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Technical Specification

**GEO-Mobile Radio Interface Specifications;
Part 3: Network specifications;
Sub-part 5: Organization of Subscriber Data;
GMR-2 03.008**



Reference

DTS/SES-002-03008

Keywordsdata, GMR, GSM, GSO, interface, MES, mobile,
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IPRs:

Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
TS 101 377 V1.1.1	Digital Voice Systems Inc		US	US 5,715,365	US
TS 101 377 V1.1.1	Digital Voice Systems Inc		US	US 5,754,974	US
TS 101 377 V1.1.1	Digital Voice Systems Inc		US	US 5,226,084	US
TS 101 377 V1.1.1	Digital Voice Systems Inc		US	US 5,701,390	US
TS 101 377 V1.1.1	Digital Voice Systems Inc		US	US 5,826,222	US

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Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
TS 101 377 V1.1.1	Ericsson Mobile Communication	Improvements in, or in relation to, equalisers	GB	GB 2 215 567	GB
TS 101 377 V1.1.1	Ericsson Mobile Communication	Power Booster	GB	GB 2 251 768	GB
TS 101 377 V1.1.1	Ericsson Mobile Communication	Receiver Gain	GB	GB 2 233 846	GB
TS 101 377 V1.1.1	Ericsson Mobile Communication	Transmitter Power Control for Radio Telephone System	GB	GB 2 233 517	GB

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Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
TS 101 377 V1.1.1	Hughes Network Systems		US	Pending	US

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Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	2.4-to-3 Kbps Rate Adaptation Apparatus for Use in Narrowband Data and Facsimile Communication Systems	US	US 6,108,348	US
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Cellular Spacecraft TDMA Communications System with Call Interrupt Coding System for Maximizing Traffic Throughput Cellular Spacecraft TDMA Communications System with Call Interrupt Coding System for Maximizing Traffic Throughput	US	US 5,717,686	US
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Enhanced Access Burst for Random Access Channels in TDMA Mobile Satellite System	US	US 5,875,182	
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Spacecraft Cellular Communication System	US	US 5,974,314	US
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Spacecraft Cellular Communication System	US	US 5,974,315	US
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Spacecraft Cellular Communication System with Mutual Offset High-argin Forward Control Signals	US	US 6,072,985	US
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Spacecraft Cellular Communication System with Spot Beam Pairing for Reduced Updates	US	US 6,118,998	US

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Satellite Earth Stations and Systems (SES).

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

Version 1.m.n

where:

- the third digit (n) is incremented when editorial only changes have been incorporated in the specification;
- the second digit (m) is incremented for all other types of changes, i.e. technical enhancements, corrections, updates, etc.

The present document is part 3, sub-part 5 of a multi-part deliverable covering the GEO-Mobile Radio Interface Specifications, as identified below:

Part 1: "General specifications";

Part 2: "Service specifications";

Part 3: "Network specifications";

Sub-part 1: "Network Functions; GMR-2 03.001";

Sub-part 2: "Network Architecture; GMR-2 03.002";

Sub-part 3: "Numbering, Addressing and Identification; GMR-2 03.003";

Sub-part 4: "Restoration Procedures; GMR-2 03.007";

Sub-part 5: "Organization of Subscriber Data; GMR-2 03.008";

Sub-part 6: "Handover Procedures; GMR-2 03.009";

Sub-part 7: "Technical Realization of Short Message Service (SMES) Point-to-Point; GMR-2 03.040";

Sub-part 8: "Location Registration Procedures; GMR-2 03.012";

Sub-part 9: "Discontinuous Reception (DRX) in the GMR-2 System; GMR-2 03.013";

Sub-part 10: "Security Related Network Functions; GMR-2 03.020";

Sub-part 11: "Functions Related to Mobile Earth Station (MES) in idle Mode; GMR-2 03.022";

Sub-part 12: "Technical Realization of Facsimile Group 3 Transparent; GMR-2 03.045";

Sub-part 13: "Transmission Planning Aspects of the Speech Service in the Public Satellite Mobile Network (PSMN) system; GMR-2 03.050";

Sub-part 14: "Call Waiting (CW) and Call Hold (HOLD) Supplementary Services - Stage 2; GMR-2 03.083";

Sub-part 15: "Multiparty Supplementary Services; GMR-2 03.084";

Sub-part 16: "Technical Realization of Operator Determined Barring; GMR-2 03.015";

Sub-part 17: "Call Barring (CB) Supplementary Services - Stage 2; GMR-2 03.088";

Part 4: "Radio interface protocol specifications";

Part 5: "Radio interface physical layer specifications";

Part 6: "Speech coding specifications";

Part 7: "Terminal adaptor specifications".

