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Characteristics of the IP Multimedia Services Identity Module (ISIM) application
(3GPP TS 31.103 version 14.6.0 Release 14)

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Contents

Foreword

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Introduction

The present document defines the IM Services Identity Module (ISIM) application. This application resides on the UICC, an IC card specified in TS 31.101 [3]. In particular, TS 31.101 [3] specifies the application independent properties of the UICC/terminal interface such as the physical characteristics and the logical structure.

TS 31.101 [3] is one of the core documents for this specification and is therefore referenced in many places in the present document.

1 Scope

The present document defines the ISIM application for access to IMS services.

The present document specifies:

- specific command parameters;
- file structures;
- contents of EFs (Elementary Files);
- security functions;
- application protocol to be used on the interface between UICC (ISIM) and Terminal.

This is to ensure interoperability between an ISIM and Terminal independently of the respective manufacturer, card issuer or operator.

The present document does not define any aspects related to the administrative management phase of the ISIM. Any internal technical realisation of either the ISIM or the Terminal is only specified where these are reflected over the interface. The present document does not specify any of the security algorithms that may be used.

2 References

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

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 21.111: "USIM and IC Card Requirements".

[2] 3GPP TS 31.102: "Characteristics of the USIM Application".

[3] 3GPP TS 31.101: "UICC-Terminal Interface, Physical and Logical Characteristics".

[4] 3GPP TS 33.102: "3G Security; Security Architecture".

[5] 3GPP TS 33.103: "3G Security; Integration Guidelines".

[6] ISO/IEC 7816-4: "Identification cards - Integrated circuit cards,Part 4: Organization, security and commands for interchange".

[7] Void.

[8] Void.

[9] 3GPP TS 23.003: "Numbering, Addressing and Identification".

[10] Void.

[11] Void.

[12] 3GPP TS 25.101: "UE Radio Transmission and Reception (FDD)".

[13] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2".

[14] 3GPP TS 33.203: "3G security; Access security for IP-based services".

[15] 3GPP TS 24.228: "Signalling flows for the IP multimedia call control based on SIP and SDP; Stage 3".

[16] IETF RFC 3261: "SIP: Session Initiation Protocol".

[17] 3GPP TS 23.038: "Alphabets and language-specific information".

[18] Void

[19] 3GPP TS 51.011 Release 4: "Specification of the Subscriber Identity Module - Mobile Equipment (SIM-ME) interface".

[20] ISO/IEC 8825-1 (2008): "Information technology – ASN.1 encoding rules : Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)".

[21] 3GPP TS 22.101: "Service aspects; Service principles".

[22] Void.

[23] ETSI TS 101 220: "Smart cards; ETSI numbering system for telecommunication application providers".

[24] IETF RFC 2486: "The Network Access Identifier".

[25] 3GPP TS 33.220: "Generic Authentication Architecture (GAA); Generic bootstrapping architecture".

[26] IETF RFC 2617: "HTTP Authentication: Basic and Digest Access Authentication". (http://www.ietf.org/rfc/rfc2617.txt)

[27] IETF RFC 3629 (2003): "UTF-8, a transformation format of ISO 10646".

[28] 3GPP TS 33.110: "Key establishment between a Universal Integrated Circuit Card (UICC) and a terminal".

[29] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS)".

[30] 3GPP TS 24.011: "Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface".

[31] 3GPP TS 31.111: "USIM Application Toolkit (USAT)".

[32] 3GPP TS 24.229: "IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3".

[33] Void.

[34] 3GPP TS 24.607: "Originating Identification Presentation (OIP) and Originating Identification Restriction (OIR) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".

[35] 3GPP TS 24.167: "3GPP IMS Management Object (MO); Stage 3".

[36] 3GPP TS 24.341: "Support of SMS over IP networks; Stage 3".

[37] OMA-DDS-DM_ConnMO_3GPPPS-V1_0-20081024-A: " Standardized Connectivity Management Objects 3GPP Packet Switched Bearer Paramaters".

[38] OMA-DDS-DM_ConnMO-V1_0-20081107-A: " Standardized Connectivity Management Objects".

[39] 3GPP TS 24.424: "Management Object (MO) for Extensible Markup Language (XML) Configuration Access Protocol (XCAP) over the Ut interface for Manipulating Supplementary Services (SS)".

[40] 3GPP TS 24.623: "Extensible Markup Language (XML) Configuration Access Protocol (XCAP) over the Ut interface for Manipulating Supplementary Services".

[41] OMA OMA-TS-XDM_MO-V1_1-20080627-A: "OMA Management Object for XML Document Management".

