Generic eUICC Test Profile for Device Testing
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1 Introduction

1.1 Overview

The introduction of Devices with non-removable UICCs presents a need to review best practice for testing. System simulator-based Device testing for industry certification schemes such as GCF and PTCRB has traditionally expected the necessary Test Profiles to be made available via removable test UICCs.

As the industry moves towards widespread usage of eUICCs, testing of Devices fitted with eUICCs becomes less clear. The opportunity therefore exists to normalise the way in which Test Profiles for eUICCs will be available, and configurable, for industry standardised testing.

The Generic Test Profile described in this document is the result of an interest group of the test industry, Device manufacturers and network operators.

- It is designed to work only on defined test networks, aligned to specific technologies and their associated test specifications, as referenced by global industry certification schemes;

- It has been developed with the intention that it be an included Test Profile in eUICCs.

Whilst the Generic Test Profile is expected to be the default Test Profile on eUICCs, it does not preclude the existence of other Test Profiles for purposes outside the scope of this document.

The persistent inclusion of the Test Profile in eUICCs removes the need for:

- specific test hardware or test eUICCs,
- specific test platforms with proprietary virtual server,
- bypassing the eUICC, or modifying device hardware to enable conformance testing.

1.2 Scope

This document addresses the necessary definitions, preconditions and processes around the Generic Test Profile in the scope of testing and certification of a Device, for example preconditions for radio frequency and protocol testing defined by 3GPP specifications. This document is compliant to 3GPP 31.102 [16].

This document addresses testing of Devices incorporating eUICCs that support remote SIM provisioning as specified by the GSMA for M2M [2] and Consumer Devices [5]. Testing of the eUICC and remote SIM provisioning functionality is out of scope.

Note: Version 2.0 supports 5G SA and V2X configurations for the eSIM, and also supports SIMAlliance 2.1[11] and 2.3[13].

This document is intended for:

- parties that develop test tools and platforms;
- manufacturers (Device and eUICC);
- Mobile Network operators.

The different testing use cases are described in section **Error! Reference source not found.** o f this document. In addition:

- Section 3 – provides a general description of the whole testing process
- Section 4 – details modifications required for the actual testing
- Section 5 – describes the Generic Test Profile content

1.3 Definitions

Term	Description
Consumer Device	A Device embedding an eUICC as defined in RSP specifications for Consumer Devices SGP.21 [4] and SGP.22 [5].
Device	User equipment used in conjunction with an eUICC to connect to a mobile network. E.g. a tablet, wearable, smartphone or handset.
eUICC	A removable or non-removable UICC which enables the remote and/or local management of Profiles in a secure way. NOTE: The term originates from "embedded UICC".
Generic Test Profile	An eUICC Profile to enable Device testing as defined in 3GPP and other standards as listed in Annex E of this document.
M2M Device	A Device embedding an M2M eUICC as defined in SGP.01 [1] and SGP.02 [2].
Operational Profile	A combination of Operator data and applications to be provisioned on an eUICC for the purposes of providing services by the Operator. The Profile SHALL be in support of a Subscription with the relevant Operator and allow connectivity to a mobile network. Applications MAY be included to provide non-telecommunication services.
Profile	A combination of data and applications to be provisioned on an eUICC for the purpose of providing services.
Profile Metadata	Information pertaining to a Profile used for the purpose of Local Profile Management.
Remote SIM Provisioning	The downloading, installing, enabling, disabling, and deleting of a Profile on an eUICC as defined in GSMA specifications SGP.01 [1], SGP.02 [2], SGP.21 [4], SGP.22 [5]
Test Profile	A combination of data and applications to be provisioned on an eUICC to provide connectivity to test equipment for the purpose of testing the Device with the eUICC. A test profile is not intended to store any Operator Credentials.

