

ETSI/TC SMG

Date : October 1993

Issued By : ETSI/PT12

UPDATE NOTE

ETSI Technical Specification GSM 03.03
Numbering, Addressing and Identification

Previously Released version : 3.5.0 (Release 92, phase 1)

New Updated version : 3.6.0 (October 1993)

1. Reason for change

Changes agreed at SMG # 8, as listed in section 2, are included.

2. Details of change

The following CRs were approved at SMG # 8.

| CR | Sections Modified | Title of CR | Ref TDoc SMG |
|-----------|-------------------|-------------------------------------|--------------|
| 03.03-026 | 2.3.3 | Use of Mobile Country Code in IMSI. | 601/93 |

END OF UPDATE NOTE

ETSI/TC GSM

Title : Recommendation GSM 03.03

Numbering, Addressing and Identification

Version : 3.6.0

Date : October 1993

List of contents:

- 1 INTRODUCTION**
- 2 IDENTIFICATION OF MOBILE STATIONS**
- 3 NUMBERING PLAN FOR MOBILE STATION**
- 4 IDENTIFICATION OF LOCATION AREAS AND BASE STATIONS**
- 5 IDENTIFICATION OF MSCS AND LOCATION REGISTERS**
- 6 INTERNATIONAL MOBILE EQUIPMENT IDENTITY**
- ANNEX A PLMN COLOUR CODES (NCCS)**

Language of original : English

Number of pages : 13

TABLE OF CONTENTS

| | |
|--|----|
| 1 INTRODUCTION | 3 |
| 1.1 Scope | 3 |
| 1.2 References | 3 |
| 1.3 General note on bitordering | 3 |
| 2 IDENTIFICATION OF MOBILE SUBSCRIBERS..... | 4 |
| 2.1 General | 4 |
| 2.2 Composition of IMSI | 4 |
| 2.3 Allocation principles | 5 |
| 2.4 Structure of TMSI..... | 6 |
| 2.5 Structure of LMSI..... | 6 |
| 3 NUMBERING PLAN FOR MOBILE STATIONS | 6 |
| 3.1 General | 6 |
| 3.2 Numbering plan requirements..... | 7 |
| 3.3 Structure of mobile station international PSTN/ISDN number | 7 |
| 3.4 Mobile station roaming number for PSTN/ISDN routing | 8 |
| 3.5 Structure of mobile station international data number | 10 |
| 3.6 Mobile station roaming numbers for PDN routing | 10 |
| 3.7 Handover Number | 10 |
| 4 IDENTIFICATION OF LOCATION AREAS AND BASE STATIONS | 10 |
| 4.1 Composition of the location area identification..... | 10 |
| 4.2 Base station identification | 10 |
| 5 IDENTIFICATION OF MSCs AND LOCATION REGISTERS | 11 |
| 5.1 Identification for routing purpose | 11 |
| 5.2 Identification of HLR for HLR restoration application | 11 |
| 6 INTERNATIONAL MOBILE STATION EQUIPMENT IDENTITY | 12 |
| 6.1 General | 12 |
| 6.2 Composition of IMEI | 12 |
| 6.3 Allocation principles | 12 |
| Annex A PLMN Colour Codes (NCCs)..... | 13 |

1 INTRODUCTION

1.1 Scope

The scope of this Recommendation is to define :

- i) an identification plan for mobile subscribers in the GSM system.
- ii) principles of assigning telephone and ISDN numbers to mobile stations in the country of registration of the mobile station.
- iii) principles of assigning mobile station roaming numbers to visiting mobile stations.
- iv) an identification plan for location areas and base stations in the GSM system.
- v) an identification plan for MSCs and location registers in the GSM system.
- vi) principles of assigning international mobile equipment identities.

1.2 References

The identification plan for mobile subscribers defined below is that defined in CCITT Recommendation E. 212.

The ISDN numbering plan for mobile stations and the allocation of mobile station roaming numbers is that defined in CCITT Recommendation E. 213. Only one of the principles for allocating ISDN numbers is proposed for GSM PLMNs. Only the method for allocating mobile station roaming numbers contained in the main text of CCITT Recommendation E. 213 is recommended for use in GSM PLMNs. If there is any difference between this Recommendation and the CCITT Recommendations, the former shall prevail.

