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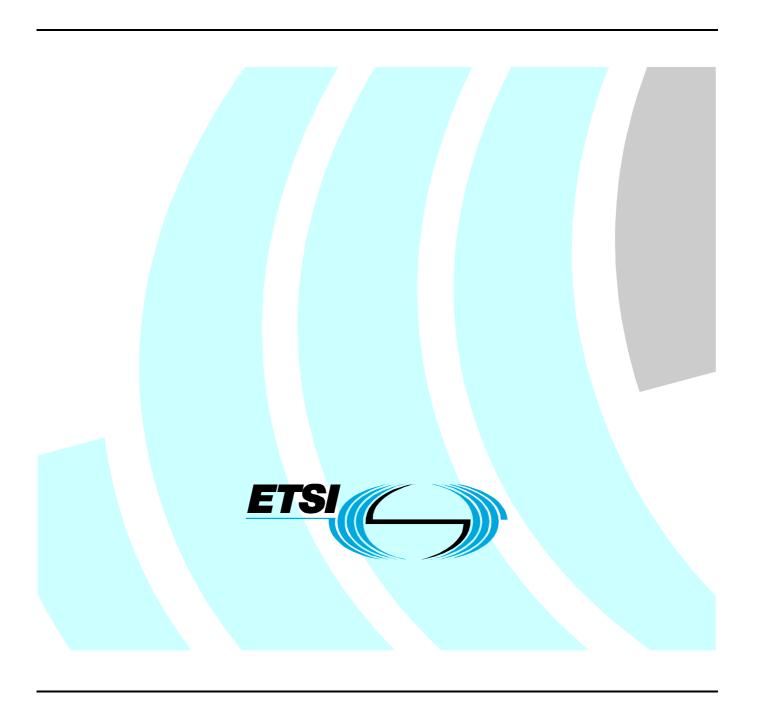
Technical Specification

GEO-Mobile Radio Interface Specifications (Release 2)
General Packet Radio Service;
Part 3: Network specifications;
Sub-part 3: Numbering, addressing and identification;
GMPRS-1 03.003

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Contents

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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 2.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 3 of a multi-part deliverable covering the GEO-Mobile Radio Interface Specifications (Release 2) General Packet Radio Service, as identified below:

Part 1: "General specifications";

Part 2: "Service specifications";

Part 3: "Network specifications":

  Sub-part 1: "Network Functions";

  Sub-part 2: "Network Architecture";

  Sub-part 3: "Numbering, addressing and identification";

  Sub-part 4: "Organization of Subscriber Data";

  Sub-part 5: "Technical realization of Supplementary Services";

  Sub-part 6: "Location Registration and Position Identification Procedures";

  Sub-part 7: "Discontinuous Reception (DRX)";

  Sub-part 8: "Support of Dual-Tone Multifrequency Signalling (DTMF)";

  Sub-part 9: "Security related Network Functions";

  Sub-part 10: "Functions related to Mobile Earth Station (MES) in idle mode";

  Sub-part 11: "Technical realization of the Short Message Service (SMS) Point-to-Point (PP)";

  Sub-part 12: "Technical realization of the Short Message Service Cell Broadcast (SMSCB)";

Sub-part 13: "Technical realization of group 3 facsimile using transparent mode of transmission";

Sub-part 14: "Transmission Planning Aspects of the Speech Service in the GMR-1 system";

Sub-part 15: "Line Identification supplementary service - Stage 2";

Sub-part 16: "Call Barring (CB) supplementary services - Stage 2";

Sub-part 17: "Unstructured Supplementary Service Data (USSD) - Stage 2";

Sub-part 18: "Terminal-to-Terminal Call (TtT)";

Sub-part 19: "Optimal Routing technical realization";

Sub-part 20: "Technical realization of High-Penetration Alerting";

Sub-part 21: "Position Reporting services; Stage 2 Service description";

Sub-part 22: "Overall description of the GMPRS radio interface; Stage 2".

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.

The present document is part of the GMR Release 2 specifications. Release 2 specifications are identified in the title and can also be identified by the version number:

- Release 1 specifications have a GMR-1 prefix in the title and a version number starting with "1" (V1.x.x.).

- Release 2 specifications have a GMPRS-1 prefix in the title and a version number starting with "2" (V2.x.x.).

The GMR release 1 specifications introduce the GEO-Mobile Radio interface specifications for circuit mode mobile satellite services (MSS) utilizing geostationary satellite(s). GMR release 1 is derived from the terrestrial digital cellular standard GSM (phase 2) and it supports access to GSM core networks.

The GMR release 2 specifications add packet mode services to GMR release 1. The GMR release 2 specifications introduce the GEO-Mobile Packet Radio Service (GMPRS). GMPRS is derived from the terrestrial digital cellular standard GPRS (included in GSM Phase 2+) and it supports access to GSM/GPRS 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. This GMR number has a different prefix for Release 2 specifications as follows:

- Release 1: GMR-n xx.zyy.