1.4 Abbreviations

Term	Description
AID	Application Identifier
APDU	Application Protocol Data Unit
AT	Attention; this two-character abbreviation is used to start a command line to be sent from Terminal Equipment to Terminal Adaptor
CCID	Chip Card Interface Device
CSIM	CDMA Subscriber Identity Module

Term	Description
DUT	Device Under Test
EF	Elementary File
ETSI	European Telecommunications Standards Institute
FFS	For Future Study
GCF	Global Certification Forum
ISIM	IMS Subscriber Identity Module
M2M	Machine to Machine
NAA	Network Access Application
NIST	National Institute of Standards and Technology
OTA	Over The Air
PRD	Permanent Reference Document
PTCRB	Operator Certification Group in the USA
RAM	Remote Application Management
RFM	Remote File Management
RSP	Remote SIM Provisioning
SIM	Subscriber Identity Module
USAT	USIM Application Toolkit
USIM	Universal Subscriber Identity Module

1.5 References

Ref	Doc Number	Title
[1]	SGP.01	GSMA “Embedded SIM Remote Provisioning Architecture” V4.0 or later
[2]	SGP.02	GSMA "Remote Provisioning of Embedded UICC Technical specification" V4.0 or later
[3]	SGP.11	GSMA Remote Provisioning Architecture for Embedded UICC Test Specification v3.1 or later
[4]	SGP.21	GSMA RSP Architecture v2.1 or later
[5]	SGP.22	RSP Technical Specification v2.1 or later
[6]	SGP.23	RSP Test Specification v1.4 or later
[7]	GPC Amd. B	GlobalPlatform Card Specification v.2.2 Amendment B: Remote Application Management over HTTP v1.1.3
[8]	3GPP 27.007	Technical Specification Group Core Network and Terminals; AT command set for User Equipment (UE); Release 9
[9]	TS.11	Device Field and Lab Test Guidelines v30.0 or later
[10]	SGP.26	RSP Test Certificate Description v 1.2 or later
[11]	SA-PP-IF v2.1	eUICC Profile Package: Interoperable Format Technical Specification v2.1
[12]	SA-PP-IF v2.2	eUICC Profile Package: Interoperable Format Technical Specification v2.2

Ref	Doc Number	Title
[13]	SA-PP-IF v2.3	eUICC Profile Package: Interoperable Format Technical Specification v2.3
[14]	ETSI TS 102 225	Secured packet structure for UICC based applications; Release 12
[15]	ETSI TS 102 226	Remote APDU structure for UICC based applications; Release 9
[16]	3GPP 31.102	Characteristics of the Universal Subscriber Identity Module (USIM) application Release 16

1.6 Conventions

Throughout this document, normative requirements are highlighted by use of key words as described below.

The key words "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "MAY" in this document are to be interpreted as follows:

SHALL - This word, or the term "REQUIRED", mean that the definition is a mandatory requirement of the specification.

SHALL NOT - This phrase means that the definition is a mandatory prohibition of the specification.

SHOULD - This word, or the adjective “RECOMMENDED”, means that there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.

SHOULD NOT - This phrase, or the phrase “NOT RECOMMENDED”, means that there may exist valid reasons in particular circumstances when the particular behaviour is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behaviour described with this label.

MAY - This word mean that an item is truly optional. One supplier may choose to include the item because a particular marketplace requires it or because the supplier feels that it enhances the product while another supplier may omit the same item.

2 Use Cases

The following use cases have been identified for the Generic Test Profile:

a) Product Development Conformance Testing, including Certification.
b) Production line sampling and testing
c) After Sales testing

3 Testing Approach and Overall Process

This Generic Test Profile has been specified to be fully compatible with the GSMA Embedded SIM specification for both M2M and Consumer Devices as defined in GSMA PRDs SGP.01 [1] and SGP.02 [2] for M2M and SGP.21 [4] and SGP.22 [5] for Consumer Devices.

3.1 Generic Test Profile Concept

The Generic Test Profile has been developed to fulfil requirements for the execution of Device tests defined by standardization organizations and included in industry certification schemes GCF and PTCRB, as per Use Case a) in section **Error! Reference source not found.**.

In order to facilitate an efficient and cost-effective testability solution for all use cases defined in section 2, it is RECOMMENDED that:

- the Generic Test Profile, and the associated Test Certificate as defined in Annex D, is pre-loaded on all eUICCs, during the manufacturing process.
- the presence of Generic Test Profile is persistent.
- the Generic Test Profile SHALL NOT be deleted from the eUICC on a permanent basis. This is important to ensure compliance with the needs of testing section 2 Use Case C (After Sales testing), considering that a faulty Device may not be capable of establishing a connection to an external service to download the Profile.