Introduction

GMR stands for GEO (Geostationary Earth Orbit) Mobile Radio interface, which is used for mobile satellite services (MSS) utilizing geostationary satellite(s). GMR is derived from the terrestrial digital cellular standard GSM and supports access to GSM core networks.

Due to the differences between terrestrial and satellite channels, some modifications to the GSM standard are necessary. Some GSM specifications are directly applicable, whereas others are applicable with modifications. Similarly, some GSM specifications do not apply, while some GMR specifications have no corresponding GSM specification.

Since GMR is derived from GSM, the organization of the GMR specifications closely follows that of GSM. The GMR numbers have been designed to correspond to the GSM numbering system. All GMR specifications are allocated a unique GMR number as follows:

GMR-n xx.zyy

where:

xx.0yy (z=0) is used for GMR specifications that have a corresponding GSM specification. In this case, the numbers xx and yy correspond to the GSM numbering scheme.

xx.2yy (z=2) is used for GMR specifications that do not correspond to a GSM specification. In this case, only the number xx corresponds to the GSM numbering scheme and the number yy is allocated by GMR.

n denotes the first (n=1) or second (n=2) family of GMR specifications.

A GMR system is defined by the combination of a family of GMR specifications and GSM specifications as follows:

- If a GMR specification exists it takes precedence over the corresponding GSM specification (if any). This precedence rule applies to any references in the corresponding GSM specifications.

NOTE: Any references to GSM specifications within the GMR specifications are not subject to this precedence rule. For example, a GMR specification may contain specific references to the corresponding GSM specification.

- If a GMR specification does not exist the corresponding GSM specification may or may not apply. The applicability of the GSM specifications is defined in GMR-n 01.201.

1 Scope

The present document provides details concerning information to be stored in home location registers and visitor location registers concerning mobile subscriber.

Clause 4 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 7 gives a summary overview and identifies the reference information required for accessing the 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, subsequent revisions do apply.

- [1] GMR-2 01.004 (ETSI TS 101 377-1-1): "GEO-Mobile Radio Interface Specifications; Part 1: General specifications; Sub-part 1: Abbreviations and Acronyms".
- [2] GSM 02.02 (ETSI ETS 300 501): "European digital cellular telecommunications system (Phase 2); Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN)".
- [3] GMR-2 02.003 (ETSI TS 101 377-2-1): "GEO-Mobile Radio Interface Specifications; Part 2: Service specifications; Sub-part 1: Teleservices supported by a GMR-2 Public Satellite Mobile Network (PSMN)" (V4.2.2).
- [4] GMR-2 02.004 (ETSI TS 101 377-2-2): "GEO-Mobile Radio Interface Specifications; Part 2: Service specifications; Sub-part 2: General on Supplementary Services".
- [5] GMR-2 03.003 (ETSI TS 101 377-3-3): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 3: Numbering, Addressing and Identification".
- [6] GMR-2 03.007 (ETSI TS 101 377-3-4): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 4: Restoration Procedures".
- [7] GMR-2 03.012 (ETSI TS 101 377-3-8): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 8: Location Registration Procedures".
- [8] GMR-2 03.015 (ETSI TS 101 377-03-16): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 16: Technical Realization of operator determined barring".
- [9] GMR-2 03.020 (ETSI TS 101 377-3-10): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 10: Security related Network Functions".
- [10] GSM 03.40 (ETSI ETS 300 536): "Digital cellular telecommunications system (Phase 2); Technical realization of Short Message Service (SMS) Point-to-Point (PP) (V4.13.0)".
- [11] GSM 03.81 (ETSI ETS 300 542): "Digital cellular telecommunications system (Phase 2); Line identification supplementary services - Stage 2" (V4.8.0).
- [12] GSM 03.82 (ETSI ETS 300 543): "Digital cellular telecommunications system (Phase 2); Call Forwarding (CF) supplementary services - Stage 2" (V4.8.1).

