ETSI TS 102 695-1 V12.1.0 (2016-10)

Smart Cards;
Test specification for the Host Controller Interface (HCI);
Part 1: Terminal features
(Release 12)

Reference
RTS/SCP-00HCITvc10

Keywords
smart card, terminal

ETSI

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

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

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

Important notice

The present document can be downloaded from:
http://www.etsi.org/standards-search

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status.
Information on the current status of this and other ETSI documents is available at
https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx

If you find errors in the present document, please send your comment to one of the following services:
https://portal.etsi.org/People/CommiteeSupportStaff.aspx

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.
The content of the PDF version shall not be modified without the written authorization of ETSI.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2016.
All rights reserved.

DECT™, **PLUGTESTS**™, **UMTS**™ and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.
3GPP™ and **LTE**™ are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.
GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Contents

Intellectual Property Rights 8
Foreword 8
Modal verbs terminology 8
Introduction 9
1 Scope 10
2 References 10
2.1 Normative references 10
2.2 Informative references 11
3 Definitions, symbols and abbreviations 11
3.1 Definitions 11
3.2 Symbols 11
3.3 Abbreviations 11
3.4 Void 12
3A Formats 12
3A.1 Format of the table of optional features 12
3A.2 Format of the applicability table 13
3A.3 Status and Notations 13
3A.4 Format of the conformance requirements tables 14
4 Test environment 14
4.1 Table of optional features 14
4.2 Applicability table 15
4.3 Information to be provided by the device supplier 18
4.4 Test equipment 18
4.4.0 Base Requirements 18
4.4.1 Measurement/setting uncertainties 19
4.4.2 Default conditions for DUT operation 19
4.4.2.1 General 19
4.4.2.2 Status of UICC interfaces 19
4.4.3 Minimum/maximum conditions for DUT operation 19
4.4.4 Conventions 19
4.5 Test execution 19
4.5.1 Parameter variations 19
4.5.2 Execution requirements 20
4.6 Pass criterion 20
4.6.0 Principle 20
4.6.1 Unanticipated behaviour from the DUT 20
5 Test cases 21
5.1 HCI architecture 21
5.1.1 Overview 21
5.1.2 Hosts 21
5.1.3 Gates 21
5.1.3.1 Conformance requirements 21
5.1.3.2 Test case 1: existence of gates 21
5.1.3.2.1 Test execution 21
5.1.3.2.2 Initial conditions 21
5.1.3.2.3 Test procedure 22
5.1.3.3 Void 22
5.1.4 Pipes 22
5.1.4.1 Conformance requirements 22
5.1.4.2 Test case 1: static pipe deletion 23
5.1.4.2.1 Test execution 23
5.1.4.2.2 Initial conditions 23

5.1.4.2.3 Test procedure 23
5.1.4.3 Test case 2: initial pipe state and persistence of pipe state and registry value 23
5.1.4.3.1 Test execution 23
5.1.4.3.2 Initial conditions 23
5.1.4.3.3 Test procedure 23
5.1.5 Registries 24
5.1.5.1 Conformance requirements 24
5.1.5.2 Test case 1: registry deletion 24
5.1.5.2.1 Test execution 24
5.1.5.2.2 Initial conditions 24
5.1.5.2.3 Test procedure 25
5.2 HCP 25
5.2.1 HCP packets 25
5.2.1.1 Conformance requirements 25
5.2.2 HCP message structure 26
5.2.2.1 Conformance requirements 26
5.2.2.2 Test case 1: commands/events on pipe which is not open 26
5.2.2.2.1 Test execution 26
5.2.2.2.2 Initial conditions 26
5.2.2.2.3 Test procedure 26
5.2.3 Message fragmentation 27
5.2.3.1 Conformance requirements 27
5.3 Instructions 27
5.3.1 Commands 27
5.3.1.1 Overview 27
5.3.1.1.1 Conformance requirements 27
5.3.1.2 Generic commands 27
5.3.1.2.1 ANY_SET_PARAMETER 27
5.3.1.2.2 ANY_GET_PARAMETER 28
5.3.1.2.3 ANY_OPEN_PIPE 28
5.3.1.2.4 ANY_CLOSE_PIPE 29
5.3.1.3 Administration commands 30
5.3.1.3.1 ADM_CREATE_PIPE 30
5.3.1.3.2 ADM_NOTIFY_PIPE_CREATED 30
5.3.1.3.3 ADM_DELETE_PIPE 30
5.3.1.3.4 ADM_NOTIFY_PIPE_DELETED 30
5.3.1.3.5 ADM_CLEAR_ALL_PIPE 31
5.3.1.3.6 ADM_NOTIFY_ALL_PIPE_CLEARED 31
5.3.2 Responses 31
5.3.2.1 Conformance requirements 31
5.3.2.2 Test case 1: response to unknown command 31
5.3.2.2.1 Test execution 31
5.3.2.2.2 Initial conditions 32
5.3.2.2.3 Test procedure 32
5.3.3 Events 32
5.3.3.1 Conformance requirements 32
5.3.3.2 Test case 1: reception of unknown events 32
5.3.3.2.1 Test execution 32
5.3.3.2.2 Initial conditions 32
5.3.3.2.3 Test procedure 32
5.4 GATES and subclauses 33
5.4.1 GATES 33
5.4.1.1 Conformance requirements 33
5.4.2 Management gates 33
5.4.2.1 Administration gates 33
5.4.2.1.1 Host controller administration gate 33
5.4.2.1.2 Host administration gate 37
5.4.2.2 Link management gate 38
5.4.2.2.1 Host controller link management gate 38
5.4.2.2.2 Host link management gate 38
5.4.2.3 Identity management gate 38
5.4.2.3.1 Local registry 38