For terminology, see also CCITT Recommendations E.164 and X.121.

1.3 General note on bitordering

The following conventions hold for the coding of the different identities appearing in this recommendation and in other GSM recommendation if not indicated otherwise:

- The different parts of an identity are shown in the figures in order of significance;
- The most significant part of an identity is on the left part of the figure and the least significant on the right.

When an identity appears in other Recommendations, the following conventions hold if not indicated otherwise:

- digits are numbered by order of significance, with digit 1 being the most significant
- bits are numbered by order of significance, with the lowest bit number corresponding to the least significant bit.

2 IDENTIFICATION OF MOBILE SUBSCRIBERS

2.1 General

A unique International Mobile Subscriber Identity (IMSI) shall be allocated to each mobile subscriber in the GSM system.

Note 1 : This IMSI is the concept referred to by CCITT as "International Mobile Station Identity".

Note 2 : The allocation of IMSI/MSISDN pairs for mobile PBXs is for further study.

In order to support the subscriber identity confidentiality service the VLRs may allocate a unique Temporary Mobile Subscriber Identity (TMSI) to visiting mobile subscribers. The VLR must be capable of correlating the IMSI of an MS and the current TMSI for that MS.

In order to speed up the search for subscriber data in the VLR a supplementary Local Mobile Station Identity (LMSI) may be defined in the case where the MSRN allocation is done on a per call basis.

The LMSI is allocated by the VLR at location updating and is sent to the HLR together with the IMSI. The HLR makes no use of it but includes it together with the IMSI in all messages sent to the VLR concerning that MS.

2.2 Composition of IMSI

IMSI is composed as shown in Figure 1.

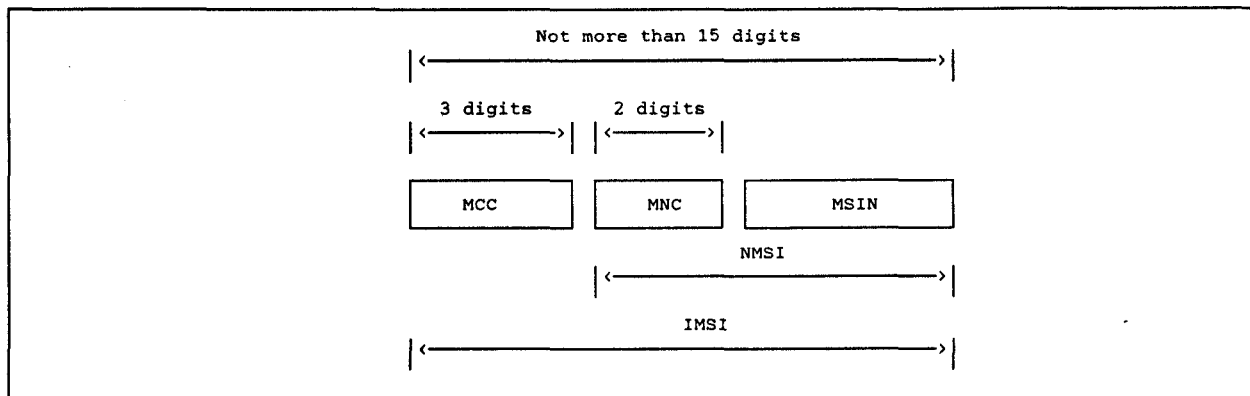


Figure 1 - Structure of IMSI

IMSI is composed of three parts :

- i) Mobile Country Code (MCC) consisting of three digits. The MCC identifies uniquely the country of domicile of the mobile subscriber.
- ii) Mobile Network Code (MNC) consisting of two digits for GSM applications. The MNC identifies the home GSM PLMN of the mobile subscriber.
- iii) Mobile Subscriber Identification Number (MSIN) identifying the mobile subscriber within a GSM PLMN.

