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Technical Specification

**3rd Generation Partnership Project;
Technical Specification Group Core Network;
Digital cellular telecommunications system (Phase 2+);
Organization of subscriber data
(Release 1998)**



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Foreword

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

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

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0 Scope

The scope of the present document is to provide details concerning information to be stored in home location registers, visitor location registers and GPRS Support Nodes concerning mobile subscribers.

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 References

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

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

- [1] 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".
- [15] GSM 03.71: "Digital cellular telecommunications system (Phase 2+); Location Services (LCS); Functional Description; Stage 2".
- [16] GSM 03.78: "Digital cellular telecommunications system (Phase 2+); Customised Applications for Mobile network Enhanced Logic (CAMEL) - Stage 2".
- [17] GSM 03.81: "Digital cellular telecommunications system (Phase 2+); Line identification supplementary services - Stage 2".
- [18] GSM 03.82: "Digital cellular telecommunications system (Phase 2+); Call Forwarding (CF) supplementary services - Stage 2".
- [19] GSM 03.83: "Digital cellular telecommunications system (Phase 2+); Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 2".
- [20] GSM 03.84: "Digital cellular telecommunications system (Phase 2+); Multi Party (MPTY) supplementary services - Stage 2".
- [21] GSM 03.85: "Digital cellular telecommunications system (Phase 2+); Closed User Group (CUG) supplementary services - Stage 2".
- [22] GSM 03.86: "Digital cellular telecommunications system (Phase 2+); Advice of Charge (AoC) supplementary services - Stage 2".
- [23] GSM 03.88: "Digital cellular telecommunications system (Phase 2+); Call Barring (CB) supplementary services - Stage 2".
- [24] GSM 03.90: "Digital cellular telecommunications system (Phase 2+); Unstructured Supplementary Service Data (USSD) - Stage 2".
- [25] GSM 04.08: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification".
- [26] GSM 09.02: "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification".
- [27] 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)".
- [28] GSM 12.03: "Digital cellular telecommunications system (Phase 2); Security management".
- [29] GSM 12.08: "Digital cellular telecommunications system (Phase 2); Subscriber and Equipment Trace".
- [30] CCITT Recommendation Q.763: "Specifications of Signalling System No.7; Formats and codes".
- [31] ANSI T1.113: "Signalling System No7 (SS7) Integrated Services Digital Network (ISDN) User Part".
- [32] GSM 02.60: "Digital cellular telecommunications system (Phase 2+); "General Packet Radio Service (GPRS) Stage 1".
- [33] GSM 03.60: "Digital cellular telecommunications system (Phase 2+); "General Packet Radio Service (GPRS) Stage 2".

0.2 Abbreviations

Abbreviations used in the present document 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

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: 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 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 K_i 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 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 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 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.

2.4.9 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 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 GMLCs for the particular MS from which a location request for this MS may be confined for particular LCS clients.

2.4.10 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.

2.4.11 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.

2.4.11.1 RSZI lists

The RSZI lists are permanent subscriber data stored conditionally in the HLR.

2.4.11.2 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.

2.4.12 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.

2.4.13 LA not allowed flag

The LA not allowed flag is set in the VLR 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.

2.4.14 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.

2.4.14a RA not allowed flag

The RA not allowed flag is set in the SGSN depending on National Roaming, Regionally Restricted Subscription and Roaming Restricted in the SGSN Due To Unsupported Feature, see GSM 09.02. It is applied to restrict service on a location area basis.

The RA not allowed flag is temporary subscriber data stored in the SGSN.

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 the HLR and the 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 the HLR and the SGSN, see subclause 2.4.15.3, 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, resulting in roaming restriction in the MSC 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 2.4.13) and the "MSC area restricted flag" in the HLR (see subclause 2.4.12); see also GSM 09.02.

The flag "roaming restriction due to unsupported feature" is temporary subscriber data stored in the VLR and in the HLR.

2.4.15.3 Roaming restricted in the SGSN due to unsupported feature

Roaming restricted in the SGSN due to unsupported feature is a parameter which indicates that one or several services or features are not supported by the SGSN, resulting in roaming restriction in the SGSN area. It can take either of the following values:

- roaming restricted;
- roaming not restricted.

The parameter governs the "RA not allowed flag" in the SGSN (see subclause 2.4.14a) and the "SGSN area restricted flag" in the HLR (see subclause 2.4.14); see also GSM 09.02.

The flag "roaming restricted in the SGSN due to unsupported feature" is temporary subscriber data stored in the 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 when ever 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, the preferential access indicator, the active mode support indicator and active mode indication 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.

2.4.17.2A LSA Preferential Access Indicator

The Localised Service Area Preferential Access Indicator defines if the subscriber shall be favoured in cells belonging to the LSA at resource allocation compared to other subscribers. The LSA Preferential Access Indicator is permanent subscriber data stored conditionally in the HLR.