5.4.2.3.2 Remote registry 40
5.4.2.4 Loop back gate 41
5.4.2.4.1 Conformance requirements 41
5.4.3 Generic gates 41
5.5 HCI procedures 41
5.5.1 Pipe management 41
5.5.1.1 Pipe creation 41
5.5.1.1.1 Conformance requirements 41
5.5.1.2 Pipe deletion 42
5.5.1.2.1 Conformance requirements 42
5.5.1.2.2 Test case 1: valid pipe deletion from host to host controller 42
5.5.1.3 Clear all Pipes 43
5.5.1.3.1 Conformance requirements 43
5.5.1.3.2 Test case 1: identity reference data when ETSI TS 102 613 is used 43
5.5.1.3.3 Test case 2: reception of ADM_CLEAR_ALL_PIPE - static pipes, dynamic pipes to host 43
5.5.2 Registry access 44
5.5.3 Host and Gate discovery 44
5.5.4 Session initialization 44
5.5.4.1 Conformance requirements 44
5.5.4.2 Test case 1: inhibited state 45
5.5.4.2.1 Test execution 45
5.5.4.2.2 Initial conditions 45
5.5.4.2.3 Test procedure 45
5.5.4.3 Test case 2: inhibited state, followed by subsequent successful identity check 46
5.5.4.3.1 Test execution 46
5.5.4.3.2 Initial conditions 46
5.5.4.3.3 Test procedure 46
5.5.4.4 Test case 3: initialization using all defined gates 46
5.5.4.4.1 Test execution 46
5.5.4.4.2 Initial conditions 46
5.5.4.4.3 Test procedure 47
5.5.5 Loop back testing 50
5.5.5.1 Conformance requirements 50
5.5.5.2 Test case 1: processing of EVT_POST_DATA 50
5.5.5.2.1 Test execution 50
5.5.5.2.2 Initial conditions 50
5.5.5.2.3 Test procedure 50
5.6 Contactless card emulation 50
5.6.1 Overview 50
5.6.1.1 Conformance requirements 50
5.6.1.2 Test case 1: RF gate of type A 51
5.6.1.2.1 Test execution 51
5.6.1.2.2 Initial conditions 51
5.6.1.2.3 Test procedure 51
5.6.1.3 Test case 2: RF gate of type B 51
5.6.1.3.1 Test execution 51
5.6.1.3.2 Initial conditions 51
5.6.1.3.3 Test procedure 51
5.6.1.4 Test case 3: RF gate of type F 52
5.6.1.4.1 Test execution 52
5.6.1.4.2 Initial conditions 52
5.6.1.4.3 Test procedure 52
5.6.2 Void 53
5.6.3 Gates 53
5.6.3.1 Void 53
5.6.3.2 Identity management gate 53
5.6.3.2.1 Conformance requirements 53
5.6.3.3 Card RF gates 53
5.6.3.3.1 Overview 53
5.6.3.3.2 Commands 53
5.6.3.3.3 Events and subclauses 53
5.6.3.3.4 Registry and subclauses 54