- Release 2: GMPRS-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 GMPRS-1 01.201 [8].

1   Scope

The present document defines:

a)   an identification plan for mobile subscribers in the Geo-Mobile Radio (GMR-1) Mobile Satellite System;

b)   principles of assigning telephone and ISDN numbers to mobile earth stations;

c)   principles of assigning mobile station roaming numbers to visiting mobile earth stations;

d)   an identification plan for location areas and ground stations in the GMR-1 system;

e)   an identification plan for MSCs and location registers in the GMR-1 system;

f)   principles of assigning international mobile equipment identities;

g)   principles of assigning zones for regional subscription;

h)   principles for assigning Packet Data Protocol (PDP) to mobile terminals.

The present document is based on 3GPP TS 03.03 Phase 2+ [7] for packet switched services and
GSM 03.03 Phase 2 [2] for circuit switched services.

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 and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at
http://docbox.etsi.org/Reference.

[1]   GMPRS-1 01.004 (ETSI TS 101 376-1-1): "GEO-Mobile Radio Interface Specifications
           (Release 2) General Packet Radio Service; Part 1: General specifications;
           Sub-part 1: Abbreviations and acronyms".

[2]   GSM 03.03 (ETSI EN 300 523): "Digital cellular telecommunications system (Phase 2) (GSM);
           Numbering, addressing and identification". (GSM Phase 2).

[3]   ITU-T Recommendation E.164: "The international public telecommunication numbering plan".

[4]   ITU-T Recommendation E.212: "The international identification plan for mobile terminals and
           mobile users".

[5]   ITU-T Recommendation E.213: "Telephone and ISDN numbering plan for land mobile stations in
           public land mobile networks (PLMN)".

[6]   ITU-T Recommendation X.121: "International numbering plan for public data networks".

[7]   3GPP TS 03.03 (ETSI TS 100 927): "Digital cellular telecommunications system (Phase 2+);
           Numbering, addressing and identification (Release 1998)".

[8]   GMPRS-1 01.201 (ETSI TS 101 376-1-2): "GEO-Mobile Radio Interface Specifications
           (Release 2) General Packet Radio Service; Part 1: General specifications; Sub-part 2: Introduction
           to the GMR-1 family".

[9]   IETF RFC 2181: "Clarifications to the DNS Specification".

[10]   IETF RFC 1035: "Domain names - implementation and specification".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in GMPRS-1 01.201 [8] apply.

3.2 Abbreviations

For the purposes of the present document, the abbreviations defined in GMPRS-1 01.004 [1] apply.

4 General comments to references

The identification plan for mobile subscribers defined below is that defined in ITU-T Recommendation E.212 [4].

The ISDN numbering plan for mobile earth stations and the allocation of mobile station roaming numbers is that defined in ITU-T Recommendation E.213 [5]. Only one of the principles for allocating ISDN numbers is proposed for GMR-1 satellite Network. Only the method for allocating mobile station roaming numbers contained in the main text of ITU-T Recommendation E.213 [5] is recommended for use in GMR-1 Satellite Network. If there is any difference between the present document and the ITU-T Recommendations, the former shall take precedence.

For terminology, see also ITU-T Recommendations E.164 [3] and X.121 [6].

5 Conventions on bit ordering

Same as clause 1.5 of GSM 03.03 Phase 2 [2].

6 Identification of mobile subscribers

6.1 General

Same as clause 2.1 of GSM 03.03 Phase 2 [2] except that the following text is added as per 3GPP TS 03.03 Phase 2+ [7].

An MES may be allocated two TMSIs, one for services provided through the MSC, and the other for services provided through the SGSN (P-TMSI for short).

For addressing on resources used for GPRS, a Temporary Logical Link Identity (TLLI) is used. The TLLI to use is built by the MES either on the basis of the P-TMSI (local or foreign TLLI), or directly (random TLLI).

6.2 Composition of IMSI

Same as clause 2.2 of GSM 03.03 Phase 2 [2].

6.3 Allocation principles

Same as clause 2.3 of GSM 03.03 Phase 2 [2].

6.4   Structure of TMSI

Same as clause 2.6 of 3GPP TS 03.03 Phase 2+ [7].

6.5   Structure of LMSI

Same as clause 2.5 of GSM 03.03 Phase 2 [2].

6.6   Structure of TLLI

Same as clause 2.6 of 3GPP TS 03.03 Phase 2+ [7].

7   Numbering plan for mobile earth stations

7.1   General

Same as clause 3.1 of 3GPP TS 03.03 Phase 2+ [7].

7.2   Numbering plan requirements

Same as clause 3.2 of 3GPP TS 03.03 Phase 2+ [7].

