

ETSI TS 122 022 V14.0.0 (2017-03)



**Digital cellular telecommunication system (Phase 2+) (GSM);
Universal Mobile Telecommunications System (UMTS);
LTE;
Personalisation of Mobile Equipment (ME);
Mobile functionality specification
(3GPP TS 22.022 version 14.0.0 Release 14)**



Reference

RTS/TSGS-0122022ve00

Keywords

GSM,LTE,UMTS**ETSI**

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

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2017-03

1 Scope

The present document provides functional specifications of five features to personalise Mobile Equipment (ME) for GSM and 3G systems. These features are called:

- Network personalisation;
- Network subset personalisation;
- Service Provider (SP) personalisation;
- Corporate personalisation;
- SIM/USIM personalisation (SIM for GSM systems or USIM for 3G systems).

The present document specifies requirements for MEs which provide these personalisation features.

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. 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] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 22.011: "Service accessibility".
- [3] 3GPP TS 23.003: "Numbering, addressing and identification".
- [4] 3GPP TS 23.122: "Non-Access-Stratum (NAS) functions related to Mobile Station (MS) in idle mode".
- [5] 3GPP TS 23.038: "Alphabets and language-specific information".
- [6] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS); Point-to-Point (PP)".
- [7] GSM 11.11: "Digital cellular telecommunications system (Phase 2+); Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface".
- [8] GSM 11.14: "Digital cellular telecommunications system (Phase 2+); Specification of the SIM Application Toolkit for the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface".
- [9] 3GPP TS 31.102: "Characteristics of the USIM application".
- [10] 3GPP TS 31.111: "USIM Application Tool Kit".

3 Definitions and abbreviations

3.1 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CCK	Corporate Control Key
CNL	Co-operative Network List
GID1	Group Identifier (level 1)
GID2	Group Identifier (level 2)
EF	Elementary File
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
MCC	Mobile Country Code
ME	Mobile Equipment
MS	GSM Mobile Station (ME + SIM)
MNC	Mobile Network Code
NCK	Network Control Key
NSCK	Network Subset Control Key
PCK	Personalisation Control Key
SIM	Subscriber Identity Module
SMS	Short Message Service
SP	Service Provider
SPCK	Service Provider Control Key
TMSI	Temporary Mobile Subscriber Identity
UE	3G User Equipment (ME + USIM)
USIM	User Services Identity Module

Further GSM abbreviations are given in TS 21.905 [1].

3.2 Definitions

For the purposes of the present document, the following definitions apply:

corporate personalisation: Allows a corporate customer to personalise MEs that he provides for his employees or customers use so that they can only be used with the company's own SIM/USIMs.

de-personalisation: Is the process of deactivating the personalisation so that the ME ceases to carry out the verification checks.

network personalisation: Allows the network operator to personalise a ME so that it can only be used with that particular network operator's SIM/USIMs

network subset personalisation: A refinement of network personalisation, which allows network operators to limit the usage of a ME to a subset of SIM/USIMs

normal mode of operation: Is the mode of operation into which the ME would have gone if it had no personalisation checks to process.

personalisation: Is the process of storing information in the ME and activating the procedures which verify this information against the corresponding information stored in the SIM/USIM whenever the ME is powered up or a SIM/USIM is inserted, in order to limit the SIM/USIMs with which the ME will operate.

SIM/USIM personalisation: Enables a user to personalise a ME so that it may only be used with particular SIM/USIM(s).

SP personalisation: Allows the service provider to personalise a ME so that it can only be used with that particular service provider's SIM/USIMs.

user: Normally refers to the person performing the personalisation or de-personalisation operations and may represent a network operator, service provider, manufacturer of the user/owner of the handset, depending on the context.

network code: MCC and MNC.

network subset code: digits 6 and 7 of the IMSI.

SP code: code which when combined with the network code refers to a unique SP. The code is provided in the GID1 file on the SIM/USIM (see Annex A.1.) and is correspondingly stored on the ME.

Corporate code: code which when combined with the network and SP codes refers to a unique Corporate. The code is provided in the GID2 file on the SIM/USIM (see Annex A.1.) and is correspondingly stored on the ME.

SIM/USIM code: code which when combined with the network and NS codes refers to a unique SIM/USIM. The code is provided by the digits 8 to 15 of the IMSI

network code group: same as network code

network subset code group: combination of a network subset code and the associated network code.

SP code group: combination of the SP code and the associated network code.

Corporate code group: combination of the Corporate code and the associated SP and network codes.

SIM/USIM code group: combination of the SIM/USIM code and the associated network subset and network codes (it is equivalent to the IMSI).