5.6.3.4 Card application gates 64
5.6.3.4.1 Overview 64
5.6.3.4.2 Commands 64
5.6.3.4.3 Events and subclauses 64
5.6.3.4.4 Registry 65
5.6.4 Procedures 65
5.6.4.1 Use of contactless card application 65
5.6.4.1.1 Conformance requirements 65
5.6.4.1.2 Test case 1: ISO/IEC 14443-3 Type A 66
5.6.4.1.3 Test case 2: ISO/IEC 14443-3 Type B 67
5.6.4.1.4 Test case 3: Routing EVT_FIELD_ON and EVT_FIELD_OFF to RF Gate with lowest G_{ID} 68
5.6.4.1.5 Test case 4: ISO/IEC 14443-3 Type A 69
5.6.4.1.6 Test case 5: ISO/IEC 14443-3 Type B 70
5.6.4.1.7 Test case 6: Routing HCI events to RF Gate with MODE parameter enabled only - single card RF Gate 71
5.6.4.1.8 Test case 7: Routing HCI events to RF Gate with MODE parameter enabled only - multiple card RF Gates 72
5.6.4.2 Non ISO/IEC 14443-4 type A applications 73
5.6.4.2.1 Conformance requirements 73
5.6.4.2.2 Test case 1: Non ISO/IEC 14443-4 type A 73
5.6.4.2.3 Test case 2: Routing EVT_FIELD_ON and EVT_FIELD_OFF to RF Gate with lowest G_{ID} 74
5.6.4.3 Type B' RF technology 75
5.6.4.3.1 Conformance requirements 75
5.6.4.4 Type F RF technology 75
5.6.4.4.1 Conformance requirements 75
5.6.4.4.2 Test case 1: ISO/IEC 18092 Type F 76
5.6.4.4.3 Test case 2: RF off during ISO/IEC 18092 Type F commands handling 77
5.6.4.4.4 Test case 3: Routing EVT_FIELD_ON and EVT_FIELD_OFF to RF Gate with lowest G_{ID} 79
5.6.4.5 Update RF technology settings 80
5.6.4.5.1 Conformance requirements 80
5.6.4.6 Identity check 80
5.6.4.6.1 Conformance requirements 80
5.7 Contactless reader 81
5.7.1 Overview 81
5.7.1.1 Conformance requirements 81
5.7.2 Reader RF gates 81
5.7.2.1 Overview 81
5.7.2.2 Command 81
5.7.2.2.1 WR_XCHG_DATA 81
5.7.2.3 Registries 82
5.7.2.3.1 Type A reader RF gate 82
5.7.2.3.2 Type B reader RF gate 85
5.7.2.4 Events and subclauses 88
5.7.2.4.1 Events 88
5.7.2.4.2 EVT_READER_REQUESTED 88
5.7.2.4.3 EVT_END_OPERATION 88
5.7.2.4.4 EVT_READER_STATUS 89
5.7.2.5 Responses 89
5.7.2.5.1 Conformance requirements 89
5.7.3 Reader application gates 89
5.7.3.1 Overview 89
5.7.3.2 Command 89
5.7.3.2.1 Conformance requirements 89
5.7.3.3 Registry 90
5.7.3.3.1 Conformance requirements 90
5.7.3.4 Events and subclauses 90
5.7.3.4.1 Events 90
5.7.3.4.2 EVT_TARGET_DISCOVERED 90
5.7.4 Procedures 90
5.7.4.1 Use of contactless reader application 90
5.7.4.1.1 Conformance requirements 90
5.7.4.2 Contactless reader not available 91

