REFERENCE P38 T 9001 4	
Company / organisation	**UIC ERTMS/GSM-R Operators Group** **GSM-R Industry Group**

FFFIS for GSM-R SIM Cards

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	NAME	DATE	VISA
Author	Morane	6/07/1999	
Revision	GSM-R IG SAGEM	January 2007	GSM-R IG P. Benois
Review	ERTMS/GSM-R Operators Group	January 2007	G.Porpora OG Ad hoc Group
Approval	ERTMS/GSM-R ERIG	January 2007	R.Sarfati

EVOLUTION SHEET

Version	Date	Author	MODIFICATION
1	14/03/00	PMT	First Issue
2a	18/07/00	PMT	Updated version after meeting 6/7/00
2c	18/07/00	Arcor	Corrections and remarks
2d	28/07/00	SAGEM	Corrections
2e	03/08/00	SAGEM	Additional corrections
2	11/08/00	PMT	Second issue
3	12/12/03	OG & IG	Third issue
3.01 to 3.0.9	13/06/05	OG&IG	Draft versions
3.9b	02/06/06	SAGEM	Final issue for UIC submission
3.9c	11/12/06	SAGEM	New release after UIC comments
3.9d	24/01/07	SAGEM	Update after UIC/IG meeting in January 2007
4	29/01/07	OG & IG	Fourth Issue

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1. REFERENCE

1.1. Documentation

[1] EIRENE, System Requirement Specification, version 15
[2] EIRENE, Functional Requirements Specification, version 7
[3] GSM11.11 version 8.2.0
[4] 3GPP TS 23.040 version 3.4.1
[5] MORANE, FFFS for confirmation of high priority calls, F 10 T 6002 4
[6] MORANE, FFFS for functional addressing, E 10 T6001 4
[7] MORANE, FFFIS for shunting mode, I 13/2 T 7001 2
[8] 3GPP TS 27.007 v 4.2.0
[9] MORANE, FFFS for Presentation of Functional Numbers, F10 T 6003 4
[10] EN 301 515 V2.3.0 (2005-02)

1.2. Abbreviation / Acronyms

A3	Authentication algorithm; Used for authenticating the subscriber
A5	Cipher algorithm; Used for enciphering/deciphering data
A8	Algorithm used to generate Kc given in input to A5
ASCI	Advanced Speech Calls Items
AC	Access Conditions
ADN	Abbreviated Dialling Number
BCCH	Broadcast Control Channel
CBMI	Cell Broadcast Message Identifier
CHV	Card Holder Verification information
COMP128	Name of standard A3/A8 MoU algorithm
DF	Dedicated File
DSD	Driver Safety Device.
EDOR	ETCS Data Only Radio
EF	Elementary Files
EMLPP	enhanced Multi-Level Pre-emption and Priority
EMS	EIRENE Mobile Station
ETCS	European Train Control System
FDN	Fixed Dialling Number
FN	Functional Number
GID	Group call Identifier
GSM	Global System for Mobile communications
GSM-R	Global System for Railway Mobile communications
GSM-R MS	GSM-R Mobile Station
GSM-R PLMN	GSM-R Public Land Mobile Network
HPLMN	Home PLMN
IC	International Code
ICCID	Integrated Circuit(s) Card Identification
IMSI	International Mobile Subscriber Identity
MF	Master File
MMI	Man Machine Interface
MS	Mobile Station
MSISDN	Mobile Station International ISDN Number
PIN	Personal Identification Number

PLMN	Public Lands Mobile Network
SIM	Subscriber Identity Module
SMS	Short Message Service
SMSCB	Short Message Service Cell Broadcast
SMS-SC	Short Message Service - Service Centre
SMS/PP	Short Message Service/Point-to-Point
VBS	Voice Broadcast Service
VGCS	Voice Group Call Service

2. GENERAL

This document aims to define the specification of GSM-R SIM cards in order to fulfil the EIRENE requirements.

The EIRENE requirements are described in documents [1] and [2].

This document assumes that the specified GSM-R SIM card is inserted in GSM-R mobile stations.

A mandatory requirement is that the GSM-R SIM card shall be GSM compliant, excepted for update access conditions of some EFs. The GSM-R specific data is stored in a way that these GSM-R SIM cards may also be used when inserted into standard public mobiles without any side effects upon the normal operation of standard GSM mobile terminal.

This document presents the following topics:

- in chapter 2, a brief overview about SIM card, as an introduction to the various SIM card topics,
- in chapter 3, the data storage requirements, which defines the minimum configuration required for any given GSM-R SIM card
- in chapter 4, the data stored on the SIM card, which identifies mandatory files and their structures,
- in appendix A an informative section concerning possibilities that improve the SIM card management
- in appendix B, some examples of managing any given Numbering Plan and a GSM-R SIM card personalised configuration

3. SIM CARD OVERVIEW

This chapter aims to provide general information concerning SIM cards.

The purpose of the SIM card in GSM is to personalise the mobile with subscription data.

The first generation of SIM cards (phase 1 and phase 2) only stored information without further processing. This information is stored within the so called Elementary Files (EF), organised in a tree structure on the SIM card. The data stored within the SIM card is relevant for the GSM operator and the subscriber:

- The GSM operator: uses basic GSM data for subscription and security, additional facilities are available according to operator's operational requirements.
- The subscriber: currently uses mainly it for phone books and short messages.

The phase 2+ generation of SIM cards offers new functionality. In addition to the functionality of the previous SIM card generations, the phase 2+ SIM card is now able to initiate certain actions providing new functionality.

This new functionality is called « SIM tool kit ».

GSM phase 2+ ASCI functionality requires new specific files within the SIM card. These new file definitions are part of a new generation phase2+ SIM card release.

Information within the SIM card may be accessed by the following:

- the network,
- the user through the MMI,
- AT commands

The AT commands can:

- access directly most of EF by commands defined in the standard GSM,
- access the EF through the address of the EF in the SIM card (in this case, the EF shall be managed as a linear set of bytes because there is restricted SIM access +CRSM command, see document [10]).

The following diagram illustrates the use and environment of GSM-R SIM cards.

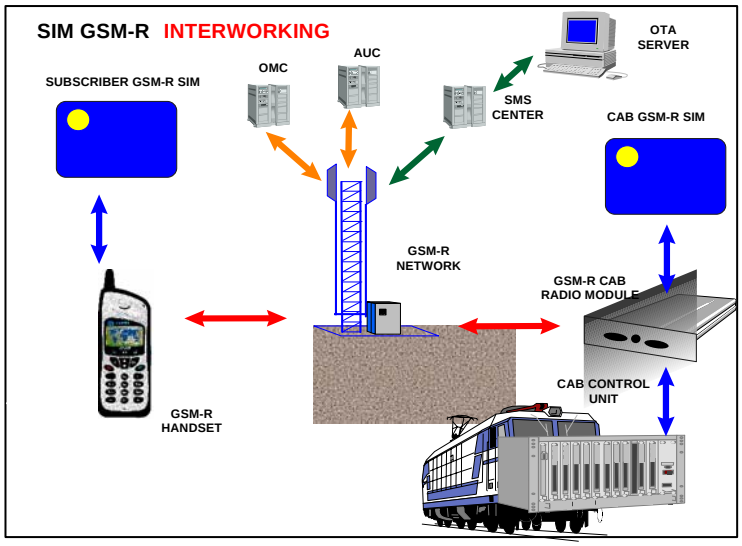


Figure 1: SIM GSM-R interworking

4. SIM CARD REQUIREMENTS FOR DATA STORAGE

This chapter presents data storage requirements for GSM-R SIM cards. The contents of the GSM-R SIM card are examined in the next chapter.

The EIRENE specification shall support the ASCI features VBS, VGCS and eMLPP. As ASCI features are part of GSM phase 2+ specification, the GSM-R SIM cards shall be compliant to phase2+ SIM standard.

The GSM-R SIM card memory shall have a minimum of 16Kbytes. This capacity is deduced from the GSM-R SIM card mapping simulation, as calculated in appendix B[1]. This capacity may be increased following the requirements of the railway operators for additional information (national implementations). For information: 32 , 64, and 128 Kbytes SIM cards are currently available.

4.1. Hardware constraints

The GSM-R SIM card life cycle requirement is a minimum of 10 years. This situation is due to current technology for read/write cycle of the SIM card.

[1] This capacity seems to be the strict minimum. A capacity of 32K provides national implementation solution.

5. DATA ON THE GSM-R SIM CARD

This chapter defines mandatory files on the GSM-R SIM card.

There are 3 classes of mandatory files on the GSM-R SIM card :

1. Common mandatory GSM files, which are on the SIM card simply because the GSM-R system is also based upon the GSM standard. (see document [3]).
2. Optional GSM files which become mandatory for a GSM-R SIM card: The purpose of chapter 5.2 is to identify those EFs and to define their use within the GSM-R environment. The definition and the structure of these files are already established within the standard (see document [3]).
3. Specific EIRENE files which are EFs that must be defined to support the GSM-R requirements. These files are new to GSM and chapter 5.3 defines the structure and the use of these new files.

The following diagram illustrates the distinction between the exiting GSM directory files and the EIRENE directory file :

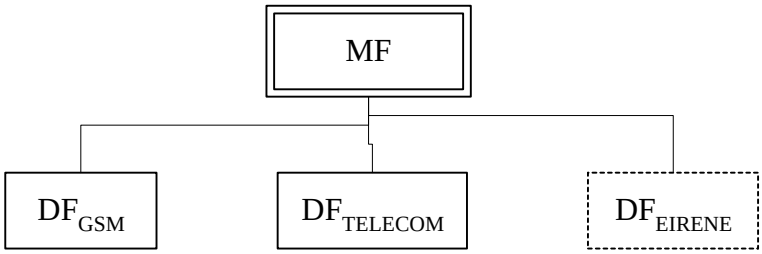


Figure 2: Structure of DF system

5.1. Mandatory GSM EF

This paragraph provides the list of the common mandatory files for GSM SIM Cards that are also mandatory for GSM-R SIM cards.

The reference document [3] contains a complete description.

The dedicated **MF**, (address '3F00') which contains:

EF name	Identifier	Type	Contents
ICCID	2FE2	transparent	ICC Identification

The dedicated **GSM**, (address '7F20') which contains:

EF name	Identifier	Type	Contents
LP	6F05	transparent	Language Preference
IMSI	6F07	transparent	IMSI
KC	6F20	transparent	Ciphering Key Kc
EF PLMNsel	6F30	transparent	PLMN selector
EF HPLMN	6F31	transparent	HPLMN search period
SST	6F38	transparent	SIM service table
BCCH	6F74	transparent	Broadcast control channel
ACC	6F78	transparent	Access control class
FPLMN	6F7B	transparent	Forbidden PLMN
LOCI	6F7E	transparent	Location information[2]
AD	6FAD	transparent	Administrative data
PHASE	6FAE	transparent	Phase identification

According to [3], the dedicated **TELECOM** (address '7F10') does not contain any mandatory EF for GSM SIM-Cards.

5.2. Optional GSM EF required for GSM-R

For GSM-R SIM cards some of the GSM EFs that are optional for GSM shall be mandatory for GSM-R in order to fulfil EIRENE requirements.

The purpose of this chapter is to identify those EFs, to justify why they are mandatory for GSM-R and how they shall be used within the GSM-R environment.

The definition and the structure is already established within the GSM-standard (see document [3]). However in this document, the minimum sizing of these files is redefined for GSM-R.

DF name	EF name	Identifier	Type	Contents
GSM	CBMI	6F45	Transparent	CB messages identifier
GSM	VGCS	6FB1	Transparent	Voice group call Service
GSM	VGCSS	6FB2	Transparent	Voice group call Service Status
GSM	VBS	6FB3	Transparent	Voice broadcast Call Service
GSM	VBSS	6FB4	Transparent	Voice broadcast Call Service Status
GSM	EMLPP	6FB5	Transparent	Enhanced MLPP
GSM	AaeM	6FB6	Transparent	Automatic answering for eMLPP service

[2] Location Information contains : Temporary Mobile Subscriber Identity (TMSI), Location Area Information (LAI), TMSI TIME and Location update status

DF name	EF name	Identifier	Type	Contents
TELECOM	ADN	6F3A	Linear Fixed	Abbreviated dialling numbers
TELECOM	SMS	6F3C	Linear Fixed	Short messages
TELECOM	SMSS	6F43	Transparent	Short messages status
TELECOM	SMSP	6F42	Linear Fixed	Short messages Service parameters
TELECOM	MSISDN	6F40	Linear Fixed	MSISDN
TELECOM	SDN	6F49	Linear Fixed	Short dialled numbers

5.2.1. $EF_{PLMNsel}$, PLMN selector

EIRENE requires that, in case of network selection, authorised networks that are available shall be listed or automatically selected in the following order of priority

1. home EIRENE network
2. ”foreign” railway networks,
3. public networks with EIRENE facilities,
4. public networks without EIRENE facilities.

The standard GSM specification allows only a list of preferred PLMNs without further classification. This is not fulfilling the railway needs.

Owing to the fact that a distinction between the three groups could not be performed using the $EF_{PLMNsel}$ field, this specification defines an EIRENE specific file called $EF_{GsmrPLMN}$ (see chapter 5.3.5 for details). The GSM file $EF_{PLMNsel}$ shall not be used by EIRENE compliant GSM-R terminals, unless a non GSM-R SIM Card is inserted in the terminals. On the other hand $EF_{PLMNsel}$ can be used by those mobiles not EIRENE compliant which are able to work on the GSM-R band.[3]

5.2.2. EF_{CBMI}, Cell broadcast message identifier selection

The EIRENE specification requires support for the SMS-CB messages. This EF contains message identifier parameters of the type of cell broadcast messages to accept.

Sizing of GSM-R takes into consideration a maximum amount of 10 CB message identifier records.

Structure description and access rights are described in document [3]. This EF is included in the DF_{GSM}.

5.2.3. EF_{VGCS} and EF_{VGCSS}: VGCS service

The EIRENE specification requires support for VGCS. The EF for VGCS contains the subscribed GIDs of group calls and the status of each group call.

group ID VGCS	= 50 x 4 bytes
VGCS status	= 7 bytes

[3] As far as network selection is concerned, if a GSM-R Operator wishes to have non EIRENE compliant terminals behaving like EIRENE ones, then $EF_{PLMNsel}$ content has to have the same network selection order as $EF_{GsmrPLMN}$.

Each GID is described using 4 bytes: the empty field ‘FF FF FF FF’ means ‘GID not present’. Empty fields shall not lead to a malfunction of mobile terminals.

50 GID values are required. This is the maximum allowed by the ETSI specification. The size of VGCS Status file is fixed.

The EF_{VGCS} file shall contain all the VGCS GIDs subscribed to the user:

As an example, a SIM to be inserted in the Cab Radio shall include as a minimum configuration train emergency and shunting GIDs (common, emergency and dedicated shunting GID).