Annex D describes scenarios where it may be necessary to remove and restore the Generic Test Profile. For example, to carry out testing of specific features on the Device which do not require the permanent presence of the Generic Test Profile.

The Generic Test Profile SHALL also support testing covered by section Use Cases b) and c).

3.2 Testing Preparation

For the execution of the tests in scope of this work, the following approach has been considered:

Before a Device test starts, the Generic Test Profile SHALL be present on the DUT.

The Tester/Test equipment SHALL activate (enable) the Generic Test Profile (see section 3.3) before executing the test case and, if necessary, configure the Generic Test Profile using one or a combination of the methods defined in section 4.

It SHALL be possible to switch back to the Operational Profile after test case execution, see section 3.3. The Generic Test Profile SHALL remain active until specifically reset back to original Profile. A power cycle of the DUT SHALL keep the Generic Test Profile active.

If a Test Applet is used for Test Profile Modification (see also section 4.3), it SHALL be loaded before commencing testing. The additional capabilities necessary for USIM and USAT conformance testing may be provided by a Test Applet.

3.3 Enabling and Disabling of the Generic Test Profile

Refer to GSMA PRD specifications SGP.02 [2] for M2M and SGP.22 [5] for Consumer Devices for details on enabling and disabling test profiles, also applicable to the Generic Test Profile.

If the enabling and disabling of the Generic Test Profile is not supported as defined in the above specifications, it is the responsibility of the manufacturer to provide an alternative method for performing 3GPP Device testing when connected to a system simulator.

4 Test Profile Modification

Where required by a Device test specification, one of the following methods or combinations SHOULD be used to modify the Generic Test Profile. Each method for Profile modification SHALL provide a way to return to original (default) status.

4.1 RFM/RAM

The DUT SHALL support an OTA interface as defined in GSMA PRDs SGP.02 [2] and SGP.22 [5] (ES6 interface). This interface MAY be used to modify Generic Test Profile content by using standardized RFM/RAM commands as defined in ETSI 102 225 [14], ETSI 102 226 [15] and GlobalPlatform Amd. B [7].

4.2 AT Commands

AT commands MAY be sent over a USB interface to update the Generic Test Profile.

AT+CSIM command defined in 3GPP 27.007 [8] section 8.17 and AT+CRSM commands defined in section 8.18 can be used for selecting EFs and updating the files with given data.

Note: Currently the usage of AT commends is not standardized and mandated in 3GPP specifications.

4.3 Test Applet

A Test Applet could be defined and used in combination with any Profile modification methods to update the Generic Test Profile.

Use of the Test Applet along with EF-TEST can simplify the method of updating the Generic Test Profile for executing any Test Suite.

Refer to Annex C for the requirements of EF-TEST (Table C.1) and Test Applet (Table C.2)

EF-TEST can be pre-loaded with EF deltas required for each Test Suite and this file should be included in the Generic Test Profile (in Annex A). Different records in EF-TEST can hold the EF delta (compared to the Generic Test Profile) for different Test Suites. Refer to Table C.2 for the format of data in each record in EF-TEST.

Test Case level delta can also be saved in different records in EF-TEST if preferred.

Test Applet can read data from the required record and update EFs in the Generic Test Profile. The EF update in the Generic Test Profile can be triggered by updating the record numbers to be read from EF-TEST in the first record of this file. This trigger data in record 1 can be updated in EF-TEST by using AT command or any other file update method when required. Refer to Table C.3 for the format of trigger data.

The Second record in EF-TEST can hold the EF delta required to reset the Profile back to the original Generic Test Profile at any time.

4.4 Proprietary Approach

Devices supporting CCID interface MAY execute tests by sending APDU commands through this interface.

Other interfaces MAY be available for testing purposes.

5 Requirements

5.1 Common Part of the Generic Test Profile

The Profile Header SHALL contain

- major-version,
- minor-version,
- profileType,
- eUICC-Mandatory-services,
- eUICC-Mandatory-GFSTEList and
- eUICC-Mandatory-AIDs

as defined in the Generic eUICC Test Profile package in the Annex A.1

The connectivityParameters SHALL be set to:

- For M2M Devices: The eUICC manufacturer must define connectivityParameters in accordance with SGP.02[2]
- For Consumer Devices: Field Not Present

All files defined in Annex A of this document SHALL be present according to the eUICC type.