The National Mobile Subscriber Identify (NMSI) consists of the Mobile Network Code and the Mobile Subscriber Identification Number.

2.3 Allocation principles

2.3.1.

IMSI shall consist of numerical characters (0 through 9) only.

2.3.2.

The overall number of digits in IMSI shall not exceed 15 digits.

2.3.3.

The allocation of Mobile Country Codes (MCCs) is administered by the CCITT and is given in Annex A to CCITT Blue Book Recommendation E. 212.

2.3.4.

The allocation of National Mobile Subscriber Identity (NMSI) is the responsibility of each administration.

2.3.5.

If more than one GSM PLMN exist in a country, a unique Mobile Network Code should be assigned to each of them.

2.3.6.

The allocation of IMSIs should be such that not more than the digits MCC + MNC of the IMSI have to be analysed in a foreign GSM PLMN for information transfer.

2.4 Structure of TMSI

2.4.1

Since the TMSI has only local significance (i.e. within the VLR and the area controlled by the VLR), the structure of it can be chosen by each administration in order to meet local needs.

2.4.2

The TMSI should not consist of more than 4 octets.

2.4.3

In order to avoid double allocation of TMSIs after a restart of a VLR, some part of the TMSI may be related to the time when it was allocated or contain a bit field which is changed when the VLR has recovered from the restart.

2.4.4

The TMSI should be allocated after successful authentication. See also Recommendation GSM 03.20.

2.5 Structure of LMSI

The LMSI consists of 4 octets and is allocated by the VLR.

3 NUMBERING PLAN FOR MOBILE STATIONS

3.1 General

Below the structure of the numbers used by a subscriber of a fixed (or mobile) network for calling a mobile station of a GSM PLMN is defined.

Also the structure of mobile station roaming numbers is defined.

One or more numbers of the ISDN numbering plan shall be assigned to a mobile station to be used for all calls to that station.

There may be a need for Mobile Stations (MS) to have a X.121 number. Because the MS has to have in any case a number from the ISDN numbering plan, the X.121 number will be in addition. Implications on numbering interworking functions which may need to be provided by the PLMN (if the use of X.121 numbers is required) are indicated in GSM Recommendation 03.70.

Note 1 : For card operated stations the ISDN number should be assigned to the holder of the card (personal number).

3.2 Numbering plan requirements

3.2.1

In principle, it should be possible for any subscriber of the ISDN or PSTN to call any mobile station in a GSM PLMN. This implies that ISDN numbers for mobile stations should comply with the ISDN numbering plan in each country.

3.2.2

The ISDN numbers of mobile stations should be composed in such a way that standard ISDN/PSTN charging can be used for calls to mobile stations.

3.2.3

It should be possible for each administration to develop its own independent numbering plan for mobile stations.

3.2.4

The numbering plan should not limit the possibility for mobile stations to roam among GSM PLMNs.

3.2.5

It should be possible to change the IMSI without changing the ISDN number allocated to a mobile station and vice versa.

3.2.6

In principle, it should be possible for any subscriber of the CSPDN/PSPDN to call any Mobile Station (MS) in a GSM PLMN. This implies that it may be necessary for an MS to have a X.121 number.

3.3 Structure of mobile station international PSTN/ISDN number

3.3.1

The mobile station international ISDN numbers are allocated from the CCITT Recommendation E.164 numbering plan, see also CCITT Recommendation E.213. The mobile station international ISDN number will then be as shown in Figure 2.

