.60.

2.1.7 Random TLLI

Random TLLI is chosen randomly by the MS. It is defined in GSM 03.03. Random TLLI is short living temporary subscriber data and is conditionally stored in the SGSN. For use of Random TLLI see GSM 03.60.

A Random TLLI may be used if no valid P-TMSI is available.

2.1.8 Local Mobile Station Identity (LMSI)

Local Mobile Station Identity (LMSI) is defined in GSM 03.03. The LMSI is temporary subscriber data. The LMSI may be stored in the VLR; if it is received in the HLR it must be stored there.

2.1.9 International Mobile Equipment Identity (IMEI)

International Mobile Equipment Identity (IMEI) is defined in GSM 03.03. The IMEI is temporary subscriber data and is conditionally stored in the SGSN.

2.2 Data related to Mobile Station types

2.2.1 Mobile Station Category

Mobile Station Category has a structure identical to that of "Calling Party's Category" defined in ISUP (CCITT Recommendation Q.763).

The following values of category shall be supported:

- ordinary subscriber.

The category is assigned per IMSI.

Mobile Station Category is permanent subscriber data and is stored in HLR and VLR.

2.2.A LMU Identifier

The LMU identifier is part of the subscriber data for a Type A LMU, when associated with an NSS based SMLC, and serves to distinguish a Type A LMU from a normal MS.

2.3 Data related to authentication and ciphering

2.3.1 Random Number (RAND), Signed Response (SRES) and Ciphering Key (Kc)

Random Number (RAND), Signed Response (SRES) and Ciphering Key (Kc) form a triplet of vectors used for authentication and encryption as defined in GSM 03.20.

A set of up to 5 triplet values is calculated in the AuC (see GSM 12.03), provided to and stored in the HLR and then sent to the VLR and to the SGSN on request. These data are temporary subscriber data stored in the HLR, the VLR and the SGSN.

2.3.2 The Ciphering Key Sequence Number (CKSN)

The Ciphering Key Sequence Number (CKSN) is used to ensure authentication information (Kc) consistency between the MS and the VLR and between the MS and the SGSN.

CKSN and its handling are defined in GSM 04.08 and GSM 03.20. It is a temporary subscriber data and is stored in the VLR and in the SGSN.

2.3.3 Selected Ciphering Algorithm

Selected Ciphering Algorithm is defined in GSM 03.60.

Selected Ciphering Algorithm is temporary subscriber data stored in the SGSN.

2.3.4 Current Kc

Current Kc is defined in GSM 03.20.

Current Kc is temporary subscriber data stored in the SGSN.

2.3.5 P-TMSI Signature

P-TMSI Signature is defined in TSs GSM 03.03 and GSM 03.60. It is used for identification checking purposes.

P-TMSI Signature is temporary subscriber data and is conditionally stored in the SGSN.

2.4 Data related to roaming

2.4.1 Mobile Station Roaming Number (MSRN)

Mobile Station Roaming Number (MSRN) is defined in GSM 03.03.

NOTE: There may be more than one MSRN simultaneously per IMSI.

The MSRN is short-lived temporary subscriber data stored in the VLR.

2.4.2 Location Area Identification (LAI)

Location Area Identification (LAI) is defined in GSM 03.03.

The LAI is temporary subscriber data and is stored in the VLR.

2.4.3 Routing Area Identification (RAI)

Routing Area Identification (RAI) is defined in GSM 03.03.

The RAI is temporary subscriber data and is stored in the SGSN.

2.4.4 Cell Global Identification

Cell Identity (CI) is defined in GSM 03.03.

CI is temporary subscriber data and is conditionally stored in the SGSN.

2.4.5 VLR number

VLR number is defined in GSM 03.03.

The VLR number is temporary subscriber data and is stored in the HLR. Absence of the VLR number in HLR indicates that the mobile station is deregistered for non-GPRS or the subscriber has not a non-GPRS subscription in the HLR. The VLR number is stored in the SGSN with the Gs interface option. For usage of the VLR number in SGSN, please refer to GSM 03.60.

2.4.6 MSC number

MSC number is defined in GSM 03.03.

The MSC number is temporary subscriber data and is stored in the HLR and conditionally in the VLR. For absence of the MSC number in the HLR, the remarks on VLR number apply accordingly, cf. subclause 2.4.5.

2.4.7 HLR number

HLR number is defined in GSM 03.03.

The HLR number may be stored in the VLR and SGSN. It is received as a mandatory parameter in the updating location accepted message. This data may be needed to retrieve subscribers to be restored after HLR reset.

The HLR number is temporary subscriber data and may optionally be stored in the VLR and SGSN.

2.4.8 GSN number

GSN number occurs as SGSN number and as GGSN number.

2.4.8.1 SGSN number

SGSN number is the SS7 address of the SGSN . It is defined in GSM 03.03.

The SGSN number is temporary subscriber data and is stored in the HLR for a GPRS subscription. It is conditionally stored in the VLR if the Gs interface is installed. Absence of the SGSN number in the HLR indicates that the mobile station is deregistered for GPRS or the subscriber has no GPRS subscription in the HLR. Absence of the SGSN number in the VLR indicates that there is no association between the VLR and the SGSN for this MS. The SGSN number is to be distinguished from the SGSN address described in subclause 2.13.10.

2.4.8.2 GGSN number

GGSN number is the SS7 address of the GGSN .It is defined in GSM 03.03. Its usage is described in GSM 03.60. It is contained in the GGSN-list stored in the HLR and does not appear as separate subscriber data. Cf. subclause 2.13.11.

2.4.A MLC number

The MLC number occurs as an SMLC number and as a GMLC number.

2.4.A.1 SMLC number

The SMLC number is the E.164 address of an NSS based SMLC.

The SMLC number is permanent data that may be stored in an MSC in association with either a set of IMSIs belonging to LMUs controlled by the SMLC or a set of cell identifiers belonging to the geographic area served by the SMLC.

2.4.A.2 GMLC number

The GMLC number is the E.164 address of the GMLC. One or more GMLC numbers may be stored in the MS subscriber data in the HLR and downloaded to the VLR. These GMLC numbers identify the GMLCs for the particular MS from which a location request for this MS may be confined for particular LCS clients.

2.4.9 Subscription restriction

Subscription restriction is a parameter indicating whether or not certain restrictions apply to the subscription. The parameter takes either of the following values (see also GSM 02.13):

- accessible area for service:
- all GSM PLMNs,
- one national and all foreign GSM PLMNs,
- regionally restricted (part of a GSM PLMN in one country),
- regionally restricted plus all other GSM PLMNs.

The HLR associates location updating information with subscription restriction. It deregisters the MS if the PLMN is not allowed and sets

- the MSC area restricted flag if the MSC area is not allowed, see subclause 2.4.11.
- SGSN area restricted flag if the SGSN area is not allowed, see subclause 2.4.13

Handling of Regionally Restricted Subscription is defined in subclause 2.4.10. By operator agreement, regional restriction in parts of different GSM PLMNs is also possible.

The subscription restriction is permanent subscriber data and is stored in the HLR.

2.4.10 Regional Subscription Information

If a mobile subscriber has a regional subscription, the HLR shall store a list of up to ten Regional Subscription Zone Identities (RSZIs) per Network Destination Code (NDC) of the PLMN involved. The structure of RSZI is defined in GSM 03.03; since it is composed of the PLMN identification (CC NDC) and the Zone Code it is sufficient to store the Zone Code List per CC NDC.

On updating the VLR or the SGSN, the HLR identifies the VPLMN and NDC given by the VLR or SGSN number and transfers the pertaining Zone Code List to the VLR or SGSN. The VLR or SGSN derives from the Zone Code List the allowed and not allowed MSC or SGSN areas and location areas; it sets the "LA not allowed flag" should the target LAI of the mobile station be excluded, and it informs the HLR should the MSC or SGSN area be excluded. Signalling of cause value "location area not allowed" towards the mobile station is defined in TSs GSM 09.02 and GSM 04.08.

2.4.10.1 RSZI lists

The RSZI lists are permanent subscriber data stored conditionally in the HLR.

2.4.10.2 Zone Code List

The VLR and the SGSN shall store as permanent and conditional subscriber data at least those Zone Codes by which they are affected.

2.4.11 MSC area restricted flag

MSC area restricted flag is a parameter which can take either of the following values:

- MSC area restricted;
- MSC area not restricted.

The parameter is set in the HLR during updating of the VLR. Handling of unsupported services and information received from the VLR based on national roaming or regionally restricted subscription (subclause 2.4.10) determine its value. The parameter contributes to the "MS Not Reachable" state for handling of terminating traffic in the HLR. The default value is "MSC area not restricted".

The MSC area restricted flag is temporary subscriber data and is contained in the HLR.

2.4.12 LA not allowed flag

The LA not allowed flag is set in the VLR and the SGSN depending on National Roaming, Regionally Restricted Subscription and Roaming Restriction Due To UnSupported Feature, see GSM 09.02. It is applied to restrict service on a location area basis.

The LA not allowed flag is temporary subscriber data stored in the VLR and the SGSN.

2.4.13 SGSN area restricted flag

SGSN area restricted flag is a parameter which can take either of the following values:

- SGSN area restricted;
- SGSN area not restricted.

The parameter is set in the HLR during updating of the SGSN. Handling of unsupported services and information received from the SGSN based on national roaming or regionally restricted subscription (subclause 2.4.7) determine its value. The parameter contributes to the "MS Not Reachable" state for handling of terminating traffic in the HLR. The default value is "SGSN area not restricted".

The SGSN area restricted flag is temporary subscriber data and is contained in the HLR.

2.4.15 Service restriction data induced by roaming

If in the course of roaming or at updating of the VLR or SGSN the HLR is informed that the VLR or SGSN does not support certain sensitive services or features, or, the HLR is informed in data request that the VLR or the SGSN supports only specific services, features or phases which do not correspond to subscribed services, features or phases, the HLR takes appropriate measures to restrict service for the mobile station in that VLR or SGSN by setting and sending network induced replacing services such as available services, features or phases, barring programs or the roaming restriction for the MSC or SGSN area.

These network-induced data have to be kept separate in the HLR, and where possible as discussed below in the VLR, from the permanent subscriber data of the call barring supplementary services, from the barring related data that can be modified by the subscriber or from the permanent regional subscription data.

These network-induced data have to be kept separate in the HLR, and where possible as discussed below in the SGSN, from the permanent regional subscription data.

The network induced data take precedence over the subscriber data of the user where they are in conflict. If, in the course of roaming, restrictions caused by a service are lifted, the original subscriber data have to be re-installed both in HLR, in SGSN and in VLR when applicable, regarding any remaining restrictions due to other service replacements.

All network-induced restriction data are temporary subscriber data.

For ODB, GSM 03.15 recommends mainly barring programs to replace this feature. The replacing barring data are conditionally stored in the HLR and VLR. In the VLR they cannot be distinguished from the permanent supplementary services data with the available signalling means, and no additional storage is needed. Interrogation shall reflect in both HLR and VLR the valid setting of the replacing temporary data; to prevent interference with Subscriber Controlled Input and to inform the customer on the restriction, the "control of barring services" subscription option is also temporarily set to the value "by the service provider".

CUG is also replaced by Outgoing Call Barring as described in GSM 03.85.

Roaming restriction in the MSC area due to unsupported features is used to replace AoCC, see GSM 03.86, and Zone Codes for regional subscription, see subclause 2.4.10 and GSM 09.02. A flag in HLR and VLR, see subclause 2.4.15.2, collects the sources of network-induced roaming restriction which are also kept separate by the HLR.

Roaming restriction in the SGSN area due to unsupported features is used to replace Zone Codes for regional subscription, see subclause 2.4.10 and GSM 09.02. A flag in HLR and SGSN, see subclause 2.4.15.2, collects the sources of network-induced roaming restriction which are also kept separate by the HLR.

2.4.15.1 ODB-induced barring data

ODB-induced barring data are temporary data stored conditionally in the HLR; they include the necessary replacing barring programs for outgoing and incoming calls depending on the ODB profile. The subscription option "control of barring services" is set to "by the service provider". The corresponding barring supplementary services for outgoing calls are set by the HLR and sent to the VLR.

2.4.15.2 Roaming restriction due to unsupported feature

Roaming restriction due to unsupported feature is a parameter which indicates that one or several services or features are not supported by the MSC or the SGSN, resulting in roaming restriction in the MSC area or SGSN area. It can take either of the following values:

- roaming restricted;
- roaming not restricted.

The parameter governs the "LA not allowed flag" in the VLR (see subclause 2.4.12) and the "MSC area restricted flag" in the HLR (see subclause 2.4.11), or the "LA not allowed flag" in the SGSN (see subclause 2.4.12) and the "SGSN area restricted flag" in the HLR (see subclause 2.4.13), see GSM 09.02.

The flag "roaming restriction due to unsupported feature" is temporary subscriber data stored in the VLR, SGSN and in the HLR.

2.4.16 Cell ID

The cell ID indicates the global cell identity of the cell in which the MS is currently in radio contact or in which the MS was last in radio contact. The VLR shall update the stored cell ID at establishment of every radio connection.

The cell ID is temporary subscriber data stored in the VLR. It is conditional data, the VLR shall store it whenever the subscriber data is marked as confirmed by radio contact.

2.4.17 Localised Service Area Information

If a mobile subscriber has a localised service area subscription, the HLR shall store a list of up to 20 Localised Service Area Identities (LSA IDs) per PLMN. The structure of LSA ID is defined in GSM 03.03.

On updating the VLR or the SGSN, the HLR identifies the VPLMN given by the VLR or SGSN number and transfers the applicable LSA ID List to the VLR or SGSN. The VLR or SGSN derives from the LSA ID List the allowed LSA(s), priority of each LSA and the "LSA only access" indicator.

2.4.17.1 LSA Identity

LSA Identity (LSA ID) is defined in GSM 03.03. The element uniquely identifies a LSA.

2.4.17.2 LSA Priority

Localised Service Area Priority (LSA Priority) is defined in GSM 08.08. The LSA Priority is permanent subscriber data stored conditionally in the HLR.

2.4.17.3 LSA Only Access Indicator

The LSA Only Access Indicator defines if the subscriber is only allowed within its subscribed LSAs. The LSA Only Access Indicator is permanent subscriber data stored conditionally in the HLR.

2.4.17.4 LSA Active Mode Indicator

The Localised Service Area Active Mode Indicator defines if the LSA Identity of the cell in which the MS is currently in radio contact with shall be indicated to the subscriber in active mode. The LSA Active Mode Indicator is permanent subscriber data stored conditionally in the HLR.

2.4.17.5 VPLMN Identifier

The VPLMN Identifier identifies the VPLMN in which an LSA Identity is applicable. This identifier is not applicable to Universal LSA IDs as defined in GSM 03.03. The VPLMN identifier is permanent subscriber data stored conditionally in the HLR.

**** NEXT MODIFIED SECTION ****

2.15 Data related to IST

2.15.1 IST Alert Timer

The IST Alert Timer indicates the timer value that the VMSC and the GMSC shall use to inform the HLR about each of the call activities that an IST non-CAMEL subscriber performs.

This parameter is only sent to the VLRs which support the non-CAMEL IST functionality.

2.A Data related to Location Services

2.A.1 Subscriber Data stored in HLR

2.A.1.1 Privacy Exception List

This data contains the privacy classes for any target MS which identify the LCS clients permitted to locate the MS. For a detailed definition of this data, refer to GSM 03.71.

2.A.1.2 GMLC Numbers

This data contains the GMLC addresses for an MS subscriber. These addresses may be used to verify that a location request from specific LCS clients is authorized for the target MS.

2.A.1.3 MO-LR List

This data contains the classes of MO-LR that are permitted for the MS subscriber. For a detailed definition of this data, refer to GSM 03.71.

2.A.2 Data stored in GMLC

The GMLC stores data related to LCS clients. Refer to GSM 03.71 for a detailed description.

2.A.3 Data stored in SMLC

The SMLC stores data related to associated Type A and Type B LMUs from which location measurements may be received. Refer to GSM 03.71 for a detailed description.

2.A.4 Data stored in LMU

The LMU stores data related to its LCS measurement and O&M capabilities and may store data related to LCS measurements and O&M reports that it is required to provide to its controlling SMLC. The nature and content of this data is not defined in GSM.

2.A.5 Data stored in the MSC

In order to support routing of connectionless LCS messages to an SMLC or a Type B LMU, the MSC may store permanent routing data for an SMLC or a Type B LMU in association with a specific location area identifier or location area identifier plus cell identifier.

2.A.6 Data stored in the BSC

In order to support routing of connectionless LCS messages to an SMLC or a Type B LMU, the BSC may store permanent routing data for an SMLC or a Type B LMU in association with a specific location area identifier or location area identifier plus cell identifier.

****** NEXT MODIFIED SECTION ******

4 Accessing subscriber data

It shall be possible to retrieve or store subscriber data concerning a specific MS from the HLR by use of each of the following references:

- International Mobile Subscriber Identity (IMSI);
- Mobile Station ISDN Number (MSISDN)

It shall be possible to retrieve or store subscriber data concerning a specific MS from the VLR by use of each of the following references:

- International Mobile Subscriber Identity (IMSI);
- Temporary Mobile Subscriber Identity (TMSI).

It shall be possible to retrieve or store subscriber data concerning a specific MS from the SGSN by use of each of the following references:

- International Mobile Subscriber Identity (IMSI);
- Packet Temporary Mobile Subscriber identity (P-TMSI).

It shall be possible to retrieve or store subscriber data concerning a specific MS from the GGSN by use of each of the following references:

- International Mobile Subscriber Identity (IMSI);

See clause 3 for explanation of M, C, T and P in table 1 and table 2.

Table 1: Overview of data stored for non-GPRS Network Access Mode

PARAMETER	SUBCLAUSE	HLR	VLR	TYPE	
IMSI	2.1.1.1	M	M	P	Note
Network Access Mode	2.1.1.2	M	-	P	Note
International MS ISDN number	2.1.2	M	M	P	
multinumbering MSISDNs	2.1.3	C	-	P	Note
Basic MSISDN indicator	2.1.3.1	C	-	P	
MSISDN-Alert indicator	2.1.3.2	C	-	P	
TMSI	2.1.4	-	C	T	
LMSI	2.1.8	C	C	T	Note
Mobile Station Category	2.2.1	M	M	P	
LMU Identifier	2.2.A	C	C	P	
RAND, SRES and Kc	2.3.1	M	M	T	
Ciphering Key Sequence Number	2.3.2	-	M	T	
MSRN	2.4.1	-	C	T	Note
Location Area Identity	2.4.2	-	M	T	
VLR number	2.4.5	M	-	T	Note
MSC number	2.4.6	M	C	T	
HLR number	2.4.7	-	C	T	
Subscription restriction	2.4.9	C	-	P	
RSZI lists	2.4.10.1	C	-	P	
Zone Code List	2.4.10.2	-	C	P	
MSC area restricted flag	2.4.11	M	-	T	
LA not allowed flag	2.4.12	-	M	T	
ODB-induced barring data	2.4.15.1	C	-	T	
Roaming restriction due to unsupported feature	2.4.15.2	M	M	T	
Cell ID	2.4.16	-	C	T	
LSA Identity	2.4.X.1	C	C	P	
LSA Priority	2.4.X.2	C	C	P	
LSA Only Access Indicator	2.4.X.3	C	C	P	
LSA Active Mode Indicator	2.4.X.4	C	C	P	
VPLMN Identifier	2.4.X.5	C	-	P	
Provision of bearer service	2.5.1	M	M	P	
Provision of teleservice	2.5.2	M	M	P	
BC allocation	2.5.3	C	C	P	
IMSI detached flag	2.7.1	-	C	T	
Confirmed by Radio Contact indicator	2.7.4.1	-	M	T	
Subscriber Data Confirmed by HLR indicator	2.7.4.2	-	M	T	
Location Information Confirmed in HLR indicator	2.7.4.3	-	M	T	
Check SS indicator	2.7.4.4	M	-	T	
MS purged for non-GPRS flag	2.7.5	M	-	T	
MNRR	2.7.7	C	-	T	
Subscriber status	2.8.1	C	C	P	
Barring of outgoing calls	2.8.2.1	C	C	P	
Barring of incoming calls	2.8.2.2	C	-	P	
Barring of roaming	2.8.2.3	C	-	P	
Barring of premium rate calls	2.8.2.4	C	C	P	
Barring of supplementary service management	2.8.2.5	C	C	P	
Barring of registration of call forwarding	2.8.2.6	C	-	P	
Barring of invocation of call transfer	2.8.2.7	C	C	P	
Operator determined barring PLMN-specific data	2.8.3	C	C	P	
Handover Number	2.9.1	-	C	T	
Messages Waiting Data	2.10.1	C	-	T	
Mobile Station Not Reachable Flag	2.10.2	C	M	T	
Memory Capacity Exceeded Flag	2.10.3	C	-	T	

(continued)

Table 1 (concluded): Overview of data stored for non-GPRS Network Access Mode

PARAMETER	SUBCLAUSE	HLR	VLR	TYPE	
Trace Reference	2.11.1	C	C	P	
Trace Type	2.11.2	C	C	P	
Operations Systems Identity	2.11.3	C	C	P	
HLR Trace Type	2.11.4	C	-	P	
MAP Error On Trace	2.11.5	C	-	T	
Trace Activated in VLR	2.11.6	C	C	T	
Foreign Subscriber Registered in VLR	2.11.7	-	C	P	Note
VGCS Group Membership List	2.12.1	C	C	P	
VBS Group Membership List	2.12.2	C	C	P	
Broadcast Call Initiation Allowed List	2.12.2.1	C	C	P	
Originating CAMEL Subscription Information	2.14.1.1	C	C	P	
Terminating CAMEL Subscription Information	2.14.1.2	C	-	P	
Location Information/Subscriber state Information	2.14.1.3	C	-	P	
USSD CAMEL subscription information(U-CSI)	2.14.1.4	C	-	P	
SS invocation notification (SS-CSI)	2.14.1.5/3.2	C	C	P	
FTN translation information flag(TIF-CSI)	2.14.1.6	C	-	P	
USSD General CAMEL service information (UG-CSI)	2.14.2	C	-	P	
Negotiated CAMEL Capability Handling	2.14.2	C	-	T	
IST Alert Timer	2.16.1	C	C	P	
Privacy Exception List	2.A.1.1	C	C	P	
GMLC Numbers	2.A.1.2	C	C	P	
MO-LR List	2.A.1.3	C	C	P	

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Phoenix AZ, 15-19 Nov 1999

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e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

23.016 CR 006

Current Version: **3.2.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **TSG CN#06**
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strategic (for SMG use only)
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Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc

Proposed change affects:
(at least one should be marked with an X)

(U)SIM ME UTRAN / Radio Core Network

Source: TSG N2 **Date:** 15 Nov 1999

Subject: Support of Subscriber Data Management in the HLR and VLR for LCS

Work item: Location Services (LCS)

Category: Correction
(only one category shall be marked with an X)
Corresponds to a correction in an earlier release
Addition of feature
Functional modification of feature
Editorial modification

Release: Phase 2
Release 96
Release 97
Release 98
Release 99
Release 00

Reason for change: Modify Subscriber Data Management for LCS

Clauses affected: 3, 4

Other specs affected: Other 3G core specifications → List of CRs:
Other GSM core specifications → List of CRs:
MS test specifications → List of CRs:
BSS test specifications → List of CRs:
O&M specifications → List of CRs:

Other comments:

3 Definitions and abbreviations

3.1 Abbreviations

Abbreviations used in this specification are listed in GSM 01.04.

3.2 Definitions

Subscriber data to be stored in the HLR, VLR and SGSN are defined in GSM 03.08, GSM 03.71 and in GSM 03.6x, GSM 03.8x and GSM 03.9x-series of technical specifications.

Voice Broadcast Service (VBS), Voice Group Call Service (VGCS) and enhanced Multi Level Precedence and Pre-emption Service (eMLPP) Data related to group call area, cell or dispatcher attributes is only stored in the Group Call Register (GCR) which is linked to each MSC/VLR.

The GCR and it's stored data is out of scope of this specification.

Subscriber related VBS, VGCS and eMLPP Data only concerns entitlement data for these-services and is seen as shared non-GPRS subscriber data.

GPRS and non-GPRS subscriber data:

The HLR has to download data to the VLR and to the SGSN. In this specification those data sent to the VLR are called non-GPRS subscriber data and those data sent to the SGSN are called GPRS subscriber data.

Whenever the refining identifier non-GPRS or GPRS is missing a common rule is addressed which hold for both kinds of subscriber data.

Subscriber data specific to non-GPRS shall only be sent from the HLR to the VLR. Subscriber data specific to GPRS shall only be sent from the HLR to the SGSN.

Subscriber data common to both non-GPRS and GPRS (regional subscription information) are downloaded from the HLR to both entities.

Shared non-GPRS subscriber data:

Common subset of subscriber data defined to be stored in both the HLR and VLR. Subscriber data only stored in the HLR is not part of shared subscriber data. Shared subscriber data includes:

- BS: Bearer Service (see GSM 02.02);
- TS: Teleservice (see GSM 02.03);
- BSG: Basic Service Group (see GSM 02.01, GSM 02.04 and GSM 03.11);
- EBSG: Elementary Basic Service Group (see GSM 03.11);
- CBSG: Collective Basic Service Group (see GSM 03.11).
- LSA Information: Localised Service Area Information (see GSM 03.73).
- IST Information: Immediate Service Termination Information (see GSM 03.35).

Shared GPRS subscriber data:

Common subset of subscriber data defined to be stored in both the HLR and SGSN. Subscriber data only stored in the HLR is not part of shared subscriber data. Shared GPRS subscriber data includes:

- TS: Teleservice (see GSM 02.03);

PDP Context (see GSM 03.60).

LSA Information: Localised Service Area Information (see GSM 03.73).

Mandatory data:

Data required to form a self-consistent set of subscriber data. The context governs whether a specific parameter is mandatory, e.g. the data set for a specific service may be optional, however if data for this service is present, then parameters within this data set may be mandatory.

Mandatory data is defined by the service description (see e.g. GSM 03.6x, GSM 03.8x and GSM 03.9x-series of technical specifications and GSM 03.15, GSM 03.71) and by PLMN defined requirements.

NOTE: The above definition is seen from a semantic point of view. Semantically, mandatory parameters may be defined as syntactically optional or mandatory by the protocol.

Optional data:

Data which is defined as subscriber data, but which is not required to form a self-consistent set of subscriber data; the context governs whether a specific parameter is optional.

Optional data is data which is defined by the service description (see e.g. GSM 03.6x, GSM 03.8x and GSM 03.9x-series of technical specifications and GSM 03.15, GSM 03.71) or by PLMN defined requirements but is not defined as mandatory data.

NOTE: The above definition is seen from a semantic point of view. Semantically optional parameters are always defined as syntactically optional by the protocol.

Missing data:

Data which is mandatory in a given context but is not received nor is valid data available locally.

Unexpected data:

Data which is received and cannot be further processed. This may be either:

- optional data not required in a given context; or
- optional or mandatory data, required in this context but received with an unexpected value.

Overlapping data:

Two different cases of overlapping within subscriber data are possible:

- two or more parameters are to be stored at the same address in the data structure (see subclause 4.4);
- two or more BSGs within a BSG list include or are identical with one and the same EBSG.

The following **groups of non-GPRS subscriber information** are defined:

- Subscriber information (Group A):
 - International Mobile Subscriber Identity (IMSI);
 - basic Mobile Station International ISDN Number (MSISDN);
 - category;
 - subscriber status,
 - LMU identifier
- Basic service information (Group B):
 - Bearer Service list;
 - Teleservice list.

NOTE: VBS and VGCS entitlement data are subsumed under Teleservices

- Supplementary Service (SS) information (Group C):
 - forwarding information;
 - call barring information;
 - Closed User Group (CUG) information;
 - eMLPP data;
 - SS Data;
- Operator Determined Barring (ODB) information (Group D):
 - ODB Data for non-GPRS services;
- Roaming restriction information (Group E):
 - roaming restriction due to unsupported feature;
- Regional subscription information (Group F):
 - regional subscription data.
- VBS/VGCS subscription information (Group G):
 - VBS subscription data;
 - VGCS subscription data.
- CAMEL subscription information (Group H):
 - Originating CAMEL Subscription Information.
- LSA Information (Group I):
 - LSA data.
- Location Services (LCS) information (Group X)
 - ~~HPLMN~~-GMLC List
 - LCS Privacy Exception List
 - MO-LR List.
- IST Information (Group J):
 - IST data.