7.3   Structure of Mobile Station International PSTN/ISDN Number (MSISDN)

Same as clause 3.3 of GSM 03.03 Phase 2 [2].

7.4   Mobile Station Roaming Number (MSRN) for PSTN/ISDN routing

Same as clause 3.4 of GSM 03.03 Phase 2 [2].

7.5   Structure of mobile station international data number

Same as clause 2.2 of 3GPP TS 03.03 Phase 2+ [7].

7.6   Handover number

Not applicable.

7.7   Structure of an IP v4 address

Same as clause 2.2 of 3GPP TS 03.03 Phase 2+ [7].

7.8   Structure of an IP v6 address

Same as clause 2.2 of 3GPP TS 03.03 Phase 2+ [7].

8 Identification of location areas and gateway stations

8.1 Composition of the Location Area Identification (LAI)

The Location Area Identification (LAI) shall be composed as shown in figure 8.1.

G - 1 3 7 5 9 P
0 9 / 2 5 / 9 8

Figure 8.1: Structure of Location Area Identification (LAI)

The LAI is composed of the following elements:

- Mobile Country Code (MCC) identifies the country in which the PLMN is located. The value of the MCC is the same as the three digits. MCC contained in international mobile subscriber identity (IMSI);

- Mobile Network Code (MNC) is a code identifying the PLMN in that country. The MNC takes the same value as the two digit MNC contained in IMSI.

NOTE 1: The specific MCC and MNC values that are reserved for a satellite network are defined in ITU-T Recommendation E.212 [4].

- Location Area Code (LAC) which is a fixed length code (of 2 octets) identifying a location area within a GMR-1 Satellite Network. LAC is composed of two parts:

  i) Mobile Switching Centre ID (MSCID) which identifies a Mobile Switching Centre (MSC) within a GMR-1 Satellite Network or SGSN ID, which identifies an SGSN within a GMR-1 Satellite Network. Its length is six bits.

  ii) Spot beam ID (spot beam ID) which identifies a spot beam within GMR-1 Satellite Network. Its length is ten bits.

NOTE 2: This usage of the LAC is specific to a GMR-1 Satellite Network.

8.2 Composition of the Routing Area Identification (RAI)

The Routing Area Identification (RAI) shall be composed as shown in figure 8.2:
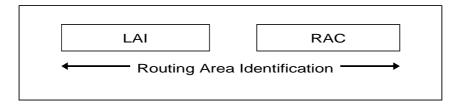

Figure 8.2: Structure of Routing Area Identification (RAI)

The RAI is composed of the following elements:

- A valid Location Area Identity (LAI) as defined in clause 8.1.

- Routing Area Code (RAC), which is a fixed length code (of 1 octet) identifying a routing area within a location area.

8.3   Gateway station identification

8.3.1   Cell identity (CI) and Cell Global Identification (CGI)

Same as clause 4.3.1 of 3GPP TS 03.03 Phase 2+ [7].

8.3.2   Base transceiver Station Identity Code (BSIC)

Same as clause 4.3.2 of 3GPP TS 03.03 Phase 2+ [7].

8.4   Regional Subscription Zone Identity (RSZI)

Same as clause 4.4 of 3GPP TS 03.03 Phase 2+ [7].

8.5   Location number

Same as clause 4.5 of 3GPP TS 03.03 Phase 2+ [7].

9   Identification of MSCs and location registers

9.1   Identification for routing purpose

Same as clause 5.1 of 3GPP TS 03.03 Phase 2+ [7].

9.2   Identification of HLR for HLR restoration application

Same as clause 5.2 of GSM 03.03 Phase 2 [2].

10   International mobile station equipment identity and software version number

10.1   General

Same as clause 6.1 of GSM 03.03 Phase 2 [2].

10.2   Composition of IMEI and IMEISV

10.2.1   Composition of IMEI

Same as clause 6.2.1 of GSM 03.03 Phase 2 [2].

10.2.2   Composition of IMEISV

Same as clause 6.2.2 of GSM 03.03 Phase 2 [2].

10.3 Allocation principles

Same as clause 6.3 of GSM 03.03 Phase 2 [2].

11 Identification of voice group call and voice broadcast call entities

Not applicable.

12 SCCP subsystem numbers

Not applicable.

13 Definition of Access Point Name

In the GPRS backbone, an Access Point Name (APN) is a reference to a GGSN. To support inter-PLMN roaming, the internal GPRS DNS functionality is used to translate the APN into the IP address of the GGSN.

13.1 Structure of APN

The APN is composed of two parts as follows:

- The APN Network Identifier which defines to which external network the GGSN is connected. This part of the APN is mandatory.

- The APN Operator Identifier which defines in which PLMN GPRS backbone the GGSN is located. This part of the APN is optional.