2.4.17.2B LSA Active Mode Support Indicator

The Localised Service Area Active Mode Support Indicator defines if cells belonging to the LSA shall be favoured for the subscriber compared to other cells at resource allocation. The LSA Active Mode Indicator 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.

2.5 Data related to basic services

2.5.1 Provision of bearer service

Provision of bearer service is a parameter identifying whether a bearer service is provisioned to the mobile subscriber or not. This provision can be achieved through subscription of the mobile subscriber or the bearer service can be generally available. The parameter "provision of bearer service" must be set for the bearer service defined in GSM 02.02 for which a subscription is required.

Provision of bearer service is permanent subscriber data and is stored in the HLR and VLR.

2.5.2 Provision of teleservice

Provision of teleservice is a parameter identifying whether a teleservice is provisioned to the mobile subscriber or not. This provision can be achieved through subscription of the mobile subscriber or the teleservice can be generally available. The parameter "provision of teleservice" must be set for the teleservices defined in GSM 02.03 for which a subscription is required.

Provision of teleservice is permanent subscriber data and is stored in the HLR, SGSN and VLR.

2.5.3 Bearer capability allocation

Bearer capability allocation is a parameter stored against each ISDN number in the case when the Home PLMN allocates one directory number per teleservice and bearer service. In this case it is used to permit the establishment of the correct bearer capability on the connection to the MS (see GSM 09.07). The bearer capability allocation is not required when the Home PLMN only allocates one directory number per subscriber for all bearer services and teleservices. It is permanent data stored conditionally in both HLR and VLR.

2.5.4 Transfer of SM option

Transfer of SM option is a parameter indicating which path should be used for transfer of Terminating Short Message when GPRS is not supported by the GMSC. Two options are possible:

- « transfer of SM via the MSC when GPRS is not supported in the GMSC » : this option is used to indicate that SM shall always be sent via the MSC when the GMSC does not support the GPRS functionality;
- « transfer of SM via the SGSN when GPRS is not supported in the GMSC » : this option is used to indicate that SM shall always be sent via the SGSN when the GMSC does not support the GPRS functionality.

Transfer of SM option is permanent subscriber data stored in HLR for a GPRS subscription.

The data has an interim nature since in the final solution, the decision on SM Transfer is taken in the SMS-GMSC.

2.6 Data related to supplementary services

Subscriber data related to supplementary services are contained in the GSM 03.8x and 03.9x series of Technical Specifications, that is GSM 03.81 and following describing the network functionality of supplementary services.

There is no data type which is mandatory for all supplementary services; note that the provision status is mandatory for all supplementary services except CUG, GSM 03.85. All other data are conditional depending on the provision. The data settable but by O&M are the permanent data while the temporary data are those that can be modified by subscriber control in the mobile station.

2.7 Mobile station status data

2.7.1 IMSI detached flag

IMSI detached flag is a parameter indicating that the MS is in the IMSI detached state, i.e. the subscriber is no longer reachable. For definition and handling see GSM 03.12 and GSM 09.02. The parameter takes the following values:

- IMSI detached;
- IMSI attached.

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

2.7.2 Mobile station Not Reachable for GPRS (MNRG)

In HLR, MNRG indicates whether the MS is marked as GPRS detached or GPRS not reachable in the SGSN and possibly in the GGSN. The reason why the MS is GPRS not reachable is indicated in the Mobile Not Reachable Reason (MNRR).

In SGSN, MNRG indicates whether activity from the MS shall be reported to the HLR.

In GGSN, MNRG indicates whether the MS is marked as GPRS detached in the SGSN.

MNRG is described in GSM 03.60. It is temporary subscriber data stored in the HLR, in the SGSN and in the GGSN.

2.7.3 Mobility Management State

The Mobility Management State indicates the GPRS state of the MS. It takes one of three possible values:

- READY - The MS is GPRS attached and its location is known at Cell Identity level.
- STANDBY - The MS is GPRS attached and its location is known at Routing Area level.
- IDLE - The MS is not GPRS attached.

The parameter is described in GSM 03.60. It is temporary subscriber data stored in the SGSN.

2.7.4 Restoration flags

In the case of SGSN, VLR or HLR failure, location register data have to be restored as described in GSM 03.07 and GSM 09.02. The following flags are used for this purpose.

2.7.4.1 Confirmed by Radio Contact indicator

Confirmed by Radio Contact indicator is a restoration indicator defined in GSM 03.07.

It is temporary subscriber data, stored in the VLR.

2.7.4.2 Subscriber Data Confirmed by HLR indicator

Subscriber Data Confirmed by HLR indicator is a restoration indicator defined in GSM 03.07.

It is temporary subscriber data, stored in the VLR and in the SGSN.

2.7.4.3 Location Information Confirmed in HLR indicator

Location Information Confirmed in HLR indicator is a restoration indicator defined in GSM 03.07.

It is temporary subscriber data, stored in the VLR and in the SGSN.

2.7.4.4 Check SS indicator

Check SS indicator is a restoration indicator defined in GSM 03.07.