Personalisation entity: Network, network subset, SP, Corporate or SIM/USIM to which the ME is personalised

4 General description

The personalisation features work by storing information in the ME which limits the IMs with which it will operate, and by checking this information against the SIM/USIM whenever the ME is powered up or a SIM/USIM is inserted. If a check fails, the ME enters the "limited service state" in which only emergency calls can be attempted (see annex A.2).

There are five personalisation categories of varying granularity; network, network subset, SP, corporate and SIM/USIM. The personalisation categories are independent in so far as each category can be activated or de-activated regardless of the status of the others. Each category has a separate personalisation indicator to show whether it is active or not. The ME can be personalised to one network, one network subset, one SP, one Corporate, one SIM/USIM or any combination thereof. The ME may optionally be personalised to multiple networks, network subsets, SPs, Corporates, IMs or any combinations thereof.

The codes used for each personalisation category are shown in Table 1. Some categories require several codes (e.g. SP and network for SP personalisation) and each combination of codes relating to a particular entity (network, SP etc.) is referred to as a code group. To personalise to multiple entities, multiple code groups are stored in the ME. For each activated personalisation category, the ME retrieves the relevant codes from the SIM/USIM and checks the retrieved code group against the (list of) code group(s) stored in the ME. If a match is found with any of the code groups stored in the ME, the check is passed for that category. If checks for all active categories are passed, then the MS goes into normal operation.

Table 1: Codes used by each personalisation category

Code	Network (MCC, MNC)	Network Subset (IMSI digits 6 and 7)	SP	Corporate	SIM/USIM (IMSI digits 8 to 15)
Personalisation category					
Network	✓				
Network subset	✓	✓			
SP	✓		✓		
Corporate	✓		✓	✓	
SIM/USIM	✓	✓			✓

Precautions must be taken to ensure that when more than one personalisation category is to be activated or when the ME is to be personalised to more than one entity of a personalisation category, the new codes are not in conflict with any existing valid codes. To avoid such conflicts, checks are carried out by the ME during the personalisation cycle, as described in clause 13.

As an optional ME feature, the status (activated or not) of each personalisation category and the values of the relevant codes may be read by the user.

5 Network personalisation

5.1 Network personalisation

Network personalisation allows a ME to be personalised to a particular network, for example to prevent the use of stolen MEs on other networks. The ME may optionally be personalised to more than one network.

The ME is network personalised by storing the code (MCC+MNC) (see TS 23.003 [3]) of the relevant network(s) in the ME and setting a network personalisation indicator in the ME to "on". Whenever a SIM/USIM is inserted, or the ME is powered up with a SIM/USIM already in place, the International Mobile Subscriber Identity (IMSI) is read from the SIM/USIM and the embedded network code (MCC+MNC) checked against that stored in the ME. If the values differ, the MS shall go into emergency calls only mode as defined in annex A.2.

The network personalisation feature is controlled by a Network Control Key, (NCK) which has to be entered into the ME in order to network de-personalise it.

In order to support the network personalisation feature the ME shall have storage for the network personalisation indicator, the network code(s) and the NCK.

5.1.1 Operation of network personalised ME

The network personalisation check described below is performed whenever a SIM/USIM is inserted or the ME is powered up with a SIM/USIM already in place.

The personalisation check is as follows. When more than one personalisation is active in the ME, normal mode of operation includes performing any outstanding personalisation checks:

- a) **check whether the ME is network personalised:** The ME checks its network personalisation indicator, if it is set to "off" the personalisation check shall be stopped and the MS goes into the normal mode of operation, omitting the remaining steps of the check;
- b) **check the network code(s):** The ME reads the IMSI from the SIM/USIM, extracts the network code from it and checks it against the (list of) value(s) stored on the ME.

If no match is found in b), the ME may display an appropriate message, (e.g., "Incorrect SIM" or "Incorrect USIM") and shall go into the emergency calls only mode as defined in annex A.2. If a match is found, the MS goes into the normal mode of operation.

5.1.2 Network personalisation cycle

5.1.2.1 Personalisation cycle

The process of personalisation can only be carried out on a currently unpersonalised ME, i.e., if the network personalisation indicator is set to "off". Access to the personalisation process shall be restricted in order to prevent unauthorised, accidental or unwanted personalisation. Other restrictions are described in clause 13. The personalisation process results in the NCK being set, the network personalisation indicator being set to "on" and the storage in the ME of the network code(s) to which the ME is being personalised.

The network personalisation process is as follows:

- a) The network code(s) are entered into the ME. This may be accomplished by one of the following means: