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

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

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

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Introduction

Work on Machine-to-Machine (M2M) applications has given rise to the possibility of having a UICC that is embedded in a communication device in such a way that the UICC is not easily accessible or replaceable. The ability to change network subscriptions on such devices becomes problematic, thus necessitating new methods for securely and remotely provisioning access credentials on these Embedded UICCs (eUICC) and managing subscription changes from one MNO to another.

In its current state, the present document is to be considered as a "work in progress". It contains a restricted set of requirements related to the provisioning of profiles in an eUICC as well as general requirements on the architecture of the eUICC. As a consequence, some of the elements required to specify a complete technical solution are missing, among which are requirements for:

- management of profiles;

- management of credentials;
- the policy control function;

which will be defined in further versions of the present document.

1 Scope

The present document defines the use cases and requirements for an embedded UICC.

2 References

2.1 Normative references

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- In the case of a reference to a TC SCP document, a non-specific reference implicitly refers to the latest version of that document in the same Release as the present document.

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The following referenced documents are necessary for the application of the present document.

[1] ETSI TS 102 221: "Smart Cards; UICC-Terminal interface; Physical and logical characteristics".

[2] ETSI TS 102 671: "Smart Cards; Machine to Machine UICC; Physical and logical characteristics".

[3] Void.

[4] ETSI TS 102 241: "Smart Cards; UICC Application Programming Interface (UICC API) for Java Card (TM)".

2.2 Informative references

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] Recommendation ITU-T E.212: "The international identification plan for public networks and subscriptions".

[i.2] ETSI TR 102 216: "Smart cards; Vocabulary for Smart Card Platform specifications".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ETSI TR 102 216 [i.2] and the following apply:

Attribute (of a Profile): indication that a Profile delivers some specific functions; the knowledge of attributes offered by Profiles could be used by any authorized entity accessing the eUICC (terminal, server, etc.) to determine a particular behaviour

Embedded UICC: UICC which is not easily accessible or replaceable, is not intended to be removed or replaced in the terminal, and enables the secure changing of subscriptions

Enabled Profile: Profile, the files and/or applications (e.g. NAA) of which are selectable over the UICC-Terminal interface

eUICC Management Credentials: credentials used to verify the authorization for the establishment of Profile Management Credentials and Profile Provisioning Credentials

eUICC Supplier: supplier of the eUICC modules and resident software (such as firmware and operating system)

Mobile Network Operator (MNO): entity providing communication services to its customers through mobile networks

Network Access Application (NAA): application residing on an eUICC that provides authorization to access a network

EXAMPLE: A USIM application.

NOTE: Copied from ETSI TR 102 216 [i.2], to be deleted when the current document is finalized.

Network Access Credentials (NAC): data required to authenticate to an ITU E.212 [i.1] Network

NOTE: Network Access Credentials may include data such as Ki/K, and IMSI stored within a NAA.

Operational Attribute: indication that a Profile, containing network access applications and associated network access credentials, is associated to an Operational Subscription

Operational Subscription: subscription that enables a device to access an ITU E.212 [i.1] network for the purpose of accessing telecommunication and related services

Policy: principles reflected in a set of rules that govern the behaviour of an eUICC and/or entities involved in the remote management of the eUICC

Policy Control Function: function that defines, updates or removes Policy Rules to implement a Policy

Policy Enforcement Function: function that executes Policy Rules to implement a Policy

Policy Rule: defines the actions required to implement a Policy and the conditions under which they are executed

eUICC Policy Control Credentials: credentials used for authorization and authentication for the establishment and update of the Policy Rules defined on the eUICC outside Profiles

NOTE: This definition might be refined according to the decision about the need to have Policy Rules defined inside and/or outside Profiles.

Profile: combination of a file structure, data and applications to be provisioned onto, or present on, an eUICC

Profile Access Credentials: data required to exist within a Profile so that secured communication can be set up between an external entity and the eUICC in order to manage that Profile's structure and its data (e.g. operator OTA keys)

Profile Container: logical container for a Profile on an eUICC providing security services, enabling separation of Profiles and providing secure communication

Profile Container Initialization: process of preparing a Profile Container so that it is ready for Profile Loading and Installation

Profile Loading: transfer of a Profile from a Profile Provisioning Credentials holder into the eUICC so that it is ready for installation

Profile Transport: transfer of a cryptographically protected Profile from a Profile Management Credential holder to the eUICC

Profile Installation: process of allocating resources and registering parameters for a Profile to bring it to a state where it can be enabled

Profile Provisioning Credentials: data required to exist within an eUICC so that a Profile downloaded from an external entity can be decrypted and installed on the eUICC

Profile Management Credentials: data required to exist within an eUICC so that a secured communication can be set up between an external entity and the eUICC in order to manage the Profiles on the eUICC

Profile Management Operations: consists of Profile Transport, Profile deletion, Profile enabling, and Profile disabling

Provisioning: container creation and initialization, loading, and installation of a Profile into an eUICC

Provisioning Attribute: indication that a Profile, containing network access applications and associated network access credentials, is associated with the Provisioning Subscription

Provisioning Subscription: subscription, with its associated Profile, that enables a device to access a mobile network for the purpose of management of Profiles on the eUICC

Subscriber: entity that has a subscription with a telecommunications service provider

Subscription: commercial relationship for the supply of services between the Subscriber and Telecommunications Service Provider

Subscription Manager: combination of the functions of the SM-SR and the SM-DP

Subscription Manager - Data Preparation (SM-DP): role that prepares Profiles to be securely provisioned on the eUICC e.g. encryption of Profile

NOTE 1: Also known as Profile Provisioning Credentials holder.

NOTE 2: "securely" is felt to relate to requirements captured in an appropriate section of the present document. The term "securely" may be removed from this definition once those requirements are specified.

Subscription Manager - Secure Routing (SM-SR): role that securely performs functions which directly manage the Profiles on the eUICC

NOTE: "securely" is felt to relate to requirements captured in an appropriate section of the present document. The term "securely" may be removed from this definition once those requirements are specified.

Telecommunications Service Provider: MNO, or party trusted by the MNO acting on behalf of the MNO, which provides services to the subscriber

3.1a Definitions for further study

Definitions are required for the following terms:

- **Initialized State:**

NOTE: This definition is required. Best proposal so far: "refers to the state the eUICC is in when a Profile with the Provisioning Attribute is either not active or not present, and the eUICC is only accessible for the purpose of management of operational Profiles".

3.2 Abbreviations

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

ATR	Answer To Reset
CAT	Card Application Toolkit
CSIM	CDMA Subscriber Identity Module
eUICC	embedded UICC
FFS	For Further Study
IMSI	International Mobile Subscriber Identity
ISIM	IM Services Identity Module
M2M	Machine to Machine (communication)
MF	Master File
MNO	Mobile Network Operator
NAA	Network Access Application
NAC	Network Access Credentials
OEM	Original Equipment Manufacturer
OTA	Over-The-Air
PCF	Policy Control Function
PIN	Personal Identification Number
PMC	Profile Management Credentials
PUK	PIN Unblocking Key
RAM	Remote Application Management
RFM	Remote File Management
SD	Security Domain
SIM	Subscriber Identity Module
SM	Subscription Manager
SM-DP	Subscription Manager - Data Preparation
SM-SR	Subscription Manager - Secure Routing
SP	Service Provider
TBD	To Be Defined
USIM	Universal Subscriber Identity Module

4 Abstract (informative)

The present document enables remote management of an embedded UICC (eUICC) for purposes of changing an MNO subscription without requiring a physical removal and replacement of the UICC in the end Device.

The present document develops use cases and requirements for the "enhanced, remote management" of a UICC, which is embedded in a communication device, i.e. where the UICC is not intended to be removed. This type of embedded UICC (eUICC) is compatible with Machine-to-Machine (M2M) applications. The eUICC may be embedded at the manufacturing site in advance, depending on the country and network operator, and is compatible for use in a variety of end-user equipment. In these scenarios there may be a requirement to remotely change a subscription easily, similar to what is currently achieved by physically changing the UICC.

The purpose for defining these requirements is to provide ease of use and deployment benefits for end users/consumers and thereby stimulate the M2M sector. A further intent is to enable the creation of common standards and processes for remote management of profiles on an eUICC, such that interoperability is ensured.

It is noted that new business models and usage scenarios, primarily driven by M2M, struggle when supported by the traditional UICC/SIM card. For example:

- By installing a physical UICC, the user is connected to a specific network, as the card only provides access to one network. Should the user wish to (or need to) use another network, then they or the M2M Service Provider has to fit another card in the user's device.
- Changing a UICC may be problematic since that M2M equipment may be remotely located and/or hermetically sealed. It should be noted that where the UICC is not intended to be sealed and inaccessible, the portability of traditional form factor UICC cards is perceived to be a user benefit.
- Non-standard provisioning and re-provisioning methods are being defined and used. These present security implications and a risk of fragmentation within the industry.