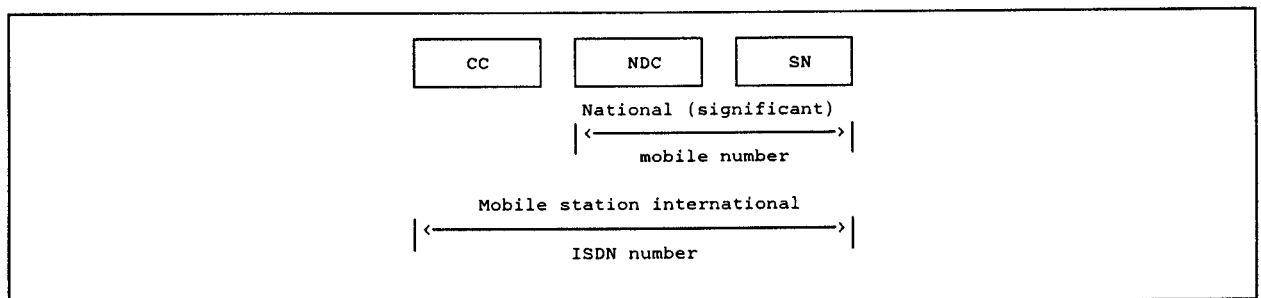


Figure 2 - Number Structure

The number consists of :

- Country Code (CC) of the country in which the mobile station is registered, followed by
- National (significant) mobile number which consists of National Destination Code (NDC) and Subscriber Number (SN).

For GSM applications, a National Destination Code is allocated to each GSM PLMN. In some countries more than one NDC may be required for each GSM PLMN.

3.3.2

The composition of the mobile station international ISDN number should be such that it can be used as a global title address in the Signalling Connection Control Part (SCCP) for routing messages to the home location register of the mobile station. The country code (CC) and the national destination code (NDC) will provide such routing information. If further routing information is required, it should be contained in the first few digits of the subscriber number (SN).

3.4 Mobile station roaming number for PSTN/ISDN routing

3.4.1

Mobile station roaming numbers for PSTN/ISDN routing are allocated to mobile stations on a temporary basis when the mobile station roams into another numbering area. Two alternatives are available for assigning the MSRN to a roamed MS. These are:

Alternative 1: Assign a MSRN in the visited network upon initial registration or location updating and pass this to the HLR.

Alternative 2: Assign a MSRN in the visited Network upon demand by the HLR on a per call basis.

The mobile station roaming number is used by the home location register for rerouting calls to the mobile station.

Note : Allocation/reallocation of roaming numbers may also take place within the area controlled by one location register, i.e. if the location register area covers several numbering areas.

3.4.2

The mobile station roaming number for PSTN/ISDN routing shall have the same structure as international ISDN numbers in the area in which the roaming number is allocated, i.e. :

- the country code of the country in which the visitor location register is located.
- the national destination code of the visitor GSM PLMN or numbering area.
- a subscriber number with the appropriate structure for that numbering area.

3.4.3

The mobile station roaming number allocation will be cancelled when the visiting mobile station leaves the area. The number may then be allocated to another visiting station.

The cancellation takes place in both the visitor and home location registers as part of the location cancellation procedure. If this procedure does not succeed, the mobile station roaming number must not be allocated to another mobile station until it is ascertained that the home location register has removed the number.

If MSRN allocation alternative 2 is used, reallocation of MSRN is defined in recommendation GSM 03.08.

3.4.4

The mobile station roaming number must not be used for subscriber dialling. It should be noted that the mobile station roaming number can be identical to the mobile station international ISDN number (section 3.3) in certain circumstances. In order to discriminate between subscriber generated access to these numbers and rerouting performed by the network, rerouting or redirection indicators or other signalling means should be used, if available (see Recommendation GSM 09.03).

3.5 Structure of mobile station international data number

The structure of mobile station international data numbers should comply with the data numbering plan of CCITT Recommendation X.121 as applied in the home country of the mobile subscriber.

3.6 Mobile station roaming numbers for PDN routing

Further study

3.7 Handover Number.

The handover number is used for establishment of a circuit between MSC's to be used for a call being handed over.