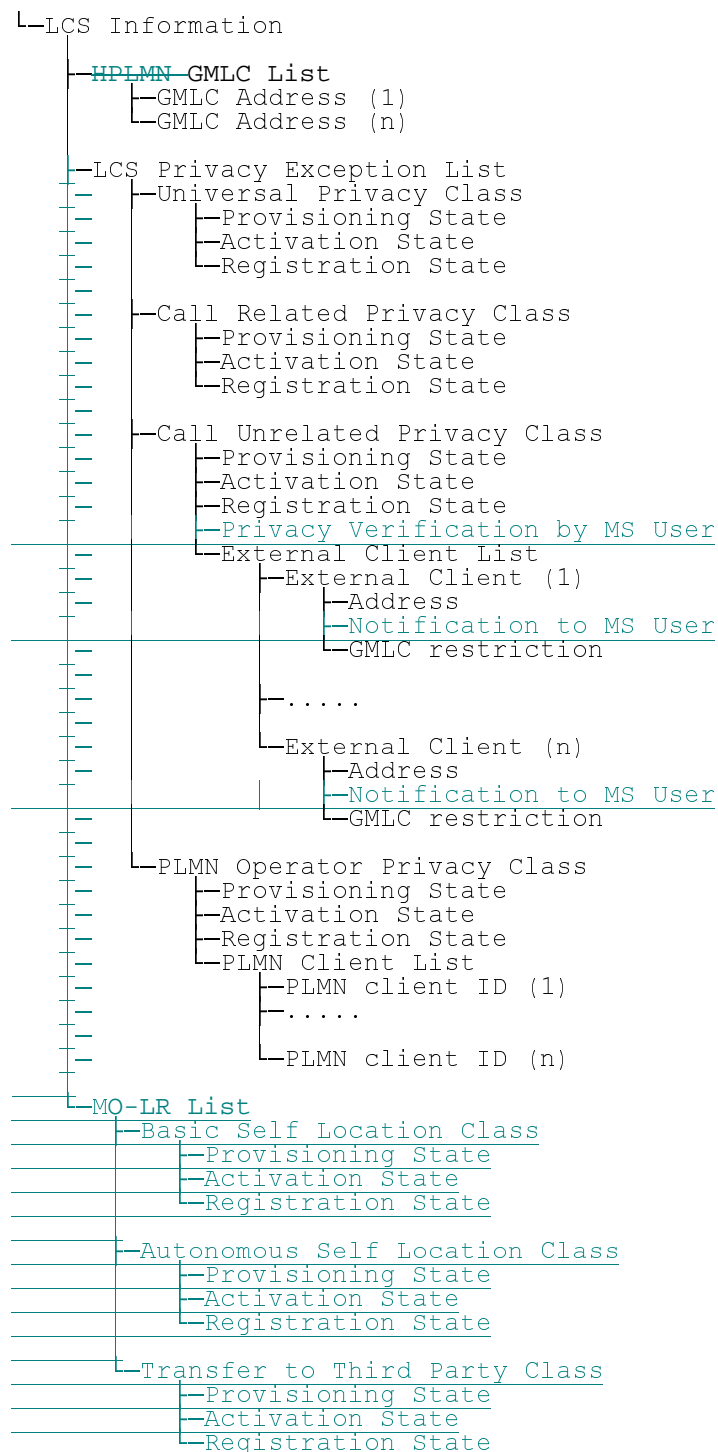
The following **groups of GPRS subscriber information** are defined:

- Subscriber information (Group P1):
 - International Mobile Subscriber Identity (IMSI);
 - basic Mobile Station International ISDN Number (MSISDN);
 - subscriber status;
- Basic service information (Group P2):
 - Teleservice list.
- Operator Determined Barring (ODB) information (Group P3):
 - ODB Data for GPRS services;

- Roaming restriction information (Group P4):
 - roaming restriction in SGSN due to unsupported feature;
- Regional subscription information (Group P5):
 - regional subscription data.
- GPRS subscription information (Group P6):
 - GPRS subscription data.
- LSA Information (Group P7):
 - LSA data.

4 General on handling of subscriber information

4.5.4 Consistency of supplementary service data



NOTE: For detailed information see GSM 03.71 and [3GPP 29.002](#)[GSM 09.02](#).

Figure 16: LCS Information

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.
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5 Overload and compatibility overview

5.1 Overload control

**** NEXT MODIFIED SECTION ****

5.1.2 Overload control for MAP entities

Table 5.1/2: Priorities of Application Contexts for MSC/VLR as Responder

Responder = MSC/VLR	Initiating Entity
<i>Priority high</i>	
<u>Handover</u>	
handoverControl (prepareHandover/v2), (performHandover/v1)	MSC
<u>Mobility and Location Register Management</u>	
locationCancel (cancelLocation)	HLR
reset (reset)	HLR
immediateTermination (istCommand/v3)	HLR
interVlrInfoRetrieval (sendIdentification/v2), (sendParameters/v1)	VLR
subscriberDataMngt (insertSubscriberData), (deleteSubscriberData)	HLR
tracing (activateTraceMode), (deactivateTraceMode)	HLR
<u>Short Message Service</u>	
shortMsgMO-Relay (MO-ForwardSM v3) (forwardSM v1/v2)	MSC/SGSN
shortMsgMT-Relay (MT-ForwardSM v3) (forwardSM v1/v2)	MSC
shortMsgAlert (alertServiceCentre/v2), (alertServiceCentreWithoutResult/v1)	HLR
<u>Mobile Terminating Traffic</u>	
roamingNbEnquiry (provideRoamingNumber)	HLR
callControlTransfer (resumeCallHandling)	MSC
subscriberInfoEnquiry (provideSubscriberInformation)	HLR
reporting (remoteUserFree) (SetReportingState)	HLR
<u>Location Services</u>	
locationSvcLMUControl (lesReset v3)	SMLC
locationSvcDataTransfer (lesInformationRequest v3)	SMLC
locationSvcEnquiry (provideSubscriberLocation v3)	GMLC
<u>Network-Initiated USSD</u>	
networkUnstructuredSs (unstructuredSS-Request/v2), (unstructuredSS-Notify/v2)	HLR
<i>Priority low</i>	

NOTE: The application context name is the last component but one of the object identifier.
Operation names are given in brackets for information with "/vn" appended to vn only operations.

Table 5.1/4: Priorities of Application Contexts for SMLC as Responder

Responder = SMLC	Initiating Entity
<i>Priority high</i>	
<u><i>Location Services</i></u>	
locationSveLMUControl	VLR
(lesRegistration v3)	
locationSveDataTransfer	MSC
(lesInformationReport v3)	
locationSvePositioning	MSC
(performLocation v3)	
<i>Priority low</i>	

NOTE: The application context name is the last component but one of the object identifier.
Operation names are given in brackets for information with "/vn" appended to vn.

6 Requirements concerning the use of SCCP and TC

6.1 Use of SCCP

6.1.3 SCCP addressing

****** NEXT MODIFIED SECTION ******

6.1.3.1 Introduction

Within the GSM System there will be a need to communicate between entities within the same PLMN and in different PLMNs. Using the Mobile Application Part (MAP) for this function implies the use of Transaction Capabilities (TC) and the Signalling Connection Control Part (SCCP) of CCITT Signalling System No. 7.

Only the entities which should be addressed are described below. If the CCITT or ITU-T SCCP is used, the format and coding of address parameters carried by the SCCP for that purpose shall comply with CCITT Recommendation Q.713 with the following restrictions:

1) Intra-PLMN addressing

For communication between entities within the same PLMN, a MAP SSN shall always be included in the called and calling party addresses. All other aspects of SCCP addressing are network specific.

2) Inter-PLMN addressing

a) Called Party Address

- SSN indicator = 1 (MAP SSN always included);
- Global title indicator = 0100 (Global title includes translation type, numbering plan, encoding scheme and nature of address indicator);
- the translation type field will be coded "00000000" (Not used). For call related messages for non-optimal routed calls (as described in GSM 03.66) directed to another PLMN the translation type field may be coded "10000000" (CRMNP);
- Routing indicator = 0 (Routing on global title);

b) Calling Party Address

- SSN indicator = 1 (MAP SSNs always included);
- Point code indicator = 0;
- Global title indicator = 0100 (Global title includes translation type, numbering plan, encoding scheme and nature of address indicator);
- Numbering Plan = 0001 (ISDN Numbering Plan, E.164; In Case of Inter-PLMN Signalling, the dialogue initiating entity and dialogue responding entity shall always include its own E.164 Global Title as Calling Party Address);
- the translation type field will be coded "00000000" (Not used);
- Routing indicator = 0 (Routing on Global Title).

If ANSI T1.112 SCCP is used, the format and coding of address parameters carried by the SCCP for that purpose shall comply with ANSI specification T1.112 with the following restrictions:

1) Intra-PLMN addressing

For communication between entities within the same PLMN, a MAP SSN shall always be included in the called and calling party addresses. All other aspects of SCCP addressing are network specific.

2) Inter-PLMN addressing

a) Called Party Address

- SSN indicator = 1 (MAP SSN always included);
- Global title indicator = 0010 (Global title includes translation type);
- the Translation Type (TT) field will be coded as follows:
 - TT = 9, if IMSI is included,
 - TT = 14, if MSISDN is included,
 - Or TT = 10, if Network Element is included. (If TT=10, then Number Portability GTT is not invoked, if TT=14, then Number Portability GTT may be invoked.)
- Routing indicator = 0 (Routing on global title);

b) Calling Party Address

- SSN indicator = 1 (MAP SSNs always included);
- Point code indicator = 0;
- Global title indicator = 0010 (Global title includes translation type);
 - TT = 9, if IMSI is included,
 - TT = 14, if MSISDN is included,
 - Or TT = 10, if Network Element is included. (If TT=10, then Number Portability GTT is not invoked, if TT=14, then Number Portability GTT may be invoked.)

Routing indicator = 0 (Routing on Global Title).

If a Global Title translation is required for obtaining routing information, one of the numbering plans E.164, E.212 and E.214 is applicable.

- E.212 numbering plan

When CCITT or ITU-T SCCP is used, an E.212 number must not be included as Global Title in an SCCP UNITDATA message. The translation of an E.212 number into a Mobile Global Title is applicable in a dialogue initiating VLR, SGSN or GGSN if the routing information towards the HLR is derived from the subscriber's IMSI. In World Zone 1 when ANSI SCCP is used, the IMSI (E.212 number) is used as a Global Title to address the HLR. When an MS moves from one VLR service area to another, the new VLR may derive the address of the previous VLR from the Location Area Identification provided by the MS in the location registration request. The PLMN where the previous VLR is located is identified by the E.212 numbering plan elements of the Location Area Identification, ie the Mobile Country Code (MCC) and the Mobile Network Code (MNC).

- E.214 and E.164 numbering plans

When CCITT or ITU-T SCCP is used, only address information belonging to either E.214 or E.164 numbering plan is allowed to be included as Global Title in the Called and Calling Party Address. In World Zone 1 when ANSI SCCP is used, the IMSI (E.212 number) is used as a Global Title to address the HLR.

If the Calling Party Address associated with the dialogue initiating message contains a Global Title, the sending network entity shall include its E.164 entity number.

When receiving an SCCP UNITDATA message, SCCP shall accept either of the valid numbering plans in the Called Party Address and in the Calling Party Address.

When CCITT or ITU-T SCCP is used and an N-UNITDATA-REQUEST primitive from TC is received, SCCP shall accept an E.164 number or an E.214 number in the Called Address and in the Calling Address. In World Zone 1 when ANSI SCCP is used, the IMSI (E.212 number) is used instead of E.214 number.

The following subclauses describe the method of SCCP addressing appropriate for each entity both for the simple intra-PLMN case and where an inter-PLMN communication is required. The following entities are considered:

- the Mobile-services Switching Centre (MSC);
- the Home location Register (HLR);
- the Visitor Location Register (VLR);
- the Gateway Mobile-services Switching Centre (GMSC);
- the GSM Service Control Function (gsmSCF);
- the Interworking Mobile-services Switching Centre (IWMSC);
- the Shared Inter Working Function (SIWF);
- the Serving GPRS Support Node (SGSN);
- the Gateway GPRS Support Node (GGSN);
- ~~— the Serving Mobile Location Center (SMLC);~~
- the Gateway Mobile Location Center (GMLC).

**** NEXT MODIFIED SECTION ****

6.1.3.10 The Gateway MSC (GMSC) for Short Message Service

The GMSC provides interworking with the network to access the Short Message Service Centre, the mobile network and routing of Send Routing Info For SM. The GMSC has an E.164 address known in the HLR, SGSN or MSC

~~6.1.3.10A The Serving Mobile Location Center (SMLC)~~

~~There are several instances where an SMLC needs to be addressed.~~

~~6.1.3.10A.1 Registration (LMU)~~

~~When an LMU needs to register with a controlling SMLC, it may derive the identity of the SMLC from pre-administered data. The identity will be represented in this case by an international E.164 address.~~

~~6.1.3.10A.2 Instigation of Positioning (MSC)~~

~~When an MSC needs to instigate procedures to obtain location information for a target MS, it derives the identity of the SMLC for this MS from the MS's serving cell site. The identity of the SMLC shall be represented by either an SS7 signalling point code or an international E.164 address.~~

6.1.3.10B The Gateway Mobile Location Center (GMLC)

The GMLC initiates location requests on behalf of external clients. The E.164 address of the GMLC is provided to an HLR when the GMLC requests a serving MSC address from the HLR for a target MS. The E.164 address of the GMLC is also provided to a serving MSC when the GMLC requests the location of a target MS served by this MSC.

6.1.3.11 Summary table

The following tables summarize the SCCP address used for invoke operations. As a principle, within a PLMN either an SPC or a GT may be used (network operation option), whereas when addressing an entity outside the PLMN the GT must be used. The address type mentioned in the table (e.g. MSISDN) is used as GT or to derive the SPC.

For a response, the originating address passed in the invoke is used as SCCP Called Party Address. For extra-PLMN addressing the own E.164 entity address is used as SCCP Calling Party Address; for intra-PLMN addressing an SPC derived from the entity number may be used instead. When using an SPC, the SPC may be taken directly from MTP.

Table 6.1/1

to from	fixed net work	HLR	VLR	MSC	EIR	gsmSCF	SIWF	SGSN	GGSN
fixed network	---	E:GT T:MSISDN	---	---	---	---	---	---	---
home location register	---	---	I:SPC/GT E:GT T:VLR NUMBER	---	---	I:SPC/GT E:GT T:gsmSCF NUMBER	---	I:SPC/GT E:GT T:SGSN NUMBER	I:SPC/GT E:GT T:GGSN NUMBER
visitor location register	---	I:SPC/GT E:GT T:MGT (outside World Zone 1)/MSISDN (World Zone 1)/HLR NUMBER (note)	I:SPC/GT E:GT T:VLR NUMBER	---	---	---	---	---	---
mobile-services switching centre	---	I:SPC/GT E:GT T:MSISDN	I:SPC/GT E:GT T:VLR NUMBER	I:SPC/GT E:GT T:MSC NUMBER	I:SPC/GT E:GT T:EIR NUMBER	I:SPC/GT E:GT T:gsmSCF NUMBER	I:SPC/GT E:GT T:SIWF NUMBER	I:SPC/GT E:GT T:SGSN NUMBER	---
gsm Service Control Function	---	I:SPC/GT E:GT T:MSISDN	---	---	---	---	---	---	---
Shared Inter Working Function	---	---	---	I:SPC/GT E:GT T:MSC NUMBER	---	---	---	---	---
Serving GPRS Support Node	---	I:SPC/GT E:GT T:MGT/ MSISDN/HL R NUMBER	---	I:SPC/GT E:GT T:MSC NUMBER	I:SPC/GT E:GT T:EIR NUMBER	---	---	---	---
Gateway GPRS Support Node	---	I:SPC/GT E:GT T:MGT	---	---	---	---	---	---	---
Serving Mobile Location Centre	---	---	I:SPC/GT (E:GT) T:VLR NUMBER	I:SPC/GT (E:GT) T:MSC NUMBER	---	---	---	---	---
Gateway Mobile Location Center	---	I:SPC/GT E:GT T:MSISDN, MGT (outside World Zone 1) or IMSI (World Zone 1) (note)	---	I:SPC/GT E:GT T:MSC NUMBER	---	---	---	---	---

I: Intra-PLMN E: Extra(Inter)-PLMN T: Address Type

GT: Global Title MGT: E.214 Mobile Global Title SPC: Signalling Point Code

NOTE: For initiating the location updating procedure and an authentication information retrieval from the HLR preceding it, the VLR has to derive the HLR address from the IMSI of the MS. The result can be an SPC or an E.214 Mobile Global Title if CCITT or ITU-T SCCP is used, or IMSI itself if ANSI SCCP is used (ANSI SCCP is used in World Zone 1).. When continuing the established update location dialogue (as with any other dialogue) the VLR must derive the routing information towards the HLR from the Calling Party Address received with the first responding CONTINUE message until the dialogue terminating message is received.

For transactions invoked by the VLR after update location completion, the VLR may derive the information for addressing the HLR from addresses received in the course of the update location procedure (MSISDN or HLR number) or from the IMSI.

When invoking the Restore Data procedure and an authentication information retrieval from the HLR preceding it, the VLR must derive the information for addressing the HLR from the address information received in association with the roaming number request. This may be either the IMSI received as a parameter of the MAP message requesting the Roaming Number or the Calling Party Address associated with the MAP message requesting the Roaming Number.

The gsmSCF shall be addressed using more than one Global Title number. The first Global Title number is used to address a gsmSCF for MAP. The second Global Title number is used to address a gsmSCF for CAP.

For querying the HLR to obtain the VMSC address to support location services, the GMLC has to derive the HLR address from either the MSISDN or IMSI of the target MS. When using the IMSI, the result can be an SPC or an E.214 Mobile Global Title if CCITT or ITU-T SCCP is used, or IMSI itself if ANSI SCCP is used (ANSI SCCP is used in World Zone 1).

~~Inter-PLMN signalling from an SMLC to MSC is not defined in GSM 03.71; hence, the type of addressing is not significant.~~

Table 6.1/2

to from	SMLC	GMLC
fixed network	---	---
home location register	---	---
visitor location register	I:SPC/GT (E:GT) T:MLC NUMBER	---
mobile-services switching centre	I:SPC/GT (E:GT) T:MLC NUMBER	---
gsm Service Control Function	---	---
Shared Inter Working Function	---	---
Serving GPRS Support Node	---	---
Gateway GPRS Support Node	---	---
Serving Mobile Location Centre	---	---
Gateway Mobile Location Center	---	---

I: Intra-PLMN

E: Extra(Inter)-PLMN

T: Address Type

GT: Global Title

MGT: E.214 Mobile Global Title

SPC: Signalling Point Code

~~NOTE: Inter-PLMN signalling from an MSC to SMLC is not defined in GSM 03.71; hence, the type of addressing is not significant.~~

7 General on MAP services

**** NEXT MODIFIED SECTION ****

7.6 Definition of parameters

Following is an alphabetic list of parameters used in the common MAP-services in subclause 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
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 number	7.6.2.46	LMSI	7.6.2.16
Additional signal info	7.6.9.10	Location Information	7.6.2.30
Additional SM Delivery Outcome	7.6.8.11		
Alert Reason	7.6.8.8	Location update type	7.6.9.6
Alert Reason Indicator	7.6.8.10	Lower Layer Compatibility	7.6.3.42
		LSA Information	7.6.3.56
		LSA Information Withdraw	7.6.3.58
Alerting Pattern	7.6.3.44	Mobile Not Reachable Reason	7.6.3.51
All GPRS Data	7.6.3.53	More Messages To Send	7.6.8.7
All Information Sent	7.6.1.5	MS ISDN	7.6.2.17
APN	7.6.2.42	MSC number	7.6.2.11
Authentication set list	7.6.7.1	MSISdn-Alert	7.6.2.29
B-subscriber Address	7.6.2.36	MWD status	7.6.8.3
B subscriber Number	7.6.2.48	Network Access Mode	7.6.3.50
B subscriber subaddress	7.6.2.49	Network node number	7.6.2.43
Basic Service Group	7.6.4.40	Network resources	7.6.10.1
Bearer service	7.6.4.38	Network signal information	7.6.9.8
BSS-apdu	7.6.9.1	New password	7.6.4.20
Call barring feature	7.6.4.19	No reply condition timer	7.6.4.7
Call barring information	7.6.4.18	North American Equal Access preferred Carrier Id	7.6.2.34
		Number Portability Status	7.6.5.14
Call Direction	7.6.5.8	ODB General Data	7.6.3.9
Call Info	7.6.9.9	ODB HPLMN Specific Data	7.6.3.10
Call reference	7.6.5.1		
Call Termination Indicator	7.6.3.67	OMC Id	7.6.2.18
Called number	7.6.2.24	Originally dialled number	7.6.2.26
Calling number	7.6.2.25		
CAMEL Subscription Info Withdraw	7.6.3.38	Originating entity number	7.6.2.10
Cancellation Type	7.6.3.52	Override Category	7.6.4.4
Category	7.6.3.1	P-TMSI	7.6.2.47
CCBS Feature	7.6.5.8	PDP-Address	7.6.2.45
Channel Type	7.6.5.9	PDP-Context identifier	7.6.3.55
Chosen Channel	7.6.5.10	PDP-Type	7.6.2.44
Ciphering mode	7.6.7.7	Pre-paging supported	7.6.5.15
		Previous location area Id	7.6.2.4
Cksn	7.6.7.5	Protocol Id	7.6.9.7
CLI Restriction	7.6.4.5	Provider error	7.6.1.3
CM service type	7.6.9.2		
Complete Data List Included	7.6.3.54	QoS-Subscribed	7.6.3.47
CUG feature	7.6.3.26	Rand	7.6.7.2
CUG index	7.6.3.25	Regional Subscription Data	7.6.3.11
CUG info	7.6.3.22	Regional Subscription Response	7.6.3.12
CUG interlock	7.6.3.24	Requested Info	7.6.3.31
CUG Outgoing Access indicator	7.6.3.8	Roaming number	7.6.2.19
CUG subscription	7.6.3.23	Roaming Restricted In SGSN Due To	7.6.3.49
CUG Subscription Flag	7.6.3.37	Unsupported Feature	
		Roaming Restriction Due To	7.6.3.13
Current location area Id	7.6.2.6	Unsupported Feature	
		Service centre address	7.6.2.27
Current password	7.6.4.21	Serving Cell Id	7.6.2.37
eMLPP Information	7.6.4.41	SGSN address	7.6.2.39
Equipment status	7.6.3.2	SGSN number	7.6.2.38
Extensible Basic Service Group	7.6.3.5	SIWF Number	7.6.2.35
Extensible Bearer service	7.6.3.3	SoLSA Support Indicator	7.6.3.57
		SM Delivery Outcome	7.6.8.6
Extensible Call barring feature	7.6.3.21	SM-RP-DA	7.6.8.1
Extensible Call barring information	7.6.3.20	SM-RP-MTI	7.6.8.16
Extensible Forwarding feature	7.6.3.16	SM-RP-OA	7.6.8.2
Extensible Forwarding info	7.6.3.15	SM-RP-PRI	7.6.8.5
Extensible Forwarding Options	7.6.3.18		

Extensible No reply condition timer	7.6.3.19	SM-RP-SMEA	7.6.8.17
Extensible SS-Data	7.6.3.29	SM-RP-UI	7.6.8.4
Extensible SS-Info	7.6.3.14	Sres	7.6.7.3
Extensible SS-Status	7.6.3.17	SS-Code	7.6.4.1
Extensible Teleservice	7.6.3.4	SS-Data	7.6.4.3
External Signal Information	7.6.9.4	SS-Event	7.6.4.42
Forwarded-to number	7.6.2.22	SS-Event-Data	7.6.4.43
Forwarded-to subaddress	7.6.2.23	SS-Info	7.6.4.24
Forwarding feature	7.6.4.16	SS-Status	7.6.4.2
Forwarding information	7.6.4.15	Stored location area Id	7.6.2.5
Forwarding Options	7.6.4.6	Subscriber State	7.6.3.30
GGSN address	7.6.2.40	Subscriber Status	7.6.3.7
GGSN number	7.6.2.41	Supported CAMEL Phases	7.6.3.36
GMSC CAMEL Subscription Info	7.6.3.34	Suppress T-CSI	7.6.3.33
GPRS Node Indicator	7.6.8.14	Suppression of Announcement	7.6.3.32
GPRS Subscription Data	7.6.3.46	Target cell Id	7.6.2.8
GPRS Subscription Data Withdraw	7.6.3.45	Target location area Id	7.6.2.7
GPRS Support Indicator	7.6.8.15	Target MSC number	7.6.2.12
Group Id	7.6.2.33	Teleservice	7.6.4.39
GSM bearer capability	7.6.3.6	TMSI	7.6.2.2
Guidance information	7.6.4.22	Trace reference	7.6.10.2
Handover number	7.6.2.21	Trace type	7.6.10.3
High Layer Compatibility	7.6.3.43	User error	7.6.1.4
HLR Id	7.6.2.15	USSD Data Coding Scheme	7.6.4.36
HLR number	7.6.2.13	USSD String	7.6.4.37
HO-Number Not Required	7.6.6.7	UU Data	7.6.5.12
IMEI	7.6.2.3	UUS CF Interaction	7.6.5.13
IMSI	7.6.2.1	VBS Data	7.6.3.40
Inter CUG options	7.6.3.27	VGCS Data	7.6.3.39
Intra CUG restrictions	7.6.3.28	VLR CAMEL Subscription Info	7.6.3.35
		VLR number	7.6.2.14
		VPLMN address allowed	7.6.3.48
		Zone Code	7.6.2.28

7.6.1 Common parameters

The following set of parameters are used in several MAP service-primitives:

7.6.1.1 Invoke Id

This parameter identifies corresponding service primitives. The parameter is supplied by the MAP service-user and must be unique over each service-user/service-provider interface.

7.6.1.2 Linked Id

This parameter is used for linked services and it takes the value of the invoke Id of the service linked to.

7.6.1.3 Provider error

This parameter is used to indicate a protocol related type of error:

- duplicated invoke Id;
- not supported service;
- mistyped parameter;
- resource limitation;
- initiating release, i.e. the peer has already initiated release of the dialogue and the service has to be released;
- unexpected response from the peer;
- service completion failure;

- no response from the peer;
- invalid response received.

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

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 case of barring of Mobil 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 GSM 04.80.

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 TS GSM 03.40, under SMS-SUBMIT-REPORT and SMS-DELIVERY-REPORT. If the SM entity which 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 GSM 03.40;
- 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:

- Unauthorized Requesting Network
- Unauthorized LCS Client with detailed reason as follows
- Unauthorized Privacy Class
- Unauthorized Call Unrelated External Client
- Unauthorized Call Related External Client
- Privacy override not applicable
- Position method failure with detailed reason as follows:
 - Congestion
 - Insufficient resources
 - Insufficient Measurement Data
 - Inconsistent Measurement Data
 - Location procedure not completed
 - Location procedure not supported by target MS
 - QoS not attainable

~~Position method failure with restart allowed~~

~~LMU Unknown or Offline~~

~~Traffic channel establishment failure~~

- Unknown or unreachable LCS Client

7.6.1.5 All Information Sent

This parameter indicates to the receiving entity when the sending entity has sent all necessary information.

**** NEXT MODIFIED SECTION ****

7.6.3 Subscriber management parameters

7.6.3.58 LSA Information Withdraw

This parameter indicates that LSA information shall be deleted from the VLR or the SGSN.

7.6.3.59 LMU Indicator

This parameter indicates the presence of an LMU.

7.6.3.60 LCS Information

This parameter defines the LCS related information for an MS subscriber and contains the following components:

- ~~HPLMN~~-GMLC List (see subclause 7.6.3.61)
- LCS Privacy Exception List (see subclause 7.6.3.62)

- MO-LR List (see subclause 7.6.3.65A)

7.6.3.61 HPLMN-GMLC List

This parameter contains the addresses of all GMLCs in the MS subscriber's HPLMN that are permitted to issue a non-call related MT-LR location request for this MS. Usage of this parameter is defined in GSM 03.71.

7.6.3.62 LCS Privacy Exception List

This parameter defines the classes of LCS Client that are allowed to locate any target MS. For each class, the following information is provided:

- SS-Code (see subclause 7.6.4.1);
- a list of LCS privacy exception parameters (see subclause 7.6.3.63).

7.6.3.63 LCS Privacy Exception Parameters

This parameter gives the status of each LCS privacy exception class and any additional parameters relevant to this class. The parameter contains the following information:

- provisioned SS-Status (see subclause 7.6.3.17);
- privacy verification by MS user (see subclause 7.6.3.65B);
- external client List (see subclause 7.6.3.64);
- internal client List (see subclause 7.6.3.65)

7.6.3.64 External Client List

This parameter is only applicable to the non-call related privacy class and gives the identities of the external clients that are allowed to locate a target MS for a non-call related MT-LR. Each identity is an international (e.g.E.164) address. For each identified external client, GMLC restrictions may be defined. It may also be indicated if the MS shall be notified of a non-restricted MT-LR from each identified LCS client and, if so, whether notification only or notification with privacy verification shall apply. Usage of this parameter is defined in GSM 03.71.

7.6.3.65 Internal Client List

This parameter is only applicable to the PLMN operator privacy class and gives the identities of the internal PLMN operator clients that are allowed to locate a target MS for an NI-LR or MT-LR. Usage of this parameter is defined in GSM 03.71.

7.6.3.65A MO-LR List

This parameter defines the classes of MO-LR for which a subscription exists for a particular MS. For each class, the following information is provided:

- SS-Code (see subclause 7.6.4.1);

7.6.3.65B Privacy Verification By MS User

This parameter is applicable to the non-call related privacy class and indicates whether the MS user shall be notified for a non-call related MT-LR from any value added LCS client when the MT-LR is restricted and be enabled to accept or override the restriction.

7.6.3.65C GMLC List Withdraw

This parameter indicates whether the subscriber's LCS GMLC list shall be deleted from the VLR. The parameter does not apply to, and shall be ignored if received by, an SGSN.

7.6.3.66 IST Alert Timer

This parameter indicates the IST Alert Timer value that must be used in the MSC to inform the HLR about the call activities that the subscriber performs. Units are minutes.

7.6.3.67 Call Termination Indicator

This parameter indicates whether the MSC shall terminate a specific ongoing call, or all the call activities related to a specified subscriber.

7.6.3.68 IST Information Withdraw

This parameter indicates that IST information shall be deleted from the VMSC.

7.6.3.69 IST Support Indicator

This parameter indicates the degree of IST functionality supported by the MSC (Visited MSC or Gateway MSC). It can take one of the following values:

- Basic IST functionality
- IST command service (in addition to the basic IST functionality and including the ability to terminate all calls being carried for the identified subscriber).

7.6.4 Supplementary services parameters

7.6.4.1 SS-Code

This parameter may refer to one supplementary service or a set of supplementary services as defined in TS GSM 02.04. For MAP Release ~~'98~~⁹⁷ this includes:

- Calling Line Identification Presentation service (CLIP);
- Calling Line Identification Restriction service (CLIR);
- Connected Line Identification Presentation service (COLP);
- Connected Line Identification Restriction service (COLR);
- Calling Name Presentation (CNAP)
- All Call Forwarding services;
- Call Waiting (CW);
- Call Hold (HOLD);
- Multi-Party service (MPTY);
- Closed User Group (CUG);
- All Charging services;
- All Call Restriction services;
- Explicit Call Transfer service (ECT);
- enhanced Multi-Level Precedence and Pre-emption service (eMLPP);
- Completion of Calls to Busy Subscriber, originating side (CCBS-A);

- Completion of Calls to Busy Subscriber, destination side (CCBS-B);
- All LCS privacy exceptions (see subclause 7.6.4.44);
- Mobile Originating Location Request (MO-LR) (see subclause 7.6.4.44A).