[42] 3GPP TS 23.379: "Functional architecture and information flows to support Mission Critical Push To Talk (MCPTT)".

3 Definitions, symbols, abbreviations and coding conventions

3.1 Definitions

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

ISIM: application residing on the UICC, an IC card specified in TS 31.101 [3]
In particular, TS 31.101 [3] specifies the application independent properties of the UICC/terminal interface such as the physical characteristics and the logical structure

The AID of ISIM is defined in ETSI TS 101 220 [23] and is stored in EF_{DIR}.

ADM: access condition to an EF which is under the control of the authority which creates this file

3.2 Symbols

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

||	Concatenation
⊕	Exclusive or
f1	Message authentication function used to compute MAC
f1*	A message authentication code (MAC) function with the property that no valuable information can be inferred from the function values of f1* about those of f1, ... , f5 and vice versa
f2	Message authentication function used to compute RES and XRES
f3	Key generating function used to compute CK
f4	Key generating function used to compute IK
f5	Key generating function used to compute AK

3.3 Abbreviations

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

3GPP	3rd Generation Partnership Project
AC	Access Condition
ADF	Application Dedicated File
AID	Application IDentifier
AK	Anonymity Key
AKA	Authentication and Key Agreement
ALW	ALWays
AMF	Authentication Management Field
ASN.1	Abstract Syntax Notation One
AuC	Authentication Centre
AUTN	AUthentication TokeN
BER-TLV	Basic Encoding Rule - TLV
B-TID	Bootstrapping Transaction IDentifier
CK	Cipher Key
DF	Dedicated File
EF	Elementary File
FFS	For Further Study

FQDN	Fully Qualified Domain Name
HE	Home Environment
HN	Home Network
IARI	IMS Application Reference Identifier
ICC	Integrated Circuit Card
ID	IDentifier
IK	Integrity Key
IM	IP Multimedia
IMPI	IM Private Identity
IMPU	IM PUblic identity
IMS	IP Multimedia Subsystem
ISIM	IM Services Identity Module
K	long-term secret Key shared between the ISIM and the AuC
KSI	Key Set Identifier
LI	Language Indication
LSB	Least Significant Bit
MAC	Message Authentication Code
MCPTT	Mission Critical Push To Talk
MF	Master File
MSB	Most Significant Bit
NAI	Network Access Identifier
NEV	NEVer
PIN	Personal Identification Number
PL	Preferred Languages
PS_DO	PIN Status Data Object
RAND	RANDom challenge
RES	user RESponse
RFU	Reserved for Future Use
RST	ReSeT
SDP	Session Description Protocol
SFI	Short EF Identifier
SIP	Session Initiation Protocol
SQN	SeQuence Number
SW	Status Word
TLV	Tag Length Value
UE	User Equipment
XRES	eXpected user RESponse

3.4 Coding Conventions

The following coding conventions apply to the present document.

All lengths are presented in bytes, unless otherwise stated. Each byte is represented by bits b8 to b1, where b8 is the most significant bit (MSB) and b1 is the least significant bit (LSB). In each representation, the leftmost bit is the MSB.

The coding of Data Objects in the present document is according to TS 31.101 [3].

'XX':	Single quotes indicate hexadecimal values. Valid elements for hexadecimal values are the numbers '0' to '9' and 'A' to 'F'.

4 Files

This clause specifies the EFs for the IMS session defining access conditions, data items and coding. A data item is a part of an EF which represents a complete logical entity.

For an overview containing all files see figure 4.1.

4.1 Contents of the EFs at the MF level

There are four EFs at the Master File (MF) level. These EFs are specified in TS 31.101 [3].

4.2 Contents of files at the ISIM ADF (Application DF) level

The EFs in the ISIM ADF contain service and network related information and are required for UE to operate in an IP Multimedia Subsystem.

The File IDs '6F1X' (for EFs), '5F1X' and '5F2X' (for DFs) with X ranging from '0' to 'F' are reserved under the ISIM ADF for administrative use by the card issuer.

4.2.1 Void

4.2.2 EF_{IMPI} (IMS private user identity)

This EF contains the private user identity of the user.

Identifier: '6F02'	Structure: transparent	Mandatory
SFI: '02'		
File size: X bytes	Update activity: low	

Access Conditions:

READ	PIN
UPDATE	ADM
DEACTIVATE	ADM
ACTIVATE	ADM

Bytes	Description	M/O	Length
1 to X	NAI TLV data object	M	X bytes

- NAI

  Contents:

  - Private user identity of the user.