4 IDENTIFICATION OF LOCATION AREAS AND BASE STATIONS

4.1 Composition of the location area identification

The location area identification should be composed as shown in Figure 3 :

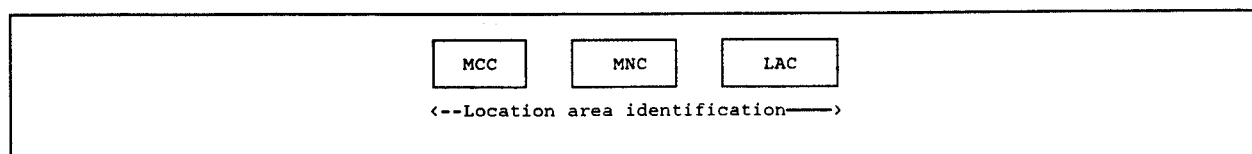


Figure 3 - Structure of location area identification

The location area identification is composed of the following elements :

- Mobile Country Code (MCC) identifies the country in which the GSM PLMN is located. The value of the MCC is the same as the three digit MCC contained in international mobile subscriber identity (IMSI).
- Mobile Network Code (MNC) is a code identifying the GSM PLMN in that country. The MNC takes the same value as the MNC contained in IMSI.
- Location Area Code (LAC) which is a flexible length code {(up to 2 octets maximum)} identifying a location area within a GSM PLMN. This part of the location area identification can be coded using a full hexadecimal representation, except one value with all bits set to zero. The reserved value is used in some special cases when no valid LAI exists in the mobile station. (See recommendations GSM 04.08 and GSM 11.11)

4.2 Base station identification

4.2.1 Cell Identity (CI)

The BSS and cell within the BSS is identified within a location area by adding a cell identity (CI) to the location area identification, as shown in Figure 4. The CI is of flexible length and it can be coded using a full hexadecimal representation.

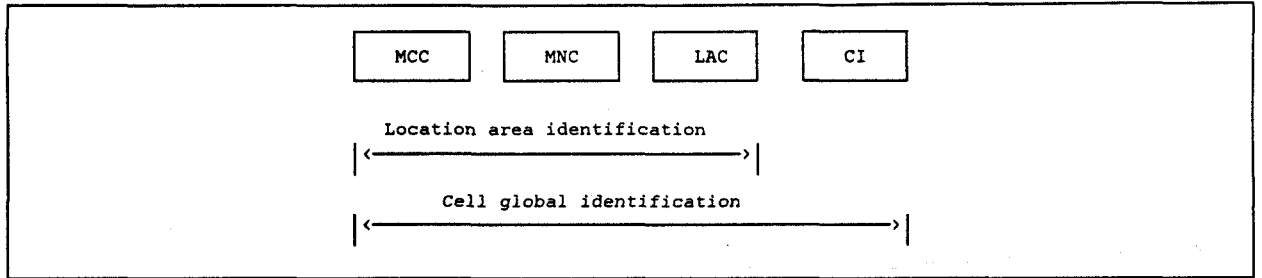


Figure 4 - Structure of cell global identification

It must be possible for the mobile station to distinguish between location area identification and CIs in all GSM PLMNs. The maximum lengths of the LAC and CI are 2 octets each.

4.2.2 Base Station Identify Code (BSIC)

The base station identity code is a local colour code that allows a mobile station to distinguish between different neighbouring base stations. BSIC is a 6 bit length code which is structured in the following way.

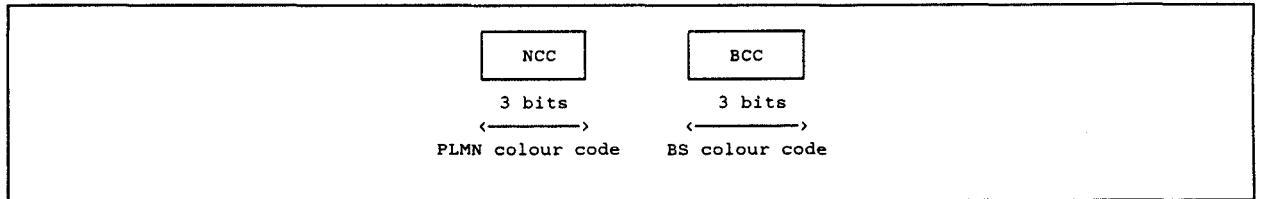


Figure 5 - Structure of BSIC

In the definition of the NCC, care needs to be taken to ensure that the same NCC is not used in the adjacent PLMNs. Therefore, to prevent potential deadlocks, a definition of the NCC appears in Annex A. This Annex will be reviewed in a co-ordinated manner when a PLMN is created.

5 IDENTIFICATION OF MSCs AND LOCATION REGISTERS

5.1 Identification for routing purpose

MSCs and location registers are identified by international PSTN/ISDN numbers and/or Signalling Point Codes ("entity number" , ie. "HLR number", "VLR number", "MSC number") in each GSM PLMN

5.2 Identification of HLR for HLR restoration application

HLR may also be identified by one or several "HLR id(s)", consisting of the leading digits of the IMSI (MCC + MNC + leading digits of MSIN)

6 INTERNATIONAL MOBILE STATION EQUIPMENT IDENTITY

6.1 General

Below the structure and allocation principles of International Mobile station Equipment Identities (IMEI) are defined.

An IMEI uniquely identifies a mobile station equipment.

6.2 Composition of IMEI

The International Mobile station Equipment Identity (IMEI) should be composed as shown in Figure 6.

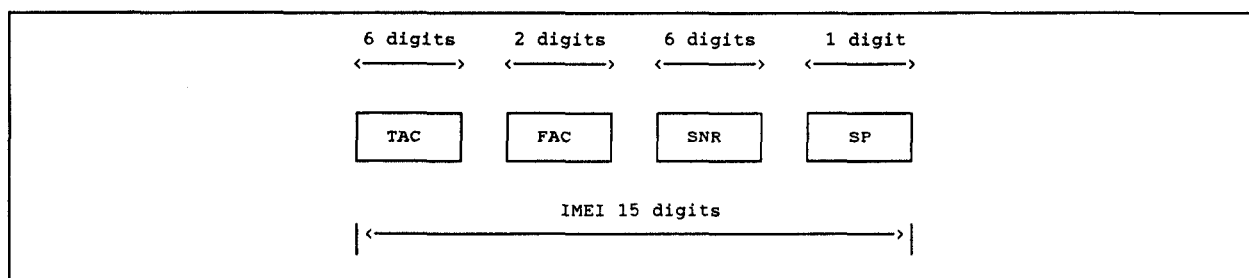


Figure 6 - Structure of IMEI

The IMEI is composed of the following elements :

- Type Approval Code (TAC) ; its contents is determined by a central body. Its length is 6 digits.
- Final Assembly Code (FAC) identifies the place of manufacture/final assembly. Its length is 2 digits.
- Serial Number (SNR) is an individual serial number of 6 digits uniquely identifying each equipment within each TAC and FAC.
- Spare (SP) for further assignment (1 digit).

6.3 Allocation principles

The Type Approval Code (TAC) is issued by a central body.

The place of final assembly (FAC) is encoded by the manufacturer.

Manufacturers shall allocate individual serial numbers (SNR) in asequential order.

Annex A PLMN Colour Codes (NCCs)

| | | | |
|---------------|---|---|------------------------|
| Austria | : | 0 | |
| Belgium | : | | 1 |
| Cyprus | : | 3 | |
| Denmark | : | | 1 |
| Finland | : | 0 | |
| France | : | 0 | |
| FRG | : | 3 | |
| Greece | : | 0 | |
| Iceland | : | 0 | |
| Ireland | : | 3 | |
| Italy | : | 2 | |
| Liechtenstein | : | 2 | |
| Luxembourg | : | 2 | |
| Malta | : | 1 | |
| Monaco | : | | 3(possibly 0(=France)) |
| Netherlands | : | 0 | |
| Norway | : | 3 | |
| Portugal | : | | 3 |
| San Marino | : | | 0(possibly 2(= Italy)) |
| Spain | : | 1 | |
| Sweden | : | | 2 |
| Switzerland | : | | 1 |
| Turkey | : | 2 | |
| UK | : | 2 | |
| Vatican | : | | 1 (possibly 2(=Italy)) |
| Yugoslavia | : | | 3 |

This allows for each country a second operator by allocating the colour codes n (in the table) and $n + 4$. More than 2 colour codes per country may be used provided that in border areas only the values n and/or $n+4$ are used.