It is temporary subscriber data and is stored in the HLR.

2.7.5 MS purged for non-GPRS flag

MS purged for non-GPRS flag is set in the HLR per IMSI record in order to indicate that the subscriber data for the MS concerned have been purged in the VLR. The parameter takes the following values:

- MS purged;
- MS not purged.

The default value is "MS not purged". The parameter is temporary subscriber data, stored in the HLR.

2.7.6 MS purged for GPRS flag

MS purged for GPRS flag is set in the HLR per IMSI record in order to indicate that the subscriber data for the MS concerned have been purged in the SGSN. The parameter takes the following values:

- MS purged for GPRS;
- MS not purged for GPRS.

The default value is "MS not purged for GPRS". The parameter is temporary subscriber data, stored in the HLR for a GPRS subscription.

2.7.7 Mobile station Not Reachable Reason (MNRR)

Mobile station Not Reachable Reason (MNRR) for SMS is defined in GSM 03.40. The MNRR is temporary subscriber data. It is conditionally stored in the HLR.

2.8 Data related to operator determined barring

2.8.1 Subscriber status

Subscriber status is a flag which indicates whether the subscriber is subject to operator determined barring.

It is permanent subscriber data, and is conditionally stored in the HLR, the SGSN and the VLR.

2.8.2 Operator determined barring general data

2.8.2.1 Barring of outgoing calls

Barring of outgoing calls indicates which one of the following categories of operator determined barring of outgoing calls applies to the subscriber:

- no barring of outgoing calls;
- barring of all outgoing calls;
- barring of all outgoing international calls;
- barring of all outgoing international calls except those directed to the home PLMN country;
- barring of all outgoing inter-zonal calls;
- barring of all outgoing inter-zonal calls except those directed to the home PLMN country;

- barring of all outgoing international calls except those directed to the home PLMN country AND barring of all outgoing inter-zonal calls.

It is permanent data, and is stored conditionally in the HLR, the SGSN and the VLR.

2.8.2.2 Barring of incoming calls

Barring of incoming calls indicates which one of the following categories of operator determined barring of incoming calls applies to the subscriber:

- no barring of incoming calls;
- barring of all incoming calls;
- barring of all incoming calls when roaming outside the home PLMN country;
- barring of all incoming calls when roaming outside the zone of the home PLMN country.

It is permanent data, and is stored conditionally in the HLR.

2.8.2.3 Barring of roaming

Barring of roaming indicates which one of the following categories of operator determined barring of roaming applies to the subscriber:

- no barring of roaming;
- barring of roaming outside the home PLMN;
- barring of roaming outside the home PLMN country.

It is permanent data, and is stored conditionally in the HLR both for non-GPRS and GPRS subscription.

2.8.2.4 Barring of premium rate calls

Barring of premium rate calls indicates which one of the following categories of operator determined barring of premium rate calls applies to the subscriber:

- no barring of premium rate calls;
- barring of premium rate (information) calls;
- barring of premium rate (entertainment) calls;
- barring of premium rate (information) calls and premium rate (entertainment) calls.

It is permanent subscriber data, and is stored conditionally in the HLR and the VLR.

2.8.2.5 Barring of supplementary services management

Barring of supplementary services management is a flag which indicates whether the subscriber is subject to operator determined barring of supplementary services management.

It is permanent subscriber data, and is stored conditionally in the HLR and the VLR.

2.8.2.6 Barring of registration of call forwarding

Barring of registration of call forwarding indicates which one of the following categories of operator determined barring of registration of call forwarding applies to the subscriber:

- barring of registration of any forwarded-to number;
- barring of registration of any international forwarded-to number;

- barring of registration of any international forwarded-to number except a number within the HPLMN country;
- barring of registration of any inter-zonal forwarded-to number;
- barring of registration of any inter-zonal forwarded-to number except a number within the HPLMN country.

It is permanent subscriber data, and is stored conditionally in the HLR.

2.8.2.7 Barring of invocation of call transfer

Barring of invocation of call transfer indicates which of the following categories of operator determined barring of invocation of call transfer applies to the subscriber:

One of:

- barring of invocation of any call transfer;
- barring of invocation of call transfer where at least one of the two calls is a call charged to the served subscriber;
- barring of invocation of call transfer where at least one of the two calls is a call charged to the served subscriber at international rates;
- barring of invocation of call transfer where at least one of the two calls is a call charged to the served subscriber at inter-zonal rates;

and independently:

- barring of invocation of call transfer where both calls are calls charged to the served subscriber;

and independently:

- barring of invocation of call transfer when there is an existing transferred call for the served subscriber in the same MSC/VLR.

It is permanent subscriber data, and is stored conditionally in the HLR and the VLR.

2.8.3 Operator determined barring PLMN-specific data

Operator determined barring PLMN-specific data indicates which of the following categories of operator specific barring, in any combination, applies to the subscriber:

- operator specific barring (type 1);
- operator specific barring (type 2);
- operator specific barring (type 3);
- operator specific barring (type 4).