As per section 4.3, EF-TEST with pre-loaded profile deltas SHALL be included in the Generic Test Profile if the Test Applet is used for delta updates for different test suites.

The USIM and ISIM NAAs algorithm and keys SHALL be used as defined in Annex A for USIM and ISIM.

- The CSIM NAA algorithm and keys SHALL be used as defined in Annex A for CSIM.

The RAM/RFM parameters SHALL be used as defined in the Annex A.
The Token Verification and the Receipt Generation keys SHALL not be set in the PE-MNO-SD
PIN/PUK parameters and values SHALL be used as defined in Annex A.
Access conditions (EF) SHALL be used as defined in Annex A.

5.1.1 Secure Element related parts of the Generic Test Profile

This section is For Further Study (FFS).

It will define requirements for the eSIM Test Profile which are needed for testing Secure Element based services (For example support of GSMA PRD TS.27 NFC Handset Test Book).

- Test applets and additional services will be required (For example. ARA Test Applet as defined in GlobalPlatform SEAC Device Test Suite).

5.1.2 Recommended optional configuration.

Extended logical channel supported by the eSIM

- Minimum 8 channels should be supported.

5.2 Consumer Devices Profile Metadata

The Profile Metadata (see section 4.4 of SGP.22 [2]) of the Generic Test Profile SHALL contain:

- iccid as defined in Annex A,
- serviceProviderName set to 'GSMA_TEST',
- profileName set to 'GSMA_TEST_PROFILE',
- profileClass set to ‘test’

Annex A Generic eUICC Test Profile Structure (Normative)

The Generic Test Profile contains the file tree and configuration as specified in the GSMA_TS48_eSIM_GTP_Profile_Structure_v5.xlsx

A.1 Generic eUICC Test Profile package

The Generic Test profile package can be downloaded from:

https://github.com/GSMATerminals/Generic-eUICC-Test-Profile-for-Device-Testing-Public as GSMA_TS48_eSIM_GTP_Profile_Package_v5.zip

There are 4 Test Profile files within the zip pack:

SAIP 2.3 with BER-TLV

SAIP 2.3 without BER-TLV

SAIP 2.1A without BER-TLV

SAIP 2.1B without BER-TLV

(SAIP = SIMAlliance Interoperable Profile)

Note1: The current version of the profile package is only applicable for the Consumer Devices eUICC.

Note2: Explanation of the different profiles is contained within the zip pack on GitHub

A.2 Implementation of older version of the Test Profiles

If implementing an older versions of the Test Profile e.g. v3.0 or below, you will need to ensure the following payload changes are made within your profile.

- Change minimum security from 0x06 (Ciphering + CC) to 0x02 (CC only)
- Change the OTA keys to align to 31.124 test cases

Annex B Test Keys and Certificates (Normative for Profile Download Case)

B.1 M2M

No specific configurations are defined in this version of the document.

B.2 Consumer Devices

The eUICC SHALL be configured with NIST based keys and certificates as defined in SGP.26 [10].

Annex C Test EF and Test Applet (Normative)

Table C.1 EF-TEST Requirements

Identifier: '2FFB' File Path: 3F00/2FFB	Structure: linear fixed	Optional
Record length: TBD bytes	No of Records : TBD	
Access Conditions: READ ALWAYS UPDATE ALWAYS DEACTIVATE ADM ACTIVATE ADM		

No	Requirement	Additional details
REQ_EF1	Record 1 of the file SHALL be used for triggering the EF update when required	Either Test system or tester can use this trigger when EF update in GTP is required.
REQ_EF2	Data in records > 1 SHALL be used for EF delta and follow the format specified in Table D.3	
REQ_EF3	Some records >1 SHALL be used to save the delta needed for resetting the profile back to original GTP	This can be used at any time when it is not sure of the EF update status of the Test Profile.