5.7.4.2.1 Conformance requirements....91
5.7.4.3 Error management....91
5.7.4.3.1 Conformance requirements....91
5.8 Connectivity....91
5.8.1 Overview....91
5.8.2 Connectivity gate and subclauses....91
5.8.2.1 Connectivity gate....91
5.8.2.2 Commands....92
5.8.2.2.1 PRO_HOST_REQUEST....92
5.8.2.3 Events and subclauses....92
5.8.2.3.1 Events....92
5.8.2.3.2 EVT_CONNECTIVITY....92
5.8.2.3.3 Void....92
5.8.2.3.4 EVT_OPERATION_ENDED....92
5.8.2.3.5 EVT_TRANSACTION....93
5.8.2.4 Registry....93
5.8.2.4.1 Conformance requirements....93
5.8.3 Connectivity application gate and subclauses....94
5.8.3.1 Connectivity application gate....94
5.8.3.1.1 Conformance requirements....94
5.8.3.2 Commands....94
5.8.3.2.1 Conformance requirements....94
5.8.3.3 Events and subclauses....94
5.8.3.3.1 Events....94
5.8.3.3.2 EVT_STANDBY....94
5.8.3.4 Registry....94
5.8.3.4.1 Conformance requirements....94
5.8.4 Procedures....94
5.8.4.1 Use of connectivity gate....94
5.9 APDU Transport....95
5.9.1 Server APDU host (APDU gate)....95
5.9.1.1 General....95
5.9.1.1.1 Conformance requirements....95
5.9.1.2 Commands....95
5.9.1.3 Events....95
5.9.1.3.1 Conformance requirements....95
5.9.1.4 Registry....96
5.9.1.4.1 Conformance requirements....96
5.9.1.5 State diagram for the APDU gate....96
5.9.1.5.1 Conformance requirements....96
5.9.2 Client APDU host (APDU application gate)....96
5.9.2.1 General....96
5.9.2.1.1 Conformance requirements....96
5.9.2.2 Commands....96
5.9.2.3 Events....97
5.9.2.3.1 Conformance requirements....97
5.9.2.4 Registry....97
5.9.2.5 State diagram for the APDU gate....97
5.9.2.5.1 Conformance requirements....97

Annex A (informative): Bibliography....98

Annex B (informative): Core specification version information....99

Annex C (informative): Change history....100

History....102

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (https://ipr.etsi.org/).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Smart Card Platform (SCP).

The contents of the present document are subject to continuing work within TC SCP and may change following formal TC SCP approval. If TC SCP modifies the contents of the present document, it will then be republished by ETSI with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

0 early working draft;

1 presented to TC SCP for information;

2 presented to TC SCP for approval;

3 or greater indicates TC SCP approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

The present document is part 1 of a multi-part deliverable covering the Test specification for the Host Controller Interface (HCI), as identified below:

Part 1: "Terminal features";

Part 2: "UICC features";

Part 3: "Host Controller features".

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Introduction

The present document defines test cases for the terminal relating to the Host Controller Interface (HCI) as specified in ETSI TS 102 622 [1].

The aim of the present document is to ensure interoperability between the terminal and the UICC independently of the respective manufacturer, card issuer or operator.

1 Scope

The present document covers the minimum characteristics which are considered necessary for the terminal in order to provide compliance to ETSI TS 102 622 [1].

The present document specifies the test cases for:

- the HCI core as described in the first part of ETSI TS 102 622 [1];
- the contactless platform as described in the second part of ETSI TS 102 622 [1].

Test cases for the UICC relating to ETSI TS 102 622 [1] and test cases for the Single Wire Protocol (SWP) covering both terminal and UICC are out of scope of the present document.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

- 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.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

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

[1] ETSI TS 102 622: "Smart Cards; UICC - Contactless Front-end (CLF) Interface; Host Controller Interface (HCI)".

[2] ETSI TS 102 613: "Smart Cards; UICC - Contactless Front-end (CLF) Interface; Part 1: Physical and data link layer characteristics".

[3] ETSI TS 102 223: "Smart Cards; Card Application Toolkit (CAT)".

[4] ISO/IEC 18092: "Information technology - Telecommunications and information exchange between systems - Near Field Communication - Interface and Protocol (NFCIP-1)".

[5] ISO/IEC 14443-2: "Identification cards - Contactless integrated circuit(s) cards - Proximity cards - Part 2: Radio frequency power and signal interface".

[6] ISO/IEC 14443-3: "Identification cards - Contactless integrated circuit(s) cards - Proximity cards - Part 3: Initialization and anticollision".

[7] ISO/IEC 14443-4: "Identification cards - Contactless integrated circuit(s) cards - Proximity cards - Part 4: Transmission Protocol".

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

[9] ISO/IEC 9646-7: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 7: Implementation Conformance Statements".

[10] ETSI TS 102 695-3: "Smart Cards; Test specification for the Host Controller Interface (HCI); Part 3: Host Controller features".