- [13] GMR-2 03.083 (ETSI TS 101 377-3-14): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 14: Call Waiting (CW) and Call Hold (HOLD) Supplementary Services - Stage 2".
- [14] GMR-2 03.084 (ETSI TS 101 377-3-15): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 15: Multiparty Supplementary Services".
- [15] GSM 03.85 (ETSI ETS 300 546): "Digital cellular telecommunications system (Phase 2); Closed User Group (CUG) supplementary services - Stage 2" (V4.2.1).
- [16] GSM 03.86 (ETSI ETS 300 547): "Digital cellular telecommunications system (Phase 2); Advice of Charge (AoC) supplementary services - Stage 2" (V4.6.1).
- [17] GSM 03.88 (ETSI ETS 300 548): "Digital cellular telecommunications system (Phase 2); Call Barring (CB) supplementary services - Stage 2" (V4.6.1).
- [18] GSM 03.90 (ETSI ETS 300 549): "Digital cellular telecommunications system (Phase 2); Unstructured supplementary services operation - Stage 2" (V4.1.1).
- [19] GMR-2 04.008 (ETSI TS 101 377-4-7): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 7: Mobile radio interface Layer 3 Specifications".
- [20] GSM 09.02 (ETSI ETS 300 599): "Digital cellular telecommunications system (Phase 2); Mobile Application Part (MAP) specification" (V4.18.0).
- [21] GSM 09.07 (ETSI ETS 300 604): "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)" (V4.12.1).
- [22] GSM 12.03 (ETSI ETS 300 614): "Digital cellular telecommunications system (Phase 2); Security management" (V4.6.1).
- [23] GSM 12.08 (ETSI ETS 300 627): "Digital cellular telecommunications system (Phase 2); Subscriber and Equipment Trace" (V4.6.0).
- [24] ITU-T Recommendation Q.763: "Specifications of Signalling System No.7; Formats and codes".

3 Abbreviations

For the purposes of the present document, the abbreviations given in GMR-2 01.004 [1] apply.

4 Introduction to Subscriber Data

4.1 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, 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.

4.2 Storage facilities

The present document considers subscriber data stored in 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.

4.3 Subscriber data in functional units other than the HLR & the VLR

The individual Subscriber Authentication Key K_i defined in GMR-2 03.020 [9] 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 Recommendation. Such units could include encryption key distribution centres, maintenance centres, etc.

5 Definition of subscriber data

5.1 Data related to identification and numbering

5.1.1 International mobile subscriber identity (IMSI)

International mobile subscriber identity (IMSI) is defined in GMR-2 03.003 [5].

IMSI is permanent subscriber data. IMSI is stored in both HLR and VLR.

5.1.2 Mobile Station International ISDN Number (MSISDN)

Mobile Station International ISDN Number (MSISDN) is defined in GMR-2 03.003 [5].

The MSISDN number is permanent subscriber data and is stored in both HLR and VLR.

If the multi-numbering option applies, the MSISDN stored in the VLR is the Basic MSISDN, see clause 5.1.3.1.

5.1.3 MSISDNs for multi-numbering option

If the HPLMN allocates different MSISDNs for different Basic Services (see GSM 09.07 [21]), these numbers are conditionally stored as permanent data in the HLR.

5.1.3.1 The Basic MSISDN Indicator

The Basic MSISDN is defined in GMR-2 03.012 [7]. The Basic MSISDN indicator marks the MSISDN to be used as Basic MSISDN.

It is permanent subscriber data stored conditionally in the HLR.

5.1.3.2 The MSISDN-Alert Indicator

The MSISDN-Alert is defined in GSM 03.40 [10]. The MSISDN-Alert indicator marks the MSISDN to be used as MSISDN-Alert.