****** NEXT MODIFIED SECTION ******

7.6.4.42 SS-event

This parameter indicates the Supplementary Service for which an invocation notification is sent towards the gsmSCF. It can indicate one of the following services:

- Explicit Call Transfer (ECT)
- Call Deflection (CD)
- Multi-Party call (MPTY)

7.6.4.43 SS-event data

This parameter contains additional information related to Supplementary Service invocation. Depending on the service invoked it can contain the following information:

ECT A list with all Called Party Numbers involved.

CDThe called Party number involved.

7.6.4.44 LCS Privacy Exceptions

Distinct SS codes are assigned to the following classes of LCS client in a target MS subscriber's privacy exception list.

- Universal Class
- Call related value added class
- Non-Call related value added class
- PLMN operator class

7.6.4.44A Mobile Originating Location Request (MO-LR)

Distinct SS codes are assigned to the following classes of MO-LR:

- Basic Self Location
- Autonomous Self Location
- Transfer to Third Party

****** NEXT MODIFIED SECTION ******

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 Report Error Indication~~

~~If present, this parameter requests an LCS Information Report error message from a serving MSC when an LCS Information message from an SMLC cannot be transferred to a target LMU.~~

~~7.6.11.3 LCS Cause~~

~~This parameter contains the reason why LCS data could not be transferred to an LMU.~~

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 LCS MLC Data

This parameter provides the identities of any ~~authorized home~~ GMLCs for a target MS. Only these GMLCs are allowed to send a location request for an external client when location requests are restricted to these ~~GMLCs home PLMN~~.

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 – ~~“no delay”~~, “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 — LCS APDU

~~This parameter carries LCS related data between an SMLC and a BSC or LMU. For data transfer to or from an LMU, it is identical to the Facility Information Element defined in GSM 04.71. For data transfer to or from a BSC, it is identical to the LCS Information parameter defined in GSM 08.71.~~

7.6.11.10 — LMU List

~~This parameter defines a list of LMUs sharing the same SMLC.~~

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.

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

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 — Positioning Data

~~This parameter provides data on the positioning process for possible use in billing in location method evaluation. The data includes the following for each position method attempt:~~

- ~~——— positioning method~~
- ~~——— positioning result (success, failure)~~
- ~~——— positioning duration~~
- ~~——— resources used~~

7.6.11.16 Privacy Override

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

~~7.6.11.17 Radio Channel Type~~

~~This parameter identifies the type of radio channel currently assigned to or to be assigned to the target MS.~~

~~7.6.11.18 Registration Type~~

~~This parameter distinguishes LMU registration in an SMLC from LMU deregistration.~~

~~7.6.11.19 Release Forbidden~~

~~This parameter indicates if an LMU is forbidden to release a signaling channel to the serving MSC.~~

8 Mobility services

**** NEXT MODIFIED SECTION ****

8.8 Subscriber management services

8.8.1 MAP-INSERT-SUBSCRIBER-DATA service

8.8.1.2 Service primitives

Table 8.8/1: MAP-INSERT-SUBSCRIBER-DATA

Parameter name	Request	Indication	Response	Confirm
Invoke Id	M	M(=)	M(=)	M(=)
IMSI	C	C(=)		
MSISDN	C	C(=)		
Category	C	C(=)		
Subscriber Status	C	C(=)		
Bearer service List	C	C(=)	C	C(=)
Teleservice List	C	C(=)	C	C(=)
Forwarding information List	C	C(=)		
Call barring information List	C	C(=)		
CUG information List	C	C(=)		
SS-Data List	C	C(=)		
eMLPP Subscription Data	C	C(=)		
Operator Determined Barring General data	C	C(=)	C	C(=)
Operator Determined Barring HPLMN data	C	C(=)		
Roaming Restriction Due To Unsupported Feature	C	C(=)		
Regional Subscription Data	C	C(=)		
VLR CAMEL Subscription Info	C	C(=)		
Voice Broadcast Data	C	C(=)		
Voice Group Call Data	C	C(=)		
Network access mode	C	C(=)		
GPRS Subscription Data	C	C(=)		
Roaming Restricted In SGSN Due To Unsupported Feature	C	C(=)		
North American Equal Access preferred Carrier Id List	U	C(=)		
LSA Information	C	C(=)		
IST Alert Timer	C	C(=)		
SS-Code List			C	C(=)
LMU Identifier	C	C(=)		
LCS Information	C	C(=)		
Regional Subscription Response			C	C(=)
Supported CAMEL Phases			C	C(=)
User error			U	C(=)
Provider error				O

8.8.1.3 Parameter use

North American Equal Access preferred Carrier Id List

A list of the preferred carrier identity codes that are subscribed to.

When the VLR receives this parameter from the HLR, it shall replace the previously stored preferred carrier identity codes with the received ones. It is not possible to delete all the preferred carrier identity codes from the VLR using this service. To delete all the preferred carrier identity codes from the VLR, the HLR shall use the MAP_CANCEL_LOCATION service.

LSA Information

If included in the ISD request, this parameter contains a list of localised service area identities a user might have subscribed to together with the priority of each localised service area; see subclause 7.6. The access right outside these localised service areas is also indicated. In all cases mentioned below, the LSA information shall only include LSA Data applicable to the VPLMN where the Subscriber is located. The VLR number, received in the MAP-UPDATE_LOCATION primitive, or the SGSN number, received in the MAP_UPDATE_GPRS_LOCATION primitive, can be used, alongside data stored in the HLR, to determine the LSA Data applicable to the VPLMN.

At restoration, location updating or GPRS location updating the HLR shall include the complete set of applicable LSA Information.

When there is a change in LSA data the HLR shall include at least the new and/or modified LSA data.

When there is a change in the access right outside the localised service areas the HLR shall include the LSA only access indicator.

When the SGSN or the VLR receives LSA information within a dialogue it shall check if the received data has to be considered as the entire LSA information. If so, it shall replace the stored LSA information with the received data set, otherwise it shall replace the data only for the modified LSA data (if any) and/or access right, and add the new LSA data (if any) to the stored LSA Information.

If the entire LSA information is received, it shall always include the LSA only access indicator value together with the LSA data applicable for the PLMN (if any).

If LSA Information is omitted in the Insert Subscriber Data operation the SGSN or the VLR shall keep the previously stored LSA Information.

If the SGSN or the VLR detects that there is overlapping in the information received within a dialogue, it shall send the error Unexpected Data Value. This parameter is used by the VLR and the SGSN.

IST Alert Timer

This parameter contains the IST Alert timer value that must be used to inform the HLR about the call activities that the subscriber performs.

At Location Updating, restoration, or when there is a change in the IST data defined for the Subscriber, the HLR shall include the IST Alert timer.

LMU Identifier

This parameter indicates the presence of an LMU. This parameter is used only by the VLR and shall be ignored if received by an SGSN.

LCS Information

This parameter provides the following LCS related information for an MS subscriber:

- list of GMLCs in the HPLMN
- privacy exception list
- MO-LR list

At restoration and location updating, the HLR shall include the complete LCS data of the subscriber.

When there is a change in LCS subscriber data the HLR shall include at least the new and/or modified LCS data. LCS data that is not modified need not be included.

The VLR shall keep any previously stored LCS Information that is not included in an Insert Subscriber Data operation.

If the VLR detects that there is overlapping in the LCS information received within a dialogue, it shall send the error Unexpected Data Value.

This parameter is used only by the VLR and shall be ignored if received by an SGSN.

**** NEXT MODIFIED SECTION ****

8.8.2 MAP-DELETE-SUBSCRIBER-DATA service

8.8.2.2 Service primitives

Table 8.8/2: MAP-DELETE-SUBSCRIBER-DATA

Parameter name	Request	Indication	Response	Confirm
Invoke Id	M	M(=)	M(=)	M(=)
IMSI	M	M(=)		
Basic service List	C	C(=)		
SS-Code List	C	C(=)		
Roaming Restriction Due To Unsupported Feature	C	C(=)		
Camel Subscription Info Withdraw	C	C(=)		
Regional Subscription Data	C	C(=)		
VBS Group Indication	C	C(=)		
VGCS Group Indication	C	C(=)		
GPRS Subscription Data Withdraw	C	C(=)		
Roaming Restricted In SGSN Due To Unsupported Feature	C	C(=)		
LSA Information Withdraw	C	C(=)		
IST Information Withdraw	C	C(=)		
Regional Subscription Response			C	C(=)
<u>GMLC List Withdraw</u>	<u>C</u>	<u>C(=)</u>		
User error			C	C(=)
Provider error				O

8.8.2.3 Parameter use

All parameters are described in subclause 7.6. The following clarifications are applicable:

Basic service List

A list of Extensible Basic service parameters (Extensible Basic service is defined in subclause 7.6). It is used when one, several or all basic services are to be withdrawn from the subscriber. If the VLR or the SGSN receives a value for an Extensible Basic Service which it does not support, it shall ignore that value. This parameter is used by the VLR and by the SGSN.

SS-Code List

A list of SS-Code parameters (SS-Code is defined in subclause 7.6). It is used when several or all supplementary services are to be withdrawn from the subscriber.

There are three possible options:

- deletion of basic service(s);
The parameter Basic service List is only included.
- deletion of supplementary service(s);
The parameter SS-Code List is only included.

- deletion of basic and supplementary services;

Both Basic service List and SS-Code List are included.

This parameter is used only by the VLR and if the SGSN receives this parameter it shall ignore it.

Roaming Restriction Due To Unsupported Feature

This parameter is used if Roaming Restriction Due To Unsupported Feature is deleted from the subscriber data. This may occur if unsupported features or services are removed from the subscriber data in the HLR.

If this parameter is sent the VLR shall check if the current Location Area is possibly allowed now. This parameter is used only by the VLR and if the SGSN receives this parameter it shall ignore it.

CAMEL Subscription Info Withdraw

This parameter is used to indicate that CAMEL Subscription Info shall be deleted from the VLR. All CAMEL Subscription Info for the subscriber shall be deleted. This parameter is used only by the VLR and if the SGSN receives this parameter it shall ignore it.

Regional Subscription Identifier

Contains one single Zone Code (as defined subclause 7.6) and is used if all Zone Codes shall be deleted from the subscriber data. When all the Zone Codes are deleted, the VLR or the SGSN shall check for its location areas whether they are allowed or not. If the whole MSC area is restricted, VLR will report it to HLR by returning the Regional Subscription Response "MSC Area Restricted". If the whole SGSN area is restricted, SGSN will report it to HLR by returning the Regional Subscription Response "SGSN Area Restricted".

The binary coding of the Zone Code value received in a Delete Subscriber Data request shall not be checked by the VLR or by the SGSN.

Note that support of this parameter is a network operator option and it shall not be sent to networks which do not support Regional Subscription.

If Regional Subscription is not supported by the VLR or by the SGSN, the request for deletion of Zone Codes is refused by sending the Regional Subscription Response "Regional Subscription Not Supported" to the HLR.

If no Zone Codes are stored in the respective subscriber data record, the request for deleting all Zone Code information shall be ignored and no Regional Subscription Response shall be returned. This parameter is used by the VLR and by the SGSN.

VBS Group Indication

Contains an indication (flag) which is used if all Group Id's shall be deleted from the subscriber data for the Voice Broadcast teleservice.

If VBS is not supported in the VLR or no Group Ids are stored for VBS in the respective subscriber record, the request for deletion of all Group Ids shall be ignored. This parameter is used only by the VLR and if the SGSN receives this parameter it shall ignore it.

VGCS Group Indication

Contains an indication (flag) which is used if all Group Id's shall be deleted from the subscriber data for the Voice Group Call teleservice. This parameter is used only by the VLR and if the SGSN receives this parameter it shall ignore it.

If VGCS is not supported in the VLR or no Group Ids are stored for VGCS in the respective subscriber record, the request for deletion of all Group Ids shall be ignored.

GPRS Subscription Data Withdraw

This parameter is used to indicate whether all GPRS Subscription Data for the subscriber shall be deleted or if only a subset of the stored GPRS Subscription Data for the subscriber shall be deleted. In the latter case only those PDP context whose identifiers are included in the subsequent identifier list will be deleted. This parameter is used only by the SGSN and if the VLR receives this parameter it shall ignore it.

Roaming Restricted In SGSN Due To Unsupported Feature

This parameter is used if Roaming Restricted In SGSN Due To Unsupported Feature is deleted from the GPRS subscriber data. This may occur if unsupported features or services are removed from the GPRS subscriber data in the HLR.

If this parameter is sent the SGSN shall check if the current Location Area is possibly allowed now. This parameter is used only by the SGSN and if the VLR receives this parameter it shall ignore it.

LSA Information Withdraw

This parameter is used to indicate whether all LSA Information for the subscriber shall be deleted or if only a subset of the stored LSA Information for the subscriber shall be deleted. In the latter case only the LSA data whose LSA identities are included in the subsequent LSA data list will be deleted. This parameter is used by the VLR and the SGSN.

IST Information Withdraw

This parameter is used to indicate that the IST condition has been removed for the subscriber. See GSM 03.35 for the use of this parameter.

Regional Subscription Response

If included in the Delete Subscriber Data response this parameter indicates one of:

- MSC Area Restricted
- SGSN Area Restricted;
- Regional Subscription Not Supported.

This parameter is used by the VLR and by the SGSN.

GMLC List Withdraw

This parameter indicates that the subscriber's LCS GMLC List shall be deleted from the VLR.

This parameter is used only by the VLR and shall be ignored if received by an SGSN.

User error

Only one of the following values is applicable:

- Unidentified subscriber;
- Data missing;
- Unexpected data value.

**** NEXT MODIFIED SECTION ****

13A Location Service Management Services

13A.1 MAP-SEND-ROUTING-INFO-FOR-LCS Service

13A.1.1 Definition

This service is used between the GMLC and the HLR to retrieve the routing information needed for routing a location service request to the servicing VMSC. The MAP-SEND-ROUTING-INFO-FOR-LCS is a confirmed service using the primitives from table A.1/1.

13A.1.2 Service Primitives

The service primitives are shown in table 13A.1/1.

Table 13A.1/1: MAP-SEND-ROUTING-INFO-FOR-LCS

Parameter name	Request	Indication	Response	Confirm
Invoke Id	M	M(=)	M(=)	M(=)
MLC Number	M	M(=)		
MSISDN	C	C(=)	C	C(=)
IMSI	C	C(=)	C	C(=)
LMSI			C	C(=)
MSC Number			C	C(=)
User error			C	C(=)
Provider error				O

13A.1.3 Parameter Use

Invoke id:

See definition in subclause 7.6.1.

MLC Number:

See definition in subclause 7.6.2.

MSISDN:

See definition in subclause 7.6.2. The request shall carry either the IMSI or MSISDN. The response shall carry whichever of these was not included in the request (see GSM 03.71 for details).

IMSI:

See definition in subclause 7.6.2.

LMSI:

See definition in subclause 7.6.2. It is an operator option to provide this parameter from the VLR; it is mandatory for the HLR to include the LMSI in a successful response, if the VLR has used the LMSI.

MSC Number:

See definition in subclause 7.6.2. This parameter is provided in a successful response.

User error:

The following errors defined in subclause 7.6.1 may be used, depending on the nature of the fault:

- Unknown subscriber;
- Absent Subscriber;
- Facility Not Supported;
- System failure;
- Unexpected Data Value;
- Data missing;
- Unauthorized requesting network

Provider error:

For definition of provider errors see subclause 7.6.1.

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 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(=)		
NA-ESRK	C	C(=)		
IMEI	<u>C</u>	C(=)		
Location Estimate			M	M(=)

Age of Location Estimate			C	C(=)
User error			C	C(=)
Provider error				O

13A.2.3 Parameter Definition and Use

All parameters are defined in section 7.6. The use of these parameters and the requirements for their presence are specified in GSM 03.71.

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 for an MR-LR are in the same country.

IMSI

The IMSI is provided to identify the target MS. At least one of the IMSI, or MSISDN ~~or NA-ESRK~~ is mandatory.

MSISDN

The MSISDN is provided to identify the target MS. At least one of the IMSI, or MSISDN ~~or NA-ESRK~~ is mandatory.

LMSI

The LMSI shall be provided if previously supplied by the HLR

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.

NA-ESRK

~~This parameter only applies to North America and provides a North American Emergency Service Routing Key.~~

IMEI

~~Inclusion of the IMEI is optional The IMEI shall be provided if available when the target MS is identified by an NA-ESRK.~~

Location Estimate

This parameter provides the location estimate.

Age of Location Estimate

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

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 section 7.6.1.

- System Failure;
- Data Missing;
- Unexpected Data Value;
- ~~Unknown Subscriber~~
- Facility Not Supported;
- Unidentified Subscriber;
- Illegal Subscriber;
- Illegal Equipment;
- Absent Subscriber (diagnostic information may also be provided);
- Unauthorized requesting network;
- Unauthorized LCS Client with detailed reason;
- Position method failure with detailed reason.

Provider error

These are defined in subclause 7.6.1.

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

13A.3.1 Definition

This service is used by a VMSC 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(=)		
<u>MSC Number</u>	<u>M</u>	<u>M(=)</u>		
IMSI	C	C(=)		
MSISDN	C	C(=)		
NA-ESRD	C	C(=)		

NA-ESRK	C	C(=)		
IMEI	<u>U</u> C	C(=)		
Location Estimate	C	C(=)		
Age of Location Estimate	C	C(=)		
<u>LMSI</u>	<u>U</u>	<u>C(=)</u>		
User error			C	C(=)
Provider error				O

13A.3.3 Parameter Definition and Use

All parameters are defined in section 7.6. The use of these parameters and the requirements for their presence are specified in GSM 03.71.

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.

MSC Number:

See definition in subclause 7.6.2. This parameter provides the address of the visited MSC for target MS.

IMSI

The IMSI shall be provided if available to the VMSC

MSISDN

The MSISDN shall be provided if available to the VMSC

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~~ may be provided by the VMSC if ~~assigned~~ available.

IMEI

Inclusion of the IMEI is optional ~~If the target MS has originated an emergency service call in North America, the IMEI may be provided by the VMSC.~~

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.

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.

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 section 7.6.1.

- System Failure;
- Data Missing;
- Unexpected Data Value;
- Resource Limitation;
- Unknown Subscriber;
- Unauthorized requesting network;
- Unknown or unreachable LCS Client;

Provider error

These are defined in subclause 7.6.1.

~~13A.4 MAP-PERFORM-LOCATION Service~~

~~13A.4.1 Definition~~

~~This service is used by a serving MSC to request location information from an SMLC for a target MS. This is a confirmed service using the primitives from table 13A.4/1.~~

~~13A.4.2 Service Primitives~~

Table 13A.4/1: Perform_Location

Parameter name	Request	Indication	Response	Confirm
Invoke-id	M	M(⇒)	M(⇒)	M(⇒)
Global-cell-Id	M	M(⇒)		
Radio-Channel-Type	Ⓒ	Ⓒ(⇒)		
LCS-Priority	Ⓒ	Ⓒ(⇒)		
LCS-QoS	Ⓒ	Ⓒ(⇒)		
LCS-APDU	Ⓒ	Ⓒ(⇒)		
Location-Estimate			Ⓒ	Ⓒ(⇒)
Positioning-Data			Ⓒ	Ⓒ(⇒)
User-error			Ⓒ	Ⓒ(⇒)
Provider-error				Ⓒ

~~13A.4.3 Parameter Definition and Use~~

All parameters are defined in section 7.6. The use of these parameters and the requirements for their presence are specified in GSM 03.71.

Global cell Id

This is the current cell location of the MS being located.

Radio Channel Type

This parameter gives the type of radio channel currently assigned to the MS.

LCS Priority

This parameter indicates the priority of the location request.

LCS QoS

This is the Quality of Service required for the location request in terms of response time and accuracy.

LCS APDU

This parameter contains LCS related information (e.g. Timing Advance) received from the BSC.

Location Estimate

This parameter gives an estimate of the MS location and the accuracy of the estimate.

Positioning Data

This parameter provides data on the positioning process including the result and resources used.

User error

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

- System Failure
- Data Missing;
- Unexpected Data Value
- Position method failure with detailed reason (restart not allowed)
- Position method failure with restart allowed

Provider error

These are defined in subclause 7.6.1.

~~13A.5 MAP-LCS Registration Service~~

~~13A.5.1 Definition~~

This service is used by a VLR to register or deregister an LMU in an SMLC. This is a confirmed service using the primitives from table 13A.5/1.

~~13A.5.2 Service Primitives~~

Table 13A.5/1: LCS Registration

Parameter name	Request	Indication	Response	Confirm
Invoke id	M	M(=)	M(=)	M(=)
IMSI	M	M(=)		
LMSI	U	C(=)		
Registration Type	M	M(=)		
MSC Number	C	C(=)		
User error			C	C(=)
Provider error				Ø

13A.5.3 Parameter Definition and Use

All parameters are defined in section 7.6. The use of these parameters and the requirements for their presence are specified in GSM 03.71.

IMSI

This is the E.212 IMSI identity of the LMU.

LMSI

The LMSI of the LMU shall be provided by the MSC if assigned in the VLR and if the registration type indicates registration.

Registration Type

The registration type distinguishes registration and deregistration.

MSC Number

This is the E.164 number of the MSC serving the LMU. Inclusion of the MSC number is mandatory if the registration type indicates registration.

User error

This parameter is sent by the SMLC when the registration procedure has failed and, if present, takes one of the following values defined in section 7.6.1.

- LMU unknown or offline;
- system failure;
- unexpected Data Value;
- Data Missing

Provider error

These are defined in subclause 7.6.1.

13A.6 MAP LCS INFORMATION REQUEST Service

13A.6.1 Definition

This service is used by an SMLC to transfer LCS related data to an MSC for onward transfer to an LMU or serving BSC. This is an unconfirmed service using the primitives from table 13A.6/1.

13A.6.2 Service Primitives

Table 13A.6/1: LCS Information Request

Parameter name	Request	Indication
Invoke id	M	M(⇒)
IMSI	C	C(⇒)
LMSI	C	C(⇒)
MLC Number	U	C(⇒)
Release Forbidden	U	C(⇒)
Report Error Indication	U	C(⇒)
LCS APDU	C	C(⇒)

13A.6.3 Parameter Definition and Use

All parameters are defined in section 7.6. The use of these parameters and the requirements for their presence are specified in GSM 03.71.

IMSI

This is the E.212 IMSI identity of an LMU. Inclusion of the IMSI is mandatory when the destination for the LCS data is an LMU. For other destinations, an IMSI shall not be included.

LMSI

When the destination is an LMU, the LMSI of the LMU shall be provided by the SMLC if previously supplied by the MSC.

MLC Number

This parameter contains the E.164 address for the SMLC. The inclusion of this parameter is optional.

Release Forbidden

This parameter is applicable only when the destination is an LMU. It indicates if an LMU is forbidden to release a signaling channel to the MSC.

Report Error Indication

If present, this parameter requests an LCS Information Report error message from the serving MSC if the LCS Information Request message cannot be transferred to the required destination.

LCS APDU

This parameter contains the LCS data to be sent on by the MSC to the required destination. For transfer to an LMU, the content of the data is defined in GSM 04.71. For transfer to a BSC, it is defined in GSM 08.71.

13A.7 MAP-LCS-INFORMATION-REPORT Service

13A.7.1 Definition

This service is used by an MSC to transfer LCS related data to an SMLC that was received from or intended for an LMU or BSC. This is an unconfirmed service using the primitives from table 13A.7/1. The message shall be transferred

to the SMLC using SCCP class 1.

13A.7.2 Service Primitives

Table 13A.7/1: LCS Information Report

Parameter name	Request	Indication
Invoke id	M	M(=)
IMSI	C	C(=)
LMSI	U	C(=)
LCS Cause	C	C(=)
LCS-APDU	C	C(=)

13A.7.3 Parameter Definition and Use

All parameters are defined in section 7.6. The use of these parameters and the requirements for their presence are specified in GSM 03.71.

IMSI

This is the E.212 IMSI identity of the LMU. Inclusion of the IMSI is mandatory for data transfer related to an LMU. An IMSI shall not be included for other types of data transfer.

LMSI

For data transfer related to an LMU, the MSC may include the LMSI if available in the VLR.

LCS Cause

This parameter contains the reason why LCS data received by the MSC in an LCS Information Request could not be transferred to its intended destination. This parameter shall be included if and only if the MSC is returning LCS data to the SMLC that could not be transferred to the intended destination.

LCS-APDU

This parameter contains the LCS data received from or intended for an LMU or BSC. The content of this parameter is defined in GSM 04.71 for an LMU and in GSM 08.71 for a BSC.

13A.8 MAP-LCS-RESET Service

13A.8.1 Definition

This service is used by an SMLC after either a restart or discovery of inconsistent data to request that a VLR instigate a reset for either all LMUs that are served by the VLR or just certain specific LMUs. This is an unconfirmed service using the primitives from table 13A.8/1.

13A.8.2 Service Primitives

Table 13A.8/1: LCS Reset

Parameter name	Request	Indication
Invoke id	M	M(=)

MLC number	M	M(⇒)
LMU List	U	C(⇒)

13A.8.3 Parameter Definition and Use

All parameters are defined in section 7.6. The use of these parameters and the requirements for their presence are specified in GSM 03.71.

MLC

This is the E.164 address for the SMLC.

LMU List

This is a list of LMUs sharing the same SMLC.

13A.9 ~~MAP LCS ASSIGN TRAFFIC CHANNEL~~ Service

13A.9.1 Definition

This service is used by an SMLC to request assignment of a traffic channel to the target MS by the visited MSC. This is a confirmed service using the primitives from table 13A.9/1.

13A.9.2 Service primitives

Table 13A.9/1: LCS Assign Traffic Channel

Parameter name	Request	Indication	Response	Confirm
Invoke id	M	M(⇒)	M(⇒)	M(⇒)
Radio Channel Type	M	M(⇒)		
User error			C	C(⇒)
Provider error				∅

13A.9.3 Parameter definition and use

All parameters are defined in section 7.6. The use of these parameters and the requirements for their presence are specified in GSM 03.71.

Radio Channel Type

This parameter defines the type of traffic channel to be assigned.

User error

This parameter is sent by the MSC when the required type of traffic channel cannot be assigned and, if present, takes one of the following values defined in section 7.6.1.

- Traffic channel establishment failure;
- system failure;
- unexpected Data Value;

—data missing;

Provider error

These are defined in subclause 7.6.1.

**** NEXT MODIFIED SECTION ****

16 Mapping on to TC services

16.2 Service specific procedures

Specific services are mapped to TC component handling services.

16.2.1 Directly mapped parameters

The Invoke Id parameter of the MAP request and indication primitive is directly mapped on to the Invoke Id parameter of the component handling primitives.

16.2.2 Use of other parameters of component handling primitives

16.2.2.4 Operation

When mapping a request primitive on to a Remote Operations PDU (invoke), the MAP PM shall set the operation code according to the mapping described in table 16.2/1.

When mapping a response primitive on to a Remote Operations service, the MAP PM shall set the operation code of the TC-RESULT-L/NL primitive (if required) to the same value as the one received at invocation time.

Table 16.2/1: Mapping of MAP specific services on to MAP operations

MAP-SERVICE	operation
MAP-ACTIVATE-SS	activateSS
MAP-ACTIVATE-TRACE-MODE	activateTraceMode
MAP-ALERT-SERVICE-CENTRE	alertServiceCentre
MAP-ANY-TIME-INTERROGATION	anyTimeInterrogaton
MAP-CANCEL-LOCATION	cancelLocation
MAP-CHECK-IMEI	checkIMEI
MAP-DEACTIVATE-SS	deactivateSS
MAP-DEACTIVATE-TRACE-MODE	deactivateTraceMode
MAP-DELETE-SUBSCRIBER-DATA	deleteSubscriberData
MAP-ERASE-CC-ENTRY	eraseCC-Entry
MAP-ERASE-SS	eraseSS
MAP-FAILURE-REPORT	failureReport
MAP-FORWARD-ACCESS-SIGNALLING	forwardAccessSignalling
MAP-FORWARD-CHECK-SS-INDICATION	forwardCheckSsIndication
MAP-FORWARD-GROUP-CALL-SIGNALLING	forwardGroupCallSignalling
MAP-MT-FORWARD-SHORT-MESSAGE	mt-forwardSM
MAP-MO-FORWARD-SHORT-MESSAGE	mo-forwardSM
MAP-GET-PASSWORD	getPassword
MAP-INFORM-SERVICE-CENTRE	informServiceCentre
MAP-INSERT-SUBSCRIBER-DATA	insertSubscriberData
MAP-INTERROGATE-SS	interrogateSs
MAP-IST-ALERT	istAlert
MAP-IST-COMMAND	istCommand
MAP-LCS-ASSIGN-TRAFFIC-CHANNEL	lcsAssignTrafficChannel
MAP_LCS_INFORMATION_REPORT	lcsInformationReport
MAP_LCS_INFORMATION_REQUEST	lcsInformationRequest
MAP_LCS_REGISTRATION	lcsRegistration
MAP_LCS_RESET	lcsReset
MAP-NOTE-MS-PRESENT-FOR-GPRS	noteMsPresentForGprs
MAP-PERFORM-LOCATION	performLocation
MAP-PREPARE-GROUP-CALL	prepareGroupCall
MAP-PREPARE-HANDOVER	prepareHandover
MAP-PREPARE-SUBSEQUENT-HANDOVER	prepareSubsequentHandover
MAP-PROCESS-ACCESS-SIGNALLING	processAccessSignalling
MAP-PROCESS-GROUP-CALL-SIGNALLING	processGroupCallSignalling
MAP-PROCESS-UNSTRUCTURED-SS-REQUEST	processUnstructuredSS-Request
MAP-PROVIDE-ROAMING-NUMBER	provideRoamingNumber
MAP-PROVIDE-SIWFS-NUMBER	provideSIWFSNumber
MAP-PROVIDE-SUBSCRIBER-LOCATION	provideSubscriberLocation
MAP-PROVIDE-SUBSCRIBER-INFO	provideSubscriberInfo
MAP-PURGE-MS	purgeMS
MAP-READY-FOR-SM	readyForSM
MAP-REGISTER-CC-ENTRY	registerCC-Entry
MAP-REGISTER-PASSWORD	registerPassword
MAP-REGISTER-SS	registerSS
MAP-REMOTE-USER-FREE	remoteUserFree
MAP-REPORT-SM-DELIVERY-STATUS	reportSmDeliveryStatus
MAP-RESET	reset
MAP-RESTORE-DATA	restoreData
MAP-SEND_GROUP_CALL_END_SIGNAL	sendGroupCallEndSignal
MAP-SEND-END-SIGNAL	sendEndSignal
MAP-SEND-AUTHENTICATION-INFO	sendAuthenticationInfo
MAP-SEND-IMSI	sendIMSI
MAP-SEND-IDENTIFICATION	sendIdentification
MAP-SEND-ROUTING-INFO-FOR-SM	sendRoutingInfoForSM
MAP-SEND-ROUTING-INFO-FOR-GPRS	sendRoutingInfoForGprs
MAP-SEND-ROUTING-INFO-FOR-LCS	sendRoutingInfoForLCS
MAP-SEND-ROUTING-INFORMATION	sendRoutingInfo
MAP-SET-REPORTING-STATE	setReportingState
MAP-SIWFS-SIGNALLING-MODIFY	SIWFSsignallingModify
MAP-STATUS-REPORT	statusReport
MAP-SUBSCRIBER-LOCATION-REPORT	subscriberLocationReport

MAP-SUPPLEMENTARY-SERVICE-INVOCATION-NOTIFICATION	ss-Invocation-Notification
MAP-UNSTRUCTURED-SS-NOTIFY	unstructuredSS-Notify
MAP-UNSTRUCTURED-SS-REQUEST	unstructuredSS-Request
MAP-UPDATE-GPRS-LOCATION	updateGprsLocation
MAP-UPDATE-LOCATION	updateLocation

**** NEXT MODIFIED SECTION ****

17 Abstract syntax of the MAP protocol

17.1 General

17.1.6 Application Contexts

The following informative table lists the latest versions of the Application Contexts used in this specification, with the operations used by them and, where applicable, whether or not the operation description is exactly the same as for previous versions. Information in sections 17.6 & 17.7 relates only to the ACs in this table.

AC Name	AC Version	Operations Used	Comments *
locationCancellationContext	v3	cancelLocation	
equipmentMngtContext	v2	checkIMEI	
imsiRetrievalContext	v2	sendIMSI	
infoRetrievalContext	v2	sendAuthenticationInfo	
interVlrInfoRetrievalContext	v2	sendIdentification	
handoverControlContext	v2	prepareHandover forwardAccessSignalling sendEndSignal processAccessSignalling prepareSubsequentHandover	
mwdMngtContext	v3	readyForSM	
msPurgingContext	v3	purgeMS	
shortMsgAlertContext	v2	alertServiceCentre	
resetContext	v2	reset	
networkUnstructuredSsContext	v2	processUnstructuredSS-Request unstructuredSS-Request unstructuredSS-Notify	
tracingContext	v3	activateTraceMode deactivateTraceMode	
networkFunctionalSsContext	v2	registerSS eraseSS activateSS deactivateSS registerPassword interrogateSS getPassword	
shortMsgMO-RelayContext	v3	mo-forwardSM	
shortMsgMT-RelayContext	v3	mt-forwardSM	
shortMsgGatewayContext	v3	sendRoutingInfoForSM reportSM-DeliveryStatus InformServiceCentre	the syntax of this operation has been extended in comparison with release 96 version
networkLocUpContext	v3	updateLocation forwardCheckSs-Indication restoreData insertSubscriberData activateTraceMode	the syntax is the same in v1 & v2
gprsLocationUpdateContext	v3	updateGprsLocation insertSubscriberData activateTraceMode	
subscriberDataMngtContext	v3	insertSubscriberData deleteSubscriberData	
roamingNumberEnquiryContext	v3	provideRoamingNumber	

locationInfoRetrievalContext	v3	sendRoutingInfo	
gprsNotifyContext	v3	noteMsPresentForGprs	
gprsLocationInfoRetrievalContext	v3	sendRoutingInfoForGprs	
failureReportContext	v3	failureReport	
callControlTransferContext	v4	resumeCallHandling	
subscriberInfoEnquiryContext	v3	provideSubscriberInfo	
anyTimeEnquiryContext	v3	anyTimeInterrogation	
ss-InvocationNotificationContext	v3	ss-InvocationNotification	
siWFSAAllocationContext	v3	provideSIWFSSNumber siWFSSignallingModify	
groupCallControlContext	v3	prepareGroupCall processGroupCallSignalling forwardGroupCallSignalling sendGroupCallEndSignal	
reportingContext	v3	setReportingState statusReport remoteUserFree	
callCompletionContext	v3	registerCC-Entry eraseCC-Entry	
istAlertingContext	v3	istAlert	
ImmediateTerminationContext	v3	istCommand	
locationSvcLMUControlContext	v3	lcsRegistrationResest	
locationSvcDataTransferContext	v3	lcsInformationRequest lcsInformationReport	
locationSvcEnquiryContext	v3	provideSubscriberLocation subscriberLocationReport	
locationSvcGatewayContext	v3	sendRoutingInfoForLCS	
locationSvcPositioningContext	v3	lcsAssignTrafficChannel lcsInformationRequest lcsInformationReport performLocation	

NOTE (*): The syntax of the operations is not the same as in previous versions unless explicitly stated

17.2 Operation packages

**** NEXT MODIFIED SECTION ****

17.2.2 Packages specifications

17.2.2.43 Call Completion

This operation package includes the operations required for procedures between VLR and HLR for subscriber control of call completion services.

```

CallCompletionPackage-v3 ::= OPERATION-PACKAGE
  -- Supplier is HLR if Consumer is VLR
  CONSUMER INVOKES {
    registerCC-Entry,
    eraseCC-Entry}

```

This package is v3 only.

17.2.2.44 Location service gateway services

This operation package includes the operations required for location service gateway procedures between GMLC and HLR.

```

LocationSvcGatewayPackage-v3 ::= OPERATION-PACKAGE
  -- Supplier is HLR if Consumer is GMLC
  CONSUMER INVOKES {
    sendRoutingInfoForLCS}

```

This package is v3 only.

17.2.2.45 Location service enquiry

This operation package includes the operations required for the location service enquiry procedures between GMLC and MSC.

```

LocationSvcEnquiryPackage-v3 ::= OPERATION-PACKAGE
  -- Supplier is MSC if Consumer is GMLC
  CONSUMER INVOKES {
    provideSubscriberLocation}
  SUPPLIER INVOKES {
    subscriberLocationReport}

```

This package is v3 only.

17.2.2.46 Location service Positioning

This operation package includes the operations required for the location service positioning procedures between MSC and SMLC.

```

LocationSvcPositioningPackage-v3 ::= OPERATION-PACKAGE
  -- Supplier is SMLC if Consumer is MSC
  CONSUMER INVOKES {
    performLocation,
    lcsInformationReport}
  SUPPLIER INVOKES {
    lcsAssignTrafficChannel, lcsInformationRequest}

```

This package is v3 only.

17.2.2.47 Location service LMU Control

This operation package includes the operations required for the location service LMU control procedures between MSC and SMLC.

```

LocationSvcLMUControlPackage-v3 ::= OPERATION-PACKAGE
  -- Supplier is SMLC if Consumer is VLR
  CONSUMER INVOKES {
    lcsRegistration }
  SUPPLIER INVOKES {
    LcsReset}

```

This package is v3 only.

17.2.2.48 Location service Data Transfer

This operation package includes the operations required for the location service data transfer procedures between MSC and SMLC when performed in stand alone mode.

```

LocationSvcDataTransferPackage-v3 ::= OPERATION-PACKAGE
  -- Supplier is MSC if Consumer is SMLC
  CONSUMER INVOKES {
    lcsInformationRequest}
  SUPPLIER INVOKES {
    lcsInformationReport}

```

This package is v3 only.

17.2.2.49 IST Alerting

This operation package includes the operation required for alerting procedures between the MSC (Visited MSC or Gateway MSC) and HLR.

```

IST-AlertingPackage-v3 ::= OPERATION-PACKAGE
  -- Supplier is HLR if Consumer is VMSC
  -- Supplier is HLR if Consumer is GMSC
  CONSUMER INVOKES {
    istAlert}

```

This package is v3 only.

17.2.2.50 Service Termination

This operation package includes the operation required for immediate service termination procedures between the HLR and the Visited MSC or between the HLR and the Gateway MSC.

```

ServiceTerminationPackage-v3 ::= OPERATION-PACKAGE
  -- Supplier is VMSC or GMSC if Consumer is HLR
  CONSUMER INVOKES {
    istCommand}

```

This package is v3 only.

****** NEXT MODIFIED SECTION ******

17.3 Application contexts

17.3.2 Application context definitions

17.3.2.38 Call Completion

This application context is used between VLR and the HLR for subscriber control of call completion services.

```

callCompletionContext-v3 APPLICATION-CONTEXT
  -- Responder is HLR if Initiator is VLR
  INITIATOR CONSUMER OF {
    CallCompletionPackage-v3}
  ::= {map-ac callCompletion(8) version3(3)}

```

This application-context is v3 only.

17.3.2.39 Location Service Gateway

This application context is used for location service gateway procedures.

```
locationSvcGatewayContext-v3 APPLICATION-CONTEXT
-- Responder is HLR if Initiator is GMLC
INITIATOR CONSUMER OF {
    locationSvcGatewayPackage-v3}
 ::= {map-ac locationSvcGateway(37) version3(3)}
```

17.3.2.40 Location Service Enquiry

This application context is used for location service enquiry procedures.

```
locationSvcEnquiryContext-v3 APPLICATION-CONTEXT
-- Responder is MSC if Initiator is GMLC
INITIATOR CONSUMER OF {
    locationSvcEnquiryPackage-v3}
 ::= {map-ac locationScvEnquiry(38) version3 (3)}
```

17.3.2.41 Location Service Positioning

This application context is used for location service positioning procedures.

```
locationSvcPositioningContext-v3 APPLICATION-CONTEXT
-- Responder is SMLC if Initiator is MSC
INITIATOR CONSUMER OF {
    locationSvcPositioningPackage-v3}
 ::= {map-ac locationSvcPositioning(39) version3(3)}
```

17.3.2.42 Location Service LMU Control

This application context is used for location service LMU control procedures.

```
locationSvcLMUControlContext-v3 APPLICATION-CONTEXT
-- Responder is SMLC if Initiator is VLR
INITIATOR CONSUMER OF {
    locationSvcLMUControlPackage-v3}
 ::= {map-ac locationSvcLMUControl(40) version3(3)}
```

17.3.2.43 Location Service Data Transfer

This application context is used for location service data transfer procedures.

```
locationSvcDataTransferContext-v3 APPLICATION-CONTEXT
-- Responder is MSC if Initiator is SMLC
INITIATOR CONSUMER OF {
    locationSvcDataTransferPackage-v3}
 ::= {map-ac locationSvcDataTransfer(41) version3(3)}
```

17.3.2.44 IST Alerting

This application context is used between MSC (Visited MSC or Gateway MSC) and HLR for for alerting services within IST procedures.

```
istAlertingContext-v3 APPLICATION-CONTEXT
-- Responder is HLR if Initiator is VMSC
-- Responder is HLR if Initiator is GMSC
INITIATOR CONSUMER OF {
    IST-AlertingPackage-v3}
 ::= {map-ac alerting (4) version3(3)}
```

This application-context is v3 only.

17.3.2.45 Service Termination

This application context is used between HLR and MSC (Visited MSC or Gateway MSC) for service termination services within IST procedures.

```

serviceTerminationContext-v3 APPLICATION-CONTEXT
  -- Responder is VMSC or GMSC if Initiator is HLR
  INITIATOR CONSUMER OF {
    ServiceTerminationPackage-v3}
 ::= {map-ac serviceTermination (9) version3(3)}

```

This application-context is v3 only.

17.3.3 ASN.1 Module for application-context-names

The following ASN.1 module summarizes the application-context-name assigned to MAP application-contexts.

```

1  MAP-ApplicationContexts {
2    ccitt identified-organization (4) etsi (0) mobileDomain (0)
3    gsm-Network (1) modules (3) map-ApplicationContexts (2) version6 (6)}
4
5  DEFINITIONS
6
7  ::=
8
9  BEGIN
10
11
12  -- EXPORTS everything
13
14
15  IMPORTS
16    gsm-NetworkId,
17    ac-Id
18  FROM MobileDomainDefinitions {
19    ccitt (0) identified-organization (4) etsi (0) mobileDomain (0)
20    mobileDomainDefinitions (0) version1 (1)}
21  ;
22
23  -- application-context-names
24
25  map-ac OBJECT IDENTIFIER ::= {gsm-NetworkId ac-Id}
26
27  networkLocUpContext-v3 OBJECT IDENTIFIER ::=
28    {map-ac networkLocUp(1) version3(3)}
29
30  locationCancellationContext-v3 OBJECT IDENTIFIER ::=
31    {map-ac locationCancel(2) version3(3)}
32
33  roamingNumberEnquiryContext-v3 OBJECT IDENTIFIER ::=
34    {map-ac roamingNbEnquiry(3) version3(3)}
35
36  locationInfoRetrievalContext-v3 OBJECT IDENTIFIER ::=
37    {map-ac locInfoRetrieval(5) version3(3)}
38
39  resetContext-v2 OBJECT IDENTIFIER ::=
40    {map-ac reset(10) version2(2)}
41
42  handoverControlContext-v2 OBJECT IDENTIFIER ::=
43    {map-ac handoverControl(11) version2(2)}
44
45  equipmentMngtContext-v2 OBJECT IDENTIFIER ::=
46    {map-ac equipmentMngt(13) version2(2)}
47
48  infoRetrievalContext-v2 OBJECT IDENTIFIER ::=
49    {map-ac infoRetrieval(14) version2(2)}
50
51  interVlrInfoRetrievalContext-v2 OBJECT IDENTIFIER ::=
52    {map-ac interVlrInfoRetrieval(15) version2(2)}
53
54  subscriberDataMngtContext-v3 OBJECT IDENTIFIER ::=
55    {map-ac subscriberDataMngt(16) version3(3)}
56

```


57 **tracingContext-v3** OBJECT IDENTIFIER ::=

58 {map-ac tracing(17) version3(3)}

59

60 **networkFunctionalSsContext-v2** OBJECT IDENTIFIER ::=

61 {map-ac networkFunctionalSs(18) version2(2)}

62

63 **networkUnstructuredSsContext-v2** OBJECT IDENTIFIER ::=

64 {map-ac networkUnstructuredSs(19) version2(2)}

65

66 **shortMsgGatewayContext-v3** OBJECT IDENTIFIER ::=

67 {map-ac shortMsgGateway(20) version3(3)}

68

69 **shortMsgMO-RelayContext-v3** OBJECT IDENTIFIER ::=

70 {map-ac shortMsgMO-Relay(21) version3(3)}

71

72 **shortMsgAlertContext-v2** OBJECT IDENTIFIER ::=

73 {map-ac shortMsgAlert(23) version2(2)}

74

75 **mwdMngtContext-v3** OBJECT IDENTIFIER ::=

76 {map-ac mwdMngt(24) version3(3)}

77

78 **shortMsgMT-RelayContext-v3** OBJECT IDENTIFIER ::=

79 {map-ac shortMsgMT-Relay(25) version3(3)}

80

81 **imsiRetrievalContext-v2** OBJECT IDENTIFIER ::=

82 {map-ac imsiRetrieval(26) version2(2)}

83

84 **msPurgingContext-v3** OBJECT IDENTIFIER ::=

85 {map-ac msPurging(27) version3(3)}

86

87 **subscriberInfoEnquiryContext-v3** OBJECT IDENTIFIER ::=

88 {map-ac subscriberInfoEnquiry(28) version3(3)}

89

90 **anyTimeInfoEnquiryContext-v3** OBJECT IDENTIFIER ::=

91 {map-ac anyTimeInfoEnquiry(29) version3(3)}

92

93 **callControlTransferContext-v4** OBJECT IDENTIFIER ::=

94 {map-ac callControlTransfer(6) version4(4)}

95

96 **ss-InvocationNotificationContext-v3** OBJECT IDENTIFIER ::=

97 {map-ac ss-InvocationNotification(36) version3(3)}

98

99 **sIWFSAllocationContext-v3** OBJECT IDENTIFIER ::=

100 {map-ac sIWFSAllocation(12) version3(3)}

101

102 **groupCallControlContext-v3** OBJECT IDENTIFIER ::=

103 {map-ac groupCallControl(31) version3(3)}

104

105 **gprsLocationUpdateContext-v3** OBJECT IDENTIFIER ::=

106 {map-ac gprsLocationUpdate(32) version3(3)}

107

108 **gprsLocationInfoRetrievalContext-v3** OBJECT IDENTIFIER ::=

109 {map-ac gprsLocationInfoRetrieval(33) version3(3)}

110

111 **failureReportContext-v3** OBJECT IDENTIFIER ::=

112 {map-ac failureReport(34) version3(3)}

113

114 **gprsNotifyContext-v3** OBJECT IDENTIFIER ::=

115 {map-ac gprsNotify(35) version3(3)}

116

117 **reportingContext-v3** OBJECT IDENTIFIER ::=

118 {map-ac reporting(7) version3(3)}

119

120 **callCompletionContext-v3** OBJECT IDENTIFIER ::=

121 {map-ac callCompletion(8) version3(3)}

122

123 **istAlertingContext-v3** OBJECT IDENTIFIER ::=

124 {map-ac istAlerting(4) version3(3)}

125

126 **serviceTerminationContext-v3** OBJECT IDENTIFIER ::=

127 {map-ac immediateTermination(9) version3(3)}

128

```

129 locationSvcGatewayContext-v3 OBJECT IDENTIFIER ::=
130     {map-ac locationSvcGateway(37) version3(3)}
131
132 locationSvcEnquiryContext-v3 OBJECT IDENTIFIER ::=
133     {map-ac locationSvcEnquiry(38) version3(3)}
134
135 locationSvcPositioningContext-v3 OBJECT IDENTIFIER ::=
136     {map-ac locationSvcPositioning(39) version3(3)}
137
138 locationSvcLMUControlContext-v3 OBJECT IDENTIFIER ::=
139     {map-ac locationSvcLMUControl(40) version3(3)}
140
141 locationSvcDataTransferContext-v3 OBJECT IDENTIFIER ::=
142     {map-ac locationSvcDataTransfer(41) version3(3)}
143
144
145 -- The following Object Identifiers are reserved for application-
146 -- contexts existing in previous versions of the protocol
147
148 -- AC Name & Version          Object Identifier
149 --
150 -- networkLocUpContext-v1      map-ac networkLocUp (1)          version1 (1)
151 -- networkLocUpContext-v2      map-ac networkLocUp (1)          version2 (2)
152 -- locationCancellationContext-v1 map-ac locationCancellation (2)   version1 (1)
153 -- locationCancellationContext-v2 map-ac locationCancellation (2)   version2 (2)
154 -- roamingNumberEnquiryContext-v1 map-ac roamingNumberEnquiry (3)   version1 (1)
155 -- roamingNumberEnquiryContext-v2 map-ac roamingNumberEnquiry (3)   version2 (2)
156 -- locationInfoRetrievalContext-v1 map-ac locationInfoRetrieval (5)   version1 (1)
157 -- locationInfoRetrievalContext-v2 map-ac locationInfoRetrieval (5)   version2 (2)
158 -- resetContext-v1             map-ac reset (10)                version1 (1)
159 -- handoverControlContext-v1    map-ac handoverControl (11)       version1 (1)
160 -- equipmentMngtContext-v1      map-ac equipmentMngt (13)         version1 (1)
161 -- infoRetrievalContext-v1      map-ac infoRetrieval (14)         version1 (1)
162 -- subscriberDataMngtContext-v1 map-ac subscriberDataMngt (16)     version1 (1)
163 -- subscriberDataMngtContext-v2 map-ac subscriberDataMngt (16)     version2 (2)
164 -- tracingContext-v1           map-ac tracing (17)              version1 (1)
165 -- tracingContext-v2           map-ac tracing (17)              version2 (2)
166 -- networkFunctionalSsContext-v1 map-ac networkFunctionalSs (18)   version1 (1)
167 -- shortMsgGatewayContext-v1    map-ac shortMsgGateway (20)       version1 (1)
168 -- shortMsgGatewayContext-v2    map-ac shortMsgGateway (20)       version2 (2)
169 -- shortMsgRelayContext-v1      map-ac shortMsgRelay (21)         version1 (1)
170 -- shortMsgAlertContext-v1      map-ac shortMsgAlert (23)         version1 (1)
171 -- mwdMngtContext-v1           map-ac mwdMngt (24)              version1 (1)
172 -- mwdMngtContext-v2           map-ac mwdMngt (24)              version2 (2)
173 -- shortMsgMT-RelayContext-v2   map-ac shortMsgMT-Relay (25)      version2 (2)
174 -- msPurgingContext-v2         map-ac msPurging (27)            version2 (2)
175 -- callControlTransferContext-v3 map-ac callControlTransferContext (6) version3 (3)
176
177
178 END

```

**** NEXT MODIFIED SECTION ****

17.5 MAP operation and error codes

```

1 MAP-Protocol {
2     ccitt-identified-organization (4) etsi (0) mobileDomain (0)
3     gsm-Network (1) modules (3) map-Protocol (4) version6 (6)}
4
5 DEFINITIONS
6
7 ::=
8
9 BEGIN
10
11 IMPORTS
12     UpdateLocation,
13     CancelLocation,
14     PurgeMS,
15     SendIdentification,
16     UpdateGprsLocation,

```

```

17 PrepareHandover,
18 SendEndSignal,
19 ProcessAccessSignalling,
20 ForwardAccessSignalling,
21 PrepareSubsequentHandover,
22 SendAuthenticationInfo,
23 CheckIMEI,
24 InsertSubscriberData,
25 DeleteSubscriberData,
26 Reset,
27 ForwardCheckSS-Indication,
28 RestoreData,
29 ProvideSubscriberInfo,
30 AnyTimeInterrogation,
31 SendRoutingInfoForGprs,
32 FailureReport,
33 NoteMsPresentForGprs
34
35
36 FROM MAP-MobileServiceOperations {
37   ccitt identified-organization (4) etsi (0) mobileDomain (0)
38   gsm-Network (1) modules (3) map-MobileServiceOperations (5)
39   version6 (6)}
40
41   ActivateTraceMode,
42   DeactivateTraceMode,
43   SendIMSI
44 FROM MAP-OperationAndMaintenanceOperations {
45   ccitt identified-organization (4) etsi (0) mobileDomain (0)
46   gsm-Network (1) modules (3) map-OperationAndMaintenanceOperations (6)
47   version6 (6)}
48
49   SendRoutingInfo,
50   ProvideRoamingNumber,
51   ResumeCallHandling,
52   ProvideSIWFSNumber,
53   SIWFSSignallingModify,
54   SetReportingState,
55   StatusReport,
56   RemoteUserFree,
57   IST-Alert,
58   IST-Command
59 FROM MAP-CallHandlingOperations {
60   ccitt identified-organization (4) etsi (0) mobileDomain (0)
61   gsm-Network (1) modules (3) map-CallHandlingOperations (7)
62   version6 (6)}
63
64   RegisterSS,
65   EraseSS,
66   ActivateSS,
67   DeactivateSS,
68   InterrogateSS,
69   ProcessUnstructuredSS-Request,
70   UnstructuredSS-Request,
71   UnstructuredSS-Notify,
72   RegisterPassword,
73   GetPassword,
74   SS-InvocationNotification,
75   RegisterCC-Entry,
76   EraseCC-Entry
77 FROM MAP-SupplementaryServiceOperations {
78   ccitt identified-organization (4) etsi (0) mobileDomain (0)
79   gsm-Network (1) modules (3) map-SupplementaryServiceOperations (8)
80   version6 (6)}
81
82   SendRoutingInfoForSM,
83   MO-ForwardSM,
84   MT-ForwardSM,
85   ReportSM-DeliveryStatus,
86   AlertServiceCentre,
87   InformServiceCentre,
88   ReadyForSM
89 FROM MAP-ShortMessageServiceOperations {
90   ccitt identified-organization (4) etsi (0) mobileDomain (0)
91   gsm-Network (1) modules (3) map-ShortMessageServiceOperations (9)
92   version6 (6)}
93
94   PrepareGroupCall,
95   ProcessGroupCallSignalling,

```

```

96     ForwardGroupCallSignalling,
97     SendGroupCallEndSignal
98 FROM MAP-Group-Call-Operations {
99     ccitt identified-organization (4) etsi (0) mobileDomain (0)
100    gsm-Network (1) modules (3) map-Group-Call-Operations (22)
101    version6 (6)}
102
103     LCSAssignTrafficChannel,
104     LCSInformationReport,
105     LCSInformationRequest,
106     LCSRegistration,
107     LCSReset,
108     ProvideSubscriberLocation,
109     PerformLocation,
110     SendRoutingInfoForLCS,
111     SubscriberLocationReport
112 FROM MAP-LocationServiceOperations {
113     ccitt identified-organization (4) etsi (0) mobileDomain (0)
114     gsm-Network (1) modules (3) map-LocationServiceOperations (24)
115     version6 (6)}
116
117     SystemFailure,
118     DataMissing,
119     UnexpectedDataValue,
120     FacilityNotSupported,
121     UnknownSubscriber,
122     NumberChanged,
123     UnknownMSC,
124     UnidentifiedSubscriber,
125     UnknownEquipment,
126     RoamingNotAllowed,
127     IllegalSubscriber,
128     IllegalEquipment,
129     BearerServiceNotProvisioned,
130     TeleserviceNotProvisioned,
131     NoHandoverNumberAvailable,
132     SubsequentHandoverFailure,
133     TracingBufferFull,
134     OR-NotAllowed,
135     NoRoamingNumberAvailable,
136     AbsentSubscriber,
137     BusySubscriber,
138     NoSubscriberReply,
139     CallBarred,
140     ForwardingViolation,
141     ForwardingFailed,
142     CUG-Reject,
143     ATI-NotAllowed,
144     IllegalSS-Operation,
145     SS-ErrorStatus,
146     SS-NotAvailable,
147     SS-SubscriptionViolation,
148     SS-Incompatibility,
149     UnknownAlphabet,
150     USSD-Busy,
151     PW-RegistrationFailure,
152     NegativePW-Check,
153     NumberOfPW-AttemptsViolation,
154     SubscriberBusyForMT-SMS,
155     SM-DeliveryFailure,
156     MessageWaitingListFull,
157     AbsentSubscriberSM,
158     ResourceLimitation,
159     NoGroupCallNumberAvailable,
160     ShortTermDenial,
161     LongTermDenial,
162     IncompatibleTerminal,
163     UnauthorizedRequestingNetwork,
164     UnauthorizedLCSCClient,
165     PositionMethodFailure,
166     PositionMethodFailureWithRestart,
167     LMUUnknownOrOffline,
168     TrafficChannelEstablishmentFailure,
169     UnknownOrUnreachableLCSCClient
170
171 FROM MAP-Errors {
172     ccitt identified-organization (4) etsi (0) mobileDomain (0)
173     gsm-Network (1) modules (3) map-Errors (10) version6 (6)}
174 ;

```

```

175
176
177 -- location registration operation codes
178
179 updateLocation UpdateLocation ::= localValue 2
180 cancelLocation CancelLocation ::= localValue 3
181 purgeMS PurgeMS ::= localValue 67
182 sendIdentification SendIdentification ::= localValue 55
183
184
185 -- handover operation codes
186
187 prepareHandover PrepareHandover ::= localValue 68
188 sendEndSignal SendEndSignal ::= localValue 29
189 processAccessSignalling ProcessAccessSignalling ::= localValue 33
190 forwardAccessSignalling ForwardAccessSignalling ::= localValue 34
191 prepareSubsequentHandover PrepareSubsequentHandover ::=
192     localValue 69
193
194
195 -- authentication operation codes
196
197 sendAuthenticationInfo SendAuthenticationInfo ::= localValue 56
198
199
200 -- IMEI MANAGEMENT operation codes
201
202 checkIMEI CheckIMEI ::= localValue 43
203
204
205 -- subscriber management operation codes
206
207 insertSubscriberData InsertSubscriberData ::= localValue 7
208 deleteSubscriberData DeleteSubscriberData ::= localValue 8
209
210
211 -- fault recovery operation codes
212
213 reset Reset ::= localValue 37
214 forwardCheckSS-Indication ForwardCheckSS-Indication ::=
215     localValue 38
216 restoreData RestoreData ::= localValue 57
217
218
219 -- operation and maintenance operation codes
220
221 activateTraceMode ActivateTraceMode ::= localValue 50
222 deactivateTraceMode DeactivateTraceMode ::= localValue 51
223 sendIMSI SendIMSI ::= localValue 58
224
225
226 -- call handling operation codes
227
228 sendRoutingInfo SendRoutingInfo ::= localValue 22
229 provideRoamingNumber ProvideRoamingNumber ::= localValue 4
230 resumeCallHandling ResumeCallHandling ::= localValue 6
231 provideSIWFSNumber ProvideSIWFSNumber ::= localValue 31
232 sIWFSsignallingModify SIWFSsignallingModify ::= localValue 32
233 setReportingState SetReportingState ::= localValue 73
234 statusReport StatusReport ::= localValue 74
235 remoteUserFree RemoteUserFree ::= localValue 75
236 istAlert IST-Alert ::= localValue 87
237 istCommand IST-Command ::= localValue 88
238
239
240 -- supplementary service handling operation codes
241

```

```

242 registerSS RegisterSS ::= localValue 10
243 eraseSS EraseSS ::= localValue 11
244 activateSS ActivateSS ::= localValue 12
245 deactivateSS DeactivateSS ::= localValue 13
246 interrogateSS InterrogateSS ::= localValue 14
247 processUnstructuredSS-Request ProcessUnstructuredSS-Request ::=
248     localValue 59
249 unstructuredSS-Request UnstructuredSS-Request ::= localValue 60
250 unstructuredSS-Notify UnstructuredSS-Notify ::= localValue 61
251 registerPassword RegisterPassword ::= localValue 17
252 getPassword GetPassword ::= localValue 18
253 registerCC-Entry RegisterCC-Entry ::= localValue 76
254 eraseCC-Entry EraseCC-Entry ::= localValue 77

```

```

255
256
257 -- short message service operation codes
258

```

```

259 sendRoutingInfoForSM SendRoutingInfoForSM ::= localValue 45
260 mo-forwardSM MO-ForwardSM ::= localValue 46
261 mt-forwardSM MT-ForwardSM ::= localValue 44
262 reportSM-DeliveryStatus ReportSM-DeliveryStatus ::= localValue 47
263 informServiceCentre InformServiceCentre ::= localValue 63
264 alertServiceCentre AlertServiceCentre ::= localValue 64
265 readyForSM ReadyForSM ::= localValue 66

```

```

266
267 -- provide subscriber info operation codes
268

```

```

269 provideSubscriberInfo ProvideSubscriberInfo ::= localValue 70

```

```

270
271 -- any time interrogation operation codes
272

```

```

273 anyTimeInterrogation AnyTimeInterrogation ::= localValue 71

```

```

274
275 -- supplementary service invocation notification operation codes
276

```

```

277 ss-InvocationNotification SS-InvocationNotification ::= localValue 72

```

```

278
279
280 --Group Call operation codes
281

```

```

282 prepareGroupCall PrepareGroupCall ::= localValue 39
283 sendGroupCallEndSignal SendGroupCallEndSignal ::= localValue 40
284 processGroupCallSignalling ProcessGroupCallSignalling ::= localValue 41
285 forwardGroupCallSignalling ForwardGroupCallSignalling ::= localValue 42

```

```

286
287
288 -- gprs location updating operation codes
289

```

```

290 updateGprsLocation UpdateGprsLocation ::= localValue 23

```

```

291
292 -- gprs location information retrieval operation codes
293

```

```

294 sendRoutingInfoForGprs SendRoutingInfoForGprs ::= localValue 24

```

```

295
296 -- failure reporting operation codes
297

```

```

298 failureReport FailureReport ::= localValue 25

```

```

299
300 -- GPRS notification operation codes
301

```

```

302 noteMsPresentForGprs NoteMsPresentForGprs ::= localValue 26

```

```

303
304 -- Location service operation codes
305

```

```

306 lcsAssignTrafficChannel LCSAssignTrafficChannel ::= localValue 78
307 lcsInformationReport LCSInformationReport ::= localValue 79
308 lcsInformationRequest LCSInformationRequest ::= localValue 80
309 lcsRegistration LCSRegistration ::= localValue 81
310 lcsReset LCSReset ::= localValue 82
311 provideSubscriberLocation ProvideSubscriberLocation ::= localValue 83
312 performLocation PerformLocation ::= localValue 84
313 sendRoutingInfoForLCS SendRoutingInfoForLCS ::= localValue 85
314 subscriberLocationReport SubscriberLocationReport ::= localValue 86

```

```

315
316
317 -- generic error codes
318

```

```

319 systemFailure SystemFailure ::= localValue 34
320 dataMissing DataMissing ::= localValue 35
321 unexpectedDataValue UnexpectedDataValue ::= localValue 36
322 facilityNotSupported FacilityNotSupported ::= localValue 21
323 incompatibleTerminal IncompatibleTerminal ::= localValue 28
324 resourceLimitation ResourceLimitation ::= localValue 51
325
326
327 -- identification and numbering error codes
328
329 unknownSubscriber UnknownSubscriber ::= localValue 1
330 numberChanged NumberChanged ::= localValue 44
331 unknownMSC UnknownMSC ::= localValue 3
332 unidentifiedSubscriber UnidentifiedSubscriber ::= localValue 5
333 unknownEquipment UnknownEquipment ::= localValue 7
334
335
336 -- subscription error codes
337
338 roamingNotAllowed RoamingNotAllowed ::= localValue 8
339 illegalSubscriber IllegalSubscriber ::= localValue 9
340 illegalEquipment IllegalEquipment ::= localValue 12
341 bearerServiceNotProvisioned BearerServiceNotProvisioned ::=
342     localValue 10
343 teleserviceNotProvisioned TeleserviceNotProvisioned ::=
344     localValue 11
345
346
347 -- handover error codes
348
349 noHandoverNumberAvailable NoHandoverNumberAvailable ::=
350     localValue 25
351 subsequentHandoverFailure SubsequentHandoverFailure ::=
352     localValue 26
353
354
355 -- operation and maintenance error codes
356
357 tracingBufferFull TracingBufferFull ::= localValue 40
358
359
360 -- call handling error codes
361
362 noRoamingNumberAvailable NoRoamingNumberAvailable ::= localValue 39
363 absentSubscriber AbsentSubscriber ::= localValue 27
364 busySubscriber BusySubscriber ::= localValue 45
365 noSubscriberReply NoSubscriberReply ::= localValue 46
366 callBarred CallBarred ::= localValue 13
367 forwardingFailed ForwardingFailed ::= localValue 47
368 or-NotAllowed OR-NotAllowed ::= localValue 48
369 forwardingViolation ForwardingViolation ::= localValue 14
370 cug-Reject CUG-Reject ::= localValue 15
371
372
373 -- any time interrogation error codes
374 ati-NotAllowed ATI-NotAllowed ::= localValue 49
375
376
377 -- Group Call error codes
378 noGroupCallNumberAvailable NoGroupCallNumberAvailable ::= localValue 50
379
380
381 -- supplementary service error codes
382

```

```

383 illegalSS-Operation IllegalSS-Operation ::= localValue 16
384 ss-ErrorStatus SS-ErrorStatus ::= localValue 17
385 ss-NotAvailable SS-NotAvailable ::= localValue 18
386 ss-SubscriptionViolation SS-SubscriptionViolation ::= localValue 19
387 ss-Incompatibility SS-Incompatibility ::= localValue 20
388 unknownAlphabet UnknownAlphabet ::= localValue 71
389 ussd-Busy USSD-Busy ::= localValue 72
390 pw-RegistrationFailure PW-RegistrationFailure ::= localValue 37
391 negativePW-Check NegativePW-Check ::= localValue 38
392 numberOfPW-AttemptsViolation NumberOfPW-AttemptsViolation ::=
393     localValue 43
394 shortTermDenial ShortTermDenial ::= localValue 29
395 longTermDenial LongTermDenial ::= localValue 30
396
397
398 -- short message service error codes
399
400 subscriberBusyForMT-SMS SubscriberBusyForMT-SMS ::= localValue 31
401 sm-DeliveryFailure SM-DeliveryFailure ::= localValue 32
402 messageWaitingListFull MessageWaitingListFull ::= localValue 33
403 absentSubscriberSM AbsentSubscriberSM ::= localValue 6
404
405 -- location service error codes
406
407 unauthorizedRequestingNetwork UnauthorizedRequestingNetwork ::= localValue 52
408 unauthorizedLCSCClient UnauthorizedLCSCClient ::= localValue 53
409 positionMethodFailure PositionMethodFailure ::= localValue 54
410 positionMethodFailureWithRestart PositionMethodFailureWithRestart ::= localValue 55
411 lmuUnknownOrOffline LMUUnknownOrOffline ::= localValue 56
412 trafficChannelEstablishmentFailure TrafficChannelEstablishmentFailure ::= localValue 57
413 unknownOrUnreachableLCSCClient UnknownOrUnreachableLCSCClient ::= localValue 58
414
415
416 -- The following operation codes are reserved for operations
417 -- existing in previous versions of the protocol
418
419 -- Operation Name                AC used                Oper. Code
420 --
421 -- sendParameters                map-ac infoRetrieval (14) version1 (1)    localValue 9
422 -- processUnstructuredSS-Data    map-ac networkFunctionalSs (18) version1 (1) localValue 19
423 -- performHandover              map-ac handoverControl (11) version1 (1)  localValue 28
424 -- performSubsequentHandover     map-ac handoverControl (11) version1 (1)  localValue 30
425 -- noteInternalHandover         map-ac handoverControl (11) version1 (1)  localValue 35
426 -- noteSubscriberPresent        map-ac mwdMngt (24) version1 (1)         localValue 48
427 -- alertServiceCentreWithoutResult map-ac shortMsgAlert (23) version1 (1)    localValue 49
428 -- traceSubscriberActivity       map-ac handoverControl (11) version1 (1)  localValue 52
429 -- beginSubscriberActivity       map-ac networkFunctionalSs (18) version1 (1) localValue 54
430
431 -- The following error codes are reserved for errors
432 -- existing in previous versions of the protocol
433
434 -- Error Name                    AC used                Error Code
435 --
436 -- unknownBaseStation            map-ac handoverControl (11) version1 (1)  localValue 2
437 -- invalidTargetBaseStation      map-ac handoverControl (11) version1 (1)  localValue 23
438 -- noRadioResourceAvailable      map-ac handoverControl (11) version1 (1)  localValue 24
439
440
441 END

```

1 17.6 MAP operation and error type

**** NEXT MODIFIED SECTION ****

17.6.6 Errors


```

1  MAP-Errors {
2      ccitt identified-organization (4) etsi (0) mobileDomain (0)
3      gsm-Network (1) modules (3) map-Errors (10) version6 (6)}
4
5  DEFINITIONS
6
7  ::=
8
9  BEGIN
10
11  EXPORTS
12
13      -- generic errors
14      SystemFailure,
15      DataMissing,
16      UnexpectedDataValue,
17      FacilityNotSupported,
18      IncompatibleTerminal,
19      ResourceLimitation,
20
21      -- identification and numbering errors
22      UnknownSubscriber,
23      NumberChanged,
24      UnknownMSC,
25      UnidentifiedSubscriber,
26      UnknownEquipment,
27
28      -- subscription errors
29      RoamingNotAllowed,
30      IllegalSubscriber,
31      IllegalEquipment,
32      BearerServiceNotProvisioned,
33      TeleserviceNotProvisioned,
34
35      -- handover errors
36      NoHandoverNumberAvailable,
37      SubsequentHandoverFailure,
38
39      -- operation and maintenance errors
40      TracingBufferFull,
41
42      -- call handling errors
43      OR-NotAllowed,
44      NoRoamingNumberAvailable,
45      BusySubscriber,
46      NoSubscriberReply,
47      AbsentSubscriber,
48      CallBarred,
49      ForwardingViolation,
50      ForwardingFailed,
51      CUG-Reject,
52
53      -- any time interrogation errors
54      ATI-NotAllowed,
55
56      -- supplementary service errors
57      IllegalSS-Operation,
58      SS-ErrorStatus,
59      SS-NotAvailable,
60      SS-SubscriptionViolation,
61      SS-Incompatibility,
62      UnknownAlphabet,
63      USSD-Busy,
64      PW-RegistrationFailure,
65      NegativePW-Check,
66      NumberOfPW-AttemptsViolation,
67      ShortTermDenial,
68      LongTermDenial,
69
70      -- short message service errors
71      SubscriberBusyForMT-SMS,
72      SM-DeliveryFailure,
73      MessageWaitingListFull,
74      AbsentSubscriberSM,
75
76      -- Group Call errors
77      NoGroupCallNumberAvailable,
78
79      -- location service errors

```

```

80   UnauthorizedRequestingNetwork,
81   UnauthorizedLCSCClient,
82   PositionMethodFailure,
83   PositionMethodFailureWithRestart,
84   LMUUnknownOrOffline,
85   TrafficChannelEstablishmentFailure,
86   UnknownOrUnreachableLCSCClient
87
88 ;
89
90 IMPORTS
91   ERROR
92 FROM TCAPMessages {
93   ccitt recommendation q 773 modules (2) messages (1) version2 (2)}
94
95   SS-Status
96 FROM MAP-SS-DataTypes {
97   ccitt identified-organization (4) etsi (0) mobileDomain (0)
98   gsm-Network (1) modules (3) map-SS-DataTypes (14) version6 (6)}
99
100  SS-IncompatibilityCause,
101  PW-RegistrationFailureCause,
102  SM-DeliveryFailureCause,
103  SystemFailureParam,
104  DataMissingParam,
105  UnexpectedDataParam,
106  FacilityNotSupParam,
107  UnknownSubscriberParam,
108  NumberChangedParam,
109  UnidentifiedSubParam,
110  RoamingNotAllowedParam,
111  IllegalSubscriberParam,
112  IllegalEquipmentParam,
113  BearerServNotProvParam,
114  TeleservNotProvParam,
115  TracingBufferFullParam,
116  NoRoamingNbParam,
117  OR-NotAllowedParam,
118  AbsentSubscriberParam,
119  BusySubscriberParam,
120  NoSubscriberReplyParam,
121  CallBarredParam,
122  ForwardingViolationParam,
123  ForwardingFailedParam,
124  CUG-RejectParam,
125  ATI-NotAllowedParam,
126  SubBusyForMT-SMS-Param,
127  MessageWaitListFullParam,
128  AbsentSubscriberSM-Param,
129  ResourceLimitationParam,
130  NoGroupCallNbParam,
131  IncompatibleTerminalParam,
132  ShortTermDenialParam,
133  LongTermDenialParam,
134  UnauthorizedRequestingNetwork-Param,
135  UnauthorizedLCSCClient-Param,
136  PositionMethodFailure-Param,
137  PositionMethodFailureWithRestart-Param,
138  LMUUnknownOrOffline-Param,
139  TrafficChannelEstablishmentFailure-Param,
140  UnknownOrUnreachableLCSCClient-Param
141
142
143 FROM MAP-ER-DataTypes {
144   ccitt identified-organization (4) etsi (0) mobileDomain (0)
145   gsm-Network (1) modules (3) map-ER-DataTypes (17) version6 (6)}
146 ;
147
148
149 -- generic errors
150
151 SystemFailure ::= ERROR
152   PARAMETER
153     systemFailureParam          SystemFailureParam
154     -- optional
155

```

```

156 DataMissing ::= ERROR
157     PARAMETER
158         dataMissingParam          DataMissingParam
159         -- optional
160         -- dataMissingParam must not be used in version <3
161
162 UnexpectedDataValue ::= ERROR
163     PARAMETER
164         unexpectedDataParam        UnexpectedDataParam
165         -- optional
166         -- unexpectedDataParam must not be used in version <3
167
168 FacilityNotSupported ::= ERROR
169     PARAMETER
170         facilityNotSupParam        FacilityNotSupParam
171         -- optional
172         -- facilityNotSupParam must not be used in version <3
173
174 IncompatibleTerminal ::= ERROR
175     PARAMETER
176         incompatibleTerminalParam    IncompatibleTerminalParam
177         -- optional
178
179 ResourceLimitation ::= ERROR
180     PARAMETER
181         resourceLimitationParam      ResourceLimitationParam
182         -- optional
183
184 -- identification and numbering errors
185
186 UnknownSubscriber ::= ERROR
187     PARAMETER
188         unknownSubscriberParam       UnknownSubscriberParam
189         -- optional
190         -- unknownSubscriberParam must not be used in version <3
191
192 NumberChanged ::= ERROR
193     PARAMETER
194         numberChangedParam           NumberChangedParam
195         -- optional
196
197 UnknownMSC ::= ERROR
198
199 UnidentifiedSubscriber ::= ERROR
200     PARAMETER
201         unidentifiedSubParam         UnidentifiedSubParam
202         -- optional
203         -- unidentifiedSubParam must not be used in version <3
204
205 UnknownEquipment ::= ERROR
206
207 -- subscription errors
208
209 RoamingNotAllowed ::= ERROR
210     PARAMETER
211         roamingNotAllowedParam       RoamingNotAllowedParam
212
213
214 IllegalSubscriber ::= ERROR
215     PARAMETER
216         illegalSubscriberParam       IllegalSubscriberParam
217         -- optional
218         -- illegalSubscriberParam must not be used in version <3
219
220 IllegalEquipment ::= ERROR
221     PARAMETER
222         illegalEquipmentParam        IllegalEquipmentParam
223         -- optional
224         -- illegalEquipmentParam must not be used in version <3
225
226 BearerServiceNotProvisioned ::= ERROR
227     PARAMETER
228         bearerServNotProvParam       BearerServNotProvParam
229         -- optional
230         -- bearerServNotProvParam must not be used in version <3
231
232 TeleserviceNotProvisioned ::= ERROR

```

```

233 PARAMETER
234     teleservNotProvParam          TeleservNotProvParam
235     -- optional
236     -- teleservNotProvParam must not be used in version <3
237
238
239 -- handover errors
240
241 NoHandoverNumberAvailable ::= ERROR
242
243 SubsequentHandoverFailure ::= ERROR
244
245
246 -- operation and maintenance errors
247
248 TracingBufferFull ::= ERROR
249     PARAMETER
250         tracingBufferFullParam      TracingBufferFullParam
251         -- optional
252
253
254 -- call handling errors
255
256 NoRoamingNumberAvailable ::= ERROR
257     PARAMETER
258         noRoamingNbParam            NoRoamingNbParam
259         -- optional
260
261 AbsentSubscriber ::= ERROR
262     PARAMETER
263         absentSubscriberParam        AbsentSubscriberParam
264         -- optional
265
266     -- absentSubscriberParam must not be used in version <3
267
268 BusySubscriber ::= ERROR
269     PARAMETER
270         busySubscriberParam          BusySubscriberParam
271         -- optional
272
273 NoSubscriberReply ::= ERROR
274     PARAMETER
275         noSubscriberReplyParam       NoSubscriberReplyParam
276         -- optional
277
278 CallBarred ::= ERROR
279     PARAMETER
280         callBarredParam              CallBarredParam
281         -- optional
282
283 ForwardingViolation ::= ERROR
284     PARAMETER
285         forwardingViolationParam      ForwardingViolationParam
286         -- optional
287
288 ForwardingFailed ::= ERROR
289     PARAMETER
290         forwardingFailedParam         ForwardingFailedParam
291         -- optional
292
293 CUG-Reject ::= ERROR
294     PARAMETER
295         cug-RejectParam              CUG-RejectParam
296         -- optional
297
298 OR-NotAllowed ::= ERROR
299     PARAMETER
300         or-NotAllowedParam           OR-NotAllowedParam
301         -- optional
302
303
304 -- any time interrogation errors
305 ATI-NotAllowed ::= ERROR
306     PARAMETER
307         ati-NotAllowedParam          ATI-NotAllowedParam
308         -- optional
309

```

```

310
311 -- supplementary service errors
312
313 IllegalSS-Operation ::= ERROR
314
315 SS-ErrorStatus ::= ERROR
316     PARAMETER
317         ss-Status                SS-Status
318         -- optional
319
320 SS-NotAvailable ::= ERROR
321
322 SS-SubscriptionViolation ::= ERROR
323
324 SS-Incompatibility ::= ERROR
325     PARAMETER
326         ss-IncompatibilityCause    SS-IncompatibilityCause
327         -- optional
328
329 UnknownAlphabet ::= ERROR
330
331 USSD-Busy ::= ERROR
332
333 PW-RegistrationFailure ::= ERROR
334     PARAMETER
335         pw-RegistrationFailureCause    PW-RegistrationFailureCause
336
337 NegativePW-Check ::= ERROR
338
339 NumberOfPW-AttemptsViolation ::= ERROR
340
341 ShortTermDenial ::= ERROR
342     PARAMETER
343         shortTermDenialParam          ShortTermDenialParam
344         -- optional
345
346 LongTermDenial ::= ERROR
347     PARAMETER
348         longTermDenialParam           LongTermDenialParam
349         -- optional
350
351
352 -- short message service errors
353
354 SubscriberBusyForMT-SMS ::= ERROR
355     PARAMETER
356         subBusyForMT-SMS-Param        SubBusyForMT-SMS-Param
357         -- optional
358
359 SM-DeliveryFailure ::= ERROR
360     PARAMETER
361         sm-DeliveryFailureCause       SM-DeliveryFailureCause
362
363 MessageWaitingListFull ::= ERROR
364     PARAMETER
365         messageWaitListFullParam      MessageWaitListFullParam
366         -- optional
367
368 AbsentSubscriberSM ::= ERROR
369     PARAMETER
370         absentSubscriberSM-Param      AbsentSubscriberSM-Param
371         -- optional
372
373 -- Group Call errors
374
375 NoGroupCallNumberAvailable ::= ERROR
376     PARAMETER
377         noGroupCallNbParam            NoGroupCallNbParam
378         -- optional
379
380 -- location service errors
381

```

```

382 UnauthorizedRequestingNetwork ::= ERROR
383     PARAMETER
384         unauthorizedRequestingNetwork-Param  UnauthorizedRequestingNetwork-Param
385         -- optional
386
387 UnauthorizedLCSCClient ::= ERROR
388     PARAMETER
389         unauthorizedLCSCClient-Param      UnauthorizedLCSCClient-Param
390         -- optional
391
392 PositionMethodFailure ::= ERROR
393     PARAMETER
394         positionMethodFailure-Param      PositionMethodFailure-Param
395         -- optional
396
397 PositionMethodFailureWithRestart ::= ERROR
398     PARAMETER
399         positionMethodFailureWithRestart Param  PositionMethodFailureWithRestart Param
400         optional
401
402 LMUUnknownOrOffline ::= ERROR
403     PARAMETER
404         lmuUnknownOrOffline Param  LMUUnknownOrOffline Param
405         optional
406
407 TrafficChannelEstablishmentFailure ::= ERROR
408     PARAMETER
409         trafficChannelEstablishmentFailure  TrafficChannelEstablishmentFailure Param
410         optional
411
412 UnknownOrUnreachableLCSCClient ::= ERROR
413     PARAMETER
414         unknownOrUnreachableLCSCClient-Param  UnknownOrUnreachableLCSCClient-Param
415         -- optional
416
417 END

```

1

2

****** NEXT MODIFIED SECTION ******

17.6.8 Location service operations

```

1  MAP-LocationServiceOperations {
2      ccitt identified-organization (4) etsi (0) mobileDomain (0)
3      gsm-Network (1) modules (3) map-LocationServiceOperations (24)
4      version6 (6)}
5
6  DEFINITIONS
7
8  ::=
9
10 BEGIN
11
12 EXPORTS
13     LCSAssignTrafficChannel,
14     LCSInformationReport,
15     LCSInformationRequest,
16     LCSRegistration,
17     LCSReset,
18     ProvideSubscriberLocation,
19     PerformLocation,
20     SendRoutingInfoForLCS,
21     SubscriberLocationReport
22 ;
23

```

```

24 IMPORTS
25 OPERATION
26 FROM TCAPMessages {
27     ccitt recommendation q 773 modules (2) messages (1) version2 (2)}
28
29     SystemFailure,
30     DataMissing,
31     UnexpectedDataValue,
32     FacilityNotSupported,
33     UnknownSubscriber,
34     AbsentSubscriber,
35     UnauthorizedRequestingNetwork,
36     UnauthorizedLCSCClient,
37     PositionMethodFailure,
38     PositionMethodFailureWithRestart,
39     ResourceLimitation,
40     LMUUnknownOrOffline,
41     TrafficChannelEstablishmentFailure,
42     UnknownOrUnreachableLCSCClient
43 FROM MAP-Errors {
44     ccitt identified-organization (4) etsi (0) mobileDomain (0)
45     gsm-Network (1) modules (3) map-Errors (10) version6 (6)}
46
47 LCSAssignTrafficChannel-Arg,
48 LCSAssignTrafficChannel-Res,
49 LCSInformationReport-Arg,
50 LCSInformationRequest-Arg,
51 LCSRegistration-Arg,
52 LCSRegistration-Res,
53 LCSReset-Arg,
54     RoutingInfoForLCS-Arg,
55     RoutingInfoForLCS-Res,
56     ProvideSubscriberLocation-Arg,
57     ProvideSubscriberLocation-Res,
58 PerformLocation-Arg,
59 PerformLocation-Res,
60     SubscriberLocationReport-Arg,
61     SubscriberLocationReport-Res
62 FROM MAP-LCS-DataTypes {
63     ccitt identified-organization (4) etsi (0) mobileDomain (0)
64     gsm-Network (1) modules (3) map-LCS-DataTypes (25) version6 (6)}
65 ;
66

```

67	SendRoutingInfoForLCS ::= OPERATION	--Timer m
68	ARGUMENT	
69	routingInfoForLCS-Arg	RoutingInfoForLCS-Arg
70	RESULT	
71	routingInfoForLCS-Res	RoutingInfoForLCS-Res
72	ERRORS {	
73	SystemFailure,	
74	DataMissing,	
75	UnexpectedDataValue,	
76	FacilityNotSupported,	
77	UnknownSubscriber,	
78	AbsentSubscriber,	
79	UnauthorizedRequestingNetwork }	

81	ProvideSubscriberLocation ::= OPERATION	--Timer ml
82	ARGUMENT	
83	provideSubscriberLocation-Arg	ProvideSubscriberLocation-Arg
84	RESULT	
85	provideSubscriberLocation-Res	ProvideSubscriberLocation-Res
86	ERRORS {	
87	SystemFailure,	
88	DataMissing,	
89	UnexpectedDataValue,	
90	FacilityNotSupported,	
91	UnknownSubscriber,	
92	UnidentifiedSubscriber,	
93	IllegalSubscriber,	
94	IllegalEquipment,	
95	AbsentSubscriber,	
96	UnauthorizedRequestingNetwork,	
97	UnauthorizedLCSCClient,	
98	PositionMethodFailure }	

99

```

100 SubscriberLocationReport ::= OPERATION          --Timer m
101     ARGUMENT
102         subscriberLocationReport-Arg    SubscriberLocationReport-Arg
103     RESULT
104         subscriberLocationReport-Res    SubscriberLocationReport-Res
105     ERRORS {
106         SystemFailure,
107         DataMissing,
108         UnexpectedDataValue,
109         ResourceLimitation,
110         UnknownSubscriber,
111         UnauthorizedRequestingNetwork,
112         UnknownOrUnreachableLCSClient}
113
114 PerformLocation ::= OPERATION          --Timer ml
115     ARGUMENT
116         performLocation-Arg             PerformLocation-Arg
117     RESULT
118         performLocation-Res             PerformLocation-Res
119     ERRORS {
120         SystemFailure,
121         DataMissing,
122         UnexpectedDataValue,
123         PositionMethodFailure,
124         PositionMethodFailureWithRestart }
125
126 LCSRegistration ::= OPERATION          --Timer m
127     ARGUMENT
128         lcsRegistration-Arg             LCSRegistration-Arg
129     RESULT
130         lcsRegistration-Res             LCSRegistration-Res
131     ERRORS {
132         SystemFailure,
133         LMUUnknownOrOffline,
134         DataMissing,
135         UnexpectedDataValue }
136
137 LCSInformationRequest ::= OPERATION      --Timer s
138     ARGUMENT
139         lcsInformationRequest-Arg       LCSInformationRequest-Arg
140
141 LCSInformationReport ::= OPERATION      --Timer s
142     ARGUMENT
143         lcsInformationReport-Arg        LCSInformationReport-Arg
144
145 LCSReset ::= OPERATION                  --Timer s
146     ARGUMENT
147         lcsReset-Arg                   LCSReset-Arg
148
149 LCSAssignTrafficChannel ::= OPERATION   --Timer m
150     ARGUMENT
151         lcsAssignTrafficChannel-Arg     LCSAssignTrafficChannel-Arg
152     RESULT
153         lcsAssignTrafficChannel-Res     LCSAssignTrafficChannel-Res
154     ERRORS {
155         SystemFailure,
156         DataMissing,
157         UnexpectedDataValue,
158         TrafficChannelEstablishmentFailure }
159
160 END
161

```

17.7 MAP constants and data types

****** NEXT MODIFIED SECTION ******

17.7.1 Mobile Service data types

```

1 MAP-MS-DataTypes {
2     ccitt-identified-organization (4) etsi (0) mobileDomain (0)
3     gsm-Network (1) modules (3) map-MS-DataTypes (11) version6 (6)}
4
5 DEFINITIONS

```



```

6
7 IMPLICIT TAGS
8
9 ::=
10
11 BEGIN
12
13 EXPORTS
14
15     -- location registration types
16     UpdateLocationArg,
17     UpdateLocationRes,
18     CancelLocationArg,
19     CancelLocationRes,
20     PurgeMS-Arg,
21     PurgeMS-Res,
22     SendIdentificationRes,
23     UpdateGprsLocationArg,
24     UpdateGprsLocationRes,
25     IST-SupportIndicator,
26
27
28     -- handover types
29     PrepareHO-Arg,
30     PrepareHO-Res,
31     PrepareSubsequentHO-Arg,
32
33     -- authentication management types
34     SendAuthenticationInfoArg,
35     SendAuthenticationInfoRes,
36
37     -- security management types
38     EquipmentStatus,
39     Kc,
40
41     -- subscriber management types
42     InsertSubscriberDataArg,
43     InsertSubscriberDataRes,
44     DeleteSubscriberDataArg,
45     DeleteSubscriberDataRes,
46     SubscriberData,
47     ODB-Data,
48     SubscriberStatus,
49     ZoneCodeList,
50     maxNumOfZoneCodes,
51     O-CSI,
52     O-BcsmCamelTDPCriteriaList,
53     SS-CSI,
54     ServiceKey,
55     DefaultCallHandling,
56     CamelCapabilityHandling,
57     BasicServiceCriteria,
58     SupportedCamelPhases,
59     maxNumOfCamelTDPData,
60     CUG-Index,
61     CUG-Interlock,
62     InterCUG-Restrictions,
63     IntraCUG-Options,
64     IST-AlertTimerValue,
65
66
67     -- fault recovery types
68     ResetArg,
69     RestoreDataArg,
70     RestoreDataRes,
71
72     -- subscriber information enquiry types
73     ProvideSubscriberInfoArg,
74     ProvideSubscriberInfoRes,
75     SubscriberInfo,
76     LocationInformation,
77     SubscriberState,
78
79     -- any time information enquiry types
80     AnyTimeInterrogationArg,
81     AnyTimeInterrogationRes,
82
83     -- gprs location information retrieval types
84     SendRoutingInfoForGprsArg,

```

```

85     SendRoutingInfoForGprsRes,
86
87     -- failure reporting types
88     FailureReportArg,
89     FailureReportRes,
90
91     -- gprs notification types
92     NoteMsPresentForGprsArg,
93     NoteMsPresentForGprsRes
94
95
96 ;
97
98 IMPORTS
99     IST-SupportIndicator,
100    IST-AlertTimerValue
101 FROM MAP-CH-DataTypes {
102     ccitt identified-organization (4) etsi (0) mobileDomain (0)
103     gsm-Network (1) modules (3) map-CH-DataTypes (13) version5 (5) }
104     maxNumOfSS,
105     SS-SubscriptionOption,
106     SS-List
107 FROM MAP-SS-DataTypes {
108     ccitt identified-organization (4) etsi (0) mobileDomain (0)
109     gsm-Network (1) modules (3) map-SS-DataTypes (14) version6 (6)}
110
111     SS-Code
112 FROM MAP-SS-Code {
113     ccitt identified-organization (4) etsi (0) mobileDomain (0)
114     gsm-Network (1) modules (3) map-SS-Code (15) version6 (6)}
115
116     Ext-BearerServiceCode
117 FROM MAP-BS-Code {
118     ccitt identified-organization (4) etsi (0) mobileDomain (0)
119     gsm-Network (1) modules (3) map-BS-Code (20) version6 (6)}
120
121     Ext-TeleserviceCode
122 FROM MAP-TS-Code {
123     ccitt identified-organization (4) etsi (0) mobileDomain (0)
124     gsm-Network (1) modules (3) map-TS-Code (19) version6 (6)}
125
126
127     ISDN-AddressString,
128     maxISDN-AddressLength,
129     ISDN-SubaddressString,
130     ExternalSignalInfo,
131     IMSI,
132     HLR-List,
133     LMSI,
134     Identity,
135     GlobalCellId,
136     CellIdOrLAI,
137     Ext-BasicServiceCode,
138     NAEA-PreferredCI,
139     EMLPP-Info,
140     SubscriberIdentity,
141     AgeOfLocationInformation,
142     LCSClientExternalID,
143     LCSClientInternalID
144
145
146
147 FROM MAP-CommonDataTypes {
148     ccitt identified-organization (4) etsi (0) mobileDomain (0)
149     gsm-Network (1) modules (3) map-CommonDataTypes (18) version6 (6)}
150
151     ExtensionContainer
152 FROM MAP-ExtensionDataTypes {
153     ccitt identified-organization (4) etsi (0) mobileDomain (0)
154     gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version6 (6)}
155
156     AbsentSubscriberDiagnosticSM
157 FROM MAP-ER-DataTypes {
158     ccitt identified-organization (4) etsi (0) mobileDomain (0)
159     gsm-Network (1) modules (3) map-ER-DataTypes (17) version6 (6)}
160
161
162 ;
163

```

164
165 -- location registration types
166

167	UpdateLocationArg ::= SEQUENCE {		
168	imsi	IMSI,	
169			
170	msc-Number	[1] ISDN-AddressString,	
171	vlr-Number	ISDN-AddressString,	
172	lmsi	[10] LMSI OPTIONAL,	
173	extensionContainer	ExtensionContainer	OPTIONAL,
174	...		
175	vlr-Capability	[6] VLR-Capability	OPTIONAL }

177	VLR-Capability ::= SEQUENCE{		
178	supportedCamelPhases	[0] SupportedCamelPhases	OPTIONAL,
179	extensionContainer	ExtensionContainer	OPTIONAL,
180	...		
181	solsaSupportIndicator	[2] NULL	OPTIONAL,
182	istSupportIndicator	[1] IST-SupportIndicator	OPTIONAL }

184	IST-SupportIndicator ::= ENUMERATED {		
185	basicISTSupported	(0),	
186	istCommandSupported	(1), ...}	
187	-- exception handling:		
188	-- reception of values > 1 shall be mapped to ' istCommandSupported '		

191	UpdateLocationRes ::= SEQUENCE {		
192	hlr-Number	ISDN-AddressString,	
193			
194	extensionContainer	ExtensionContainer	OPTIONAL,
195	...		

197	CancelLocationArg ::= [3] SEQUENCE {		
198	identity	Identity,	
199	cancellationType	CancellationType	OPTIONAL,
200	extensionContainer	ExtensionContainer	OPTIONAL,
201	...		

204	CancellationType ::= ENUMERATED {		
205	updateProcedure	(0),	
206	subscriptionWithdraw	(1),	
207	...		
208	-- The HLR shall not send values other than listed above		

211	CancelLocationRes ::= SEQUENCE {		
212	extensionContainer	ExtensionContainer	OPTIONAL,
213	...		

215	PurgeMS-Arg ::= [3] SEQUENCE {		
216	imsi	IMSI,	
217	vlr-Number	[0] ISDN-AddressString	OPTIONAL,
218	sgsn-Number	[1] ISDN-AddressString	OPTIONAL,
219	extensionContainer	ExtensionContainer	OPTIONAL,
220	...		

222	PurgeMS-Res ::= SEQUENCE {		
223	freezeTMSI	[0] NULL	OPTIONAL,
224	freezeP-TMSI	[1] NULL	OPTIONAL,
225	extensionContainer	ExtensionContainer	OPTIONAL,
226	...		

228	SendIdentificationRes ::= SEQUENCE {		
229	imsi	IMSI,	
230	authenticationSetList	AuthenticationSetList	OPTIONAL,
231	...		

233	AuthenticationSetList ::= SEQUENCE SIZE (1..5) OF		
234		AuthenticationSet	

235

```

236 AuthenticationSet ::= SEQUENCE {
237     rand                RAND,
238     sres                SRES,
239     kc                 Kc,
240     ...}
241
242 RAND ::= OCTET STRING (SIZE (16))
243
244 SRES ::= OCTET STRING (SIZE (4))
245
246 Kc ::= OCTET STRING (SIZE (8))
247
248 -- gprs location registration types
249
250 UpdateGprsLocationArg ::= SEQUENCE {
251     imsi                IMSI,
252     sgsn-Number        ISDN-AddressString,
253     sgsn-Address       GSN-Address,
254     extensionContainer ExtensionContainer OPTIONAL,
255     ... ,
256     sgsn-Capability    [0] SGSN-Capability OPTIONAL }
257
258 SGSN-Capability ::= SEQUENCE{
259     solsaSupportIndicator NULL OPTIONAL,
260     extensionContainer    [1] ExtensionContainer OPTIONAL,
261     ... }
262
263 GSN-Address ::= OCTET STRING (SIZE (5..17))
264 -- Octets are coded according to TS GSM 03.03
265
266 UpdateGprsLocationRes ::= SEQUENCE {
267     hlr-Number          ISDN-AddressString,
268     extensionContainer ExtensionContainer OPTIONAL,
269     ...}
270
271 -- handover types
272
273 PrepareHO-Arg ::= SEQUENCE {
274     targetCellId        GlobalCellId OPTIONAL,
275     ho-NumberNotRequired NULL OPTIONAL,
276     bss-APDU            ExternalSignalInfo OPTIONAL,
277     ...}
278
279 PrepareHO-Res ::= SEQUENCE {
280     handoverNumber      ISDN-AddressString OPTIONAL,
281     bss-APDU            ExternalSignalInfo OPTIONAL,
282     ...}
283
284 PrepareSubsequentHO-Arg ::= SEQUENCE {
285     targetCellId        GlobalCellId,
286     targetMSC-Number    ISDN-AddressString,
287     bss-APDU            ExternalSignalInfo,
288     ...}
289
290 -- authentication management types
291
292 SendAuthenticationInfoArg ::= IMSI
293
294 SendAuthenticationInfoRes ::= AuthenticationSetList
295
296
297 -- security management types
298
299 EquipmentStatus ::= ENUMERATED {
300     whiteListed (0),
301     blackListed (1),
302     greyListed (2)}
303
304
305 -- subscriber management types
306

```

```

307 InsertSubscriberDataArg ::= SEQUENCE {
308     imsi [0] IMSI OPTIONAL,
309     COMPONENTS OF SubscriberData,
310     extensionContainer [14] ExtensionContainer OPTIONAL,
311     ... ,
312     naea-PreferredCI [15] NAEA-PreferredCI OPTIONAL,
313     -- naea-PreferredCI is included at the discretion of the HLR operator.
314     gprsSubscriptionData [16] GPRSSubscriptionData OPTIONAL,
315     roamingRestrictedInSgsnDueToUnsupportedFeature [23] NULL
316     OPTIONAL,
317     networkAccessMode [24] NetworkAccessMode OPTIONAL,
318     lsaInformation [25] LSAInformation OPTIONAL,
319     lmu-Indicator [21] NULL OPTIONAL,
320     lcsInformation [22] LCSInformation OPTIONAL,
321     istAlertTimer [26] IST-AlertTimerValue OPTIONAL
322 }
323 -- If the Network Access Mode parameter is sent, it shall be present only in
324 -- the first sequence if the segmentation is used

```

```

325
326 IST-AlertTimerValue ::= INTEGER (15..255)

```

```

327
328 LCSInformation ::= SEQUENCE {
329     hplmn-GMLC-List [0] HPLMN-GMLC-List OPTIONAL,
330     lcs-PrivacyExceptionList [1] LCS-PrivacyExceptionList OPTIONAL,
331     molr-List [2] MOLR-List OPTIONAL,
332     ...}

```

```

333
334 HPLMN-GMLC-List ::= SEQUENCE SIZE (1..maxNumOfGMLC) OF
335     ISDN-AddressString
336     -- if segmentation is used, the complete GMLC-List shall be sent in one segment

```

```

337
338 maxNumOfGMLC INTEGER ::= 5

```

```

339
340
341 NetworkAccessMode ::= ENUMERATED {
342     bothMSCAndSGSN (0),
343     onlyMSC (1),
344     onlySGSN (2),
345     ...}
346 -- if unknown values are received in NetworkAccessMode
347 -- they shall be discarded.

```

```

348
349 GPRSDataList ::= SEQUENCE SIZE (1..maxNumOfPDP-Contexts) OF
350     PDP-Context

```

```

351
352 maxNumOfPDP-Contexts INTEGER ::= 50

```

```

353
354 PDP-Context ::= SEQUENCE {
355     pdp-ContextId ContextId,
356     pdp-Type [16] PDP-Type,
357     pdp-Address [17] PDP-Address OPTIONAL,
358     qos-Subscribed [18] QoS-Subscribed,
359     vplmnAddressAllowed [19] NULL OPTIONAL,
360     apn [20] APN ,
361     extensionContainer [21] ExtensionContainer OPTIONAL,
362     ...}

```

```

363
364 ContextId ::= INTEGER (1..maxNumOfPDP-Contexts)

```

```

365
366 GPRSSubscriptionData ::= SEQUENCE {
367     completeDataListIncluded NULL OPTIONAL,
368     -- If segmentation is used, completeDataListIncluded may only be present in the
369     -- first segment.
370     gprsDataList [1] GPRSDataList,
371     extensionContainer [2] ExtensionContainer OPTIONAL,
372     ...}

```

```

373
374
375 APN ::= OCTET STRING (SIZE (2..63))
376     -- Octets are coded according to TS GSM 03.03

```

```

377
378

```

```

379 PDP-Type ::= OCTET STRING (SIZE (2))
380 -- Octets are coded according to TS GSM 09.60
381
382 PDP-Address ::= OCTET STRING (SIZE (1..16))
383 -- Octets are coded according to TS GSM 09.60
384
385 -- The possible size values are:
386 -- 1-7 octets X.25 address type
387 -- 4 octets IPv4 address type
388 -- 16 octets Ipv6 address type
389
390 QoS-Subscribed ::= OCTET STRING (SIZE (3))
391 -- Octets are coded according to TS GSM 04.08.
392
393 LSAOnlyAccessIndicator ::= ENUMERATED {
394     accessOutsideLSAsAllowed (0),
395     accessOutsideLSAsRestricted (1)}
396
397 LSADataList ::= SEQUENCE SIZE (1..maxNumOfLSAs) OF
398     LSAData
399
400 maxNumOfLSAs INTEGER ::= 20
401
402 LSAData ::= SEQUENCE {
403     lsaIdentity [0] LSAIdentity,
404     lsaPriority [1] LSAPriority,
405     lsaActiveModeIndicator [2] NULL OPTIONAL,
406     lsaActiveModeSupportIndicator [3] NULL OPTIONAL,
407     extensionContainer [4] ExtensionContainer OPTIONAL,
408     ...}
409
410 LSAInformation ::= SEQUENCE {
411     completeDataListIncluded NULL OPTIONAL,
412
413     -- If segmentation is used, completeDataListIncluded may only be present in the
414     -- first segment.
415     lsaOnlyAccessIndicator [1] LSAOnlyAccessIndicator OPTIONAL,
416     lsaDataList [2] LSADataList OPTIONAL,
417     extensionContainer [3] ExtensionContainer OPTIONAL,
418     ...}
419
420 LSAIdentity ::= OCTET STRING (SIZE (3))
421 -- Octets are coded according to TS GSM 03.03
422
423 LSAPriority ::= OCTET STRING (SIZE (1))
424 -- Octets are coded according to TS GSM 08.08
425
426
427 SubscriberData ::= SEQUENCE {
428     msisdn [1] ISDN-AddressString OPTIONAL,
429     category [2] Category OPTIONAL,
430     subscriberStatus [3] SubscriberStatus OPTIONAL,
431     bearerServiceList [4] BearerServiceList OPTIONAL,
432     -- The exception handling for reception of unsupported / not allocated
433     -- bearerServiceCodes is defined in section 6.8.1
434     teleserviceList [6] TeleserviceList OPTIONAL,
435     -- The exception handling for reception of unsupported / not allocated
436     -- teleserviceCodes is defined in section 6.8.1
437     provisionedSS [7] Ext-SS-InfoList OPTIONAL,
438     odb-Data [8] ODB-Data OPTIONAL,
439     roamingRestrictionDueToUnsupportedFeature [9] NULL OPTIONAL,
440     regionalSubscriptionData [10] ZoneCodeList OPTIONAL,
441     vbsSubscriptionData [11] VBSDataList OPTIONAL,
442     vgcsSubscriptionData [12] VGCSDataList OPTIONAL,
443     vlrCamelSubscriptionInfo [13] VlrCamelSubscriptionInfo OPTIONAL,
444     }
445
446 Category ::= OCTET STRING (SIZE (1))
447 -- The internal structure is defined in CCITT Rec Q.763.
448
449 SubscriberStatus ::= ENUMERATED {
450     serviceGranted (0),
451     operatorDeterminedBarring (1)}
452

```

```

453 BearerServiceList ::= SEQUENCE SIZE (1..maxNumOfBearerServices) OF
454                               Ext-BearerServiceCode
455
456 maxNumOfBearerServices INTEGER ::= 50
457
458 TeleserviceList ::= SEQUENCE SIZE (1..maxNumOfTeleservices) OF
459                               Ext-TeleserviceCode
460
461 maxNumOfTeleservices INTEGER ::= 20
462
463 ODB-Data ::= SEQUENCE {
464     odb-GeneralData                ODB-GeneralData,
465     odb-HPLMN-Data                 ODB-HPLMN-Data           OPTIONAL,
466     extensionContainer              ExtensionContainer        OPTIONAL,
467     ...}
468
469 ODB-GeneralData ::= BIT STRING {
470     allOG-CallsBarred (0),
471     internationalOGCallsBarred (1),
472     internationalOGCallsNotToHPLMN-CountryBarred (2),
473     interzonalOGCallsBarred (6),
474     interzonalOGCallsNotToHPLMN-CountryBarred (7),
475     interzonalOGCallsAndInternationalOGCallsNotToHPLMN-CountryBarred (8),
476     premiumRateInformationOGCallsBarred (3),
477     premiumRateEntertainmentOGCallsBarred (4),
478     ss-AccessBarred (5),
479     allECT-Barred (9),
480     chargeableECT-Barred (10),
481     internationalECT-Barred (11),
482     interzonalECT-Barred (12),
483     doublyChargeableECT-Barred (13),
484     multipleECT-Barred (14)} (SIZE (15..32))
485 -- exception handling: reception of unknown bit assignments in the
486 -- ODB-GeneralData type shall be treated like unsupported ODB-GeneralData
487
488 ODB-HPLMN-Data ::= BIT STRING {
489     plmn-SpecificBarringType1 (0),
490     plmn-SpecificBarringType2 (1),
491     plmn-SpecificBarringType3 (2),
492     plmn-SpecificBarringType4 (3)} (SIZE (4..32))
493 -- exception handling: reception of unknown bit assignments in the
494 -- ODB-HPLMN-Data type shall be treated like unsupported ODB-HPLMN-Data
495
496 Ext-SS-InfoList ::= SEQUENCE SIZE (1..maxNumOfSS) OF
497                               Ext-SS-Info
498
499 Ext-SS-Info ::= CHOICE {
500     forwardingInfo                [0] Ext-ForwInfo,
501     callBarringInfo               [1] Ext-CallBarInfo,
502     cug-Info                       [2] CUG-Info,
503     ss-Data                       [3] Ext-SS-Data,
504     emlpp-Info                    [4] EMLPP-Info}
505
506
507 Ext-ForwInfo ::= SEQUENCE {
508     ss-Code                        SS-Code,
509     forwardingFeatureList           Ext-ForwFeatureList,
510     extensionContainer              [0] ExtensionContainer        OPTIONAL,
511     ...}
512
513 Ext-ForwFeatureList ::= SEQUENCE SIZE (1..maxNumOfExt-BasicServiceGroups) OF
514                               Ext-ForwFeature
515
516 Ext-ForwFeature ::= SEQUENCE {
517     basicService                   Ext-BasicServiceCode           OPTIONAL,
518     ss-Status [4] Ext-SS-Status,
519     forwardedToNumber              [5] ISDN-AddressString         OPTIONAL,
520     -- When this data type is sent from an HLR which supports CAMEL Phase 2
521     -- to a VLR that supports CAMEL Phase 2 the VLR shall not check the
522     -- format of the number
523     forwardedToSubaddress          [8] ISDN-SubaddressString     OPTIONAL,
524     forwardingOptions               [6] Ext-ForwOptions           OPTIONAL,
525     noReplyConditionTime           [7] Ext-NoRepCondTime         OPTIONAL,
526     extensionContainer              [9] ExtensionContainer        OPTIONAL,
527     ...}
528

```

529	Ext-SS-Status ::= OCTET STRING (SIZE (1..5))		
530	-- OCTET 1:		
531	--		
532	-- bits 8765: 0000 (unused)		
533	-- bits 4321: Used to convey the "P bit", "R bit", "A bit" and "Q bit",		
534	-- representing supplementary service state information		
535	-- as defined in TS GSM 03.11		
536	--		
537	-- bit 4: "Q bit"		
538	--		
539	-- bit 3: "P bit"		
540	--		
541	-- bit 2: "R bit"		
542	--		
543	-- bit 1: "A bit"		
544	--		
545	-- OCTETS 2-5: reserved for future use. They shall be discarded if		
546	-- received and not understood.		
547			
548			
549			
550	Ext-ForwOptions ::= OCTET STRING (SIZE (1..5))		
551	-- OCTET 1:		
552	--		
553	-- bit 8: notification to forwarding party		
554	-- 0 no notification		
555	-- 1 notification		
556	--		
557	-- bit 7: redirecting presentation		
558	-- 0 no presentation		
559	-- 1 presentation		
560	--		
561	-- bit 6: notification to calling party		
562	-- 0 no notification		
563	-- 1 notification		
564	--		
565	-- bit 5: 0 (unused)		
566	--		
567	-- bits 43: forwarding reason		
568	-- 00 ms not reachable		
569	-- 01 ms busy		
570	-- 10 no reply		
571	-- 11 unconditional		
572	--		
573	-- bits 21: 00 (unused)		
574	--		
575	-- OCTETS 2-5: reserved for future use. They shall be discarded if		
576	-- received and not understood.		
577			
578			
579	Ext-NoRepCondTime ::= INTEGER (1..100)		
580	-- Only values 5-30 are used.		
581	-- Values in the ranges 1-4 and 31-100 are reserved for future use		
582	-- If received:		
583	-- values 1-4 shall be mapped on to value 5		
584	-- values 31-100 shall be mapped on to value 30		
585			
586	Ext-CallBarInfo ::= SEQUENCE {		
587	ss-Code	SS-Code,	
588	callBarringFeatureList	Ext-CallBarFeatureList,	
589	extensionContainer	ExtensionContainer	OPTIONAL,
590	...		
591			
592	Ext-CallBarFeatureList ::= SEQUENCE SIZE (1..maxNumOfExt-BasicServiceGroups) OF		
593	Ext-CallBarringFeature		
594			
595	Ext-CallBarringFeature ::= SEQUENCE {		
596	basicService	Ext-BasicServiceCode	OPTIONAL,
597	ss-Status [4] Ext-SS-Status,		
598	extensionContainer	ExtensionContainer	OPTIONAL,
599	...		
600			
601	CUG-Info ::= SEQUENCE {		
602	cug-SubscriptionList	CUG-SubscriptionList,	
603	cug-FeatureList	CUG-FeatureList	OPTIONAL,
604	extensionContainer	[0] ExtensionContainer	OPTIONAL,
605	...		
606			


```

607 CUG-SubscriptionList ::= SEQUENCE SIZE (0..maxNumOfCUG) OF
608     CUG-Subscription
609
610 CUG-Subscription ::= SEQUENCE {
611     cug-Index CUG-Index,
612     cug-Interlock          CUG-Interlock,
613     intraCUG-Options      IntraCUG-Options,
614     basicServiceGroupList Ext-BasicServiceGroupList OPTIONAL,
615     extensionContainer    [0] ExtensionContainer OPTIONAL,
616     ...}
617
618 CUG-Index ::= INTEGER (0..32767)
619 -- The internal structure is defined in ETS 300 138.
620
621 CUG-Interlock ::= OCTET STRING (SIZE (4))
622
623 IntraCUG-Options ::= ENUMERATED {
624     noCUG-Restrictions (0),
625     cugIC-CallBarred (1),
626     cugOG-CallBarred (2)}
627
628 maxNumOfCUG INTEGER ::= 10
629
630 CUG-FeatureList ::= SEQUENCE SIZE (1..maxNumOfExt-BasicServiceGroups) OF
631     CUG-Feature
632
633 Ext-BasicServiceGroupList ::= SEQUENCE SIZE (1..maxNumOfExt-BasicServiceGroups) OF
634     Ext-BasicServiceCode
635
636 maxNumOfExt-BasicServiceGroups INTEGER ::= 32
637
638 CUG-Feature ::= SEQUENCE {
639     basicService          Ext-BasicServiceCode OPTIONAL,
640     preferentialCUG-Indicator CUG-Index OPTIONAL,
641     interCUG-Restrictions InterCUG-Restrictions,
642     extensionContainer    ExtensionContainer OPTIONAL,
643     ...}
644
645 InterCUG-Restrictions ::= OCTET STRING (SIZE (1))
646
647 -- bits 876543: 000000 (unused)
648 -- Exception handling:
649 -- bits 876543 shall be ignored if received and not understood
650
651 -- bits 21
652 -- 00 CUG only facilities
653 -- 01 CUG with outgoing access
654 -- 10 CUG with incoming access
655 -- 11 CUG with both outgoing and incoming access
656
657 Ext-SS-Data ::= SEQUENCE {
658     ss-Code          SS-Code,
659     ss-Status [4] Ext-SS-Status,
660     ss-SubscriptionOption SS-SubscriptionOption OPTIONAL,
661     basicServiceGroupList Ext-BasicServiceGroupList OPTIONAL,
662     extensionContainer    [5] ExtensionContainer OPTIONAL,
663     ...}
664
665 LCS-PrivacyExceptionList ::= SEQUENCE SIZE (1..maxNumOfPrivacyClass) OF
666     LCS-PrivacyClass
667
668 maxNumOfPrivacyClass INTEGER ::= 4

```

```

669
670 LCS-PrivacyClass ::= SEQUENCE {
671     ss-Code                SS-Code,
672     ss-Status              Ext-SS-Status,
673     privacyVerificationByMSuser [0] NULL OPTIONAL,
674     -- privacyVerificationByMSUser is expected only for SS-code = callunrelated
675     externalClientList     [10] ExternalClientList OPTIONAL,
676     -- externalClientList is expected only for SS-code = callunrelated
677     plmnClientList        [21] PLMNClientList OPTIONAL,
678     -- plmnClientList is expected only for SS-code = plmn
679     extensionContainer     [32] ExtensionContainer OPTIONAL,
680     -- if segmentation is used, the complete LCS-PrivacyClass shall be sent in one segment
681     ...}
682
683 ExternalClientList ::= SEQUENCE SIZE (0..maxNumOfExternalClient) OF
684     ExternalClient
685
686 maxNumOfExternalClient INTEGER ::= 5
687
688 PLMNClientList ::= SEQUENCE SIZE (1..maxNumOfPLMNClient) OF
689     LCSCClientInternalID
690
691 maxNumOfPLMNClient INTEGER ::= 5
692
693 ExternalClient ::= SEQUENCE {
694     clientIdentity          LCSCClientExternalID,
695     gmlc-Restriction       [0] GMLC-Restriction OPTIONAL,
696     notificationToMSUser  [1] NotificationToMSUser OPTIONAL,
697     extensionContainer     [21] ExtensionContainer OPTIONAL,
698     ...}
699
700 GMLC-Restriction ::= ENUMERATED {
701     hplmn-gmlc-List        (0),
702     home-Country          (1)}
703
704 NotificationToMSUser ::= ENUMERATED {
705     notification           (0),
706     notificationWithPrivacyVerification (1)}
707
708 MOLR-List ::= SEQUENCE SIZE (1..maxNumOfMOLR-Class) OF
709     MOLR-Class
710
711 maxNumOfMOLR-Class INTEGER ::= 3
712
713 MOLR-Class ::= SEQUENCE {
714     ss-Code                SS-Code,
715     ss-Status              Ext-SS-Status,
716     extensionContainer     [0] ExtensionContainer OPTIONAL,
717     ...}
718
719 ZoneCodeList ::= SEQUENCE SIZE (1..maxNumOfZoneCodes)
720     OF ZoneCode
721
722 ZoneCode ::= OCTET STRING (SIZE (2))
723     -- internal structure is defined in TS GSM 03.03
724
725 maxNumOfZoneCodes INTEGER ::= 10
726
727 InsertSubscriberDataRes ::= SEQUENCE {
728     teleserviceList        [1] TeleserviceList OPTIONAL,
729     bearerServiceList     [2] BearerServiceList OPTIONAL,
730     ss-List                [3] SS-List OPTIONAL,
731     odb-GeneralData       [4] ODB-GeneralData OPTIONAL,
732     regionalSubscriptionResponse [5] RegionalSubscriptionResponse OPTIONAL,
733     supportedCamelPhases  [6] SupportedCamelPhases OPTIONAL,
734     extensionContainer     [7] ExtensionContainer OPTIONAL,
735     ...}
736
737
738 RegionalSubscriptionResponse ::= ENUMERATED {
739     networkNode-AreaRestricted (0),
740     tooManyZoneCodes          (1),
741     zoneCodesConflict         (2),
742     regionalSubscNotSupported (3)}
743