The structure description and access rights are described in document [3]. This EF is included in the DF_{GSM}.

The UPDATE right of the status field (ADM) shall be set by the operator to CHV1 to allow the user to activate or deactivate any Group ID. Any access restrictions to specific GIDs are provided by the application reading EIRENE specific EFs.

The following table shows an example given for information of EF_{VGCS} configuration for a SIM to be installed in a CAB:

GID List:

GID List		EF_{VGCS} content	
299	599	1st to 8th byte	92 F9 FF FF 95 F9 FF FF
200	500	9th to 16th byte	02 F0 FF FF 05 F0 FF FF
501	502	17th to 24th byte	05 F1 FF FF 05 F2 FF FF
…	…	…	…
527	528	121st to 128th byte	25 F7 FF FF 25 F8 FF FF
529	*(no group)*	129th to 136th byte	25 F9 FF FF FF FF FF FF
…	…	…	…
(no group)	*(no group)*	393rd to 400 byte	FF FF FF FF FF FF FF FF

Table 5.2.3 : Example of EF_{VGCS} content

The relevant EF_{VGCSS} for this example has to be configured as follows:

1st Byte:

299	Active	1	“05”
599	Inactive	0	
200	Active	1	
500	Inactive	0	
501	Inactive	0	
502	Inactive	0	
503	Inactive	0	
504	Inactive	0	

2nd Byte:

505	Inactive	0	“00”
506	Inactive	0	
507	Inactive	0	
508	Inactive	0	
509	Inactive	0	
510	Inactive	0	
511	Inactive	0	
512	Inactive	0	

3rd Byte:

513	Inactive	0	“00”
514	Inactive	0	
515	Inactive	0	
516	Inactive	0	
517	Inactive	0	
518	Inactive	0	
519	Inactive	0	
520	Inactive	0	

4th Byte:

521	Inactive	0	“00”
522	Inactive	0	
523	Inactive	0	
524	Inactive	0	
525	Inactive	0	
526	Inactive	0	
527	Inactive	0	
528	Inactive	0	

5th Byte:

529	Inactive	0	“00”
(no group)	Inactive	0	
(no group)	Inactive	0	
(no group)	Inactive	0	
(no group)	Inactive	0	
(no group)	Inactive	0	
(no group)	Inactive	0	
(no group)	Inactive	0	

6th Byte:

(no group)	Inactive	0	“00”
(no group)	Inactive	0	
(no group)	Inactive	0	
(no group)	Inactive	0	
(no group)	Inactive	0	
(no group)	Inactive	0	
(no group)	Inactive	0	
(no group)	Inactive	0	

7th Byte:

(no group)	Inactive	0	“FC”
(no group)	Inactive	0	
	Fixed by [3]	1	
	Fixed by [3]	1	
	Fixed by [3]	1	
	Fixed by [3]	1	
	Fixed by [3]	1	
	Fixed by [3]	1	

5.2.4. EF_{VBS} and EF_{VBSS} : VBS service

The EIRENE specification requires support for VBS.

The EF contains the subscribed GID of broadcast calls and the status of each broadcast call.

group ID VBS	= 50 x 4 bytes
VBS status	= 7 bytes

50 GID values are required. This is the maximum allowed by the ETSI specification. The size of VBS Status file is fixed.

The structure description and access rights are described in document [3] and follows the same rules as for EF_{VGCS} and EF_{VGCSS}. This EF is included in the DF_{GSM}.

The UPDATE right of the status field (ADM) shall be set by the operator to CHV1 to allow the user to activate or deactivate any Group ID. Any access restrictions to specific GIDs are provided by the application reading GSM-R specific EFs.

5.2.5. EF_{eMLPP} and EF_{AAeM} : eMLPP service

The EIRENE specification requires support for eMLPP.

The **EF_{eMLPP}** contains the data for priority levels subscription and the Fast call set-up conditions.

The structure description and access rights are given below and described in details in document [3]. This EF is included in the DF_{GSM}.

Identifier: '6FB5'	Structure: transparent	Mandatory
file length: 2 bytes	Update activity: low	

Access Conditions:

READ	CHV1
UPDATE	ADM
INVALIDATE	ADM
REHABILITATE	ADM

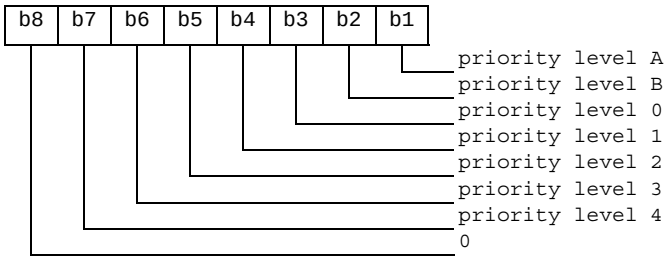
Bytes	Description	M/O	Length
1	Priority levels	M	1 byte
2	Fast call set-up conditions	M	1 byte

1st byte: Priority levels

Contents: The eMLPP priority levels subscribed to.

Coding: each eMLPP priority level is coded on one bit. Priority levels subscribed to, have their corresponding bits set to 1. Priority levels not subscribed to, have their corresponding bits set to 0. Bit b8 is reserved and set to 0.

Byte 1:



NOTE: Priority levels A and B cannot be subscribed to (see GSM 02.67 for details).

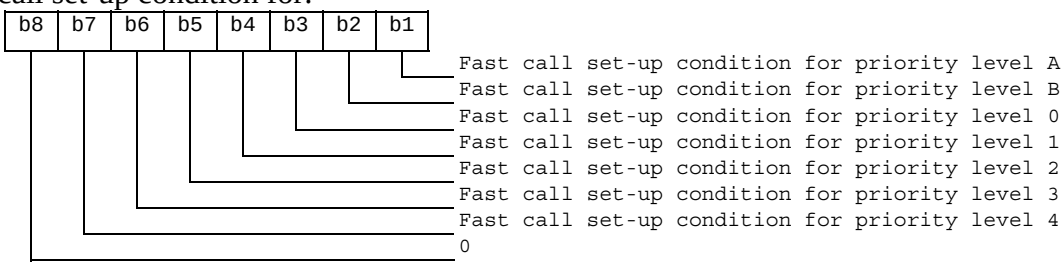
EXAMPLE 1: If priority levels 0 to 4 are subscribed to, EF_{eMLPP} shall be coded '7C'.

2nd byte: Fast call set-up conditions

Contents: for each eMLPP priority level, the capability to use a fast call set-up procedure.

Coding: each eMLPP priority level is coded on one bit. Priority levels for which fast call set-up is allowed have their corresponding bits set to 1. Priority levels for which fast call set-up is not allowed have their corresponding bits set to 0. Bit b8 is reserved and set to 0.

Byte 2: fast call set-up condition for:



EXAMPLE 2: If fast call set-up is allowed only for priority level 0, then byte 2 of EF_{eMLPP} is coded '04'.

EF_{AAeM} (Automatic Answer for eMLPP Service) contains those priority levels (of the Multi Level Pre-emption and Priority service) for which the mobile station shall answer incoming calls automatically.

Identifier: '6FB6'	Structure: transparent	Mandatory
file length: 1 bytes	Update activity: low	

Access Conditions:

READ	CHV1
UPDATE	CHV1
INVALIDATE	ADM
REHABILITATE	ADM

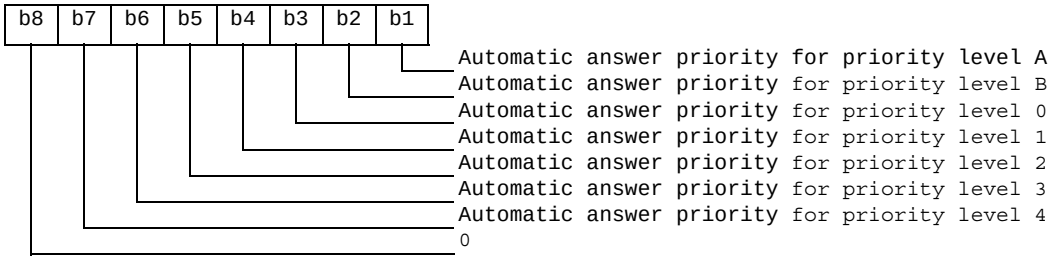
Bytes	Description	M/O	Length
1	Automatic answer priority levels	M	1 byte

Automatic answer priority levels

Contents: for each eMLPP priority level, the capability for the mobile station to answer incoming calls automatically (with the corresponding eMLPP priority level).

Coding: each eMLPP priority level is coded on one bit. Priority levels allowing an automatic answer from the mobile station have their corresponding bits set to 1. Priority levels not allowing an automatic answer from the mobile station have their corresponding bits set to 0. Bit b8 is reserved and set to 0.

Byte 1:



EXAMPLE: If automatic answer is allowed for incoming calls with priority levels 0, 1 and 2, then EF_{AAeM} is coded '1C'.

5.2.6. EF_{ADN}, Abbreviated Dialling Numbers

The EIRENE specification requires being able to store a list of names & frequently used numbers. This field should be used to store numbers entered by each user.

This EF should be used to store numbers entered by each user.

numbers	= 100 numbers x 14 bytes
names	= 100 names x 14 characters

the structure description and access rights are described in document [3]. This EF is included in the $DF_{TELECOM}$.

Note: Depending on SIM capacity the maximum number of records could vary up to 241 records which represent a limit for this field.

5.2.7. EF_{SMS} , EF_{SMSP} and EF_{SMSS}, Short Messages

The EIRENE specification requires support for SMS services.

Those fields contain the short message information.

Structure description and access right are described in document [3]. This EF is included in the $DF_{TELECOM}$.

5.2.8. EF_{MSISDN}, MSISDN for speech, data and fax

The EIRENE specification requires being able to store MSISDN used within the SIM card.

This EF contains the MSISDN used for speech, data and fax.

Structure description and access rights are described in document [3]. This EF is included in the $DF_{TELECOM}$.

Identifier: '6F40'	Structure: linear fixed	Mandatory
Record length: X+14 bytes	Update activity: low	

Access Conditions:

READ	CHV1
UPDATE	**ADM (highly recommended)*** or CHV1
INVALIDATE	ADM
REHABILITATE	ADM

Bytes	Description	M/O	Length
1 to X	Alpha Identifier	O	X bytes
X+1	Length of BCD number/SCC contents	M	1 byte
X+2	TON and NPI	M	1 byte
X+3 to X+12	Dialling Number/SCC String	M	10 bytes
X+13	Capability/Configuration Identifier	M	1 byte
X+14	Extension1 Record Identifier	M	1 byte

*: GSM-R terminals use EFMSISDN during the interrogation and forced deregistration procedures: if the content of this field is incorrectly filled, then the above procedures will not work properly. Hence, it is highly recommended to prevent the possibility that the user, via MMI, accidentally modifies the content of this field: this is achieved by setting EF Update Access Condition to ADM. It shall be a GSM-R operator responsibility to fill the content of EFMSISDN during SIM production or successively by means of OTA update.

For contents and coding of all data items see the respective data items of EF_{ADN} defined in [3].

Note:

- This file has to be set individually for each SIM card. No pre-set value is possible.
- EIRENE does not support multi-numbering capability, so the subscriber will use the same MSISDN number for voice, for fax and for data terminated calls.

<u>EXAMPLE:</u> The EF_{MSISDN} content in case of Alpha Identifier =”Own number” and associated MSISDN number =”+393138123456” shall be:

“4F 77 6E 20 6E 75 6D 62 65 72 FF FF FF FF”: Alpha Identifier (X = 14) coded using SMS default 7-bit coded alphabet as defined in GSM 03.38 with bit 8 set to 0.

“07”: Length of BCD number/SCC contents = 7 bytes

“91”: TON = International and NPI = ISDN/Telephony numbering plan (CCITT Recommendation E.164/E.163)

“93 13 83 21 43 65 FF FF FF FF”: Dialling Number/SCC String written in nibble format

“FF”: Capability/Configuration Identifier

“FF”: Extension1 Record Identifier

5.2.9. EF_{LND} , Last Number Dialled

The EIRENE specification requires support for a set of Last Number Dialled. The SIM card files EF_{LND} can support this list.

However, the last dialled number could be stored directly in the mobile, and not in the SIM card.

5.2.10. EF_{SDN}, Service Dialling Numbers

The EIRENE specification requires direct access to following numbers. These numbers are mainly directly associated to a MMI function (e.g. cab radio priority access).

The number of EFSDN records is GSM-R Operator's specific. The following example considers the case of 10 records:

The use of this file within the GSM-R environment is to store short codes.

services numbers	= 10 x 14 bytes
services names	= 10 x X characters (where X>=3)

The"Services numbers" field contains fixed dialling numbers and/or supplementary service control strings (SSC). The service name shall be a N characters string, where N is equal or bigger than 3. The field length of the name tag can be chosen by the operator with a minimum length of 3 characters. A usual length is the same as for EF_ADN.

Also VGCS and VBS tele-services (including priority) could be initiated using this concept.

SIM-Cards to be used for voice & non safety critical data radios shall have EFSDN records N.1 to N.5 and N.7 configured as according to the table below. In case where DSD is implemented, then record N.10 has also to be filled as shown in the table below.

Sim-Cards to be inserted in GPH or OPH can use a different configuration for service names and record content, provided that if train & shunting emergency GID are subscribed in the SIM, then the relevant invoke values occupy the1st and the 2nd record in EFSDN.

The contents of this file shall be as follows:

Record Number	Service names	Service description	For e.g. : invoke values
1	ETE	(train) emergency call	*SC[4]*<priority[5]>#<GID[6]>
2	ESE	(shunting) emergency call	*SC*<priority>#<GID>
3	PPC	Primary train controller	*<priority>#<short codes>
4	PSC	Secondary train Controller	*<priority>#<short codes>
5	PEC	Electrical power supply controller	*<priority>#<short codes>
6	Reserved for future use	Reserved for future use	
7	PDA	Other drivers in area	*SC*<priority>#<GID>

[4] SC is Service Code described in GSM 02.30
[5] coded on 3 digits as described in GSM02.30
[6] as defined in the document [1]

8	Reserved for future use	Reserved for future use	
9	Reserved for future use	Reserved for future use	
10	DSD	Driver Safety Device	*<priority>#<short codes>

Structure description and access rights are described in document [3]. This EF is included in the $DF_{TELECOM}$.

SC is Service Code described in GSM 02.30:

- SC = “17” for VGCS calls
- SC = “18” for VBS calls

Priority is coded on 3 digits as described in GSM 02.30:

- Priority = “750” for priority level 0
- Priority = “751” for priority level 1
- Priority = “752” for priority level 2
- Priority = “753” for priority level 3
- Priority = “754” for priority level 4

Structure description and access rights are described in document [3]. This EF is included in the $DF_{TELECOM}$.