It is permanent subscriber data. It is stored conditionally in the HLR, the SGSN and in the VLR when the subscriber is registered in the home PLMN.

2.9 Data related to handover

2.9.1 Handover Number

Handover Number is defined in GSM 03.03 and its use is specified in GSM 03.09.

The Handover Number is short-lived subscriber data and is stored in the VLR.

2.10 Data related to short message support

2.10.1 Messages Waiting Data (MWD)

Messages Waiting Data (MWD) is defined in GSM 03.40.

The MWD is temporary subscriber data, and is conditionally stored in the HLR.

2.10.2 Mobile Station Not Reachable Flag (MNRF)

Mobile Station Not Reachable Flag (MNRF) is defined in GSM 03.40.

The MNRF is temporary data. It is stored in the VLR and conditionally stored in the HLR.

2.10.3 Memory Capacity Exceeded Flag (MCEF)

Memory Capacity Exceeded Flag (MCEF) is defined in GSM 03.40.

The MCEF is temporary subscriber data and is conditionally stored in the HLR.

2.10.4 Mobile station Not Reachable for GPRS (MNRG)

For MNRG see subclause 2.7.2.

2.10.5 Mobile station Not Reachable Reason (MNRR)

For MNRR see subclause 2.7.7.

2.11 Data related to subscriber trace

2.11.1 Trace Reference

The Trace Reference is defined in GSM 12.08.

The Trace Reference is permanent subscriber data and is conditionally stored in the HLR and VLR.

2.11.2 Trace Type

The Trace Type is defined in GSM 12.08.

The Trace Type is permanent subscriber data and is conditionally stored in the HLR and VLR.

2.11.3 Operations Systems Identity

The Operations Systems Identity is defined in GSM 12.08.

The Operations Systems Identity is permanent subscriber data and is conditionally stored in the HLR and VLR.

2.11.4 HLR Trace Type

The HLR Trace Type is defined in GSM 12.08.

The HLR Trace Type is permanent subscriber data and is conditionally stored in the HLR.

2.11.5 MAP Error On Trace

The MAP Error On Trace is defined in GSM 12.08.

The MAP Error On Trace is temporary subscriber data and is conditionally stored in the HLR.

2.11.6 Trace Activated in VLR

The Trace Activated in VLR flag is defined in GSM 12.08.

The Trace Activated in VLR flag is temporary subscriber data and is conditionally stored in the HLR and VLR.

2.11.7 Trace Activated in SGSN

The Trace Activated in SGSN flag is defined in GSM 12.08.

The Trace Activated in SGSN flag is temporary subscriber data and is conditionally stored in the HLR and SGSN.

2.11.8 Foreign Subscriber Registered in VLR

The Foreign Subscriber Registered in VLR flag is handled by operation and maintenance means in the VLR and is defined in GSM 12.08.

The Foreign Subscriber Registered in VLR flag is permanent subscriber data and is conditionally stored in the VLR.

2.12 Data related to the support of voice group and broadcast calls

2.12.1 VGCS Group Membership List

VGCS Group Membership List and its special condition of storage in VLR is defined in GSM 03.68.

The VGCS Group Membership List is permanent subscriber data. It is stored conditionally in HLR and in the VLR.

2.12.2 VBS Group Membership List

VBS Group Membership List and its special condition of storage in VLR is defined in GSM 03.69.

The VBS Group Membership List is permanent subscriber data. It is stored conditionally in HLR and in the VLR.

2.12.2.1 Broadcast Call Initiation Allowed List

The Broadcast Call Initiation Allowed List and its special condition of storage in VLR is defined in GSM 03.69.

It is permanent subscriber data. It is stored conditionally in HLR and in the VLR.

2.13 Data related to GPRS NAM

The data listed in this subclause pertain to the Network Access Mode "GPRS" and have no counterpart for non-GPRS.

2.13.1 PDP Type

PDP Type is defined in GSM 03.60. It indicates which type of protocol is used by the MS for a certain service, e.g. IP and X.25.

PDP Type is permanent subscriber data and conditionally stored in HLR, SGSN and GGSN.

2.13.2 PDP Address

PDP Address is defined in GSM 03.60. It holds the address of the MS for a certain service, e.g. an X.121 address. If dynamic addressing is allowed, PDP Address is empty in the HLR, and, before the PDP context is activated, empty in the SGSN.

PDP Address is permanent subscriber data and conditionally stored in HLR, SGSN and GGSN.

2.13.3 NSAPI

NSAPI is defined in GSM 03.60. It holds the index of the PDP Context.

NSAPI is temporary subscriber data and conditionally stored in SGSN and GGSN.

2.13.4 Packet Data Protocol (PDP) State

PDP State is defined in GSM 03.60. The PDP State is either ACTIVE or INACTIVE.

PDP State is temporary subscriber data and conditionally stored in SGSN.