It is permanent subscriber data stored conditionally in the HLR.

5.1.4 Temporary mobile subscriber identity (TMSI)

TMSI is not available in the current version of GMR-2.

5.1.5 Local Mobile Station Identity (LMSI)

Local Mobile Station Identity (LMSI) is defined in GMR-2 03.003 [3]. 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.

5.2 Data related to Mobile Station types

5.2.1 Mobile Station Category

Mobile Station Category has a structure identical to that of "Calling Party's Category" defined in ISUP (ITU-T 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.

5.3 Data related to authentication and ciphering

5.3.1 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 GMR-2 03.020 [9].

A set of up to 5 triplet values is calculated in the AuC (see GSM 12.03 [22]), provided to and stored in the HLR and sent to the VLR on request. These data are temporary subscriber data stored in the HLR and the VLR.

5.3.2 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.

CKSN and its handling are defined in GMR-2 04.008 [19] and GMR-2 03.020 [9]. It is a temporary subscriber data and is stored in the VLR.

5.4 Data related to roaming

5.4.1 Mobile Station Roaming Number (MSRN)

Mobile Station Roaming Number (MSRN) is defined in GMR-2 03.003 [5].

NOTE: There may be more than one MSRN simultaneously per IMSI.

The MSRN is short-lived temporary subscriber data stored in the VLR.

5.4.2 Location Area Identification (LAI)

Location Area Identification (LAI) is defined in GMR-2 03.003 [5].

The LAI is temporary subscriber data and is stored in the VLR.

5.4.3 VLR number

VLR number is defined in GMR-2 03.003 [5].

The VLR number is temporary subscriber data and is stored in the HLR. Absence of the VLR number indicates that the mobile station is deregistered in the HLR.

5.4.4 MSC number

MSC number is defined in GMR-2 03.003 [5].

The MSC number is temporary subscriber data and is stored in the HLR and conditionally in the VLR.

5.4.5 HLR number

HLR number is defined in GMR-2 03.003 [5].

The HLR number may be stored in the VLR. 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.

5.4.6 Subscription restriction

Subscription restriction is a parameter indicating whether or not certain restrictions apply to the subscription. The parameter takes any of the following values:

- accessible area for service:
 - all GMR-2 PSMNs;
 - one national and all foreign GMR-2 PSMNs;
 - regionally restricted (part of a GMR-2 PSMN in one country);
 - regionally restricted plus all other GMR-2 PSMNs.

The HLR associates location updating information with subscription restriction. It deregisters the MES if the PSMN is not allowed and sets the MSC area restricted flag if the MSC area is not allowed, see clause 5.4.8.

Handling of Regionally Restricted Subscription is defined in clause 5.4.7. By operator agreement, regional restriction in parts of different GMR-2 PSMNs is also possible.

The subscription restriction is permanent subscriber data and is stored in the HLR.

5.4.7 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 PSMN involved. The structure of RSZI is defined in GMR-2 03.003 [5]; since it is composed of the PSMN identification (CC NDC) and the Zone Code it is sufficient to store the Zone Code List per CC NDC.

On updating the VLR, the HLR identifies the VPSMN and NDC given by the VLR number and transfers the pertaining Zone Code List to the VLR. The VLR derives from the Zone Code List the allowed and not allowed MSC 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 area be excluded. Signalling of cause value "location area not allowed" towards the mobile station is defined in GSM 09.02 [20] and GMR-2 04.008 [19].

5.4.7.1 RSZI lists

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

5.4.7.2 Zone Code List

The VLR shall store as permanent and conditional subscriber data at least those Zone Codes by which it is affected.

5.4.8 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 (clause 5.4.7) determine its value. The parameter contributes to the "MS Not Reachable" state for handling of terminating traffic in the HLR. The default value is "MSC area not restricted".

The MSC area restricted flag is temporary subscriber data and is contained in the HLR.

5.4.9 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 [20]. It is applied to restrict service on a location area basis.

The LA not allowed flag is temporary subscriber data stored in the VLR.