Empty records shall be filled with FF FF …

5.3. EIRENE EF

The EIRENE specification has specific requirements not covered by the standard GSM phase 2+. Owing to these requirements, the EIRENE specific files are defined in the following table. The purpose of this table is to specify these files and to define their structure.

Elementary File name	Identifier
FN	6FF1
CallconfC	6FF2
CallconfI	6FF3
Shunting	6FF4
GsmrPLMN	6FF5
NW	6F80
5to8digits	6F81
2digits	6F82
8digits	6F83
9digits	6F84
SSSSS	6F85
LLLLL	6F86
FreeNumber	6F87
FC	6F88
Service	6F89
Call	6F8A
FctTeam	6F8B
Gateway	6F8C
IC	6F8D
CT	6F8E
SC	6F8F
Location	6F91
Controller	6F92

Remarks :

The following rule applies to all BCD coded values in this chapter:

- Digit 1 of a BCD coded value shall be the most significant digit.
- In this chapter, some values are strings. The alphabet used by those strings shall follow CCITT Recommendation T.50: "International Alphabet No. 5". (ISO 646: 1983, "Information processing - ISO 7-bits coded characters set for information interchange".) The alphabet is also known as SMS default 7-bit coded alphabet.

5.3.1. EIRENE dedicated file DF_{EIRENE}

The EIRENE EFs are not part of the GSM standard. They shall be included into a Dedicated File.

EIRENE specific data shall be stored into the new dedicated DF_{EIRENE}. This DF_{EIRENE} is situated at the root of the GSM-R SIM card file system. The advantages are :

- GSM-R SIM cards may be used in a standard GSM MS, without any corruption of specific EIRENE information,
- The consequence is that only GSM-R mobiles are able to manage information in this DF.

The identifier of DF_{EIRENE} shall be: **'7FE0'**.

The dedicated DF_{EIRENE} is mandatory for all GSM-R SIM cards. All following files described in this chapter shall be included in DF_{EIRENE}.

5.3.2. EF_{FN} , Functional Numbers

GSM-R MS shall store Functional Numbers on the SIM card that has been previously registered successfully in the GSM-R network (see document [6]). The EIRENE specified cab radio MS may be considered as a " worst case" in relation to railway functional requirements.. Requirements for this MS will be used in this chapter to define the maximum size needed for storage of FNs. The following storage dimensioning has to be considered only as an example: GSM-R network operators are at liberty to freely decide the appropriate number of records for EF_{FN},

The EF_{FN} will support the Functional Numbers storage facility.

The sizing of FNs that a GSM-R SIM card requires to allow having simultaneously:

- 2 train numbers
- 1 engine number (or coach number)
- 1 FN for shunting mode.

Assuming a maximum of 15 Function Codes allocated per train number and 5 Function Codes associated with engine/coach number, this leads to a total of 36 = (15*2TN+5*1EN+1) functional numbers.

Additionally, Functional Numbers stored in the SIM card have to be split into 2 types:

- Permanent Functional Number : the engine number or the coach number
- Temporary Functional Number : the other Functional Numbers

The permanent FN can be de-registered only by action of maintenance staff.

The temporary FN can be de-registered in addition to user action by the application program when one of the following events occurs.

- MS is switched off

- Invalid functional number after interrogation
- External de-registration of FN (for e.g. forced FN de-registration).

This information shall be associated with the storage of the FN within the SIM card.

The EF_{FN} file supports the current functional address of the GSM-R MS. The structure of EF_{FN} is as follows :

Identifier: '6FF1'	Structure: linear fixed	Mandatory
file length: 9*n bytes (n<=36)	Update activity: high	

Access Conditions:

READ	CHV1
UPDATE	CHV1
INVALIDATE	ADM
REHABILITATE	ADM

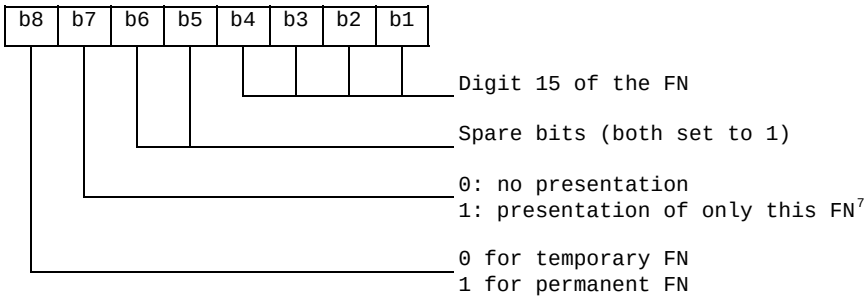
Bytes	Description	M/O	Length
1 to 8	Functional Number and type	M	8 bytes
9	List Number	M	1 byte
:	:	:	:
9*(n-1)+1 to 9*(n-1)+8	Functional Number and type	O	8 bytes
9*n	List Number	O	1 byte

The field"Functional Number and type" contains the FN. The file size is up to 15 digits, coded in BCD. The FN shall be stored in the format defined in [9] (IC included). The structure of this field is as follows:

B8	B7	B6	B5	B4	B3	B2	B1	
Digit 2				Digit 1				Byte 1
Digit 4				Digit 3				Byte 2
Digit 6				Digit 5				Byte 3
Digit 8				Digit 7				Byte 4
digit 10				Digit 9				Byte 5
digit 12				Digit 11				Byte 6
digit 14				Digit 13				Byte 7
0/1	0/1	Spare		Digit 15				Byte 8

The value 'F' is used for an empty digit.

The last byte of the field has the following meaning :



The field ”List number” contains the serial number of the FN. The field is coded in binary. The empty value is ‘0’. This field is managed automatically by the MS to sort FN registration. The following rules shall be applied :

- When the first FN is registered, then the serial number is ‘1’.
- When the MS is switched on, then the serial number is the maximum value stored in the set of the field ”List number”.
- When a FN is registered, the serial number is automatically incremented by the MS application. The increment is ‘1’. Then the serial number increases until it reaches the value ‘255’.
- When a FN is de-registered, the serial number is temporarily ”lost”. The field “List number” is set to the empty value ‘0’.
- When this serial number reaches the maximum value ‘255’, then the list of serial numbers may be of a discontinuous order. Then the list of serial number is rearranged from 1 to the amount of registered FN (up to 80) and all fields ‘List number’ are updated. The application is in charge of updating the value in all the ‘List number’ fields.

The default value for those records reserved for “temporary” functional number in case no any functional number is stored in the SIM-Card is as follows:

‘FF FF FF FF FF FF FF 3F 00’.

[7] When the subscriber is registered to more than one FN, this bit is used to indicate the current FN displayed on the screen and sent to the network in the User to User Information Element field.

5.3.3. Call Confirmation of emergency calls

The EIRENE specification requires confirmation of receipt of Railways Emergency Calls. This function implies storing of the following:

- General configuration for call confirmation
    - PL_CONF, the priority level of call confirmation,
    - CONF_NR, the phone number of the Acknowledgement Centre,
    - MAX_RAND, the maximum value (in sec) of a random range of confirmation call,
    - N_ACK_MAX, the number of confirmation trials until a success,
    - PL_ACK, Priority level over which a confirmation is needed,
    - N_NESTED_MAX, the maximum number of pending confirmation calls (currently 10).
    - Train Emergency GID, the position of GID=299 into EF_{VGCS}
    - Shunting emergency GID, the position of GID=599 into EF_{VGCS}
    - MS IMEI, the value of the IMEI of the MS to avoid any Call Confirmation from any other MS.

- Call structure set. Each structure is dedicated to one call and contains :
    - T_DUR_S, the duration of the call to confirm,
    - T_RELCALC, the time stamp to calculate T_REL,
    - PL_CALL, the priority level of the received call,
    - CAUSE, the cause of the end of call,
    - GCR, the Group Call Reference of the call,
    - FNR, the Functional Number of the MS when the call is received,

The general confirmation parameters could be configured by the railway Operator to optimise the network load. The user access right to update these parameters shall be restricted through the application (MS).

The set of structures to confirm a call shall be updated by the application itself. Other rights are needed and defined in the following table.

The $EF_{CallConfC}$ and $EF_{CallConfI}$ will support the Call Confirmation storage facilities.

5.3.3.1. $EF_{CallconfC}$, Call Confirmation Configuration :

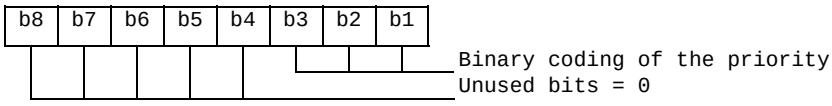
Identifier: '6FF2'	Structure: transparent	Mandatory
file length: 24 bytes	Update activity: low	

Access Conditions:

READ	CHV1
UPDATE	CHV1
INVALIDATE	ADM
REHABILITATE	ADM

Bytes	Description	M/O	Length
1	PL_CONF	M	1 byte
2-9	CONF_NR	M	8 bytes
10	MAX_RAND	M	1 byte
11-12	N_ACK_MAX	M	2 bytes
13	PL_ACK	M	1 byte
14	N_NESTED_MAX	M	1 byte
15	Train Emergency GID	M	1 byte
16	Shunting Emergency GID	M	1 byte
17-24	RFU (Reseved for Future Use)	M	8 bytes

The field ”PL_CONF” contains the configuration of the priority of the call confirmation :



The binary coding of the priorities is as follows:

0	No priority
1	Priority 4
2	Priority 3
3	Priority 2
4	Priority 1
5	Priority 0

The values set for priority in EF_{EMLPP} for Confirmation of high priority calls is not checked against subscription.

The priority level of a call confirmation shall be set according E-SRS chapter 13.5.5 (for priority 4 call confirmation, “PL_CONF” should be set to ’01’.

The field ”CONF_NR” contains the phone number of the call confirmation centre. This phone number is coded in BCD. It has a maximum of 16 digits. ‘F’ is an empty digit.

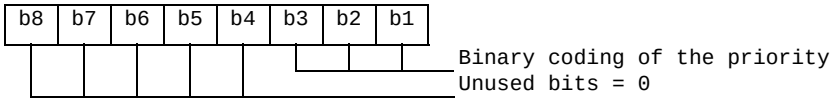
B8	B7	B6	B5	B4	B3	B2	B1	
Digit 2				Digit 1				Byte 1
Digit 4				Digit 3				Byte 2
Digit 6				Digit 5				Byte 3
Digit 8				Digit 7				Byte 4
digit 10				Digit 9				Byte 5
digit 12				Digit 11				Byte 6
digit 14				Digit 13				Byte 7
Digit 16				Digit 15				Byte 8

The EIRENE numbering plan specifies short code =”1612” for call confirmation address, so CONF_NR should be set to ‘61 21 FF FF FF FF FF FF’

The field ”MAX_RAND” contains the hexadecimal maximum value (in seconds) for the random timer used to establish the call confirmation call. The values of MAX_RAND are defined in [5]. As an example, if the mobile is required to send confirmation within 30 seconds from the end of the emergency call, then MAX RAND has to be set to ‘1E’.

The field ”N_ACK_MAX” contains the maximum number of trials to send confirmation. This value is coded in binary. The values are defined in [5].

The field ”PL_ACK” contains the threshold above which a confirmation is required (calls that do not exceed this priority level will not be stored in the $EF_{CallConfI}$ file):



The binary coding of the priorities are :

0	No priority
1	Priority 4
2	Priority 3
3	Priority 2
4	Priority 1
5	Priority 0
6	Priority B
7	Priority A

The values for priority within this table are independent of the subscribed priority EF_{EMLPP}.

The field ”N_NESTED_MAX” contains the maximum number of element of the $EF_{CallConfI}$. The coding is in binary. The value N_NESTED_MAX shall be equal to the number of records of $EF_{CallConfI}$.

The field ”Train Emergency GID” contains an index pointing to the Train Emergency GID in the EF_{VGCS}. This value is coded in binary and is in the range [1, 50[8]]. This field shall be put in relation with the Train Emergency Call GID given in the EF_{SDN}. If no Train Emergency GID is defined in $EF_{VGCS,}$ then the field has to be configured to “FF”

For example, if Train Emergency GID is the first GID in the EF_{VGCS} this field is set to ‘01’.

The field ”Shunting Emergency GID” contains an index pointing to the Shunting Emergency GID in the EF_{VGCS}. This value is coded in binary and is in the range [1 to 50]. This field shall be put in relation with the Shunting Emergency Call given in the EF_{SDN}. If no Shunting Emergency GID is defined in EF_{VGCS} then the field has to be configured to “FF”.

For example, if Shunting Emergency GID is the second GID in the EF_{VGCS} this field is set to ‘02’.

As an option the field ”RFU” could contain the IMEI of the MS. This IMEI is coded in BCD. It has a maximum of 15 digits. ‘F’ is an empty digit. This field shall be pre set by the operator with 'F' for all digits. If IMEI option is implemented on the terminals, they shall write their own IMEI into this field whenever they use the $EF_{CallConfI}$ elementary file for storing information needed for pending confirmation calls.

Note:

If the IMEI stored in the SIM card is different to that of the IMEI of the MS (Ref. to § 5.3.3) and the SIM card has been replaced then, the Mobile shall read/use information stored in the field of the recently inserted SIM card.

As an example, $EF_{CallconfC}$ could be configured as follows:

“01 61 21 FF FF FF FF FF FF 1E 00 03 04 0A 01 02 FF FF FF FF FF FF FF FF“

[8] in binary : from 1 [Hexa] to 32 [Hexa]

5.3.3.2. $EF_{CallConfI}$, Call Confirmation Information

Identifier: '6FF3'	Structure: linear	Mandatory
file length: 21 * n bytes (n<=10)	Update activity: high	

Access Conditions:

READ	CHV1
UPDATE	CHV1
INVALIDATE	ADM
REHABILITATE	ADM

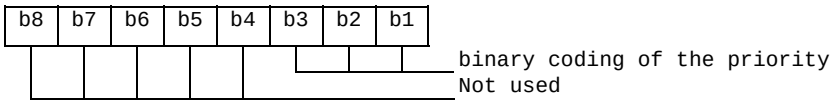
Bytes	Description	M/O	Length
1 to 3	T_DUR	M	3 bytes
4 to 7	T_RELCALC	M	4 bytes
8	PL_CALL	M	1 byte
9	CAUSE	M	1 byte
10 to 13	GCR	M	4 bytes
14 to 21	FNR	M	8 bytes
:	:	:	:
21*(n-1)+1 to 21*(n-1)+3	T_DUR	O	3 bytes
21*(n-1)+4 to 21*(n-1)+7	T_RELCALC	O	4 bytes
21*(n-1)+8	PL_CALL	O	1 byte
21*(n-1)+9	CAUSE	O	1 byte
21*(n-1)+10 to 21*(n-1)+13	GCR	O	4 bytes
21*(n-1)+14 to 21*(n-1)+21	FNR	O	8 bytes

The field ”T_DUR” contains the call duration (in seconds). The value is coded in binary.

The field ”T_RELCALC” contains the information needed by the MS to be sent to the Acknowledgement Centre. This time corresponds to the delay between the end of the call and the sending of the confirmation.

In the case where the user is able to change the internal clock (the value that is used for the time stamp) the MS shall reject this attempt as long as there are unconfirmed high priority calls.

The field ”PL_CALL” contains the priority of the call received :

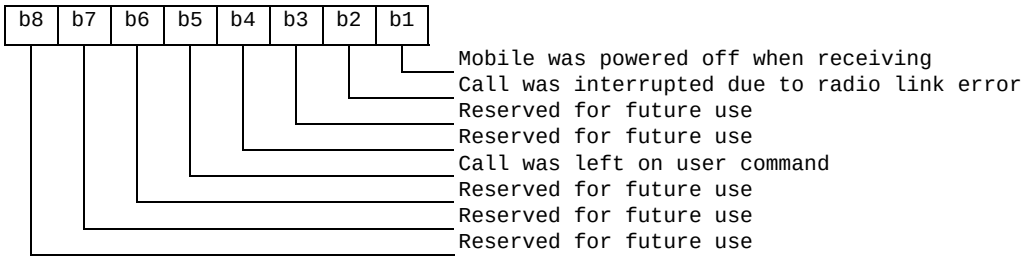


The decimal coding of the priorities is as follows:

0	No priority
1	Priority 4
2	Priority 3
3	Priority 2
4	Priority 1
5	Priority 0
6	Priority B
7	Priority A

The field ”CAUSE” contains the value of the cause of the termination:

- ‘00’ is regular call termination
- otherwise, a bit to ‘1’ indicates an error :



The field ”GCR” contains the group call reference. This value has a maximum of 8 digits and is coded in BCD. The value ‘F’ is used for an empty digit.

B8	B7	B6	B5	B4	B3	B2	B1	
Digit 2				Digit 1				Byte 1
Digit 4				Digit 3				Byte 2
Digit 6				Digit 5				Byte 3
Digit 8				Digit 7				Byte 4

The field ”FNR” contains the default Functional Number of the MS which was set to be presented by the MS when the emergency call was received. This value has a maximum of 15 digits and is coded in BCD. The value ‘F’ is used for an empty digit. The FN shall be stored following [9].

B8	B7	B6	B5	B4	B3	B2	B1	
digit 2				Digit 1				Byte 1
digit 4				Digit 3				Byte 2
digit 6				Digit 5				Byte 3
digit 8				Digit 7				Byte 4
Digit 10				Digit 9				Byte 5
Digit 12				Digit 11				Byte 6
Digit 14				Digit 13				Byte 7
‘F’				Digit 15				Byte 8

The default value when there is no call to confirm is ‘FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF’.

5.3.4. $EF_{Shunting}$

For some types of MS the EIRENE specification requires shunting functionality. In this case, GSM-R SIM card has to store information (see document [7]). Identified information to store is :

- the common shunting GID, one of the GIDs subscribed in the $EF_{VGCS,}$
- the list of shunting GIDs. A shunting GID has to be a subscribed GID. The list of subscribed GIDs is in the EF_{VGCS}.

A file **$EF_{Shunting}$** is required for shunting to store the configuration.

Identifier: '6FF4'	Structure: transparent	Mandatory
file length: 8 bytes	Update activity: low	

Access Conditions:

READ	CHV1
UPDATE	ADM
INVALIDATE	ADM
REHABILITATE	ADM

Bytes	Description	M/O	Length
1	Common GID	M	1 byte
2 to 8	Shunting GID	M	7 bytes

The field"Common GID" contains a value coded in binary. This value is in the range [1 to 50][9]. This number is an index pointing to the Common Shunting GID in the EF_{VGCS}. If no common shunting GID is available in EF_{VGCS}, the value shall be set to 'FF'.

The field "Shunting GID" contains the indication concerning the GID subscribed in the EF_{VGCS} which are shunting GID. A bit is set to '1' if the corresponding GID in the record of EF_{VGCS} is a shunting GID. Otherwise, the bit is set to '0'. If GID 500 and 599 are present, the equivalent bits in the following table have to be set to 1.

The following table indicates for each bit of the field the record number of the EF_{VGCS}.

B8	B7	B6	B5	B4	B3	B2	B1	
8	7	6	5	4	3	2	1	Byte 1
16	15	14	13	12	11	10	9	Byte 2
24	23	22	21	20	19	18	17	Byte 3
32	31	30	29	28	27	26	25	Byte 4
40	39	38	37	36	35	34	33	Byte 5
48	47	46	45	44	43	42	41	Byte 6
Unused bits = 0						50	49	Byte 7

This last field allows identification management of the shunting GID in the EF_{VGCS} and the rights to activate or de-activate those GIDs in the EF_{VGCSS}.

Procedures and rules for shunting are described within [7]. Subscription checking for GIDs and priority levels are not performed by the SIM card.

If no shunting GIDs are subscribed in EF_{VGCS}, the default configuration for $EF_{Shunting}$ shall be: "FF 00 00 00 00 00 00 00". The configuration for the example reported at § 5.2.3 shall be "04 FA FF FF FF 01 00 00"

[9] in binary : from 1 [Hexa] to 32 [Hexa]

5.3.5. $EF_{GsmrPLMN}$: GSM-R network selection

EIRENE requires a network selection mechanism according to the following :

1. Home railway network,
2. ”foreign” railway networks when roaming in foreign railway network,
3. Public networks with EIRENE facilities,
4. Public networks without EIRENE facilities.

The required priority of the networks is coded in the order of the following table.

The structure of the file $\mathbf{EF_{GsmrPLMN}}$ is :

Identifier: ‘6FF5’	Structure: linear fixed	Mandatory
file length: 9*n bytes (n<=50)	Update activity: low	

Access Conditions:

READ	CHV1
UPDATE	ADM
INVALIDATE	ADM
REHABILITATE	ADM

Bytes	Description	M/O	Length
1 to 3	PLMN 1	M	3 bytes
4	Class of network 1	M	1 byte
5 to 6	IC-Incoming reference table 1	M	2 bytes
7 to 8	Outgoing reference table 1	M	2 bytes
9	IC table reference 1	M	1 byte
:	:	:	:
9*(n-1)+1 to 9*(n-1)+3	PLMN n	O	3 bytes
9*(n-1)+4	Class of network n	O	1 byte
9*(n-1)+5 to 9*(n-1)+6	IC-Incoming reference table n	O	2 bytes
9*(n-1)+7 to 9*(n-1)+8	Outgoing reference table n	O	2 bytes
9*(n-1)+9	IC table reference n	O	1 byte

The field ”PLMN” contains the Mobile Country Code (MCC) followed by the Mobile Network Code (MNC). The coding of this field is the same as described in the $EF_{PLMNsel}$ in the document [3].

The Mobile Country Code (MCC) is followed by the Mobile Network Code (MNC).

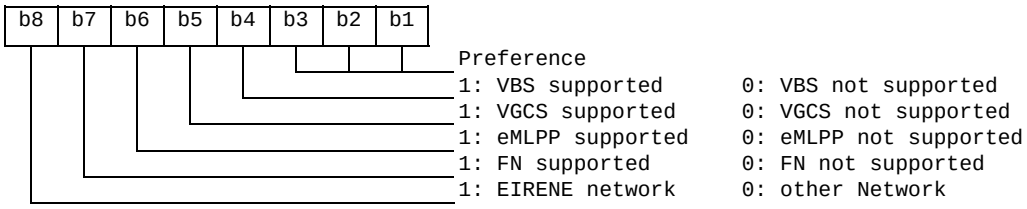
Coding is according to GSM 04.08.

- If storage for fewer than the maximum possible number n is required, the excess bytes shall be set to 'FF'.

For instance, using 246 for the MCC and 81 for the MNC and if this is the first and only PLMN, the contents reads as follows:

Bytes 1-3:	'42' 'F6' '18'
Byte 4:	'F8'
Byte 5-6:	'6F8D'
Byte 7-8:	'6F8E'
Byte 9:	'01'

The ”Class of network” field has the following structure :



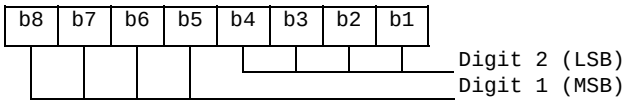
The “Preference” parameter is a binary value. ‘0’ is the highest priority and ‘7’ is the lowest priority. The LSB is b1 the MSB is b3.

The bits b8 to b4 indicate the features supported by the network.

The field ”IC-Incoming reference table” is a BCD value. This field contains the address of the Elementary File in the EIRENE DF which is the root file of the numbering plan tree to analyse a Functional Numbers for incoming calls. Hence, the content of this field has to be set to “6F 8D”, which is the EF_{IC} address in the EIRENE DF.

The field ”Outgoing reference table” is the address of the Elementary File in the EIRENE DF which is the root file of the Numbering Plan tree to construct a Functional Number. Hence, the content of this field has to be set to “6F 8E”, which is the EF_{CT} address in the EIRENE DF

The ”IC table reference” is a 1 byte not swapped BCD value where digit 1 is reserved for Most Significant Byte and digit 2 for Less Significant Byte (see figure below). It is a record number in a EIRENE SIM card file where the IC value and the reference to the network name are stored. This file shall be a mandatory file described in the paragraph of the numbering plan (see below). The reference of the IC file is in the field ”IC-Incoming reference table”.



The value ‘FF’ shall be used to indicate an empty table. In this case, there is no numbering plan information available for this PLMN.

Remark : the Home PLMN shall be included in the $EF_{GsmrPLMN}$ and shall be the first entry.

All the empty records shall be at the end of the EF and filled with ‘FF FF FF FF FF FF FF FF’.

5.3.6. Numbering plan

The EIRENE specification requires accommodating different requirements of individual railways concerning the functional numbering. The MS has to be the most independent of the numbering plan.

The storage in SIM card of numbering plan structure will give to MS a maximum flexibility in numbering arrangements.

The definition of the numbering plan on the SIM shall not interfere with standard GSM requirements on European Emergency Call Number (112).

5.3.6.1. Introduction

The GSM Numbering Plan defines the structure of the phone numbers. Typically, this Numbering Plan is supported by the network, especially by the switch (Local Exchange, National Exchange or International Exchange). Each subscriber has an easy knowledge of the dialled number in order to contact the called party; he has to know the number and the prefix for the local area, for national STDs (Subscribers Trunk Dialling) and ISD (International Subscribers Dialling).

The EIRENE Numbering Plan provides a more complete phone number structure in order to respond to the Railways professional needs. It is then no longer possible to expect the subscriber to keep in mind the structure of this Numbering Plan. It is for this reason that the subscriber needs a support in order to dial numbers in accordance with the numbering plan structure.

For this purpose, the best way should be to store a complete application within the SIM card in order to construct a phone number in accordance with EIRENE requirements. The terminal could be fully independent of the numbering plan chosen by the Operator.

The implementation shall be as follows:

- to store the ”building principles” of the structure of the numbering plan in the MS, that is to say the running application,
- and to store all the elements and values of the numbering plan needed to build this structure in the SIM card,

in order to provide a maximum flexibility and independence with regards to the values (digits or terms used) and with regards to national choices.

5.3.6.2. Brief numbering plan analysis

An analysis of the numbering plan retains those principles for any EIRENE number:

1. The first digit (the Call Type) defines the type of the call.
2. Based on this value, the subscriber has to construct a number with a grouping of the following:

- either several digits to dial (the train number, the coach number, the engine number, the shunting team number, mobile subscriber number, a PSTN access number)
- or to select predefined numbers corresponding to an identified function (a Function Code (FC), a International Code (IC), a specific value corresponding to a specific usage).

The EIRENE numbers may be different for incoming and outgoing calls: in the case of incoming calls, the calling party FN starts with IC, while in case of outgoing calls the number may or may not start with “900+IC”.

5.3.6.3. SIM card Elementary Files structure

The SIM card shall contain structure information of the Numbering Plan. This structure will be stored in different files, organised like a tree, provided that some sub-trees could be common.

This paragraph identifies the 4 different file structures used to build up the tree.

5.3.6.4. Table types and structures

1. Tables of “Switching” values

This type of table provides the relevant information to decide which branch of the decision table to select for the given dialled number.

The table for switching values consists of a number of records. Each record shall have a length of **6 bytes** with the following structure:

- 1 byte — Next table type indicator :
  This byte defines the type of the next table or indicates to the application program that the end of the decision tree is reached.
- 2 bytes — Next table pointer :
  These bytes refer to the next Elementary File of the decision tree.
- 2 bytes — Decision Value :
  Thess bytes define the number of digits (1 to 3) that are relevant to read from the dialled/matched number string for a switching decision. The switching decision will define the selected branch of the decision tree.
- 1 byte — String Table Index :
  A binary reference to an alphanumerical string which defines the meaning of the selected value. This string is displayed to the user to indicate the selected choice. These strings shall be stored in the mobile equipment (not on the SIM) and are displayed in the language corresponding to the user selection.

EF_{CT} and EF_{SC} are the only EFs structured as a table of switching values.

“Switching” table structure

The definition of the structure used for decision, e.g. $\mathbf{EF_{CT}}$, is as follows:

Identifier: 6F8E	Structure: linear fixed	Mandatory
Record length: 6n bytes (n<=10)	Update activity: low	

Access Conditions:

READ	CHV1
UPDATE	ADM
INVALIDATE	ADM
REHABILITATE	ADM

Bytes	Description	M/O	Length
1	Next Table Type	M	1 byte
2 to 3	Identifier of the next table	M	2 bytes
4 to 5	Decision value 1	M	2 bytes
6	String table Index 1	M	1 byte
:	:	:	:
6*(n-1)+1	Next Table Type	O	1 byte
6*(n-1)+2 to 6*(n-1)+3	Identifier of the next table	O	2 bytes
6*(n-1)+4 to 6*(n-1)+5	Decision value n	O	2 bytes
6*(n-1)+6	String table Index n	O	1 byte

The field ”Next Table Type” shall contain the type of structure of the next table. It will be :

1. ‘F0’, for a ”decision” table which contains decision values.
2. ‘F1’, for a ”pre-defined values” table.
3. ‘F2’, for a ”number of dialled digits” table.
4. ‘F3’, for the ”IC” table.
5. ‘FF’, for an empty next table. End of the decision tree.

The field ”Identifier of the next table” is the address of another Elementary File in the decision tree. These EF are contained in the subdirectory file of EIRENE DF. The value ‘FFFF’ is used for an empty next table and marks the end of the decision tree.

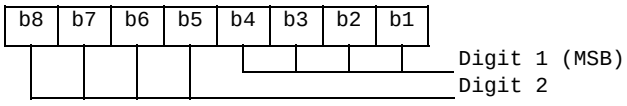
The field ”Decision value” contains 1 to 4 digits and is coded in BCD. Non-relevant digits shall be coded as ‘F’. The relevant digits (not ”F”) shall be situated beginning with the MSB of the decision value field.

The amount of relevant digits is fixed for all records within one decision table. A variable amount of relevant digits is for further study.

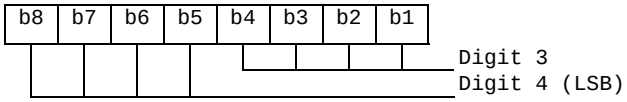
”FFFF” as a decision value is not allowed.

The coding of the”Decision value” (2 bytes) is:

First byte :



Second byte :



The field ”<u>String table Index</u>” contains a value from ‘0’ to ‘254’. The value ‘255’ (‘FF’) means a nil pointer (no alphanumerical string available). The table of string is described below.

2. Tables of “Predefined” values

This type of table is used wherever a combination of digits has a predefined meaning. E.g. 01 equals ”leading driver”. Note that the table refers only to a certain string. The string itself is not stored on the SIM.

The table of predefined values consists of a number of records. The record length is defined to be **3 bytes** with the following structure:

The first record of the table serves as a header and is structured as follows.

- 1 byte — <u>Next table type indicator :</u>
  This byte defines the type of the next table or indicates to the application program that the end of the decision tree is reached.
- 2 bytes — <u>Next table pointer :</u>
  These bytes refer to the next Elementary File of the decision tree.

All following records of the table contain the predefined values and the string pointers.

- 2 bytes — <u>Pre-defined value :</u>
  Value of the pre-defined pattern of digits.
- 1 byte — <u>String table Index :</u>
  A binary reference to an alphanumerical string which defines the meaning of the call type. This string is displayed to the user to indicate the selected choice. These strings shall be stored in the mobile equipment (not on the SIM) and are displayed in the language corresponding to the user selection.

The file size for n predefined values is (3 + (3*n)) bytes of information.

EFs structured as a table of predefined values are: EF_{FC}, $EF_{Service}$, EF_{Call}, $EF_{fct\ team}$, $EF_{Controller}$, $EF_{Gateway}$

“Pre-defined” values table structure

The predefined values table structure will be defined as follows:

Identifier: ----	Structure: linear fixed	Optional
Record length: 3+(3*n) bytes (n<=99)	Update activity: low	

Access Conditions:

READ	CHV1
UPDATE	ADM
INVALIDATE	ADM
REHABILITATE	ADM

Bytes	Description	M/O	Length
1	Next Table Type	M	1 bytes
2 to 3	Identifier of the next table	M	2 bytes
4 to 5	Predefined value 1	M	2 bytes
6	String table Index 1	M	1 bytes
:	:	:	:
3+3*(n-1)+1 to 3+3*(n-1)+2	Predefined value n	O	2 bytes
3+3*(n-1)+3	String table Index n	O	1 bytes

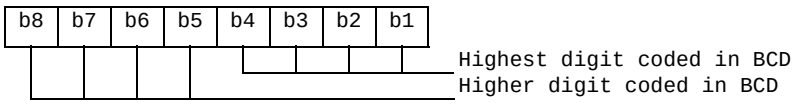
The fields ”Next Table Type” as well as the ”Identifier of the next table” follow the same format as specified for the switching table structure.

Followed by a set of :

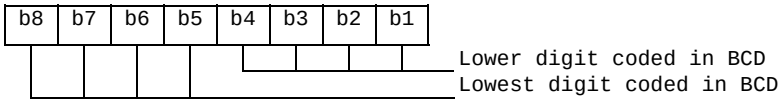
- 2 bytes up to 4 digits which are coded in BCD. The F is used for an empty or blank digit.
- 1 byte used as a decimal reference to an alphanumerical string which predefines the value (This will be displayed to the user to allow this choice to be stored in the mobile)

The field ”Predefined value” will be as follows:

First byte:



Second byte:



The value ‘F’ is used for an empty value.

The field ”String table Index” contains a value from ‘0’ to ‘254’. The value ‘255’ (‘FF’) shall indicate a nil pointer (no alphanumerical string available). The table of string is described below.

3. Tables of "Dialled" values

Although this file type is defined as "transparent" (not linear fixed) the structure of the first three bytes is the same as the one of the first record of the other table types.

This EF is composed of **4 bytes**: the first three bytes of the table serves as a header and is structured as follows.

- 1 byte — Next table type indicator :
  This byte defines the type of the next table or indicates to the application program that the end of the decision tree is reached.
- 2 bytes — Next table pointer :
  These bytes refer to the next Elementary File of the decision tree.

The fourth byte of the table contains the number of digits to be evaluated.

- 1 byte — Dialled Digit :
  This byte contains the max and min. number of digits to be evaluated.

EFs structured as a table of predefined values are: $EF_{5\ to\ 8\ digits}$, $EF_{8\ digits}$, $EF_{9\ digits}$, $EF_{2\ digits}$, EF_{SSSSS}, EF_{LLLLL}, $EF_{Location}$, $EF_{FreeNumber}$.

Number of "Dialled" digits table structure

The dialled values table structure will be defined as follows:

Identifier: ----	Structure: transparent	Optional
Record length: 4	Update activity: low	

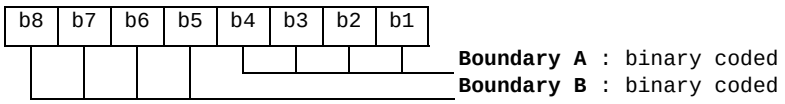
Access Conditions:

READ	CHV1
UPDATE	ADM
INVALIDATE	ADM
REHABILITATE	ADM

Bytes	Description	M/O	Length
1	Next Table Type	M	1 byte
2-3	Identifier of the next table	M	2 bytes
4	Dialled Digits	M	1 byte

The fields "Next Table Type" as well as the "Identifier of the next table" follow the same format as specified for the switching table structure.

The field "Dialled Digits" define the digit amount limit (boundary) authorised for dialling. The most significant four bits B_8 to B_5 represents the 'boundary B', binary coded. The least significant four bits B_4 to B_1 represent the 'boundary A', coded in the same way.



Depending on the ratio of these values three combinations are of relevance.

1) A>B or A=B

Boundary A is bigger than boundary B or Boundary A is equal to boundary B :

In this case boundary A has the meaning of the **maximum** amount of digits to be dialled whereas boundary B has the meaning of the **minimum** amount of digits to be dialled. In the case that A and B are equal this is the value which has to be dialled exactly.

The maximum (A) identifies the amount of digits that have to be evaluated. The range of this value shall be 1 to 15.

The minimum number (B) identifies the amount of digits that are requested to start the evaluation. The range of this value shall be 1 to 15 (the value 0 is not allowed).

If both values are set to 0 all remaining digits shall be evaluated up to the maximum allowed amount of digits (28 digits).

2) A<B

Boundary A is smaller than boundary B:

In this case boundary B defines the maximum amount of input digits entered by the user. Boundary A defines the amount of digits that have to be filled up with zeros in the case that the user entered less than value A digits. The value A=0 is not allowed.

In all three cases dialled strings not in line with the given boundaries the MMI shall inform the user with an appropriate help message (e.g. Additional input is necessary)

3) Examples

The following example may clarify this definition.

A=5, B=3 The minimum amount of digits required is 3 and at most 5 digits, all other inputs are rejected.

A=4, B=4 The dialled string shall have exactly 4 digits, all other entries are rejected.

A=5, B=8 The mobile output string will be at least 5 digits (A=5) long: if the user dials a lower number of digits, the application will put zero digits in front of the number dialled to lengthen the string to 5 digits. The maximum allowed amount of digits is 8 (B=8). The user input must be processed as follows :

User input		Output string
1 digit :	3	00003
2 digits :	12	00012
4 digits :	1234	01234
5 digits :	12345	12345
6 digits :	123456	123456
9 digits :	123456789	Rejected, user input exceeds value B.

4. Tables of "IC" values

This type of table provides relevant information to decide which branch of the decision table to select for the given number.

The table for IC values consists of a number of records. Each record length is defined to be **7 bytes** with the following structure:

- 1 byte — Next table type indicator :
  This byte defines the type of the next table or indicates to the application program that the end of the decision tree is reached.
- 2 bytes — Next table pointer :
  These bytes refer to the next Elementary File of the decision tree.
- 2 bytes — IC Value :
  These bytes define the number of digits (1 to 4) that are relevant to read from the dialled/matched number string for a switching decision. The switching decision will define the selected branch of the decision tree.
- 2 bytes — Network String Table Index :
  A binary reference to an alphanumerical string which identifies the network name. This string is displayed to the user to indicate the network name. These strings shall be stored on the SIM (EF_{NW}).

EF_{IC} is the only EF structured as a table of IC values.

"IC" table structure

The structure definition used for IC table (EF_{IC}) is as follows:

Identifier: 6F8D	Structure: linear fixed	Mandatory
Record length: 7n bytes (n<=50)	Update activity: low	

Access Conditions:

READ	CHV1
UPDATE	ADM
INVALIDATE	ADM
REHABILITATE	ADM

Bytes	Description	M/O	Length
1	Next Table Type 1	M	1 byte
2-3	Identifier of the next table 1	M	2 bytes
4-5	IC decision value 1	M	2 bytes
6-7	Network String table Index 1	M	2 bytes
:	:	:	:
7*(n-1)+1	Next Table Type n	O	1 byte
7*(n-1)+2 to 7*(n-1)+3	Identifier of the next table n	O	2 bytes
7*(n-1)+4 to 7*(n-1)+5	IC decision value n	O	2 bytes
7*(n-1)+6 7*(n-1)+7	Network String table Index n	O	2 bytes

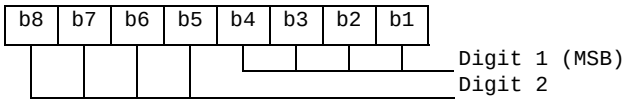
The fields "Next Table Type" as well as the "Identifier of the next table" follow the same format as specified for the switching table structure.

The field ”IC decision value” contains the International Code (IC), 1 to 3 digits. This field is coded in BCD. Digits not relevant are coded as ‘F’. The relevant digits (not ”F”) shall be situated beginning with the MSB of the decision value field.

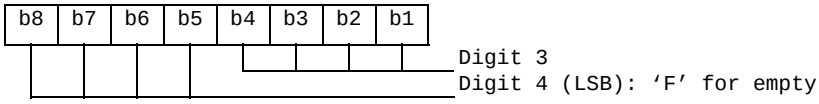
”FFFF” as a decision value is not allowed.

The coding of the ”Decision value” (2 bytes) is :

First byte :



Second byte :



The field ”Network String Table Index” contains a value from ‘1’ up to ‘65535’. The Network string table is stored in an EF_{NW} on the SIM. The coding of the ”Network String Table index” (2 bytes) is in binary coding with:

The first byte is the MSB,

the second byte is the LSB.

All the empty records shall be at the end of the EF and filled with ‘FF FF FF FF FF FF FF’.

5.3.6.5. Network name EF_{NW}

An Elementary File in the GSM-R SIM card shall contain the network names. This file will be referred to the IC table.

The EF_{NW} is defined in the DF_{EIRENE}.

Identifier: '6F80'	Structure: linear fixed	Mandatory
file length: 8*n bytes (n<=50)	Update activity: low	

Access Conditions:

READ	CHV1
UPDATE	ADM
INVALIDATE	ADM
REHABILITATE	ADM

Bytes	Description	M/O	Length
1 to 8	Network names 1	M	8 bytes
:	:	:	:
8*(n-1)+1 to 8*(n-1)+8	Network names n	O	8 bytes

The field ”Network names” is a string, which is the short name. The string is formatted as described in document [8] for short network representation of the command AT+COPS.

All the empty records shall be at the end of the EF and filled with ‘FF FF FF FF FF FF FF FF’.

As an example, the string “GSMR RFI” will be coded as: “47 53 4D 52 20 52 46 49”

5.3.6.6. Tables of strings for the numbering plan

For certain user entries the MS shall display textual representation of numbers. These textual representations shall be stored outside the SIM. This chapter defines a fixed relationship between the index used by the SIM card tables (switching and predefined values table) and the location of the text string stored outside the SIM.

The text string length for the for textual representation is not part of this specification and is implementation dependent.

Each textual description allocates one of 255 possible indices. The following table defines the meaning of each of the 255 positions. The application on the MS side is in charge of displaying the appropriate string, taking into account the current language selected by the user.

String index	Description
0	Description of Call Type 0 : e.g. Public
1	Description of Call Type 1 : e.g. Short coded
2	Description of Call Type 2 : e.g. Train
3	Description of Call Type 3 : e.g. Engine
4	Description of Call Type 4 : e.g. Coach
5	Description of Call Type 5 : e.g. group and broadcast
6	Description of Call Type 6 : e.g. Shunting and Maintenance
7	Description of Call Type 7 : e.g. Train Controller
8	Description of Call Type 8 : e.g. MSISDN
9	Description of Call Type 9 : e.g. Gateway
10	Shunting Team Leader
11	Shunting Team Member 1
12	Shunting Team Member 2
13	Shunting Team Member 3
14	Shunting Train Driver
15	Maintenance Team Leader
16	Maintenance Team Member 1
17	Maintenance Team Member 2
18	Maintenance Team Member 3
19	Maintenance Team Member 4
20	Other GSM-R (in case of CT 9)
21	Private railways (in case of CT 9)
30	Most appropriate primary controller (in case of CT 1)
31	Most appropriate secondary controller (in case of CT 1)
32	Power supply controller (in case of CT 1)
33	ERTMS/ETCS RBC (in case of CT 1)
34	Call confirmation centre (in case of CT 1)
…	…
40	
41	
42	Trains groups
43	Station and security staff group
44	*Reserved for national use*
45	Shunting groups
46	Track side maintenance group
47	Controller groups
…	…
50	All groups (VBS/VGCS)
51	Team number
52	Emergency call

String index	Description
…	…
60	Primary controller
61	Secondary controller
62	Power supply controller
…	…
100	Description of Function Code 00 : Spare alarm
101	Description of Function Code 01 : Leading Driver
…	…
106	Description of Function Code 06 : FAX
107	Description of Function Code 07 : Intercom
108	Description of Function Code 08 : Public Address
109	*Reserved for international use*
110	Description of Function Code 10 : Chief Conduct.
…	…
120	Description of Function Code 20 : Catering Chief
…	…
199	Description of Function Code 99 : Reserved for national use
200	Group Call (in case of CT 5)
201	Broadcast Call (in case of CT 5)
…	…
255	Empty string

For ‘string index’ = 1 to 10 following description applies:

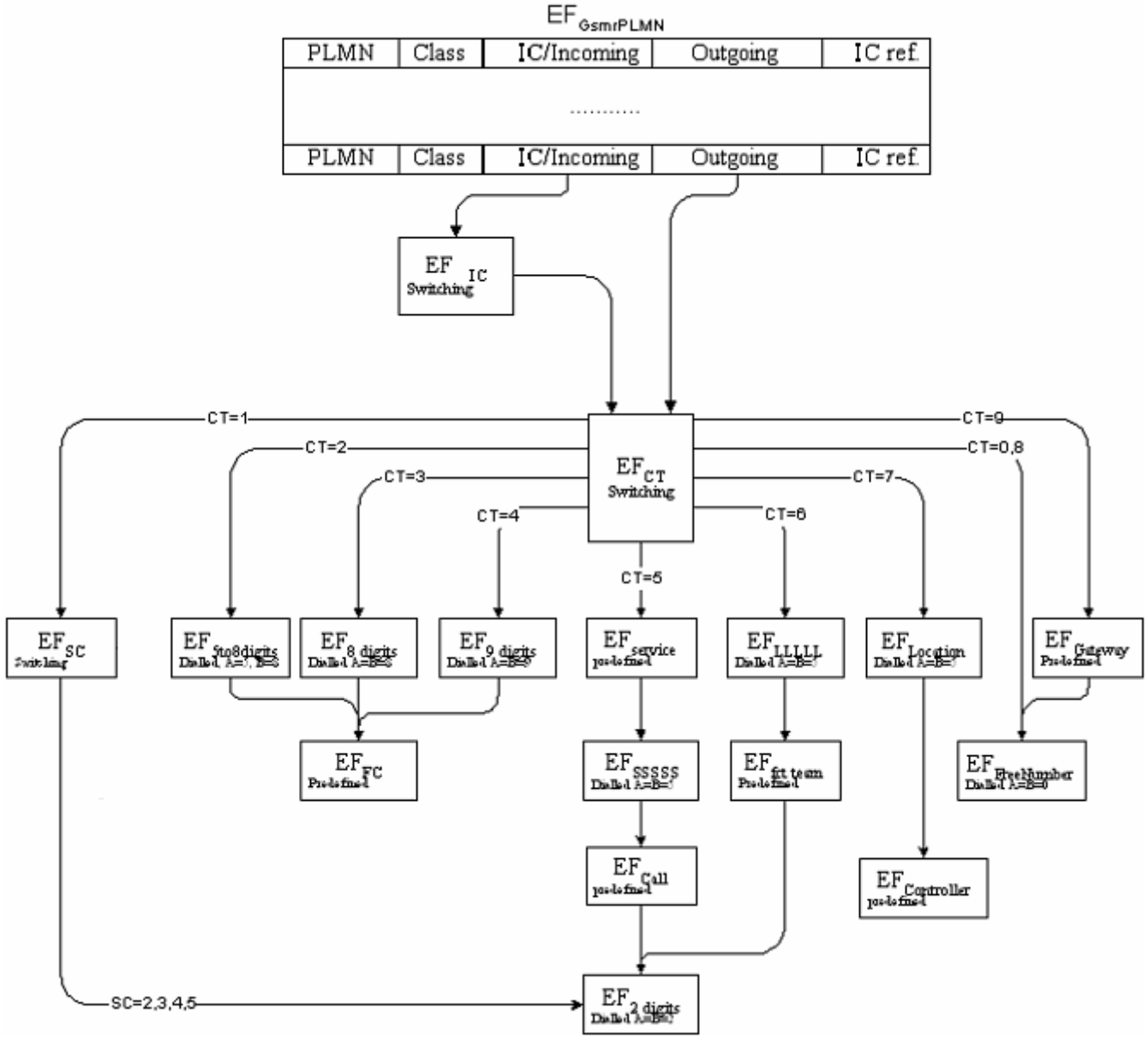
The field description contains the representation of the call type usage foreseen by document [1].

5.3.6.7. SIM card application Tables for the EIRENE numbering plan

This paragraph describes the application of the solution to the international EIRENE numbering plan. The proposed files could be adapted with the same structure with additional national requirements.

The purpose of the following block diagram is to summarise the tree of the EIRENE numbering plan:

Figure 3: Numbering plan structure on SIM card



5.3.6.8. EF_{CT}

For the numbering plan currently defined in EIRENE, the following **EF_{CT}** table is the root file to construct a Functional Number beginning by the Call Type :

Next table type	Next table Pointer	Decision Value (CT)	String reference in table §5.3.6.6	String displayed
F2	<EF code>$_{\text{free number}}$	FFF0	0	Public
F0	<EF code>$_{SC}$	FFF1	1	Short code
F2	<EF code>$_{\text{5 to 8 digits}}$	FFF2	2	Train
F2	<EF code>$_{\text{8 digits}}$	FFF3	3	Engine
F2	<EF code>$_{\text{9 digits}}$	FFF4	4	Coach
F1	<EF code>$_{\text{Service}}$	FFF5	5	Group & Broadcast
F2	<EF code>$_{LLLL}$	FFF6	6	Shunt. & Maint.
F2	<EF code>$_{\text{Locationr}}$	FFF7	7	Train Controller
F2	<EF code>$_{\text{free number}}$	FFF8	8	MSISDN
F1	<EF code>$_{\text{Gateway}}$	FFF9	9	Gateway

All the empty records shall be at the end of the EF and filled with ‘FF FF FF FF FF FF’.

An example of SIM card configuration for EF_{CT} (‘6F 8E’) is:

1st byte	2nd and 3rd byte	4th and 5th byte	6th byte	String displayed
F2	6F 87	F0FF	00	Public
F0	6F 8F	F1FF	01	Short code
F2	6F 81	F2FF	02	Train
F2	6F 83	F3FF	03	Engine
F2	6F 84	F4FF	04	Coach
F1	6F 89	F5FF	05	Group & Broadcast
F2	6F 86	F6FF	06	Shunt. & Maint.
F2	6F 91	F7FF	07	Train Controller
F2	6F 87	F8FF	08	MSISDN
F1	6F 8C	F9FF	09	Gateway

5.3.6.9. EF_{SC}

The following **EF_{SC}** table is the switching table used in the case of Call Type 1. This table is used to select the next digit after the Call Type :

Next table type	Reference of the next table	Decision Value	String reference in table §5.3.6.6	String displayed
F2	<EF code>$_{\text{2 digits}}$	FFF2	30	Primary Controller
F2	<EF code>$_{\text{2 digits}}$	FFF3	31	Secondary Controller
F2	<EF code>$_{\text{2 digits}}$	FFF4	32	Power Supply Controller

An example of SIM configuration for EF_{SC} (‘6F 8F’), is:

1st byte	2nd and 3rd byte	4th and 5th byte	6th byte

F2	6F 82	F2 FF	1E
F2	6F 82	F3 FF	1F
F2	6F 82	F4 FF	20

5.3.6.10. EF$_{5\ to\ 8\ digits}$

In order to allow a full interoperability between EIRENE networks, the **EF$_{5\ to\ 8\ digits}$** shall be configured as below:

Next table type	Reference of the next table	B	A
F1	<EF code>$_{FC}$	8	5

The example below shows the SIM card configuration for EF$_{5\ to\ 8\ digits}$ (‘6F 81’) :

1st byte	2nd and 3rd byte	4th byte
F1	6F 88	85

5.3.6.11. EF$_{2\ digits}$

The **EF$_{2\ digits}$** shall be configured as follows:

Next table type	Reference of the next table	B	A
FF	FF FF	2	2

The example below shows the SIM card configuration for EF$_{2\ digits}$ (‘6F 82’) :

1st byte	2nd and 3rd byte	4th byte
FF	FF FF	22

5.3.6.12. EF$_{8\ digits}$

The **EF$_{8\ digits}$** shall be configured as follows:

Next table type	Reference of the next table	B	A
F1	<EF code>$_{FC}$	8	8

The example below shows the SIM card configuration for EF$_{8\ digits}$ (‘6F 83’) :

1st byte	2nd and 3rd byte	4th byte
F1	6F 88	88

5.3.6.13. EF$_{9\ digits}$

The **EF$_{9\ digits}$** shall be configured as follows:

Next table type	Reference of the next table	B	A
F1	<EF code>$_{FC}$	9	9

The example below shows the SIM card configuration for EF$_{9\ digits}$ (‘6F 84’) :

1st byte	2nd and 3rd byte	4th byte

F1	6F 88	99

5.3.6.14. EF_{SSSSS}

The **EF_{SSSSS}** shall be configured as follows:

Next table type	Reference of the next table	B	A
F1	<EF code>$_{Call}$	5	5

The example below shows the SIM card configuration for EF_{SSSSS} ('6F 85') :

1st byte	2nd and 3rd byte	4th byte
F1	6F 8A	55

5.3.6.15. EF_{LLLLL}

The **EF_{LLLLL}** shall be configured as follows:

Next table type	Reference of the next table	B	A
F1	<EF code>$_{fct\ team}$	5	5

The example below shows the SIM card configuration for EF_{LLLLL} ('6F 86') :

1st byte	2nd and 3rd byte	4th byte
F1	6F 8B	55

5.3.6.16. $EF_{Location}$

The **$EF_{Location}$** shall be configured as follows:

Next table type	Reference of the next table	B	A
F1	<EF code>$_{Controller}$	5	5

The example below shows the SIM card configuration for $EF_{Location}$ ('6F 91') :

1st byte	2nd and 3rd byte	4th byte
F1	6F 92	55

5.3.6.17. $EF_{Free\ number}$

The **$EF_{free\ number}$** shall be configured as follows:

Next table type	Reference of the next table	B	A
FF	FFFF	0	0

The example below shows the SIM card configuration for $EF_{Location}$ ('6F 87') :

1st byte	2nd and 3rd byte	4th byte
FF	FF FF	00

5.3.6.18. EF_{FC}

The $\mathbf{EF_{FC}}$ shall start with:

Next table type	Reference of the next table
FF	FFFF

and then followed by a list of records representing the Function Codes the user can select. If the following list of FCs is assumed to be used by the user,

FC	String reference in table §5.3.6.6	String displayed
FF01	101	Leading Driver
FF06	106	Fax
FF07	107	Intercom
FF08	108	Public address
FF10	110	Chief Cond.
FF20	120	Catering
FF61	161	Passengers Info

then the SIM configuration for EF_{FC} ('6F 88') will be:

	1st (and 2nd) byte	(2nd and) 3rd byte	String displayed
1st record	FF	FF FF	
2nd record	10 FF	65	Leading Driver
3rd record	60 FF	6A	Fax
4th record	70 FF	6B	Intercom
5th record	80 FF	6C	Public address
6th record	01 FF	6E	Chief Cond.
7th record	02 FF	78	Catering
8th record	16 FF	A1	Passengers Info
Empty records	FF FF	FF	

<u>Notes :</u>

The decimal reference of a Function Code shall be the function code value + 100.

5.3.6.19. $EF_{Service}$

The $\mathbf{EF_{Service}}$ shall contain the amount of digits allowed after the '5' (CT ='5'). It starts with :

Next table type	Reference of the next table
F2	<EF code>$_{SSSSS}$

And is followed by:

VGCS-VBS	String reference in table §5.3.6.6	String displayed
FFF0	200	VGCS
FFF1	201	VBS

The example below shows the SIM card configuration for $EF_{Service}$ ('6F 89'):

	1st (and 2nd) byte	(2nd and) 3rd byte	String displayed
1st record	F2	6F 85	
2nd record	F0 FF	C8	VGCS
3rd record	F1 FF	C9	VBS

5.3.6.20. EF_{Call}

The $\mathbf{EF_{Call}}$ shall contain the digit of the group type. It will start with:

Next table type	Reference of the next table
F2	<EF code>$_{2\ digit}$

And then be followed by :

Group type	String reference in table §5.3.6.6	String displayed
FFF2	42	Train Groups
FFF3	43	Station and Security Staff Groups
FFF5	45	Shunting
FFF6	46	Track side Maintenance Groups
FFF7	47	Controller Groups

The example below shows the SIM configuration for EF_{Call} ('6F 8A'):

	1st (and 2nd) byte	(2nd and) 3rd byte	String displayed
1st record	F2	6F 82	
2nd record	F2 FF	2A	Train Groups
3rd record	F3 FF	2B	Station and Security Staff Groups
4th record	F5 FF	2D	Shunting
5th record	F6 FF	2E	Track side Maintenance Groups
6th record	F7 FF	2F	Controller Groups
Empty records	FF FF	FF	

5.3.6.21. $EF_{Fct\ Team}$

The $\mathbf{EF_{Fct\ Team}}$ shall contain the digit used to distinguish between "shunting team" (5) and "maintenance teams" + the digit of the "Team Member Function". It will start with:

Next table type	Reference of the next table
F2	<EF code>$_{2\ digit}$

And then followed by :

Team Type and Function	String reference in table §5.3.6.6	String displayed
FF50	10	Sh Team Leader
FF51	11	Sh Team Member 1
FF52	12	Sh Team Member 2
FF53	13	Sh Team Member 3
FF54	14	Sh Train Driver
FF60	15	Maint. Team Leader

FF61	16	Maint. Team Member 1
FF62	17	Maint. Team Member 2
FF63	18	Maint. Team Member 3
FF64	19	Maint. Team Member 4

The example below shows the SIM card configuration for $EF_{Fct\ Team}$ ('6F 8B'):

	1st (and 2nd) byte	(2nd and) 3rd byte	String displayed
1st record	F2	6F 82	
2nd record	05 FF	0A	Sh Team Leader
3rd record	15 FF	0B	Sh Team Member 1
4th record	25 FF	0C	Sh Team Member 2
5th record	35 FF	0D	Sh Team Member 3
6th record	45 FF	0E	Sh Train Driver
7th record	06 FF	0F	Maint. Team Leader
8th record	16 FF	10	Maint. Team Member 1
9th record	26 FF	11	Maint. Team Member 2
10th record	36 FF	12	Maint. Team Member 3
11th record	46 FF	13	Maint. Team Member 4

5.3.6.22. $EF_{Controller}$

The $\mathbf{EF_{Controller}}$ will contain the end code for the controller (Call Type 7). It will begin start with :

Next table type	Reference of the next table
FF	FFFF

And then be followed by :

	String reference in table §5.3.6.6	String displayed
FF01	60	Primary controller
FF02	61	Secondary controller
FF03	62	Power supply controller

The example below shows the SIM configuration for $EF_{Controller}$ ('6F 92'):

	1st (and 2nd) byte	(2nd and) 3rd byte	String displayed
1st record	FF	FF FF	
2nd record	10 FF	3C	Primary controller
3rd record	20 FF	3D	Secondary controller
4th record	30 FF	3E	Power supply controller

5.3.6.23. $EF_{Gateway}$

The $\mathbf{EF_{Gateway}}$ shall contain the amount of digits to access to external networks. It will start with:

Next table type	Reference of the next table
F2	<EF code>$_{\text{free number}}$

And then be followed by :

String reference in table §5.3.6.6	String displayed

FF00	20	Other GSM-R
FF01 (*)	21	Private Railway

(*) According to EIRENE SRS and ERNST MoU, ‘901’ has to be used as a breakout code to route the call to the railway fixed network in the case where this network uses the range ‘900’ to ‘909’ originally allocated to EIRENE network.

The example below shows the SIM configuration for $EF_{Gateway}$ (‘6F 8C’):

	1st (and 2nd) byte	(2nd and) 3rd byte	String displayed
1st record	F2	6F 87	
2nd record	00 FF	14	Other GSM-R
3rd record	10 FF	15	Private Railway

5.3.6.24. EF_{IC}

For the numbering plan currently defined in EIRENE, the following **EF_{IC}** table is the root file to analyse the Functional Number beginning by the IC:

Type of next value	Reference of the next table	IC	Description
F0	<EF code>$_{CT}$	F039	Reference into EF_{NW}
F0	<EF code>$_{CT}$	F033	Reference into EF_{NW}
F0	<EF code>$_{CT}$	F049	Reference into EF_{NW}

This table is also the IC table, giving the relation between the IC value and the network name (see in description).

An example of SIM configuration for EF_{IC} ('6F 8D'), where the 1st record refers to HPLMN IC and is supposed to be ='039' and 2nd and 3rd records refer to other EIRENE networks with IC respectively equal to '033' and '049', is:

1st byte	2nd and 3rd byte	4th and 5th byte	6th and 7th byte
F0	6F 8E	30 F9	00 01
F0	6F 8E	30 F3	00 02
F0	6F 8E	40 F9	00 03

All the EF presented in the chapter reflect the EIRENE requirements and shall be mandatory for GSM-R SIM cards. In addition, railway operators are able to add specific values for their national implementation or in order to support any agreement with another operator.

On the Mobile Equipment, 2 algorithms have to be implemented:

- the first to dial a Functional Number with a user-friendly interface (to register or to call).
- the second to analyse a Functional Number to display relevant information to the user

6. SIM CARD PERSONALISATION FOR ETCS APPLICATION

This chapter defines the personalisation profile for a GSM-R SIM-Card used for ETCS application.

In case of "ETCS" SIM-Card, the following table provides the list of those EFs requiring a specific configuration:

EF	Content	Description	Applicability
EFSST	6th byte: most significant half byte configured to (hex): '0' or 'A' 6th byte: less significant half byte configured to: (binary)'11xx' where x equal '0' or '1'	Service n°21 VGCS & n°22 VBS: two configurations are possible: 1. Services not allocated ('0'), or 2. Services allocated but not activated ('A'); Service n°23 eMLPP: service allocated and activated (binary): '11' Service n°24 AAeM: different configurations are possible: 'xx' where x equal '0' or '1', but in general no auto-answer mechanism is implemented since EVC is in charge to answer the call	Mandatory
EFeMLPP	1st byte (most significant): Bit 4 configured to (bin) '1'. 1st byte recommended configuration (hex):'08' 2nd byte (less significant) recommended configuration (hex):'00':	Priority level '1' for outgoing call is permitted. Only priority level '1' for outgoing calls is admitted ETCS application does not use fast call set-up	Mandatory Recommended Recommended
EFAAeM	(hex) '00'	Not used by ETCS application	Recommended
EFSDN	Empty: all records configured to 'FF…FF'	Not used by ETCS application	Recommended
EFVGCS	Empty: all records configured to 'FF…FF'	Not used by ETCS application	Mandatory

EFVBS	Empty: all records configured to ‘FF…FF’	Not used by ETCS application	Mandatory

To shorten EDOR booting time at the switch-on, GSM-R operators may provide SIM-cards tailored for ETCS usage where the number of EFs and their dimension is minimized. As an example, EFSMS and EFADN, that generally have big dimension and require long reading time, can be created with a limited number of records or even be omitted because not used by ETCS application. Nevertheless, booting time will depend on MT processing of EF files.

As far as EIRENE DF is concerned, in principle all EFs used for dialling help usage can be omitted.

APPENDIX A - PROPOSITION TO IMPROVE SIM CARD MANAGEMENT

Please note: Appendix A is for information only.

1. MANAGEMENT OF SIM CARD

GSM-R SIM cards contain data for professional use.

However, some data should be updated live on the GSM-R MS, without the end users being aware of such operational practice (e.g.: data of the call confirmation, preferred or forbidden PLMN, …).

During normal SIM working conditions, the standard access conditions CHV1 or CHV2 are relevant for the SIM bearer, and concern the "classic" phonebooks and data.

Some other data like IMSI , GID1, … are protected from update by an administrative secret key. Those particular data elements are protected with a higher security protection level especially against involuntary updates.

In the same way, all EIRENE files are protected from update by an administrative secret key.

1.1. In-house management

For in-house management or administration it is proposed to have 2 administrative secret keys:

One standard ADM2 for GSM files.

One new ADM1, relative to EIRENE files.

To facilitate the management, a **Personalisation terminal** will be adequate.

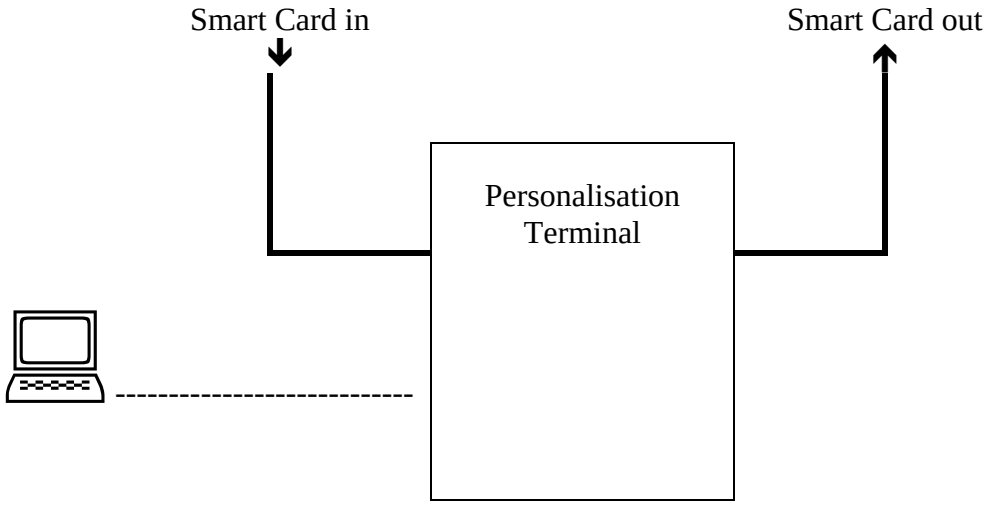
Such a tool, in accordance with the customer requirements and via a "User friendly" MMI, will perform the following:

Management of bearer standard files (ADN, SDN, MSISDN, SMS, SMSP, …)

Management of bearer EIRENE files (VBS, VGCS, eMLPP, FN, Shunting, Call Confirmation, …)

Management of administrative files (IMSI, SST, AD, …).

Furthermore, a graphical personalisation might be realised with a specific printer and reader peripheral. It could print any thing as bearer data, special group data and even a colour logo.



1.2. Over The Air management

The data could be managed by the network through the Over The Air (OTA) procedures, supported by phase2+ ETSI specification [4]. In such a case, the OTA application is a SIM toolkit application.

For example, the ADN update will be performed via a STKK menu activation.

For OTA management or administration it is proposed to comply with **ETSI GSM 03-48** (Security Mechanisms for SIM application Toolkit, document [4]).

A dedicated OTA secret key is used for the OTA administration and is included in the DFota/EFkey.

With such OTA support, via an OTA server, the administrator may read/update any file in the SIM with **secure transmission**.

A signature, computed by the OTA server, is enclosed with each administrative SMS.

The SIM checks this signature before executing any transmitted command.

It is proposed to use the 3DES (mode CBC) as secret key algorithm for signature and cipher option. Some parts of the administrative SMS may be ciphered (according to each country cryptology directives), with the same algorithm and a different key.

1.3. SIM Toolkit

The SIM toolkit mechanism is an optional GSM-R feature (document [1] & [2]). The mechanisms and the use of such services are described in the ETSI standard GSM 11-14.

The SIM Toolkit mechanism is highly recommended to facilitate the OTA management via menus. This operation will require designing an “adhoc” applet with the development tools.

Such operations are “Easy to Do” works with simple Visual Basic™ tools and Windows Powered GSM-R smart cards.

2. SIM CARD LOCKING

The purpose of this chapter is to provide a GSM-R proposal for the following problem:

In GSM the SIM card provides user information on the subscription to the system. This user is able to protect himself against pirated use by activating the PIN code. In case of a cab radio or OPH, the SIM card is associated to an engine. In the common usage for this case, the PIN code has to be known in order to be used by several users. In such cases, the SIM card has still to be protected against the theft and piracy.

In case of cab radio (EMS, EIRENE Mobile Station) or OPH terminal, the following is proposed:

- Disable CHV1 and put a tag into the SIM, at the personalization phase.
- Execute an external authentication to the SIM.

```
        OPH / EMS                                                    SIM
ASK RANDOM
                          ----------------------------------------------
                                                -
                                     RAND ( 8 bytes )
                          ----------------------------------------------
                                                -
RESULT = f(RAND,Ks)
                                       RESULT
EXT. AUTHENT.             ----------------------------------------------
                                                -
                                                          Check :
                                       SW : 90 00         RESULT=?f(RAND_KS)
                          ----------------------------------------------
                                                -
```

The authentication is compute via a secret key algorithm f( ) : 3DES (mode ECB) should be preferred.

The secret key Ks has to be “secured” embedded into the MRM or OPH.

Because this authentication phase is not necessary on the GPH mobile, 2 kinds of SIM cards are to be taken into account by putting a tag (not updateable) into the SIM EEPROM, at the personalization phase :

1. Tag for GPH SIM; Standard working.
2. Tag for MRM SIM; the authentication is required before executing any command after the SIM reset.

This tag may be included into the Ef_{info} or into a dedicated file with “NEVER” as update AC.

APPENDIX B – EXAMPLES

1. EXAMPLE OF READING THE NUMBERING PLAN INFORMATION

1.1. Outgoing calls

Outgoing call, MS in network not supporting EIRENE numbering plan:

Step	Action	Result
	User requires to enter an EIRENE numbering plan number. The user activates the outgoing call menu	• MS queries in table $EF_{GSMRPLMN}$ and checks properties of the current network (class of network, IC reference tables...). • Class of network indicates that the network does not support the EIRENE numbering plan • In table $EF_{GSMNPLMN}$ the field "Outgoing reference table" is filled with "FFFF". • The MS will allow user entries like any other public MS
	The MMI will indicate to the user that the current network does not support the facilities. It is up to the MMI to inform the user to use public network dialling procedures.	

Outgoing call, MS is within home network:

Step	Action	Result
	User requires to enter a number. The user activated the outgoing calls menu.	• MS interrogates in table $EF_{GSMRPLMN}$ and checks properties of the current network (class of network, IC reference tables...). • MS queries the address of the "outgoing reference table" (EF_{CT}) from file GSMRPLMN. • In EF_{CT} the MS will receive information Next table type Next table address Decision values Pointer to a text string
		MS will present the (Decision values and)Text Strings on the MMI as menu items. The user shall only select one of the presented decision values.
	The user selects on of the given menu items. As example CT=2	MS will query in table EFCT the starting address "Next table pointer" ($EF_{5to8\ digits}$)
		The MS reads in table $EF_{5to8digits}$ the value A=5, B=8. The MMI will accept all user entries shorter than 8 digits. User entries less than 5 digits will be filled up with zeros up to the fifth digit starting with the most significant digit (left side).
	Dial 5 to 8 digits	In table $EF_{5to8digits}$ the "Next table address" points towards table EF_{FC} (type predefined value). If the user enters less than min digits (5)
	Select FC	EFFC has one entry for each possible FC

1.2. Incoming calls

The MS is within its home country, and supports GSM-R numbering plan.

Step	Action	Result
1a	Incoming call without UUIE	• No interpretation of UUIE necessary.
	Incoming call with UUIE not following the numbering plan	• The MS will display the UUIE contents as received without an interpretation.
1b	Incoming call with UUIE	• The UUIE will consist of the IC and the functional number. • MS interrogates in table EFGSMRPLMN and checks properties of the current network (class of network, IC reference tables...). • MS queries the address of the ”incoming reference table” (EF_{IC}) from file GSMRPLMN. • In EF_{IC} the MS will receive information Next table type Next table address (EFCT) IC values Network String Table Index (EFNW) • It compares the field IC value with the first digits of the UUIE and displays the name of the network dedicated to the IC number. • The MS will now read the Next Table Address and read the EFCT table. From this point the processing is the same as for outgoing calls taking into account that user inputs are now the information retrieved from UUIE contents.

1.3. Network selection

The MS not registered within any network. The MS has deactivated the automatic network selection feature:

Step	Action	Result
	Select network menu	The MS will present the table of the available networks by reading the MNC and comparing it with the entries of the GSMR supporting networks listed in $EF_{GSMRPLMN}$ file. The presentation is sorted using the information retrieved from the class of network field of each network. Networks not listed in $EF_{GSMRPLMN}$ are listed at the end of the selection table on MMI.
	User selects one of the presented networks	

2. EXAMPLE : SIM CARD PERSONALISATION

The following table present an example of GSM- SIM card personalisation construct with the present document requirements.

Note: Y for Yes and N for No.
Description table of phase 2 features :

chv1 dis	Y	ext1	N
adn	Y	ext2	N
fdn	N	sms par	N
sms	Y	ldn	N
aoc	N	cbmi	Y
ccp	N	gid1	Y
plmnsel	Y	gid2	N
msisdn	Y	spn	N

Description table of phase 2+ features :

sdn	Y	smsr	N
ext3	N	cbmir	N
vgcs	Y	bdn	N
vbs	Y	ext4	N
mlpps	Y	dck	N
aamlpp	Y	cnl	N
smscb	Y	nia	N
SoLSA	N	sume	N
nosms	N	gprs	N

Description table of SIM tool kit features :

proactive	N
menusel	N
call ctrl	N

Description of specific options :

image	N
smspp	N
dcs1800	N
SICAP	N
Transport	Y
OTA	Y
EIRENE	Y

		TYPE	M/O	present	a-tag length	Fixed length	Rec NB	File length	EEPROM space	Read	Update	Rehab	Invalid
									16384				
Opt			Mandatory	**Y**				64	16320				
Reserved Area			Mandatory	**Y**		8		24	16296				
backup zone			Mandatory	**Y**		9	8	342	15954				
Option : Ext Auth			Optional	Y				300	15654				
Option : SICAP			Optional	N					15654				
Option : Transport			Optional	Y				100	15554				
Option : OTA			Optional	Y				4500	11054				
Option : proactive			Optional	N					11054				
File names									11054				
MF	3F00	DF	Mandatory	**Y**				46	11008				
EF KEYMAN	0011	Key	Optional	N		8	0		11008				
EF KEYOP	0001	Key	Mandatory	**Y**		8	11	157	10851	NEV	NEV	NEV	NEV
EF CHV	0000		Mandatory	**Y**		8	4	80	10771	NEV	NEV	NEV	NEV
EF INFO	2FFF	Transparent	Optional	Y		31		67	10704	ALW	ADM0	ADM0	ADM0
EF ICCID	2FE2	Transparent	Mandatory	**Y**		10		46	10658	ALW	NEV	ADM0	ADM0
EF ELP	2F05	Transparent	Optional	N		0			10658	ALW	CHV1	ADM2	ADM2
EF ICC	0002	Transparent	Optional	N		15			10658	ALW	ADM0	NEV	NEV
DF GSM	7F20	DF	Mandatory	**Y**				46	10612				
EF LP	6F05	Transparent	Mandatory	**Y**		10		46	10566	ALW	CHV1	ADM2	ADM2
EF IMSI	6F07	Transparent	Mandatory	**Y**		9		45	10521	CHV1	ADM2	CHV1	ADM2
EF KC	6F20	Transparent	Mandatory	**Y**		9		45	10476	CHV1	CHV1	ADM2	ADM2
EF PLMNsel	6F30	Transparent	Optional	**N**		105			10476	CHV1	CHV1	ADM2	ADM2
EF HPLMN	6F31	Transparent	Mandatory	**Y**		1		37	10439	CHV1	ADM2	ADM2	ADM2
EF ACMmax	6F37	Transparent	Optional	**N**		0			10439	CHV1	CHV2	ADM2	ADM2
EF SST	6F38	Transparent	Mandatory	**Y**		8		44	10395	CHV1	ADM2	ADM2	ADM2
EF ACM	6F39	Cyclic	Optional	**N**		3	0		10395	CHV1	CHV2	ADM2	ADM2
EF GID1	6F3E	Transparent	Optional	**Y**		16		52	10343	CHV1	ADM2	ADM2	ADM2
EF GID2	6F3F	Transparent	Optional	**N**		0			10343	CHV1	ADM2	ADM2	ADM2
EF PUCT	6F41	Transparent	Optional	**N**		5			10343	CHV1	CHV2	ADM2	ADM2
EF CBMI	6F45	Transparent	Optional	**Y**		10		56	10287	CHV1	CHV1	ADM2	ADM2
EF SPN	6F46	Transparent	Optional	**N**		17			10287	ALW	ADM2	ADM2	ADM2
EF BCCH	6F74	Transparent	Mandatory	**Y**		16		52	10235	CHV1	CHV1	ADM2	ADM2
EF ACC	6F78	Transparent	Mandatory	**Y**		2		38	10197	CHV1	ADM2	ADM2	ADM2
EF FPLMN	6F7B	Transparent	Mandatory	**Y**		12		48	10149	CHV1	CHV1	ADM2	ADM2
EF LOCI	6F7E	Transparent	Mandatory	**Y**		11		47	10102	CHV1	CHV1	CHV1	ADM2
EF AD	6FAD	Transparent	Mandatory	**Y**		8		44	10058	ALW	ADM2	ADM2	ADM2
EF PHASE	6FAE	Transparent	Mandatory	**Y**		1		37	10021	ALW	ADM2	ADM2	ADM2
EF DCK	6F2C	Transparent	Optional	N		16			10021	CHV1	CHV1	ADM2	ADM2
EF CNL	6F32	Transparent	Optional	N		0			10021	CHV1	ADM2	ADM2	ADM2
EF CBMID	6F48	Transparent	Optional	Y		10		46	9975	CHV1	ADM2	ADM2	ADM2
EF CBMIR	6F50	Transparent	Optional	N		8			9975	CHV1	CHV1	ADM2	ADM2
EF NIA	6F51	Linear	Optional	N	16	1	0		9975	CHV1	ADM2	ADM2	ADM2
EF KcGPRS	6F52	Transparent	Optional	N		9			9975	CHV1	CHV1	ADM2	ADM2
EF LOCIGPRS	6F53	Transparent	Optional	N		14			9975	CHV1	CHV1	ADM2	ADM2
EF SUME	6F54	Transparent	Optional	N		8			9975	ADM2	ADM2	ADM2	ADM2
EF VGCS	6FB1	Transparent	Mandatory	Y		200		236	9739	CHV1	ADM2	ADM2	ADM2
EF VGCSS	6FB2	Transparent	Mandatory	Y		7		43	9696	CHV1	CHV1	ADM2	ADM2
EF VBS	6FB3	Transparent	Mandatory	Y		200		236	9460	CHV1	ADM2	ADM2	ADM2
EF VBSS	6FB4	Transparent	Mandatory	Y		7		43	9417	CHV1	CHV1	ADM2	ADM2
EF EMLPP	6FB5	Transparent	Mandatory	Y		2		38	9379	CHV1	ADM2	ADM2	ADM2
EF AAEM	6FB6	Transparent	Mandatory	Y		1		37	9342	CHV1	CHV1	ADM2	ADM2
EF ECC	6FB7	Transparent	Optional	N		0			9342	ALW	ADM2	ADM2	ADM2
DF SoLSA	5F70	DF	Optional	N					9342				
EF SAI	4F30	Transparent	Optional	N		8			9342	CHV1	ADM2	ADM2	ADM2
EF SLL	4F31	Linear	Optional	N	8	10	4		9342	CHV1	CHV1	ADM2	ADM2
DF TELECOM	7F10	DF	Mandatory	**Y**				46	9296				
EF ADN	6F3A	Linear	Optional	**Y**	14	14	100	2840	6456	CHV1	CHV1	CHV2	CHV2
EF FDN	6F3B	Linear	Optional	**N**	16	14	0		4656	CHV1	CHV2	ADM2	ADM2
EF SMS	6F3C	Linear	Optional	**Y**		176	10	1800	4656	CHV1	CHV1	ADM2	ADM2
EF CCP	6F3D	Linear	Optional	**N**		14	4		4496	CHV1	CHV1	ADM2	ADM2
EF MSISDN	6F40	Linear	Mandatory	**Y**	16	14	4	160	4496	CHV1	CHV1	ADM2	ADM2
EF SMSP	6F42	Linear	Optional	**Y**	16	28	1	84	4412	CHV1	CHV1	ADM2	ADM2

		TYPE	M/O	present	a-tag length	Fixed length	Rec NB	File length	EEPROM space	Read	Update	Rehab	Invalid
EF SMSS	6F43	Transparent	Optional	**Y**		2		38	4374	CHV1	CHV1	ADM2	ADM2
EF LND	6F44	Cyclic	Optional	**N**	16	14	5		4374	CHV1	CHV1	ADM2	ADM2
EF EXT1	6F4A	Linear	Optional	**N**		13	0		4374	CHV1	CHV1	ADM2	ADM2
EF EXT2	6F4B	Linear	Optional	**N**		13	0		4374	CHV1	CHV2	ADM2	ADM2
EF SMSR	6F47	Linear	Optional	N		30	0		4374	CHV1	CHV1	ADM2	ADM2
EF SDN	6F49	Linear	Mandatory	Y	10	14	20	520	3854	CHV1	ADM2	ADM2	ADM2
EF EXT3	6F4C	Linear	Optional	N		13	0		3854	CHV1	ADM2	ADM2	ADM2
EF BDN	6F4D	Linear	Optional	N	16	14	0		3854	CHV1	CHV2	CHV2	CHV2
EF EXT4	6F4E	Linear	Optional	N		13	0		3854	CHV1	CHV2	ADM2	ADM2
DF DCS1800	7F21	DF	Optional	N					3854				
EF Voice msg.	6F11	Transparent	Optional	N		2			3854	CHV1	CHV1	ADM2	ADM2
EF Serv. table	6F12	Linear	Optional	N	16	21	8		3854	CHV1	CHV1	ADM2	ADM2
EF Call fwd.flg.	6F13	Transparent	Optional	N		2			3854	CHV1	CHV1	ADM2	ADM2
EF Oper. name	6F14	Transparent	Optional	N		30			3854	CHV1	ADM2	ADM2	ADM2
EF Custm srv.	6F15	Transparent	Optional	N		18			3854	CHV1	CHV1	ADM2	ADM2
EF CPHS Info	6F16	Transparent	Optional	N		3			3854	CHV1	ADM2	ADM2	ADM2
EF Mailbox nb.	6F17	Linear	Optional	N	16	14	8		3854	CHV1	CHV1	ADM2	ADM2
EF Oper. shtn.	6F18	Transparent	Optional	N		10			3854	CHV1	ADM2	ADM2	ADM2
EF Info. nb.	6F19	Linear	Optional	N	16	5	20		3854	CHV1	CHV1	ADM2	ADM2
DF OTA	7F40	DF	Optional	Y				46	3808				
EF key	1100	Key	Optional	Y		8	2	58	3750	NEV	NEV	NEV	NEV
EF script	6FD1	Transparent	Optional	Y		512		548	3202	CHV1	ADM2	ADM2	ADM2
EF Compt	6FD2	Linear	Optional	Y	0	5	1	45	3157	CHV1	ADM2	ADM2	ADM2
EF Message	6FD3	Transparent	Optional	Y		30		66	3091	CHV1	ADM2	ADM2	ADM2
DF EIRENE	7FE0	DF	Mandatory	Y				46	3045				
EF FN	6FF1	Linear	Mandatory	Y	0	9	36	364	2681	CHV1	CHV1	ADM1	ADM1
EF CallconfC	6FF2	Transparent	Mandatory	Y		24		60	2621	CHV1	**CHV1**	ADM1	ADM1
EF Callconf_I	6FF3	Linear	Mandatory	Y	0	21	10	250	2371	CHV1	CHV1	ADM1	ADM1
EF Shunting	6FF4	Transparent	Mandatory	Y		8		44	2327	CHV1	ADM1	ADM1	ADM1
EF GsmrPLMN	6FF5	Linear	Mandatory	Y	0	9	30	310	2017	CHV1	ADM1	ADM1	ADM1
EF NW	6F80	Linear	Mandatory	Y	0	10	30	340	1677	CHV1	ADM1	ADM1	ADM1
EF 5to8digits	6F81	Transparent	Mandatory	Y	0	4		40	1637	CHV1	ADM1	ADM1	ADM1
EF 2digits	6F82	Transparent	Mandatory	Y	0	4		40	1597	CHV1	ADM1	ADM1	ADM1
EF 8digits	6F83	Transparent	Mandatory	Y	0	4		40	1557	CHV1	ADM1	ADM1	ADM1
EF 9digits	6F84	Transparent	Mandatory	Y	0	4		40	1517	CHV1	ADM1	ADM1	ADM1
EF SSSS	6F85	Transparent	Mandatory	Y	0	4		40	1477	CHV1	ADM1	ADM1	ADM1
EF LLLL	6F86	Transparent	Mandatory	Y	0	4		40	1437	CHV1	ADM1	ADM1	ADM1
EF FreeNumber	6F87	Transparent	Mandatory	Y	0	4		40	1397	CHV1	ADM1	ADM1	ADM1
EF FC	6F88	Linear	Mandatory	Y	0	3	101	343	1054	CHV1	ADM1	ADM1	ADM1
EF Service	6F89	Linear	Mandatory	Y	0	3	3	49	1005	CHV1	ADM1	ADM1	ADM1
EF Call	6F8A	Linear	Mandatory	Y	0	3	6	58	947	CHV1	ADM1	ADM1	ADM1
EF FctTeam	6F8B	Linear	Mandatory	Y	0	3	10	70	877	CHV1	ADM1	ADM1	ADM1
EF Gateway	6F8C	Linear	Mandatory	Y	0	3	3	61	816	CHV1	ADM1	ADM1	ADM1
EF IC	6F8D	Linear	Mandatory	Y	0	7	30	250	566	CHV1	ADM1	ADM1	ADM1
EF CT	6F8E	Linear	Mandatory	Y	0	6	10	100	466	CHV1	ADM1	ADM1	ADM1
EF SC	6F8F	Linear	Mandatory	Y	0	6	5	70	396	CHV1	ADM1	ADM1	ADM1
EF Location	6F91	Transparent	Mandatory	Y	0	4		40	356	CHV1	ADM1	ADM1	ADM1
EF Controller	6F92	Linear	Mandatory	Y	0	3	4	52	304	CHV1	ADM1	ADM1	ADM1

3. EXAMPLE : EF_{IC}, EF_{NW} & $EF_{GSMRPLMN}$ PERSONALISATION

The following table is aimed at showing a "possible" example of SIM Card personalisation for EFIC, EFNW & EFGSMRPLMN .

In the example:

1. the first record of each EF contains HPLMN information;

2. records 2nd to 8th of each EF are reserved for other GSM-R networks;

3. records 9th to 10th of each EF are reserved for Italian public GSM networks (not EIRENE networks).

	EFIC:	EFNW:	EFGSMRPLMN:
1	F0 6F 8E 30 F9 00 01	47 53 4D 52 20 49 54 FF; "GSMR IT"	22 F2 03 F8 6F 8D 6F 8E 01
2	F0 6F 8E 40 F1 00 02	47 53 4D 52 20 43 48 FF; "GSMR CH"	22 F8 60 F9 6F 8D 6F 8E 02
3	F0 6F 8E 40 F9 00 03	47 53 4D 52 20 47 45 52; "GSMR GER"	62 F2 01 F9 6F 8D 6F 8E 03
4	F0 6F 8E 30 F1 00 04	47 53 4D 52 20 4E 4C FF; "GSMR NL"	02 F4 12 F9 6F 8D 6F 8E 04
5	F0 6F 8E 30 F2 00 05	47 53 4D 52 20 42 45 4C; "GSMR BEL"	02 F6 10 F9 6F 8D 6F 8E 05
6	F0 6F 8E 40 F6 00 06	47 53 4D 52 20 53 57 45;"GSMR SWE"	42 F0 12 F9 6F 8D 6F 8E 06
7	…	…	…
8			
9	F0 6F 8E 30 F9 00 09	49 2D 54 49 4D FF FF FF; "I-TIM"	22 F2 10 62 6F 8D 6F 8E 09
10	F0 6F 8E 30 F9 00 0A	56 6F 64 61 66 6F 6E 65; "Vodafone"	22 F2 01 63 6F 8D 6F 8E 10
11 …	FF…FF …	FF…FF …	FF…FF …