2.13.5 New SGSN Address

New SGSN Address is defined in GSM 03.60. It is the IP-address of the new SGSN, to which N-PDUs should be forwarded from the old SGSN after an inter-SGSN routing update.

New SGSN Address is temporary subscriber data and conditionally stored in SGSN.

2.13.6 Access Point Name (APN)

Access Point Name (APN) is defined in TS GSM 03.03 and 03.60. The APN field in the HLR contains either only an APN Network Identifier (i.e. an APN without APN Operator Identifier) or the wild card value (defined in GSM 03.03). APN is permanent subscriber data conditionally stored in HLR, in GGSN and SGSN.

2.13.7 GGSN Address in Use

GGSN Address in Use is defined in GSM 03.60. It is the IP address of the GGSN currently used by a certain PDP Address of the MS.

GGSN Address is temporary subscriber data and conditionally stored in SGSN.

2.13.8 VPLMN Address Allowed

VPLMN Address Allowed is defined in GSM 03.60. It specifies whether the MS is allowed to use a dynamic address allocated in any VPLMN.

VPLMN Address Allowed is permanent subscriber data and conditionally stored in HLR and SGSN.

2.13.9 Dynamic Address

Dynamic Address is defined in GSM 03.60. It indicates whether the address of the MS is dynamic.

Dynamic Address is temporary subscriber data conditionally stored in GGSN.

2.13.10 SGSN Address

SGSN Address is defined in GSM 03.03. It is the IP Address of the SGSN currently serving the MS.

SGSN Address is temporary subscriber data stored in HLR and stored conditionally in GGSN. A pendant is the SGSN number, cf subclause 2.4.8.

2.13.11 GGSN-list

GGSN-list is defined in GSM 03.60. It defines the GGSNs to be contacted when activity from the MS is detected and MNRG is set. It contains the GGSN number and optionally the GGSN IP address.

GGSN-list is temporary subscriber data stored in the HLR.

2.13.12 Quality of Service Subscribed

Quality of Service Subscribed is defined in GSM 03.60. It specifies the quality of service subscribed for a certain PDP context.

Quality of Service Subscribed is permanent subscriber data and conditionally stored in HLR and SGSN.

2.13.13 Quality of Service Requested

Quality of Service Requested is defined in GSM 03.60. It specifies the quality of service requested for a certain PDP context.

Quality of Service Requested is temporary subscriber data and conditionally stored in SGSN.

2.13.14 Quality of Service Negotiated

Quality of Service Negotiated is defined in GSM 03.60. It specifies the quality of service for a certain PDP context, negotiated between the MS and the SGSN, and then the GGSN.

Quality of Service Negotiated is temporary subscriber data and conditionally stored in SGSN and GGSN.

2.13.15 SND

SND is defined in GSM 03.60. It is the GPRS Tunnelling Protocol sequence number of the next downlink N-PDU.

SND is temporary subscriber data conditionally stored in SGSN and GGSN.

2.13.16 SNU

SNU is defined in GSM 03.60. It is the GPRS Tunnelling Protocol sequence number of the next uplink N-PDU.

SNU is temporary subscriber data and conditionally stored in SGSN and GGSN.

2.13.17 DRX Parameters

DRX Parameters is defined in GSM 03.60.

DRX Parameters is temporary subscriber data stored in SGSN.

2.13.18 Compression

Compression is defined in GSM 03.60. There is one set of negotiated compression parameters per QoS priority level.

Compression is temporary subscriber data conditionally stored in the SGSN.

2.13.19 Non-GPRS Alert Flag (NGAF)

Non-GPRS Alert Flag (NGAF) is defined in GSM 03.60. It indicates whether activity from the MS shall be reported to the MSC/VLR.

NGAF is temporary subscriber data and is conditionally stored in the SGSN if the Gs interface is installed.

2.13.20 Classmark

MS Classmark is defined in GSM 04.08.

Classmark is temporary subscriber data stored in the SGSN.

2.13.21 Tunnel Identifier (TID)

Tunnel Identifier is defined in GSM 09.60. It is used for Anonymous Access. TID is temporary subscriber data conditionally stored in SGSN and GGSN.

2.13.22 Radio Priority

Radio Priority is defined in GSM 03.60. It indicates the RLC/MAC radio priority level for uplink user data transmission for a certain PDP context.

Radio Priority is temporary subscriber data and conditionally stored in SGSN.

2.13.23 Radio Priority SMS

Radio Priority SMS is defined in GSM 03.60. It indicates the RLC/MAC radio priority level for uplink SMS transmission.

Radio Priority SMS is temporary subscriber data and conditionally stored in SGSN.

2.13.24 PDP Context Identifier

PDP Context Identifier is defined in GSM 03.60. It identifies uniquely each PDP context.

PDP Context Identifier is permanent subscriber data and conditionally stored in HLR and SGSN.

2.14 Data related to CAMEL

2.14.1 The following Subscriber Data stored in HLR

2.14.1.1 Originating CAMEL Subscription Information (O-CSI)

This data defines the contents of the Originating CAMEL subscription information used to interwork with the gsmSCF for MO and MF call. It consists of:

- a servicekey. The servicekey identifies to the gsmSCF the service logic that should apply;
- a gsmSCFaddress. It is the gsmSCF address (E164 number) where the CAMEL service is treated for the subscriber;
- a default Call handling. The default call handling indicates whether the call shall be released or continued as requested in case of error in the gsmSSF to gsmSCF dialogue;
- a TDP list. For O-CSI only DP2 is used;
- DP criteria. The DP criteria indicates on which criteria the gsmSSF shall access the gsmSCF;
- CAMEL capability handling. It gives the CAMEL phase associated to the subscriber (CAMEL Phase 1 or CAMEL Phase 2).

2.14.1.2 Terminating CAMEL Subscription Information (T-CSI)

This data defines the contents of the terminating CAMEL subscription information used to interwork with the gsmSCF for MT call. It consists of:

- a servicekey. The servicekey identifies to the gsmSCF the service logic that should apply;
- a gsmSCFaddress. It is the gsmSCF address (E164 number) where the CAMEL service is treated for the subscriber;
- a default Call handling. The default call handling indicates whether the call shall be released or continued as requested in case of error in the gsmSSF to gsmSCF dialogue;
- a TDP list. For T-CSI only DP12 is used;
- DP criteria. The DP criteria indicates on which criteria the gsmSSF shall access the gsmSCF;
- CAMEL capability handling. It gives the CAMEL phase associated to the subscriber (CAMEL phase 1 or CAMEL phase 2).

2.14.1.3 Location information/Subscriber state interrogation

This data indicates whether additional subscriber information shall be sent to the GMSC for MT call. It consists of an indication that the HLR shall send the location information of the called subscriber.

2.14.1.4 USSD CAMEL subscription information(U-CSI)

This data is used on USSD request receipt from the MS. It consists of a list of:

- a service code. The service code defines a specific application in the gsmSCF;
- a gsmSCFaddress. It is the gsmSCF address (E164 number) where the USSD application is treated for this subscriber

2.14.1.5 Supplementary Service invocation notification(SS-CSI)

This data is used to notify the gsmSCF about Supplementary service invocation. It consists of :

- a notification criteria, which may be a list of Supplementary service(s). The possible Supplementary services are: ECT, CD or MPTY;
- a gsmSCFaddress. It is the gsmSCF address (E164 number) where the Supplementary service invocation is treated for this subscriber

2.14.1.6 Translation Information flag (TIF-CSI)

This flag is used to indicate that the HLR shall not attempt to perform any actions on the FTN (translation, prohibited FTN checks, call barring checks) at the registration procedure.

2.14.2 Other Data stored in HLR

Additionally to Originating CAMEL Subscription Information the following data shall be stored in the HLR:

- negotiated CAMEL capability handling. It is temporary data stored conditionally in the HLR; it identifies the CAMEL phase that was negotiated between the HLR and the VLR to be used in the VMSC.

The USSD general CAMEL service(UG-CSI) is also stored in the HLR. This data is used on USSD request receipt from the MS. It consists of a list of:

- a service code. The service code defines a specific application in the gsmSCF;
- a gsmSCFaddress. It is the gsmSCF address (E164 number) where the USSD application is treated for this subscriber.

For a more detailed description of the data see GSM 03.78.

The CAMEL related data is permanent subscriber data. It is stored conditionally in HLR.

2.14.3 Data stored in VLR

2.14.3.1 Originating CAMEL Subscription Information (O-CSI)

The Originating CAMEL Subscription Information (O-CSI) are stored in the VLR:

This data defines the contents of the originating CAMEL subscription information used to interwork with the gsmSCF for MO and CF call. It consists of:

- a servicekey. The servicekey identifies to the gsmSCF the service logic that should apply;
- a gsmSCFaddress. It is the gsmSCF address (E164 number) where the CAMEL service is treated for the subscriber;
- a default Call handling. The default call handling indicates whether the call shall be released or continued as requested in case of error in the gsmSSF to gsmSCF dialogue;
- a TDP list. For O-CSI only DP2 is used;
- DP criteria. The DP criteria indicates on which criteria the gsmSSF shall access the gsmSCF;
- CAMEL capability handling. It gives the CAMEL phase associated to the subscriber (CAMEL phase1 or CAMEL phase2).

2.14.3.2 Supplementary Service invocation notification(SS-CSI)

This data is used to notify the gsmSCF about Supplementary service invocation. It consists of:

- a notification criteria, which may be ECT, CD or MPTY;
- a gsmSCFaddress. It is the gsmSCF address (E164 number) where the Supplementary service invocation is treated for this subscriber.

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 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.

2.15.1.3 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.

3 Summary of data stored in location registers

Table 1 gives an overview of data stored in location registers for non-GPRS Network Access Mode, whereas table 2 shows the data stored in the location registers, in the SGSN and in the GGSN for GPRS Network Access Mode. In the tables, M = mandatory means that this parameter is stored for all subscribers with subscription of the Network Access Mode as shown in the table heading and defining the table; and C = conditional means that the parameter is subject to some condition (e.g. subscription of teleservice or other services, reception of optional message or short-lived data). The type indication indicates whether the subscriber data is temporary (T) or permanent (P) data, where permanent data can be set and modified but by the operator, whereas the temporary data are set and changed automatically by network functions.

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	
multinumbeing 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	2.4.17.1	C	C	P	
LSA Priority	2.4.17.2	C	C	P	
LSA Preferential Access Indicator	2.4.17.2A	C	C	P	
LSA Active Mode Support Indicator	2.4.17.2B	C	C	P	
LSA Only Access Indicator	2.4.17.3	C	C	P	
LSA Active Mode Indicator	2.4.17.4	C	C	P	
VPLMN Identifier	2.4.17.5	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	
GMLC Numbers	2.15.1.2	C	C	P	
MO-LR List	2.15.1.3	C	C	P	

Table 2: Overview of data used for GPRS Network Access Mode

PARAMETER	Subclause	HLR	VLR	SGSN	GGSN	TYPE	
IMSI	2.1.1.1	M	M	M	M		P Note
Network Access Mode	2.1.1.2	M	-	C (a)	-		P Note
International MS ISDN number	2.1.2	M	M	M	-		T
multinumbers MSISDNs	2.1.3	C	-	-	-		T Note
Basic MSISDN indicator	2.1.3.1	C	-	-	-		T .
MSISDN-Alert indicator	2.1.3.2	C	-	-	-		T
P-TMSI	2.1.5	-	-	C	-		T Note
TLLI	2.1.6	-	-	C	-		T
Random TLLI	2.1.7	-	-	C	-		T Note
IMEI	2.1.9	-	-	C	-		T
RAND/SRES and Kc	2.3.1	M	-	M	-		T
Ciphering Key Sequence Number	2.3.2	-	-	M	-		T
Selected Ciphering Algorithm	2.3.3	-	-	M	-		T
Current Kc	2.3.4	-	-	M	-		T
P-TMSI Signature	2.3.5	-	-	C	-		T
Routing Area Identity	2.4.3	-	-	M	-		T
Cell Global Identification	2.4.4	-	-	C	-		T
VLR Number	2.4.5	M	-	C (Gs)	-		T
SGSN Number	2.4.8.1	M	C (Gs)	-	-		T Note
GGSN Number	2.4.8.2	M	-	-	-		P Note
RSZI Lists	2.4.10.1	C	-	-	-		P
Zone Code List	2.4.10.2	-	-	C	-		P
RA not allowed flag	2.4.14	-	-	M	-		T
Roaming Restricted in the SGSN due to unsupported feature	2.4.15.3	M	-	-	-		T
Roaming Restriction in the SGSN ..	2.4.15.2	M	-	M	-		T
Cell ID	2.4.16	-	-	C	-		T
LSA Identity	2.4.17.1	C	C	C	-		P
LSA Priority	2.4.17.2	C	C	C	-		P
LSA Preferential Access Indicator	2.4.17.2A	C	C	C	-		P
LSA Active Mode Support Indicator	2.4.17.2B	C	C	C	-		P
LSA Only Access Indicator	2.4.17.3	C	C	C	-		P
LSA Active Mode Indicator	2.4.17.4	C	C	C	-		P
VPLMN Identifier	2.4.17.5	C	-	-	-		P
Provision of teleservice	2.5.2	C	-	C	-		P
Transfer of SM option	2.5.4	M	-	-	-		P
MNRG	2.7.2	M	-	M	M		T
MM State	2.7.3	-	-	M	-		T
Subscriber Data Confirmed by HLR Indicator	2.7.4.2	-	-	M	-		T
Location Info Confirmed by HLR Indicator	2.7.4.3	-	-	M	-		T
MS purged for GPRS flag	2.7.6	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 roaming	2.8.2.3	C	-	C	-		P
ODB PLMN-specific data	2.8.3	C	-	-	-		P
Trace Activated in SGSN	2.11.7	C	-	C	-		P
PDP Type	2.13.1	C	-	C	M		P
PDP Address	2.13.2	C	-	C	M		P
NSAPI	2.13.3	-	-	C	C		T
PDP State	2.13.4	-	-	C	-		T
New SGSN Address	2.13.5	-	-	C	-		T
Access Point Name	2.13.6	C	-	C	C		P/T Note
GGSN Address in Use	2.13.7	-	-	C	-		T
VPLMN Address Allowed	2.13.8	C	-	C	-		P
Dynamic Address	2.13.9	-	-	-	C		T
SGSN Address	2.13.10	-	-	-	M		T
GGSN-list	2.13.11	M	-	-	-		T

(continued)