```

744	DeleteSubscriberDataArg ::= SEQUENCE {		
745	imsi	[0] IMSI,	
746	basicServiceList	[1] BasicServiceList	OPTIONAL,
747	-- The exception handling for reception of unsupported/not allocated		
748	-- basicServiceCodes is defined in section 6.8.2		
749	ss-List	[2] SS-List	OPTIONAL,
750	roamingRestrictionDueToUnsupportedFeature	[4] NULL	OPTIONAL,
751	regionalSubscriptionIdentifier	[5] ZoneCode	OPTIONAL,
752	vbsGroupIndication	[7] NULL	OPTIONAL,
753	vgcsGroupIndication	[8] NULL	OPTIONAL,
754	camelSubscriptionInfoWithdraw	[9] NULL	OPTIONAL,
755	extensionContainer	[6] ExtensionContainer	OPTIONAL,
756	...		
757	gprsSubscriptionDataWithdraw	[10] GPRSSubscriptionDataWithdraw	OPTIONAL,
758	roamingRestrictedInSgsnDueToUnsupportedFeature	[11] NULL	OPTIONAL,
759	lsaInformationWithdraw	[12] LSAInformationWithdraw	OPTIONAL,
760	istInformationWithdraw	[13] NULL	OPTIONAL,
761	gmlc-ListWithdraw	[14] NULL	OPTIONAL }
762	EDITORIAL NOTE: gmlc-ListWithdraw ASN.1 tag for Release 98 is 13		
763	GPRSSubscriptionDataWithdraw ::= CHOICE {		
764	allGPRSData	NULL,	
765	contextIdList	ContextIdList}	
766			
767	ContextIdList ::= SEQUENCE SIZE (1..maxNumOfPDP-Contexts) OF		
768	ContextId		
769			
770	LSAInformationWithdraw ::= CHOICE {		
771	allLSAData	NULL,	
772	lsaIdentityList	LSAIdentityList }	
773			
774	LSAIdentityList ::= SEQUENCE SIZE (1..maxNumOfLSAs) OF		
775	LSAIdentity		
776			
777	BasicServiceList ::= SEQUENCE SIZE (1..maxNumOfBasicServices) OF		
778	Ext-BasicServiceCode		
779			
780	maxNumOfBasicServices INTEGER ::= 70		
781			
782	DeleteSubscriberDataRes ::= SEQUENCE {		
783	regionalSubscriptionResponse	[0]	
784		RegionalSubscriptionResponse	OPTIONAL,
785	extensionContainer	ExtensionContainer	OPTIONAL,
786	...}		
787			
788	VlrCamelSubscriptionInfo ::= SEQUENCE {		
789	o-CSI	[0] O-CSI	OPTIONAL,
790	extensionContainer	[1] ExtensionContainer	OPTIONAL,
791	...		
792	ss-CSI	[2] SS-CSI	OPTIONAL,
793	o-BcsmCamelTDP-CriteriaList	[4] O-BcsmCamelTDPCriteriaList	OPTIONAL,
794	tif-CSI	[3] NULL	OPTIONAL
795	}		
796			
797	SS-CSI ::= SEQUENCE {		
798	ss-CamelData	SS-CamelData,	
799	extensionContainer	ExtensionContainer	OPTIONAL,
800	...}		
801			
802	SS-CamelData ::= SEQUENCE {		
803	ss-EventList	SS-EventList,	
804	gsmSCF-Address	ISDN-AddressString,	
805	extensionContainer	[0] ExtensionContainer	OPTIONAL,
806	...		
807	}		
808			
809	SS-EventList ::= SEQUENCE SIZE (1..maxNumOfCamelSSEvents) OF SS-Code		
810	-- Actions for the following SS-Code values are defined in CAMEL Phase 2:		
811	-- ect	SS-Code ::= '00110001'B	
812	-- multiPTY	SS-Code ::= '01010001'B	
813	-- cd	SS-Code ::= '00100100'B	
814	-- all other SS codes shall be ignored		
815			
816	maxNumOfCamelSSEvents INTEGER ::= 10		
817			

```

818 O-CSI ::= SEQUENCE {
819   o-BcsmCamelTDPDataList          O-BcsmCamelTDPDataList,
820   extensionContainer              ExtensionContainer          OPTIONAL,
821   ...,
822   camelCapabilityHandling        [0] CamelCapabilityHandling  OPTIONAL
823 }
824
825 O-BcsmCamelTDPDataList ::= SEQUENCE SIZE (1..maxNumOfCamelTDPData) OF
826   O-BcsmCamelTDPData
827 --- O-BcsmCamelTDPDataList shall not contain more than one instance of
828 --- O-BcsmCamelTDPData containing the same value for o-BcsmTriggerDetectionPoint.
829 --- For CAMEL Phase 2, this means that only one instance of O-BcsmCamelTDPData is allowed
830 --- with o-BcsmTriggerDetectionPoint being equal to DP2.
831
832 maxNumOfCamelTDPData INTEGER ::= 10
833
834 O-BcsmCamelTDPData ::= SEQUENCE {
835   o-BcsmTriggerDetectionPoint      O-BcsmTriggerDetectionPoint,
836   serviceKey                       ServiceKey,
837   gsmSCF-Address                   [0] ISDN-AddressString,
838   defaultCallHandling              [1] DefaultCallHandling,
839   extensionContainer                [2] ExtensionContainer          OPTIONAL,
840   ...
841 }
842
843 ServiceKey ::= INTEGER (0..2147483647)
844
845 O-BcsmTriggerDetectionPoint ::= ENUMERATED {
846   collectedInfo (2),
847   ... }
848 -- exception handling:
849 -- For O-BcsmCamelTDPData sequences containing this parameter with any
850 -- other value than the ones listed the receiver shall ignore the whole
851 -- O-BcsmCamelTDPData sequence.
852 -- For O-BcsmCamelTDP-Criteria sequences containing this parameter with any
853 -- other value than the ones listed the receiver shall ignore the whole
854 -- O-BcsmCamelTDP-Criteria sequence.
855
856 O-BcsmCamelTDPCriteriaList ::= SEQUENCE SIZE (1..maxNumOfCamelTDPData) OF
857   O-BcsmCamelTDP-Criteria
858
859 O-BcsmCamelTDP-Criteria ::= SEQUENCE {
860   o-BcsmTriggerDetectionPoint      O-BcsmTriggerDetectionPoint,
861   destinationNumberCriteria        [0] DestinationNumberCriteria  OPTIONAL,
862   basicServiceCriteria             [1] BasicServiceCriteria        OPTIONAL,
863   callTypeCriteria                 [2] CallTypeCriteria            OPTIONAL,
864   ... }
865
866 DestinationNumberCriteria ::= SEQUENCE {
867   matchType                        [0] MatchType,
868   destinationNumberList            [1] DestinationNumberList    OPTIONAL,
869   destinationNumberLengthList     [2] DestinationNumberLengthList  OPTIONAL,
870   -- one or both of destinationNumberList and destinationNumberLengthList
871   -- shall be present
872   ... }
873
874 DestinationNumberList ::= SEQUENCE SIZE (1..maxNumOfCamelDestinationNumbers) OF
875   ISDN-AddressString
876 -- The receiving entity shall not check the format of a number in
877 -- the dialled number list
878
879 DestinationNumberLengthList ::= SEQUENCE SIZE (1..maxNumOfCamelDestinationNumberLengths) OF
880   INTEGER(1..maxNumOfISDN-AddressDigits)
881
882 BasicServiceCriteria ::= SEQUENCE SIZE(1..maxNumOfCamelBasicServiceCriteria) OF
883   Ext-BasicServiceCode
884
885 maxNumOfISDN-AddressDigits INTEGER ::= 15
886
887 maxNumOfCamelDestinationNumbers INTEGER ::= 10
888
889 maxNumOfCamelDestinationNumberLengths INTEGER ::= 3
890
891 maxNumOfCamelBasicServiceCriteria INTEGER ::= 5
892

```

```

893 CallTypeCriteria ::= ENUMERATED {
894     forwarded (0),
895     notForwarded (1)}
896
897 MatchType ::= ENUMERATED {
898     inhibiting (0),
899     enabling (1)}
900
901
902 DefaultCallHandling ::= ENUMERATED {
903     continueCall (0) ,
904     releaseCall (1) ,
905     ...}
906 -- exception handling:
907 -- reception of values in range 2-31 shall be treated as "continueCall"
908 -- reception of values greater than 31 shall be treated as "releaseCall"
909
910 CamelCapabilityHandling ::= INTEGER(1..16)
911 -- value 1 = CAMEL phase 1,
912 -- value 2 = CAMEL phase 2:
913 -- reception of values greater than 2 shall be treated as CAMEL phase 2
914
915 SupportedCamelPhases ::= BIT STRING {
916     phase1 (0),
917     phase2 (1) } (SIZE (1..16))
918
919
920 -- gprs location information retrieval types
921
922 SendRoutingInfoForGprsArg ::= SEQUENCE {
923     imsi [0] IMSI,
924     ggsn-Address [1] GSN-Address OPTIONAL,
925     extensionContainer [2] ExtensionContainer OPTIONAL,
926     ...}
927
928 SendRoutingInfoForGprsRes ::= SEQUENCE {
929     sgsn-Address [0] GSN-Address,
930     ggsn-Address [1] GSN-Address OPTIONAL,
931     mobileNotReachableReason [2] AbsentSubscriberDiagnosticSM OPTIONAL,
932     extensionContainer [3] ExtensionContainer OPTIONAL,
933     ...}
934
935 -- failure report types
936
937 FailureReportArg ::= SEQUENCE {
938     imsi [0] IMSI,
939     ggsn-Number [1] ISDN-AddressString ,
940     ggsn-Address [2] GSN-Address OPTIONAL,
941     extensionContainer [3] ExtensionContainer OPTIONAL,
942     ...}
943
944 FailureReportRes ::= SEQUENCE {
945     ggsn-Address [0] GSN-Address OPTIONAL,
946     extensionContainer [1] ExtensionContainer OPTIONAL,
947     ...}
948
949 -- gprs notification types
950
951 NoteMsPresentForGprsArg ::= SEQUENCE {
952     imsi [0] IMSI,
953     sgsn-Address [1] GSN-Address,
954     ggsn-Address [2] GSN-Address OPTIONAL,
955     extensionContainer [3] ExtensionContainer OPTIONAL,
956     ...}
957
958 NoteMsPresentForGprsRes ::= SEQUENCE {
959     extensionContainer [0] ExtensionContainer OPTIONAL,
960     ...}
961
962 -- fault recovery types
963
964
965 ResetArg ::= SEQUENCE {
966     hlr-Number ISDN-AddressString,
967     hlr-List HLR-List OPTIONAL,
968     ...}
969

```

```

970 RestoreDataArg ::= SEQUENCE {
971     imsi                IMSI,
972     lmsi                LMSI                OPTIONAL,
973     extensionContainer  ExtensionContainer  OPTIONAL,
974     ... ,
975     vlr-Capability     [6] VLR-Capability  OPTIONAL }
976
977 RestoreDataRes ::= SEQUENCE {
978     hlr-Number          ISDN-AddressString,
979     msNotReachable     NULL                OPTIONAL,
980     extensionContainer  ExtensionContainer  OPTIONAL,
981     ...}
982
983 -- VBS/VGCS types
984 VBSDataList ::= SEQUENCE SIZE (1..maxNumOfVBSGroupIds) OF
985     VoiceBroadcastData
986
987 VGCSDataList ::= SEQUENCE SIZE (1..maxNumOfVGCSGroupIds) OF
988     VoiceGroupCallData
989
990 maxNumOfVBSGroupIds  INTEGER ::= 50
991
992 maxNumOfVGCSGroupIds INTEGER ::= 50
993
994 VoiceGroupCallData ::= SEQUENCE {
995     groupId             GroupId,
996     extensionContainer  ExtensionContainer  OPTIONAL,
997     ...}
998
999 VoiceBroadcastData ::= SEQUENCE {
1000    groupid             GroupId,
1001    broadcastInitEntitlement  NULL                OPTIONAL,
1002    extensionContainer  ExtensionContainer  OPTIONAL,
1003    ...}
1004
1005 GroupId ::= OCTET STRING (SIZE (3))
1006 -- Refers to the Group Identification as specified in GSM TS 03.03
1007 -- and 03.68/ 03.69
1008
1009 -- provide subscriber info types
1010
1011 ProvideSubscriberInfoArg ::= SEQUENCE {
1012     imsi      [0] IMSI,
1013     lmsi      [1] LMSI                OPTIONAL,
1014     requestedInfo  [2] RequestedInfo,
1015     extensionContainer  [3] ExtensionContainer  OPTIONAL,
1016     ...}
1017
1018 ProvideSubscriberInfoRes ::= SEQUENCE {
1019     subscriberInfo  SubscriberInfo,
1020     extensionContainer  ExtensionContainer  OPTIONAL,
1021     ...}
1022
1023 SubscriberInfo ::= SEQUENCE {
1024     locationInformation  [0] LocationInformation  OPTIONAL,
1025     subscriberState     [1] SubscriberState     OPTIONAL,
1026     extensionContainer  [2] ExtensionContainer  OPTIONAL,
1027     ...}
1028
1029 RequestedInfo ::= SEQUENCE {
1030     locationInformation  [0] NULL                OPTIONAL,
1031     subscriberState     [1] NULL                OPTIONAL,
1032     extensionContainer  [2] ExtensionContainer  OPTIONAL,
1033     ...}
1034
1035 LocationInformation ::= SEQUENCE {
1036     ageOfLocationInformation  AgeOfLocationInformation  OPTIONAL,
1037     geographicalInformation  [0] GeographicalInformation  OPTIONAL,
1038     vlr-number              [1] ISDN-AddressString  OPTIONAL,
1039     locationNumber          [2] LocationNumber      OPTIONAL,
1040     cellIdOrLAI             [3] CellIdOrLAI        OPTIONAL,
1041     extensionContainer      [4] ExtensionContainer  OPTIONAL,
1042     ...}
1043

```

```

1044 GeographicalInformation ::= OCTET STRING (SIZE (8))
1045 -- Refers to geographical Information defined in GSM 03.32.
1046 -- Only the description of an ellipsoid point with uncertainty circle
1047 --as specified in GSM 03.32 is allowed to be used
1048 -- The internal structure according to GSM 03.32 is as follows:
1049 --     Type of shape (ellipsoid point with uncertainty circle)           1 octet
1050 --     Degrees of Latitude                                               3 octets
1051 --     Degrees of Longitude                                              3 octets
1052 --     Uncertainty code                                                  1 octet
1053
1054 LocationNumber ::= OCTET STRING (SIZE (2..10))
1055 -- the internal structure is defined in CCITT Rec Q.763
1056
1057 SubscriberState ::= CHOICE {
1058     assumedIdle                               [0] NULL,
1059     camelBusy [1] NULL,
1060     netDetNotReachable                       NotReachableReason,
1061     notProvidedFromVLR                       [2] NULL}
1062
1063 NotReachableReason ::= ENUMERATED {
1064     msPurged (0),
1065     imsiDetached (1),
1066     restrictedArea (2),
1067     notRegistered (3)}
1068
1069 -- any time interrogation info types
1070
1071 AnyTimeInterrogationArg ::= SEQUENCE {
1072     subscriberIdentity                       [0] SubscriberIdentity,
1073     requestedInfo                           [1] RequestedInfo,
1074     gsmSCF-Address                          [3] ISDN-AddressString,
1075     extensionContainer                       [2] ExtensionContainer OPTIONAL,
1076     ...}
1077
1078 AnyTimeInterrogationRes ::= SEQUENCE {
1079     subscriberInfo                           SubscriberInfo,
1080     extensionContainer                       ExtensionContainer OPTIONAL,
1081     ...}
1082
1083
1084

```

**** NEXT MODIFIED SECTION ****

17.7.5 Supplementary service codes

```

1  MAP-SS-Code {
2    ccitt identified-organization (4) etsi (0) mobileDomain (0)
3    gsm-Network (1) modules (3) map-SS-Code (15) version6 (6)}
4
5  DEFINITIONS
6
7  ::=
8
9  BEGIN
10
11 SS-Code ::= OCTET STRING (SIZE (1))
12 -- This type is used to represent the code identifying a single
13 -- supplementary service, a group of supplementary services, or
14 -- all supplementary services. The services and abbreviations
15 -- used are defined in TS GSM 02.04. The internal structure is
16 -- defined as follows:
17 --
18 -- bits 87654321: group (bits 8765), and specific service
19 -- (bits 4321)
20
21 allSS SS-Code ::= '00000000'B
22 -- reserved for possible future use
23 -- all SS
24

```

25	allLineIdentificationSS	SS-Code ::= '00010000'B
26	-- reserved for possible future use	
27	-- all line identification SS	
28	clip	SS-Code ::= '00010001'B
29	-- calling line identification presentation	
30	clir	SS-Code ::= '00010010'B
31	-- calling line identification restriction	
32	colp	SS-Code ::= '00010011'B
33	-- connected line identification presentation	
34	colr	SS-Code ::= '00010100'B
35	-- connected line identification restriction	
36	mci	SS-Code ::= '00010101'B
37	-- reserved for possible future use	
38	-- malicious call identification	
39		
40	allNameIdentificationSS	SS-Code ::= '00011000'B
41	-- all name identification SS	
42	cnap	SS-Code ::= '00011001'B
43	-- calling name presentation	
44		
45	-- SS-Codes '00011010'B to '00011111'B are reserved for future	
46	-- NameIdentification Supplementary Service use.	
47		
48	allForwardingSS	SS-Code ::= '00100000'B
49	-- all forwarding SS	
50	cfu	SS-Code ::= '00100001'B
51	-- call forwarding unconditional	
52	allCondForwardingSS	SS-Code ::= '00101000'B
53	-- all conditional forwarding SS	
54	cfb	SS-Code ::= '00101001'B
55	-- call forwarding on mobile subscriber busy	
56	cfnry	SS-Code ::= '00101010'B
57	-- call forwarding on no reply	
58	cfnrc	SS-Code ::= '00101011'B
59	-- call forwarding on mobile subscriber not reachable	
60	cd	SS-Code ::= '00100100'B
61	-- call deflection	
62		
63	allCallOfferingSS	SS-Code ::= '00110000'B
64	-- reserved for possible future use	
65	-- all call offering SS includes also all forwarding SS	
66	ect	SS-Code ::= '00110001'B
67	-- explicit call transfer	
68	mah	SS-Code ::= '00110010'B
69	-- reserved for possible future use	
70	-- mobile access hunting	
71		
72	allCallCompletionSS	SS-Code ::= '01000000'B
73	-- reserved for possible future use	
74	-- all Call completion SS	
75	cw	SS-Code ::= '01000001'B
76	-- call waiting	
77	hold	SS-Code ::= '01000010'B
78	-- call hold	
79	ccbs-A	SS-Code ::= '01000011'B
80	-- completion of call to busy subscribers, originating side	
81	ccbs-B	SS-Code ::= '01000100'B
82	-- completion of call to busy subscribers, destination side	
83	-- this SS-Code is used only in InsertSubscriberData	
84		
85	allMultiPartySS	SS-Code ::= '01010000'B
86	-- reserved for possible future use	
87	-- all multiparty SS	
88	multiPTY	SS-Code ::= '01010001'B
89	-- multiparty	
90		
91	allCommunityOfInterest-SS	SS-Code ::= '01100000'B
92	-- reserved for possible future use	
93	-- all community of interest SS	
94	cug	SS-Code ::= '01100001'B
95	-- closed user group	
96		

97	allChargingSS	SS-Code ::= '01110000'B
98	-- reserved for possible future use	
99	-- all charging SS	
100	aoci	SS-Code ::= '01110001'B
101	-- advice of charge information	
102	aocc	SS-Code ::= '01110010'B
103	-- advice of charge charging	
104		
105	allAdditionalInfoTransferSS	SS-Code ::= '10000000'B
106	-- reserved for possible future use	
107	-- all additional information transfer SS	
108	uus1	SS-Code ::= '10000001'B
109	-- UUS1 user-to-user signalling	
110	uus2	SS-Code ::= '10000010'B
111	-- UUS2 user-to-user signalling	
112	uus3	SS-Code ::= '10000011'B
113	-- UUS3 user-to-user signalling	
114		
115	allBarringSS	SS-Code ::= '10010000'B
116	-- all barring SS	
117	barringOfOutgoingCalls	SS-Code ::= '10010001'B
118	-- barring of outgoing calls	
119	baoc	SS-Code ::= '10010010'B
120	-- barring of all outgoing calls	
121	boic	SS-Code ::= '10010011'B
122	-- barring of outgoing international calls	
123	boicExHC	SS-Code ::= '10010100'B
124	-- barring of outgoing international calls except those directed	
125	-- to the home PLMN	
126	barringOfIncomingCalls	SS-Code ::= '10011001'B
127	-- barring of incoming calls	
128	baic	SS-Code ::= '10011010'B
129	-- barring of all incoming calls	
130	bicRoam	SS-Code ::= '10011011'B
131	-- barring of incoming calls when roaming outside home PLMN	
132	-- Country	
133		
134	allPLMN-specificSS	SS-Code ::= '11110000'B
135	plmn-specificSS-1	SS-Code ::= '11110001'B
136	plmn-specificSS-2	SS-Code ::= '11110010'B
137	plmn-specificSS-3	SS-Code ::= '11110011'B
138	plmn-specificSS-4	SS-Code ::= '11110100'B
139	plmn-specificSS-5	SS-Code ::= '11110101'B
140	plmn-specificSS-6	SS-Code ::= '11110110'B
141	plmn-specificSS-7	SS-Code ::= '11110111'B
142	plmn-specificSS-8	SS-Code ::= '11111000'B
143	plmn-specificSS-9	SS-Code ::= '11111001'B
144	plmn-specificSS-A	SS-Code ::= '11111010'B
145	plmn-specificSS-B	SS-Code ::= '11111011'B
146	plmn-specificSS-C	SS-Code ::= '11111100'B
147	plmn-specificSS-D	SS-Code ::= '11111101'B
148	plmn-specificSS-E	SS-Code ::= '11111110'B
149	plmn-specificSS-F	SS-Code ::= '11111111'B
150		
151	allCallPrioritySS	SS-Code ::= '10100000'B
152	-- reserved for possible future use	
153	-- all call priority SS	
154	emlpp	SS-Code ::= '10100001'B
155	-- enhanced Multilevel Precedence Pre-emption (EMLPP) service	
156		
157	allLCSPrivacyException	SS-Code ::= '10110000'B
158	-- all LCS Privacy Exception Classes	
159	universal	SS-Code ::= '10110001'B
160	-- allow location by any LCS client	
161	callrelated	SS-Code ::= '10110010'B
162	-- allow location by any value added LCS client to which a call	
163	-- is established from the target MS	
164	callunrelated	SS-Code ::= '10110011'B
165	-- allow location by designated external value added LCS clients	
166	plmnoperator	SS-Code ::= '10110100'B
167	-- allow location by designated PLMN operator LCS clients	
168		

```

169 allMOLR-SS SS-Code ::= '10110000'B
170 -- all Mobile Originating Location Request Classes
171 basicSelfLocation SS-Code ::= '10110001'B
172 -- allow an MS to request its own location
173 autonomousSelfLocation SS-Code ::= '10110010'B
174 -- allow an MS to perform self location without interaction
175 -- with the PLMN for a predetermined period of time
176 transferToThirdParty SS-Code ::= '10110011'B
177 -- allow an MS to request transfer of its location to another LCS client
178 EDITORIAL NOTE: the above MOLR codes also need to be added to Release 98 09.02
179
180 END

```

**** NEXT MODIFIED SECTION ****

17.7.7 Error data types

```

1 MAP-ER-DataTypes {
2   ccitt identified-organization (4) etsi (0) mobileDomain (0)
3   gsm-Network (1) modules (3) map-ER-DataTypes (17) version6 (6)}
4
5 DEFINITIONS
6
7 IMPLICIT TAGS
8
9 ::=
10
11 BEGIN
12
13 EXPORTS
14   RoamingNotAllowedParam,
15   CallBarredParam,
16   CUG-RejectParam,
17   SS-IncompatibilityCause,
18   PW-RegistrationFailureCause,
19   SM-DeliveryFailureCause,
20   SystemFailureParam,
21   DataMissingParam,
22   UnexpectedDataParam,
23   FacilityNotSupParam,
24   OR-NotAllowedParam,
25   UnknownSubscriberParam,
26   NumberChangedParam,
27   UnidentifiedSubParam,
28   IllegalSubscriberParam,
29   IllegalEquipmentParam,
30   BearerServNotProvParam,
31   TeleservNotProvParam,
32   TracingBufferFullParam,
33   NoRoamingNbParam,
34   AbsentSubscriberParam,
35   BusySubscriberParam,
36   NoSubscriberReplyParam,
37   ForwardingViolationParam,
38   ForwardingFailedParam,
39   ATI-NotAllowedParam,
40   SubBusyForMT-SMS-Param,
41   MessageWaitListFullParam,
42   AbsentSubscriberSM-Param,
43   AbsentSubscriberDiagnosticSM,
44   ResourceLimitationParam,
45   NoGroupCallNbParam,
46   IncompatibleTerminalParam,
47   ShortTermDenialParam,
48   LongTermDenialParam,
49   UnauthorizedRequestingNetwork-Param,
50   UnauthorizedLCSClient-Param,
51   PositionMethodFailure-Param,
52   PositionMethodFailureWithRestart-Param,
53   LMUUnknownOrOffline-Param,
54   TrafficChannelEstablishmentFailure-Param,
55   UnknownOrUnreachableLCSClient-Param
56

```

```

57
58 ;
59
60 IMPORTS
61   SS-Status
62 FROM MAP-SS-DataTypes {
63   ccitt identified-organization (4) etsi (0) mobileDomain (0)
64   gsm-Network (1) modules (3) map-SS-DataTypes (14) version6 (6)}
65
66   SignalInfo,
67   BasicServiceCode,
68   NetworkResource
69 FROM MAP-CommonDataTypes {
70   ccitt identified-organization (4) etsi (0) mobileDomain (0)
71   gsm-Network (1) modules (3) map-CommonDataTypes (18) version6 (6)}
72
73   SS-Code
74 FROM MAP-SS-Code {
75   ccitt identified-organization (4) etsi (0) mobileDomain (0)
76   gsm-Network (1) modules (3) map-SS-Code (15) version6 (6)}
77
78   ExtensionContainer
79 FROM MAP-ExtensionDataTypes {
80   ccitt identified-organization (4) etsi (0) mobileDomain (0)
81   gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version6 (6)}
82 ;
83

```

```

84 RoamingNotAllowedParam ::= SEQUENCE {
85   roamingNotAllowedCause          RoamingNotAllowedCause,
86   extensionContainer              ExtensionContainer          OPTIONAL,
87   ...}
88

```

```

89 RoamingNotAllowedCause ::= ENUMERATED {
90   plmnRoamingNotAllowed (0),
91   operatorDeterminedBarring (3)}
92

```

```

93 CallBarredParam ::= CHOICE {
94   callBarringCause                CallBarringCause,
95   -- call BarringCause must not be used in version 3
96   extensibleCallBarredParam       ExtensibleCallBarredParam
97   -- extensibleCallBarredParam must not be used in version <3
98   }
99

```

```

100 CallBarringCause ::= ENUMERATED {
101   barringServiceActive (0),
102   operatorBarring (1)}
103

```

```

104 ExtensibleCallBarredParam ::= SEQUENCE {
105   callBarringCause                CallBarringCause          OPTIONAL,
106   extensionContainer              ExtensionContainer          OPTIONAL,
107   ... ,
108   unauthorisedMessageOriginator  [1] NULL              OPTIONAL }
109

```

```

110 CUG-RejectParam ::= SEQUENCE {
111   cug-RejectCause                 CUG-RejectCause          OPTIONAL,
112   extensionContainer              ExtensionContainer          OPTIONAL,
113   ...}
114

```

```

115 CUG-RejectCause ::= ENUMERATED {
116   incomingCallsBarredWithinCUG (0),
117   subscriberNotMemberOfCUG (1),
118   requestedBasicServiceViolatesCUG-Constraints (5),
119   calledPartySS-InteractionViolation (7)}
120

```

```

121 SS-IncompatibilityCause ::= SEQUENCE {
122   ss-Code                         [1] SS-Code              OPTIONAL,
123   basicService                    BasicServiceCode          OPTIONAL,
124   ss-Status [4] SS-Status          OPTIONAL,
125   ...}
126

```

```

127 PW-RegistrationFailureCause ::= ENUMERATED {
128   undetermined (0),
129   invalidFormat (1),
130   newPasswordsMismatch (2)}
131
132

```

```

133 SM-EnumeratedDeliveryFailureCause ::= ENUMERATED {
134     memoryCapacityExceeded (0),
135     equipmentProtocolError (1),
136     equipmentNotSM-Equipped (2),
137     unknownServiceCentre (3),
138     sc-Congestion (4),
139     invalidSME-Address (5),
140     subscriberNotSC-Subscriber (6)}
141
142 SM-DeliveryFailureCause ::= SEQUENCE {
143     sm-EnumeratedDeliveryFailureCause SM-EnumeratedDeliveryFailureCause,
144     diagnosticInfo SignalInfo OPTIONAL,
145     extensionContainer ExtensionContainer OPTIONAL,
146     ...}
147
148 AbsentSubscriberSM-Param ::= SEQUENCE {
149     absentSubscriberDiagnosticSM AbsentSubscriberDiagnosticSM OPTIONAL,
150     -- AbsentSubscriberDiagnosticSM can be either for non-GPRS
151     -- or for GPRS
152     extensionContainer ExtensionContainer OPTIONAL,
153     ...,
154     additionalAbsentSubscriberDiagnosticSM [0] AbsentSubscriberDiagnosticSM OPTIONAL }
155     -- if received, additionalAbsentSubscriberDiagnosticSM
156     -- is for GPRS and absentSubscriberDiagnosticSM is
157     -- for non-GPRS
158
159 AbsentSubscriberDiagnosticSM ::= INTEGER (0..255)
160     -- AbsentSubscriberDiagnosticSM values are defined in ETS 300 536 (GSM 03.40)
161
162 SystemFailureParam ::= CHOICE {
163     networkResource NetworkResource,
164     -- networkResource must not be used in version 3
165     extensibleSystemFailureParam ExtensibleSystemFailureParam
166     -- extensibleSystemFailureParam must not be used in version <3
167 }
168
169 ExtensibleSystemFailureParam ::= SEQUENCE {
170     networkResource NetworkResource OPTIONAL,
171     extensionContainer ExtensionContainer OPTIONAL,
172     ...}
173
174 DataMissingParam ::= SEQUENCE {
175     extensionContainer ExtensionContainer OPTIONAL,
176     ...}
177
178 UnexpectedDataParam ::= SEQUENCE {
179     extensionContainer ExtensionContainer OPTIONAL,
180     ...}
181
182 FacilityNotSupParam ::= SEQUENCE {
183     extensionContainer ExtensionContainer OPTIONAL,
184     ...}
185
186 OR-NotAllowedParam ::= SEQUENCE {
187     extensionContainer ExtensionContainer OPTIONAL,
188     ...}
189
190 UnknownSubscriberParam ::= SEQUENCE {
191     extensionContainer ExtensionContainer OPTIONAL,
192     ...,
193     unknownSubscriberDiagnostic UnknownSubscriberDiagnostic OPTIONAL}
194
195 UnknownSubscriberDiagnostic ::= ENUMERATED {
196     imsiUnknown (0),
197     gprsSubscriptionUnknown (1),
198     ...}
199     -- if unknown values are received in
200     -- unknownSubscriberDiagnostic they shall be discarded
201
202
203 NumberChangedParam ::= SEQUENCE {
204     extensionContainer ExtensionContainer OPTIONAL,
205     ...}
206

```

207	UnidentifiedSubParam ::= SEQUENCE {		
208	extensionContainer	ExtensionContainer	OPTIONAL,
209	...}		
210			
211	IllegalSubscriberParam ::= SEQUENCE {		
212	extensionContainer	ExtensionContainer	OPTIONAL,
213	...}		
214			
215	IllegalEquipmentParam ::= SEQUENCE {		
216	extensionContainer	ExtensionContainer	OPTIONAL,
217	...}		
218			
219	BearerServNotProvParam ::= SEQUENCE {		
220	extensionContainer	ExtensionContainer	OPTIONAL,
221	...}		
222			
223	TeleservNotProvParam ::= SEQUENCE {		
224	extensionContainer	ExtensionContainer	OPTIONAL,
225	...}		
226			
227	TracingBufferFullParam ::= SEQUENCE {		
228	extensionContainer	ExtensionContainer	OPTIONAL,
229	...}		
230			
231	NoRoamingNbParam ::= SEQUENCE {		
232	extensionContainer	ExtensionContainer	OPTIONAL,
233	...}		
234			
235	AbsentSubscriberParam ::= SEQUENCE {		
236	extensionContainer	ExtensionContainer	OPTIONAL,
237	...,		
238	absentSubscriberReason	[0] AbsentSubscriberReason	OPTIONAL}
239			
240	AbsentSubscriberReason ::= ENUMERATED {		
241	imsiDetach (0),		
242	restrictedArea (1),		
243	noPageResponse (2),		
244	...}		
245	-- exception handling: at reception of other values than the ones listed the		
246	-- AbsentSubscriberReason shall be ignored.		
247			
248	BusySubscriberParam ::= SEQUENCE {		
249	extensionContainer	ExtensionContainer	OPTIONAL,
250	...,		
251	ccbs-Possible	[0] NULL	OPTIONAL,
252	ccbs-Busy [1] NULL	OPTIONAL}	
253			
254	NoSubscriberReplyParam ::= SEQUENCE {		
255	extensionContainer	ExtensionContainer	OPTIONAL,
256	...}		
257			
258	ForwardingViolationParam ::= SEQUENCE {		
259	extensionContainer	ExtensionContainer	OPTIONAL,
260	...}		
261			
262	ForwardingFailedParam ::= SEQUENCE {		
263	extensionContainer	ExtensionContainer	OPTIONAL,
264	...}		
265			
266	ATI-NotAllowedParam ::= SEQUENCE {		
267	extensionContainer	ExtensionContainer	OPTIONAL,
268	...}		
269			
270	SubBusyForMT-SMS-Param ::= SEQUENCE {		
271	extensionContainer	ExtensionContainer	OPTIONAL,
272	...,		
273	gprsConnectionSuspended	NULL	OPTIONAL }
274	-- If GprsConnectionSuspended is not understood it shall		
275	-- be discarded		
276			
277	MessageWaitListFullParam ::= SEQUENCE {		
278	extensionContainer	ExtensionContainer	OPTIONAL,
279	...}		
280			

```

281 ResourceLimitationParam ::= SEQUENCE {
282     extensionContainer          ExtensionContainer          OPTIONAL,
283     ... }
284
285 NoGroupCallNbParam ::= SEQUENCE {
286     extensionContainer          ExtensionContainer          OPTIONAL,
287     ... }
288
289 IncompatibleTerminalParam ::= SEQUENCE {
290     extensionContainer          ExtensionContainer          OPTIONAL,
291     ... }
292
293 ShortTermDenialParam ::= SEQUENCE {
294     ... }
295
296 LongTermDenialParam ::= SEQUENCE {
297     ... }
298
299 UnauthorizedRequestingNetwork-Param ::= SEQUENCE {
300     extensionContainer          ExtensionContainer          OPTIONAL,
301     ... }
302
303 UnauthorizedLCSCClient-Param ::= SEQUENCE {
304     unauthorizedLCSCClient-Diagnostic [0] UnauthorizedLCSCClient-Diagnostic OPTIONAL,
305     extensionContainer                [1] ExtensionContainer          OPTIONAL,
306     ... }
307
308 UnauthorizedLCSCClient-Diagnostic ::= ENUMERATED {
309     noAdditionalInformation (0),
310     clientNotInMSPrivacyExceptionList (1),
311     callToClientNotSetup (2),
312     privacyOverrideNotApplicable (3),
313     disallowedByLocalRegulatoryRequirements (4),
314     ... }
315 -- exception handling:
316 -- any unrecognized value shall be ignored
317
318 PositionMethodFailure-Param ::= SEQUENCE {
319     positionMethodFailure-Diagnostic [0] PositionMethodFailure-Diagnostic OPTIONAL,
320     extensionContainer                [1] ExtensionContainer          OPTIONAL,
321     ... }
322
323 PositionMethodFailure-Diagnostic ::= ENUMERATED {
324     congestion (0),
325     insufficientResources (1),
326     insufficientMeasurementData (2),
327     inconsistentMeasurementData (3),
328     locationProcedureNotCompleted (4),
329     locationProcedureNotSupportedByTargetMS (5),
330     qosNotAttainable (6),
331     ... }
332 -- exception handling:
333 -- any unrecognized value shall be ignored
334
335 PositionMethodFailureWithRestart-Param ::= SEQUENCE {
336     extensionContainer          ExtensionContainer          OPTIONAL,
337     ... }
338
339 LMUUnknownOrOffline-Param ::= SEQUENCE {
340     extensionContainer          ExtensionContainer          OPTIONAL,
341     ... }
342
343 TrafficChannelEstablishmentFailure-Param ::= SEQUENCE {
344     extensionContainer          ExtensionContainer          OPTIONAL,
345     ... }
346
347 UnknownOrUnreachableLCSCClient-Param ::= SEQUENCE {
348     extensionContainer          ExtensionContainer          OPTIONAL,
349     ... }
350
351
352 END

```

**** NEXT MODIFIED SECTION ****

17.7.8 Common data types

```

1  MAP-CommonDataTypes {
2      ccitt identified-organization (4) etsi (0) mobileDomain (0)
3      gsm-Network (1) modules (3) map-CommonDataTypes (18) version6 (6)}
4
5  DEFINITIONS
6
7  IMPLICIT TAGS
8
9  ::=
10
11 BEGIN
12
13 EXPORTS
14
15     -- general data types and values
16     AddressString,
17     ISDN-AddressString,
18     maxISDN-AddressLength,
19     ISDN-SubaddressString,
20     ExternalSignalInfo,
21     Ext-ExternalSignalInfo,
22     SignalInfo,
23     maxSignalInfoLength,
24     AlertingPattern,
25
26     -- data types for numbering and identification
27     IMSI,
28     TMSI,
29     Identity,
30     SubscriberId,
31     IMEI,
32     HLR-List,
33     LMSI,
34     GlobalCellId,
35     NetworkResource,
36     NAEA-PreferredCI,
37     NAEA-CIC,
38     ASCI-CallReference,
39     SubscriberIdentity,
40
41     -- data types for CAMEL
42     CellIdOrLAI,
43
44     -- data types for subscriber management
45     BasicServiceCode,
46     Ext-BasicServiceCode,
47     EMLPP-Info,
48     EMLPP-Priority,
49
50     -- data types for geographic location
51     AgeOfLocationInformation,
52     LCSCClientExternalID,
53     LCSCClientInternalID
54 ;
55
56 IMPORTS
57     TeleserviceCode,
58     Ext-TeleserviceCode
59 FROM MAP-TS-Code {
60     ccitt identified-organization (4) etsi (0) mobileDomain (0)
61     gsm-Network (1) modules (3) map-TS-Code (19) version6 (6)}
62
63     BearerServiceCode,
64     Ext-BearerServiceCode
65 FROM MAP-BS-Code {
66     ccitt identified-organization (4) etsi (0) mobileDomain (0)
67     gsm-Network (1) modules (3) map-BS-Code (20) version6 (6)}
68
69     ExtensionContainer
70 FROM MAP-ExtensionDataTypes {
71     ccitt identified-organization (4) etsi (0) mobileDomain (0)
72     gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version6 (6)}
73 ;
74
75

```

```

76 -- general data types
77
78 TBCD-STRING ::= OCTET STRING
79 -- This type (Telephony Binary Coded Decimal String) is used to
80 -- represent several digits from 0 through 9, *, #, a, b, c, two
81 -- digits per octet, each digit encoded 0000 to 1001 (0 to 9),
82 -- 1010 (*), 1011 (#), 1100 (a), 1101 (b) or 1110 (c); 1111 used
83 -- as filler when there is an odd number of digits.
84
85 -- bits 8765 of octet n encoding digit 2n
86 -- bits 4321 of octet n encoding digit 2(n-1) +1
87
88 AddressString ::= OCTET STRING (SIZE (1..maxAddressLength))
89 -- This type is used to represent a number for addressing
90 -- purposes. It is composed of
91 -- a) one octet for nature of address, and numbering plan
92 -- indicator.
93 -- b) digits of an address encoded as TBCD-String.
94
95 -- a) The first octet includes a one bit extension indicator, a
96 -- 3 bits nature of address indicator and a 4 bits numbering
97 -- plan indicator, encoded as follows:
98
99 -- bit 8: 1 (no extension)
100
101 -- bits 765: nature of address indicator
102 -- 000 unknown
103 -- 001 international number
104 -- 010 national significant number
105 -- 011 network specific number
106 -- 100 subscriber number
107 -- 101 reserved
108 -- 110 abbreviated number
109 -- 111 reserved for extension
110
111 -- bits 4321: numbering plan indicator
112 -- 0000 unknown
113 -- 0001 ISDN/Telephony Numbering Plan (Rec CCITT E.164)
114 -- 0010 spare
115 -- 0011 data numbering plan (CCITT Rec X.121)
116 -- 0100 telex numbering plan (CCITT Rec F.69)
117 -- 0101 spare
118 -- 0110 land mobile numbering plan (CCITT Rec E.212)
119 -- 0111 spare
120 -- 1000 national numbering plan
121 -- 1001 private numbering plan
122 -- 1111 reserved for extension
123
124 -- all other values are reserved.
125
126 -- b) The following octets representing digits of an address
127 -- encoded as a TBCD-STRING.
128
129 maxAddressLength INTEGER ::= 20
130
131 ISDN-AddressString ::=
132 AddressString (SIZE (1..maxISDN-AddressLength))
133 -- This type is used to represent ISDN numbers.
134
135 maxISDN-AddressLength INTEGER ::= 9
136

```



```

137 ISDN-SubaddressString ::=
138     OCTET STRING (SIZE (1..maxISDN-SubaddressLength))
139     -- This type is used to represent ISDN subaddresses.
140     -- It is composed of
141     -- a) one octet for type of subaddress and odd/even indicator.
142     -- b) 20 octets for subaddress information.
143
144     -- a) The first octet includes a one bit extension indicator, a
145     --     3 bits type of subaddress and a one bit odd/even indicator,
146     --     encoded as follows:
147
148     -- bit 8: 1 (no extension)
149
150     -- bits 765: type of subaddress
151     --     000 NSAP (X.213/ISO 8348 AD2)
152     --     010 User Specified
153     --     All other values are reserved
154
155     -- bit 4: odd/even indicator
156     --     0 even number of address signals
157     --     1 odd number of address signals
158     --     The odd/even indicator is used when the type of subaddress
159     --     is "user specified" and the coding is BCD.
160
161     -- bits 321: 000 (unused)
162
163     -- b) Subaddress information.
164     -- The NSAP X.213/ISO8348AD2 address shall be formatted as specified
165     -- by octet 4 which contains the Authority and Format Identifier
166     -- (AFI). The encoding is made according to the "preferred binary
167     -- encoding" as defined in X.213/ISO834AD2. For the definition
168     -- of this type of subaddress, see CCITT Rec I.334.
169
170     -- For User-specific subaddress, this field is encoded according
171     -- to the user specification, subject to a maximum length of 20
172     -- octets. When interworking with X.25 networks BCD coding should
173     -- be applied.
174
175 maxISDN-SubaddressLength INTEGER ::= 21
176
177 ExternalSignalInfo ::= SEQUENCE {
178     protocolId          ProtocolId,
179     signalInfo          SignalInfo,
180     -- Information about the internal structure is given in
181     -- subclause 7.6.9.
182     extensionContainer  ExtensionContainer OPTIONAL,
183     -- extensionContainer must not be used in version 2
184     ...}
185
186 SignalInfo ::= OCTET STRING (SIZE (1..maxSignalInfoLength))
187
188 maxSignalInfoLength INTEGER ::= 200
189     -- This NamedValue represents the theoretical maximum number of
190     -- octets which are available to carry a single data type,
191     -- without requiring segmentation to cope with the network layer
192     -- service. However, the actual maximum size available for a data
193     -- type may be lower, especially when other information elements
194     -- have to be included in the same component.
195
196 ProtocolId ::= ENUMERATED {
197     gsm-0408 (1),
198     gsm-0806 (2),
199     gsm-BSSMAP (3),
200     -- Value 3 is reserved and must not be used
201     ets-300102-1 (4)}
202
203 Ext-ExternalSignalInfo ::= SEQUENCE {
204     ext-ProtocolId      Ext-ProtocolId,
205     signalInfo          SignalInfo,
206     -- Information about the internal structure is given in
207     -- subclause 7.6.9.10
208     extensionContainer  ExtensionContainer OPTIONAL,
209     ...}
210

```

```

211 Ext-ProtocolId ::= ENUMERATED {
212     ets-300356 (1),
213     ...
214     gsm-0471 (2),
215     -- Value 2 refers to the smlc-lmu messages defined in GSM 04.71
216     gsm-0871 (3)
217     -- Value 3 refers to the SMLC-BSC messages defined in GSM 08.71
218 }
219 -- exception handling:
220 -- For Ext-ExternalSignalInfo sequences containing this parameter with any
221 -- other value than the ones listed the receiver shall ignore the whole
222 -- Ext-ExternalSignalInfo sequence.
223

```

```

224 AlertingPattern ::= OCTET STRING (SIZE (1) )
225 -- This type is used to represent Alerting Pattern
226
227 -- bits 8765 : 0000 (unused)
228
229 -- bits 43 : type of Pattern
230 --     00 level
231 --     01 category
232 --     10 category
233 --     all other values are reserved.
234
235 -- bits 21 : type of alerting
236
237 alertingLevel-0 AlertingPattern ::= '00000000'B
238 alertingLevel-1 AlertingPattern ::= '00000001'B
239 alertingLevel-2 AlertingPattern ::= '00000010'B
240 -- all other values of Alerting level are reserved
241 -- Alerting Levels are defined in GSM 02.07
242
243 alertingCategory-1 AlertingPattern ::= '00000100'B
244 alertingCategory-2 AlertingPattern ::= '00000101'B
245 alertingCategory-3 AlertingPattern ::= '00000110'B
246 alertingCategory-4 AlertingPattern ::= '00000111'B
247 alertingCategory-5 AlertingPattern ::= '00001000'B
248 -- all other values of Alerting Category are reserved
249 -- Alerting categories are defined in GSM 02.07
250

```

```

251 -- data types for numbering and identification
252

```

```

253
254 IMSI ::= TBCD-STRING (SIZE (3..8))
255 -- digits of MCC, MNC, MSIN are concatenated in this order.
256

```

```

257 Identity ::= CHOICE {
258     imsi                               IMSI,
259     imsi-WithLMSI                     IMSI-WithLMSI}
260

```

```

261 IMSI-WithLMSI ::= SEQUENCE {
262     imsi                               IMSI,
263     lmsi                               LMSI,
264     -- a special value 00000000 indicates that the LMSI is not in use
265     ...}
266

```

```

267 ASCII-CallReference ::= TBCD-STRING (SIZE (1..8))
268 -- digits of VGCS/VBC-area,Group-ID are concatenated in this order.
269

```

```

270
271 TMSI ::= OCTET STRING (SIZE (1..4))
272

```

```

273 SubscriberId ::= CHOICE {
274     imsi                               [0] IMSI,
275     tmsi                               [1] TMSI}
276

```

```

277 IMEI ::= TBCD-STRING (SIZE (8))
278 -- Refers to International Mobile Station Equipment Identity
279 -- and Software Version Number (SVN) defined in TS GSM 03.03.
280 -- If the SVN is not present the last octet shall contain the
281 -- digit 0 and a filler.
282 -- If present the SVN shall be included in the last octet.
283

```

```

284 HLR-Id ::= IMSI
285 -- leading digits of IMSI, i.e. (MCC, MNC, leading digits of
286 -- MSIN) forming HLR Id defined in TS GSM 03.03.
287

```

```

288 HLR-List ::= SEQUENCE SIZE (1..maxNumOfHLR-Id) OF
289         HLR-Id
290
291 maxNumOfHLR-Id INTEGER ::= 50
292
293 LMSI ::= OCTET STRING (SIZE (4))
294
295 GlobalCellId ::= OCTET STRING (SIZE (5..7))
296     -- Refers to Cell Global Identification defined in TS GSM 03.03.
297     -- The internal structure is defined as follows:
298     -- octet 1 bits 4321      Mobile Country Code 1st digit
299     --           bits 8765      Mobile Country Code 2nd digit
300     -- octet 2 bits 4321      Mobile Country Code 3rd digit
301     --           bits 8765      Mobile Network Code 3rd digit
302     --                               or filler (1111) for 2 digit MNCs
303     -- octet 3 bits 4321      Mobile Network Code 1st digit
304     --           bits 8765      Mobile Network Code 2nd digit
305     -- octets 4 and 5        Location Area Code according to TS GSM 04.08
306     -- octets 6 and 7        Cell Identity (CI) according to TS GSM 04.08
307
308 NetworkResource ::= ENUMERATED {
309     plmn (0),
310     hlr (1),
311     vlr (2),
312     pvlr (3),
313     controllingMSC (4),
314     vmsc (5),
315     eir (6),
316     rss (7)}
317
318 NAEA-PreferredCI ::= SEQUENCE {
319     naea-PreferredCIC [0] NAEA-CIC,
320     extensionContainer [1] ExtensionContainer OPTIONAL,
321     ...}
322
323 NAEA-CIC ::= OCTET STRING (SIZE (3))
324     -- The internal structure is defined by the Carrier Identification
325     -- parameter in ANSI T1.113.3. Carrier codes between "000" and "999" may
326     -- be encoded as 3 digits using "000" to "999" or as 4 digits using
327     -- "0000" to "0999". Carrier codes between "1000" and "9999" are encoded
328     -- using 4 digits.
329
330 SubscriberIdentity ::= CHOICE {
331     imsi [0] IMSI,
332     msisdn [1] ISDN-AddressString
333     }
334
335 LCSCClientExternalID ::= SEQUENCE {
336     externalAddress [0] AddressString OPTIONAL,
337     extensionContainer [1] ExtensionContainer OPTIONAL,
338     ... }
339
340 LCSCClientInternalID ::= ENUMERATED {
341     broadcastService (0),
342     o-andM-HPLMN (1),
343     o-andM-VPLMN (2),
344     anonymousLocation (3),
345     targetMSSubscribedService (4),
346     ... }
347
348
349 -- data types for CAMEL
350
351 CellIdOrLAI ::= CHOICE {
352     cellIdFixedLength [0] CellIdFixedLength,
353     laiFixedLength [1] LAIFixedLength}
354

```

```

355 CellIdFixedLength ::= OCTET STRING (SIZE (7))
356 -- Refers to Cell Global Identification defined in TS GSM 03.03.
357 -- The internal structure is defined as follows:
358 -- octet 1 bits 4321      Mobile Country Code 1st digit
359 --      bits 8765      Mobile Country Code 2nd digit
360 -- octet 2 bits 4321      Mobile Country Code 3rd digit
361 --      bits 8765      Mobile Network Code 3rd digit
362 --                               or filler (1111) for 2 digit MNCs
363 -- octet 3 bits 4321      Mobile Network Code 1st digit
364 --      bits 8765      Mobile Network Code 2nd digit
365 -- octets 4 and 5      Location Area Code according to TS GSM 04.08
366 -- octets 6 and 7      Cell Identity (CI) according to TS GSM 04.08
367
368 LAIFixedLength ::= OCTET STRING (SIZE (5))
369 -- Refers to Location Area Identification defined in TS GSM 03.03.
370 -- The internal structure is defined as follows:
371 -- octet 1 bits 4321      Mobile Country Code 1st digit
372 --      bits 8765      Mobile Country Code 2nd digit
373 -- octet 2 bits 4321      Mobile Country Code 3rd digit
374 --      bits 8765      Mobile Network Code 3rd digit
375 --                               or filler (1111) for 2 digit MNCs
376 -- octet 3 bits 4321      Mobile Network Code 1st digit
377 --      bits 8765      Mobile Network Code 2nd digit
378 -- octets 4 and 5      Location Area Code according to TS GSM 04.08
379
380 -- data types for subscriber management
381
382
383 BasicServiceCode ::= CHOICE {
384     bearerService      [2] BearerServiceCode,
385     teleservice        [3] TeleserviceCode}
386
387 Ext-BasicServiceCode ::= CHOICE {
388     ext-BearerService  [2] Ext-BearerServiceCode,
389     ext-Teleservice    [3] Ext-TeleserviceCode}
390
391 EMLPP-Info ::= SEQUENCE {
392     maximumtitledPriority      EMLPP-Priority,
393     defaultPriority            EMLPP-Priority,
394     extensionContainer         ExtensionContainer          OPTIONAL,
395     ...}
396
397 EMLPP-Priority ::= INTEGER (0..15)
398 -- The mapping from the values A,B,0,1,2,3,4 to the integer-value is
399 -- specified as follows where A is the highest and 4 is the lowest
400 -- priority level
401 -- the integer values 7-15 are spare and shall be mapped to value 4
402
403 priorityLevelA      EMLPP-Priority ::= 6
404 priorityLevelB      EMLPP-Priority ::= 5
405 priorityLevel0      EMLPP-Priority ::= 0
406 priorityLevel1      EMLPP-Priority ::= 1
407 priorityLevel2      EMLPP-Priority ::= 2
408 priorityLevel3      EMLPP-Priority ::= 3
409 priorityLevel4      EMLPP-Priority ::= 4
410
411 -- data types for geographic location
412
413
414 AgeOfLocationInformation ::= INTEGER (0..32767)
415 -- the value represents the elapsed time in minutes since the last
416 -- network contact of the mobile station (i.e. the actuality of the
417 -- location information).
418 -- value "0" indicates that the MS is currently in contact with the
419 -- network
420 -- value "32767" indicates that the location information is at least
421 -- 32767 minutes old
422
423 END

```

1

2

**** NEXT MODIFIED SECTION ****

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) version6 (6)}

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
PerformLocation-Arg,
PerformLocation-Res,
LCSRegistration-Arg,
LCSRegistration-Res,
LCSInformationRequest-Arg,
LCSInformationReport-Arg,
LCSReset-Arg,
LCSAssignTrafficChannel-Arg,
LCSAssignTrafficChannel-Res
;

IMPORTS
    AddressString,
    ISDN-AddressString,
    IMEI,
    IMSI,
    LMSI,
Identity,
    SubscriberIdentity,
    GlobalCellId,
Ext-ExternalSignalInfo,
    AgeOfLocationInformation,
    LCSClientExternalID,
    LCSClientInternalID
FROM MAP-CommonDataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-CommonDataTypes (18) version6 (6)}

    ExtensionContainer
FROM MAP-ExtensionDataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version6 (6)}

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) version6 (6)}
;

```

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 {
    msc-Number          ISDN-AddressString,
    lmsi                [0] LMSI                OPTIONAL,
    extensionContainer  [1] ExtensionContainer  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,
    na-ESRK            [6] ISDN-AddressString  OPTIONAL,
    lcs-Priority        [67] LCS-Priority       OPTIONAL,
    lcs-QoS            [78] LCS-QoS            OPTIONAL,
    extensionContainer  [89] ExtensionContainer  OPTIONAL,
    ...}

-- one of imsi, or msisdn or na-ESRK is mandatory
-- na-ESRK is applicable only to North American PLMNs

```

EDITORIAL NOTE: the ASN.1 TAG for the above extensionContainer for Release 98 09.02 should be 8

```

LocationType ::= SEQUENCE {
    locationEstimateType [0] LocationEstimateType,
    ...}

```

```

LocationEstimateType ::= ENUMERATED {
    currentLocation          (0),
    currentOrLastKnownLocation (1),
    initialLocation         (2),
    ...}

-- exception handling:
-- a ProvideSubscriberLocation-Arg containing an unrecognized LocationEstimateType
-- 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,
    ...}

```

```

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
```

```

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 GSM 03.32

```

```

Vertical-Accuracy ::= OCTET STRING (SIZE (1))
-- bit 8 = 0
-- bits 7-1 = 7 bit Vertical Uncertainty Code defined in GSM 03.32

```

```

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

```

```

ResponseTimeCategory ::= ENUMERATED {
    nodelay (0),
    lowdelay (01),
    delaytolerant (12),
    ... }
-- exception handling:
-- an unrecognized value shall be treated the same as value 12 (delaytolerant)

```

```

ProvideSubscriberLocation-Res ::= SEQUENCE {
    locationEstimate            Ext-GeographicalInformation,
    ageOfLocationEstimate      [0] AgeOfLocationInformation      OPTIONAL,
    extensionContainer          [1] ExtensionContainer            OPTIONAL,
    ...}

```

```

Ext-GeographicalInformation ::= OCTET STRING (SIZE (1..maxExt-GeographicalInformation))
-- Refers to geographical information defined in GSM 03.32.
-- This is composed of 1 or more octets with an internal structure according to GSM 03.32
-- Octet 1: Type of shape, only the following shapes in GSM 03.32 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
-- 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
--
-- An Ext-GeographicalInformation parameter containing any other shape or an incorrect number
-- of octets or coding according to GSM 03.32 shall be treated as invalid data by a receiver

```

```

maxExt-GeographicalInformation INTEGER ::= 20
-- the maximum length allows for further shapes in GSM 03.32 to be included in later versions
-- of GSM 09.02

```

```

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,
    ...}

```

```

-- one of msisdn, or imsi, or na-ESRK is mandatory
-- in North America, the na-ESRD is mandatory

```

```

LCS-Event ::= ENUMERATED {
    emergencyCallOrigination (0),
    emergencyCallRelease (1),
    mo-lr (2),
    ... }
-- 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

```

```

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

```

```

PerformLocation-Arg ::= SEQUENCE {
    globalCellId             GlobalCellId,
    radioChannelType         [0] RadioChannelType           OPTIONAL,
    lcs-Priority             [1] LCS-Priority                 OPTIONAL,
    lcs-QoS                  [2] LCS-QoS                     OPTIONAL,
    lcs-APDU                 [3] Ext-ExternalSignalInfo      OPTIONAL,
    extensionContainer        [4] ExtensionContainer           OPTIONAL,
    ...}

```

```

RadioChannelType ::= ENUMERATED {
    sdech (0),
    tch-fr (1),
    tch-hr (2),
    ... }
-- exception handling
-- an unrecognized value shall be treated as unexpected data
-- a return error shall be returned if received in a MAP invoke

```

```

PerformLocation-Res ::= SEQUENCE {
    locationEstimate         Ext-GeographicalInformation,
    positioningData          [0] PositioningDataList         OPTIONAL,
    extensionContainer        [1] ExtensionContainer           OPTIONAL,
    ...}

```

```

PositioningDataList ::= SEQUENCE SIZE (1..maxNumOfPositionAttempts) OF
    PositioningData
-- list of positioning data for each positioning attempt
-- first in list = first attempt, last in list = last attempt

```

```

maxNumOfPositionAttempts INTEGER ::= 5

```

```

PositioningData ::= SEQUENCE {
    positionMethod           PositionMethod,
    positionResult           PositionResult,
    duration                 [0] Duration                   OPTIONAL,
    toa-LMU-data             [1] TOA-LMU-Data                OPTIONAL,
    extensionContainer        [2] ExtensionContainer           OPTIONAL,
    ...}

```

```

-- Positioning data need not be provided to an LCS client but may be useful to the PLMN
-- for billing, accounting and statistical purposes

```



```

PositionMethod ::= ENUMERATED {
  timingAdvance (0),
  toa (1),
  ... }
exception handling
an unrecognized value may be stored in billing or accounting records
an unrecognized value shall not cause rejection of any associated location estimate

```

```

PositionResult ::= ENUMERATED {
  failure (0),
  success-NoDeliveryToClient (1),
  success-DeliveryToClient (2) }

```

```

Duration ::= INTEGER (0..250)
duration of location attempt in units of 100ms
250 : duration >= 25 seconds

```

```

FOA-LMU-Data ::= SEQUENCE {
  numberOfAssignedLMUs INTEGER (0..12),
  numberOfLMUsWithValidMeasurements INTEGER (0..12),
  extensionContainer [0] ExtensionContainer OPTIONAL,
  ... }

```

```

LCSRegistration-Arg ::= SEQUENCE {
  lmuIdentity Identity,
  registrationType RegistrationType,
  mscNumber [0] ISDN-AddressString OPTIONAL,
  extensionContainer [1] ExtensionContainer OPTIONAL,
  ... }

```

```

RegistrationType ::= ENUMERATED {
  registration (0),
  deRegistration (1) }

```

```

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

```

```

LCSInformationRequest-Arg ::= SEQUENCE {
  lcs-Entity LCS-Entity,
  mscNumber [0] ISDN-AddressString OPTIONAL,
  release-forbidden [1] NULL OPTIONAL,
  reportError-request [2] NULL OPTIONAL,
  lcs-apdu [3] Ext-ExternalSignalInfo OPTIONAL,
  lcs apdu carries either the Facility Information Element defined in GSM 04.71
  or the Location Information parameter defined in GSM 08.71
  extensionContainer [4] ExtensionContainer OPTIONAL,
  ... }

```

```

LCS-Entity ::= SEQUENCE {
  entityType EntityType,
  entityIdentity [0] EntityIdentity OPTIONAL,
  ... }

```

```

EntityType ::= ENUMERATED {
  lmu (0),
  serving-BSC (1),
  ... }
Exception handling
an unrecognized value for the Entity Type shall cause any associated LCS APDU to be discarded; the Report Error procedure in GSM 03.71 may also be invoked if requested in an LCSInformationRequest-Arg.

```

```

EntityIdentity ::= SEQUENCE {
  lmuIdentity Identity OPTIONAL,
  ... }

```

```

LCSInformationReport-Arg ::= SEQUENCE {
    lcs-Entity                LCS-Entity,
    lcsCause                  [0] LCSCause                OPTIONAL,
    -- lcsCause is included if and only if the MSC is returning an lcs-apdu to the SMLC
    -- that could not be successfully transferred to its destination LCS entity.
    lcs-apdu                  [1] Ext-ExternalSignalInfo  OPTIONAL,
    -- lcs-apdu carries either the Facility Information Element defined in GSM 04.71
    -- or the Location Information parameter defined in GSM 08.71
    extensionContainer        [2] ExtensionContainer      OPTIONAL,
    ... }

```

```

LCSCause ::= ENUMERATED {
    undefined                  (0),
    unknownLCSEntity          (1),
    noPagingResponse          (2),
    errorInAuthentication      (3),
    errorInServingMSC          (4),
    ... }
-- exception handling:
-- an unrecognized value shall be treated the same as value 0 (undefined)

```

```

LCSReset-Arg ::= SEQUENCE {
    mscNumber                 ISDN-AddressString,
    lmu-List                  [0] LMU-List                OPTIONAL,
    extensionContainer        [1] ExtensionContainer      OPTIONAL,
    ... }

```

```

LMU-Id ::= IMSI
-- leading digits of IMSI, i.e. (MCC, MNC, leading digits of
-- MSIN) defining a set of LMUs sharing the same SMLC

```

```

LMU-List ::= SEQUENCE SIZE (1..maxNumOfLMU-Id) OF
    LMU-Id

```

```

maxNumOfLMU-Id INTEGER ::= 10

```

```

LCSAssignTrafficChannel-Arg ::= SEQUENCE {
    radioChannelType          RadioChannelType,
    extensionContainer        [0] ExtensionContainer      OPTIONAL,
    ... }

```

```

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

```

END