Table C.2 Test Applet Requirements

No	Requirement	Additional details
REQ_TA1	Test Applet SHALL use data in EF-TEST to update EFs required for test suites	
REQ_TA2	Test Applet SHALL register for the event EVENT_EXTERNAL_FILE_UPDATE (ETSI 102 241) of EF-TEST.	
REQ_TA3	Trigger command used in record 1 SHALL be a list of record numbers followed by the optional REFRESH required flag.	See the format and examples in the Table D.4.
REQ_TA4	Upon receiving the event EVENT_EXTERNAL_FILE_UPDATE Test Applet SHALL verify File Id and record # in the file update event and update necessary EFs.	
REQ_TA5	Test Applet SHALL decode the data read from a record in EF-TEST according to the Table D.3.	
REQ_TA6	If REFRESH required flag is set in the trigger command Test Applet SHALL trigger REFRESH	For example the command '2,4,0' shall trigger REFRESH after updating the files specified in records 2 and 4.

Table C.3 Format of EF update data

This data SHALL be saved in EF-TEST records with numbers > 1

	Format	Additional details
Record > 1 data format	<File Id>,<record #m>,<data to be updated>;<File Id>,<record #n>,<data to be updated>;…..	<record #> for Transparent files shall be 0 and it shall be > 0 for Linear files

Table C.4 Format for the delta update triggers and examples

This data SHALL be updated in EF-TEST record number 1

	Delta update trigger	Additional details
Trigger format	<record #n1>, <record #n2>,….,<Refresh flag>	record #n1, n2…are the record numbers in EF-TEST and it SHALL be >1.

Annex D Test Profile Loading Exceptions (Normative)

This annex details exceptions where the preloaded Profile may not meet testing requirements, has been temporarily deleted, or needs to be downloaded for other reasons.

For some test cases (For example GSMA PRD SGP.23 [6]) an empty Device (no pre-loaded profiles) might be required, or it may be that an additional Test Profile must be manually downloaded. In such cases, the Device and the eUICC have to be configured with keys and certificates as defined in Annex B.

When executing GSMA PRD SGP.23 [6] Device Terms and Conditions, the initial conditions in this PRD must be met, which requires deleting the Generic Test Profile first. After executing the SGP.23 [6] Device TCs the Generic Test Profile SHALL be installed back in the eUICC.

Annex E Specification List to which the Generic Test Profile is Compliant (Informative)

As a minimum, the Generic eSIM Test Profile defined in this PRD, supports the UICC configurations required by the test specifications listed in this Annex.

Representative testing referencing these specifications has been performed to ensure the necessary eUICC operations are in place to support the 3GPP Radio Access Technologies LTE, 3G, 2G and IMS. There may be test cases within the listed test specifications which require adaptation on the test platforms but this is considered out of scope for this PRD.

Specifications list to which the Generic Test Profile is compliant:

Reference	Specification Name
3GPP TS 34.123-1	User Equipment (UE) conformance specification; Part 1: Protocol conformance specification
3GPP TS 34.229-1	User Equipment (UE) conformance specification; Part 1: Protocol conformance specification
3GPP TS 51.010-1	Mobile Station (MS) conformance specification; Part 1: Conformance specification
3GPP TS 36.523-1	User Equipment (UE) conformance specification; Part 1: Protocol conformance specification
3GPP TS 31.121	Universal Subscriber Identity Module (USIM) application test specification
3GPP TS 31.124	Universal Subscriber Identity Module Application Toolkit (USAT) conformance test specification

Note 1: Referencing the common test environments defined by 3GPP TS 34.108 and 3GPP TS 36.508

Note 2: This is not an exhaustive list of specifications.

Annex F Document Management

F.1 Document History

Version	Date	Brief Description of Change	Approval Authority	Editor / Company
1.0	1st May 2019	New PRD TS.48	TSG#35 TG#15	Olga Kaethler / Comprion
2.0	April 2020	Adding Requirements for 5GC and V2X	TSG via email	Olga Kaethler / Comprion
3.0	August 2020	Updating the scope, adding section 5.1.2 and updating the test files to be compliant with the latest 3GPP Specification	TSG via email	Paul Gosden GSMA
4.0	June 2021	Updated with changes approved in CR1004	TSG via email ISAG email June	Paul Gosden GSMA
5.0	June 2023	Updated with changes approved in CR1005 Including changes for Rel 16	TSG#49 ISAG#	Paul Gosden GSMA

F.2 Other Information

Type	Description
Document Owner	Terminal Steering Group
Editor / Company	Olga Kaethler / Comprion

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