5.4.10 Service restriction data induced by roaming

If in the course of roaming or at updating of the VLR the HLR is informed that the VLR does not support certain sensitive services or features, the HLR takes appropriate measures to restrict service for the mobile station in that VLR by setting and sending network induced replacing services such as barring programs or the roaming restriction for the MSC 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. 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 and in VLR, regarding any remaining restrictions due to other service replacements.

All network-induced restriction data are temporary subscriber data.

For ODB, GMR-2 03.015 [8] 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 [15].

Roaming restriction in the MSC area due to unsupported features is used to replace AoCC, see GSM 03.86 [16], and Zone Codes for regional subscription, see clause 5.4.7 and GSM 09.02 [20]. A flag in HLR and VLR, see clause 5.4.10.2, collects the sources of network-induced roaming restriction which are also kept separate by the HLR.

5.4.10.1 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.

5.4.10.2 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 clause 5.4.9) and the "MSC area restricted flag" in the HLR (see clause 5.4.8), see GSM 09.02 [20].

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

5.5 Data related to basic services

5.5.1 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 [2] for which a subscription is required.

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

5.5.2 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 GMR-2 02.003 [3] for which a subscription is required.

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

5.5.3 Bearer capability allocation

Bearer capability allocation is a parameter stored against each ISDN number in the case when the Home PSMN 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 MES (see GSM 09.07 [21]). The bearer capability allocation is not required when the Home PSMN only allocates one directory number per subscriber for all bearer services and teleservices. It is permanent data stored conditionally in both HLR and VLR.

5.6 Data related to supplementary services

Subscriber data related to supplementary services are contained in the GMR-2 03.08x, GSM 03.8x and 03.9x-series of Technical Specifications, that is GSM 03.81 [11] 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 [15]. 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.

5.7 Mobile station status data

5.7.1 IMSI detached flag

The IMSI detach feature is not available in the current version of GMR-2.

5.7.2 Restoration flags

In the case of VLR or HLR failure, location register data have to be restored as described in GMR-2 03.007 [6] and GSM 09.02 [20]. The following flags are used for this purpose.

5.7.2.1 Radio Confirmation Indicator

Radio Confirmation Indicator is a restoration indicator defined in GMR-2 03.007 [6].

It is temporary subscriber data, stored in the VLR.

5.7.2.2 Subscriber Data Confirmed by HLR indicator

Subscriber Data Confirmed by HLR indicator is a restoration indicator defined in GMR-2 03.007 [6].

It is temporary subscriber data, stored in the VLR.

5.7.2.3 Location Information Confirmed in HLR Indicator

Location Information Confirmed in HLR Indicator is a restoration indicator defined in GMR-2 03.007 [6].

It is temporary subscriber data, stored in the VLR.

5.7.2.4 Check supplementary services Indicator

Check supplementary services Indicator is a restoration indicator defined in GMR-2 03.007 [6].

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

5.7.3 MES purged flag

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

- MES purged;
- MES not purged.

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

5.8 Data related to operator determined barring

5.8.1 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 and the VLR.

5.8.2 Operator determined barring general data

5.8.2.1 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 PSMN country.

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

5.8.2.2 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 PSMN country.

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

5.8.2.3 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 PSMN;
- barring of roaming outside the home PSMN country.

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

5.8.2.4 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.

5.8.2.5 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 stored conditionally in the HLR and the VLR.

5.8.3 Operator determined barring PLMN-specific data

Operator determined barring PSMN-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, and in the VLR when the subscriber is registered in the home PSMN.

5.9 Data related to handover

5.9.1 Handover number

In GMR-2, handovers occur only within the same GWS and MSC. As a result, handover numbers are not used.

5.10 Data related to short message support

5.10.1 Messages Waiting Data (MWD)

Messages Waiting Data (MWD) is defined in GSM 03.40 [10].

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

5.10.2 Mobile Station Not Reachable Flag (MNRF)

Mobile Station Not Reachable Flag (MNRF) is defined in GSM 03.40 [10].

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

5.10.3 Memory Capacity Exceeded Flag (MCEF)

Memory Capacity Exceeded Flag (MCEF) is defined in GSM 03.40 [10].