  Coding:

  - For contents and syntax of NAI TLV data object values see IETF RFC 2486 [24]. The NAI shall be encoded to an octet string according to UTF-8 encoding rules as specified in IETF RFC 3629 [27]. The tag value of the NAI TLV data object shall be '80'.

4.2.3 EF_{DOMAIN} (Home Network Domain Name)

This EF contains the home operator's network domain name.

Identifier: '6F03'	Structure: transparent	Mandatory
SFI: '05'		
File size: X bytes	Update activity: low	

Access Conditions:

READ	PIN
UPDATE	ADM
DEACTIVATE	ADM
ACTIVATE	ADM

Bytes	Description	M/O	Length
1 to X	Home Network Domain Name TLV data object	M	X bytes

- URI

  Contents:

  - Home Network Domain Name.

Coding:

- For contents and syntax of Home Network Domain Name TLV data object values see TS 23.003 [9]. The Home Network Domain Name, i.e. FQDN shall be encoded to an octet string according to UTF-8 encoding rules as specified in IETF RFC 3629 [27]. The tag value of the Home Network Domain Name TLV data object shall be '80'.

4.2.4 EF_{IMPU} (IMS public user identity)

This EF contains one or more records, with each record able to hold a public SIP Identity (SIP URI) of the user. The first (or only) record in the EF shall be used when performing emergency registration; oras the default SIP Identity in case that no record is explicitly selected either in the current session or as a carryover from a prior session.

Identifier: '6F04'	Structure: linear fixed	Mandatory
SFI: '04'		
Record length: X bytes	Update activity: low	

Access Conditions:

READ	PIN
UPDATE	ADM
DEACTIVATE	ADM
ACTIVATE	ADM

Bytes	Description	M/O	Length
1 to X	URI TLV data object	M	X bytes

- URI

Contents:

- SIP URI by which other parties know the subscriber.

Coding:

- For contents and syntax of URI TLV data object values see IETF RFC 3261 [16]. The URI shall be encoded to an octet string according to UTF-8 encoding rules as specified in IETF RFC 3629 [27]. The tag value of the URI TLV data object shall be '80'.

4.2.5 EF_{AD} (Administrative Data)

This EF contains information concerning the mode of operation according to the type of ISIM, such as normal (to be used by IMS subscribers for IMS operations), type approval (to allow specific use of the Terminal during type approval procedures of e.g. the network equipment), manufacturer specific (to allow the Terminal manufacturer to perform specific proprietary auto-test in its Terminal during e.g. maintenance phases).

It also provides an indication of whether some Terminal features should be activated during normal operation.

Identifier: '6FAD'	Structure: transparent	Mandatory
SFI: '03'		
File size: 3+X bytes	Update activity: low	

Access Conditions:

READ	ALW
UPDATE	ADM
DEACTIVATE	ADM
ACTIVATE	ADM

Bytes	Description	M/O	Length
1	UE operation mode	M	1 byte
2 to 3	Additional information	M	2 bytes
4 to 3+X	RFU	O	X bytes

- UE operation mode:

Contents:

- mode of operation for the UE

Coding:

- Initial value
  - '00' normal operation.
  - '80' type approval operations.
  - '01' normal operation + specific facilities.
  - '81' type approval operations + specific facilities.
  - '02' maintenance (off line).

- Additional information:

Coding:

- specific facilities (if b1=1 in byte 1);

Bytes 2 and 3 (first byte of additional information):

b8	b7	b6	b5	b4	b3	b2	b1	
								RFU (see TS 31.101)

4.2.6 EF$_{ARR}$ (Access Rule Reference)

This EF contains the access rules for files located under the ISIM ADF in the UICC. If the security attribute tag '8B' is indicated in the FCP it contains a reference to a record in this file.

Structure of EF$_{ARR}$ at ADF-level

Identifier: '6F06'	Structure: Linear fixed	Mandatory
SFI: '06'		
Record Length: X bytes	Update activity: low	

Access Conditions:

READ	ALW
UPDATE	ADM
DEACTIVATE	ADM
ACTIVATE	ADM

Bytes	Description	M/O	Length
1 to X	Access Rule TLV data objects	M	X bytes

This EF contains one or more records containing access rule information according to the reference to expanded format as defined in ISO/IEC 7816-4 [6]. Each record represents an access rule. Unused bytes in the record are set to 'FF'.

If the card cannot access EF$_{ARR}$, any attempt to access a file with access rules indicated in this EF$_{ARR}$ shall not be granted.