The APN Operator Identifier is placed after the APN Network Identifier. An APN consisting of both the Network Identifier and Operator Identifier corresponds to a DNS name of a GGSN and has a maximum length of 100 octets.

The syntax of the APN shall follow the Name Syntax defined in RFC 2181 [9] and RFC 1035 [10]. The APN consists of one or more labels. Each label is coded as one octet length field followed by that number of octets coded as 8 bit ASCII characters. Following RFC 1035 [10] the labels should consist only of the alphabetic characters (A to Z and a to z), digits (0 to 9), and the dash (-). The case of alphabetic characters is not significant. The APN is not terminated by a length byte of zero.

NOTE: A length byte of zero is added by the SGSN at the end of the APN before interrogating a DNS server.

For the purpose of presentation, an APN is usually displayed as a string in which the labels are separated by dots (i.e. "Label1.Label2.Label3").

13.1.1 Format of APN Network Identifier

The APN Network Identifier shall contain at least one label and shall have a maximum length of 63 octets. An APN Network Identifier shall not start with the strings "rac", "lac" or "sgsn" and it shall not end in ".gprs". It shall also not take the value "*".

In order to guarantee uniqueness of APN Network Identifier within the GPRS PLMN(s), an APN Network Identifier containing more than one label corresponds to an Internet domain name. This name should only be allocated by the PLMN to an organization that has officially reserved this name in the Internet domain. Other types of APN Network Identifiers are not guaranteed to be unique within the GPRS PLMN(s).

13.1.2 Format of APN Operator Identifier

The APN Operator Identifier is composed of three labels. The last label shall be "gprs". The first and second labels together shall uniquely identify the GPRS PLMN (i.e. "<operator-name>.<operator-group>.gprs").

For each operator, there is a default APN Operator Identifier (i.e. domain name). This default APN Operator Identifier is derived from the IMSI as follows:

> "mnc<MNC>.mcc<MCC>.gprs"

> where:

>> "mnc" and "mcc" serve as invariable identifiers for the following digits.

>> <MNC> and <MCC> are the components of the IMSI defined in clause 2.2.

This default APN Operator Identifier is used in inter-PLMN roaming situations when attempting to translate an APN consisting of Network Identifier only into the IP address of the GGSN residing in the HPLMN. The PLMN may provide DNS translations for other, more human-readable, APN Operator Identifiers in addition to the default Operator Identifier described above.

13.2 Definition of the wild card APN

The APN field in the HLR may contain a wild card APN if the HPLMN operator allows the subscriber to access any network of a given PDP type. If an SGSN has received such a wild card APN, it may either choose the APN Network Identifier received from the Mobile Station or a default APN Network Identifier for addressing the GGSN when activating a PDP context.

13.2.1 Coding of the wild card APN

The wild card APN is coded as an APN with "*" as its single label, (i.e. a length octet with value one, followed by the ASCII code for the asterisks).

14 Identification of the cordless telephony system entities

Not applicable.

15 Identification of localized service area

Not applicable.

Annex A (informative):
Colour codes

A.1 Utilization of the BSIC

Same as clause A.1 of GSM 03.03 Phase 2 [2].

A.2 Guidance for planning

Same as clause A.2 of GSM 03.03 Phase 2 [2].

A.3 Example of PLMN colour codes (NCCs) for the European region

Not applicable.

Annex B (informative): Bibliography

GMR-1 03.008 (ETSI TS 101 376-3-4) V1.1.1: "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 4: Organization of Subscriber Data; GMR-1 03.008".

> NOTE: This is a reference to a GMR-1 Release 1 specification. See the introduction for more details.

GMR-1 03.020 (ETSI TS 101 376-3-9) V1.1.1: "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 9: Security related Network Functions; GMR-1 03.020".

> NOTE: This is a reference to a GMR-1 Release 1 specification. See the introduction for more details.

GSM 03.70 (ETSI ETS 300 541): "European digital cellular communications system (Phase 2); Routing of calls to/from Public Data Networks (PDN)". (GSM Phase 2).

GMR-1 04.008 (ETSI TS 101 376-4-8) V1.2.1: "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 8: Mobile Radio Interface Layer 3 Specifications; GMR-1 04.008".

> NOTE: This is a reference to a GMR-1 Release 1 specification. See the introduction for more details.

GSM 09.03 (ETSI ETS 300 600): "European digital cellular telecommunications system (Phase 2); Signalling requirements on interworking between the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN) and the Public Land Mobile Network (PLMN)". (GSM Phase 2)

GSM 11.11 (V4.21.0) (ETSI ETS 300 608): "Digital cellular telecommunications system (Phase 2); Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface" (GSM Phase 2).

History

Document history		
V2.1.1	March 2003	Publication
V2.2.1	March 2005	Publication