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

5.11 Data related to subscriber trace

5.11.1 Trace Reference

The Trace Reference is defined in GSM 12.08 [23].

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

5.11.2 Trace Type

The Trace Type is defined in GSM 12.08 [23].

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

5.11.3 Operations Systems Identity

The Operations Systems Identity is defined in GSM 12.08 [23].

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

5.11.4 HLR Trace Type

The HLR Trace Type is defined in GSM 12.08 [23].

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

5.11.5 MAP Error on Trace

The MAP Error On Trace is defined in GSM 12.08 [23].

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

5.11.6 Trace Activated in VLR

The Trace Activated in VLR flag is defined in GSM 12.08 [23].

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

5.11.7 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 [23].

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

6 Summary of data stored in location registers

Table 1 in clause 7 gives an overview of data that may be stored in location registers. In the table M = mandatory means that this parameter is stored for all subscribers and C = conditional means that the parameter is subject to some condition (e.g. subscription, 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.

7 Accessing subscriber data

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

- International Mobile Subscriber Identity (IMSI).

Table 1: Overview of data stored in location registers

PARAMETER	CLAUSE	HLR	VLR	TYPE	
IMSI	5.1.1	M	M	P	
International MES ISDN number	5.1.2	M	M	P	
Multi-numbering MSISDNs	5.1.3	C	-	P	
Basic MSISDN indicator	5.1.3.1	C	-	P	
MSISDN-Alert indicator	5.1.3.2	C	-	P	
LMSI	5.1.5	C	C	T	(note)
Mobile Station Category	5.2.1	M	M	P	
RAND/SRES and Kc	5.3.2	M	M	T	
Ciphering Key Sequence Number	5.3.3	-	M	T	
MSRN	5.4.1	-	C	T	(note)
Location Area Identity	5.4.2	-	M	T	
VLR number	5.4.3	M	-	T	(note)
MSC number	5.4.4	M	C	T	
HLR number	5.4.5	-	C	T	
Subscription restriction	5.4.6	C	-	P	
RSZI lists	5.4.7.1	C	-	P	
Zone Code List	5.4.7.2	-	C	P	
MSC area restricted flag	5.4.8	M	-	T	
LA not allowed flag	5.4.9	-	M	T	
ODB-induced barring data	5.4.10.1	C	-	T	
Roam, restricted due to unsupported feature	5.4.10.2	M	M	T	
Provision of bearer service	5.5.1	M	M	P	
Provision of teleservice	5.5.2	M	M	P	
BC allocation	5.5.3	C	C	P	
Radio Confirmation Indicator	5.7.2.1	-	M	T	
Subscriber Data Cnf by HLR Indicator	5.7.2.2	-	M	T	
Location Info Cnf in HLR Indicator	5.7.2.3	-	M	T	
Check Supplementary Services Indicator	5.7.2.4	M	-	T	
MES purged flag	5.7.3	M	-	T	
Subscriber Status	5.8.1	C	C	P	
Barring of outgoing calls	5.8.2.1	C	C	P	
Barring of incoming calls	5.8.2.2	C	-	P	
Barring of roaming	5.8.2.3	C	-	P	
Barring of premium rate calls	5.8.2.4	C	C	P	
Barring of supplementary service management	5.8.2.5	C	C	P	
Operator determined barring PLMN-specific data	5.8.3	C	C	P	
Messages Waiting Data	5.10.1	C	-	T	
Mobile Station Not Reachable Flag	5.10.2	C	M	T	
Memory Capacity Exceeded Flag	5.10.3	C	-	T	
Trace Reference	5.11.1	C	C	P	
Trace Type	5.11.2	C	C	P	
Operations Systems Identity	5.11.3	C	C	P	
HLR Trace Type	5.11.4	C	-	P	
MAP Error On Trace	5.11.5	C	-	T	
Trace Activated in VLR	5.11.6	C	C	T	
Trace Activated in VLR	5.11.6	C	C	T	
Foreign Subscriber Registered in VLR	5.11.7	-	C	P	(note)
NOTE: For special conditions of storage, see relevant clause.					

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

History

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