Table 2 (concluded): Overview of data used for GPRS Network Access Mode

PARAMETER	Subclause	HLR	VLR	SGSN	GGSN TYPE	
Quality of Service Subscribed	2.13.12	C	-	C	-	P
Quality of Service Requested	2.13.13	-	-	C	-	T
Quality of Service Negotiated	2.13.14	-	-	C	M	T
SND	2.13.15	-	-	C	C	T
SNU	2.13.16	-	-	C	C	T
DRX Parameters	2.13.17	-	-	M	-	T
Compression	2.13.18	-	-	C	-	T
NGAF	2.13.19	-	-	C (Gs)	-	T
Classmark	2.13.20	-	-	M	-	T
TID	2.13.21	-	-	C	C	T
Radio Priority	2.13.22	-	-	C	-	T
Radio Priority SMS	2.13.23	-	-	C	-	T
PDP Context Identifier	2.13.24	C		C		T

NOTE 1: The HLR column indicates only GPRS related use, i.e. if the HLR uses a parameter in non-GPRS Network Access Mode but not in GPRS Network Access Mode, it is not mentioned in this table 2.

(Gs): The VLR column is applicable if Gs interface is installed. It only indicates GPRS related data to be stored and is only relevant to GPRS subscribers registered in VLR.

a): This parameter is relevant in the SGSN only when the Gs interface is installed.

NOTE 2: For special condition of storage see in the clauses 2.x.y referred-to.
See clause 3 for explanation of M,C,T and P in table 2.

Annex A (informative): Status of Technical Specification GSM 03.08

Status of Technical Specification GSM 03.08						
TSG CN#	Spec	Version	CR	<Phase>	New Version	Subject/Comment
GSM #31	03.08	3.7.0	025r1		4.0.0	July 1991
	03.08	3.7.0	027r2		4.0.0	
	03.08	3.7.0	028r2		4.0.0	
	03.08	3.7.0	029r4		4.0.0	
	03.08	3.7.0	030r1		4.0.0	
	03.08	3.7.0	031r1		4.0.0	
	03.08	3.7.0	032r1		4.0.0	
	03.08	3.7.0	034r1		4.0.0	
	03.08	3.7.0	035r3		4.0.0	
	03.08	3.7.0	036r1		4.0.0	
	03.08	3.7.0	040r1		4.0.0	
	03.08	3.7.0	042		4.0.0	
	GSM #32	03.08	4.0.0	039		4.1.0
03.08			041r1		4.1.0	
SMG #1	03.08	4.1.0	045r1		4.2.0	January 1992
SMG #2	03.08	4.2.0	046		4.3.0	April 1992
SMG #5	03.08	4.3.0	047		4.4.0	January 1992
	03.08	4.3.0	048		4.4.0	
	03.08	4.3.0	049r1		4.4.0	
SMG #6	03.08	4.4.0	050r1		4.5.0	April 1993
SMG #8	03.08	4.5.0	051		4.5.1	October 1993
SMG #9	03.08	4.5.1	053r1		4.6.0	January 1994
	03.08	4.5.1	056		4.6.0	
	03.08	4.5.1	057		4.6.0	
	03.08	4.5.1	59r1		4.6.0	
SMG #10	03.08	4.6.0	060		4.7.0	April 1994
	03.08	4.6.0	061		4.7.0	
	03.08	4.6.0	062		4.7.0	
SMG #18	03.08	4.7.0	A002r2		4.8.0	April 1996
SMG #18	03.08	4.8.0	A003r2		5.0.0	April 1996
SMG #21	03.08	5.0.0	A004r1		5.1.0	February 1997
	03.08	5.0.0	A005r1		5.1.0	
	03.08	5.0.0	A006		5.1.0	
SMG #23	03.08	5.1.0	A007		5.2.0	June 1998
	03.08	5.1.0	A008		5.2.0	
SMG #25	03.08	5.2.0	A010		6.0.0	June 1998
	03.08	5.2.0	A011		6.0.0	
	03.08	5.2.0	A012		6.0.0	
	03.08	6.0.0	A013		6.1.0	June 1998
	03.08	6.0.0	A014		6.1.0	
	03.08	6.1.0	A016r1		6.2.0	October 1998
	03.08	6.2.0	A015r1		6.3.0	February 1999
	03.08	6.3.0	A019r1		7.0.0	February 1999
	03.08	7.0.0	A025		7.1.0	June 1999
	03.08	7.1.0	A029		7.2.0	December 1999
CN#07	03.08	7.2.0	A030		7.3.0	March 2000
	03.08	7.2.0	A032r1		7.3.0	
CN#09	03.08	7.3.0	A034		7.4.0	Deletion of "Barring of roaming" stored in SGSN
		7.3.0			7.4.0	Conversion to 3GPP layout
CN#20		7.4.0	A041	R98	7.5.0	Distinction between Roaming Restriction Due To Unsupported Feature and Roaming Restricted in the SGSN Due To Unsupported Feature